# SUZUKI

# GSX-R750

SERVICE MANUAL



#### **FOREWORD**

This manual contains an introductory description on the SUZUKI GSX-R750 and procedures for its inspection/service and overhaul of its main components.

Other information considered as generally known is not included.

Read the GENERAL INFORMATION section to familiarize yourself with the motorcycle and its maintenance. Use this section as well as other sections to use as a guide for proper inspection and service. This manual will help you know the motorcycle better so that you can assure your customers of fast and reliable service.

- \* This manual has been prepared on the basis of the latest specifications at the time of publication. If modifications have been made since then, differences may exist between the content of this manual and the actual motorcycle.
- \* Illustrations in this manual are used to show the basic principles of operation and work procedures. They may not represent the actual motorcycle exactly in detail.
- \* This manual is written for persons who have enough knowledge, skills and tools, including special tools, for servicing SUZUKI motorcycles. If you do not have the proper knowledge and tools, ask your authorized SUZUKI motorcycle dealer to help you.

#### **▲** WARNING

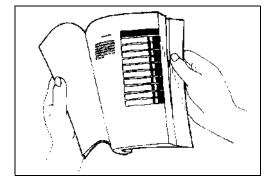
Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual.

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

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

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



#### COMPONENT PARTS AND WORK TO BE DONE

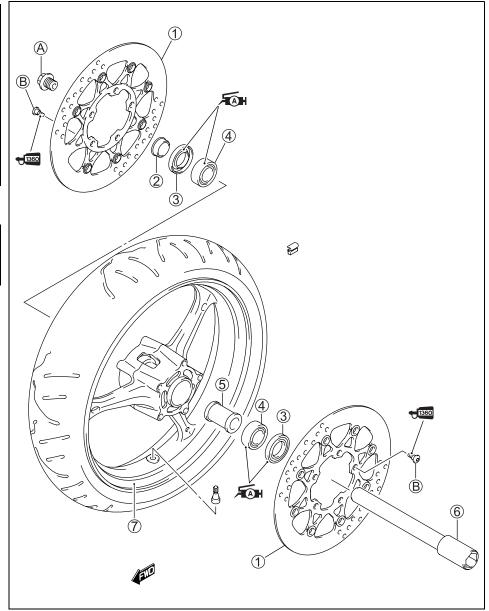
Under the name of each system or unit, is its exploded view. Work instructions and other service information such as the tightening torque, lubricating points and locking agent points, are provided.

Example: Front wheel

1	Brake disc
2	Collar
3	Dust seal
4	Bearing
<b>⑤</b>	Spacer
6	Front axle
7	Front wheel
A	Front axle bolt
$^{\circ}$	Brake disc bolt



ITEM	N⋅m	kgf-m	lb-ft
A	100	10.0	72.5
(B)	23	2.3	16.5



# **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 (Except USA)
M/O	Apply molybdenum oil solution. (Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1:1)	FORK	Use fork oil. 99000-99001-SS5
FAH	Apply SUZUKI SUPER GREASE "A" or equivalent grease. 99000-25010	BF	Apply or use brake fluid.
FSH	Apply SUZUKI SILICONE GREASE. 99000-25100	V	Measure in voltage range.
₹® H	Apply SUZUKI MOLY PASTE. 99000-25140	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	(-))) (-)))	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

Α

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)

EVAP : Evaporative Emission EVAP Canister : Evaporative Emission

Canister (Canister)

EXC System : Exhaust Control System (EXCS)
EXC Valve : Exhaust Control Valve (EXCV)
EXCV Actuator : Exhaust Control Valve Actuator

(EXCVA)

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

1

IAP Sensor : Intake Air Pressure Sensor (IAPS)

(MAP Sensor)

IAT Sensor : Intake Air Temperature Sensor

(IATS)

IG : Ignition

П

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

Ρ

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

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

Dgr : Dark gray O : Orange

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

Y/BI

Y/R

: Yellow with Blue tracer

: Yellow with Red tracer

Y/B

Y/G

Y/W

: Yellow with Black tracer

: Yellow with Green tracer

: Yellow with White tracer

# GENERAL INFORMATION

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# **COUNTRY AND AREA CODES**

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

CODE	COUNTRY or AREA	EFFECTIVE FRAME NO.
E-02	U.K.	JS1CF111100100001 -
E-19 (GSX-R750)	E.U.	JS1CF111100100001 -
E-19 (GSX-R750U2)	E.U.	JS1CF211100100001 -
E-24	Australia	JS1CF121300100001 -
E-03	U.S.A. (Except for California)	JS1GR7KA 62100001 –
E-28	Canada	JS1GR7KA 62100001 –
E-33	California (U.S.A.)	JS1GR7KA 62100001 –

#### 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

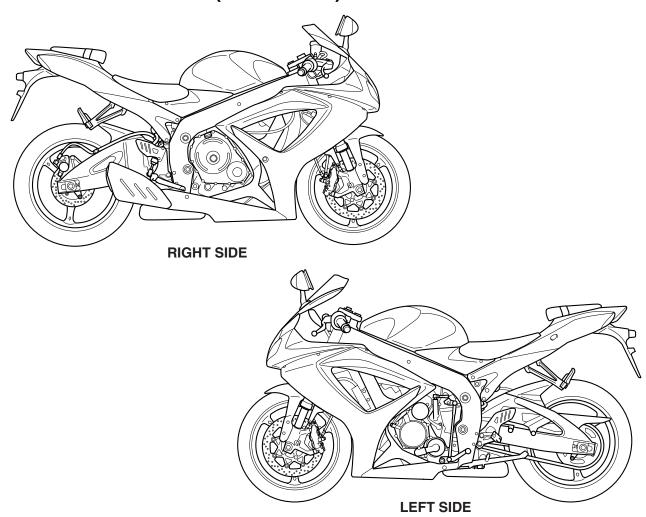
- \* Proper service and repair procedures are important for the safety of the service mechanic and the safety and reliability of the motorcycle.
- \* When 2 or more persons work together, pay attention to the safety of each other.
- \* When it is necessary to run the engine indoors, make sure that exhaust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

After servicing the fuel, oil, water, exhaust or brake systems, check all lines and fittings related to the system for leaks.

#### CAUTION

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

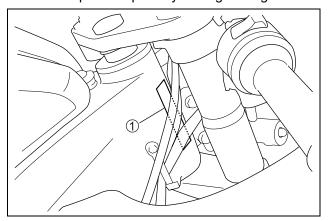
# SUZUKI GSX-R750K6 ('06-MODEL)

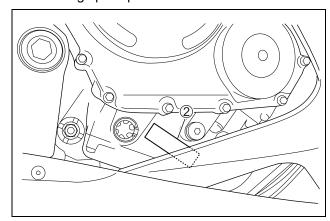


• Difference between illustrations and actual motorcycle may exist depending on the markets.

# **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 right side of the crankcase. These numbers are required especially for registering the machine and ordering spare parts.





# FUEL, OIL AND ENGINE COOLANT RECOMMENDATION FUEL (FOR USA AND CANADA)

Use only unleaded gasoline of at least 90 pump octane (R/2 + M/2).

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

#### **FUEL (FOR OTHER COUNTRIES)**

Gasoline used should be graded 95 octane (Research Method) or higher. Unleaded gasoline is recommended.

## **ENGINE OIL (FOR USA)**

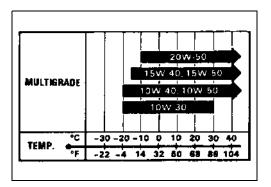
Oil quality is a major contributor to your engine's performance and life. Always select good quality engine oil. Suzuki recommends the use of SUZUKI PERFORMANCE 4 MOTOR OIL or equivalent engine oil. Use of SF/SG or SH/SJ in API with MA in JASO.

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

## **ENGINE OIL (FOR OTHER COUNTRIES)**

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

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



#### 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 SS-05 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 performs as a corrosion and rust inhibitor as well as anti-freeze. Therefore, the engine coolant should be used at all times even though the atmospheric temperature in your area does not go down to freezing point.

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

#### LIQUID AMOUNT OF WATER/ENGINE COOLANT

Solution capacity (total): Approx. 2 700 ml (2.9/2.4 US/Imp qt)

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

#### **CAUTION**

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

#### **BREAK-IN PROCEDURES**

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

Keep to these break-in engine speed limits:

Initial 800 km ( 500 miles): Below 7 500 r/min Up to 1 600 km (1 000 miles): Below 11 000 r/min Over to 1 600 km (1 000 miles): Below 15 000 r/min

• Upon reaching an odometer reading of 1 600 km (1 000 miles) you can subject the motorcycle to full throttle operation.

However, do not exceed 15 000 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.)



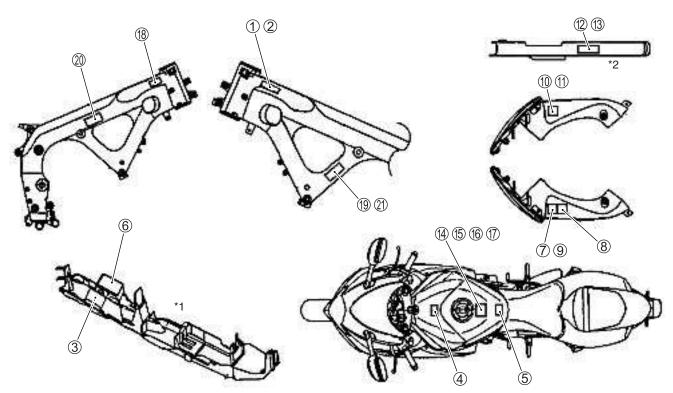
# **INFORMATION LABELS**

	GSX-R750	GSX-R750UF
① Noise label	A (For E-03, 24, 33)	
② Information label	A (For E-03, 28, 33)	
③ Vacuum hose routing label	A (For E-33)	
4 Fuel caution label	A (For E-02, 24)	
⑤ Fuel information label	A	Α
6 Manual notice label	A (For E-03, 33)	
⑦ Screen label	A (Except E-19)	
® Screen label	A (For E-28)	Α
Screen label	A (For E-19)	
10 Warning steering label	A (For E-03, 33)	
1 Warning steering label	A (Except E-03, 33)	Α
12 Tire information label	A (For E-03, 33)	
③ Tire information label	A (Except E-03, 33)	Α
(4) General warning label	A (Except E-19, 28)	
(5) General warning label		Α
16 General warning label	A (For E-28)	
General warning label	A (For E-19)	
® ICES Canada label	A (For E-28)	
19 I.D. plate	A (For E-02, 19, 24)	Α
② E-19 I.D. label		Α
② Safety plate	A (For E-03, 28, 33)	

#### A: Attached

\*1: Rear fender (front)

\*2: Chain case



# **SPECIFICATIONS DIMENSIONS AND DRY MASS**

Overall length	2 040 mm (80.3 in)
Overall width	715 mm (28.1 in)
Overall height	1 125 mm (44.3 in)
Wheelbase	1 400 mm (55.1 in)
Ground clearance	130 mm (5.1 in)
Seat height	810 mm (31.9 in)
Dry mass	164 kg (361 lbs)E-33
	163 kg (359 lbs)Others

## **ENGINE**

Type	Four stroke, liquid-cooled, DOHC
Number of cylinders	4
Bore	70.0 mm (2.756 in)
Stroke	48.7 mm (1.917 in)
Displacement	750 cm <sup>3</sup> (45.8 cu. in)
Compression ratio	12.5 : 1
Fuel system	Fuel injection
Air cleaner	Paper element
Starter system	Electric
Lubrication system	Wet sump
Idle speed	1 200 ± 100 r/min
·	•

# **DRIVE TRAIN**

Clutch	Wet multi-plate type
Transmission	6-speed constant mesh
Gearshift pattern	1-down, 5-up
Primary reduction ratio	1.761 (74/42)
Gear ratios, Low	2.785 (39/14)
2nd	2.052 (39/19)
3rd	1.714 (36/21)
4th	1.500 (36/24)
5th	1.347 (31/23)
Тор	1.208 (29/24)
Final reduction ratio	2.647 (45/17)
Drive chain	RK525ROZ5Y, 116 links

CHASSIS	
Front suspension	Inverted telescopic, coil spring, oil damped
Rear suspension	Link type, coil spring, oil damped
Front fork stroke	120 mm (4.7 in)
Rear wheel travel	130 mm (5.1 in)
Steering angle	27°
Caster	23° 45'
Trail	97 mm (3.8 in)
Turning radius	3.4 m (11.2 ft)
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	8° B.T.D.C.at 1 200 r/min
Spark plug	NGK CR9E or DENSO U27ESR-N
Battery	12 V 36.0 kC (10 Ah)/10 HR
Generator	Three-phase A.C. generator
Main fuse	30 A
Fuse	10/10/15/15/10/10 A
Headlight	12 V 55 W (H7) + 12 V 65 W (H9)
Turn signal light	12 V 21 W
License plate light	12 V 5 W
Brake light/Taillight	LED
Position light	12 V 5 W × 2
Speedometer light	LED
Tachometer light	LED
Neutral indicator light	LED
High beam indicator light	LED
Turn signal indicator light	LED
Fuel level indicator light	LED
Oil pressure/Coolant temperature/FI warning light	LED
Engine RPM indicator light	LED
Immobilizer indicator light	LEDE-02, 19, 24
CAPACITIES	
Fuel tank, including reserve	15.5 L (4.1/3.4 US/Imp gal)E-33
	16.5 L (4.4/3.6 US/Imp gal)Others
Engine oil, oil change	2 200 ml (2.3/1.9 US/Imp qt)
with filter change	2 500 ml (2.6/2.2 US/Imp qt)
overhaul	2 900 ml (3.1/2.6 US/Imp qt)
Coolant	2.7 L (2.9/2.4 US/Imp qt)

These specifications are subject to change without notice.

# PERIODIC MAINTENANCE

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# PERIODIC MAINTENANCE SCHEDULE

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

IMPORTANT (For E-28): The periodic maintenance intervals and service requirements have been established in accordance with EPA regulations. Following these instructions will ensure that the motorcycle will not exceed emission standards and it will also ensure the reliability and performance of the motorcycle.

#### NOTE:

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

#### PERIODIC MAINTENANCE CHART

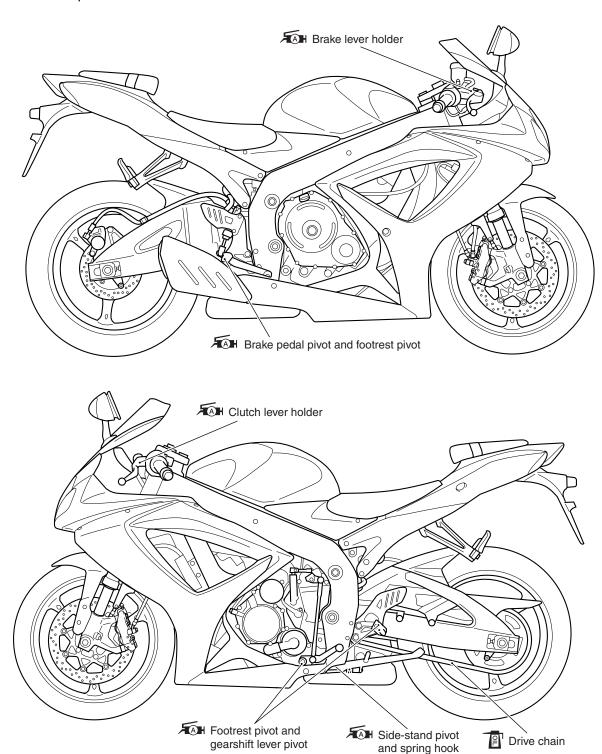
Interval	miles	600	4 000	7 500	11 000	14 500
	km	1 000	6 000	12 000	18 000	24 000
Item	months	2	12	24	36	48
Air cleaner element			l		R	I
Spark plugs			I	R	I	R
Valve clearance			_		_	I
Exhaust control valve		I	_	l	_	I
Engine oil		R	R	R	R	R
Engine oil filter		R	_		R	
Fuel line			1	l	I	I
Idle speed		I	1		I	I
Throttle valve synchronization		I (E-33 only)	_	I	_	I
Evaporative emission control system			_	ı	_	1
(E-33 only)				•		
PAIR (air supply) system			_	ļ	_	l
Throttle cable play		l	l		I	l
Clutch cable play			[		l	I
Radiator hoses		-	1	ļ	l	l
Engine coolant		Replace every 2 years.				
Drive chain						l
		Clean and lubricate every 1 000 km (600 miles).				
Brakes		l	[		l	1
Brake hoses			<u> </u>		l	l
		Replace every 4 years.				
Brake fluid			I	l	I	l
		Replace every 2 years.				
Tires			I	l	I	l
Steering		l		l	_	l
Front forks			_	l	_	l
Rear suspension			_	l	_	l
Exhaust pipe bolts and muffler bolt and 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.



#### 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.

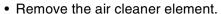
# **MAINTENANCE AND TUNE-UP PROCEDURES**

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

#### **AIR CLEANER**

Inspect every 6 000 km (4 000 miles, 12 months). Replace every 18 000 km (11 000 miles, 36 months).

- Remove the front seat. ( 8-7)
- Lift and support the fuel tank. ( 5-3)
- Remove the air cleaner element by removing the screws.



· 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.



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 from the air cleaner box to allow any water to drain out.







#### SPARK PLUG

Inspect every 6 000 km (4 000 miles, 12 months). Replace every 12 000 km (7 500 miles, 24 months).

#### SPARK PLUG AND IGNITION COIL/PLUG CAP REMOVAL

- Remove the front seat. ( 8-7)
- Lift and support the fuel tank. ( 5-3)
- Remove the air cleaner box. ( 5-14)
- Disconnect all lead wire couplers from ignition coil/plug caps.

#### **CAUTION**

Disconnect the lead wire coupler before removing the ignition coil/plug cap to avoid lead wire coupler dam-

• Remove the ignition coils/plug caps.



- \* 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 with a spark plug wrench.

#### **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:

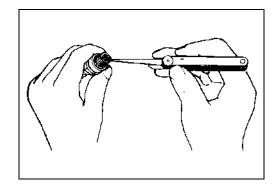
"R" type spark plug has a resistor built into at the center electrode to prevent radio noise.

#### **CARBON DEPOSITS**

- · Check carbon deposits on the spark plug.
- If carbon is deposited, remove it using a spark plug cleaner machine or carefully use a tool with a pointed end.







#### **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 (0.028 - 0.031 in)

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, 8.0 lb-ft)

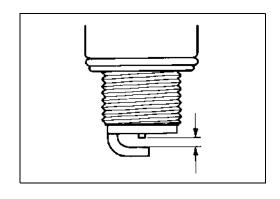
#### CAUTION

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

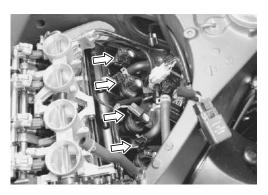
 Install the ignition coils/plug caps and connect their lead wire couplers.

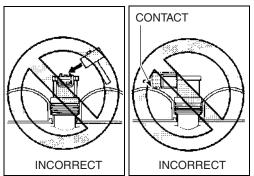
#### CAUTION

- \* 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.





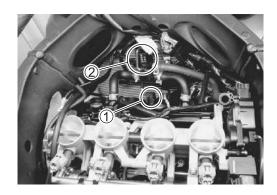




#### **VALVE CLEARANCE**

#### Inspect every 24 000 km (14 500 miles, 48 months).

- Remove the right under cowling. (\$\sumsymbol{\text{LF}} 8-5\$)
- Lift and support the fuel tank. (5-3)
- Remove the air cleaner box. ( 5-14)
- 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.
- Move the throttle body assembly.
- Move the radiator forward. ( 6-10)
- Remove the regulator/rectifier and horn. (23-6)
- Remove the cylinder head cover. ( 3-14)





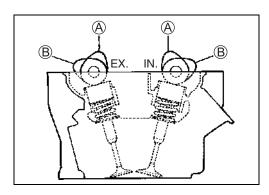
The valve clearance specification is different for intake and exhaust valves. Valve clearance must be checked and adjusted, 1) at the time of periodic inspection, 2) when the valve mechanism is serviced, and 3) when the camshafts are removed for servicing.

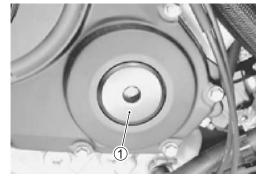
#### **DATA** Valve clearance (when cold):

Standard: IN.: 0.08 - 0.18 mm (0.003 - 0.007 in) EX.: 0.18 - 0.28 mm (0.007 - 0.011 in)

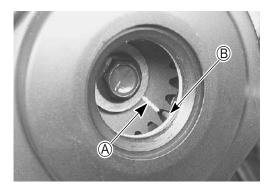
#### NOTE:

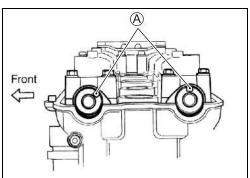
- \* The cam must be at positions, (A) or (B), when checking or adjusting the valve clearance. Clearance readings should not be taken with the cam in any other position than these two positions.
- \* The clearance specification is for COLD state.
- \* To turn the crankshaft for clearance checking, be sure to use a wrench, and rotate in the normal running direction. All spark plugs should be removed.
- Remove the valve timing inspection cap ①.





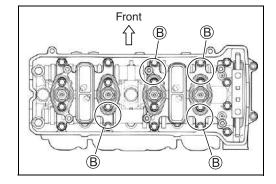
rotor to the rib (B) behind the clutch cover and also to bring the notches (A) on the left ends of both camshafts (Ex. and In.) to the positions as shown.





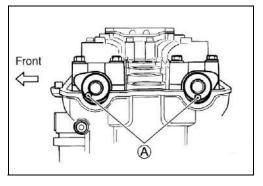
- In this condition, read the valve clearance at the valves (B) (In. and Ex. of No. 4 cylinder, Ex. of No. 3 and In. of No. 2).
- If the clearance is out of specification, adjust the clearance. ( 2-9)

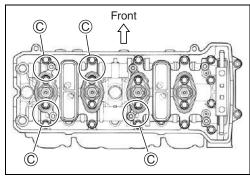
09900-20803: Thickness gauge



- Turn the crankshaft 360 degrees (one rotation) to bring the line on the CKP sensor rotor 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. (2-9)

Cam position	Notch (A) position			
Cam position	Exhaust Camshaft	Intake Camshaft		
<b>B</b>	← Front 🔿	$\leftarrow$ Front $\bigcirc$		
©	← Front ۞	$\leftarrow$ Front $\bigcirc$		



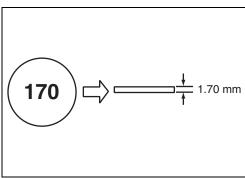


#### **VALVE CLEARANCE ADJUSTMENT**

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

- Remove the intake or exhaust camshafts. ( 3-14)
- 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 21 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 ( 2-10 and -11) for details.





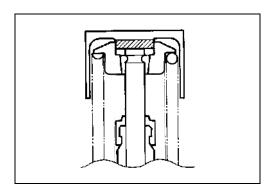
#### NOTE:

- \* 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:

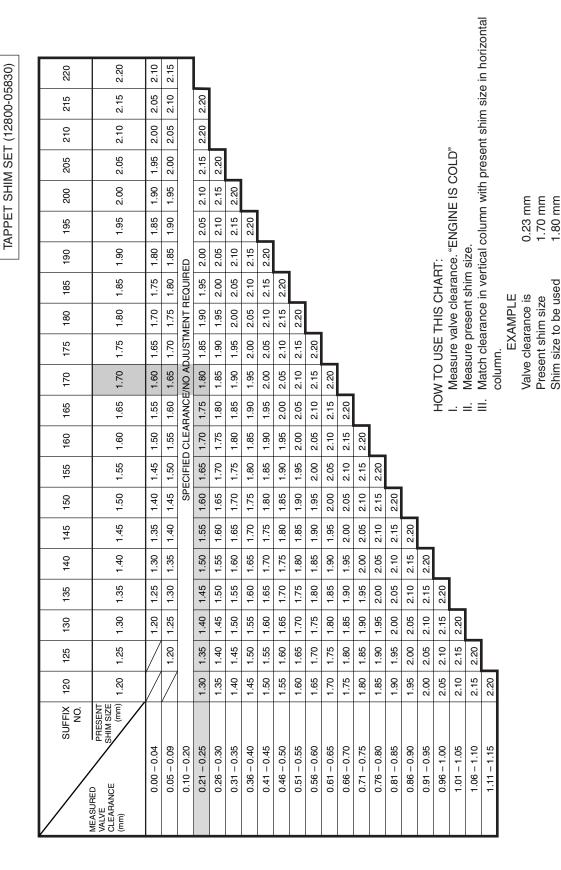
Reinstall the camshafts in the specified manner. (3-92)

- 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 ( 3-97)
- \* Spark plug and plug cap ( 2-6)
- \* Throttle body assembly (\$\sumsets 5-21)
- \* Valve timing inspection plug ( 3-97)
- \* PAIR control solenoid valve ( 11-7)



#### (INTAKE SIDE)

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

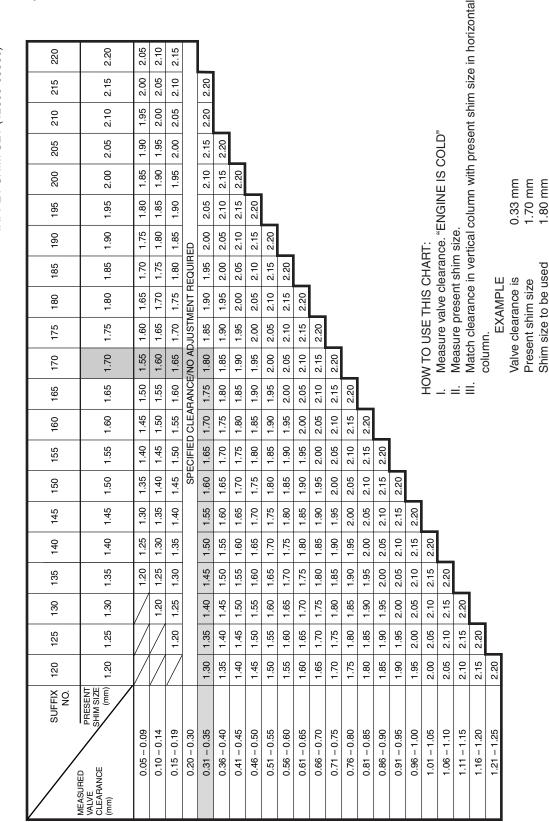


#### (EXHAUST SIDE)

TAPPET SHIM SET (12800-05830)

TAPPET SHIM SELECTION TABLE [EXHAUST]

TAPPET SHIM NO. (12892-05C00-XXX)



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

#### (ENGINE OIL)

Replace initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter.

#### (OIL FILTER)

Replace initially at 1 000 km (600 miles, 2 months) and every 18 000 km (11 000 miles, 36 months) thereafter.

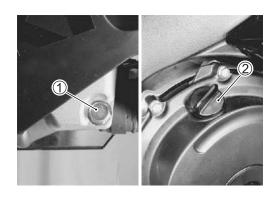
#### **ENGINE OIL REPLACEMENT**

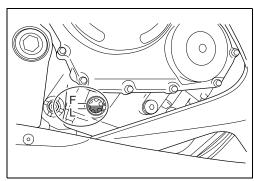
- Remove the under cowlings. ( 8-5)
- Keep the motorcycle upright.
- · Place an oil pan below the engine, and drain oil by removing the oil drain plug 1 and filler cap 2.
- Tighten the drain plug 1 to the specified torque, and pour fresh oil through the oil filler. The engine will hold about 2.2 L (2.3/1.9 US/Imp qt) of oil. Use of SF/SG or SH/SJ in API with MA in JASO.

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



- 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 mark "L", add oil to "F" level. If the level is above mark "F", drain oil to "F" level.





#### **OIL FILTER REPLACEMENT**

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

#### 1001 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 properly tighten the oil filter, use the special tool. Never tighten the oil filter by hand.

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

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

#### DATA NECESSARY AMOUNT OF ENGINE OIL:

: 2.2 L (2.3/1.9 US/Imp qt) Oil change Oil and filter change: 2.5 L (2.6/2.2 US/Imp qt) Engine overhaul : 2.9 L (3.1/2.6 US/Imp qt)

#### CAUTION

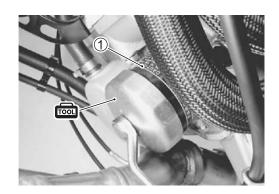
ONLY USE A GENUINE SUZUKI MOTORCYCLE OIL FILTER. Other manufacturer's oil filters may differ in thread specifications (thread diameter and pitch), filtering performance and durability which may lead to engine damage or oil leaks. Also, do not use a genuine Suzuki automobile oil filter on this motorcycle.

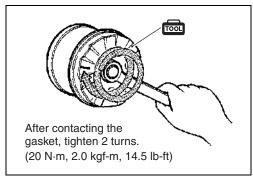
#### **EXHAUST CONTROL VALVE**

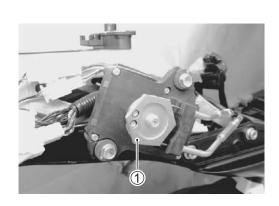
Inspect initially at 1 000 km (600 miles, 2 months) and every 12 000 km (7 500 miles, 24 months) thereafter.

Exhaust control valve actuator is installed in the right-hand side in tail cowl.

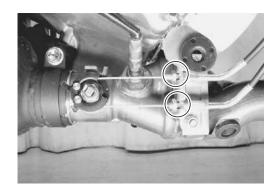
Check the exhaust control valve actuator (1) for its movement when the ignition switch is turned ON. If the exhaust valve actuator does not move, check exhaust valve actuator electrical circuit and exhaust valve carbon sticking. Check the exhaust control cable play. ( 6-14)







- Remove the under cowlings. ( 8-5)
- Check the lock-nuts tightness. If the lock-nuts are loose, adjust the cable play and tighten the lock-nuts.



#### **FUEL LINE**

Inspect initially 6 000 km (4 000 miles, 12 months).

• 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 (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter.

#### NOTE:

Warm up the engine before adjusting the engine idle speed.

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

Engine idle speed: 1 200 ± 100 r/min



#### THROTTLE VALVE SYNCHRONIZATION

Inspect initially at 1 000 km (600 miles, 2 months) (E-33 only) and every 12 000 km (7 500 miles, 24 moths).

• Inspect the throttle valve synchronization periodically. ( 5-26)

# **EVAPORATIVE EMISSION CONTROL** SYSTEM (E-33 ONLY)

Inspect every 12 000 km (7 500 miles, 24 months). Replace vapor hose every 4 years.

• Inspect the evaporative emission control system periodically.

# PAIR (AIR SUPPLY) SYSTEM

Inspect every 12 000 km (7 500 miles, 24 months).

• Inspect the PAIR (air supply) system periodically. (\$\sumsymbol{\text{LT}} 11-6\$)

#### THROTTLE CABLE PLAY

Inspect initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter.

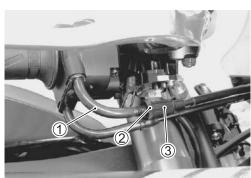
- Loosen the lock-nut ② of the throttle pulling cable ①.
- Turn the adjuster 3 in or out until the throttle cable play (at the throttle grip)  $\triangle$  is between 2.0 – 4.0 mm (0.08 – 0.16 in).
- Tighten the lock-nut ② while holding the adjuster ③.

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

#### **▲** WARNING

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

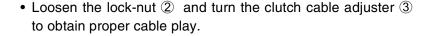


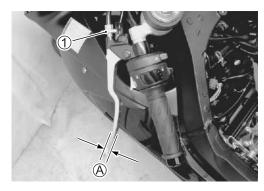


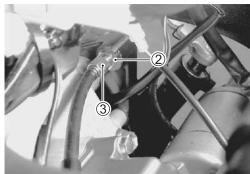
### **CLUTCH**

#### Inspect every 6 000 km (4 000 miles, 12 months).

- Lift and support the fuel tank with its prop stay. (5-3)
- Turn in the adjuster 1 all the way into the clutch lever assembly.



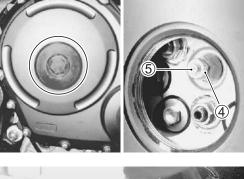


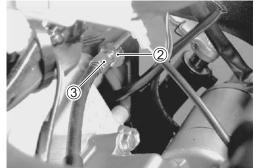


- Remove the clutch release adjuster cap.
- Loosen the lock-nut 4 and turn out the adjusting screw 5 two or three rotations.
- From that position, slowly turn in the adjusting screw ⑤ until resistance is felt.
- From this position, turn out the adjusting screw ⑤ 1/2 rotation, and tighten the lock-nut 4 while holding the screw 5.
- Turn the cable adjuster 3 to obtain 10 15 mm (0.4 0.6 in) of free play (A) at the clutch lever end.
- Tighten the lock-nut 2.

Clutch lever play  $\triangle$ : 10 – 15 mm (0.4 – 0.6 in) Clutch release screw: 1/2 turn out

Clutch release adjuster cap: 11 N·m (1.1 kgf-m, 8.0 lb-ft)



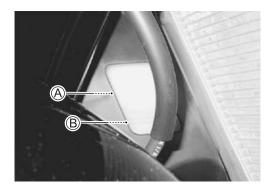


#### COOLING SYSTEM

Inspect every 6 000 km (4 000 miles, 12 months). Replace engine coolant every 2 years.

#### **ENGINE COOLANT LEVEL CHECK**

- Keep the motorcycle upright.
- · Check the engine coolant level by observing the full and lower lines on the engine coolant reservoir.
  - Full line ® Lower line
- If the level is below the lower line, remove the right under cowling (28-5), and add engine coolant to the full line from the engine coolant reservoir filler.





#### **ENGINE COOLANT CHANGE**

- Remove the under cowlings. ( 8-5)
- 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 (excluding reservoir): 2 400 ml (2.5/2.1 US/Imp qt)

• Bleed the air from the engine coolant circuit in the following procedure. (F2-18)

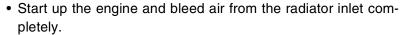
**ENGINE COOLANT INFORMATION (** 7-2)





#### 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.
- Close the air bleeding bolt securely.
- · 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.

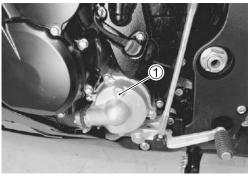
#### CAUTION

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

#### Engine coolant capacity:

Engine side : 2 400 ml (2.5/2.1 US/Imp qt) Reservoir tank side: 250 ml (0.3/0.2 US/Imp qt)





#### **RADIATOR HOSES**

- Remove the under cowlings. (\$\sums\$8-5)
- Lift and support the fuel tank. ( 5-3)
- 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 (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter. Clean and lubricate every 1 000 km (600 miles).

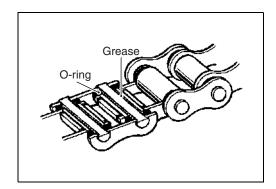
Visually check the drive chain for the possible defects listed below. (Support the motorcycle by a jack and a wooden block, turn the rear wheel slowly by hand with the transmission shifted to Neutral.)

- \* 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.

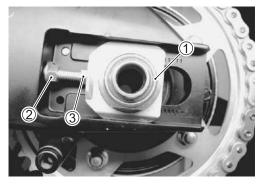
### NOTE:

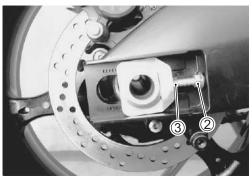
When replacing the drive chain, replace the drive chain and sprockets as a set.



### **CHECKING**

- Remove the axle cotter pin. (For E-03, 28, 33)
- Loosen the axle nut 1.
- Loosen the chain adjuster lock-nuts 2.
- Give tension to the drive chain fully by turning both chain adjuster bolts ③.

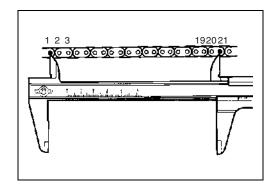




• Count out 21 pins (20 pitches) on the chain and measure the distance between the two points. If the distance exceeds the service limit, the chain must be replaced.

### DATA Drive chain 20-pitch length:

Service limit: 319.4 mm (12.57 in)



### **ADJUSTING**

• Loosen or tighten both chain adjuster bolts 1 until there is 20 -30 mm (0.8 -1.2 in) of slack at the middle of the chain between the engine and rear sprockets as shown. 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.

### DATA Drive chain slack:

Standard: 20 - 30 mm (0.8 - 1.2 in)

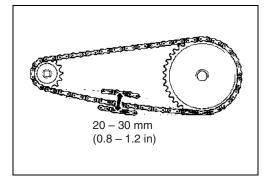
- Place the motorcycle on its side-stand for accurate adjust-
- After adjusting the drive chain, tighten the axle nut 2 to the specified torque.
- Tighten both chain adjuster lock-nuts ③ securely.

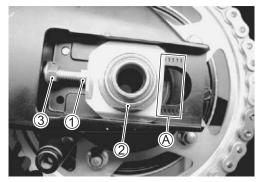
# Rear axle nut: 100 N⋅m (10.0 kgf-m, 72.5 lb-ft)

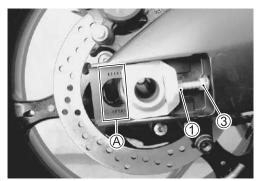
- Install a new cotter pin. (For E-03, 28, 33)
- Recheck the drive chain slack after tightening the axle nut.

### NOTE:

Do not adjust the drive chain beyond the adjustable range (A). Replace the drive chain before drive chain exceeds the limit.







### **CLEANING AND LUBRICATING**

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

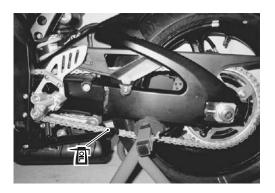
### CAUTION

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 RK525ROZ5Y. Suzuki recommends to use this standard drive chain as a replacement.



### **BRAKE**

### (BRAKE)

Inspect initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter.

### (BRAKE HOSE AND BRAKE FLUID)

Inspect every 6 000 km (4 000 miles, 12 months). Replace hoses every 4 years. Replace fluid every 2 years.

### **BRAKE FLUID LEVEL CHECK**

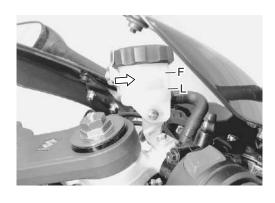
- Keep the motorcycle upright and place the handlebars straight.
- Check the brake fluid level relative to the lower limit lines on the front and rear brake fluid reservoirs.
- When the level is below the lower limit line, replenish with brake fluid that meets the following specification.

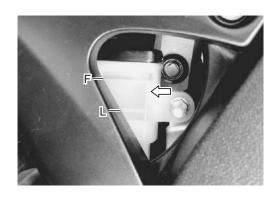


Specification and classification: DOT 4

# **▲** 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**

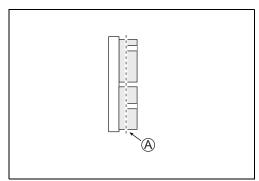
### Front brake

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 the new ones. (58-65)

### CAUTION

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





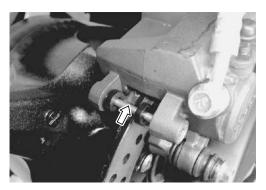
# Rear brake

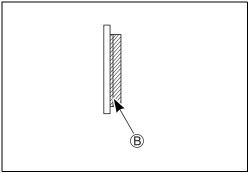
The extent of brake pad wear can be checked by observing the grooved limit line  $\[ B \]$  on the pad. When the wear exceeds the grooved limit line, replace the pads with the new ones.

( 38-76)

### CAUTION

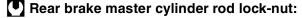
Replace the brake pads as a set, otherwise braking performance will be adversely affected.





# **BRAKE PEDAL HEIGHT**

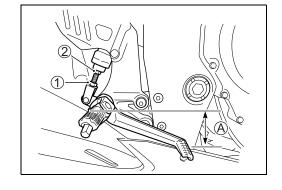
- Loosen the lock-nut ①.
- Turn the push rod ② until the brake pedal height becomes 65
   75 mm (2.6 3.0 in) below the top of the footrest.
- Tighten the lock-nut ① securely.



18 N·m (1.8 kgf-m, 13.0 lb-ft)

**PATA** Brake pedal height A:

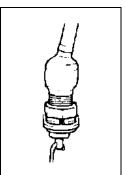
Standard: 65 - 75 mm (2.6 - 3.0 in)



### **BRAKE LIGHT SWITCH**

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





### AIR BLEEDING FROM BRAKE FLUID CIRCUIT

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

### FRONT BRAKE (Caliper side)

- Fill the master cylinder reservoir to the top of the inspection window. Replace the reservoir cap to prevent dirt from enter-
- · 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.



### CAUTION

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





# FRONT BRAKE (Master cylinder side)

• Bleed air from the master cylinder in the same manner as front brake (caliper side).

Air bleeder valve: 6.0 N·m (0.6 kgf-m, 4.3 lb-ft)

### NOTE:

If air is trapped in the master cylinder, bleed air from the master cylinder first.

### **REAR BRAKE**

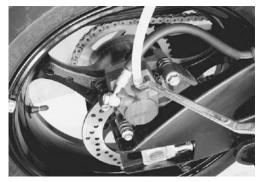
• Bleed air from the rear brake system in the same manner as

Air bleeder valve: 7.5 N·m (0.75 kgf-m, 5.5 lb-ft)

### NOTE:

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





# **TIRES**

Inspect every 6 000 km (4 000 miles, 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

DATA Tire tread depth:

Service Limit: FRONT: 1.6 mm (0.06 in)

**REAR**: 2.0 mm (0.08 in)

### **TIRE PRESSURE**

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

**DATA** Cold inflation tire pressure

Solo riding: Front: 250 kPa (2.50 kgf/cm<sup>2</sup>, 36 psi)

Rear: 290 kPa (2.90 kgf/cm<sup>2</sup>, 42 psi)

Dual riding: Front: 250 kPa (2.50 kgf/cm<sup>2</sup>, 36 psi)

Rear: 290 kPa (2.90 kgf/cm<sup>2</sup>, 42 psi)

### 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.

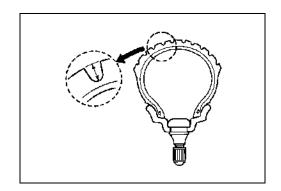
DATA TIRE TYPE

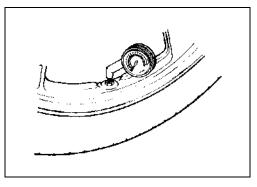
BRIDGESTONE (Front: BT014FSJ, Rear: BT014R W)

# **STEERING**

Inspect initially at 1 000 km (600 miles, 2 months) and every 12 000 km (7 500 miles, 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. ( 8-33)







# **FRONT FORK**

Inspect every 12 000 km (7 500 miles, 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. ( \$\sumsymbol{1} 8-18 \)



# **REAR SUSPENSION**

Inspect every 12 000 km (7 500 miles, 24 months).

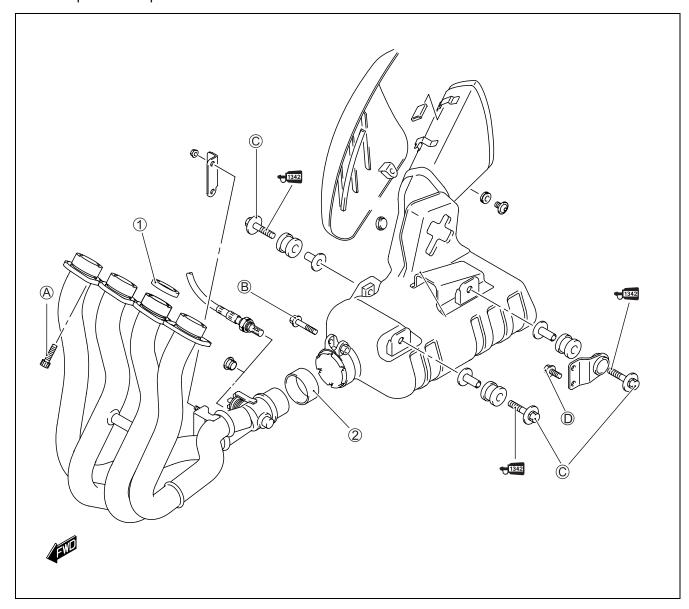
• Inspect the rear shock absorbers for oil leakage and check that there is no play in the swingarm. Replace any defective parts if necessary. ( 8-49)



# **EXHAUST PIPE BOLT AND NUT**

Tighten initially at 1 000 km (600 miles, 2 months) and every 12 000 km (7 500 miles, 24 months) thereafter.

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



1	Gasket	2	Exhaust pipe connecter

L	

ITEM	N⋅m	kgf-m	lb-ft
AB	00	0.0	16.5
$\bigcirc \bigcirc$	23	2.3	16.5

# CAUTION

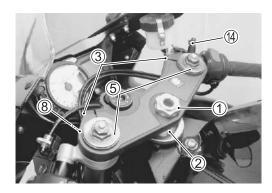
Replace the gaskets and exhaust pipe connector with the new ones.

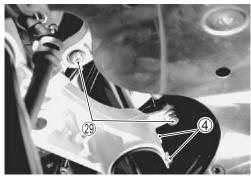
# **CHASSIS BOLTS AND NUTS**

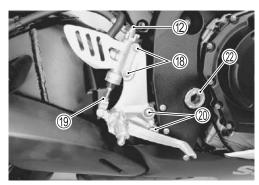
Tighten initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter.

Check that all chassis bolts and nuts are tightened to their specified torque. (Refer to page 2-31 for the locations of the following nuts and bolts on the motorcycle.)

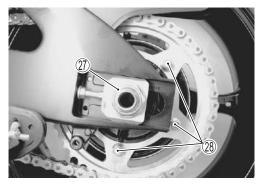
Item	N∙m	kgf-m	lb-ft
① Steering stem head nut	90	9.0	65.0
② Steering stem lock-nut	80	8.0	58.0
③ Front fork upper clamp bolt	23	2.3	16.5
④ Front fork lower clamp bolt	23	2.3	16.5
⑤ Front fork cap bolt	35	3.5	25.5
6 Front axle bolt	100	10.0	72.5
⑦ Front axle pinch bolt	23	2.3	16.5
8 Handlebar clamp bolt	23	2.3	16.5
Front brake master cylinder mounting bolt	10	1.0	7.0
Front brake caliper mounting bolt	35	3.5	25.5
front brake caliper housing bolt	22	2.2	16.0
Brake hose union bolt (Front & Rear)	23	2.3	16.5
③ Air bleeder valve	7.5	0.75	5.5
(Front brake caliper & Rear brake caliper)	7.5	0.75	5.5
(4) Air bleeder valve (Master cylinder)	6.0	0.6	4.5
(5) Brake disc bolt (Front)	23	2.3	16.5
(6) Brake disc bolt (Rear)	35	3.5	25.5
Rear brake caliper mounting bolt	17	1.7	12.5
® Rear brake master cylinder mounting bolt	10	1.0	7.0
Rear brake master cylinder rod lock-nut	18	1.8	13.0
② Front footrest bracket mounting bolt	23	2.3	16.5
② Swingarm pivot nut	100	10.0	72.5
② Swingarm pivot lock-nut	90	9.0	65.0
② Rear suspension bracket nut	115	11.5	83.0
Rear shock absorber mounting bolt/nut (Upper & Lower)	50	5.0	36.0
② Cushion rod nut	78	7.8	56.5
(3) Cushion lever mounting nut	98	9.8	71.0
② Rear axle nut	100	10.0	72.5
Rear sprocket nut	93	9.3	67.5
③ Steering damper bolt/nut	23	2.3	16.5
③ Rear brake caliper pin bolt	32	3.2	23.0

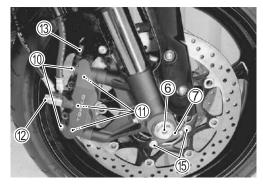


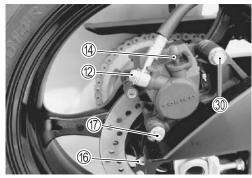


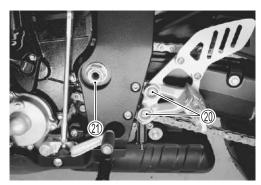


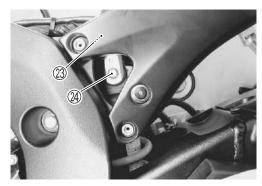


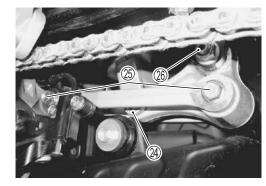












# COMPRESSION PRESSURE CHECK

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
1 300 – 1 700 kPa	1 000 kPa	200 kPa
(13 – 17 kgf/cm², 185 – 242 psi)	(10 kgf/cm², 148 psi)	(2 kgf/cm², 28 psi)

### Low compression pressure can indicate any of the following conditions:

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

### Overhaul the engine in the following cases:

- \* Compression pressure in one of the cylinders is 1 000 kPa (10 kgf/cm², 148 psi) and less.
- \* The difference in compression pressure between any two cylinders is 200 kPa (2 kgf/cm², 28 psi) and more.
- \* All compression pressure readings are below 1 300 kPa (13 kgf/cm², 185 psi) even when they measure 1 000 kPa (10 kgf/cm<sup>2</sup>, 148 psi) and more.

# COMPRESSION TEST PROCEDURE

### NOTE:

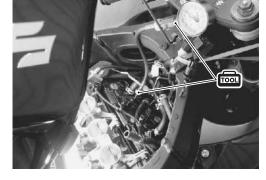
- \* Before testing the engine for compression pressure, make sure that the cylinder head nuts are tightened to the specified torque values and the valves are properly adjusted.
- \* Have the engine warmed up before testing.
- \* Make sure that the battery is fully-charged.

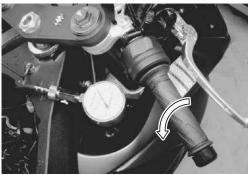
Remove the related parts and test the compression pressure in the following manner.

- Lift and support the fuel tank. ( 5-3)
- Remove all the spark plugs. ( 2-5)
- · Install the compression gauge and adaptor in the spark plug hole. Make sure that the connection is tight.
- Press the starter button and crank the engine for a few seccompression.
- Repeat this procedure with the other cylinders.

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

 Keep the throttle grip in the fully opened position. onds. Record the maximum gauge reading as the cylinder





# 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

100 - 400 kPa (1.0 - 4.0 kgf/cm<sup>2</sup>, 14 - 57 psi) at 3 000 r/min, Oil temp. at 60 °C (140 °F)

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

### **LOW OIL PRESSURE**

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

### **HIGH OIL PRESSURE**

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

### **OIL PRESSURE TEST PROCEDURE**

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

- Remove the 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

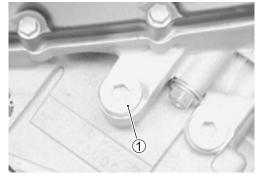
• After warming up, increase the engine speed to 3 000 r/min (observe the tachometer), and read the oil pressure gauge.

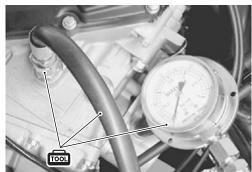
09915-74521: Oil pressure gauge hose

09915-74540: Oil pressure gauge attachment

09915-77331: Meter (for high pressure)

Oil gallery plug (M16): 35 N·m (3.5 kgf-m, 25.5 lb-ft)





# 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.

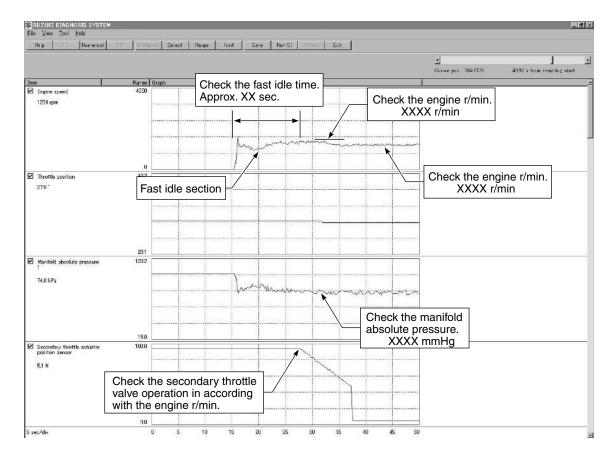
- Remove the front seat. ( 8-7)
- Set up the SDS tool. ( 4-26)

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

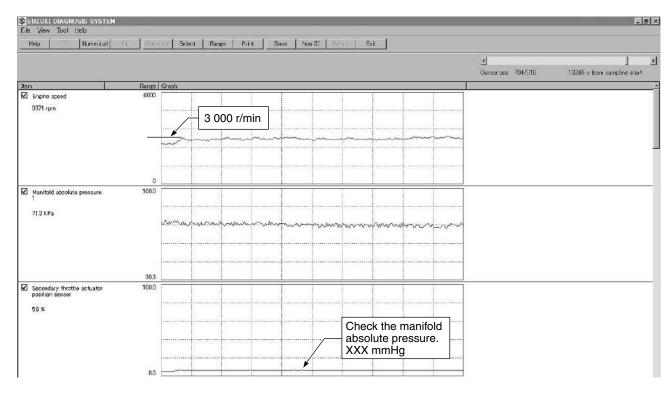
### NOTE:

- \* 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.

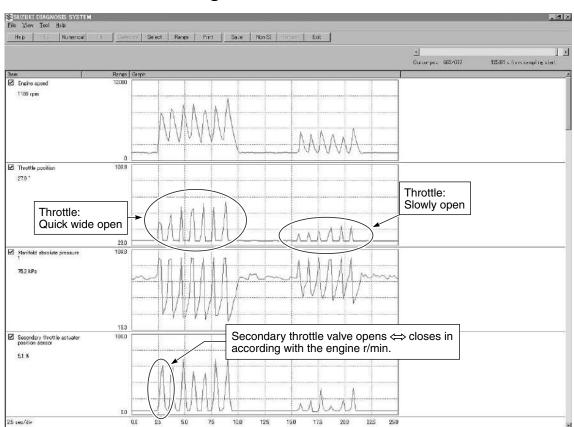
# SAMPLE: Data sampled from cold starting through warm-up



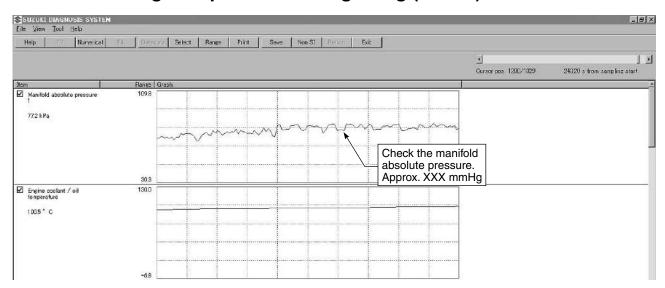
# Data at 3 000 r/min under no load



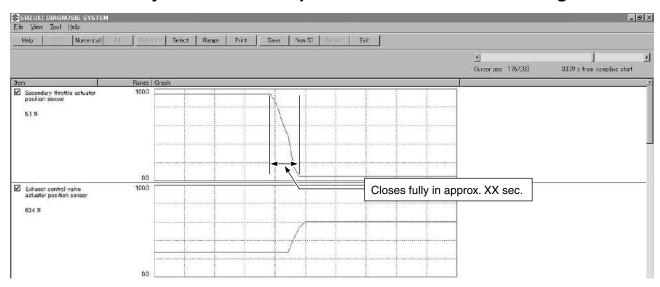
# Data at the time of racing



# 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	INSTALLATION
PAIR control solenoid valve	<b>F11-7</b>	₩ 11-7	[] 11-7
Starter motor	<b>∷</b> ₹3-14	₩ 9-14	<b>∷</b> ₹3-103
Breather cover	<b>□</b> 3-22	_	<b>∷</b> ₹3-84
Thermostat	<b>∑</b> 7-9	<b>∷</b> ₹7-9	<b>∑</b> ₹7-10
Cylinder head cover	₩3-14	_	<b>∷</b> ₹3-102
Camshaft	<b>∷</b> ₹3-14	₩3-29	<b>∷</b> ₹3-96
Intake pipe	<b>73-38</b>	_	<b>∷</b> ₹3-39
Oil filter	<b>∷</b> ₹3-22	_	<b>∷</b> ₹3-84
Oil cooler	<b>F3-23</b>	₩7-17	<b>∷</b> ₹3-83
Oil pan	<b>∷</b> ₹3-23	_	<b>∷</b> ₹3-83
Oil pump	₩3-23	∑3-42	₩3-82

### **ENGINE RIGHT SIDE**

ITEM	REMOVAL	INSPECTION	INSTALLATION
Exhaust pipe and muffler	<b>3-5</b>	_	<b>∷</b> ₹3-12
Cam chain tension adjuster	∑₹3-15	<b>∷</b> ₹3-32	<b>∷</b> ₹3-99
Clutch cover	∑₹3-16	_	<b>∷</b> ₹3-94
Clutch (plates)	∑₹3-17	₩3-39	<b>∷</b> ₹3-92
Clutch lifter	∑₹3-18	₩3-40	<b>∷</b> ₹3-90
Primary driven gear	∑₹3-18	₩3-40	<b>∷</b> ₹3-90
Oil pump drive sprocket	∑₹3-19	_	<b>∷</b> ₹3-89
Gearshift shaft	∑₹3-19	₩3-44	<b>∷</b> ₹3-88
CKP sensor	∑₹3-16	<b>∑</b> 74-35	<b>∷</b> ₹3-94
Oil pump driven gear	∑₹3-42	_	_
Cam chain tensioner	∑₹3-20	<b>∷</b> ₹3-31	<b>∷</b> ₹3-86
Cam chain guide	∑₹3-20	<b>∷</b> ₹3-31	<b>∷</b> ₹3-86

### **ENGINE LEFT SIDE**

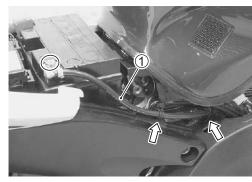
ITEM	REMOVAL	INSPECTION	INSTALLATION
Engine sprocket	<b>∷</b> ₹3-7, 8	_	<b>∷</b> ₹3-12
Gear position switch	₩3-22	<b>∷</b> ₹4-75	₩3-84
Starter idle gear cover	<b>∷</b> ₹3-19	_	∷₹3-88
Starter idle gear	∑₹3-19, 20	_	<b>∷</b> ₹3-87, 88
Generator cover	<b>∷</b> ₹3-20	_	<b>∷</b> ₹3-87
Starter clutch	₩3-21	<b>∷</b> ₹3-42	<b>∷</b> ₹3-86
Generator rotor	<b>∷</b> ₹3-21	_	<b>∷</b> ₹3-86
Water pump	₩3-21	<b>∷</b> ₹7-13	<b>∷</b> ₹3-85

# 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 cowlings. (\$\sumset\$8-5)
- Lift and support the fuel tank. ( 5-3)
- Drain engine oil. ( 2-12)
- Drain engine coolant. ( 2-17)
- Disconnect the battery 

  ─ lead wire ①.



• Remove the air cleaner box. ( 5-14)

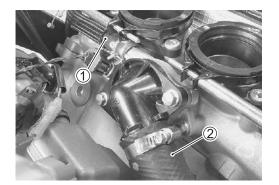


• Remove the throttle body assembly. (\$\sumsymbol{\subset} 5-15\$)

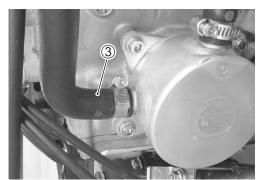


### **RADIATOR**

 $\bullet$  Disconnect the by-pass hose  $\textcircled{\scriptsize 1}$  and radiator inlet hose  $\textcircled{\scriptsize 2}.$ 



• Disconnect the oil cooler outlet hose 3.



• Disconnect the cooling fan coupler 4.

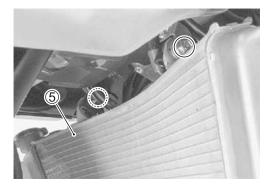


- Remove the radiator mounting bolts.
- Remove the radiator ⑤.

# CAUTION

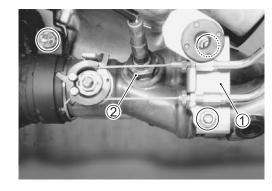
Be careful not to bent the radiator fins.



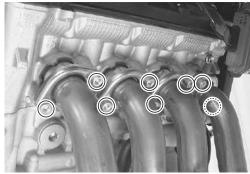


### **EXHAUST PIPE AND MUFFLER**

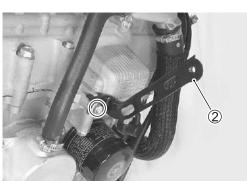
- Remove the EXCV cables along with the bracket ①.
- Loosen the muffler connecting bolt.
- Remove the HO2 sensor ② (For E-02, 19). ((374-107)



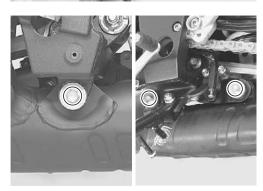
- Remove the exhaust pipe bolts.
- Remove the exhaust pipe.
- Remove the exhaust pipe gaskets.



• Remove the radiator mounting bracket ②.

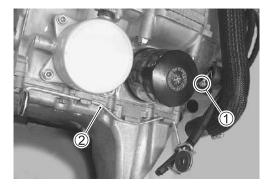


• Remove the muffler body. ( 6-11)



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

- Disconnect the oil pressure switch lead wire 1.
- Remove the under cowling lower bracket 2.



- · Disconnect the following couplers.
  - 3 GP switch lead wire
  - 4 CKP sensor lead wire
  - (5) Ground lead wire
  - 6 Starter motor lead wire
  - ⑦ Speed sensor lead wire
  - 8 ECT sensor



### **CAUTION**

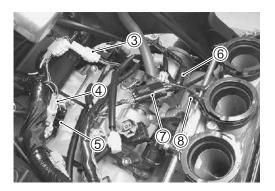
Do not remove the ignition coil/plug cap before disconnecting its coupler.

- Disconnect the CMP sensor lead wire coupler 9 and regulator/rectifier couplers 10.
- Remove the ignition coils/plug caps.

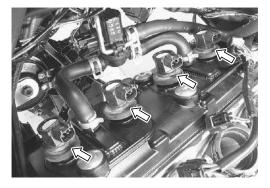
### **CAUTION**

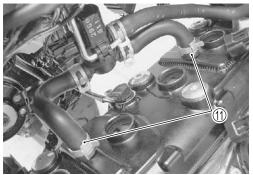
- \* Do not pry up the ignition coil/plug cap with a screw driver or a bar to avoid its damage.
- \* Be careful not to drop the ignition coil/plug cap to prevent its short or open circuit.
- Disconnect the PAIR hoses 11.

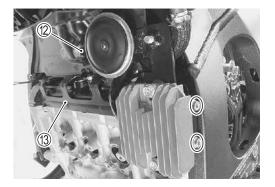
- Disconnect the horn coupler 12.
- Remove the horn and regulator/rectifier along with their bracket.
- Remove the front engine cover ③.





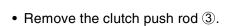


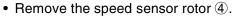




### **ENGINE SPROCKET AND GEARSHIFT LEVER**

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

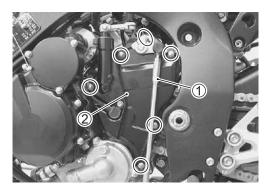




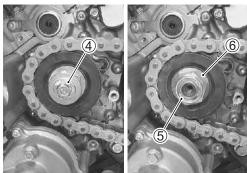
• Remove the engine sprocket nut ⑤ and the washer ⑥.

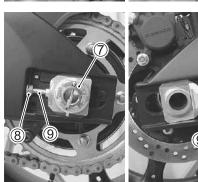
- Remove the cotter pin. (For E-03, 28, 33)
- Loosen the rear axle nut 7.
- Loosen the chain adjuster lock-nuts 8.
- Loosen the chain adjusters 9.

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











• Remove the engine sprocket ①.

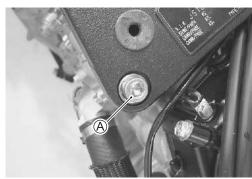


### **ENGINE MOUNTING**

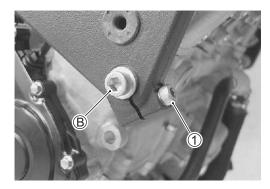
• Support the engine using an engine jack.



• Remove the engine mounting bolt (A).

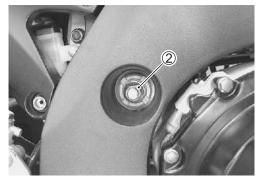


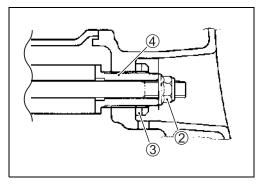
- Loosen the engine mounting pinch bolt ①.
- Remove the engine mounting bolt <sup>®</sup>.

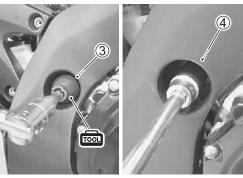


- Remove the engine mounting nut 2.
- Remove the engine mounting thrust adjuster lock-nut ③ with the special tool.
- Loosen the engine mounting thrust adjuster 4 fully.

09940-14980: Engine mounting thrust adjuster socket wrench





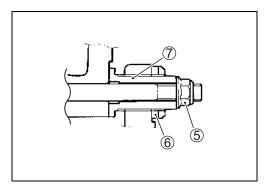


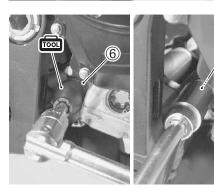
- Remove the engine mounting nut ⑤.
- Loosen the engine mounting thrust adjuster lock-nut ⑥ with the special tool.
- Loosen the engine mounting thrust adjuster ⑦.

09940-14980: Engine mounting thrust adjuster socket wrench

NOTE:

Do not remove the engine mounting bolts at this stage.





- Remove the engine mounting bolts and gradually lower the front side of the engine. Then, take off the drive chain from the driveshaft.
- Remove the engine assembly.

Install the engine in the reverse order of engine 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 spacers ①.
- Gradually raise the rear side of the engine assembly, and then put the drive chain on the driveshaft.
- Install all engine mounting bolts, spacers and tighten them temporarily. ((3-3-11)

### **CAUTION**

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

- Tighten the engine mounting thrust adjusters to the specified torque.
- Engine mounting thrust adjuster:

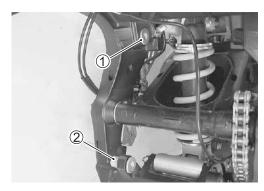
23 N·m (2.3 kgf-m, 16.5 lb-ft)

- Tighten the engine mounting thrust adjuster lock-nuts to the specified torque with the special tool.
- 09940-14980: Engine mounting thrust adjuster socket wrench
- Engine mounting thrust adjuster lock-nut:
  45 N·m (4.5 kgf-m, 32.5 lb-ft)
- Tighten all engine mounting bolts and nuts to the specified torque. ( 3-11)

### NOTE:

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

• Tighten the engine mounting pinch bolts to the specified torque. ( 3-11)





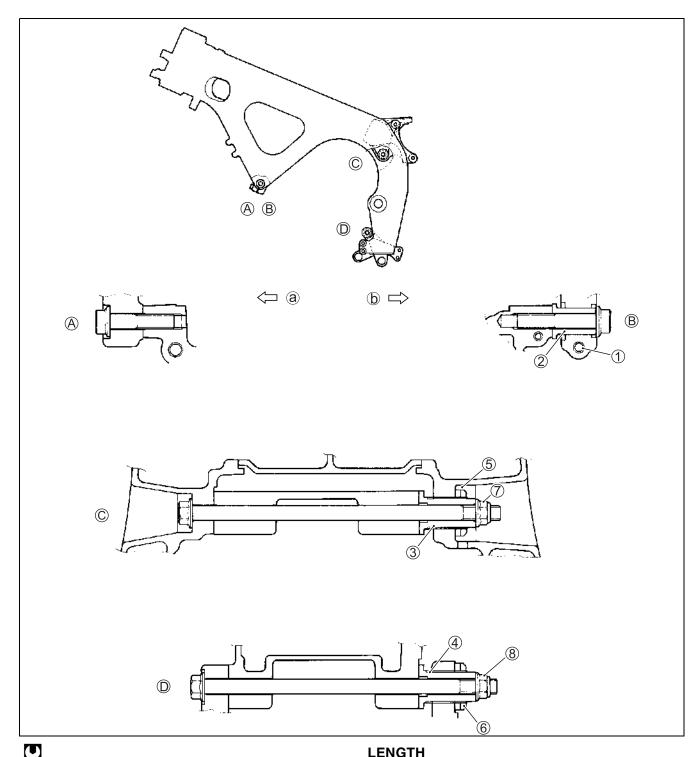












<u> </u>			
ITEM	N⋅m	kgf-m	lb-ft
AB	55	5.5	40.0
1	23	2.3	16.5
34	23	2.3	16.5
56	45	4.5	32.5
78	75	7.5	54.0

LENGTH					
ITEM		mm	in		
	A	45	1.77		
Bolt	B	55	2.17		
	©	215	8.46		
	D	205	8.07		
Spacer	2	30.5	1.20		
Adjuster	34	40	1.57		

a LH b RH

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

+1342 99000-32050: THREAD LOCK "1342"

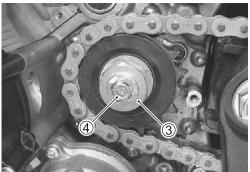
• Tighten the engine sprocket nut to the specified torque.

