# 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

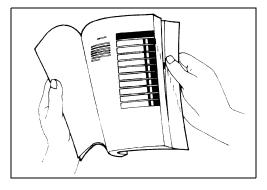
Improper repair may result in injury to the mechanic and may render the motorcycle unsafe for the rider and passenger.

#### **SUZUKI MOTOR CORPORATION**

# **GROUP INDEX** GENERAL INFORMATION PERIODIC MAINTENANCE **ENGINE** FI SYSTEM DIAGNOSIS FUEL SYSTEM AND THROTTLE **BODY EXHAUST SYSTEM** COOLING AND LUBRICATION SYSTEM CHASSIS ELECTRICAL SYSTEM 10 SERVICING INFORMATION EMISSION CONTROL INFORMATION WIRING DIAGRAM

# 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.



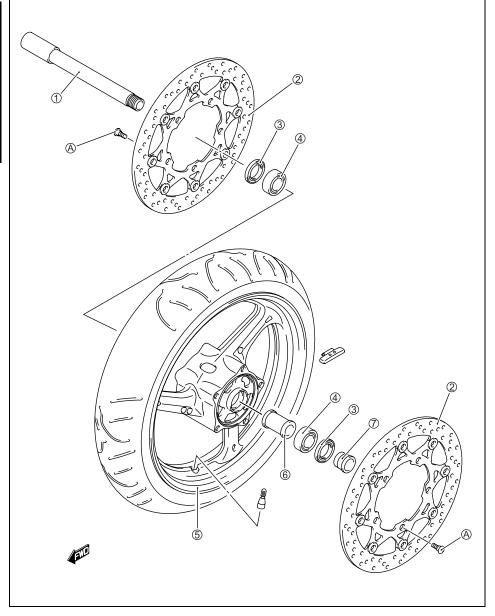
#### COMPONENT PARTS AND WORK TO BE DONE

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
<b>⑤</b>	Front wheel
6	Spacer
7	Collar
A	Brake disc bolt

O						
ITEM	N∙m	kgf-m				
1	100	10.0				
A	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
U	Torque control required. Data beside it indicates specified torque.	1360	Apply THREAD LOCK SUPER "1360". 99000-32130
	Apply oil. Use engine oil unless otherwise specified.	LLC	Use engine coolant. 99000-99032-11X
M/O	Apply molybdenum oil solution. (Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1:1)	FORK	Use fork oil. 99000-99044-10G
FAH	Apply SUZUKI SUPER GREASE "A" or equivalent grease. 99000-25010	BF	Apply or use brake fluid.
₹MH	Apply SUZUKI MOLY PASTE. 99000-25140	V	Measure in voltage range.
FSH	Apply SUZUKI SILICONE GREASE. 99000-25100	A	Measure in current range.
1215	Apply SUZUKI BOND "1215" or equivalent bond. 99000-31110	Ω	Measure in resistance range.
1207B	Apply SUZUKI BOND "1207B" 99000-31140		Measure in diode test range.
1303	Apply THREAD LOCK SUPER "1303". 99000-32030	(10))) (10)	Measure in continuity test range.
1322	Apply THREAD LOCK SUPER "1322" or equivalent thread lock. 99000-32110	TOOL	Use special tool.
1342	Apply THREAD LOCK "1342". 99000-32050	DATA	Indication of service data.

# ABBREVIATIONS USED IN THIS MANUAL

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

В

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

Ε

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

Н

HC: Hydrocarbons

HO2 Sensor : Heated Oxygen Sensor

ı

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

Ν

NOX : Nitrogen Oxides

0

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)

Т

TO Sensor : Tip Over Sensor (TOS)

TP Sensor : Throttle Position Sensor (TPS)

#### **WIRE COLOR**

Y/W

: Yellow with White tracer

В : Black G : Green Р : Pink ВΙ : Blue Gr : Gray R : Red : White Br : Brown Lbl : Light blue W : Dark green : Light green : Yellow Dg Lg Υ

Dgr : Dark gray O : Orange

B/BI : Black with Blue tracer B/Br : Black with Brown tracer B/G : Black with Green tracer B/Lq : Black with Light green tracer B/R : Black with Red tracer : Black with White tracer B/W B/Y : Black with Yellow tracer BI/B : Blue with Black tracer BI/G : Blue with Green tracer BI/R : Blue with Red tracer BI/W : Blue with White tracer BI/Y : Blue with Yellow tracer Br/Y : Brown with Yellow tracer G/B : Green with Black tracer G/BI · 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 : Light green with Blue tracer Lg/BI Lg/G : Light green with Green tracer Lg/W: Light green with White tracer O/B : Orange with Black tracer O/BI : 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 R/B : Red with Black tracer : Pink with White tracer R/BI : Red with Blue tracer R/Y : Red with Yellow tracer R/W : Red with White tracer W/B : White with Black tracer W/BI : White with Blue tracer W/G : White with Green tracer : White with Yellow tracer W/R : White with Red tracer W/Y Y/B : Yellow with Black tracer Y/BI : Yellow with Blue tracer Y/G : Yellow with Green tracer Y/R : Yellow with Red tracer

# **GENERAL INFORMATION**

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# **COUNTRY AND AREA CODES**

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

MODEL	CODE	COUNTRY or AREA	EFECTIVE FRAME NO.
	E-02	U.K.	JS1B9111100 100001 -
GSR600	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 WARN-INGS 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

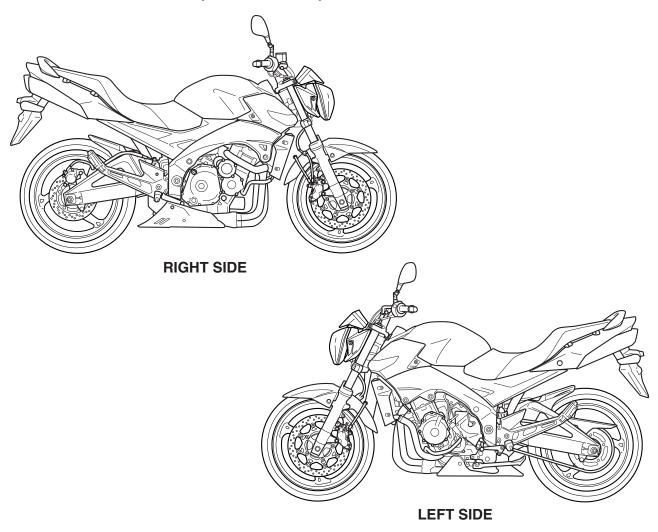
#### **▲** WARNING

- \* 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 out-
- \* When working with toxic or flammable materials, make sure that the area you work in is wellventilated 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)**



• 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.





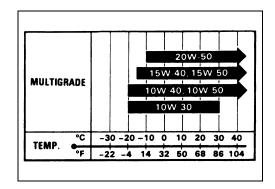
# FUEL, OIL AND ENGINE COOLANT RECOMMENDATION **FUEL**

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 1 600 km: Below 10 500 r/min Up to 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

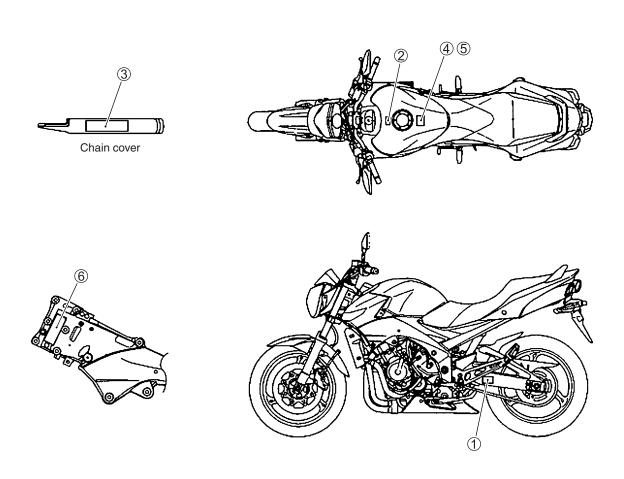
The four cylinders of this engine are identified as No.1, No.2, No.3 and No.4 cylinder, as counted from left to right (as viewed by the rider on the seat.)



# **INFORMATION LABELS**

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

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 <sup>3</sup>
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**

OTAGGIG	
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
miniosines in a locate in give minimum	
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
Oolan	4.0 L

These specifications are subject to change without notice.

# PERIODIC MAINTENANCE

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# PERIODIC MAINTENANCE SCHEDULE

The chart below lists the recommended intervals for all the required periodic service work necessary to keep the 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

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

#### NOTE:

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

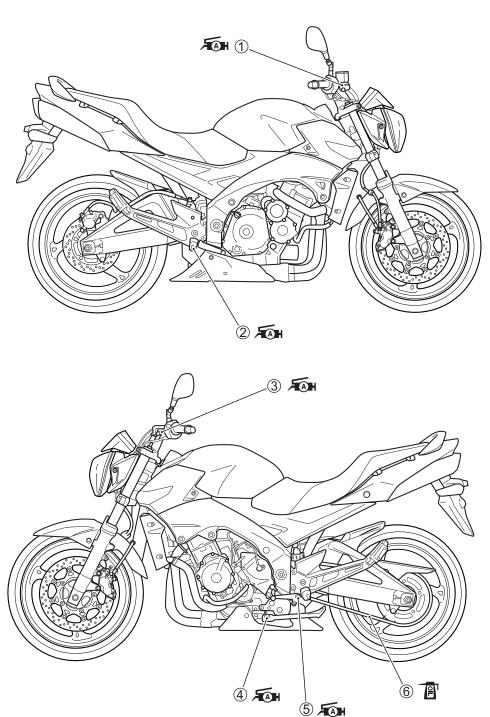
R = Replace

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
	and footrest pivot
3	Clutch lever holder
4	Side-stand pivot and spring hook
	and spring hook
<b>⑤</b>	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.



• 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.

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.

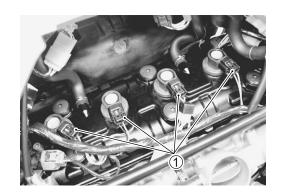
	Hot type	Standard	Cold type					
NGK	CR8E	CR9E	CR10E					
ND	U24ESR-N	U27ESR-N	U31ESR-N					

#### 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.

Spark plug gap:

Standard: 0.7 - 0.8 mm

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.



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

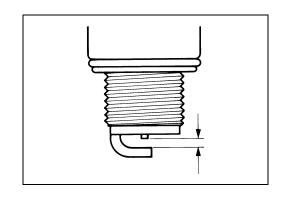
• Screw the spark plugs into the cylinder head with fingers, and then tighten them to the specified torque.

Spark plug: 11 N·m (1.1 kgf-m)

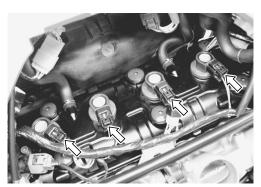
#### **CAUTION**

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.

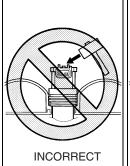


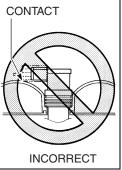




#### CAUTION

- \* 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**

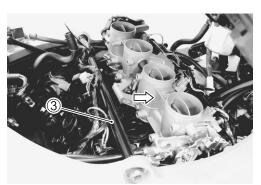
#### Inspect every 24 000 km (48 months).

- 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)



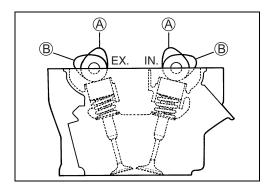
The valve clearance specification is different for intake and exhaust valves. Valve clearance must be checked and adjusted, 1) at the time of periodic inspection, 2) when the valve mechanism is serviced, and 3) when the camshafts are removed for servicing.

#### **DATA** Valve clearance (when cold):

Standard: IN.: 0.10 - 0.20 mm EX.: 0.20 - 0.30 mm

#### NOTE:

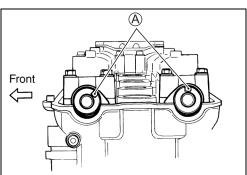
- \* The cam must be at positions, (A) or (B), when checking or adjusting the valve clearance. Clearance readings should not be taken with the cam in any other position than these two positions.
- \* The clearance specification is for COLD state.
- \* To turn the crankshaft for clearance checking, be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



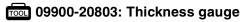
• Remove the valve timing inspection plug ①.

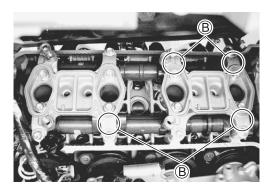
• Turn the crankshaft to bring the "Top" line on the starter clutch to the index mark and also to bring the notches (A) on the left ends of both camshafts (Ex. and In.) to the positions as shown.





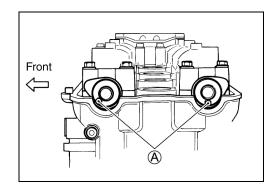
- In this condition, read the valve clearance at the valves (B) (In. and Ex. of No.4 cylinder, Ex. of No.3 and In. of No.2).
- If the clearance is out of specification, adjust the clearance. ( 2-9)

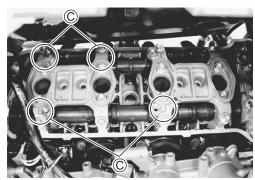




- Turn the crankshaft 360 degrees (one rotation) to bring the "TOP" line on the starter clutch to the index mark of valve timing inspection hole and also to bring the notches A to the position as shown.
- Read the clearance at the rest of the valves © and adjust the clearance if necessary. ( below)

Cam position	Notch (A) position									
Cam position	Exhaust Camshaft	Intake Camshaft								
<b>B</b>	← Front 🕝	← Front 💍								
©	← Front ۞	← Front 🔘								





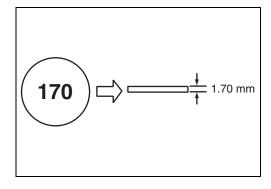
#### **VALVE CLEARANCE ADJUSTMENT**

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

- Remove the intake or exhaust camshafts. (23-15)
- 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:

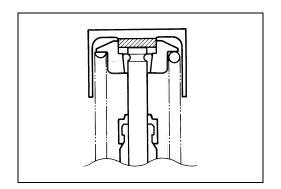
- \* Be sure to apply engine oil to tappet shim top and bottom faces.
- \* When seating the tappet shim, be sure the figure printed surface faces the tappet.

#### 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 (5-5-19)





1.80 mm

Shim size to be used

Present shim size

## (INTAKE SIDE)

TAPPET SHIM SET (12800-05830)

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

Match clearance in vertical column with present shim size in horizontal 2.15 2.10 2.20 220 2.10 2.05 2.15 2.20 215 2.10 2.15 2.20 2.05 2.10 2.00 210 Measure valve clearance. "ENGINE IS COLD" 1.95 2.00 2.05 2.15 2.20 205 1.95 2.00 1.90 2.20 200 0.23 mm 1.70 mm 2.00 2.05 2.10 1.85 1.90 1.60 1.65 1.70 1.75 1.80 1.85 1.90 1.95 2.00 2.05 2.05 | 2.10 | 2.15 1.95 195 1.75 1.80 2.10 2.15 Measure present shim size. 1.80 1.85 2.20 190 1.90 SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED HOW TO USE THIS CHART: 2.15 2.20 1.85 185 **EXAMPLE** Valve clearance is 1.70 1.90 1.95 1.95 2.00 1.95 2.00 2.05 1.70 | 1.75 2.00 2.05 2.10 2.10 2.15 180 1.80 1.65 1.75 2.10 2.15 175 1.60 1.70 1.75 1.80 1.85 1.90 1.65 2.05 2.15 1.70 170 1.95 2.00 2.05 1.80 | 1.85 | 1.90 2.00 | 2.05 | 2.10 1.45 | 1.50 | 1.55 1.50 1.55 1.60 1.75 1.80 1.85 1.90 | 1.95 1.90 | 1.95 | 2.00 2.10 2.15 165 1.65 2.10 2.15 1.60 160 2.05 1.85 2.15 2.20 1.55 155 2.00 1.40 1.45 1.65 1.70 1.75 1.90 1.95 2.00 2.05 2.05 2.10 1.80 1.85 2.10 2.15 1.50 150 2.10 2.15 2.20 1.60 1.70 1.80 1.95 1.65 1.85 1.90 1.45 1.35 1.40 1.55 1.75 145 1.55 1.65 1.80 2.00 2.05 1.30 1.50 1.60 1.75 1.90 1.95 2.15 1.40 1.35 1.70 1.85 2.20 140 1.80 1.25 1.30 1.65 1.70 1.75 1.85 | 1.90 1.90 1.95 1.95 2.00 1.40 | 1.45 1.45 1.50 1.50 | 1.55 1.55 | 1.60 1.65 | 1.70 1.80 1.85 2.00 2.05 2.05 | 2.10 2.05 2.10 2.15 1.35 135 2.10 2.15 2.20 1.75 1.20 1.60 1.25 1.30 130 2.15 1.40 1.85 1.90 2.00 1.75 1.80 1.95 1.35 1.45 1.50 1.55 1.60 1.65 1.70 2.20 1.20 1.25 125 2.10 2.15 1.30 1.35 1.40 1.60 1.65 1.70 1.75 1.80 1.85 1.95 2.00 2.05 1.20 1.45 1.50 1.55 1.90 120 PRESENT SHIM SIZE (mm) SUFFIX NO. 1.06 - 1.100.21 - 0.250.31 - 0.350.51 - 0.550.56 - 0.600.61 - 0.650.66 - 0.700.71 - 0.750.76 - 0.800.81 - 0.850.86 - 0.901.01 - 1.051.11 - 1.150.05 - 0.090.26 - 0.300.36 - 0.400.41 - 0.450.46 - 0.500.91 - 0.950.96 - 1.000.00 - 0.040.10 - 0.20MEASURED VALVE CLEARANCE (mm)

TAPPET SHIM SET (12800-05830)

# (EXHAUST SIDE)

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

		10	_	10																			Match clearance in Vertical column With present shim size in nonzontal		
220	2.20	2.05	2.10	2.15		L	ı															.!	e III		
215	2.15	2.00	2.05	2.10		2.20																	IIII SIZ		
210	2.10	1.95	2.00	2.05		2.20																1	าน ราน		
205	2.05	1.90	1.95	2.00		2.15	2.20														SOLD		brese		
200	2.00	1.85	1.90	1.95		2.10	2.15	2.20													E IS	11	MIN C		
195	1.95	1.80	1.85	1.90		2.05	2.10	2.15	2.20												Z S Z		olumi		0.33 mm 1.70 mm 1.80 mm
190	1.90	1.75	1.80	1.85		2.00	2.05	2.10	2.15	2.20										ij E	Э. •	size.	ılcal c		
185	1.85	1.70	1.75	1.80	EQUIR	1.95	2.00	2.05	2.10	2.15	2.20									CHAF	earan	shim	In ver	Ш	s sed
180	1.80	1.65	1.70	1.75	IENT R	1.90	1.95	2.00	2.05	2.10	2.15	2.20								SIL.	alve cl	resen	rance	FXAMPI F	ance im siz o be u
175	1.75	1.60	1.65	1.70	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20							HOW TO USE THIS CHART:	Measure valve clearance. "ENGINE IS COLD"	Measure present shim size	n clea	. X	Valve clearance is Present shim size Shim size to be used
170	1.70	1.55	1.60	1.65	NO AL	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20						ω Σ	Meas	Meas	Matc		Valve Prese Shim
165	1.65	1.50	1.55	1.60	RANCE	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20					오.	- :	= =	≝		
160	1.60	1.45	1.50	1.55	CLEA	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20									
155	1.55	1.40	1.45	1.50	CIFIED	1.65	1.70	1.75	1.80	1.85	1.90	1.95	2.00	2.05	2.10	2.15	2.20								
150	1.50	1.35	1.40	1.45	SPE	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							
145	1.45	1.30	1.35	1.40		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						
140	1.40	1.25	1.30	1.35		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					
135	1.35	1.20	1.25	1.30		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				
130	1.30		1.20	1.25		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			
125	1.25		7	1.20		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		
120	1.20			/		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	
	MEASURED PRESENT CLEARANCE SHIM SIZE (mm)	0.05 – 0.09	0.10 – 0.14	0.15 – 0.19	0.20 - 0.30	0.31 – 0.35	0.36 – 0.40	0.41 - 0.45	0.46 - 0.50	0.51 – 0.55	0.56 – 0.60	0.61 – 0.65	0.66 – 0.70	0.71 – 0.75	0.76 – 0.80	0.81 – 0.85	0.86 – 0.90	0.91 – 0.95	0.96 - 1.00	1.01 – 1.05	1.06 – 1.10	1.11 – 1.15	1.16 – 1.20	1.21 – 1.25	

#### **ENGINE OIL AND OIL FILTER**

#### (ENGINE OIL)

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

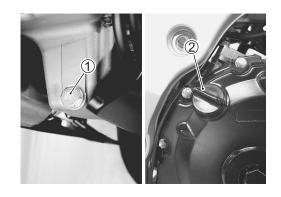
#### (OIL FILTER)

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.

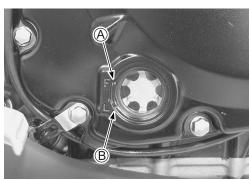
Oil drain plug: 23 N·m (2.3 kgf-m)





- · 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 (B), add oil to full line (A). If the level is above full line, drain oil to full line.

A: Full line **B**: 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.

#### 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.

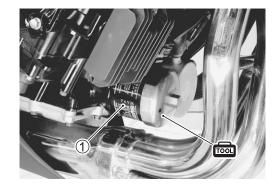
#### DATA NECESSARY AMOUNT OF ENGINE OIL:

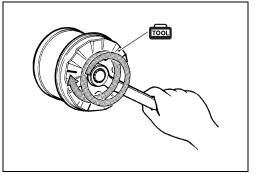
Oil change : 3.2 L Oil and filter change : 3.6 L **Engine overhaul** : 3.9 L

#### 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

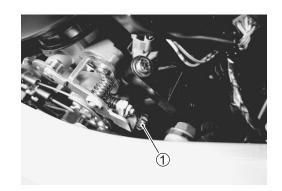
Inspect initially at 1 000 km (2 months) and every 6 000 km (12 months) thereafter.

#### 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.

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.

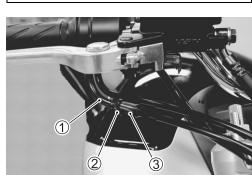
Adjust the throttle cable play (A) as follows.

- 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) A is between 2.0 – 4.0 mm.
- Tighten the lock-nut ② while holding the adjuster ③.

Throttle cable play (A): 2.0 – 4.0 mm

#### **▲** WARNING

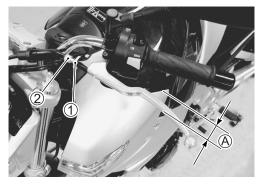
After the adjustment is completed, check that handlebar movement does not raise the engine idle speed and that the throttle grip returns smoothly and automatically.



## **CLUTCH**

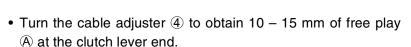
#### Inspect every 6 000 km (12 months).

- 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.



• Tighten the lock-nut 3 and 1.

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

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



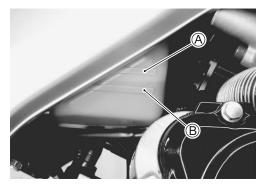


#### COOLING SYSTEM

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.
  - A Full line **B** 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.

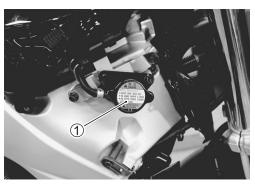
#### **▲** WARNING

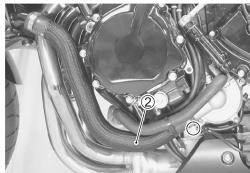
- \* Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.
- \* Engine coolant may be harmful if swallowed or if it comes in contact with skin or eyes. If engine coolant gets into the eyes or in contact with the skin, flush thoroughly with plenty 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.

#### Engine coolant capacity (total): 2 800 ml

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

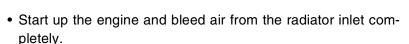
#### **ENGINE COOLANT INFORMATION (** 7-2)





#### 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.



- 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**

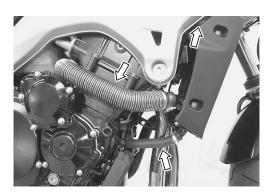
Repeat the above procedure several times and make sure that the radiator is filled with engine coolant up to the reservoir full level.

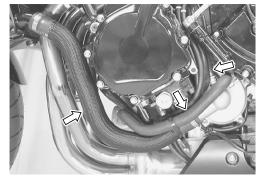
#### **RADIATOR HOSES**

- · 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

\* Excessive wear

\* Damaged rollers

\* Improper chain adjustment

\* Dry or rusted links

\* Missing O-ring seals

\* Kinked or binding links

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

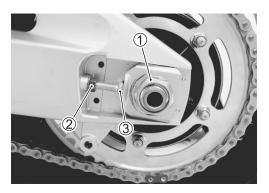
#### NOTE:

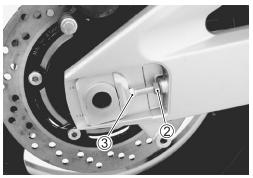
When replacing the drive chain, replace the drive chain and sprockets as a set.



#### **CHECKING**

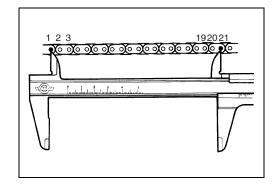
- Loosen the axle nut 1.
- Loosen the chain adjuster lock-nuts 2.
- Give tension to the drive chain fully by turning both chain adjuster bolts 3.





 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.

### 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 (A) on both sides of the swingarm must be equal to ensure that the front and rear wheels are correctly aligned.

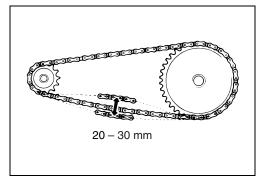
### DAVA Drive chain slack:

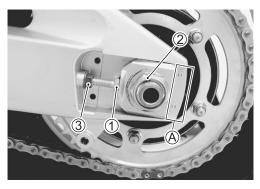
Standard: 20 - 30 mm

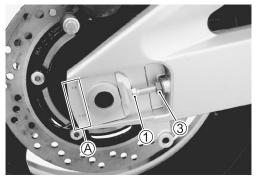
- Place the motorcycle on its side-stand for accurate adjustment
- After adjusting the drive chain, tighten the axle nut ② to the specified torque.
- Tighten both chain adjuster lock-nuts ③ securely.

## 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.





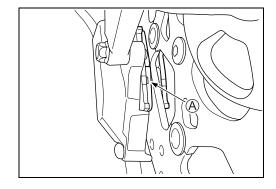
### **BRAKE PADS**

### Front brake

The extent of brake pad wear can be checked by observing the grooved limit line A on the pad. When the wear exceeds the grooved limit line, replace the pads with new ones. (\$\sumset\$8-54)

### CAUTION

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

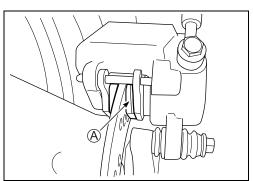


### Rear brake

The extent of brake pad wear can be checked by observing the limit line (A) on the pad. When the wear exceeds the limit line, replace the pads with new ones. ( 8-65)

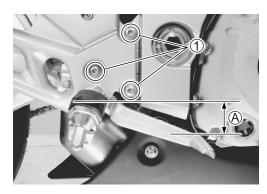
### CAUTION

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

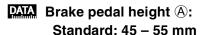


### **BRAKE PEDAL HEIGHT**

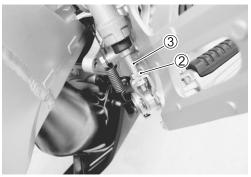
• Remove the front footrest bracket bolts ①.



- Loosen the lock-nut 2.
- Turn the push rod ③ until the brake pedal height A 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.

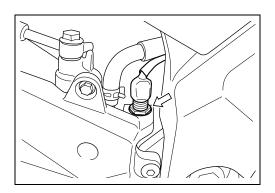


Rear brake master cylinder rod lock-nut: 18 N·m (1.8 kgf-m) Front footrest bracket bolt: 23 N·m (2.3 kgf-m)



### **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.

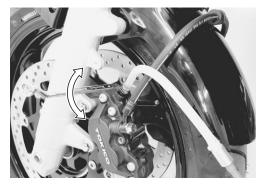
 Close the air bleeder valve and disconnect the hose. Fill the reservoir with brake fluid to the top of the inspection window.

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.

09900-20805: Tire depth gauge

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/cm<sup>2</sup>)

Dual riding: Front: 250 kPa (2.50 kgf/cm²)

Rear: 290 kPa (2.90 kgf/cm<sup>2</sup>)

### 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.

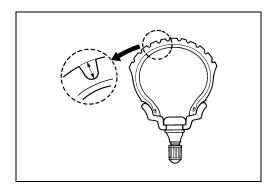
### DATA TIRE TYPE

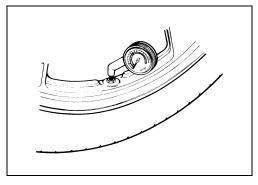
BRIDGESTONE (Front: BT014F SN, Rear: BT014R N)

### **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. ( 38-14)



### **REAR SUSPENSION**

Inspect every 12 000 km (24 months).

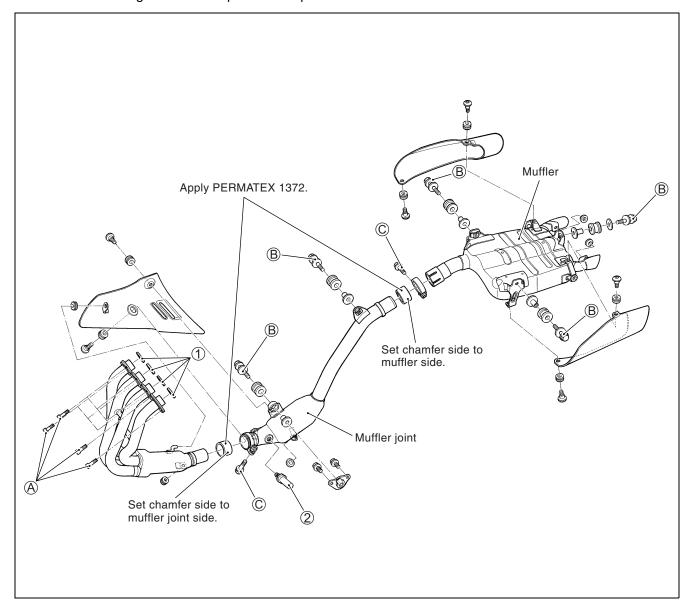
Inspect the rear shock absorbers for oil leakage and check that there is no play in the swingarm. Replace any defective parts if necessary. ( \$\tilde{\t



### **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	$^{\odot}$	Muffler mounting bolt
2	HO2 sensor	$\odot$	Muffler connecting bolt
$\bigcirc$	Exhaust pipe bolt		

ITEM	N⋅m	kgf-m
2	48	4.8
ABC	23	2.3

### CAUTION

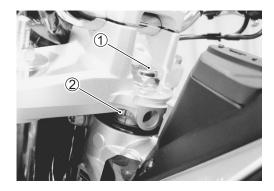
Replace the gaskets and connectors with new ones.

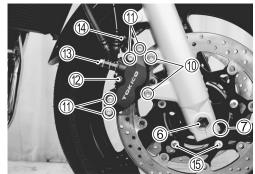
## **CHASSIS BOLTS AND NUTS**

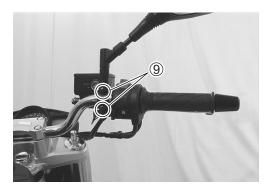
Tighten initially at 1 000 km (2 months) and every 6 000 km (12 months) thereafter.

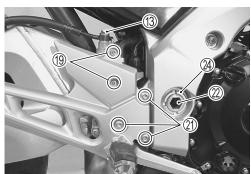
Check that all chassis bolts and nuts are tightened to their specified torque. (Refer to page 2-30 for the locations of the following nuts and bolts on the motorcycle.)

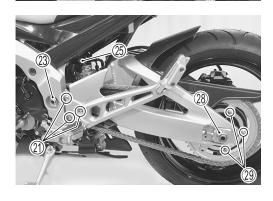
Item	N⋅m	kgf-m
① Steering stem head nut	90	9.0
② Steering stem lock-nut	80	8.0
③ Front fork upper clamp bolt	23	2.3
④ Front fork lower clamp bolt	23	2.3
⑤ Front fork cap bolt	23	2.3
6 Front axle	100	10.0
Tront axle pinch bolt	23	2.3
8 Handlebar clamp bolt	23	2.3
Front brake master cylinder mounting bolt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

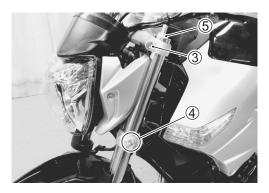


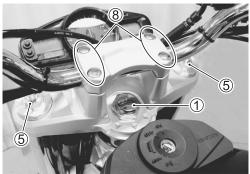


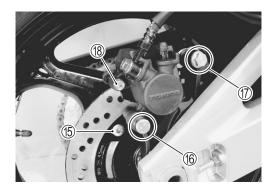


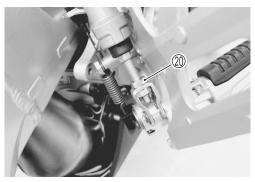


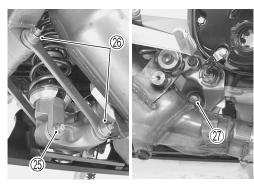












### COMPRESSION PRESSURE CHECK

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	900 kPa	200 kPa
(11 – 15 kgf/cm²)	(9 kgf/cm²)	(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/cm<sup>2</sup>) 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. (\$\sum\_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.

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.

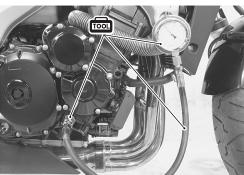
09915-74521: Oil pressure gauge hose

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.

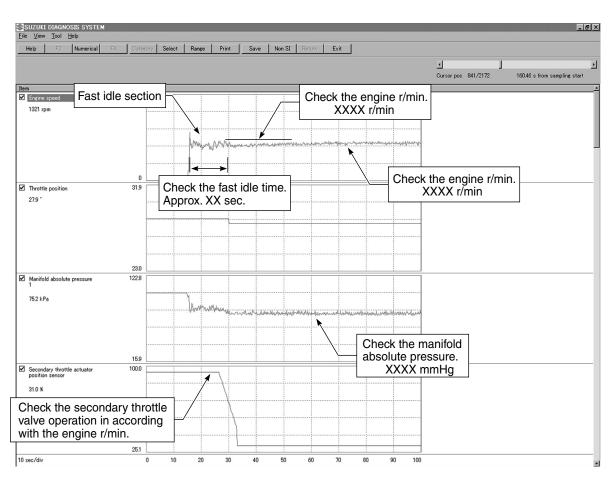
- Remove the left frame cover. ( 8-4)
- Set up the SDS tools. ( 4-46)

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

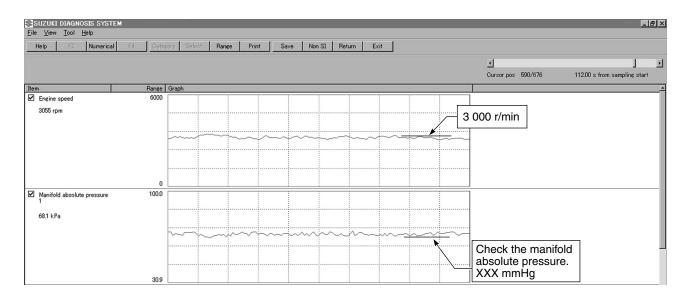
### NOTE:

- \* 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.

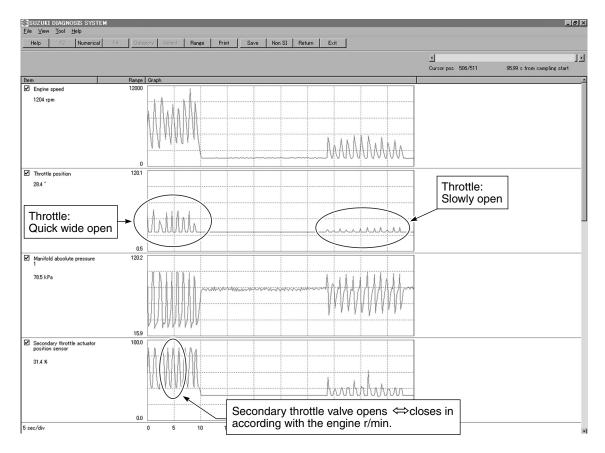
# SAMPLE: Data sampled from cold starting through warm-up



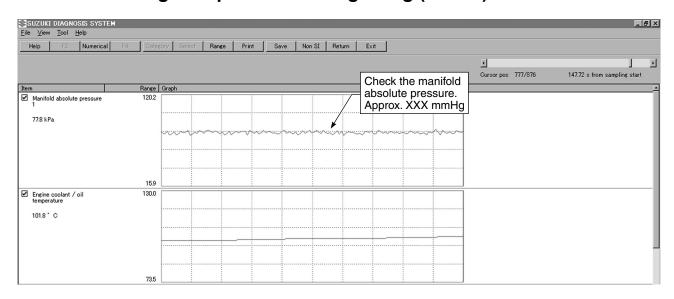
### Data at 3 000 r/min under no load



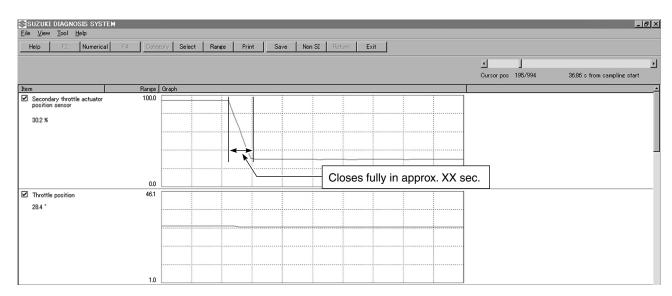
## Data at the time of racing



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



## Data of secondary throttle valve operation at the time of starting



## ENGINE

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## **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	<b>∷</b> ₹3-17	<b>∷</b> ₹3-100
Starter motor	<b>∷</b> ₹3-14	<b>∑</b> 79-14	<b>∷</b> ₹3-101
Crankcase breather cover	₩3-23		<b>∷</b> ₹3-79
Thermostat	<b>∷</b> ₹3-16	<b>∑</b> ₹7-9	<b>∷</b> ₹3-93
Cylinder head cover	<b>∷</b> ₹3-14	<b>∷</b> ₹3-27	<b>∷</b> ₹3-100
Camshaft	<b>∷</b> ₹3-16	<b>∷</b> ₹3-28	<b>∷</b> ₹3-93
Intake pipe	<b>□</b> 3-39		<b>∷</b> ₹3-39
Oil filter	<b>∷</b> ₹3-23		<b>∷</b> ₹3-78
Oil cooler	<b>□</b> 3-23	-	<b>∷</b> ₹3-78
Oil pan	₩3-23	-	<b>∷</b> ₹3-78

### **ENGINE RIGHT SIDE**

ITEM	REMOVAL	INSPECTION	REINSTALLATION
Exhaust pipe and muffler joint	<b>73-5</b>	<b>∷</b> ₹6-2	<b>∷</b> ₹3-13
Cam chain tension adjuster	<b>∷</b> ₹3-15	₩3-30	<b>∷</b> ₹3-97
Clutch cover	<b>∑</b> ₹3-17		<b>∷</b> ₹3-91
Clutch (plates)	<b>∑</b> 3-17	₩3-40	<b>∷</b> ₹3-90
Primary driven gear	<b>∑</b> ₹3-18	₩3-41	<b>∷</b> ₹3-88
Oil pump	<b>73-19</b>	₩3-41	<b>∑</b> 3-87
Gearshift shaft	<b>73-19</b>	₩3-43	<b>∷</b> ₹3-85
Starter idle gear cover	<b>3-20</b>		<b>∷</b> ₹3-85
Starter idle gear	<b>73-20</b>		<b>∷</b> ₹3-84
Starter clutch cover	∑₹3-21		∑₹3-84
Starter clutch	∑₹3-21	₩3-41	∑₹3-84
CKP sensor	<b>∷</b> ₹3-21	<b>□₹4-34</b>	<b>∷</b> ₹3-82
Oil pump driven gear	∑₹3-19		<b>∷</b> ₹3-87
Cam chain tensioner	<b>∷</b> ₹3-21	<b>∷</b> ₹3-31	<b>∷</b> ₹3-83
Cam chain guide	∑₹3-21	<b>∷</b> ₹3-31	<b>∷</b> ₹3-83

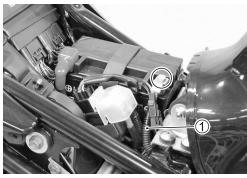
### **ENGINE LEFT SIDE**

ITEM	REMOVAL	INSPECTION	REINSTALLATION
Engine sprocket	₩3-8		∑₹3-12
Gear position switch	₩3-23	<b>∑</b> 74-72	<b>∑</b> 3-79
Generator (cover)	₩3-22	<b>∷</b> ₹3-42	<b>∷</b> ₹3-82
Generator rotor	₩3-22		<b>73-80</b>
Water pump	₩3-22	<b>∷</b> ₹7-13	<b>∷</b> ₹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  $\bigcirc$  lead wire  $\bigcirc$ 1.



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

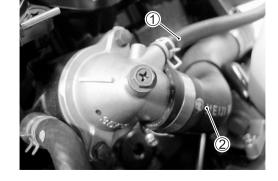


• Remove the throttle body assembly ③. ( 5-13)

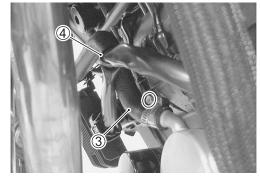


### **RADIATOR**

• 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.

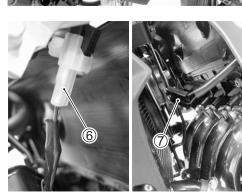
### CAUTION

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 ®.

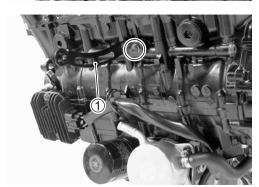


### **EXHAUST PIPE AND MUFFLER JOINT**

- Remove the exhaust pipe and muffler joint. ( 6-3)
- Remove the O2 sensor. ( 76-3)

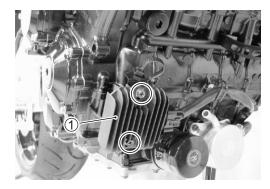


• Remove the radiator mounting bracket ①.

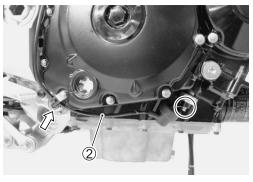


### **ELECTRIC PARTS AND PAIR HOSE**

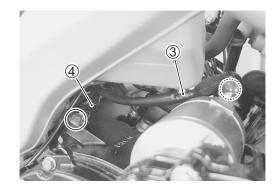
• Remove the regulator/rectifier ①.



• 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.

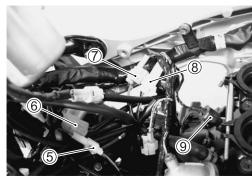
CKP sensor (5)

Generator 6

Side-stand (7)

GP switch ®

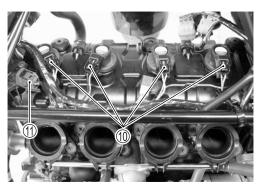
ECT sensor 9



• Disconnect the ignition coil/plug cap lead wire couplers ① and CMP sensor lead wire coupler ①.

### CAUTION

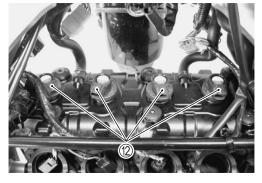
Do not remove the ignition coil/plug cap before disconnecting its coupler.



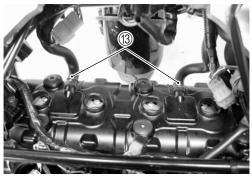
• Remove the ignition coil/plug caps ②.

### 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 <sup>(3)</sup>.



### **ENGINE SPROCKET AND GEAR SHIFT LEVER**

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



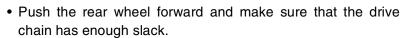


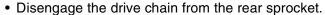
- Remove the speed sensor rotor ⑤.
- Remove the engine sprocket nut ⑥ and its washer.

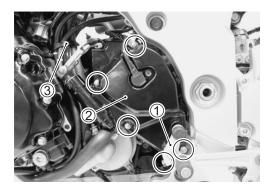
### NOTE:

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

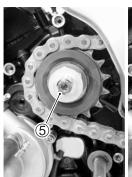
- Loosen the rear axle nut 7.
- Loosen the chain adjuster lock-nuts.
- Loosen the chain adjusters 8.

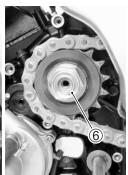


















• Remove the engine sprocket 9.

## **ENGINE MOUNTING**

• Support the engine using an engine jack.

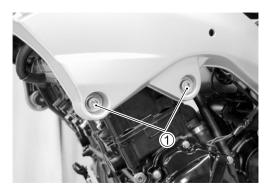
• Remove the engine mounting bolts ①.

• Remove the engine mounting bolt 2.

• Remove the engine mounting bolt/nut ③.









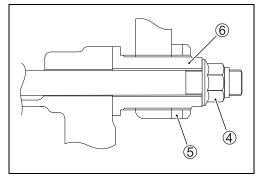


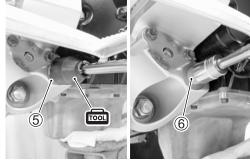
- Remove the engine mounting nut 4.
- Loosen the engine mounting thrust adjuster lock-nut 5 with the special tool.
- Loosen the engine mounting thrust adjuster 6.

09940-14980: Engine mounting thrust adjuster socket wrench

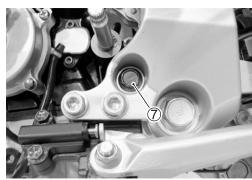
### NOTE:

Do not remove the engine mounting bolt  $\Im$  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:

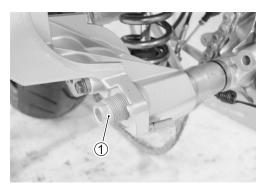
### NOTE:

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.



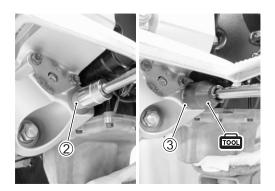


## **■** Engine mounting thrust adjuster: 23 N·m (2.3 kgf-m)

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

## Engine mounting thrust adjuster lock-nut:

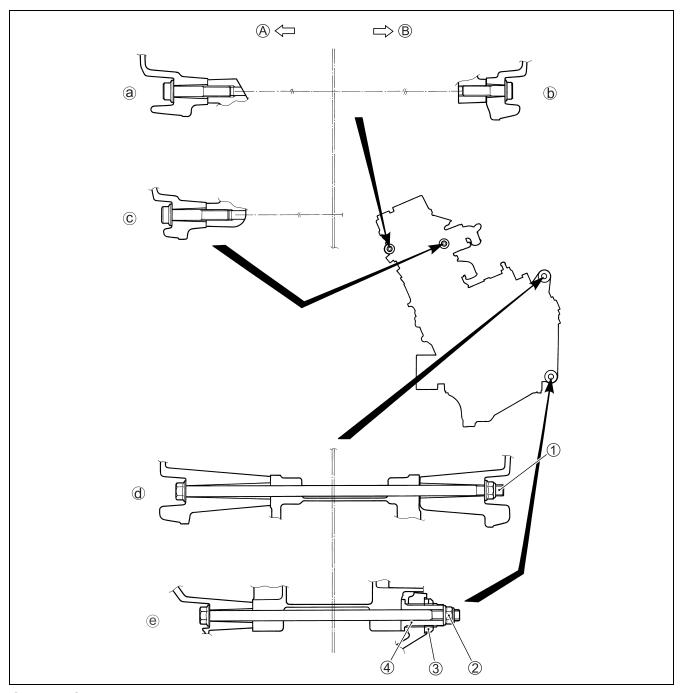
45 N·m (4.5 kgf-m)



• 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.



(A) Left ® Right

ı	ľ	v	١
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ITEM	N⋅m	kgf-m
<b>abc</b>	55	5.5
12	75	7.5
3	45	4.5
4	23	2.3

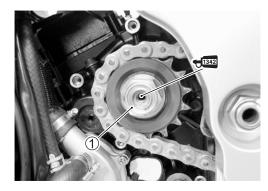
**LENGTH** 

ITEM		mm
Bolt	<b>a</b> c	55
	<b>b</b>	40
	Ø	305
	e	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)





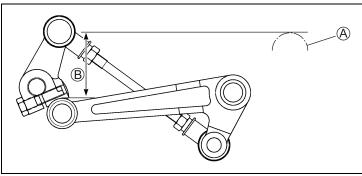
- Apply SUZUKI SUPER GREASE "A" to the clutch push rod end.
- 99000-25010: SUZUKI SUPER GREASE "A" (or equivalent grease)
- Install the engine sprocket cover.

### 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.
  - (A) Footrest
  - **B** 35 45 mm

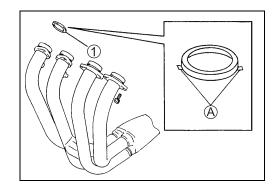




 Replace the exhaust pipe gaskets and muffler connectors with new ones.

### NOTE:

Be sure to face the tabs A 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)

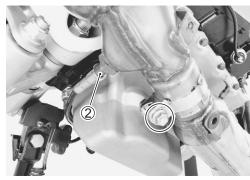
Muffler mounting bolt: 23 N·m (2.3 kgf-m)

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 (\$\sumset 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)

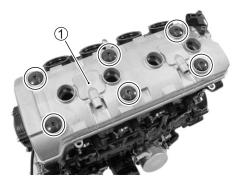
### **STARTER MOTOR**

• Remove the starter motor ①.

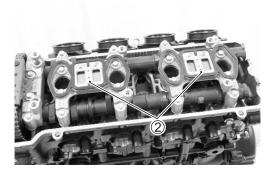


### CYLINDER HEAD COVER AND PAIR REED VALVE

• Remove the cylinder head cover ① and its gaskets.



• Remove the PAIR reed valves ② and their gaskets.



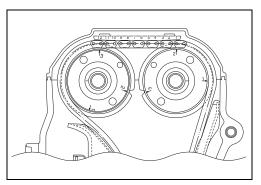
### **CAMSHAFTS**

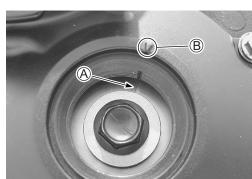
• Remove the valve timing inspection cap ①.



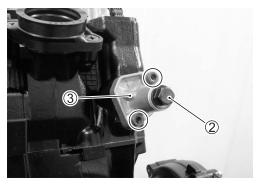
• Turn the crankshaft to bring the line (A) on the starter clutch to the index mark (B) of the valve timing inspection hole and also to bring the cams to the position as shown.







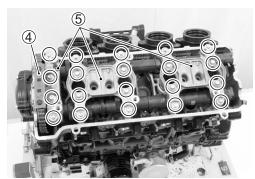
- Remove the cam chain tension adjuster cap bolt 2.
- Remove the cam chain tension adjuster ③ with the spring.



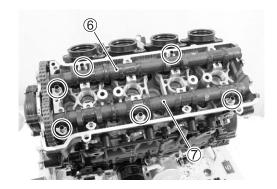
- Remove the cam chain guide 4.
- Remove the camshaft journal holders ⑤.

### 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**

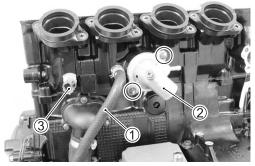
- Remove the water hose 1.
- Remove the thermostat cover ② and thermostat.

### THERMOSTAT INSPECTION (77-9)

• Remove the ECT sensor 3.

### **ECT SENSOR INSPECTION (**( 7-7)

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



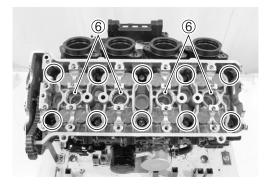


- Remove the O-rings 6.
- Remove the cylinder head bolts and washers.

### NOTE:

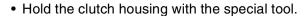
When loosening the cylinder head bolts, loosen each bolt little by little diagonally.

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



### **CLUTCH**

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



### CAUTION

Do not damage the clutch plates by the special tool.

### 09920-53740: Clutch sleeve hub holder

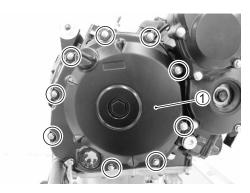
• Remove the clutch springs.

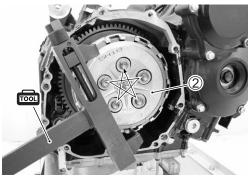
### NOTE:

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

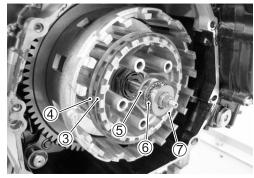
- Remove the pressure plate 2
- Remove the clutch drive plates and driven plates.

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









### NOTE:

If it is difficult to pull out the push  $\operatorname{rod} \ensuremath{\$}$ , use a magnetic hand or a wire.



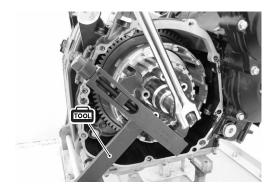




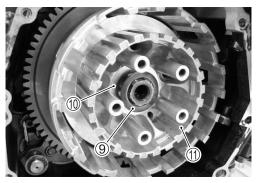
• Hold the clutch sleeve hub with the special tool.

## 09920-53740: Clutch sleeve hub holder

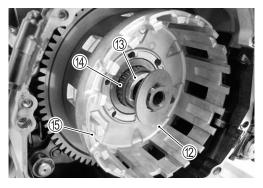
• Remove the clutch sleeve hub nut.



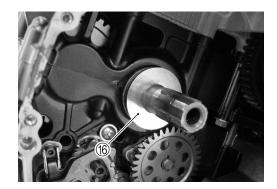
• Remove the concaved washer (9), washer (10) and clutch sleeve hub (11).



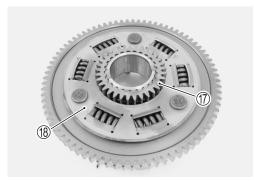
- Remove the washer ②, spacer ③ and bearing ④.
- Remove the primary driven gear assembly ⑤.



• Remove the thrust washer 16.



• Remove the oil pump drive gear ⑦ from the primary driven gear assembly ⑱.



### **OIL PUMP**

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

### NOTE:

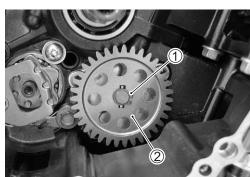
Do not drop the snap ring 1 into the crankcase.

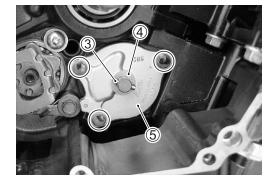
09900-06107: Snap ring priers

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

### NOTE:

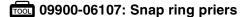
Do not drop the pin 3 and washer 4 into the crankcase.

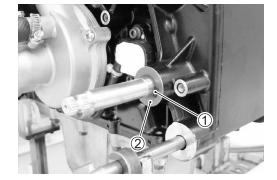




### **GEARSHIFT SYSTEM**

• Remove the snap ring ① and washer ②.

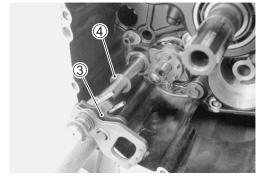




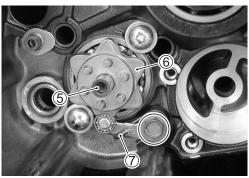
• Remove the gearshift shaft assembly ③ and washer ④.

### NOTE:

Do not drop the washer 4 into the crankcase.

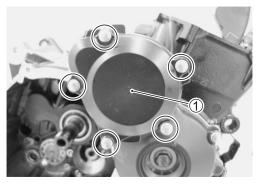


- Remove the gearshift cam plate bolt ⑤ and gearshift cam plate ⑥.
- Remove the gearshift cam stopper ⑦.

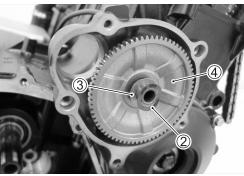


### **STARTER IDLE GEAR**

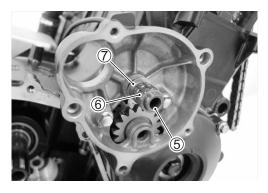
- Remove the starter idle gear cover ①.
- Remove the dowel pins and gasket.



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



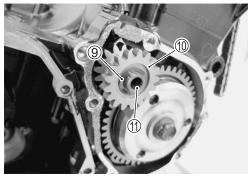
• Remove the shaft ⑤, bearing ⑥ and thrust washer ⑦.



- 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.

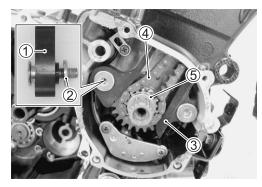
# 09920-34830: Starter clutch holder

- 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**

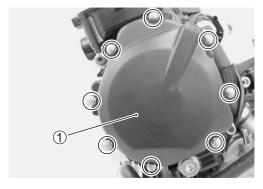
• Remove the CKP sensor ①.

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.

09930-44520: Rotor holder

• Remove the generator rotor bolt.

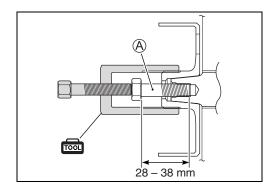


• Install a bolt (A) of suitable size to the left end of crankshaft.

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

• Remove the generator rotor with the special tool.

09930-34980: Rotor remover

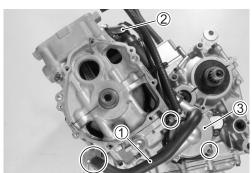




#### **WATER PUMP**

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

WATER PUMP SERVICING (7-11)



# **GEAR POSITION SWITCH**

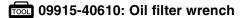
• Remove the gear position switch ①.

# **CRANKCASE BREATHER (PCV) COVER**

• Remove the crankcase breather cover ①.

### **OIL FILTER**

• Remove the oil filter with the special tool.

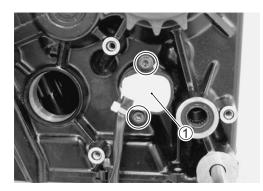


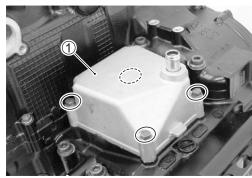
### **OIL COOLER**

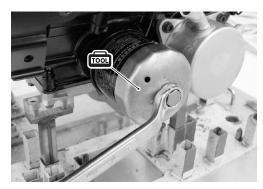
• Remove the oil cooler ①.

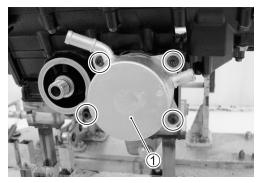
### OIL PAN

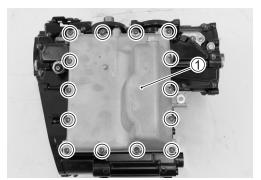
• Remove the oil pan 1.



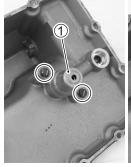








- Remove the oil pressure regulator case ①.
- Remove the oil pressure regulator 2.



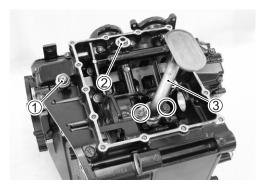


#### **OIL PRESSURE SWITCH**

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

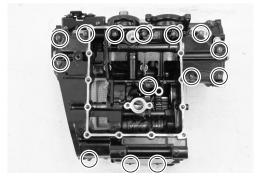
#### **OIL STRAINER**

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



#### **LOWER CRANK CASE**

• Remove the lower crankcase bolts (M6).

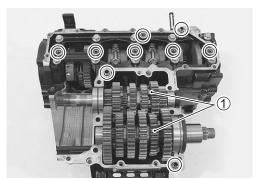


- Remove the lower crankcase bolts (M8).
- Remove the lower crankcase assembly.



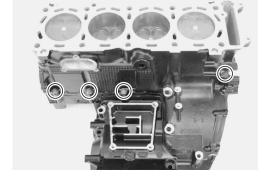
### **TRANSMISSION**

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



#### **MIDDLE CRANKCASE**

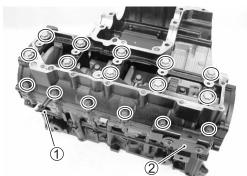
• Remove the crankcase bolts (M6).



- 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**

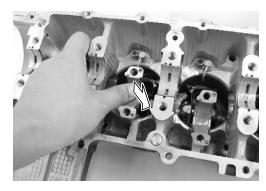
- Loosen the bearing cap bolts using a 10 mm, 12 point-socket wrench, and tap the bearing cap bolts lightly with a plastic hammer to remove the bearing cap.
- Remove the dowel pins.
- Remove the O-ring 1.
- Remove the crankshaft and thrust washers 2.

#### **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.



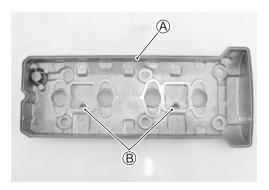
# ENGINE COMPONENTS INSPECTION AND SERVICE

#### 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

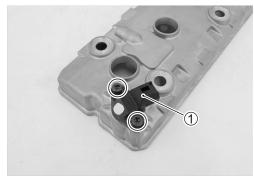
- If it is damaged, replace the cylinder head cover with a new one.



# **CMP SENSOR**

#### **REMOVAL**

- Remove the CMP sensor ① from the cylinder head cover. **INSPECTION**
- Inspect the CMP sensor. ( 4-32)



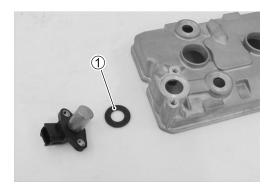
#### **INSTALLATION**

• Install the oil seal ① and CMP sensor.

#### NOTE:

When installing, clean the CMP sensor's surface.

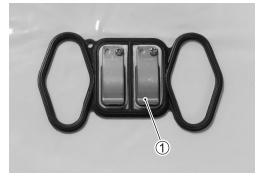
CMP sensor bolt: 11 N·m (1.1 kgf-m)



# **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**

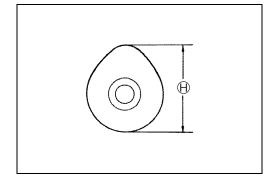
- Check the camshaft for wear or damage.
- $\bullet$  Measure the cam height  $\ensuremath{\boldsymbol{\upalpha}}$  with a micrometer.

#### DATA Cam height H:

Service Limit: (IN.): 35.48 mm

(EX.): 34.68 mm

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:

Camshaft journal oil clearance:

Service Limit: (IN & EX): 0.150 mm

09900-22301: Plastigauge 09900-22302: Plastigauge

#### NOTE:

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

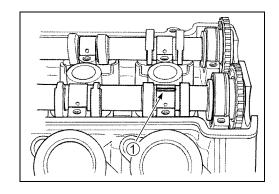
Tighten the camshaft journal holder bolts evenly and diagonally to the specified torque.

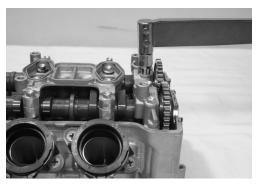
# Camshaft journal holder bolt: 10 N·m (1.0 kgf-m)

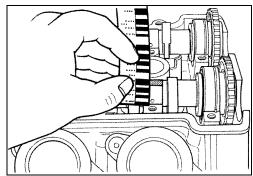
### NOTE:

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

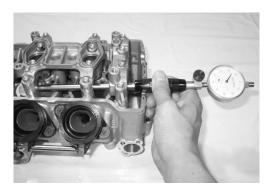
09900-20602: Dial gauge (1/1 000, 1 mm)

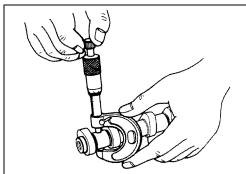
09900-22403: Small bore gauge (18 – 35 mm)

Camshaft journal O.D.:

Standard (IN & EX): 23.959 - 23.980 mm

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

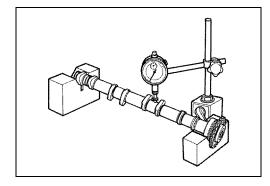
09900-20607: Dial gauge (1/100 mm)

09900-20701: Magnetic stand

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

#### **CAM SPROCKET**

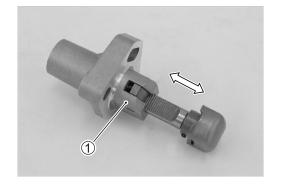
- Inspect the sprocket teeth for wear.
- If they are worn, replace the sprocket/camshaft assembly and cam chain as a set.





# 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.



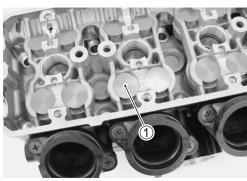
# **CYLINDER HEAD AND VALVE**

### **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

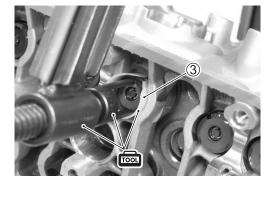
09916-84511: Tweezers

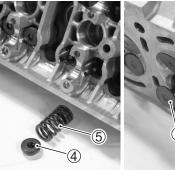
09919-28610: Sleeve protector

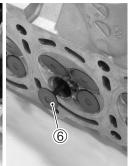
#### CAUTION

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.





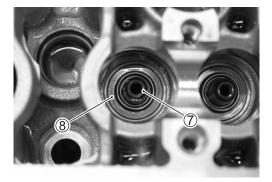


• Remove the oil seal 7 and spring seat 8.

# CAUTION

#### Do not reuse the removed oil seal.

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



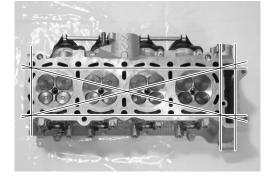
#### CYLINDER HEAD DISTORTION

- 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.

DATA 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

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

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.

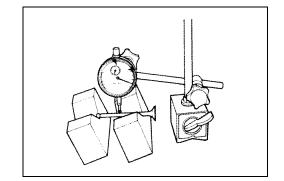
# **VALVE FACE WEAR**

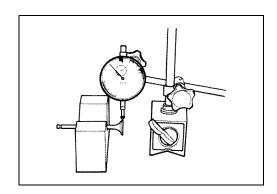
· Visually inspect each valve face for wear. Replace any valve with an abnormally worn face. The thickness of the valve face decreases as the face wears. Measure the valve face T. If it is out of specification, replace the valve with a new one.

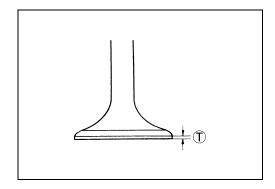
#### DATA Valve head thickness T:

Service Limit: 0.5 mm

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.



Service Limit: 0.35 mm

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

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.

# 09916-53310: Valve guide remover/installer

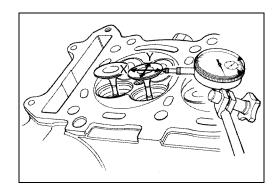
#### NOTE:

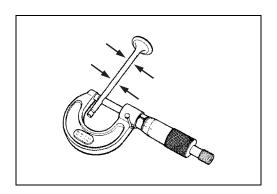
- \* Discard the removed valve guide subassemblies.
- \* Only oversized valve guides are available as replacement parts. (Part No. 11115-11D70)
- · Re-finish the valve guide holes in cylinder head with the reamer and handle.

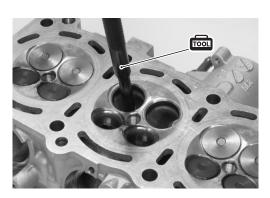
09916-49030: Valve guide reamer 09916-34542: Reamer handle

#### **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.

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.

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

#### NOTE:

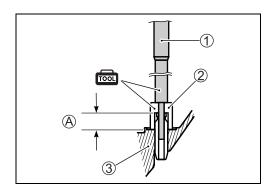
- \* Be sure to cool down the cylinder head to ambient air temperature.
- \* Insert the reamer from the combustion chamber and always turn the reamer handle clockwise.