Engine sprocket nut: 115 N⋅m (11.5 kgf-m, 83.0 lb-ft)

- Install the speed sensor rotor 3.
- Tighten the speed sensor rotor bolt 4 to the specified torque.

Speed sensor rotor bolt: 25 N·m (2.5 kgf-m, 18.0 lb-ft)





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

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

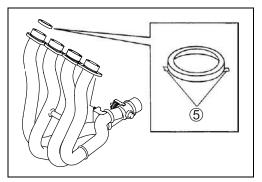
• Install the engine sprocket cover.



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

### NOTE:

Be sure to face the tabs ⑤ on the exhaust pipe gaskets to the exhaust pipe side when installing them.

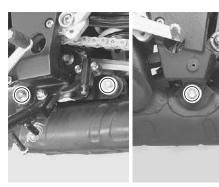


• Tighten the muffler mounting bolts, exhaust pipe bolts and muffler connecting bolt to the specified torque.

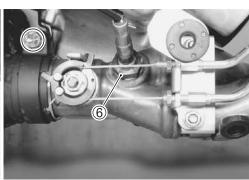
Muffler mounting bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Muffler connecting bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Exhaust pipe bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

• Install the HO2 sensor 6. (For E-02, 19)

**1** HO2 sensor: 48 N⋅m (4.8 kgf-m, 34.5 lb-ft)



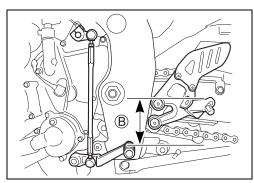




 $\bullet$  Install the gearshift lever and adjust the lever height  $\ensuremath{\mathbb{B}}.$ 

Gearshift lever height (B)

Standard: 65 - 75 mm (2.56 - 2.95 in)



- Perform service and adjustment in the following items.
- \* Engine oil ( 2-12)
- \* Engine coolant ( 2-17)
- \* Throttle cable play (\$\sumset 2-15)
- \* Clutch (2-16)
- \* Idling adjustment ( 2-14)
- \* Throttle valve synchronization (5-5-26)
- \* EXCV cable adjustment ( 6-8)
- \* Drive chain slack ( 2-21)
- \* Wiring harness, cables and hoses (F10-17 to -24)

# **ENGINE DISASSEMBLY**

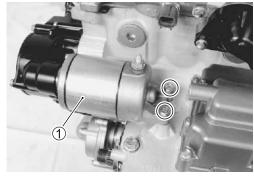
# CAUTION

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)

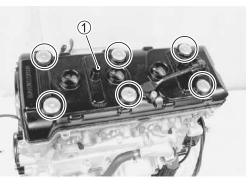
### **STARTER MOTOR**

• Remove the starter motor ①.

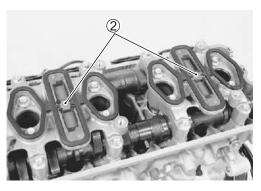


### **CYLINDER HEAD COVER**

• Remove the cylinder head cover ① and its gaskets.

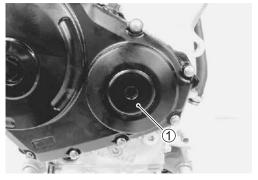


Remove the PAIR reed valves ② with their gaskets.

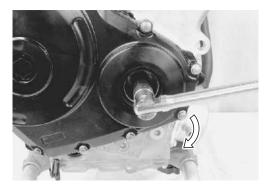


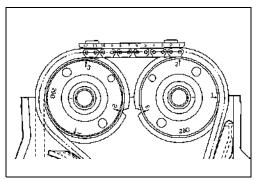
### **CAMSHAFT**

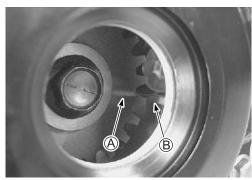
• Remove the valve timing inspection cap ①.



• Turn the crankshaft to bring the line (A) on the CKP sensor rotor to the rib (B) behind the clutch cover and also to bring the cams to the position as shown.







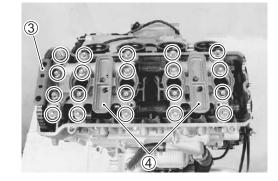
• Remove the cam chain tension adjuster ②.



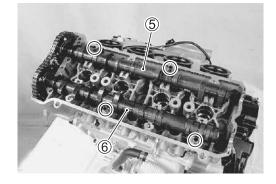
- Remove the cam chain guide No. 2 3.
- Remove the camshaft journal holders 4.

# **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 ⑤.
- Remove the exhaust camshaft 6.
- Remove the dowel pins.



### **CYLINDER HEAD**

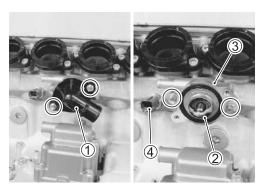
- Remove the thermostat cover ①.
- Remove the thermostat 2 and thermostat conector 3.

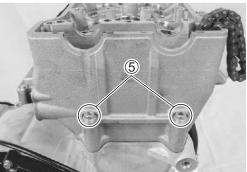
### THERMOSTAT INSPECTION (27-9)

• Remove the ECT sensor 4.

# ECT SENSOR INSPECTION (\$\tilde{\tilie}\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde

• Remove the cylinder head bolts (M6) ⑤.





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

### NOTE:

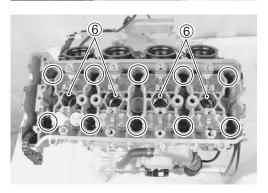
When loosening the cylinder head bolts, loosen each bolt little by little diagonally.

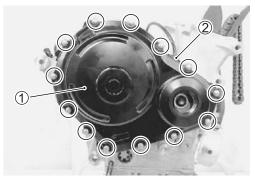
- Remove the cylinder head.
- Remove the dowel pins and gasket.

# **CLUTCH**

- Remove the clutch cover 1 along with the CKP sensor 2.
- Remove the dowel pins and gasket.

# CKP SENSOR INSPECTION ( 4-35)





Hold the clutch housing with the special tool.

# CAUTION

Do not damage the clutch plates by the special tool.

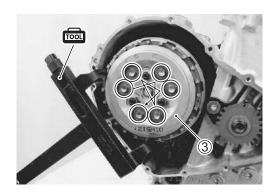
# 09920-53740: Clutch sleeve hub holder

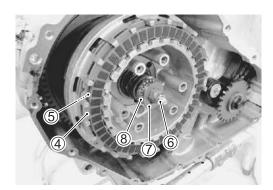
• Remove the clutch springs.

### NOTE:

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

- Remove the pressure plate 3.
- Remove the clutch drive plates ④ and driven plates ⑤.
- Remove the clutch push piece ⑥, thrust washer ⑦ and bearing ⑧.

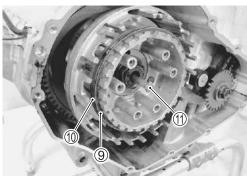




- Remove the spring washer 9 and its seat 10.
- Remove the clutch push rod ①.

### NOTE:

If it is difficult to pull out the push rod ①, use a magnetic hand or a wire.



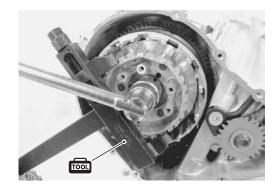
• Unlock the clutch sleeve hub nut.



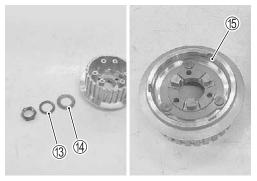
• Hold the clutch sleeve hub with the special tool.

# 09920-53740: Clutch sleeve hub holder

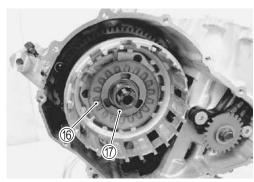
• Remove the clutch sleeve hub nut.



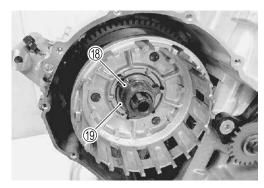
• Remove the washers ③, ④ and ⑤ from the clutch sleeve hub.



• Remove the wave spring washers ® and clutch lifter driven cam ®.



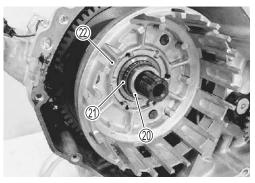
• Remove the clutch lifter drive cam ® and washer ®.



- Remove the spacer ② and bearing ②.
- Remove the primary driven gear assembly ②.

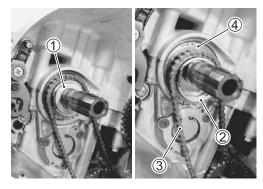
### NOTE:

If it is difficult to remove the primary driven gear, rotate the crankshaft.



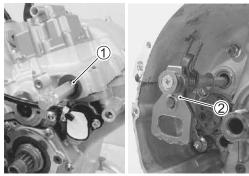
### **OIL PUMP DRIVE SPROCKET**

- Remove the spacer 1.
- Remove the oil pump drive sprocket ② and chain ③.
- Remove the thrust washer 4.

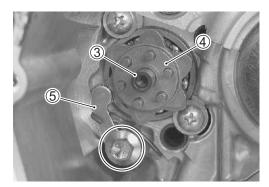


### **GEARSHIFT SYSTEM**

• With the snap ring ① and washer removed, remove the gearshift shaft assembly ②.



- Remove the gearshift cam plate bolt ③ and gearshift cam plate ④.
- Remove the gearshift cam stopper ⑤.

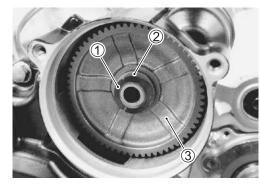


# STARTER IDLE GEAR AND GENERATOR COVER

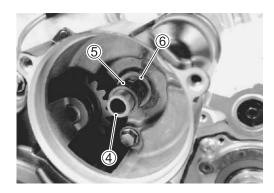
• Remove the starter idle gear cover.



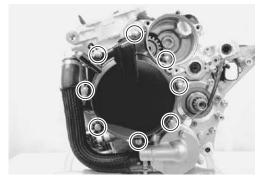
• Remove the spring washer ①, washer ② and starter idle gear No. 1 ③.



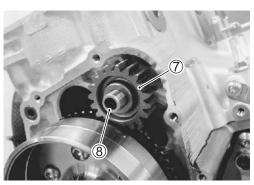
• Remove the shaft 4, bearing 5 and thrust washer 6.



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

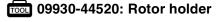


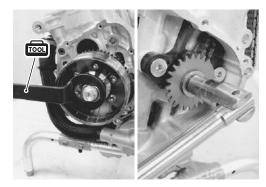
• Remove the starter idle gear No. 2 ⑦ and shaft ⑧.



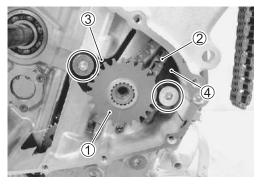
## CAM CHAIN/CAM CHAIN TENSIONER/CAM CHAIN GUIDE

 While holding the generator rotor with the special tool, remove the CKP sensor rotor/cam chain drive sprocket bolt.





- Remove the CKP sensor rotor/cam chain drive sprocket ① and cam chain ②.
- Remove the cam chain tensioner ③ and cam chain guide No. 1 ④.

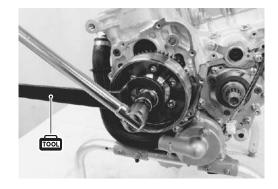


#### **GENERATOR ROTOR AND STARTER DRIVEN GEAR**

• Hold the generator rotor with the special tool.

09930-44520: Rotor holder

• Remove the generator rotor bolt.

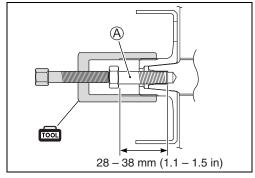


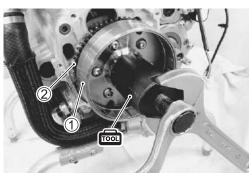
• Install a bolt (A) of suitable size to the left end of crankshaft.

**SUITABLE BOLT** (M12, length: 28 – 38 mm (1.1 – 1.5 in)]

• Remove the generator rotor ① and starter driven gear ② with the special tool.

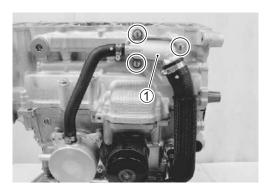
09930-34980: Rotor remover





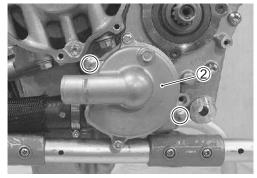
## **WATER PUMP**

• Remove the water hoses and water inlet connector ①.



• Remove the water pump 2.

WATER PUMP SERVICING ( 7-11)



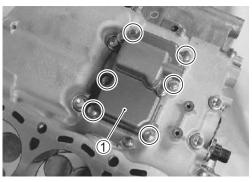
## **GEAR POSITION SWITCH**

• Remove the gear position switch ①.

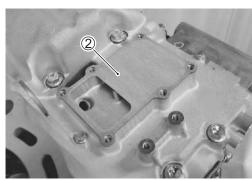


## **CRANKCASE BREATHER (PCV) COVER**

• Remove the crankcase breather cover 1.



• Remove the gasket ②.



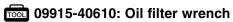
## **OIL PRESSURE SWITCH**

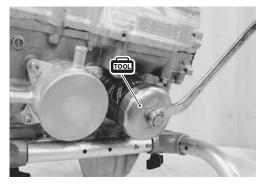
• Remove the oil pressure switch ①.



## **OIL FILTER**

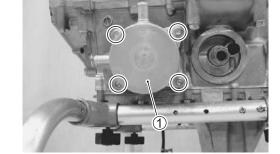
• Remove the oil filter with the special tool.





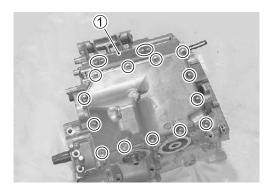
## **OIL COOLER**

• Remove the oil cooler ①.



#### **OIL PAN**

- Remove the plate ① and oil pan.
- Remove the gasket.

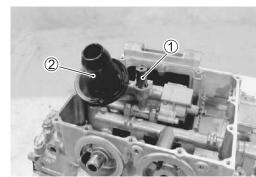


## **OIL PRESSURE REGULATOR**

• Remove the oil pressure regulator ①.

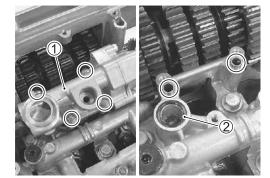
## **OIL STRAINER**

• Remove the oil strainer 2.



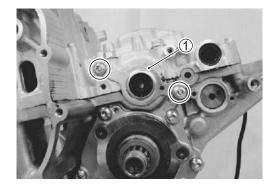
## **OIL PUMP**

- Remove the oil pump ①.
- Remove the dowel pins and O-ring ②.

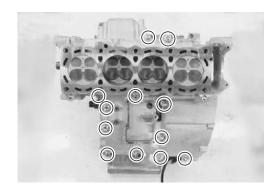


## **LOWER CRANKCASE**

• Remove the clutch push rod oil seal retainer ①.



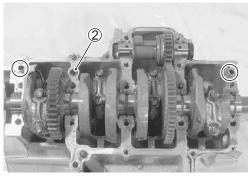
• Remove the upper crankcase bolts.



- Remove the lower crankcase bolts (M8).
- Remove the crankshaft journal bolts (M9).
- Remove the lower crankcase assembly.

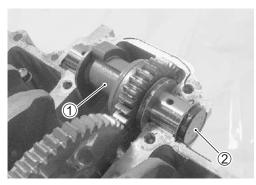


• Remove the dowel pins and O-ring ②.



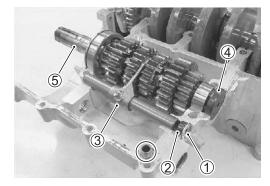
## **BALANCER SHAFT**

• Remove the balancer shaft 1) and oil seal 2).

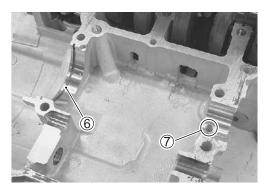


## COUNTERSHAFT

- Remove the dowel pin.
- Remove the retainer ①, bushing ②, gearshift shaft and fork ③.
- Remove the oil seal 4 and countershaft assembly 5.

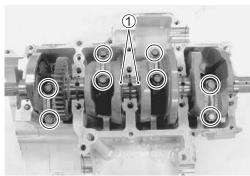


• Remove the C-ring 6 and bearing pin 7.



#### **CRANKSHAFT**

- Loosen the conrod bearing cap bolts by 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 crankshaft and thrust bearings ①.

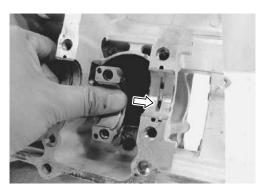


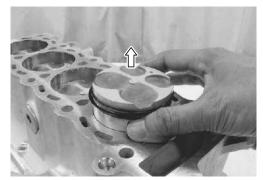
#### **PISTON AND CONROD**

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

## CAUTION

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





• Remove the piston pin circlip ①.



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

## NOTE:

Scribe the cylinder number on the piston head.



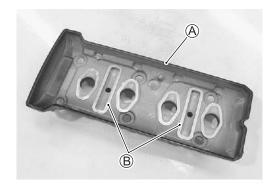
# ENGINE COMPONENTS INSPECTION AND SERVICE

### CAUTION

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

## CYLINDER HEAD COVER

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



## **CMP SENSOR**

#### **REMOVAL**

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

#### **INSPECTION**

• Inspect the CMP sensor. ( 4-33)



#### **INSTALLATION**

• Install the CMP sensor.

#### NOTE:

When installing, clean the CMP sensor's face.

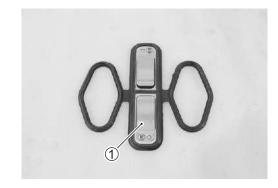
CMP sensor mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)



## **PAIR REED VALVE**

#### **REMOVAL**

• Remove the PAIR reed valve ① from the gasket.



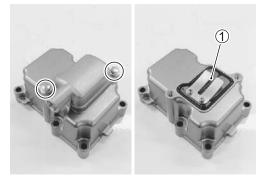
## • Inspect the reed valve for the carbon deposit.

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



## CRANKCASE BREATHER REED VALVE

• Remove the crankcase breather reed valve ① from the crankcase breather cover.



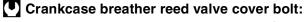
#### **INSPECTION**

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



#### **INSTALLATION**

- Install the reed valve to the breather cover.
- Tighten the bolts to the specified torque.



10 N·m (1.0 kgf-m, 7.0 lb-ft)



## **PCV HOSE**

- Remove the PCV hose from the crankcase breather reed valve 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**

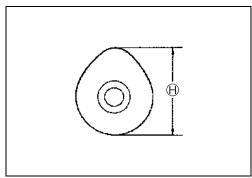
- Check the camshaft for wear or damage.
- $\bullet$  Measure the cam height  $\ensuremath{\boldsymbol{\upalpha}}$  with a micrometer.

DATA Cam height H:

Service Limit: (IN.): 36.48 mm (1.436 in)

(EX.): 35.08 mm (1.381 in)

09900-20202: Micrometer (25 – 50 mm)



#### **CAMSHAFT JOURNAL WEAR**

- Determine whether or not each journal is worn down to the limit by measuring the oil clearance with the camshaft installed in place.
- Use the plastigauge ① to read the clearance at the widest portion, which is specified as follows:



Service Limit: (IN. & EX.): 0.150 mm (0.0059 in)

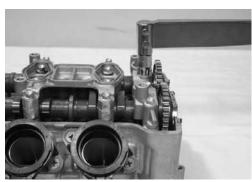
1001 09900-22301: Plastigauge 09900-22302: Plastigauge

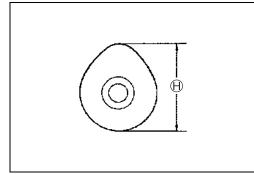
NOTE:

Install camshaft journal holders to their original positions. (CF 3-98)

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

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

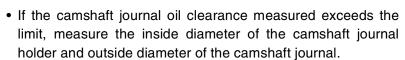




#### NOTE:

Do not rotate the camshaft with the plastigauge in place.

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



 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 (0.9454 - 0.9459 in)

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

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

Camshaft journal O.D.:

Standard (IN. & EX.):

23.959 - 23.980 mm (0.9433 - 0.9441 in)

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 (0.004 in)

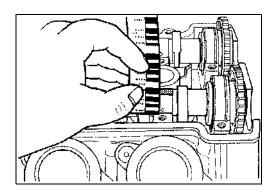
**5** 09900-20607: Dial gauge (1/100 mm)

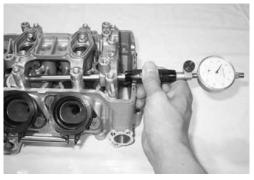
09900-20701: Magnetic stand

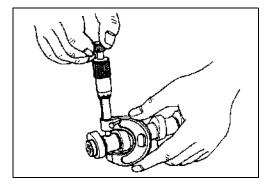
09900-21304: V-block set (100 mm)

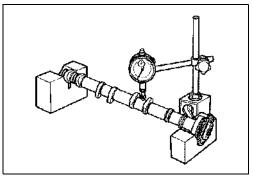
#### **CAM SPROCKET**

- 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

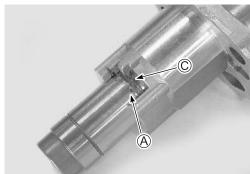


#### NOTE:

- \* Wipe off engine oil from the plunger head and thumb so that they may not to be slippery.
- \* If it is difficult to compress because of internal engine oil, disassemble the adjuster by releasing the inner circlip © and spill out the oil.

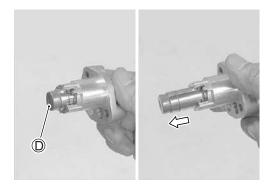


Do not turn the adjuster body until the outer circlip (A) passes over the groove (B), or the plunger may not be automatically out from the adjuster body even pushing force is applied on the head. (CF Below)





- Check that the plunger is automatically out when tapping its head  $\mathbb{D}$ .
- If it does not work 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 guide No. 1 and No. 2.
- If they are worn or damaged, replace them with the new ones.



## CYLINDER HEAD AND VALVE

## **VALVE AND VALVE SPRING DISASSEMBLY**

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

### CAUTION

Identify the position of each removed part.

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

09916-14510: Valve lifter

09916-14530: Valve lifter attachment

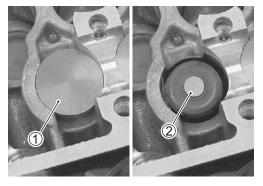
09916-84511: Tweezers

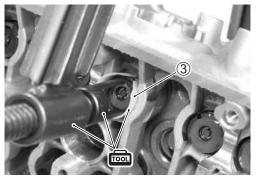
09919-28610: Sleeve protector

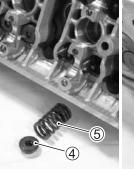
#### CAUTION

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

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







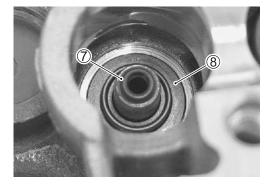


• Remove the oil seal ⑦ and spring seat ⑧.

#### CAUTION

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

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



#### CYLINDER HEAD DISTORTION

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

Cylinder head distortion:

Service Limit: 0.20 mm

09900-20803: Thickness gauge

#### **VALVE STEM RUNOUT**

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

DATA Valve stem runout:

Service Limit: 0.05 mm

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.

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)

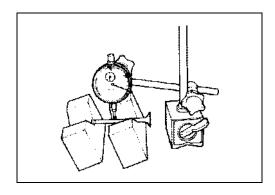
## CAUTION

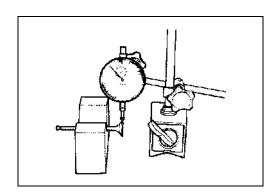
Be careful not to damage the valve and valve stem when handling it.

#### **VALVE STEM AND VALVE FACE WEAR CONDITION**

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









#### **VALVE STEM DEFLECTION**

- Lift the valve about 10 mm 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: 0.25 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) : 4.475 - 4.490 mm (0.1762 - 0.1768 in)

(EX): 4.455 – 4.470 mm (0.1754 – 0.1760 in)

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.

## 09916-43211: Valve guide remover/installer

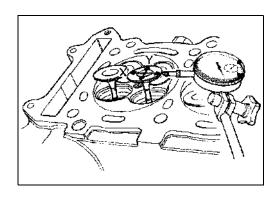
#### NOTE:

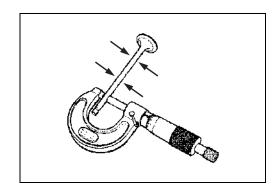
- \* Discard the removed valve guide subassemblies.
- \* Only oversized valve guides are available as replacement parts. (Part No. 11115-29G70)
- Re-finish the valve guide holes in cylinder head with the reamer and handle.

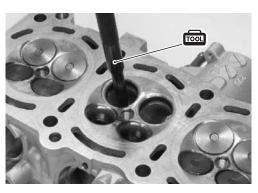
09916-33320: Valve guide reamer 09916-34542: Reamer handle

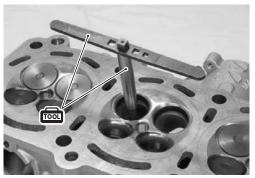
## **CAUTION**

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







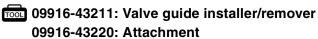


 Cool down the new valve guides in a freezer for about one hour and heat the cylinder head to 100 °C – 150 °C (212 °F – 302 °F) with a hot plate.

#### CAUTION

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

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





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

A: 15.7 mm (0.618 in) (IN & EX)



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.

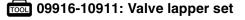
09916-33210: Valve guide reamer 09916-34542: Reamer handle

#### NOTE:

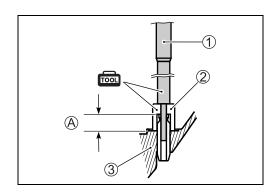
- \* Be sure to cool down the cylinder head to ambient air temperature.
- \* Insert the reamer from the combustion chamber and always turn the reamer handle clockwise.

#### **VALVE SEAT WIDTH INSPECTION**

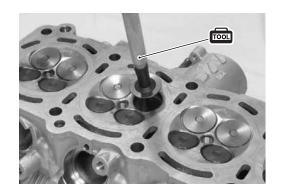
- Visually check for valve seat width on each valve face.
- If the valve face has worn abnormally, replace the valve.
- Coat the valve seat with Prussian Blue and set the valve in place. Rotate the valve with light pressure.
- Check that the transferred blue on the valve face is uniform all around and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







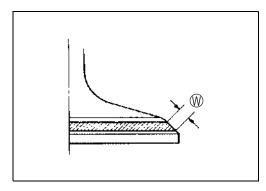




#### DATA Valve seat width ::

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

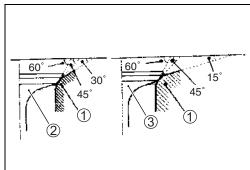
If the valve seat is out of specification, re-cut the seat.



#### **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 – 1.1mm (0.035 – 0.043 in)		
Valve diameter	29.0 mm (1.14 in)	23 mm (0.91 in)	
Valve guide I.D.	4.500 – 4.512 mm (0.177 – 0.178 i		



## CAUTION

- \* The valve seat contact area must be inspected after each cut.
- \* Do not use lapping compound after the final cut is made. The finished valve seat should have a velvety smooth finish but not a highly polished or shiny finish. This will provide a soft surface for the final seating of the valve which will occur during the first few seconds of engine operation.
- \* The titanium valves are coated with an oxidized membrane treatment to resist wear but the membrane tend to be removed if lapped after valve seat servicing.

#### 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.



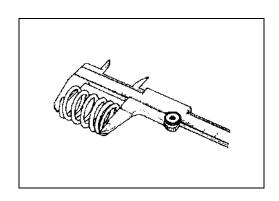
Service limit (IN & EX): 37.1 mm (1.460 in)

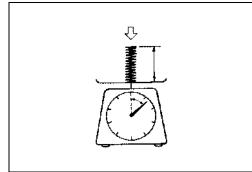
09900-20102: Vernier calipers

Valve spring tension (IN. & EX.):

Standard:

Approx. 147 N, 15.0 kgf/33.55 mm (33.1 lbs/1.32 in)





#### **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.

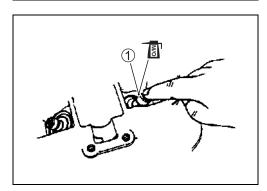
 Insert the valve, with its stem coated with MOLYBDENUM OIL SOLUTION all around and along the full stem length without any break.

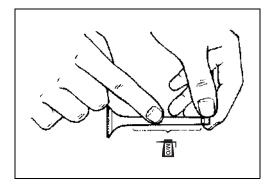
#### CAUTION

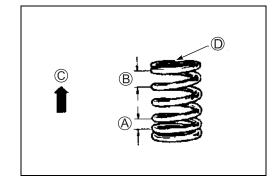
When inserting the valve, take care not to damage the lip of the oil seal.



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

**5** 09916-14510: Valve lifter

09916-14530: Valve lifter attachment

09916-84511: Tweezers

09919-28610: Sleeve protector

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



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

## CAUTION

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

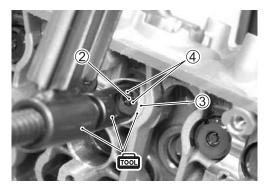
- 2 Valve spring retainer
- 4 Cotter
- Install the tappet shims and the tappets to their original positions.

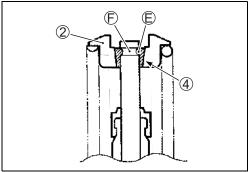
#### NOTE:

- \* Apply engine oil to the stem end, shim and tappet before fitting them.
- \* When seating the tappet shim, be sure the figure printed surface faces the tappet.

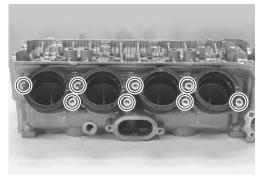
#### **INTAKE PIPE**

• Remove the intake pipes.









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

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

- Install the intake pipes.
- Apply THREAD LOCK to the bolts.

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



## **CLUTCH**

#### **CLUTCH DRIVE PLATE INSPECTION**

#### NOTE:

- \* Wipe off engine oil from the clutch drive plates with a clean rag.
- \* Clutch drive plate No.1: I.D. 111 mm (4.4 in)/Purple paint
- \* Clutch drive plate No.2: I.D. 111 mm (4.4 in)/Black paint
- \* Clutch drive plate No.3: I.D. 118 mm (4.6 in)/NIL

(A) Paint

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

## DATA Drive plate thickness:

**Service Limit: 2.42 mm (0.095 in)** 

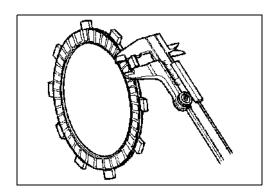
09900-20102: Vernier calipers

- 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: 13.05 mm (0.5138 in)

09900-20102: Vernier calipers



#### **CLUTCH DRIVEN PLATE INSPECTION**

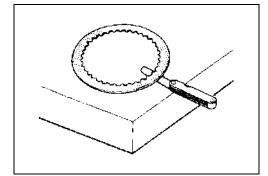
#### NOTE:

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

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

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

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.

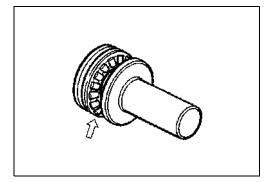
## **DATA** Clutch spring free length:

**Service Limit: 53.2 mm (2.094 in)** 

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.



## **CLUTCH LIFTER**

## CLUTCH LIFTER DRIVE CAM AND DRIVEN CAM INSPECTION

- Inspect the clutch lifter drive cam and driven cam for wear or damage.
- If any defects are found, replace the clutch lifter drive cam or driven cam.



#### **CLUTCH LIFTER PIN ADJUSTMENT**

#### NOTE:

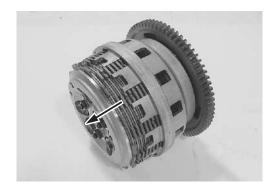
When adjusting the clutch lifter, it is not necessary to install the clutch onto the countershaft.

- Assemble the following parts into the primary driven gear assembly. ( 3-90 to -93)
- \* Clutch sleeve hub
- \* Spring washer seat, Spring washer
- \* Clutch drive plates, Clutch driven plates
- \* Pressure plate
- \* Clutch springs, Clutch springs set bolts

## Clutch spring set bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

 Remove the clutch assembly from the primary driven gear assembly.





- Check the height  $\oplus$  of clutch lifter adjusting pin screws at three positions using the thickness gauge.
- If the measurement is out of the specification, adjust the height  $\oplus$  as shown in the following specification.

Clutch lifter adjusting pin screw height  $\oplus$  Standard: 0.2 – 0.4 mm (0.008 – 0.016 in)

09900-20803: Thickness gauge

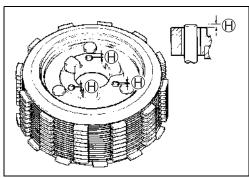
#### NOTE:

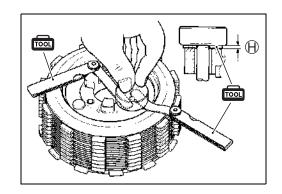
Each clutch lifter adjusting pin screw height should be as closely as possible.



- Set the thickness gauge to 0.3 mm (0.012 in).
- Place a proper flat plate on the thickness gauges and hold them by hand.
- Slowly turn in the adjusting pin screw until resistance is felt.
- Tighten the lock-nut.

Clutch lifter pin lock-nut: 23 N·m (2.3 kgf-m, 16.5 lb-ft)





#### **WAVE SPRING WASHER INSPECTION**

- ullet Measure the free height ullet of each wave spring washer with a vernier calipers.
- If each wave spring washer height  $\oplus$  is not within the specified limit, replace it with a new one.

09900-20102: Vernier calipers

**DATA** Wave spring washer height  $\oplus$ 

**Service Limit: 4.30 mm (0.169 in)** 

## **OIL PUMP**

#### **INSPECTION**

Remove the oil pump driven sprocket ①.



- · Rotate the oil pump shaft 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 onto the starter clutch and turn the starter driven gear by hand to inspect the starter clutch for a smooth movement. The gear turns one direction only. If a large resistance is felt to rotation, inspect the starter clutch for damage or inspect the starter clutch contacting surface of the starter driven gear for wear or damage.
- If they are found to be damaged, replace them with new ones.
- Inspect the starter driven gear bearing for any damages.

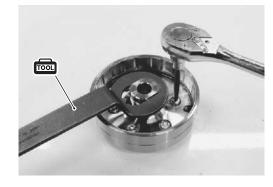




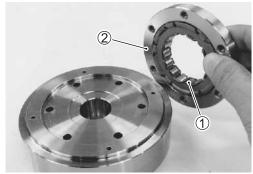
#### **DISASSEMBLY**

• With holding the rotor with the special tool remove the starter clutch bolts.

09930-44520: Rotor holder

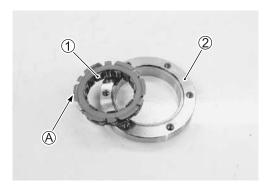


Remove the one way clutch ① and guide ② from the rotor.

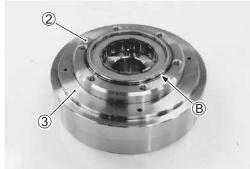


#### **REASSEMBLY**

• When fitting the one way clutch ① to the guide ②, position flange side A of one way clutch to the rotor side.



• When installing the starter clutch guide ② to the rotor ③, make sure that the flange B side faces outside.

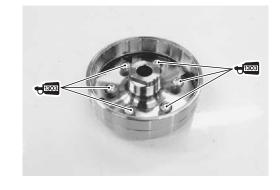


- Degrease the securing bolts and bolt holes.
- Apply THREAD LOCK SUPER "1303" to the bolts and tighten them to the specified torque while holding the rotor with the special tool.

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

Starter clutch securing bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

09930-44520: Rotor holder



## **GENERATOR**

INSPECTION ( 9-10)

#### REASSEMBLY

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

Generator stator set bolt: 11 N⋅m (1.1 kgf-m, 8.0 lb-ft)

#### NOTE:

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

#### **WATER PUMP**

**₹7-11** 

## **GEARSHIFT SYSTEM**

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

- · Remove the following parts from the gearshift shaft/gearshift
- 1 Washer

⑤ Plate return spring

2 Snap ring

- 6 Washer
- 3 Gearshift shaft return spring
- ⑦ Screw
- 4 Gearshift cam drive plate

#### **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

Apply THREAD LOCK to the gearshift shaft screw.

+1342 99000-32050: THREAD LOCK "1342"

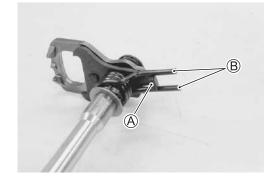


#### NOTE:

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





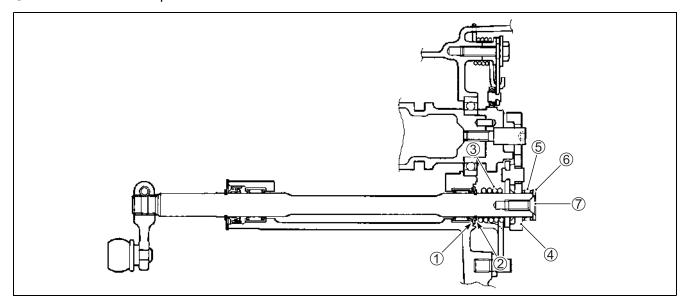


- Install the following parts to the gearshift shaft/gearshift arm as shown in the illustration.
- 1 Washer

⑤ Plate return spring

② Snap ring

- 6 Washer
- 3 Gearshift shaft return spring
- 7 Screw
- 4 Gearshift cam drive plate



## **OIL PRESSURE REGULATOR**

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



## **OIL STRAINER**

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

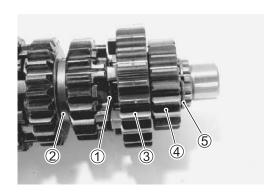


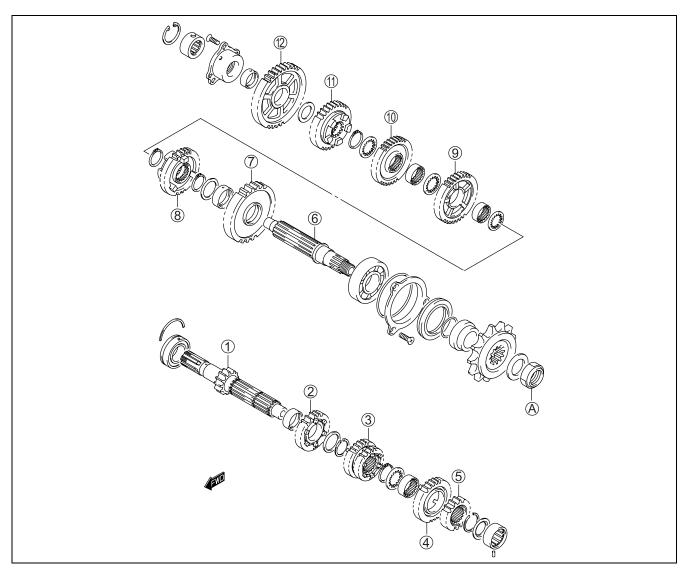
# TRANSMISSION DRIVESHAFT REMOVAL ((3-52)

#### **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		3rd driven gear
	3rd/4th drive gears		4th driven gear
_	6th drive gear		5th driven gear
<b>⑤</b>	2nd drive gear	12	1st driven gear
6	Driveshaft	A	Engine sprocket nut
7	2nd driven gear		

ITEM	N∙m	kgf-m	lb-ft		
A	115	11.5	83.0		

#### **REASSEMBLY**

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

#### NOTE:

- \* Rotate the bearings by hand to inspect for smooth rotation.

  Replace the bearings if there is anything unusual.
- \* Before installing the gears, apply engine oil to the driveshaft and countershaft.
- \* When installing the oil seal, apply SUZUKI SUPER GREASE "A" to it

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

#### CAUTION

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

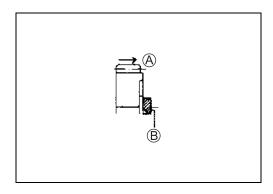
#### NOTE:

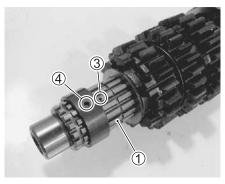
When reassembling the transmission, attention must be given to the locations and positions of washers and snap rings. The cross sectional view shows the correct position of the gears, bushings, washers and snap rings. (3-48)

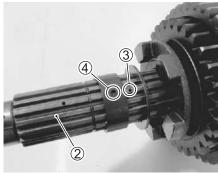
- When installing a new snap ring, pay attention to its direction. Fit it to the side where the thrust is as shown in the illustration.
  - (A) Thrust
  - B Sharp edge

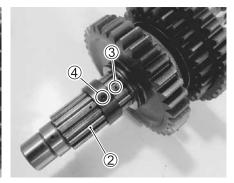
### CAUTION

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

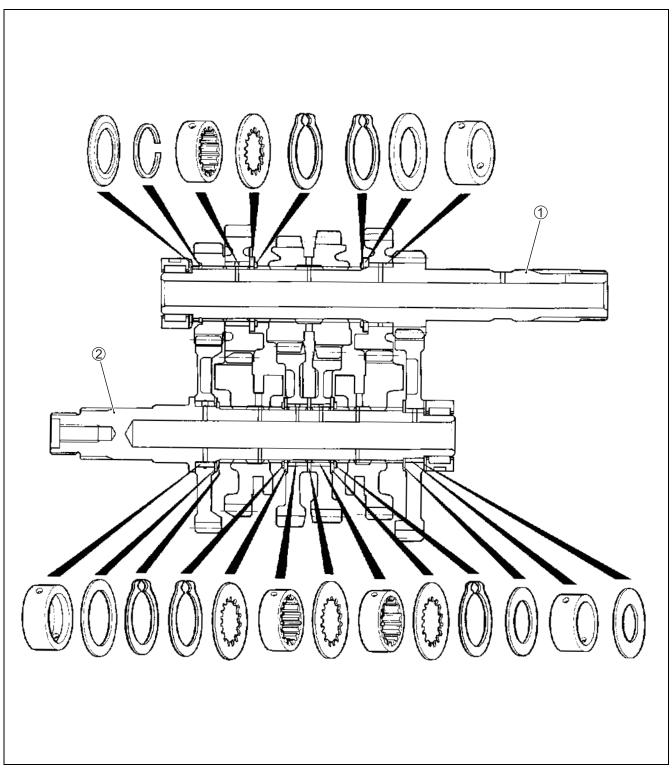








## TRANSMISSION PARTS LOCATION



1	Countershaft	2	Driveshaft

## **CYLINDER**

## CRANKCASE SERVICING (3-52)

#### CYLINDER DISTORTION

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

## **DATA** Cylinder distortion:

**Service Limit: 0.02 mm (0.008 in)** 

09900-20803: Thickness gauge

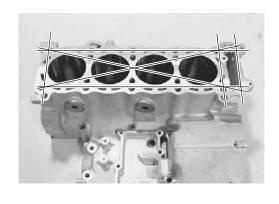
#### CYLINDER BORE

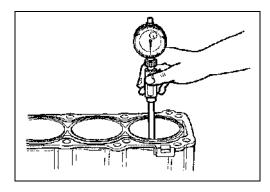
- Inspect the cylinder wall for any scratches, nicks or other damage.
- Measure the cylinder bore diameter at six places.

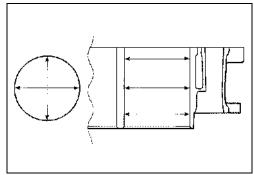
## Cylinder bore:

Standard: 70.000 - 70.015 mm (2.7559 - 2.7565 in)

09900-20508: Cylinder gauge set







## PISTON AND PISTON RING

#### **PISTON DIAMETER**

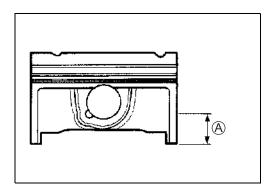
- Using a micrometer, measure the piston outside diameter at 15 mm (0.6 in) (A) from the piston skirt end.
- If the measurement is less than the limit, replace the piston.

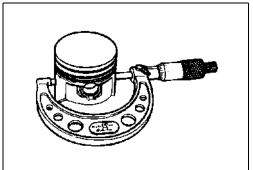
#### DATA Piston diameter:

Service Limit: 69.88 mm (2.7512 in)

at 15 mm (0.6 in) from the skirt end

09900-20203: Micrometer (50 – 75 mm)





#### **PISTON-TO-CYLINDER CLEARANCE**

- Subtract the piston diameter from the cylinder bore diameter. ( 3-49)
- If the piston-to-cylinder clearance exceeds the service limit, replace the crankcase set or the piston, or both.

#### **DATA** Piston-to-cylinder clearance:

Service Limit: 0.120 mm (0.0047 in)

#### **PISTON PIN AND PIN BORE**

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

### Piston pin bore I.D.:

Service Limit: 15.030 mm (0.5917 in)

09900-20602: Dial gauge (1/1000 mm) 09900-22401: Small bore gauge (10 – 18 mm)

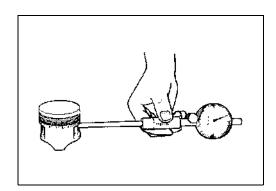
Measure the piston pin outside diameter at three positions

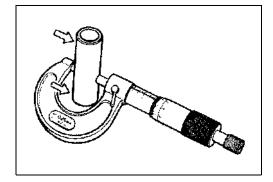
- using the micrometer.
- If any of the measurements is out of specification, replace the piston pin.

## Piston pin O.D.:

Service Limit: 14.980 mm (0.5898 in)

09900-20205: Micrometer (0 – 25 mm)





#### PISTON RING-TO-GROOVE CLEARANCE

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

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

Piston ring-to-groove clearance:

Service Limit (1st): 0.180 mm (0.0071 in) (2nd): 0.150 mm (0.0059 in)

Piston ring groove width:

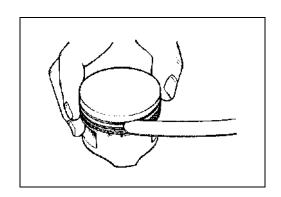
Standard (1st): 1.01 - 1.03 mm (0.0398 - 0.0406 in)

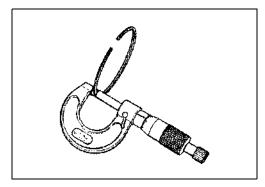
(2nd): 0.81 - 0.83 mm (0.0319 - 0.0327 in) (Oil): 1.51 - 1.53 mm (0.0594 - 0.0602 in)

**DATA** Piston ring thickness:

Standard (1st) : 0.97 - 0.99 mm (0.0382 - 0.0390 in)

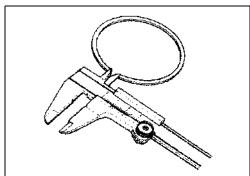
(2nd): 0.77 – 0.79 mm (0.0303 – 0.0311 in)





#### PISTON RING FREE END GAP AND PISTON RING END GAP

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



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

PAYA Piston ring free end gap:

Service Limit (1st): 7.3 mm (0.29 in) (2nd): 5.8 mm (0.23 in)

09900-20102: Vernier calipers

Piston ring end gap:

Service Limit (1st): 0.50 mm (0.020 in) (2nd): 0.50 mm (0.020 in)

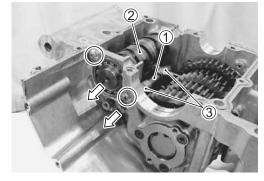
09900-20803: Thickness gauge



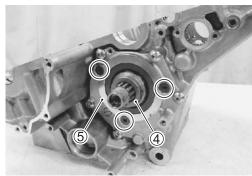
## DRIVESHAFT AND GEARSHIFT CAM

#### Removal

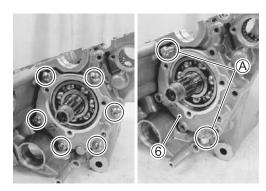
- Remove the screws.
- Remove the gearshift fork shaft ①, gearshift cam ② and gearshift forks ③.



- Remove the spacer 4.
- Remove the driveshaft left bearing dust seal ⑤.



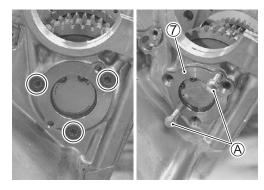
- Remove the driveshaft left bearing case bolts.
- By using suitable size bolts (A), remove the driveshaft left bearing case (6).



• Remove the dowel pin.



- Remove the driveshaft right bearing case bolts.
- By using suitable size bolts (A), remove the driveshaft right bearing assembly (7).

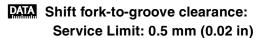


Remove the driveshaft assembly 8.



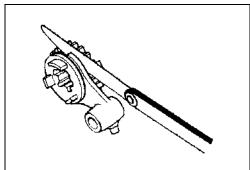
#### **GEARSHIFT FORK-TO-GROOVE CLEARANCE**

- Using a thickness gauge, check the gearshift fork clearance in the groove of its gear.
- The clearance for each gearshift fork plays an important role in the smoothness and positiveness of the shifting action.



09900-20803: Thickness gauge

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



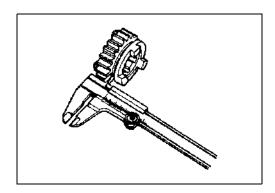
#### **GEARSHIFT FORK GROOVE WIDTH**

 Measure the gearshift fork groove width using the vernier calipers.

**DATA** Shift fork groove width:

Standard: 5.0 - 5.1 mm (0.197 - 0.201 in)

09900-20102: Vernier calipers



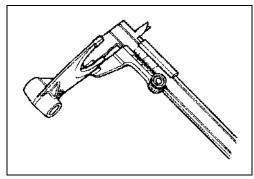
#### **GEARSHIFT FORK THICKNESS**

 Measure the gearshift fork thickness using the vernier calipers.

DATA Shift fork thickness:

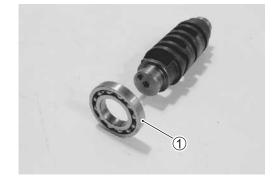
Standard: 4.8 - 4.9 mm (0.189 - 0.193 in)

09900-20102: Vernier calipers

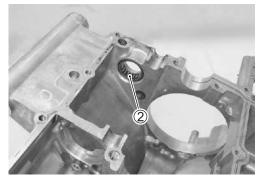


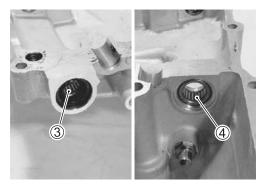
## Inspection

- Inspect the gearshift cam bearing ① for abnormal noise and smooth rotation.
- Replace the bearings if there is anything unusual.



- Inspect the gearshift cam bearing ②, gearshift shaft bearings
   ③ (LH) and ④ (RH) for abnormal noise and smooth rotation while they are in the crankcase.
- Replace the bearing if there is anything unusual.





- Inspect the driveshaft left bearing for abnormal noise and smooth rotation while it is in the case.
- Replace the bearing if there is anything unusual.



- Inspect the driveshaft right bearing for abnormal noise and smooth rotation.
- If there is anything unusual, replace the bearing assembly.



- Inspect the driveshaft left bearing dust seal for wear and damage.
- Replace the dust seal if there is anything unusual.



#### Removal

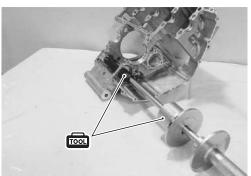
• Remove the gearshift cam bearing with the special tools.

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

## CAUTION

Be careful not to lean the bearing remover.

• Remove the oil seal. (LH only)





• Remove the gearshift shaft bearings with the special tool.

09921-20240: Bearing remover set (15 mm)



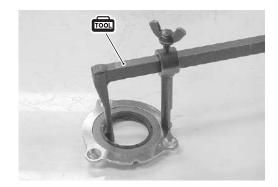
• Remove the bearing with the special tool.

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



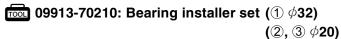
· Remove the driveshaft left bearing dust seal from the retainer using the special tool.

09913-50121: Oil seal remover



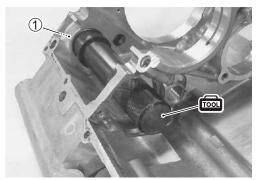
## Installation

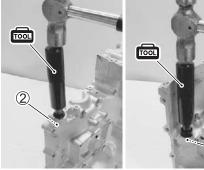
• Install the bearings with the special tool.

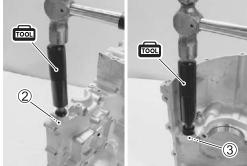


## NOTE:

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



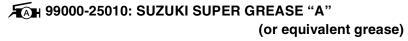


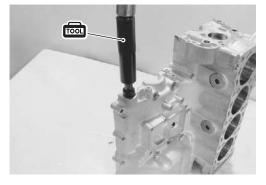


• Install new oil seal with the special tool.

**5.1** 09913-70210: Bearing installer set ( $\phi$ 22)

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





• Install the bearing with the special tool.



## NOTE:

The stamped mark side of the driveshaft left bearing faces outside.



 Install the driveshaft left bearing dust seal with the special tool.

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



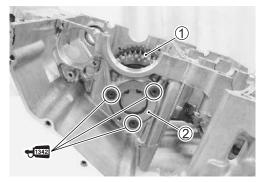
- Put the driveshaft assembly 1 into the lower crankcase.
- Install the driveshaft right bearing assembly 2.
- Apply THREAD LOCK to the bolts and tighten them to the specified torque.

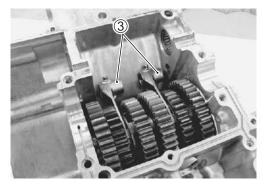
**←**1342 99000-32050: THREAD LOCK "1342"

Driveshaft right bearing case bolt:

12 N·m (1.2 kgf-m, 8.7 lb-ft)

• Install the gearshift forks 3 as shown.





- Install the gearshift cam 4 with the bearing fitted.
- With engaging each fork end to the cam groove, insert the fork shaft ⑤.
- Apply THREAD LOCK to the screws and tighten them to the specified torque.

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

■ Bearing retainer screw: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

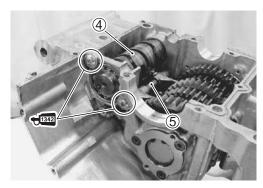
- Install the dowel pin.
- Apply SUZUKI SUPER GREASE "A" to the O-ring and fit the driveshaft left bearing case 6.

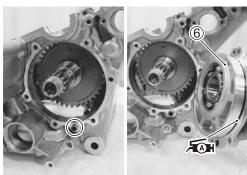
## CAUTION

Replace the O-ring with a new one.

FAH 99000-25010: SUZUKI SUPER GREASE "A"

(or equivalent grease)





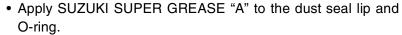
 Apply THREAD LOCK to the bolts and tighten them to the specified torque.

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

TOOL

Driveshaft left bearing case bolt:

12 N·m (1.2 kgf-m, 8.7 lb-ft)



 Apply THREAD LOCK to the bolts and tighten them to the specified torque.

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

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

Driveshaft retainer bolt: 12 N⋅m (1.2 kgf-m, 8.7 lb-ft)

# CAUTION

Replace the O-ring with a new one.

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

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

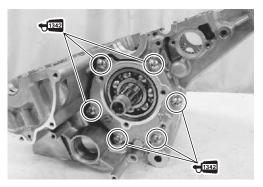
# CAUTION

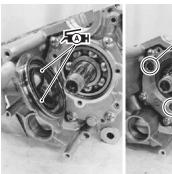
Replace the O-ring with a new one.

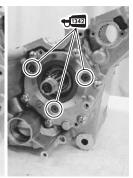
Install the spacer 7.

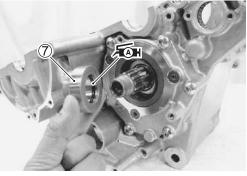
# OIL JET Removal

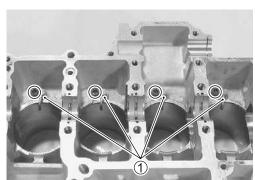
 Remove the piston cooling oil jets ① from the upper crankcase.



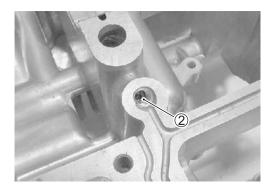




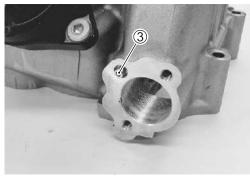




 Remove the oil jet ② (for transmission) from the lower crankcase.



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



# Inspection and cleaning

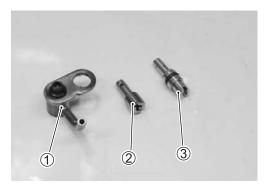
- Check the oil jets for clogging.
- If they are clogged, clean their oil passage with a proper wire and compressed air.
  - 1 Piston cooling oil jet
  - 2 Oil jet (#14) (For transmission)
  - 3 Oil jet (#8) (For cam chain tension adjuster)

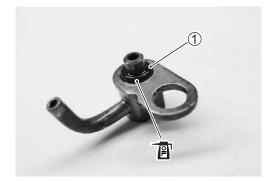
## Installation

• 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.





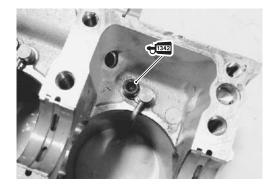
• Install each piston cooling oil jet.

## NOTE:

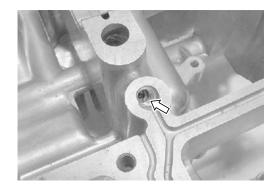
Apply a small quantity of THREAD LOCK to the bolts and tighten them to the specified torque.

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

Piston cooling oil jet bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)



• Install the oil jet (for transmission).

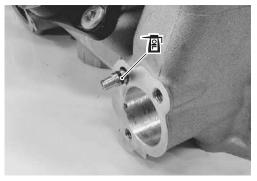


• Apply engine oil to the O-ring.

# CAUTION

# Use new O-ring to prevent oil pressure leakage.

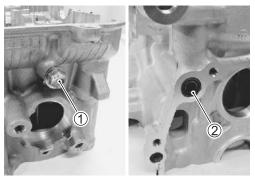
• Install the oil jet (for cam chain tension adjuster).



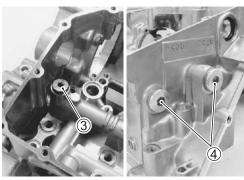
# **PLUG**

# Removal

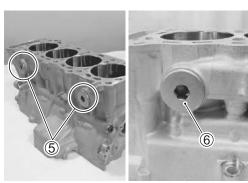
• Remove the oil gallery plugs ① and ②.



• Remove the oil gallery plugs 3 and 4.



 $\bullet$  Remove the water jacket plugs  $\ensuremath{\mathfrak{G}}$  and  $\ensuremath{\mathfrak{G}}.$ 



## Installation

Apply THREAD LOCK to the oil gallery plug ②.

99000-32050: THREAD LOCK "1342"

## NOTE:

- \* It is not required to apply THREAD LOCK when installing the other removed oil gallery plugs.
- \* After tightening the plug ②, make sure that the plug end is flush with the cover mating surface.
- Apply engine coolant to the O-rings of the water jacket plugs
   and 6.

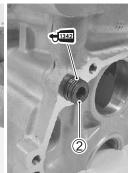
# 99000-99032-11X: SUZUKI COOLANT (Except USA)

- Tighten each plug to the specified torque.
- ① Oil gallery plug: 10 N·m (1.0 kgf-m, 7.0 lb-ft)
  - 2 Oil gallery plug: 22 N·m (2.2 kgf-m, 16.0 lb-ft)
  - 3 Oil gallery plug: 15 N·m (1.5 kgf-m, 11.0 lb-ft)
  - 4 Oil gallery plug: 35 N·m (3.5 kgf-m, 25.5 lb-ft)
  - 5 Water jacket plug: 9.5 N·m (0.95 kgf-m, 6.9 lb-ft)
  - 6 Water jacket plug: 9.5 N·m (0.95 kgf-m, 6.9 lb-ft)

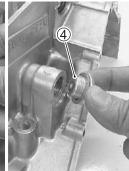
## CAUTION

Use new gasket or O-ring for each plug.

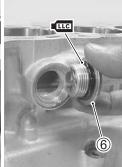












# **BALANCER SHAFT**

## **DISASSEMBLY**

 Remove the balancer gear along with the dampers from the balancer shaft.

## **INSPECTION**

• Inspect the damper for wear and damage, replace it if any defects are found.



#### REASSEMBLY

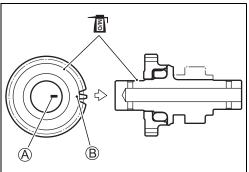
Apply MOLYBDENUM OIL SOLUTION to each part.

# MOLYBDENUM OIL SOLUTION

 Set the dampers and install the balancer shaft to balancer gear.

## NOTE:

- \* Fit the stopper of the balancer shaft between the dampers.
- \* Align the line (A) on the balancer shaft with the punch (B) on the balancer gear.



# **BALANCER SHAFT JOURNAL BEARING**

## **INSPECTION**

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

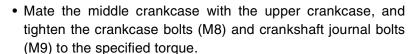
## **SELECTION**

• Place the plastigauge axially along the balancer shaft journal as shown.



# CAUTION

Never rotate the balancer shaft when a piece of plastigauge is installed.



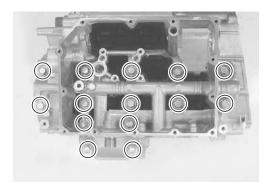


Initial: 18 N·m (1.8 kgf-m, 13.0 lb-ft)

Final: 50°

Crankcase bolt (M8):

Initial: 15 N·m (1.5 kgf-m, 11.0 lb-ft) Final: 26 N·m (2.6 kgf-m, 19.0 lb-ft)





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

# **DATA** Balancer shaft journal oil clearance:

Standard: 0.028 - 0.052 mm (0.0011 - 0.0020 in) Service Limit: 0.080 mm (0.031 in)

- If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.
- Check the corresponding crankcase journal I.D. code number
   A, "A" or "B" which is stamped on the rear of upper crankcase.
- Check the corresponding balancer shaft journal O.D. code number (B), "A" or "B" which is stamped on the balancer shaft.

# DAVA Bearing selection table

		Balancer shaft journal O.D. ®	
	Code	Α	В
Crankcase	Α	Green	Black
I.D. (A	В	Black	Brown

# **DATA** Crankcase I.D. specification

Code	I.D. specification
^	26.000 – 26.008 mm
^	(1.0236 - 1.0239 in)
D	26.008 – 26.016 mm
В	(1.0239 – 1.0243 in)

# Balancer shaft journal O.D. specification

Code	O.D. specification
^	22.984 – 22.992 mm
^	(0.9049 – 0.9052 in)
В	22.976 – 22.984 mm
	(0.9046 – 0.9049 in)

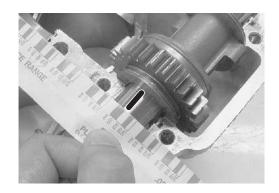
09900-20205: Micrometer (0 – 25 mm)

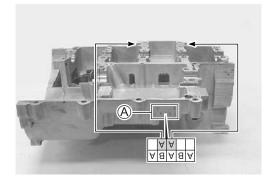
# **DATA** Bearing thickness specification

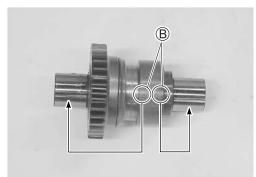
Color (Part No.)	Thickness
Green	1.486 – 1.490 mm
(12229-40F50-0A0)	(0.0585 – 0.0587 in)
Black	1.490 – 1.494 mm
(12229-40F50-0B0)	(0.0587 – 0.0588 in)
Brown	1.494 – 1.498 mm
(12229-40F50-0C0)	(0.0588 – 0.0590 in)

NOTE:

The balancer shaft journal bearings on upper and middle crankcases are the same.









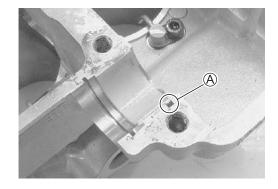


# **INSTALLATION**

• When fitting the balancer shaft 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 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 (0.002 in)** 

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.

# DAVA Conrod small end I.D.:

Service Limit: 15.040 mm (0.5921 in)

09900-20602: Dial gauge (1/1000 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.

# Conrod big end side clearance:

**Service Limit: 0.30 mm (0.012 in)** 

09900-20803: Thickness gauge

Conrod big end width:

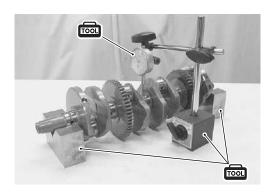
Standard: 19.95 - 20.00 mm (0.7854 - 0.7874 in)

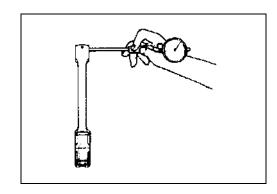
09900-20205: Micrometer (0 – 25 mm)

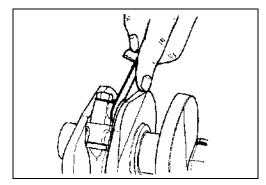
Crank pin width:

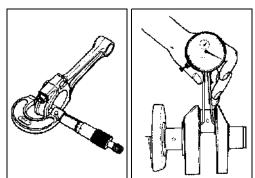
Standard: 20.10 - 20.15 mm (0.7913 - 0.7933 in)

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



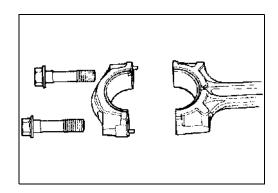






## **CONROD-BIG END BEARING INSPECTION**

 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

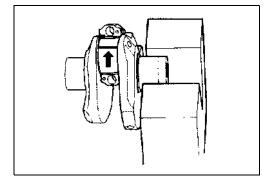
 Place the plastigauge axially along the crank pin, avoiding the oil hole, as shown.

# 09900-22301: Plastigauge

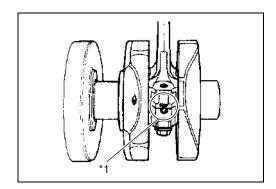
• Tighten the conrod cap bolts to the specified torque, in two stages. ( 3-77)

# CAUTION

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



\*1: The number faces the intake side.