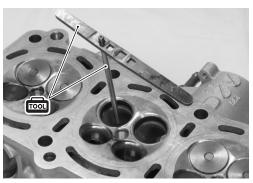
#### VALVE SEAT WIDTH INSPECTION

- 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.

09916-10911: Valve lapper set







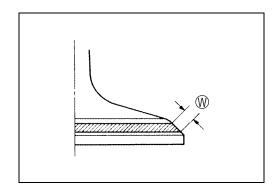


• If the seat width W measured exceeds the standard value or seat width is not uniform, reface the seat using the seat cutter.

#### DATA Valve seat width W:

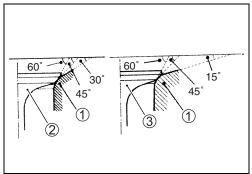
Standard: 0.9 - 1.1 mm

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
- \* 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.



Service limit: (IN): 36.2 mm

(EX): 36.0 mm

09900-20102: Vernier calipers

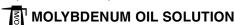
**DATA** Valve spring tension:

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.



#### CAUTION

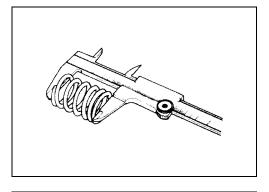
Do not reuse the removed oil seal.

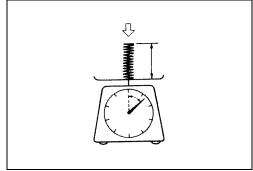
 Insert the valve, with its stem coated with MOLYBDENUM OIL SOLUTION all around and along the full stem length without any break.

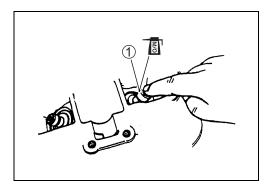
#### CAUTION

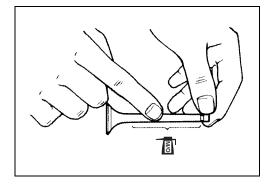
When inserting the valve, take care not to damage the lip of the oil seal.



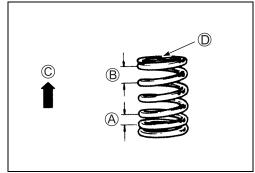








- Install the valve spring with the small-pitch portion (A) facing cylinder head.
  - B Large-pitch portion
  - © UPWARD
  - D Paint



• 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.

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 (F) in the stem end.
- Install the other valves and springs in the same manner as described previously.



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

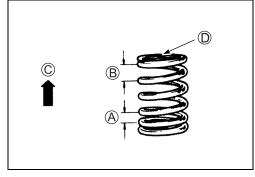
# CAUTION

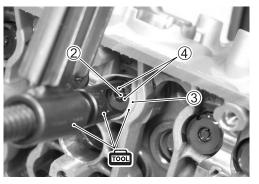
Be careful not to damage the valve and valve stem when handling it.

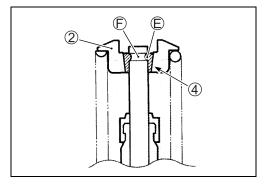
- 2 Valve spring retainer
- 4 Cotter
- · Install the tappet shims and the tappets to their original positions.

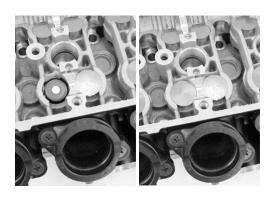
#### NOTE:

- \* 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.

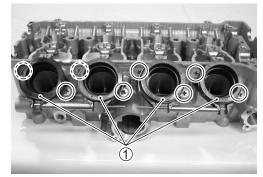




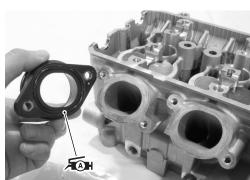




• Remove the intake pipes ①.

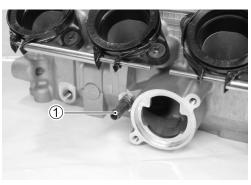


- Apply SUZUKI SUPER GREASE to the O-rings.
- Install the intake pipes.



## **WATER BYPASS UNION**

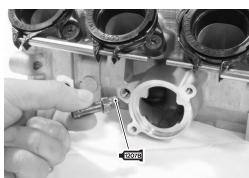
• Remove the water bypass union ①.



• 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

A 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

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

09900-20102: Vernier calipers



#### 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

09900-20803: Thickness gauge

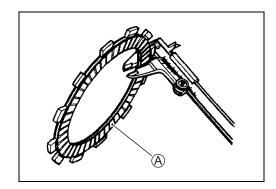
## **CLUTCH SPRING INSPECTION**

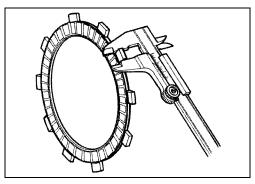
- Measure the free length of each coil spring with a vernier calipers, and compare the length with the specified limit.
- Replace all the springs if any spring is not within the limit.

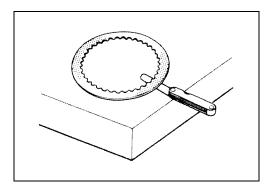
#### **DATA** Clutch spring free length:

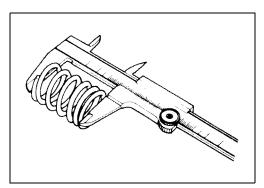
Service Limit: 52.4 mm

**1001** 09900-20102: Vernier calipers



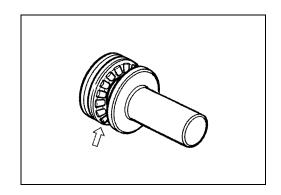






#### **CLUTCH BEARING INSPECTION**

- 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.



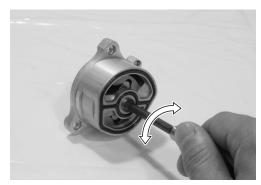
# **OIL PUMP**

#### **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

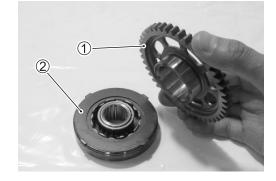
- \* Do not attempt to disassemble the oil pump assembly.
- \* The oil pump is available only as an assembly.



# 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**

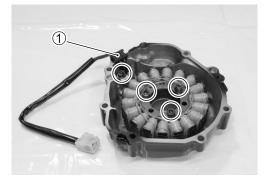
INSPECTION ( 9-10) REASSEMBLY

• 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 (77-12)

# **GEARSHIFT SYSTEM**

#### **GEARSHIFT SHAFT/GEARSHIFT ARM DISASSEMBLY**

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

4 Gearshift cam drive plate

2 Snap ring

- ⑤ Plate return spring
- ③ Gearshift shaft 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.

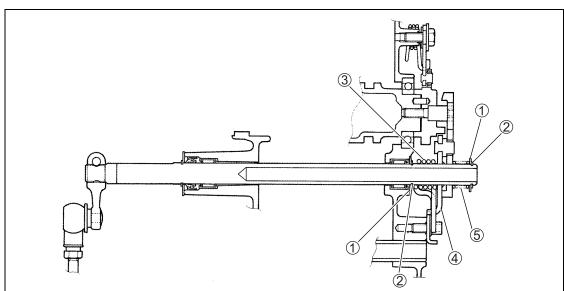
#### GEARSHIFT SHAFT/GEARSHIFT ARM REASSEMBLY

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

4 Gearshift cam drive plate

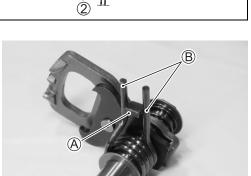
2 Snap ring

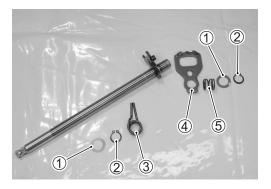
- 5 Plate return spring
- 3 Gearshift shaft return spring



#### NOTE:

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





- 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.

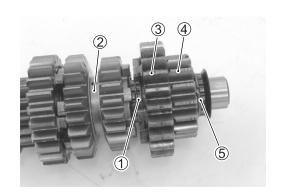


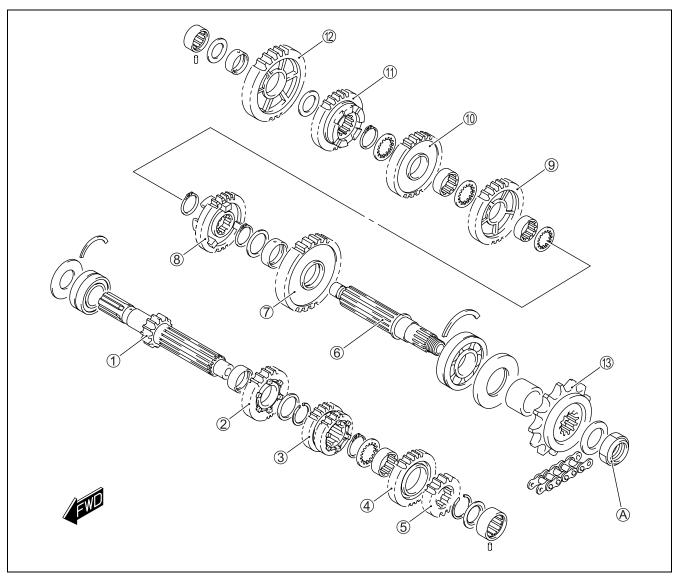
# **TRANSMISSION**

### **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
<b>⑤</b>	2nd drive gear	12	1st driven gear
6	Driveshaft	13	Engine sprocket
7	2nd driven gear	A	Engine sprocket nut

lacksquare		
ITEM	N∙m	kgf-m
A	115	11.5

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.



#### **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.

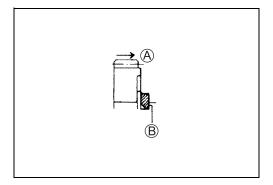
#### NOTE:

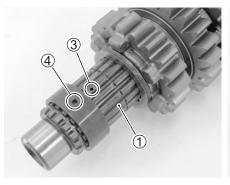
When reassembling the transmission, attention must be given to the locations and positions of washers and snap rings. The cross sectional view shows the correct position of the gears, bushings, washers and snap rings. (3-47)

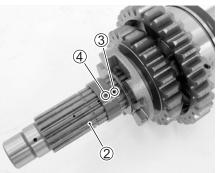
- When installing a new snap ring, pay attention to its direction. Fit it to the side where the thrust is as shown in the illustration.
  - A Thrust
  - B Sharp edge

#### 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.

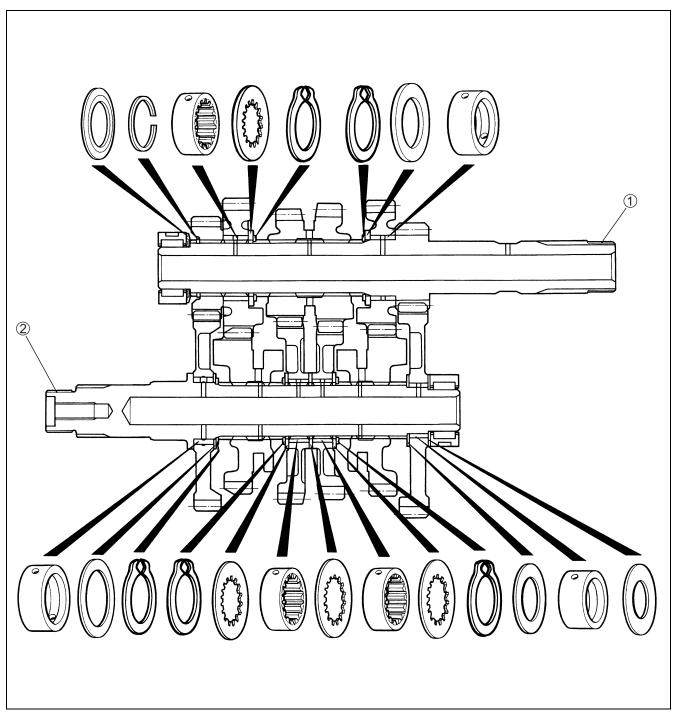








# TRANSMISSION PARTS LOCATION



2 Driveshaft

# CRANKCASE SERVICING (\$\sigma^3-51)

ing at several places as indicated.

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

# Cylinder distortion:

Service Limit: 0.02 mm

09900-20803: Thickness gauge

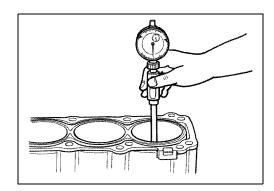
#### **CYLINDER BORE**

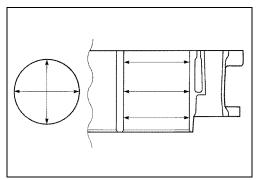
- Inspect the cylinder wall for any scratches, nicks or other damage.
- Measure the cylinder bore diameter at six places.

# Cylinder bore:

Standard: 67.000 – 67.015 mm 09900-20508: Cylinder gauge set







### PISTON AND PISTON RING

#### **PISTON DIAMETER**

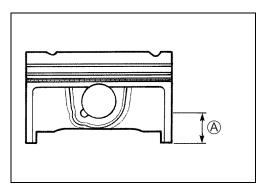
- Using a micrometer, measure the piston outside diameter at 15 mm (A) from the piston skirt end.
- If the measurement is less than the limit, replace the piston.

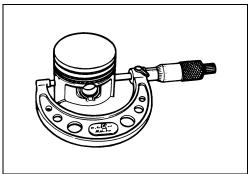
# Piston diameter:

Service Limit: 66.845 mm

at 15 mm from the skirt end

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.

#### PATA 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.

#### PAIA Piston pin bore I.D.:

Service Limit: 14.030 mm

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

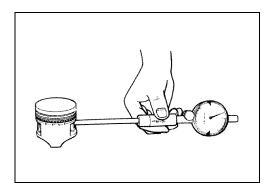
09900-22401: Small bore gauge (10 - 18 mm)

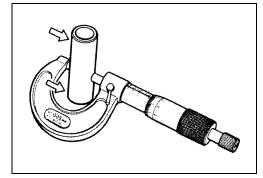
- Measure the piston pin outside diameter at three positions using the micrometer.
- If any of the measurements are out of specification, replace the piston pin.

### Piston pin O.D.:

Service Limit: 13.980 mm

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.

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

Piston ring-to-groove clearance:

Service Limit (1st): 0.180 mm (2nd): 0.150 mm

**PATA** Piston ring groove width:

Standard (1st): 1.01 - 1.03 mm

(2nd): 0.81 - 0.83 mm (Oil): 1.51 - 1.53 mm

PAYA 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

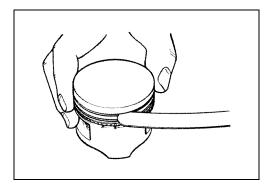
09900-20102: Vernier calipers

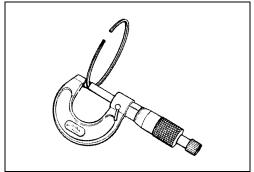
DATA Piston ring end gap:

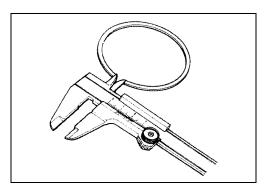
Service Limit (1st): 0.50 mm

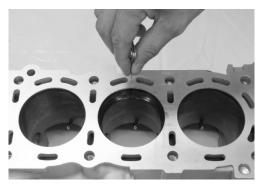
(2nd): 0.50 mm

09900-20803: Thickness gauge









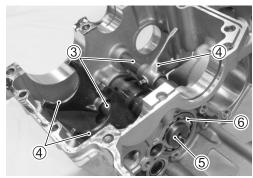
# **CRANKCASE**

### 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.

# Shift fork-to-groove clearance: Service Limit: 0.5 mm

09900-20803: Thickness gauge

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

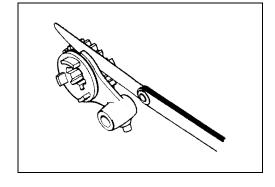


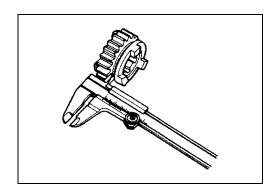
 Measure the gearshift fork groove width using the vernier calipers.

Shift fork groove width:

Standard: 5.0 – 5.1 mm

09900-20102: Vernier calipers





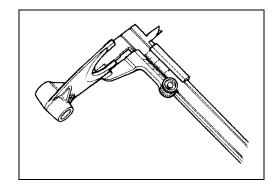
#### **GEARSHIFT FORK THICKNESS**

· Measure the gearshift fork thickness using the vernier calipers.

DATA Shift fork thickness:

Standard: 4.8 - 4.9 mm

09900-20102: Vernier calipers



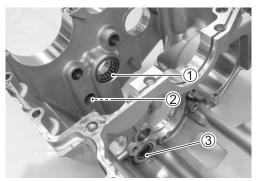
# **GEARSHIFT CAM BEARING AND GEARSHIFT SHAFT BEARING**

#### Inspection

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



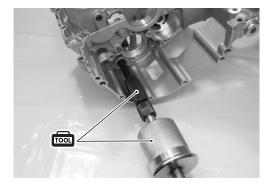
- Inspect the gearshift cam bearing ①, gearshift shaft bearings 2 and 3 for abnormal noise and smooth rotation while they are in the crankcase.
- Replace the bearing if there is anything unusual.



#### Removal

• Remove the gearshift shaft bearing with the special tools.

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

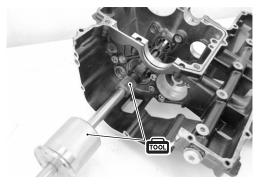


• Remove the gearshift cam bearing with the special tools.

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

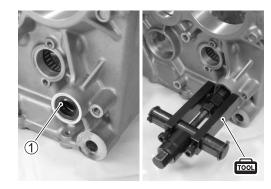
CAUTION

Be careful not to lean the bearing remover.



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





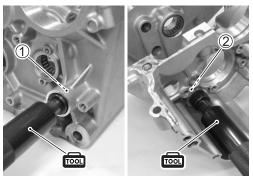
#### Installation

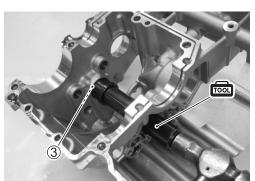
• Install the bearings with the special tool.

09913-70210: Bearing installer set (1), 2  $\phi$ 22) (3  $\phi$ 32)

### NOTE:

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



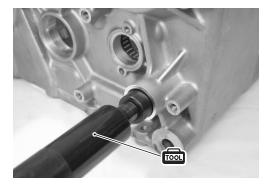


• Install the oil seal with the special tool.

 $\bigcirc$  09913-70210: Bearing installer set ( $\phi$ 22)

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

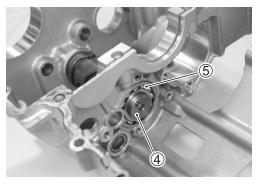




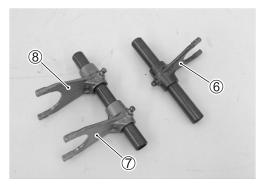
• Install the gearshift cam 4 with the bearing 5.

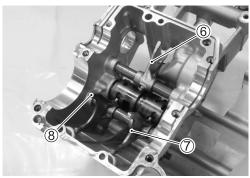
#### NOTE:

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



- 6 For 3rd/4th drive gears (17E-3W)
- 7 For 6th driven gear (17E-1E)
- 8 For 5th driven gear (17E-1F)



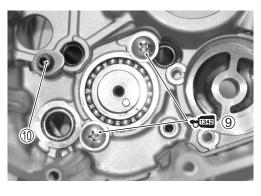


- Apply a small quantity of THREAD LOCK to the bearing retainer screws 9.
- Tighten the bearing retainer screws (9) and gearshift fork shaft retainer bolt (10) to the specified torque.

**←**1342 99000-32050: THREAD LOCK "1342"

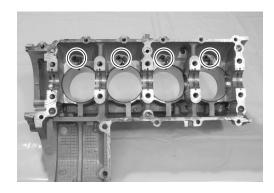
■ Bearing retainer screw: 10 N·m (1.0 kgf-m)

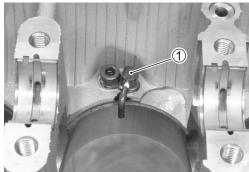
Gearshift fork shaft retainer bolt: 10 N·m (1.0 kgf-m)



# 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.

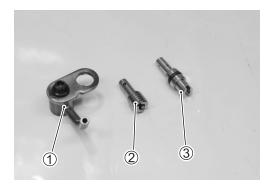


• Remove the oil jet ③ (for cam chain tension adjuster) from the cylinder head.



# 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)

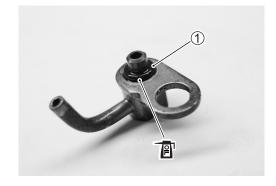


#### Installation

• 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.

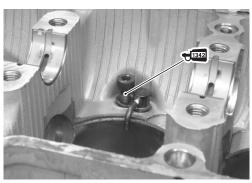
#### NOTE:

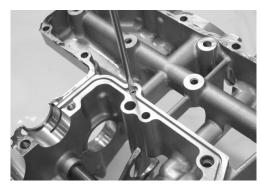
Apply a small quantity of THREAD LOCK to the bolts and tighten them to the specified torque.

**←**1342 99000-32050: THREAD LOCK "1342"

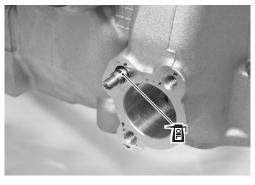
Piston cooling oil jet bolt: 10 N·m (1.0 kgf-m)

• Install the oil jet (for transmission).



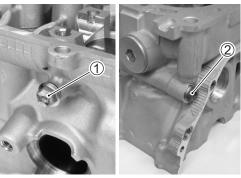


- Apply engine oil to the O-ring.
- Install the oil jet (for cam chain tension adjuster).

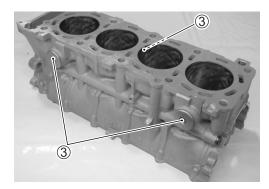


# **PLUG** Removal

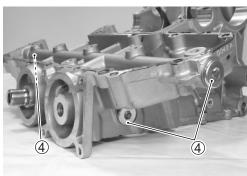
- Remove the oil gallery plugs 1 and 2.
  - 1 (for cylinder head side)
  - ② (for upper crankcase side)



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).

# 99000-99032-11X: SUZUKI COOLANT

Apply THREAD LOCK to the oil gallery plug ②.

# **+**1342 99000-32050: THREAD LOCK "1342"

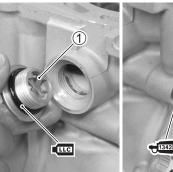
#### NOTE:

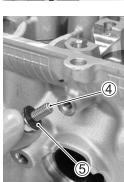
It is not required to apply THREAD LOCK when installing the other removed oil gallery plugs.

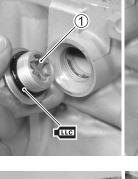
- Tighten each plug to the specified torque.
- **1** ① Water jacket plug: 9.5 N⋅m (0.95 kgf-m)
  - ② Oil gallery plug (upper crankcase): 11 N·m (1.1 kgf-m)
  - ③ Oil gallery plug (lower crankcase): 35 N·m (3.5 kgf-m)
  - **④** Oil gallery plug (cylinder head): 10 N⋅m (1.0 kgf-m)

# 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.

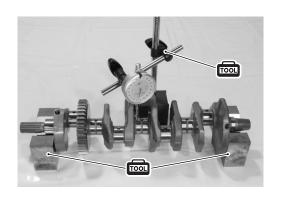
#### DATA Crankshaft runout:

Service Limit: 0.05 mm

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.**

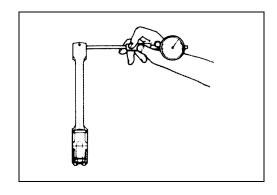
• Using a small bore gauge, measure the inside diameter of the conrod small end.

#### DATA Conrod small end I.D.:

Service Limit: 14.040 mm

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

09900-20803: Thickness gauge

Conrod big end width:

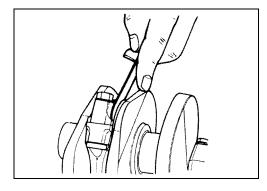
Standard: 19.95 - 20.00 mm

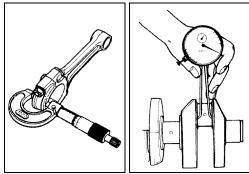
09900-20205: Micrometer (0 – 25 mm)

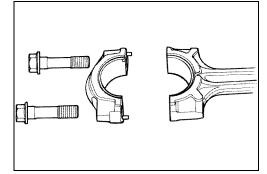
Crank pin width:

Standard: 20.10 - 20.15 mm

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**

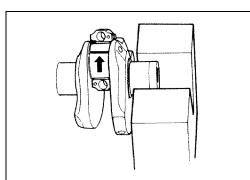
• Place the plastigauge axially along the crank pin, avoiding the oil hole, as shown.

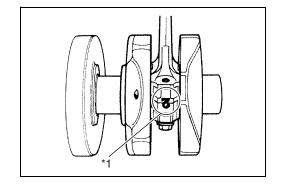
# 09900-22301: Plastigauge

 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.



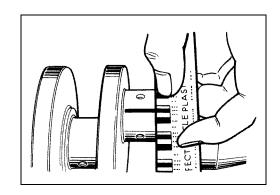


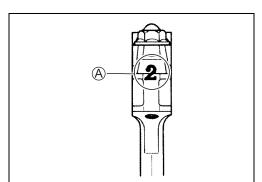
· Remove the bearing caps and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

#### **PATA** 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") A.





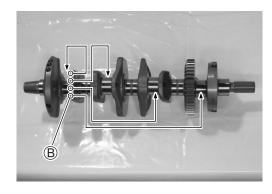
• Check the corresponding crank pin O.D. code number ("1", "2" or "3") B.

# **DAYA** Bearing selection table

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

#### DATA Conrod I.D.

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



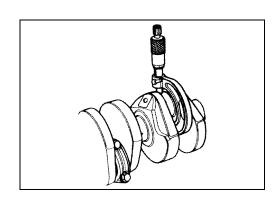
# Crank pin O.D.

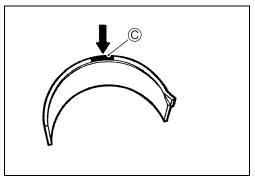
Code	O.D. specification		
1	30.992 – 31.000 mm		
2	30.984 – 30.992 mm		
3	30.976 – 30.984 mm		



# **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	



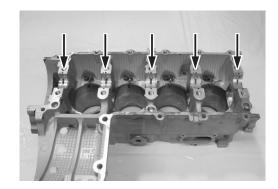


# CAUTION

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.



#### **CAUTION**

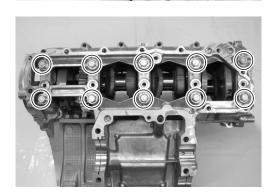
Never rotate the crankshaft when a piece of plastigauge is installed.

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



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.

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.



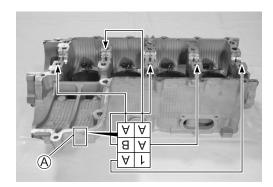
- Check the corresponding crankcase journal I.D. code number
   A, "A" or "B" which is stamped on the rear of upper crankcase.
- Check the corresponding crankshaft journal O.D. code number (B), "A", "B" or "C" which is stamped on the crankshaft.

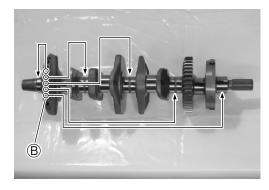
# **DATA** Bearing selection table

		Crankshaft journal O.D. ®			
	Code		В	С	
Crankcase	Α	Green	Black	Brown	
I.D. (A	В	Black	Brown	Yellow	

# Crankcase I.D. specification

Code	I.D. specification		
Α	33.000 – 33.008 mm		
В	33.008 – 33.016 mm		





# Crankshaft journal O.D. specification

Code	O.D. specification		
А	29.992 – 30.000 mm		
В	29.984 – 29.992 mm		
С	29.976 – 29.984 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:

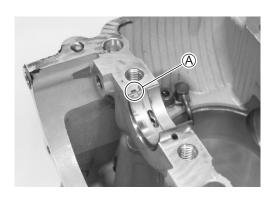
Upper and middle crankshaft journal bearings are the same.

#### **INSTALLATION**

• When fitting the crankshaft journal bearings to the upper and middle crankcases, be sure to fix the stopper part (A) 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.

①: Left-side thrust bearing

R: Right-side thrust bearing

#### NOTE:

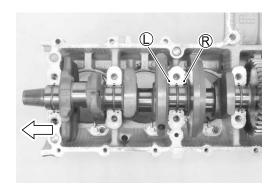
Pull the crankshaft to the generator side, so that there is no clearance on the right-side thrust bearing.

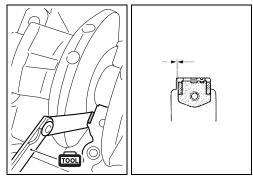
#### **DATA** Thrust clearance:

Standard: 0.055 - 0.110 mm

09900-20803: Thickness gauge

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





#### CRANKSHAFT THRUST CLEARANCE ADJUSTMENT

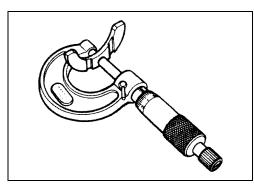
- Remove the right-side thrust bearing and measure its thickness with a micrometer.
- If the thickness of the right-side thrust bearing is below standard, replace it with a new one and once again perform the thrust clearance measurement listed above, checking to make sure it is within standard.

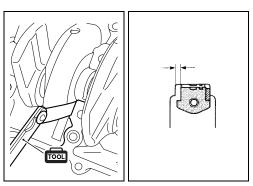


Standard: 2.425 - 2.450 mm

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

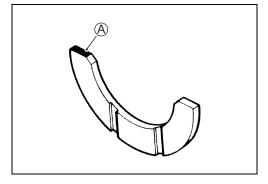
Clearance before inserting left-side thrust bearing	Color (Part No.)	Thrust bearing thickness	Thrust clearance
2.560 – 2.585 mm	White (12228-17E00-0F0)	2.475 – 2.500 mm	0.060 – 0.110 mm
2.535 – 2.560 mm	Yellow (12228-17E00-0E0)	2.450 – 2.475 mm	0.060 – 0.110 mm
2.510 – 2.535 mm	Green (12228-17E00-0D0)	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.

A 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:

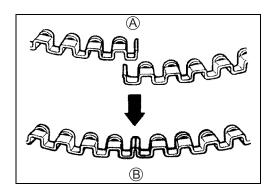
Side designations, top and bottom, are not applied to the spacer and side rails: you can position each either way.

# 2 1 1 2

#### CAUTION

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

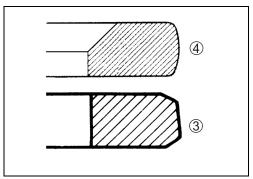
- **(A) INCORRECT**
- **B** CORRECT



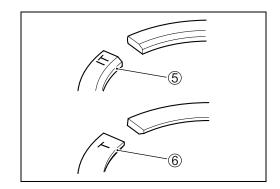
• Install the 2nd ring 3 and the 1st ring 4 to the piston.

#### NOTE:

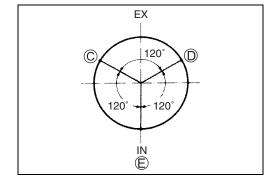
1st ring and 2nd ring differ in shape.



• 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
  - D Upper side rail
  - E 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 (A) on the piston head must be brought to the other side of ID code (B) 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.

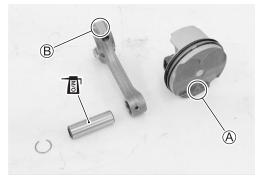
#### NOTE:

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

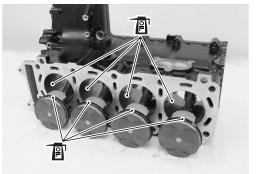
Apply engine oil to the sliding surface of the pistons and cylinder walls.

### 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.



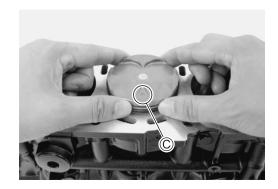




• Install the pistons and conrods into the cylinders from upside.

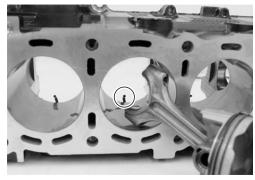
#### NOTE:

When installing the pistons, the indent  $\bigcirc$  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.

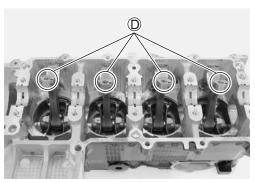


• Check that ID code 

on each conrod faces intake side.

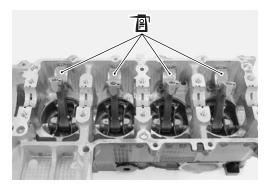
# CAUTION

Be sure to clean the conrod big end.



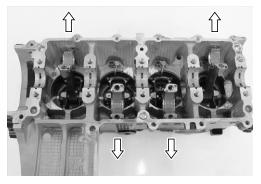
Apply MOLYBDENUM OIL SOLUTION to the crank pin bearings surface.

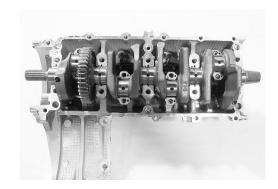
# MOLYBDENUM OIL SOLUTION



#### **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.





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

# MOLYBDENUM OIL SOLUTION

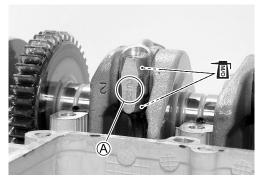
#### CAUTION

#### Be sure to clean the conrod big end.

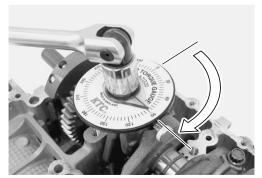
- When fitting the conrod cap, make sure that I.D. code (A) on each conrod faces intake side.
- Apply engine oil to the bearing cap bolts.
- Tighten the bearing cap bolt by using a 10 mm, 12 point socket wrench in the following two steps.
- Conrod bearing cap bolt: Initial: 15 N·m (1.5 kgf-m)

Final: 90° (1/4 turn)

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

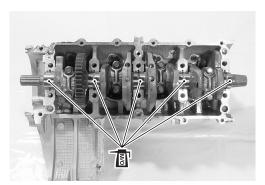






 Apply MOLYBDENUM OIL SOLUTION to each crankshaft journal bearing lightly.

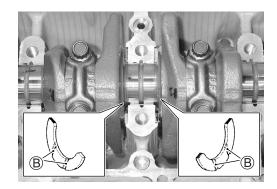
# MOLYBDENUM OIL SOLUTION



• Insert the right and left thrust bearings with oil groove ® facing the crank web.

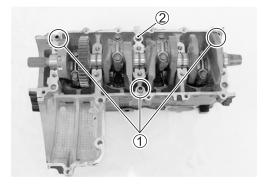
# NOTE:

Right thrust bearing has green painting.



# CRANKCASE

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



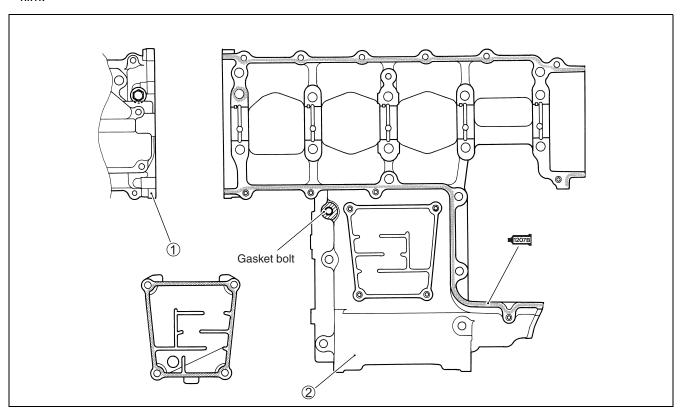
 Apply SUZUKI BOND to the mating surface of the middle crankcase.

# ■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.

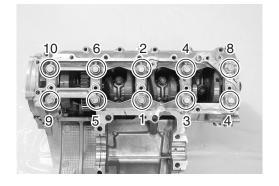


- 1 Lower crankcase
- Middle crankcase
- Tighten the crankshaft journal bolts (9 mm) in ascending order of numbers assigned to these bolts. Tighten each bolt a little at a time to equalize the pressure in the following two steps.

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.

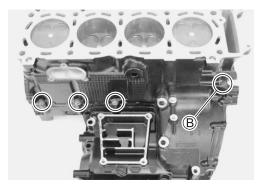
Crankcase bolt: (M6) Initial: 6 N·m (0.6 kgf-m) Final: 11 N·m (1.1 kgf-m)

NOTE:

Fit the clamp to the crankcase bolt (A).

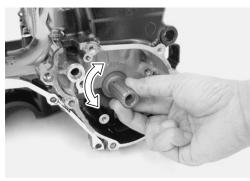
#### NOTE:

Fit a new gasket to the crankcase bolt B.



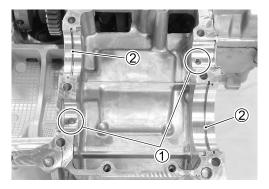
#### NOTE:

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



#### **TRANSMISSION**

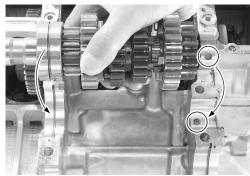
• Install the bearing pins ① and the C-rings ② on the middle crankcase.



• Install the countershaft assembly on the middle crankcase.

#### NOTE:

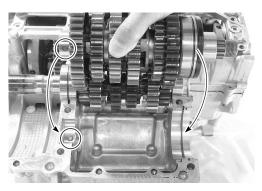
Align the C-ring with the groove of bearing and the bearing pin with the indent on the bearing.



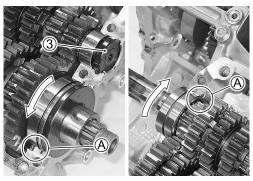
• Install the driveshaft assembly on the middle crankcase.

#### NOTE:

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



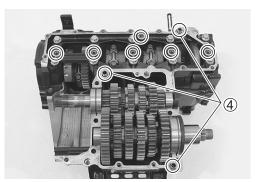
- Install the oil seal 3.
- Turn the bearings to install the bearing dowel pins (A) in the respective positions.



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

#### CAUTION

Replace the O-rings with new ones.



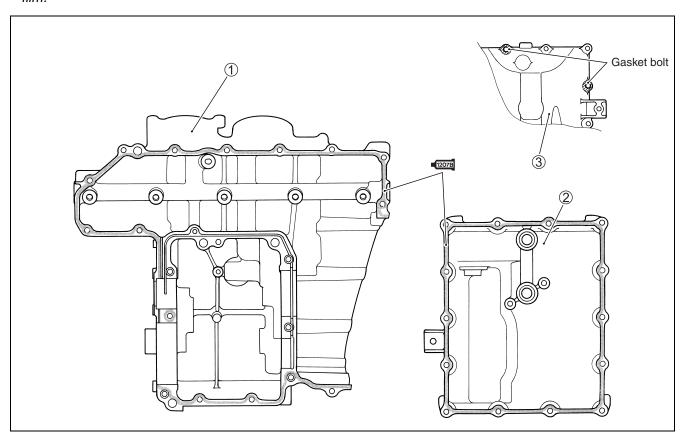
• Apply SUZUKI BOND to the mating surface.

# ■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.

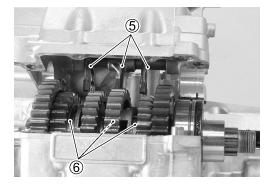


1	Lower crankcase
2	Middle crankcase
(3)	Oil pan

• Match the middle and lower crankcases.

#### NOTE:

Align the gearshift forks 5 with their grooves 6.



Crankcase bolt: (M6) Initial: 6 N⋅m (0.6 kgf-m)

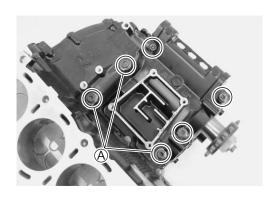
Final: 11 N·m (1.1 kgf-m)

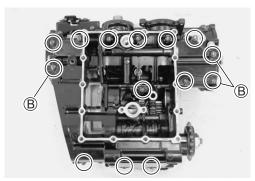
(M8) Initial: 15 N·m (1.5 kgf-m)

Final: 26 N·m (2.6 kgf-m)

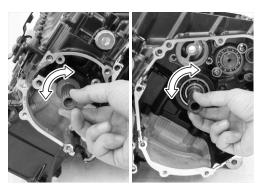
#### NOTE:

- \* Fit new copper washer to the crankcase bolts (A).
- \* Fit new gasket washer to the crankcase bolts B.





• Check that the driveshaft and countershaft rotate smoothly.



#### **OIL STRAINER**

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

F(A) 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.

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

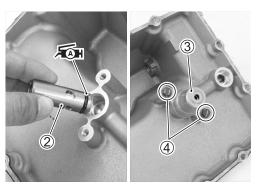
#### CAUTION

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**

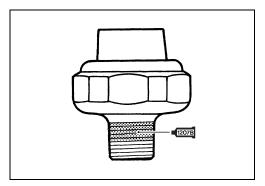
• Apply SUZUKI BOND to the thread part of oil pressure switch and tighten oil pressure switch to the specified torque.

■1207B 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 A.

• 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.

**→** 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"

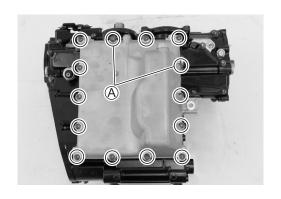
• Tighten the oil cooler mounting bolts to the specified torque.

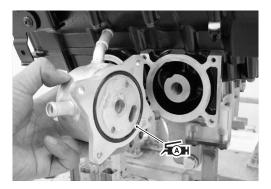
Oil cooler mounting bolt: 10 N·m (1.0 kgf-m)

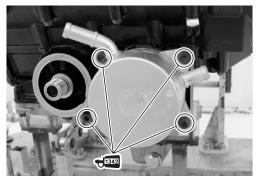
#### **OIL FILTER**

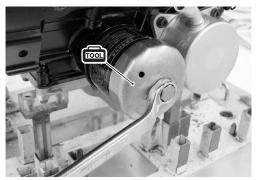
• Install the oil filter with the special tool. ( 2-14)

09915-40610: Oil filter wrench



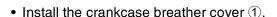




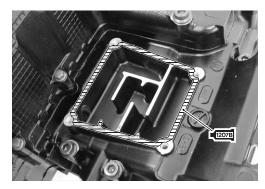


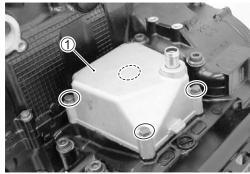
#### **CRANKCASE BREATHER COVER**

- Apply SUZUKI BOND to the mating surface.
- ■1207B 99000-31140: SUZUKI BOND "1207B"



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





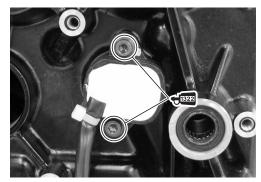
• Apply SUZUKI SUPER GREASE "A" to the O-ring.

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.

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.

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

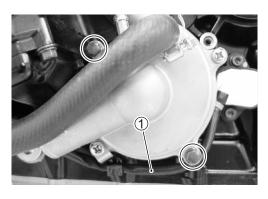


Water pump mounting bolt: 10 N⋅m (1.0 kgf-m)

NOTE:

Pass the gear position switch lead wire ① under the water pump

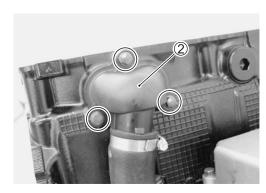
Apply engine coolant to the O-ring.



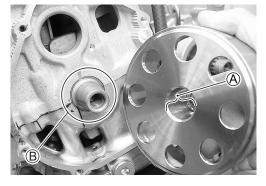


• Install the water inlet cover 2.

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



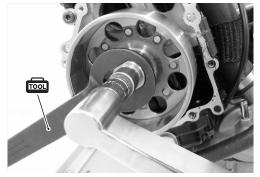
#### **GENERATOR ROTOR**



- 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)



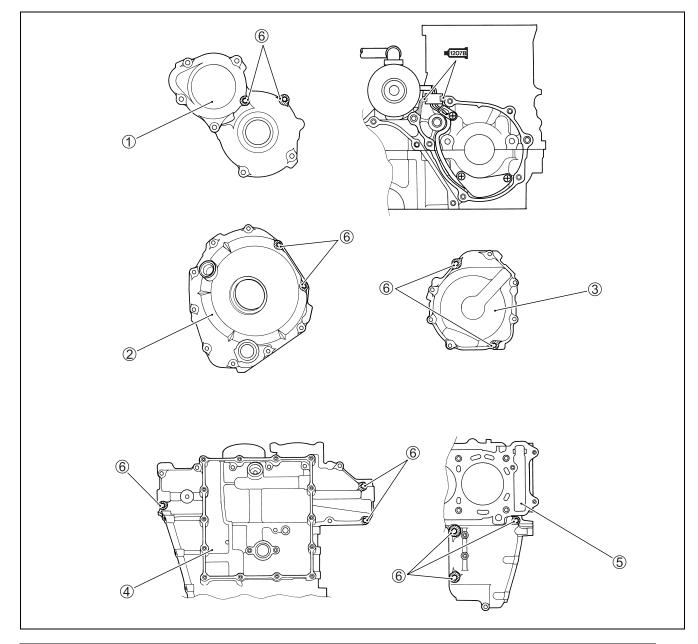
• Apply SUZUKI BOND to the mating surfaces.

# ■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	<b>⑤</b>	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)

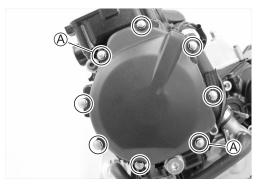
# **▲** WARNING

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

#### NOTE:

Fit the gasket washer to the bolts (A).

• 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 A and B.

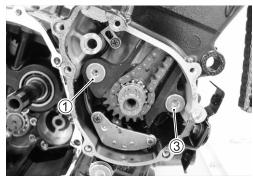


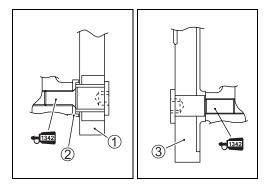
# **CAM CHAIN TENSIONER AND CAM CHAIN GUIDE**

- 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.

When installing the starter clutch assembly, align the wide spline teeth (A) and (B).

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

09920-34830: Starter clutch holder

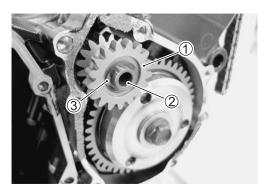
Starter clutch bolt: 54 N·m (5.4 kgf-m)





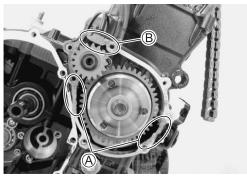
# **STARTER IDLE GEAR**

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



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

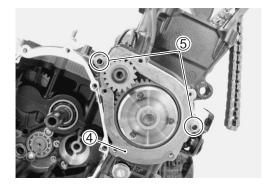
■1207B 99000-31140: SUZUKI BOND "1207B"



• 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:

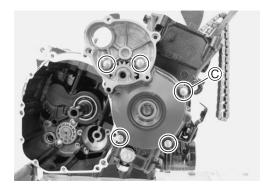
Fit a new gasket washer to the starter clutch cover bolt © as shown.

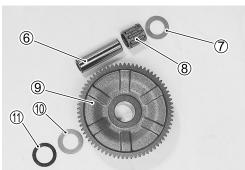
#### CAUTION

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.

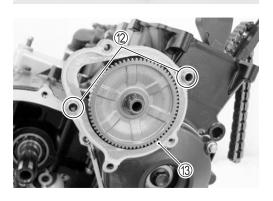




• Install the dowel pins ② and new gasket ③.

#### 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 D.



#### **GEARSHIFT SYSTEM**

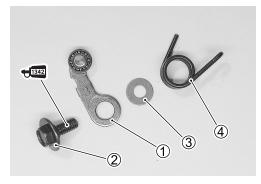
• Install the gearshift cam stopper ①, its bolt ②, washer ③ and return spring ④.

#### NOTE:

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

99000-32050: THREAD LOCK "1342"

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



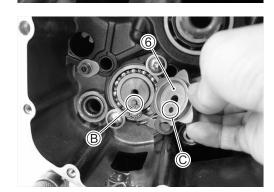
Hook the return spring end (A) to the stopper (5).

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



#### 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"

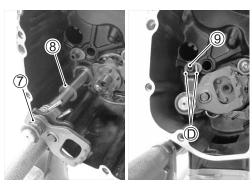
Gearshift cam stopper plate bolt: 13 N⋅m (1.3 kgf-m)



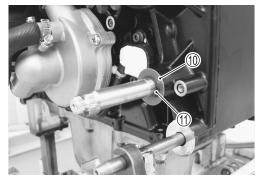
• Install the gearshift shaft assembly ? and washer ? as shown.

#### NOTE:

Pinch the gearshift arm stopper 9 with return spring ends 0.



• Install the washer ① and snap ring ①.



#### **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 (A) to the water pump shaft.

# FAH 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 crank-case.

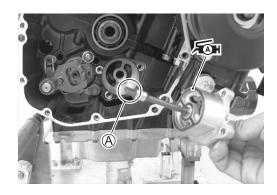
- Install the oil pump driven gear 3.
- Install the snap ring 4.

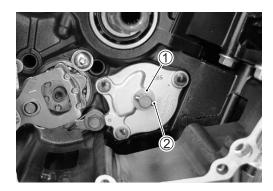
### CLUTCH

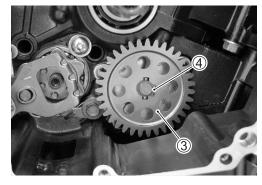
• Install the thrust washer onto the countershaft.

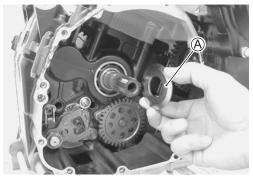
#### NOTE:

The chamfer side (A) of thrust washer faces inner side.









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

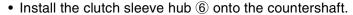


• Install the primary driven gear assembly.

#### NOTE:

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

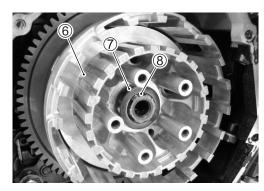
- Install the bearing ③ and spacer ④ and apply engine oil to them.
- Install the thrust washer ⑤.

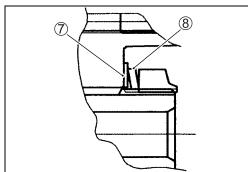


• Install the washer 7 and spring washer 8.

#### NOTE:

The convex side of spring washer ® faces outside.





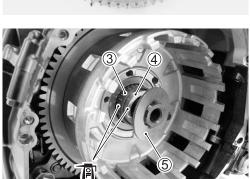
• Hold the clutch sleeve hub with the special tool.



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

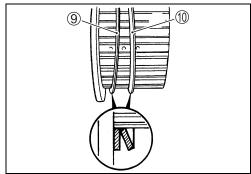
Clutch sleeve hub nut: 150 N·m (15.0 kgf-m)







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



 $\bullet$  Install the clutch push rod  $\textcircled{\scriptsize 1}$  into the countershaft.



• Install the clutch push piece ②, bearing ③ and thrust washer ④ to the countershaft.

#### NOTE:

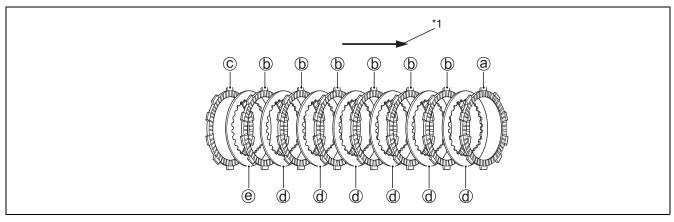
Thrust washer 4 is located between the pressure plate and bearing 3.



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

#### NOTE:





#### \*1: Direction of outside

#### DRIVE PLATE:

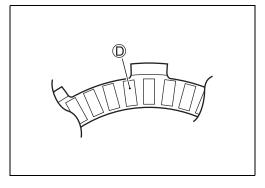
- (a) No.2 Drive plate...1 pc [48 friction pieces/I.D. 101 mm]
- (b) No.1 Drive plate...6 pcs [40 friction pieces/I.D. 101 mm]
- © No.3 Drive plate...1 pc [48 friction pieces/I.D. 108 mm]
- D Friction piece

#### NOTE:

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

# DRIVEN PLATE:

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

# 09920-53740: Clutch sleeve hub holder

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

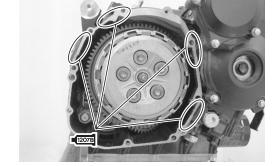
# Clutch spring set bolt: 10 N·m (1.0 kgf-m)

NOTE:

Tighten the clutch spring set bolts diagonally.

#### **CLUTCH COVER**

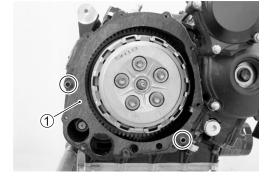
- Apply SUZUKI BOND lightly to the mating surfaces at the parting line between the upper, middle and lower crankcases as shown.
- ■1207B 99000-31140: SUZUKI BOND "1207B"



• Install the dowel pins and gasket ①.

#### CAUTION

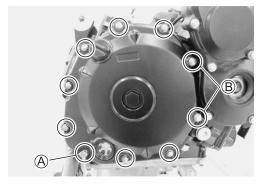
Use new gasket to prevent oil leakage.

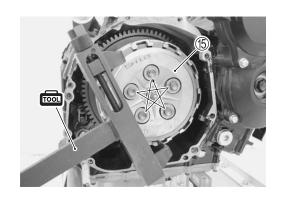


- Install the clutch cover and tighten its bolts to the specified torque.
- Clutch cover bolt: 10 N·m (1.0 kgf-m)

# NOTE:

- \* Fit the clamp to the bolt (A) as shown.
- \* Fit the gaskets to the bolts ® as shown.

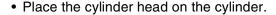




• Fit the dowel pins 1) and new cylinder head gasket 2) to the cylinder.

#### **CAUTION**

Use new gasket to prevent gas leakage.



#### 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:

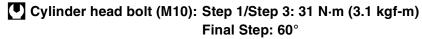
· Loosen all the cylinder head bolts diagonally.

#### 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.

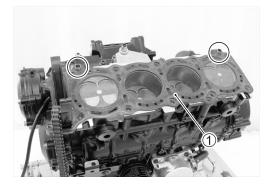


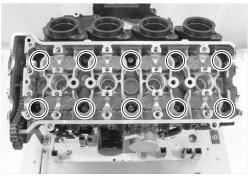
#### NOTE:

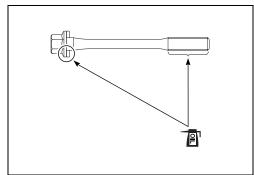
Apply engine oil to the washers and thread portion of the bolts before installing the cylinder head bolts.

• 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.

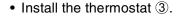
#### CAUTION

Replace the O-rings with new ones.

**1** 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)



#### NOTE:

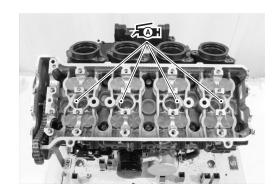
The jiggle valve (A) of thermostat faces upside.

- Install the thermostat cover 4.
- Thermostat cover bolt: 10 N·m (1.0 kgf-m)

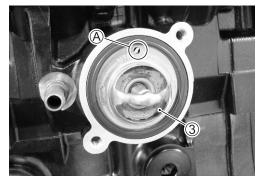
## • Install the water hose ⑤. ( 10-23)

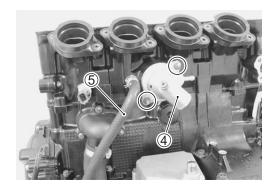
#### **CAMSHAFT**

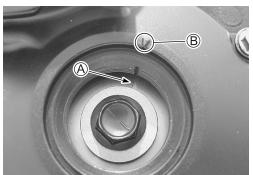
• Turn the crankshaft clockwise with the box wrench and align the line (A) on the starter clutch with the index mark (B) of valve timing inspection hole while keeping the cam chain pulled upward.











#### 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 (A) with the index mark (B) and hold this position when installing the camshafts.

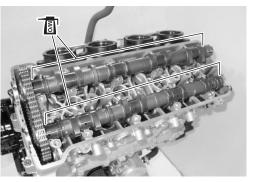
- The camshafts are identified by the embossed letters.
- Before replacing the camshafts on cylinder head, apply MOLYBDENUM OIL SOLUTION to their journals and cam faces.
- · Apply MOLYBDENUM OIL SOLUTION to the camshaft journal holders.



#### NOTE:

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

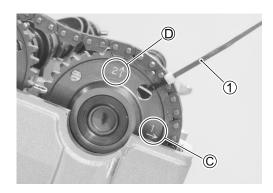


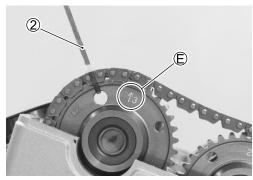


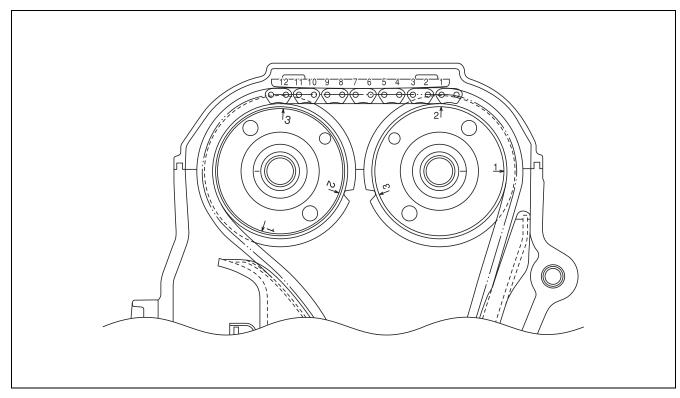
- Pull the cam chain lightly.
- The exhaust camshaft sprocket has an arrow marked "1" ©.
   Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head.
- Engage the cam chain with the exhaust camshaft sprocket.
- Bind the cam chain and sprocket with a proper wire 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" sount 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.



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.







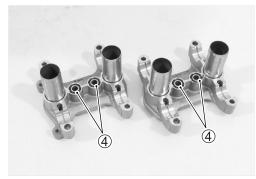
Install the dowel pins ③.



• 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.

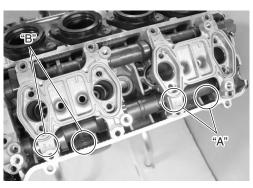
#### CAUTION

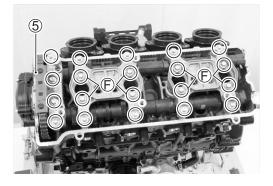
Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.

- 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.





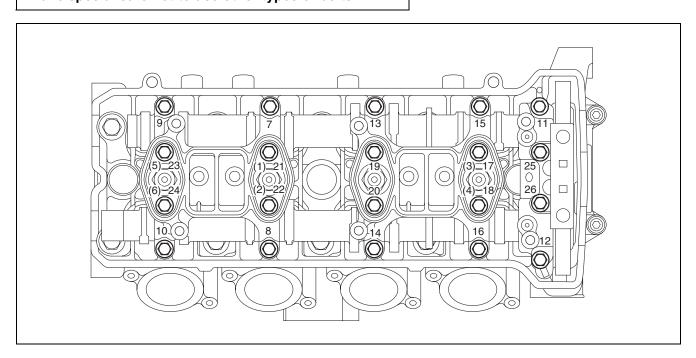
• Tighten the camshaft journal holder bolts in the ascending order of numbers to the specified torque.

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

#### CAUTION

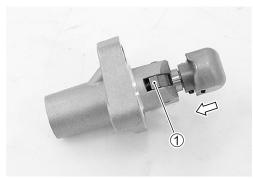
The camshaft journal holder bolts are made of a special material and much superior in strength, compared with other types of high strength bolts.

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

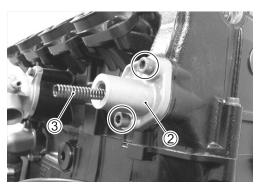
#### Use new gasket to prevent oil leakage.

• 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.

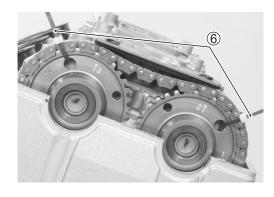


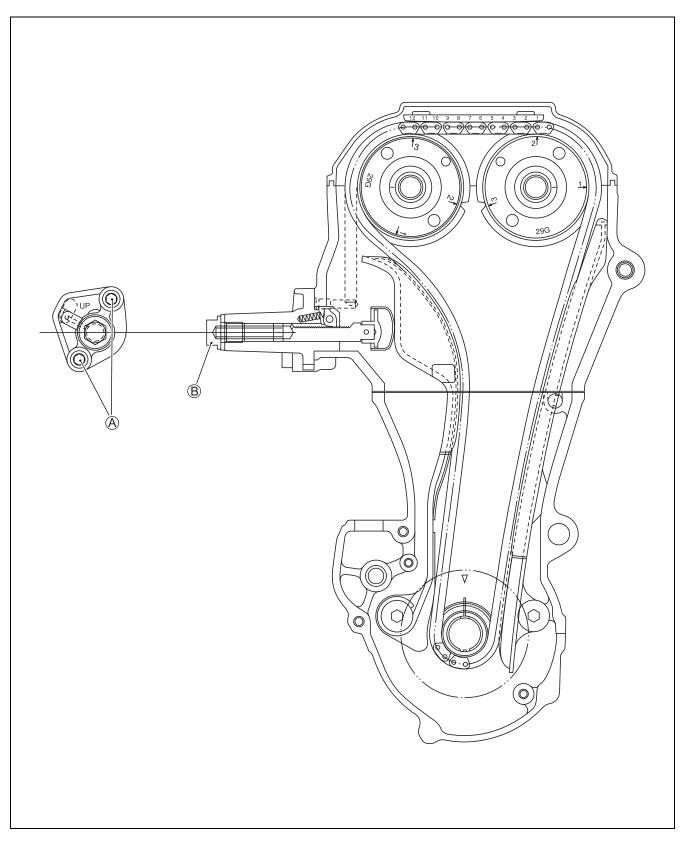
#### CAUTION

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
$^{\odot}$	Cam chain tension adjuster cap bolt

U				
ITEM	N⋅m	kgf-m		
A	10	1.0		
B	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)

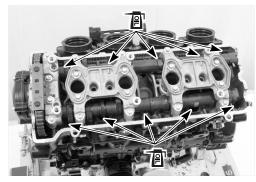


#### CYLINDER HEAD COVER AND PAIR REED VALVE

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

#### NOTE:

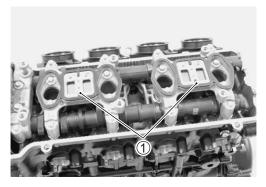
Be sure to check the valve clearance. ( 2-7)



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

#### CAUTION

Replace the gaskets with new ones.

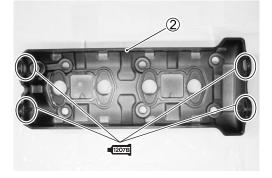


- Install new gasket ② to the cylinder head cover.
- Apply SUZUKI BOND to the cam end caps of the gasket as shown.

■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

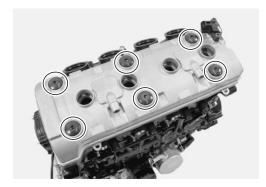
Use new gasket to prevent oil leakage.



• 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.

**1** 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)

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# FI SYSTEM DIAGNOSIS

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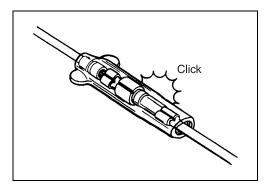
### PRECAUTIONS IN SERVICING

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

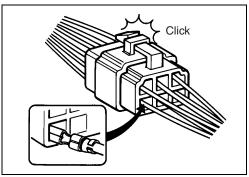
#### **ELECTRICAL PARTS**

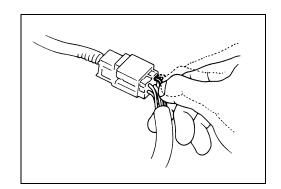
#### CONNECTOR/COUPLER

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

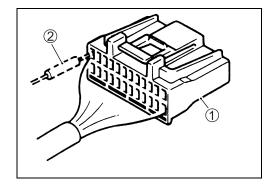


- With a lock type coupler, be sure to release the lock when disconnecting, and push in fully to engage the lock when connecting.
- When disconnecting the coupler, be sure to hold the coupler body and do not pull the lead wires.
- Inspect each terminal on the connector/coupler for looseness or bending.
- 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.



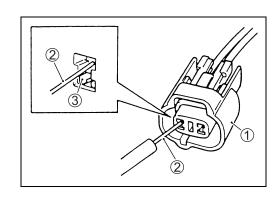
- 1 Coupler
- 2 Probe

 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

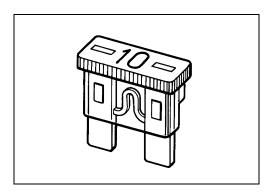
Never push in the probe where male terminal is supposed to fit.

- 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



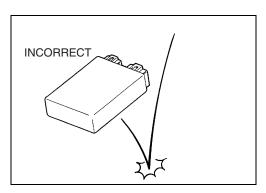
#### **FUSE**

- 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.

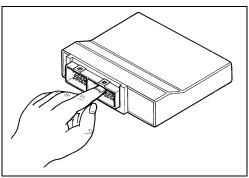


#### **ECM/VARIOUS SENSORS**

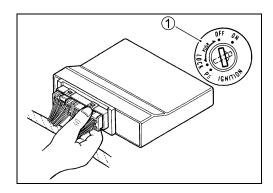
 Since each component is a high-precision part, great care should be taken not to apply any sharp impacts during removal and installation.



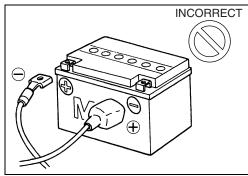
Be careful not to touch the electrical terminals of the ECM.
 The static electricity from your body may damage this part.



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

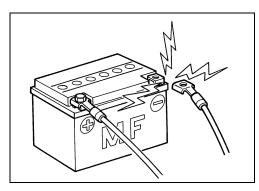


• Battery connection in reverse polarity is strictly prohibited. Such a wrong connection will damage the components of the FI system instantly when reverse power is applied.

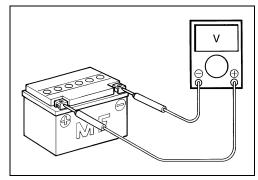


• Removing any battery terminal of a running engine is strictly prohibited.

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**

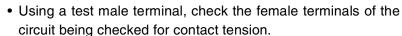
Possible causes for the open circuits are as follows. As the cause can exist in the connector/coupler or terminal, they need to be checked carefully.

- 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.



② ECM

\*1 Check for loose connection.

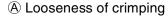


Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted in the coupler and locked.

If contact tension is not enough, rectify the contact to increase tension or replace.

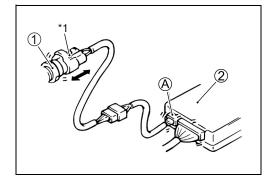
The terminals must be clean and free of any foreign material which could impede proper terminal contact.

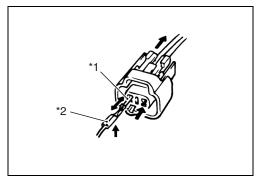
- \*1 Check contact tension by inserting and removing.
- \*2 Check each terminal for bend and proper alignment.
- Using continuity inspect or voltage check procedure as described on next page, inspect the wire harness terminals for open circuit and poor connection.

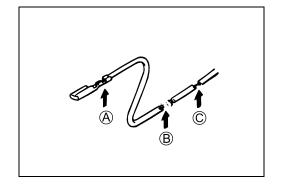


B Open

© Thin wire (a few strands left)







#### Continuity check

• Measure resistance across coupler ® (between A and C in the figure).

If no continuity is indicated (infinity or over limit), the circuit is open between terminals A and C.



• Disconnect the coupler ® and measure resistance between couplers (A) and (B).

If no continuity is indicated, the circuit is open between couplers (A) and (B). If continuity is indicated, there is an open circuit between couplers ®' and © or an abnormality in coupler B' or coupler C.



#### **VOLTAGE CHECK**

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

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

If measurements were taken as shown in the figure at the right and results are as listed below, it means that the circuit is open between terminals (A) and (B).

#### **Voltage Between:**

© and body ground: Approx. 5 V B and body ground: Approx. 5 V A and body ground: 0 V

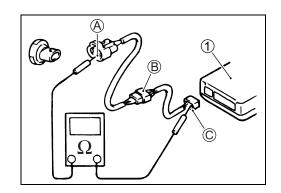
Also, if measured values are as listed below, a resistance (abnormality) exists which causes the voltage drop in the circuit between terminals (A) and (B).

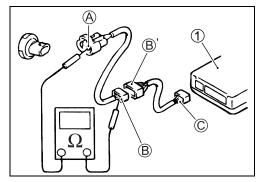
#### **Voltage Between:**

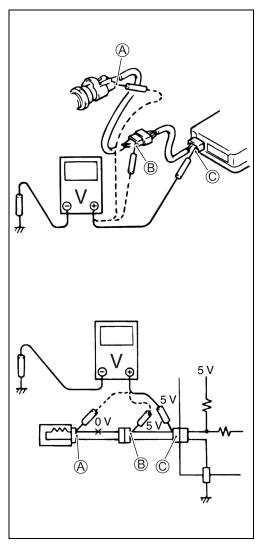
© and body ground: Approx. 5 V

B and body ground: Approx. 5 V -- 2 V voltage drop

A and body ground:







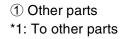
#### SHORT CIRCUIT CHECK (WIRE HARNESS TO GROUND)

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

#### NOTE:

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

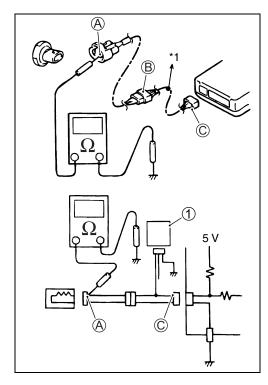
• Measure resistance between terminal at one end of circuit (A) terminal in figure) and body ground. If continuity is indicated, there is a short circuit to ground between terminals A and C.

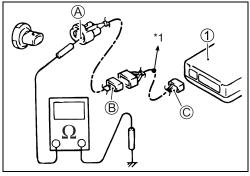


• Disconnect the connector/coupler included in circuit (coupler (B) and measure resistance between terminal (A) and body ground.

If continuity is indicated, the circuit is shorted to the ground between terminals (A) and (B).

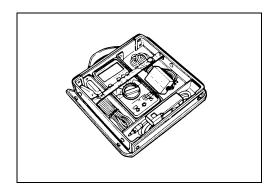
> ① ECM \*1: To other parts





#### **USING THE MULTI-CIRCUIT TESTER**

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



#### **USING THE TESTER**

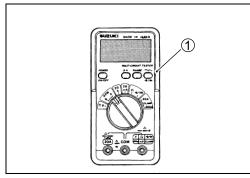
- Incorrectly connecting the ⊕ and ⊕ probes may cause the inside of the tester to burnout.
- If the voltage and current are not known, make measurements using the highest range.
- When measuring the resistance with the multi-circuit tester ①,  $\infty$  will be shown as 10.00  $M\Omega$  and "1" flashes 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.

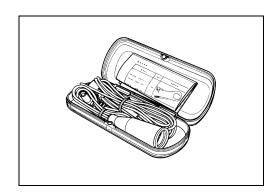


#### NOTE:

- \* 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.



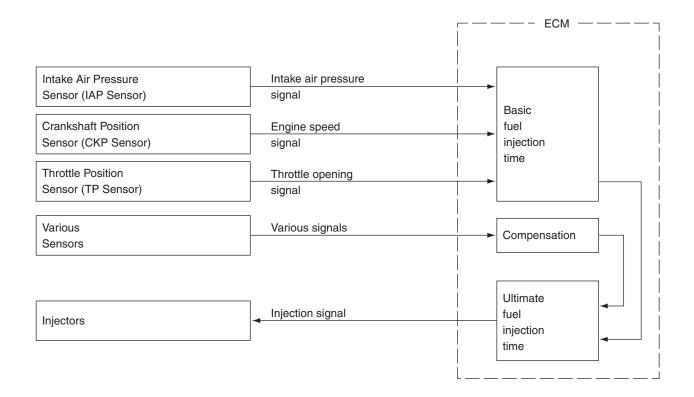




# FI SYSTEM TECHNICAL FEATURES INJECTION TIME (INJECTION VOLUME)

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.



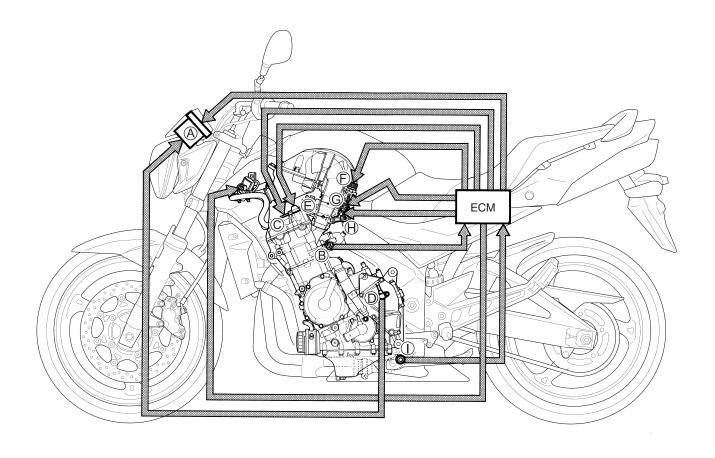
**COMPENSATION OF INJECTION TIME (VOLUME)**The following different signals are output from the respective sensors for compensation of the fuel injection time (volume).

SIGNAL	DESCRIPTION
ATMOSPHERIC PRESSURE SENSOR	When atmospheric pressure is low, the sensor sends the
SIGNAL	signal to the ECM and reduce the injection time (volume).
ENGINE COOLANT TEMPERATURE SEN-	When engine coolant temperature is low, injection time (vol-
SOR SIGNAL	ume) is increased.
INTAKE AIR TEMPERATURE SENSOR	When intake air temperature is low, injection time (volume)
SIGNAL	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/	During acceleration, the fuel injection time (volume) is
DECELERATION SIGNAL	increased in accordance with the throttle opening speed and
	engine rpm. During deceleration, the fuel injection time (vol-
	ume) is decreased.

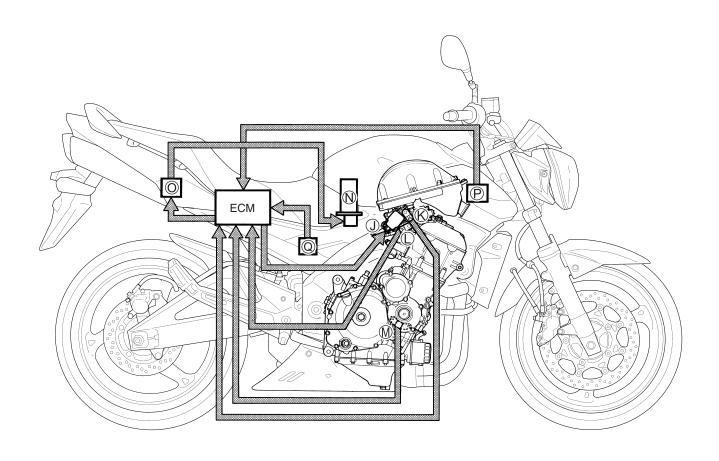
## **INJECTION STOP CONTROL**

SIGNAL	DESCRIPTION
TIP-OVER SENSOR SIGNAL	When the motorcycle tips over, the tip-over sensor sends a
(FUEL SHUT-OFF)	signal to the ECM. Then, this signal cuts OFF current sup-
	plied 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

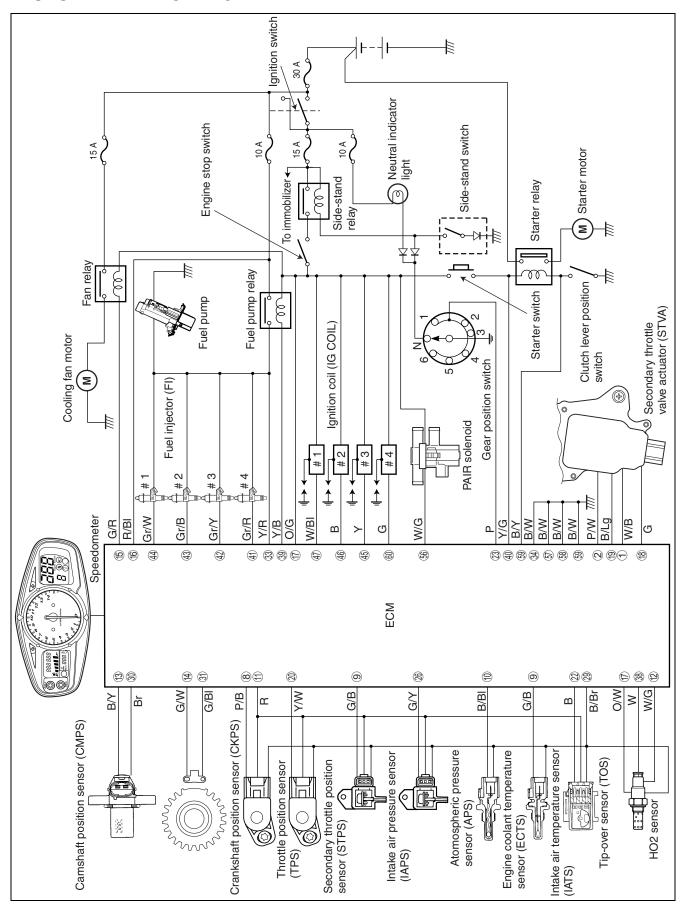


- **(A)** Speedometer
- B Engine coolant temperature sensor (ECTS)
- © Ignition coil
- Speed sensor
- © Cam shaft position sensor (CMPS)
- ⑤ Intake air pressure sensor (IAPS)
- © Intake air temperature sensor (IATS)
- ⊕ Fuel injector
- ① HO2 sensor

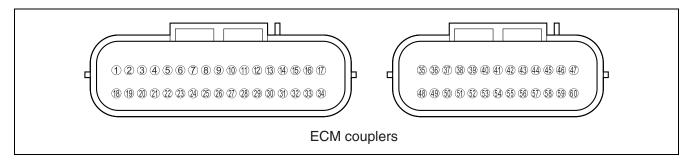


- Secondary throttle valve actuator (STVA)
- ₭ Secondary throttle position sensor (STPS)
- ① Throttle position sensor (TPS)
- N Fuel pump (FP)
- © Fuel pump relay (FP relay)
- P Atmospheric pressure sensor (APS)
- @ Tip-over sensor (TOS)

#### FI SYSTEM WIRING DIAGRAM



## **ECM TERMINAL**



TERMINAL	CIDCUIT	TERMINAL	CIDCUIT
NO.	CIRCUIT	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	<u>(55)</u>	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

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"  Engine can start	Odd, trip or clock and "FI" letters *1	FI light turns ON.	Each 2 sec., odd, trip or clock and "FI" is indicated alternately.
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 speed-ometer 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		_
"YES"	C**code is indicated from small numeral to large one.	J .	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	Anti-theft
	immobilizer)	
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.



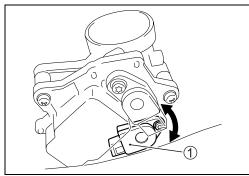
- 3. If the throttle position sensor adjustment is necessary, remove the air cleaner box (5-13) and follow the procedure below.
- 4. Loosen the screw and turn the throttle position sensor ① and bring the line to the middle.
- 5. Then, tighten the screw to fix the throttle position sensor.

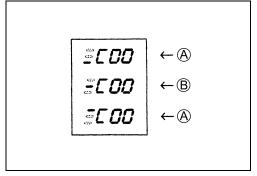
09930-11950: Torx wrench 09930-82720: Mode select switch

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.



**B** 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	"NO"	"YES"
CIMI COLLEGI	failed during running, the ECM determines the cylinder positions as # to be the same as before occurrence of such a failure.	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 cy	linders can run.
	#4 Ignition-off	"YES"	"YES"
		#1, #2 & #3 cy	linders can run.
Injection signal	#1 Fuel-cut	"YES"	"YES"
		#2, #3 & #4 cy	linders can run.
	#2 Fuel-cut	"YES"	"YES"
		#1, #3 & #4 cy	linders can run.
	#3 Fuel-cut	"YES"	"YES"
		#1, #2 & #4 cylinders can run.	
	#4 Fuel-cut	"YES"	"YES"
		#1, #2 & #3 cy	linders 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	☐ Always ON ☐ Sometimes ON ☐ Always OFF ☐ Good condition				
lamp condition (LED)	Always ON     Sometimes ON   Always OFF   Good Condition				
Malfunction display/code	User mode: ☐ No display ☐ Malfunction display ( )				
(LCD)	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:					
1					

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 con-	During driving: ☐ Constant speed ☐ Accelerating ☐ Decelerating			
dition	☐ 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)

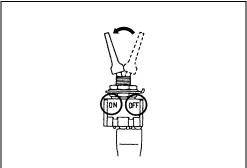
#### SELF-DIAGNOSTIC PROCEDURES

#### 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.

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
- 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.

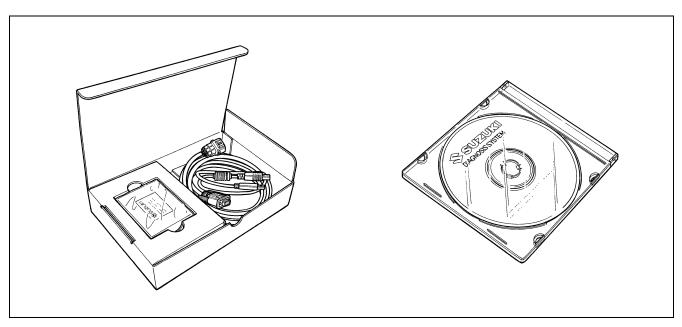


#### **USE OF SDS DIAGNOSTIC PROCEDURES**

- \* 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" (\$\subseteq 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.)

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





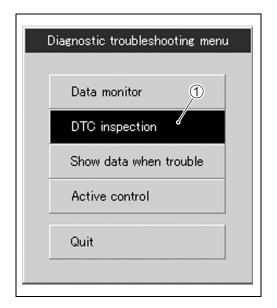
## USE OF SDS DIAGNOSIS RESET PROCEDURE

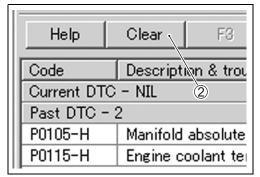
- After repairing the trouble, turn OFF the ignition switch and turn ON again.
- Click the DTC inspection button 1.
- Check the DTC.
- The previous malfunction history code (Past DTC) still remains stored in the ECM. Therefore, erase the history code memorized in the ECM using SDS tool.

#### NOTE:

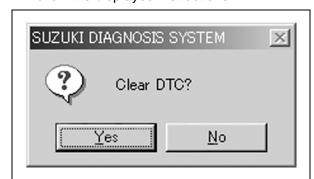
The malfunction code is memorized in the ECM also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.

• Click "Clear" 2 to delete history code (Past DTC).



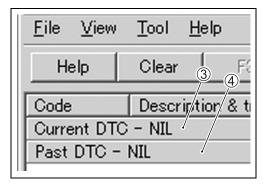


• Follow the displayed instructions.





 Check that both "Current DTC" (3) and "Past DTC" (4) are deleted (NIL).

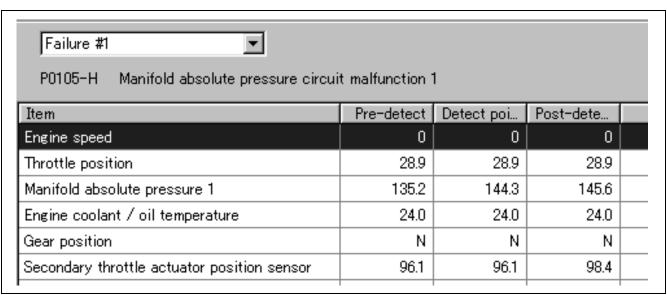


# SHOW DATA WHEN TROUBLE (DISPLAING DATA AT THE TIME OF DTC)

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.



P0110-H Intake air temperature circuit malfunction  Item Pre-d  Engine speed  Throttle position  Manifold absolute pressure 1  Engine coolant / oil temperature  Gear position	Failure #2				
Engine speed Throttle position Manifold absolute pressure 1 Engine coolant / oil temperature	P0110-H Intake air temperature circuit malfunction				
Throttle position  Manifold absolute pressure 1  Engine coolant / oil temperature	Item	Pre-d			
Manifold absolute pressure 1 Engine coolant / oil temperature	Engine speed				
Engine coolant / oil temperature	Throttle position				
·	Manifold absolute pressure 1				
Gear position	Engine coolant / oil temperature				
1 ·					
Secondary throttle actuator position sensor					

# **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	CMP sensor wiring and mechanical parts
P0340			signal.	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	CKP sensor wiring and mechanical parts
P0335			signal.	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
	Н		Sensor voltage is higher than specified value.	IAP sensor circuit shorted to VCC or ground circuit open
P0105	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
	Η		Sensor voltage is higher than specified value.	TP sensor circuit shorted to VCC or ground circuit open
P0120	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. $0.15 \text{ V} \leq \text{sensor voltage} < 4.85 \text{ V}$ In other than the above range, C15 (P0115) is indicated.	ECT sensor, lead wire/coupler connection
P0115	Н		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

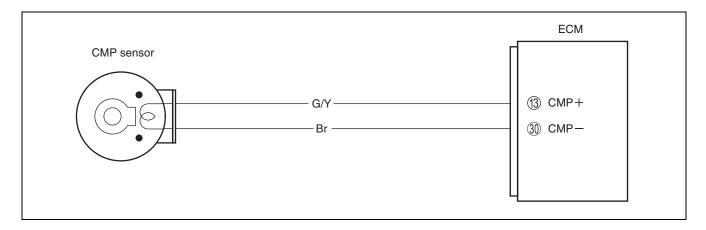
DTC No.		DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C21		IAT sensor	The sensor voltage should be the following. 0.15 V $\leq$ sensor voltage < 4.85 V In other than the above range, C21 (P0110) is indicated.	IAT sensor, lead wire/coupler connection
P0110 L			Sensor voltage is higher than specified value.  Sensor voltage is lower than specified value.	IAT sensor circuit open or ground circuit open IAT sensor circuit shorted to ground
C22		AP sensor	The sensor voltage should be the following. 0.5 V $\leq$ sensor voltage < 4.85 V In other than the above range, C22 (P1450) is indicated.	AP sensor, wiring/coupler connection
P1450	P1450 L		Sensor voltage is higher than specified value. Sensor voltage is lower than specified value.	AP sensor circuit shorted to VCC or ground circuit open AP sensor circuit open or shorted to ground or VCC circuit
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	P1651 L		Sensor voltage is higher than specified value. Sensor voltage is lower than specified value.	TO sensor circuit shorted to VCC or ground circuit open TO sensor circuit open or shorted to ground or VCC circuit open
C24/C25 C26/C27 P0351/P0352 P0353/P0354		Ignition sig- nal	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 con- nection, power supply from the battery
C28		Secondary throttle valve actuator	When no actuator control signal is supplied from the ECM, communication signal does not reach ECM or	STVA motor, STVA lead wire/coupler
P1655			operation voltage does not reach STVA motor, C28 (P1655) is indicated. STVA can not operate.	

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
	Н		Sensor voltage is higher than specified value.	STP sensor circuit shorted to VCC or ground circuit open
P1654	L		Sensor voltage is lower than specified value.	STP sensor circuit open or shorted to ground or VCC circuit open
C31		Gear posi- tion signal	Gear position signal voltage should be higher than the following for 3 seconds and more.	GP switch, wiring/coupler connection, gearshift cam, etc.
P0705			Gear position sensor voltage > 0.6 V If lower than the above value, C31 (P0705) is indicated.	
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	Fuel injector, wiring/coupler connection, power supply to the injector
P0201/P0 P0203/P0			(P0202), C34 (P0203) or C35 (P0204) is indicated.	
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/cou- pler connection, power source to fuel pump relay and fuel injec- tors
P0230	Н		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)
1 0200	اـ		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 P1650		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

DTC No.	DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
	HO2 sensor	HO2 sensor output voltage is not input	HO2 sensor circuit open or
C44		to ECM during engine operation and	shorted to ground
		running condition.	
		(Sensor voltage ≤ 0.1 V)	
P0130		In other than the above value, C44	
		(P0130) is indicated.	
C44		The Heater can not operate so that	HO2 sensor lead wire/coupler
U44		heater operation voltage is not supply	connection
P0135		to the oxygen heater circuit, C44	Battery voltage supply to the
P0135		(P0135) is indicated.	HO2 sensor
C49	PAIR control	PAIR control solenoid valve voltage is	PAIR control solenoid valve, lead
P1656	solenoid	not input to ECM.	wire/coupler
1 1030	valve		
C60	Cooling fan	Cooling fan relay signal is not input to	Cooling fan relay, lead wire/cou-
P0480	relay	ECM.	pler connection

### "C11" (P0340) CMP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
The signal does not reach ECM for 3 sec. or more,	Metal particles or foreign material being stuck on
after receiving the starter signal.	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:  $0.9 - 1.7 \text{ k}\Omega$ 

(Terminal - Terminal)

09900-25008: Multi-circuit tester set  $\square$  Tester knob indication: Resistance ( $\Omega$ )

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

**DATA** CMP sensor continuity:  $\infty \Omega$  (Infinity)

(Terminal – Ground)

Are the resistance and continuity OK?

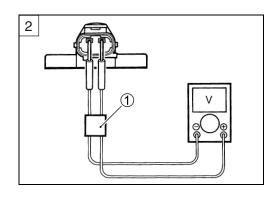
YES	Go to step 2.
NO	Replace the CMP sensor with a new one.



- 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.

CMP sensor peak voltage: 0.7 V and more (+) B/Y - -> B/Br)

1 Peak volt adaptor

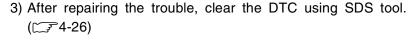


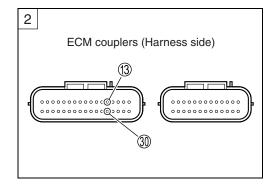
09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (===)

### Is the voltage OK?

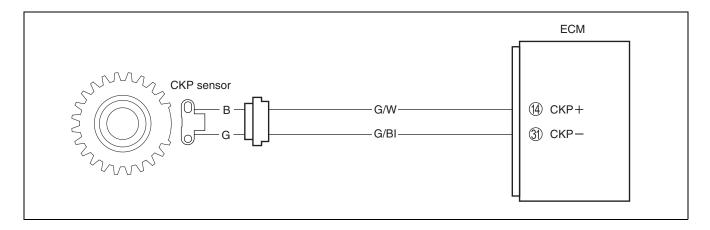
	G/Y or Brown wire open or shorted to ground
	Loose or poor contacts on the CKP sensor cou-
	pler or ECM coupler (terminal ® or ®)
	• If wire and connection are OK, intermittent trou-
YES	ble or faulty ECM.
	Recheck each terminal and wire harness for
	open circuit and poor connection.
	Replace the ECM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





# "C12" (P0335) CKP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
The signal does not reach ECM for 3 sec. or more,	Metal particles or foreign material being stuck on
after receiving the starter signal.	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.



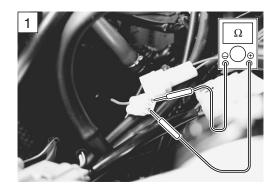
4) Disconnect the CKP sensor coupler and measure the resistance.

**DATA** CKP sensor resistance: 142 – 194  $\Omega$ 

(Black - Green)

09900-25008: Multi-circuit tester set

 $\square$  Tester knob indication: Resistance ( $\Omega$ )



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

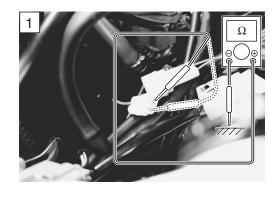
**CKP** sensor continuity:  $\infty \Omega$  (Infinity)

(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. (574-26)



### 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.

CKP sensor peak voltage: 0.5 V and more

(+ Black - - Green)

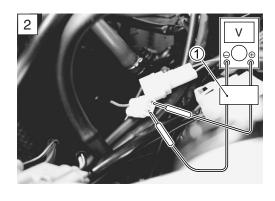
1 Peak volt adaptor

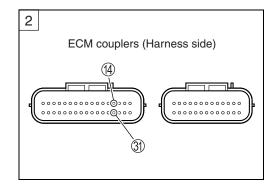
09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (---)

Is the voltage OK?

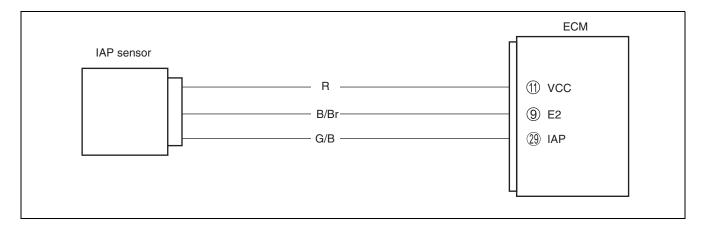
YES	<ul> <li>G/W or G/BI wire open or shorted to ground.</li> <li>Loose or poor contacts on the CKP sensor coupler or ECM coupler (terminal 4 or 3).</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> </ul>
	<ul> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	<ul> <li>Inspect that metal particles or foreign material stuck on the CKP sensor and rotor tip.</li> <li>If there are no metal particles and foreign material, then replace the CKP sensor with a new one.</li> </ul>





# "C13" (P0105-H/L) IAP SENSOR CIRCUIT MALFUNCTION

		DETECTED CONDITION		POSSIBLE CAUSE
P0105		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	Н	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.

IAP sensor input voltage: 4.5 – 5.5 V

(⊕ Red – ⊝ Ground)

(⊕ Red – ⊝ B/Br)

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	<ul> <li>Loose or poor contacts on the ECM coupler (terminal ① or ②).</li> <li>Open or short circuit in the Red wire or B/Br wire.</li> </ul>

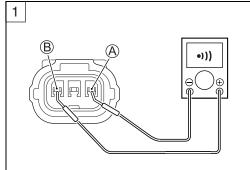
### Step 1 (When indicating P0105-H:)

- 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 (A) and G/B wire (B). If the sound is not heard from the tester, the circuit condition is OK.









- 6) Disconnect the ECM coupler.
- 7) Check the continuity between G/B wire ® and terminal 9.
- 8) If OK, then check the continuity between B/Br wire © and terminal ②.

IAPS lead wire continuity: Continuity (•)))

09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•)))

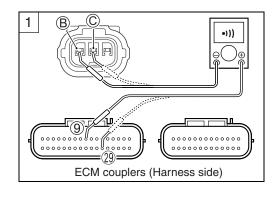
Is the continuity OK?

YES	Go to Step 2.	
NO	G/B wire shorted to VCC, or B/Br wire open.	

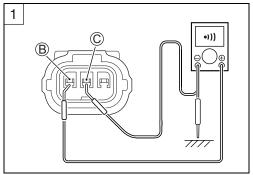
9) After repairing the trouble, clear the DTC using SDS tool. (2-4-26)

### 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 B 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 (A) and terminal (1).
- 9) Also, check the continuity between G/B wire ® and terminal 9.

IAPS lead wire continuity: Continuity (•)))

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 ( 74-36) and go to Step 2.		
NO	Red wire or G/B wire open, or G/B wire shorted to	
NO	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.

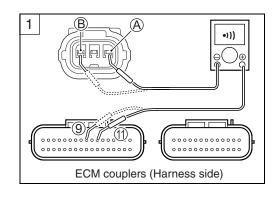
IAP sensor output voltage: Approx. 2.7 V at idle speed (+ G/B - - B/Br)

09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Voltage (---)

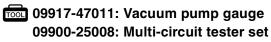
Is the voltage OK?

YES	Go to Step 3.		
	Check the vacuum hose for crack or damage.		
NO	Open or short circuit in the G/B wire		
I NO	If vacuum hose and wire are OK, replace the		
	IAP sensor with a new one.		





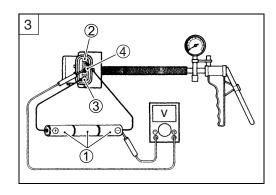
- 1) Turn the ignition switch to OFF.
- 2) Remove the IAP sensor.
- 3) Connect the vacuum pump gauge to the vacuum port of the IAP sensor.
  - Arrange 3 new 1.5 V batteries in series ① (check that total voltage is 4.5 5.0 V) and connect  $\bigcirc$  terminal to the ground terminal ② and  $\oplus$  terminal 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)

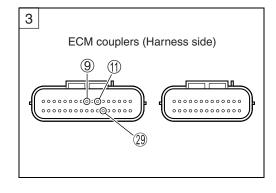


Tester knob indication: Voltage (---)



YES	<ul> <li>G/B, Red or B/Br wire open or shorted to ground, or poor (9), (1) or (2) connection</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	If check result is not satisfactory, replace the IAP sensor with a new one.



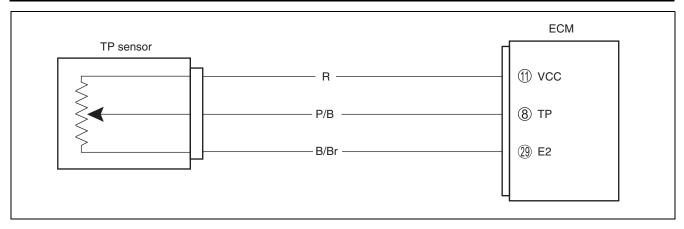


Output voltage (VCC voltage 4.5 – 5.0 V, ambient temp. 20 – 30 °C)

ALTITUDE	ATMOSPHERIC		OUTPUT
(Reference)	PRES	SURE	VOLTAGE
(m)	(mmHg)	kPa	(V)
0	760	100	
			3.1 – 3.6
610	708	95	
611	707	94	
			2.8 - 3.4
1 524	635	86	
1 525	634	85	
			2.6 – 3.1
2 438	568	77	
2 439	567	76	
			2.4 - 2.9
3 048	526 70		

# "C14" (P0120-H/L) TP SENSOR CIRCUIT MALFUNCTION

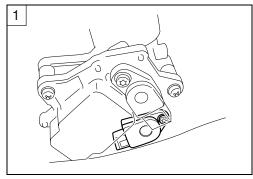
DETECTED CONDITION				POSSIBLE CAUSE
C14		Output voltage is not within the following	•	TP sensor maladjusted
		range.	•	TP sensor circuit open or short
		Difference between actual throttle open-	•	TP sensor malfunction
		ing and opening calculated by ECM is	•	ECM malfunction
		larger than specified value.		
		0.2 V ≤ Sensor voltage < 4.8 V		
P0120	Н	Sensor voltage is higher than specified	•	TP sensor circuit shorted to VCC or ground circuit
	11	value.		open
		Sensor voltage is lower than specified	•	TP sensor circuit open or shorted to ground or
	_	value.		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 (B) and ground.
- 8) If OK, then measure the voltage at the Red wire ® and B/Br wire ©.



TP sensor input voltage: 4.5 – 5.5 V

(⊕ Red – ⊝ Ground)

(⊕ Red – ⊝ B/Br)

09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (---)

Is the voltage OK?

YES	Go to Step 2.		
NO	<ul> <li>Loose or poor contacts on the ECM coupler (terminal ① or ②).</li> <li>Open or short circuit in the Red wire or B/Br wire.</li> </ul>		

# 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. (5-5-13)
- 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 (A) and Red wire (B). If the sound is not heard from the tester, the circuit condition is OK.
- 1 B A 1))

- 7) Disconnect the ECM coupler.
- 8) Check the continuity between P/B wire A and terminal 8.
- 9) Also, check the continuity between B/Br wire © and terminal ②.

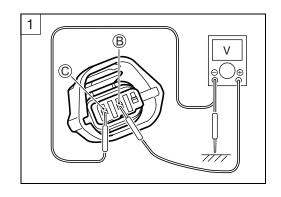
TPS lead wire continuity: Continuity (•)))

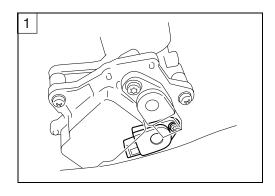
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

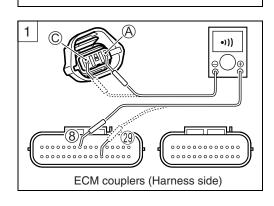
Tester knob indication: Continuity test (•)))

Is the continuity OK?

YES	Go to Step 2.	
NO	P/B wire shorted to VCC, or B/Br wire open	

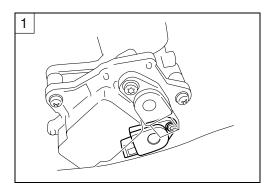


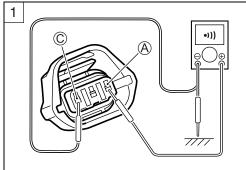




### Step 1 (When indicating P0120-L:)

- 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 (A) and ground.
- 7) Also, check the continuity between P/B wire (A) and B/Br wire (C). If the sound is not heard from the tester, the circuit condition is OK.



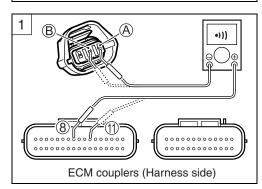


- 8) Disconnect the ECM coupler.
- 9) Check the continuity between P/B wire A and terminal 8.
- 10) Also, check the continuity between Red wire ® and terminal ①.

TPS lead wire continuity: Continuity (\*)))

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 ( 4-42) and go to Step 2.			
NO	Red wire or P/B wire open, or P/B wire shorted to			
NO	ground			

- 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 (A) and ground.

**PATA** TP sensor continuity:  $\infty \Omega$  (Infinity)

(Terminal A – Ground)

09900-25008: Multi-circuit tester set 09900-28630: TPS test wire harness

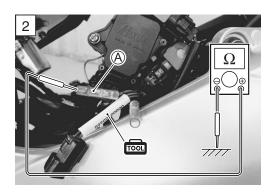
Tester knob indication: Continuity test (•)))

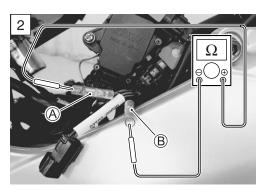
5) If OK, then measure the TP sensor resistance at the test harness terminals (between terminal (a) and terminal (b).

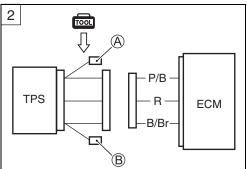
6) Turn the throttle grip and measure the resistance.

DATA TP sensor resistance

Throttle valve is closed: Approx. 1.1 k $\Omega$  Throttle valve is opened: Approx. 4.4 k $\Omega$ 





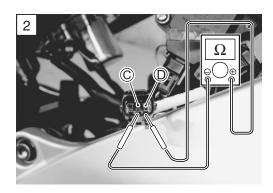


7) If OK, then measure the TP sensor resistance at the test harness terminals (between terminal © and terminal D).

TP sensor resistance: Approx. 4.68 k $\Omega$ 

(Terminal © – Terminal ©)

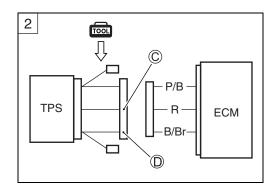
Tester knob indication: Resistance ( $\Omega$ )



Are the continuity and resistance OK?

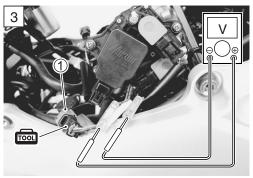
YES	Go to Step 3.		
NO	Reset the TP sensor position correctly.		
NO	Replace the TP sensor with a new one.		

8) After repairing the trouble, clear the DTC using SDS tool. (2-4-26)



### Step 3

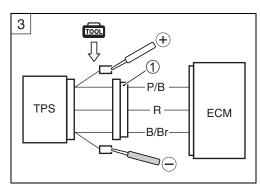
- 1) Connect the TP sensor coupler ① to the test harness.
- 2) Turn the ignition switch to ON.
- 3) Measure the TP sensor output voltage at the coupler (between ⊕ P/B and ⊝ B/Br) by turning the throttle grip.



TP sensor output voltage

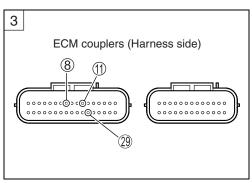
Throttle valve is closed: Approx. 1.1 V Throttle valve is opened: Approx. 4.4 V

09900-25008: Multi-circuit tester set



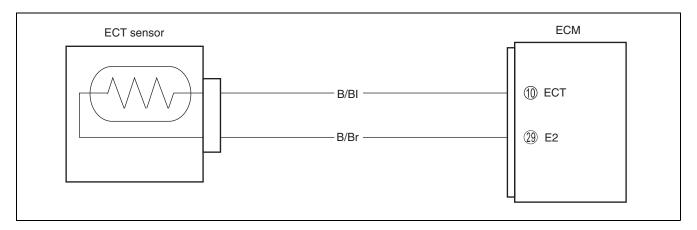
Is the voltage OK?

YES	<ul> <li>P/B, Red or B/Br wire open or shorted to ground, or poor ®, ① or ② connection</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	If check result is not satisfactory, replace TP sensor with a new one.



# "C15" (P0115-H/L) ECT SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION			POSSIBLE CAUSE
C15		Output voltage is not within the following	ECT sensor circuit open or short
		range.	ECT sensor malfunction
		0.15 V ≤ Sensor voltage < 4.85 V	ECM malfunction
P0115	Н	Sensor voltage is higher than specified	ECT sensor circuit open or ground circuit open
	П	value.	
	ı	Sensor voltage is lower than specified	ECT sensor circuit shorted to ground
	_	value.	



### **INSPECTION**

### Step 1 (When indicating C15:)

- 1) Turn the ignition switch to OFF.
- 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/BI wire terminal (A) and ground.
- 5) If OK, then measure the voltage between B/BI wire terminal (A) and B/Br wire terminal (B).

PATA ECT sensor voltage: 4.5 – 5.5 V

( $\oplus$  B/BI –  $\bigcirc$  Ground)

(⊕ B/BI – ⊝ B/Br)

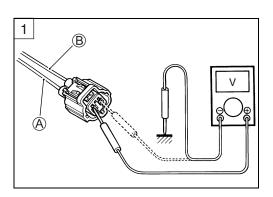
09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (==-)

Is the voltage OK?

YES	Go to Step 2.
NO	<ul> <li>Loose or poor contacts on the ECM coupler (terminal ① or ②).</li> <li>Open or short circuit in the B/BI wire or B/Br wire</li> </ul>





### 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.



3) Disconnect the ECT sensor coupler and ECM coupler.

4) Check the continuity between B/BI wire (A) and terminal (10).

5) Also, check the continuity between B/Br wire B and terminal 29.

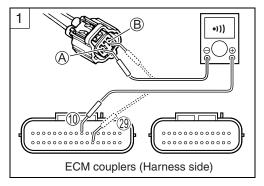
ECTS lead wire continuity: Continuity (•)))

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/BI or B/Br wire open

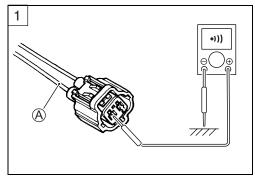


### Step 1 (When indicating P0115-L:)

- 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/BI wire (A) and ground. If the sound is not heard from the tester, the circuit condition is OK.
- Tester knob indication: Continuity test (•)))

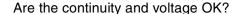


- 5) Connect the ECT sensor coupler and turn the ignition switch to ON.
- 6) Measure the voltage between B/BI wire (A) and ground.

ECT sensor output voltage: 0.15 – 4.85 V (+ B/BI – - Ground)

09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Voltage (---)



YES Go to Step 2.	
NO	B/BI wire shorted to ground
NO	If wire is OK, go to 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 k $\Omega$  at 20 °C (Terminal – Terminal)

09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )

Refer to page 7-7 for details.

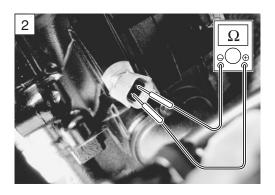
### Is the resistance OK?

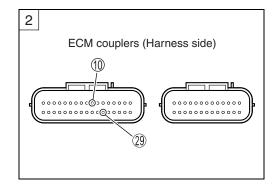
	YES	Replace the ECM with a known good one, and
inspect it again.		inspect it again.
NO Replace the ECT sensor with a new one.	NO	Replace the ECT sensor with a new one.

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

### **DATA** ECT sensor specification

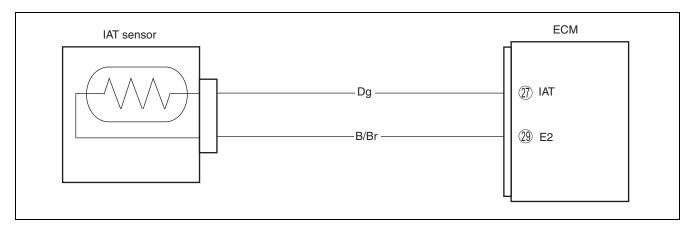
Resistance
Approx. 2.45 k $\Omega$
Approx. 0.811 k $\Omega$
Approx. 0.318 k $\Omega$
Approx. $0.142 \text{ k}\Omega$





# "C21" (P0110-H/L) IAT SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION			POSSIBLE CAUSE
C21 Output voltage is not within the following		Output voltage is not within the following	IAT sensor circuit open or short
		range.	IAT sensor malfunction
		0.15 V ≤ Sensor voltage < 4.85 V	ECM malfunction
P0110		Sensor voltage is higher than specified	IAT sensor circuit open or ground circuit open
	П	value.	
	ı	Sensor voltage is lower than specified	IAT sensor circuit shorted to ground
	L	value.	



### **INSPECTION**

### Step 1 (When indicating C21:)

- 1) Turn the ignition switch to OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 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 (A) and ground.
- 6) If OK, then measure the voltage between Dg wire terminal (A) and B/Br wire terminal (B).

DATA IAT sensor input voltage: 4.5 – 5.5 V

(**⊕** Dg – **⊝** Ground)

(⊕ Dg – ⊝ B/Br)

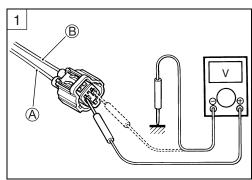
09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (---)

Is the voltage OK?

YES Go to Step 2.	
NO	<ul> <li>Loose or poor contacts on the ECM coupler (terminal ② or ②)</li> <li>Open or short circuit in the Dg wire or B/Br wire</li> </ul>





### 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 (A) and terminal (2).

6) Also, check the continuity between B/Br wire ® and terminal ®.

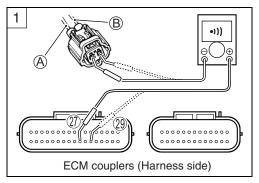
IATS lead wire continuity: Continuity (•)))

09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•)))

Is the continuity OK?

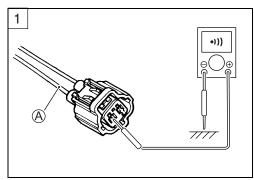
YES Go to Step 2.  NO Dg wire or B/Br v		Go to Step 2.
		Dg wire or B/Br wire open



### 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 (A) and ground. If the sound is not heard from the tester, the circuit condition is OK.
- Tester knob indication: Continuity test (•)))



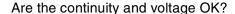
- 6) Connect the IAT sensor coupler and turn the ignition switch ON.
- 7) Measure the voltage between Dg wire (A) and ground.

IAT sensor output voltage: 0.15 – 4.85 V

 $( \oplus$  Dg  $- \bigcirc$  Ground)

09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Voltage (==)



YES	Go to Step 2.	
NO	<ul><li>Dg wire shorted to ground</li><li>If wire is OK, go to Step 2.</li></ul>	



1) Turn the ignition switch to OFF.

2) Measure the IAT sensor resistance.

IAT sensor resistance: Approx. 2.45 k $\Omega$  at 20 °C

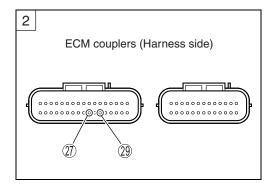
(Terminal – Terminal)

09900-25008: Multi-circuit tester set Tester knob indication: Resistance ( $\Omega$ )

### Is the resistance OK?

YES	<ul> <li>Dg or B/Br wire open or shorted to ground, or poor ② or ② connection</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	Replace the IAT sensor with a new one.

# 



### DATA IAT sensor specification

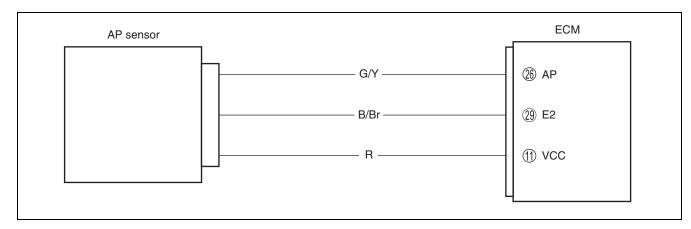
Intake Air Temp	Resistance
20 °C	Approx. 2.45 kΩ
50 °C	Approx. 0.808 kΩ
80 °C	Approx. 0.322 kΩ
110 °C	Approx. 0.148 kΩ

### 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 fol-	•	Clogged air passage with dust
		lowing range.	•	AP sensor circuit open or shorted to ground
	0.5 V ≦ Sensor voltage < 4.85 V		•	AP sensor malfunction
		NOTE:	•	ECM malfunction
		Note that atmospheric pressure varies		
	depending on weather conditions as			
	well as altitude.			
Take that into consideration		Take that into consideration when		
		inspecting voltage.		
P1450	Н	Sensor voltage is higher than specified	•	AP sensor circuit shorted to VCC or ground circuit
	П	value.		open
		Sensor voltage is lower than specified	•	AP sensor circuit open or shorted to ground or
	L	value.		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 (A) and B/Br wire (B).

AP sensor input voltage: 4.5 – 5.5 V

( $\oplus$  R –  $\ominus$  Ground)

(⊕ R – ⊝ B/Br)

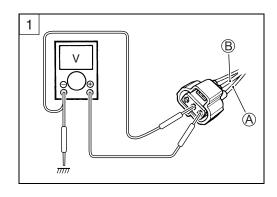
09900-25008: Multi-circuit tester set

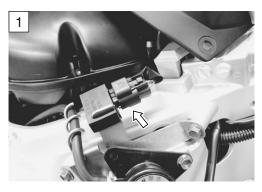
Is the voltage OK?

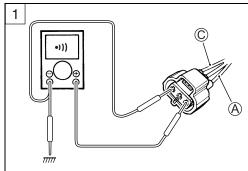
YES	Go to Step 2.
	Loose or poor contacts on the ECM coupler
NO	(terminal ① or ②)
	Open or short circuit in the R wire or B/Br wire

### 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 (A) and G/Y wire (C). 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 36.
- 8) If OK, then check the continuity between B/Br wire ® and terminal ②.

APS lead wire continuity: Continuity (•)))

09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•)))

Is the continuity OK?

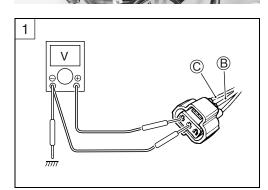
YES	Go to Step 2.
NO	G/Y wire shorted to VCC, or B/Br wire open

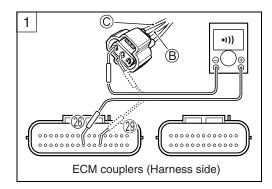
9) After repairing the trouble, clear the DTC using SDS tool. (2-4-26)

### 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 B. 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 (A) and terminal (1).
- 9) If OK, then check the continuity between G/Y wire © and terminal 3.

APS lead wire continuity: Continuity (•)))

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	
INO	ground	

10) After repairing the trouble, clear the DTC using SDS tool. (23-4-26)

### Step 2

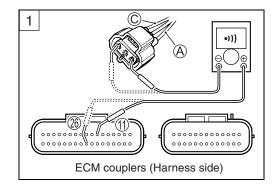
- 1) Connect the AP sensor coupler and ECM coupler.
- 2) Insert the needle pointed probes to the lead wire coupler. Turn the ignition switch ON.
- 3) Measure the AP sensor output voltage at the wire side coupler (between G/Y and B/Br wires).

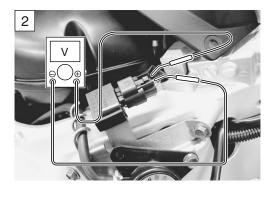
AP sensor output voltage: Approx. 3.6 V at 100 kPa (760 mmHg) (⊕ G/Y – ⊖ B/Br)

09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

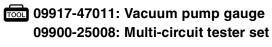
Tester knob indication: Voltage (==)

YES	Go to Step 3.	
	Check the air passage for clogging.	
NO	Open or short circuit in the G/Y wire	
	Replace the AP sensor with a new one.	





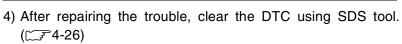
- 1) Remove the AP sensor.
- 2) Connect the vacuum pump gauge to the vacuum port of the AP sensor.
  - Arrange 3 new 1.5 V batteries in series 1 (check that total voltage is 4.5 5.0 V) and connect terminal to the ground terminal 2 and + terminal to the VCC terminal 3.
- 3) Check the voltage between Vout ④ and ground. Also, check if voltage reduces when vacuum is applied up to 400 mmHg by using vacuum pump gauge. ( Below)

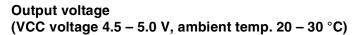


Tester knob indication: Voltage (---)

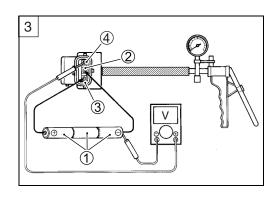
Is the voltage OK?

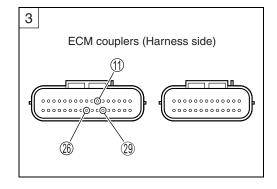
YES	<ul> <li>R, G/Y or B/Br wire open or shorted to ground, or poor ①, ② or ② connection.</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	If check result is not satisfactory, replace AP sensor with a new one.





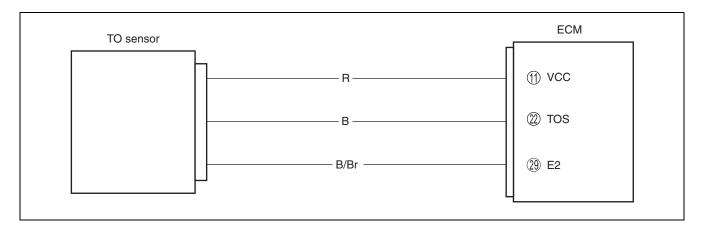
ALTITUDE	ATMOSPHERIC		OUTPUT
(Reference)	PRESSURE		VOLTAGE
(m)	(mmHg)	kPa	(V)
0	760	100	
			3.1 – 3.6
610	708	95	
611	707	94	
			2.8 – 3.4
1 524	635	86	
1 525	634	85	
			2.6 – 3.1
2 438	568	77	
2 439	567	76	
			2.4 – 2.9
3 048	526	70	





## "C23" (P1651-H/L) TO SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION		DETECTED CONDITION	POSSIBLE CAUSE
C23		The sensor voltage should be the follow-	TO sensor circuit open or short
		ing for 2 sec. and more, after ignition	<ul> <li>TO sensor malfunction</li> </ul>
		switch is turned ON.	ECM malfunction
		0.2 V ≤ Sensor voltage < 4.8 V	
P1651	Н	Sensor voltage is higher than specified	• TO sensor circuit shorted to VCC or ground circuit
	П	value.	open
		Sensor voltage is lower than specified	<ul> <li>TO sensor circuit open or shorted to ground or</li> </ul>
	L	value.	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 (A) and terminal (C).

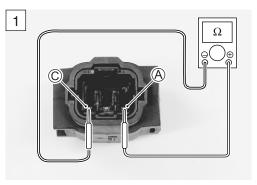
DATA TO sensor resistance: 16.5 – 22.3 k $\Omega$ 

(Terminal (A) – Terminal (C)

09900-25008: Multi-circuit tester set  $\square$  Tester knob indication: Resistance ( $\Omega$ )

Is the resistance OK?

YES	Go to Step 2.
NO	Replace the TO sensor with a new one.

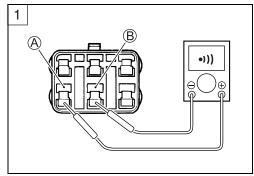


### Step 1 (When indicating P1651-H:)

- 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 (a) and B wire (b). If the sound is not heard from the tester, the circuit condition is OK.



- 6) Disconnect the ECM coupler.
- 7) Check the continuity between B wire (B) and terminal (2).
- 8) Also, check the continuity between B/Br wire © and terminal 29.

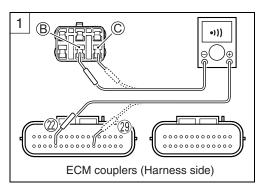
TOS lead wire continuity: Continuity (•)))

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	Black wire shorted to VCC, or B/Br wire open.



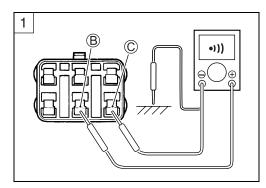
### Step 1 (When indicating P1651-L:)

- 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 B 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 A and terminal 11.

TOS lead wire continuity: Continuity (•)))

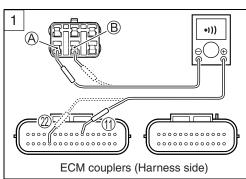
09900-25008: Multi-circuit tester set

09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•)))

Is the continuity OK?

YE	ES	Go to Step 2.
N	0	R or B wire open, or B wire shorted to ground.



- 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.
- Measure the voltage at the wire side coupler between B and B/Br wires.

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.

TO sensor voltage (Leaning): 3.7 – 4.4 V

(⊕ B – ⊝ B/Br)

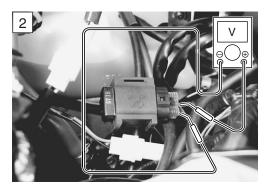
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

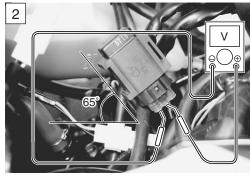
Tester knob indication: Voltage (==)

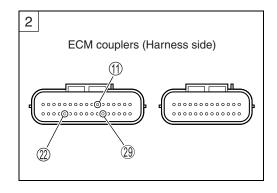
Is the voltage OK?

<ul> <li>R, B or B/Br wire open or shorted to ground, or poor ①, ② or ③ connection</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
<ul> <li>Loose or poor contacts on the ECM coupler</li> <li>Open or short circuit</li> <li>Replace the TO sensor with a new one.</li> </ul>

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





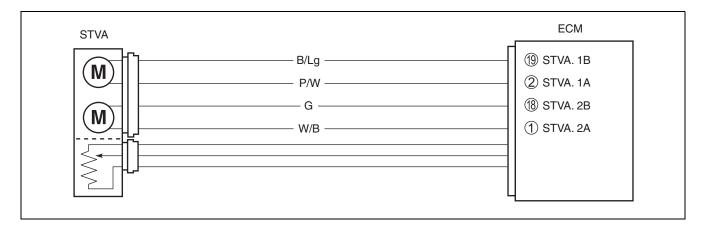


# "C24" (P0351), "C25" (P0352), "C26" (P0353) or "C27" (P0354) IGNITION SYSTEM MALFUNCTION

\* 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.	STVA malfunction
ECM does not receive communication signal from	STVA circuit open or short
the STVA.	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.

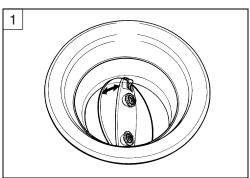


4) Turn the ignition switch to ON to check the STV operation. (STV operating order: Full open  $\rightarrow$  95% open)

Is the operating OK?

YES	Go to Step 2.
	Loose or poor contacts on the STVA coupler
NO	<ul> <li>Open or short circuit in the B/Lg, P/W, W/B or</li> </ul>
	Green wires
	<ul> <li>If wire and connection are OK, go to Step 2.</li> </ul>

5) After repairing the trouble, clear the DTC using SDS tool. ( 34-26)



#### 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.

STVA continuity:  $\infty \Omega$  (Infinity) (Terminal – Ground)

STVA resistance: Approx. 7.0  $\Omega$ 

(Terminal A – Terminal B)

(Terminal © - Terminal ®)

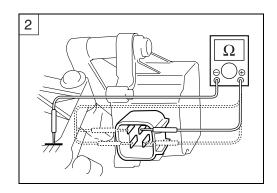
09900-25008: Multi-circuit tester set

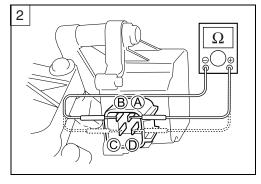
Tester knob indication: Resistance ( $\Omega$ )

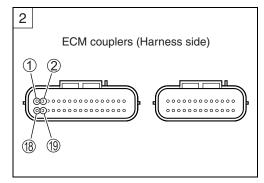
Is the resistance OK?

	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 trou-
VEC	ble or faulty ECM.
YES	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)

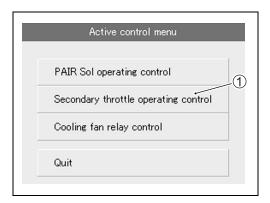






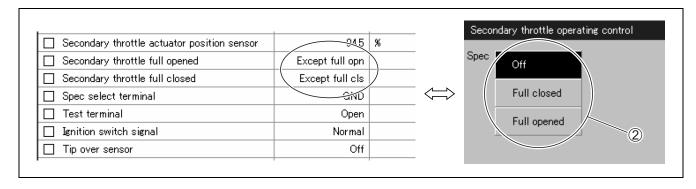
#### **ACTIVE CONTROL INSPECTION**

- 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.



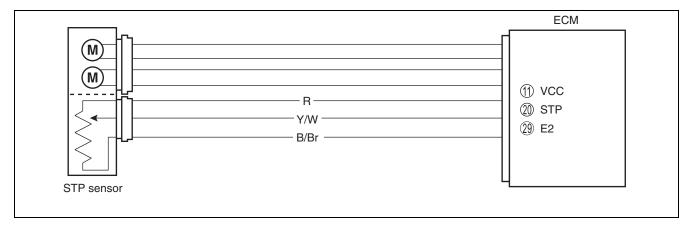
4) Click each button 2.

At this time, if an operation sound is heard from the STVA, the function is normal.



# "C29" (P1654-H/L) STP SENSOR CIRCUIT MALFUNCTION

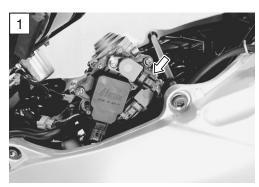
DETECTED CONDITION		POSSIBLE CAUSE		
C29		Signal voltage is not within the following	•	STP sensor maladjusted
		range.	•	STP sensor circuit open or short
		Difference between actual throttle open-	•	STP sensor malfunction
		ing and opening calculated by ECM is	•	ECM malfunction
		larger than specified value.		
		0.15 V ≤ Sensor voltage < 4.85 V		
P1654	Н	Sensor voltage is higher than specified	•	STP sensor circuit shorted to VCC or ground cir-
	П	value.		cuit open
	1	Sensor voltage is lower than specified	•	STP sensor circuit open or shorted to ground or
	L	value.		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. (5-5-13)
- 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 (A) and ground.
- 8) Also, measure the voltage at the R wire (A) and B/Br wire (C).



STP sensor input voltage: 4.5 – 5.5 V

(**⊕** R – **⊝** Ground)

(⊕ R – ⊝ B/Br)

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 ① or ②)
	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. (5-5-13)
- 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 B and terminal D.
- 9) Also, check the continuity between B/Br wire © and terminal

STPS lead wire continuity: Continuity (•)))

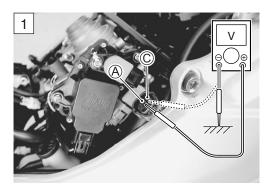
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

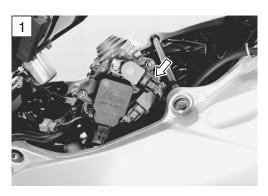
Tester knob indication: Continuity test (•)))

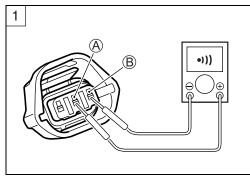
Is the continuity OK?

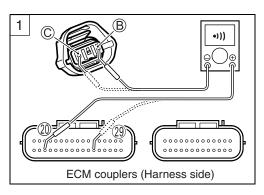
YES	Go to Step 2.
NO	Y/W wire shorted to VCC, or B/Br wire open

10) After repairing the trouble, clear the DTC using SDS tool. (2-4-26)



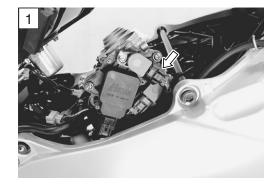




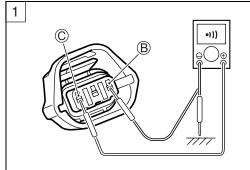


#### Step 1 (When indicating P1654-L:)

- 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. (5-5-13)
- 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.

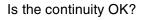


- 8) Disconnect the ECM coupler.
- 9) Check the continuity between Y/W wire B and terminal D.
- 10) Also, check the continuity between R wire (A) and terminal (f).

STPS lead wire continuity: Continuity (•)))

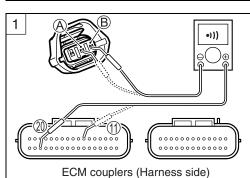
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•)))



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
INO	ground

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



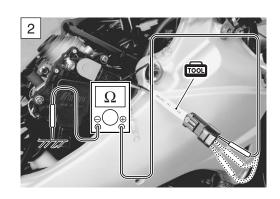
#### Step 2

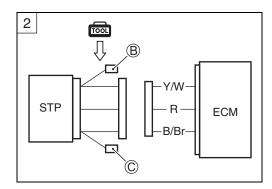
- 1) Turn the ignition switch to OFF.
- 2) Remove the air cleaner box and lift up the throttle body. (5-13)
- 3) Disconnect the STP sensor coupler.
- 4) Install the test harness to the STP sensor.
- 5) Check the continuity between each terminal and ground.

STP sensor continuity:  $\infty \Omega$  (Infinity) (Terminal – Ground)

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.

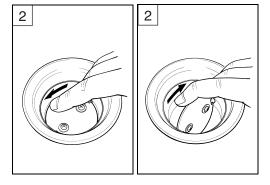




**DATA** STP sensor resistance

Secondary throttle valve is closed: Approx. 0.5 k $\Omega$  Secondary throttle valve is opened: Approx. 3.9 k $\Omega$ 

Tester knob indication: Resistance ( $\Omega$ )



8) If OK, then measure the STP sensor resistance at the wire terminals (between terminal (a) and terminal (b).

STP sensor resistance: Approx. 4.69 k $\Omega$ 

09900-25008: Multi-circuit tester set 09900-28630: TPS test wire harness

Tester knob indication: Resistance ( $\Omega$ )

Are the continuity and resistance OK?

YES	Go to Step 3.
NO	Reset the STP sensor position correctly.
NO	Replace the STP sensor with a new one.

9) After repairing the trouble, clear the DTC using SDS tool. (2-4-26)

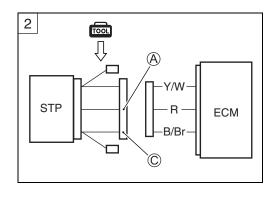
#### Step 3

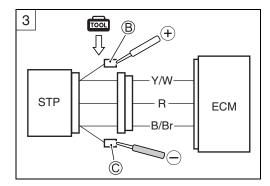
- 1) Turn the ignition switch to OFF.
- 2) Connect the STP sensor coupler to the test harness.
- 3) Disconnect the STVA lead wire coupler.
- 4) Turn the ignition switch to ON.
- 5) Measure the STP sensor output voltage at the wire terminal (between ⊕ terminal ® and ⊝ terminal ©) by turning the secondary throttle valve (close and open) with a finger.

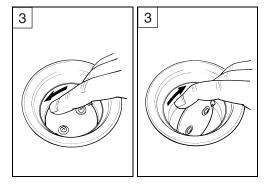


Secondary throttle valve is closed : Approx. 0.5 V Secondary throttle valve is opened : Approx. 3.9 V

Tester knob indication: Voltage (---)



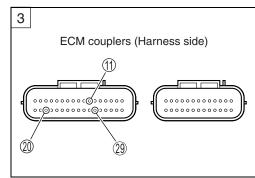






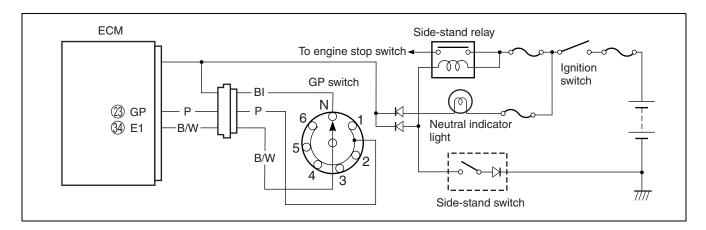
	• R, Y/W or B/Br wire open or shorted to ground,
	or poor ①, ② or ② connection
YES	If wire and connection are OK, intermittent trou-
	ble or faulty ECM.
	Recheck each terminal and wire harness for
	open circuit and poor connection.
	Replace the ECM with a known good one, and
	inspect it again.
NO	If check result is not satisfactory, replace STP
	sensor with a new one.

After repairing the trouble, clear the DTC using SDS tool. (34-26)



# "C31" (P0705) GP SWITCH CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
No Gear Position switch voltage	Gear Position switch circuit open or short
Switch voltage is not within the following range.	Gear Position switch malfunction
Switch voltage > 0.6 V	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.

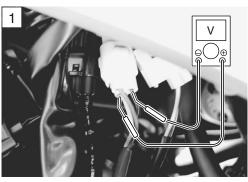


- 3) Support the motorcycle with a jack.
- 4) Fold the side-stand to up position.
- 5) Make sure the engine stop switch is in the "RUN" position.
- 6) Insert the needle pointed probe to the lead wire coupler.
- 7) Turn the ignition switch to ON.
- 8) Measure the voltage at the wire side coupler between P wire and B/W wire, when shifting the gearshift lever from 1st to



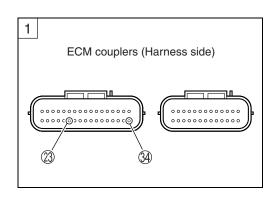
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Voltage (===)



# Is the voltage OK?

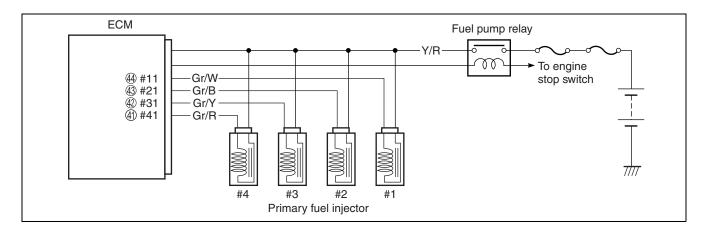
	P wire open or shorted to ground
	• If wire and connection are OK, intermittent trou-
	ble or faulty ECM.
YES	Recheck each terminal and wire harness for
	open circuit and poor connection.
	Replace the ECM with a known good one, and
	inspect it again.
	P or B/W wire open, or P wire shorted to ground
NO	<ul> <li>Loose or poor contacts on the ECM coupler</li> </ul>
	(terminal 3 or 3)
	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. (5-4-26)

# "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	Injector circuit open or short
interrupted by 4 times or more continuously.	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.

Injector resistance: 11 – 13  $\Omega$  at 20 °C

(Terminal - Terminal)

09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )



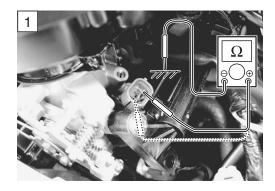
5) If OK, then check the continuity between each terminal and ground.