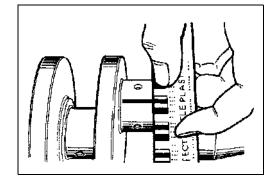


 Remove the bearing caps and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

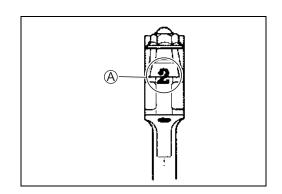
## **DATA** Conrod big end oil clearance:

Standard: 0.032 - 0.056 mm (0.0013 - 0.0022 in) Service Limit: 0.080 mm (0.0031 in)

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



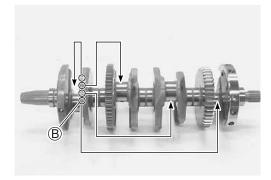
• Check the corresponding conrod I.D. code number ("1" or "2")



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

# **DATA** Bearing selection table

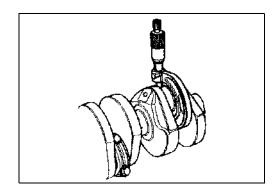
		Crank pin O.D. ®		
	Code	1	2	3
Conrod	1	Green	Black	Brown
I.D (A)	2	Black	Brown	Yellow



# DATA Conrod I.D.

Code	I.D. specification
4	36.000 – 36.008 mm
'	(1.4173 – 1.4176 in)
2	36.008 – 36.016 mm
2	(1.4176 – 1.4179 in)

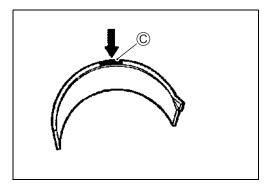
Code	O.D. specification
4	32.992 – 33.000 mm
'	(1.2989 – 1.2992 in)
2	32.984 – 32.992 mm
2	(1.2986 – 1.2989 in)
3	32.976 – 32.984 mm
3	(1.2983 – 1.2986 in)



09900-20202: Micrometer (25 – 50 mm)

**PATA** Bearing thickness

Color © (Part No.)	Thickness
Yellow	1.492 – 1.496 mm
(12164-30G00-0D0)	(0.0587 – 0.0589 in)
Brown	1.488 – 1.492 mm
(12164-30G00-0C0)	(0.0586 – 0.0587 in)
Black	1.484 – 1.488 mm
(12164-30G00-0B0)	(0.0584 – 0.0586 in)
Green	1.480 – 1.484 mm
(12164-30G00-0A0)	(0.0583 – 0.0584 in)

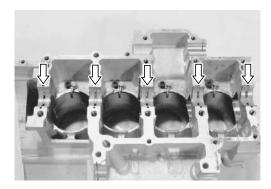


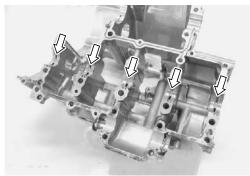
CAUTION

The bearings must be replaced as a set.

# CRANKSHAFT JOURNAL BEARING INSPECTION

 Inspect each bearing of upper and lower 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 lower crankcase with the upper crankcase.
- Tighten the crankshaft journal bolts (M9) in ascending order of numbers assigned to these bolts. Tighten each bolt a little at a time to equalize the pressure.

Crankshaft journal bolt: (M9)

Initial: 18 N·m (1.8 kgf-m, 13.0 lb-ft)

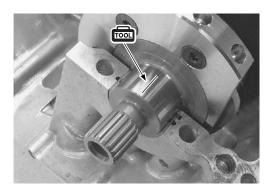
Final: 50°

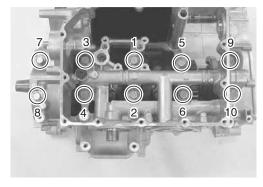
 Remove the lower crankcase and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

**DATA** Crankshaft journal oil clearance:

Standard: 0.010 - 0.028 mm (0.0004 - 0.0011 in) Service Limit: 0.080 mm (0.0031 in)

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







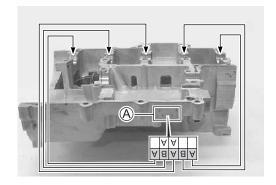
- Check the corresponding crankcase journal I.D. code number
   A, "A", "B" or "C" which is stamped on the rear of upper crankcase.
- Check the corresponding crankshaft journal O.D. code number (B), "A", "B" or "C" which is stamped on the crankshaft.

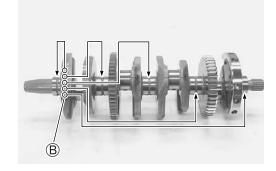
# **DATA** Bearing selection table

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

# Crankcase I.D. specification

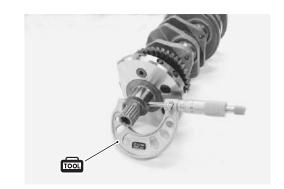
Code	I.D. specification
А	35.000 – 35.006 mm
	(1.3780 – 1.3782 in)
D	35.006 – 35.012 mm
В	(1.3782 – 1.3784 in)
(	35.012 – 35.018 mm
	(1.3784 – 1.3787 in)





# Crankshaft journal O.D. specification

Code	O.D. specification
A	31.994 – 32.000 mm
A	(1.2596 – 1.2598 in)
D	31.988 – 31.994 mm
В	(1.2594 – 1.2596 in)
	31.982 – 31.988 mm
	(1.2591 – 1.2594 in)



09900-20202: Micrometer (25 – 50 mm)

# **DATA** Bearing thickness specification

Color (Part No.)	Thickness
Blue	1.504 – 1.507 mm
(12229-02H00-0E0)	(0.0592 – 0.0593 in)
Yellow	1.501 – 1.504 mm
(12229-02H00-0D0)	(0.0591 – 0.0592 in)
Brown	1.498 – 1.501 mm
(12229-02H00-0C0)	(0.0590 – 0.0591 in)
Black	1.495 – 1.498 mm
(12229-02H00-0B0)	(0.0589 – 0.0590 in)
Green	1.492 – 1.495 mm
(12229-02H00-0A0)	(0.0587 – 0.0589 in)



NOTE:

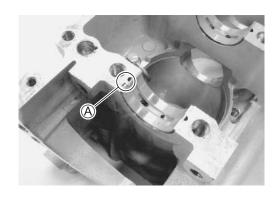
Upper and lower crankshaft journal bearings are the same.

# **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:

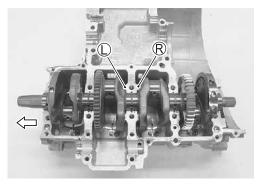
Pull the crankshaft to the generator side, so that there is no clearance on the right-side thrust bearing.

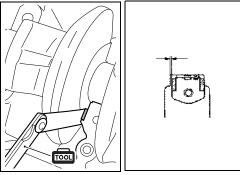
# DATA Thrust clearance:

Standard: 0.055 - 0.110 mm (0.0022 - 0.0043 in)

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.

# Right-side thrust bearing thickness:

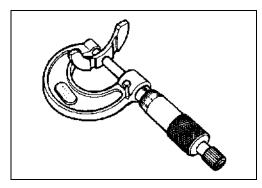
Standard: 2.425 - 2.450 mm (0.0955 - 0.0964 in)

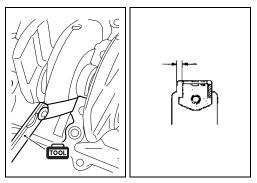


- If the right-side thrust bearing is within the standard range, reinsert the right-side thrust bearing and remove the left-side thrust bearing.
- As shown in the illustration, measure the clearance by using a thickness gauge before inserting the left-side thrust bearing.

# 09900-20803: Thickness gauge

• Select a left-side thrust bearing from the selection table. ( 3-73)





# Thrust bearing selection table

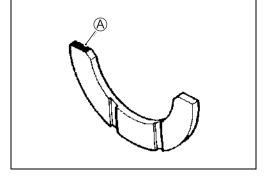
Clearance before inserting left-side thrust bearing	Color (Part No.)	Thrust bearing thickness	Thrust clearance
2.560 – 2.585 mm	White	2.475 – 2.500 mm	0.060 – 0.110 mm
(0.1008 – 0.1018 in)	(12228-17E00-0F0)	(0.0974 – 0.0984 in)	(0.0024 – 0.0043 in)
2.535 – 2.560 mm	Yellow	2.450 – 2.475 mm	0.060 – 0.110 mm
(0.0998 – 0.1008 in)	(12228-17E00-0E0)	(0.0965 – 0.0974 in)	(0.0024 – 0.0043 in)
2.510 – 2.535 mm	Green	2.425 – 2.450 mm	0.060 – 0.110 mm
(0.0988 – 0.0998 in)	(12228-17E00-0D0)	(0.0955 – 0.0965 in)	(0.0024 – 0.0043 in)
2.485 – 2.510 mm	Blue	2.400 – 2.425 mm	0.060 – 0.110 mm
(0.0978 – 0.0988 in)	(12228-17E00-0C0)	(0.0945 – 0.0955 in)	(0.0024 – 0.0043 in)
2.460 – 2.485 mm	Black	2.375 – 2.400 mm	0.060 – 0.110 mm
(0.0969 – 0.0978 in)	(12228-17E00-0B0)	(0.0935 – 0.0945 in)	(0.0024 – 0.0043 in)
2.430 – 2.460 mm	Red	2.350 – 2.375 mm	0.055 – 0.110 mm
(0.0957 – 0.0969 in)	(12228-17E00-0A0)	(0.0925 – 0.0935 in)	(0.0022 – 0.0043 in)

 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 bearings ( 3-71)
- \* Driveshaft ( 3-57)
- \* Gearshift fork shafts ( 3-44)
- \* Gearshift shaft bearings ( 3-56)
- \* Gearshift cam bearings ( 3-56)
- \* Gearshift cam ( 3-57)
- \* Driveshaft bearings ( 3-57)
- \* Oil jets (3-59)

## **PISTON RING**

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

## NOTE:

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

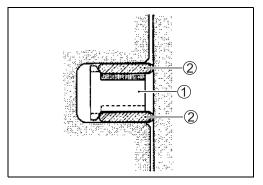
# CAUTION

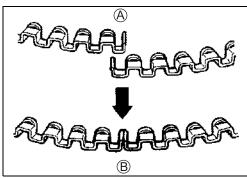
When installing the spacer, be careful not to allow its two ends to overlap in the groove.

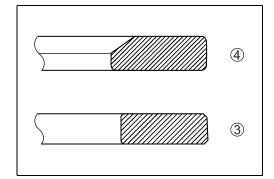
- **A INCORRECT**
- **B** CORRECT
- Install the 2nd ring 3 and the 1st ring 4 to the piston.

# NOTE:

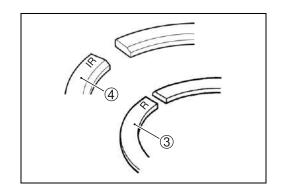
1st ring and 2nd ring differ in shape.



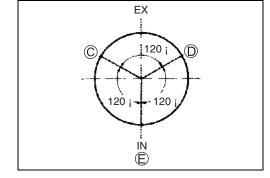




• 1st ring ④ and 2nd ring ③ have letters "IR" and "R" marked on one side. Be sure to bring the marked side upward when fitting them to the piston.



 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
- 1st ring and spacer



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



• 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.

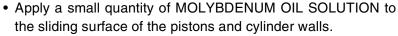
• Install the piston pin circlips ①.

# CAUTION

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

## NOTE:

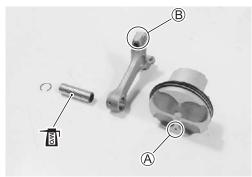
End gap of the circlip should not be aligned with the cutaway in the piston pin bore.



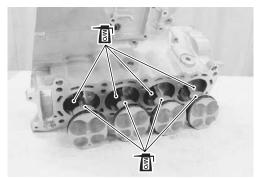


## NOTE:

Be sure to install the pistons in the cylinders from which they were removed in disassembly, referring to the cylinder numbers, "1" through "4", scribed on the piston.



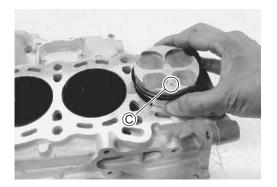




• Install the pistons and conrods into the cylinders from upside.

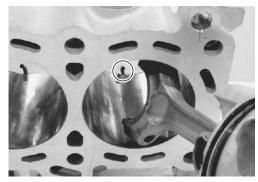
# NOTE:

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



# CAUTION

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

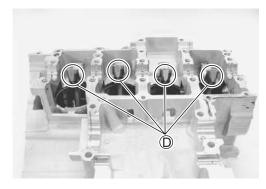


• Check that I.D. code 

on each conrod faces intake side.

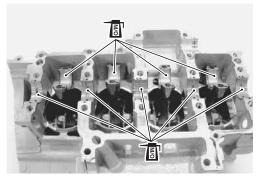
# CAUTION

Be sure to clean the conrod big end.



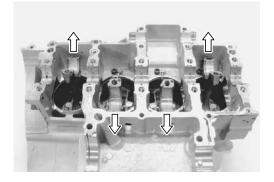
• Apply a MOLYBDENUM OIL SOLUTION to each crank pin bearing surface and crankshaft journal bearing surface.

# MOLYBDENUM OIL SOLUTION

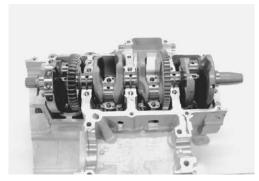


## **CRANKSHAFT**

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



• Set the crankshaft to the conrods and upper crankcase.



• Apply engine oil to the crank pin and bearing surface.

# **CAUTION**

## Be sure to clean the conrod big end.



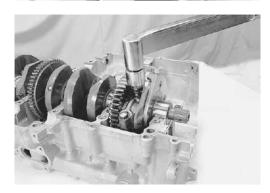
- Apply engine oil to the bearing cap bolts.
- Tighten the conrod bearing cap bolt by using a 10 mm, 12 point socket wrench in the following two steps.

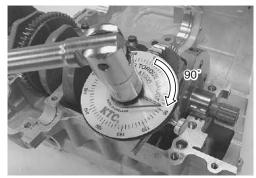
# Conrod bearing cap bolt:

Initial: 15 N·m (1.5 kgf-m, 11.0 lb-ft)

Final: 90° (1/4 turn)

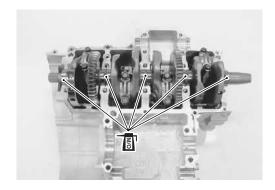
- Apply engine oil to the conrod big end side surfaces.
- Check the conrod movement for smooth turning.





 Apply a MOLYBDENUM OIL SOLUTION to each crankshaft journal and bearing lightly.

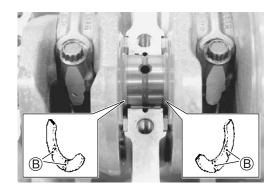




• Insert the right and left thrust bearings with oil groove ® facing the crank web.

## NOTE:

Right thrust bearing has green painting.

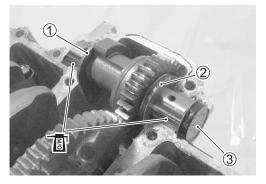


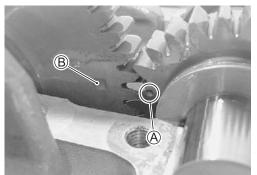
#### **BALANCER SHAFT**

- Install the thrust washers ①, ② and oil seal ③.
- Apply a MOLYBDENUM OIL SOLUTION to each balancer shaft journal and bearing lightly.

# MOLYBDENUM OIL SOLUTION

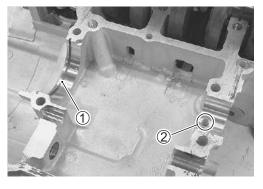
• Set the balancer shaft so that its punch mark (A) is aligned with the index (B) on the crankshaft.





# **COUNTERSHAFT**

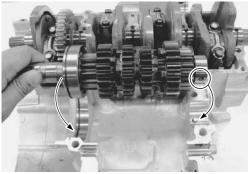
• Install the C-ring ① and bearing pin ② to the upper crankcase.



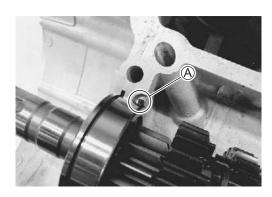
• Install the countershaft assembly to the upper crankcase.

## NOTE:

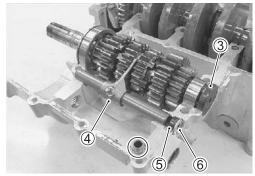
Align the C-ring with the groove of bearing and the bearing pin with the indent on the bearing.



ullet Turn the bearing to fit the bearing dowel pin in the position lacktriangle.



- Install the dowel pin and oil seal ③.
- Install the gearshift shaft and fork ④, bushing ⑤ and retainer ⑥.



## **CRANKCASE**

- Clean the mating surfaces of the crankcases.
- Install the dowel pins.
- Install the dowel pins, O-ring 1 and cap 2.

# **CAUTION**

Replace the O-ring with a new one.

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

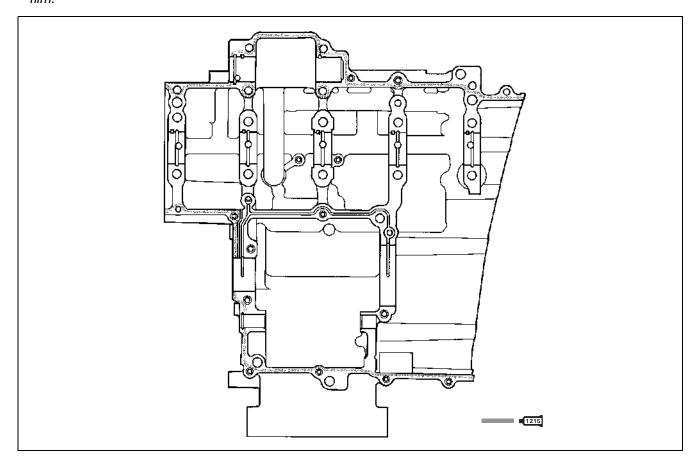
# ■1215 99000-31110: SUZUKI BOND "1215"

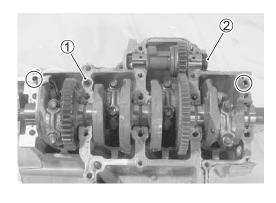
(or equivalent bond)

## 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.





Tighten the crankshaft journal bolts (M9) 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, 13.0 lb-ft)

Final:50°

# **CAUTION**

Fit new gasket washers to the bolts  $\widehat{\mathbb{A}}$  to prevent oil leakage.

• 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, 4.5 lb-ft)

Final: 11 N·m (1.1 kgf-m, 8.0 lb-ft)

(M8) Initial: 15 N·m (1.5 kgf-m, 11.0 lb-ft)

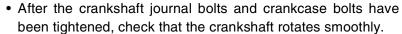
Final: 26 N·m (2.6 kgf-m, 19.0 lb-ft)

Crankcase bolt B:(M8) Initial: 15 N·m (1.5 kgf-m, 11.0 lb-ft)

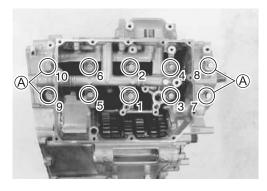
Final: 22 N·m (2.2 kgf-m, 16.0 lb-ft)

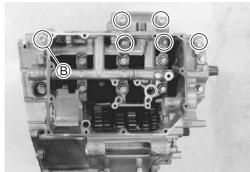
## CAUTION

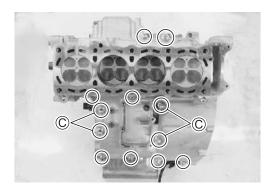
- \* Replace the bolt ® with a new precoated one.
- \* Fit new gasket washers to the bolts © to prevent oil leakage.

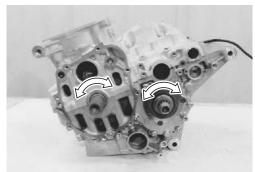


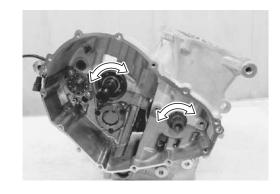
 Also check that the driveshaft and countershaft rotate smoothly.





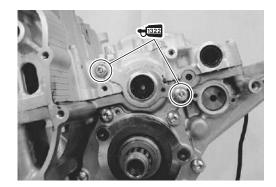






- Install the clutch push rod oil seal retainer ①.
- Apply THREAD LOCK to the bolts.

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



#### **OIL PUMP**

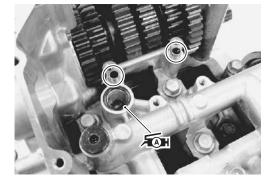
- · Install new O-ring.
- Apply SUZUKI SUPER GREASE "A" to the O-ring.

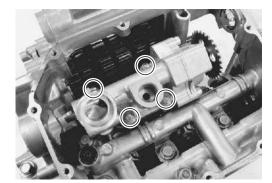
FAH 99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)

# **CAUTION**

Use a new O-ring to prevent oil leakage.

- Install the dowel pins.
- Install the oil pump ① and tighten the oil pump bolts to the specified torque.
- Oil pump mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)





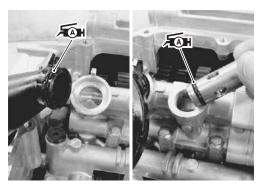
## **OIL STRAINER AND OIL PRESSURE REGULATOR**

• Apply SUZUKI SUPER GREASE "A" to the O-rings and press in the oil strainer and oil pressure regulator to the crankcase.

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

# CAUTION

Use a new O-ring to prevent oil leakage.



## **OIL PAN**

- Install new gasket.
- Install the plate ① and oil pan.

# NOTE:

- \* Fit the clamp to the bolt A.
- \* Fit new gasket washer to the bolt B.

# **CAUTION**

- \* Replace the bolts with new precoated ones for plate ①.
- \* Use new gasket and gasket washer to prevent oil leakage.
- Tighten the oil pan bolts diagonally to the specified torque.
- Oil pan bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

## **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, 10.0 lb-ft)

NOTE:

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

## OIL COOLER

 Apply SUZUKI SUPER GREASE "A" to the O-ring and install the oil cooler.

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

 Apply THREAD LOCK to the bolts and tighten them to the specified torque.

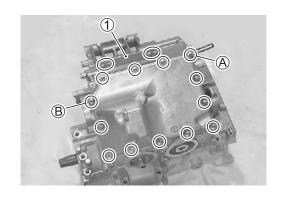
99000-32110: THREAD LOCK SUPER "1322"

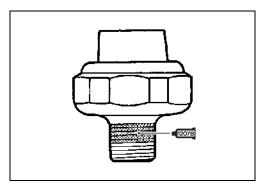
(or equivalent thread lock)

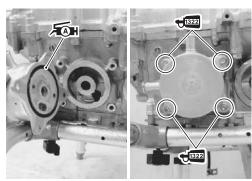
Oil cooler mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

# **CAUTION**

Use a new O-ring to prevent oil leakage.





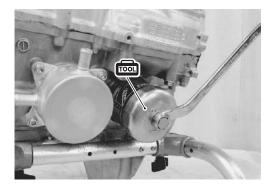


## **OIL FILTER**

• Install the oil filter with the special tool. ( 2-13)

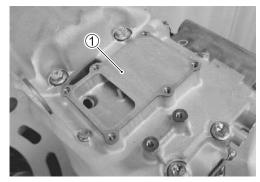
09915-40610: Oil filter wrench

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



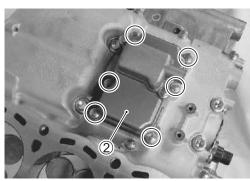
#### CRANKCASE BREATHER COVER

• Install a new gasket 1.



• Install the crankcase breather cover 2.

Crankcase breather cover bolt: 10 N⋅m (1.0 kgf-m, 7.0 lb-ft)

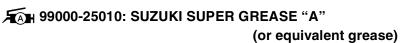


# **GEAR POSITION SWITCH**

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

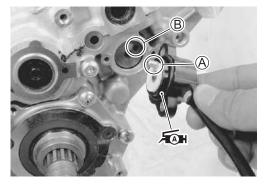
# NOTE:

Align the gear position switch pin (A) with the gearshift cam hole





Gear position switch bolt: 7 N·m (0.7 kgf-m, 5.0 lb-ft)





## **WATER PUMP**

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

# CAUTION

Use a new O-ring to prevent oil leakage.

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

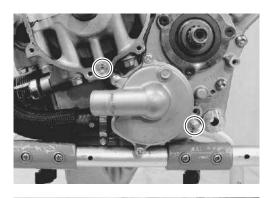
• Install the water pump.

## NOTE:

Set the water pump shaft end A to the oil pump shaft B as shown.

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





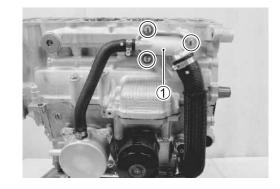
• Apply engine coolant to the O-ring.

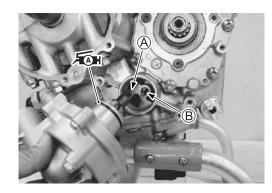
# CAUTION

Use a new O-ring to prevent engine coolant leakage.



- Install the water inlet connector ①.
- Water inlet connector bolt: 10 N⋅m (1.0 kgf-m, 7.0 lb-ft)





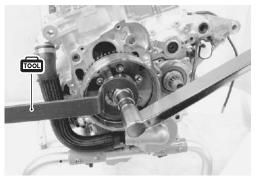
# **GENERATOR ROTOR AND STARTER DRIVEN GEAR**



- Install the generator rotor onto the crankshaft.
- Install the rotor bolt.
- 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, 87.0 lb-ft)

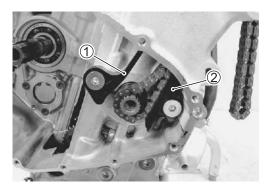


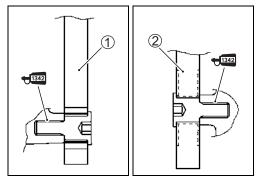
## CAM CHAIN/CAM CHAIN TENSIONER/CAM CHAIN GUIDE

- · 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.
- Install the cam chain guide No. 1 2.

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

Cam chain tensioner bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Cam chain guide No. 1 bolt: 23 N·m (2.3 kgf-m, 6.5 lb-ft)



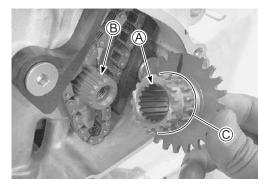


 Install the CKP sensor rotor/cam chain drive sprocket onto the crankshaft.

# NOTE:

When installing the cam chain drive sprocket, align the wide spline tooth A and B.

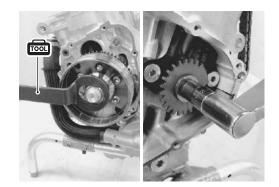
• Set the cam chain onto the teeth ©.



 While holding the generator rotor with the special tool, tighten the CKP sensor rotor/cam chain drive sprocket bolt.

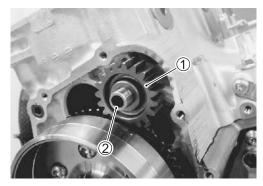
09930-44520: Rotor holder

CKP sensor rotor/cam chain drive sprocket bolt: 54 N·m (5.4 kgf-m, 39.0 lb-ft)



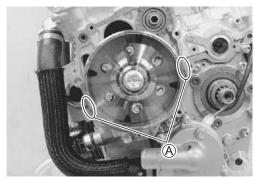
## STARTER IDLE GEAR

• Install the starter idle gear No. 2 1) and shaft 2).



• Apply SUZUKI BOND lightly to the mating surfaces (A) at the parting line between the upper and lower crankcases.

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



• Install the dowel pin 3 and gasket 4.

# CAUTION

Use a new gasket to prevent oil leakage.

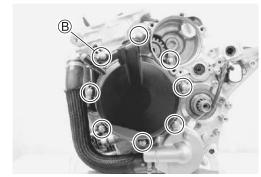


• Install the generator cover.

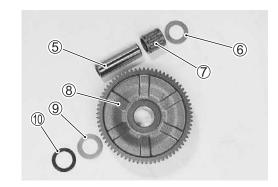
## NOTE:

\* Fit the clamp to the generator cover bolt B.

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



Install the starter idle gear No. 1 shaft ⑤, thrust washer ⑥, bearing ⑦, starter idle gear No. 1 ⑧, washer ⑨, and spring washer ⑩.



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

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



• 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, 7.0 lb-ft)



## **GEARSHIFT SYSTEM**

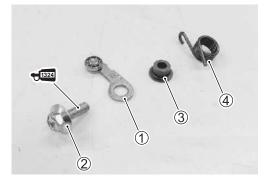
• Install the gearshift cam stopper ①, bolt ②, collar ③ and return spring ④.

## NOTE:

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

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

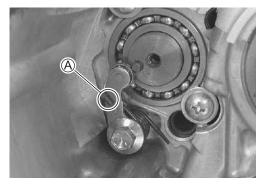
Gearshift cam stopper bolt: 10 N⋅m (1.0 kgf-m, 7.0 lb-ft)



## NOTE:

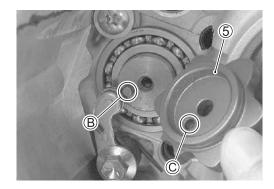
Hook the return spring end (A) to the stopper.

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



• Install the gearshift cam stopper plate ⑤.

NOTE:

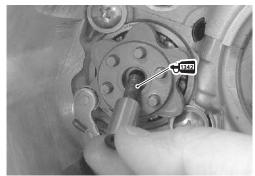


 Apply a small quantity of THREAD LOCK to the gearshift cam stopper plate bolt and tighten it to the specified torque.

99000-32050: THREAD LOCK "1342"

Gearshift cam stopper plate bolt:

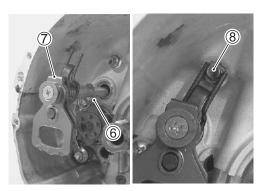
13 N·m (1.3 kgf-m, 9.5 lb-ft)



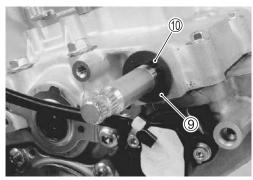
• Install the washer 6 and gearshift shaft assembly 7.

NOTE:

Pinch the gearshift arm stopper ® with return spring ends.



• Install the washer 9 and snap ring 10.

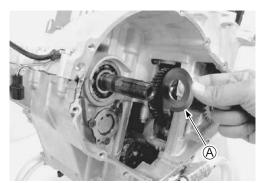


# **OIL PUMP DRIVE SPROCKET**

• Install the thrust washer onto the countershaft.

NOTE:

The chamfer side  ${\mathbin{\widehat{\otimes}}}$  of thrust washer should face the crankcase side.

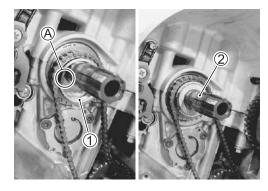


Install the oil pump drive sprocket 1 to the countershaft.

## NOTE:

Teeth A on the sprocket must face the clutch side.

Pass the chain between the oil pump drive and driven sprockets

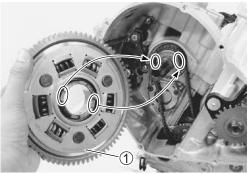


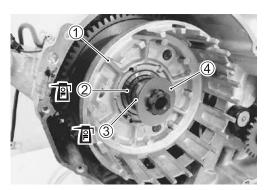
## **CLUTCH**

• Install the primary driven gear assembly 1.

## NOTE:

- \* Before assembling the clutch, adjust the clutch lifter. (3-41)
- \* If it is difficult to install the primary driven gear, rotate the crankshaft.
- \* Be sure to engage the oil pump drive sprocket with the primary driven gear.
- Install the bearing ② and spacer ③, and apply engine oil to them
- Install the thrust washer 4).





• Install the washer ⑤ to the clutch sleeve hub.

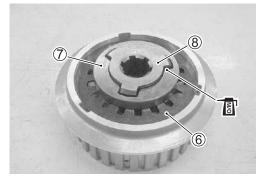


• Install the wave spring washers ⑥, clutch lifter driven cam ⑦ and clutch lifter drive cam ⑧.

## NOTE:

\* Apply a small quantity of MOLYBDENUM OIL SOLUTION to the contact surfaces of the clutch lifter drive cam ® and driven cam ⑦.

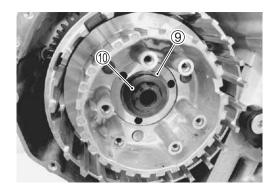


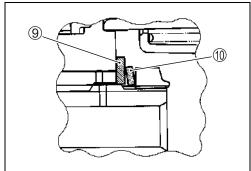


- Install the clutch sleeve hub assembly onto the countershaft.
- Install the washer (9) and spring washer (10).

## NOTE:

- \* Before installing the washer (9), visually inspect the washer surface for wear and damage. If necessary, replace it with a new one.
- \* The conical curve side of spring washer <sup>(1)</sup> faces outside.





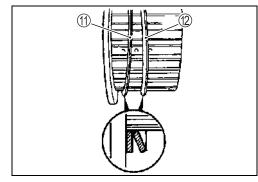
- Hold the clutch sleeve hub with the special tool.
- 09920-53740: Clutch sleeve hub holder
- Tighten the clutch sleeve hub nut to the specified torque.
- Clutch sleeve hub nut: 95 N·m (9.5 kgf-m, 68.7 lb-ft)



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



• Install the spring washer seat ① and spring washer ② onto the clutch sleeve hub correctly.



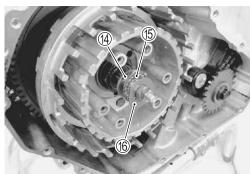
• Install the clutch push rod ③ into the countershaft.



• Install the clutch push piece (4), bearing (5) and thrust washer (6) to the countershaft.

# NOTE:

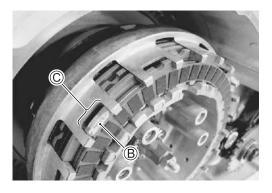
Thrust washer **(6)** is located between the pressure plate and bearing **(5)**.

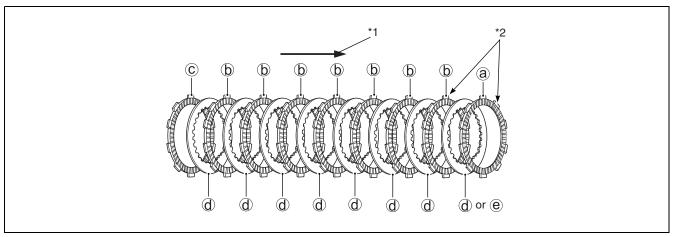


• Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order.

#### NOTE:

Insert the outermost No. 2 drive plate claws  $\ \ \ \ \ \ \$  to the other slits  $\ \ \ \ \$  of clutch housing as shown.





\*1: Direction of outside

\*2: Paint

#### **DRIVE PLATE:**

- ⓐ No. 2 Drive plate ...... 1 pc. [Black paint/I.D. 111 mm (4.4 in)]
- (b) No. 1 Drive plate ....... 7 pcs. [Purple paint/I.D. 111 mm (4.4 in)]
- © No. 3 Drive plate ......1 pc. [NIL/I.D. 118 mm (4.6 in)]

#### NOTE:

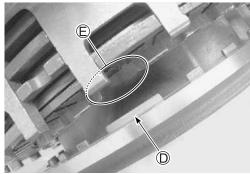
No.3 drive plate can be distinguished by the inside diameter (I.D.).

DRIVEN PLATE: (0 + e) = Total 8 pcs.)

- d No. 1 Driven plate (Thickness): 2.0 mm (0.102 in).....6 − 8 pcs.
- ⊕ No. 2 Driven plate (Thickness): 1.6 mm (0.091 in).....2 0 pcs.
- Install the pressure plate 18.

#### NOTE:

When install the pressure plate, fit the convex part  $\mathbb D$  of the pressure plate onto the concave part  $\mathbb E$  of the clutch sleeve hub.



- Install the clutch springs.
- Hold the clutch housing with the special tool.

#### **CAUTION**

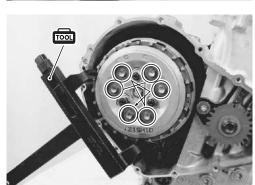
Be careful not to damage the clutch housing or clutch plates.

# 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, 7.0 lb-ft)

# NOTE:

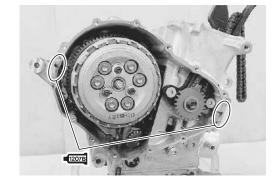
- \* Tighten the clutch spring set bolts diagonally.
- \* After mounting the engine, adjust the push rod. ( 2-16)



#### **CLUTCH COVER**

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

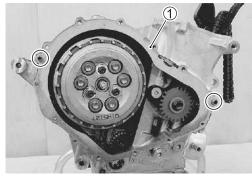
■1207B 99000-31140: SUZUKI BOND "1207B"



Install new gasket ① and dowel pin.

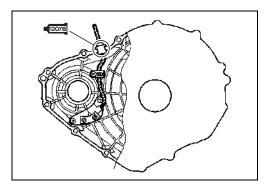
# CAUTION

Use a new gasket to prevent oil leakage.



• Apply SUZUKI BOND lightly to the CKP sensor gromet.

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



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

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

# NOTE:

\* Fit new gasket washer to the bolts A.

# CAUTION

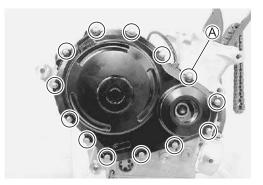
Use a new gasket washer to prevent oil leakage.

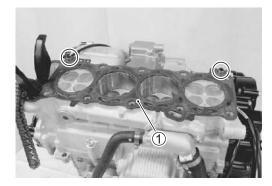
### **CYLINDER HEAD**

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

# CAUTION

Use a new gasket to prevent gas leakage.





• Place the cylinder head on the cylinder.

#### NOTE:

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

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

# Step 1:

• Tighten the cylinder head bolts to the specified torque with a torque wrench sequentially and diagonally.

#### Step 2:

• Loosen all the cylinder head bolts diagonally.

#### Step 3

 Retighten the cylinder head bolts to the specified torque with a torque wrench sequentially and diagonally.

#### Step 4:

 Additionally tighten the cylinder head bolts with the specified angles diagonally using an angular torque gauge.

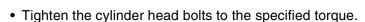
# Cylinder head bolt (M10):

Step 1/Step 3: 31 N·m (3.1 kgf-m, 22.5 lb-ft)

Final step : 60° (1/6 turn)

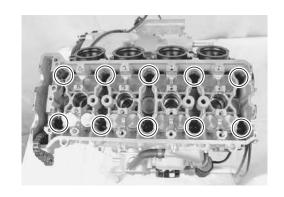
#### NOTE:

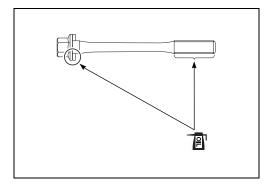
Apply engine oil to the washers and thread portion of the bolts before installing the cylinder head bolts.

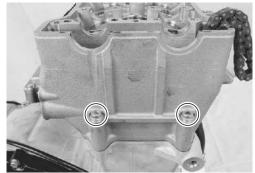


Cylinder head bolt (M6): 10 N·m (1.0 kgf-m, 7.0 lb-ft)

- $\bullet$  Fit the gasket  $\ensuremath{\text{\textcircled{2}}}$  and tighten the ECT sensor.
- **■** ECT sensor: 18 N·m (1.8 kgf-m, 13.0 lb-ft)









- Apply engine coolant to the O-ring.
- Install the thermostat conector 3.

# **CAUTION**

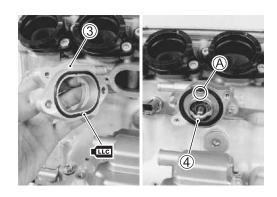
Use a new O-ring to prevent engine coolant leakage.

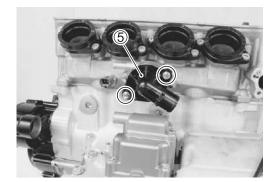
- Thermostat conector bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)
- Install the thermostat 4.

#### NOTE:

The jiggle valve (A) of thermostat faces upside.

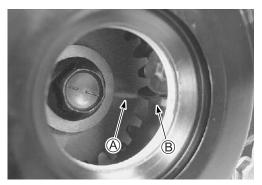
- Install the thermostat cover ⑤.
- Thermostat cover bolt: 10 N⋅m (1.0 kgf-m, 7.0 lb-ft)





#### CAMSHAFT

• Turn the crankshaft clockwise with the box wrench and align the line (A) on the CKP sensor rotor to the rib (B) behind the clutch cover 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.
- \* To adjust the camshaft timing correctly, be sure to align the line (A) with (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 a MOLYBDENUM OIL SOLUTION to the camshaft journal holders.

# MOLYBDENUM OIL SOLUTION

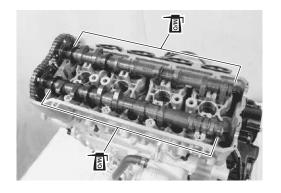
#### NOTE:

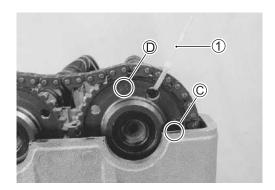
Before installing the camshaft, check that the tappets are installed correctly.

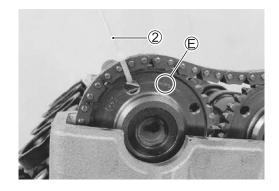
- Pull the cam chain lightly.
- The exhaust camshaft sprocket has an arrow marked "1" ©.
   Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head.
- Engage the cam chain with the exhaust camshaft sprocket.
- Bind the cam chain and sprocket with a proper clamp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

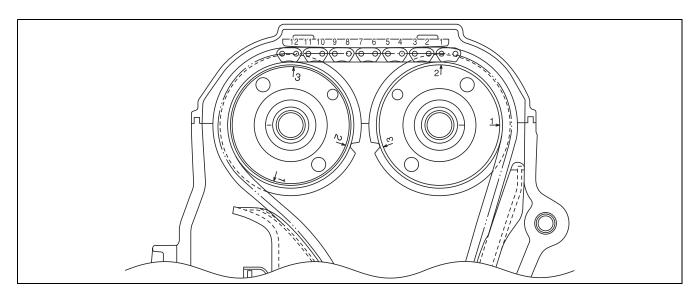
#### NOTE:

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

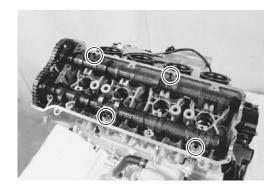








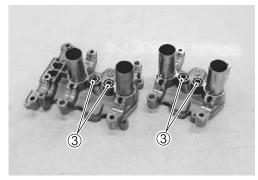
• Install the dowel pins.



Install O-rings ③ 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.

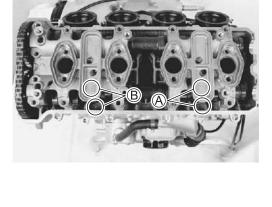


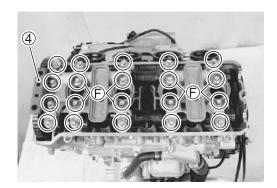
Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.

- Install the can chain guide No. 2 4.
- 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.





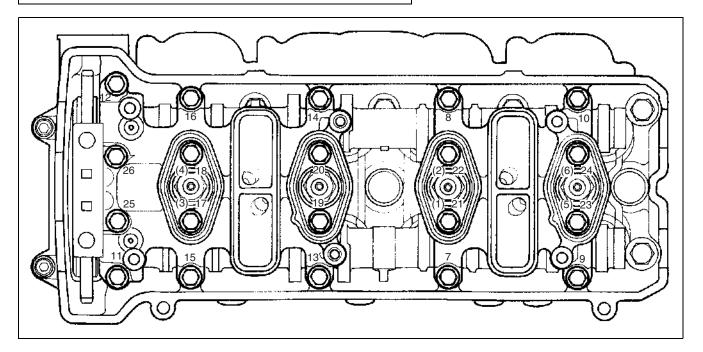
• Tighten the camshaft journal holder bolts in the ascending order of numbers to the specified torque.

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

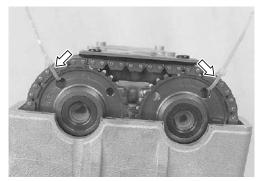
# CAUTION

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.



• Remove the clamps.



#### **CAM CHAIN TENSION ADJUSTER**

 Holding the cam chain tension adjuster as shown, compress the plunger by turning the adjuster body until the outer circlip
 A fits the groove B. ( 3-3-31)

### **CAUTION**

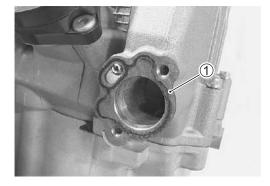
Do not turn the adjuster body until the outer circlip (A) passes over the groove (B), or the plunger may not be automatically out from the adjuster body even pushing force is applied on the head.



• Fit a new gasket 1.

# CAUTION

Use a new gasket to prevent oil leakage.



• Install the cam chain tension adjuster.

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



 Turn the crankshaft approx. 180° counterclockwise to make the push rod come out from the adjuster against the cam chain, via chain tensioner.

#### NOTE:

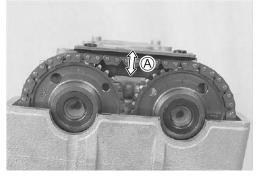
When slight pushing force is applied to the push rod head, the push rod is automatically out from the adjuster body.

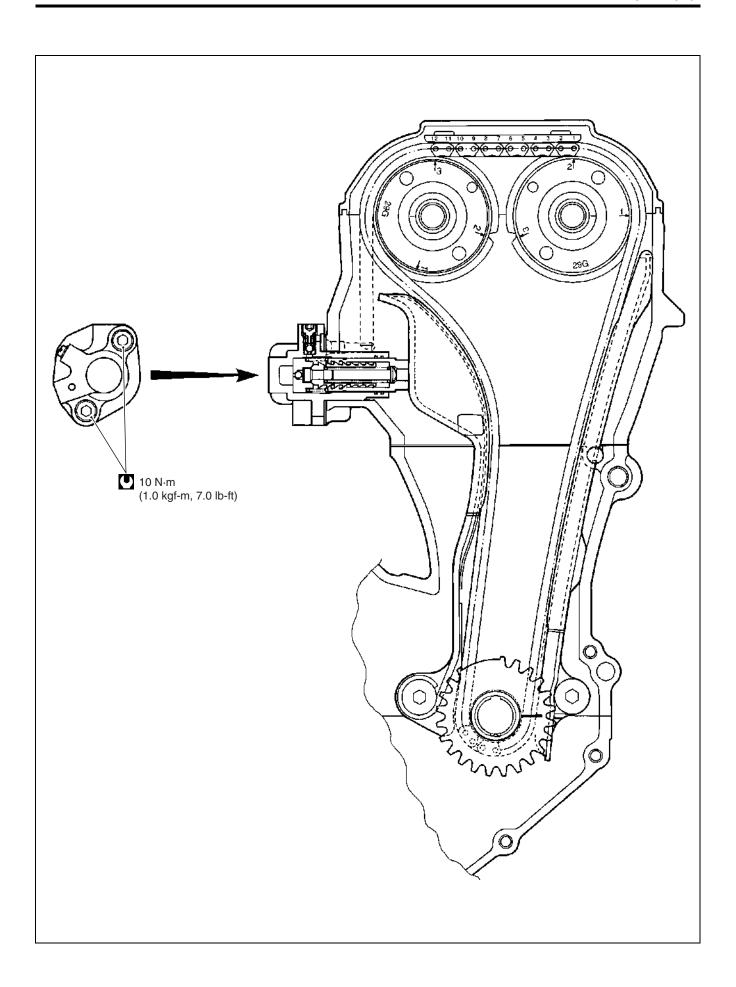


# **CAUTION**

Make sure that the adjuster works properly by checking no slack made at point  $\triangle$ .

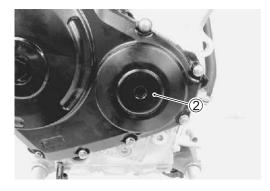
Turn the crankshaft clockwise and recheck the cam position.
 ( 3-101)





• Tighten the valve timing inspection cap ② to the specified torque.

**Valve timing inspection cap: 11 N·m (1.1 kgf-m, 8.0 lb-ft)** 

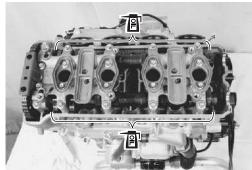


#### CYLINDER HEAD COVER

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

#### NOTE:

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



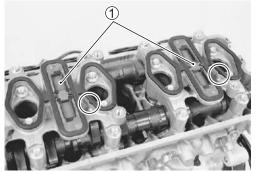
• Install the PAIR reed valves ① along with the gaskets.

#### NOTE:

Fit the projection of the gaskets to the depression of the camshaft holders.

# CAUTION

Replace the gaskets with new ones.



- Install a new gasket to the cylinder head cover.
- Apply SUZUKI BOND to the cam end cap points of the gasket as shown.

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

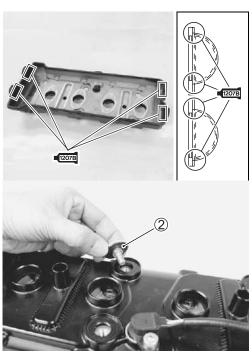
# CAUTION

Use a new gasket to prevent oil leakage.

- Place the cylinder head cover on the cylinder head.
- Fit a new gasket 2 to each head cover bolt.

# CAUTION

Use new gaskets to prevent oil leakage.



• Tighten the head cover bolts to the specified torque.

Head cover bolt: 14 N·m (1.4 kgf-m, 10.0 lb-ft)



#### **STARTER MOTOR**

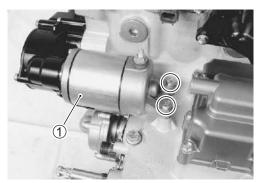
• Apply SUZUKI SUPER GREASE "A" to the O-ring.

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



• Install the starter motor ①.

Starter motor mounting bolt: 6 N·m (0.6 kgf-m, 4.5 lb-ft)



• Install the spark plugs. ( 2-6)

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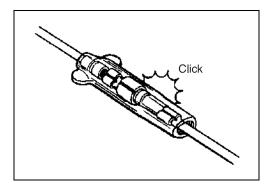
# PRECAUTIONS IN SERVICING

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

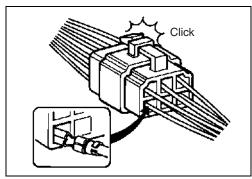
# **ELECTRICAL PARTS**

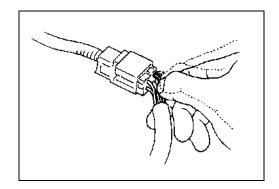
#### CONNECTOR/COUPLER

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

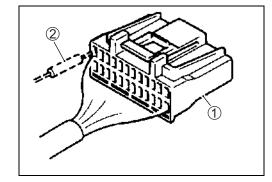


- With a lock type coupler, be sure to release the lock when disconnecting, and push in fully to engage the lock when connecting.
- When disconnecting the coupler, be sure to hold the coupler body and do not pull the lead wires.
- Inspect each terminal on the connector/coupler for looseness or bending.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



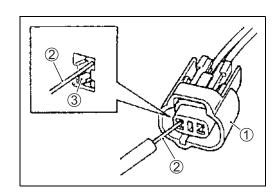
- 1 Coupler
- 2 Probe

 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.

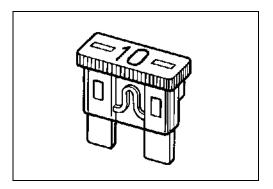
Never push in the probe where male terminal is supposed to fit

- 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



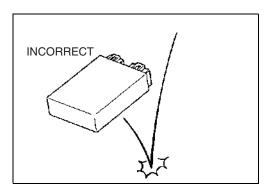
# **FUSE**

- 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.

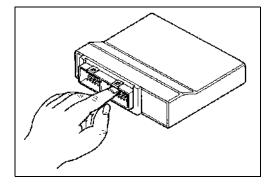


# ECM/VARIOUS SENSORS

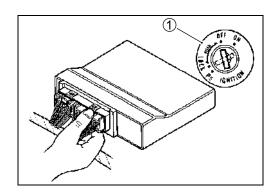
 Since each component is a high-precision part, great care should be taken not to apply any sharp impacts during removal and installation.



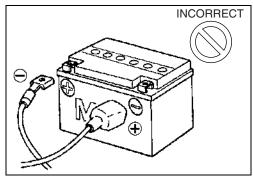
Be careful not to touch the electrical terminals of the ECM.
 The static electricity from your body may damage this part.



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

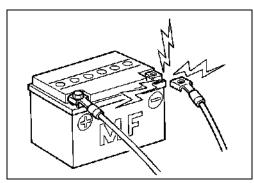


 Battery connection in reverse polarity is strictly prohibited.
 Such a wrong connection will damage the components of the FI system instantly when reverse power is applied.

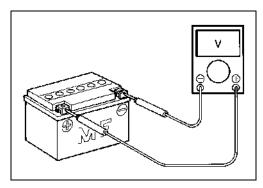


 Removing any battery terminal of a running engine is strictly prohibited.

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**

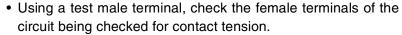
Possible causes for the open circuits are as follows. As the cause can exist in the connector/coupler or terminal, they need to be checked carefully.

- 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.

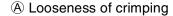


Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted in the coupler and locked.

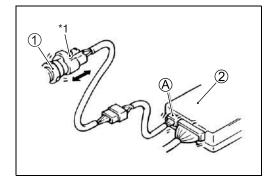
If contact tension is not enough, rectify the contact to increase tension or replace.

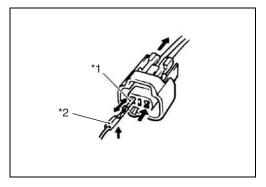
The terminals must be clean and free of any foreign material which could impede proper terminal contact.

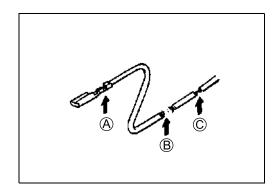
- \*1 Check contact tension by inserting and removing.
- \*2 Check each terminal for bend and proper alignment.
- Using continuity inspect or voltage check procedure as described below, inspect the wire harness terminals for open circuit and poor connection. Locate abnormality, if any.



- B Open
- © Thin wire (a few strands left)







#### **Continuity check**

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

① ECM

• 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 B' and C or an abnormality in coupler B' or coupler C.

1 ECM



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

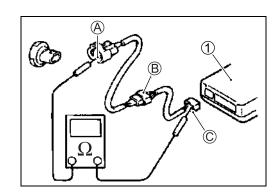
Also, if measured values are as listed below, a resistance (abnormality) exists which causes the voltage drop in the circuit between terminals A and B.

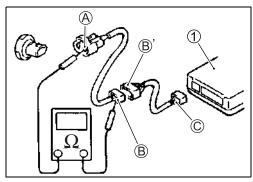
#### Voltage Between:

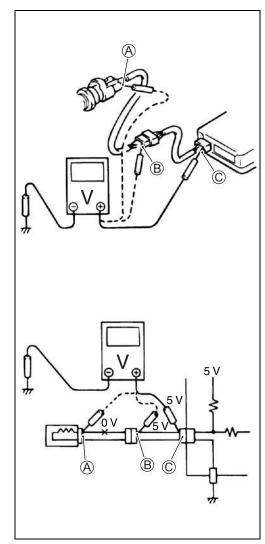
© and body ground: Approx. 5 V

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

A and body ground: 3 V-







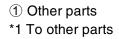
# SHORT CIRCUIT CHECK (WIRE HARNESS TO GROUND)

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

#### NOTE:

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

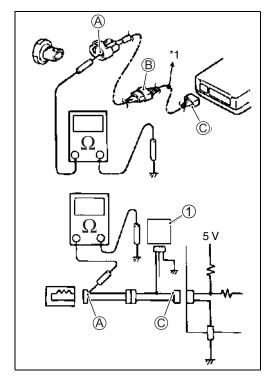
• Measure resistance between terminal at one end of circuit (A) terminal in figure) and body ground. If continuity is indicated, there is a short circuit to ground between terminals A and C.

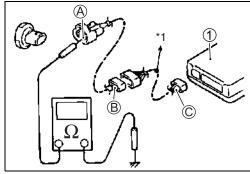


• Disconnect the connector/coupler included in circuit (coupler (B) and measure resistance between terminal (A) and body ground.

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

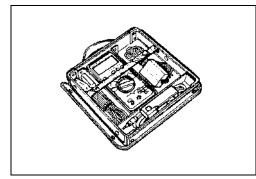
> 1 ECM \*1 To other parts





# **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**

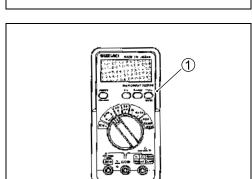
- Incorrectly connecting the ⊕ and ⊕ probes may cause the inside of the tester to burnout.
- If the voltage and current are not known, make measurements using the highest range.
- When measuring the resistance with the multi-circuit tester ①,  $\infty$  will be shown as 10.00 M $\Omega$  and "1" flashes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

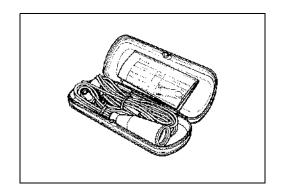


#### NOTE:

- \* 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.



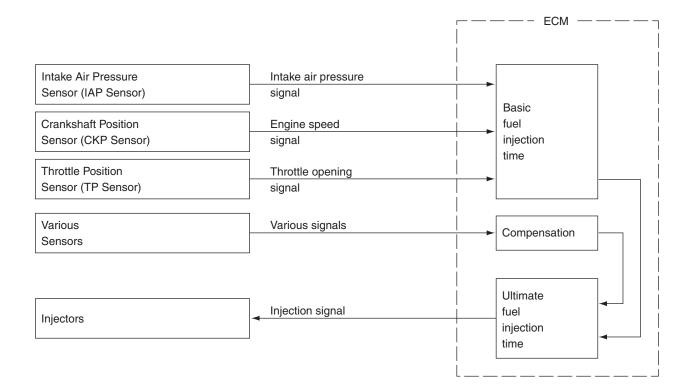




# FI SYSTEM TECHNICAL FEATURES INJECTION TIME (INJECTION VOLUME)

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)**

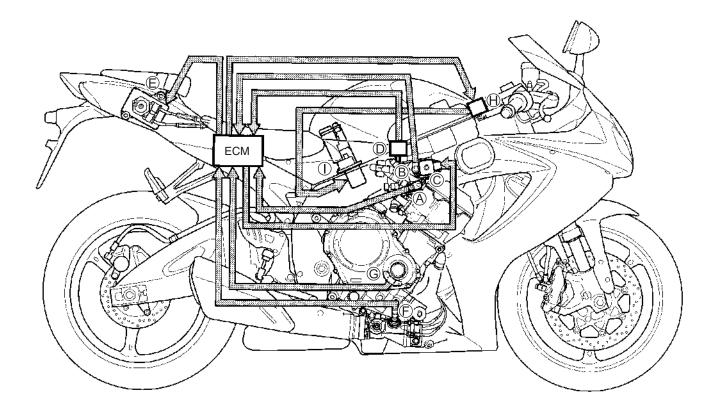
The following different signals are output from the respective sensors for compensation of the fuel injection time (volume).

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
(For E-02, 19)	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. This
	is the compensation of the SRAD.
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**

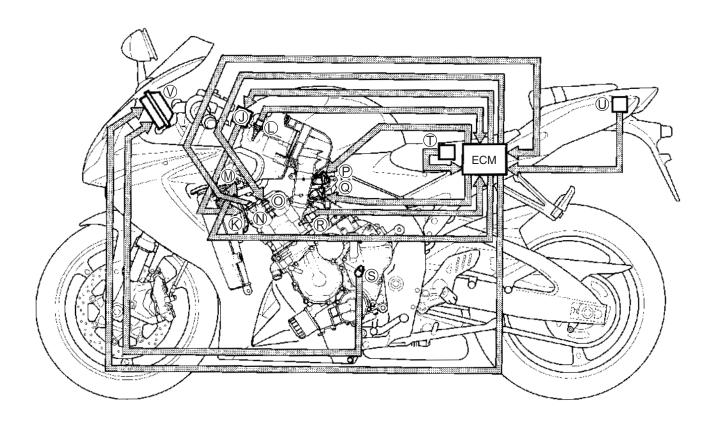
SIGNAL	DESCRIPTION
TIP-OVER SENSOR SIGNAL	When the motorcycle tips over, the tip-over sensor sends a
(FUEL SHUT-OFF)	signal to the ECM. Then, this signal cuts OFF current sup-
	plied to the fuel pump, fuel injectors and ignition coils.
OVER-REV. LIMITER SIGNAL	The fuel injectors stop operation when engine rpm reaches
	rev. limit rpm.

# FI SYSTEM PARTS LOCATION



- (A) Throttle position sensor (TPS)
- © Secondary throttle valve actuator (STVA)
- © Exhaust control valve actuator (EXCVA)
- © Crankshaft position sensor (CKPS)
- ① Fuel pump (FP)

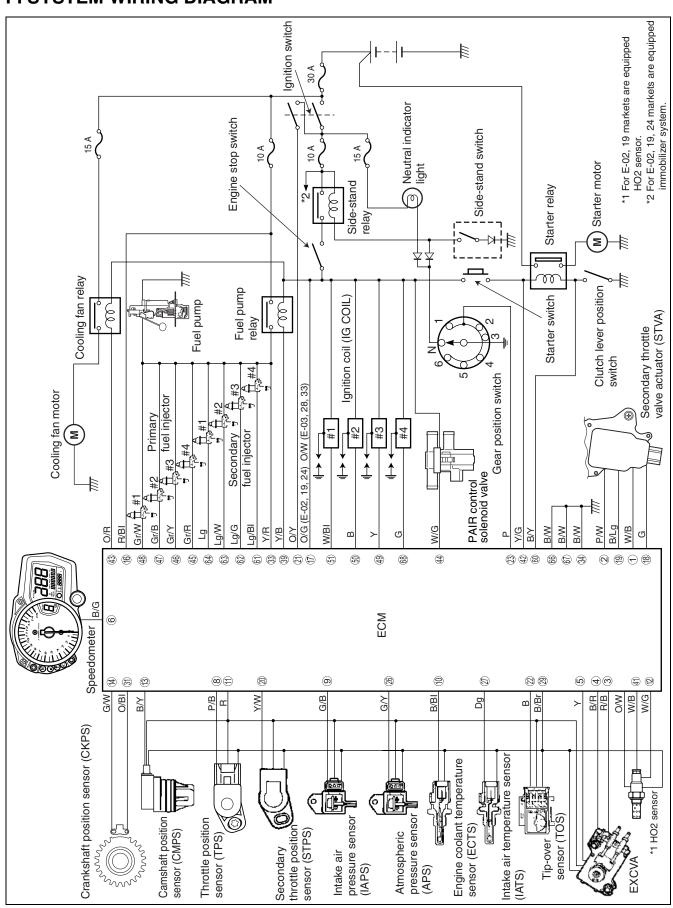
- ® Secondary throttle position sensor (STPS)
- ① Intake air pressure sensor (IAPS)
- F HO2 sensor (For E-02, 19)
- ⊕ Fuel pump relay (FP relay)



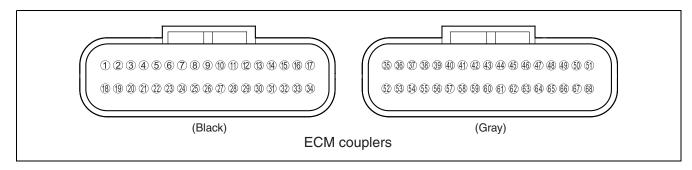
- ① Cooling fan relay
- ① Intake air temperature sensor (IATS)
- N Camshaft position sensor (CMPS)
- P Secondary fuel injector
- R Engine coolant temperature sensor (ECTS)
- ① Atmospheric pressure sensor (APS)

- M PAIR control solenoid valve
- © Ignition coil (IG COIL)
- @ Primary fuel injector
- S Speed sensor
- U Tip-over sensor (TOS)

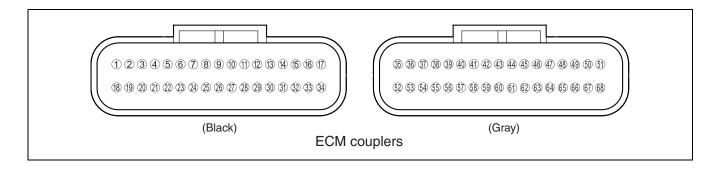
# FI SYSTEM WIRING DIAGRAM



# **ECM TERMINAL**



TERMINAL NO.	CIRCUIT	TERMINAL NO.	CIRCUIT
1	STVA signal (STVA. 2A)	18	STVA signal (STVA. 2B)
2	STVA signal (STVA. 1A)	19	STVA signal (STVA. 1B)
3	EXCVA power (MO-)	20	STP sensor signal (STP)
4	EXCVA power (MO+)	21)	Ignition switch signal [For E-03, 28, 33]
(5)	EXCVA position sensor (MPS)	22)	TO sensor signal (TOS)
6	Serial data for speedometer	23)	GP switch signal (GP)
7	_	24)	_
8	TP sensor signal (TP)	25)	Blank
9	IAP sensor signal (IAP)	26	AP sensor signal (AP)
10	ECT sensor signal (ECT)	27)	IAT sensor signal (IAT)
11)	Power source for sensors (VCC)	28	Blank
(2)	HO2 sensor signal (OX) [For E-02, 19, 24]	29	Sensors ground (E2)
(3)	CMP sensor signal (CMP+)	30	HO2 sensor control selector [For E-02, 19]
<b>14</b> )	CKP sensor signal (CKP+)	31)	CKP sensor signal (CKP-)
15	_	32)	Serial data for self-diagnosis
16	Power source for back-up	33	Power source for fuel injectors (VM)
17)	Power source	34)	ECM ground (E1)



TERMINAL	CIRCUIT	TERMINAL	CIRCUIT	
NO.	CIRCUIT	NO.	CINCOTI	
35)	_	52	_	
36	_	53	_	
37)	_	54)	_	
38)	Tachometer	<b>55</b>	_	
39	Fuel pump relay (FP Relay)	56	_	
40	Immobilizer communication	<b>(57)</b>	Immobilizer communication	
40	[For E-02, 19, 24]	3)	[For E-02, 19, 24]	
<b>41</b> )	HO2 sensor heater (OXH)	(58)	Mode select switch	
41)	[For E-02, 19]	J0	Mode Select Switch	
42	Starter relay	59	Neutral switch	
43	Cooling fan relay (FAR)	60	Clutch position switch	
44	PAIR control solenoid valve (PAIR)	<b>61</b> )	Secondary fuel injector #4 (#42)	
45	Primary fuel injector #4 (#41)	62	Secondary fuel injector #3 (#32)	
46	Primary fuel injector #3 (#31)	63	Secondary fuel injector #2 (#22)	
47)	Primary fuel injector #2 (#21)	64)	Secondary fuel injector #1 (#12)	
48	Primary fuel injector #1 (#11)	65)	_	
49	Ignition coil #3	66	General ground (E01)	
(50)	Ignition coil #2	67	Ground for ignition system (E03)	
<b>(51)</b>	Ignition coil #1	68	Ignition coil #4	

# **SELF-DIAGNOSIS FUNCTION**

The self-diagnosis function is incorporated in the ECM. The function has two modes, "User mode" and "Dealer mode". The user can only be notified by the LCD (DISPLAY) panel and LED (FI light). To check the function of the individual FI system devices, the dealer mode is provided. In this check, the special tool is necessary to read the code of the malfunction items.

# **USER MODE**

MALFUNCTION	LCD (DISPLAY)	FI LIGHT	INDICATION MODE
WALI GIVOTION	INDICATION	INDICATION	INDIOATION WODE
"NO"	Coolant temperature		
"YES"	Coolant temperature	FI light turns ON.	Each 2 sec. Coolant
	and "FI" letters		temperature or "FI" is
Engine can start	*1		indicated.
Engine can not start	"FI" letter	FI light turns ON	"FI" is indicated
	*2	and blinks.	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 coolant temperature 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 does 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.