#### **DATA** Injector resistance: $\infty \Omega$ (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)



#### 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.

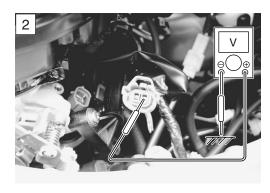
09900-25008: Multi-circuit tester set

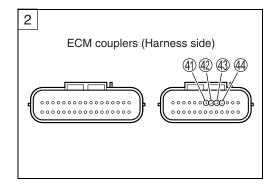
Tester knob indication: Voltage (==)

Is the voltage OK?

YES	<ul> <li>Gr/W wire open or shorted to ground, or poor 44 connection (#1 cylinder side)</li> <li>Gr/B wire open or shorted to ground, or poor 43 connection (#2 cylinder side)</li> <li>Gr/Y wire open or shorted to ground, or poor 42 connection (#3 cylinder side)</li> <li>Gr/R wire open or shorted to ground, or poor 41 connection (#4 cylinder side)</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and interest it a pair.</li> </ul>
	inspect it again.
NO	Open circuit in the Y/R wire

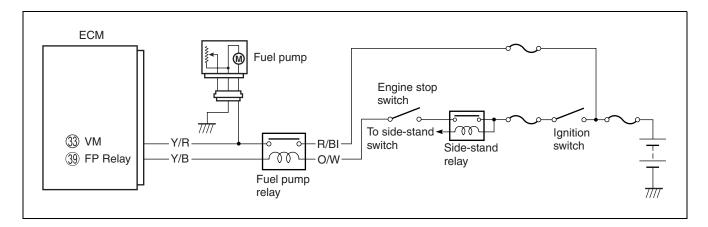
3) After repairing the trouble, clear the DTC using SDS tool. (2-4-26)





# "C41" (P0230-H/L) FP RELAY CIRCUIT MALFUNCTION

	DETECTED CONDITION		POSSIBLE CAUSE
C41		No voltage is applied to fuel pump	Fuel pump relay circuit open or short
		although fuel pump relay is turned ON,	Fuel pump relay malfunction
		or voltage is applied to fuel pump,	ECM malfunction
		although fuel pump relay is turned OFF.	
P0230		Voltage is applied to fuel pump although	Fuel pump relay switch circuit shorted to power
	Н	fuel pump relay is turned OFF.	source
			Faulty fuel pump relay (switch side)
		No voltage is applied to fuel pump	Fuel pump relay coil circuit open or short
	L	although fuel pump relay is turned ON.	Faulty fuel pump relay (coil side)



#### **INSPECTION**

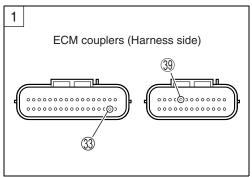
#### Step 1 (When indicating C41:)

- 1) Turn the ignition switch to OFF.
- 2) Remove the seat tail cover. ( \$\sumsymbol{1} 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	<ul> <li>Y/B or O/W wire open or short or poor ③ connection</li> <li>Y/R or R/BI wire open, shorted or poor ③ connection</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and</li> </ul>
	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	<ul> <li>Y/R wire shorted to power source</li> <li>Y/B wire shorted to ground</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	Replace the FP relay with a new one.

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

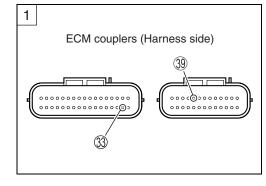
#### Step 1 (When indicating P0230-L:)

- 1) Turn the ignition switch to OFF.
- 2) Remove the seat tail cover. ( \$\sumsymbol{1} 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?

	Y/B wire open or poor <sup>39</sup> connection
	O/W wire open or shorted to ground
	R/Bl or Y/R wire open or shorted to ground or
	poor 33 connection
YES	If wire and connection are OK, intermittent trou-
1 5	ble 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. (2-4-26)

# "C42" (P01650) IG SWITCH CIRCUIT MALFUNCTION (Only for Immobilizer)

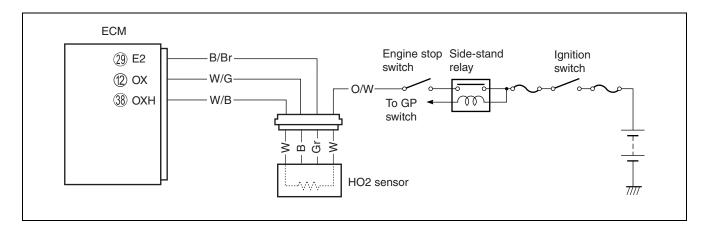
DETECTED CONDITION	POSSIBLE CAUSE
When the ID agreement is not verified.	Immobilizer system malfunction
ECM does not receive communication signal from the	
immobilizer antenna.	

#### **INSPECTION**

<sup>\*</sup> Refer to the IGNITION SWITCH INSPECTION for details. (29-20)

# "C44" (P0130/P0135) HO2 SENSOR (HO2S) CIRCUIT MALFUNCTION

	DETECTED CONDITION	POSSIBLE CAUSE
C44	HO2 sensor output voltage is not input	HO2 sensor circuit open or shorted to ground.
(P0130)	to ECM during engine operation and	Fuel system malfunction.
	running condition.	ECM malfunction.
	(Sensor voltage ≤ 0.1 V)	
C44	The heater can not operate so that	Battery voltage supply to the HO2 sensor.
(P0135)	heater operation voltage is not supplied	
	to the oxygen heater circuit.	

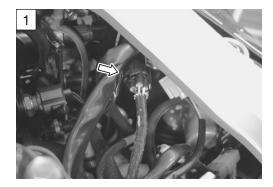


#### **INSPECTION**

#### Step 1 (When indicating C44/P0130:)

- 1) Turn the ignition switch OFF.
- 2) Check the HO2 sensor for loose or poor contacts.

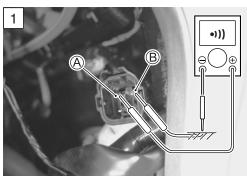
  If OK, then check the HO2 sensor lead wire continuity.



- 3) Disconnect the HO2 sensor coupler
- 4) Check the continuity between W/G wire (A) and ground.

09900-25008: Multi-circuit tester set

Tester knob indication: Continuity test (•)))



6) Remove the seat (\$\times 8-3\$) and disconnect the ECM coupler.

7) Check the continuity between W/G wire (A) and terminal (2).

8) Also, check the continuity between B/Br wire ® and terminal ®.

HO2S lead wire continuity: Continuity (•)))

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. (When indicating C44/P0130:)	
NO	W/G wire shorted to ground, or W/G or B/Br wire	
	open.	

9) After repairing the trouble, clear the DTC using SDS tool. (5-4-26)

#### Step 2 (When indicating C44/P0130:)

- 1) Connect the ECM couplers and HO2 sensor coupler.
- 2) Warm up the engine enough.
- 3) Measure the HO2 sensor output voltage between W/G wire and B/Br wire, when idling condition.

HO2 sensor output voltage at idle speed:

0.4 V and less (⊕ W/G - ⊝ B/Br)

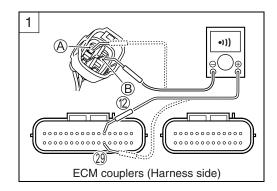
- 4) If OK, then move the radiator forward (3-4) and pinch the PAIR hoses 1 with proper hose clamps.
- 5) Measure the HO2 sensor output voltage while holding the engine speed at 5 000 r/min.

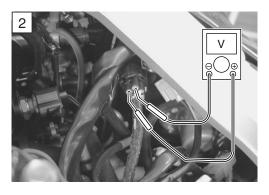
HO2 sensor output voltage at 5 000 r/min:

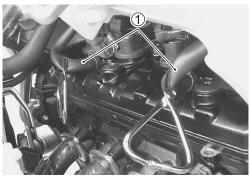
0.6 V and more (⊕ W/G – ⊝ B/Br)

09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Voltage (===)

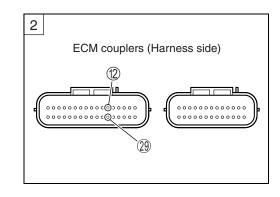






#### Is the voltage OK?

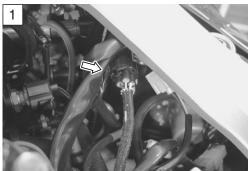
YES	<ul> <li>W/G wire or B/Br wire open or shorted to ground, or poor ② or ② connection.</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	Replace the HO2 sensor with a new one.



6) After repairing the trouble, clear the DTC using SDS tool. (34-26)

#### Step 1 (When indicating C44/P0135:)

- 1) Turn the ignition switch OFF.
- 2) Check the HO2 sensor for loose or poor contacts. If OK, then measure the HO2 sensor resistance.



3) Disconnect the HO2 sensor coupler and measure the resistance between terminals.

# **HO2** heater resistance: 4.0 – 5.0 $\Omega$ at 23 °C (W – W) *NOTE:*

- \* Temperature of the sensor affects resistance value largely.
- \* Make sure that the sensor heater is at correct temperature.

09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )



YES	Go to Step 2.
NO	Replace the HO2 sensor with a new one.

4) After repairing the trouble, clear the DTC using SDS tool. (13-4-26)



#### Step 2 (When indicating C44/P0135:)

- 1) Connect the HO2 sensor coupler.
- 2) Insert the needle pointed probe to the HO2 sensor coupler.
- 3) Turn the ignition switch ON and measure the heater voltage between W wire and ground.
- 4) If the tester voltage indicates the battery voltage, it is good condition.

#### PATA Heater voltage: Battery voltage

(⊕ W – ⊝ Ground)

#### NOTE:

Battery voltage can be detected only before starting the engine.

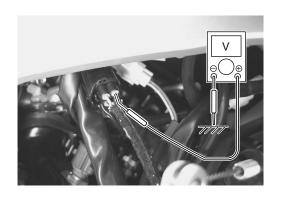
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

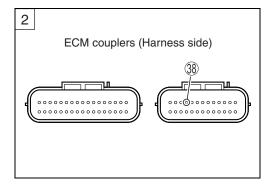
Tester knob indication: Voltage (==)

#### Is the voltage OK?

YES	<ul> <li>O/W or W wire open or shorted to ground, or poor <sup>®</sup> connection.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	<ul> <li>Open or short circuit in the W/B wire or O/W wire.</li> <li>Loose or poor contacts on the ECM coupler (Terminal ③) or HO2 sensor coupler.</li> </ul>

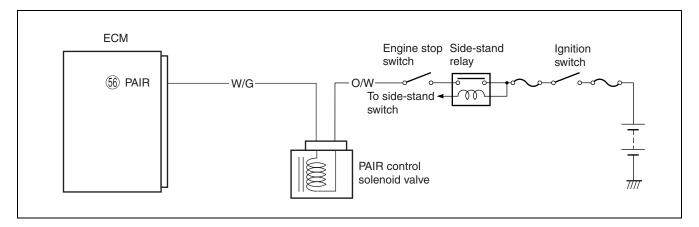
5) After repairing the trouble, clear the DTC using SDS tool. (574-26)





# "C49" (P1656) PAIR CONTROL SOLENOID VALVE CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
PAIR control solenoid valve voltage is not input to	PAIR control solenoid valve circuit open or short
ECM.	PAIR control solenoid valve malfunction
	ECM malfunction



#### **INSPECTION**

#### Step 1

- 1) Turn the ignition switch to OFF.
- 2) Remove the air cleaner box. ( 5-3)
- Check the PAIR control solenoid valve coupler for loose or poor contacts.

If OK, then measure the PAIR control solenoid valve resistance.



- 4) Remove the PAIR control solenoid valve. ( 11-7)
- 5) Measure the resistance between terminals.

PAIR valve resistance:  $18 - 22 \Omega$  at  $20 - 30 ^{\circ}$ C

(Terminal – Terminal)

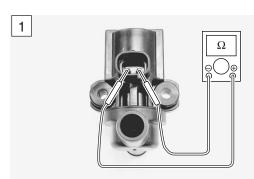
09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )

Is the resistance OK?

YES Go to Step 2.	
NO	Replace the PAIR control solenoid valve with a
INO	new one.

6) After repairing the trouble, clear the DTC using SDS tool. (13-4-26)



#### Step 2

1) Turn the ignition switch to ON.

2) Measure the voltage between O/W wire and ground.

PAIR valve voltage: Battery voltage

(**⊕** O/W – **⊝** Ground)

09900-25008: Multi-circuit tester set

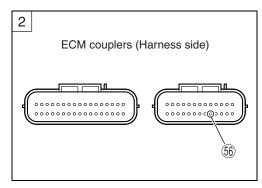
Tester knob indication: Voltage (==)

#### Is the voltage OK?

YES	<ul> <li>W/G wire open or shorted to ground, or poor ⑤ connection failure.</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	Open or short circuit in the O/W wire.

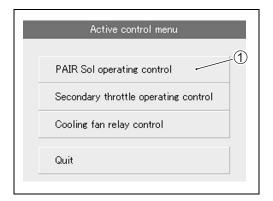
3) After repairing the trouble, clear the DTC using SDS tool. (3)4-26)

# 2



#### **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 "PAIR Sol operating control" 1.



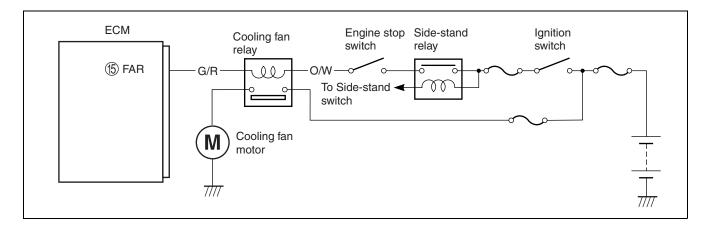
4) Click each button 2.

At this time, if an operation sound is heard from the PAIR control solenoid valve, the function is normal.

✓ Throttle position	28.9 *		PAIR Sol operating control
✓ Secondary throttle actuator position sensor	94.5 %		Spe/ Off
✓ PAIR control solenoid valve	On	$\langle \Longrightarrow \rangle$	
☑ Ignition switch signal	Nermal	٧ ٧	On
☑ Tip over sensor	Off		2
☑ Clutch switch signal	Off		

# "C60" (P0480) COOLING FAN RELAY CIRCUIT MALFUNCTION

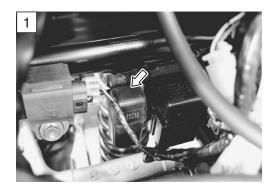
DETECTED CONDITION	POSSIBLE CAUSE	
Cooling fan relay signal is not input to ECM.	Cooling fan relay circuit open or short	
	ECM malfunction	



# INSPECTION

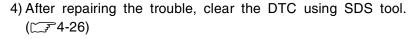
#### Step 1

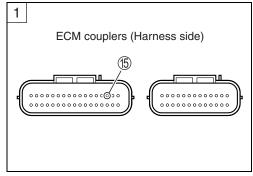
- 1) Turn the ignition switch to OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 3) Check the cooling fan relay coupler for loose or poor contacts. If OK, then inspect the cooling fan relay. ( 7-6)



Is the cooling fan relay OK?

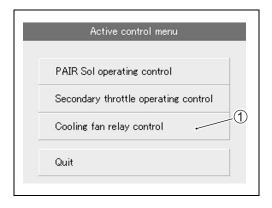
YES	<ul> <li>O/W and G/R wire open or shorted to ground, or poor ⑤ connection</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	Replace the cooling fan relay with a new one.





#### **ACTIVE CONTROL INSPECTION**

- 1) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
- 2) Start the engine and run it idling condition.
- 3) Click "Cooling fan relay control" 1.

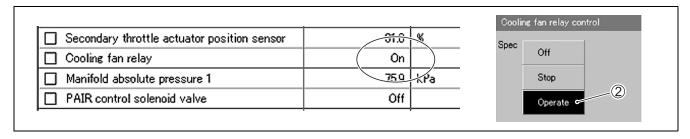


4) Click the operate button 2.

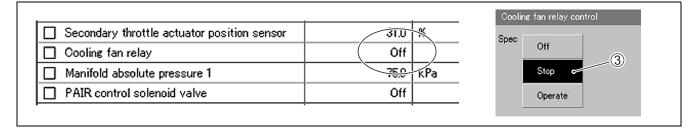
At this time, if an operation sound is heard from the cooling fan relay and cooling fan motor is operated, the function is normal.

#### NOTE:

Cooling fan relay and cooling fan motor operation can be checked until the engine coolant temperature is less than 100 °C after starting the engine.



5) Click the stop button ③ to check the operation properly.



6) Click the off button 4 to check the cooling fan relay and cooling fan motor operation.

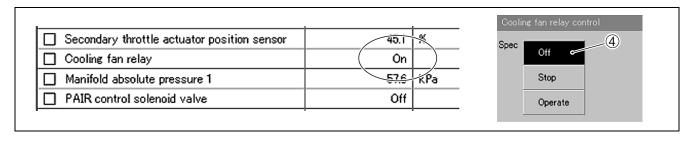
#### NOTE:

This inspection should be begun from when the engine coolant temperature is below 50 °C.

Check that the cooling fan relay operates for a few seconds as the engine coolant temperature arrives each at 50 °C, 70 °C and 90 °C / above 4 000 r/min. It is cooling fan motor malfunction or its circuit failure when the motor would not run even if the relay turns to ON.

#### NOTE:

There is a tolerance of operating remperature of cooling fan relay.



#### **SENSORS**

#### CMP SENSOR INSPECTION

The camshaft position sensor is installed on the cylinder head cover. ( 4-32)

#### CMP SENSOR REMOVAL AND INSTALLATION

- Remove the air cleaner box. ( 5-13)
- Remove the CMP sensor. ( 3-27)
- Install the CMP sensor in the reverse order of removal.

#### CKP SENSOR INSPECTION

The crankshaft position sensor is installed on the right side of middle crankcase. ( 4-34)

#### CKP SENSOR REMOVAL AND INSTALLATION

- Remove the starter clutch cover. ( 3-21)
- Install the starter clutch cover in the reverse order of removal.

# IAP SENSOR INSPECTION

The intake air pressure sensor is installed at the rear side of the air cleaner box. ( $\bigcirc$  4-36)

#### IAP SENSOR REMOVAL AND INSTALLATION

- Lift and support the fuel tank. ( 5-3)
- Remove the IAP sensor from the air cleaner box.
- Install the IAP sensor in the reverse order of removal.

#### TP SENSOR INSPECTION

The throttle position sensor is installed at the right side of the No. 4 throttle body. ( 4-42)

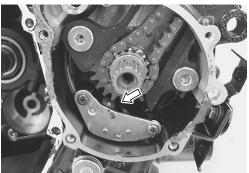
#### TP SENSOR REMOVAL AND INSTALLATION

- Remove the air cleaner box ( 5-13) and lift up the throttle body.
- Remove the TP sensor. ( 5-15)
- Install the TP sensor. ( 5-17)

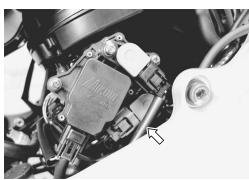
#### TP SENSOR ADJUSTMENT

• Adjust the TP sensor. ( 4-19)









#### **ECT SENSOR INSPECTION**

The engine coolant temperature sensor is installed at the cylinder head. ( 4-47)

#### ECT SENSOR REMOVAL AND INSTALLATION

- Remove the ECT sensor. ( 7-7)
- Install the ECT sensor in the reverse order of removal.

ECT sensor: 18 N·m (1.8 kgf-m)

#### IAT SENSOR INSPECTION

The intake air temperature sensor is installed on the left side of the air cleaner box. ( 4-51)

#### IAT SENSOR REMOVAL AND INSTALLATION

- Lift and support the fuel tank. ( 5-3)
- Remove the IAT sensor from the air cleaner box.
- Install the IAT sensor in the reverse order of removal.

IAT sensor: 18 N⋅m (1.8 kgf-m)

#### AP SENSOR INSPECTION

The AP sensor is located on the right frame. (274-55)

#### AP SENSOR REMOVAL AND INSTALLATION

- Lift and support the fuel tank. ( 5-3)
- Remove the AP sensor from the frame.
- Install the AP sensor in the reverse order of removal.



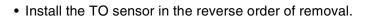




# TO SENSOR INSPECTION TO SENSOR REMOVAL AND INSTALLATION

The tip-over sensor is located above the swingarm pivot.  $(5^{\circ}4-60)$ 

- Lift and support the fuel tank. ( 5-3)
- Remove the TO sensor.



#### NOTE:

When installing the TO sensor, the arrow mark (A) must be pointed upward.





# STP SENSOR INSPECTION STP SENSOR REMOVAL AND INSTALLATION

The secondary throttle position sensor is installed at the right side of the No. 4 throttle body. ( \$\subseteq 4-67\$)

- Remove the air cleaner box ( 5-13) and lift up the throttle body.
- Remove the STP sensor. ( 5-15)
- Install the STP sensor. ( 5-17)

#### STP SENSOR ADJUSTMENT

• Adjust the STP sensor. ( 5-20)

#### **HO2 SENSOR INSPECTION**

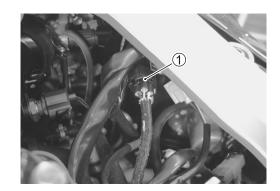
The heated oxygen sensor is installed to the muffler joint. (5.74-79)





# **HO2 SENSOR REMOVAL AND INSTALLATION**

- Remove the right under cover. ( 8-5)
- Disconnect the coupler ① and remove the HO2 sensor.



## **▲** WARNING

Do not remove the HO2 sensor while it is hot.

#### CAUTION

Be careful not to expose it to excessive shock.

Do not use an impact wrench while removing or installing the HO2 sensor.

Be careful not to twist or damage the sensor lead wires.

• Installation is in the reverse order of removal.

#### CAUTION

Do not apply oil or other materials to the sensor air hole.

• Tighten the sensor unit to the specified torque.

HO2 SENSOR: 48 N·m (4.8 kgf-m)

• Route the HO2 sensor lead wire properly.( 10-18)

# FUEL SYSTEM AND THROTTLE BODY

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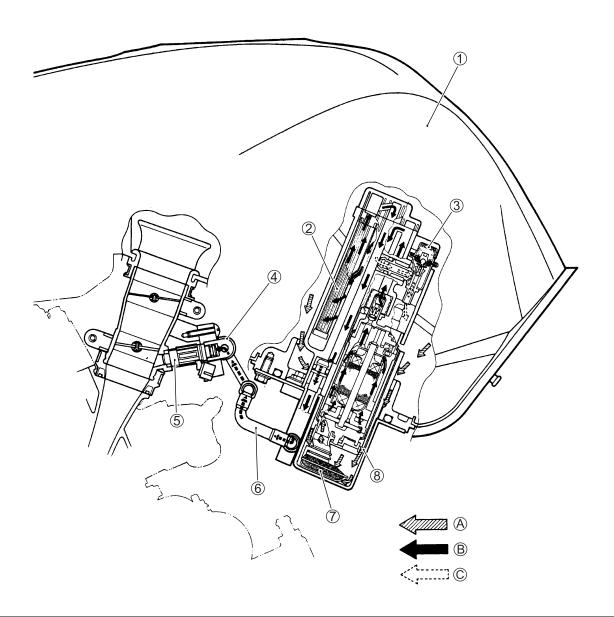
# **▲** WARNING

Gasoline must be handled carefully in an area well ventilated and away from fire or sparks.

## **FUEL DELIVERY SYSTEM**

The fuel delivery system consists of the fuel tank, fuel pump, fuel filters, fuel feed hose, fuel delivery pipe (including fuel injectors) and fuel pressure regulator. There is no fuel return hose. The fuel in the fuel tank is pumped up by the fuel pump and pressurized fuel flows into the injector installed in the fuel delivery pipe. Fuel pressure is regulated by the fuel pressure regulator. As the fuel pressure applied to the fuel injector (the fuel pressure in the fuel delivery pipe) is always kept at absolute fuel pressure of 300 kPa (3.0 kgf/cm²), the fuel is injected into the throttle body in conic dispersion when the injector opens according to the injection signal from the ECM.

The fuel relieved by the fuel pressure regulator flows back to the fuel tank.



1	Fuel tank	7	Fuel mesh filter (For low pressure)
2	Fuel filter (For high pressure)	8	Fuel pump
3	Fuel pressure regulator	A	Before-pressurized fuel
4	Fuel delivery pipe	$^{\textcircled{B}}$	Pressurized fuel
<b>⑤</b>	Fuel injector	©	Relieved fuel
6	Fuel feed hose		

## **FUEL SYSTEM**

#### **FUEL TANK LIFT-UP**

- Remove the seat. ( \$\sumset\$ 8-3)
- Remove the frame covers. ( 8-4)
- Remove the fuel tank cover/turn signal light assemblies. ( 3-3)
- Take out the fuel tank prop stay 1



• Lift and support the fuel tank with the fuel tank prop stay.



#### **FUEL TANK REMOVAL**

- Lift and support the fuel tank. ( above)
- Disconnect the fuel pump lead wire coupler ①.
- Disconnect the fuel tank breather hose 2 and fuel tank drain hose 3.
- Place a rag under the fuel feed hose 4 and disconnect the fuel feed hose.

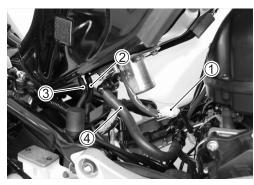


When removing the fuel tank, do not leave the fuel feed hose 4 on the fuel tank side.



Gasoline is highly flammable and explosive. Keep heat, spark and flame away.

- Remove the fuel tank bracket mounting bolt.
- · Remove the fuel tank.





#### **FUEL TANK INSTALLATION**

• Installation is in the reverse order of removal.

#### **FUEL PRESSURE INSPECTION**

- Lift and support the fuel tank. ( 5-3)
- Place a rag under the fuel feed hose ① and remove the fuel feed hose.



 Install the special tools between the fuel tank and fuel delivery pipe.

09940-40211: Fuel pressure gauge adaptor

09940-40220: Fuel pressure gauge hose attachment

09915-77331: Oil pressure gauge 09915-74521: Oil pressure gauge hose

Turn the ignition switch ON and check the fuel pressure.

Fuel pressure: Approx. 300 kPa (3.0 kgf/cm²)

If the fuel pressure is lower than the specification, inspect the following items:

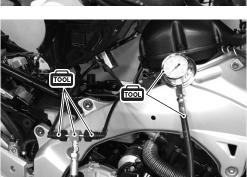
- \* Fuel hose leakage
- \* Clogged fuel filter
- \* Pressure regulator
- \* Fuel pump

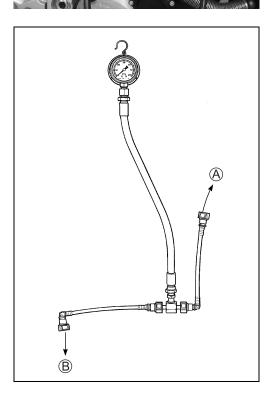
If the fuel pressure is higher than the specification, inspect the following items:

- \* Fuel pump check valve
- \* Pressure regulator

#### **▲** WARNING

- \* Before removing the special tools, turn the ignition switch to OFF position and release the fuel pressure
- \* Gasoline is highly flammable and explosive. Keep heat, sparks and flame away.
- A To fuel tank
- B To fuel delivery pipe





#### **FUEL PUMP INSPECTION**

Turn the ignition switch ON and check that the fuel pump operates for few seconds.

If the fuel pump motor does not make operating sound, inspect the fuel pump circuit connections or inspect the fuel pump relay and TO sensor.

If the fuel pump relay, TO sensor and fuel pump circuit connections are OK, the fuel pump may be faulty, replace the fuel pump with a new one.

#### FUEL DISCHARGE AMOUNT INSPECTION

## **A WARNING**

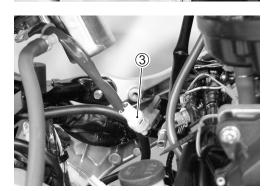
Gasoline is highly flammable and explosive. Keep heat, spark and flame away.

- Lift and support the fuel tank. ( 5-3)
- Place a rag under the fuel feed hose 1 and disconnect the fuel feed hose from the fuel pump.
- Connect a proper fuel hose ② to the fuel pump.
- · Place the measuring cylinder and insert the fuel hose end into the measuring cylinder.





Disconnect the fuel pump lead wire coupler ③.



· Connect a proper lead wire into the fuel pump lead wire coupler (fuel pump side) and apply 12 V to the fuel pump (between Y/R wire and B/W wire) for 10 seconds and measure the amount of fuel discharged.

Battery + terminal - Y/R terminal

Battery  $\bigcirc$  terminal —— B/W terminal

If the pump does not discharge the amount specified, it means that the fuel pump is defective or that the fuel filter is clogged.

Fuel discharge amount: 168 ml and more/10 sec.

NOTE:

The battery must be in fully charged condition.



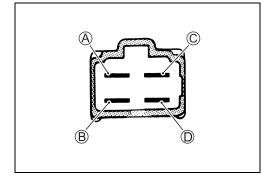
## **FUEL PUMP RELAY INSPECTION**

Fuel pump relay is located in the left side of the frame.

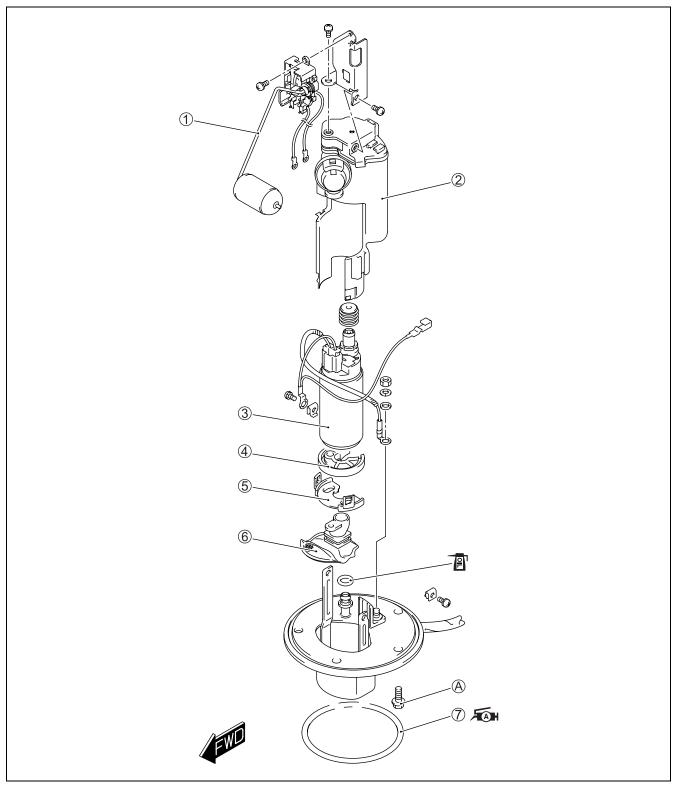
- Remove the seat tail cover. ( 8-4)
- Remove the fuel pump relay ①.

First, check the insulation between (A) and (B) terminals with pocket tester. Then apply 12 V to  $\ensuremath{\mathbb{C}}$  and  $\ensuremath{\mathbb{D}}$  terminals,  $\ensuremath{\textcircled{+}}$  to  $\ensuremath{\mathbb{C}}$ and  $\bigcirc$  to  $\mathbb{O}$ , and check the continuity between  $\mathbb{A}$  and  $\mathbb{B}$ . If there is no continuity, replace it with a new one.





# FUEL PUMP AND FUEL FILTER REMOVAL CONSTRUCTION



1	Fuel level gauge	<b>⑤</b>	Holder
2	Fuel pump case/Fuel filter cartridge	6	Fuel mesh filter
3	Fuel pump	7	O-ring
4	Rubber cushion	A	Fuel pump mounting bolt

$lue{f U}$		
ITEM	N∙m	kgf-m
A	10	1.0

#### **REMOVAL**

- Remove the fuel tank. ( 5-3)
- Remove the fuel pump assembly 1) by removing its mounting bolts diagonally.

#### **▲** WARNING

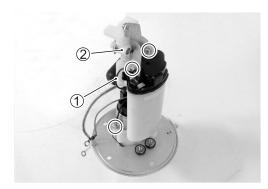
Gasoline is highly flammable and explosive. Keep heat, spark and flame away.

• Remove the nuts.

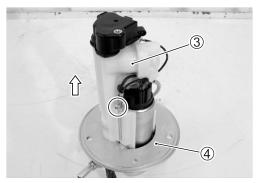




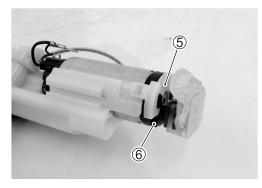
• Remove the lead wire ①, screws and fuel level gauge ②.



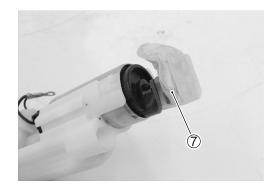
- Remove the screw.
- Remove the fuel pump ③ from the fuel pump plate ④.



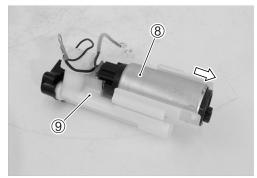
• Remove the fuel pump holder ⑤ and rubber cushion ⑥.



Remove the fuel mesh filter ⑦.



• Remove the fuel pump ® from the fuel pump case/fuel filter cartridge 9.



# **FUEL MESH FILTER INSPECTION AND CLEANING**

If the fuel mesh filter is clogged with sediment or rust, fuel will not flow smoothly and loss in engine power may result. Blow the fuel mesh filter with compressed air.

#### NOTE:

If the fuel mesh filter is clogged with many sediment or rust, replace the fuel filter cartridge with a new one.

# **FUEL PUMP AND FUEL MESH FILTER INSTALLATION**

Install the fuel pump and fuel mesh filter in the reverse order of removal. Pay attention to the following points:

• Install new bushing 1 to the fuel pump.

#### CAUTION

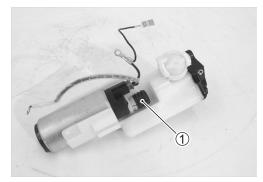
Use new bushing to prevent fuel leakage.

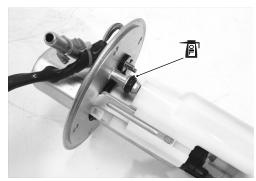
- Install new O-ring to the fuel pipe.
- · Apply thin coat of engine oil to the new O-ring.

#### CAUTION

Use new O-ring to prevent fuel leakage.

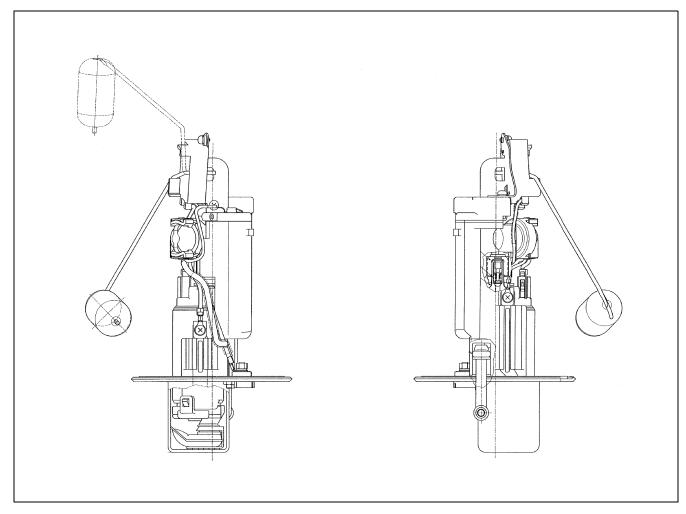






- Be sure to connect the wires to the proper terminals.
- (BI)..... + terminal for fuel pump
- ⊕ (R) ..... 
  ⊕ terminal for fuel level gauge





• Install a new O-ring and apply SUZUKI SUPER GREASE "A" to it.



**1** 99000-25010: SUZUKI SUPER GREASE "A" (or equivalent grease)

# **▲** WARNING

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



• When installing the fuel pump assembly, first tighten all the fuel pump mounting bolts lightly and then to the specified torque, in the ascending order of numbers.

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

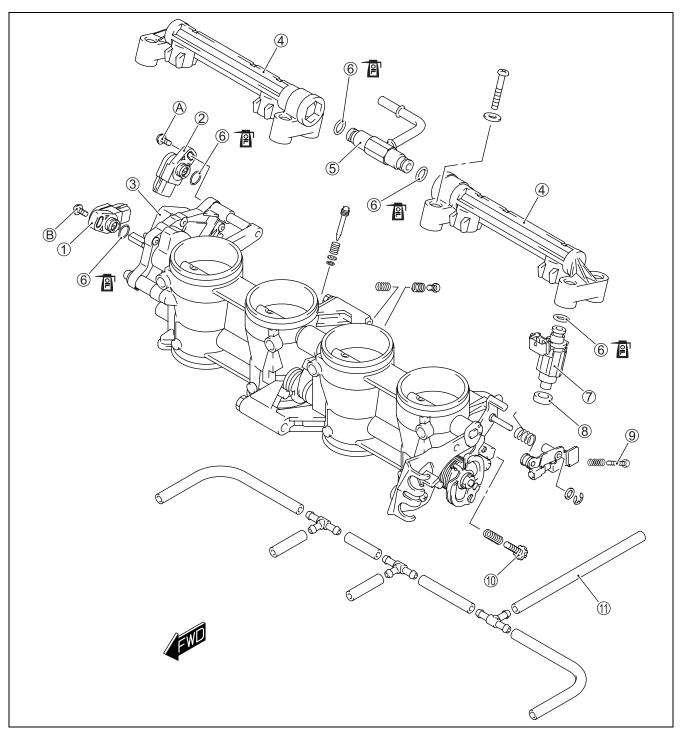
NOTE:

Apply a small quantity of the THREAD LOCK to the thread portion of fuel pump mounting bolts.

**←**1342 99000-32050: THREAD LOCK "1342"



# **THROTTLE BODY CONSTRUCTION**

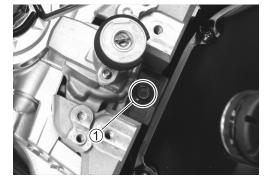


1	TP sensor	8	Cushion seal
2	STP sensor	9	Fast idle adjusting screw
3	STVA	10	Throttle stop screw
4	Fuel delivery pipe	11)	Vacuum hose
<b>⑤</b>	Fuel delivery pipe joint	A	STP sensor mounting screw
6	O-ring	$^{\circ}$	TP sensor mounting screw
(7)	Fuel injector		

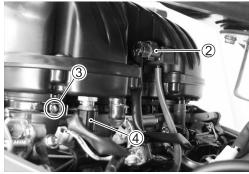
lacksquare		
ITEM	N⋅m	kgf-m
A	3.5	0.35
B	3.5	0.35

#### AIR CLEANER BOX REMOVAL

- Lift and support the fuel tank. ( 5-3)
- Remove the air cleaner box mounting bolt ①.



- Remove the IAP sensor ② from the air cleaner box.
- Loosen the throttle body clamp screws 3 (4 pcs) and lift up the air cleaner box.
- Disconnect the IAT sensor lead wire coupler 4.



- Disconnect the PCV hose ⑤ and PAIR hose ⑥.
- · Remove the air cleaner box.



#### THROTTLE BODY REMOVAL

- Remove the air cleaner box. ( above)
- Disconnect the throttle cables from their drum.

#### CAUTION

After disconnecting the throttle cables, do not snap the throttle valve from full open to full close. It may cause damage to the throttle valve and throttle body.

• Place a rag under the fuel feed hose and disconnect the fuel feed hose from the fuel tank.





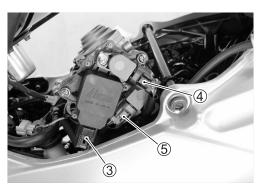
- Remove the clamps 1.
- Remove the fuel injector lead wire couplers 2.



- Loosen the throttle body clamp screws at the intake pipe side.
- Lift up the throttle body assembly

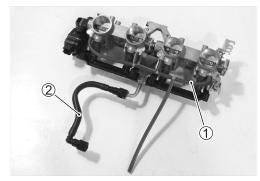


- Disconnect the STVA lead wire coupler ③, STP sensor lead wire coupler ④ and TP sensor lead wire coupler ⑤.
- Remove the throttle body assembly.



#### THROTTLE BODY DISASSEMBLY

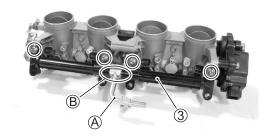
- Disconnect the respective vacuum hoses ① from each throttle body.
- Remove the fuel feed hose 2.



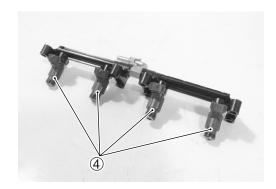
 Remove the fuel delivery pipe assembly ③ by removing the screws.

#### CAUTION

Be careful not to twist the fuel delivery pipe's T-joint (A), when disconnecting the fuel feed hose or removing the fuel delivery pipes, or joint part (B) of the fuel delivery pipe get damage.



• Remove the fuel injectors 4.

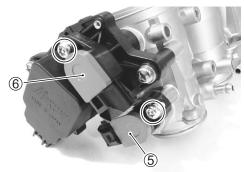


• Remove the TP sensor ⑤ and STP sensor ⑥ with the special tool.

# 09930-11950: Torx wrench

#### NOTE:

Prior to disassembly, mark the each sensor's original position with a paint or scribe for accurate reinstallation.



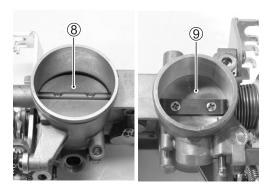
#### CAUTION

Never remove the STVA 7 from the throttle body.



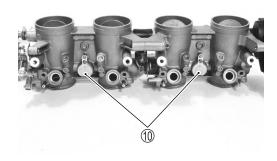
# CAUTION

Never remove the secondary throttle valves  $\ensuremath{\$}$  and throttle valves 9.



# CAUTION

Never remove the caps ①.



#### THROTTLE BODY CLEANING

#### **▲** WARNING

Some carburetor cleaning chemicals, especially dip-type soaking solutions, are very corrosive and must be handled carefully. Always follow the chemical manufacturer's instructions on proper use, handling and storage.

· Clean all passageways with a spray-type carburetor cleaner and blow dry with compressed air.

#### CAUTION

Do not use wire to clean passageways. Wire can damage passageways. If the components cannot be cleaned with a spray cleaner it may be necessary to use a dip-type cleaning solution and allow them to soak. Always follow the chemical manufacturer's instructions for proper use and cleaning of the throttle body components. Do not apply carburetor cleaning chemicals to the rubber and plastic materials.

#### INSPECTION

Check following items for any damage or clogging.

- \* O-ring
- \* Throttle valve
- \* Secondary throttle valve
- \* Vacuum hose

#### THROTTLE BODY REASSEMBLY

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

 With the STV fully opened, install the STP sensor ① and tighten the STP sensor mounting screw to the specified torque.

#### NOTE:

- \* Apply thin coat of engine oil to the O-ring.
- \* Align the secondary throttle shaft end (A) with the groove (B) of STP sensor.
- \* Apply SUZUKI SUPER GREASE "A" to the secondary throttle shaft end A if necessary.



(or equivalent grease)

**100** 09930-11950: Torx wrench

STP sensor mounting screw: 3.5 N·m (0.35 kgf-m)

#### NOTE:

- \* Make sure the STV open or close smoothly.
- \* If the STP sensor adjustment is necessary, refer to page 5-20 for STP sensor setting procedure.
- With the throttle valve fully closed, install the TP sensor ② and tighten the TP sensor mounting screw to the specified torque.

#### NOTE:

- \* Apply thin coat of engine oil to the O-ring.
- \* Align the throttle shaft end © with the groove © of TP sensor.
- \* Apply SUZUKI SUPER GREASE "A" to the throttle shaft end © if necessary.

ÆA 99000-25010: SUZUKI SUPER GREASE "A"

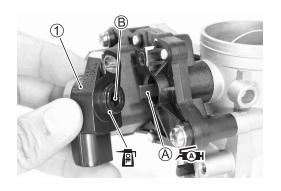
(or equivalent grease)

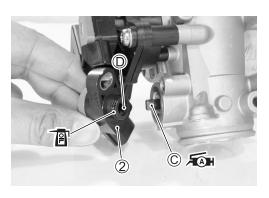
09930-11950: Torx wrench

TP sensor mounting screw: 3.5 N·m (0.35 kgf-m)

#### NOTE:

- \* Make sure the throttle valve open or close smoothly.
- \* TP sensor setting procedure. ( 4-19)





#### CAUTION

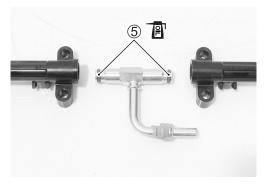
Replace the cushion seal and O-ring with new ones.



• Apply thin coat of engine oil to new O-rings ⑤.

#### CAUTION

Replace the O-rings with new ones.

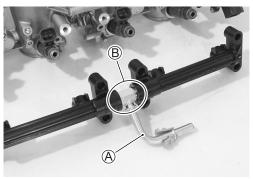


• Assemble the fuel delivery pipe assembly as shown.

#### **CAUTION**

Be careful not to twist the fuel delivery pipe's T-joint

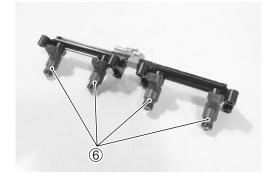
- A when installing the fuel delivery pipes, or joint part
- B of the fuel delivery pipe may get damage.



• Install the fuel injectors ⑥ by pushing them straight to the delivery pipes assembly.

#### CAUTION

Never turn the injector while pushing it.



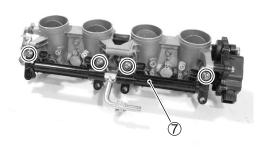
• Install the fuel delivery pipe assembly ⑦ to the throttle body assembly.

#### CAUTION

Never turn the fuel injectors while installing them.

• Tighten the fuel delivery pipe mounting screws to the specified torque.





#### THROTTLE BODY INSTALLATION

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

• Connect the TP sensor lead wire coupler ① and STP sensor lead wire coupler 2.

#### CAUTION

TP sensor lead wire coupler and STP sensor lead wire coupler resemble each other very closely in external appearance.

Make sure to check the color of coupler before installing.

TP sensor lead wire coupler: Gr STP sensor lead wire coupler: B

• Connect the fuel injector couplers to the fuel injectors. Make sure that each coupler is installed in the correct position. The color on each lead wire refers to the appropriate fuel injector.

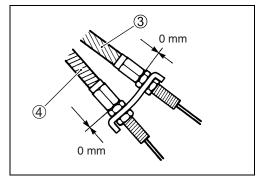
Injector 1	Y/R and Gr/W
Injector 2	Y/R and Gr/B
Injector 3	Y/R and Gr/Y
Injector 4	Y/R and Gr/R

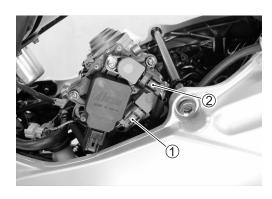
• Connect the throttle pulling cable 3 and throttle returning cable 4 to the throttle cable drum.





- Loosen each throttle cable lock-nut.
- Turn in each throttle cable adjuster fully and locate each outer cable so that the clearance is 0 mm.
- Tighten each lock-nut.
- · Adjust the throttle cable play. Refer to page 2-15 for details.

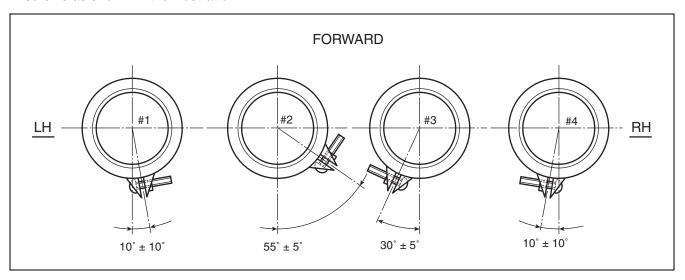




#### AIR CLEANER BOX INSTALLATION

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

 Install the air cleaner box and tighten the throttle body clamp screws as shown in the illustration.



#### STP SENSOR ADJUSTMENT

If the STP sensor adjustment is necessary, measure the sensor output voltage and adjust the STP sensor position as follows:

- Disconnect the STVA lead wire coupler.
- Remove the air cleaner box. ( 5-13)
- Insert the needle pointed probes to the STP sensor coupler.
- Turn the ignition switch to ON.
- Close the secondary throttle valve by finger, and measure the STP sensor output voltage.

**DATA** STP sensor output voltage

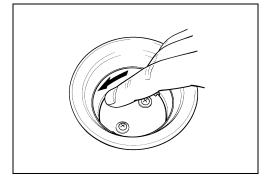
ST valve is fully closed: 0.57 – 0.67 V

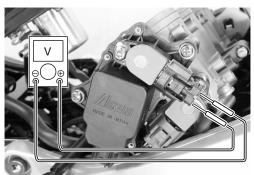
(⊕ Y/W – ⊝ B/Br)

09900-25008: Multi-circuit tester set

09900-25009: Needle pointed probe set

Tester knob indication: Voltage (---)

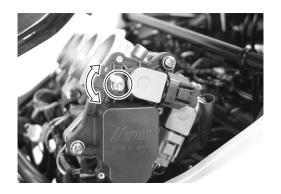




- Loosen the STP sensor mounting screw.
- Adjust the STP sensor ① until the output voltage comes within the specified value and tighten the STP sensor mounting screw.

09930-11950: Torx wrench

STP sensor mounting screw: 3.5 N·m (0.35 kgf-m)



#### **FUEL INJECTOR REMOVAL**

- Lift and support the fuel tank. ( 5-3)
- Remove the air cleaner box. ( 5-13)
- With battery negative cable disconnected, disconnect the injector couplers.
- Remove the fuel delivery pipe assembly. ( 5-14)
- Remove the fuel injectors. ( 5-15)

#### **FUEL INJECTOR INSPECTION**

Check fuel injector filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in the fuel lines and fuel tank.

The fuel injector can be checked without removing it from the throttle body.

Refer to page 4-74 for details.



#### **FUEL INJECTOR INSTALLATION**

- · Apply thin coat of engine oil to new injector cushion seals and O-rings.
- Install the injector by pushing it straight to the throttle body. Never turn the injector while pushing it. (5-18)

#### **FAST IDLE**

The fast idle system is automatic type.

When the fast idle cam is turned by the secondary throttle valve actuator, the cam pushes the lever on the throttle valve shaft causing the throttle valve to open and raise the engine speed. When the engine has warmed up, depending on the water temperature, ambient temperature and lapsed time, the fast idle is cancelled allowing the engine to resume idle speed.

Ambient Temp.	Fast idle r/min	Fast idle cancel- ling time
−5 °C	1 500 – 2 000 r/min	Approx. 35 sec.
15 °C	1 500 – 2 000 r/min	Approx. 17 sec.
25 °C	1 500 – 2 000 r/min	Approx. 11 sec.

#### **FAST IDLE ADJUSTMENT**

- Lift and support the fuel tank. ( 5-3)
- Remove the air cleaner box. ( 5-13)
- Start up the engine and run it in idling condition for warming up at the water temperature of 80 – 90 °C.
- Set the idle r/min to 1 300 r/min by turning the throttle stop screw ①.
- Check and adjust the TP sensor. ( 4-19)
- Turn the ignition switch to OFF
- Disconnect the TP sensor coupler ② and install the test harness.
- Start up the engine.
- Measure the TP sensor output voltage at the wire terminals (between ⊕ P/B and — B/Br).

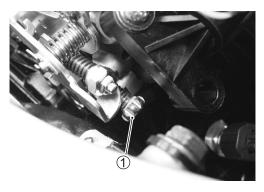
#### TP sensor output voltage at idle position:

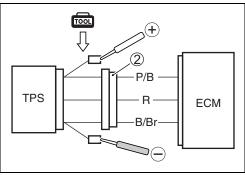
Approx.  $1.12 \pm 0.05 \text{ V}$ 

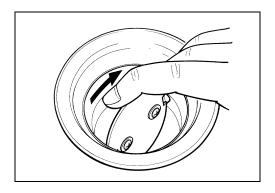
09900-25008: Multi-circuit tester set 09900-28630: TPS test wire harness

Tester knob indication: Voltage (---)

- Turn the ignition switch to OFF.
- Disconnect the STVA coupler.
- Turn the ignition switch to ON.
- Open the secondary throttle valve fully by turning it with your finger.
- With the secondary throttle valve held at this position, measure the output voltage of the TP sensor.







• Calculate the voltage difference between TP sensor output voltage at idle and TP sensor output voltage with the STV full opened.

Example: TP sensor output voltage with the STV fully open Minus TP sensor output voltage at idle is 0.027 V

> STV fully open 1.142 V Idle - 1.115 V 0.027 V

#### DATA TP sensor output voltage variation: 0.021 - 0.032 V

• If the voltage variation is out of specification, loosen the lock-nut 4 and turn in or out the fast idle adjust screw 5 to adjust the voltage to specification.

#### CAUTION

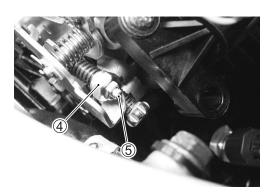
The fast idle screw is factory-adjusted at the time of delivery and therefore avoid removing or turning it unless otherwise necessary.

· Cool down the engine to ambient air temperature and start the engine to check the fast idle r/min comes with in the specified r/min.

#### DATA Standard

Fast idle r/min: 1 500 – 2 000 r/min (Cold engine) Idle r/min: 1 300 ± 100 r/min (Warmed engine)

• If it is not at the specified r/min, the cause may possibly be short-circuit in water temperature sensor or wiring harness or STVA.



#### THROTTLE VALVE SYNCHRONIZATION

Check and adjust the throttle valve synchronization among four cylinders.

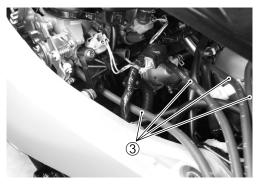
#### Step 1

- Lift and support the fuel tank. ( 5-3)
- Start up the engine and run it in idling condition for warming up.
- Stop the warmed-up engine.
- Disconnect the IAP sensor coupler ① and remove the IAP sensor from the air cleaner box.
- Disconnect the vacuum hose ② from each throttle body.





 Connect the vacuum tester hose ③ to each vacuum nipple on the throttle body.



#### Step 2

- Connect a tachometer and start up the engine.
- Bring the engine r/min to 1 300 r/min by the throttle stop screw.
- Check the vacuum of the four cylinders and balance the four throttle valves with the balance screw ④.

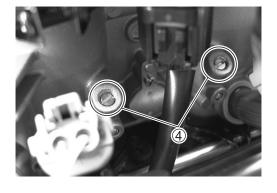
#### CAUTION

Avoid dirt drawn into the throttle body while running the engine without air cleaner box cover. Dirt drawn into the engine will damage the internal engine parts.

#### NOTE:

- \* During balancing the throttle valves, always set the engine r/min at 1 300 r/min, using throttle stop screw.
- \* After balancing the four valves, set the idle r/min to 1 300 r/min by the throttle stop screw.
- \* If the above procedures cannot still synchronize the valves, proceed to the next step.





#### Step 3

- Turn in all the idle air screws to the complete close position.
- Check for difference of vacuum between #1 and #2.
- Equalize these two by gradually turning back the air screw on the higher vacuum side until the vacuum comes down to the lower. Similarly perform the same procedures between #3 and #4.
- Check for the synchronization adjustment. If the adjustment is not yet correct, remove each idle air screw and clean them with a spray-type carburetor cleaner and blow dry with a compressed air.
- Also, clean the idle air screw passageways.

#### NOTE:

- \* Slowly turn the idle air screw in clockwise and count the number of turns until the screw is lightly seated.
- \* Make a note of how many turns were made so the screw can be reset correctly after cleaning.

#### Step 4

Repeat the procedures of Step 2 and Step 3.

# THROTTLE POSITION SENSOR (TPS) SETTING

After all adjustments are completed, check or adjust the TPS setting condition.

(Refer to page 4-19 for TPS setting procedure.)



# EXHAUST SYSTEM

CONTENTS		
PRECAUTIONS FOR EXHAUST SYSTEM	6- 2	
EXHAUST SYSTEM COMPONENTS	6- 2	
EXHAUST PIPE AND MUFFLER	6- 2	
INSPECTION	6- 2	
REMOVAL	6- 3	
INSTALLATION	6- 5	

#### PRECAUTIONS FOR EXHAUST SYSTEM

# **▲** WARNING

To avoid the danger of being burned, do not touch the exhaust system when the system is hot. Any service on the exhaust system should be performed when the system is cool.

#### CAUTION

Make sure that the exhaust pipe and muffler have enough clearance from the rubber parts and plastic parts to avoid melting.

### EXHAUST SYSTEM COMPONENTS (2-28)

# **EXHAUST PIPE AND MUFFLER** INSPECTION

Inspect the exhaust pipe connection, muffler connection and HO2 sensor for exhaust gas leakage and mounting condition. If any defect is found, replace the defect part with a new one.

• Tighten the exhaust pipe bolts, muffler mounting bolts, muffler connecting bolts and HO2 sensor to the specified torque. 





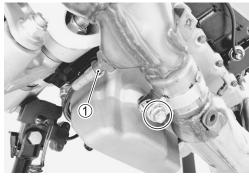


# **REMOVAL**

- Remove the radiator mounting bolts and move the radiator forward. (23-4)
- Remove the exhaust pipe bolts.



- Remove the under covers. ( \$\sumset\$ 8-5)
- Remove the HO2 sensor ①.
- Remove the exhaust pipe and muffler joint.







- Remove the seat tail cover. ( 8-4)
- Remove the muffler covers. ( 8-5)
- Remove the taillight/turn signal light assembly ①.





• Remove the muffler.





# **INSTALLATION**

Install the exhaust pipe and muffler in the revers order of removal. Pay attention to the following points:

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

#### NOTE:

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

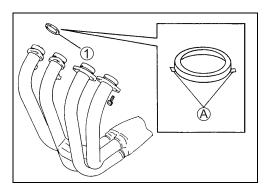
• Tighten the exhaust pipe bolts, muffler mounting bolts and muffler connecting bolts to the specified torque.

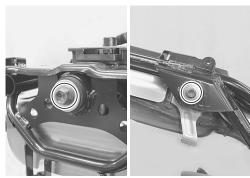
Exhaust pipe bolt: 23 N·m (2.3 kgf-m) Muffler mounting bolt: 23 N⋅m (2.3 kgf-m) Muffler connecting bolt: 23 N⋅m (2.3 kgf-m)

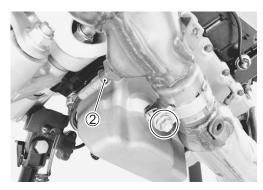
• Install the HO2 sensor 2.

HO2 sensor: 48 N·m (4.8 kgf-m)











# **COOLING AND LUBRICATION SYSTEM**

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COOLING CIRCUIT INSPECTION7- 3	
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#### **ENGINE COOLANT**

At the time of manufacture, the cooling system is filled with a 50:50 mixture of distilled water and ethylene glycol anti-freeze. This 50:50 mixture will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above –31 °C.

If the motorcycle is to be exposed to temperatures below -31 °C, this mixing ratio should be increased up to 55% or 60% according to the figure.

Anti-freeze density	Freezing point
50%	−30 °C
55%	−40 °C
60%	−55 °C

#### CAUTION

- \* Use a high quality ethylene glycol base anti-freeze, mixed with distilled water. Do not mix an alcohol base anti-freeze and different brands of anti-freeze.
- \* Do not put in 60% and more anti-freeze or 50% and less. (Refer to below figure.)
- \* Do not use a radiator anti-leak additive.

50% Engine coolant including reserve tank capacity

Anti-freeze	1 400 ml
Water	1 400 ml

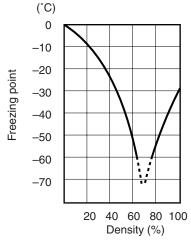


Fig. 1 Engine coolant density-freezing point curve

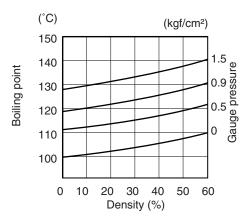
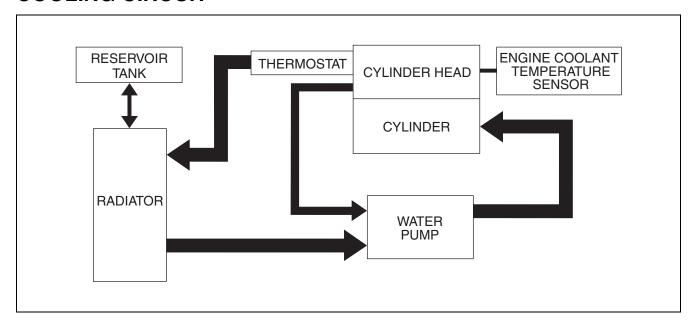


Fig. 2 Engine coolant density-boiling point curve

#### **A WARNING**

- \* You can be injured by scalding fluid or steam if you open the radiator cap when the engine is hot. After the engine cools, wrap a thick cloth around cap and carefully remove the cap by turning it a quarter turn to allow pressure to escape and then turn the cap all the way off.
- \* The engine must be cool before servicing the cooling system.
- \* Coolant is harmful:
  - If it comes in contact with skin or eyes, flush with water.
  - If swallowed accidentally, induce vomiting and call physician immediately.
  - · Keep it away from children.

#### **COOLING CIRCUIT**



#### COOLING CIRCUIT INSPECTION

Before removing the radiator and draining the engine coolant, inspect the cooling circuit for tightness.

- Remove the right fuel side tank cover. (\$\sumset\$8-3)
- Remove the radiator cap ① and connect the tester ② to the filler.

#### **▲** WARNING

Do not remove the radiator cap when the engine is hot.

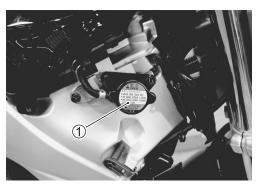
- Give a pressure of about 120 kPa (1.2 kgf/cm²) and see if the system holds this pressure for 10 seconds.
- If the pressure should fall during this 10-second interval, it
  means that there is a leaking point in the system. In such a
  case, inspect the entire system and replace the leaking component or part.

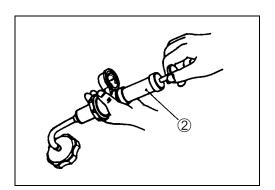
#### **▲** WARNING

When removing the radiator cap tester, put a rag on the filler to prevent spouting of engine coolant.

#### CAUTION

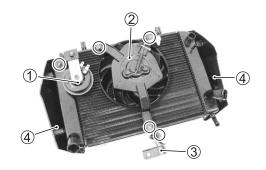
Do not allow the pressure to exceed the radiator cap release pressure, or the radiator can be damaged.





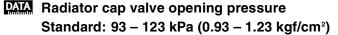
# RADIATOR AND WATER HOSES RADIATOR REMOVAL

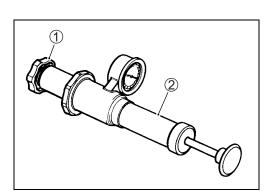
- Drain engine coolant. ( 2-17)
- Remove the radiator assembly. (3-4)
- Remove the horn ①, cooling fan ②, bracket ③ and radiator covers 4 from the radiator.



#### RADIATOR CAP INSPECTION

- Fit the cap 1 to the radiator cap tester 2.
- · Build up pressure slowly by operating the tester. Make sure that the pressure build-up stops at 93 - 123 kPa (0.93 - 1.23 kgf/cm²) and that, with the tester held standstill, the cap is capable of holding that pressure for at least 10 seconds.
- Replace the cap if it is found not to satisfy either of these two requirements.





#### RADIATOR INSPECTION AND CLEANING

Road dirt or trash stuck on the fins must be removed. Use of compressed air is recommended for this cleaning.



Fins bent down or dented can be repaired by straightening them with the blade of a small screwdriver.



#### RADIATOR INSTALLATION

• Install the cooling fan and horn.

# Cooling fan/horn mounting bolt: 8 N⋅m (0.8 kgf-m)

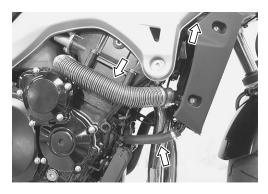
- Install the radiator.
- Route the radiator hoses properly. (\$\sumsymbol{10-23}\$)
- Pour engine coolant and Bleed air from the cooling circuit. ( 2-17 and -18)

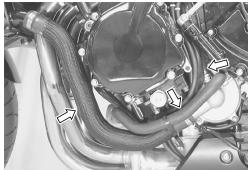
#### WATER HOSE INSPECTION

• Lift and support the fuel tank. ( 5-3)

Any water hose found in a cracked condition or flattened must be replaced.

Any leakage from the connecting section should be corrected by proper tightening.









#### COOLING FAN

### REMOVAL (F7-4)

#### **INSPECTION**

- · Remove the radiator mounting bolts and move the radiator forward. ((3-4)
- Disconnect the cooling fan coupler ①.



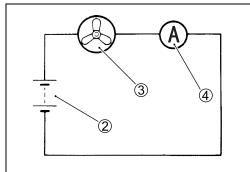
· Test the cooling fan motor for load current with an ammeter connected as shown in the illustration.

The voltmeter is for making sure that the battery 2 applies 12 V to the cooling fan motor 3. With the cooling fan motor with electric motor fan running at full speed, the ammeter 4 should be indicating not 5 A and more.

If the fan motor does not turn, replace the motor assembly with a new one.

#### NOTE:

When making above test, it is not necessary to remove the cooling fan.

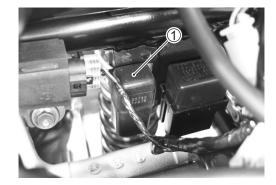


# **INSTALLATION** (27-5)

#### COOLING FAN RELAY INSPECTION

Cooling fan relay is located above the swingarm pivot.

- Lift and support the fuel tank. ( 5-3)
- Remove the cooling fan relay 1.



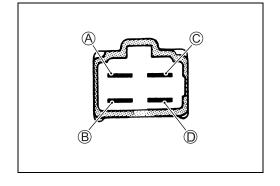
First check the insulation between (A) and (B) terminals with tester. Then apply 12 V to  $\bigcirc$  and  $\bigcirc$  terminals,  $\oplus$  to  $\bigcirc$  and  $\bigcirc$  to D, and check the continuity between A and B.

If there is no continuity, replace it with a new one.

09900-25008: Multi-circuit tester set



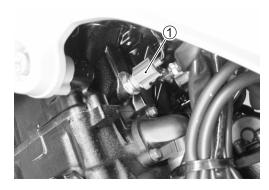
Tester knob indication: Continuity test (•)))



#### **ECT SENSOR**

#### **REMOVAL**

- · Keep the motorcycle upright.
- Disconnect the ECT sensor coupler 1.
- Place a rag under the ECT sensor and remove the ECT sensor.



#### INSPECTION

- Check the ECT sensor by testing it at the bench as shown in the figure. Connect the ECT sensor 1 to a circuit tester and place it in the oil 2 contained in a pan, which is placed on a stove.
- · Heat the oil to raise its temperature slowly and read the column thermometer 3 and the ohmmeter.
- If the ECT sensor ohmic value does not change in the proportion indicated, replace it with a new one.

#### **DATA** Temperature sensor specification

Temperature	Standard resistance
20 °C	Approx. 2.45 kΩ
50 °C	Approx. 0.811 kΩ
80 °C	Approx. 0.318 kΩ
110 °C	Approx. 0.142 kΩ

#### Cooling fan operating temperature:

Standard (OFF→ON): Approx. 105 °C (ON→OFF): Approx. 100 °C

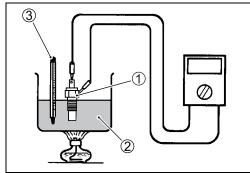
#### NOTE:

As coolant temperature rises, the cooling fan operates for 5 seconds when the temperature arrives each at 50 °C, 70 °C and 90 °C.

If the resistance is noted to show infinity or too much different resistance value, replace the ECT sensor with a new one.

#### CAUTION

- \* Take special care when handling the ECT sensor. It may cause damage if it gets a sharp impact.
- \* Do not contact the ECT sensor and the column thermometer with a pan.



# **INSTALLATION**

• Tighten the ECT sensor to the specified torque.

ECT sensor: 18 N·m (1.8 kgf-m)

## CAUTION

Take special care when handling the ECT sensor. It may cause damage if it gets a sharp impact.

• Pour engine coolant and bleed air from the cooling circuit. ( 2-17 and -18)

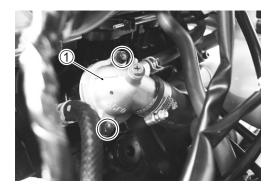


# **THERMOSTAT**

#### **REMOVAL**

- Drain engine coolant. ( 2-17)
- Lift and support the fuel tank. ( 5-3)
- Place a rag under the thermostat cover.
- Remove the thermostat cover 1.

• Remove the thermostat 2.





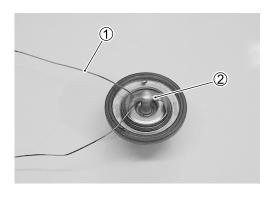
#### INSPECTION

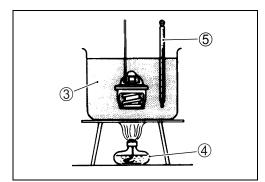
Inspect the thermostat pellet for signs of cracking.

Test the thermostat at the bench for control action, in the following manner.

- Pass a string 1 between flange 2 of thermostat, as shown.
- Immerse the thermostat in the water contained in a beaker, as shown in the illustration. Note that the immersed thermostat is in suspension. Heat the water 3 by placing the beaker on a stove 4 and observe the rising temperature on a thermometer ⑤.
- Read the thermometer just when opening the thermostat. This reading, which is the temperature level at which the thermostat valve begins to open, should satisfy the standard value.

Thermostat valve opening temperature Standard: Approx. 82 °C



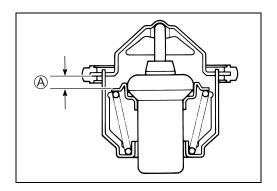


- Keep on heating the water to raise its temperature.
- Just when the water temperature reaches specified value, the thermostat valve should have lifted by at least 8 mm.

#### DATA Thermostat valve lift (A)

Standard: 8.0 mm and over at 95 °C

• A thermostat failing to satisfy either of the two requirements (start-to-open temperature and valve lift) must be replaced.



#### **INSTALLATION**

• Install the thermostat.

#### NOTE:

The jiggle valve A of the thermostat faces upside.



- Install the thermostat cover 1.
- Tighten the thermostat cover bolts to the specified torque.
- Thermostat cover bolt: 10 N·m (1.0 kgf-m)



• Pour engine coolant and bleed air from the cooling circuit. (2-17 and -18)

# **WATER PUMP** REMOVAL AND DISASSEMBLY

#### NOTE:

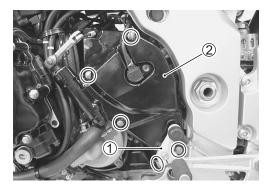
Before draining engine oil and engine coolant, inspect engine oil and coolant leakage between the water pump and crankcase. If engine oil is leaking, visually inspect the oil seal and O-ring. If engine coolant is leaking, visually inspect the mechanical seal and seal washer. ( 7-13)

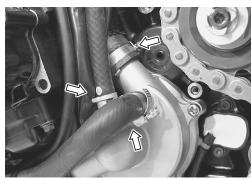
- Drain engine coolant. ( 2-17)
- Drain engine oil. ( 2-13)
- Remove the gearshift lever 1.
- Remove the engine sprocket cover 2.

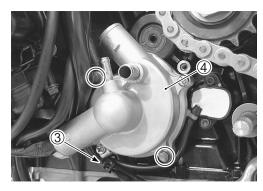


- Release the lead wires from the clamp 3.
- Remove the water pump 4.









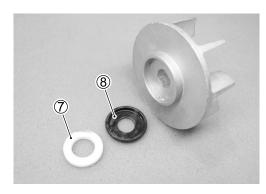
• Remove the water pump cover ⑤ and clamp ⑥.



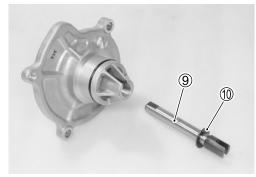
 Remove the impeller securing bolt by holding the impeller with a water pump pliers.



• Remove the mechanical seal ring ⑦ and rubber seal ⑧ from the impeller.



• Remove the impeller shaft 9 and washer 10.



• Remove the mechanical seal with the special tool.

# 09921-20240: Bearing remover set (12 mm)

#### NOTE:

If there is no abnormal condition, the mechanical seal removal is not necessary.

#### **CAUTION**

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



• Remove the oil seal using a suitable bar.

#### NOTE:

If there is no abnormal condition, the oil seal removal is not necessary.

#### CAUTION

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



#### **INSPECTION**

#### **MECHANICAL SEAL**

- Visually inspect the mechanical seal for damage, with particular attention given to the sealing face.
- Replace the mechanical seal that shows indications of leakage. Also replace the seal ring if necessary.



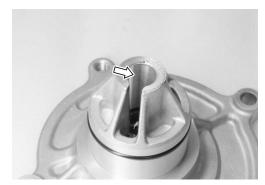
#### **OIL SEAL**

- · Visually inspect the oil seal for damage, with particular attention given to the lip.
- Replace the oil seal that shows indications of leakage.



#### IMPELLER SHAFT JOURNAL

- Visually inspect the journal for damage or scratch.
- Replace the water pump body if necessary.



#### **SEAL WASHER**

- Visually inspect the seal washer for damage, with particular attention given to the sealing face.
- Replace the seal washer that shows indications of leakage.



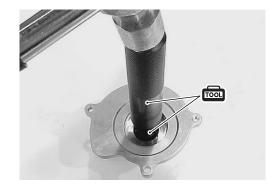
#### REASSEMBLY AND INSTALLATION

• Install the oil seal with the special tool.

 $\bigcirc$  09913-70210: Bearing installer set ( $\phi$ 22)

NOTE:

The stamped mark on the oil seal faces mechanical seal side.



• Apply a small quantity of the SUZUKI SUPER GREASE "A" to the oil seal lip.

**1** 99000-25010: SUZUKI SUPER GREASE "A" (or equivalent grease)

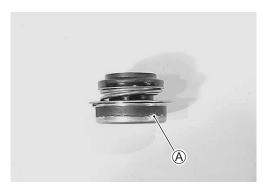


• Install the new mechanical seal using a suitable size socket wrench.

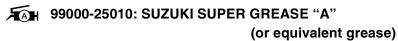


#### NOTE:

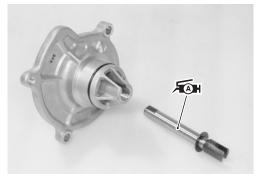
On the new mechanical seal, the sealer A has been applied.



• Apply SUZUKI SUPER GREASE "A" to the impeller shaft.



• Install the impeller shaft to the water pump body.

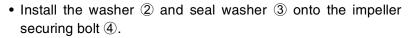


(B)

- Install the rubber seal ① into the impeller.
- After wiping off the oily or greasy matter from the mechanical seal ring, install it into the impeller.

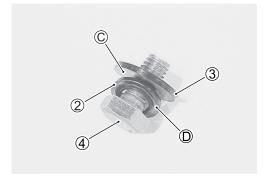
#### NOTE:

ber seal.



#### NOTE:

The metal side © of seal washer and the curved side © of washer face the impeller securing bolt head.



- Install the impeller ⑤ and its securing bolt onto the shaft.
- Tighten the impeller securing bolt to the specified torque.

#### Impeller securing bolt: 8 N·m (0.8 kgf-m)

#### NOTE:

Before installing the impeller securing bolt, apply a small quantity of the THREAD LOCK to it.

**←**1342 99000-32050: THREAD LOCK "1342"

• Install the new O-rings 6 and 7.

#### CAUTION

Use the new O-rings to prevent engine coolant leakage.

#### NOTE:

- \* Apply engine coolant to the O-ring 6.
- \* Apply SUZUKI SUPER GREASE "A" to the O-ring ?.

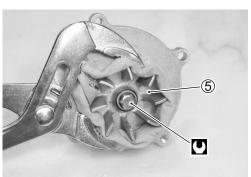
# ÆA⊪ 99000-25010: SUZUKI SUPER GREASE "A" (or equivalent grease)

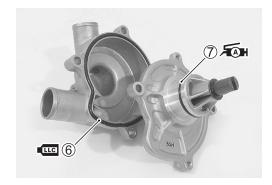
• Tighten the water pump cover screws to the specified torque.

# **(■)** Water pump cover screw: 5 N·m (0.5 kgf-m)

#### NOTE:

Fit the clamp © to the water pump cover screw.



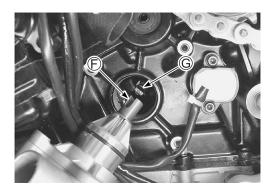


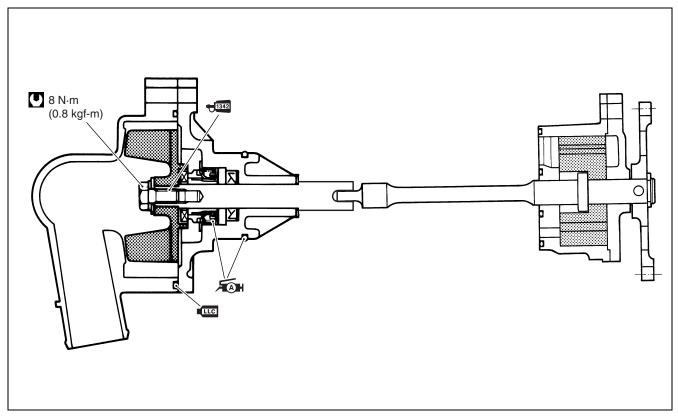


• Install the water pump.

## NOTE:

Set the water pump shaft end  ${\Bbb E}$  to the oil pump shaft  ${\Bbb G}$  as shown.





• 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 and side-stand switch lead wires under the water pump lib.



- Connect the water hoses. ( 10-23)
- Install the engine sprocket cover.
- Pour engine oil. ( 2-12)
- Adjust the gearshift lever height. ( 3-12)
- Pour engine coolant and bleed air from the cooling circuit.
   (2-17 and -18)

## **LUBRICATION SYSTEM**

## **OIL COOLER**

## **INSPECTION**

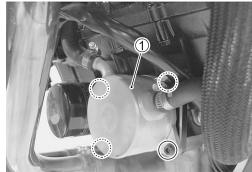
Inspect the oil cooler and oil cooler water hoses for engine oil leakage and engine coolant leakage.

Replace any defective parts if necessary.



## **REMOVAL**

- Drain engine oil. ( 2-13)
- Drain engine coolant. ( 2-17)
- · Disconnect the oil cooler water hoses.
- Remove the oil cooler 1.



## **INSTALLATION**

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

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



CAUTION

Replace the O-ring with a new one.

· Apply THREAD LOCK to the oil cooler mounting bolts and install the oil cooler 1 as shown.

**←**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)

· Connect the oil cooler water hoses.

- Pour engine oil. ( 2-13)
- Pour engine coolant and bleed air from the cooling circuit. ( 2-17 and -18)



## **OIL PRESSURE**

**∑**32-32

## **OIL FILTER**

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## **OIL PRESSURE REGULATOR**

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## **OIL STRAINER**

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## **OIL JET**

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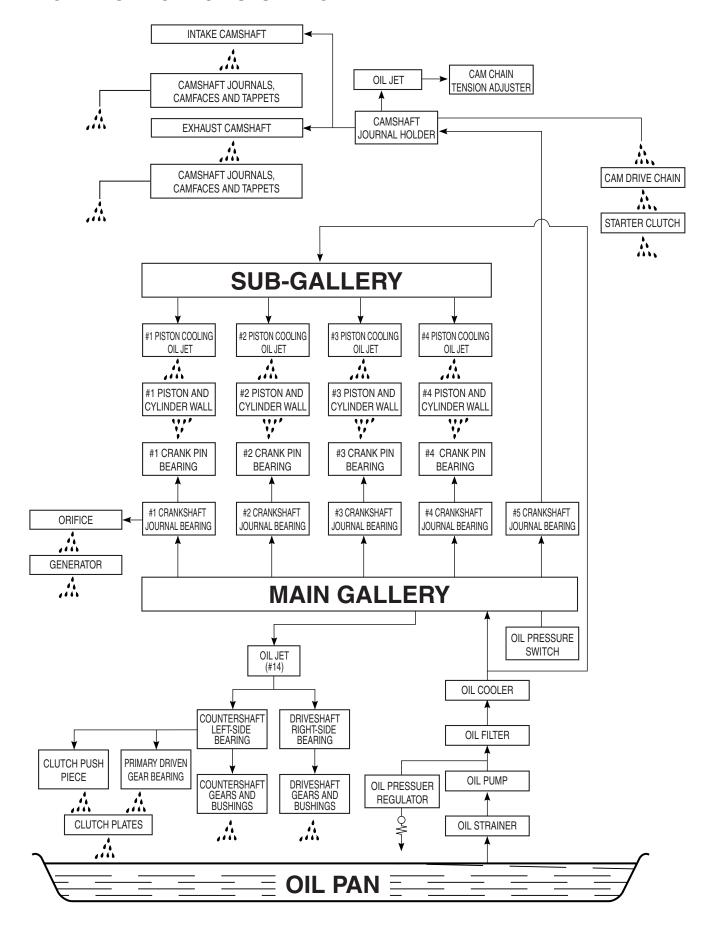
## **OIL PUMP**

₩3-41

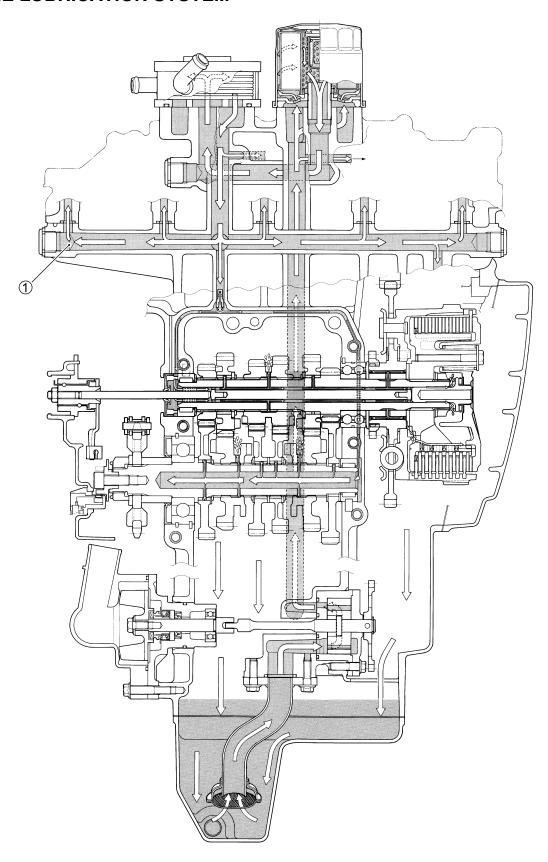
## **OIL PRESSURE SWITCH**

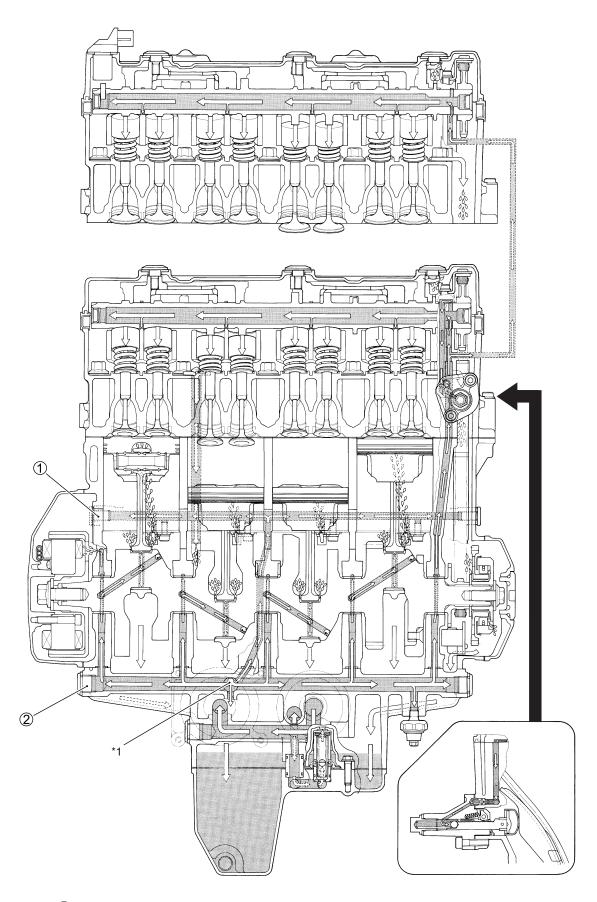
**□**₹9-34

## **ENGINE LUBRICATION SYSTEM CHART**



## **ENGINE LUBRICATION SYSTEM**





① Sub-gallery ② Main gallery \*1 To transmission

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## **EXTERIOR PARTS**

## **REMOVAL**

## SEAT

- Unhook the velcro fastenings ①.
- Unlock the seat with the ignition key.
- Remove the seat.



## FUEL TANK SIDE COVER/TURN SIGNAL LIGHT ASSEMBLY

• Remove the fasteners.



• Remove the fuel tank bracket 1.

## NOTE:

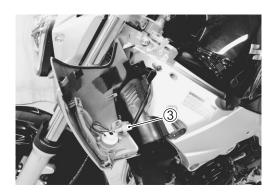
Do not disconnect the immobilizer antenna coupler 2.



• Remove the bolt.

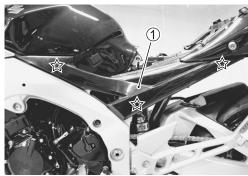


- Disconnect the turn signal light coupler ③.
- Remove the fuel tank side cover/turn signal light assembly.



## FRAME COVER

- Remove the seat. ( \$\sumsymbol{1} 8-3)
- Remove the frame cover ①.



 $\stackrel{\wedge}{\sim}$ : Hooked point

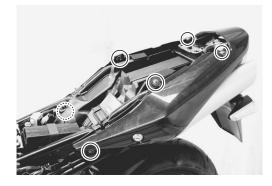
## **PILLION RIDER HANDLE**

- Remove the seat. ( \$\sigma 8-3 )
- Remove the pillion rider handle ①.



## **SEAT TAIL COVER**

- Remove the seat, frame side covers and pillion rider handle.
   ( above )
- Remove the screws (6 pcs).



- Disconnect the seat lock cable ①.
- Remove the seat tail cover.

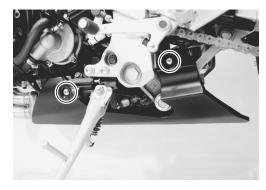


## **MUFFLER COVER**

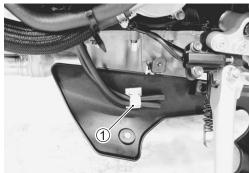
- Remove the seat tail cover. (\$\sumsymbol{2}\$ 8-4)
- Remove the muffler cover ①.

## **UNDER COVER**

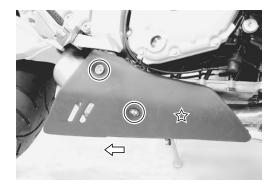
• Remove the bolts.



- Open the hose clamp ①.
- Remove the under cover (LH).



- Remove the bolts.
- Remove the under cover (RH).



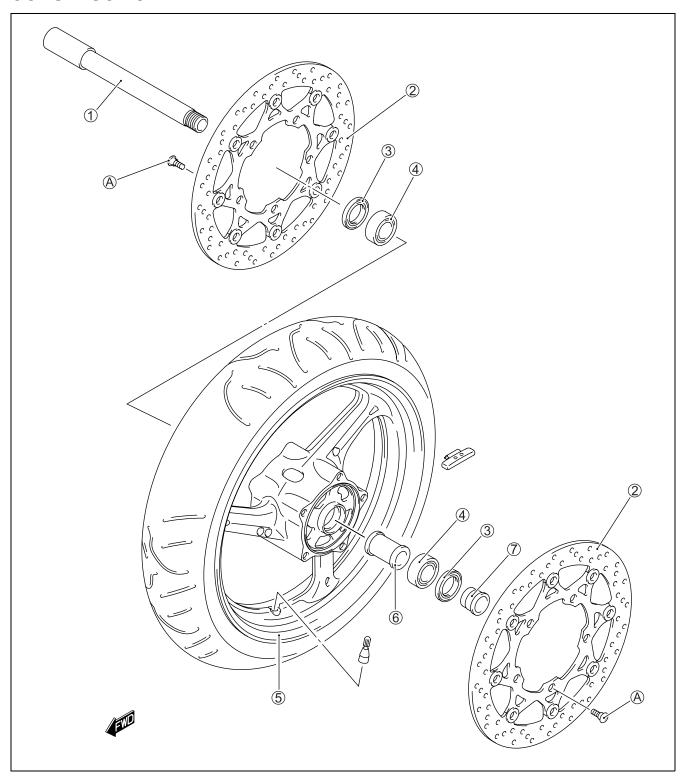
☆: Hooked point

FRONT FENDER ......(1278-14)

## **INSTALLATION**

Installation is in the reverse order of removal.

# FRONT WHEEL CONSTRUCTION



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

ITEM	N⋅m	kgf-m
1	100	10.0
A	23	23.0

## **REMOVAL**

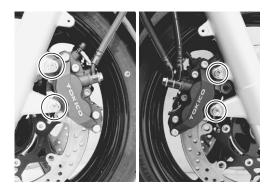
• Remove the brake calipers.

## CAUTION

Do not operate the brake lever while removing the calipers.

- Loosen two axle pinch bolts 1 on the right front fork leg.
- Slightly loosen the front axle with the special tool.

09944-18740: Hexagon socket (19 mm)





- Remove the under covers. ( 8-5)
- · Raise the front wheel off the ground and support the motorcycle with a jack or a wooden block.

## CAUTION

Do not carry out the work with the motorcycle resting on the side-stand. Do not support the motorcycle with the exhaust pipe. Make sure that the motorcycle is supported securely.

• Draw out the front axle ② and remove the front wheel.

## NOTE:

After removing the front wheel, fit the calipers temporarily to the original positions.

• Remove the collar 3 (LH).





## INSPECTION AND DISASSEMBLY

TIRE......(2-26, 8-73) BRAKE DISC......(178-59)

## **DUST SEAL**

Inspect the dust seal lip for wear or damage. If any damages are found, replace the dust seal with a new one.

Remove both side dust seals with the special tool.

09913-50121: Oil seal remover

## CAUTION

The removed dust seals must be replaced with the new ones.









## **AXLE SHAFT**

Using the dial gauge, check the axle shaft for runout and replace it if the runout exceeds the limit.

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

09900-20701: Magnetic stand 09900-21304: V-block set (100 mm)

DATA Axle shaft runout:

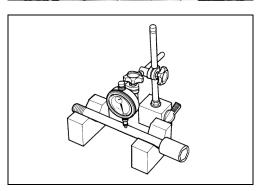
Service Limit: 0.25 mm

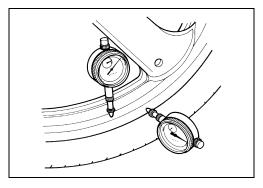
## WHEEL

Make sure that the wheel runout checked as shown does not exceed the service limit. An excessive runout is usually due to worn or loosened wheel bearings and can be reduced by replacing the bearings. If bearing replacement fails to reduce the runout, replace the wheel.

## **DATA** Wheel runout:

Service Limit (Axial and Radial): 2.0 mm

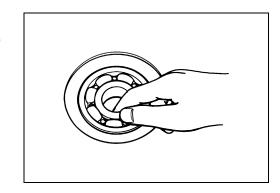




## WHEEL BEARING

Inspect the wheel bearing play by finger while they are in the wheel. Rotate the inner race by finger to inspect for abnormal noise and smooth rotation.

Replace the bearing in the following procedure if there is anything unusual.



• Remove the wheel bearings with the special tool.

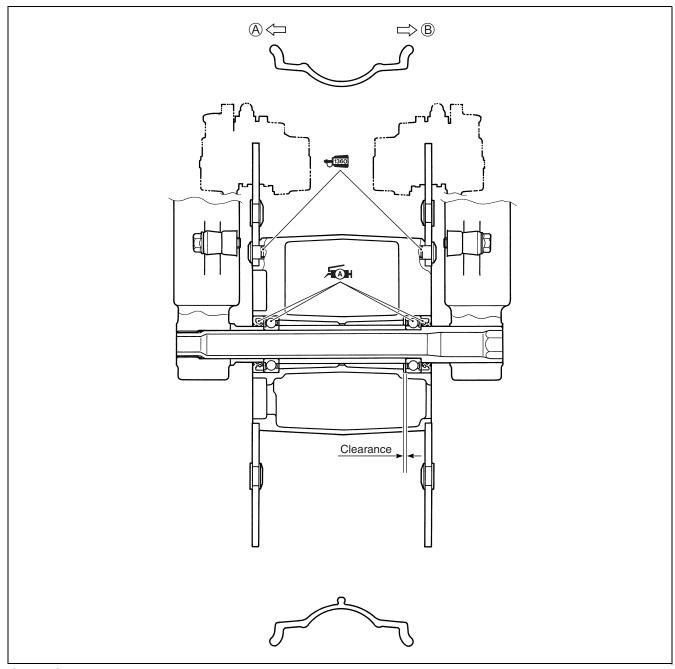


The removed bearings should be replaced with the new ones.



## **REASSEMBLY AND INSTALLATION**

Reassemble and install the front wheel in the reverse order of removal and disassembly. Pay attention to the following points:



A LH B RH

## WHEEL BEARING

• Apply SUZUKI SUPER GREASE "A" to the wheel bearings.

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



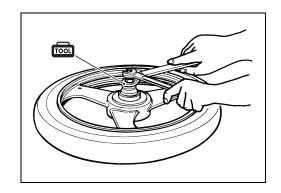
• Install the wheel bearings as follows with the special tools.

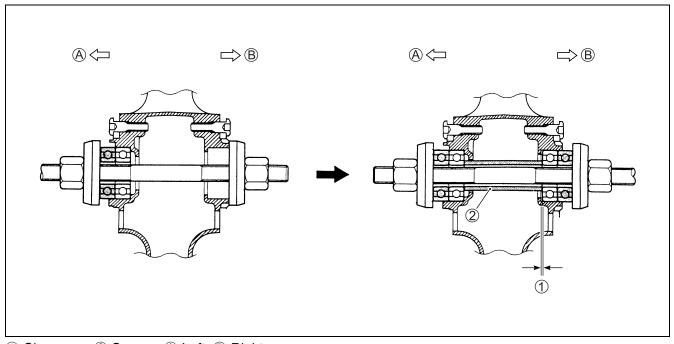
09913-70210: Bearing installer set 09941-34513: Steering race installer 09924-84510: Bearing installer set

## CAUTION

First install the left wheel bearing, then install the right wheel bearing.

The sealed cover of the bearing must face outside.





- 1 Clearance 2 Spacer A Left B Right
- Install the dust seal with the special tool.

09913-70210: Bearing installer set (52 mm)

• Apply SUZUKI SUPER GREASE "A" to the dust seal lip.

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



## **BRAKE DISC**

Make sure that the brake disc is clean and free of any greasy matter.

 Apply THREAD LOCK to the brake disc bolts and tighten them to the specified torque.

99000-32130: THREAD LOCK SUPER "1360"

■ Brake disc bolt: 23 N·m (2.3 kgf-m)



Install the front wheel and hand-tighten the front axle temporarily.

## **▲** WARNING

The directional arrow on the wheel and tire should point to the wheel rotation, when remounting the wheel.

## **FRONT AXLE**

• Tighten the front axle with the special tool to the specified torque.

09944-18740: Hexagon socket (19 mm)

Front axle: 100 N·m (10.0 kgf-m)

## NOTE:

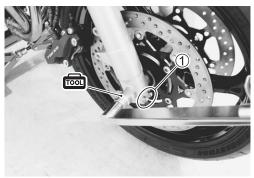
Before tightening the front axle pinch bolts ① and cariper mouting bolts, move the front forks up and down four or five times.

• Tighten the front axle pinch bolts 1 to the specified torque.

Front axle pinch bolt: 23 N·m (2.3 kgf-m)











• Tighten the brake caliper mounting bolts to the specified torque.

■ Brake caliper mounting bolt: 25 N·m (2.5 kgf-m)

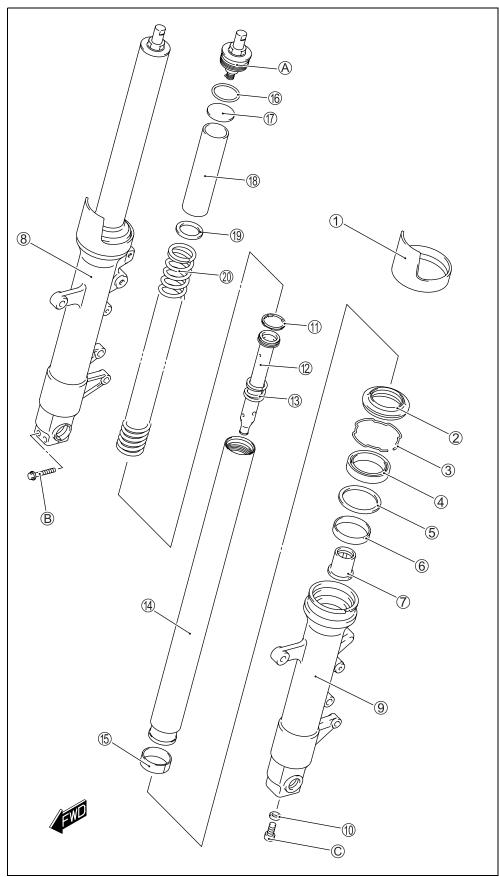
## **▲** WARNING

After install the brake calipers, front brake should be efficient by pumping the front brake lever.





# FRONT FORK CONSTRUCTION



	-
1	Front fork protector
2	Dust seal
3	Oil seal stopper ring
4	Oil seal
<b>⑤</b>	Oil seal retainer
6	Guide metal
7	Oil lock piece
8	Outer tube (RH)
9	Outer tube (LH)
10	Gasket
11	Ring
12	Cylinder
13	Spring
14)	Inner tube
15	Slide metal
16	O-ring
17)	Spring seat
18	Spacer
19	Washer
20	Spring
A	Front fork cap bolt
$^{lack}$	Front axle pinch bolt
<b>©</b>	Cylinder bolt

## U

ITEM	N∙m	kgf-m
A	23	2.3
B	23	2.3
©	30	3.0

## REMOVAL AND DISASSEMBLY

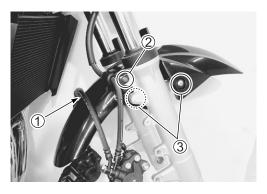
- Raise the front wheel off the ground using a jack or wooden block.
- Remove the front wheel. (28-7)

## **CAUTION**

- \* Make sure that the motorcycle is supported securely.
- \* Do not operate the front brake lever with the front wheel removed.

## **FRONT FENDER**

- Disconnect the brake hose clamp ① from the front fender.
- Remove the brake hose clamp bolt 2.
- Remove the front fender mounting bolts 3.
- · Remove the front fender.



## FRONT FORK

• Loosen the front fork upper clamp bolt ①.

## NOTE:

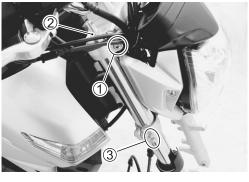
Slightly loosen the front fork cap bolt ② to facilitate later disassembly.

- Loosen the front fork lower clamp bolts 3.
- Remove the front fork.

## NOTE:

Hold the front fork by hand to prevent it from sliding out of the steering stem.

• Remove the front axle pinch bolts (RH).





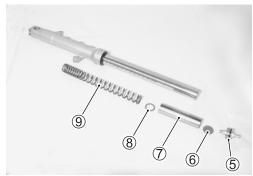
• Remove the protector 4.



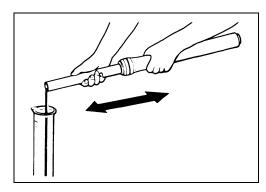
• Remove the front fork cap bolt ⑤, spring seat ⑥, spacer ⑦, washer ⑧ and fork spring ⑨.

## **▲** WARNING

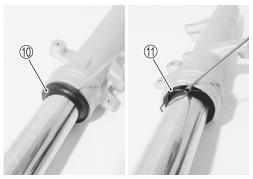
Hold the front fork cap bolt when removing it, or it will jump out due to the spring pressure.



- Invert the front fork and stroke it several times to drain out fork oil.
- Hold the front fork in the inverted position for a few minutes to allow the fork oil to fully drain.



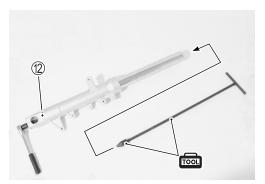
• Remove the dust seal ① and oil seal stopper ring ①.



• Remove the cylinder bolt ② using the special tools.

09940-34520: T-Handle

09940-34531: Attachment (A)



• Remove the cylinder (3) and rebound spring (4).



• Pull the inner tube out of the outer tube with light impact.

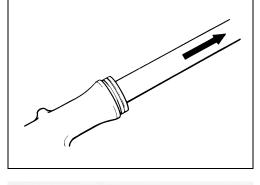
## NOTE:

Be careful not to damage the inner tube.

## CAUTION

The slide metals, oil seal and dust seal must be replaced with the new ones when reassembling the front fork.

- Remove the following parts from the inner tube.
  - 15 Oil lock piece
  - (6) Slide metal
  - (17) Guide metal
  - (8) Oil seal retainer
  - 19 Oil seal

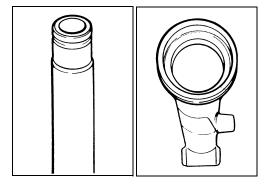




## **INSPECTION**

## **INNER AND OUTER TUBES**

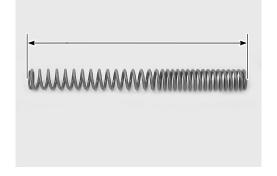
Inspect the inner tube sliding surface and outer tube sliding surface for scuffing. If any defects are found, replace them with new ones.



#### **FORK SPRING**

Measure the fork spring free length. If it is shorter than the service limit, replace it with a new one.

Front fork spring free length
Service Limit: 327 mm



#### CYLINDER RING

Inspect the cylinder ring for wear or damage. If it is worn or damaged, replace it with a new one.

#### NOTE:

The ring should be installed onto the cylinder with its oil passage notches ① facing downward.



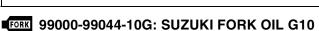
## REASSEMBLY AND REMOUNTING

## **METALS AND SEALS**

• Hold the inner tube vertically and clean the metal groove and install the slide metal by hand as shown.

## CAUTION

- \* Use special care to prevent damage to the "Teflon" coated surface of the guide metal when mounting it.
- \* When installing the oil seal to inner tube, be careful not to damage the oil seal lip.
- \* Replace the removed metals and seal with new ones.
- \* Apply fork oil to the metals and lip of the oil seal.



- · Assemble the following parts as shown.
  - 1) Oil seal
  - 2 Oil seal retainer
  - ③ Guide metal
  - 4 Slide metal

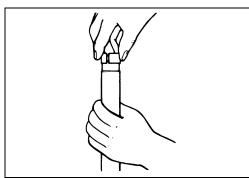
## NOTE:

Stamped mark on the oil seal must face upward.

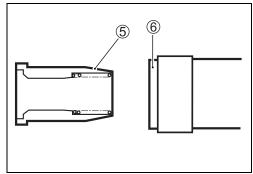
- Install the oil lock piece 5 into the inner tube 6.
- Install the inner tube into the outer tube with care not to drop the oil lock piece out.

## NOTE:

After installing the inner tube into the outer tube, keep the oil lock piece into the inner tube by compressing the front fork fully.

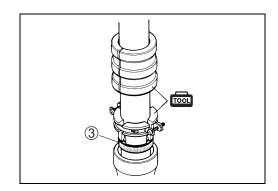






• Insert the inner tube into the outer tube and fit the oil seal ③ using the special tools.

09940-52861: Front fork oil seal installer set

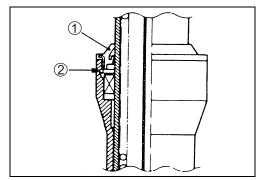


• Install the oil seal stopper ring 2.

## CAUTION

Make sure that the oil seal stopper ring is fitted securely.

• Install the dust seal 1.



## **CYLINDER BOLT**

- Install the rebound spring ① to the cylinder ②.
- Apply fork oil to the cylinder ring.
- Install the cylinder into the front fork.



 Apply THREAD LOCK "1342" to the cylinder bolt and tighten it to the specified torque using the special tools.

**←**1342 99000-32050: THREAD LOCK "1342"

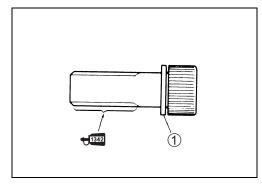
09940-34520: T-Handle

09940-34531: Attachment (A)

Cylinder bolt: 30 N·m (3.0 kgf-m)

CAUTION

Use a new gasket 1 to prevent oil leakage.

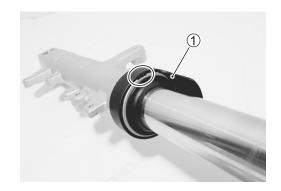


## FRONT FORK PROTECTOR

• Install the front fork protector ①.

#### NOTE:

Fit the projection of the front fork protector to the depression of the front fork outer tube.

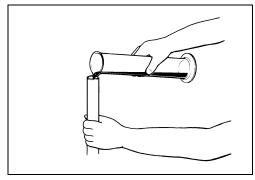


## **FORK OIL**

- Place the front fork vertically without spring.
- Compress the front fork fully.
- Pour the specified front fork oil into the front fork.

99000-99044-10G: SUZUKI FORK OIL G10

Front fork oil capacity (each leg): 508 ml



- Move the inner tube up and down several strokes until no more bubbles come out from the oil.
- Keep the front fork vertically and leave it during 5 6 minutes.

## NOTE:

Take extreme attention to pump out air completely.



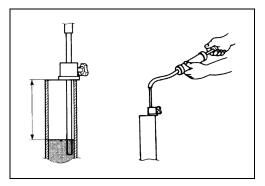
 Hold the front fork vertically and adjust the fork oil level with the special tool.

## NOTE:

When adjusting the fork oil level, compress the inner tube fully.

09943-74111: Front fork oil level gauge

Fork oil level: 114 mm



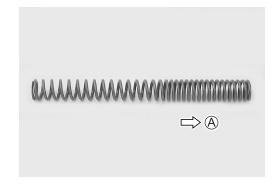
## **FORK SPRING**

• Insert the fork spring as shown.

#### NOTE:

The smaller pitch end of the spring must face downward.

• Install the washer and spacer.



(A): Downward

• Apply fork oil lightly to the O-ring.

## **CAUTION**

Use a new O-ring to prevent oil leakage.

## 99000-99044-10G: SUZUKI FORK OIL 10G

• Tighten the front fork cap bolt temporarily.

## **REMOUNTING**

• Set the top end of inner tube to the upper surface of steering stem upper bracket at point (A).





- Tighten the front fork lower clamp bolts ①.
- Front fork lower clamp bolt ①: 23 N⋅m (2.3 kgf-m)
- Tighten the front fork cap bolt ② and front fork upper clamp bolt ③.
- Front fork cap bolt ②: 23 N·m (2.3 kgf-m)
  Front fork upper clamp bolt ③: 23 N·m (2.3 kgf-m)



- · Install the front fender.
- Install the front wheel. (\$\sumset\$8-10)

## **▲** WARNING

After install the brake calipers, front brake should be efficient by pumping the front brake lever.

## SUSPENSION SETTING

After installing the front fork, adjust the spring per-load as follows.

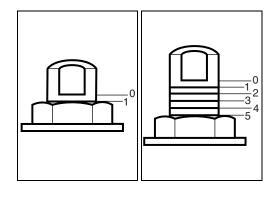
## SPRING PRE-LOAD ADJUSTMENT

There are seven grooved lines on the side of the spring adjuster. Position 0 provides the maximum spring pre-load and position 7 provides the minimum spring pre-load.

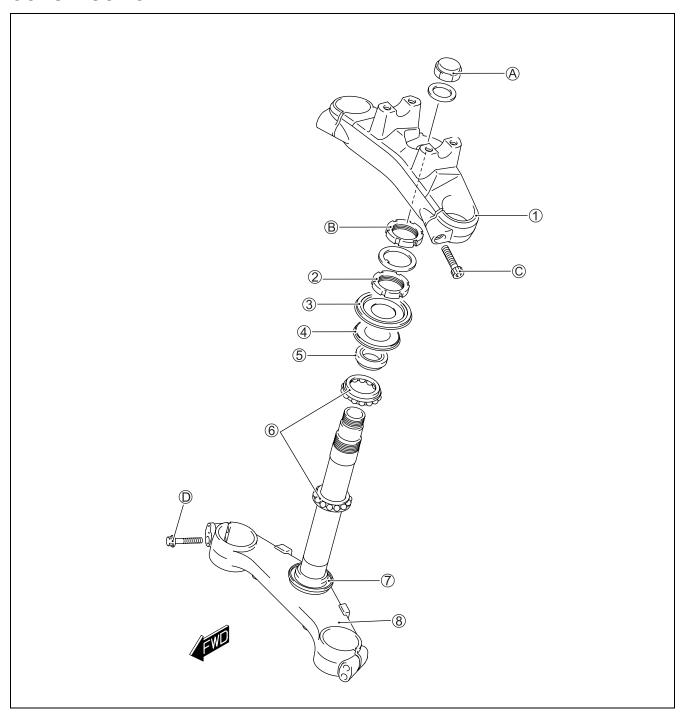
STD POSITION: 5

## **▲** WARNING

Be sure to adjust the spring pre-load on both front fork legs equally.



# STEERING CONSTRUCTION

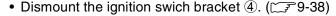


1	Steering stem upper bracket	7	Bearing lower inner race
2	Steering stem nut	8	Steering stem lower bracket
3	Dust seal cover	A	Steering stem head nut
4	Dust seal	$^{\textcircled{B}}$	Steering stem lock nut
<b>⑤</b>	Bearing upper inner race	©	Front fork upper clamp bolt
<b>6</b>	Bearing	<b>D</b>	Front fork lower clamp bolt

ITEM	N⋅m	kgf-m			
A	90	9.0			
B	80	8.0			
©	23	2.3			
D	23	2.3			

## **REMOVAL**

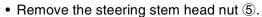
- Remove the front wheel. (\$\sumset\$8-7)
- Remove the front forks. (\$\sumset\$8-14)
- Remove the air cleaner box. ( 5-13)
- Remove the cable guide bolt 1.
- Remove the brake hose clamp 2.
- Remove the headlight bracket bolts 3.



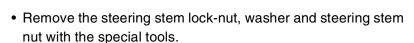
## NOTE:

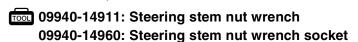
Do not disconnect the ignition switch coupler.

• Remove the rear view mirrors and dismount the handlebars.



• Remove the steering stem upper bracket 6.



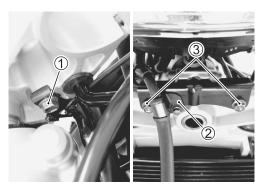


• Draw out the steering stem lower bracket.

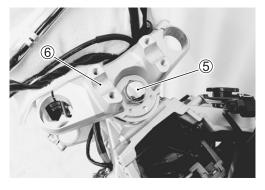
## NOTE:

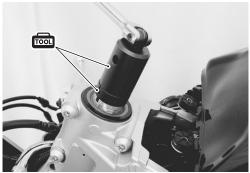
Hold the steering stem lower bracket by hand to prevent it from falling.

• Remove the dust seal cover 7, dust seal 8.



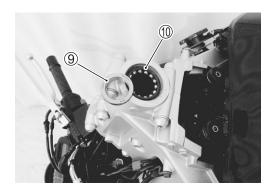








• Remove the steering stem upper bearing inner race 9 and bearing 10.



## **INSPECTION AND DISASSEMBLY**

Inspect the removed parts for the following abnormalities.

- \* Handlebar distortion
- \* Distortion of the steering stem
- \* Bearing wear or damage
- \* Abnormal bearing noise
- \* Race wear or damage

If any abnormal points are found, replace defective parts with new ones

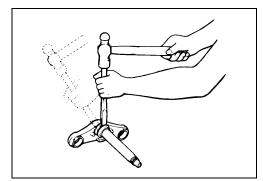




• Remove the steering stem lower bearing inner race with a chisel.

## CAUTION

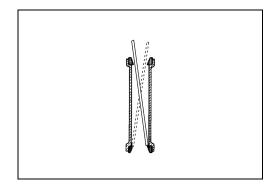
The removed bearing outer race must be replaced with a new one.



• Drive out the steering stem bearing outer races (upper and lower) using the steel rod.

## CAUTION

The removed bearing outer race must be replaced with a new one.



## **REASSEMBLY**

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

## **OUTER RACE**

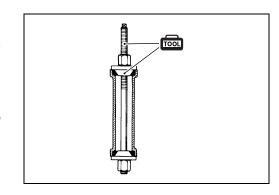
 Press in the upper and lower bearing outer races with the special tools.

09941-34513: Steering outer race installer set 09913-70210: Bearing installer set ( $\phi$ 55)

#### **INNER RACE**

Press in the lower bearing inner race with the special tool.







## INSTALLATION

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

## **BEARING**

 Apply SUZUKI SUPER GREASE "A" to the bearings and bearing races.

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

- Install the lower bearing to the steering stem lower bracket.
- Install the upper bearing and bearing inner race.

#### STEM NUT

- · Install the dust seal and dust seal cover.
- Tighten the steering stem nut to the specified torque with the special tools.

09940-14911: Steering stem nut wrench
09940-14960: Steering stem nut wrench socket

Steering stem nut: 45 N·m (4.5 kgf-m)

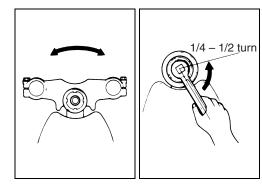




- Turn the steering stem lower bracket about five or six times to the left and right so that the angular ball bearings will be seated properly.
- Loosen the stem nut by 1/4 1/2 turn.

#### NOTE:

This adjustment will vary from motorcycle to motorcycle.



## NOTE:

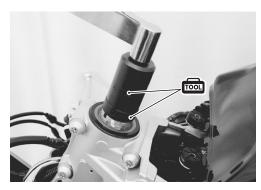
When installing the washer, align the stopper lug to the groove of steering stem.



• Install the steering stem lock-nut and tighten it to the specified torque with the special tools.

09940-14911: Steering stem nut wrench
09940-14960: Steering stem nut wrench socket

Steering stem lock-nut: 80 N·m (8.0 kgf-m)



## FRONT FORK AND STEERING STEM UPPER BRACKET

- Install the headlight bracket.
- Temporarily install the front forks. ( 8-20)
- Tighten the steering stem head nut to the specified torque.

## Steering stem head nut: 90 N⋅m (9.0 kgf-m)

- Install the front wheel. (\$\sumset\$8-12)
- Install the handlebars. ( 8-28)
- Cable routing ( 10-17 and -18)



Check the steering movement in the following procedure.

- By supporting the motorcycle with a jack, lift the front wheel until it is off the floor by 20 – 30 mm.
- Check that the cables and wire harnesses are properly routed.
- With the front wheel in the straight ahead state, hitch the spring scale (special tool) on one handlebar grip end as shown in the figure and read the graduation when the handlebar starts moving. Do the same on the other grip end.

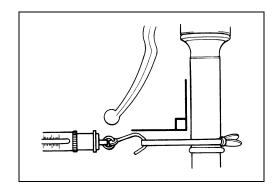
DATA Initial force: 200 − 500 grams

■ 09940-92720: Spring scale

- If the initial force read on the scale when the handlebar starts turning is either too heavy or too light, adjust it till it satisfies the specification.
- First, loosen the front fork upper clamp bolts, handlebar clamp bolts, steering stem head nut and steering stem lock-nut, and then adjust the steering stem nut by loosening or tightening it.
- 2) Tighten the steering stem lock-nut, stem head nut, handlebar clamp bolts and front fork upper clamp bolts to the specified torque and re-check the initial force with the spring scale according to the previously described procedure.
- 3) If the initial force is found within the specified range, adjustment has been completed.

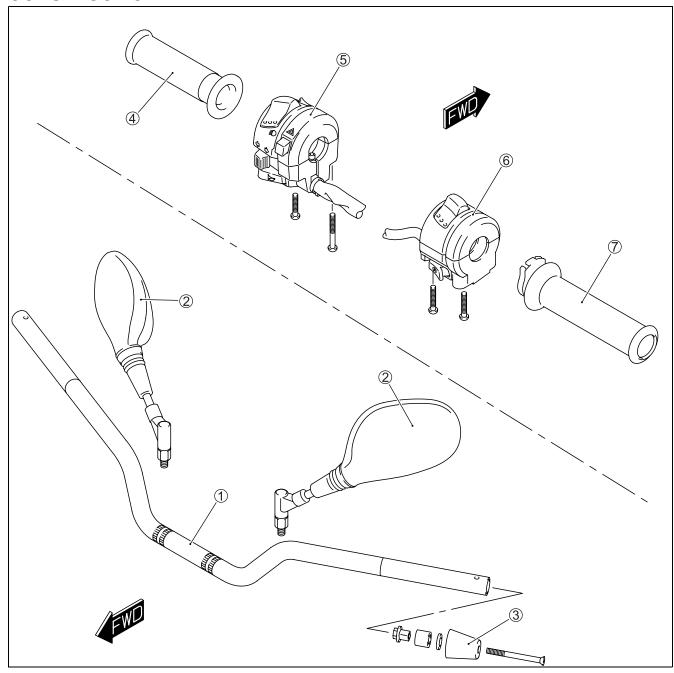
## NOTE:

Hold the front fork legs, move them back and forth and make sure that the steering is not loose.





# **HANDLEBARS CONSTRUCTION**



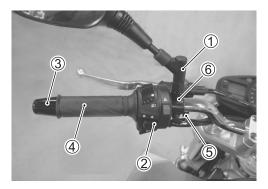
1	Handlebars	<b>⑤</b>	Left handlebar switch
2	Rear view mirror	6	Right handlebar switch
3	Handlebar balancer	7	Right handlebar grip
4	Left handlebar grip		

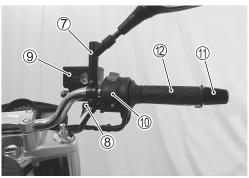
- Remove the following items from the handlebars.
  - 1 Rear view mirror
  - 2 Left handlebar switch box
  - 3 Handlebar balancer
  - 4 Grip rubber
  - (5) Clutch switch lead wires
  - 6 Clutch lever holder/Clutch lever
  - 7 Rear view mirror
  - 8 Brake light switch lead wires
  - 9 Front brake master cylinder/Front brake lever
  - 10 Right handlebar switch box
  - 11 Handlebar balancer
  - 12 Throttle grip

## **CAUTION**

Do not turn the front brake master cylinder upside down.

• Remove the caps and handlebar clamp bolts.



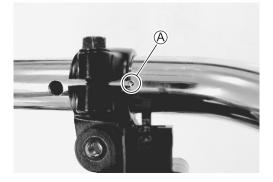


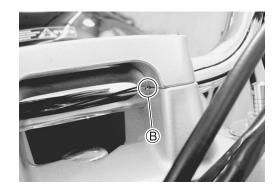




- Align the clutch lever holder's matching surface with the punch mark (A) on the handlebar.
- Tighten the clutch holder mounting bolt to the specified torque.

Clutch holder mounting bolt: 10 N⋅m (1.0 kgf-m)



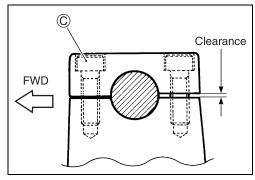


• Tighten the handlebar clamp bolts.

## NOTE:

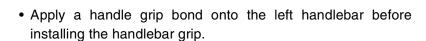
First tighten the handlebar clamp bolts © (front ones) to the specified torque.

Handlebar clamp bolt: 23 N⋅m (2.3 kgf-m)

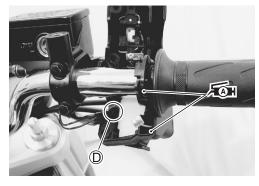


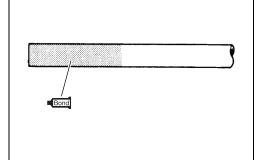
- Install the front brake master cylinder. ( 8-63)
- Insert the projection ① of the right handlebar switch into hole of the handlebar.
- Apply SUZUKI SUPER GREASE to the throttle cables and cable pulley.

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



Bond 39442-09D00: HANDLE GRIP BOND





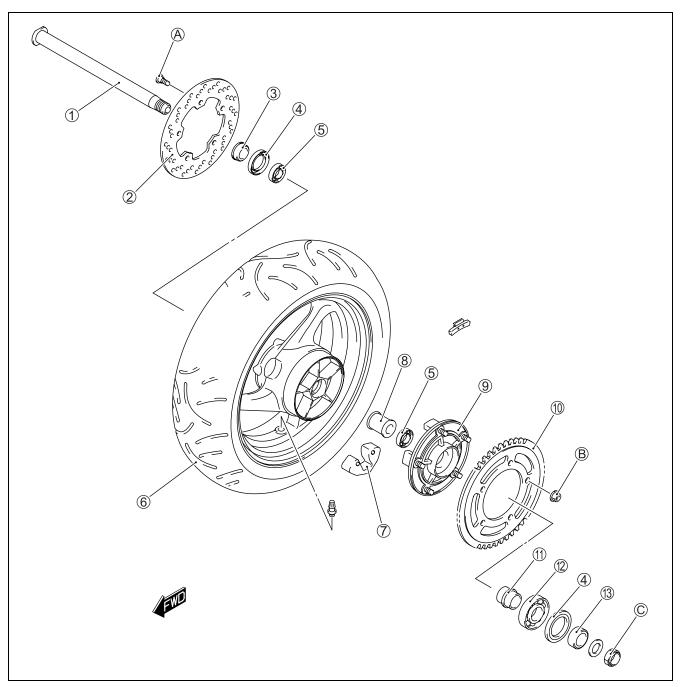
• Insert the projection © of the left handlebar switch box into the hole of the handlebar.



After installing the handlebars, the following adjustments are required before riding.

- Cable routing ( 10-17 and -18)
- Throttle cable play ( 2-15)
- Clutch lever play ( 2-16)

# REAR WHEEL CONSTRUCTION



1	Rear axle	9	Sprocket mounting drum
2	Brake disc	10	Rear sprocket
3	Collar	11)	Spacer
4	Dust seal	12	Bearing
<b>⑤</b>	Bearing	13	Spacer
<b>6</b>	Rear wheel	A	Brake disc bolt
7	Cushion	<b>B</b>	Rear sprocket nut
8	Spacer	©	Rear axle nut

<b>U</b>		
ITEM	N⋅m	kgf-m
A	23	2.3
B	60	6.0
©	100	10.0

- Loosen the axle nut 1.
- Raise the rear wheel off the ground and support the motorcycle with a jack or wooden block.
- Remove the axle nut and draw out the rear axle.



• Remove the rear wheel by disengaging the drive chain.

# **CAUTION**

Do not operate the brake pedal while removing the rear wheel.



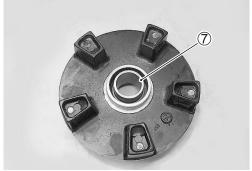
- Remove the collar 2.
- Remove the brake disc 3.



- Remove the spacer 4.
- Loosen the rear sprocket mounting nuts.
- Draw out the rear sprocket mounting drum ⑤ from the wheel hub and separate the rear sprocket ⑥ from the mounting drum.



• Remove the rear sprocket mounting drum spacer 7.



# INSPECTION AND DISASSEMBLY

TIRE	( 2-26, 8-73)
WHEEL	•
AXLE SHAFT	
BRAKE DISC	(📜 8-59)
	• • • • • • • • • • • • • • • • • • • •

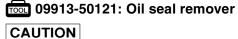
(Use the front wheel specifications and procedure.)

#### **DUST SEAL**

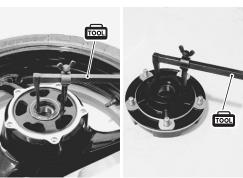
Inspect the wheel and sprocket mounting drum dust seal for wear or damage. If any damage is found, replace the dust seal with a new one.



• Remove the dust seal with the special tool.

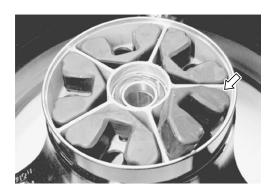


The removed dust seal must be replaced with a new



#### WHEEL DAMPER

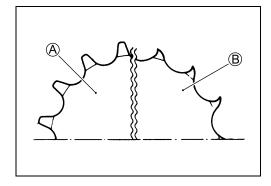
Inspect the dampers for wear and damage. Replace the damper if there is anything unusual.



#### **SPROCKET**

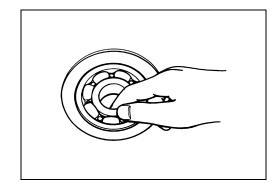
Inspect the sprocket teeth for wear. If they are worn as shown, replace the two sprockets and drive chain as a set.

- A Normal wear
- **B** Excessive wear



#### **BEARINGS**

Inspect the wheel bearing play and sprocket mounting drum bearing by hand while they are installed in place. Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



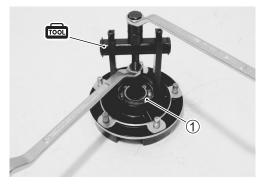
• Remove the sprocket mounting drum bearing ① and wheel bearing ② with the special tool.

09921-20240: Bearing remover set (1) 30 mm)

(2 25 mm)

# CAUTION

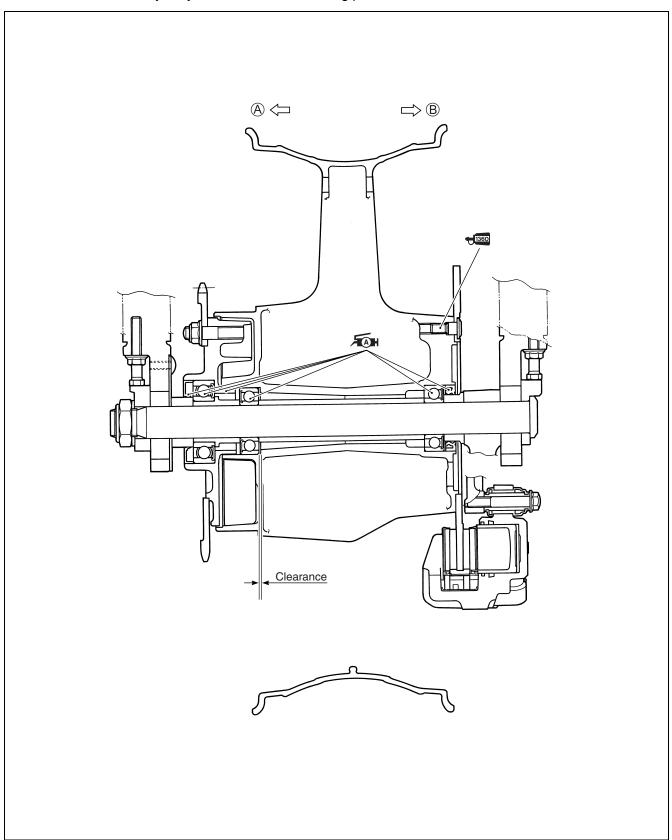
The removed bearings must be replaced with new ones.





# **REASSEMBLY AND INSTALLATION**

Reassemble and install the rear wheel in the reverse order of removal and disassembly. Pay attention to the following points:



#### **BEARINGS**

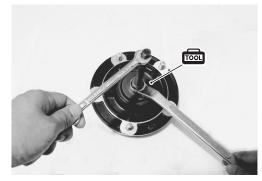
• Apply SUZUKI SUPER GREASE "A" to the bearings before installing.

**1** 99000-25010: SUZUKI SUPER GREASE "A" (or equivalent grease)



• Install the new bearing to the sprocket mounting drum with the special tool.

09924-84510: Bearing installer set



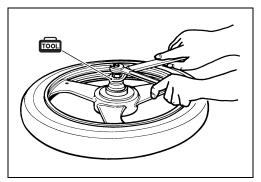
• First install the right wheel bearing, then install the left wheel bearing with the special tools.

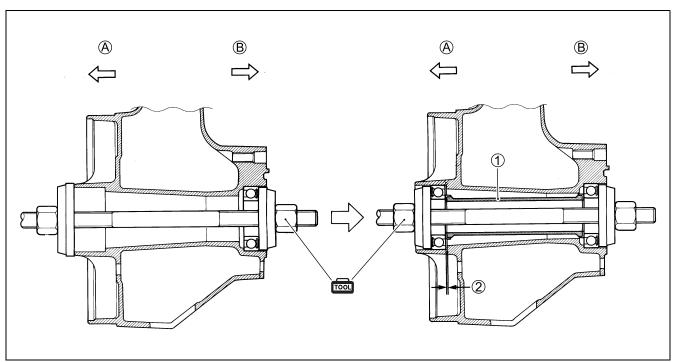


09941-34513: Steering race installer 09924-84510: Bearing installer set

# CAUTION

The sealed cover of the bearing must face outside.





#### **DUST SEALS**

• Install new dust seals with the special tool.

 $\bigcirc$  09913-70210: Bearing installer set (1)  $\phi$ 68)

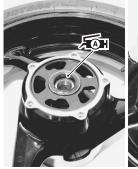
**(2)**  $\phi$ **52)** 





• Apply SUZUKI SUPER GREASE "A" to the dust seal lip before assembling rear wheel.

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





#### REAR SPROCKET AND SPROCKET MOUNTING DRUM

- Install the rear sprocket mounting drum spacer ①.
- Install the rear sprocket mounting drum to the rear wheel.



• Tighten the sprocket mounting nuts to the specified torque.

Rear sprocket nut: 60 N·m (6.0 kgf-m)

NOTE:

Stamped mark (A) on the sprocket should face outside.

• Install the collar 2.



#### **BRAKE DISC**

 Apply THREAD LOCK to the disc bolts and tighten them to the specified torque.

#### NOTE:

Make sure that the brake disc is clean and free of any greasy matter.

**♥**1360 99000-32130: THREAD LOCK SUPER "1360"

Brake disc bolt: 23 N⋅m (2.3 kgf-m)

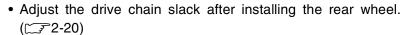
• Install the collar 1.

#### WHEEL

• Remount the rear wheel.

# **▲** WARNING

The directional arrow on the tire must point to the wheel rotation, when remounting the wheel.

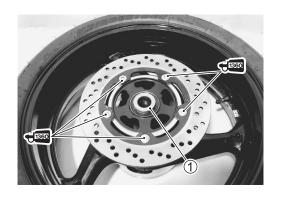


• Tighten the rear axle nut 1 to the specified torque.

Rear axle nut: 100 N·m (10.0 kgf-m)

# **▲** WARNING

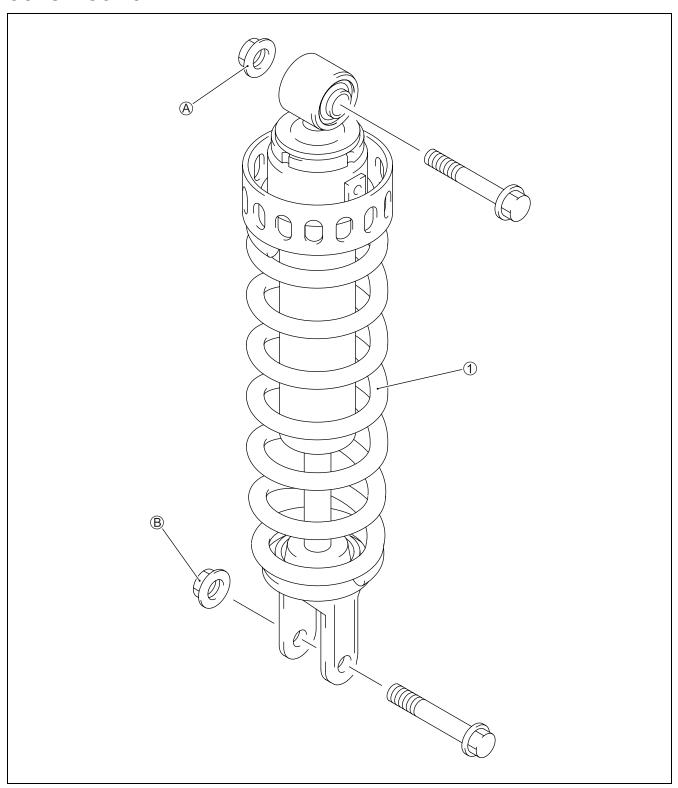
After remounting the rear wheel, pump the brake pedal a few times to check for proper brake operation.







# REAR SHOCK ABSORBER CONSTRUCTION



	1	Rear shock absorber	B	Rear shock absorber lower mounting nut
I	<b>(A)</b>	Rear shock absorber upper		
	O	mounting nut		

$oldsymbol{ol}}}}}}}}}}}}}}}}}}}}}$									
ITEM	N⋅m	kgf-m							
A	50	5.0							
B	50	5.0							

# **REMOVAL**

- Remove the under covers. (\$\sumsymbol{1} 8-5\$)
- Support the motorcycle with a jack relieve no load on the rear shock absorber.
- Remove the rear shock absorber upper and lower mounting bolts and nuts.







# **INSPECTION**

Inspect the shock absorber body and bushing for damage and oil leakage.

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

# CAUTION

Do not attempt to disassemble the rear shock absorber unit. It is unserviceable.





# REAR SHOCK ABSORBER DISPOSAL

# **▲** WARNING

The rear shock unit contains high-pressure nitrogen gas. Mishandling can cause explosion.

- \* Keep away from fire and heat. High gas pressure caused by heat can cause an explosion.
- \* Release gas pressure before disposing.



- Mark the drill hole at (A) with a center punch.
  - A: 10 mm
- Cover the rear shock absorber with a transparent vinyl bag ①.
- Hold the rear shock absorber ② with a vice.
- Make a hole with a 3 mm drill.

### **▲** WARNING

Wear eye protection to protect your eyes from released gas and metal chips.

#### NOTE:

When holding the absorber, its bushing must be faced upward.



#### REMOUNTING

Remount the rear shock absorbers in the reverse order of removal. Pay attention to the following points:

• Install the rear shock absorber and tighten the rear shock absorber upper/lower mounting nuts.

Rear shock absorber mounting nut (upper and lower): 50 N·m (5.0 kgf-m)







# **SUSPENSION SETTING**

After installing the rear suspension, adjust the spring pre-load and damping force as follows.

# **SPRING PRE-LOAD ADJUSTMENT**

The pre-load is adjusted by turning the pre-load adjuster ①.

Position "1" provides the softest spring pre-load.

Position "7" provides the stiffest spring pre-load.

STD position: 4

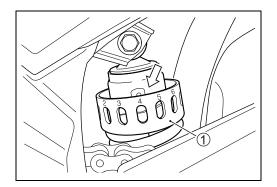


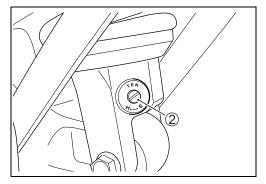
The damping force is adjusted by turning the damping force adjuster ②.

Fully turn the damping force adjuster clockwise. It is at stiffest position and turn it out to standard setting position.

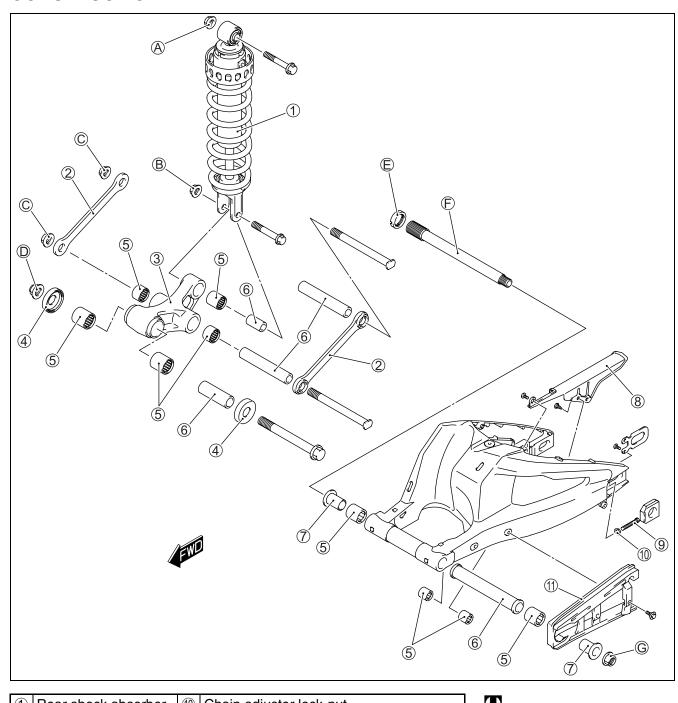
# STD Position: 1 turn out from stiffest position

[Fine-tune the adjuster by turning it slightly until two punch marks align.]