The FI light is also turned ON when engine temperature is high or oil pressure is low.

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.	•	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)	
C29	Secondary throttle position sensor (STPS)	
C31	Gear position signal (GP switch)	
C32	Primary injector signal #1 (FI #1)	For #1 cylinder
C33	Primary injector signal #2 (FI #2)	For #2 cylinder
C34	Primary injector signal #3 (FI #3)	For #3 cylinder
C35	Primary injector signal #4 (FI #4)	For #4 cylinder
C36	Secondary injector signal #1	For #1 cylinder
C37	Secondary injector signal #2	For #2 cylinder
C38	Secondary injector signal #3	For #3 cylinder
C39	Secondary injector signal #4	For #4 cylinder
C41	Fuel pump control system (FP control system)	Fuel pump, Fuel pump relay
C42	Ignition switch signal (IG switch signal/immobi-	Anti-theft
	lizer for E-02, 19, 24)	
C44	HO2 Sensor (For E-02, 19)	
C46	Exhaust control valve actuator (EXCVA)	
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 1 200 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.

# TPS ADJUSTMENT

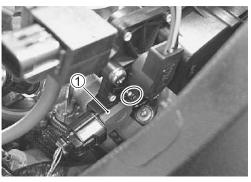
- 1. Adjust the engine rpm to 1 200 r/min. ( 2-14)
- 2. Connect the special tool (Mode select switch) to the dealer mode coupler at the wiring harness.



- 3. If the throttle position sensor adjustment is necessary, remove the aircleaner box and lift up the throttle body. (5-14)
- 4. Loosen the screw and slide the throttle position sensor ① to bring the line to the middle.
- 5. Then, tighten the screw to fix the throttle position sensor.

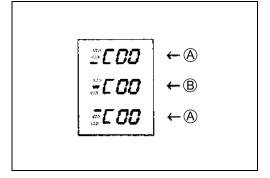
09930-11950: Torx wrench 09930-82720: Mode select switch

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	RUNNING
		ABILITY	ABILITY
CMP sensor	When camshaft position signal has	"NO"	"YES"
	failed during running, the ECM	Motorcycle can rur	n, but once engine
	determines the cylinder positions as	stops, engine can	not start.
	# to be the same as before occur-		
	rence of such a failure.		T
IAP sensor	Intake air pressure is fixed to 101	"YES"	"YES"
	kPa (760 mmHg).	. 20	. 20
TP sensor	The throttle opening is fixed to full		
	open position.	"YES"	"YES"
	Ignition timing is also fixed.		
ECT sensor	Engine coolant temperature value is		
	fixed to 80 °C (176 °F).	"YES"	"YES"
	Cooling fan is fixed on position.		
IAT sensor	Intake air temperature value is fixed	"YES"	"YES"
	to 40 °C (104 °F).	120	120
AP sensor	Atmospheric pressure is fixed to 101	"YES"	"YES"
	kPa (760 mmHg).		
Ignition signal	#1 Ignition-off	"YES"	"YES"
			linders can run.
	#2 Ignition-off	"YES"	"YES"
		#1, #3 & #4 cylinders can run.	
	#3 Ignition-off	"YES"	"YES"
		#1, #2 & #4 cyl	linders can run.
	#4 Ignition-off	"YES"	"YES"
		#1, #2 & #3 cy	linders can run.
Primary injection signal	#1 Fuel-cut (primary side)	"YES"	"YES"
		#2, #3 & #4 cyl	linders can run.
	#2 Fuel-cut (primary side)	"YES"	"YES"
		#1, #3 & #4 cy	linders can run.
	#3 Fuel-cut (primary side)	"YES"	"YES"
	-	#1, #2 & #4 cy	linders can run.
	#4 Fuel-cut (primary side)	"YES"	"YES"
		#1, #2 & #3 cyl	linders can run.

ITEM	FAIL-SAFE MODE	STARTING ABILITY	RUNNING ABILITY
Secondary injection signal	#1 Fuel-cut (secondary side)	_	"YES"
		#2, #3 & #4 cy	linders can run.
	#2 Fuel-cut (secondary side)		"YES"
		#1, #3 & #4 cy	linders can run.
	#3 Fuel-cut (secondary side)		"YES"
		#1, #2 & #4 cy	linders can run.
	#4 Fuel-cut (secondary side)		"YES"
		#1, #2 & #3 cy	linders can run.
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 (For E-02, 19)	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"
EXCV actuator	EXCV actuator is fixed to full open position. When motor disconnection or lock occurs, power from ECM is shut off.	"YES"	"YES"

The engine can start and can run even if the above signal is not received from each sensor. But, the engine running condition is not complete, providing only emergency help (by fail-safe circuit). In this case, it is necessary to bring the motorcycle to the workshop for complete repair.

When two ignition signals or two injector signals are not received by ECM, the fail-safe circuit can not work and ignition 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.

<b>EXAMPLE: CUSTOMER</b>	PROBLEM	INSPECTION	FORM
--------------------------	---------	------------	------

User name:	Model: VIN:		
Date of issue:	Date Reg.	Date of problem:	Mileage:
Malfunction indicator	□ Alwaya ON □ Coma	stimes ON Always OFF	□ Cood condition
lamp condition (LED)	☐ Always ON ☐ Sometimes ON ☐ Always OFF ☐ G		☐ Good condition
Malfunction display/code	User mode: ☐ No display	$\hfill \square$ Malfunction display (	)
(LCD)	Dealer mode: ☐ No code	$\square$ Malfunction code (	)
PROBLEM SYMPTOMS			
□ Difficult Starting		☐ Poor Driveability	
☐ No cranking		☐ Hesitation on acceleration	
☐ No initial combustion		□ Back fire/□ After fire	
☐ No combustion		☐ Lack of power	
☐ Poor starting at		☐ Surging	
(□ cold □ warm □ always)		☐ Abnormal knocking	
☐ Other		☐ Engine rpm jumps briefly	
		☐ Other	
☐ Poor Idling		☐ Engine Stall when	
☐ Poor fast Idle		☐ Immediately after start	
☐ Abnormal idling speed		☐ Throttle valve is opened	
(☐ High ☐ Low) ( r/min)		☐ Throttle valve is closed	
☐ Unstable		☐ Load is applied	
☐ Hunting ( r/min to r/min)		☐ Other	
☐ Other			
☐ OTHERS:			

MOTORCYCLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS			
Environmental condition			
Weather	☐ Fair ☐ Cloudy ☐ Rain ☐ Snow ☐ Always ☐ Other		
Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ( °C/ °F) ☐ 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 screen with the use of mode select switch or SDS.
- \* Engine oil level and leakage ( 2-12)
- \* Engine coolant level and leakage (2-17)
- \* Fuel level and leakage ( 2-14 and 9-33)
- \* Clogged air cleaner element ( 2-4)
- \* Battery condition ( 9-40)
- \* Throttle cable play ( 2-15)
- \* Vacuum hose looseness, bend and disconnection
- \* Broken fuse
- \* FI light operation ( 4-17 and 9-31)
- \* Each warning light operation ( 9-31)
- \* Speedometer operation ( 9-34)
- \* Exhaust gas leakage and noise (2-29)
- \* Each coupler disconnection
- \* Clogged radiator fins ( 7-4 and -5)

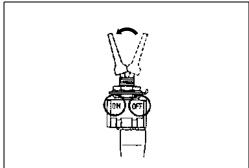
## **SELF-DIAGNOSTIC PROCEDURES**

#### 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" ( 4-17 and 4-18) carefully to have good understanding as to what functions are available and how to use it.
- \* Be sure to read "PRECAUTIONS IN SERVICING" (\$\sum\_4-3\$) before inspection and observe what is written there.
- Remove the front seat. ( 8-7)
- 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.







# **SELF-DIAGNOSIS RESET PROCEDURE**

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

#### NOTE:

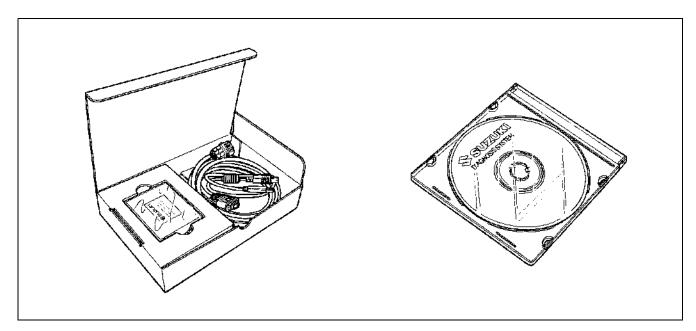
- \* Even though the malfunction code (C00) is indicated, the previous malfunction history code still remains stored in the ECM. Therefore, erase the history code memorized in the ECM using SDS.
- \* The malfunction code is memorized in the ECM also when the wire coupler of any sensor is disconnected.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



## **USE OF SDS DIAGNOSTIC PROCEDURES**

- \* Don't 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" (274-3) before inspection and observe what is written there.
- Remove the front seat. ( 8-7)
- 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.
- Not only is SDS used for detecting Diagnostic Trouble Codes but also for reproducing and checking on screen the failure condition as described by customers using the trigger.
- · How to use trigger. (Refer to the SDS operation manual for further details.)

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



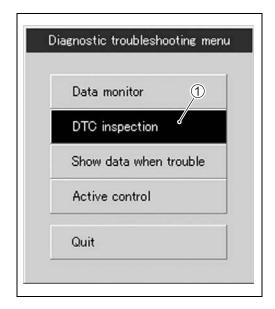
# USE OF SDS DIAGNOSIS RESET PROCE-DURE

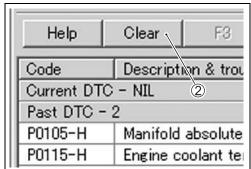
- After repairing the trouble, turn OFF the ignition switch and turn ON again.
- Click the DTC inspection button ①.
- · Check the DTC.
- The previous malfunction history code (Past DTC) still remains stored in the ECM. Therefore, erase the history code memorized in the ECM using SDS tool.

#### NOTE:

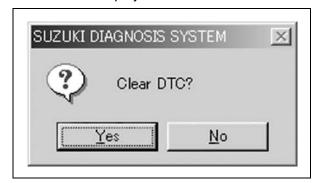
The malfunction code is memorized in the ECM also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.

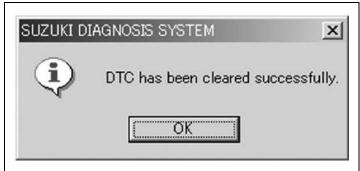
Click "Clear" ② to delete history code (Past DTC).



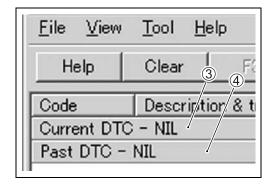


• Follow the displayed instructions.





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

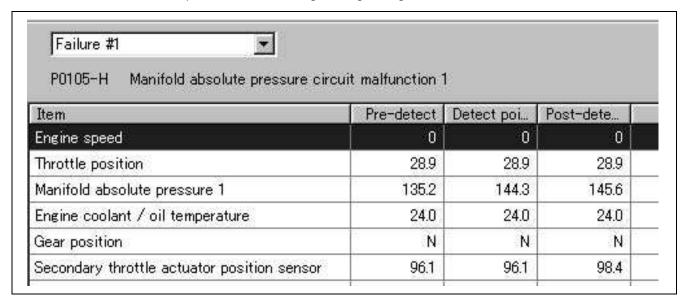


# SHOW DATA WHEN TROUBLE (DISPLAING DATA AT THE TIME OF DTC)

ECM stores the engine and driving conditions (in the form of data as shown in the figure) at the moment of the detection of a malfunction in its memory. This data is called "Show data when trouble".

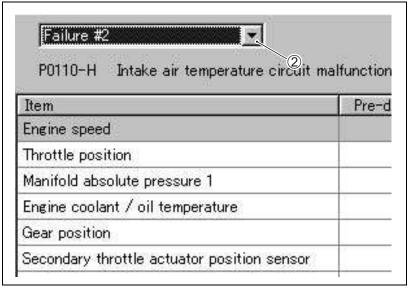
Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the motorcycle was running or stopped) when a malfunction was detected by checking the show data when trouble. This show data when trouble function can record the maximum of two Diagnostic Trouble Codes in the ECM.

Also, ECM has a function to store each show data when trouble for two different malfunctions in the order as the malfunction is detected. Utilizing this function, it is possible to know the order of malfunctions that have been detected. Its use is helpful when rechecking or diagnosing a trouble.



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





# **MALFUNCTION CODE AND DEFECTIVE CONDITION**

DTC No.		DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C00		NO FAULT		
C11	C11		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
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
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 V ≤ sensor voltage < 4.85 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
. 3110	L		Sensor voltage is lower than specified value.	ECT sensor circuit shorted to ground

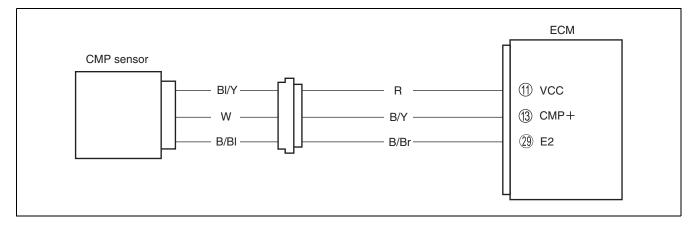
		DETECTED		
DTC No.		ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C29		STP sensor	The sensor should produce following voltage.  0.15 V ≤ sensor voltage < 4.85 V In other than the above range, C29 (P1654) is indicated.	STP sensor, lead wire/coupler connection
P1654			Sensor voltage is higher than specified value. Sensor voltage is lower than specified value.	STP sensor circuit shorted to VCC or ground circuit open 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		Primary 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	Primary fuel injector, wiring/cou- pler connection, power supply to the injector
P0201/P0202 P0203/P0204			(P0202), C34 (P0203) or C35 (P0204) is indicated.	
C36/C37 C38/C39		Secondary fuel injector	Some failure exists in the fuel injector signal in a high load, high revolution condition. In this case, the code C36	Secondary fuel injector, wiring/coupler connection, power supply to the injector
P1764/P1765 P1766/P1767			(P1764), C37 (P1765), C38 (P1766) or C39 (P1767) 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)
. 3230	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	<ul> <li>* When the I.D. agreement is not verified.</li> <li>* ECM does not receive communication signal from the immobilizer antenna.</li> </ul>	etc. * Immobilizer/anti-theft system

<sup>\*:</sup> Immobilizer system is equipped model only.

DTC No. DETECTED ITEM			DETECTED FAILURE CONDITION	CHECK FOR
C44		HO2 sensor (For E-02, 19)	HO2 sensor output voltage is not input to ECM during engine operation and running condition.	HO2 sensor circuit open or shorted to ground
P0130			(Sensor voltage < 0.55 V) In other than the above value, C44 (P0130) is indicated.	
C44			The Heater can not operate so that heater operation voltage is not supply	HO2 sensor lead wire/coupler connection
P0135			to the oxygen heater circuit, C44 (P0135) is indicated.	Battery voltage supply to the HO2 sensor
C46		Exhaust control valve actuator	EXCVA position sensor produces following voltage.  0.1 V ≤ sensor voltage < 4.9 V In other than the above range, C46 (P1675) is indicated.  When no actuator control signal is supplied from the ECM, communication signal does not reach ECM or operation voltage does not reach EXCVA motor, C46 (P1658) is indicated. EXCVA can not operate.	EXCVA, EXCVA lead wire/coupler
P1657	Н		EXCVA position sensor voltage is higher than specified value.	EXCVA position sensor circuit shorted to VCC or ground circuit open
L			EXCVA position sensor voltage is lower than specified value.	EXCVA position sensor circuit open or shorted to ground or VCC circuit open
P1658			When no actuator control signal is supplied from the ECM, communication signal does not reach ECM or operation voltage does not reach EXCVA motor, C46 (P1658) is indicated. EXCVA motor can not operate.	EXCVA, EXCVA motor lead wire/coupler
C49		PAIR control	PAIR control solenoid valve voltage is	PAIR control solenoid valve, lead
P1656		solenoid valve	not input to ECM.	wire/coupler
C60		Cooling fan	Cooling fan relay signal is not input to	Cooling fan relay, lead wire/cou-
P0480	P0480		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**

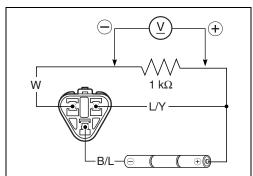
- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. (5-3)
- 3) Remove the air cleaner box. ( 5-14)
- 4) Check the CMP sensor coupler for loose or poor contacts. If OK, remove the CMP sensor. (3-26)



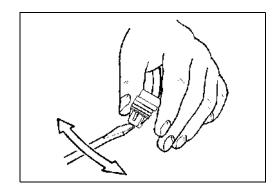
5) Connect 3 new 1.5 V batteries in series, 1  $k\Omega$  resistor and the multi-circuit tester as shown in the illustration.

09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (---)

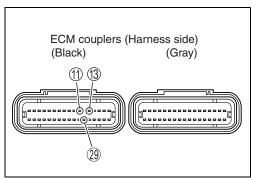


6) Under this condition, if a suitable screwdriver touching the pick-up surface of the CMP sensor is moved, the tester reading voltage changes (0.8 V and less  $\leftrightarrow$  4.3 V and more).



## Is the voltage OK?

	B/Y, B/Br or R wire open or shorted to ground
	Loose or poor contacts on the CKP sensor cou-
	pler or ECM coupler (terminal ③, ② or ①)
	<ul> <li>If wires and connection are OK, intermittent</li> </ul>
YES	trouble or faulty ECM.
	Recheck each terminal and wire harness for
	open circuit and poor connection.
	Replace the ECM with a known good one, and
	inspect it again.
	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.



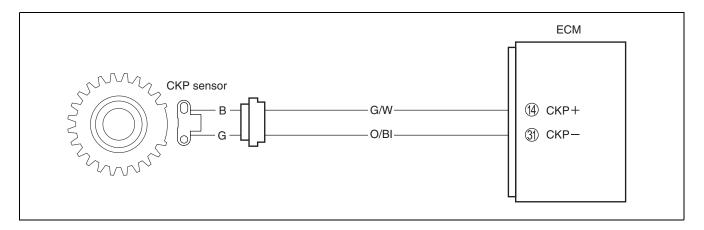
### CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

7) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

# "C12" (P0335) CKP SENSOR CIRCUIT MALFUNCTION

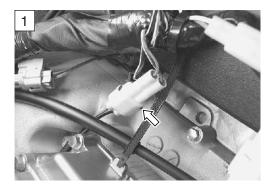
DETECTED CONDITION	POSSIBLE CAUSE
The signal does not reach ECM for 3 sec. or more,	Metal particles or foreign material being stuck on
after receiving the starter signal.	the CKP sensor and rotor tip
	CKP sensor circuit open or short
	CKP sensor malfunction
	ECM malfunction



# **INSPECTION**

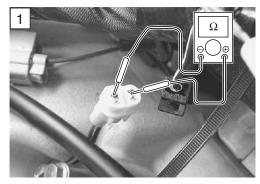
# Step 1

- 1) Turn the ignition switch 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  $\Omega$  (B – G)



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

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

(B - Ground)

(G - Ground)

09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )

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. (5.74-27)

# 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.

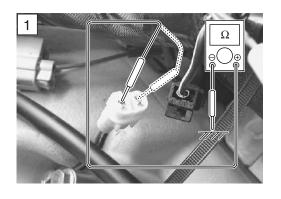
CKP sensor peak voltage: 0.28 V and more

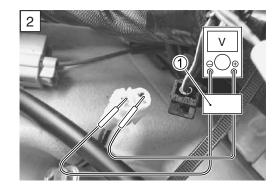
(⊕ B – ⊝ G)

1 Peak volt adaptor

09900-25008: Multi-circuit tester set

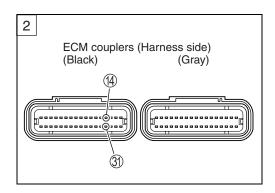
Tester knob indication: Voltage (---)





## Is the voltage OK?

YES	<ul> <li>G/W or O/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> <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>



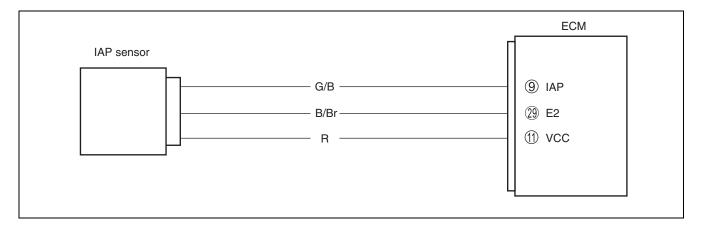
# CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

3) After repairing the trouble, clear the DTC using SDS tool. (274-27)

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

		DETECTED CONDITION	POSSIBLE CAUSE
C13		IAP sensor voltage is not within the following range.  0.5 V ≤ Sensor voltage < 4.85 V  NOTE:  Note that atmospheric pressure varies depending on weather conditions as well as altitude.  Take that into consideration when inspecting voltage.	<ul> <li>Clogged vacuum passage between throttle body and IAP sensor.</li> <li>Air being drawn from vacuum passage between throttle body and IAP sensor.</li> <li>IAP sensor circuit open or shorted to ground.</li> <li>IAP sensor malfunction.</li> <li>ECM malfunction.</li> </ul>
P0105	Н	Sensor voltage is higher than specified value.	<ul> <li>IAP sensor circuit open or shorted to VCC or ground circuit open.</li> </ul>
	L	Sensor voltage is lower than specified value.	<ul> <li>IAP sensor circuit shorted to ground or VCC circuit open.</li> </ul>



### **INSPECTION**

# Step 1 (When indicating C13:)

- 1) Turn the ignition switch 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 ON.
- 6) Measure the voltage at the R wire and ground.
- 7) If OK, then measure the voltage at the R wire (A) and B/Br wire (B).

DATA IAP sensor input voltage: 4.5 – 5.5 V

(⊕ R – ⊝ Ground)

(⊕ R – ⊝ B/Br)

09900-25008: Multi-circuit tester set

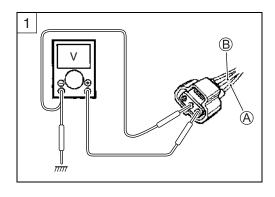
Tester knob indication: Voltage (---)

Is the voltage OK?

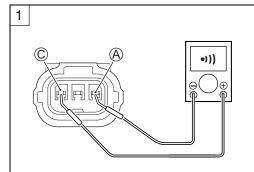
YE	S	Go to Step 2.	
N	Э	• Loose or poor contacts on the ECM coupler (terminal 11) or 29).	
		Open or short circuit in the R wire or B/Br wire.	

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

- 1) Turn the ignition switch 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 R wire (A) and G/B 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/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 (•)))

## CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

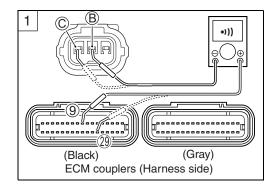
Is the continuity OK?

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

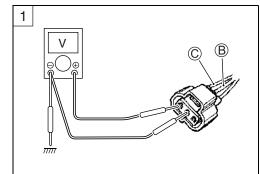
9) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

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

- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- Check the IAP sensor coupler for loose or poor contacts.If OK, then check the IAP sensor lead wire continuity.
- 4) Disconnect the IAP sensor coupler.
- 5) Check the continuity between G/B wire © and ground.
- 6) Also, check the continuity between G/B wire © and B/Br wire ®. If the sound is not heard from the tester, the circuit condition is OK.







- 7) Disconnect the ECM coupler.
- 8) Check the continuity between R wire A and terminal 11.
- 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 (•)))

## **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

YES	Go to Step 1 ( 4-38) and go to Step 2.
NO	R or G/B wire open, or G/B wire shorted to ground

10)After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

#### Step 2

- 1) Connect the IAP sensor coupler and ECM coupler.
- 2) Insert the needle pointed probes to the lead wire coupler.
- Start the engine at idle speed and measure the IAP sensor output voltage at the wire side coupler (between G/B and B/Br wires).

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

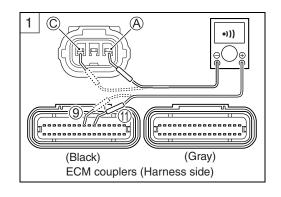
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

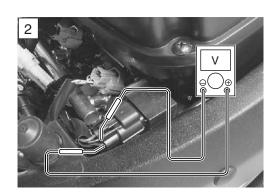
Tester knob indication: Voltage (---)

Is the voltage OK?

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

4) After repairing the trouble, clear the DTC using SDS tool. ( 3-4-27)



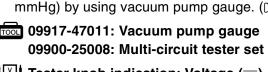


#### Step 3

- 1) Turn the ignition switch 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 + terminal to the VCC terminal ③.
- 4) Check the voltage between V-out @ and ground. Also, check if voltage reduces when vacuum is applied up to 53 kPa (400 mmHg) by using vacuum pump gauge. ( 4-43)

09917-47011: Vacuum pump gauge

Tester knob indication: Voltage (==)



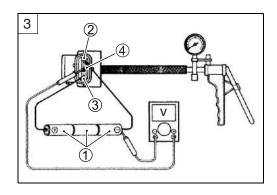
Is the voltage OK?

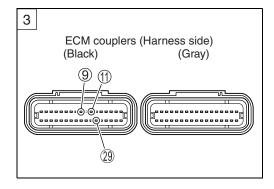
YES	<ul> <li>G/B, R or B/Br wire open or shorted to ground, or poor ⑨, ⑪ or ⑨ connection</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	If check result is not satisfactory, replace the IAP sensor with a new one.

#### CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

5) After repairing the trouble, clear the DTC using SDS tool. ( 34-27)



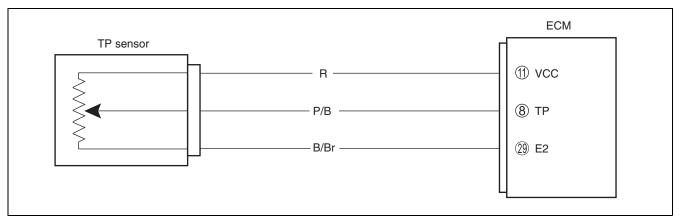


# Output voltage (VCC voltage 4.5 – 5.0 V, ambient temp. 20 – 30 °C, 68 – 86 °F)

ALTITUDE		ATMOS	ATMOSPHERIC	
(Reference)		PRESSURE		VOLTAGE
(ft)	(m)	(mmHg)	kPa	(V)
0	0	760	100	
				3.1 – 3.6
2 000	610	707	94	
2 001	611	707	94	
				2.8 - 3.4
5 000	1 524	634	85	
5 001	1 525	634	85	
				2.6 – 3.1
8 000	2 438	567	76	
8 001	2 439	567	76	
				2.4 - 2.9
10 000	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
	П	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) Check the TP sensor coupler for loose or poor contacts. If OK, then measure the TP sensor input voltage.
- 4) Disconnect the TP sensor coupler.
- 5) Turn the ignition switch ON.
- 6) Measure the voltage at the R wire ® and ground.



TP sensor input voltage: 4.5 – 5.5 V

(+) R − (-) Ground)

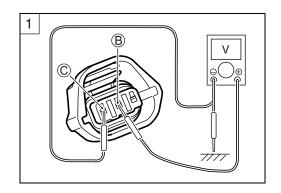
(⊕ R – ⊝ B/Br)

09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (==)

Is the voltage OK?

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

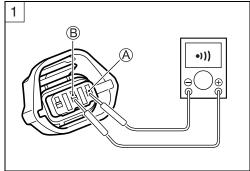


## Step 1 (When indicating P0120-H:)

- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 3) Check the TP sensor coupler for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.



- 4) Disconnect the TP sensor coupler.
- 5) Check the continuity between P/B wire (A) and R wire (B). If the sound is not heard from the tester, the circuit condition is OK.

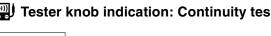


- 6) Disconnect the ECM coupler.
- 7) Check the continuity between P/B wire (A) and terminal (8).
- 8) Also, check the continuity between B/Br wire © and terminal 29.

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

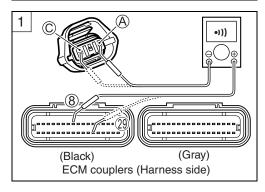
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Continuity test (•)))



# **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.



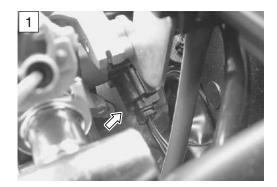
## Is the continuity OK?

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

9) After repairing the trouble, clear the DTC using SDS tool. (5-4-27)

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

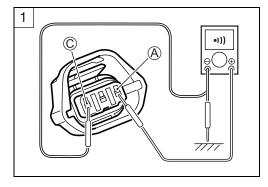
- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. (5-3)
- 3) Check the TP sensor coupler for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.



- 4) Disconnect the TP sensor coupler.
- 5) Check the continuity between P/B wire A and ground.
- 6) Also, check the continuity between P/B wire 

  and B/Br wire

  . If the sound is not heard from the tester, the circuit condition is OK.

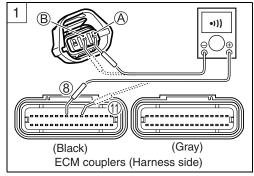


- 7) Disconnect the ECM coupler.
- 8) Check the continuity between P/B wire A and terminal 8.
- 9) Also, check the continuity between R wire B and terminal 11.

TPS lead wire continuity: Continuity (•)))

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

Tester knob indication: Continuity test (•)))



## **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

YES	Go to Step 1 ( 4-44) and go to Step 2.
NO	R wire or P/B wire open, or P/B wire shorted to
	ground

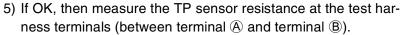
10)After repairing the trouble, clear the DTC using SDS tool. (5-4-27)

#### Step 2

- 1) Turn the ignition switch 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.

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

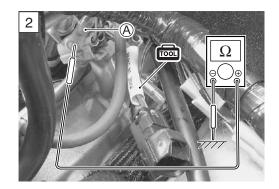
(Terminal A – Ground)

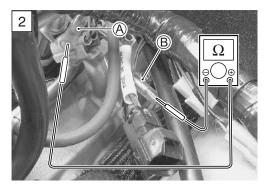


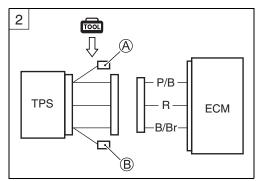
6) Turn the throttle grip and measure the resistance.

DATA TP sensor resistance

Throttle valve is closed: Approx. 1.1 k $\Omega$  Throttle valve is opened: Approx. 4.3 k $\Omega$ 







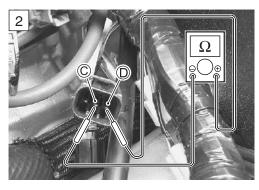
7) If OK, then measure the TP sensor resistance at the test harness terminals (between terminal  $\mathbb O$  and terminal  $\mathbb O$ ).

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

(Terminal © - Terminal ®)

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

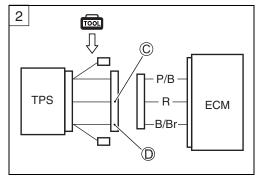
Tester knob indication: Resistance ( $\Omega$ )



Are the continuity and resistance OK?

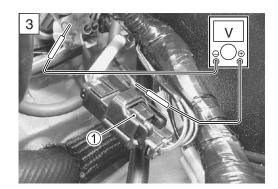
YES	Go to Step 3.
NO	Reset the TP sensor position correctly.
INO	Replace the TP sensor with a new one.

8) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)



### Step 3

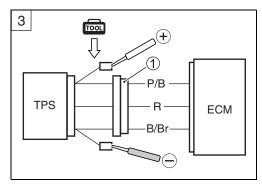
- 1) Connect the TP sensor coupler ① to the test harness.
- 2) Turn the ignition switch ON.
- 3) Measure the TP sensor output voltage at the coupler (between ⊕ P/B and ⊝ B/Br) by turning the throttle grip.



TP sensor output voltage

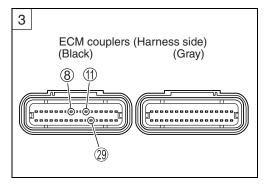
Throttle valve is closed: Approx. 1.1 V Throttle valve is opened: Approx. 4.3 V

09900-25008: Multi-circuit tester set



Is the voltage OK?

YES	<ul> <li>P/B, R 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.



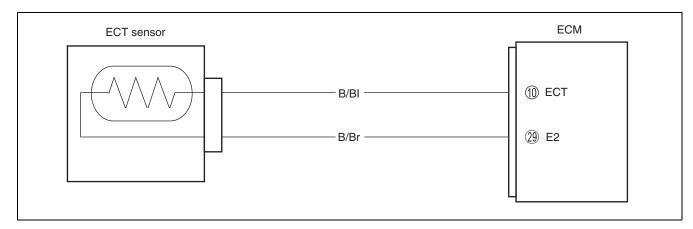
### CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

4) After repairing the trouble, clear the DTC using SDS tool. (274-27)

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

	DETECTED CONDITION		POSSIBLE CAUSE	
C15	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		Sensor voltage is higher than specified	ECT sensor circuit open or ground circuit open	
	Н	value.		
		Sensor voltage is lower than specified	ECT sensor circuit shorted to ground	
	L	value.		



#### **INSPECTION**

### Step 1 (When indicating C15:)

- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. (5-3)
- Check the ECT sensor coupler for loose or poor contacts.
   If OK, then measure the ECT sensor voltage at the wire side coupler.
- 4) Disconnect the coupler and turn the ignition switch ON.
- 5) Measure the voltage between B/BI wire terminal (A) and ground.
- 6) If OK, then measure the voltage between B/BI wire terminal (A) and B/Br wire terminal (B).

DATA ECT sensor voltage: 4.5 – 5.5 V

(⊕ B/BI – ⊝ Ground)

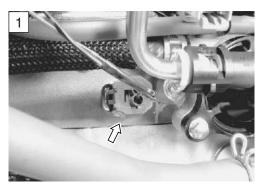
(⊕ B/BI – ⊝ B/Br)

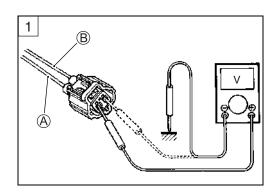
09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (==)

Is the voltage OK?

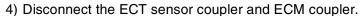
YES	Go to Step 2.
	• Loose or poor contacts on the ECM coupler (terminal 10 or 29).
NO	Open or short circuit in the B/BI wire or B/Br wire





#### **Step 1 (When indicating P0115-H:)**

- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 3) Check the ECT sensor coupler for loose or poor contacts. If OK, then check the ECT sensor lead wire continuity.



- 5) Check the continuity between B/BI wire (A) and terminal (10).
- 6) Also, check the continuity between B/Br wire ® and terminal ®.

ECTS lead wire continuity: Continuity (•)))

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

Tester knob indication: Continuity test (•)))

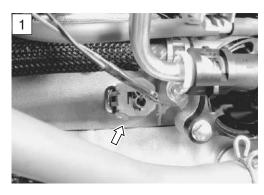


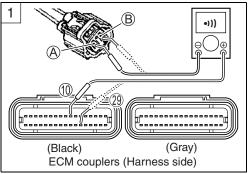
When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

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

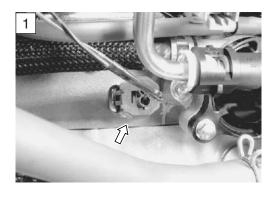
7) After repairing the trouble, clear the DTC using SDS tool. (34-27)



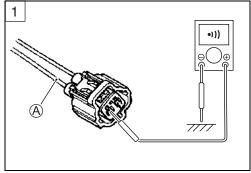


# Step 1 (When indicating P0115-L:)

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



- 4) Disconnect the ECT sensor coupler.
- 5) 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 (•)))



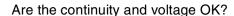
- 6) Connect the ECT sensor coupler and turn the ignition switch ON.
- 7) Measure the voltage between B/BI wire (A) and ground.

ECT sensor output voltage: 0.15 – 4.85 V

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

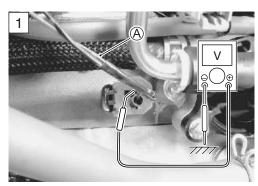
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Voltage (===)



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

8) After repairing the trouble, clear the DTC using SDS tool. (574-27)



#### Step 2

- 1) Turn the ignition switch OFF.
- 2) Disconnect the ECT sensor coupler.
- 3) Measure the ECT sensor resistance.

#### **DATA** ECT sensor resistance:

Approx. 2.45 k $\Omega$  at 20 °C (68 °F) (Terminal – Terminal)

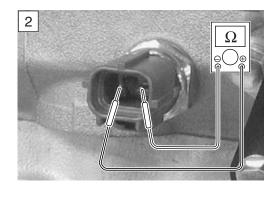
09900-25008: Multi-circuit tester set

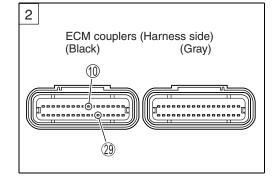
Tester knob indication: Resistance ( $\Omega$ )

Refer to page 7-7 for details.

Is the resistance OK?

	B/Bl or B/Br wire open or shorted to ground, or	
	poor ① or ② connection.	
	If wire and connection are OK, intermittent trou-	
YES	ble or faulty ECM.	
1 1 2 3	Recheck each terminal and wire harness for	
	open circuit and poor connection.	
	Replace the ECM with a known good one, and	
	inspect it again.	
NO	Replace the ECT sensor with a new one.	





#### **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

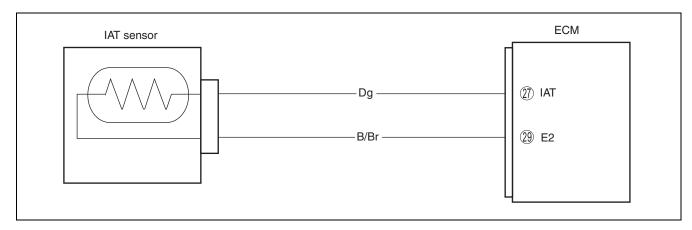
4) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

## **DATA** ECT sensor specification

Engine Coolant Temp	Resistance
20 °C (68 °F)	Approx. 2.45 kΩ
50 °C (122 °F)	Approx. 0.811 kΩ
80 °C (176 °F)	Approx. 0.318 kΩ
110 °C (230 °F)	Approx. 0.142 kΩ

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

		DETECTED CONDITION		POSSIBLE CAUSE
C21		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
	Н	value.		
		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 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

( $\oplus$  Dg –  $\ominus$  Ground)

(⊕ Dg – ⊝ B/Br)

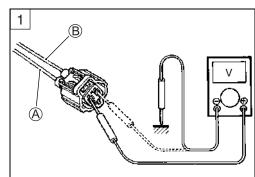
09900-25008: Multi-circuit tester set

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 ③)</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 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 ②.

IATS lead wire continuity: Continuity (•)))

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

Tester knob indication: Continuity test (•)))

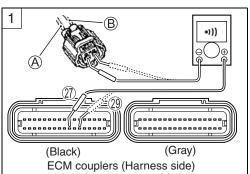


When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

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

7) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

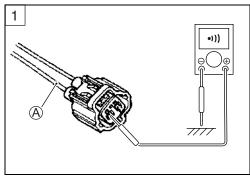


#### Step 1 (When indicating P0110-L:)

- 1) Turn the ignition switch 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

(**⊕ Dg – ⊝ Ground**)

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

Tester knob indication: Voltage (---)



Are the continuity and voltage OK?

YES	Go to Step 2.
NO	Dg wire shorted to ground
INO	If wire is OK, go to Step 2.

8) After repairing the trouble, clear the DTC using SDS tool. (274-27)

### Step 2

1) Turn the ignition switch OFF.

2) Measure the IAT sensor resistance.

IAT sensor resistance: Approx. 2.45 k $\Omega$  at 20 °C (68 °F)

(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.



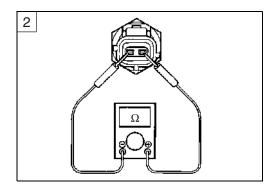
When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

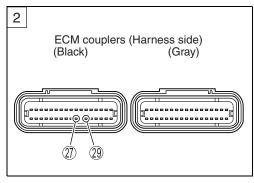
## DATA IAT sensor specification

Intake Air Temp	Resistance
20 °C (68 °F)	Approx. 2.45 kΩ
50 °C (122 °F)	Approx. 0.808 kΩ
80 °C (176 °F)	Approx. 0.322 kΩ
110 °C (230 °F)	Approx. 0.148 kΩ

#### NOTE:

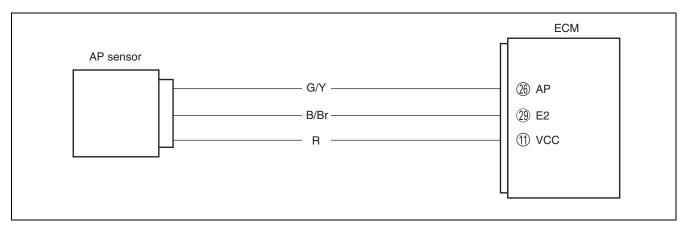
IAT sensor resistance measurement method is the same way as that of the ECT sensor. Refer to page 7-7 for details.





# "C22" (P1450-H/L) AP SENSOR CIRCUIT MALFUNCTION

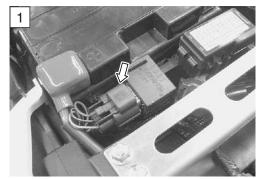
		DETECTED CONDITION		POSSIBLE CAUSE
C22		AP sensor voltage is not within the fol-		Clogged air passage with dust
		lowing range.	•	AP sensor circuit open or shorted to ground
		0.5 V ≤ Sensor voltage < 4.85 V	•	AP sensor malfunction
		NOTE:	•	ECM malfunction
		Note that atmospheric pressure varies		
	depending on weather conditions as			
	well as altitude.			
		Take that into consideration when		
ins		inspecting voltage.		
P1450	Н	Sensor voltage is higher than specified	•	AP sensor circuit shorted to VCC or ground circuit
	П	value.		open
	1	Sensor voltage is lower than specified	•	AP sensor circuit open or shorted to ground or
	<u> </u>	value.		VCC circuit open



#### **INSPECTION**

# Step 1 (When indicating C22:)

- 1) Turn the ignition switch OFF.
- 2) Remove the front seat. ( \$\sumset\$ 8-7)
- 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 ON.
- 6) Measure the voltage at the R wire and ground.
- 7) If OK, then measure the voltage at the R wire (A) and B/Br wire (B).

AP 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?

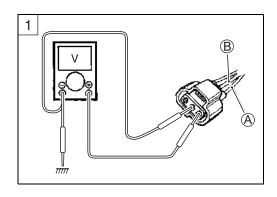
YES	Go to Step 2.
NO	<ul> <li>Loose or poor contacts on the ECM coupler (terminal ① or ②)</li> <li>Open or short circuit in the R wire or B/Br wire</li> </ul>

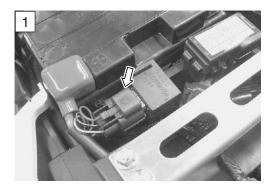
# Step 1 (When indicating P1450-H:)

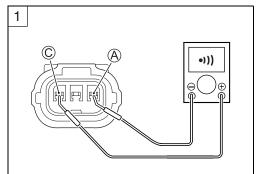
- 1) Turn the ignition switch OFF.
- 2) Remove the front seat. ( 8-7)
- 3) Check the AP sensor coupler for loose or poor contacts. If OK, then check the AP sensor lead wire continuity.



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 ③.

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

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

Tester knob indication: Continuity test (•)))

## **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

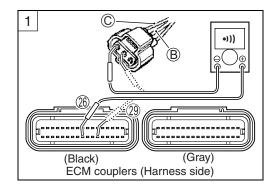
Is the continuity OK?

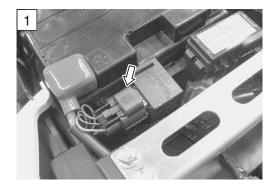
YES	Go to Step 2.
NO	G/Y wire shorted to VCC, or B/Br wire open

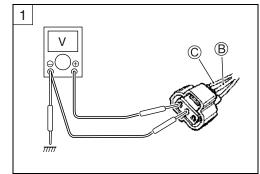
9) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

#### Step 1 (When indicating P1450-L:)

- 1) Turn the ignition switch OFF.
- 2) Remove the front seat. ( 8-7)
- 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 11.
- 9) If OK, then check the continuity between G/Y wire © and terminal <sup>2</sup>6.

APS lead wire continuity: Continuity (•)))

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

Tester knob indication: Continuity test (•)))

# CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

YES	Go to Step 1 ( 4-57) and go to Step 2.
NO	R or G/Y wire open, or G/Y wire shorted to ground

10)After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

#### 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)

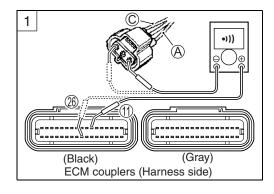
(⊕ G/Y – ⊝ B/Br)

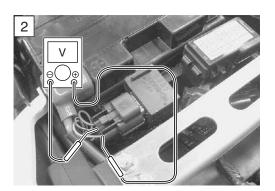
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

Tester knob indication: Voltage (---)

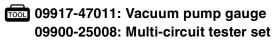
YES	Go to Step 3.
	Check the air passage for clogging.
NO	Open or short circuit in the G/Y wire
	Replace the AP sensor with a new one.

4) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)





- 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 V-out ④ and ground. Also, check if voltage reduces when vacuum is applied up to 53 kPa (400 mmHg) by using vacuum pump gauge. (CF Below)



Tester knob indication: Voltage (---)

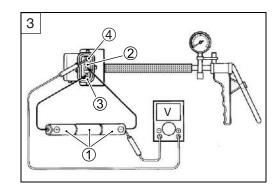


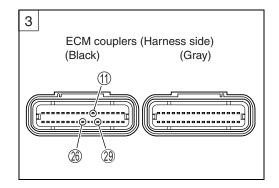
YES	<ul> <li>G/Y, R or B/Br wire open or shorted to ground, or poor ②, ① or ② connection.</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and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

# CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

4) After repairing the trouble, clear the DTC using SDS tool. ( +27)

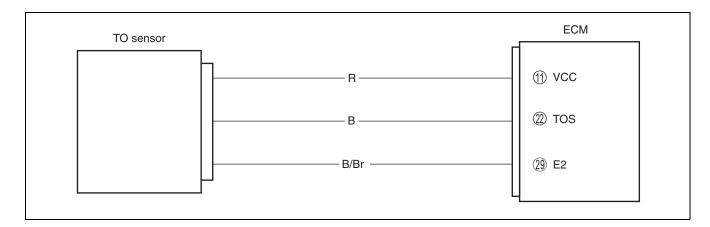




ALTITUDE		ATMOS	OUTPUT	
(Refe	(Reference)		PRESSURE	
(ft)	(m)	(mmHg)	kPa	(V)
0	0	760	100	
				3.1 – 3.6
2 000	610	707	94	
2 001	611	707	94	
				2.8 - 3.4
5 000 1 524		634	85	
5 001	1 524	634	85	
				2.6 – 3.1
8 000	2 438	567	76	
8 001	2 439	567	76	
				2.4 – 2.9
10 000	3 048	526	70	

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

		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	•	TO sensor malfunction
		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	•	TO sensor circuit open or shorted to ground or
	L	value.		VCC circuit open



### **INSPECTION**

### Step 1 (When indicating C23:)

- 1) Turn the ignition switch OFF.
- 2) Remove the frame cover. ( 8-8)
- 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:  $16.5 - 22.3 \text{ k}\Omega$ 

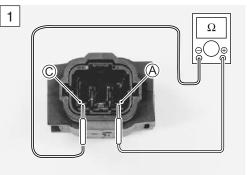
(Terminal (A) – Terminal (C)

09900-25008: Multi-circuit tester set

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

Is the resistance OK?

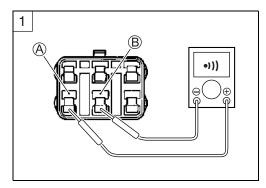
YES	Go to Step 2.
NO	Replace the TO sensor with a new one.



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

- 1) Turn the ignition switch OFF.
- 2) Remove the frame cover. ( 8-8)
- 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.

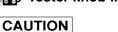


- 6) Disconnect the ECM coupler.
- 7) Check the continuity between B wire B and terminal 22.
- 8) Also, check the continuity between B/Br wire © and terminal 29.

TOS lead wire continuity: Continuity (•)))

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

Tester knob indication: Continuity test (•)))

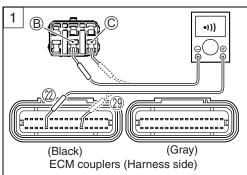


When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

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

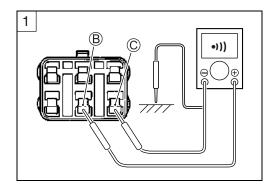
9) After repairing the trouble, clear the DTC using SDS tool. (574-27)



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

- 1) Turn the ignition switch OFF.
- 2) Remove the frame cover. ( 8-8)
- 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.

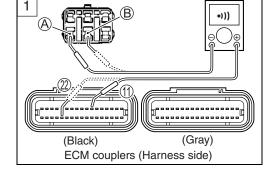


- 7) Disconnect the ECM coupler.
- 8) Check the continuity between R wire A and terminal 1.
- 9) Also, then check the continuity between B wire  ${\mathbb B}$  and terminal  ${\mathbb Q}$ .

TOS lead wire continuity: Continuity (•)))

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

Tester knob indication: Continuity test (•)))



### CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

YES	Go to Step 2.
NO	R or B wire open, or B wire shorted to ground.

10)After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

- 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 ON.
- 4) Measure the voltage between B and B/Br wires.

Also, measure the voltage as the motorcycle is leaned.

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.

09900-25008: Multi-circuit tester set

09900-25009: Needle pointed probe set

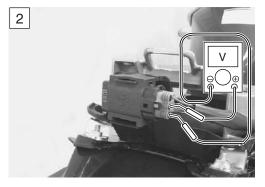
Is the voltage OK?

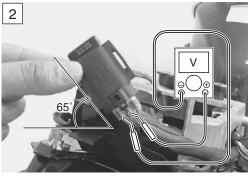
YES	<ul> <li>R, B or B/Br wire open or shorted to ground, or poor ①, ② or ③ connection</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>	
NO	<ul><li>Loose or poor contacts on the ECM coupler</li><li>Open or short circuit</li></ul>	
	Replace the TO sensor with a new one.	

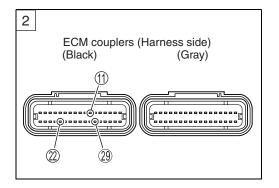
### CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

6) After repairing the trouble, clear the DTC using SDS tool. (574-27)





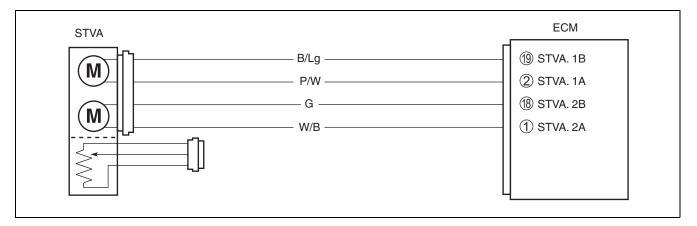


# "C24" (P0351), "C25" (P0352), "C26" (P0353) or "C27" (P0354) IGNITION SYSTEM MALFUNCTION

\* Refer to the IGNITION SYSTEM for details. ( 9-20)

# "C28" (P1655) STV ACTUATOR CIRCUIT MALFUNCTION

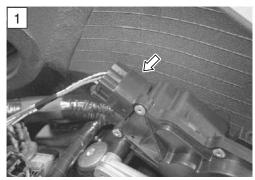
DETECTED CONDITION	POSSIBLE CAUSE
The operation voltage does not reach the STVA.	STVA malfunction
ECM does not receive communication signal from	STVA circuit open or short
the STVA.	STVA motor malfunction



### **INSPECTION**

### Step 1

- 1) Lift and support the fuel tank. ( 5-3)
- 2) Remove the air cleaner box. ( 5-14)
- 3) Check the STVA lead wire coupler for loose or poor contacts.

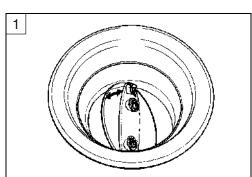


4) Turn the ignition switch ON to check the STV operation. (STV operating order: Full open  $\rightarrow$  95% open)

Is the operating OK?

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

5) After repairing the trouble, clear the DTC using SDS tool. (2-3-4-27)



- 1) Turn the ignition switch OFF.
- 2) Disconnect the STVA lead wire coupler.
- 3) Check the continuity between each terminal and ground.

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

 $\Delta \Delta \Delta$  STVA resistance: Approx. 7.0  $\Omega$ 

(Terminal (B) – Terminal (B)

(Terminal © – Terminal ©)

09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )

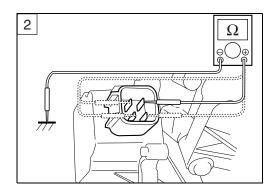
Is the resistance OK?

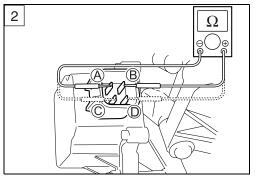
YES	<ul> <li>W/B, P/W, G and B/Lg wire open or shorted to ground, or poor ①, ②, ® and ⑨ connection</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>Replace the ECM with a known good one, and inspect it again.</li> </ul>
NO	<ul><li>Loose or poor contacts on the ECM coupler.</li><li>Replace the STVA with a new one.</li></ul>

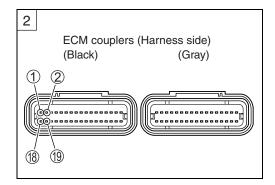
### CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

5) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

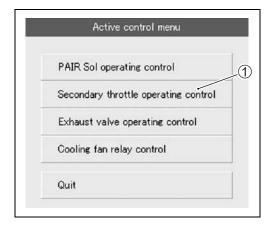






### **ACTIVE CONTROL INSPECTION**

- 1) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
- 2) Turn the ignition switch ON.
- 3) Click "Secondary throttle operating control" ①.



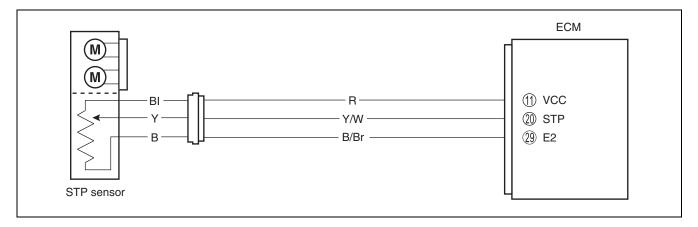
4) Click each button 2.

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

V	Secondary throttle actuator position sensor	94.5	%		6 1 1 1 1 1 2 1 1
V	Secondary throttle full opened	Except full opn			Secondary throttle operating control
V	Secondary throttle full closed	Except full cls			Spec Off
V	Engine coolant / oil temperature	53.5	* C		
V	Engine speed	0	rpm	$= \iff$	Full closed
V	Throttle position	28.9	•		Full around
V	Intake air temperature	45.9	* C		Full opened 2
V	Barometric pressure	102.0	kPa		
V	Manifold absolute pressure 1	101.3	kPa		

# "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
		Sensor voltage is lower than specified	•	STP sensor circuit open or shorted to ground or
	_	value.		VCC circuit open



### **INSPECTION**

### Step 1 (When indicating C29:)

- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 3) Check the STP sensor coupler for loose or poor contacts. If OK, then measure the STP sensor input voltage.
- 4) Disconnect the STP sensor coupler.
- 5) Turn the ignition switch ON.
- 6) Measure the voltage at the R wire (A) and ground.
- 7) 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)

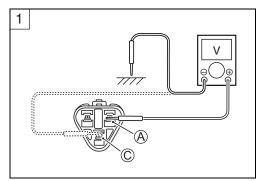
09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (==)

Is the voltage OK?

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





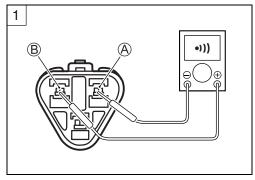
### Step 1 (When indicating P1654-H:)

- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 3) Check the STP sensor coupler for loose or poor contacts. If OK, then check the STP sensor lead wire continuity.



- 4) Disconnect the STP sensor coupler.
- 5) Check the continuity between Y/W wire ® and R wire A.

  If the sound is not heard from the tester, the circuit condition is OK.

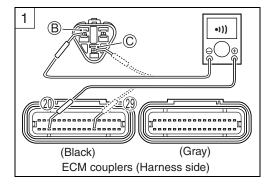


- 6) Disconnect the ECM coupler.
- 7) Check the continuity between Y/W wire ® and terminal @.
- 8) Also, check the continuity between B/Br wire  $\ \ \,$  and terminal  $\ \ \,$   $\ \ \,$

DATA STPS lead wire continuity: Continuity (•)))

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





### CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

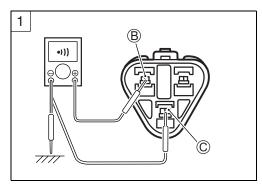
YES	Go to Step 2.
NO	Y/W wire shorted to VCC, or B/Br wire open

9) After repairing the trouble, clear the DTC using SDS tool. (274-27)

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

- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 3) Check the STP sensor coupler for loose or poor contacts. If OK, then check the STP sensor lead wire continuity.

- 4) Disconnect the STP sensor coupler.
- 5) Check the continuity between Y/W wire ® and ground.
- 6) 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.

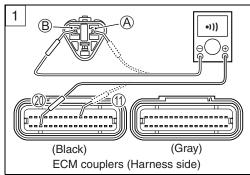


- 7) Disconnect the ECM coupler.
- 8) Check the continuity between Y/W wire ® and terminal @.
- 9) Also, check the continuity between R wire A and terminal 11.

STPS lead wire continuity: Continuity (•)))

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

Tester knob indication: Continuity test (•)))



### **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

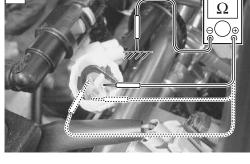
Is the continuity OK?

YES	Go to Step 1 ( 4-70) and go to Step 2.
NO	R or Y/W wire open, or Y/W wire shorted to
	ground

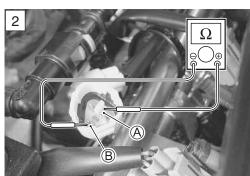
10)After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 3) Disconnect the STP sensor coupler.
- 4) Check the continuity between each terminal and ground.

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



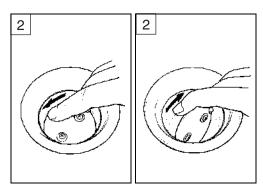
- 5) If OK, then measure the STP sensor resistance at the wire terminals (between Y wire (A) and B wire (B)).
- 6) Close and open the secondary throttle valve by finger, and measure the valve closing and opening resistance.



**DATA** STP sensor resistance

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

(Y A - B B)



7) If OK, then measure the STP sensor resistance at the wire terminals (between BI wire © and B wire ®).

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

(BI © - B B)

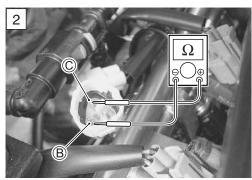
09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )

Are the continuity and resistance OK?

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

8) After repairing the trouble, clear the DTC using SDS tool. (274-27)



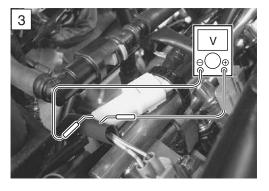
- 1) Turn the ignition switch OFF.
- 2) Connect the STP sensor coupler.
- 3) Insert the needle pointed probes to the STP sensor coupler.
- 4) Disconnect the STVA lead wire coupler.
- 5) Turn the ignition switch ON.
- 6) Measure the STP sensor output voltage at the coupler (between ⊕ Y wire and ⊝ B wire) by turning the secondary throttle valve (close and open) with a finger.

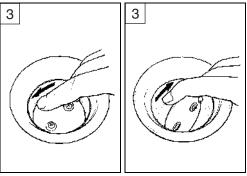


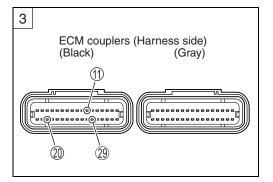
Secondary throttle valve is closed : Approx. 0.5 V Secondary throttle valve is opened : Approx. 3.9 V

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

Tester knob indication: Voltage (---)







### Is the voltage OK?

YES	<ul> <li>R, Y/W 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 STP sensor with a new one.

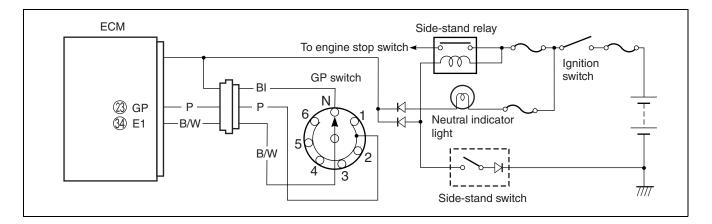
### **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

After repairing the trouble, clear the DTC using SDS tool. (274-27)

# "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 OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 3) Check the GP switch coupler for loose or poor contacts. If OK, then measure the GP switch voltage.

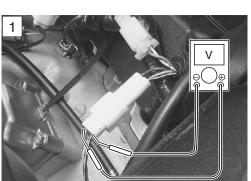


- 4) Support the motorcycle with a jack.
- 5) Fold the side-stand to up position.
- 6) Make sure the engine stop switch is in the "RUN" position.
- 7) Insert the needle pointed probe to the lead wire coupler.
- 8) Turn the ignition switch ON.
- 9) Measure the voltage at the wire side coupler between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



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
	Loose or poor contacts on the ECM coupler
NO	(terminal ② or ④)
	If wire and connection are OK, replace the GP
	switch with a new one.

# ECM couplers (Harness side) (Black) (Gray)

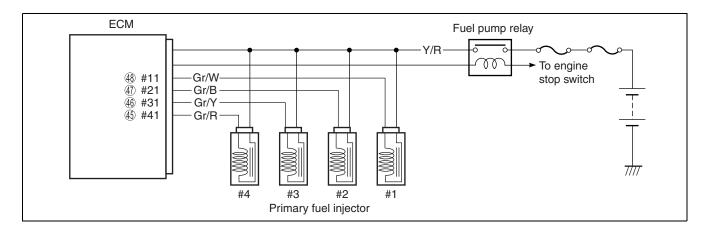
### **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

10)After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

# "C32" (P0201), "C33" (P0202), "C34" (P0203) or "C35" (P0204) PRIMARY 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**

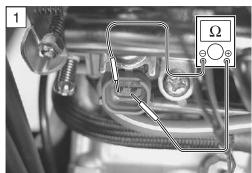
### Step 1

- 1) Turn the ignition switch 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 (68 °F) (Terminal – Terminal)



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

**DATA** Injector continuity:  $\infty \Omega$  (Infinity)

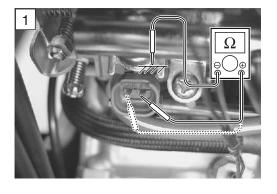
09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )

Are the resistance and continuity OK?

YES	Go to Step 2.
NO	Replace the injector with a new one. (5-23)

6) After repairing the trouble, clear the DTC using SDS tool. (2-4-27)



### Step 2

- 1) Turn the ignition switch ON.
- 2) Measure the injector voltage between Y/R wire and ground.

Injector voltage: Battery voltage

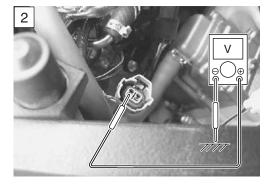
(**⊕** Y/R – **⊝** Ground)

### NOTE:

Injector voltage can be detected only 3 for seconds after ignition switch is turned ON.

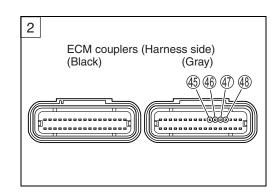
09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (==)



### Is the voltage OK?

YES	<ul> <li>Gr/W wire open or shorted to ground, or poor 48 connection (#1 cylinder side)</li> <li>Gr/B wire open or shorted to ground, or poor 47 connection (#2 cylinder side)</li> <li>Gr/Y wire open or shorted to ground, or poor 46 connection (#3 cylinder side)</li> <li>Gr/R wire open or shorted to ground, or poor 45 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> </ul>
	·
	Replace the ECM with a known good one, and
	inspect it again.
NO	Open circuit in the Y/R wire



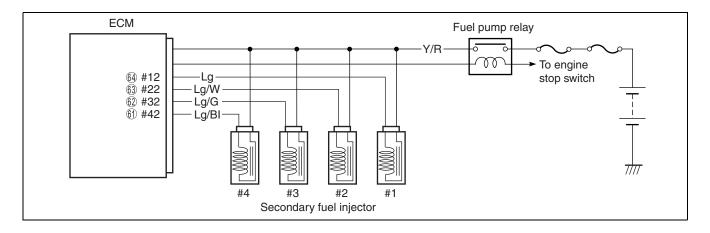
### CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

3) After repairing the trouble, clear the DTC using SDS tool. (274-27)

# "C36" (P1764), "C37" (P1765), "C38" (P1766) or "C39" (P1767) SECONDARY FUEL INJECTOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
Some failure exists in the fuel injector signal in a	Injector circuit open or short
high load, high revolution condition.	Injector malfunction
	ECM malfunction



### **INSPECTION**

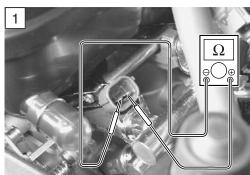
### Step 1

- 1) Turn the ignition switch 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 (68 °F) (Terminal – Terminal)



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

**DATA** Injector continuity:  $\infty \Omega$  (Infinity)

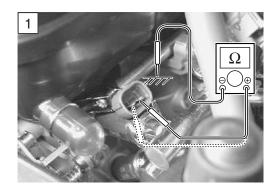
09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )

Are the resistance and continuity OK?

YES	Go to Step 2.
NO	Replace the injector with a new one. ( 5-23)

6) After repairing the trouble, clear the DTC using SDS tool. (274-27)



### Step 2

- 1) Turn the ignition switch ON.
- 2) Measure the injector voltage between Y/R wire and ground.

Injector voltage: Battery voltage

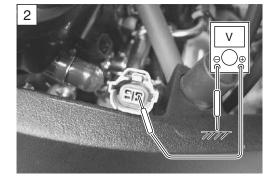
(**⊕** Y/R – **⊝** Ground)

NOTE:

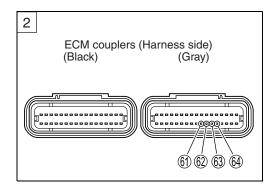
Injector voltage can be detected only 3 seconds after ignition switch is turned ON.

09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (==)



YES	<ul> <li>Lg wire open or shorted to ground, or poor (a) connection (#1 cylinder side)</li> <li>Lg/W wire open or shorted to ground, or poor (a) connection (#2 cylinder side)</li> <li>Lg/G wire open or shorted to ground, or poor (a) connection (#3 cylinder side)</li> <li>Lg/BI wire open or shorted to ground, or poor (a) 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 inspect it again.</li> </ul>	
NO Open circuit in the Y/R wire.		