# REAR SUSPENSION CONSTRUCTION

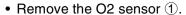


1	Rear shock absorber	10	Chain adjuster lock-nut
2	Cushion rod	A	Rear shock absorber upper mounting nut
3	Cushion lever	$^{\circ}$	Rear shock absorber lower mounting nut
4	Dust seal	©	Cushion rod nut
<b>⑤</b>	Bearing	<b>D</b>	Cushion lever mounting nut
6	Spacer	E	Swingarm pivot lock-nut
7	Collar	(Ē)	Swingarm pivot shaft
8	Chain cover	G	Swingarm pivot nut
9	Chain adjuster		

ITEM	N⋅m	kgf-m
A	50	5.0
B	50	5.0
©	78	7.8
D	132	13.2
Ē	90	9.0
Ē	15	1.5
G	100	10.0
G	100	10.0

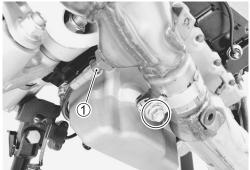
# **REMOVAL**

- Remove the seat and right frame cover. ( 8-4 and -5)
- Remove the under covers. (\$\sumsymbol{2} 8-5)
- Remove the radiator bracket bolts and move the radiator forward. (\$\subseteq 3-4\$)
- Remove the exhaust pipe bolts.



• Remove the exhaust pipe and muffler joint.





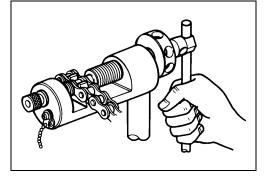




• Cut the drive chain. ( \$\sumsymbol{1} 8-77 )

# NOTE:

- \* It is necessary to cut the drive chain, only when replacing drive chain or swingarm.
- \* Do not remove the drive chain from the drive sprocket when removing the swingarm.



- Raise the rear wheel off the ground and support the motorcycle with a jack or a wooden block.
- Remove the rear wheel. ( 8-32)
- Remove the brake hose guide 2.



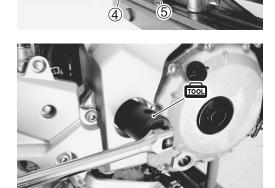
- Remove the cushion lever mounting bolt/nut ③ and rear shock absorber lower mounting bolt/nut ④.
- Remove the cushion lever ⑤.

#### NOTE:

Slightly loosen the cushion rod mounting bolt/nut (A) to facilitate later disassembly.

Remove the swingarm pivot lock-nut with the special tool.

09940-14940: Swingarm pivot thrust adjuster socket wrench

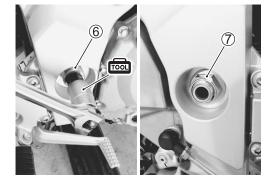


• While holding the swingarm pivot shaft ⑥ with the special tool, remove the swingarm pivot nut ⑦.

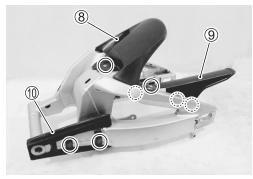
09944-28320: Hexagon socket (19 mm)

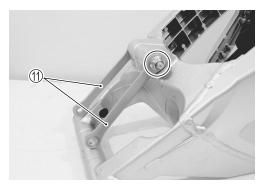
- Remove the swingarm pivot shaft.
- Remove the swingarm assembly.

• Remove the rear fender (lower) ®, chain case 9 and chain buffer 10.



• Remove the cushion rods ①.





- Remove the collars and spacer from swingarm.
- Remove the dust seals and spacers from the cushion lever.
- Inspect the collars and spacers for any flaws or other damage. If any defects are found, replace the collars or spacer with a new one.

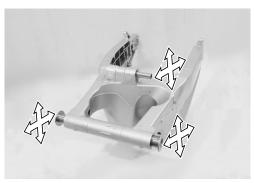




### **SWINGARM BEARING**

Insert the collars and spacer into bearings and check the play when moving the collars and spacer up and down.

If excessive play is noted, replace the bearing with a new one.



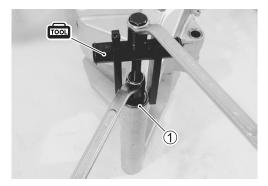
• Draw out the swingarm pivot bearings ① and the swingarm cushion rod upper bearings ② with the special tool.

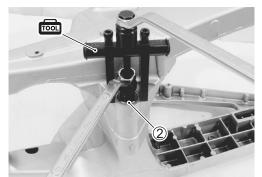
09921-20240: Bearing remover set (1) 28 mm)

(2 17 mm)

# CAUTION

The removed bearings must be replaced with the new ones.





# **CUSHION LEVER BEARING**

Insert the spacers into bearings and check the play when moving the spacers up and down.

If excessive play is noted, replace the bearing with a new one.



Draw out the cushion lever bearings with the special tool.

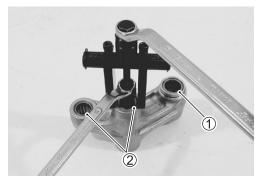


09921-20240: Bearing remover set (1) (20 mm)

2 (17 mm)

# CAUTION

The removed bearings must be replaced with the new ones.



#### **CUSHION LEVER AND CUSHION RODS**

Inspect the cushion lever and cushion rods for damage.



## **SWINGARM PIVOT SHAFT**

Using a dial gauge, check the pivot shaft runout and replace it if the runout exceeds the limit.

**DATA** Swingarm pivot shaft runout:

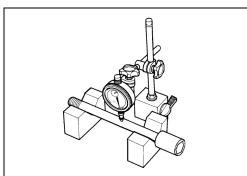
Service limit: 0.3 mm



09900-20607: Dial gauge (1/100 mm, 10 mm)

09900-20701: Magnetic stand

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



#### **CHAIN BUFFER**

Inspect the chain buffer for wear and damage.

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



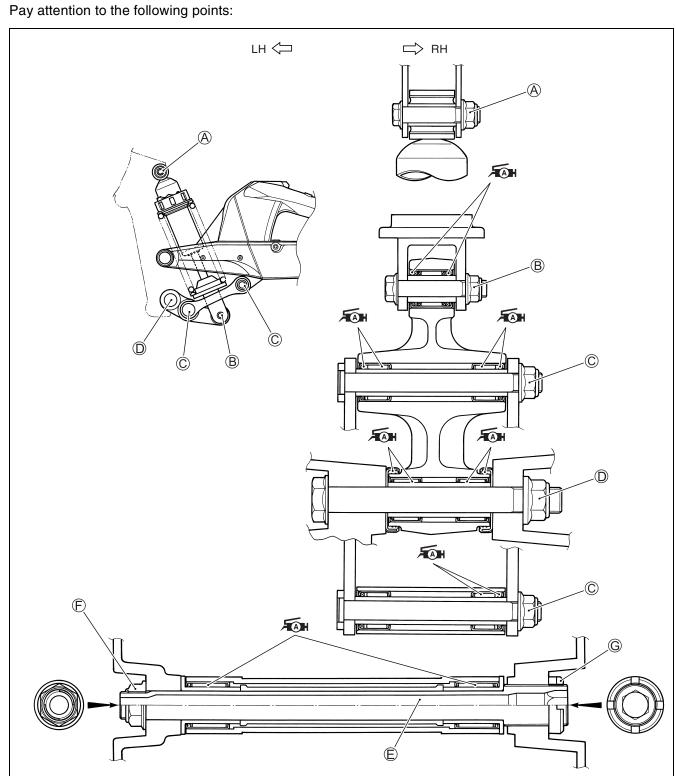
# **PLATE**

• Inspect the plate for damage and excessive bend.



# **REASSEMBLY**

Reassemble the swingarm in the reverse order of disassembly and removal.



		_									
ITEM	N∙m	kgf-m	ITEM	N⋅m	kgf-m	ITEM	N⋅m	kgf-m	ITEM	N⋅m	kgf-m
A	50	5.0	©	78	7.8	Ē	15	1.5	G	90	9.0
B	50	5.0	D	132	13.2	Ē	100	10.0			

#### **SWINGARM BEARING**

• Press the bearing into the swingarm pivot with the special tool.

# 09941-34513: Steering race installer

#### NOTE:

When reinstalling the bearing, stamped mark on bearing must face outside.

 Press the swingarm cushion rod upper side bearing with the special tool.

# 09924-84521: Steering race installer

#### NOTE:

When reinstalling the bearing, stamped mark on bearing must face outside.





# **CUSHION LEVER BEARING**

• Press the bearings into the cushion lever with the special tool and suitable socket wrench.

# 09924-84521: Steering race installer

#### NOTE:

When installing the bearing, stamped mark on bearing must face outside.

• Apply SUZUKI SUPER GREASE "A" to the bearings, spacers and collars.

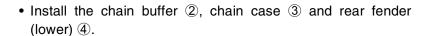


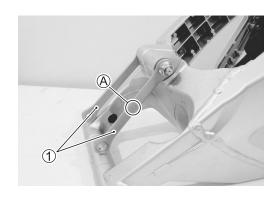


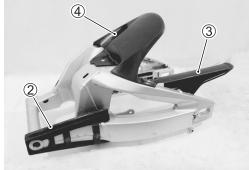




- Assemble the cushion rods ① to the swingarm temporarily. NOTE:
- \* The stamped marks (A) on the cushion rods should face outside.
- \* The bolt should be inserted from left side.







# **INSTALLATION**

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

# SWINGARM PIVOT THRUST CLEARANCE ADJUSTMENT

Adjust swingarm pivot thrust clearance in the following procedure.

 Insert the swingarm pivot shaft and tighten its to the specified torque.

09900-18740: Hexagon socket (24 mm)

Swingarm pivot shaft: 15 N·m (1.5 kgf-m)

• Hold the swingarm pivot shaft and tighten the swingarm pivot nut ① to the specified torque.

Swingarm pivot nut: 100 N⋅m (10.0 kgf-m)

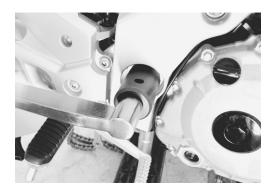




• Tighten the swingarm pivot lock-nut to the specified torque with the special tool.

09940-14940: Swingarm pivot thrust adjuster socket wrench

Swingarm pivot lock-nut: 90 N⋅m (9.0 kgf-m)

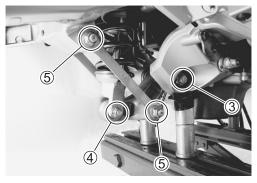


#### SHOCK ABSORBER AND CUSHION LEVER MOUNTING NUT

• Install the dust seals 1 and cushion lever 2.



- Tighten the cushion lever mounting nut ③ to the specified torque.
- Cushion lever mounting nut ③: 132 N·m (13.2 kgf-m)
- Assemble the cushion lever, cushion rod and rear shock absorber and tighten them to the specified torque. ( 8-49)
- Rear shock absorber mounting nut 4: 50 N·m (5.0 kgf-m) Cushion rod nut 5: 78 N·m (7.8 kgf-m)
- Route the brake hose ( 10-25) and install the brake hose guide 6.





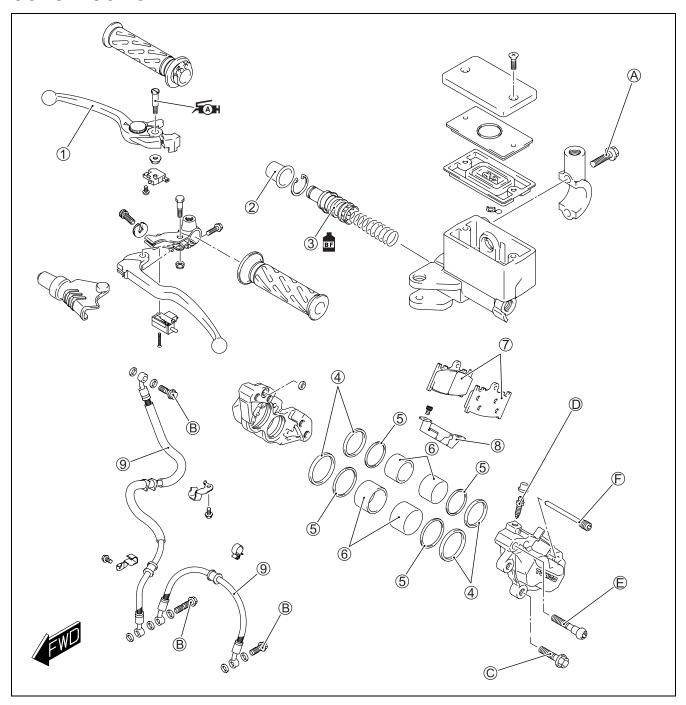
- Install the rear wheel. ( 8-38)
- Connect the drive chain. ( \$\sumset\$ 8-78)
- Install the exhaust pipe and muffler. ( 6-5)

# FINAL INSPECTION AND ADJUSTMENT

After installing the rear suspension and wheel, the following adjustments are required before driving.

- \* Drive chain ( 2-20)
- \* Tire pressure ( 2-26)

# FRONT BRAKE CONSTRUCTION



Brake lever	9	Brake hose
② Dust boot	$\bigcirc$	Master cylinder mounting bolt
③ Piston set	$^{\textstyle \textcircled{B}}$	Brake hose union bolt
4 Piston seal	©	Brake caliper mouting bolt
⑤ Dust seal	<b>D</b>	Brake caliper air bleeder valve
6 Brake caliper piston	(E)	Brake caliper housing bolt
7 Brake pad	(Ē)	Brake pad mounting pin
8 Brake pad spring		

<b>U</b>		
ITEM	N⋅m	kgf-m
A	10	1.0
B	23	2.3
©	25	2.5
D	7.5	0.75
E	22	2.2
E	15	1.5

# **▲** WARNING

- \* This brake system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use mix different types of fluid such as silicone-based or petroleum-based.
- \* Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or stored for long periods.
- \* When storing the brake fluid, seal the container completely and keep away from children.
- \* When replenishing brake fluid, take care not to get dust into fluid.
- \* When washing brake components, use fresh brake fluid. Never use cleaning solvent.
- \* A contaminated brake disc or brake pad reduces braking performance. Discard contaminated pads and clean the disc with high quality brake cleaner or neutral detergent.

## CAUTION

Handle brake fluid with care: The fluid reacts chemically with paint, plastics, rubber materials etc. and will damage then severely.

#### **BRAKE PAD REPLACEMENT**

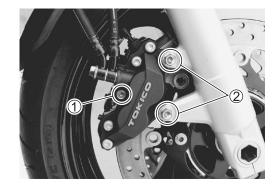
- Loosen the pad mounting pin 1.
- · Remove the brake caliper by removing the caliper mounting bolts 2.
- Remove the pad mounting pin 1 and brake pads.

#### CAUTION

- \* Do not operate the brake lever with the pads removed.
- \* Replace the brake pads as a set, otherwise braking performance will be adversely affected.

#### NOTE:

- \* When the brake caliper is removed, care must be used so as not to cause stress to the brake hose. (Hang the brake caliper on the frame with a string etc.)
- \* When removing the pad spring, push the pistons all the way into the brake caliper.
- Inspect the pad mounting pin for bent or damage. If any defects are found, replace the pad mounting pin with a new one.



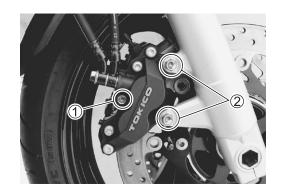


- Install new brake pads.
- Install the brake caliper.
- Tighten the pin 1 and bolts 2 to the specified torque.

Pad mounting pin ①: 16 N·m (1.6 kgf-m) Front brake caliper mounting bolt ②: 25 N·m (2.5 kgf-m)

# **▲** WARNING

After replacing the brake pads, pump the brake lever a few times to check for proper brake operation and then check the brake fluid level.



# **BRAKE FLUID REPLACEMENT**

- Place the motorcycle on a level surface and keep the handlebars straight.
- Remove the brake fluid reservoir cap and diaphragm.
- Suck up the old brake fluid as much as possible.
- Fill the reservoir with new brake fluid.



- · Connect a clear hose to the caliper air bleeder valve and insert the other end of hose into a receptacle.
- · Loosen the air bleeder valve and pump the brake lever until old brake fluid flows out of the bleeder system.



· Close the caliper air bleeder valve and disconnect a clear hose. Fill the reservoir with new fluid to the upper mark of the reservoir.



Specification and classification: DOT 4

# CAUTION

Bleed air from the brake system. (2-25)



**CALIPER REMOVAL** 

 Remove the brake hose from the caliper by removing the union bolt ① and catch the brake fluid in a suitable receptacle.

#### NOTE:

Place a rag underneath the union bolt on the brake caliper to catch any split brake fluid.

- Remove the brake caliper.
- Remove the brake pads. ( 8-54)

# CAUTION

Never reuse the brake fluid left over from previous servicing and stored for long periods of time.

# **▲** WARNING

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

# **CALIPER DISASSEMBLY**

- Remove the caliper air bleeder valve 1.
- Remove the pad spring 2.
- Separate the caliper halves by removing the caliper housing bolts with the special tools.

09930-11920: Torx bit JT40H 09930-11940: Bit holder

Remove the O-ring ③.

#### **CAUTION**

Replace the O-ring with a new one.

• Place a rag over the pistons to prevent it from popping out and then force out the pistons using compressed air.

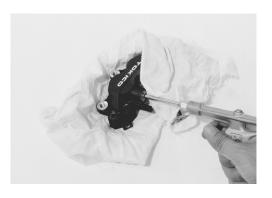
#### CAUTION

Avoid using high pressure air to prevent piston damage.





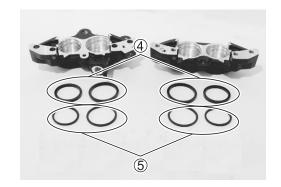




Remove the dust seals 4 and piston seals 5.

#### CAUTION

Avoid reusing the dust seals and piston seals to prevent fluid leakage.



# CALIPER INSPECTION

#### **BRAKE CALIPER**

• Inspect the brake caliper cylinder wall for nicks, scratches or other damage.

#### **BRAKE CALIPER PISTON**

 Inspect the brake caliper piston surface for any scratches or other damage.



# CALIPER REASSEMBLY

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

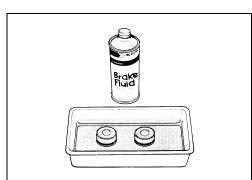
• Clean the caliper bores and pistons with specified brake fluid, especially the dust seal grooves and piston seal grooves.



Specification and classification: DOT 4

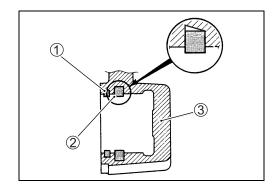
#### CAUTION

- \* Clean the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to clean them.
- \* Do not wipe the brake fluid off after cleaning the components.
- \* When cleaning the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or others.
- \* Replace the piston seals and dust seals with the new ones when reassembly. Apply the brake fluid to both seals when installing them.



#### **PISTON SEAL**

- Install the piston seals as shown in the illustration.
  - 1 Dust seal
  - 2 Piston seal
  - 3 Caliper body

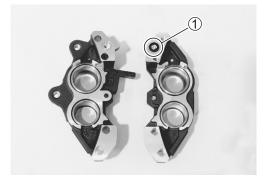


#### **O-RING**

• Install the new O-ring ① and reassemble caliper halves.

# CAUTION

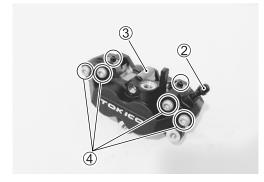
Replace the O-ring with a new one.



- Temporarily install the air bleeder valve ②.
- Install the pad spring ③.
- Tighten the caliper housing 4 to the specified torque.

Front brake caliper housing bolt 4: 22 N·m (2.2 kgf-m)

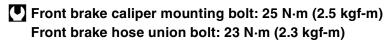
09930-11920: Torx bit JT40H 09930-11940: Bit holder



### CALIPER INSTALLATION

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

- Install the brake pads. (\$\sumset\$8-55)
- Install the brake caliper. ( \$\sumset\$ 8-55)
- Tighten each bolt to the specified torque.



# CAUTION

- \* The seal washers should be replaced with new ones to prevent fluid leakage.
- \* Bleed air from the system after reassembling the caliper. ( 2-25)



After replacing the brake pads, pump the brake lever a few times to check for proper brake operation and then check the brake fluid level.

# **BRAKE DISC INSPECTION**

- Visually check the brake disc for damage or cracks.
- Measure the thickness with a micrometer.
- Replace the disc if the thickness is less than the service limit or if damage is found.

PATA Front disc thickness: Service Limit: 4.5 mm

09900-20205: Micrometer (0 – 25 mm)

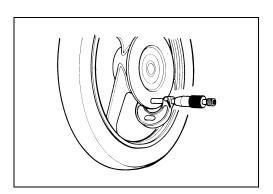
- Dismount the brake caliper.
- · Measure the runout with the dial gauge.
- Replace the disc if the runout exceeds the service limit.

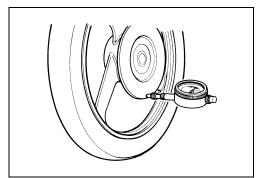
Front disc runout: Service Limit: 0.30 mm

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

09900-20701: Magnetic stand







- Drain brake fluid. ( 8-55)
- Disconnect the front brake light switch lead wires ①.
- Place a rag underneath the brake hose union bolt ② on the master cylinder to catch any split brake fluid. Remove the brake hose union bolt ② and disconnect the brake hose.

# CAUTION

Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The fluid reacts chemically with paint, plastics and rubber materials, etc. and will damage them severely.



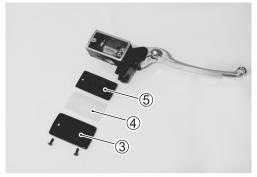
• Remove the master cylinder assembly.

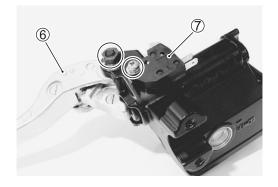


• Remove the brake lever 6 and brake light switch 7.

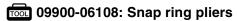


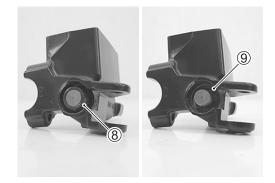




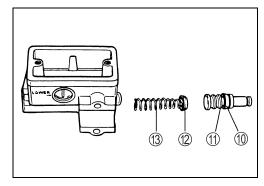


• Pull out the dust boot ® and remove the snap ring 9.





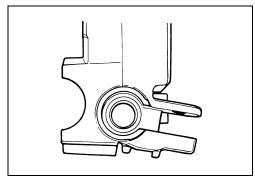
- Remove the piston/secondary cup, primary cup and spring.
  - 10 Secondary cup
  - 1 Piston
  - 12 Primary cup
  - (13) Spring



# **MASTER CYLINDER INSPECTION**

### **MASTER CYLINDER**

Inspect the master cylinder bore for any scratches or other damage.

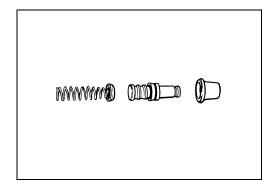


# **PISTON**

Inspect the piston surface for any scratches or other damage.

# **RUBBER PARTS**

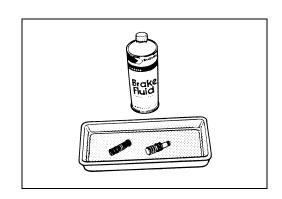
Inspect the primary cup, secondary cup and dust boot for wear or damage.



Reassemble and install the master cylinder in the reverse order of removal and disassembly. Pay attention to the following points:

#### CAUTION

- \* Wash the master cylinder components with new brake fluid before reassembly.
- \* Do not wipe the brake fluid off after washing the components.
- \* When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.
- \* Apply brake fluid to the master cylinder bore and all of the master cylinder components before reassembly.





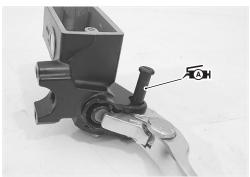
Specification and classification: DOT 4

· When installing the brake light switch, align the projection on the switch with the hole in the master cylinder.

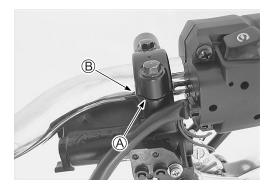


Apply SUZUKI SUPER GREASE to the brake lever pivot bolt.

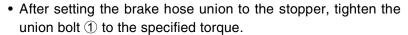
**√A** 99000-25010: SUZUKI SUPER GREASE "A" (or equivalent grease)

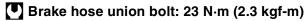


 When installing the master cylinder onto the handlebar, align the master cylinder holder's mating surface (A) with the punch mark (B) on the handlebar and tighten the upper holder bolt first.



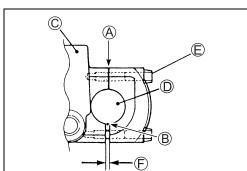
- A Mating surface
- ® Punch mark
- © Master cylinder
- D Handlebar
- © Upper holder bolt
- © Clearance
- Master cylinder holder bolt (upper and lower):
  10 N⋅m (1.0 kgf-m)





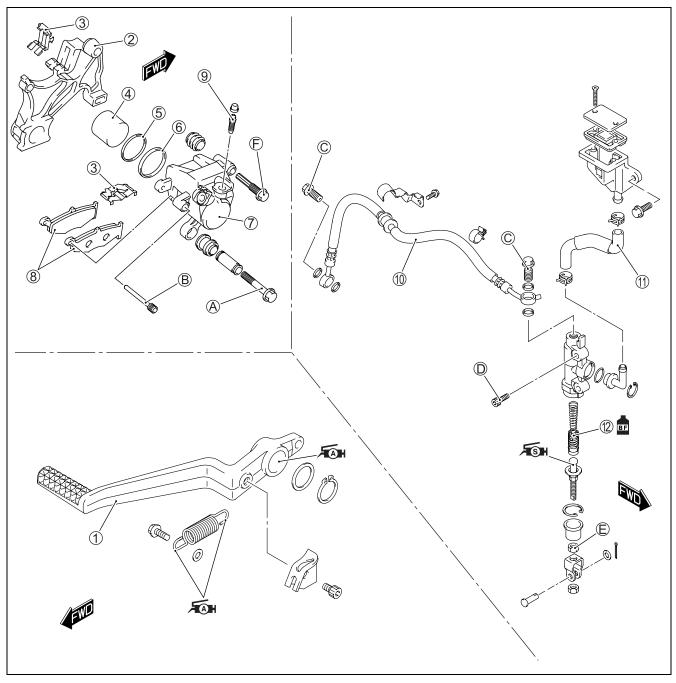
# CAUTION

- \* The seal washers should be replaced with the new ones to prevent fluid leakage.
- \* Bleed air from the brake system after reassembling the master cylinder. (2-25)





# REAR BRAKE CONSTRUCTION



1	Brake padal	10	Brake hose
2	Brake caliper bracket	11)	Reservoir hose
3	Brake pad spring	12	Piston/Cup set
4	Caliper piston	A	Brake caliper mouting bolt
<b>⑤</b>	Dust seal	$^{\circ}$	Brake pad mouting pin
6	Piston seal	©	Brake hose union bolt
7	Brake caliper	<b>D</b>	Brake master cylinder mouting bolt
8	Brake pad	Ē	Brake master cylinder rod lock nut
9	Caliper air bleeder vavle	Ð	Brake caliper sliding pin

ITEM	N⋅m	kgf-m
A	25	2.5
B	16	1.6
©	23	2.3
D	10	1.0
E	18	1.8
Ē	33	3.3

# **▲** WARNING

- \* This brake system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid such as silicone-based or petroleum-based.
- \* Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or stored for long periods.
- \* When storing the brake fluid, seal the container completely and keep away from children.
- \* When replenishing brake fluid, take care not to get dust into fluid.
- \* When washing brake components, use fresh brake fluid. Never use cleaning solvent.
- \* A contaminated brake disc or brake pad reduces braking performance. Discard contaminated pads and clean the disc with high quality brake cleaner or neutral detergent.

#### CAUTION

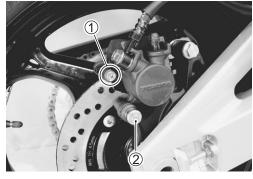
Handle brake fluid with care: the fluid reacts chemically with paint, plastics, rubber materials etc. and will damage them severely.

# **BRAKE PAD REPLACEMENT**

- Remove the pad mounting pin 1.
- Remove the caliper mounting bolt 2.

### CAUTION

- \* Do not operate the brake pedal while dismounting the pads.
- \* Replace the brake pads as a set, otherwise braking performance will be adversely affected.
- Remove the brake pads with the rear caliper pivoted up.
- Clean up the caliper especially around the caliper pistons.





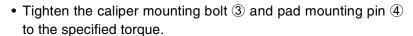
• Inspect the pad mounting pin for wear or damage. If necessary, replace it with a new one.

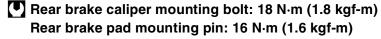


• Install new brake pads and pad mounting pin.

#### NOTE:

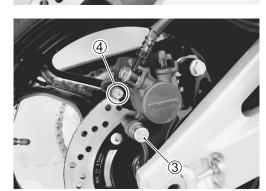
Make sure that the detents of the pads is seated onto the retainer on the caliper bracket.





# **▲** WARNING

After replacing the brake pads, pump the brake pedal several times in order to operate the brake parts correctly and then check the brake fluid level.



# BRAKE FLUID REPLACEMENT

- Remove the right frame cover. ( 8-4)
- Remove the brake fluid reservoir cap.
- Replace the brake fluid in the same manner as the front brake. ( 8-55)

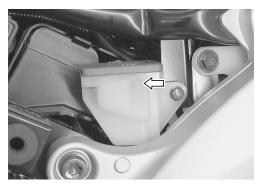


# **CAUTION**

Bleed air from the brake system. (2-25)







# CALIPER REMOVAL AND DISASSEMBLY

- Drain the brake fluid. ( 8-55)
- Remove the brake pads. ( 8-65)
- Place a rag underneath the union bolt to catch any split brake fluid.
- Disconnect the brake hose by removing the brake hose union holt
- Remove the caliper from the caliper bracket.

# CAUTION

Do not reuse the brake fluid left over from previous servicing and stored for long periods.

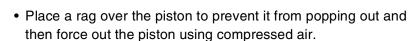
# **▲** WARNING

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

- Remove the brake pad spring 1.
- Remove the spacer ②, boots ③ and ④ from the caliper.

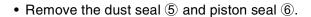
#### NOTE:

Remove the spring ① before removing the piston to prevent piston damage.



# CAUTION

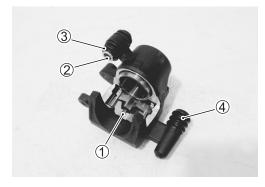
Do not use high pressure air to prevent piston damage.



# CAUTION

Do not reuse the dust seal and piston seal to prevent fluid leakage.









# **CALIPER INSPECTION**

BRAKE CALIPER .....(278-57) BRAKE CALIPER PISTONS......(278-57) BRAKE DISC......(278-59)

(Use the front wheel specifications and procedure.)

DATA Brake disc thickness (rear)

Service Limit: 4.5 mm

PAVA Brake disc runout (rear) Service Limit: 0.30 mm

# CALIPER REASSEMBLY

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

• Clean the caliper bores and pistons with specified brake fluid, especially the dust seal grooves and piston seal grooves.



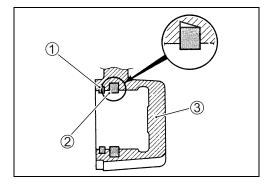
Specification and Classification: DOT 4

# **CAUTION**

- \* Clean the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to clean them.
- \* Do not wipe the brake fluid off after cleaning the components.
- \* When cleaning the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine the oth-
- \* Replace the piston seals and dust seals with new ones when reassembly. Apply the brake fluid to both seals when installing them.

# **PISTON SEAL**

- Install the piston seals as shown in the illustration.
  - 1 Dust seal
  - ② Piston seal
  - 3 Caliper body



- Tighten the brake caliper sliding pin 4 and mounting bolt 5.
- After setting the brake hose union to the stopper, tighten the union bolt ⑥ to the specified torque.
- Brake caliper sliding pin 4: 33 N·m (3.3 kgf-m)
  Brake caliper mounting bolt 5: 18 N·m (1.8 kgf-m)
  Brake hose union bolt 6: 23 N·m (2.3 kgf-m)

#### NOTE:

Before remounting the brake caliper, push the brake caliper pistons all the way into the caliper.

# CAUTION

- \* The seal washers should be replaced with the new ones to prevent fluid leakage.
- \* Bleed air from the system after reassembling the caliper. ( 2-24)



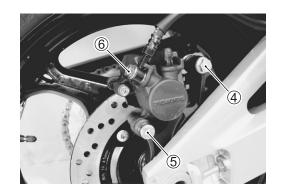
After remounting the brake calipers, pump the brake pedal until the pistons push the pads correctly.

# MASTER CYLINDER REMOVAL AND DISASSEMBLY

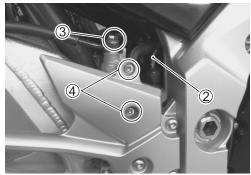
- Remove the right frame cover. (\$\sumsymbol{2} 8-4\$)
- Drain brake fluid. ( 8-55)
- Remove the brake fluid reservoir mounting bolt ①.
- Disconnect the reservoir hose 2.
- Place a rag underneath the union bolt on the master cylinder to catch spilled drops of brake fluid. Remove the union bolt ③ and disconnect the brake hose.
- Remove the mounting bolts 4.

#### CAUTION

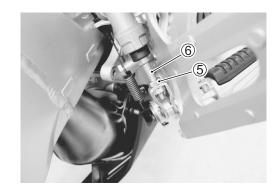
Immediately and completely wipe off any brake fluid contacting any parts of the motorcycle. The fluid reacts chemically with paint, plastic and rubber materials, etc. and will damage them severely.







- Remove the front footrest bracket bolts. ( 2-23)
- Loosen the lock-nut ⑤.
- Remove the master cylinder by turning the master cylinder rod 6.



- Remove the reservoir cap 7 and diaphragm 8.
- Remove the connector 9 by removing the snap ring.
- Remove the O-ring ①.

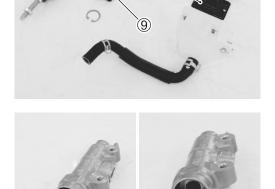
# CAUTION

Replace the O-ring with a new one.

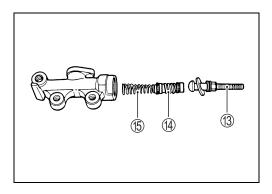
09900-06108: Snap ring pliers

• Pull out the dust boot 1 and remove the snap ring 2.

09900-06108: Snap ring pliers



• Remove the push rod ③, piston/primary cup ④ and spring ⑤.

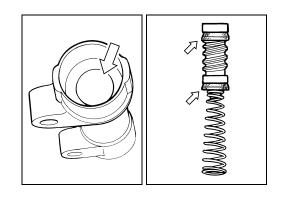


# MASTER CYLINDER INSPECTION

CYLINDER, PISTON AND CUP SET

Inspect the cylinder bore wall for any scratches or other dam-

Inspect the cup set and each rubber part for damage.



# MASTER CYLINDER REASSEMBLY AND INSTALLATION

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

# **CAUTION**

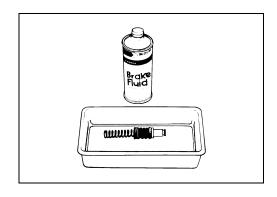
- \* Clean the master cylinder components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to clean them.
- \* Do not wipe the components with a rag.
- \* Apply brake fluid to the cylinder bore and all the component to be inserted into the bore.

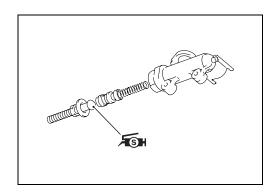


Specification and classification: DOT 4

• Apply SUZUKI SILICONE GREASE to the push rod end.





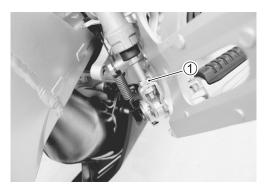


- Rout the rear brake hose properly. ( 10-25)
- Adjust the brake pedal height. ( 2-23)
- Tighten each bolt to the specified torque.

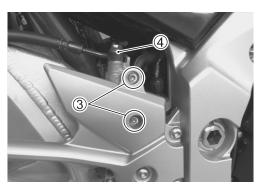
Master cylinder rod lock-nut ①: 18 N·m (1.8 kgf-m)
Front footrest bracket bolt ②: 23 N·m (2.3 kgf-m)
Master cylinder mounting bolt ③: 10 N·m (1.0 kgf-m)
Brake hose union bolt ④: 23 N·m (2.3 kgf-m)

# CAUTION

- \* The seal washers should be replaced with the new ones to prevent fluid leakage.
- \* Bleed air from the system after reassembling the master cylinder. (2-25)







# TIRE AND WHEEL TIRE REMOVAL

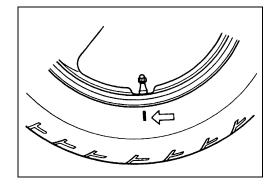
The most critical factor of tubeless tire is the seal between the wheel rim and the tire bead. For this reason, it is recommended to use a tire changer that can satisfy this sealing requirement and can make the operation efficient as well as functional.

For operating procedures, refer to the instructions supplied by the tire changer manufacturer.

#### NOTE:

When removing the tire in the case of repair or inspection, mark the tire with a chalk to indicate the tire position relative to the valve position.

Even though the tire is refitted to the original position after repairing puncture, the tire may have to be balanced again since such a repair can cause imbalance.

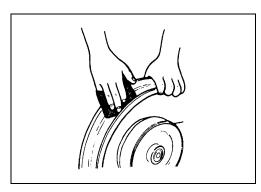


# **INSPECTION**

#### WHEEL

Wipe the wheel clean and check for the following:

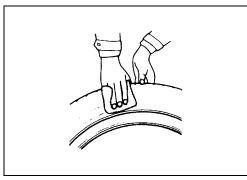
- Distortion and crack
- Any flaws and scratches at the bead seating area.
- Wheel runout ( 8-8)



# TIRE

Tire must be checked for the following points:

- Nick and rupture on side wall
- Tire tread depth ( 2-26)
- Tread separation
- Abnormal, uneven wear on tread
- Surface damage on bead
- Localized tread wear due to skidding (Flat spot)
- Abnormal condition of inner liner



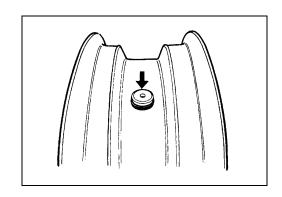
# **VALVE INSPECTION**

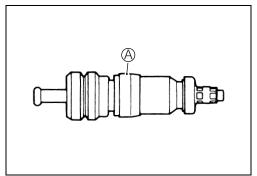
• Inspect the valve after the tire is removed from the rim. Replace the valve with a new one if the seal (A) rubber is peeling or has damage.

#### NOTE:

If the external appearance of the valve shows no abnormal condition, removing of the valve is not necessary.

If the seal has abnormal deformation, replace the valve with a new one.





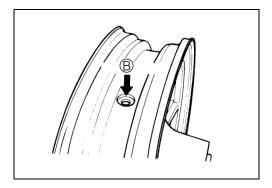
- Any dust or rust around the valve hole (B) must be cleaned off.
- Then install the valve © in the rim.

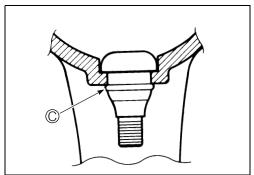
# NOTE:

To properly install the valve into the valve hole, apply a special tire lubricant or neutral soapy liquid to the valve.

# **CAUTION**

Be careful not to damage the lip © of valve.



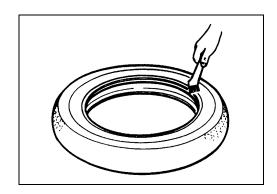


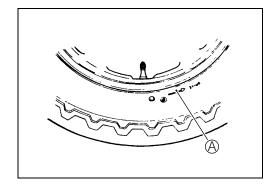
# TIRE INSTALLATION

- Apply tire lubricant to the tire bead.
- When installing the tire onto the wheel, observe the following points.

# CAUTION

- \* Do not reuse the valve which has been once removed.
- \* Never use oil, grease or gasoline on the tire bead in place of tire lubricant.
- When installing the tire, the arrow (A) on the side wall should point to the direction of wheel rotation.
- Align the chalk mark put on the tire at the time of removal with the valve position.





- For installation procedure of tire onto the wheel, follow the instructions given by the tire changer manufacturer.
- Bounce the tire several times while rotating. This makes the tire bead expand outward to contact the wheel, thereby facilitating air inflation.
- Inflate the tire.

# **▲** WARNING

- \* Do not inflate the tire to more than 400 kPa (4.0 kgf/cm²). If inflated beyond this limit, the tire can burst and possibly cause injury. Do not stand directly over the tire while inflating.
- \* In the case of preset pressure air inflator, pay special care for the set pressure adjustment.

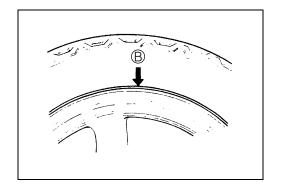
- In this condit
- In this condition, check the "rim line" ® cast on the tire side walls. The line must be equidistant from the wheel rim all around. If the distance between the rim line and wheel rim varies, this indicates that the bead is not properly seated. If this is the case, deflate the tire completely and unseat the bead for both sides. Coat the bead with lubricant and fit the tire again.
- When the bead has been fitted properly, adjust the pressure to specification.
- As necessary, adjust the tire balance.

# CAUTION

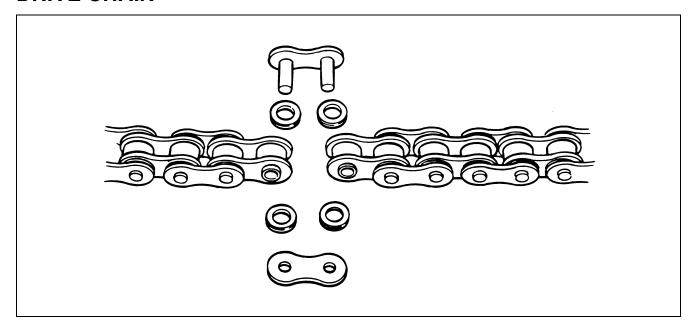
Do not run with a repaired tire at a high speed.

# **DATA** Cold inflation tire pressure

	Front	Rear
Solo riding	250 kPa	250 kPa
	(2.50 kgf/cm <sup>2</sup> )	(2.50 kgf/cm <sup>2</sup> )
Dual riding	250 kPa	290 kPa
	(2.50 kgf/cm <sup>2</sup> )	(2.90 kgf/cm <sup>2</sup> )



# **DRIVE CHAIN**

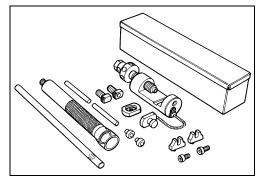


Use the special tool in the following procedures, to cut and rejoin the drive chain.

09922-22711: Drive chain cutting and joining tool set

#### NOTE.

When using the special tool, apply a small quantity of grease to the threaded parts of the special tool.

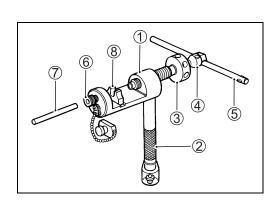


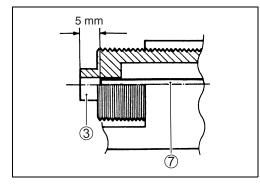
# **DRIVE CHAIN CUTTING**

- Set up the special tool as shown in the illustration.
  - 1 Tool body
  - 2 Grip handle
  - 3 Pressure bolt "A"
  - 4 Pressure bolt "B"
  - ⑤ Bar
  - 6 Adjuster bolt (with through hole)
  - 7 Pin remover
  - ® Chain holder (engraved mark 500) with reamer bolt M5 x 10

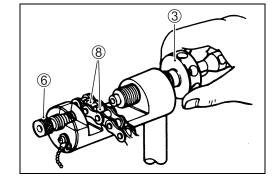
# NOTE:

The tip of pin remover  $\centcolor{T}$  should be positioned inside approximately 5 mm from the end face of pressure bolt "A"  $\centcolor{T}$  as shown in the illustration.





- Place the drive chain link being disjointed on the holder part
   8) of the tool.
- Turn in both the adjuster bolt ⑥ and pressure bolt "A" ③ so that each of their end hole fits over the chain joint pin properly.
- Tighten the pressure bolt "A" 3 with the bar.



• Turn in the pressure bolt "B" ④ with the bar ⑤ and force out the drive chain joint pin ⑨.

# CAUTION

Continue turning in the pressure bolt "B" ④ until the joint pin has been completely pushed out of the chain.

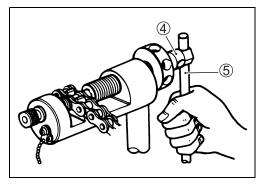
#### NOTE:

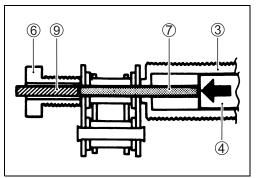
After the joint pin (9) is removed, loosen the pressure bolt "B" (4) and then pressure bolt "A" (3).

• Remove the joint pin (9) of the other side of joint plate.

# CAUTION

Never reuse joint pins, O-rings and plates. After joint pins, O-rings and plates have been removed from the drive chain, the removed joint pins, O-rings and plates should be discarded and new joint plate, O-rings and plate must be installed.





# DRIVE CHAIN CONNECTING JOINT PLATE INSTALLATION

- Set up the special tool as shown in the illustration.
  - 1 Tool body

5 Adjuster bolt

2 Grip handle

(without hole)

3 Joint plate holder

6 Pressure bolt "A"

(engraved mark "F50")

(7) Bar

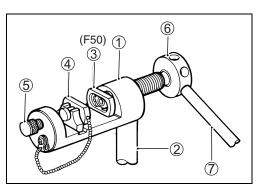
- 4 Wedge holder & wedge pin
- Connect both ends of the drive chain with the joint pin ® inserted from the wheel side A as installed on the motorcycle.
  - 9 O-ring ... 4 pcs.
  - 10 Joint plate

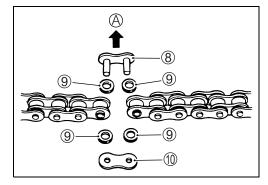
Joint set part number

RK: 525SMO7



Do not use joint clip type of drive chain. The joint clip may have a chance to drop which may cause severe damage to motorcycle and severe injury.



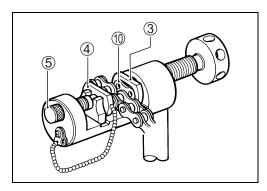


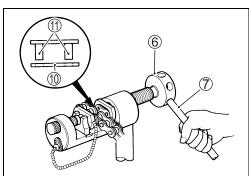
Apply grease on the recessed portion of the joint plate holder
 and set the joint plate ①.

#### NOTE:

When positioning the joint plate ① on the tool, its stamp mark must face the joint plate holder ③ side.

- Set the drive chain on the tool as illustrated and turn in the adjuster bolt ⑤ to secure the wedge holder & wedge pin ④.
- Turn in the pressure bolt "A" (6) and align two joint pins (11) properly with the respective holes of the joint plate (10)
- Turn in the pressure bolt "A" (6) further using the bar (7) to press the joint plate over the joint pins.





• Continue pressing the joint plate until the distance between the two joint plates come to the specification.

# DATA Joint plate distance specification (1)

RK	18.60 – 18.90 mm

# CAUTION

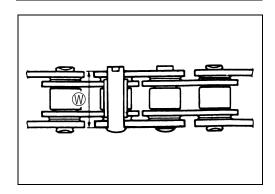
Should pressing of the joint plate be made excessively beyond the specified dimension, the work should be redone using the new joint parts.

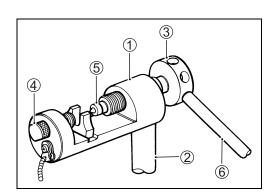
#### JOINT PIN STAKING

- Set up the special tool as shown in the illustration.
  - 1 Tool body
  - 2 Grip handle
  - 3 Pressure bolt "A"
  - 4 Adjuster bolt (without hole)
  - ⑤ Staking pin (stowed inside grip handle behind rubber cap)
  - 6 Bar

#### NOTE:

Before staking the joint pin, apply a small quantity of grease to the staking pin ⑤.



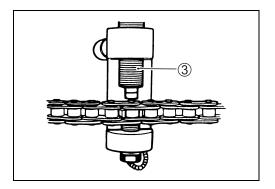


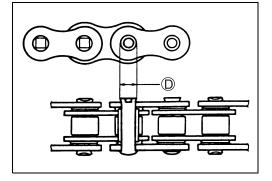
• Stake the joint pin by turning (approximately 7/8 turn) the pressure bolt "A" ③ with the bar until the pin end diameter becomes the specified dimension.

# Pin end diameter specification ①

# CAUTION

- \* After joining of the chain has been completed, check to make sure that the link is smooth and no abnormal condition is found.
- \* Should any abnormal condition be found, reassemble the chain link using the new joint parts.
- Adjust the drive chain, after connecting it. (\$\sumsymbol{2}\$-20)





# ELECTRICAL SYSTEM

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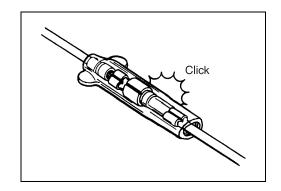
# **ELECTRICAL SYSTEM**

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# **CAUTIONS IN SERVICING**

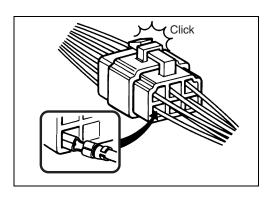
# CONNECTOR

- When connecting a connector, be sure to push it in until a click is felt.
- · Inspect the connector for corrosion, contamination and breakage in its cover.



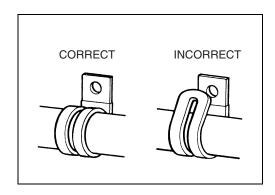
# COUPLER

- With a lock type coupler, be sure to release the lock when disconnecting, and push in fully to engage the lock when connecting.
- When disconnecting the coupler, be sure to hold the coupler itself and do not pull the lead wires.
- Inspect each terminal on the coupler for being loose or bent.
- Inspect each terminal for corrosion and contamination.



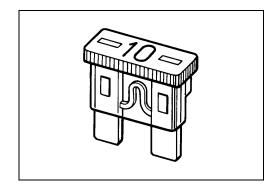
# CLAMP

- Clamp the wire harness at such positions as indicated in "WIRING HARNESS ROUTING". ( 10-17 to -18)
- Bend the clamp properly so that the wire harness is clamped securely.
- In clamping the wire harness, use care not to allow it to hang
- Do not use wire or any other substitute for the band type clamp.



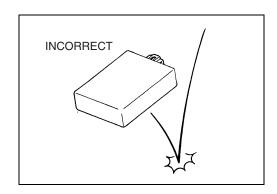
# **FUSE**

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



# SEMI-CONDUCTOR EQUIPPED PART

- Be careful not to drop the part with a semi-conductor built in such as a ECM.
- When inspecting this part, follow inspection instruction strictly. Neglecting proper procedure may cause damage to this part.



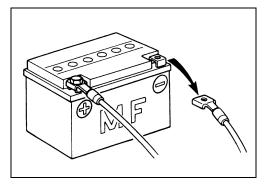
# **BATTERY**

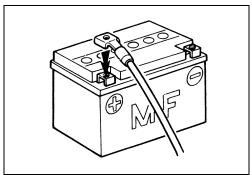
- The MF battery used in this motorcycle does not require maintenance (e.g., electrolyte level inspection, distilled water replenishment).
- During normal charging, no hydrogen gas is produced. However, if the battery is overcharged, hydrogen gas may be produced. Therefore, be sure there are no fire or spark sources (e.g., short circuit) nearby when charging the battery.
- · Be sure to recharge the battery in a well-ventilated and open area.
- Note that the charging system for the MF battery is different from that of a conventional battery. Do not replace the MF battery with a conventional battery.

# CONNECTING THE BATTERY

- · When disconnecting terminals from the battery for disassembly or servicing, be sure to disconnect the 

  battery lead wire, first.
- When connecting the battery lead wires, be sure to connect the + battery lead wire, first.
- If the terminal is corroded, remove the battery, pour warm water over it and clean it with a wire brush.
- After connecting the battery, apply a light coat of grease to the battery terminals.
- Install the cover over the  $\oplus$  battery terminal.





# WIRING PROCEDURE

· Properly route the wire harness according to the "WIRING HARNESS ROUTING" section. ( 10-17 to -18)

# **USING THE MULTI-CIRCUIT TESTER**

- Properly use the multi-circuit tester ⊕ and ⊖ probes. Improper use can cause damage to the motorcycle and tester.
- If the voltage and current values are not known, begin measuring in the highest range.
- When measuring the resistance, make sure that no voltage is applied. If voltage is applied, the tester will be damaged.
- · After using the tester, be sure to turn the switch to the OFF position.



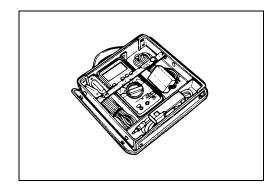
# CAUTION

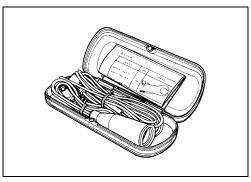
Before using the multi-circuit tester, read its instruction manual.

#### NOTE:

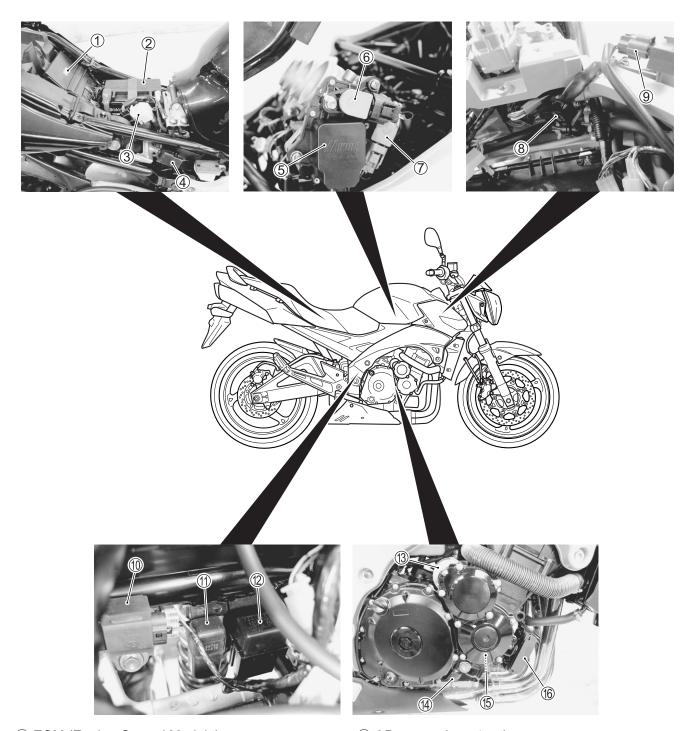
- \* When connecting the multi-circuit tester, use the needle pointed probe to the back side of the lead wire coupler and connect the probes of tester to them.
- \* Use the needle pointed probe to prevent the rubber of the water proof coupler from damage.





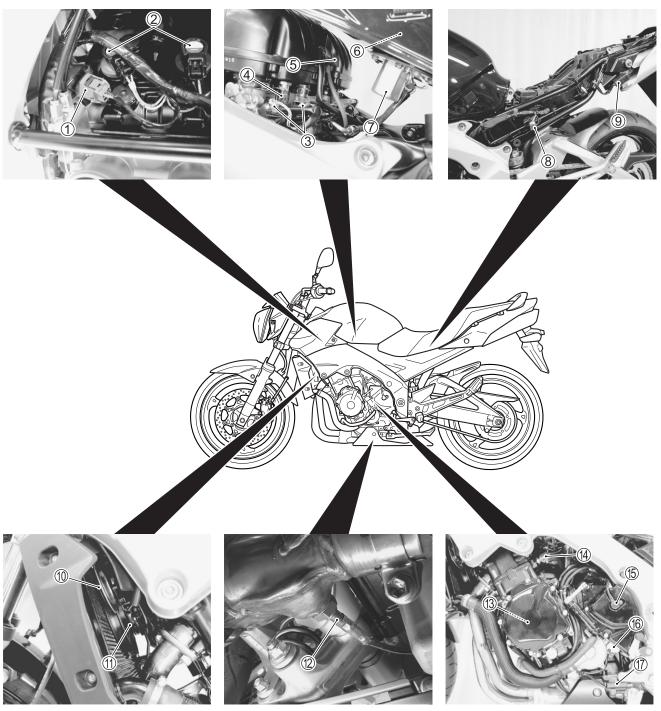


# **LOCATION OF ELECTRICAL COMPONENTS**



- 1 ECM (Engine Control Module)
- 2 Battery
- 3 Starter relay/Main fuse
- 4 Fuse box
- ⑤ STV actuator (( 4-64)
- ⑥ STP sensor (☐ 4-67)
- ⑦ TP sensor (CF4-42)
- 8 PAIR control solenoid valve (11-7)

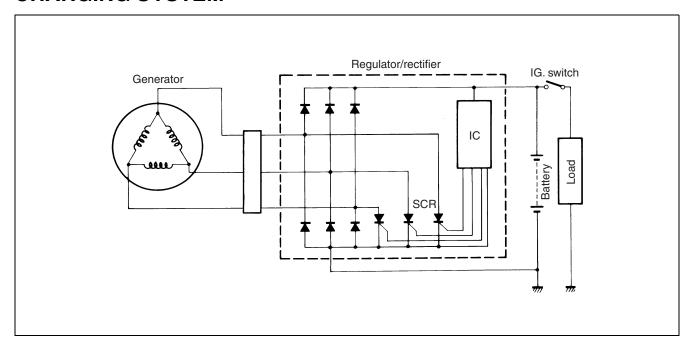
- 9 AP sensor ( 34-55)
- ① TO sensor ( 4-60)
- ① Cooling fan relay ( 7-6)
- 12 Turn signal/Side-stand relay
- Starter motor
- (1) Oil pressure switch
- (5) CKP sensor ( 74-34)
- 16 Regulator/Rectifier



- ① CMP sensor ( 74-32)
- 2 Ignition coil
- 3 Fuel injector ( 4-74)
- 4 IAT sensor ( 4-51)
- ⑤ IAP sensor ( 34-36)
- 6 Fuel level gauge
- ⑦ Fuel pump (ご 5-5)
- (8) Mode selection switch coupler
- ⑨ Fuel pump relay (☐F5-6)

- 10 Horn
- ① Cooling fan (CF7-6)
- ② HO2 sensor ( 11-10)
- (13) Generator
- (#) ECT sensor (\*\* 4-47)
- **15** Speed sensor
- 16 GP switch
- T Side-stand switch

# **CHARGING SYSTEM**



# **TROUBLESHOOTING**

# Battery runs down quickly

# Step 1

1) Check accessories which use excessive amounts of electricity. Are accessories being installed?

YES	Remove accessories.
NO	Go to Step 2.

# Step 2

1) Check the battery for current leaks. (\$\tilde{1}\tilde{9}\tilde{9}\tilde{9}\$) Is the battery for current leaks OK?

YES	Go to Step 3.
NO	Short circuit of wire harness
	Faulty electrical equipment

# Step 3

1) Measure the regulated voltage between the battery terminals. ( 9-10) Is the regulated voltage OK?

YES	<ul><li>Faulty battery</li><li>Abnormal driving condition</li></ul>
NO	Go to Step 4.

# Step 4

1) Measure the resistance of the generator coil. ( 9-10) Is the resistance of generator coil OK?

YES	Go to Step 5.
NO	Faulty generator coil
	Disconnected lead wires

# Step 5

1) Measure the generator no-load performance. ( 9-11) Is the generator no-load performance OK?

YES	Go to Step 6.
NO	Faulty generator

# Step 6

1) Inspect the regulator/rectifier. ( 9-11) Is the regulator/rectifier OK?

YES	Go to Step 7.
NO	Faulty regulator/rectifier

# Step 7

1) Inspect wirings. Are the wirings OK?

YES	Faulty battery.
NO	Short circuit of wire harness
	Poor contact of couplers

# **Battery overcharges**

- Faulty regulator/rectifier
- Faulty battery
- Poor contact of generator lead wire coupler

# INSPECTION

# **BATTERY CURRENT LEAKAGE**

- Remove the seat. ( \$\sumset\$ 8-3)
- Turn the ignition switch to the OFF position.
- Disconnect the battery  $\bigcirc$  lead wire.
- ullet Measure the current between ullet battery terminal and the ulletbattery lead wire using the multi-circuit tester. If the reading exceeds the specified value, leakage is evident.

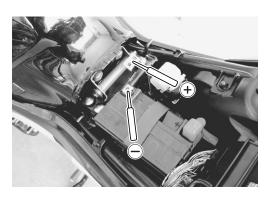


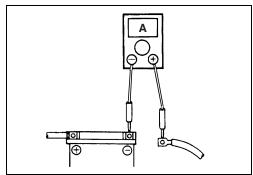
Battery current (leak): Under 3 mA

Tester knob indication: Current (---, 20 mA)

# CAUTION

- \* In case of a large current leak, turn the tester to high range first to avoid tester damage.
- \* Do not turn the ignition switch to the "ON" position when measuring current.





#### REGULATED VOLTAGE

- Remove the seat. ( \$\sumset\$ 8-3)
- Start the engine and keep it running at 5 000 r/min with the dimmer switch turned HI position.
- Measure the DC voltage between the ⊕ and ⊕ battery terminals using the multi-circuit tester. If the voltage is not within the specified value, inspect the generator and regulator/rectifier. (☐ 9-10 and -11)

#### NOTE:

When making this test, be sure that the battery is in fully-charged condition.

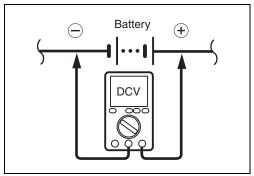
09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (==)

**PATA** Regulated voltage (Charging output):

14.0 - 15.5 V at 5 000 r/min





# **GENERATOR COIL RESISTANCE**

- Lift and support the fuel tank. ( 5-3)
- Disconnect the generator coupler ①.
- Measure the resistance between the three lead wires.
   If the resistance is out of specified value, replace the stator with a new one. Also, check that the generator core is insulated properly.

09900-25008: Multi-circuit tester set

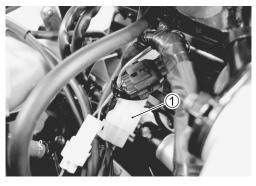
Tester knob indication: Resistance ( $\Omega$ )

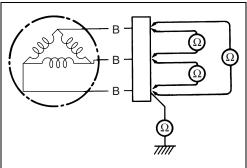
**DATA** Generator coil resistance:  $0.2 - 0.9 \Omega$  (B - B)

 $\infty \Omega$  (B – Ground)

# NOTE:

When making above test, it is not necessary to remove the generator.





#### GENERATOR NO-LOAD PERFORMANCE

- Lift and support the fuel tank. ( 5-3)
- Disconnect the generator coupler. ( 9-10)
- Start the engine and keep it running at 5 000 r/min.
- Using the multi-circuit tester, measure the voltage between three lead wires.

If the tester reads under the specified value, replace the generator with a new one.

09900-25008: Multi-circuit tester set

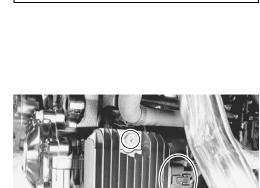
Tester knob indication: Voltage (~)

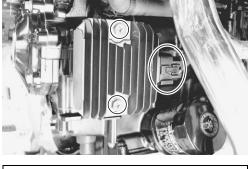
**DATA** Generator no-load performance:

65 V and more at 5 000 r/min (When engine is cold)

# REGULATOR/RECTIFIER

- Remove the regulator/rectifier.
- · Measure the voltage between the terminals using the multi circuit tester as indicated in the table below. If the voltage is not within the specified value, replace the regulator/rectifier with a new one. ( 10-31)



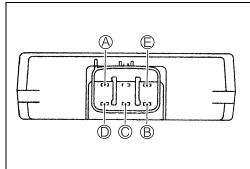


Measure the voltage between the terminals using the multi circuit tester, as indicated in the table below.

If the voltage is not within the specified value, replace the regulator/rectifier with a new one.

09900-25008: Multi circuit tester set

Tester knob indication: Diode test (→



Unit:V

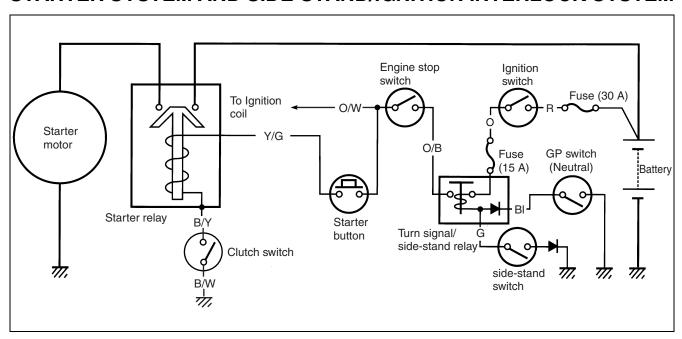
						0111111
	─ Tester prove					
ē		A	B	©	D	E
prove	A		0.4 - 0.7	0.4 - 0.7	0.4 - 0.7	0.5 – 1.2
	B	*		*	*	0.4 - 0.7
Tester	©	*	*		*	0.4 - 0.7
Ι.	D	*	*	*		0.4 - 0.7
(+)	Ē	*	*	*	*	

\* 1.4 V and more (tester's battery voltage)

# NOTE:

If the tester reads 1.4 V and below when the tester probes are not connected, replace the battery of multi circuit tester.

# STARTER SYSTEM AND SIDE-STAND/IGNITION INTERLOCK SYSTEM



# TROUBLESHOOTING

Make sure that the fuses are not blown and the battery is fully-charged before diagnosing.

# Starter motor will not run

# Step 1

- 1) Shift the transmission to neutral.
- 2) Pull the clutch lever, turn on the ignition switch with the engine stop switch in the "RUN" position and listen for a click from the starter relay when the starter button is pushed. Is a click sound heard?

YES	Go to Step 2.
NO	Go to Step 3.

# Step 2

1) Check if the starter motor runs when its terminal is connected to the battery  $\oplus$  terminal. (Do not use thin "wire" because a large amount of current flows.)

Does the starter motor run?

YES	<ul><li>Faulty starter relay</li><li>Loose or disconnected starter motor lead wire</li></ul>
	Loose or disconnected between starter relay and battery    terminal
NO	Faulty starter motor

# Step 3

1) Measure the starter relay voltage at the starter relay connectors (between Y/G  $\oplus$  and B/Y  $\bigcirc$ ) when the starter button is pushed.

Is a voltage OK?

YES	Go to Step 4.			
	Faulty engine stop switch			
	Faulty clutch switch			
	Faulty GP switch			
	Faulty turn signal/side-stand relay			
NO	Faulty starter button			
	Faulty ignition switch			
	Faulty side-stand switch			
	Poor contact of connector			
	Open circuit in wire harness			

# Step 4

1) Check the starter relay. ( 9-16) Is the starter relay OK?

YES	Poor contact of the starter relay	
NO	Faulty starter relay	

# Starter motor runs but does not crank the engine Step 1

- 1) The starter motor runs when the transmission is in neutral, but does not run when the transmission is in any position other than neutral, with the side-stand up.
- 2) Check the side-stand switch. ( 9-17) Is the side-stand switch OK?