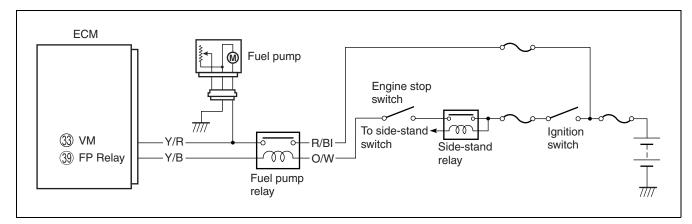
### **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

3) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

# "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)



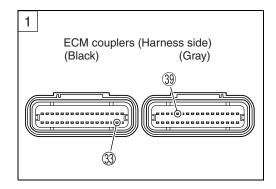
### **INSPECTION**

### Step 1 (When indicating C41:)

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



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>
	Replace the ECM with a known good one, and inspect it again.
NO	Replace the FP relay with a new one.



### **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

4) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

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

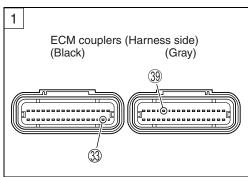
- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 3) Check the FP relay coupler for loose or poor contacts. If OK, then check the FP relay. ( 5-7)



### Is the FP relay OK?

	Y/R wire shorted to power source	
	Y/B wire shorted to ground	
	• 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 Replace the FP relay with a new one.		

4) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)



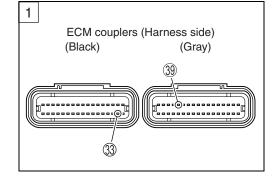
### Step 1 (When indicating P0230-L:)

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



### 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. ( $\frac{1}{2}$ 4-27)

# "C42" (P01650) IG SWITCH CIRCUIT MALFUNCTION

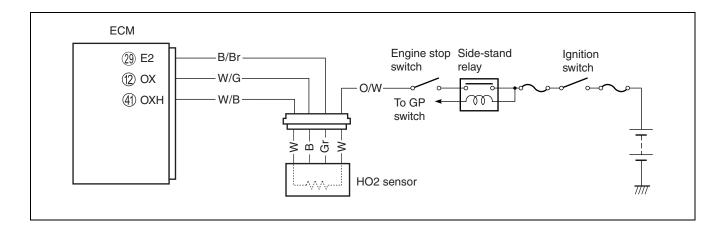
DETECTED CONDITION	POSSIBLE CAUSE
Ignition switch signal is not input to the ECM.	Ignition system circuit open or short
	ECM malfunction
When the ID agreement is not verified.	Immobilizer system malfunction
ECM does not receive communication signal from the	(For E-02, 19, 24)
immobilizer antenna.	
(For E-02, 19, 24)	

### **INSPECTION**

<sup>\*</sup> Refer to the IGNITION SWITCH INSPECTION for details. ( $\bigcirc$  9-39)

# "C44" (P0130/P0135) HO2 SENSOR (HO2S) CIRCUIT MALFUNCTION (For E-02, 19)

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 < 0.55 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.		



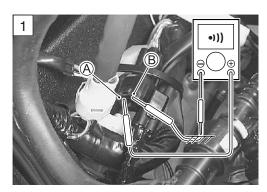
#### **INSPECTION**

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

- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 3) Check the HO2 sensor for loose or poor contacts.

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

- 4) Disconnect the HO2 sensor coupler
- 5) Check the continuity between W/G wire A and ground.
- 09900-25008: Multi-circuit tester set
- Tester knob indication: Continuity test (•)))



7) Disconnect the ECM coupler.

8) Check the continuity between W/G wire A and terminal 12.

9) Also, check the continuity between B/Br wire ® and terminal 3.

HO2S lead wire continuity: Continuity (•)))

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

Tester knob indication: Continuity test (•)))

### CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

YES Go to Step 2. (When indicating C44/P0130				
NO	W/G wire shorted to ground, or W/G or B/Br wire			
INO	open.			

10)After repairing the trouble, clear the DTC using SDS tool. (574-27)

### 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)

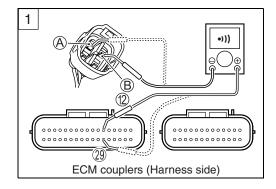
- 4) If OK, then remove the air cleaner box (\$\subseteq 5-14\$) and pinch the PAIR hoses ① with proper hose clamps.
- 5) Measure the HO2 sensor output voltage while holding the engine speed at 5 000 r/min.

HO2 sensor output voltage at 5 000 r/min:

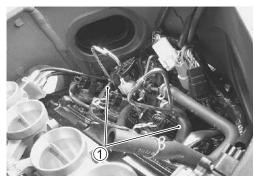
0.6 V and more (⊕ W/G – ⊖ B/Br)

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

Tester knob indication: Voltage (==)

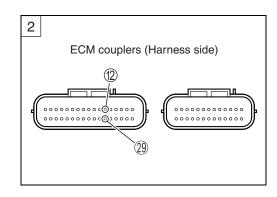






### Is the voltage OK?

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.		



### CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

6) After repairing the trouble, clear the DTC using SDS tool. (34-27)

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

- 1) Turn the ignition switch OFF.
- 2) Lift and support the fuel tank. ( 5-3)
- 3) Check the HO2 sensor for loose or poor contacts. If OK, then measure the HO2 sensor resistance.



4) 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.

5) After repairing the trouble, clear the DTC using SDS tool. (574-27)



### 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 (O/W) wire and ground.
- 4) If the tester voltage indicates the battery voltage, it is good condition.

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 (---)

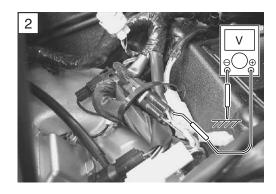
Is the voltage OK?

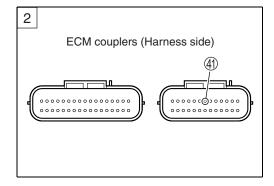
YES	<ul> <li>O/W or W wire open or shorted to ground, or poor ④ connection.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Replace the ECM with a known good one, and inspect it 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 4) or HO2 sensor coupler.</li> </ul>

### CAUTION

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

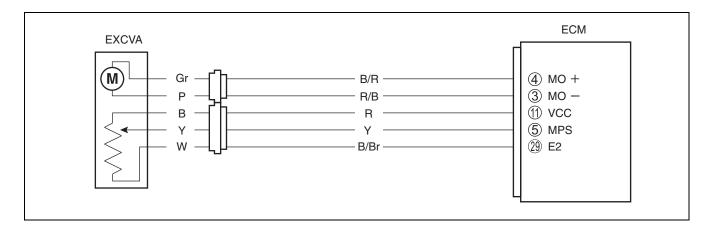
5) After repairing the trouble, clear the DTC using SDS tool. (574-27)





# "C46" (P1657-H/L or P1658) EXCV ACTUATOR CIRCUIT MALFUNCTION

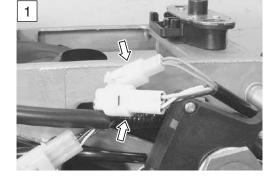
DETECTED CONDITION				POSSIBLE CAUSE
C46		The operation signal does not reach the EXCV actuator.  EXCVA position sensor voltage low or high  0.1 V ≤ Sensor voltage < 4.9 V  (without the above range)	• • •	EXCVA maladjusted EXCVA circuit open or short EXCVA motor malfunction EXCVA position sensor malfunction
P1657	Н	Sensor voltage is higher than specified value.	•	EXCVA position sensor circuit shorted to VCC or ground circuit open
	L	Sensor voltage is lower than specified value.	•	EXCVA position sensor circuit open or shorted to ground or VCC circuit open
P1658		The operation signal does not reach the EXCVA motor. ECM does not receive communication signal from the STVA motor.	•	EXCVA motor circuit open or short EXCVA motor malfunction



### **INSPECTION**

### Step 1 (When indicating C46:)

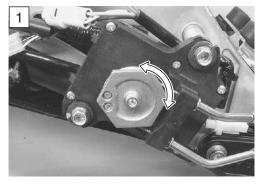
- 1) Turn the ignition switch OFF.
- 2) Remove the frame cover. ( 5-8)
- 3) Check the EXCVA lead wire couplers for loose or poor contacts.



- 4) Turn the ignition switch ON.
- 5) Check the operation of the EXCVA. (EXCVA operating order: Full close  $\rightarrow$  Full open  $\rightarrow$  30% open)

Is the operation OK?

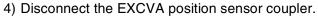
YES	Go to Step 2.
NO	Go to Step 6.



### Step 1 (When indicating P1657-H:)

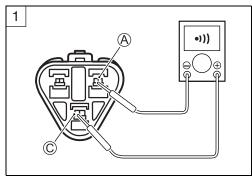
- 1) Turn the ignition switch OFF.
- 2) Remove the frame cover. ( 5-8)
- Check the EXCVA position sensor coupler for loose or poor contacts.

If OK, then check the EXCVA position sensor lead wire continuity.



5) Check the continuity between R wire © and Y wire ⓐ. If the sound is not heard from the tester, the circuit condition is OK.





6) Disconnect the ECM coupler.

7) Check the continuity between Y wire A and terminal 5.

8) Also, check the continuity between B/Br wire ® and terminal ②.

DATA EXCVA lead wire continuity: Continuity (•)))

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

Tester knob indication: Continuity test (•)))

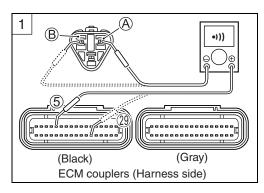


When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

YES	Go to Step 4.
NO	Y wire shorted to VCC, or B/Br wire open

9) After repairing the trouble, clear the DTC using SDS tool. (274-27)



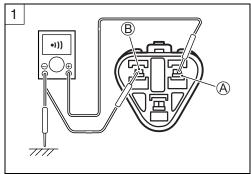
### Step 1 (When indicating P1657-L:)

- 1) Turn the ignition switch OFF.
- 2) Remove the frame cover. ( 5-8)
- 3) Check the EXCVA position sensor coupler for loose or poor contacts.

If OK, then check the EXCVA position sensor lead wire continuity.



- 4) Disconnect the EXCVA position sensor coupler.
- 5) Check the continuity between Y wire (A) and ground.

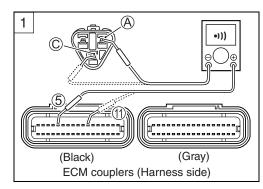


- 7) Disconnect the ECM coupler.
- 8) Check the continuity between Y wire (A) and terminal (5).
- 9) Also, check the continuity between R wire © and terminal ①.

EXCVA lead wire continuity: Continuity (•)))

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

Tester knob indication: Continuity test (•)))



### **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

Is the continuity OK?

YES	Go to Step 2 and Go to Step 4.
NO	R or Y wire open, or Y wire shorted to ground

10) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)

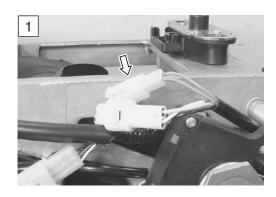
### Step 1 (When indicating P1658:)

- 1) Turn the ignition switch OFF.
- 2) Remove the frame cover. ( 5-8)
- 3) Check the EXCVA motor coupler for loose or poor contacts.

Is the contacting OK?

YES	Go to Step 6.
NO	Loose or poor contacts on the EXCV motor cou-
	pler

4) After repairing the trouble, clear the DTC using SDS tool. ( 4-27)



### Step 2

- 1) Turn the ignition switch OFF.
- 2) Check the installation of EXCV cables. (\$\subseteq 6-7\$) If it is necessary, adjust the EXCV cables. (\$\subseteq 6-7\$)



- 3) Disconnect the EXCVA position sensor lead wire coupler.
- 4) Turn the ignition switch ON.
- 5) Measure the voltage between the R wire terminal ① and ground.
- 6) If OK, then measure the voltage between the R wire terminal ① and B/Br wire terminal ②.

Position sensor input voltage: 4.5 – 5.5 V

( $\oplus$  R –  $\ominus$  Ground)

(⊕ R – ⊝ B/Br)



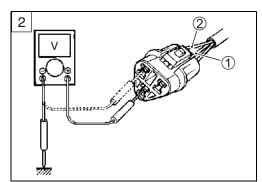
Tester knob indication: Voltage (---)

Is the voltage OK?

YES	Go to Step 3.
	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

7) After repairing the trouble, clear the DTC using SDS tool. ( +27)

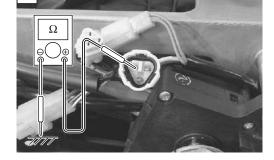




- 1) Turn the ignition switch OFF.
- 2) Check the continuity between Y wire and ground.

Position sensor continuity:  $\infty \Omega$  (Infinity)

3) If OK, then measure the position sensor resistance.



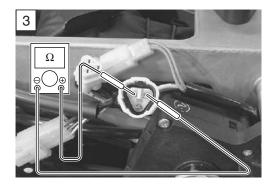
- 4) Connect the position sensor coupler.
- 5) Set the EXCVA to adjustment position. ( 6-4)



- 6) Disconnect the position sensor coupler and measure the resistance. (between Y and W wires)
- Position sensor resistance at adjustment position: Approx. 3.1 k $\Omega$  ( $\oplus$  Y  $\ominus$  W)
- 09900-25008: Multi circuit tester set
- Tester knob indication: Resistance ( $\Omega$ )

Is the resistance OK?

YES	Go to Step 4.
NO	Replace the EXCVA with a new one.



- 1) Turn the ignition switch OFF.
- 2) Connect the position sensor coupler.
- 3) Measure the position sensor output voltage at fully close position and fully open position.
- 4) Insert the needle pointed probes to the back side of the position sensor lead wire coupler. (⊕ Y − ⊝ B/Br)
- 5) Disconnect the EXCVA motor lead wire coupler 2.
- 6) To set the EXCV to fully close position, apply 12 V to (A) and (B) terminals.

Positive wire – (A) (P wire) terminal Negative wire – (B) (Gr wire) terminal

- 7) Turn the ignition switch ON.
- 8) Measure the position sensor output voltage at fully close position.
- 9) Then, to set the EXCV to fully open position, apply 12 V to ® and A terminals.

Positive wire – (B) (Gr wire) terminal Negative wire – (A) (P) wire) terminal

10)Measure the position sensor output voltage at fully open position.



EXCV is fully close: 0.5 - 1.3 VEXCV is fully open: 3.7 - 4.5 V $( \oplus \text{ Y} - \ominus \text{ W})$ 

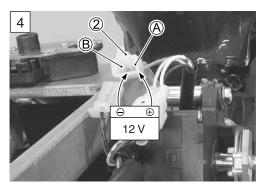
09900-25008: Multi circuit tester set 09900-25009: Needle pointed probe set

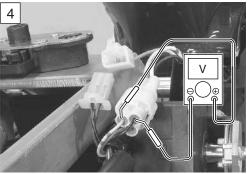
Tester knob indication: Voltage (---)

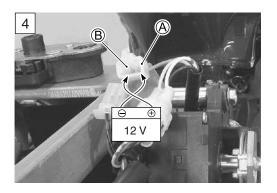
Is the voltage OK?

I YES	Replace the ECM with a known good one, and inspect it again.
NO	Go to Step 5.

11)After repairing the trouble, clear the DTC using SDS tool. ( 4-27)







### Step 5

- 1) If the position sensor output voltage is 0.5 V and less at fully close position, adjust the output voltage to specified by turning out the No. 1 cable adjuster ①.
- 2) Repeat the above procedure (Step 4) until the out put voltage becomes specified value. (If C46/P1657 code is indicated after adjusting the voltage, increase the voltage to 0.4 V.)

# **CAUTION**

- \* Adjusting the cable with the EXCV fully opened or fully closed can damage the EXCVA. Be sure to adjust the cable with the EXCV set in adjustment position. ( 6-4)
- \* Do not turn the EXCVA pulley using the wrench.
- 3) If the position sensor output voltage is 4.5 V and more at fully open position, adjust the output voltage to specified by turning out the No. 2 cable adjuster ②. Repeat the above procedure (Step 4) until the output voltage is within the specified value.

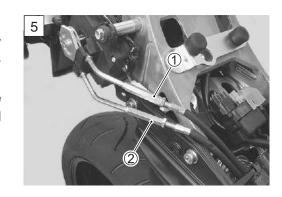
## PATA Position sensor output voltage

EXCV is fully close:  $0.5 \le \text{Output Voltage} \le 1.3$  EXCV is fully open:  $3.7 \le \text{Output Voltage} \le 4.5$ 

Is the voltage OK?

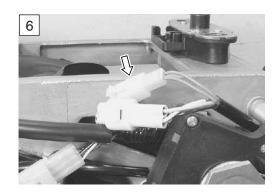
I YES	Replace the ECM with a known good one, and inspect it again.
NO	Replace the EXCVA with a new one.

3) After repairing the trouble, clear the DTC using SDS tool. (274-27)

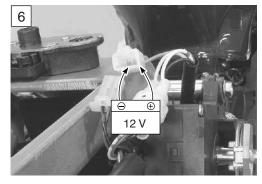


## Step 6

- 1) Turn the ignition switch OFF.
- 2) Disconnect the motor lead wire coupler of the EXCVA.

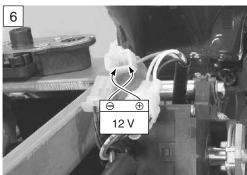


3) Apply 12 V to the terminal and check the operation of EXCVA.



4) Then, swap the wires supplied 12 V and check the operation of EXCVA.

(Check the operation of EXCVA both way.)



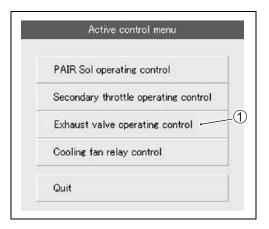
# Is the operation OK?

	<ul> <li>Loose or poor contacts on the EXCVA or ECM coupler (terminal ③ or ④)</li> </ul>
	• Open or short circuit in the B/R wire or R/B wire
	• 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.
	Replace the EXCVA with a new one.
NO	<ul> <li>Inspect that the EXCV and two cables move</li> </ul>
	smoothly. ( 56-11)

5) After repairing the trouble, clear the DTC using SDS tool. (274-27)

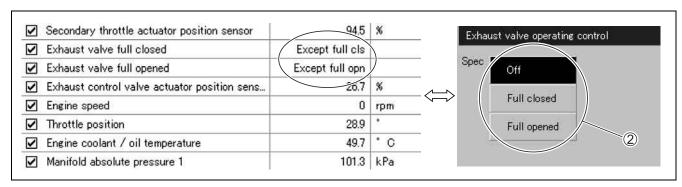
#### **ACTIVE CONTROL INSPECTION**

- 1) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
- 2) Turn the ignition switch ON.
- 3) Click "Exhaust valve operating control" 1.



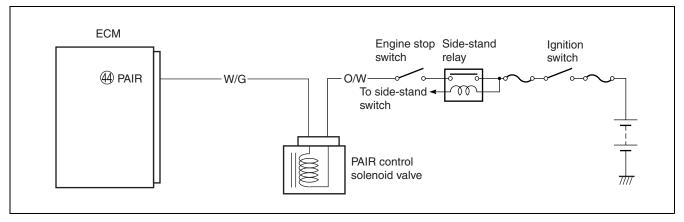
4) Click each button 2.

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



# "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 OFF.
- 2) Remove the air cleaner box. ( 5-14)
- 3) Check the PAIR control solenoid valve coupler for loose or poor contacts.

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



5) Measure the resistance between terminals.

PAIR valve resistance:  $18 - 22 \Omega$  at  $20 - 30 ^{\circ}$ C ( $68 - 86 ^{\circ}$ F)

(Terminal - Terminal)

09900-25008: Multi-circuit tester set

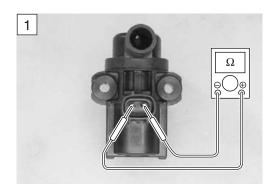
Tester knob indication: Resistance ( $\Omega$ )

Is the resistance OK?

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

6) After repairing the trouble, clear the DTC using SDS tool. (5-4-27)





## Step 2

1) Turn the ignition switch ON.

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

PATA 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 ® 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.

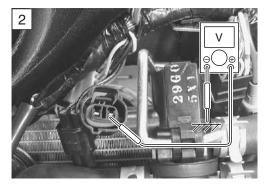
## **CAUTION**

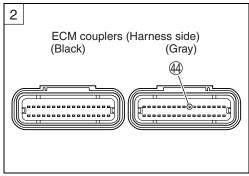
When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

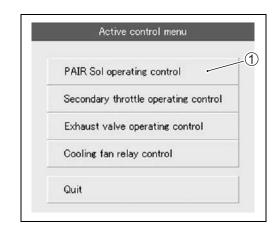
3) After repairing the trouble, clear the DTC using SDS tool. ( 274-27)

## **ACTIVE CONTROL INSPECTION**

- 1) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
- 2) Turn the ignition switch ON.
- 3) Click "PAIR Sol operating control" 1.







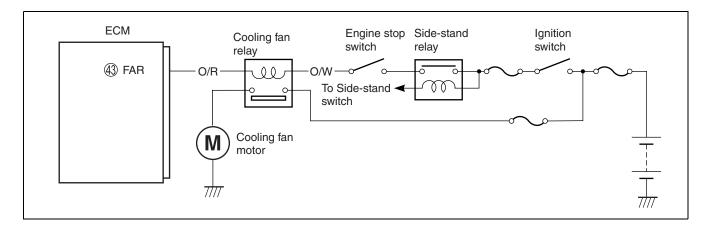
# 4) Click each button ②.

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	94.1	%	That corporating control
☑ Intake air temperature	46.5	* C	Spe Off
☑ Barometric pressure	102.0	kPa	
✓ Starter signal	<del>Olf</del>		On
✓ PAIR control solenoid valve	On		
✓ Battery voltage	0.0	٧	
☑ Gear position	N		

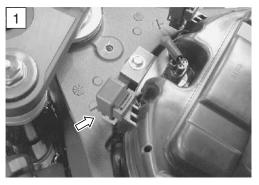
# "C60" (P0480) COOLING FAN RELAY CIRCUIT MALFUNCTION

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



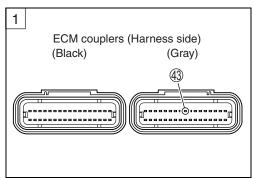
## INSPECTION Step 1

- 1) Turn the ignition switch 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 inspection the cooling fan relay. (\$\sumsymbol{17}7-7\$)



Is the cooling fan relay OK?

YES	<ul> <li>O/W and O/R wire open or shorted to ground, 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 inspect it again.</li> </ul>
NO	Replace the cooling fan relay with a new one.



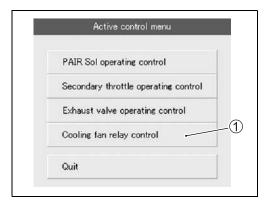
## **CAUTION**

When using the multi-circuit tester, do not storongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.

4) After repairing the trouble, clear the DTC using SDS tool. ( 34-27)

#### **ACTIVE CONTROL INSPECTION**

- 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.

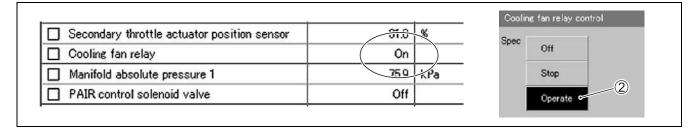


4) Click the operate button 2.

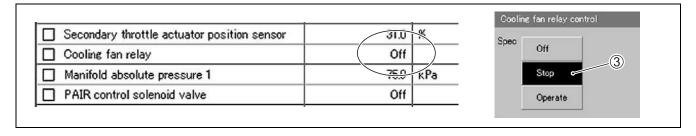
At this time, if an operation sound is heard from the cooling fan relay and cooling fan motor is operated, the function is normal.

#### NOTE:

Cooling fan relay and cooling fan motor operation can be checked until the engine coolant temperature is less than 100 °C (212 °F) after starting the engine.



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



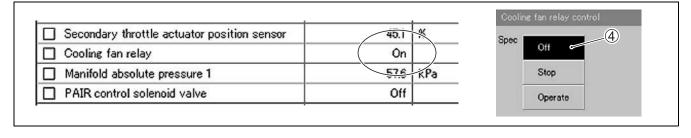
6) Click the off button 4 to check the cooling fan relay and cooling fan motor operation.

#### NOTE:

This inspection should be begun from when the engine coolant temperature is below 50 °C (122 °F). Check that the cooling fan relay operates for a few seconds as the engine coolant temperature arrives each at 50 °C (122 °F), 70 °C (158 °F) and 90 °C (194 °F)/above 4 000 r/min. It is cooling fan motor malfunction or its circuit failure when the motor would not run even if the relay turns to ON.

#### NOTE:

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



# **SENSORS**

## **CMP SENSOR INSPECTION**

The camshaft position sensor is installed on the cylinder head cover. ( 4-33)

# CMP SENSOR REMOVAL AND INSTALLATION

- Remove the CMP sensor. ( 3-26)
- Install the CMP sensor in the reverse order of removal.

CMP sensor: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

# CKP SENSOR INSPECTION

The crankshaft position sensor is installed behind the clutch cover. ( 4-35)

# CKP SENSOR REMOVAL AND INSTALLATION

- Remove the clutch cover. ( 3-16)
- Install the 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. ( 4-38)

## IAP SENSOR REMOVAL AND INSTALLATION

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

## TP SENSOR INSPECTION

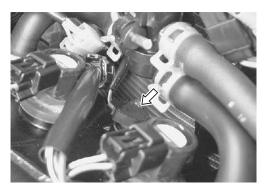
The throttle position sensor is installed at the right side of the No. 4 throttle body. ( 4-44)

## TP SENSOR REMOVAL AND INSTALLATION

- Remove the aircleaner box and lift up the throttle body. ( 5-14)
- Remove the TP sensor. ( 5-17)
- Install the TP sensor in the reverse order of removal.

## TPS ADJUSTMENT

• Adjust the TP sensor. ( 4-20)









# **ECT SENSOR INSPECTION**

The engine coolant temperature sensor is installed at the cylinder head. ( 449)

# **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, 13.0 lb-ft)

## IAT SENSOR INSPECTION

The intake air temperature sensor is installed to the air cleaner box. ( 4-53)

# 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.

# AP SENSOR INSPECTION

The AP sensor is located under the front seat. (274-57)

# AP SENSOR REMOVAL AND INSTALLATION

- 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 at the rear of seat tail rail. (2-3)

- Remove the TO sensor.
- Install the TO sensor in the reverse order of removal.

#### NOTE:

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

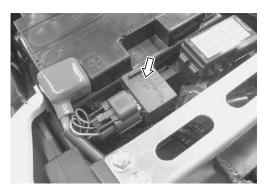
# STP SENSOR INSPECTION STP SENSOR REMOVAL AND INSTALLATION

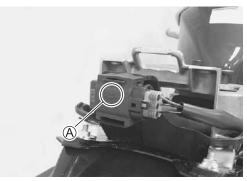
The secondary throttle position sensor is installed at the right side of the No. 4 throttle body.

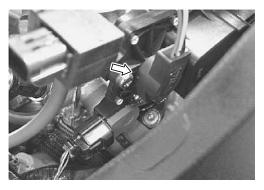
- Remove the aircleaner box and lift up the throttle body. (5-14)
- Remove the STP sensor. ( 5-17)
- Install the STP sensor in the reverse order of removal.









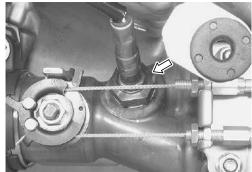


## STP SENSOR ADJUSTMENT

• Adjust the STP sensor. ( 5-22)

# **HO2 SENSOR INSPECTION (For E-02, 19)**

The heated oxygen sensor is installed to the exhaust pipe. ( 34-87)



# **HO2 SENSOR REMOVAL AND** INSTALLATION

- Remove the right under cowling. ( 8-5)
- Lift and support the fuel tank. ( 5-3)
- 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.

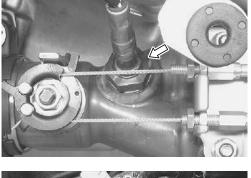
### CAUTION

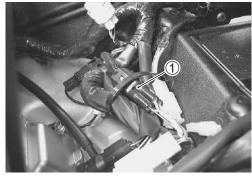
Do not apply oil or other materials to the sensor air hole.

• Tighten the sensor unit to the specified torque.

# HO2 sensor: 48 N·m (4.8 kgf-m, 34.5 lb-ft)

• Route the HO2 sensor lead wire properly.( 10-20)





# FUEL SYSTEM AND THROTTLE BODY

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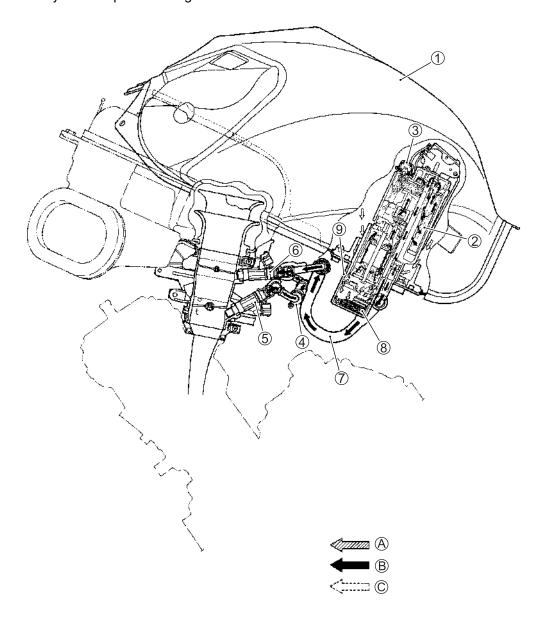
# **▲** WARNING

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 3.0 kgf/cm<sup>2</sup> (300 kPa, 43 psi), the fuel is injected into the throttle body in conic dispersion when the injector opens according to the injection signal from the ECM.

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

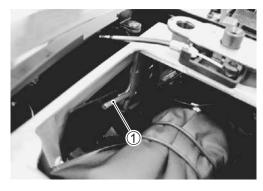


1	Fuel tank	7	Fuel feed hose
2	Fuel filter (For high pressure)	8	Fuel mesh filter (For low pressure)
3	Fuel pressure regulator	9	Fuel pump
4	Fuel delivery pipe	A	Before-pressurized fuel
<b>⑤</b>	Primary fuel injector	$^{\textcircled{B}}$	Pressurized fuel
6	Secondary fuel injector	©	Relieved fuel

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

- Remove the seats. ( \$\sumset\$ 8-7 and -8)
- 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.

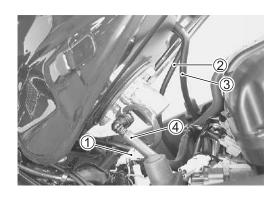
# CAUTION

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

# **▲** WARNING

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, 43 psi)

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

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

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

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

# **▲** WARNING

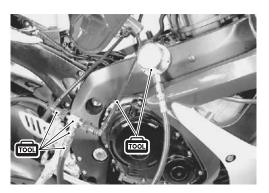
- \* Before removing the special tools, turn the ignition switch to OFF position and release the fuel pressure slowly.
- \* Gasoline is highly flammable and explosive. Keep heat, sparks and flame away.
- A To fuel tank
- B To fuel delivery pipe

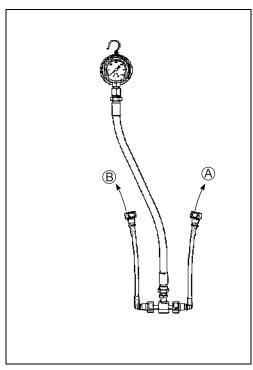
## **FUEL PUMP INSPECTION**

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**

# **▲** WARNING

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

- Lift and support the fuel tank. ( 5-3)
- Turn the ignition switch OFF.
- Disconnect the battery 

   — lead wire.
- Place a rag under the fuel feed hose and disconnect the fuel feed hose 1 from the fuel pump.
- Connect a proper fuel hose ② to the fuel pump.

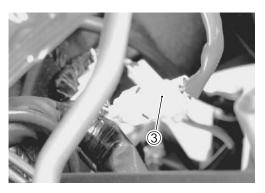




· Place the measuring cylinder and insert the fuel hose end into the measuring cylinder.



• Disconnect the fuel pump lead wire coupler 3.



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

Battery ⊕ terminal ——— (Y/R terminal) Battery ⊕ terminal ——— (B/W terminal)

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

### Fuel discharge amount:

168 ml (5.7/5.9 US/Imp oz) and more/10 sec.

NOTE:

The battery must be in fully charged condition.



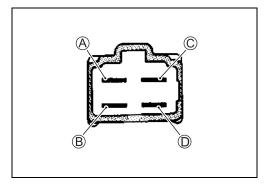
# **FUEL PUMP RELAY INSPECTION**

Fuel pump relay is located on the air cleaner box (right side one).

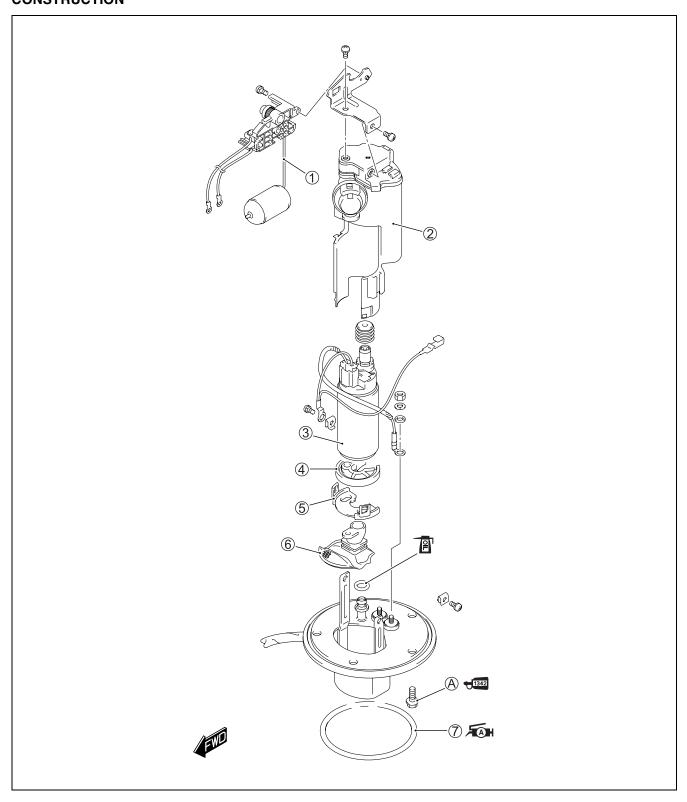
- Lift and support the fuel tank. ( 5-3)
- Remove the fuel pump relay 1.

First, check the insulation between (A) and (B) terminals with pocket tester. Then apply 12 V to © and D terminals, + to © 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	lb-ft
A	10	1.0	7.0

### **REMOVAL**

- Remove the fuel tank. ( 5-4)
- Remove the fuel pump assembly ① by removing its mounting bolts diagonally.

# **▲** WARNING

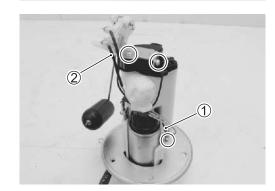
Gasoline is highly flammable and explosive. Keep heat, spark and flame away.

• Remove the nuts.

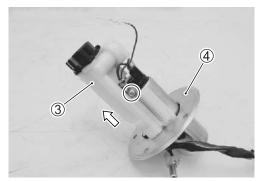




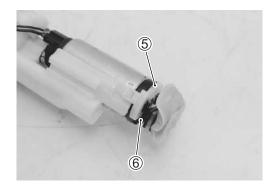
• Remove the lead wire ①, screws and fuel level gauge ②.



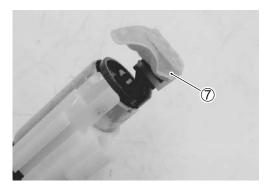
- Remove the screw.
- Remove the fuel pump ③ from the fuel pump plate ④.



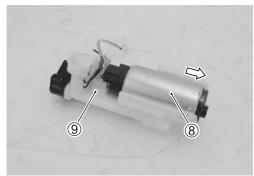
• Remove the fuel pump holder ⑤ and rubber cushion ⑥.



• 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**

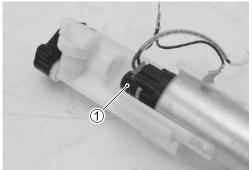
Use new bushing to prevent fuel leakage.

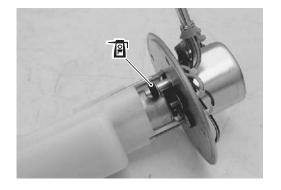
- Install new O-ring to the fuel pipe.
- Apply thin coat of engine oil to the new O-ring.

# CAUTION

Use new O-ring to prevent fuel leakage.

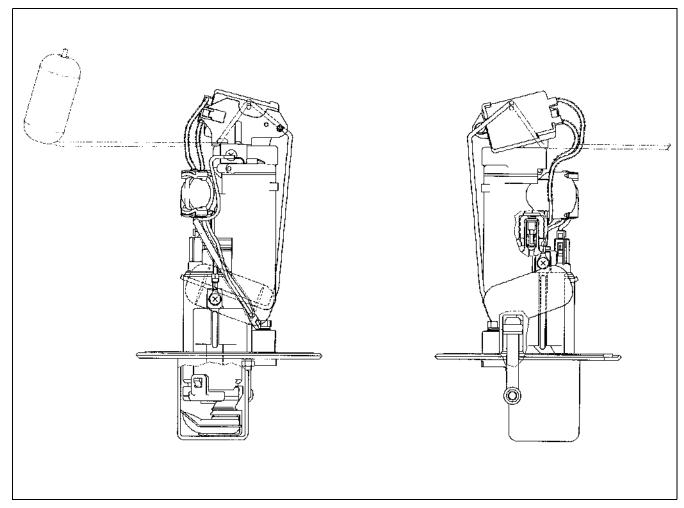






- Be sure to connect the wires to the proper terminals.
- (BI) ...... ⊕ terminal for fuel pump





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

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

# **▲** WARNING

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

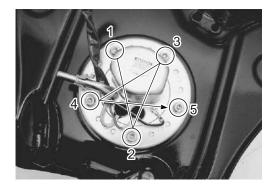


• When installing the fuel pump assembly, first tighten all the fuel pump mounting bolts lightly and then to the specified torque, in the ascending order of numbers.

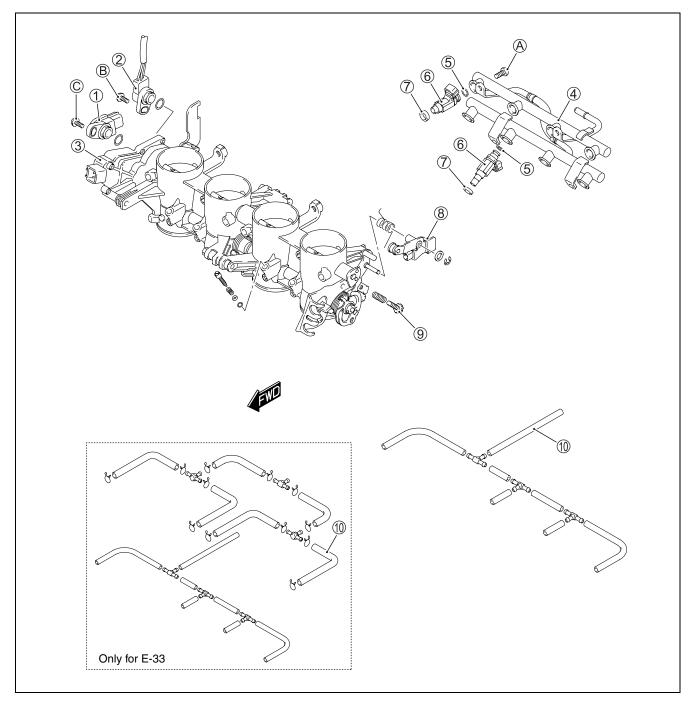
Fuel pump mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

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**



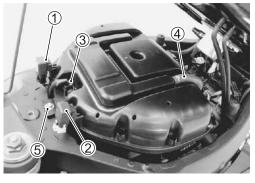
1	TP sensor	8	Fast idle adjusting screw
2	STP sensor	9	Throttle stop screw
3	STVA	10	Vacuum hose
4	Fuel delivery pipe	A	Fuel delivery pipe mounting screw
<b>⑤</b>	O-ring	₿	STP sensor mounting screw
6	Fuel injector	©	TP sensor mounting screw
7	Cushion seal		

ITEM	N∙m	kgf-m	lb-ft			
A	5.0	0.5	3.7			
<b>B</b>	3.5	0.35	2.5			
©	3.5	0.35	2.5			

# AIR CLEANER BOX REMOVAL AND INSTAL-**LATION**

### **REMOVAL**

- Lift and support the fuel tank. (5-3)
- Disconnect the fuel pump relay ①, cooling fan relay ② and IAT sensor lead wire coupler ③.
- Disconnect the PCV hose 4.
- Remove the air cleaner mounting bolt ⑤.
- Disconnect the PAIR hose 6.





- Remove the rubber caps ⑦ (LH & RH).
- Loosen the throttle body clamp screws (LH & RH).
- Remove the air cleaner box.



### **INSTALLATION**

• Installation is in the reverse order of removal.

# THROTTLE BODY REMOVAL

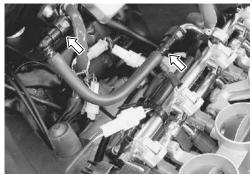
- Remove the air cleaner box. ( 5-14)
- Disconnect the throttle cables from their drum.

### CAUTION

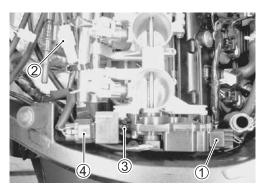
After disconnecting the throttle cables, do not snap the throttle valve from full open to full close. It may cause damage to the throttle valve and throttle body.

• Place a rag under the fuel feed hose and remove the fuel feed hose.

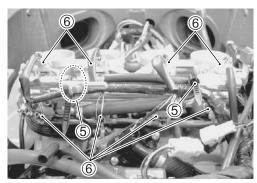




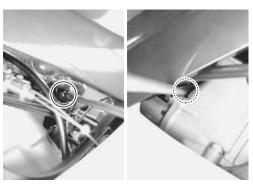
• Disconnect the STVA lead wire coupler ①, STP sensor lead wire coupler ② TP sensor lead wire coupler ③ and IAP sensor lead wire coupler 4.



• Remove the wire clamps ⑤ and disconnect the fuel injector lead wire couplers 6.



• Loosen the throttle body clamp screws at the intake pipe side.



• Remove the throttle body assembly.

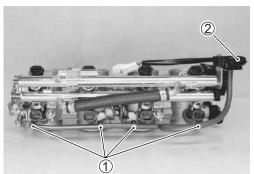


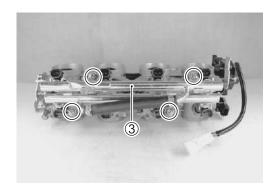
# THROTTLE BODY DISASSEMBLY

# CAUTION

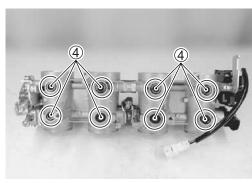
Identify the position of each removed part. Organize the parts in their respective groups so that they can be reinstalled in their original positions.

- Disconnect the respective vacuum hoses ① from each throttle body.
- Remove the IAP sensor ②
- Remove the fuel delivery pipe assembly 3.

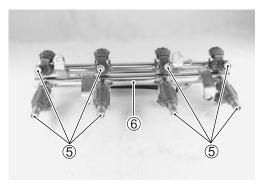




• Remove the cushion seal 4 from the throttle body.



• Remove the fuel injectors ⑤, from the fuel delivery pipe ⑥.

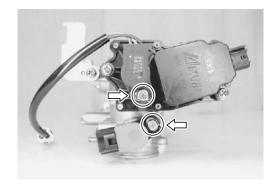


• Remove the TP sensor and STP sensor with the special tool.

09930-11950: Torx wrench

### NOTE:

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



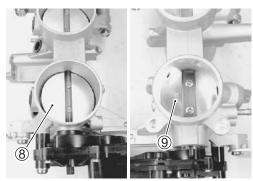
# CAUTION

Never remove the STVA 7 from the throttle body.



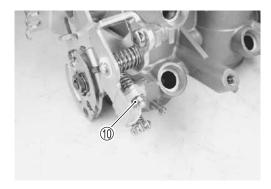
# CAUTION

Never remove the secondary throttle valve ® and throttle valve 9.



# CAUTION

The fast idle screw 10 is factory-adjusted at the time of delivery and therefore avoid removing or turning it unless otherwise necessary.



## 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 open, install the STP sensor ① and tighten the STP sensor mounting screw to the specified torque.

#### NOTE:

- \* Apply thin coat of the 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)

09930-11950: Torx wrench

STP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lb-ft)

### NOTE:

- \* Make sure the STP valve open or close smoothly.
- \* If the STP sensor adjustment is necessary, refer to page 5-22 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 the engine oil to the O-ring.
- \* Align the throttle shaft end © with the groove D of TP sensor.
- \* Apply SUZUKI SUPER GREASE "A" to the throttle shaft end © if necessary.

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

09930-11950: Torx wrench

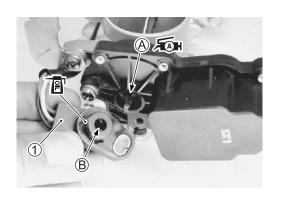
TP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lb-ft)

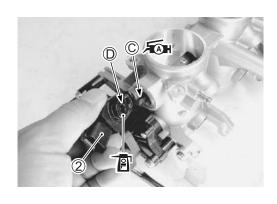
### NOTE:

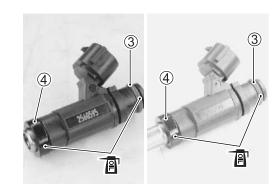
- \* Make sure the throttle valve open or close smoothly.
- \* TP sensor setting procedure. ( 4-20)
- Apply thin coat of the engine oil to the new O-ring 3 and cushion seal 4.

#### **CAUTION**

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







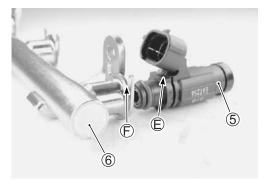
• Install the fuel injector ⑤ by pushing it straight to the delivery pipe ⑥.

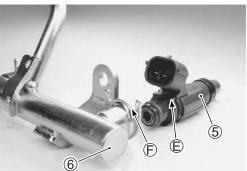
### NOTE:

Align the boss E of the injector with the groove F of the delivery pipe.

# **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.

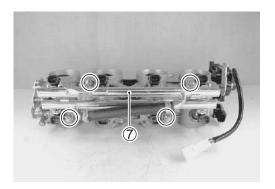
Tighten the fuel delivery pipe mounting screws to the specified torque.

Fuel delivery pipe mounting screw:

5.0 N·m (0.5 kgf-m, 3.7 lb-ft)

# **CAUTION**

- \* Replace the O-rings with the new ones.
- \* Never turn the fuel delivery pipes while pushing them.



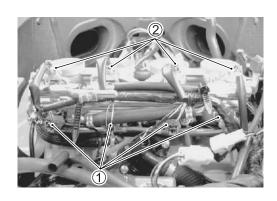
# THROTTLE BODY INSTALLATION

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

• 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.

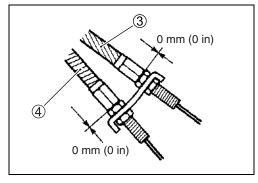
	① Primary injector	② Secondary injector
#1	Y/R and Gr/W	Y/R and Lg
#2	Y/R and Gr/B	Y/R and Lg/W
#3	Y/R and Gr/Y	Y/R and Lg/G
#4	Y/R and Gr/R	Y/R and Lg/BI

• 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 (0 in).
- Tighten each lock-nut.
- · Adjust the throttle cable play. Refer to page 2-15 for details.



## STP SENSOR ADJUSTMENT

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

- Remove the air cleaner box . ( 5-14)
- Loosen the throttle body clamp screws at the intake pipe side.
- Lift up the throttle body assembly from the intake pipe.
- Disconnect the throttle cables from their drum.
- Disconnect the STVA lead wire coupler.
- Insert the needle pointed probes to the STP sensor coupler.
- Turn the ignition switch ON.
- Close the secondary throttle valve by finger, and measure the STP sensor output voltage.

STP sensor output voltage

ST valve is fully closed: 0.57 - 0.67 V

(⊕ Yellow – ⊕ Black)

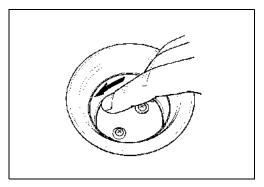
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

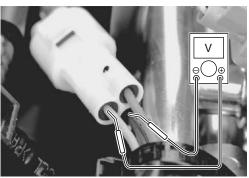
Tester knob indication: Voltage (---)

- 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, 2.5 lb-ft)







## **FUEL INJECTOR REMOVAL**

- Remove the air cleaner box. ( 5-14)
- With battery negative cable disconnected, disconnect the injector couplers.
- Remove the fuel delivery pipe assemblies. ( 5-16)
- Remove the primary and secondary fuel injectors #1, #2, #3 and #4. ( 5-16)

## **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 4-77 to -82 for details.



# **FUEL INJECTOR INSTALLATION**

- · Apply thin coat of the engine oil to new injector cushion seal and O-rings.
- Install the injector by pushing it straight to the throttle body. Never turn the injector while pushing it. (5-20)

## **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 rpm	Fast idle cancel- ling time
−5 °C (23 °F)	1 500 – 2 000 r/min	Approx. 100 sec.
15 °C (59 °F)	1 500 – 2 000 r/min	Approx. 20 sec.
25 °C (77 °F)	1 500 – 2 000 r/min	Approx. 15 sec.

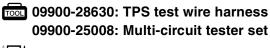
# FAST IDLE ADJUSTMENT

- Lift and support the fuel tank. (5-3)
- · Start up the engine and run it in idling condition for warming up at the water temperature of 80 - 90 °C (176 - 194 °F).
- Set the idle rpm to 1 200 r/min by the throttle stop screw ①.
- Check and adjust the TP sensor. ( 4-20)



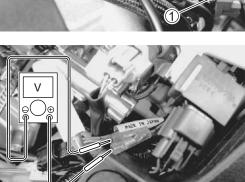
- Turn the ignition switch OFF.
- Disconnect the TP sensor coupler and install the test harness.
- Start up the engine.
- Measure the TP sensor output voltage at the wire terminals (between ⊕ terminal Red and ⊝ terminal Black).

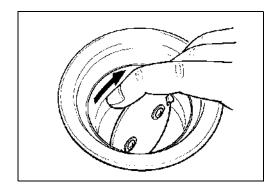
TP sensor output voltage at idle position: Approx. 1.125 V



Tester knob indication: Voltage (---)

- Turn the ignition switch OFF.
- Remove the air cleaner box (5-14) and disconnect the STVA coupler. ( 5-15)
- Turn the ignition switch 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 as shown.





 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 0.030 V

STV fully open 1.155 V - 1.125 V - 0.030 V

# TP sensor output voltage variation: 0.025 - 0.035 V

• If the voltage variation is out of specification, turn in or out the fast idle adjust screw ③ to adjust the voltage to specification.

## CAUTION

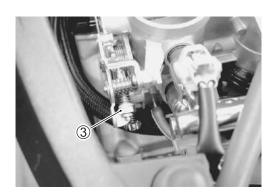
The fast idle screw is factory-adjusted at the time of delivery and therefore avoid removing or turning it unless otherwise necessary.

 Cool down the engine to ambient air temperature and start the engine to check the fast idle rpm comes with in the specified rpm.

## **DATA** Standard

Fast idle rpm: 1 500 – 2 000 r/min (Cold engine) Idle rpm : 1 200 ± 100 r/min (Warmed engine)

 If it is not at the specified rpm, 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 .
- 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 1 200 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.

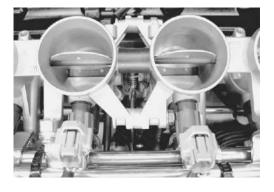
#### CAUTION

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 1 200 r/min, using throttle stop screw.
- \* After balancing the four valves, set the idle r/min to 1 200 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.

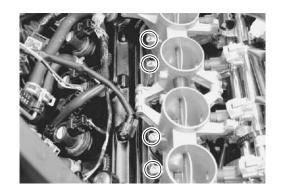
#### Step 4

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 4-20 for TPS setting procedure.)



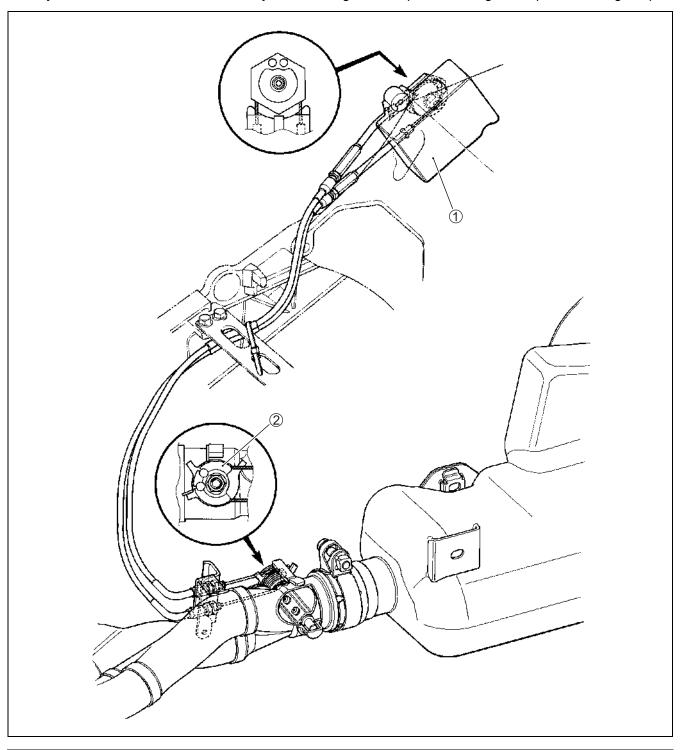
# EXHAUST SYSTEM

EXHAUST SYSTEM	6- 2
EXHAUST CONTROL SYSTEM	6- 2
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AND EXCV (EXHAUST CONTROL VALVE)	6- 4
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# EXHAUST SYSTEM EXHAUST CONTROL SYSTEM

The exhaust control system (EXCS) consists of the exhaust control valve (EXCV), exhaust control valve actuator (EXCVA) and exhaust control valve cables (EXCV cables).

EXCV is installed the exhaust pipes. EXCVA is mounted on the right side of the seat rail. The EXCV is operated by the EXCVA via the cables. This system is designed to improve the engine torque at low engine rpm.



2 Exhaust control valve (EXCV)

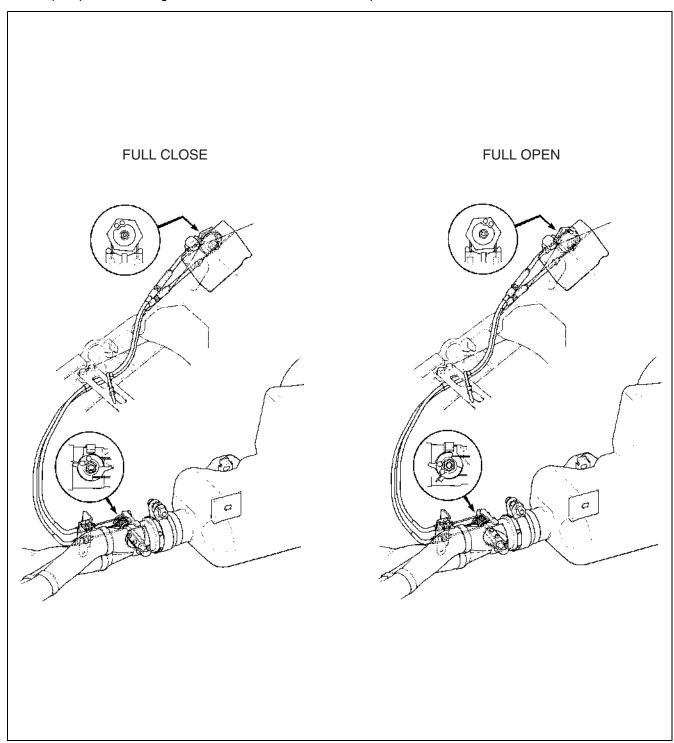
1 | Exhaust control valve actuator (EXCVA)

#### **OPERATION**

The EXCS is operated by the signal supplied from the ECM.

The open/close operation of the EXCV is performed by the EXCVA which is controlled by the ECM by changing the current direction of the actuator motor. The position sensor (incorporated in the EXCVA) detects the EXCVA movement by measuring the voltage and then the ECM determines the EXCV opening angle based on the engine rpm and gear positions.

Every time the ignition switch is turned ON, the EXCVA automatically drives the EXCV and detects full close/open position voltages and sets the EXCV to middle position.



# **EXCVA (EXHAUST CONTROL VALVE ACTUATOR) AND EXCV** (EXHAUST CONTROL VALVE)

#### **EXCVA REMOVAL**

- Turn the ignition switch OFF.
- Remove the frame cover. ( 8-8)
- · Connect the special tool (Mode select switch) to the dealer mode coupler. ( 4-18)
- After turning the special tool's switch ON, turn the ignition switch ON.

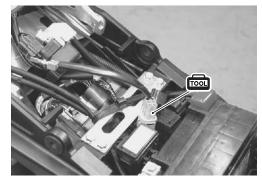


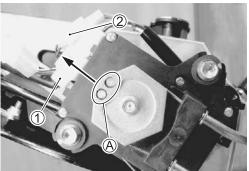
- Check the cable slots (A) of the EXCVA pulley facing rearward (adjustment position) as shown.
- · Turn the ignition switch OFF.

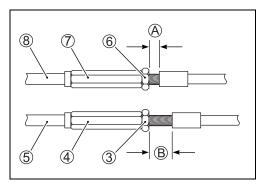
#### **CAUTION**

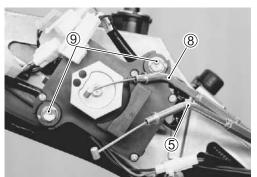
Before removing the EXCVA, be sure to set the EXCVA pulley to the adjustment position.

- Disconnect the EXCVA lead wire couplers ①, ②.
- the No.1 and No.2 cables.
- Loosen the lock-nut 3 on the No.2 cable 5 and turn in the cable adjuster 4 fully.
- Loosen the lock-nut 6 on the No.1 cable 8 and turn in the cable adjuster 7 fully.
- Disconnect the No.2 cable ⑤ and then No.1 cable ⑧ from the EXCVA pulley.
- Remove the EXCVA mounting bolts 9.
- · Remove the EXCVA.









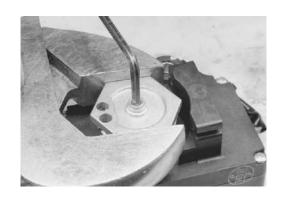
 Hold the EXCVA pulley with an adjustable wrench, and loosen the pulley mounting bolt.

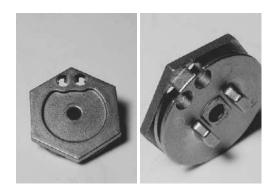
#### CAUTION

- \* When loosening or tightening the pulley bolt, be sure to fix the pulley with an adjustable wrench, or EXCVA may get damaged.
- \* Do not use the adjustable wrench to turn EXCVA pulley so as not to cause damage to the internal gear of EXCVA.
- Remove the EXCVA pulley from the EXCVA body.

## **EXCVA PULLEY INSPECTION**

- Inspect the EXCVA pulley groove for wear and damage.
- If any defects are found, replace the EXCVA pulley with a new one.



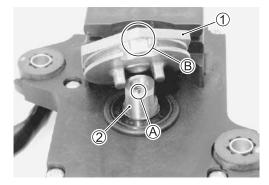


#### **EXCVA INSTALLATION**

• Install the EXCVA pulley 1 to the shaft 2.

#### NOTE:

Align the shaft's line (A) and cable slots (B) as shown.



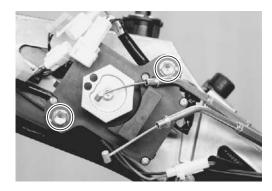
- Hold the EXCVA pulley with an adjustable wrench, and then tighten the EXCVA pulley mounting bolt to the specified torque.
- EXCVA pulley mounting bolt: 5 N·m (0.5 kgf-m, 3.5 lb-ft)

#### CAUTION

When loosening or tightening the pulley bolt, be sure to fix the pulley with an adjustable wrench, or EXCVA may get damaged.

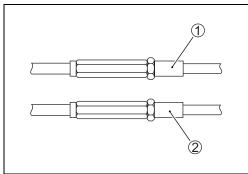


# EXCVA mounting bolt: 6.0 N·m (0.6 kgf-m, 4.5 lb-ft)



- Turn in the two cable adjusters fully.
- Connect the No.1 cable ① (01H0CL) and No.2 cable ② (01H0OP) to the EXCVA pulley.

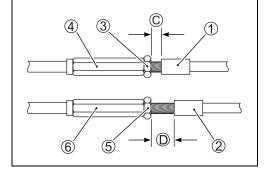
No.1 cable: 01H0CL No.2 cable: 01H0OP

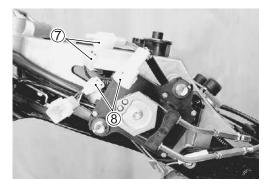


- After connecting the No.1 cable ①, loosen the lock-nut ③ and turn the adjuster ④ in or out until the thread length © becomes the measured value before disconnecting the No.1 cable ①.
- Tighten the lock-nut 3.
- After connecting the No.2 cable ②, loosen the lock-nut ⑤ and turn the adjuster ⑥ in or out until the thread length D becomes the measured value before disconnecting the No.2 cable.
- Tighten the lock-nut ⑤.
- Connect the EXCVA lead wire couplers 7, 8.

#### CAUTION

The cable slots of EXCVA pulley must be located adjustment position. ( 6-4)





#### CAUTION

If the EXCVA adjustment is necessary, refer to page 6-8 to -10 for EXCVA ADJUSTMENT setting procedure.

#### **EXCVA INSPECTION**

**74-91** 

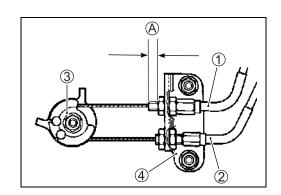
#### **EXCV CABLE REPLACEMENT**

- Lift and support the fuel tank. ( 5-3)
- Check the EXCVA to adjustment position. ( 6-4)

#### CAUTION

Before disconnecting the EXCV cables, be sure to set the EXCVA to the ADJUSTMENT setting position.

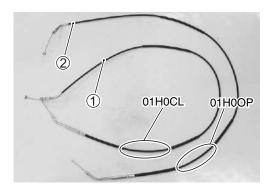
- Disconnect the EXCV cables from the EXCVA pulley.
   (5-6-4)
- Disconnect the EXCV cables ① and ② from the EXCV pulley ③ and bracket ④.



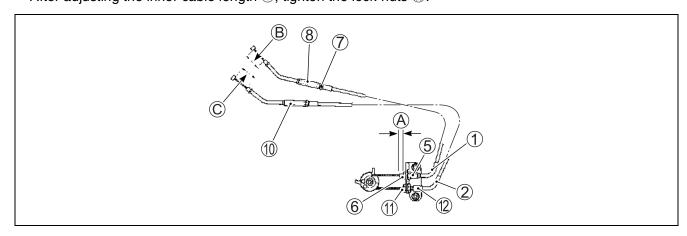
#### NOTE:

The EXCV cables are identified by the letters and shape.

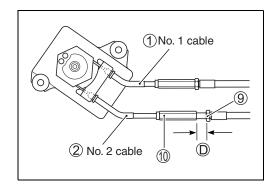
No.1 cable ①: 01H0CL No.2 cable ②: 01H0OP



- Connect the EXCV cables (1) and 2) temporarily to the EXCV pulley.
- Turn the adjuster ⑤ in or out and adjust the thread length ⑥ becomes the measured value before disconnecting ther No.1 cable.
- Tighten the lock-nut 6.
- After adjusting the thread length (A), adjust the inner cable length (B) becomes 41.0 42.0 mm (1.61 1.65 in) by turning the adjuster (B).
- Tighten the lock-nut 7.
- Turn in the No.2 cable adjuster <sup>(1)</sup> fully.
- Loosen the lock-nuts ① and turn the No.2 cable adjuster ② in or out until the inner cable length © becomes 60.0 61.0 mm (2.36 2.40 in).
- After adjusting the inner cable length ©, tighten the lock-nuts ①.



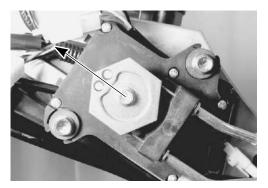
- Connect the No.1 cable ① and No.2 cable ② to the EXCVA pulley.
- Loosen the lock-nut (9) and turn the No.2 cable adjuster (10) in (0.43 - 0.47 in).
- Tighten the lock-nut 9.



### **EXCVA ADJUSTMENT**

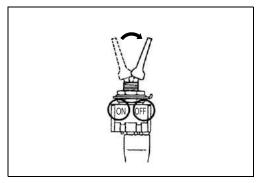
#### 1st step:

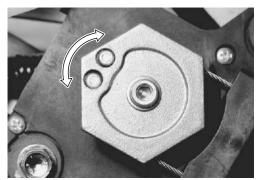
- Set the EXCVA to adjustment position. ( 6-4)
- Make sure that the No.1cable and No.2 cable are fixed with a clamp.



#### 2nd step:

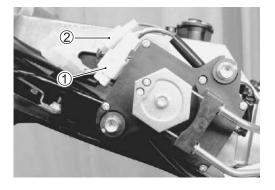
- Turn the mode select switch OFF.
- Turn the ignition switch ON to check the EXCVA operation.
- Turn the mode select switch ON.
- If C46 is not indicated on the LCD (DISPLAY), the adjustment is correctly completed. In this case, it is unnecessary to proceed to 3rd step.
- If C46 is indicated, repeat the adjustment procedure from 3rd and 4th step.





#### 3rd step:

- This procedure is only required when C46 is indicated.
- Turn the ignition switch OFF.
- · Insert the needle pointed probes into the backside of the position sensor lead wire coupler 1.
- Disconnect the EXCVA motor lead wire coupler ②.



Battery  $\oplus$  terminal—  $ext{ } ext{ } ext{$ 

Battery — terminal— B (Gray lead wire) terminal

#### CAUTION

To prevent the motor damage, stop applying 12 V as soon as the EXCV reaches fully close position.

- Turn the ignition switch ON.
- Measure the position sensor output voltage at fully close position.

## PATA Position sensor output voltage

EXCV is fully close:  $0.5 \le \text{output voltage} \le 1.3 \text{ (V)}$ ( $\oplus \text{ Yellow} - \ominus \text{ B/Br}$ )

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

Tester knob indication: Voltage (---)

If the measured voltage is less than specification, adjust the No.1 cable adjuster as follows:

• Set the EXCVA to adjustment position. ( 6-4)

#### CAUTION

Adjusting the No.1 cable with the EXCV fully closed can damage the EXCVA. Be sure to adjust the No.1 cable with the EXCV set in adjustment position.

- Turn out the No.1 cable adjuster ③.
- Repeat the above procedure until the output voltage becomes specified value.

# Position sensor output voltage EXCV is fully close: $0.5 \le \text{output voltage} \le 1.3 \text{ (V)}$

• To next step.

#### NOTE:

If C46 code is indicated after adjusting the voltage, increase the voltage to 0.9 V.

#### 4th step:

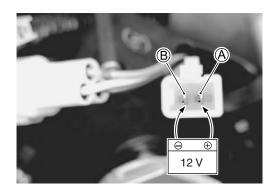
To set the EXCV to fully open position, apply 12 V to A and B terminals.

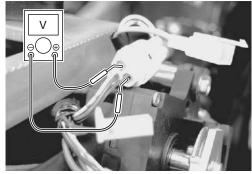
Battery  $\oplus$  terminal— B (Gray lead wire) terminal

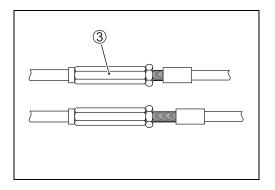
Battery — terminal — A (Pink lead wire) terminal

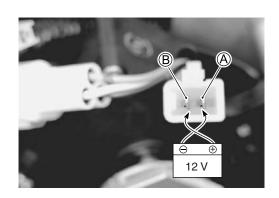
#### CAUTION

To prevent the motor damage, stop applying 12 V as soon as the EXCV reaches fully open position.







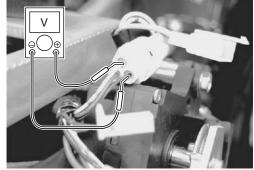


Measure the position sensor output voltage at fully open position.

PATA Position sensor output voltage

EXCV is fully open:  $3.7 \le \text{output voltage} \le 4.5 \text{ (V)}$ 

(**+** Yellow – **−** B/Br)



If the measured voltage is more than specification, adjust the No.2 cable adjuster as follows:

• Set the EXCVA to adjustment position. ( 6-4)

#### CAUTION

Adjusting the No.2 cable with the EXCV fully opened can damage the EXCVA. Be sure to adjust the No.2 cable with the EXCV set in adjustment position.

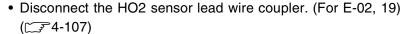
- Turn out the No.2 cable adjuster ①.
- Repeat the above procedure until the output voltage comes within the specified value.

# **DATA** Position sensor output voltage EXCV is fully open: $3.7 \le \text{output voltage} \le 4.5 \text{ (V)}$

· After adjusting the EXCV cables, perform 2nd step to confirm C46 is not indicated.

# **EXCV/EXHAUST PIPE, MUFFLER REMOVAL**

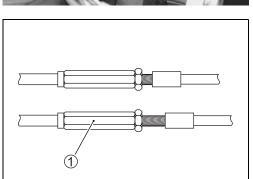
- Remove the frame cover. ( 8-8)
- Remove the under cowling. (\$\sums\$8-5)
- Lift and support the fuel tank. ( 5-3)
- Disconnect the EXCV cables ① and ② from the EXCV pullev.
- Remove the EXCV cable bracket ③.

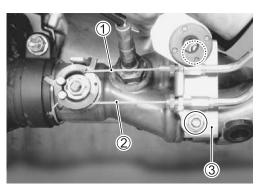


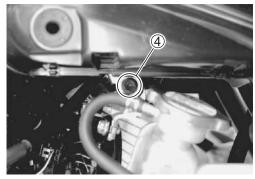
- Remove the HO2 sensor. (For E-02, 19) ( 4-107)
- Remove the radiator mounting bolts 4.
- Move the radiator forward.

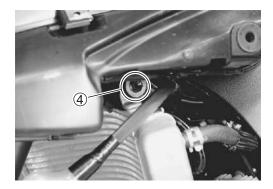
#### CAUTION

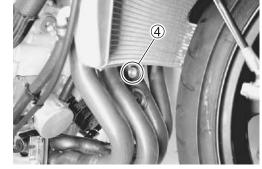
Be careful not to bent the radiator fin.



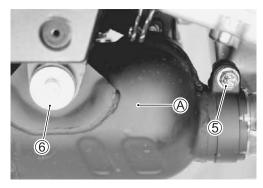




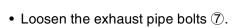




- Loosen the exhaust pipe connector bolt ⑤.
- Remove the muffler mounting bolts 6.



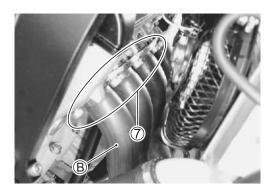
6



- Remove the muffler body (A). • Remove the exhaust pipe bolts ⑦.
- Remove the exhaust pipe B.

#### NOTE:

When an exhaust pipe separates, not to throw or drop, have by hand and remove carefully.

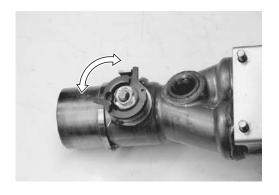


#### **EXCV INSPECTION**

- Turn the EXCV by hand and check that it moves smoothly.
- · If it does not move smoothly, replace the EXCV together with the exhaust pipe.
- · Decarbonize the EXCV if necessary.

#### **CAUTION**

- \* Do not attempt to disassemble the EXCV.
- \* The EXCV is available only as the exhaust pipe assembly.



# **EXCV/EXHAUST PIPE, MUFFLER INSTALLATION**

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

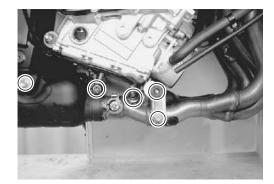
- Tighten the exhaust pipe bolts to the specified torque.
- Exhaust pipe bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

#### **CAUTION**

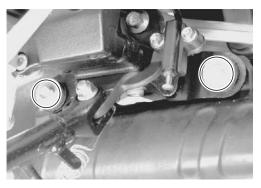
Replace the gaskets and exhaust pipe connector with the new ones.

- · Tighten the muffler mounting bolts and exhaust pipe connector bolt to the specified torque.
- Exhaust pipe connector bolt: 23 N·m (2.3kgf-m, 16.5 lb-ft) Muffler mounting bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

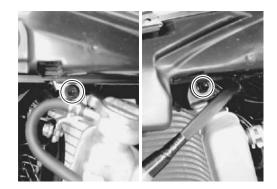


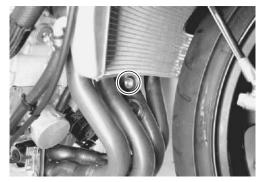


- Tighten the EXCV cable bracket to the specified torque.
- EXCV cable bracket: 10 N·m (1.0 kgf-m, 7.0 lb-ft)
- Tighten the HO2 sensor to the specified torque. (For E-02, 19)
- HO2 sensor: 48 N⋅m (4.8 kgf-m, 35.0 lb-ft)



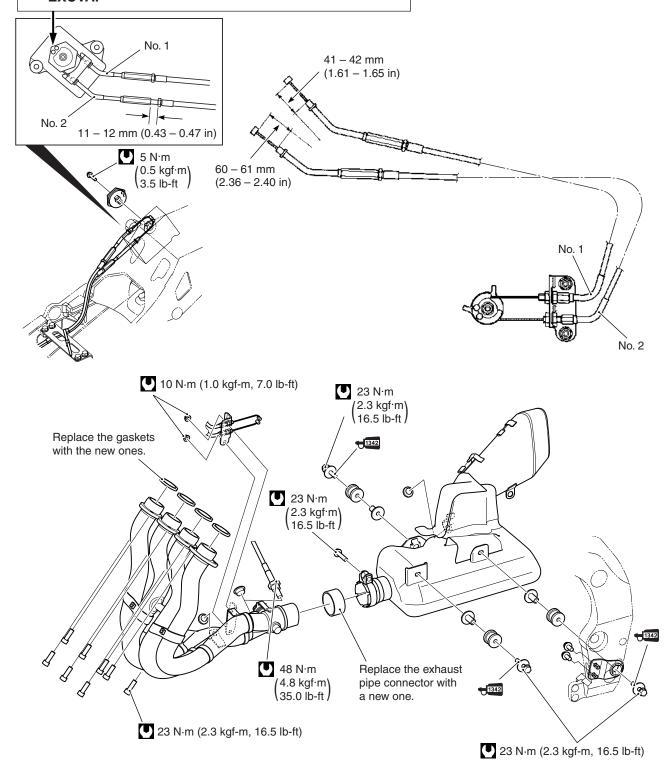
- Tighten the radiator mounting bolts to the specified torque.
- Radiator mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)
- Install the EXCV cables. ( \$\sum\_{\textit{F}} 6-7)





## CAUTION

- \* When adjusting the No. 1 and No. 2 cables, the cable slots of EXCVA pulley must be located to adjustment position.
- \* Do not use the adjustable wrench to turn EXCVA pulley so as not to cause damage to the internal gear of EXCVA.



# **COOLING AND LUBRICATION SYSTEM**

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# **ENGINE COOLANT**

At the time of manufacture, the cooling system is filled with a 50:50 mixture of distilled water and ethylene glycol anti-freeze. This 50:50 mixture will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above –31 °C (–24 °F).

If the motorcycle is to be exposed to temperatures below -31 °C (-24 °F), this mixing ratio should be increased up to 55% or 60% according to the figure.

Anti-freeze density	Freezing point
50%	–30 °C (–24 °F)
55%	–40 °C (–44 °F)
60%	–55 °C (–67 °F)

#### CAUTION

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

50% Engine coolant including reserve tank capacity

Anti-freeze	1 350 ml (2.9/2.4 US/lmp.pt)
Water	1 350 ml (2.9/2.4 US/lmp.pt)

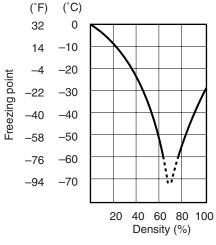


Fig. 1 Engine coolant density-freezing point curve

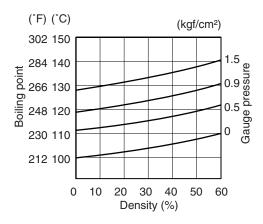
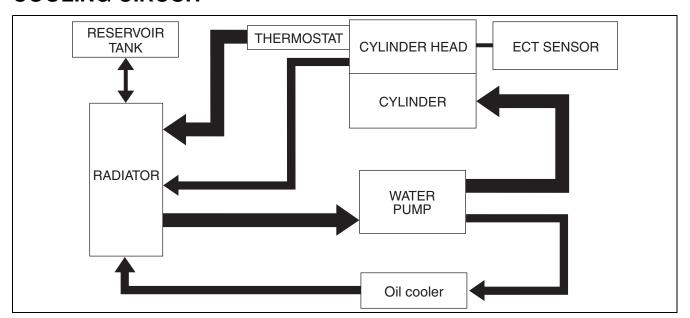


Fig. 2 Engine coolant density-boiling point curve

#### **▲** WARNING

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

# **COOLING CIRCUIT**



#### COOLING CIRCUIT INSPECTION

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

- Remove the right under cowling. (28-5)
- 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/cm<sup>2</sup>, 17 psi) and see if the system holds this pressure for 10 seconds.
- If the pressure should fall during this 10-second interval, it means that there is a leaking point in the system. In such a case, inspect the entire system and replace the leaking component or part.

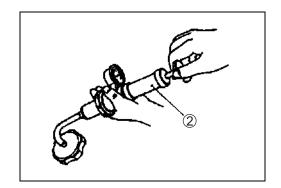
#### **▲** WARNING

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

#### CAUTION

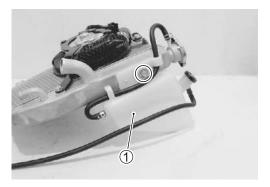
Do not allow the pressure to exceed the radiator cap release pressure, or the radiator can be damaged.





# **RADIATOR AND WATER HOSES RADIATOR REMOVAL**

- Remove the under cowlings. ( 8-5)
- Drain the engine coolant. ( 2-17)
- Remove the radiator assembly. ( 3-4)
- Remove the reservoir tank ①, cooling fan ② from the radiator.





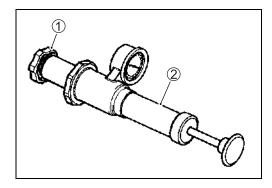
## RADIATOR CAP INSPECTION

- 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/cm<sup>2</sup>, 13.2 - 17.5 psi) 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.



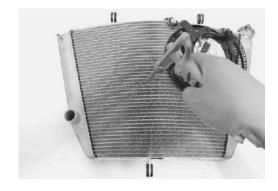
Standard: 108 - 137 kPa

(1.1 - 1.4 kgf/cm<sup>2</sup>, 15.4 - 19.5 psi)

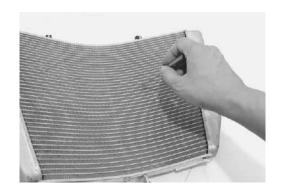


#### RADIATOR INSPECTION AND CLEANING

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



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



#### RADIATOR INSTALLATION

• Install the cooling fan.

# Cooling fan mounting bolt: 8 N·m (0.8 kgf-m, 6.0 lb-ft)

- Install the radiator.
- Route the radiator hoses properly. (10-24)
- Pour engine coolant. ( 2-17)
- Bleed air from the cooling circuit. ( 2-18)
- Install the under cowlings. ( 8-5)

## WATER HOSE INSPECTION

- Remove the under cowlings. (28-5)
- 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.







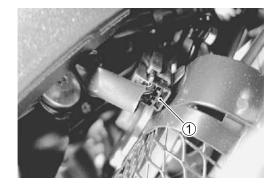


# **COOLING FAN REMOVAL**

**(** 7-4)

## **INSPECTION**

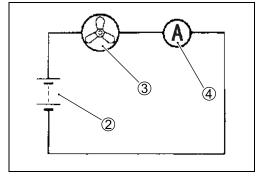
- Remove the right under cowling. ( 8-5)
- Disconnect the cooling fan coupler ①.
- · Test the cooling fan motor for load current with an ammeter connected as shown in the illustration.



- 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**

**(** 7-5)

## **COOLING FAN RELAY INSPECTION**

Cooling fan relay is located on the air cleaner box (left side one).

- Lift and support the fuel tank. ( 8-3)
- Remove the cooling fan relay 1.

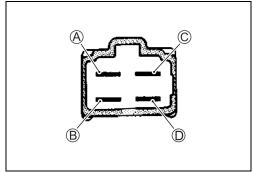
First check the insulation between (A) and (B) terminals with tester. Then apply 12 V to  ${\Bbb C}$  and  ${\Bbb D}$  terminals,  ${\bf \oplus}$  to  ${\Bbb C}$  and  ${\bf \ominus}$  to ①, and check the continuity between A and B.

If there is no continuity, replace it with a new one.

09900-25008: Multi-circuit tester set

Tester knob indication: Continuity test (•)))

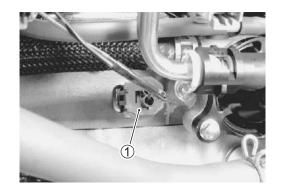




# **ECT SENSOR**

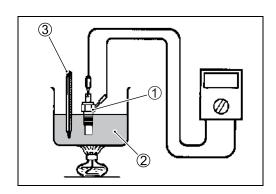
# **REMOVAL**

- Keep the motorcycle upright.
- Lift and support the fuel tank. ( 5-3)
- 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 (68 °F)	Approx. 2.45 kΩ
50 °C (122 °F)	Approx. 0.811 kΩ
80 °C (176 °F)	Approx. 0.318 kΩ
110 °C (230 °F)	Approx. 0.142 kΩ

#### **DATA** Cooling fan operating temperature:

Standard (OFF $\rightarrow$ ON): Approx. 105 °C (221 °F) (ON $\rightarrow$ OFF): Approx. 100 °C (212 °F)

#### NOTE:

As coolant temperature rises, the cooling fan operates for 5 seconds when the temperature arrives each at 50 °C (122 °F), 70 °C (158 °F) and 90 °C (194 °F)/above 4 000 r/min.

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, 13.0 lb-ft)

# **CAUTION**

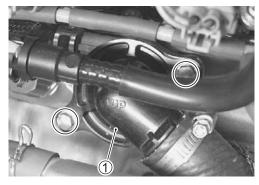
Take special care when handling the ECT sensor. It may cause damage if it gets a sharp impact.

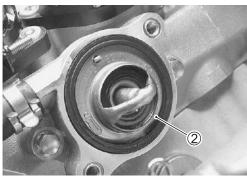
- Install the fuel tank. ( 5-4)
- · Install the front seat.
- Pour engine coolant. ( 2-17



# **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.





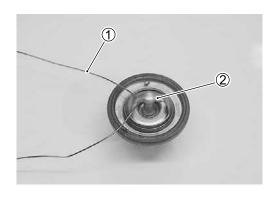
## INSPECTION

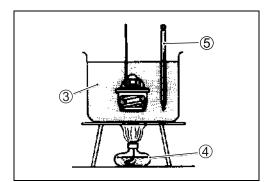
Inspect the thermostat pellet for signs of cracking.

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 (180 °F)



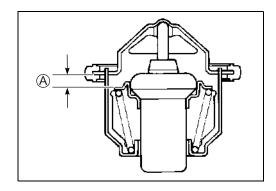


- Keep on heating the water to raise its temperature.
- Just when the water temperature reaches specified value, the thermostat valve should have lifted by at least 8 mm (0.31 in).

# Thermostat valve lift A Standard:

8.0 mm and over at 95 °C (0.31 in and over at 203 °F)

• A thermostat failing to satisfy either of the two requirements (start-to-open temperature and valve lift) must be replaced.



#### INSTALLATION

• Install the thermostat 1.

#### NOTE:

The jiggle valve A of the thermostat faces upside.

- Install the thermostat cover ②.
- Tighten the thermostat cover bolts to the specified torque.
- Thermostat cover bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)



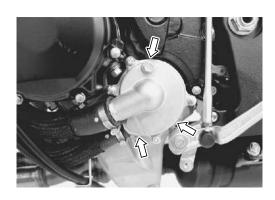
- Install the fuel tank. ( 5-4)
- Install the front seat.
- Pour engine coolant. ( 2-17)

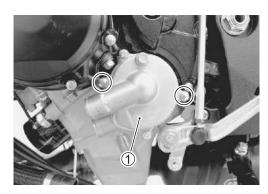
# **WATER PUMP REMOVAL AND DISASSEMBLY**

#### NOTE:

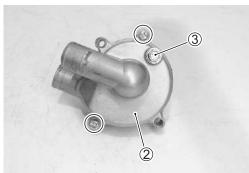
Before draining engine oil and engine coolant, inspect engine oil and coolant leakage between the water pump and crankcase. If engine oil is leaking, visually inspect the oil seal and O-ring. If engine coolant is leaking, visually inspect the mechanical seal and seal washer. ( 7-13)

- Remove the under cowlings. (28-5)
- Drain the engine coolant. ( 2-17)
- Drain the engine oil. ( 2-12)
- Remove the water pump assembly 1.





• Remove the water pump cover ② and air bleeder plug ③.



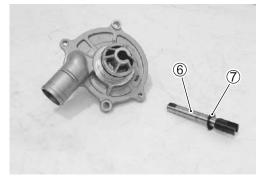
• Remove the impeller securing bolt by holding the impeller with a pliers.



• Remove the mechanical seal ring ④ and rubber seal ⑤ from the impeller.



• Remove the impeller shaft 6 and washer 7.



• 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**

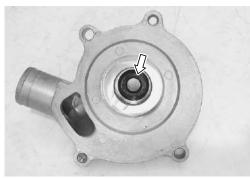
#### **MECHANICAL SEAL**

- 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.



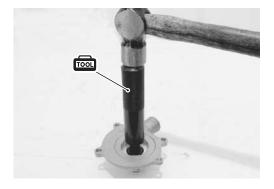
# **REASSEMBLY AND INSTALLATION**

• Install the oil seal with the special tool.

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

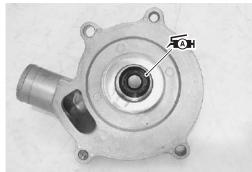
NOTE:

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.

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

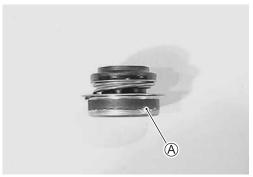


• Install the new mechanical seal using a suitable size socket wrench.

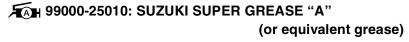


#### NOTE:

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.

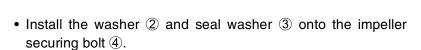


(B)

- 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.

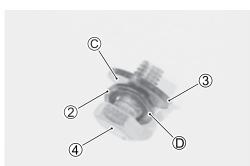
#### NOTE:

The paint marked side ® of mechanical seal ring faces the rubber 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, 6.0 lb-ft)

#### NOTE:

Before installing the impeller securing bolt, apply a small quantity of the THREAD LOCK to it.

**→**342 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 ?).

# FIGH 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, 3.5 lb-ft)
- Tighten the air bleeder plug securely.

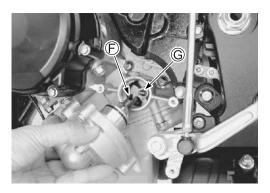


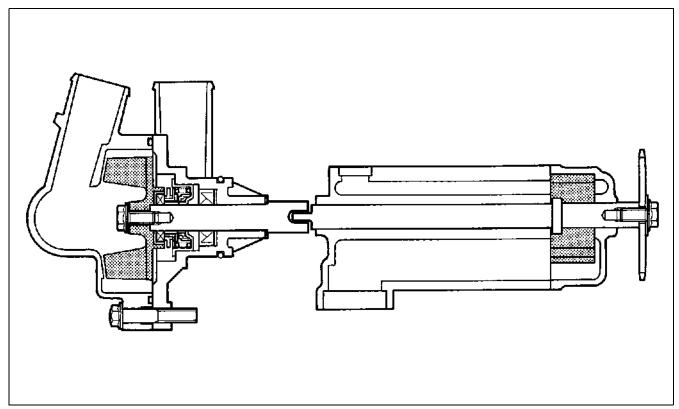




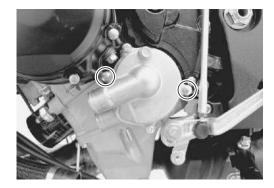
• Install the water pump.

## NOTE:





- Tighten the water pump mounting bolts to the specified torque.
- Water pump mounting bolt: 10 N⋅m (1.0 kgf-m, 7.0 lb-ft)



- Connect the water hoses. ( 10-24)
- Pour engine coolant. ( 2-17)
- Pour engine oil. ( 2-13)
- Install the under cowlings. ( 8-5)

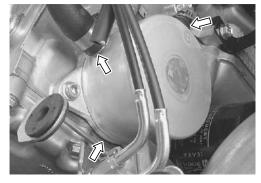
## LUBRICATION SYSTEM

#### **OIL COOLER**

#### **INSPECTION**

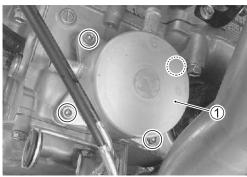
Inspect the oil cooler and oil cooler water hoses for engine oil leakage and engine coolant leakage.

Replace any defective parts if necessary.



#### **REMOVAL**

- Remove the under cowlings. ( 8-5)
- Drain engine oil. ( 2-12)
- 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.

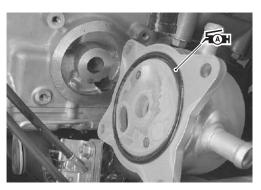
• Apply THREAD LOCK to the oil cooler mounting bolts and install the oil cooler 1 as shown.

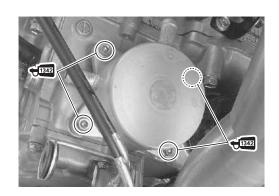


• Tighten the oil cooler mounting bolts to the specified torque.

# Oil cooler mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

- Connect the oil cooler water hoses. ( 10-24)
- Install the exhaust pipe and muffler. (\$\subseteq 6-12\$)
- Pour engine coolant. ( 2-18)
- Pour engine oil. ( 2-13)
- Install the under cowlings. ( 8-5)





# **OIL PRESSURE**

**Z**2-33

# **OIL FILTER**

**2-13** 

# **OIL PRESSURE REGULATOR**

₩3-44

# **OIL STRAINER**

₩3-44

# **OIL JET**

**3-58** 

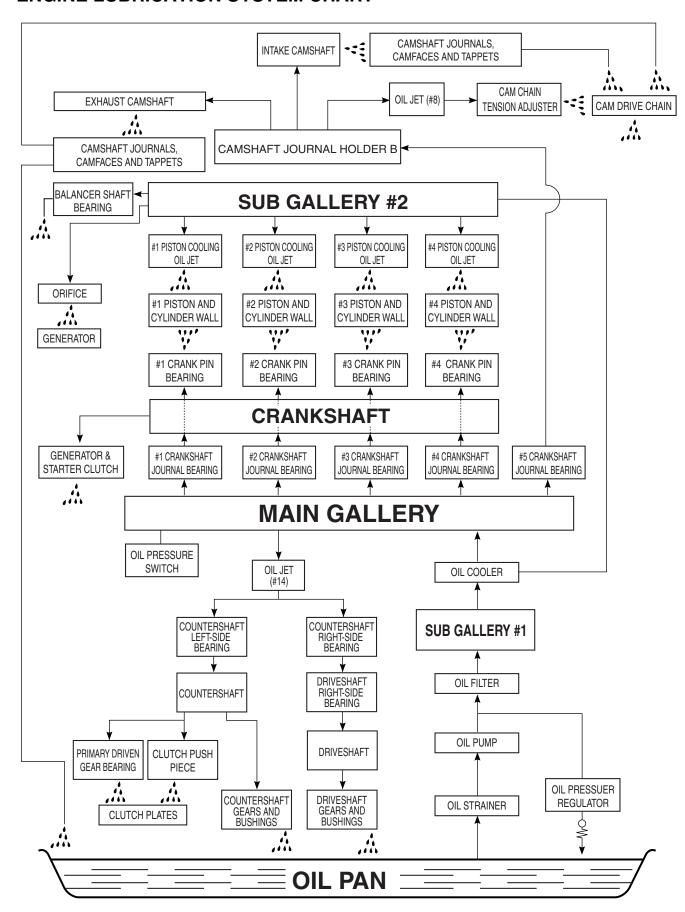
# **OIL PUMP**

₩3-41

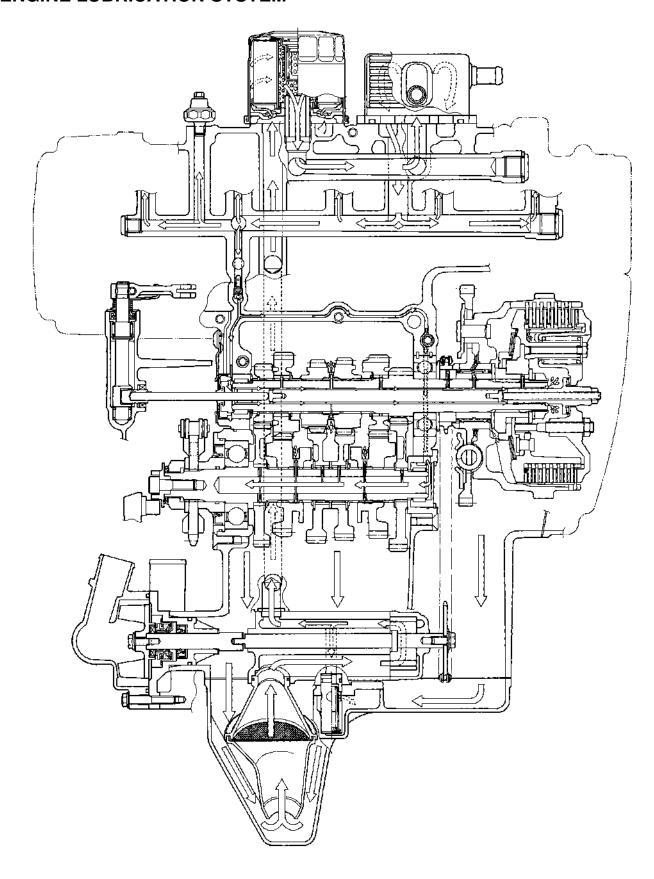
# **OIL PRESSURE SWITCH**

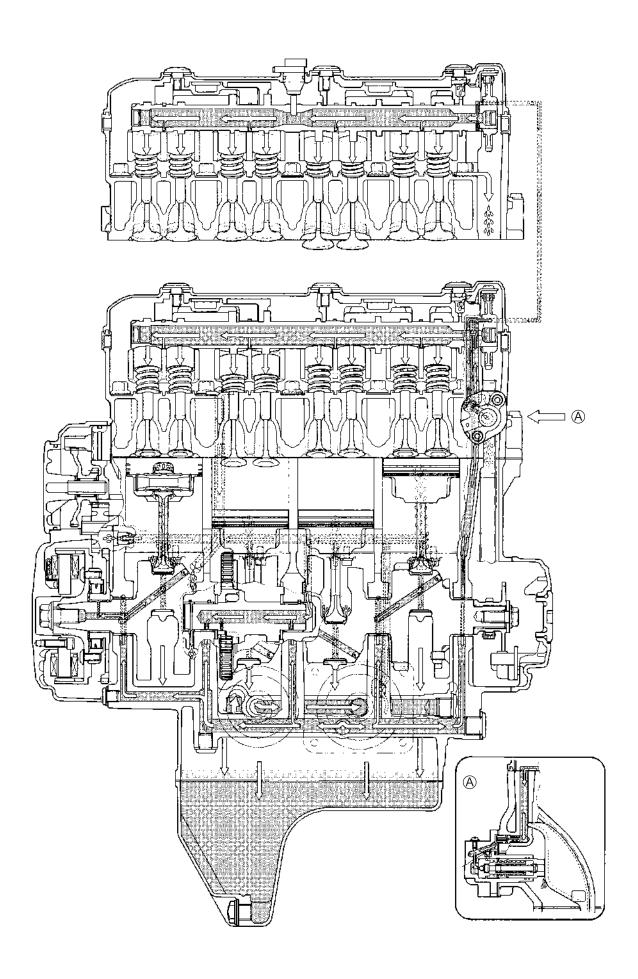
**79-34** 

#### **ENGINE LUBRICATION SYSTEM CHART**



# **ENGINE LUBRICATION SYSTEM**





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## CHASSIS

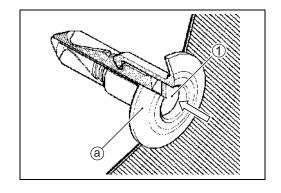
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#### **EXTERIOR PARTS**

## FASTENER REMOVAL AND INSTALLATION FASTENER (Type A)

#### Removal

- Depress the head of fastener center piece 1.
- Pull out the fastener @.

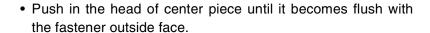


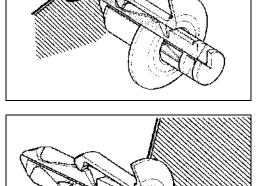
#### Installation

- Let the center piece stick out toward the head so that the pawls ② close.
- Insert the fastener into the installation hole.

#### NOTE:

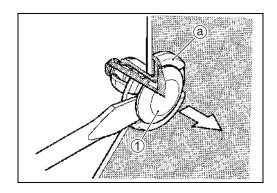
To prevent the pawl ② from damage, insert the fastener all the way into the installation hole.





#### FASTENER (Type B) Removal

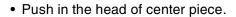
- Pry up the head of fastener center piece ① with a screw driver.
- Pull out the fastener @.

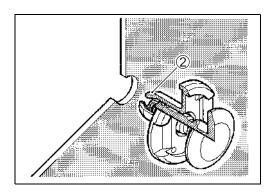


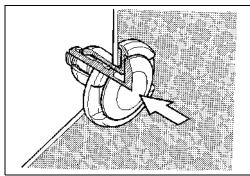
• Insert the fastener into the installation hole.

#### NOTE:

To prevent the pawl ② from damage, insert the fastener all the way into the installation hole.







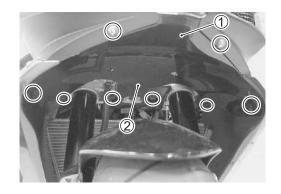
### **BODY COWLING COVER AND** LOWER BRACKET COVER

#### **REMOVAL**

- Remove the body cowling cover ① by removing the screws
- Remove the lower bracket cover ② by removing the bolts.

#### **INSTALLATION**

• Install the lower bracket cover and body cowling cover in the reverse order of removal.



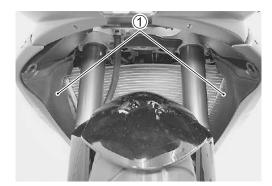
#### INNER UNDER COWLING

#### **REMOVAL**

- Remove the body cowling cover. ( Above)
- Remove the inner under cowlings ①. (LH/RH)

#### **INSTALLATION**

• Install the inner under cowlings in the reverse order of removal.



#### **UNDER COWLING**

- Remove the body cowling cover and inner under cowlings. ( Above)
- · Remove the fasteners.



• Remove the under cowlings. (LH/RH)

#### NOTE:

"☆" indicates hook location.

#### INSTALLATION

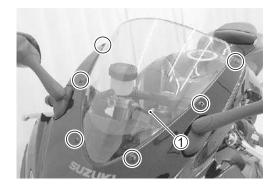
• Install the under cowlings in the reverse order of removal.



#### **SCREEN**

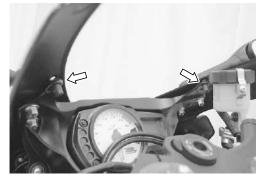
#### **REMOVAL**

• Remove the screen ① by removing the screws.



#### **INSTALLATION**

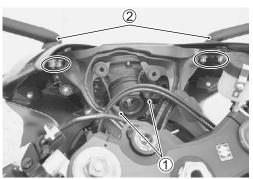
- Install two nuts (middle ones) as shown.
- · Install the window screen.



#### **BODY COWLING**

#### **REMOVAL**

- Remove the left and right under cowlings. ( 8-5)
- Remove the screen. ( Above)
- Remove the combination meter. ( 9-29)
- Disconnect the turn signal lead wire couplers ①.
- Remove the rear view mirror/turn signal assemblies 2.
- · Remove the screws.



- Disconnect the lead wire coupler ③ and remove wire clamp
- Remove the body cowling.

#### **INSTALLATION**

- Install the body cowling in the reverse order of removal.
- Refer to the turn signal cable routing. ( 10-32)



#### **AIR INTAKE PIPE**

#### **REMOVAL**

- Remove the body cowling. ( 8-6)
- · Remove the fasteners.
- Remove the air intake pipes ①. (LH/RH)

#### INSTALLATION

• Install the air intake pipes in the reverse order of removal.

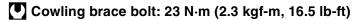
#### **COWLING BRACE**

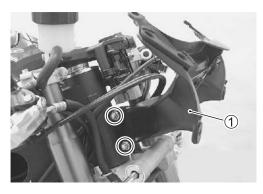
#### **REMOVAL**

- Remove the body cowling. (\$\sumset\$8-6)
- Remove the cowling brace 1.

#### **INSTALLATION**

- Install the cowling brace in the reverse order of removal.
- Tighten the cowling brace bolts.





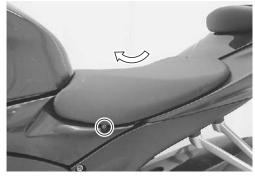
#### **FRONT SEAT**

#### **REMOVAL**

• Remove the front seat by removing the bolts.

#### **INSTALLATION**

• Install the front seat in the reverse order of removal.



### FUEL TANK LOWER SIDE COVER REMOVAL

- Remove the front seat. ( Above)
- Remove the fuel tank lower side covers ①. (LH/RH)

#### NOTE:

"☆" indicates hook location.

#### **INSTALLATION**

 Install the fuel tank lower side covers in the reverse order of removal.

### **REAR SEAT/SEAT TAIL COVER**

#### **REMOVAL**

• Remove the rear seat (seat tail cover) using the ignition key.

#### **INSTALLATION**

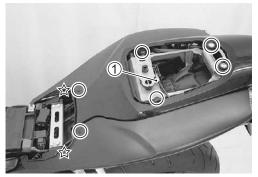
• Insert the seat hook to the guide and push down the seat (seat tail cover) firmly until the seat (seat tail cover) snaps into the locked position.



#### FRAME COVER

#### **REMOVAL**

- Remove the front and rear seats. ( 38-7 and -8)
- Remove the fasteners and screws.
- Disconnect the seat lock cable 1.





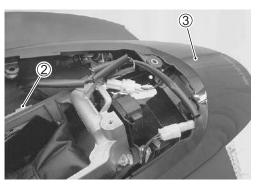
- Disconnect the rear combination light lead wire coupler ②.
- Remove the frame cover 3.

#### NOTE:

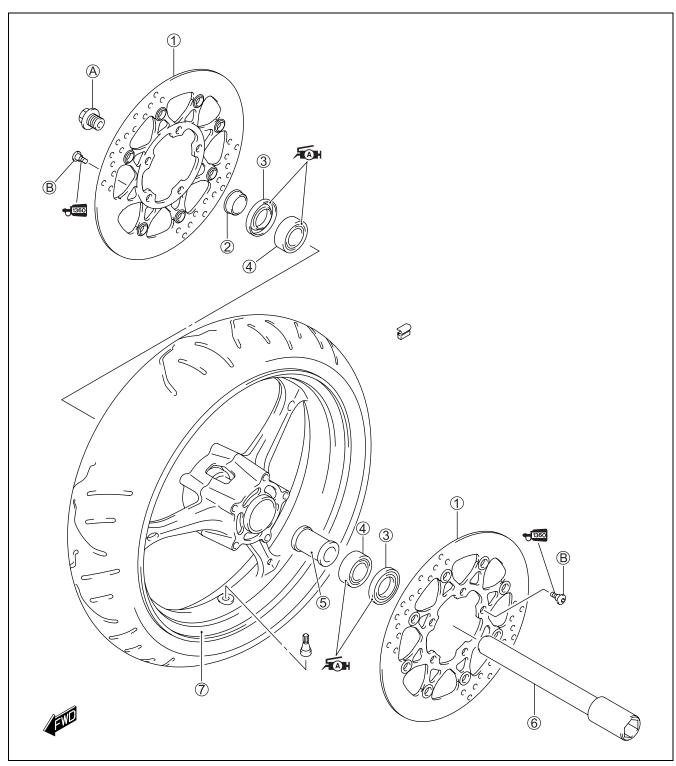
"\times" indicates hook location.

#### **INSTALLATION**

Install the frame cover in the reverse order of removal.



# FRONT WHEEL CONSTRUCTION



1	Brake disc	6	Front axle
2	Collar	7	Front wheel
3	Dust seal	A	Front axle bolt
4	Bearing	$^{\circ}$	Brake disc bolt
<b>⑤</b>	Spacer		

ITEM	N∙m	kgf-m	lb-ft			
A	100	10.0	72.5			
B	23	2.3	16.5			

#### REMOVAL AND DISASSEMBLY

• 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.
- Remove the front axle bolt 2.
- Remove the under cowling. ( 8-5)



 Raise the front wheel off the ground and support the motorcycle with a jack or a wooden block.

#### **CAUTION**

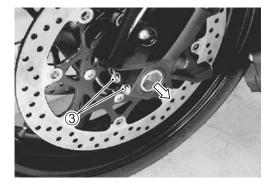
Do not carry out the work with the motorcycle resting on the side-stand. Do not support the motorcycle with the exhaust pipe. Make sure that the motorcycle is supported securely.

- Loosen two axle pinch bolts ③ on the left front fork leg.
- Draw out the front axle and remove the front wheel.

#### NOTE:

After removing the front wheel, fit the calipers temporarily to the original positions.

• Remove the collar 4.

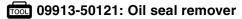




• Remove the brake discs, left and right.



• Remove the dust seals on both sides with the special tool.



### CAUTION

The removed dust seals must be replaced with new ones.



• Remove the wheel bearings with the special tool.



#### CAUTION

The removed bearings should be replaced with new ones.



• Remove the spacer ⑤.



#### INSPECTION

TIRE INSPECTION (\$\infty\$8-85)
BRAKE DISC INSPECTION (\$\infty\$8-70)

#### **AXLE SHAFT**

• Using a dial gauge, check the axle shaft for runout and replace it if the runout exceeds the limit.

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

Axle shaft runout:

**Service Limit: 0.25 mm (0.010 in)** 

#### WHEEL

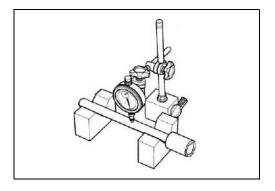
 Make sure that the wheel runout checked as shown does not exceed the service limit. An excessive runout is usually due to worn or loosened wheel bearings and can be reduced by replacing the bearings. If bearing replacement fails to reduce the runout, replace the wheel.

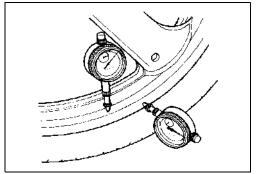
#### DAVA Wheel runout:

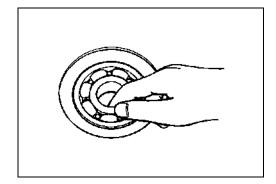
Service Limit (Axial and Radial): 2.0 mm (0.08 in)

#### WHEEL BEARINGS

- Inspect the play of the wheel bearings by finger while they are in the wheel. Rotate the inner race by finger to inspect for abnormal noise and smooth rotation.
- Replace the bearing in the following procedure if there is anything unusual.

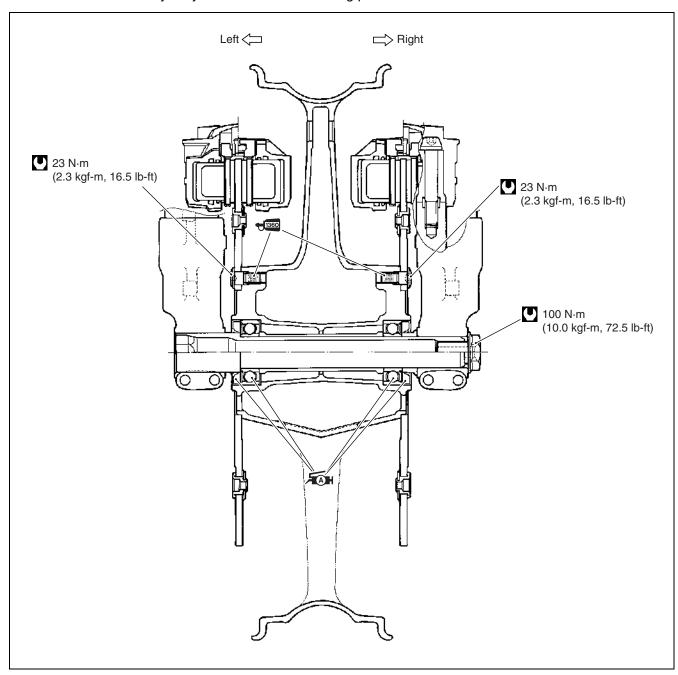






#### **REASSEMBLY AND INSTALLATION**

Reassemble and install the front wheel in the reverse order of removal and disassembly. Pay attention to the following points:



#### **WHEEL BEARING**

• Apply SUZUKI SUPER GREASE "A" to the wheel bearings.

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



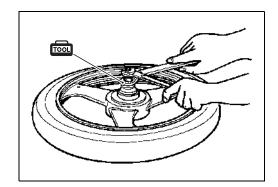
• Install the wheel bearings with the special tools as follows.

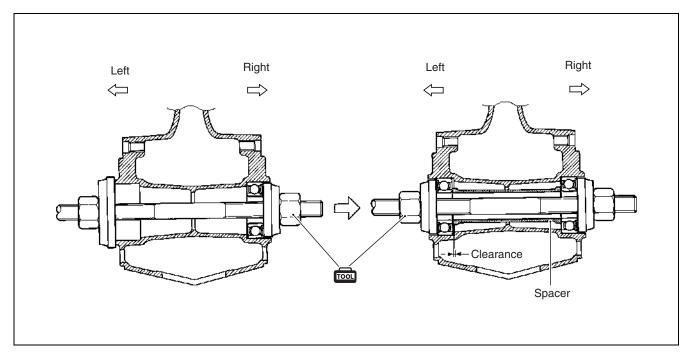
09924-84510: Bearing installer set

#### CAUTION

First install the right wheel bearing, then install the spacer and left wheel bearing.

The sealed cover of the bearing must face outside.





• Install the dust seal with the special tool.

09913-70210: Bearing installer set

• 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 disc mounting bolts and tighten them to the specified torque.

Brake disc bolt (Front): 23 N·m (2.3 kgf-m, 16.5 lb-ft)

**←**1360 99000-32130: THREAD LOCK SUPER "1360"



• Install the collar 1 in the right side.



#### WHEEL

• Install the front wheel with the front axle and hand-tighten the front axle bolt temporarily.

#### **▲** WARNING

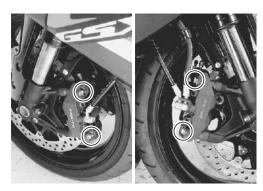
The directional arrow on the tire should point to the wheel rotation, when remounting the wheel.



#### **BRAKE CALIPER**

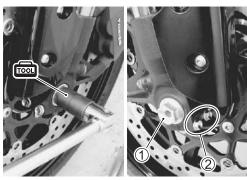
- Tighten the brake caliper mounting bolts to the specified torque.
- Front brake caliper mounting bolt:

35 N·m (3.5 kgf-m, 25.5 lb-ft)



#### **FRONT AXLE**

- Hold the front axle with the special tool and tighten the front axle bolt ① to the specified torque.
- 09900-18740: Heaxagon socket (24 mm)
- Front axle bolt: 100 N·m (10.0 kgf-m, 72.5 lb-ft)
- Tighten two axle pinch bolts ② on the right fork leg to the specified torque.
- Front axle pinch bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
- Move the front fork up and down 4 or 5 times.



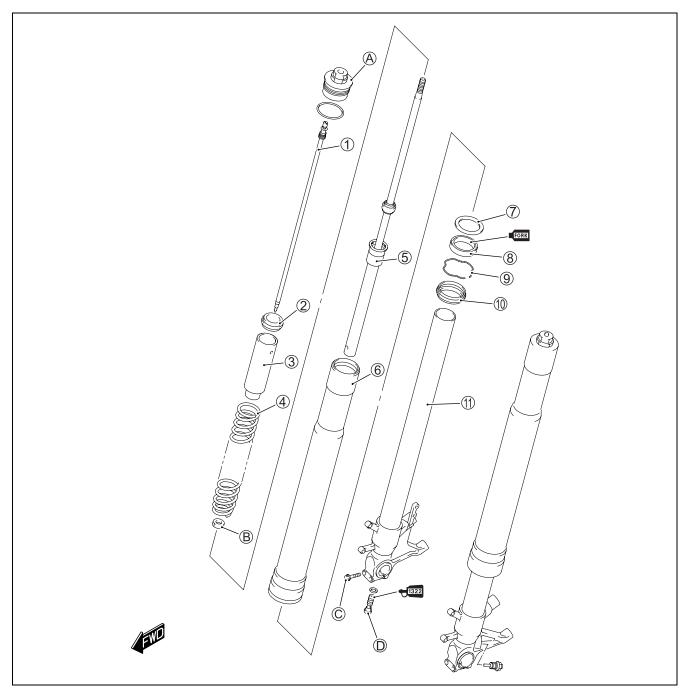


• Tighten two axle pinch bolts on the left front fork leg to the specified torque.

Front axle pinch bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)



# FRONT FORK CONSTRUCTION



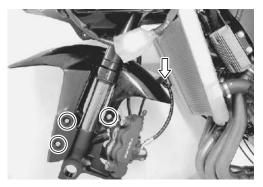
		_	r
1	Adjuster rod	9	Oil seal stopper ring
2	Spring retainer	9	Dust seal
3	Spacer	1	Inner tube
4	Spring	(A)	Front fork cap bolt
<b>⑤</b>	Inner rod/Damper rod (cartridge)	$^{\circ}$	Lock-nut
6	Outer tube	©	Front axle pinch bolt
7	Oil seal retainer	<b>D</b>	Damper rod bolt
8	Oil seal		

_	
	•
	<b>•</b> 1

ITEM	N∙m	kgf-m	lb-ft			
A	35	3.5	25.5			
B	20	2.0	14.5			
©	23	2.3	16.5			
D	35	3.5	25.5			

#### REMOVAL AND DISASSEMBLY

- Remove the under cowling cover and the lower bracket cover.
   ( 3-5)
- Remove the front wheel. ( \$\sigma 8-10 )
- Disconnect the brake hose from the brake hose guides at the front fender.
- Remove the front fender.





(4)

- Loosen the front fork upper clamp bolts ①, left and right.
- Loosen the handlebar clamp bolts 2, left and right.

#### NOTE:

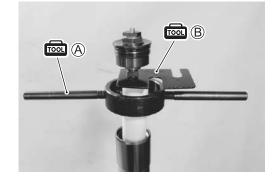
- \* Slightly loosen the front fork cap bolts ③ before loosening the lower clamp bolts to facilitate later disassembly.
- \* Be sure to adjust the rebound damping force adjuster ④ to the softest position before removing the front fork.
- Loosen the front fork lower clamp bolts, left and right.
- · Remove the front forks, left and right.

#### NOTE:

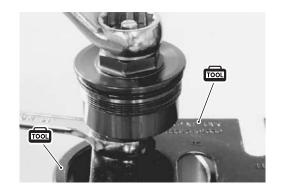
Hold the front fork by the hand to prevent sliding out of the steering stem.

- Separate the front fork cap bolt from the front fork.

09940-94930: Front fork spacer holder (A) 09940-94922: Stopper plate (B)



- Remove the front fork cap bolt from the inner rod by loosening the lock nut.
- Compress the fork spring with the special tool and remove the special tool.

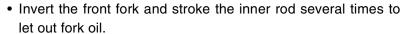


6

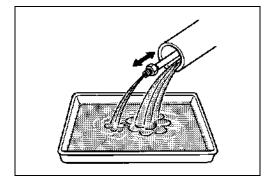
• Remove the front fork cap bolt ⑤, adjuster rod ⑥, spring retainer ⑦, spacer ⑧ and spring ⑨.

#### CAUTION

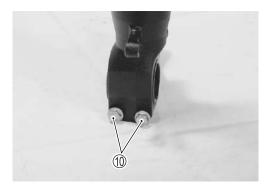
- \* Do not disassemble the front fork cap bolt 5.
- \* After removing the front fork cap bolt ⑤, avoid holding the outer tube vertically by hand to prevent the inner tube from falling and damaged.



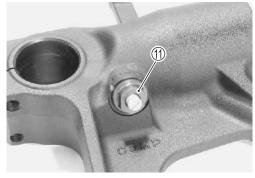
• Under the inverted condition of front fork, drain oil completely by holding the fork for a while.



• Remove the front axle pinch bolts ①.

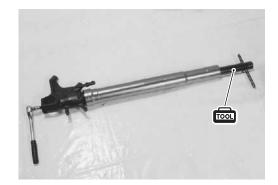


• Remove the compression damping force adjuster 11.



• Remove the damper rod bolt with the special tool and a hexagon wrench.

09940-30221: Front fork assembling tool



• Remove the inner rod/damper rod (cartridge) ②.

#### CAUTION

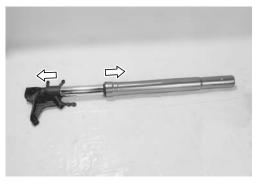
Do not disassemble the inner rod/damper rod (cartridge).



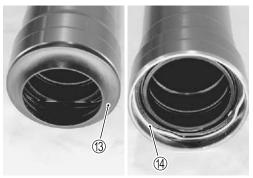
• Slide the outer tube to remove it from the inner tube.

#### NOTE:

Be careful not to damage the "ANTI-FRICTION" metals.



• Remove the dust seal (3) and oil seal stopper ring (4).



• Remove the oil seal (5) with the special tool.

09913-50121: Oil seal remover

#### CAUTION

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

• Remove the oil seal retainer 16.





#### **INSPECTION**

#### **INNER AND OUTER TUBES**

- Inspect the inner tube outer surface and outer tube inner surface for scratches.
- Inspect the "ANTI-FRICTION" metal surfaces for scratches.
- If any defects are found, replace them with the new ones.

#### CAUTION

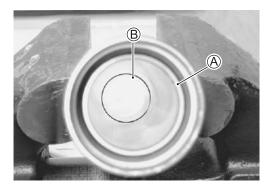
Do not remove the "ANTI-FRICTION" metals, A and B.

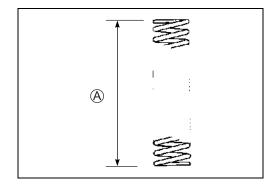
#### **FORK SPRING**

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

#### **DATA** Front fork spring free length A:

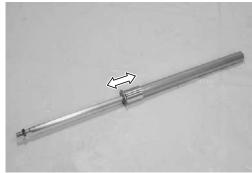
**Service Limit: 259.5 mm (10.22 in)** 





#### **DAMPER ROD**

- Move the inner rod by hand to examine it for smoothness.
- If any defects are found, replace inner rod/damper rod (cartridge) with a new one.



#### REASSEMBLY

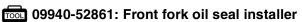
Reassemble the front fork in the reverse order of disassembly. Pay attention to the following points:

#### **OIL SEAL AND DUST SEAL**

- Install the dust seal, oil seal stopper ring, oil seal and oil seal retainer onto the inner tube.
- 1 Dust seal
- 2 Oil seal stopper ring
- ③ Oil seal
- 4 Oil seal retainer

#### **CAUTION**

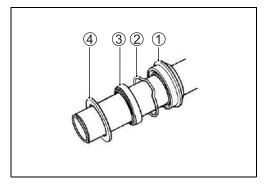
- \* When installing the oil seal to outer tube, be careful not to damage the oil seal lip.
- \* Avoid using solvents for washing to prevent oil seal damage.
- \* Apply fork oil to the Anti-friction metals and lip of the oil seal.
- \* Make sure that the oil seal stopper ring has been fitted securely.
- Insert the inner tube into the outer tube and fit the oil seal and dust seal with the special tool.

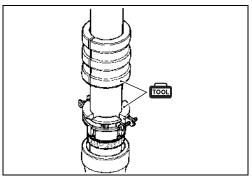


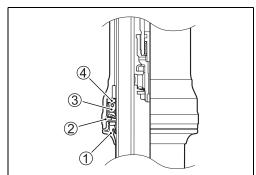
#### NOTE:

Stamped mark on the oil seal should face outside.









#### **DAMPER ROD BOLT**

- Insert the inner rod/damper rod (cartridge) into the inner tube.
- Apply THREAD LOCK to the damper rod bolt and tighten it to the specified torque with the special tool.

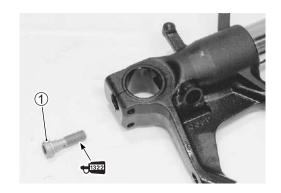
99000-32110: THREAD LOCK SUPER "1322" (or equivalent thread lock)

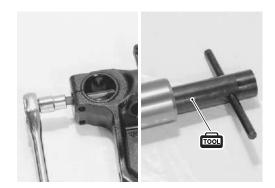
#### CAUTION

Use a new damper rod bolt gasket ① to prevent oil leakage.

09940-30221: Front fork assembling tool

Damper rod bolt: 35 N⋅m (3.5 kgf-m, 25.5 lb-ft)





#### **COMPRESSION DAMPING FORCE ADJUSTER**

- Tighten the compression damping force adjuster to the specified torque.
- Compression damping force adjuster:

23 N·m (2.3 kgf-m, 16.5 lb-ft)

#### CAUTION

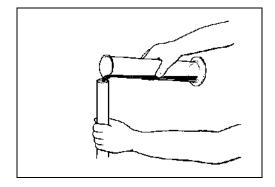
The removed O-ring must be replaced with a new one.

#### **FORK OIL**

- Place the front fork vertically without spring.
- Compress it fully.
- Pour specified front fork oil up to the top level of the outer tube.

Capacity (each leg): 408 ml (13.8/14.4 US/Imp oz)

99000-99001-SS5: SUZUKI FORK OIL SS-05 or an equivalent fork oil



 Move the inner rod slowly with the special tool ten times and more until no more bubbles come out from the oil.

#### 09940-52841: Inner rod holder

#### NOTE:

Refill front fork oil up to the top of the outer tube so that bubbles are visible while bleeding air.

- Refill specified front fork oil up to the top level of the outer tube again. Move the outer tube up and down several strokes until no more bubbles come out from the oil.
- Keep the front fork vertically and wait 5 6 minutes.

#### NOTE:

- \* Always keep oil level over the cartridge top end, or air may enter the cartridge during this procedure.
- \* Take extreme care so as to pump out air completely.
- Hold the front fork vertically and adjust fork oil level with the special tool.

#### NOTE:

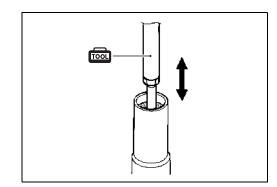
When adjusting the fork oil level, compress the outer tube fully without the fork spring.

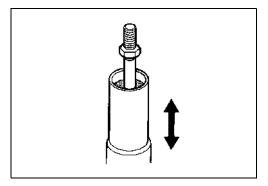
Fork oil level: 112 mm (4.41 in)

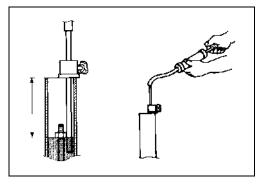
09943-74111: Front fork oil level gauge

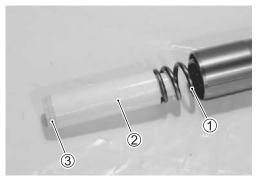
#### **FORK SPRING**

- · Install the fork spring.
- Install the spring ①, spacer ② and spring retainer ③.









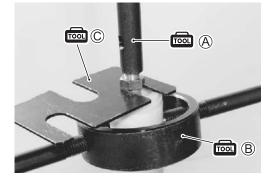
#### FRONT FORK CAP BOLT

- Pull up the inner rod with the special tool A.
- Compress the spring with the special tool ® and then insert the special tool © between the lock-nut and the spacer.

09940-52841: Inner rod holder A

09940-94930: Front fork spacer holder (B)

09940-94922: Stopper plate ©



 $\cdot$ (1)

- Insert the adjuster rod to the front fork cap bolt.
- Apply fork oil to the O-ring.

#### CAUTION

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

#### ⊕: 1.5 mm (0.05 in)

- Slowly turn the cap bolt completely by hand until the end of the cap bolt seats on the inner-rod.
- Apply fork oil to the O-ring.

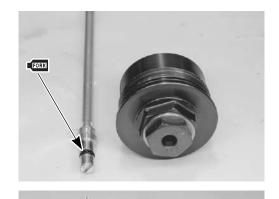
#### CAUTION

- \* The removed O-ring must be replaced with a new one.
- \* Make sure that the rebound damping force adjuster

  ① to the softest position before installing the cap
  bolt.



- Hold the cap bolt ② and tighten the lock-nut ③ to the specified torque.
- Inner rod lock-nut: 20 N·m (2.0 kgf-m, 14.5 lb-ft)
- Remove the special tools.
- Install the front fork cap bolt to the outer tube temporarily.



 $\bigcirc$ 

FORK

#### **INSTALLATION**

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

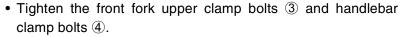
Set the upper surface of the outer tube height (A) at 5.0 mm (0.196 in) from the upper surface of the steering stem upper bracket and tighten the front fork lower clamp bolts (1) to the specified torque.

### Front fork lower clamp bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

• Tighten the front fork cap bolt ② to the specified torque and recheck the front fork outer tube upper surface height ⑥ from the upper surface of the steering stem upper bracket.

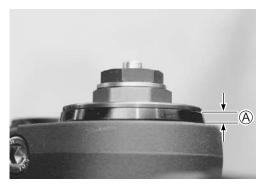
#### Front fork cap bolt: 35 N·m (3.5 kgf-m, 25.5 lb-ft)

Position the handlebars on the upper bracket.
 (238-37 to -38)

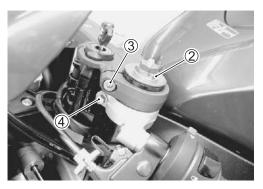


## Front fork upper clamp bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft) Handlebar clamp bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

- Remount the front wheel. ( \$\sime 8-10\$)
- Cable routing ( 10-17)
- Front brake hose routing ( 10-24)







#### SUSPENSION SETTING

After installing the front fork, adjust the spring pre-load and damping force as follows.

#### SPRING PRE-LOAD ADJUSTMENT

Turn the damping force adjuster ① counterclockwise fully. It is at softest position and turn it out to standard setting position.

STD position: 7 turns in from softest position



#### DAMPING FORCE ADJUSTMENT

#### **Compression damping force**

Turn the damping force adjuster ② clockwise fully. It is at stiffest position and turn it out to standard setting position.

STD position: 1 3/4 turns out from stiffest position



#### Rebound damping force

Turn the damping force adjuster ② clockwise fully. It is at stiffest position and turn it out to standard setting position.

STD position: 1 1/2 turns out from stiffest position



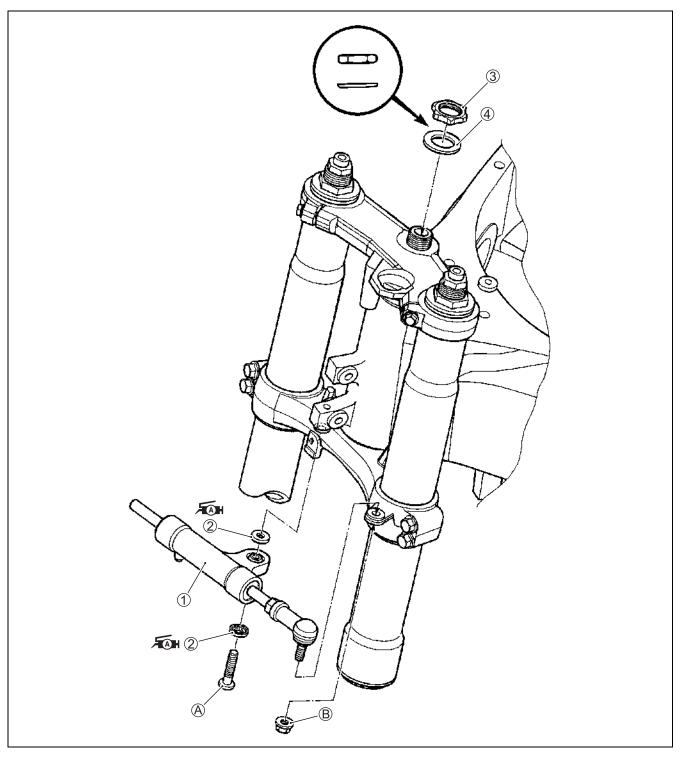
#### STANDARD FRONT SUSPENSION SETTING

	FRONT Spring pre-load Damping force adjuster			
	adjuster	Compression	Rebound	
Solo and	7 turns in from	1 3/4 turns out from	1 1/2 turns out from	
dual riding	softest position	stiffest position	stiffest position	

#### ACHTUNG A WARNING

Be sure to adjust the spring pre-load and damping force on both front fork legs equally.

# STEERING DAMPER CONSTRUCTION

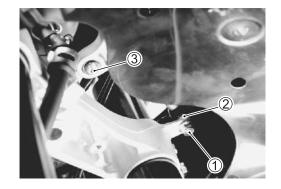


① Steering damper	Convex curve side of the washer
② Dust seal	faces down side.
3 Steering stem head nut	Damper rod bolt
	Damper rod nut

U			_
ITEM	N∙m	kgf-m	lb-ft
AB	23	2.3	16.5
3	90	9.0	65.0

#### REMOVAL

- Remove the lower bracket cover. ( 8-5)
- Remove the nut 1 by holding the nut 2.
- Remove the bolt ③ and remove the steering damper.



#### INSPECTION

- Inspect the steering damper body, bearing and oil seal for damage and oil leaking.
- Move the steering damper rod by hand to inspect for a smooth movement.
- If any defects are found, replace the steering damper with a new one.



Do not remove the bolt A.

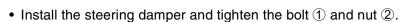


#### **INSTALLATION**

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

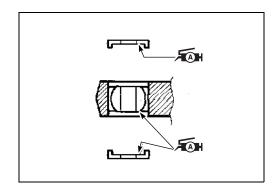
 Apply SUZUKI SUPER GREASE "A" to the bearings and dust seals.

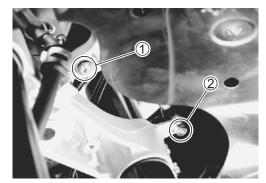
99000-25010: SUZUKI SUPER GREASE "A"
(or equivalent grease)



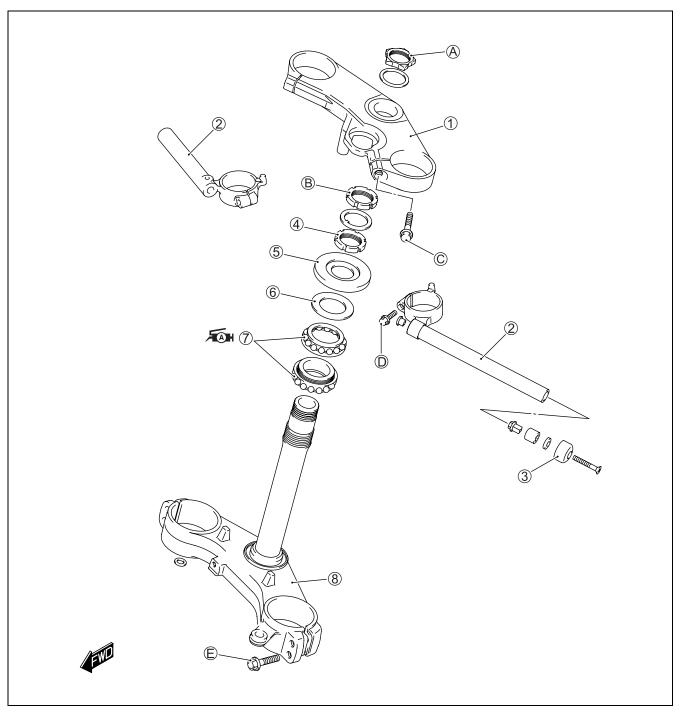
Steering damper bolt and nut:

23 N·m (2.3 kgf-m, 16.5 lb-ft)





# STEERING CONSTRUCTION



1	Steering stem upper bracket	8	Steering stem lower bracket
2	Handlebars	A	Steering stem head nut
3	Handlebar balancer	$^{\textcircled{B}}$	Steering stem lock-nut
4	Steering stem nut	©	Front fork upper clamp bolt
<b>⑤</b>	Dust seal cover	<b>D</b>	Handlebar clamp bolt
6	Dust seal	(E)	Front fork lower clamp bolt
7	Bearing		



ITEM	N∙m	N⋅m kgf-m			
A	90	9.0	65.0		
B	80	8.0	58.0		
©	23	2.3	16.5		
D	23	2.3	16.5		
Ē	23	2.3	16.5		

#### REMOVAL

- Remove the under cowling. (\$\sums\$8-5)
- Support the motorcycle with a jack or a wooden block.

#### CAUTION

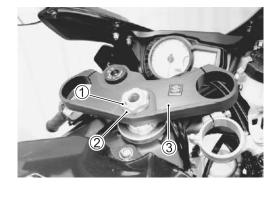
Do not work by using side stand. Do not support the motorcycle with exhaust pipe. Make sure that the motorcycle is supported securely.

- Remove the front wheel. (\$\sumset\$8-10)
- Remove the front forks. ( \$\sumset\$ 8-18)
- Remove the steering damper. ( 8-29)
- Remove the steering stem head nut 1 and washer 2.
- Remove the steering stem upper bracket 3.

#### NOTE:

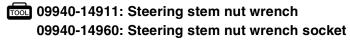
It is not necessary to remove the ignition switch, when replacing only the steering stem lower bracket and bearings. (Ignition switch removal: 39-38)

• Remove the brake hose clamp bolt.





• Remove the steering stem lock-nut, washer and steering stem nut with the special tools.



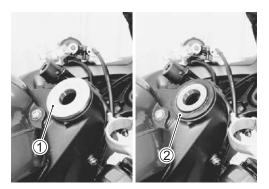
• Draw out the steering stem lower bracket.

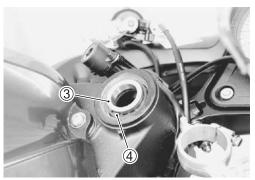
#### NOTE.

Hold the steering stem lower bracket by hand to prevent it from falling.



• Remove the dust seal cover ①, dust seal ②, steering stem upper bearing inner race ③ and bearing ④.





#### **INSPECTION AND DISASSEMBLY**

Inspect the removed parts for the following abnormalities.