YES	Go to Step 2.
NO	Faulty side-stand switch

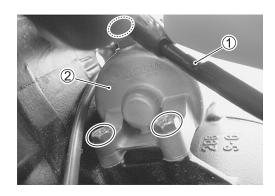
#### Step 2

1) Check the starter clutch. Is the starter clutch OK?

YES	Faulty starter clutch	
NO	Open circuit in wire harness	
INO	Poor contact of connector	

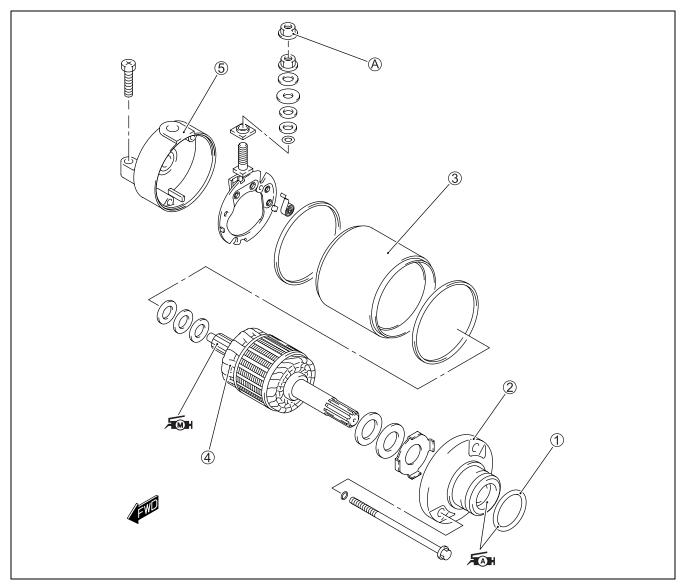
# STARTER MOTOR REMOVAL

- Disconnect the battery  $\bigcirc$  lead wire.
- Lift and support the fuel tank.
- Disconnect the starter motor lead wire 1.
- Remove the starter motor 2.



# STARTER MOTOR DISASSEMBLY

• Disassemble the starter motor as shown in the illustration.



1	O-ring	4	Armature
2	Housing end (inside)	<b>⑤</b>	Housing end (outside)
3	Starter motor case	A	Lead wire mounting bolt

$lue{f D}$	_	_
ITEM	N∙m	kgf-m
A	6	0.6

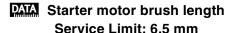
# STARTER MOTOR INSPECTION

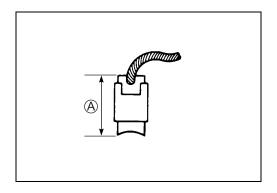
# **CARBON BRUSH**

Inspect the brushes for abnormal wear, cracks or smoothness in the brush holder.

If any damages are found, replace the brush assembly with a new one.

Make sure that the length  $ilde{A}$  is not less than 6.5 mm, If this length becomes less than 6.5 mm, replace the brush.





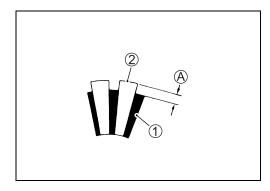
#### COMMUTATOR

Inspect the commutator for discoloration, abnormal wear or undercut  $\widehat{\mathbb{A}}.$ 

If abnormal wear is found, replace the armature with a new one. If the commutator surface is discolored, polish it with #400 sand paper and wipe it using a clean dry cloth.

If there is no undercut, scrape out the insulator with a saw blade.

- 1 Insulator
- 2 Segment

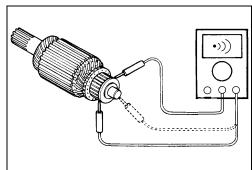


# ARMATURE COIL INSPECTION

Check for continuity between each segment and between each segment and the armature shaft using the multi-circuit tester. If there is no continuity between the segments or there is continuity between the segments and shaft, replace the armature with a new one.

09900-25008: Multi-circuit tester set

Tester knob indication: Continuity test (•)))



# **OIL SEAL INSPECTION**

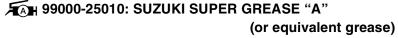
Check the oil seal lip for damage or leakage. If any damage is found, replace the housing end.



# STARTER MOTOR REASSEMBLY

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

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

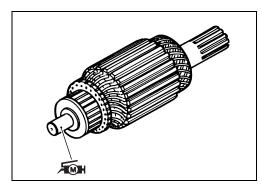




Apply a small quantity of SUZUKI MOLY PASTE to the armature shaft.

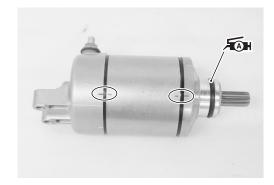
# **1** 99000-25140: SUZUKI MOLY PASTE

• Fit the projection of the starter motor case to the depression of the housing end.



- Align the marks on the housing ends with the marks on the starter motor case.
- Apply SUZUKI SUPER GREASE "A" to the O-ring.

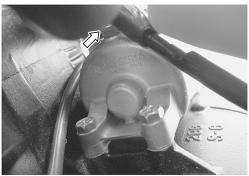
FAH 99000-25010: SUZUKI SUPER GREASE "A" (or equivalent grease)



# STARTER MOTOR INSTALLATION

• Tighten the starter motor lead wire connecting nut ① to the specified torque.

Lead wire connecting nut: 6 N·m (0.6 kgf-m)



# STARTER RELAY INSPECTION

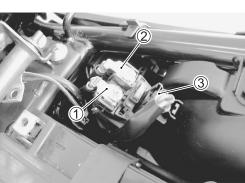
- Remove the seat. ( 8-3)
- Disconnect the battery  $\bigcirc$  lead wire from the battery.
- Remove the starter relay cover.
- Disconnect the starter motor lead wire ①, battery lead wire ② and starter relay coupler ③.
- Remove the starter relay.

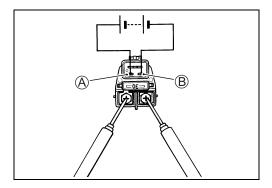
09900-25008: Multi-circuit tester set

Tester knob indication: Continuity test (•)))



Do not apply battery voltage to the starter relay for more than five seconds, since the relay coil may overheat and get damaged.

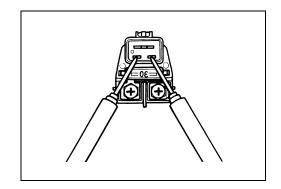




Measure the relay coil resistance between the terminals using the multi-circuit tester. If the resistance is not within the specified value, replace the starter relay with a new one.

09900-25008: Multi-circuit tester set

**DATA** Starter relay resistance: 3 – 6  $\Omega$ 



# SIDE STAND/IGNITION INTERLOCK SYSTEM PARTS INSPECTION

Check the interlock system for proper operation. If the interlock system does not operate properly, check each component for damage or abnormalities. If any abnormality is found, replace the component with a new one.

#### **SIDE-STAND SWITCH**

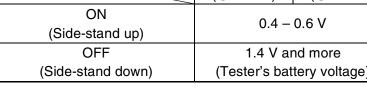
The side-stand switch coupler is located behind the left frame.

• Disconnect the side-stand switch coupler ① and measure the voltage between G and B/W lead wires.

09900-25008: Multi-circuit tester set

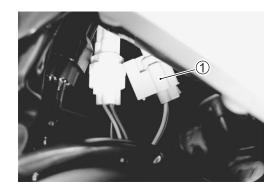
Tester knob indication: Diode test (┥╾)

	G	B/W
	(+) Probe)	(⊝ Probe)
ON	0.4 – 0.6 V	
(Side-stand up)		
OFF	1.4 V and more	
(Side-stand down)	(Tester's battery voltage)	



# NOTE:

If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.





#### **GEAR POSITION SWITCH**

• Disconnect the gear position switch coupler ① and check the continuity between BI and B/W with the transmission in neutral.

09900-25008: Multi-circuit tester set

Tester knob indication: Continuity test (•)))

	Bl	B/W
ON (Neutral)	<u> </u>	0
OFF (Except neutral)		



# CAUTION

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

- · Connect the gear position switch coupler to the wiring harness.
- Turn the ignition switch to ON position and side-stand to upright position.
- Measure the voltage between P and B/W lead wires using the multi-circuit tester when shifting the gearshift lever from low to top.

09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Voltage (==)

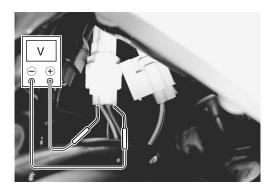
Gear position switch voltage: 0.6 V and more

\* Low to top gear position (P ⊕ – B/W ⊝)

\* Except neutral position (P ⊕ – B/W ⊝)

#### CAUTION

Use the special tool, to prevent the rubber of the water proof coupler from damage.



#### **TURN SIGNAL/SIDE-STAND RELAY**

The turn signal/side-stand relay is composed of the turn signal relay, side-stand relay and diode.

- Lift and support the fuel tank. ( 5-3)
- Remove the turn signal/side-stand relay ①.

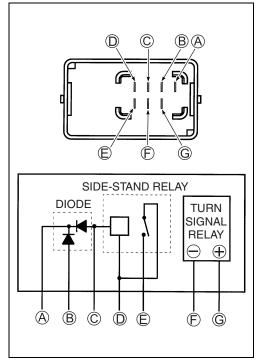


# SIDE-STAND RELAY INSPECTION

First check the insulation between  $\mathbb D$  and  $\mathbb E$  terminals with the tester. Then apply 12 V to terminals  $\mathbb O$  and  $\mathbb C$  ( $\oplus$  to  $\mathbb O$  and  $\ominus$  to ©) and check the continuity between © and E. If there is no continuity, replace the turn signal/side-stand relay with a new one.

09900-25008: Multi-circuit tester set

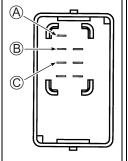
Tester knob indication: Continuity test (•)))

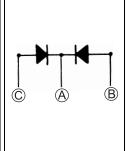


# **DIODE INSPECTION**

Measure the voltage between the terminals using the multi-circuit tester. Refer to the following table.

	Probe of tester to:			
of		©, ®	A	
be to:	©, B		1.4 V and more	
Prc	(b), (b)		(Tester's battery voltage)	
① set	A	0.4 – 0.6 V		





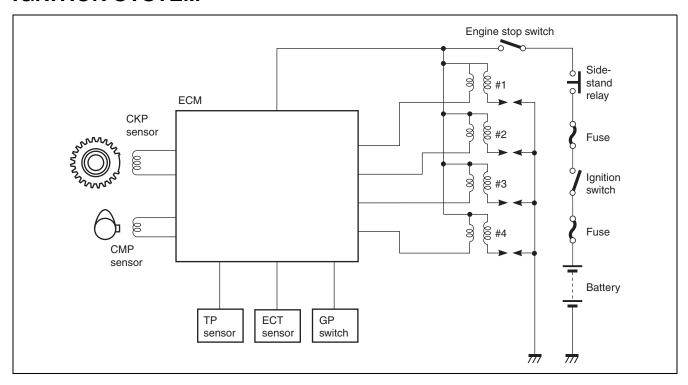
09900-25008: Multi-circuit tester set

Tester knob indication: Diode test (→←)

NOTE:

If the multi circuit tester reads 1.4 V and below when the tester probes are not connected, replace its battery.

# **IGNITION SYSTEM**



#### NOTE:

The fuel cut-off circuit is incorporated in this ECM in order to prevent over-running of engine. When engine speed reaches 13 200 r/min, this circuit cuts off fuel at the fuel injector. But under no load, the clutch lever is pulled or the gear position is neutral, this circuit cuts off fuel when engine speed reaches 12 800 r/min.

# **CAUTION**

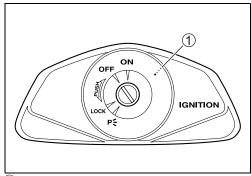
Under no load, the engine can run over 12 800 r/min, which may possibly cause engine damage. Do not run the engine without load over 12 800 r/min at anytime.

# **IMMOBILIZER**

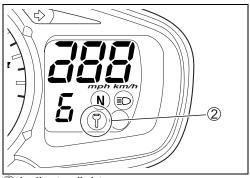
# **DESCRIPTION**

The immobilizer, an anti-theft system, is installed as a standard equipment.

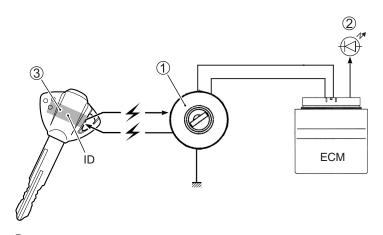
The immobilizer verifies that the key ID agrees with ECM ID by means of radio communication through the immobilizer antenna. When the ID agreement is verified, the system makes the engine ready to start.



1 Immobi-antenna



2 Indicator light



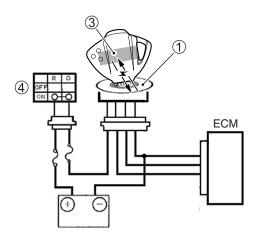
③ Transponder

#### Operation

When the ignition switch is turned ON with the engine stop switch in ON, the immobi-antenna and ECM are powered ON.

The ECM transmits a signal to the transponder through the immobi-antenna in order to make comparison between the key ID and ECM ID.

With the signal received, the transponder transmits the key ID signal to ECM so that ECM can make comparison with its own ID, and if it matches, the engine is made ready to start.



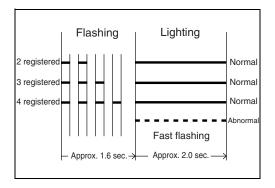
1 Immobi-antenna

③ Transponder

4 Ignition switch

Also, when the ignition switch is turned ON, the indicator light flashes as many as the number of IDs registered in ECM. Thereafter, if the IDs are in agreement, the indicator light turns on for two seconds to notify of completion in successful communication.

If the indicator light (LED) flashes fast, it notifies of communication error or disagreement of ID.

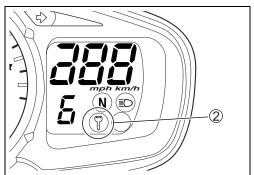


# NOTE:

If the indicator light ② flashes fast, turn the ignition switch OFF then ON to make judgment again as there is possible misjudgment due to environmental radio interference.

#### **CAUTION**

When the battery performance is lowered in winter (low temperature), the system may at times makes a re-judgment at the time of beginning the starter motor operation. In this case, the indicator light operation starts immediately after the starter operation.



# NOTE:

In the case that the LED flashes fast, remains lit or unlit, the probable cause of such a failure may be due to abnormal condition in the key, key cylinder, wiring harness or ECM. (If such a failure exists, contact your distributor or dealer.)

# **TROUBLESHOOTING**

# No spark or poor spark

#### NOTE:

Check that the transmission is in neutral and the engine stop switch is in the "RUN" position. Grasp the clutch lever. Check that the fuse is not blown and the battery is fully-charged before diagnosing.

#### Step 1

1) Check the ignition system couplers for poor connections. Are the ignition system couplers connected properly?

YES	Go to Step 2.	
NO	Poor connection of couplers	

# Step 2

1) Measure the battery voltage between input lead wires (O/G and B/W) at the ECM with the ignition switch in the "ON" position.

Is the voltage OK?

YES	Go to Step 3.		
	Faulty ignition switch		
NO	Faulty turn signal/side-stand relay		
INO	Faulty engine stop switch		
	Broken wire harness or poor connection of related circuit couplers		

#### Step 3

1) Measure the ignition coil primary peak voltage. (\$\sumsymbol{1}\$9-25)

#### NOTE:

This inspection method is applicable only with the multi circuit tester and the peak volt adaptor.

Is the peak voltage OK?

YES	Go to Step 4.
NO	Go to Step 5.

# Step 4

1) Inspect the spark plugs. ( 2-5 and -6) Are the spark plugs OK?

YES	Go to Step 5.
NO	Faulty spark plug(-s).

1) Inspect the ignition coil/plug caps. ( 9-26) Are the ignition coil/plug caps OK?

YES	Go to Step 6.	
NO	Poor connection of the ignition coil/plug cap(-s).	
INO	Faulty ignition coil/plug cap(-s).	

# Step 6

1) Measure the CKP sensor peak voltage and its resistance. ( 9-27 to -28)

# NOTE:

The CKP sensor peak voltage inspection is applicable only with the multi circuit tester and peak volt adaptor.

Are the peak voltage and resistance OK?

	Faulty ECM
YES	Open or short circuit in wire harness
	Poor connection of ignition couplers
NO	Faulty CKP sensor
INO	Metal particles or foreign material being stuck on the CKP sensor and rotor tip

# INSPECTION

# **IGNITION COIL PRIMARY PEAK VOLTAGE**

- Remove the air cleaner box. ( 5-13)
- Disconnect all the ignition coil/plug cap lead wire couplers ① before removing the ignition coil/plug caps ②.
- Remove all of the ignition coil/plug caps ②.

# CAUTION

- \* Do not remove the ignition coil/plug cap before disconnecting the lead wire coupler, or the lead wire will be damaged.
- \* Do not pry up the ignition coil/plug cap with a screwdriver or a bar to avoid damage.
- \* Be careful not to drop the ignition coil/plug cap as it may open or short in a circuit.
- Connect the new four spark plugs to each ignition coil/plug cap.
- Connect all the ignition coil/plug cap lead wire couplers to the ignition coil/plug caps respectively, and ground them on the cylinder head.

# NOTE:

Be sure that all couplers and spark plugs are connected properly and the battery used is in fully-charged condition.

Inspect each ignition coil primary peak voltage at the ignition coil/plug cap coupler.

 Connect the multi-circuit tester with peak voltage adaptor as follows.

No. 1 ignition coil/plug cap:

W/Bl wire terminal (⊕ Probe) – Ground (⊕ Probe) terminal No. 2 ignition coil/plug cap:

Black wire terminal (⊕ Probe) – Ground (⊕ Probe) terminal No. 3 ignition coil/plug cap:

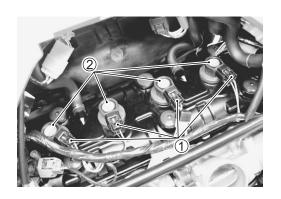
Yellow wire terminal (⊕ Probe) – Ground (⊕ Probe) terminal No. 4 ignition coil/plug cap:

Green wire terminal (⊕ Probe) – Ground (⊕ Probe) terminal

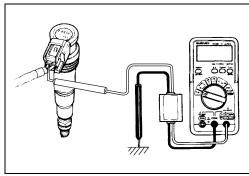
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

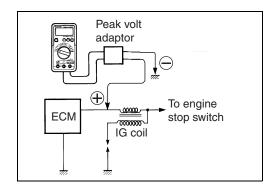
# CAUTION

Before using the multi-circuit tester and peak volt adaptor, be sure to refer to the appropriate instruction manual.









#### NOTE:

Use the special tool, to prevent the rubber of the water proof coupler from damage.

- Shift the transmission into neutral and turn ignition switch ON.
- Crank the engine a few seconds with the starter motor by depressing starter button and check the ignition coil primary peak voltage.
- Repeat the above inspection a few times and measure the highest peak voltage.

Tester knob indication: voltage (==)

Ignition coil primary peak voltage: 85 V and more

# **▲** WARNING

Do not touch the tester probes and spark plugs to prevent an electric shock while testing.

If the peak voltage is lower than the standard range, check the ignition coil/plug cap as follow.

#### **IGNITION COIL/PLUG CAP RESISTANCE**

 Check the ignition coil/plug cap for resistance in both primary and secondary coils. If the resistance is not within the standard range, replace the ignition coil/plug cap with a new one.

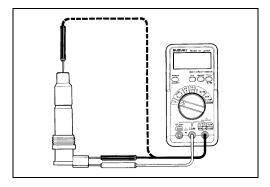
09900-25008: Multi-circuit tester set

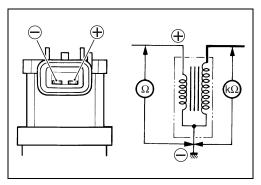
Tester knob indication: Resistance ( $\Omega$ )

DATA Ignition coil/plug cap resistance

Primary : 1.3 – 1.9  $\Omega$  ( $\oplus$  tap –  $\ominus$  tap)

Secondary:  $10.8 - 16.2 \text{ k}\Omega$  (Plug cap  $- \bigcirc$  tap)





#### **CKP SENSOR PEAK VOLTAGE**

• Remove the seat. ( \$\sumset\$ 8-3)

#### NOTE:

Be sure that all couplers are connected properly and the battery used is in fully-charged condition.

- Disconnect the both ECM couplers ①.
- Connect the multi-circuit tester with peak volt adaptor as follows.
- Measure the CKP sensor peak voltage between G/B and Green/White lead wires at the ECM coupler.

G/W wire (⊕ Probe) – G/Bl wire (⊕ Probe)

09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

# CAUTION

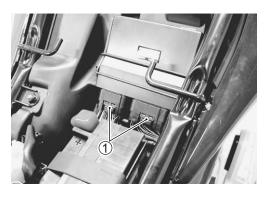
Before using the multi-circuit tester and peak volt adaptor, be sure to refer to the appropriate instruction manual.

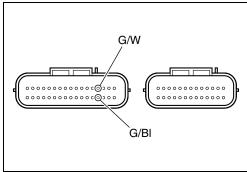
- Shift the transmission into the neutral and turn ignition switch to ON
- Crank the engine a few seconds with the starter motor by depressing starter button and check the CKP sensor peak voltage.
- Repeat the above test procedure a few times and measure the highest peak voltage.

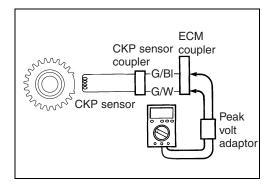
Tester knob indication: Voltage (---)

CKP sensor peak voltage: 0.5 V and more

(G/BI - G/W)







- Lift and support the fuel tank. ( 5-3)
- Disconnect the CKP sensor lead wire coupler ① and connect the multi-circuit tester with the peak volt adaptor.

B wire (⊕ Probe) – G wire (⊕ Probe)

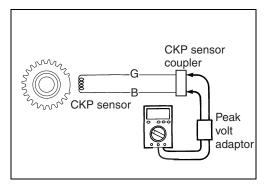
 Measure the CKP sensor peak voltage at the CKP sensor lead wire coupler.

Tester knob indication: Voltage (==)

CKP sensor peak voltage: 0.5 V and more (G – B)

If the peak voltage is lower than the standard range, check each coupler connection or replace the CKP sensor and inspect it again.





#### **CKP SENSOR RESISTANCE**

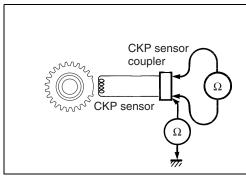
 Measure the resistance between the lead wires and ground. If the resistance is not as specified, the CKP sensor must be replaced.

09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )

**PATA** CKP sensor resistance: 142 – 194  $\Omega$  (G – B)

 $\infty \Omega$  (G – Ground)



# COMBINATION METER DESCRIPTION

This combination meter mainly consists of the stepping motor, LCD (Liquid Crystal Display) and LED (Light Emitting Diode). This combination meter is light, thin and of high response compared to those currently in use because of this composition.

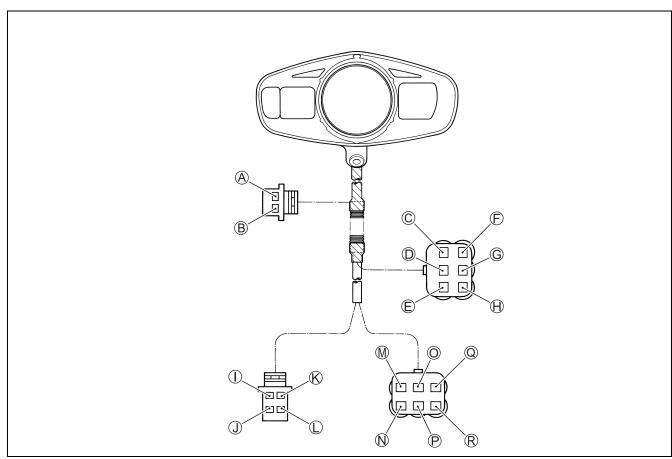
The rpm pointer is driven by the stepping motor.

The LCDs indicate Speed, Gear position, Odo/Trip 1/Trip 2/Clock, Engine coolant temp./FI (DTC) respectively.

# **LED (Light Emitting Diode)**

LED is used for the illumination light and each indicator light.

LED is maintenance free. LED is less electric-power consuming and stronger to vibration resistance compared to the bulb.



A	Position light	В
$^{\odot}$	Position light	В
(C)	Battery	R
D	Turn signal light (LH)	В
E	Oil pressure indicator light	G/Y
Ē	Tachometer signal	B/Y
G	Speed signal	Р
$\oplus$	Immobilizer indicator light	Br/Y
1	High beam	Υ

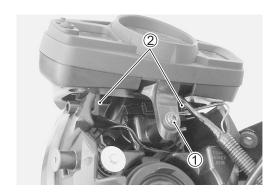
J	Meter GND	B/Br
$\mathbb{K}$	Position light	В
	Position light	В
$\bigcirc$	Meter power souece	0
N	Fuel level gauge	R/B
0	Turn signal light (RH)	Lg
P	Neutral indicator light	Lb
<b>Q</b>	Ignition	O/G
®	Data signal	B/G

# REMOVAL AND DISASSEMBLY

- Remove the headlight bracket bolts. ( 5-22)
- Remove the screw 1.
- With the hooked parts ② of the combination meter pulled from the headlight housing, disconnect the combination meter lead wire couplers.
- · Remove the combination meter.

# **CAUTION**

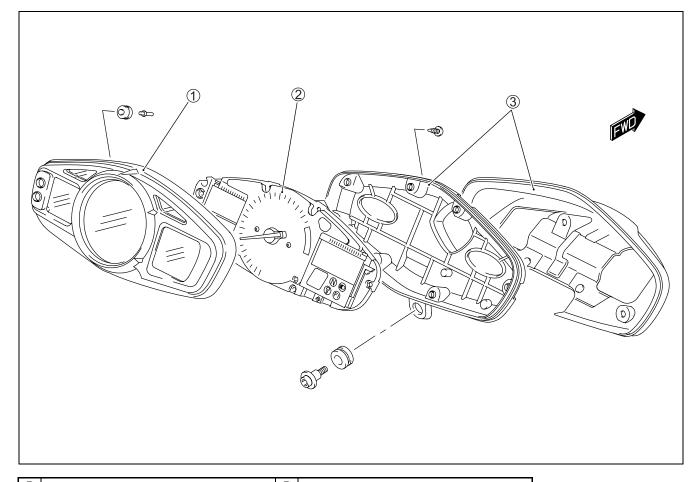
When disconnecting and reconnecting the combination meter coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.



• Disassemble the combination meter as follows.

# **CAUTION**

Do not attempt to disassemble the combination meter unit 2.



1	Combination meter cover	
)		

2 Combination meter unit

Combination meter case

# INSPECTION

# **LED (LIGHT EMITTING DIODE)**

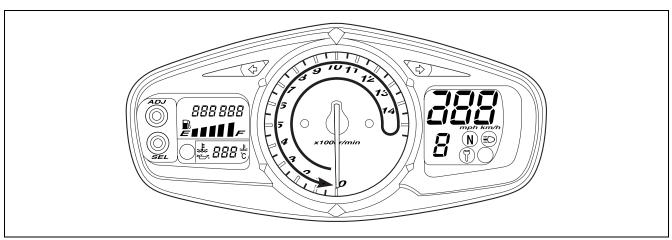
Check that the LED lights [FI light, immobilizer indicator light and oil pressure/engine coolant temp. indicator light] immediately after turning the ignition switch on. Also, other LED lights (Neutral indicator light, High-beam indicator light and Turn signal indicator light) can be checked by depending on each switch position

If the LED fails in operation, replace the combination meter unit with a new one after checking its wire harness/coupler.

#### STEPPING MOTOR

Check that the pointer calibrates itself immediately after turning the ignition switch on and stops at zero point.

If abnormal condition is found, replace the combination meter unit with a new one after checking its wire harness/coupler.

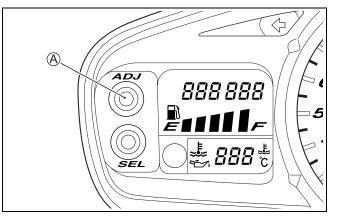


#### NOTE:

The pointer may not return to the proper position even turning the ignition switch on under low temperature condition. In that case, you can reset the pointer to the proper position by following the instruction below:

- 1) With the adjust switch A pressed, turn the ignition switch on.
- 2) Release the adjust switch ♠, more than 3 seconds after turning the ignition switch on. →Reset
- \* Complete the operation within 10 seconds after the ignition switch has been turned on.

Time	Ignition switch	Adjust switch (A)
	OFF	PUSH
0	ON	
•		
more than 3 sec.		$\left   \right  - \left   \right  - \left   \right $
•	↓	Reset



Pointer will return to the starting point right after the completion of the operation. In the case of the pointer not returning to the proper position after doing above, replace the combination meter unit.

# **ENGINE COOLANT TEMPERATURE METER AND INDICATOR**

**ECT SENSOR INSPECTION (** 7-7)

• Disconnect the ECT sensor coupler ①.

# CAUTION

When connecting and disconnecting the engine coolant temperature sensor lead wire coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.

- Connect the variable resistor (A) between the terminals.
- Disconnect the oil pressure switch lead wire from the oil pressure switch.

#### NOTE:

Leave the oil pressure switch lead wire open.

- Turn the ignition switch to ON.
- Check the LCD and LED operations when the resistance is adjusted to the specified values.

Resistance (A)	LED ®	LCD ©	LCD ①	Water temperature
2.45 k $\Omega$ and over	OFF	""		19 °C and below
Approx. 0.811 k $\Omega$	OFF	"50"		Approx. 50 °C
Approx. $0.1 \text{ k}\Omega \text{ ON}$	ON	"120" – "139"	ON	120 – 139 °C
0 $\Omega$ (Jumper wire)	ON	"HI"	ON	140 °C and over

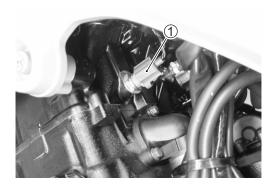
If either one or all indications are abnormal, replace the combination meter with a new one.

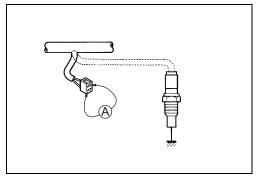
# NOTE:

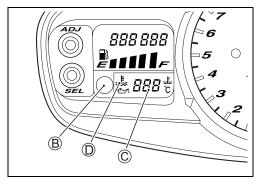
If the engine stop switch is turned OFF or side-stand/ignition inter-lock system is not working while the ignition switch is ON, the LCD displays "CHEC". But it is not a malfunction.

This condition implies that combination meter receives no signal from the ECM.

In that case, they are restored to normal indication by turning the engine stop switch to RUN position.







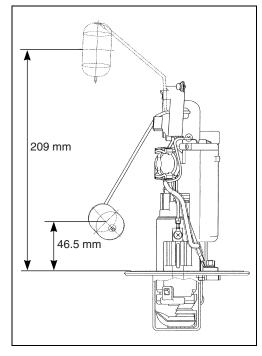
# **FUEL LEVEL GAUGE INSPECTION**

- Remove the fuel pump assembly. ( 5-8)
- Measure the resistance at each fuel level gauge float position. If the resistance is incorrect, replace the fuel level gauge with a new one.

Float position	Resistance
46.5 mm	179 – 185 Ω
209 mm	3 – 5 Ω

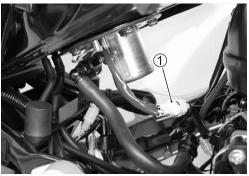
09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )

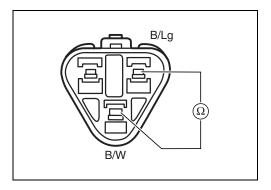


# **FUEL LEVEL METER INSPECTION**

- Lift and support the fuel tank. ( 5-3)
- Disconnect the fuel pump lead wire coupler.



- Connect the each resistor between the B/Lg and B/W lead wires at the wire harness.
- Turn the ignition switch to ON position and wait for approx. 40 seconds.
- · Check the display of fuel meter as shown below, If any abnormality is found, replace the combination meter with a new one.



Resistance	More than 175.0 Ω	110.8 – 175.0 Ω	67.0 – 110.8 Ω	39.8 – 67.0 Ω	12.2 – 39.8 Ω	12.2 $\Omega$ and less
Fuel level meter	Elicker	Flicker		<b>E</b> 11100 <i>F</i>	<b>E1111</b> []_F	<b>E</b> 1111/ <sub>F</sub>

#### **SPEEDOMETER**

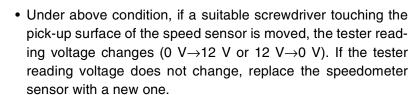
If the speedometer, odometer or trip meter does not function properly, inspect the speedometer sensor and connection of couplers. If the speed sensor and connection are functioning properly, replace the meter with a new one.

#### SPEED SENSOR

- Lift and support the fuel tank. ( 5-3)
- Disconnect speed sensor coupler ①.
- Remove the speed sensor ② by removing its mounting bolt.
- Connect 12 V battery, 10  $k\Omega$  resistor and the multi-circuit tester as shown in the right illustration.

09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (==)



#### NOTE:

The highest voltage reading in this test will be the same as that of battery (12 V).

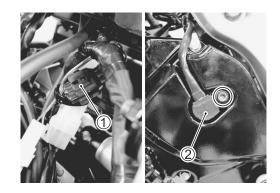
# **OIL PRESSURE INDICATOR**

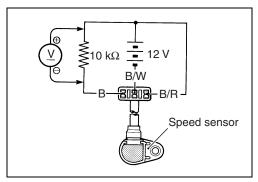
#### NOTE:

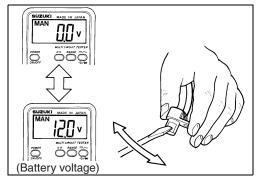
Before inspecting the oil pressure switch, check if the engine oil level is correct. ( 2-13)

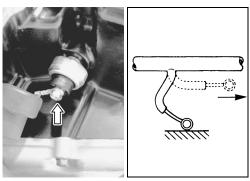
- Disconnect the oil pressure switch lead wire from the oil pressure switch.
- Turn the ignition switch ON.
- Check if the oil pressure indicator (A) will light and LCD (B) will flicker, when grounding the lead wire.

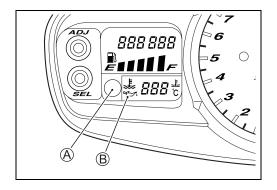
If any indications are abnormal, replace the combination meter with a new one after checking connection of couplers.









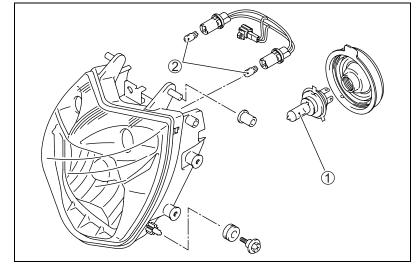


# **LAMPS**

# HEADLIGHT, BRAKE LIGHT/TAILLIGHT, LICENSE PLATE LIGHT AND TURN SIGNAL LIGHT

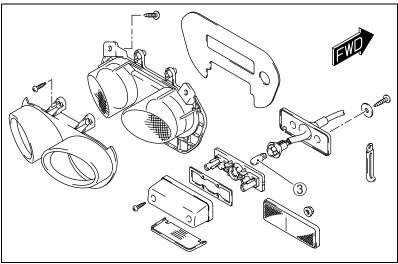
**HEADLIGHT** ① 12 V 60/55 W H4

**POSITION LIGHT 2** 12 V 5 W × 2

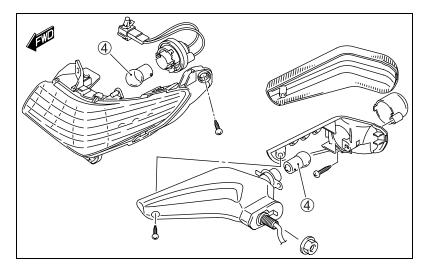


**BRAKE LIGHT/TAILLIGHT: LED LICENSE PLATE LIGHT** ③

12 V 5 W



**TURN SIGNAL LIGHT 4** 12 V 10 W × 4



# CAUTION

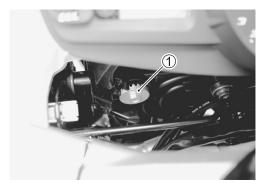
If you have touched and the bulb with your bare hands, clean it with a cloth moistened with alcohol or soapy water to maintain lens clarity.

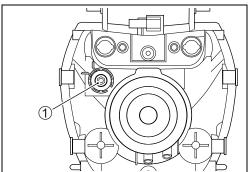
# **HEADLIGHT BEAM ADJUSTMENT**

• Adjust the headlight beam.

# NOTE:

Use a cross head screw driver for adjuster ①.

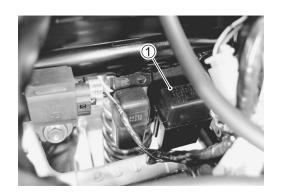




# **RELAYS**

# **TURN SIGNAL/SIDE-STAND RELAY**

The turn signal/side-stand relay 1 is composed of the turn signal relay, side-stand relay and diode.



# **INSPECTION**

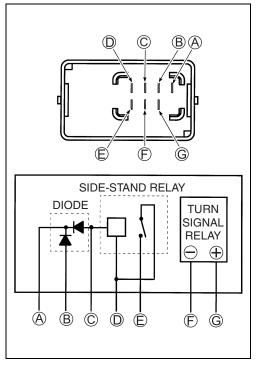
Before removing the turn signal/side-stand relay, check the operation of the turn signal light.

If the turn signal light does not illuminate, inspect the bulb, turn signal switch and circuit connection.

If the bulb, turn signal switch and circuit connection are OK, the turn signal relay may be faulty. In this case, replace the turn signal/side-stand relay with a new one.

#### NOTE:

- \* Make sure that the battery is fully charged.
- \* Refer to the page 9-17 for the side-stand relay and diode inspection.



# STARTER RELAY

₹9-16

# **FUEL PUMP RELAY**

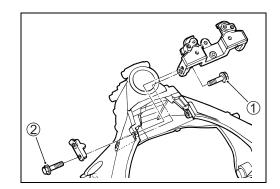
**∑**5-6

# **COOLING FAN RELAY**

**7-6** 

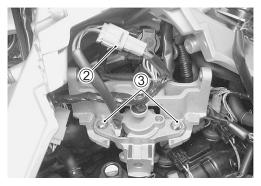
# **IGNITION SWITCH REMOVAL**

- Remove the air cleaner box. ( 5-13)
- Remove the ignition switch bracket bolts 1 and 2.



- Disconnect the ignition switch lead wire coupler 2.
- Remove the ignition switch mounting bolts ③ with the special tools.

09930-11920: Torx bit JT40H 09930-11940: Bit holder



# **IGNITION SWITCH INSTALLATION**

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

• Apply thread lock to the ignition switch bolts.

# CAUTION

When reusing the ignition switch bolt, clean thread and apply the THREAD LOCK.





# **SWITCHES INSPECTION**

Inspect each switch for continuity with a tester. If any **STARTER BUTTON** abnormality is found, replace the respective switch assemblies with new ones.

#### **HAZARD SWITCH**

Color	В	Lbl	Lg
• (OFF)			
	0	<u> </u>	

# **IGNITION SWITCH**

Color Position	R	0	Gr	Br
ON	$\overline{\bigcirc}$	<u> </u>	<u> </u>	0
OFF				
LOCK				
Р	$\overline{\bigcirc}$			0

# **DIMMER SWITCH**

Color Position	W	Υ	0
HI (≣▷)		0	
LO (≨□)	0		

# **TURN SIGNAL SWITCH**

Color Position	Lg	Lbl	В
L		O	———
PUSH			
R	$\overline{\bigcirc}$		

# **PASSING LIGHT SWITCH**

Color Position	0	Υ
•		
PUSH	0	

# **ENGINE STOP SWITCH**

Color Position	O/B	O/W
OFF (XX)		
RUN (∩)	0	<del></del> 0

Color Position	O/W	Y/G	O/R	Y/W
•			0	<u> </u>
PUSH	$\overline{\bigcirc}$			

#### **HORN BUTTON**

Color Position	B/BI	B/W
•		
PUSH	0	0

# FRONT BRAKE SWITCH

Color Position	B/R	B/BI
OFF		
ON	0	<del></del>

# **REAR BRAKE SWITCH**

Color Position	0	W/B
OFF		
ON	0	0

# **CLUTCH SWITCH**

Color Position	B/W	B/Y
•		
PUSH	0	0

# **OIL PRESSURE SWITCH**

Color Position	G/Y	Ground
ON (engine is at stop)	0	
OFF (engine is running)		

Before inspecting the oil pressure switch, check that the engine oil level is correct. ( 2-13)

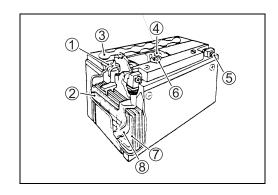
# **BATTERY SPECIFICATIONS**

Type designation	FTX9-BS	
Capacity	12 V, 28.8 kC (8 Ah)/10 HR	

- 1 Upper cover breather
- (5) Terminal
- 2 Cathode plates
- 6 Safety valve
- 3 Stopper
- 7 Anode plates

4 Filter

8 Separator (Fiberglass plate)



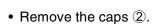
# **INITIAL CHARGING**

# Filling electrolyte

• Remove the aluminum tape ① sealing the battery electrolyte filler holes A.

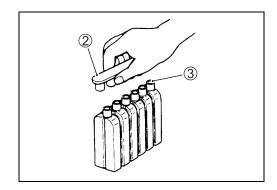
# NOTE:

When filling electrolyte, the battery must be removed from the vehicle and must be put on the level ground.

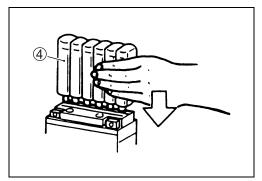


#### NOTE:

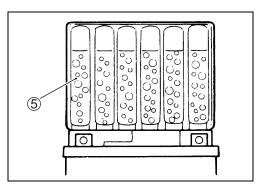
- \* After filling the electrolyte completely, use the removed cap 2 as sealing caps of battery-filler holes.
- \* Do not remove or pierce the sealed areas 3 of the electrolyte container.



• Insert the nozzles of the electrolyte container 4 into the battery's electrolyte filler holes, holding the container firmly so that it does not fall. Take precaution not to allow any of the fluid to spill.



• Make sure air bubbles ⑤ are coming up each electrolyte container, and leave in this position for about more than 20 minutes.



#### NOTE:

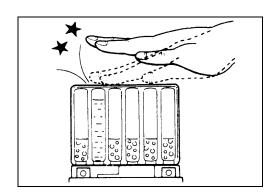
If no air bubbles are coming up from a filler port, tap the bottom of the electrolyte container two or three times.

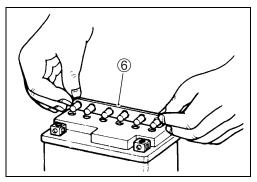
Never remove the container from the battery.

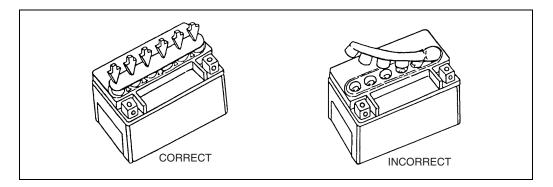
- After confirming that the electrolyte has entered the battery completely, remove the electrolyte containers from the battery. Wait for about 20 minutes.
- Insert the caps ⑥ into the filler holes, pressing in firmly so that the top of the caps do not protrude above the upper surface of the battery's top cover.



- \* Never use anything except the specified battery.
- \* Once the caps have been installed to the battery, do not remove the caps.
- \* Do not tap the caps with a tool such as hammer when installing them.







For initial charging, use the charger specially designed for MF battery.

# CAUTION

- \* For charging the battery, make sure to use the charger specially designed for MF battery. Otherwise, the battery may be overcharged resulting in shortened service life.
- \* Do not remove the cap during charging.
- \* Position the battery with the cap facing upward during charging.

# **SERVICING**

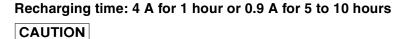
Visually inspect the surface of the battery container. If any signs of cracking or electrolyte leakage from the sides of the battery have occurred, replace the battery with a new one. If the battery terminals are found to be coated with rust or an acidic white powdery substance, clean the battery terminals with sandpaper.

# RECHARGING OPERATION

- · Using the multi circuit tester, check the battery voltage. If the voltage reading is the 12.0 V (DC) and less, recharge the battery with a battery charger.
  - (A) Charging period
  - B Stop charging

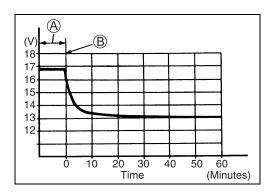
# CAUTION

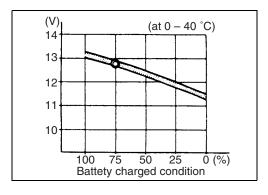
- \* When recharging the battery, remove the battery from the motorcycle.
- \* Do not remove the caps on the battery top while recharging.



Be careful not to permit the charging current to exceed 5 A at any time.

- · After recharging, wait for 30 minutes and more and check the battery voltage with a multi circuit tester.
- If the battery voltage is the 12.5 V and less, recharge the battery again.
- If battery voltage is still 12.5 V and less, after recharging, replace the battery with a new one.
- When the motorcycle is not used for a long period, check the battery every 1 month to prevent the battery discharge.





# SERVICING INFORMATION

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# **TROUBLESHOOTING** FI SYSTEM 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	CMP sensor wiring and mechanical parts
P0340			signal.	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	CKP sensor wiring and mechanical parts
P0335			signal.	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
	Н		Sensor voltage is higher than specified value.	IAP sensor circuit shorted to VCC or ground circuit open
P0105	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
	Н		Sensor voltage is higher than specified value.	TP sensor circuit shorted to VCC or ground circuit open
P0120	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. $0.15 \text{ V} \leq \text{sensor voltage} < 4.85 \text{ V}$ In other than the above range, C15 (P0115) is indicated.	ECT sensor, lead wire/coupler connection
P0115	Н		Sensor voltage is higher than specified value.	ECT sensor circuit open or ground circuit open
10110	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 $\leq$ sensor voltage < 4.85 V In other than the above range, C21 (P0110) is indicated.	IAT sensor, lead wire/coupler connection
P0110	H L		Sensor voltage is higher than specified value.  Sensor voltage is lower than specified value.	IAT sensor circuit open or ground circuit open IAT sensor circuit shorted to ground
C22		AP sensor	The sensor voltage should be the following. 0.5 V $\leq$ 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. Sensor voltage is lower than specified value.	AP sensor circuit shorted to VCC or ground circuit open AP sensor circuit open or shorted to ground or VCC circuit
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. Sensor voltage is lower than specified value.	TO sensor circuit shorted to VCC or ground circuit open TO sensor circuit open or shorted to ground or VCC circuit open
C24/C2 C26/C2 P0351/P0: P0353/P0:	7 352	Ignition sig- nal	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 con- nection, power supply from the battery
C28	<del></del>	Secondary throttle valve actuator	When no actuator control signal is supplied from the ECM, communication signal does not reach ECM or	STVA motor, STVA lead wire/coupler
P1655			operation voltage does not reach STVA motor, C28 (P1655) is indicated. STVA can not operate.	

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	STP sensor, lead wire/coupler connection
P1654	Н	-	(P1654) is indicated. Sensor voltage is higher than specified value. Sensor voltage is lower than specified	STP sensor circuit shorted to VCC or ground circuit open STP sensor circuit open or
	L		value.	shorted to ground or VCC circuit open
C31		Gear posi- tion signal	Gear position signal voltage should be higher than the following for 3 seconds and more.	GP switch, wiring/coupler connection, gearshift cam, etc.
P0705			Gear position sensor voltage > 0.6 V If lower than the above value, C31 (P0705) is indicated.	
C32/C3 C34/C3		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	Fuel injector, wiring/coupler con- nection, power supply to the injector
P0201/P02 P0203/P02			(P0202), C34 (P0203) or C35 (P0204) is indicated.	
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	Н		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)
1 0230	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	Ignition switch signal is not input to the	Ignition switch, lead wire/coupler,
P1650		switch	ECM. When the ID agreement is not verified. ECM does not receive communication signal from the immobilizer antenna.	etc. Immobilizer/anti-theft system

DTC No.	DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
	HO2 sensor	HO2 sensor output voltage is not input	HO2 sensor circuit open or
C44		to ECM during engine operation and	shorted to ground
		running condition.	
		(Sensor voltage ≤ 0.1 V)	
P0130		In other than the above value, C44	
		(P0130) is indicated.	
C44		The Heater can not operate so that	HO2 sensor lead wire/coupler
U44		heater operation voltage is not supply	connection
P0135		to the oxygen heater circuit, C44	Battery voltage supply to the
P0135		(P0135) is indicated.	HO2 sensor
C49	PAIR control	PAIR control solenoid valve voltage is	PAIR control solenoid valve, lead
P1656	solenoid	not input to ECM.	wire/coupler
1 1030	valve		
C60	Cooling fan	Cooling fan relay signal is not input to	Cooling fan relay, lead wire/cou-
P0480	relay	ECM.	pler connection

# **ENGINE**

Complaint	Symptom and possible causes	Remedy
Engine will not start	Compression too low	
or is hard to start.	1. Valve clearance out of adjustment	Adjust.
	2. Worn valve guides or poor seating of valves	Repair or replace.
	<ol><li>Mistiming valves</li></ol>	Adjust.
	<ol><li>Excessively worn piston rings</li></ol>	Replace.
	5. Worn-down cylinder bores	Replace.
	6. Too slowly starter motor cranks	See electrical section.
	7. Poor seating of spark plugs	Retighten.
	Plug not sparking	
	1. Fouled spark plugs	Clean.
	2. Wet spark plugs	Clean and dry.
	3. Defective ignition coil	Replace.
	Defective CKP sensor	Replace.
	5. Defective ECM	Replace.
	6. Open-circuited wiring connections	Repair or replace.
	No fuel reaching the intake manifold	
	<ol> <li>Clogged fuel filter or fuel hose</li> </ol>	Clean or replace.
	Defective fuel pump	Replace.
	<ol><li>Defective fuel pressure regulator</li></ol>	Replace.
	Defective fuel injector	Replace.
	<ol><li>Defective fuel pump relay</li></ol>	Replace.
	6. Defective ECM	Replace.
	7. Open-circuited wiring connections	Check and repair.
	Incorrect fuel/air mixture	
	<ol> <li>TP sensor out of adjustment</li> </ol>	Adjust.
	Defective fuel pump	Replace.
	<ol><li>Defective fuel pressure regulator</li></ol>	Replace.
	Defective TP sensor	Replace.
	5. Defective CKP sensor	Replace.
	Defective IAP sensor	Replace.
	7. Defective ECM	Replace.
	Defective ECT sensor	Replace.
	Defective IAT sensor	Replace.
	10. Defective AP sensor	Replace.

Complaint	Symptom and possible causes	Remedy
Engine idles poorly.	Valve clearance out of adjustment	Adjust.
	2. Poor seating of valves	Replace or repair.
	Defective valve guides	Replace.
	4. Worn down camshafts	Replace.
	5. Too wide spark plug gaps	Adjust or replace.
	6. Defective ignition coil/plug caps	Replace.
	7. Defective CKP sensor	Replace.
	8. Defective ECM	Replace.
	9. Defective TP sensor	Replace.
	10. Defective fuel pump	Replace.
	11. Imbalanced throttle valve	Adjust.
	12. Damaged or cracked vacuum hose	Replace.
Engine stalls often.	Incorrect fuel/air mixture	
	Defective IAP sensor or circuit	Repair or replace.
	Clogged fuel filter	Clean or replace.
	Defective fuel pump	Replace.
	Defective fuel pressure regulator	Replace.
	5. Defective ECT sensor	Replace.
	6. Defective thermostat	Replace.
	7. Defective IAT sensor	Replace.
	Damaged or cracked vacuum hose	Replace.
	Fuel injector improperly operating	
	Defective fuel injectors	Replace.
	2. No injection signal from ECM	Repair or replace.
	Open or short circuited wiring connection	Repair or replace.
	4. Defective battery or low battery voltage	Replace or recharge.
	Control circuit or sensor improperly operating	
	Defective ECM	Replace.
	Defective fuel pressure regulator	Replace.
	3. Defective TP sensor	Replace.
	4. Defective IAT sensor	Replace.
	5. Defective CMP sensor	Replace.
	6. Defective CKP sensor	Replace.
	7. Defective ECT sensor	Replace.
	8. Defective fuel pump relay	Replace.
	Engine internal parts improperly operating	
	Fouled spark plugs	Clean.
	Defective CKP sensor or ECM	Replace.
	3. Clogged fuel hose	Clean.
	4. Out of adjustment tappet clearance	Adjust.

Complaint	Symptom and possible causes	Remedy
Noisy engine	Excessive valve chatter	-
	Too large tappet clearance	Adjust.
	2. Weakened or broken valve springs	Replace.
	3. Worn tappet or cam surface	Replace.
	4. Worn and burnt camshaft journal	Replace.
	Noise seems to come from piston	
	Worn down pistons or cylinders	Replace.
	2. Carbon combustion chambers fouled with carbon	Clean.
	3. Worn piston pins or piston pin bore	Replace.
	4. Worn piston rings or ring grooves	Replace.
	Noise seems to come from timing chain	
	1. Stretched chain	Replace.
	2. Worn sprockets	Replace.
	3. Tension adjuster not working	Repair or replace.
	Noise seems to come from clutch	
	Worn splines of countershaft or hub	Replace.
	2. Worn teeth of clutch plates	Replace.
	3. Distorted clutch plates, driven and drive	Replace.
	4. Worn clutch release bearing	Replace.
	5. Weakened clutch dampers	Replace the primary
		driven gear.
	Noise seems to come from crankshaft	
	Rattling bearings due to wear	Replace.
	2. Worn and burnt big-end bearings	Replace.
	3. Worn and burnt journal bearings	Replace.
	4. Too large thrust clearance	Replace thrust bearing.
	Noise seems to come from balancer	
	Worn and burnt journal bearings	Replace.
	Noise seems to come from transmission	
	1. Worn or rubbing gears	Replace.
	2. Worn splines	Replace.
	3. Worn or rubbing primary gears	Replace.
	4. Worn bearings	Replace.
	Noise seems to come from water pump	
	Too much play on pump shaft bearing	Replace.
	Worn or damaged impeller shaft	Replace.
	3. Worn or damaged mechanical seal	Replace.
	4. Contact between pump case and impeller	Replace.

Complaint	Symptom and possible causes	Remedy
Engine runs poorly	Defective engine internal/electrical parts	
in high speed range.	<ol> <li>Weakened valve springs</li> </ol>	Replace.
	2. Worn camshafts	Replace.
	<ol><li>Valve timing out of adjustment</li></ol>	Adjust.
	4. Too narrow spark plug gaps	Adjust.
	5. Ignition not advanced sufficiently due to poorly	Replace ECM.
	working timing advance circuit	
	Defective ignition coils	Replace.
	7. Defective CKP sensor	Replace.
	8. Defective ECM	Replace.
	9. Clogged air cleaner element	Clean.
	10. Clogged fuel hose, resulting in inadequate fuel	Clean and prime.
	supply to injector	Donlago
	<ul><li>11. Defective fuel pump</li><li>12. Defective TP sensor</li></ul>	Replace.
	13. Defective STP sensor or STVA	Replace.
		nepiace.
	Defective air flow system	
	Clogged air cleaner element	Replace.
	Defective throttle valve	Adjust or replace.
	Defective secondary throttle valve	Adjust or replace.
	4. Sucking air from throttle body joint	Repair or replace.
	5. Defective ECM	Replace.
	Imbalancing throttle valve synchronization	Adjust.
	Defective control circuit or sensor	
	Low fuel pressure	Repair or replace.
	2. Defective TP sensor	Replace.
	3. Defective IAT sensor	Replace.
	Defective CMP sensor	Replace.
	5. Defective CKP sensor	Replace.
	Defective GP sensor	Replace.
	7. Defective IAP sensor	Replace.
	8. Defective ECM	Replace.
	9. TP sensor out of adjustment	Replace.
	10. Defective STP sensor and/or STVA	Replace.

Complaint	Symptom and possible causes	Remedy
Engine lacks power.	Defective engine internal/electrical parts	
	Loss of tappet clearance	Adjust.
	2. Weakened valve springs	Replace.
	3. Valve timing out of adjustment	Adjust.
	4. Worn piston rings or cylinders	Replace.
	5. Poor seating of valves	Repair.
	6. Fouled spark plugs	Clean or replace.
	7. Incorrect spark plugs	Adjust or replace.
	8. Clogged fuel injectors	Replace.
	Defective secondary fuel injectors	Replace.
	10. TP sensor out of adjustment	Adjust.
	11. Clogged air cleaner element	Replace.
	12. Imbalancing throttle valve synchronization	Adjust.
	13. Sucking air from throttle valve or vacuum hose	Retighten or replace.
	14. Too much engine oil	Drain out excess oil.
	15. Defective fuel pump or ECM	Replace.
	16. Defective CKP sensor and ignition coils	Replace.
	Defective control circuit or sensor	
	Low fuel pressure	Repair or replace.
	2. Defective TP sensor	Replace.
	3. Defective IAT sensor	Replace.
	Defective CMP sensor	Replace.
	Defective CKP sensor	Replace.
	Defective GP sensor	Replace.
	7. Defective IAP sensor	Replace.
	Defective ECM	Replace.
	Defective AP sensor	Replace.
	10. TP sensor out of adjustment	Adjust.
	11. Imbalanced throttle valve synchronaization	Adjust.
	12. Defective STP sensor and/or STVA	Replace.

Complaint	Symptom and possible causes	Remedy
Engine overheats	Defective engine internal parts	
	Heavy carbon deposit on piston crowns	Clean.
	2. Not enough oil in the engine	Add oil.
	3. Defective oil pump or clogged oil circuit	Replace or clean.
	4. Sucking air from intake pipes	Retighten or replace.
	5. Use incorrect engine oil	Change.
	6. Defective cooling system	See radiator section.
	Lean fuel/air mixture	
	Short-circuited IAP sensor/lead wire	Repair or replace.
	2. Short-circuited IAT sensor/lead wire	Repair or replace.
	3. Sucking air from intake pipe joint	Repair or replace.
	Defective fuel injectors	Replace.
	5. Defective ECT sensor	Replace.
	Other factors	·
	In Ignition timing is too advanced due to defective	Replace.
	timing advance system (ECT sensor, GP sensor,	·
	CKP sensor and ECM).	
	2. Drive chain is too tight.	Adjust.
Dirty or heavy	Too much engine oil in the engine	Check with inspection
exhaust smoke		window, drain out excess
		oil.
	2. Worn piston rings or cylinders	Replace.
	3. Worn valve guides	Replace.
	Scored or scuffed cylinder walls	Replace.
	5. Worn valves stems	Replace.
	6. Defective stem seal	Replace.
	7. Worn oil ring side rails	Replace.
Slipping clutch	Weakened clutch springs	Replace.
	Worn or distorted pressure plates	Replace.
	Distorted clutch plates or pressure plates	Replace.
Dragging clutch	Some clutch spring weakened while others	Replace.
	are not.	
	Distorted pressure plates or clutch plates	Replace.
Transmission will	Broken gearshift cam	Replace.
not shift.	2. Distorted gearshift forks	Replace.
	Worn gearshift pawl	Replace.
Transmission will	Broken return spring on shift shaft	Replace.
not shift back.	2. Rubbing or stickily shift shaft	Repair or replace.
	Distorted or worn gearshift forks	Replace.
Transmission jumps	Worn shifting gears on driveshaft or	Replace.
out of gear.	countershaft	
	2. Distorted or worn gearshift forks	Replace.
	3. Weakened stopper spring on gearshift stopper	Replace.
	4. Worn gearshift cam plate	Replace.

# RADIATOR (COOLING SYSTEM)

Complaint	Symptom and possible causes	Remedy
Engine overheats	Not enough engine coolant	Add coolant.
	Radiator core clogged with dirt or scale	Clean.
	3. Faulty cooling fan	Repair or replace.
	Defective cooling fan relay, or open- or short- circuited	Repair or replace.
	5. Defective ECM	Replace.
	6. Defective ECT sensor	Replace.
	7. Clogged water passage	Clean.
	8. Air trapped in the cooling circuit	Bleed air.
	Defective water pump	Replace.
	10. Use incorrect coolant	Replace.
	11. Defective thermostat	Replace.
Engine overcools	Defective ECT sensor	Replace.
	Extremely cold weather	Put on the radiator cover.
	Defective thermostat	Replace.
	Defective cooling fan relay, or open- or short- circuited	Repair or replace.
	5. Defective ECM	Replace.

# **CHASSIS**

Complaint	Symptom and possible causes	Remedy
Heavy steering	Overtightened steering stem nut	Adjust.
	2. Broken bearing in steering stem	Replace.
	3. Distorted steering stem	Replace.
	4. Not enough pressure in tires	Adjust.
Wobbly handlebars	1. Loss of balance between right and left front forks	Adjust.
	2. Distorted front fork	Repair or replace.
	3. Distorted front axle or crooked tire	Replace.
	Loose steering stem nut	Adjust.
	5. Worn or incorrect tire or wrong tire pressure	Adjust or replace.
	6. Worn bearing/race in steering stem	Replace.
Wobbly front wheel	Distorted wheel rim	Replace.
	2. Worn front wheel bearings	Replace.
	3. Defective or incorrect tire	Replace.
	4. Loose axle or axle pinch bolt	Retighten.
	<ol><li>Incorrect front fork oil level</li></ol>	Adjust.
	6. Incorrect front wheel weight balance	Adjust.
Front suspension	1. Weakened springs	Replace.
too soft	2. Not enough fork oil	Replenish.
	Wrong weight fork oil	Replace.
	4. Improperly set front fork spring adjuster	Adjust.
Front suspension	Too viscous fork oil	Replace.
too stiff	2. Too much fork oil	Drain excess oil.
	<ol><li>Improperly set front fork spring adjuster</li></ol>	Adjust.
	Bent front axle	Replace.
Noisy front suspen-	Not enough fork oil	Replenish.
sion	Loose bolts on suspension	Retighten.
Wobbly rear wheel	Distorted wheel rim	Replace.
	2. Worn rear wheel bearing or swingarm bearings	Replace.
	3. Defective or incorrect tire	Replace.
	4. Worn swingarm and rear suspension bearings	Replace.
	5. Loose nuts or bolts on rear suspensions	Retighten.
Rear suspension	<ol> <li>Weakened spring of shock absorber</li> </ol>	Replace.
too soft	2. Leakage of oil or gas shock absorber	Replace.
	3. Improperly set rear spring pre-load adjuster	Adjust.
	Improperly set damping force adjuster	Adjust.
Rear suspension	Bent shock absorber shaft	Replace.
too stiff	Bent swingarm pivot shaft	Replace.
	3. Worn swingarm and rear suspension bearings	Replace.
	4. Improperly set rear spring pre-load adjuster	Adjust.
	5. Improperly set damping force adjuster	Adjust.
Noisy rear suspen-	Loose nuts or bolts on rear suspension	Retighten.
sion	Worn swingarm and suspension bearings	Replace.

Complaint	Symptom and possible causes	Remedy
Insufficient brake	Leakage of brake fluid from hydraulic system	Repair or replace.
power	2. Worn pads	Replace.
	3. Oil adhesion of engaging surface of pads/shoe	Clean disc and pads.
	4. Worn disc	Replace.
	5. Air in hydraulic system	Bleed air.
	6. Not enough brake fluid in the reservoir	Replenish.
Brake squeaking	Carbon adhesion on pad surface	Repair surface with
		sandpaper.
	2. Tilted pad	Correct pad fitting or
		replace.
	3. Damaged wheel bearing	Replace.
	4. Loosen front wheel axle or rear wheel axle	Tighten to specified
		torque.
	5. Worn pads	Replace.
	6. Foreign material in brake fluid	Replace brake fluid.
	7. Clogged return port of master cylinder	Disassemble and
		clean master cylinder.
Excessive brake	Air in hydraulic system	Bleed air.
lever stroke	Insufficient brake fluid	Replenish fluid to specified
		level; bleed air.
	3. Improper quality of brake fluid	Replace with correct fluid.
Leakage of brake	Insufficient tightening of connection joints	Tighten to specified torque.
fluid	2. Cracked hose	Replace.
	3. Worn piston and/or cup	Replace piston and/or cup.
Brake drags	1. Rusty part	Clean and lubricate.
	Insufficient brake lever or brake pedal	Lubricate.
	pivot lubrication	

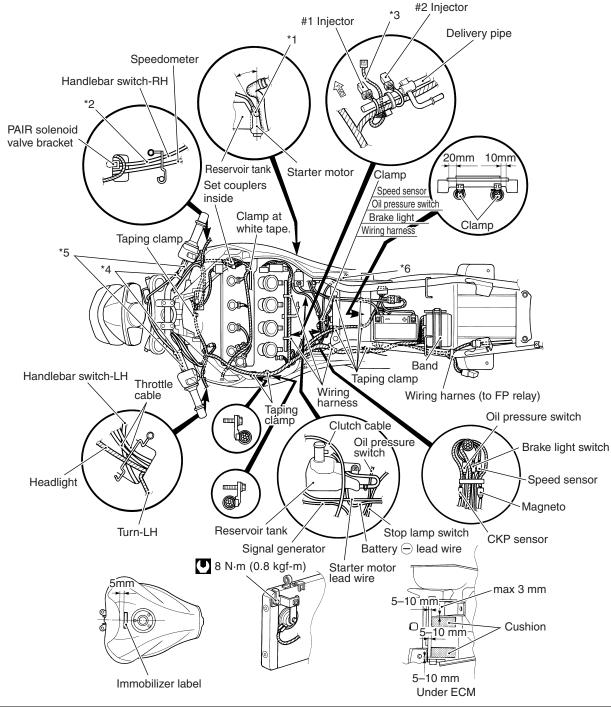
# **ELECTRICAL**

Complaint	Symptom and possible causes	Remedy
No sparking or poor	Defective ignition coils	Replace.
sparking	2. Defective spark plugs	Replace.
	3. Defective CKP sensor	Replace.
	4. Defective ECM	Replace.
	5. Defective TO sensor	Replace.
	6. Open-circuited wiring connections	Check and repair.
Spark plug soon	Mixture too rich	Inspect FI system.
become fouled with	2. Idling speed set too high	Adjust fast idle or throttle
carbon.		stop screw.
	3. Incorrect gasoline	Change.
	4. Dirty air cleaner element	Replace.
	5. Too cold spark plugs	Replace with hot type plug.
Spark plug become	Worn piston rings	Replace.
fouled too soon.	2. Worn piston or cylinders	Replace.
	3. Excessive clearance of valve stems in valve	Replace.
	guides	
	4. Worn stem oil seal	Replace.
Spark plug elec-	1. Too hot spark plugs	Replace with cold type
trodes overheat or		plugs.
burn	2. Overheated the engine	Tune up.
	3. Loose spark plugs	Retighten.
	4. Too lean mixture	Inspect FI system.
Generator does not	1. Open- or short-circuited lead wires, or loose lead	Repair or replace or
charge.	connections	retighten.
	2. Short-circuited, grounded or open generator coil	Replace.
	3. Short-circuited or punctured regulator/rectifier	Replace.
Generator does	Lead wires tend to get shorted or open-circuited	Repair or retighten.
charge, but charg-	or loosely connected at terminals.	
ing rate is below the	Grounded or open-circuited generator coil	Replace.
specification.	Defective regulator/rectifier	Replace.
	Defective cell plates in the battery	Replace the battery.
Generator over-	Internal short-circuit in the battery	Replace the battery.
charges	Damaged or defective regulator/rectifier	Replace.
	3. Poorly grounded regulator/rectifier	Clean and tighten ground
		connection.
Unstable charging	1. Lead wire insulation frayed due to vibration,	Repair or replace.
	resulting in intermittent short-circuiting.	
	Internally shorted generator	Replace.
	Defective regulator/rectifier	Replace.
Starter button is not	Run down battery	Repair or replace.
effective.	2. Defective switch contacts	Replace.
	3. Brushes not seating properly on starter motor	Repair or replace.
	commutator	
	4. Defective starter relay/starter interlock switch	Replace.
	5. Defective main fuse	Replace.