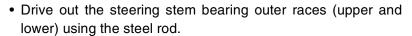
- \* Handlebars distortion
- \* Race wear and brinelling
- \* Bearing wear or damage
- \* Abnormal noise of bearing

If any abnormal points are found, replace defective parts with the new ones.

 Remove the steering stem lower bearing inner race with a chisel.

#### CAUTION

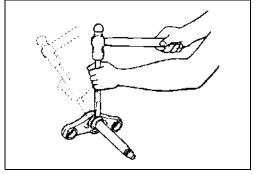
The removed bearing inner race must be replaced with a new one.

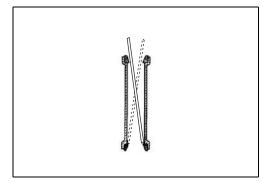


#### CAUTION

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**

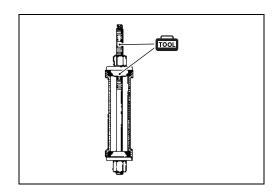
• Press in the upper and lower bearing outer races with the special tools.

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.

09925-18011: Steering bearing installer





#### **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.



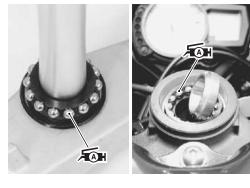
- Install the lower bearing to the steering stem lower bracket.
- Install the upper bearing and bearing inner race.

#### 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, 32.5 lb-ft)

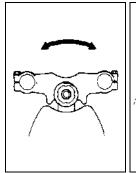




- Turn the steering stem lower bracket about five or six times to the left and right so that the angular ball bearings will be seated properly.
- Loosen the stem nut by 1/4 1/2 turn.

#### 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, 58.0 lb-ft)



#### FRONT FORK AND STEERING STEM UPPER BRACKET

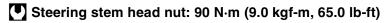
Install the front fork and steering stem upper bracket in the following steps:

1) Install the upper bracket, washer ① and steering stem head nut ② temporarily.

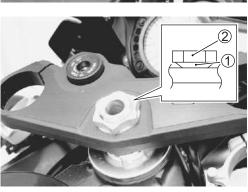
#### NOTE:

Pay attention to the direction of the washer.

2) Position the handlebars on the front forks and tighten the steering stem head nut 2.



- 3) Tighten the front fork upper and lower clamp bolts. ( \$\sumsymbol{2} 8-26\$)
- Install the steering damper. ( 8-29)
- Install the front wheel. ( 8-15 and -16)
- Cable routing ( 10-17)



Check the steering movement in the following procedure.

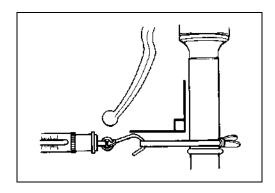
- By supporting the motorcycle with a jack, lift the front wheel until it is off the floor by 20 – 30 mm (0.8 – 1.2 in).
- Remove the steering damper. ( 8-29)
- Check to make sure that the cables and wire harnesses are properly routed.
- With the front wheel in the straight ahead state, hitch the spring scale (special tool) on one handlebar grip end as shown in the figure and read the graduation when the handlebar starts moving. Do the same on the other grip end.

**PATA** 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.

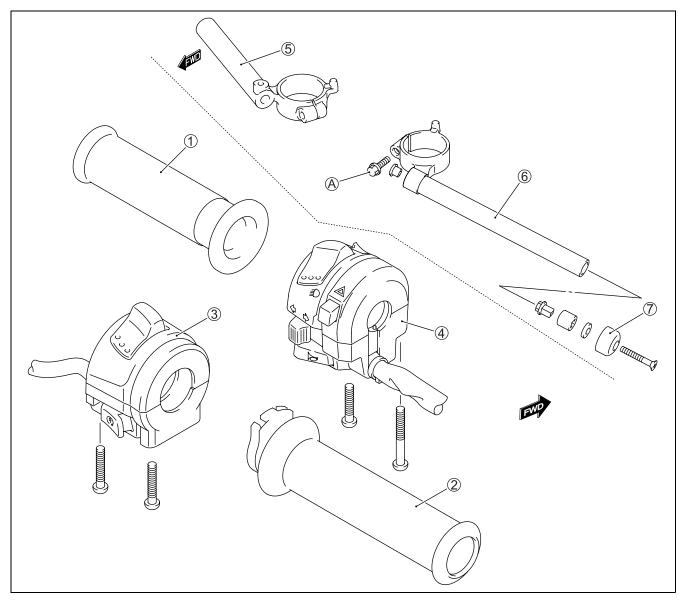
#### NOTE:

Hold the front fork legs, move them back and forth and make sure that the steering is not loose.





## **HANDLEBARS CONSTRUCTION**

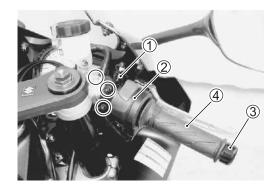


1	Left handle grip	<b>⑤</b>	Handlebar (RH)
2	Right handle throttle grip	6	Handlebar (LH)
3	Right handle switch	7	Handle balancer
4	Left handle switch	A	Handlebar clamp bolt

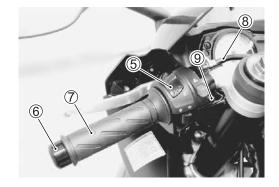
ITEM	N∙m	kgf-m	lb-ft
A	23	2.3	16.5

#### **REMOVAL**

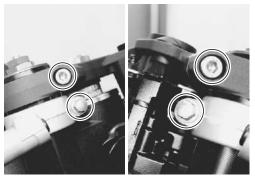
- Remove the brake master cylinder ①.
- Remove the right handle switch 2.
- Remove the handle balancer 3.
- Remove the right handle throttle grip 4.



- Remove the left handle switch ⑤ and disconnect the clutch lever switch lead wire.
- Remove the handle balancer 6.
- Remove the left handle grip 7.
- Disconnect the clutch cable 8.
- Remove the clutch lever holder (9).



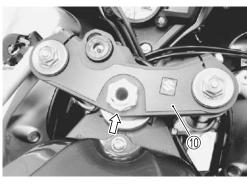
 Loosen the handlebar clamp bolts and front fork upper clamp bolts.



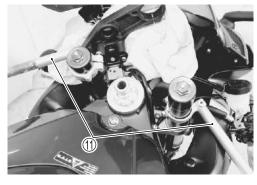
• Remove the steering stem upper bracket ① by removing the steering stem head nut.

#### NOTE:

Place a rag under the steering stem upper bracket to prevent scratching the body cowling and the air intake pipes.



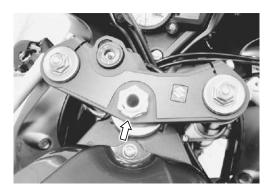
• Remove the handlebars 11 by sliding them upward.



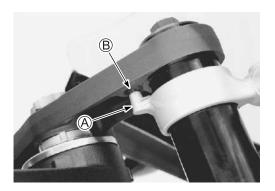
#### **INSTALLATION**

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

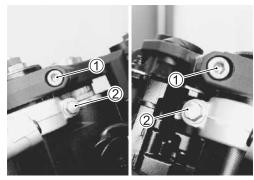
- Install the handlebars temporarily.
- Install the steering stem upper bracket and washer. ( \$\subsection 8-34 \)



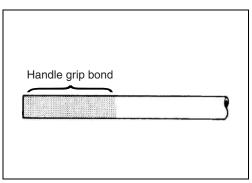
• Insert the protrusion (A) of the handlebars into the hole (B) of the steering stem upper bracket.



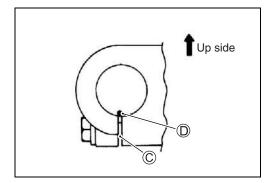
- Tighten the front fork upper clamp bolts ① and handlebar clamp bolts ② to the specified torque.
- Front fork upper clamp bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
  Handlebar clamp bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)



 Apply a handle grip bond onto the left handlebar before installing the handlebar grip.



- Install the clutch lever holder, align the holder's mating surface © with punched mark © on the handlebar.
- Install the front brake master cylinder. ( 8-74)



 Apply the SUZUKI SUPER GREASE "A" to the throttle cables and cable drum.

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

• When remounting the right and left handle switches, engage the stopper with the handlebar hole.

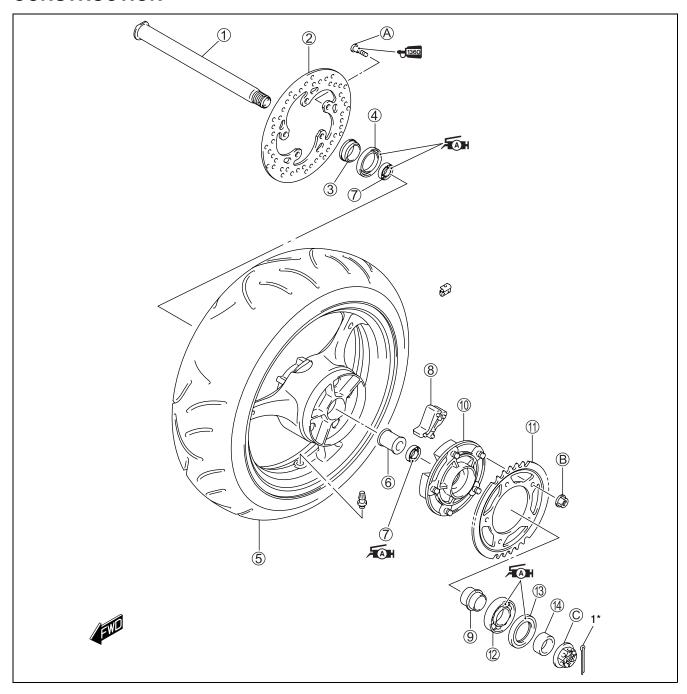




After installing the steering, the following adjustments are required before driving.

- Cable routing ( 10-17)
- Throttle cable play ( 2-15)
- Clutch lever play ( 2-16)

# REAR WHEEL CONSTRUCTION

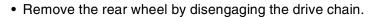


1	Rear axle	10	Sprocket mounting drum
2	Brake disc	11)	Sprocket
3	Collar	12	Bearing
4	Dust seal	13	Dust seal
<b>⑤</b>	Rear wheel	14)	Collar
<b>6</b>	Spacer	A	Brake disc bolt
7	Bearing	$^{\odot}$	Rear sprocket nut
8	Cushion	©	Rear axle nut
9	Spacer	*1	Except for E-03, 28, 33

ITEM	N∙m	kgf-m	lb-ft
A	35	3.5	25.5
$^{\circ}$	93	9.3	67.5
©	100	10.0	72.5

#### **REMOVAL**

- Remove the cotter pin. (For E-03, 28, 33)
- Loosen the axle nut 1.
- Remove the under cowling. (\$\sumset\$8-5)
- 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.



#### **CAUTION**

Do not operate the brake pedal with the rear wheel removed.



- Remove the collar 2.
- Remove the brake disc bolts 3.
- Remove the brake disc 4.

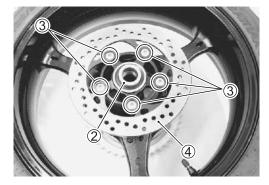


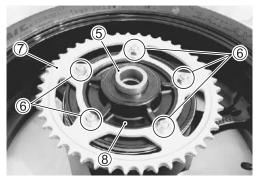
- Loosen the rear sprocket mounting bolts 6 and separate the rear sprocket 7 from its mounting drum 8.
- Draw out the rear sprocket mounting drum ® from the wheel hub.













• Remove the dust seal with the special tool.

09913-50121: Oil seal remover

#### CAUTION

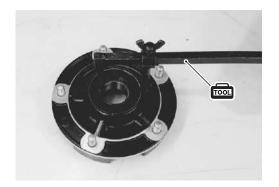
The removed dust seal must be replaced with a new one.

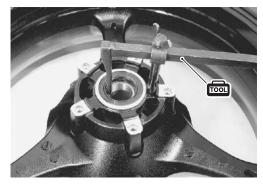
• Remove the dust seal with the special tool.

09913-50121: Oil seal remover

#### CAUTION

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





#### INSPECTION AND DISASSEMBLY

TIRE INSPECTION ( 2-27 and 8-85) WHEEL INSPECTION ( 8-85)

#### **REAR AXLE**

- Using a dial gauge, check the rear axle for runout.
- If the runout exceeds the limit, replace the rear axle.

Axle shaft runout: Service Limit: 0.25 mm (0.010 in)

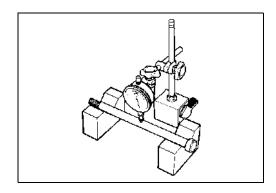
09900-20607: Dial gauge (1/100 mm)

09900-20701: Magnetic stand

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

#### WHEEL DAMPER

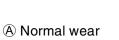
- Inspect the damper for wear and damage.
- Replace the damper if there is anything unusual.



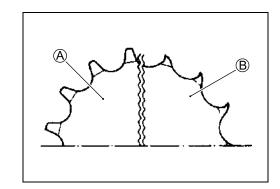


#### **SPROCKET**

- Inspect the sprocket teeth for wear.
- If they are worn as shown, replace the two sprockets and drive chain as a set.

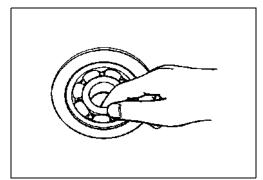


**B** Excessive wear



#### **BEARINGS**

- Inspect the play of the wheel bearing and sprocket mounting drum bearing by hand while they are installed in place. Rotate the inner race by hand to inspect for abnormal noise and smooth rotation.
- Replace the bearing if there is anything unusual.



• Remove the sprocket mounting drum bearing with the special tool.





• Remove the wheel bearings with the special tool.



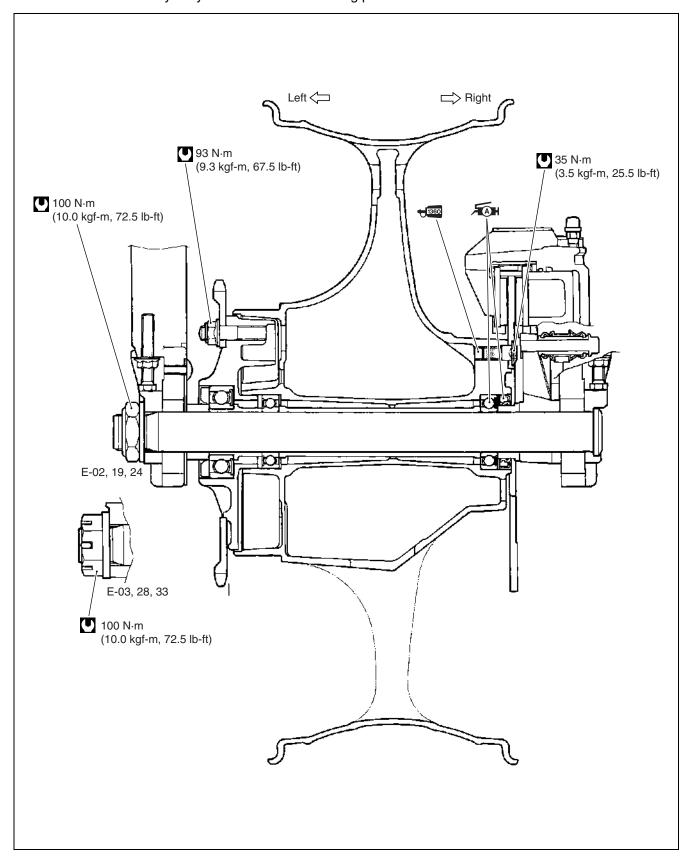
#### **CAUTION**

The removed bearings must be replaced with the new ones.



#### **REASSEMBLY AND INSTALLATION**

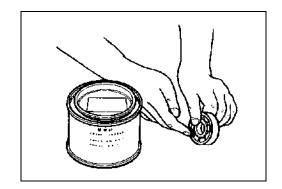
Reassemble and install the rear wheel in the reverse order of removal and disassembly. Pay attention to the following points:



#### **BEARINGS**

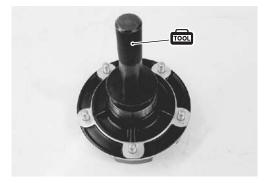
• Apply SUZUKI SUPER GREASE "A" to the bearings before installing.

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



• Install the new bearing to the sprocket mounting drum with the special tool.

09913-70210: Bearing installer set



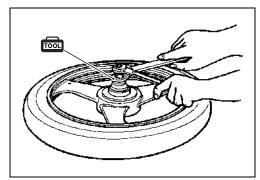
• First install the right wheel bearing, then install the left wheel bearing with the special tools.

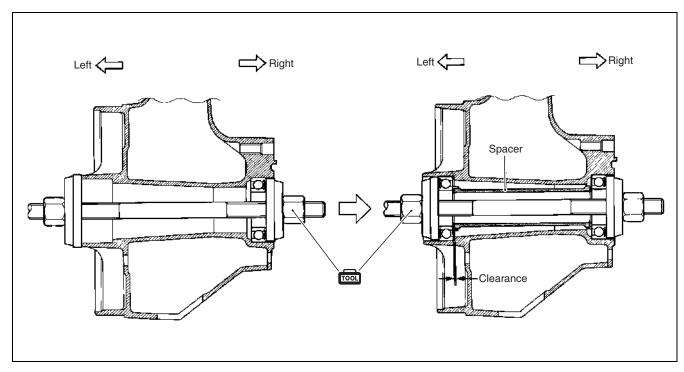


09941-34513: Steering race installer 09924-84510: Bearing installer set

#### CAUTION

The sealed cover of the bearing must face outside.





#### WHEEL DAMPER

 To install the wheel dampers, apply a special tire lubricant or neutral soapy liquid to the damper surface.

#### CAUTION

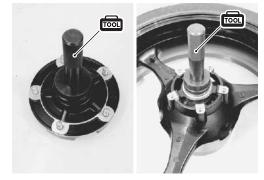
Never use oil, grease or gasoline on the damper in place of the tire lubricant.



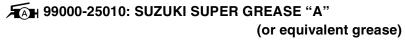
#### **DUST SEALS**

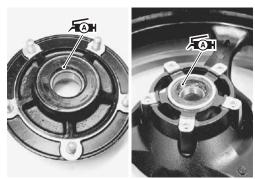
• Install the new dust seal with the special tool.





• Apply SUZUKI SUPER GREASE "A" to the dust seal lip before assembling rear wheel.





#### REAR SPROCKET AND SPROCKET MOUNTING DRUM

- Install the rear sprocket mounting drum spacer ①.
- Install the rear sprocket mounting drum to the rear wheel.

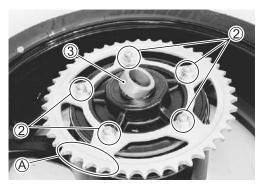


- Tighten the sprocket mounting nuts ② to the specified torque.
- Rear sprocket nut: 93 N·m (9.3 kgf-m, 67.5 lb-ft)

NOTE:

Stamped mark A on the sprocket should face outside.

• Install the collar 3.



#### **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.

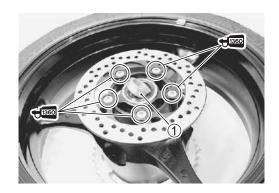
99000-32130: THREAD LOCK SUPER "1360"

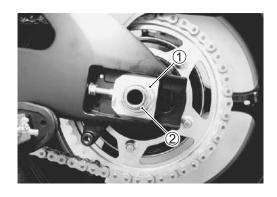
■ Brake disc bolt: 35 N·m (3.5 kgf-m, 25.5 lb-ft)

• Install the collar 1.

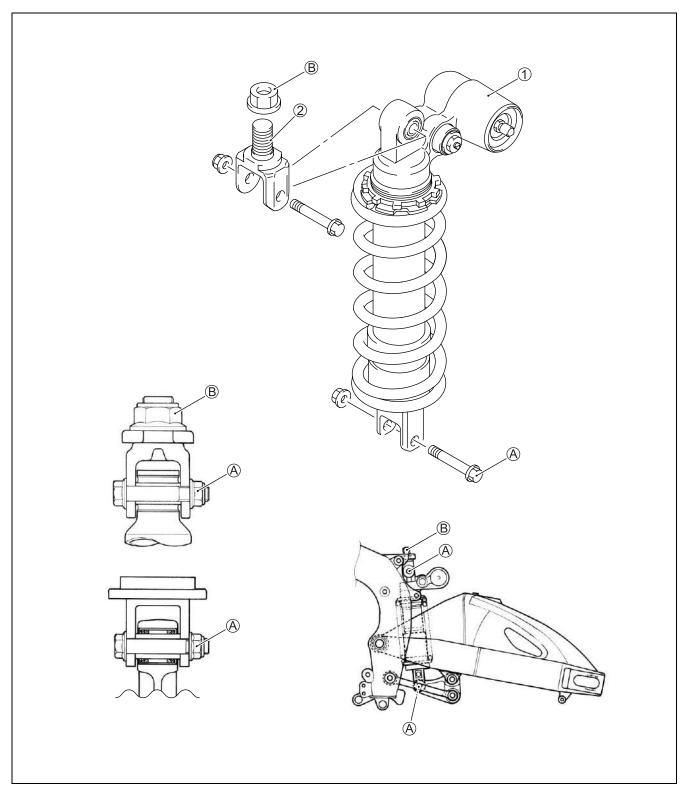
#### **REAR AXLE**

- Remount the rear wheel and rear axle shaft, and install the washer ① (Except for E-03, 28, 33) and rear axle nut ②.
- Adjust the chain slack after rear wheel installation. (2-20)





# REAR SHOCK ABSORBER CONSTRUCTION



1	Rear shock absorber	A	Rear shock absorber mounting bolt/nut
2	Rear shock absorber bracket	®	Rear shock absorber bracket nut

ITEM	N∙m	kgf-m	lb-ft
A	50	5.0	36.0
B	115	11.5	83.0

#### **REMOVAL**

- Remove the front seat. ( 8-5)
- Remove the fuel tank. ( 5-4)
- Disconnect the HO2 sensor lead wire coupler. ( 4-107)
- Remove the under cowling. ( 8-5)
- Remove the exhaust muffler. ( 6-10)
- Loosen the axle nut.
- Support the motorcycle with a jack relieve no load on the rear shock absorber.
- Remove the rear wheel. (\$\sumset\$8-41)
- Remove the rear brake hose clamp ①.
- Remove the rear brake hose guide 2.

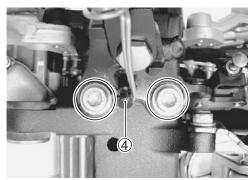




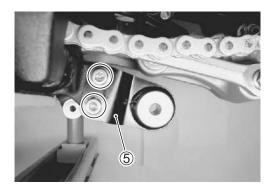
• Remove the side-stand switch 3.



• Remove the side-stand bracket 4.



• Remove the exhaust muffler bracket-left ⑤.



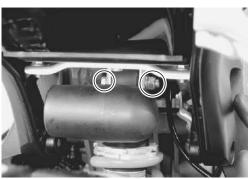
• Remove the brake fluid reservoir mounting bolt.



• Loosen the rear shock absorber bracket.



• Remove the rear shock absorber upper and lower mounting bolts and nuts.





• Remove the rear shock absorber.



#### **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

#### CAUTION

Do not attempt to disassemble the rear shock absorber unit. It is unserviceable.





## REAR SHOCK ABSORBER SCRAPPING PROCEDURE

#### **▲** WARNING

- \* The rear shock absorber 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 scrapping.

#### **REAR SHOCK ABSORBER GAS RELEASE**

• Remove the valve cap 1.



 Press the valve with a screwdriver to bleed out the nitrogen gas.

#### **▲** WARNING

- \* Releasing high pressure gas from the rear shock absorber unit can be hazardous. Never perform any servicing until the nitrogen gas pressure has been released from the rear shock absorber unit.
- \* When releasing the gas pressure, place a rag over the gas valve and use the tip of a screwdriver to press the valve. Do not use your finger to depress the gas valve, and be sure to direct the valve away from your face and body.
- \* Be sure to always wear eye protection when performing this procedure.

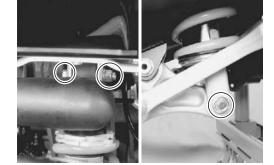


#### INSTALLATION

Remount the rear shock absorber in the reverse order of removal. Pay attention to the following points:

- Install the rear shock absorber and tighten the rear shock absorber upper/lower mounting bolts and nuts.
- Rear shock absorber mounting nut:

50 N·m (5.0 kgf-m, 36.0 lb-ft)



- Tighten the rear shock absorber bracket nut to the specified torque.
- Rear shock absorber bracket nut:

115 N·m (11.5 kgf-m, 83.0 lb-ft)



#### SUSPENSION SETTING

After installing the rear suspension, adjust the spring pre-load and damping force as follows.

#### **SPRING PRE-LOAD ADJUSTMENT**

The set length 176.4 mm (6.94 in) provides the maximum spring pre-load.

The set length 186.4 mm (7.34 in) provides the minimum spring pre-load.

**PAYA** STD length: 181.4 mm (7.14 in)

## DAMPING FORCE ADJUSTMENT Rebound side

Turn the damping force adjuster ① clockwise fully. It is at stiffest position and turn it out to standard setting position.

STD position: 1 1/2 turns out from stiffest position [Fine-tune the adjuster by turning it slightly until two punch marks align.]

#### Low speed Compression side

Turn the damping force adjuster ② clockwise fully. It is at stiffest position and turn it out to standard setting position.

#### STD position: 1 3/4 turns out from stiffest position

[Fine-tune the adjuster by turning it slightly until two punch marks align.]

#### **High speed Compression side**

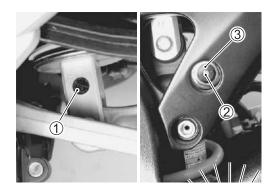
Turn the damping force adjuster ② clockwise fully. It is at stiffest position and turn it out to standard setting position.

STD position: 3 turns out from stiffest position

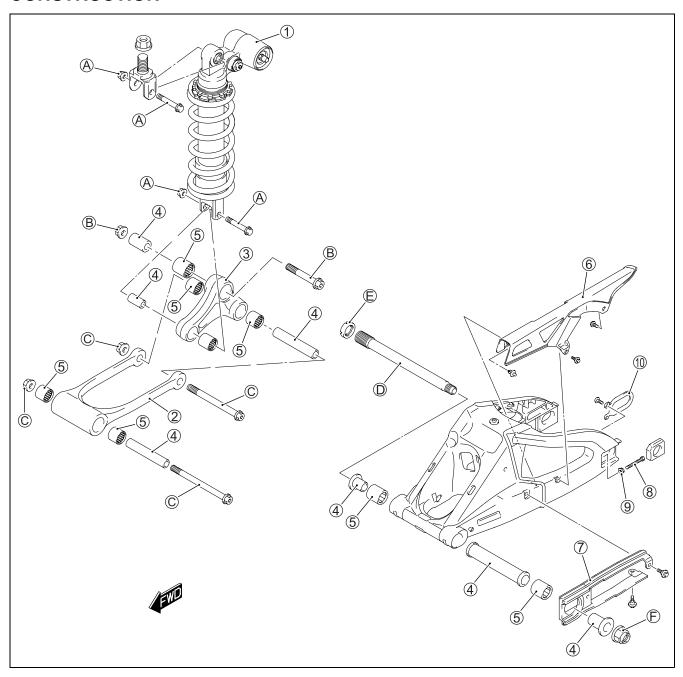
#### **DATA** Standard suspension setting

ľ		REAR							
		Spring set length	Damping force adjuster						
			Rebound	Compression					
	Solo and	1 181 4 mm (7 14 in) 1	1 1/2 turns out from	Low speed side:	High speed side:				
	dual riding		stiffest position	1 3/4 turns out from	3 turns out from stiff-				
	dual fiding		Stillest position	stiffest position	est position				





# REAR SUSPENSION CONSTRUCTION



1	Rear shock absorber	10	Plate
2	Rear cushion rod		Rear shock absorber mounting
3	Rear cushion lever	(A)	bolt/nut
4	Spacer	$^{\odot}$	Rear cushion lever bolt/nut
<b>⑤</b>	Bearing	©	Rear cushion rod bolt/nut
6	Chain cover	<b>D</b>	Swingarm pivot shaft
7	Chain buffer	E	Swingarm pivot lock-nut
8	Chain adjuster	E	Swingarm pivot nut
9	Chain adjuster lock-nut		

ITEM	N∙m	kgf-m	lb-ft
A	50	5.0	36.0
B	98	9.8	71.0
©	78	7.8	56.5
0	15	1.5	11.0
E	90	9.0	65.0
E	100	10.0	72.5

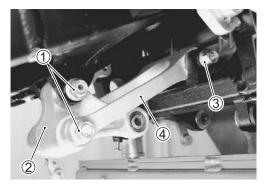
#### REMOVAL

• Cut the drive chain. ( 8-89 and -90)

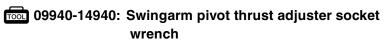
#### NOTE:

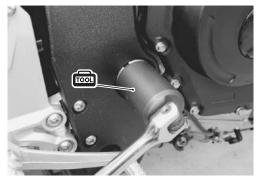
It is not necessary to cut the drive chain, unless replacing drive chain or swingarm.

- Remove the rear shock absorber. ( 8-49 and -50)
- Remove the cushion lever mounting bolt/nut ①.
- Remove the cushion lever 2.
- Remove the cushion rod mounting bolt/nut ③.
- Remove the cushion rod 4).



 Remove the swingarm pivot shaft lock-nut with the special tool.

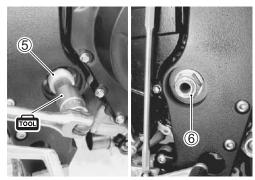




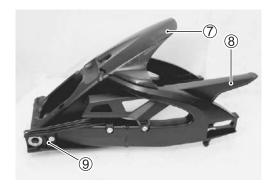
• Hold the swingarm pivot shaft ⑤ and remove the swingarm pivot nut ⑥.

#### 09944-28320: Hexagon socket (19 mm)

- Draw out the swingarm pivot shaft.
- Remove the rear suspension assembly.



- Remove the rear fender (lower) 7.
- Remove the chain case (8) and chain buffer (9).



• Remove the plate 10.



#### **INSPECTION**

#### **SWINGARM PIVOT SHAFT**

• Using a dial gauge, check the pivot shaft runout and replace it if the runout exceeds the limit.

Swingarm pivot shaft runout:

Service limit: 0.3 mm (0.01 in)

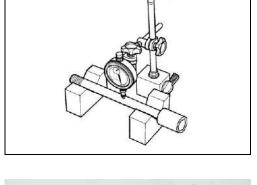
09900-20607: Dial gauge (1/100 mm, 10 mm)

09900-20701: Magnetic stand

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

#### **CHAIN BUFFER**

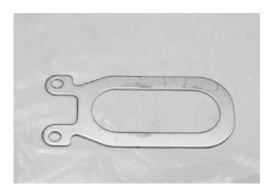
- Inspect the chain buffer for wear and damage.
- If any defects are found, replace the chain buffer with a new one.





#### **PLATE**

- Inspect the plate for damage and excessive bend.
- If any defects are found, replace the plate with a new one.



#### **SWINGARM**

• Inspect the swingarm for damage. If any damages are found, replace the swingarm with a new one.



#### **CUSHION ROD**

- Inspect the cushion rod for damage and distortion.
- If any defects are found, replace the cushion rod with a new one.



#### **CUSHION LEVER**

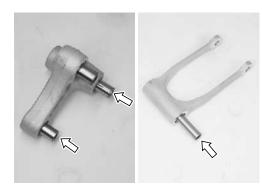
- Inspect the cushion lever for damage.
- If any defects are found, replace the cushion lever with a new one.



#### **SPACER**

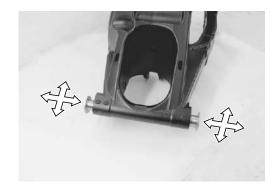
- Remove the spacers from swingarm.
- Remove the spacers from the cushion lever.
- Remove the spacer from cushion rod.
- Inspect the spacers for any flaws or other damage. If any defects are found, replace the spacers with new ones.





#### **SWINGARM BEARING**

- Insert the spacer into bearing and check the play when moving the spacer up and down.
- If excessive play is noted, replace the bearing with a new one.



#### **CUSHION ROD BEARING**

- Insert the spacer into bearing and check the play when moving the spacer up and down.
- If excessive play is noted, replace the bearing with a new one.



#### **CUSHION LEVER BEARING**

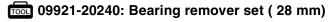
- Insert the spacer into bearing and check the play when moving the spacer up and down.
- If excessive play is noted, replace the bearing with a new one.



#### **DISASSEMBLY**

#### **SWINGARM BEARING**

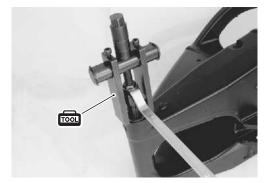
• Draw out the swingarm pivot bearings with the special tool.



#### CAUTION

The removed bearings must be replaced with new ones.

• Remove the center spacer.





#### **CUSHION ROD BEARING**

• Draw out the cushion rod bearings with the special tool.



#### CAUTION

The removed bearings must be replaced with new ones.

# TOOL

#### **CUSHION LEVER BEARING**

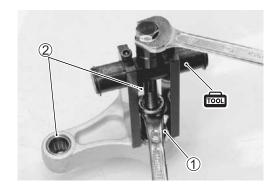
• Draw out the cushion lever bearings with the special tool.



(2 17 mm)

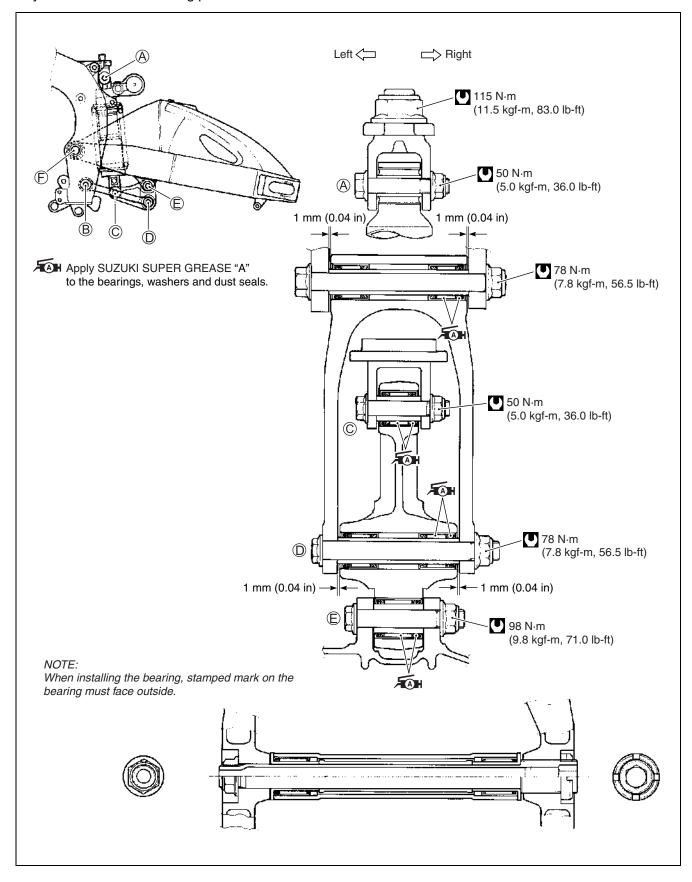
#### CAUTION

The removed bearings must be replaced with new ones.



#### REASSEMBLY AND INSTALLATION

Reassemble and install the swingarm in the reverse order of disassembly and removal. Pay attention to the following points:



#### **SWINGARM BEARING**

- Install the center spacer.
- Press the bearings into the swingarm pivot with the special tool.



#### NOTE:

When installing the bearing, stamped mark on the bearing must face outside.



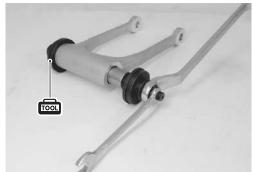
#### **CUSHION ROD BEARING**

• Press the bearings into the cushion rod with the special tool.



#### NOTE:

When installing the bearing, stamped mark on the bearing must face outside.



#### **CUSHION LEVER BEARING**

• Press the bearings into the cushion lever with the special tool.



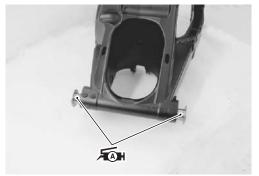
#### NOTE:

When installing the bearing, stamped mark on the bearing must face outside.



• Apply SUZUKI SUPER GREASE "A" to the bearings, spacers.





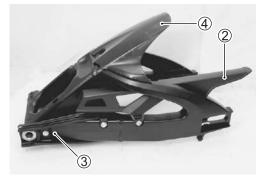




Remount the plate ①.



• Remount the chain cases ② chain buffer ③ and rear fender (lower) ④.



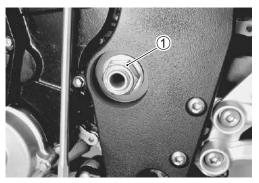
#### SWINGARM PIVOT THRUST CLEARANCE ADJUSTMENT

Adjust swingarm pivot thrust clearance in the following procedure.

- Insert the swingarm pivot shaft and tighten to the specified torque.
- 09944-28320: Hexagon socket (19 mm)
- Swingarm pivot shaft: 15 N⋅m (1.5 kgf-m, 11.0 lb-ft)



- 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, 72.5 lb-ft)



- 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, 65.0 lb-ft)



### SHOCK ABSORBER, CUSHION LEVER AND CUSHION ROD MOUNTING BOLT/NUT

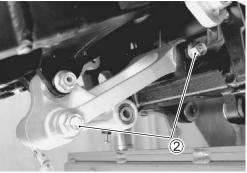
- Install the cushion lever.
- Tighten the cushion lever mounting nut ① to the specified torque.
- Cushion lever mounting nut:

98 N·m (9.8 kgf-m, 71.0 lb-ft)



- Install the cushion rod.
- Tighten the cushion rod mounting nut ② to the specified torque.
- Cushion rod mounting nut:

78 N·m (7.8 kgf-m, 56.5 lb-ft)



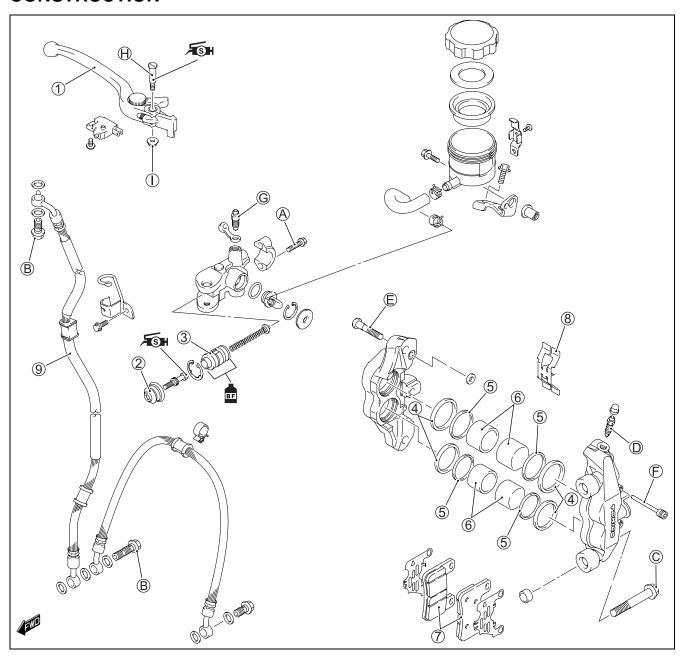
- Install the rear shock absorber. ( 8-52)
- Connect the drive chain. ( 8-90 to -92)

#### FINAL INSPECTION AND ADJUSTMENT

After installing the rear suspension and wheel, the following adjustments are required before driving.

- \* Drive chain (2-20)
- \* Tire pressure ( 2-27)

# FRONT BRAKE CONSTRUCTION



1	Brake lever	A	Master cylinder mounting bolt
2	Dust boot	$^{\circ}$	Brake hose union bolt
3	Piston set	©	Caliper mounting bolt
4	Piston seal	<b>D</b>	Caliper air bleeder valve
<b>⑤</b>	Dust seal	E	Caliper housing bolt
6	Brake caliper piston	Ē	Brake pad mounting pin
7	Brake pad	G	Master cylinder air bleeder valve
8	Brake pad spring	$\oplus$	Brake lever pivot bolt
9	Brake hose	1	Brake lever lock-nut

r 🔳	

ITEM	N∙m	kgf-m	lb-ft
A	10	1.0	7.0
B	23	2.3	16.5
©	35	3.5	25.5
D	7.5	0.75	5.5
E	22	2.2	16.0
Ē	15	1.5	11.0
G	6.0	0.6	4.5
$\Theta$	1.0	0.1	0.7
1	6.0	0.6	4.5

#### **▲** 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**

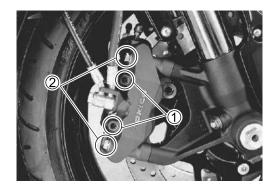
- Loosen the pad mounting pins ①.
- Remove the brake caliper by removing the caliper mounting bolts ②.
- Remove the pad mounting pins ①, brake pads and spring.

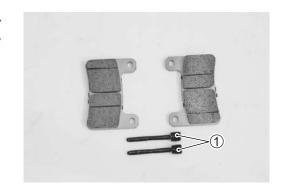
#### CAUTION

- \* 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 piston all the way into the brake caliper.
- Inspect the pad mounting pins for bent or damage. If any defects are found, replace the pad mounting pins with the new ones.





Install the spring to the caliper, bring its wider side of pawl (A) facing top.



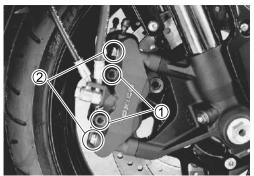
- Install the new brake pads.
- Install the brake caliper.
- Tighten each bolt to the specified torque.

Pad mounting pin ①: 15 N·m (1.5 kgf-m, 11.0 lb-ft)
Front brake caliper mounting bolt ②:

35 N·m (3.5 kgf-m, 25.5 lb-ft)

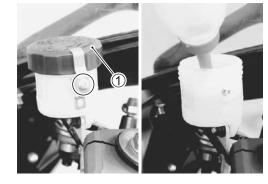
#### NOTE:

After replacing the brake pads, pump the brake lever a few times to check for proper brake operation and then check the brake fluid level.

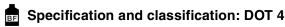


#### BRAKE FLUID REPLACEMENT

- Place the motorcycle on a level surface and keep the handlebars straight.
- Remove the brake fluid reservoir cap ① and diaphragm.
- Drain 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.



#### **CAUTION**

Bleed air from the brake system. (22-23)



#### 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 pads and spring. ( 8-65)

#### 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.
- Separate the caliper halves by removing the caliper housing bolts ② with the special tools.

09930-11920: Torx bit JT40H 09930-11940: Bit holder

• Remove the O-ring 3.

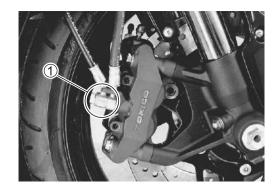
#### CAUTION

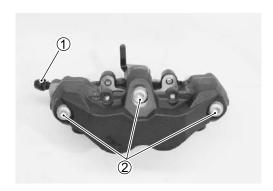
Replace the O-ring with a new one.

• 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.



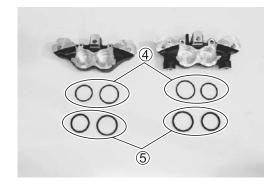






#### **CAUTION**

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:

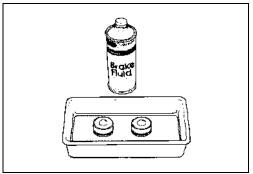
• Clean the caliper bores and pistons with specified brake fluid, especially the dust seal grooves and piston seal grooves.



Specification and classification: DOT 4

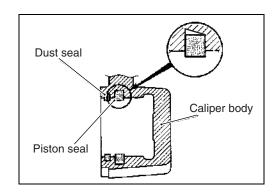
#### **CAUTION**

- \* 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.



#### **O-RING**

Install the new O-ring ① and reassemble caliper halves.

#### CAUTION

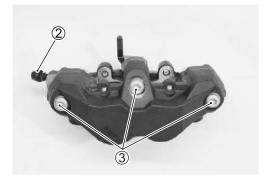
Replace the O-ring with a new one.



- Temporarily tighten the air bleeder valve ②.
- Tighten each bolt to the specified torque.
- Front brake caliper housing bolt 3:

22 N·m (2.2 kgf-m, 16.0 lb-ft)

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 spring and brake pads. ( 8-66)
- Install the brake caliper. ( 8-66)
- Tighten each bolt to the specified torque.
- Front brake hose union bolt:

23 N·m (2.3 kgf-m, 16.5 lb-ft)

#### CAUTION

- \* The seal washers should be replaced with the new ones to prevent fluid leakage.
- \* Bleed air from the system after reassembling the caliper. (2-23)



#### **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.

Front disc thickness: Service Limit: 5.0 mm (0.20 in)

09900-20205: Micrometer (0 – 25 mm)

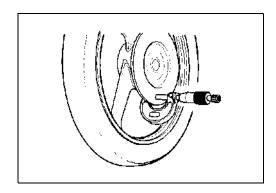
- Remove the brake calipers. ( 8-65)
- Measure the runout with a dial gauge.
- Replace the disc if the runout exceeds the service limit.

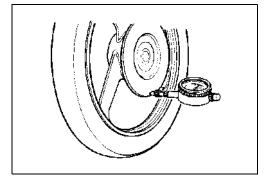
Front disc runout: Service Limit: 0.30 mm (0.012 in)

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

09900-20701: Magnetic stand

\* Brake disc removal (\$\tilde{\top} 8-11)\$
\* Brake disc installation (\$\tilde{\top} 8-14)\$





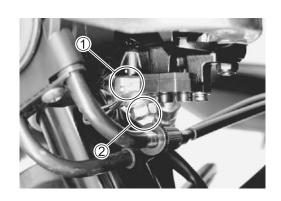
## MASTER CYLINDER REMOVAL AND DISASSEMBLY

- Drain the brake fluid. ( 8-66)
- Disconnect the front brake light switch lead wires ①.
- Place a rag underneath the union bolt ② on the master cylinder to catch any split brake fluid. Remove the union bolt and disconnect the brake hose.

#### CAUTION

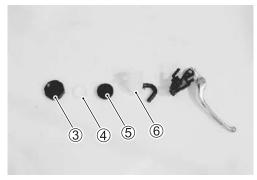
Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The fluid reacts chemically with paint, plastics and rubber materials, etc. and will damage them severely.

 Remove the master cylinder by removing the master cylinder bolts.

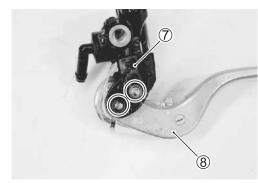




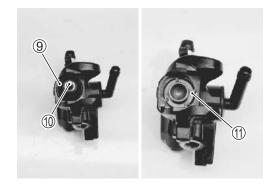
• Remove the reservoir cap ③, insulator ④, diaphragm ⑤ and reservoir tank ⑥.



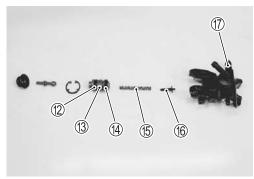
• Remove the brake switch 7 and brake lever 8.



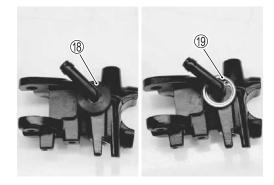
• Remove the dust boot 9 push rod 10 and snap ring 11.



- Remove the following parts.
- 12 Secondary cup
- ③ Piston
- (4) Primary cup
- 15 Return spring
- 16 Return spring guide
- ① Air bleeder valve



• Remove the dust rubber ® and snap ring ®.

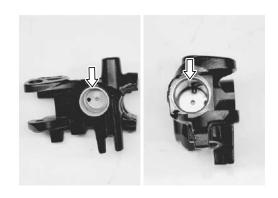


• Remove the connector @ and O-ring @.

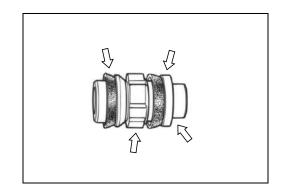


# **MASTER CYLINDER INSPECTION**

• Inspect the master cylinder bore for any scratches or other damage.



- Inspect the piston surface for any scratches or other damage.
- Inspect the primary cup, secondary cup and dust seal for wear or damage.

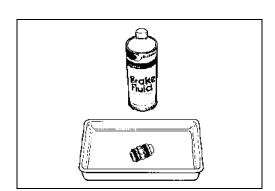


# MASTER CYLINDER REASSEMBLY

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

Install the O-ring to the brake hose connector.

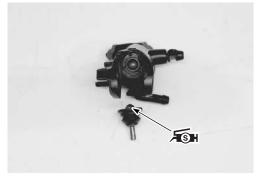
#### CAUTION

Use a new O-ring to prevent the fluid leakage.



Apply SUZUKI SILICONE GREASE to the push rod.

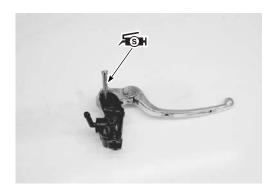
FSH 99500-25100: SUZUKI SILICONE GREASE

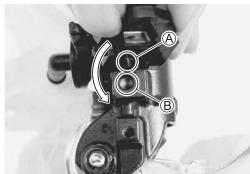


 Apply SUZUKI SILICONE GREASE to the brake lever pivot bolt.

**1** 99000-25100: SUZUKI SILICONE GREASE

Brake lever pivot bolt: 1 N·m (0.1 kgf-m, 0.7 lb-ft)
Brake lever lock-nut: 6 N·m (0.6 kgf-m, 4.5 lb-ft)





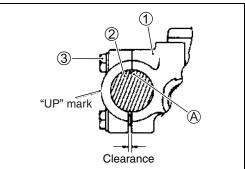
# MASTER CYLINDER INSTALLATION

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

• When installing the brake master cylinder ① onto the handle-bars ②, align the master cylinder holder's mating surface with punched mark ④ on the handlebars and tighten the upper clamp bolt ③ first as shown.

Front brake master cylinder mounting bolt:
10 N·m (1.0 kgf-m, 7.0 lb-ft)





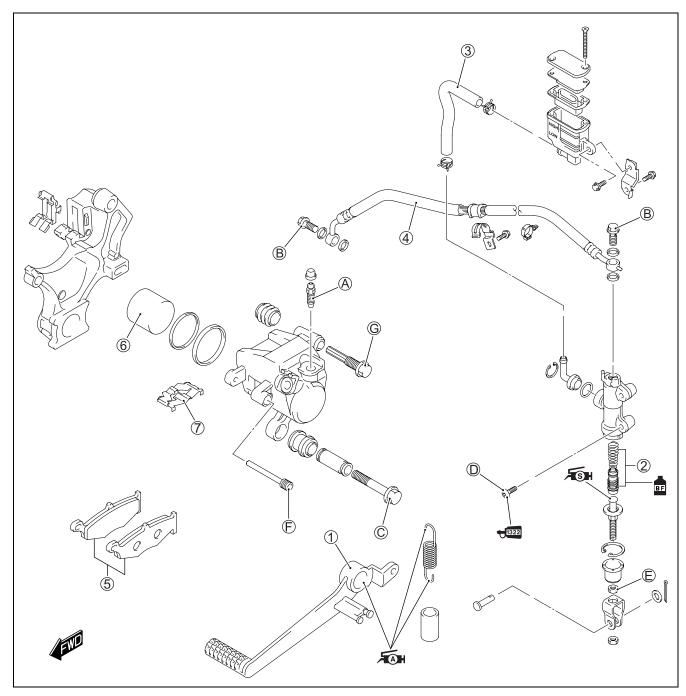
- Tighten the union bolt. (Brake hose routing: 10-24)
- Brake hose union bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

# **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. (2-23)



# REAR BRAKE CONSTRUCTION



1	Brake pedal	A	Caliper air bleeder valve
2	Piston/Cup set	$^{\textcircled{B}}$	Brake hose union bolt
3	Reservoir hose	0	Brake caliper mounting bolt
4	Brake hose	<b>D</b>	Brake master cylinder mounting bolt
<b>⑤</b>	Brake pad	E	Brake master cylinder rod lock-nut
6	Piston	(Ē)	Brake pad mounting pin
7	Brake pad spring	G	Brake caliper pin bolt

ITEM	N∙m	kgf-m	lb-ft
A	7.5	0.75	5.5
B	23	2.3	16.5
©	17	1.7	12.5
<b>D</b>	10	1.0	7.0
E	18	1.8	13.0
E	15	1.5	11.0
G	32	3.2	23.0

# **▲** WARNING

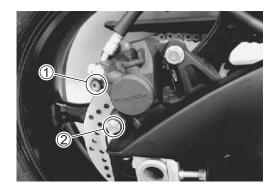
- \* This brake system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use mix different types of fluid such as silicone-based or petroleum-based.
- \* Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or 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**

- Remove the pad mounting pin 1.
- Remove the caliper mounting bolt 2.



- Remove the brake pads with the rear caliper pivoted up.
- Clean up the caliper especially around the caliper piston.

#### CAUTION

- \* Do not operate the brake pedal with the pads removed.
- \* Replace the brake pads as a set, otherwise braking performance will be adversely affected.
- Install the new brake pads.
- Pad mounting pin: 15 N·m (1.5 kgf-m, 11.0 lb-ft)
  Brake caliper mounting bolt: 17 N·m (1.7 kgf-m, 12.5 lb-ft)

#### NOTE:

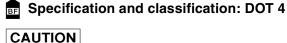
After replacing the brake pads, pump the brake pedal a few times to set the brake parts correctly and then check the brake fluid level.



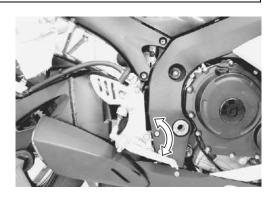


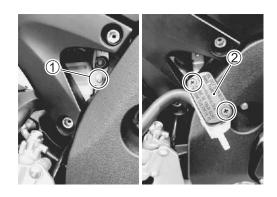
#### BRAKE FLUID REPLACEMENT

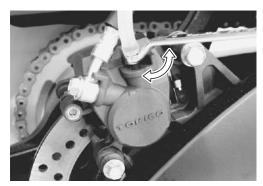
- Remove the brake fluid reservoir mounting bolt 1.
- Place a rag underneath the brake fluid reservoir to catch any split brake fluid. Remove the brake fluid reservoir cap ②.
- Replace the brake fluid in the same manner as the front brake. ( \$\frac{1}{2}8-66\$)



Bleed air from the brake system. (2-23)







# **CALIPER REMOVAL AND DISASSEMBLY**

- Drain the brake fluid.
- 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.

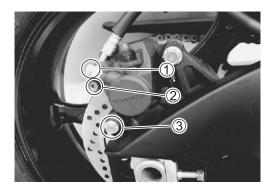
- Remove the pad mounting pin ②.
- Remove the caliper mounting bolt 3.
- Remove the brake caliper.

#### CAUTION

Never reuse the brake fluid left over from previous servicing and stored for long periods.

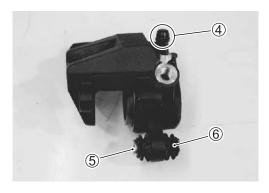
# **▲** WARNING

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.
- Remove the caliper air bleeder valve 4.
- Remove the spacer ⑤ and rubber boot ⑥ from the caliper.







• Place a rag over the piston to prevent it from popping out and then force out the pistons using compressed air.

# CAUTION

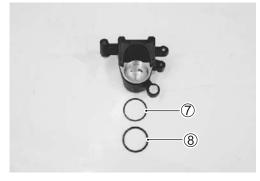
Avoid using high pressure air to prevent piston damage.



• Remove the dust seal 7 and piston seal 8.

# CAUTION

Avoid reusing the dust seals and piston seals to prevent fluid leakage.



# **CALIPER INSPECTION**

#### **BRAKE CALIPER AND BRAKE CALIPER PISTON**

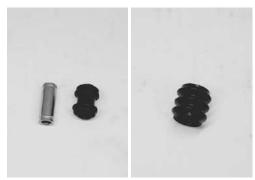
- Inspect the brake caliper cylinder wall for nicks, scratches and other damage. If any damage is found, replace the caliper with a new one.
- Inspect the brake caliper piston surface for any scratches and other damage. If any damage is found, replace the caliper with a new one.



#### **BRAKE PAD SPRING BOOTS AND SPACER**

- Inspect the brake pad spring for damage and excessive bend.
   If any damage is found, replace the brake pad spring with a new one.
- Inspect the boot and spacer for damage and wear. If any damage is found, replace boot and spacer with new ones.





#### **BRAKE DISC INSPECTION**

• Inspect the rear brake disc in the same manner as the front brake disc. ( 8-70)

#### Service Limit

Rear disc thickness: 4.5 mm (0.18 in) Rear disc runout: 0.30 mm (0.012 in)

#### CALIPER REASSEMBLY

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

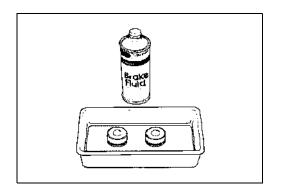
 Clean the caliper bores and pistons with specified brake fluid, especially the dust seal grooves and piston seal grooves.



Specification and classification: DOT 4

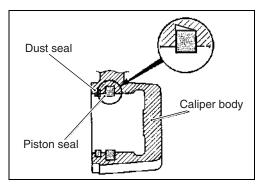
#### **CAUTION**

- \* 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 others.
- \* 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.



#### **SLIDING PIN**

- Install the rubber boot ①.
- Apply SUZUKI SILICONE GREASE to the inside of the boot.

# **√S** 99000-25100: SUZUKI SILICONE GREASE

• Install the spacer 2.



- Install the caliper air bleeder valve.
- Install the brake pad spring.

#### CALIPER INSTALLATION

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

• Tighten each bolt to the specified torque.

Brake hose union bolt ①: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Brake caliper mounting bolt ②:

17 N·m (1.7 kgf-m, 12.5 lb-ft)

Brake caliper pin bolt ③: 32 N·m (3.2 kgf-m, 23.0 lb-ft)

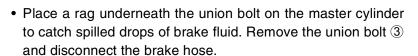
• Adjust the chain slack. ( 2-20)

#### CAUTION

Bleed air from the system after reassembling the caliper. ( $\bigcirc$  2-23)

# MASTER CYLINDER REMOVAL AND DISASSEMBLY

- Remove the brake fluid reservoir mounting bolt ①.
- Place a rag underneath the brake fluid reservoir to catch any split brake fluid. Remove the brake fluid reservoir cap ②.
- · Drain the brake fluid.

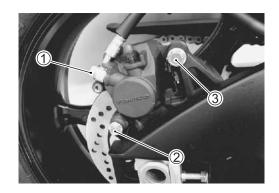


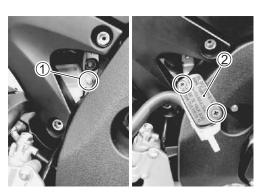
- Loosen the lock-nut 4.
- Remove the mounting bolts 5.

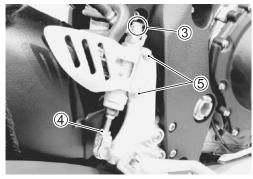
#### CAUTION

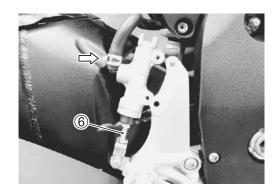
Immediately and completely wipe off any brake fluid contacting any parts of the motorcycle. The fluid reacts chemically with paint, plastic and rubber materials, etc. and will damage them severely.

- Disconnect the reservoir hose.
- Remove the master cylinder by turning the master cylinder rod ⑥.

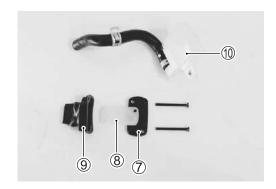






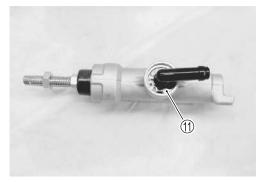


• Remove the reservoir cap ⑦, insulator ⑧, diaphragm ⑨ and reservoir tank ⑩.



• Remove the snap ring (1) with the special tool.

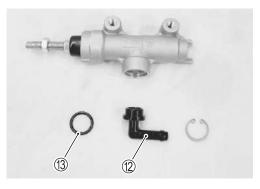
09900-06108: Snap ring pliers



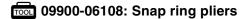
- Remove the connector 12.
- Remove the O-ring <sup>(3)</sup>.

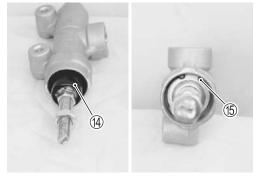
# CAUTION

Replace the O-ring with a new one.

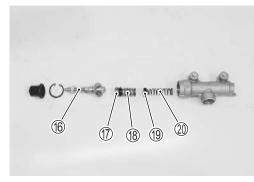


• Pull out the dust boot (4), then remove the snap ring (5).





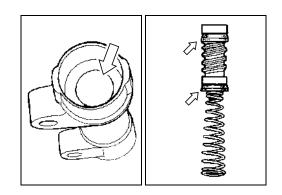
- Remove the following parts.
- 16 Push rod
- Secondary cup
- ® Piston
- 19 Primary cup
- 20 Return spring



# 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

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

#### CAUTION

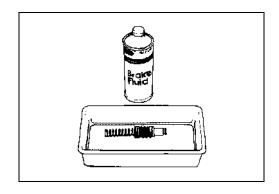
- \* Clean the master cylinder components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to clean them.
- \* Do not wipe the components with a rag.
- \* Apply brake fluid to the cylinder bore and all the component to be inserted into the bore.

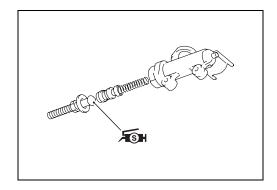


Specification and classification: DOT 4

• Apply SUZUKI SILICONE GREASE to the push rod end.

**√SH** 99000-25100: SUZUKI SILICONE GREASE





# MASTER CYLINDER INSTALLATION

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

Apply THREAD LOCK to the master cylinder mounting bolts.

99000-32110: THREAD LOCK SUPER "1322"

(or equivalent thread lock)

Tighten each bolt to the specified torque.
 (Brake hose routing: 10-25)

■ Brake hose union bolt ①: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

Master cylinder mounting bolt ②:

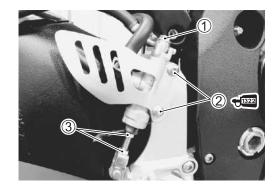
10 N·m (1.0 kgf-m, 7.0 lb-ft)

Master cylinder rod lock-nut 3:

18 N·m (1.8 kgf-m, 13.0 lb-ft)

# **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. (2-23)
- Adjust the brake pedal height. ( 2-25)



# TIRE AND WHEEL TIRE REMOVAL

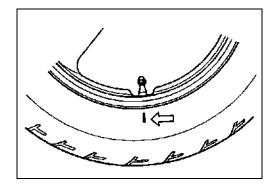
The most critical factor of tubeless tire is the seal between the wheel rim and the tire bead. For this reason, it is recommended to use a tire changer that can satisfy this sealing requirement and can make the operation efficient as well as functional.

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

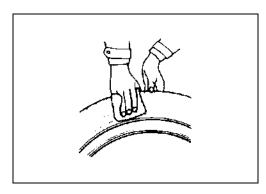
Wipe the wheel clean and check for the following:

- Distortion and crack
- Any flaws and scratches at the bead seating area.
- Wheel rim runout (28-12)

#### **TIRE**

Tire must be checked for the following points:

- Nick and rupture on side wall
- Tire tread depth ( 2-27)
- Tread separation
- Abnormal, uneven wear on tread
- Surface damage on bead
- Localized tread wear due to skidding (Flat spot)
- Abnormal condition of inner liner



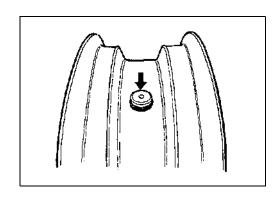
# **VALVE INSPECTION**

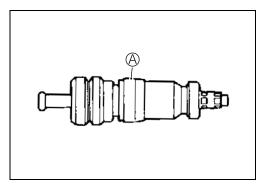
- Inspect the valve after the tire is removed from the rim.
- Replace the valve with a new one if the seal (A) rubber is peeling or has damage.

#### 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.





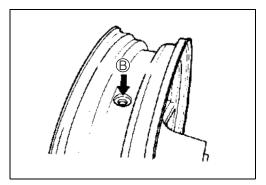
- Any dust or rust around the valve hole ® must be cleaned off.
- Then install the valve © in the rim.

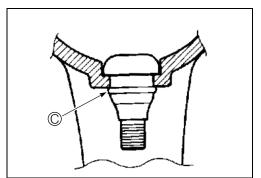
#### NOTE:

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  $\mathbb C$  of valve.



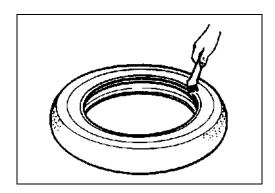


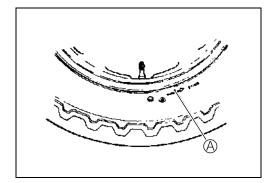
#### TIRE INSTALLATION

- · 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, 57 psi). If inflated beyond this limit, the tire can burst and possibly cause injury. Do not stand directly over the tire while inflating.
- \* In the case of preset pressure air inflator, pay special care for the set pressure adjustment.

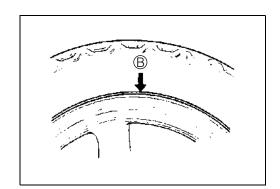
- In this condition, check the "rim line" ® cast on the tire side walls. The line must be equidistant from the wheel rim all around. If the distance between the rim line and wheel rim varies, this indicates that the bead is not properly seated. If this is the case, deflate the tire completely and unseat the bead for both sides. Coat the bead with lubricant and fit the tire again.
- When the bead has been fitted properly, adjust the pressure to specification.
- As necessary, adjust the tire balance.

### **CAUTION**

Do not run with a repaired tire at a high speed.

# Cold inflation tire pressure

	Front	Rear
Solo riding	250 kPa	290 kPa
Solo riding	(2.50 kgf/cm <sup>2</sup> , 36 psi)	(2.90 kgf/cm², 42 psi)
Dual riding	250 kPa	290 kPa
Dual riding	(2.50 kgf/cm², 36 psi)	(2.90 kgf/cm², 42 psi)

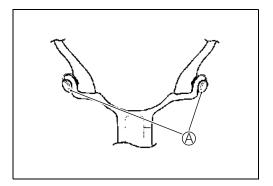


# BALANCER WEIGHT INSTALLATION

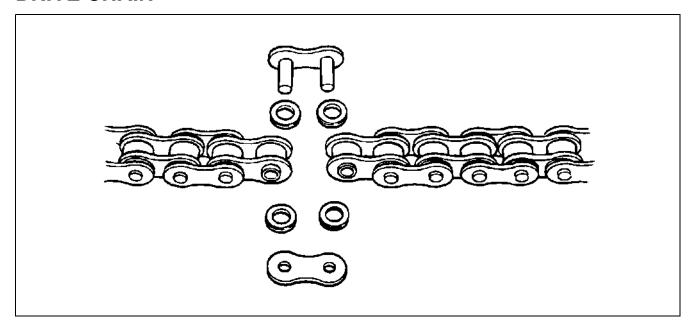
• When installing the balancer weights to the wheel, set the two balancer weights (A) on both sides of wheel rim.

#### **CAUTION**

Weight difference between the two balancer weights must be less than 10 g (0.02 lb).



# **DRIVE CHAIN**

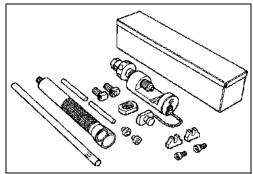


Use the special tool in the following procedures, to cut and rejoin the drive chain.