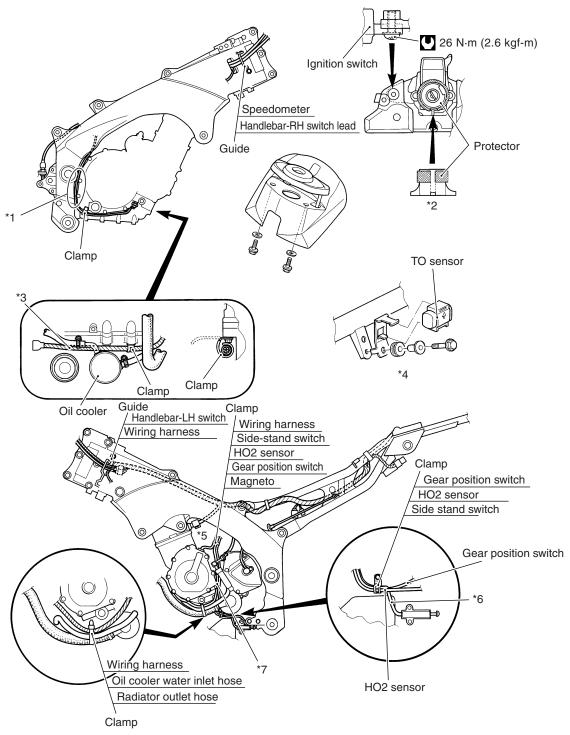
# **BATTERY**

Complaint	Symptom and possible causes	Remedy
Battery runs down	1. Trouble in the charging system	Check the generator, regu-
quickly.		lator/rectifier and circuit
		connections and make nec-
		essary adjustments to
		obtain specified charging
		operation.
	2. Cell plates have lost much of their active	Replace the battery and
	material as a result of overcharging.	correct the charging sys-
		tem.
	3. Internal short-circuit in the battery	Replace the battery.
	4. Too low battery voltage	Recharge the battery fully.
	5. Too old battery	Replace the battery.
Battery "sulfation"	Incorrect charging rate	Replace the battery.
	(When not in use batteries should be checked at	
	least once a month to avoid sulfation.)	
	2. The battery was left unused in a cold climate for	Replace the battery if badly
	too long.	sulfated.

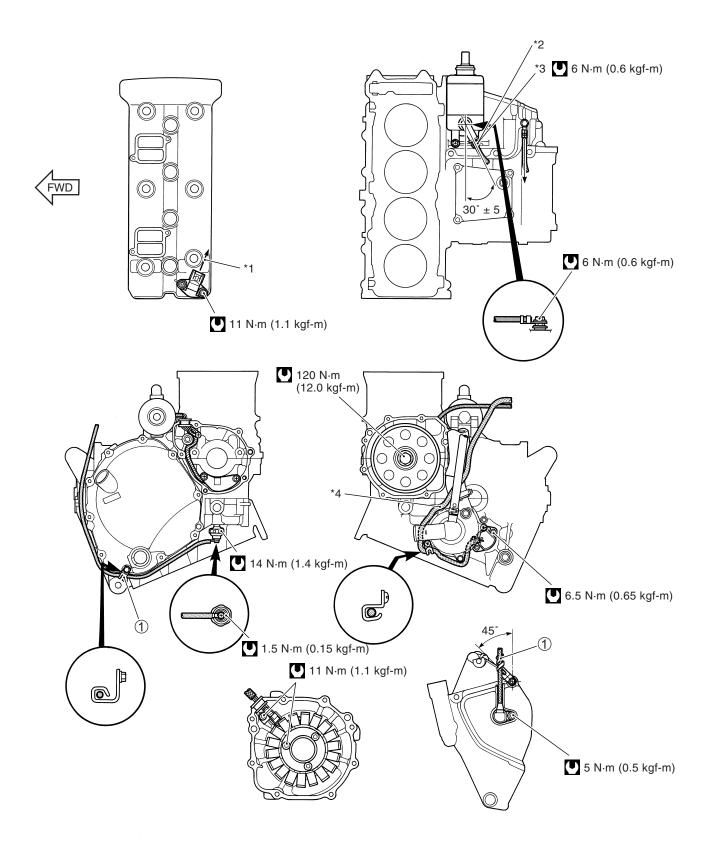
# WIRING HARNESS, CABLE AND HOSE ROUTING **WIRING HARNESS ROUTING**



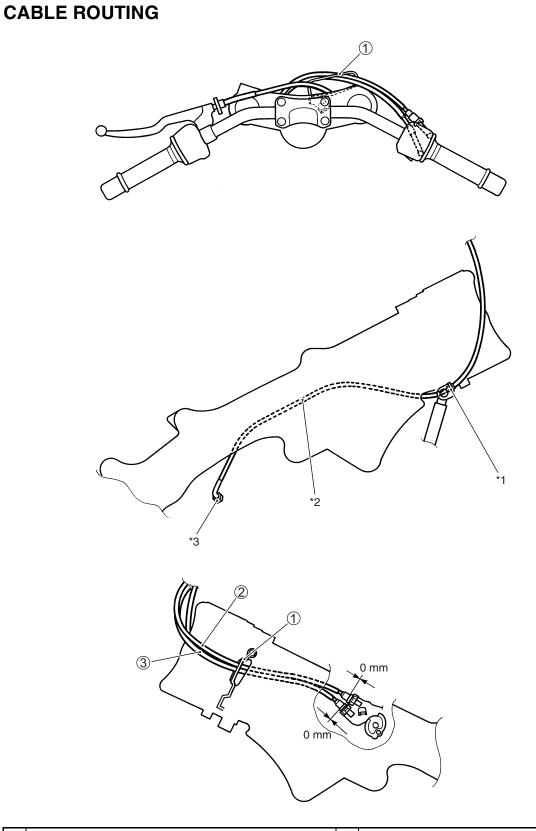
*1	Set the starter motor lead wire between radiator inlet hose and reservoir tank.	*4	Cut after clamping and set the lock part downward.
I	Pass the handle switch-RH left side of PAIR solenoid valve bracket.	*5	Do not twist the lead wires.
	Pass the IAT sensor branch wire under the delivery pipe.	*6	Pass through the brake light switch lead wire avobe the rear brake reservoir tank hose.



*1	Put the lead wire into inside and pass it upward not to be out.	*5	Pass the harnesses back of the water hose.
*2	Set the protector so that clearance comes above the water drain hole.	*6	Pass the side stand lead wire outside of left under cover.
*3	Pass the harness under the hose.	*7	Pass the wiring harness to regulator/rectifier before assembling the sprocket cover.
*4	Fix the bracket to seat rail after to sensor is inserted in the bracket.		

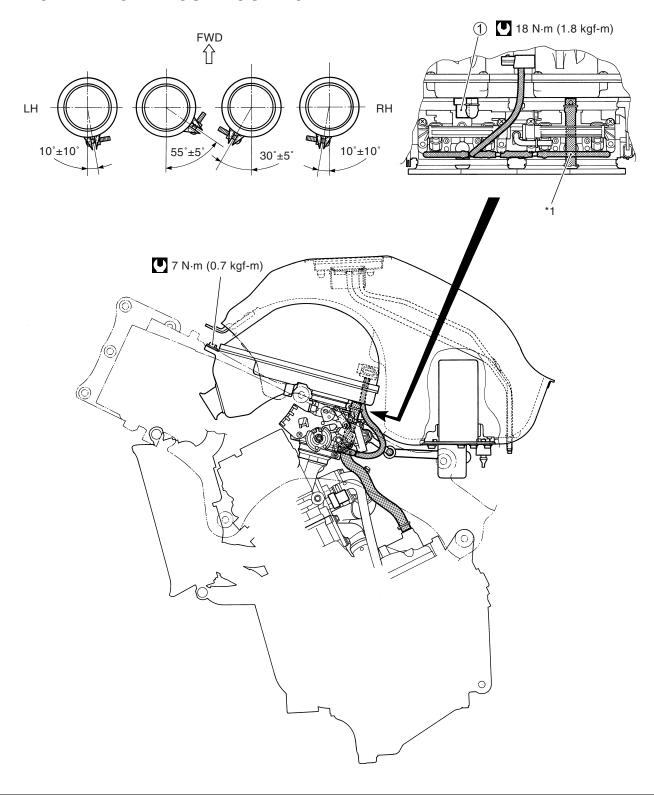


1	Clamp	*3	Tighten bolt rear one first.
*1	Direction of coupler	*4	The lead wire must be loosend.
*0	Pass the starter motor lead wire through above		
	the starter motor mounting bolt.		



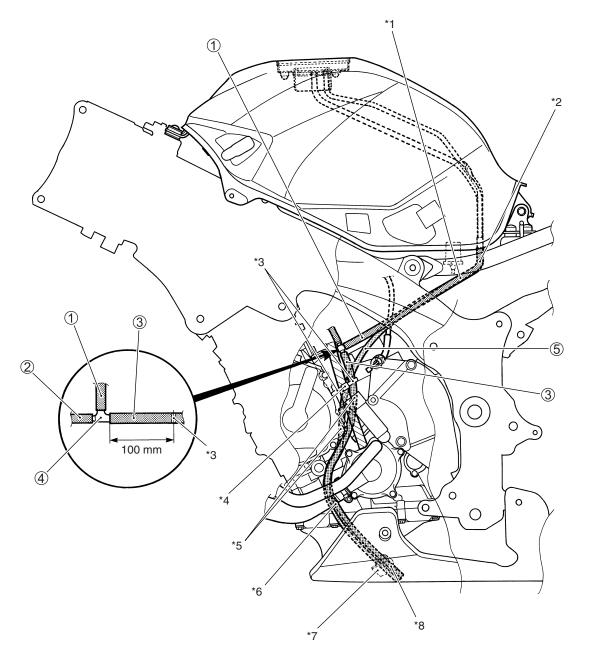
1	Guide	*1	Clamp the clutch cable with grommet.
2	Throttle cable NO.1	~2	Pass the clutch cable through outside of radiator hose.
3	Throttle cable NO.2	*3	Fix to the crankcase

#### THROTTLE BODY HOSE ROUTING



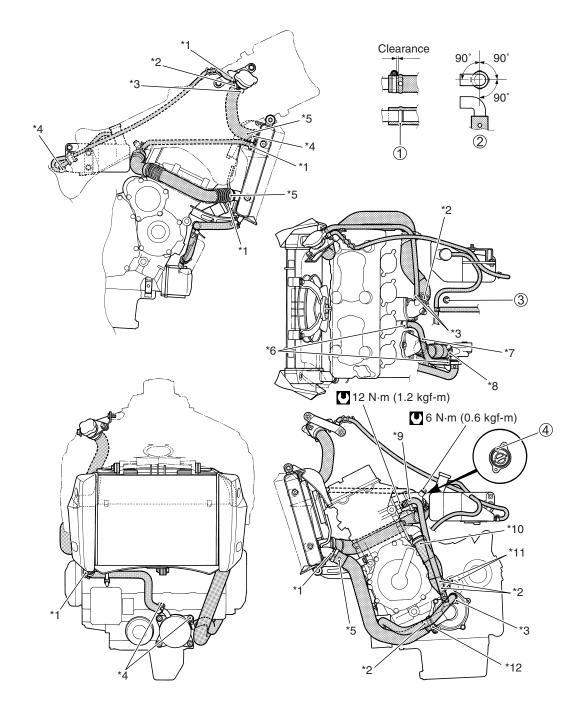
Pass the breather hose through between vaccum 1 IAT sensor hose and clamp.

## **FUEL TANK DRAIN HOSE ROUTING**



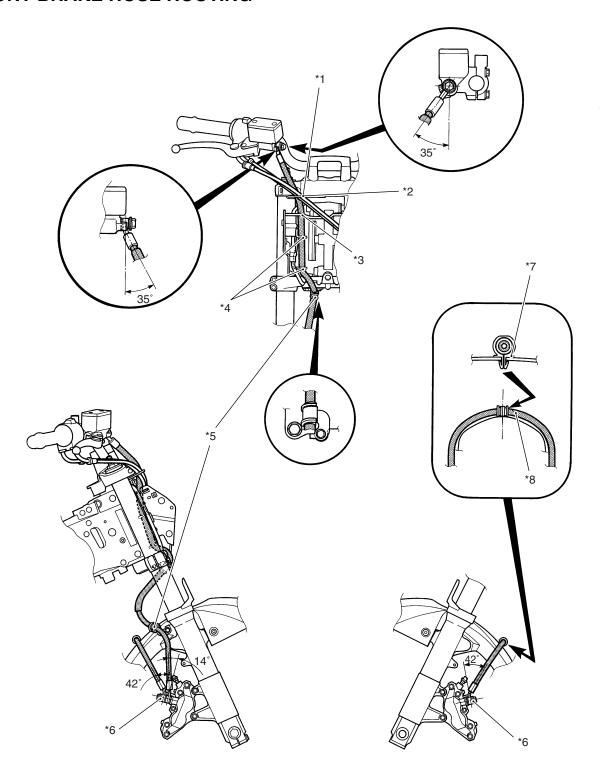
1	Fuel tank water drain hose.	*3	White mark
(2)	Reservoir tank over flow hose.	*4	Clamp drain hose and breather hose with radia-
2	Heservoir tank over now nose.	4	tor hose at white marking.
(3)	Fuel tank drain NO.2 hose.	*5	Pass the drain hose and breather hose through
3		2	inside of the sprocket cover.
<b>4</b> )	3way joint	*6	Pass the drain hose and breather hose through
4			inside of radiator hose.
<b>⑤</b>	Fuel tank breather hose.	*7	Stick clamp in mark off line.
*1	Pass the drain hose and breather hose through	*8	Clamp drain hose and breather hose at white
	under the bridge of seat rail.	8	marking.
*2	Set the drain hose and breather hose with		
~	lengthwise forward.		

# **COOLING SYSTEM HOSE ROUTING**



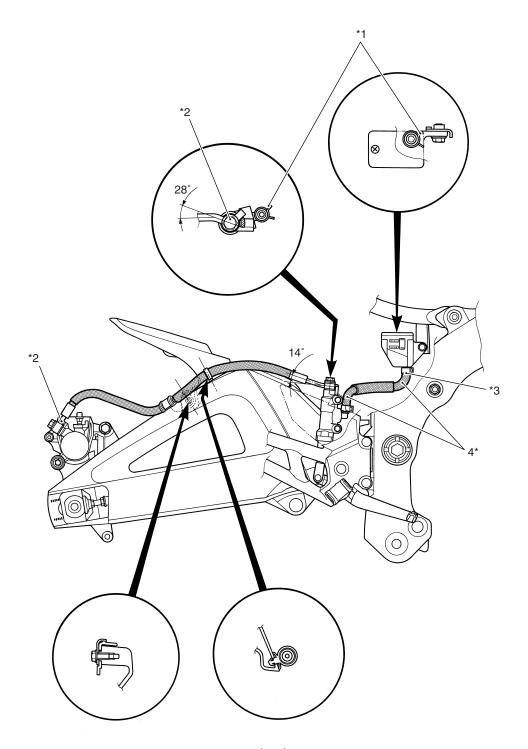
1	Match mark	*5	Pink marking
2	Marking position	*6	Clamp faces left side.
3	Breather hose	*7	Clamp faces right side.
4	Jiggle-valve	*8	Set the clamp edge away from the by-pass
4			hose.
*1	Clamp faces downward.	*9	Yellow marking
*2	White marking	*10	Blue marking
*3	Clamp faces backward.	*11	Clamp faces left back side.
*4	Clamp faces upward.	*12	Clamp faces left lower side.

# FRONT BRAKE HOSE ROUTING



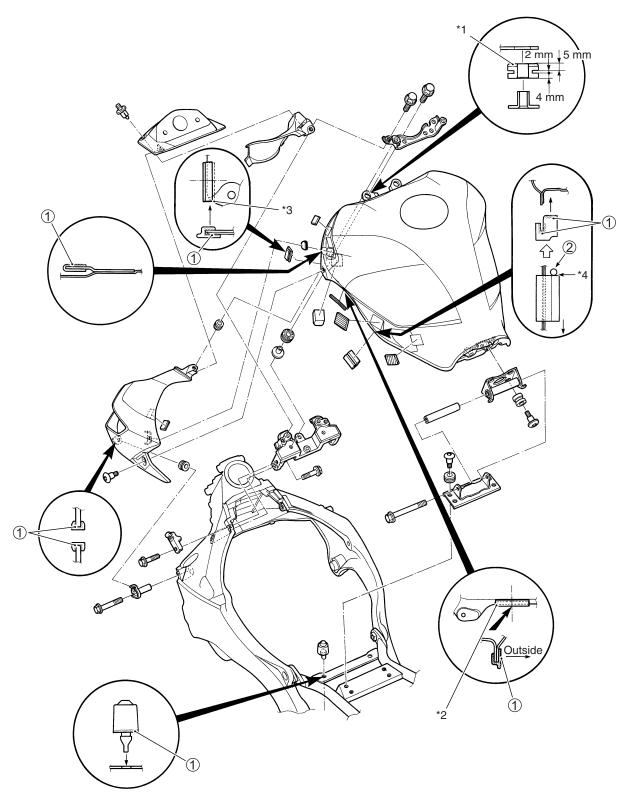
*1	Pass the brake hose through inside the guide.	*5	Clamp the brake hose firmly.
*0	Pass the brake hose through behind of throttle	*6	After contacting the brake hose union to the
-	cable.	0	stopper, tighten the union bolt.
*2	Pass the brake hose through behind the bracket.	/	Fit the clamp around the sleever. Insert the
3			clamp to the hole of front fender.
*4	Set the guide firmly.	*8	Green paint

## **REAR BRAKE HOSE ROUTING**



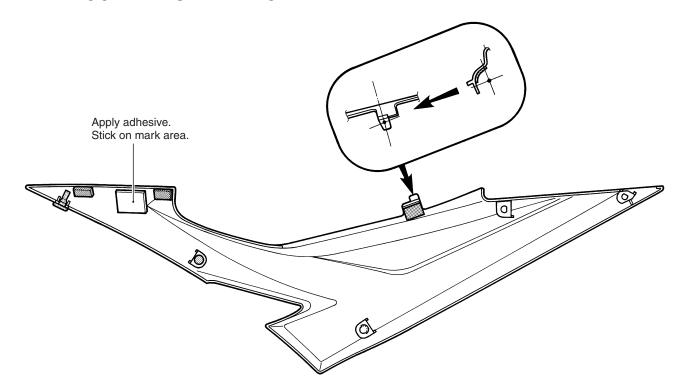
	*1	Face the clamp forward.	*3	White marking
,	۰*	After contacting the brake hose union to the	*1	Insert firmly.
	۷	stopper, tighten the union bolt.	†	msert mmy.

## **FUEL TANK INSTALLATION**

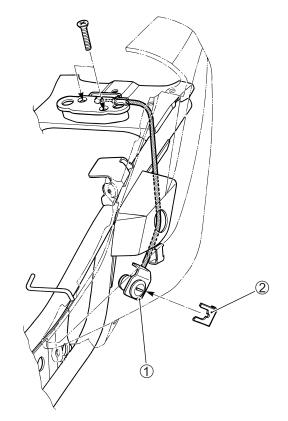


	Adhesive cement (equivalent to ARONALPHA 201)	*2	Set with R-edge.
2	Emboss	*3	Set to flange edge. (LH only)
*1	Cut side is upper	*4	Set with emboss.

#### FRAME COVER INSTALLATION

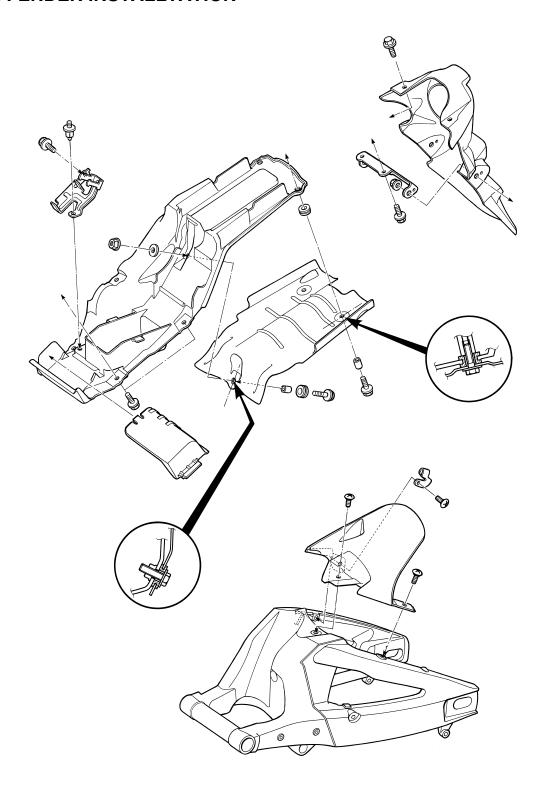


## **SEAT LOCK CABLE INSTALLATION**

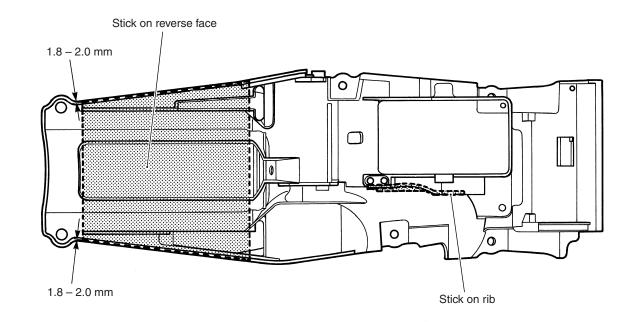


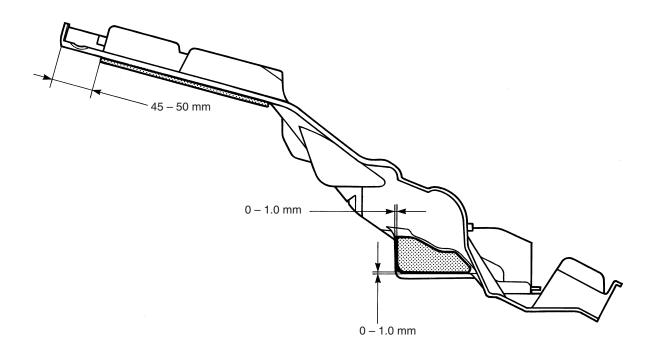
Stopper ① Seat lock

# **REAR FENDER INSTALLTATION**

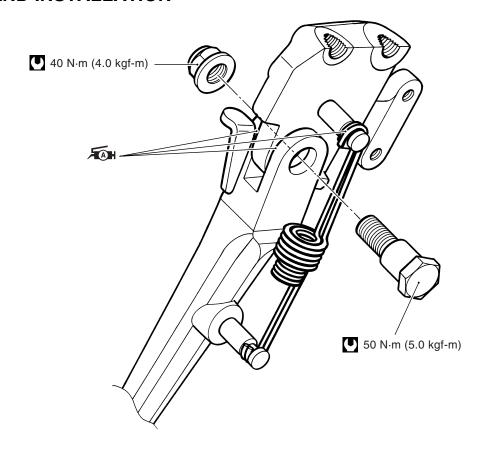


## **REAR FENDER HEAT SHIELD INSTALLATION**

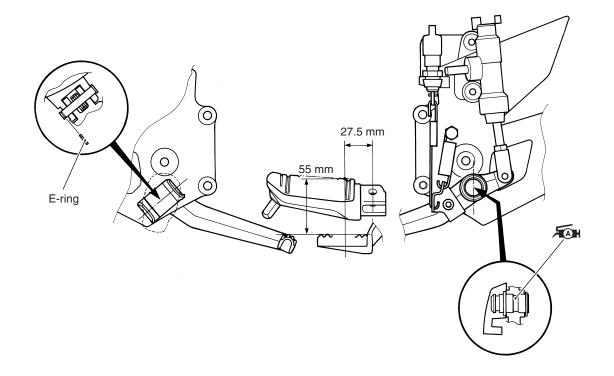




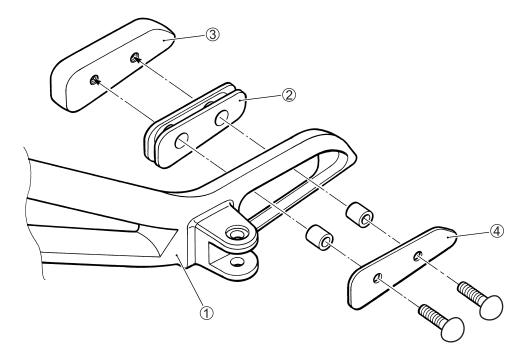
## **SIDE-STAND INSTALLATION**



# **BRAKE PEDAL INSTALLATION**

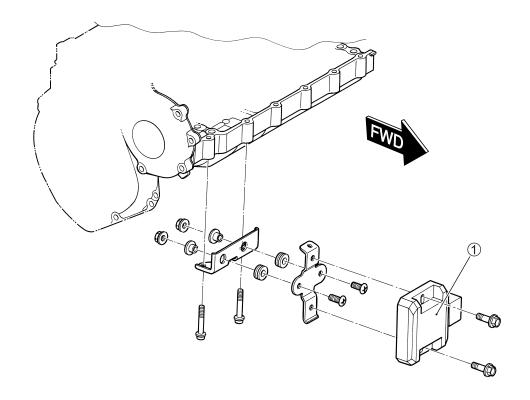


#### PILLION RIDER FOOTREST BALANCER INSTALLATION

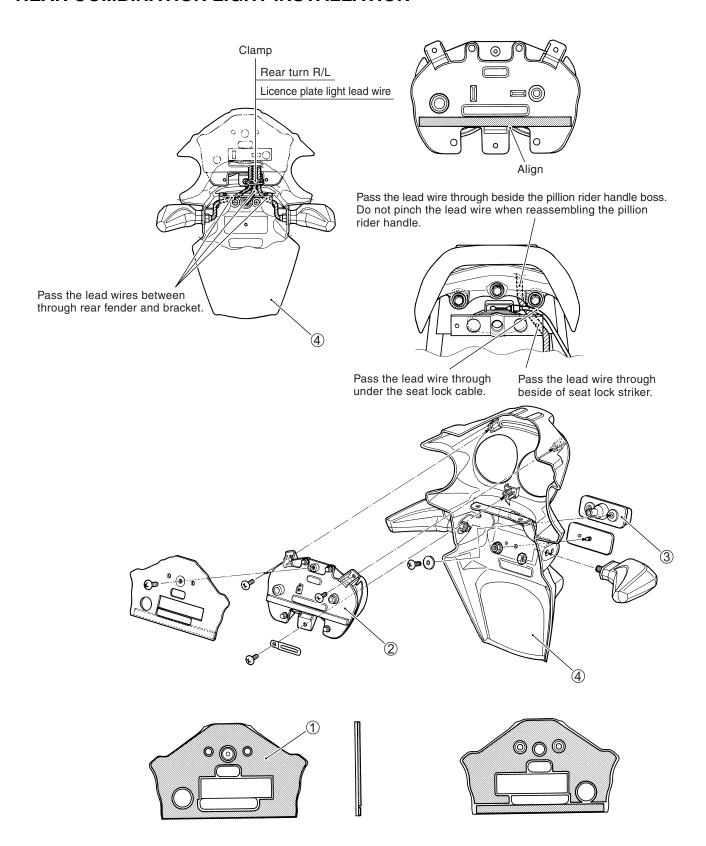


1	Footrest bracket	3	Footrest balancer No. 1
2	Balancer rubber	4	Balancer plate

## **REGULATOR/RECTIFIER INSTALLATION**

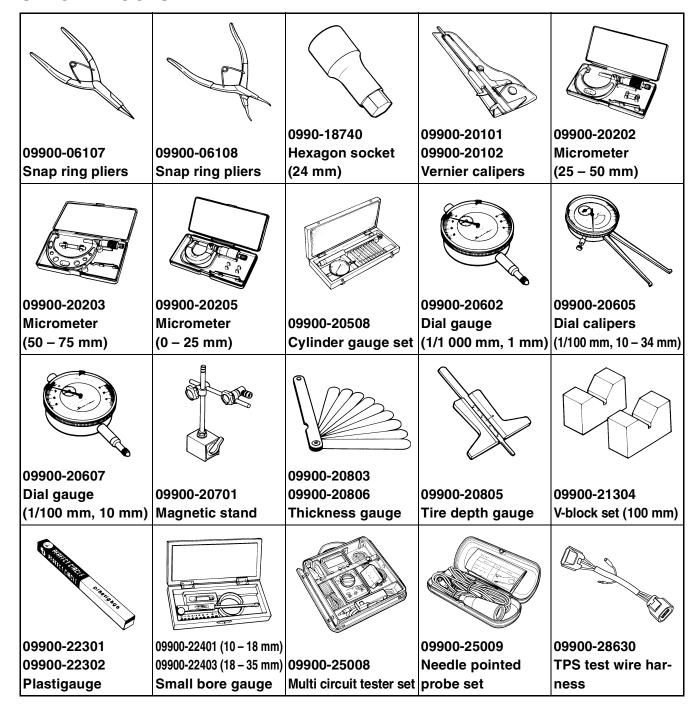


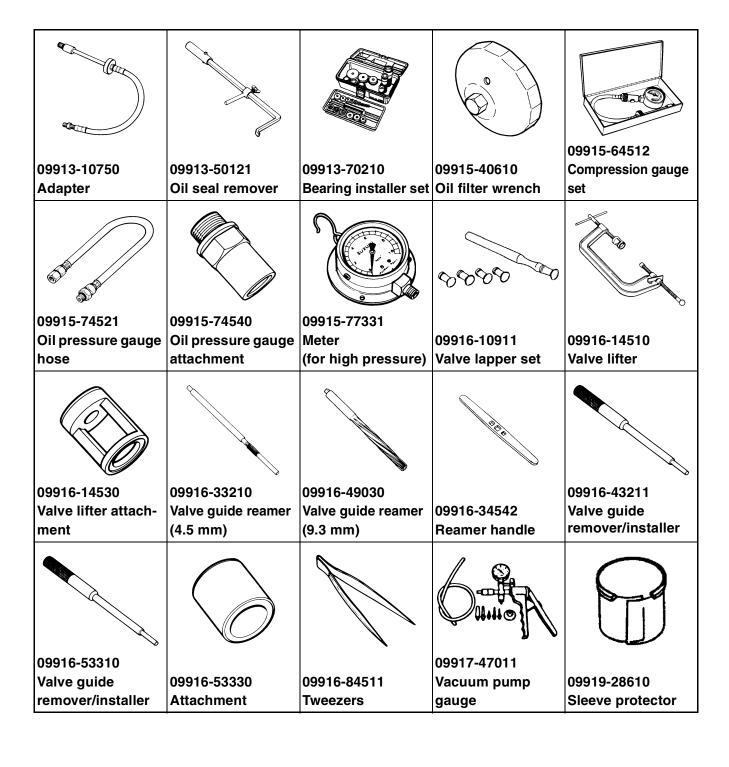
#### REAR COMBINATION LIGHT INSTALLATION

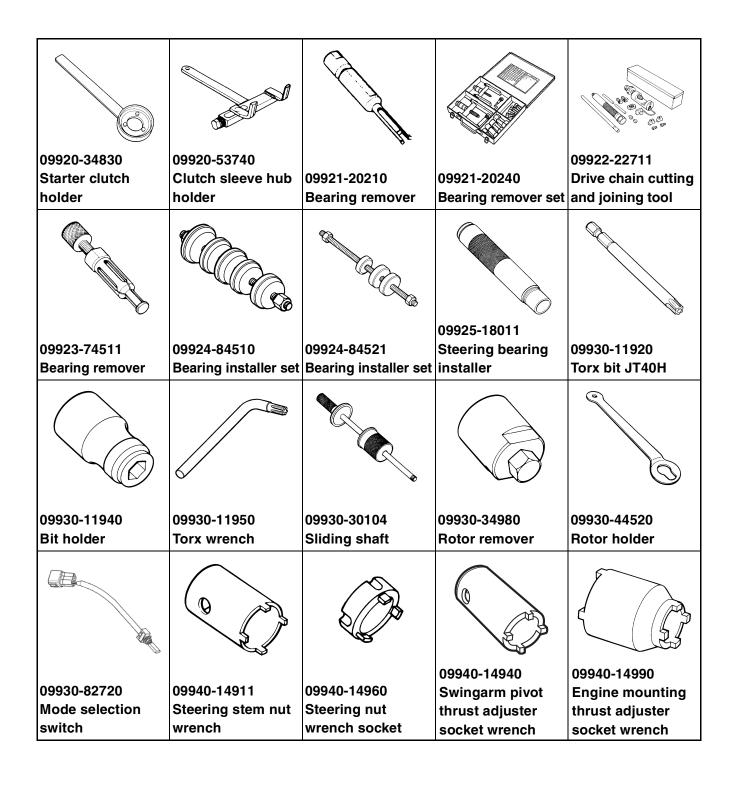


1	Heat shield	3	License plate light
2	Brake light/Taillight	4	Rear fender

#### **SPECIAL TOOLS**







#### NOTE:

When order the special tool, please confirm whether it is available or not.

# **TIGHTENING TORQUE ENGINE**

ITEM	N⋅m	kgf-m			
Exhaust pipe bolt	23	2.3			
Muffler connecting bolt	23	2.3			
Muffler mounting bolt	23	2.3			
Speed sensor rotor bolt	25	2.5			
Speed sensor bolt	4.5	0.45			
Engine sprocket nut			115	11.5	
Engine mounting bolt and nut		(M12)	75	7.5	
		(M10)	55	5.5	
Engine mounting thrust adjuster			23	2.3	
Engine mounting thrust adjuster lock-nu	ut		45	4.5	
Cylinder head cover bolt		Initial	10	1.0	
		Final	14	1.4	
Spark plug			11	1.1	
Cam chain guide bolt			10	1.0	
Camshaft journal holder bolt			10	1.0	
Cam chain tension adjuster cap bolt			23	2.3	
Cam chain tension adjuster mounting b	olt		10	1.0	
Cam chain tensioner bolt			10	1.0	
Cylinder head bolt	(1.4.0)	Step 1/Step 3	31	3.1	
	(M10)	Final step	60	)°	
	(M6)		10	1.0	
	Si	de face	14	1.4	
Water jacket plug			9.5	0.95	
Water inlet cover bolt			10	1.0	
Clutch cover bolt			10	1.0	
Clutch sleeve hub nut			150	15.0	
Clutch spring set bolt			10	1.0	
Starter clutch cover bolt			10	1.0	
Starter idle gear cover bolt			10	1.0	
Valve timing inspection plug			11	1.1	
Starter clutch bolt			54	5.4	
Generator cover bolt			10	1.0	
Generator rotor bolt			120	12.0	
Generator stator set bolt			10	1.0	
Gearshift cam stopper bolt			10	1.0	
Gearshift cam stopper plate bolt			13	1.3	
Oil pressure switch			14	1.4	
Crankcase bolt	(M6)	(Initial)	6	0.6	
	(1010)	(Final)	11	1.1	
	(M8)	(Initial)	15	1.5	
	(1010)	(Final)	26	2.6	
Crankshaft journal bolt	(M9)	(Initial)	18	1.8	
				)°	

ITEM		N⋅m	kgf-m
Oil gallery plug	(M10)	11	1.1
	(M16)	35	3.5
Oil drain plug		23	2.3
Piston cooling oil jet bolt		10	1.0
Oil pump mounting bolt		10	1.0
Conrod bearing cap bolt	(Initial)	15	1.5
	(Final)	90° (1/-	4 turn)
Bearing retainer screw		10	1.0
Crankcase breather cover bolt		10	1.0
Oil strainer bolt		10	1.0
Oil pan bolt		10	1.0
Oil cooler mounting bolt		10	1.0
Water by-pass union		12	1.2
Gearshift fork shaft retainer bolt		10	1.0
Starter motor mounting bolt		10	1.0

## FI SYSTEM AND INTAKE AIR SYSTEM

ITEM	N⋅m	kgf-m
CMP sensor bolt	11	1.1
IAT sensor	18	1.8
Fuel delivery pipe mounting screw	3.5	0.35
Fuel pump mounting bolt	10	1.0
TPS and STPS mounting screw	3.5	0.35

#### **COOLING SYSTEM**

ITEM	N⋅m	kgf-m
Impeller securing bolt	8	0.8
Water pump cover screw	5	0.5
Water pump mounting bolt	10	1.0
ECT sensor	18	1.8
Thermostat cover bolt	10	1.0
Cooling fan/horn mounting bolt	8	0.8
Thermostat air bleeding bolt	5.5	0.55

## **CHASSIS**

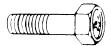
ITEM	N⋅m	kgf-m
Steering stem head nut	90	9.0
Steering stem lock-nut	80	8.0
Front fork upper clamp bolt	23	2.3
Front fork lower clamp bolt	23	2.3
Front fork cap bolt	23	2.3
Front fork cylinder bolt	30	3.0
Front axle	100	10.0
Front axle pinch bolt	23	2.3
Handlebar clamp bolt	23	2.3
Front brake master cylinder mounting bolt	10	1.0
Front brake caliper mounting bolt	25	2.5
Front brake caliper housing bolt	22	2.2
Front brake pad mounting pin	16	1.6
Brake hose union bolt	23	2.3
Clutch lever holder bolt	10	1.0
Air bleeder valve (Front and Rear)	7.5	0.75
Brake disc bolt (Front and Rear)	23	2.3
Rear brake caliper mounting bolt	18	1.8
Rear brake caliper sliding pin	33	3.3
Rear brake pad mounting pin	16	1.6
Rear brake master cylinder mounting bolt	10	1.0
Rear brake master cylinder rod locknut	18	1.8
Front footrest bracket mounting bolt	23	2.3
Swingarm pivot shaft	15	1.5
Swingarm pivot nut	100	10.0
Swingarm pivot locknut	90	9.0
Cushion lever mounting nut	132	13.2
Cushion rod nut	78	7.8
Rear shock absorber mounting nut (Upper and Lower)	50	5.0
Rear axle nut	100	10.0
Rear sprocket nut	60	6.0
Side-stand mounting bracket bolt	50	5.0

## **TIGHTENING TORQUE CHART**

For other nuts and bolts not listed in the preceding page, refer to this chart:

Bolt Diameter	Conventional or	onventional or "4" marked bolt		ked bolt
<b>(mm)</b>	N⋅m	kgf-m	N⋅m	kgf-m
4	1.5	0.15	2.3	0.23
5	3	0.3	4.5	0.45
6	5.5	0.55	10	1.0
8	13	1.3	23	2.3
10	29	2.9	50	5.0
12	45	4.5	85	8.5
14	65	6.5	135	13.5
16	105	10.5	210	21.0
18	160	16.0	240	24.0







Conventional bolt

"4" marked bolt

"7" marked bolt

# **SERVICE DATA VALVE + VALVE GUIDE**

Unit: mm

ITEM		STANDARD	LIMIT
Valve diam.	IN.	27.2	
	EX.	22.0	
Tappet clearance (when cold)	IN.	0.10 - 0.20	
	EX.	0.20 - 0.30	
Valve guide to valve stem	IN.	0.010 - 0.037	
clearance	EX.	0.030 - 0.057	
Valve guide I.D.	IN. & EX.	4.000 - 4.012	
Valve stem O.D.	IN.	3.975 – 3.990	
	EX.	3.955 – 3.970	
Valve stem deflection	IN. & EX.		0.35
Valve stem runout	IN. & EX.	<del></del>	0.05
Valve head thickness	IN. & EX.		0.5
Valve seat width	IN. & EX.	0.9 – 1.1	
Valve head radial runout	IN. & EX.		0.03
Valve spring free length	IN.	<del></del>	36.2
	EX.		36.0
Valve spring tension	IN.	155 – 179 N (15.8 – 18.3 kgf)	
	IIN.	at length 32.55 mm	
	EX.	146 – 168 N (14.9 – 17.1 kgf)	
	LA.	at length 32.55 mm	

#### **CAMSHAFT + CYLINDER HEAD**

Unit: mm

ITEM		STANDARD		
Cam height	IN.	35.78 – 35.83	35.48	
	EX.	34.98 – 35.03	34.68	
Camshaft journal oil clearance	IN. & EX.	0.032 - 0.066	0.150	
Camshaft journal holder I.D.	IN. & EX.	24.012 – 24.025		
Camshaft journal O.D.	IN. & EX.	23.959 – 23.980	_	
Camshaft runout			0.10	
Cam chain pin (at arrow "3")	12th pin		_	
Cylinder head distortion			0.20	

Unit: mm

ITEM			STANDARD	LIMIT
Compression pressure			900 kPa	
			(9 kgf/cm <sup>2</sup> )	
Compression pressure				200 kPa
difference			<del></del>	(2 kgf/cm <sup>2</sup> )
Piston to cylinder clearance			0.030 - 0.040	0.120
Cylinder bore			67.000 67.015	Nicks or
			67.000 – 67.015	Scratches
Piston diam.			66.965 – 66.980	66 945
		Mea	sure at 15 mm from the skirt end.	66.845
Cylinder distortion			<del></del>	0.02
Piston ring free end gap	1st	Т	Approx. 5.5	4.4
	2nd	Т	Approx. 8.5	6.8
Piston ring end gap	1st	Т	0.06 – 0.21	0.50
	2nd	T	0.06 – 0.21	0.50
Piston ring to groove clearance	1:	st		0.180
	2r	2nd —		0.150
Piston ring groove width	1:	st	1.01 – 1.03	_
	2r	nd	0.81 - 0.83	_
	С	il	1.51 – 1.53	_
Piston ring thickness	1:	st	0.97 - 0.99	_
	2r	nd	0.77 - 0.79	_
Piston pin bore I.D.			14.002 – 14.008	14.030
Piston pin O.D.			13.995 – 14.000	13.980

## **CONROD + CRANKSHAFT**

Unit: mm

ITEM		STANDARD	LIMIT
Conrod small end I.D.		14.010 – 14.018	14.040
Conrod big end side clearance		0.10 – 0.20	0.30
Conrod big end width		19.95 – 20.00	
Crank pin width		20.10 – 20.15	
Conrod big end oil clearance		0.032 - 0.056	0.080
Crank pin O.D.		30.976 – 31.000	
Crankshaft journal oil clearance		0.080	
Crankshaft journal O.D.		29.976 - 30.000	
Crankshaft thrust bearing	RH	2.425 – 2.450	
thickness	LH	2.350 – 2.500	
Crankshaft thrust clearance			
Crankshaft runout		_	0.05

Unit: mm Except ratio

#### **OIL PUMP**

ITEM	STANDARD	LIMIT
Oil pressure (at 60 °C)	200 – 500 kPa	
	(2.0 – 5.0 kgf/cm²)	_
	at 3 000 r/min	

CLUTCH Unit: mm

ITEM		STANDARD	
Clutch lever play		10 – 15	
Clutch release screw		1/4 turn out	
Drive plate thickness	No. 1, 2 and 3	2.92 – 3.08	2.62
Drive plate claw width	No. 1, 2 and 3	13.70 – 13.80	12.90
Driven plate distortion			
Clutch spring free length		55.11	52.4

#### TRANSMISSION + DRIVE CHAIN

ITEM LIMIT **STANDARD** Primary reduction ratio 1.926 (79/41) Final reduction ratio 3.000 (48/16) Gear ratios Low 2.785 (39/14) 2.000 (32/16) 2nd 1.600 (32/20) 3rd 4th 1.363 (30/22) 5th 1.208 (29/24) Top 1.086 (25/23) Shift fork-to-groove clearance 0.10 - 0.300.50 Shift fork groove width 5.0 - 5.1Shift fork thickness 4.8 - 4.9Drive chain Type RK525SMOZ7Y Links 114 links 20-pitch 336.5 length Drive chain slack (on side-stand) 20 - 30Gearshift lever height 35 - 45

#### THERMOSTAT + RADIATOR + FAN + COOLANT

ITEM	S	TANDARD/SPECIFICATION	NOTE
Thermostat valve opening temperature	Approx. 82 °C		-
Thermostat valve lift		8 mm and over at 95 °C	
ECT sensor 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	_
Radiator cap valve opening		93 – 123 kPa	
pressure		(0.93 - 1.23 kgf/cm²)	_
Cooling fan operating temperature	OFF→ON	Approx. 105 °C	
	ON→OFF	Approx. 100 °C	
Engine coolant type	Use an anti	Use an antifreeze/coolant compatible with alumi-	
	num radiator, mixed with distilled water only, at the		
	ratio of 50:5		
Engine coolant		Approx. 2 800 ml	_

#### INJECTOR + FUEL PUMP + FUEL PRESSURE REGULATOR

ITEM	SPECIFICATION	NOTE
Injector resistance	Approx. 12 Ω at 20 °C	
Fuel discharge amount	168 ml and more/10 sec.	
Fuel pressure regulator operating set pressure	Approx. 300 kPa (3.0 kgf/cm²)	

# FI SENSORS+ SECONDARY THROTTLE VALVE ACTUATOR

ITEM		NOTE	
CMP sensor resistance			
CMP sensor peak voltage		When cranking	
CKP sensor resistance		142 $-$ 194 $Ω$	
CKP sensor peak voltage		0.5 V and more	When cranking
IAP sensor input voltage		4.5 – 5.5 V	
IAP sensor output voltage		Approx. 2.7 V at idle speed	
TP sensor input voltage		4.5 – 5.5 V	
TP sensor resistance	Closed	Approx. 1.1 kΩ	
	Opened	Approx. 4.4 kΩ	
TP sensor output voltage	Closed	Approx. 1.1 V	
	Opened	Approx. 4.4 V	
ECT sensor input voltage		4.5 – 5.5 V	
ECT sensor resistance		Approx. 2.45 kΩ at 20 °C	
IAT sensor input voltage		4.5 – 5.5 V	
IAT sensor resistance			
AP sensor input voltage			
AP sensor output voltage	Appro		
TO sensor resistance	16.5 – 22.3 kΩ		
TO sensor voltage	Normal 0.4 – 1.4 V		
	Leaning	3.7 – 4.4 V	When leaning 65°
GP switch voltage		0.6 V and more	From 1st to Top
Injector voltage		Battery voltage	
Ignition coil primary peak voltage		85 V and more	When cranking
STP sensor input voltage		4.5 – 5.5 V	
STP sensor resistance	Closed	Approx. 0.6 kΩ	
	Opened Approx. 4.5 k $\Omega$		
STP sensor output voltage	Closed Approx. 0.6 V		
	Opened	Approx. 4.5 V	
STV actuator resistance	Approx. 7 Ω		
PAIR control solenoid valve resistance	18 – 22 Ω (at 20 °C – 30 °C)		
HO2 sensor output voltage		0.4 V and less at idle speed	
	C		
HO2 sonsor resistance	4 – 5 Ω at 23 °C		

## **THROTTLE BODY**

ITEM	SPECIFICATION
Bore size	38 mm
I.D. No.	44G0
Idle r/min.	1 300 ± 100 r/min.
Fast idle r/min.	1 500 – 2 000 r/min. When cold engine
Throttle cable play	2.0 – 4.0 mm

FI FCTRICAL

ITEM SPECIFICATION NOTE						
ITEM				NOTE		
Firing order						
Spark plug			Туре	NGK: CR9E DENSO: U27ESR-N		
			Gap	0.7 – 0.8		
Spark performance			Over 8 at 1 atm.			
CKP sensor resista	nce			142 – 194 Ω		
CKP sensor peak v	oltage			0.5 V and more		
Ignition coil resistar	nce		Primary	1.3 – 1.9 Ω	Terminal – Terminal	
			Secondary	10.8 – 16.2 kΩ	Plug cap – Terminal	
Ignition coil primary	peak voltag	je		85 V and more		
Generator coil resis	stance					
Generator no-load (When engine is co		)	65 V and more at 5 000 r/min.			
Starter motor brush	length			6.5		
Regulated voltage (put)	(charging ou	t-		14.0 – 15.5 V at 5 000 r/min.		
Starter relay resista	ance		3 – 6 Ω			
GP switch voltage			0.6 V and	more (From 1st to top without neutral)		
Battery	Type desig	ına-		FTX9-BS		
	Capacity	y		12 V 28.8 kC (8 Ah)/10 HR		
Fuse size	l la a dliadat	НІ	10 A			
	Headlight	LO	10 A 15 A			
	Ignition					
	Signal		10 A			
	Fuel			10 A		
	Fan			15 A		
	Main					

**WATTAGE** Unit: W

ITEM		STANDARD/SPECIFICATION	
Headlight	HI	60	
	LO	55	
Position light		5 × 2	
Brake light/Taillight		LED	
Turn signal light		10 × 4	
License plate light		5	
Speedometer light		LED	
Tachometer light		LED	
Neutral indicator light		LED	
High beam indicator light		LED	
Turn signal indicator light		LED	
Oil pressure/		LED	
Engine coolant temp. warning indicator light		LED	
FI warning indicator light		LED	
Immobilizer indicator light		LED	

#### **BRAKE + WHEEL**

Unit: mm

DRAKE + WIICEL					
ITEM		STANDARD			
Rear brake pedal height		45 – 55			
Brake disc thickness	Front	4.8 – 5.2	4.5		
	Rear	4.8 – 5.2	4.5		
Brake disc runout			0.30		
Master cylinder bore	Front	15.870 – 15.913			
	Rear	14.000 – 14.043			
Master cylinder piston diam	Front	15.827 – 15.854			
	Rear	13.957 – 13.984			
Brake caliper cylinder bore	Front	30.230 - 30.306 / 33.960 - 34.036	_		
	Rear	38.180 – 38.256			
Brake caliper piston diam	Front	30.150 - 30.200 / 33.884 - 33.934			
	Rear	38.098 - 38.148	_		
Brake fluid type		DOT 4			
Wheel rim runout	Axial		2.0		
	Radial		2.0		
Wheel rim size	Front	17 M/C × MT 3.50	_		
	Rear	17 M/C × MT 5.50			
Wheel axle runout	Front		0.25		
	Rear		0.25		

## **TIRE**

ITEM		STANDARD		
Cold inflation tire pressure	Front	250 kPa		
(Solo riding)	FIORE	(2.50 kgf/cm <sup>2</sup> )		
	Door	250 kPa		
	Rear	(2.50 kgf/cm <sup>2</sup> )		
Cold inflation tire pressure	Front	250 kPa		
(Dual riding)	Front	(2.50 kgf/cm <sup>2</sup> )		
	Поот	290 kPa		
	Rear	(2.90 kgf/cm <sup>2</sup> )		
Tire size	Front	120/70 ZR17 M/C (58 W)		
	Rear	180/55 ZR17 M/C (73 W)		
Tire type	Front	BRIDGESTONE: BT014F SN		
	Rear	BRIDGESTONE: BT014R N		
Tire tread depth	Front		1.6	
(Recommended depth)	Rear		2.0	

SUSPENSION Unit: mm

ITEM	STANDARD	LIMIT
Front fork stroke	130	
Front fork spring free length	334.6	327
Front fork oil level (without spring,	114	
outer tube fully compressed)	114	
Front fork oil type	SUZUKI FORK OIL G-10 or an equivalent fork oil	
Front fork oil capacity (each leg)	508 ml	_
Front fork inner tube outside diam.	43	
Front fork spring adjuster	5th groove from top	_
Rear shock absorber spring	201.4	
pre-set length	201.4	
Rear shock absorber spring	4th/7 positions	
adjuster	411/7 positions	
Rear shock absorber damping	1 turn out from stiffest position	
force adjuster	i tuiti out iroiti stillest position	
Rear wheel travel	134	
Swingarm pivot shaft runout		0.3

# **FUEL + OIL**

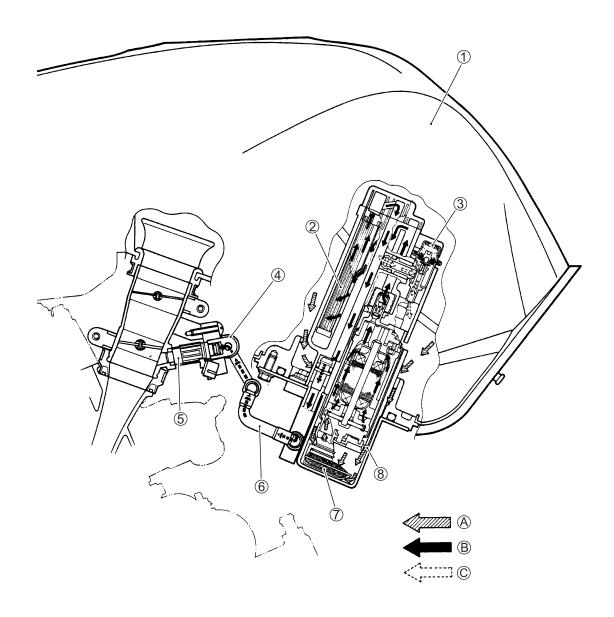
ITEM		SPECIFICATION		
Fuel type	Gasoline us	sed should be graded 91 octane or		
	higher. An ι	nigher. An unleaded gasoline is recommended.		
Fuel tank capacity		16.5 L		
Engine oil type	SAE 10W-	SAE 10W-40, API SF/SG or SH/SJ with JASO MA		
Engine oil capacity	Change	3.2 L		
	Filter	261		
	change	3.6 L		
	Overhaul	3.9 L		

# **EMISSION CONTROL INFORMATION**

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## **EMISSION CONTROL SYSTEMS FUEL INJECTION SYSTEM**

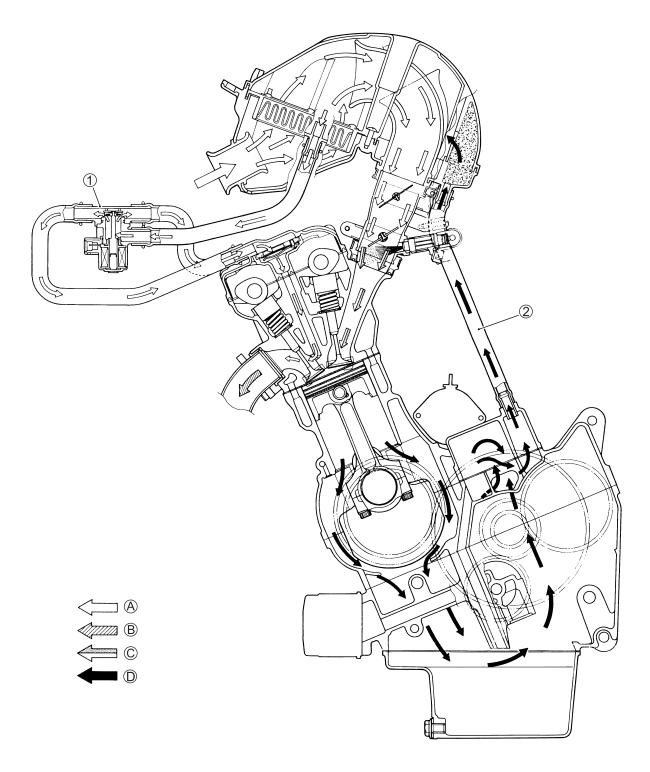
GSR600 motocycles are equipped with a fuel injection system for emission level control. This fuel injection system is precision designed, manufactured and ajusted to comply with the applicable emission limits. With a view to reducing CO, NOX and HC, all of the fuel injection volumes are stringently controlled with the programmed injection maps in the ECM by varying engine conditions. Adjusting, interfering with, improper replacement, or resetting of any of the fuel injection components may adversely affect injection performance and cause the motorcycle to exceed the exhaust emission level limits. if unable to effect repairs, contact the distributor's representative for further technical informaiton and assistance.



1	Fuel tank	7	Fuel mesh filter (For low pressure)
2	Fuel filter (For high pressure)	8	Fuel pump
3	Fuel pressure regulator	A	Before-pressurized fuel
4	Fuel delivery pipe	$^{\circ}$	Pressurized fuel
<b>⑤</b>	Fuel injector	©	Relieved fuel
6	Fuel feed hose		

#### **CRANKCASE EMISSION CONTROL SYSTEM**

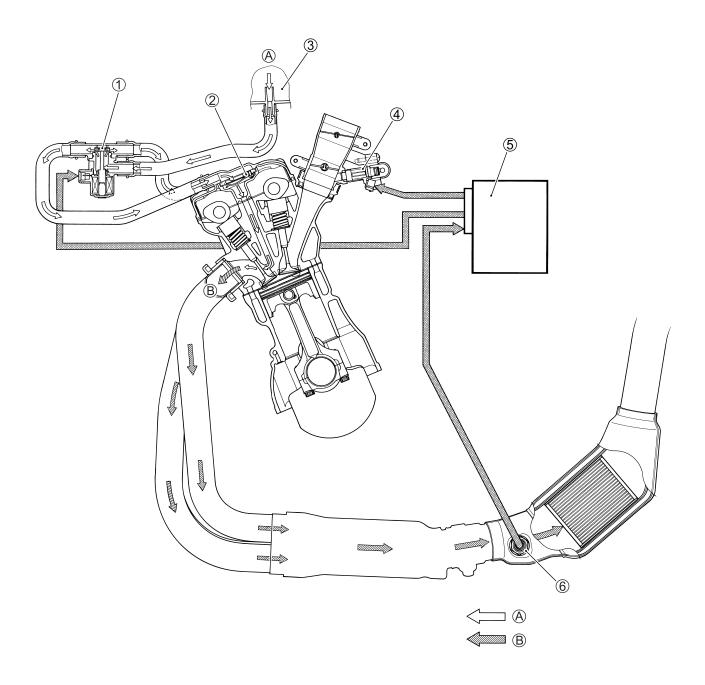
The engine is equipped with a PCV system. Blow-by gas in the engine is constantly drawn into the crankcase, which is returned to the combustion chamber through the PCV (breather) hose, air cleaner and throttle body.



1	PAIR control solenoid valve	$^{\circ}$	EXHAUST GAS
2	PCV hose	©	FUEL/AIR MIXTURE
A	FRESH AIR	<b>(D)</b>	BLOW-BY GAS

#### **EXHAUST EMISSION CONTROL SYSTEM (PAIR SYSTEM)**

The exhaust emission control system is composed of the PAIR system and THREE-WAY CATALYST system. The fresh air is drawn into the exhaust port with the PAIR control solenoid valve and PAIR reed valve. The PAIR control solenoid valve is operated by the ECM, and the fresh air flow is controlled according to the TPS, ECTS, IATS, IAPS and CKPS.



1	PAIR control solenoid valve	<b>⑤</b>	ECM
2	PAIR reed valve	6	HO2 sensor
3	Air cleaner box	A	FRESH AIR
4	Fuel injector	$^{\textcircled{B}}$	EXHAUST GAS

#### NOISE EMISSION CONTROL SYSTEM

TAMPERING WITH THE NOISE CONTROL SYSTEM PROHIBITED: Local law or federal law prohibits the following acts or the causing thereof:

- 1. The removal or rendering inoperative by any person, other than for purposes of maintenance, repair or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or
- 2. The use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

#### AMONG THOSE ACTS PRESUMED TO CONSTITUTE TAMPERING ARE THE ACTS LISTED BELOW:

- · Removing or puncturing the muffler, baffles, header pipes, screen type spark arrester (if equipped) or any other component which conducts exhaust gases.
- · Removing or puncturing the air cleaner case, air cleaner cover, baffles or any other component which conducts intake air.
- · Replacing the exhaust system or muffler with a system or muffler not marked with the same model specific code as the code listed on the Motorcycle Noise Emission Control Information label.

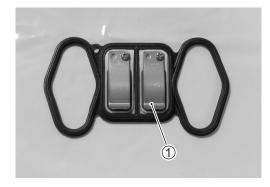
# PAIR (AIR SUPPLY) SYSTEM AND EMISSION CONTROL SYSTEM **INSPECTION**

#### **PAIR HOSES**

- Inspect the PAIR hoses for wear or damage.
- Inspect the PAIR hoses is securely connected.

#### PAIR REED VALVE

- Remove the cylinder head cover. ( 2-7)
- Remove the PAIR reed valve 1 with the gasket.



- 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.



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



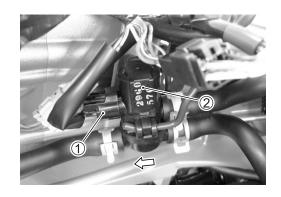
#### **PCV HOSE**

- 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.



#### PAIR CONTROL SOLENOID VALVE

- Remove the air cleaner box. ( 5-13)
- Disconnect the PAIR control solenoid valve lead wire coupler 1 and PAIR hoses.
- Remove the PAIR control solenoid valve 2.

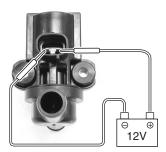


- Check that air flows through the air inlet port to the air outlet port.
- If air does not flow out, replace the PAIR control solenoid valve with a new one.

A Air flow



- Connect the 12 V battery to the PAIR control solenoid valve terminals and check the air flow.
- If air does not flow out, the solenoid valve is in normal condition.



• Check the resistance between the terminals of the PAIR control solenoid valve.

PATA Resistance:  $18 - 22 \Omega$  (at 20 °C - 30 °C)

09900-25008: Multi-circuit tester set

 $\square$  Tester knob indication: Resistance ( $\Omega$ )

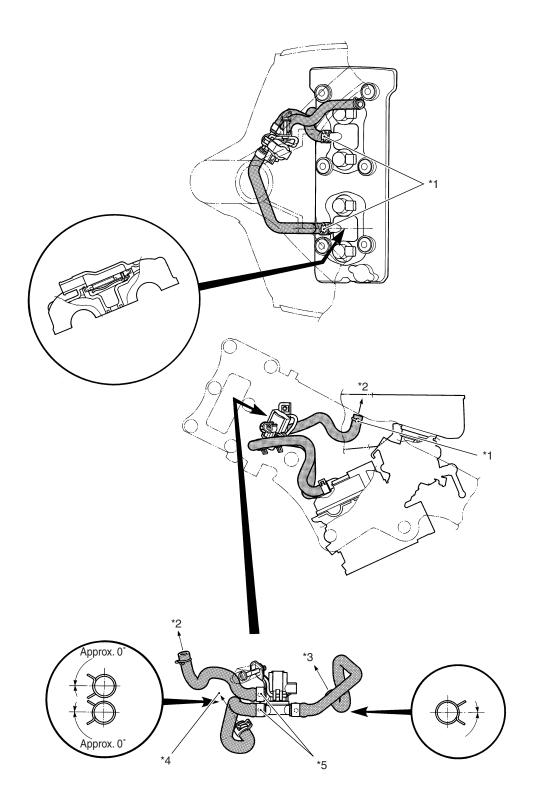


If the resistance is not within the standard range, replace the PAIR control solenoid valve with a new one.

Installation is in the reverse order of removal.

· Connect the PAIR control solenoid valve lead wire coupler and PAIR hoses securely.

# PAIR (AIR SUPPLY) SYSTEM HOSE ROUTING

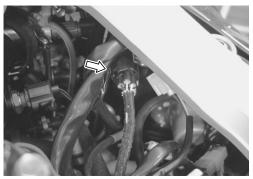


*1	White marking	*4	To head cover right side.
*2	To air cleaner	*5	Yellow marking.
*3	To head cover left side		

# **HEATED OXGEN SENSOR (HO2S) INSPECTION**

The HO2 sensor coupler is located behind the left frame.

• Inspect the HO2 sensor and its circuit referring to flow table of the malfunction code C44 (P0130/P0135).



 Check the resistance between the terminals of the HO2 sensor.

PATA Resistance:  $4.0 - 5.0 \Omega$  at 23 °C (W - W)

09900-25008: Multi-circuit tester set Tester knob indication: Resistance ( $\Omega$ )

If the resistance is not within the standard range, replace the HO2 sensor with a new one.

#### NOTE:

- \* Temperature of the sensor affects resistance value largely.
- \* Make sure that the sensor heater is at correct temperature.

#### **▲** WARNING

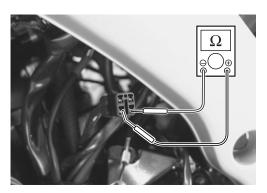
Do not remove the HO2 sensor while it is hot.

#### CAUTION

Be careful not to expose it to excessive shock.

Do not use an impact wrench while removing or installing the HO2 sensor unit.

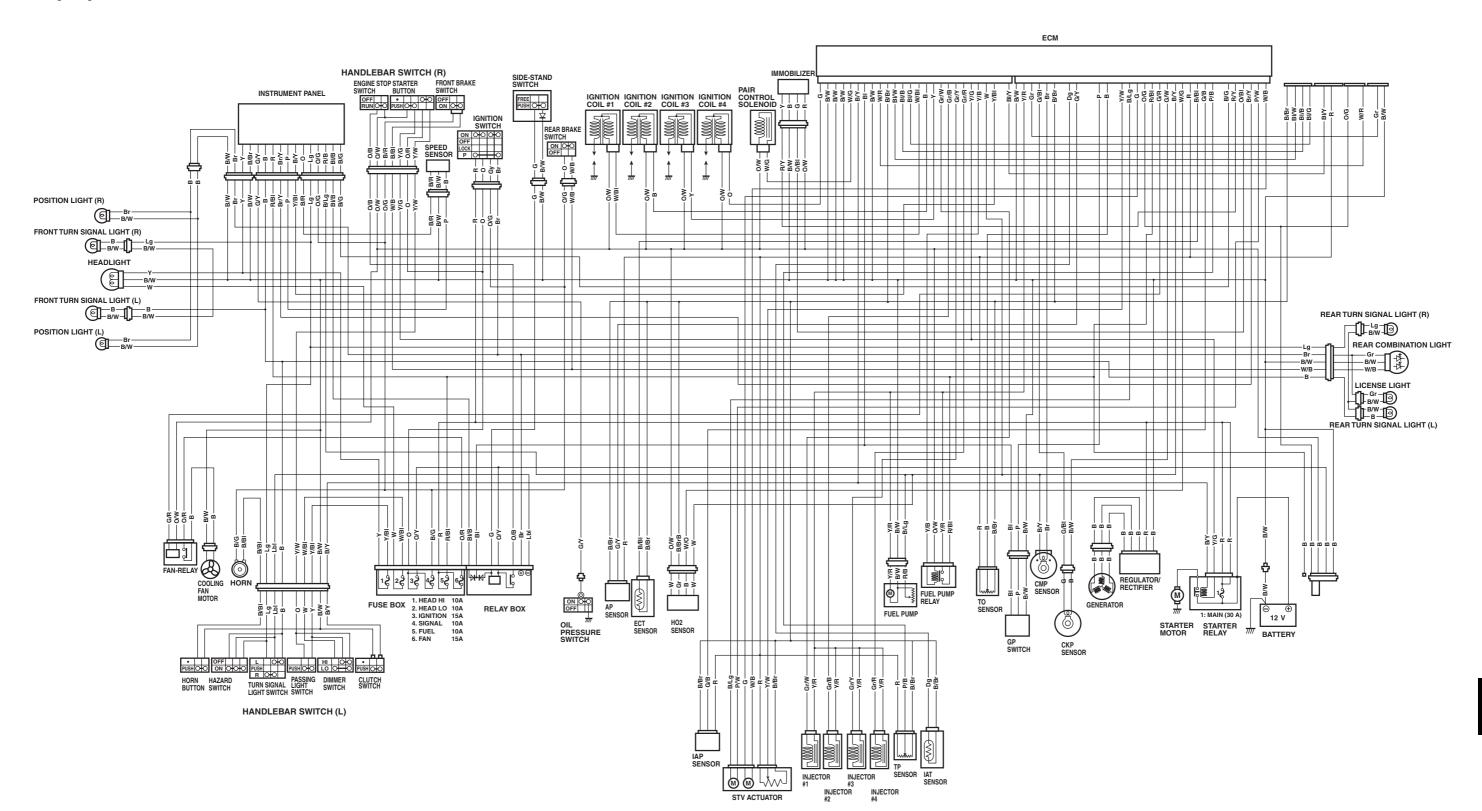
Be careful not to twist or damage the sensor lead wire.



## **WIRING DIAGRAM**

#### E-02, 19, 24

Wiring diagrams wire color, refer to section "WIRE COLOR".



## Prepared by

#### **SUZUKI MOTOR CORPORATION**

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