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.

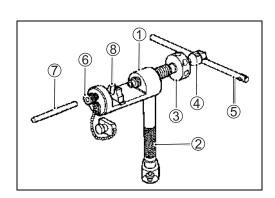


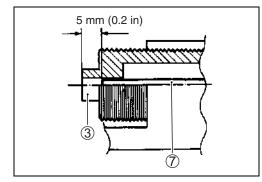
# **DRIVE CHAIN CUTTING**

- 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

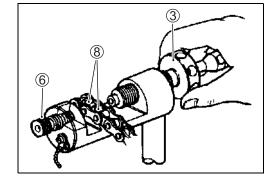
#### NOTE:

The tip of pin remover  $\centcolor{T}$  should be positioned inside approximately 5 mm (0.2 in) 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.

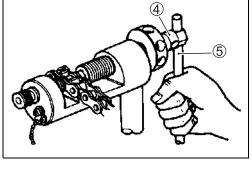
#### NOTE:

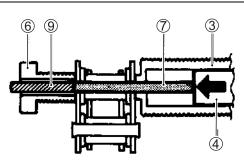
After the joint pin 9 is removed, loosen the pressure bolt "B" 4 and then pressure bolt "A" 3.

• 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

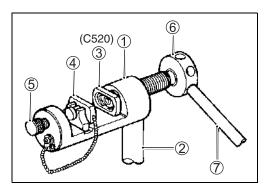
- (without hole)
- 3 Joint plate holder
- 6 Pressure bolt "A"
- (engraved mark "C520")
- (7) Bar
- 4 Wedge holder & wedge pin
- Connect both ends of the drive chain with the joint pin ® inserted from the wheel side A as installed on the motorcycle.
  - 9 O-ring ... 4 pcs.
  - 10 Joint plate

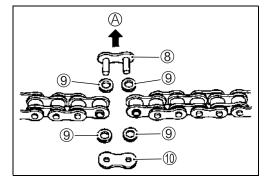
Joint set part number

RK: 27620-33E40



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.



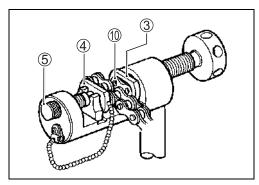


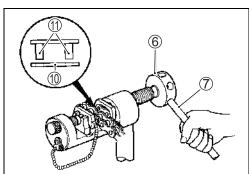
Apply grease on the recessed portion of the joint plate holder
 and set the joint plate ①.

#### 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.

#### Joint plate distance specification W

RK 18.6	– 18.9 mm (0.732 – 0.744 in)
---------	------------------------------

#### CAUTION

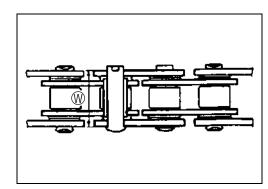
Should pressing of the joint plate be made excessively beyond the specified dimension, the work should be redone using the new joint parts.

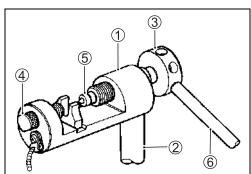
#### **JOINT PIN STAKING**

- 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.





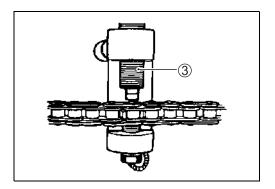
• Stake the joint pin by turning (approximately 7/8 turn) the pressure bolt "A" ③ with the bar until the pin end diameter becomes the specified dimension.

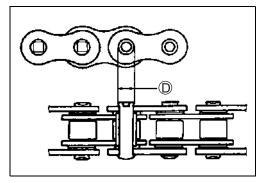
# Pin end diameter specification D

RK 5.45 – 5.85 mm (0.215 – 0.230 in)	
--------------------------------------	--

# **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. ( 2-20)





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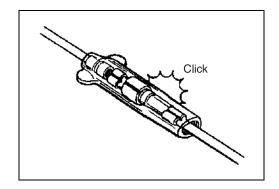
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# **CAUTIONS IN SERVICING**

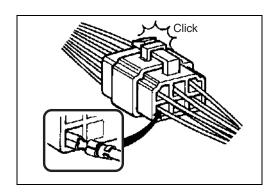
# CONNECTOR

- When connecting a connector, be sure to push it in until a click is felt.
- · Inspect the connector for corrosion, contamination and breakage in its cover.



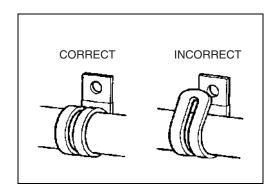
#### COUPLER

- With a lock type coupler, be sure to release the lock when disconnecting, and push 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.



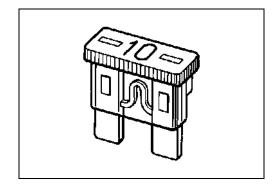
#### CLAMP

- Clamp the wire harness at such positions as indicated in "WIRING HARNESS ROUTING". ( 10-17 to -20)
- 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.



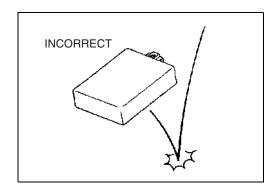
#### **FUSE**

- 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**

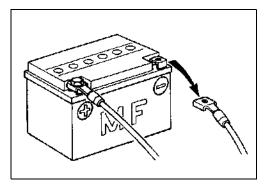
- The MF battery used in this motorcycle does not require maintenance (e.g., electrolyte level inspection, distilled water replenishment).
- During normal charging, no hydrogen gas is produced. However, if the battery is overcharged, hydrogen gas may be produced. Therefore, be sure there are no fire 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.

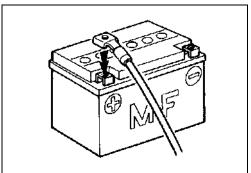
#### CONNECTING THE BATTERY

- When disconnecting terminals from the battery for disassembly or servicing, be sure to disconnect the 

   battery lead wire, first.
- If the terminal is corroded, remove the battery, pour warm water over it and clean it with a wire brush.
- After connecting the battery, apply a light coat of grease to the battery terminals.
- Install the cover over the 

   battery terminal.





#### WIRING PROCEDURE

 Properly route the wire harness according to the "WIRING HARENESS ROUTING" section. ( 10-17 to -20)

# **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.



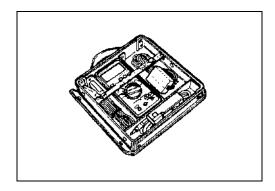
#### CAUTION

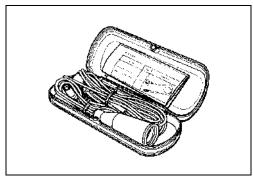
Before using the multi-circuit tester, read its instruction manual.

#### NOTE:

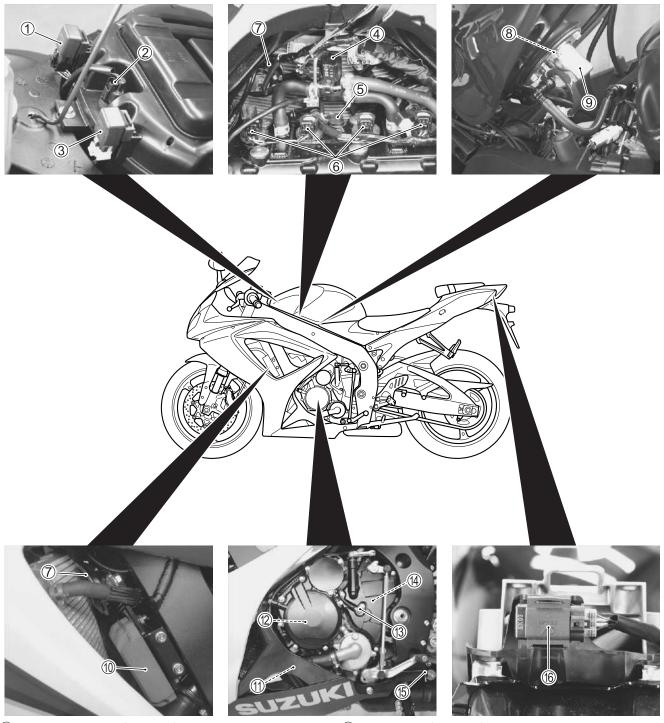
- \* When connecting the multi-circuit tester, use the needle pointed probe to the back side of the lead wire coupler and connect the probes of tester to them.
- \* Use the needle pointed probe to prevent the rubber of the water proof coupler from damage.





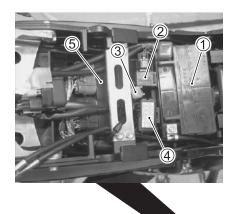


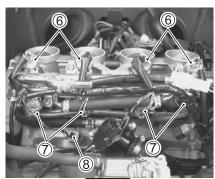
# **LOCATION OF ELECTRICAL COMPONENTS**

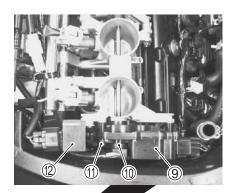


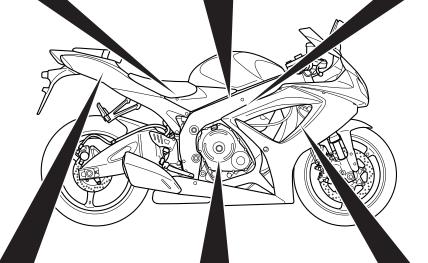
- 1 Fuel pump relay (5-7)
- ② IAT sensor ( 34-53)
- ③ Cooling fan relay (デ7-7)
- 4 PAIR control solenoid valve (11-7)
- ⑤ CMP sensor ( 33)
- 6 Ignition coil (No.1, 2, 3, 4)
- 7 Horn
- ® Fuel level gauge

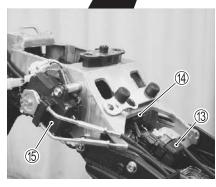
- 9 Fuel pump (5-5-8)
- 10 Regulator/Rectifier
- 11 Oil pressure switch
- 12 Generator
- Speed sensor
- (4) GP switch
- 15 Side-stand switch
- ⑥ TO sensor (☐ 4-63)

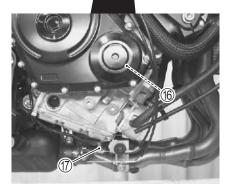










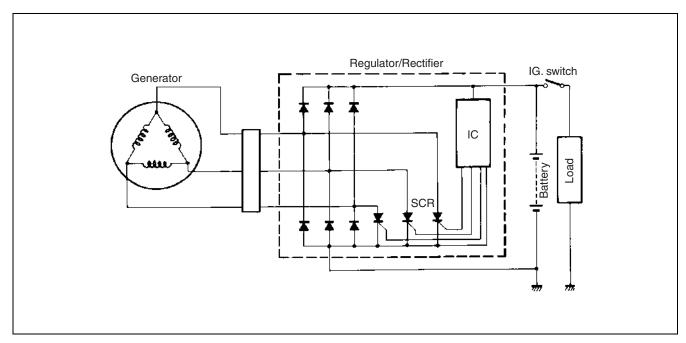




- 1 Battery
- ② AP sensor ( 34-57)
- 3 Mode selection switch coupler ( 4-18)
- 4 Fuse Box
- **5** ECM (Engine Control Module)
- 6 Secondary fuel injector ( 4-80)
- 7 Primary fuel injector ( 4-77)
- 8 ECT sensor (☐ 4-49)
- 9 STV actuator (\$\infty 4-67)\$

- ① STP sensor ( 34-70)
- ① TP sensor ( 4-44)
- 12 IAP sensor ( 34-38)
- (3) Starter relay/Main fuse
- 14 Turn signal/Side-stand relay
- ⓑ EXCVA (◯ 6-4)
- 16 CKP sensor ( 34-35)
- ① HO2 sensor (E-02, 19) ( 4-87)
- (18) Cooling fan (☐ 7-6)

# **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. (\$\subseteq 9-9\$) Is the battery for current leaks OK?

YES	Go to Step 3.
NO	Short circuit of wire harness
INO	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
INO	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

Inspect wirings.Is the wirings OK?

YES	Faulty battery
NO	Short circuit of wire harness
INO	Poor contact of couplers

#### **Battery overcharges**

- Faulty regulator/rectifier
- Faulty battery
- · Poor contact of generator lead wire coupler

### **INSPECTION**

#### **BATTERY CURRENT LEAKAGE**

- Remove the front seat. ( 8-7)
- Turn the ignition switch to the OFF position.
- Disconnect the battery  $\bigcirc$  lead wire.
- Measure the current between 

   battery terminal and the 
   battery lead wire using the multi-circuit tester. If the reading exceeds the specified value, leakage is evident.

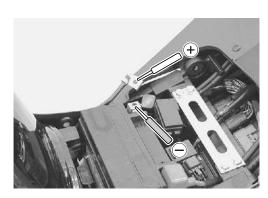


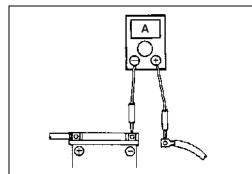
Battery current (leak): Under 3 mA

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 front seat. ( 8-7)
- 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:

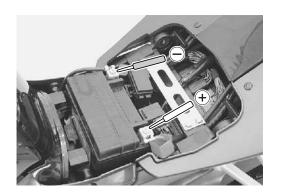
When making this test, be sure that the battery is in fully-charged condition.

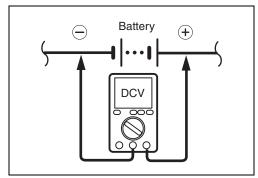
09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (==)

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.
- 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

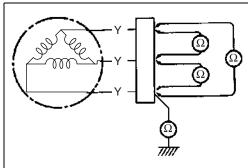
Tester knob indication: Resistance ( $\Omega$ )

Generator coil resistance: 0.2 – 1.0  $\Omega$  (Yellow – Yellow)  $\propto \Omega$  (Yellow – 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.
- 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 (~)

Generator no-load performance:

65 V and more at 5 000 r/min (When engine is cold)

#### REGULATOR/RECTIFIER

- Lift and support the fuel tank. (5-3)
- Remove the air cleaner box. ( 5-14)
- Disconnect the regulator/rectifier couplers.
- Measure the voltage between the lead wires 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.



Tester knob indication: Diode test (┪)

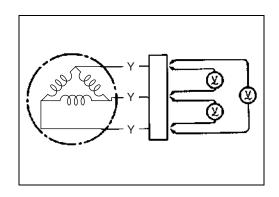
Unit: V

	Probe of tester to:							
		B/R <sub>1</sub>	B/R <sub>2</sub>	B1	B2 B3		B/W <sub>1</sub>	B/W <sub>2</sub>
r to	B/R <sub>1</sub>		0	0.4 - 0.7	0.4 - 0.7	0.4 - 0.7	0.5 – 1.2	0.5 – 1.2
ster	B/R <sub>2</sub>	0		0.4 - 0.7	0.4 - 0.7	0.4 - 0.7	0.5 – 1.2	0.5 – 1.2
of te	B1	*	*		*	*	0.4 - 0.7	0.4 - 0.7
	B2	*	*	*		*	0.4 - 0.7	0.4 - 0.7
Probe	Вз	*	*	*	*		0.4 - 0.7	0.4 - 0.7
(I)	B/W <sub>1</sub>	*	*	*	*	*		0
	B/W <sub>2</sub>	*	*	*	*	*	0	

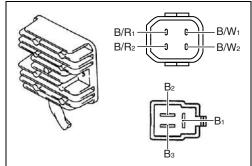
\*1.4 V and more (tester's battery voltage)

#### NOTE:

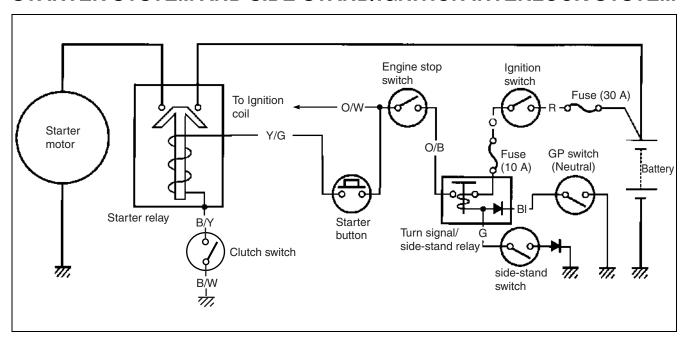
If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.







# 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	Faulty starter relay     Loose or disconnected starter motor lead wire
	• Loose or disconnected between starter relay and battery ① terminal
NO	Faulty starter motor

#### Step 3

1) Measure the starter relay voltage at the starter relay connectors (between Y/G ⊕ and B/Y ⊖) when the starter button is pushed.

Is a voltage OK?

YES	Go to Step 4.
	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

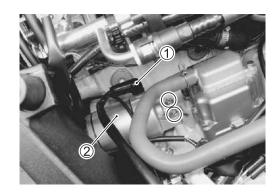
#### Step 2

1) Check the starter clutch. Is the starter clutch OK?

YES	<ul><li>Open circuit in wire harness</li><li>Poor contact of connector</li></ul>
NO	Faulty starter clutch

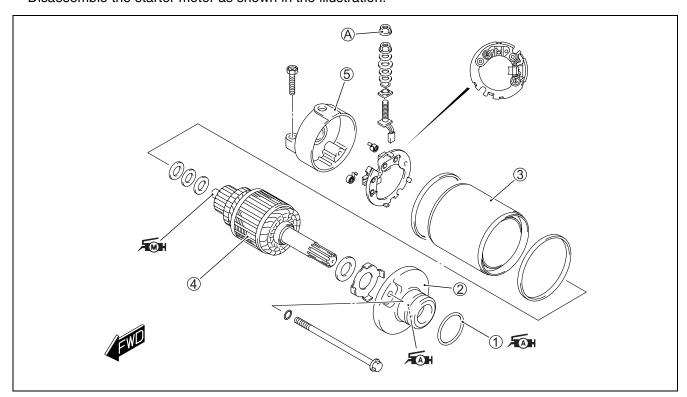
# STARTER MOTOR REMOVAL

- Remove the front seat.( 8-7)
- Lift and support the fuel tank.( 5-3)
- 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

<u>(U</u>					
	ITEM	N∙m	kgf-m	lb-ft	
	A	6	0.6	4.5	

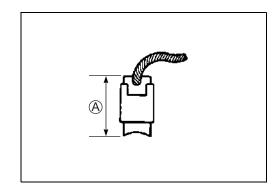
#### STARTER MOTOR INSPECTION

#### **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 (A) is not less than 6.5 mm (0.26 in), If this length becomes less than 6.5 mm (0.26 in), replace the brush.



# **DATA** Starter motor brush length Service Limit: 6.5 mm (0.26 in)

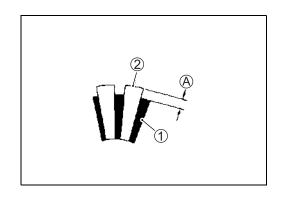
### **COMMUTATOR**

Inspect the commutator for discoloration, abnormal wear or undercut (A).

If abnormal wear is found, replace the armature with a new one. If the commutator surface is discolored, polish it with #400 sand paper and wipe it 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

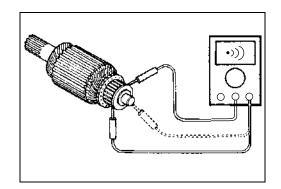
Check for continuity between each segment and between each segment and the armature shaft using the multi-circuit tester. If there is no continuity between the segments or there is continuity between the segments and shaft, replace the armature with a new one.

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.

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



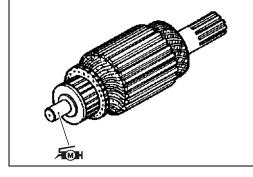
Apply a small quantity of SUZUKI MOLY PASTE to the armature shaft.

# **1** 99000-25140: SUZUKI MOLY PASTE

- Fit the projection of the starter motor case to the depression of the housing end.
- Apply SUZUKI SUPER GREASE to the O-ring.









 Tighten the starter motor lead wire mounting bolt to the specified torque.

Lead wire mounting bolt: 6 N·m (0.6 kgf-m, 4.5 lb-ft)



# STARTER RELAY INSPECTION

- Remove the front seat. ( 8-7)
- Disconnect the battery 

   — lead wire from the battery.
- Remove the frame cover. ( 8-8)
- Remove the starter relay cover 1.
- Disconnect the starter motor lead wire ②, battery lead wire ③ and starter relay coupler ④.
- Remove the starter relay 5.

09900-25008: Multi-circuit tester set

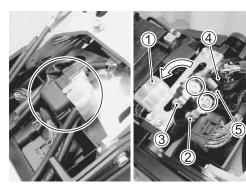
Tester knob indication: Continuity test (•)))

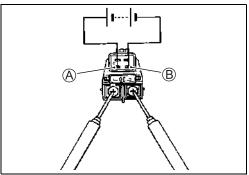
### **CAUTION**

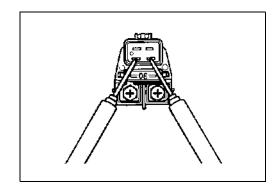
Do not apply battery voltage to the starter relay for more than five seconds, since the relay coil may overheat and get damaged.

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 Starter relay resistance: 3 – 6  $\Omega$ 







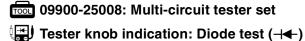
# SIDE STAND/IGNITION INTERLOCK SYSTEM PARTS INSPECTION

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 above the crankcase.

- · Remove the front seat.
- Disconnect the battery  $\bigcirc$  lead wire from the battery.
- Lift and support the fuel tank. (5-3)
- Disconnect the side-stand switch coupler and measure the voltage between Green and Black/White lead wires.



	Green (+) Probe)	Black/White (  Probe)
ON (Side-stand up)	0.4 – 0.6 V	
OFF	1.4 V and more	
(Cide stand down)	(Tootor's bot	tory voltogo

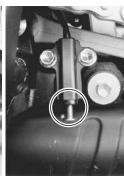
# (Side-stand down) (Tester's battery voltage)

# NOTE:

If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.







#### **GEAR POSITION SWITCH**

- · Remove the front seat.
- Disconnect the battery 

   — lead wire from the battery.
- Lift and support the fuel tank. ( 5-3)
- Disconnect the gear position switch coupler and check the continuity between Blue and Black/White with the transmission in "NEUTRAL".

09900-25008: Multi-circuit tester set

Tester knob indication: Continuity test (•)))

	Blue	Black/White
ON (Neutral)	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.
- Connect the battery  $\bigcirc$  lead wire from the battery.
- Turn the ignition switch to "ON" position and side-stand to upright position.
- Measure the voltage between Pink and Black/White lead wires using the multi-circuit tester with needle pointed probe set, 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 (---)

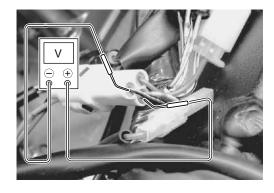
Gear position switch voltage: 0.6 V and more

\* Low to top gear position (Pink 🕀 – B/W 🖯)

\* Except neutral position (Pink ⊕ – B/W ⊝)

# **CAUTION**

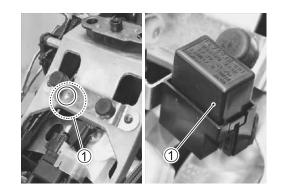
Use the special tool, to prevent the rubber of the water proof coupler from damage.



#### **TURN SIGNAL/SIDE-STAND RELAY**

The turn signal/side-stand relay is composed of the turn signal relay, side-stand relay and diode.

- Remove the front seat.( 8-7)
- Disconnect the battery  $\bigcirc$  lead wire from the battery.
- Remove the frame cover. (\$\times 8-8\$)
- Remove the turn signal/side-stand relay 1.

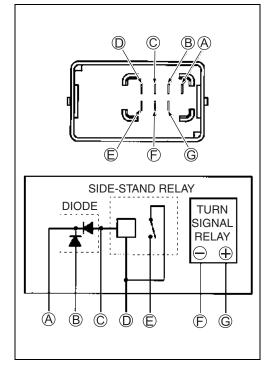


#### SIDE-STAND RELAY INSPECTION

First check the insulation between  $\mathbb D$  and  $\mathbb E$  terminals with the tester. Then apply 12 V to terminals  $\mathbb D$  and  $\mathbb C$  ( $\oplus$  to  $\mathbb D$  and  $\mathbb C$ ) and check the continuity between  $\mathbb D$  and  $\mathbb E$ . 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.

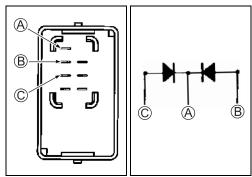
ſ		Probe of tester to:					
	o		©, ®	A			
	robe r to:	©, B		1.4 V and more			
	Prc ter	©, <b>b</b>		(Tester's battery voltage)			
	() tes	A	0.4 – 0.6 V				

09900-25008: Multi-circuit tester set

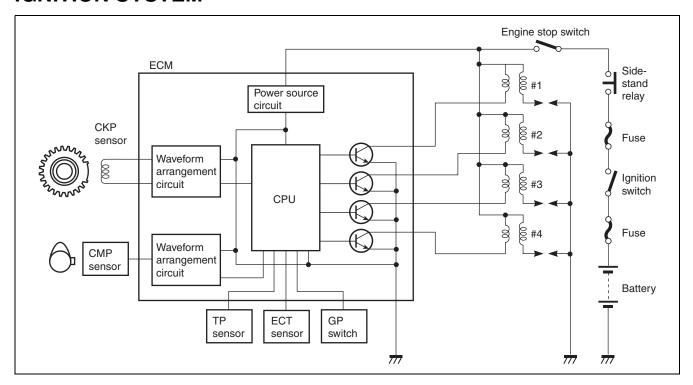
Tester knob indication: Diode test (⊢←)

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 14 500 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 14 100 r/min.

#### **CAUTION**

Under no load, the engine can run over 14 100 r/min though the ignition cut-off circuit is effective, which may possibly cause engine damage. Do not run the engine without load over 15 100 r/min at anytime.

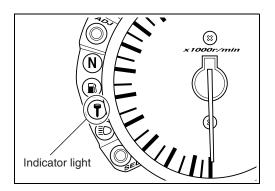
# IMMOBILIZER (Except for E-03, 28, 33)

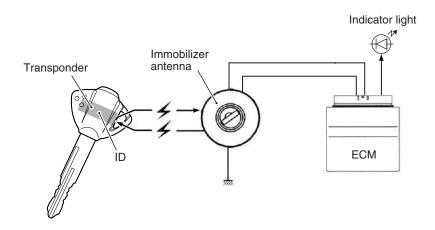
# **DESCRIPTION**

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.





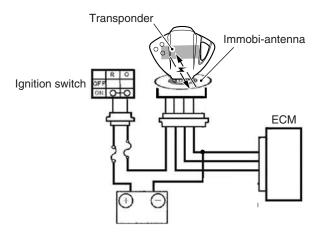


### Operation

When the ignition switch is turned ON with the engine stop switch in ON, the immobi-antenna and ECM are powered ON.

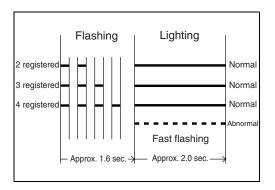
The ECM transmits a signal to the transponder through the immobi-antenna in order to make comparison between the key ID and ECM ID.

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.



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.

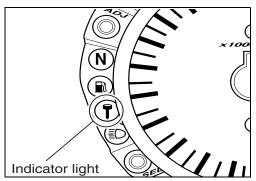


#### NOTE:

If the indicator light 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. Is there connection in the ignition system couplers?

YES	Go to Step 2.
NO	Poor connection of couplers

#### Step 2

1) Measure the battery voltage between input lead wires at the ECM with the ignition switch in the "ON" position. (E-02, 19, 24: O/G and B/W, E-03, 28, 33: O/W and B/W) Is the voltage OK?

YES	Go to Step 3.		
NO	<ul> <li>Faulty ignition switch</li> <li>Faulty turn signal/side-stand relay</li> <li>Faulty engine stop switch</li> <li>Broken wire harness or poor connection of related circuit couplers</li> </ul>		

#### Step 3

1) Measure the ignition coil primary peak voltage. ( 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 to -6) Is the spark plug OK?

YES	Go to Step 5.
NO	Faulty spark plug(-s).

# Step 5

1) Inspect the ignition coil/plug caps. ( 9-26) Is the ignition coil/plug cap 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. Is the peak voltage and resistance OK?

YES	<ul> <li>Faulty ECM</li> <li>Open or short circuit in wire harness</li> <li>Poor connection of ignition couplers</li> </ul>
NO	Faulty CKP sensor
NO	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. ( 5-14)
- Disconnect all the ignition coil/plug cap lead wire couplers before removing the ignition coil/plug caps.
- Remove all of the ignition coil/plug caps.

#### 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 (each spark plug hole).

#### CAUTION

Avoid grounding the spark plugs and suppling the electrical shock to the cylinder head cover (magnesium parts) to prevent the magnesium material from damage.

#### 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:

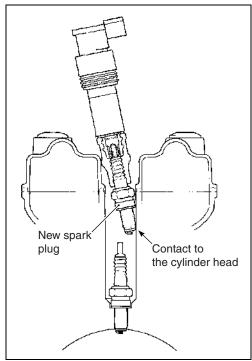
Green wire terminal (⊕ Probe) – Ground (⊕ Probe) terminal

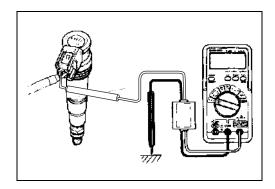
09900-25008: Multi-circuit tester set 09900-25009: Needle pointed probe set

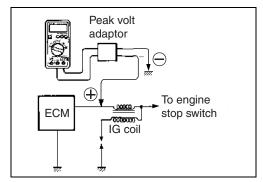
#### CAUTION

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: 80 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.

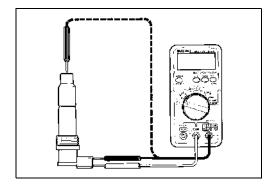
09900-25008: Multi-circuit tester set

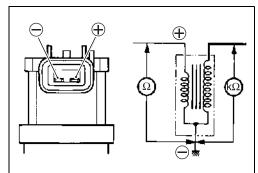
 $\square$  Tester knob indication: Resistance ( $\Omega$ )

Ignition coil/plug cap resistance

Primary :  $1.1 - 1.9 \Omega$  ( $\oplus$  tap -  $\ominus$  tap)

Secondary: 10.8 – 16.2 k $\Omega$  (Plug cap –  $\ominus$  tap)





#### **CKP SENSOR PEAK VOLTAGE**

• Remove the front seat. ( 8-7)

#### NOTE:

Be sure that all couplers are connected properly and the battery used is in fully-charged condition.

- Disconnect the both couplers ①.
- Connect the multi-circuit tester with peak volt adaptor as follows.
- Measure the CKP sensor peak voltage between Orange/Blue and Green/White lead wires at the ECM coupler (Black) (A).

G/W wire (⊕ Probe) – O/Bl wire (⊕ Probe)

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

A Black coupler

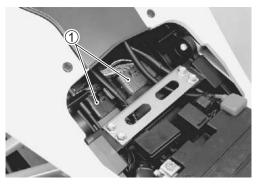
# CAUTION

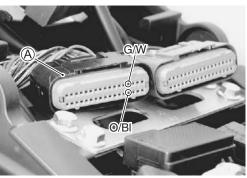
- \* Before using the multi-circuit tester and peak volt adaptor, be sure to refer to the appropriate instruction manual.
- \* Normally, use the needle pointed probe to the backside of the lead wire coupler to prevent the terminal bend and terminal alignment.
- Shift the transmission into the neutral and turn ignition switch "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.

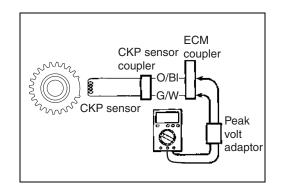
Tester knob indication: Voltage (---)

CKP sensor peak voltage: 0.28 V and more

(Orange/Blue - Green/White)







If the peak voltage is lower than the standard range, check the peak voltage at the CKP sensor lead wire coupler.

- Remove the front seat. ( 8-7)
- Lift and support the fuel tank. ( 5-3)
- Disconnect the CKP sensor lead wire coupler and connect the multi-circuit tester with the peak volt adaptor.

Black wire (⊕ Probe) – Green wire (⊕ Probe)

 Measure the CKP sensor peak voltage at the CKP sensor lead wire coupler.

Tester knob indication: Voltage (---)

CKP sensor peak voltage: 0.28 V and more (Green – Black)

If the peak voltage is lower than the standard range, check each coupler connection or replace the CKP sensor and inspect it again.

If the peak voltage is within the specification, check the continuity between the CKP sensor coupler and ECM coupler.

#### **CKP SENSOR RESISTANCE**

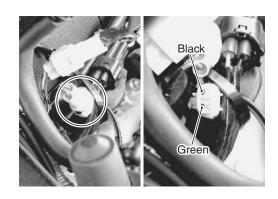
 Measure the resistance between the lead wires and ground. If the resistance is not as specified, the CKP sensor must be replaced.

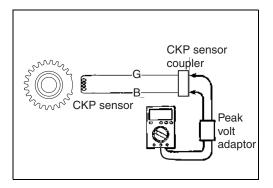
09900-25008: Multi-circuit tester set

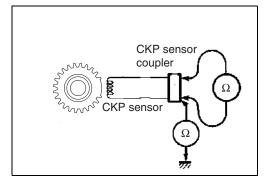
Tester knob indication: Resistance ( $\Omega$ )

CKP sensor resistance: 142 – 194  $\Omega$  (Green – Black)

 $\infty \Omega$  (Green – 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, Odo/Trip1/Trip2/Clock/Fuel reserve's trip and Engine coolant temp./FI (DTC) respectively.

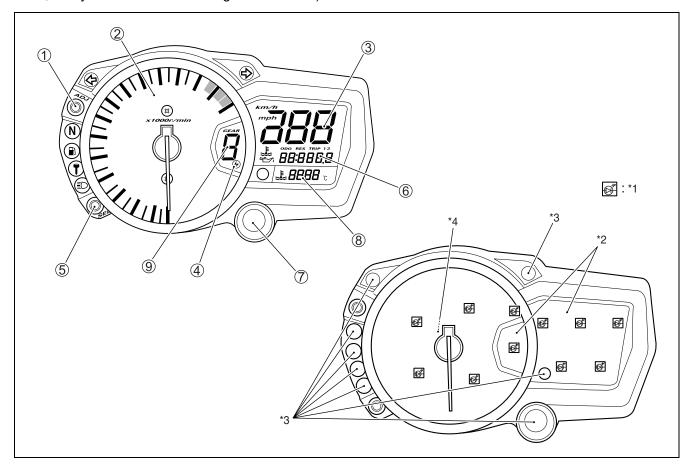
#### **LED (Light Emitting Diode)**

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.

# **Engine RPM indicator light**

This speedometer is equipped the engine RPM indicator light. The engine RPM indicator light is adjustable from 7 000 – 15 000 r/min. (from 7 000 r/min to 10 000 r/min, every 500 r/min and 10 000 r/min to 15 000 r/min, every 250 r/min initial setting: 13 000 r/min)



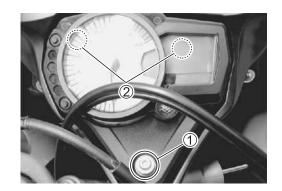
1	Adjust switch (Trip/Clock/Engine revolution)	8	Engine coolant temperature/FI (DTC)
2	Tachometer	9	Gear position indicator
3	Speedometer	*1	LED (Combination meter light)
4	Engine RPM indicator mark	*2	LCD
<b>⑤</b>	Select switch	*3	LED
6	Odo/Trip 1/Trip 2/Clock/Fuel reserve's trip	*4	Stepping motor
7	Engine RPM indicator light		

# REMOVAL AND DISASSEMBLY

- Remove the screw 1.
- With the hooked parts ② of the combination meter pulled from the headlight housing, disconnect the combination meter lead wire coupler.
- Remove the combination meter.

# CAUTION

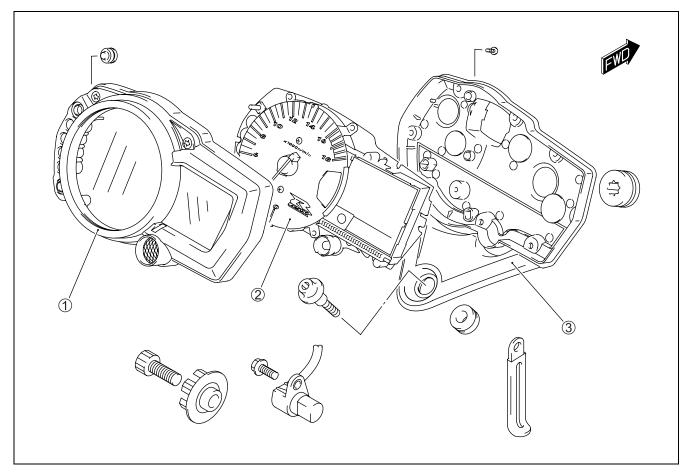
When disconnecting and reconnecting the combination meter coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.



• Disassemble the combination meter as follows.

# CAUTION

Do not attempt to disassemble the combination meter unit 2.



1	Combination meter cover	3	Combination meter case
<b>(2</b> )	Combination meter unit		

#### INSPECTION

# **LED (LIGHT EMITTING DIODE)**

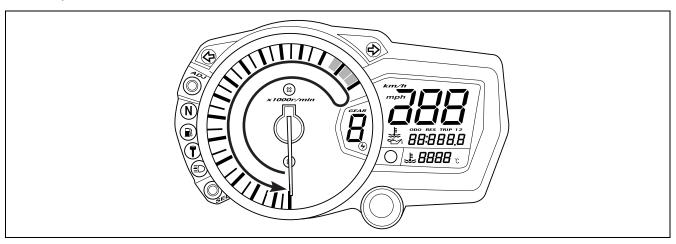
Check that the LED lights [FI light, Fuel level indicator light, Engine RPM indicator light and immobilizer indicator light (For E-02, 19, 24)] immediately after turning the ignition switch on. Also, other LED lights (Neutral indicator light, High-beam indicator light and Turn signal indicator light) 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.

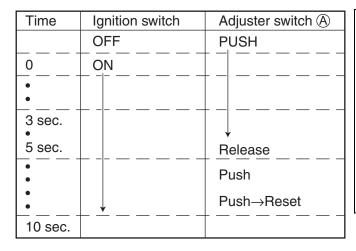
If abnormal condition is found, replace the combination meter unit with a new one after checking its wire harness/coupler.

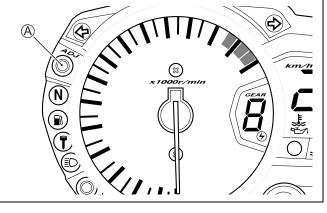


#### NOTE:

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 adjuster switch (A) pressed, turn the ignition switch on.
- 2) Release the adjuster switch (A), 3 to 5 seconds after turning the ignition switch on.
- 3) Press the adjuster switch (A) twice (within 1 second). →Reset
- \* Complete the operation within 10 seconds after the ignition switch has been turned on.





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.

# ECT sensor inspection (\$\tilde{\tilie}\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde{\tilde

- Remove the front seat.( \$\sumset\$ 8-7)
- Lift and support the fuel tank. ( 5-3)
- 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 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 more	OFF	""		19 °C and below
Approx. $0.318 \text{ k}\Omega$	OFF	"80"		Approx. 80 °C
0.1108 $k\Omega$ and less	ON	"120" – "139"	Flicker	120 – 139 °C
$0~\Omega$ (Jumper wire)	ON	"HI"	Flicker	140 °C and over

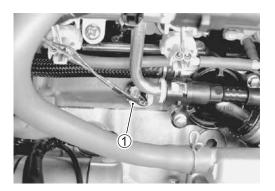
If either one or all indications are abnormal, replace the combination meter with a new one.

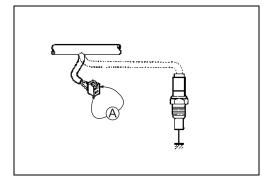
#### NOTE:

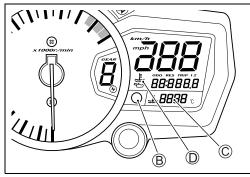
If the engine stop switch is turned OFF or side-stand/ignition inter-lock system is not working while the ignition switch is ON, the LCD displays "CHEC". But it is not a malfunction.

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.







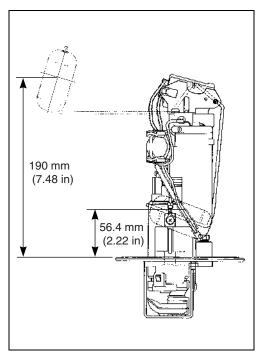
#### **FUEL LEVEL GAUGE INSPECTION**

- Remove the fuel pump assembly. ( 5-9)
- 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
190 mm (7.48 in)	182 ± 3 Ω
56.4 mm (2.22 in)	4 ± 1 Ω

09900-25008: Multi-circuit tester set

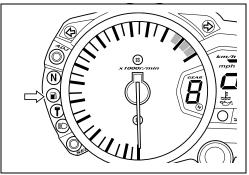
Tester knob indication: Resistance ( $\Omega$ )



#### **FUEL LEVEL INDICATOR LIGHT INSPECTION**

If the fuel level indicator light does not function properly, check the fuel level gauge and its lead wire/coupler.

If the fuel level gauge and its lead wire/coupler are functioning properly, replace the combination meter with a new one.



#### **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**

- Remove the front seat.( 8-7)
- 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.

B/R : Black with Red tracer B/W : Black with White tracer

B : Black

09900-25008: Multi-circuit tester set

Tester knob indication: Voltage (==)

 Under above condition, if a suitable screwdriver touching the pick-up surface of the speed sensor is moved, the tester reading voltage changes (0 V→ 12 V or 12 V→ 0 V). If the tester reading voltage does not change, replace the speedometer sensor with a new one.

#### NOTE:

The highest voltage reading in this test will be the same as that of battery (12 V).

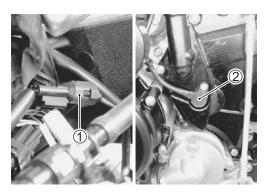
#### **OIL PRESSURE INDICATOR**

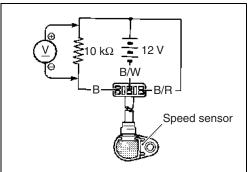
#### NOTE:

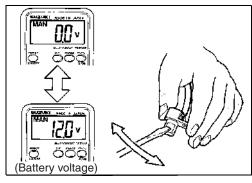
Before inspecting the oil pressure switch, check if the engine oil level is correct. ( 2-12)

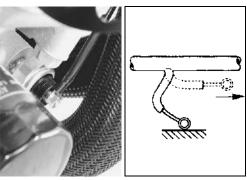
- Remove the left under cowling. (\$\sumset\$8-5)
- Disconnect the oil pressure switch lead wire from the oil pressure switch.
- Turn the ignition switch ON.
- Check if the oil pressure indicator (A) will light and LCD (B) will flicker, when grounding the lead wire.

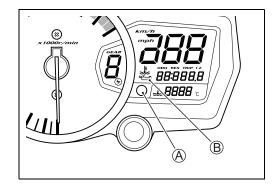
If any indications are abnormal, replace the combination meter with a new one after checking connection of couplers.











# **LAMPS**

# HEADLIGHT, BRAKE LIGHT/TAILLIGHT, LICENSE PLATE LIGHT AND TURN SIGNAL LIGHT

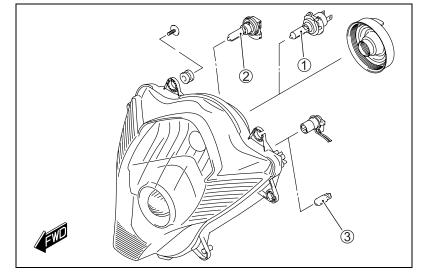
# **HEADLIGHT**

12 V 55 W H7 ①

12 V 65 W H9 ②

# **POSITION LIGHT** ③

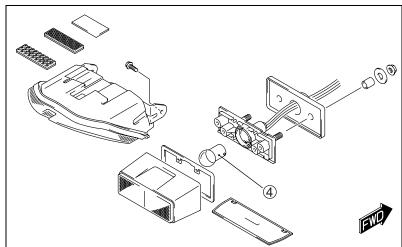
12 V 5 W × 2



#### **BRAKE LIGHT/TAILLIGHT: LED**

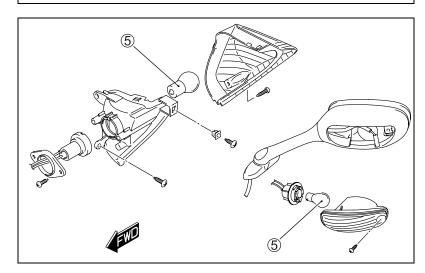
# **LICENCE PLATE LIGHT (4)**

12 V 5 W



# **TURN SIGNAL LIGHT (5)**

12 V 21 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**

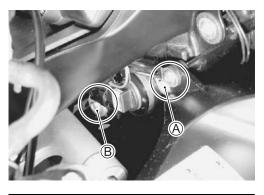
• Adjust the headlight beam.

# NOTE:

- \* Use a screw driver  $\oplus$  for adjuster A and B.
- \* To adjust the headlight beam, adjust the beam horizontally first, then adjust vertically.

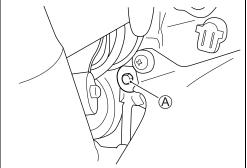
A: Horizontal adjuster

B: Vertical adjuster



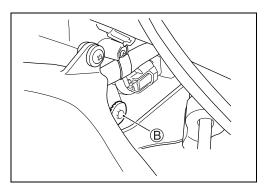
# To adjust the beam horizontally:

• Turn the adjuster (A) clockwise or counterclockwise.



# To adjust the beam vertically:

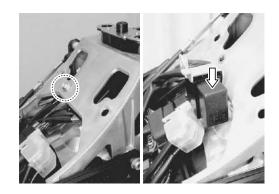
• Turn the adjuster ® clockwise or counterclockwise.



# **RELAYS**

# **TURN SIGNAL/SIDE-STAND RELAY**

The turn signal/side-stand relay is composed of the turn signal relay, side-stand relay and diode.



# **INSPECTION**

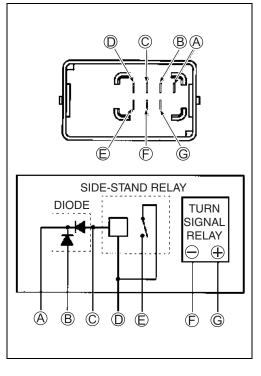
Before removing the turn signal/side-stand relay, check the operation of the turn signal light.

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**

**79-16** 

# **FUEL PUMP RELAY**

**∑**5-7

# **COOLING FAN RELAY**

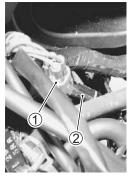
**7-7** 

# **IGNITION SWITCH REMOVAL**

- Remove the air cleaner box. ( 5-14)
- Disconnect the ignition switch lead wire coupler (Green) ①.
- Disconnect the immobilizer lead wire coupler (Black) ②. (For E-02, 19, 24)
- Remove the cable guide 3.

· Remove the ignition switch mounting bolts with the special tools.

**100** 09930-11920: Torx bit JT40H 09930-11940: Bit holder







# **IGNITION SWITCH INSTALLATION**

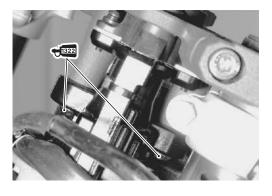
Install the ignition switch in the reverse order of removal. Pay attention to the following points:

• Apply thread lock to the ignition switch bolts.

#### CAUTION

When reusing the ignition switch bolt, clean thread and apply the THREAD LOCK.

**←**1322 99000-32110: THREAD LOCK SUPER "1322" (or equivalent 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 Position	В	Lbl	Lg
• (OFF)			
	0	0	<del></del>

### **IGNITION SWITCH (For E-02, 19, 24)**

Color Position	R	0	Gr	Br
ON	<u> </u>		<u> </u>	
OFF				
LOCK				
Р	0			

# IGNITION SWITCH (For E-03, 28, 33)

Color Position	R	0	O/Y	Gr	Br
ON	$\bigcirc$	$-\circ$		$\bigcirc$	
OFF					
LOCK					
Р	$\overline{\bigcirc}$				_

#### **DIMMER SWITCH**

Color Position	W	Υ	0
HI (≣▷)		0	——O
LO (≨□)	0		

#### **TURN SIGNAL SWITCH**

Color Position	Lg	Lbl	В
L		0	
PUSH			
R	0	<del></del>	

#### **PASSING LIGHT SWITCH**

Color Position	0	Υ
•		
PUSH	0	0

# **ENGINE STOP SWITCH**

Color Position	O/B	O/W
OFF (XX)		
RUN (∩)	0	

Color Position	O/W	Y/G	O/R	Y/W
•			0-	
PUSH	0	0		

#### **HORN BUTTON**

Color Position	B/BI	B/W
•		
PUSH	0	O

#### FRONT BRAKE SWITCH

Color Position	B/R	B/BI
OFF		
ON	0	0

#### **REAR BRAKE SWITCH**

Color Position	0	W/B
OFF		
ON	0	0

# **CLUTCH SWITCH**

Color	B/W	B/Y
OFF		
ON	0	<u> </u>

#### **OIL PRESSURE SWITCH**

Color	G/Y	Ground
ON (engine is at stop)	<u> </u>	
OFF (engine is running)		

# NOTE:

Before inspecting the oil pressure switch, check if the engine oil level is correct. (\$\sumsymbol{1}\$2-12)

#### WIRE COLOR

: Black Lbl : Light blue R:Red Lg : Light green
O : Orange W: White Br : Brown Y: Yellow Gr : Gray

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

W/B : White with Black tracer Y/G : Yellow with Green tracer Y/W : Yellow with White tracer

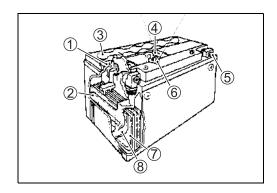
# **BATTERY SPECIFICATIONS**

Type designation	YT12A-BS
Capacity	12V,36kC (8Ah)/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)



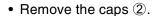
# **INITIAL CHARGING**

# Filling electrolyte

• Remove the aluminum tape ① sealing the battery electrolyte filler holes (A).

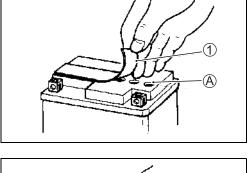
#### NOTE:

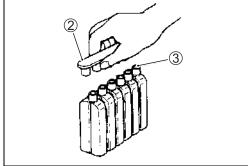
When filling electrolyte, the battery must be removed from the vehicle and must be put on the level ground.



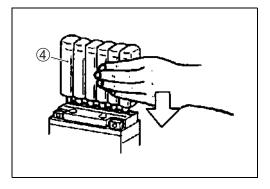
#### NOTE:

- \* 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.

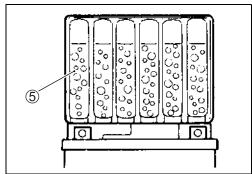




• Insert the nozzles of the electrolyte container 4 into the battery's electrolyte filler holes, holding the container firmly so that it does not fall. Take precaution not to allow any of the fluid to spill.



 Make sure air bubbles ⑤ are coming up each electrolyte container, and leave in this position for about more than 20 minutes.



#### NOTE:

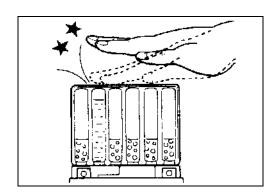
If no air bubbles are coming up from a filler port, tap the bottom of the electrolyte container two or three times.

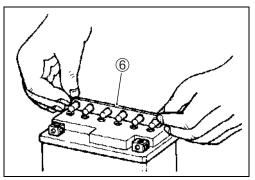
Never remove the container from the battery.

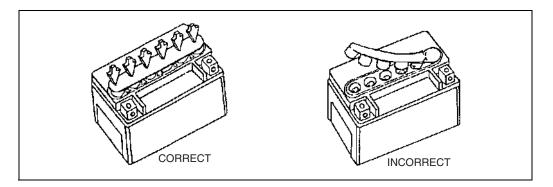
- After confirming that the electrolyte has entered the battery completely, remove the electrolyte containers from the battery. Wait for about 20 minutes.
- Insert the caps ⑥ into the filler holes, pressing in firmly so that the top of the caps do not protrude above the upper surface of the battery's top cover.

#### CAUTION

- \* Never use anything except the specified battery.
- \* Once the caps have been installed to the battery, do not remove the caps.
- \* Do not tap the caps with a tool such as 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**

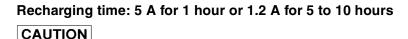
Visually inspect the surface of the battery container. If any signs of cracking or electrolyte leakage from the sides of the battery have occurred, replace the battery with a new one. If the battery terminals are found to be coated with rust or an acidic white powdery substance, clean the battery terminals 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

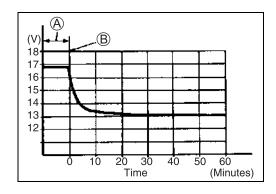
### **CAUTION**

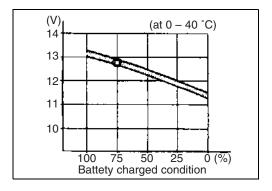
- \* When recharging the battery, remove the battery from the motorcycle.
- \* Do not remove the caps on the battery top while recharging.



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
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
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 V ≤ sensor voltage < 4.85 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
. 3110	L		Sensor voltage is lower than specified value.	ECT sensor circuit shorted to ground

DTC No		DETECTED	DETECTED EARLING CONDITION	CHECK EOD
DICNO	DIC NO.		DETECTED FAILURE CONDITION	CHECK FOR
		IAT sensor	The sensor voltage should be the fol-	IAT sensor, lead wire/coupler
001			lowing.	connection
C21			0.15 V ≤ sensor voltage < 4.85 V	
			In other than the above range, C21	
		_	(P0110) is indicated.  Sensor voltage is higher than specified	IAT sensor circuit open or
	Н		value.	ground circuit open
P0110		1	Sensor voltage is lower than specified	IAT sensor circuit shorted to
	L		value.	ground
		AP sensor	The sensor voltage should be the fol-	AP sensor, wiring/coupler con-
			lowing.	nection
C22			0.5 V ≤ sensor voltage < 4.85 V	
			In other than the above range, C22	
			(P1450) is indicated.	
	Н		Sensor voltage is higher than specified	AP sensor circuit shorted to
	11		value.	VCC or ground circuit open
P1450			Sensor voltage is lower than specified	AP sensor circuit open or
	L		value.	shorted to ground or VCC circuit
		T-0		open
		TO sensor	The sensor voltage should be the fol-	TO sensor, lead wire/coupler
			lowing for 2 sec. and more, after ignition switch is turned ON.	connection
C23				
			0.2 V ≤ sensor voltage < 4.8 V In other than the above value, C23	
			(P1651) is indicated.	
		-	Sensor voltage is higher than specified	TO sensor circuit shorted to
	Н		value.	VCC or ground circuit open
P1651		†	Sensor voltage is lower than specified	TO sensor circuit open or
	L		value.	shorted to ground or VCC circuit
				open
		Ignition sig-	CKP sensor (pick-up coil) signal is pro-	Ignition coil, wiring/coupler con-
C24/C2		nal	duced, but signal from ignition coil is	nection, power supply from the
C26/C2	7		interrupted 8 times or more continu-	battery
			ously. In this case, the code C24	
P0351/P0352			(P0351), C25 (P0352), C26 (P0353) or	
P0353/P0	354	Secondary	C27 (P0354) is indicated.	OTVA
000	C28		When no actuator control signal is	STVA motor, STVA lead
C28			supplied from the ECM, communica-	wire/coupler
		actuator	tion signal does not reach ECM or	
D1655			operation voltage does not reach	
1 1000	P1655		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
P1654	H L		Sensor voltage is higher than specified value.  Sensor voltage is lower than specified value.	STP sensor circuit shorted to VCC or ground circuit open STP sensor circuit open or shorted to ground or VCC circuit open
C31		Gear position signal	Gear position signal voltage should be higher than the following for 3 seconds and more.  Gear position sensor voltage > 0.6 V	GP switch, wiring/coupler connection, gearshift cam, etc.
C32/C33 C34/C35	3	Primary fuel injector	If lower than the above value, C31 (P0705) is indicated.  CKP sensor (pickup coil) signal is produced, but fuel injector signal is inter-	Primary fuel injector, wiring/coupler connection, power supply to
P0201/P02	P0201/P0202 P0203/P0204		rupted 4 times or more continuously. In this case, the code C32 (P0201), C33 (P0202), C34 (P0203) or C35 (P0204) is indicated.	the injector
C36/C37 C38/C39		Secondary fuel injector	Some failure exists in the fuel injector signal in a high load, high revolution condition. In this case, the code C36 (P1764), C37 (P1765), C38 (P1766) or	Secondary fuel injector, wir- ing/coupler connection, power supply to the injector
P1764/P1765 P1766/P1767			C39 (P1767) 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)
. 0200	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 P1650		Ignition switch	Ignition switch signal is not input to the ECM.  * When the ID agreement is not verified.  * ECM does not receive communication signal from the immobilizer antenna.	Ignition switch, lead wire/coupler, etc.  * Immobilizer/anti-theft system

<sup>\*:</sup> Immobilizer system is equipped model only.

DTC No	).	DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
C44		HO2 sensor (For E-02, 19)	HO2 sensor output voltage is not input to ECM during engine operation and running condition.	HO2 sensor circuit open or shorted to ground
P0130	١		(Sensor voltage < 0.55 V) In other than the above value, C44 (P0130) is indicated.	
C44			The Heater can not operate so that heater operation voltage is not supply	HO2 sensor lead wire/coupler connection
P0135	)		to the oxygen heater circuit, C44 (P0135) is indicated.	Battery voltage supply to the HO2 sensor
C46		Exhaust control valve actuator	EXCVA position sensor produces following voltage.  0.1 V ≤ sensor voltage < 4.9 V In other than the above range, C46 (P1675) is indicated.  When no actuator control signal is supplied from the ECM, communication signal does not reach ECM or operation voltage does not reach EXCVA motor, C46 (P1658) is indicated. EXCVA can not operate.	EXCVA, EXCVA lead wire/coupler
P1657	Н		EXCVA position sensor voltage is higher than specified value.	EXCVA position sensor circuit shorted to VCC or ground circuit open
1 1007	L		EXCVA position sensor voltage is lower than specified value.	EXCVA position sensor circuit open or shorted to ground or VCC circuit open
P1658			When no actuator control signal is supplied from the ECM, communication signal does not reach ECM or operation voltage does not reach EXCVA motor, C46 (P1658) is indicated. EXCVA can not operate.	EXCVA, EXCVA motor lead wire/coupler
C49 P1656		PAIR control solenoid	PAIR control solenoid valve voltage is not input to ECM.	PAIR control solenoid valve, lead wire/coupler
C60 P0480	)	valve Cooling fan relay	Cooling fan relay signal is not input to ECM.	Cooling fan relay, lead wire/coupler connection

Complaint	Symptom and possible causes	Remedy
Engine will not start	Compression too low	
or is hard to start.	Valve clearance out of adjustment	Adjust.
	2. Worn valve guides or poor seating of valves	Repair or replace.
	3. Mistiming valves	Adjust.
	4. Excessively worn piston rings	Replace.
	5. Worn-down cylinder bores	Replace.
	6. Too slowly starter motor cranks	See electrical section.
	7. Poor seating of spark plugs	Retighten.
	Plug not sparking	
	1. Fouled spark plugs	Clean.
	2. Wet spark plugs	Clean and dry.
	3. Defective ignition coil	Replace.
	Defective CMP sensor	Replace.
	5. Defective CKP sensor	Replace.
	6. Defective ECM	Replace.
	7. Open-circuited wiring connections	Repair or replace.
	No fuel reaching the intake manifold	
	Clogged fuel filter or fuel hose	Clean or replace.
	2. Defective fuel pump	Replace.
	Defective CMP sensor	Replace.
	Defective fuel pressure regulator	Replace.
	5. Defective fuel injector	Replace.
	6. Defective fuel pump relay	Replace.
	7. Defective ECM	Replace.
	Open-circuited wiring connections	Check and repair.
	Incorrect fuel/air mixture	
	TP sensor out of adjustment	Adjust.
	Defective fuel pump	Replace.
	Defective fuel pressure regulator	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.
	3. 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.
	2. 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.
	8. Damaged or cracked vacuum hose	Replace.
	Fuel injector improperly operating	
	Defective fuel injectors	Replace.
	2. No injection signal from ECM	Repair or replace.
	3. Open or short circuited wiring connection	Repair or replace.
	4. Defective battery or low battery voltage	Replace or recharge.
	Control circuit or sensor improperly operating	
	Defective ECM	Replace.
	Defective fuel pressure regulator	Replace.
	Defective TP sensor	Replace.
	Defective IAT sensor	Replace.
	Defective CMP sensor	Replace.
	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.
	Out of adjustment tappet clearance	Adjust.

Complaint	Symptom and possible causes	Remedy
Engine runs poorly	Defective engine internal/electrical parts	
in high speed range.	<u> </u>	Replace.
	2. Worn camshafts	Replace.
	3. Valve timing out of adjustment	Adjust.
	4. Too narrow spark plug gaps	Adjust.
	5. Ignition not advanced sufficiently due to poorly	Replace ECM.
	working timing advance circuit	
	6. 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	
	11. Defective fuel pump	Replace.
	12. Defective TP sensor	Replace.
	13. Defective STP sensor or STVA	Replace.
	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.
	6. Imbalancing throttle valve synchronization	Adjust.
	Defective control circuit or sensor	
	Low fuel pressure	Repair or replace.
	2. Defective TP sensor	Replace.
	Defective IAT sensor	Replace.
	4. Defective CMP sensor	Replace.
	5. Defective CKP sensor	Replace.
	6. 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.
	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.
	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.
	5. Defective CKP sensor	Replace.
	Defective GP sensor	Replace.
	7. Defective IAP sensor	Replace.
	8. Defective ECM	Replace.
	Defective AP sensor	Replace.
	10. TP sensor out of adjustment	Adjust.
	11. Defective STP sensor and/or STVA	Replace.
	12. Defective EXCVA	Replace.

Complaint	Complaint Symptom and possible causes				
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.			
	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				
	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	rty or heavy 1. Too much engine oil in the engine				
exhaust smoke		window, drain out excess			
		oil.			
	2. Worn piston rings or cylinders	Replace.			
	3. Worn valve guides	Replace.			
	4. Scored or scuffed cylinder walls				
	5. Worn valves stems				
	6. Defective stem seal				
	7. Worn oil ring side rails	Replace.			
Slipping clutch	Slipping clutch 1. Weakened clutch springs				
	2. Worn or distorted pressure plates				
	Distorted clutch plates or pressure plates	Replace.			
Dragging clutch	Some clutch spring weakened while others	Replace.			
	are not.				
	Distorted pressure plates or clutch plates				
Transmission will	ransmission will 1. Broken gearshift cam				
not shift.	oot shift. 2. Distorted gearshift forks				
	Worn gearshift pawl	Replace.			
Transmission will	i S				
not shift back.	Rubbing or stickily shift shaft	Repair or replace.			
	Distorted or worn gearshift forks	Replace.			
Transmission jumps	Transmission jumps 1. Worn shifting gears on driveshaft or				
out of gear.	countershaft				
	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.
	9. Defective water pump	Replace.
	10. Use incorrect coolant	Replace.
	11. Defective thermostat	Replace.
Engine overcools	gine overcools 1. Defective ECT sensor	
	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.
	Broken bearing in steering stem	Replace.
	Distorted steering stem	Replace.
	4. Not enough pressure in tires	Adjust.
Wobbly handlebars	1. Loss of balance between right and left front forks	Adjust.
	2. Distorted front fork	Repair or replace.
	3. Distorted front axle or crooked tire	Replace.
	4. Loose steering stem nut	Adjust.
	5. Worn or incorrect tire or wrong tire pressure	Adjust or replace.
	6. Worn bearing/race in steering stem	Replace.
Wobbly front wheel	Distorted wheel rim	Replace.
	2. Worn front wheel bearings	Replace.
	3. Defective or incorrect tire	Replace.
	4. Loose axle or axle pinch bolt	Retighten.
	5. Incorrect front fork oil level	Adjust.
	6. Incorrect front wheel weight balance	Adjust.
Front suspension	Weakened springs	Replace.
too soft	2. Not enough fork oil	Replenish.
	Wrong weight fork oil	Replace.
	<ol><li>Improperly set front fork spring adjuster</li></ol>	Adjust.
	5. Improperly set front fork damping force 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.
	4. Improperly set front fork damping force adjuster	Adjust.
	5. 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.
	Defective or incorrect tire	Replace.
	4. Worn swingarm and rear suspension bearings	Replace.
_	5. Loose nuts or bolts on rear suspensions	Retighten.
Rear suspension	Weakened spring of shock absorber	Replace.
too soft	Leakage of oil or gas shock absorber	Replace.
	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.
	Worn swingarm and rear suspension bearings	Replace.
	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.

### **BRAKES**

Complaint	Symptom and possible causes Rem				
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	,				
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	Rusty part	Clean and lubricate.			
	2. Insufficient brake lever or brake pedal	Lubricate.			
	pivot lubrication				

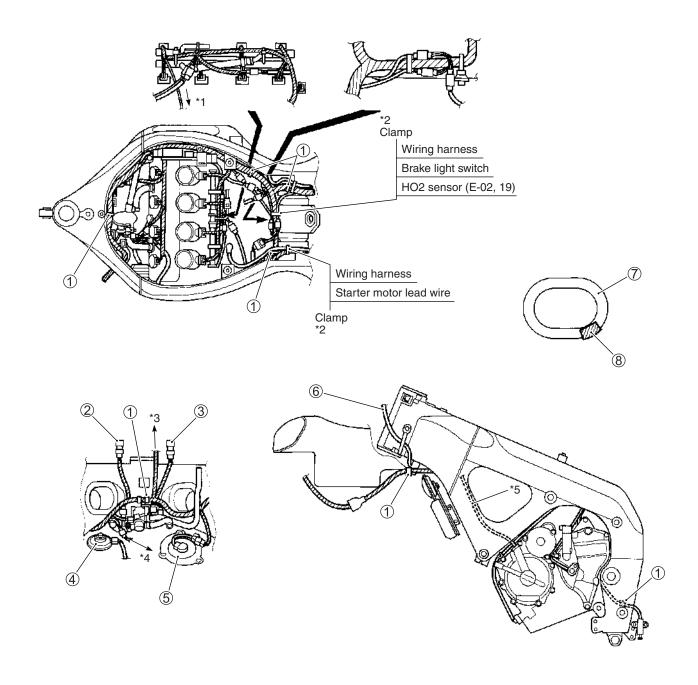
### **ELECTRICAL**

Complaint	Symptom and possible causes	Remedy
No sparking or poor	Defective ignition coils	Replace.
sparking	2. Defective spark plugs	Replace.
	3. Defective CMP sensor	Replace.
	Defective CKP sensor	Replace.
	5. Defective ECM	Replace.
	6. Defective TO sensor	Replace.
	7. 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	1. 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	2. Grounded or open-circuited generator coil	Replace.
specification.	<ol><li>Defective regulator/rectifier</li></ol>	Replace.
	4. Defective cell plates in the battery	Replace the battery.
Generator over-	<ol> <li>Internal short-circuit in the battery</li> </ol>	Replace the battery.
charges	<ol><li>Damaged or defective regulator/rectifier</li></ol>	Replace.
	3. Poorly grounded regulator/rectifier	Clean and tighten ground
		connection.
Unstable charging	<ol> <li>Lead wire insulation frayed due to vibration,</li> </ol>	Repair or replace.
	resulting in intermittent short-circuiting.	
	Internally shorted generator	
	Defective regulator/rectifier	Replace.
Starter button is not	Run down battery	Repair or replace.
effective.	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.

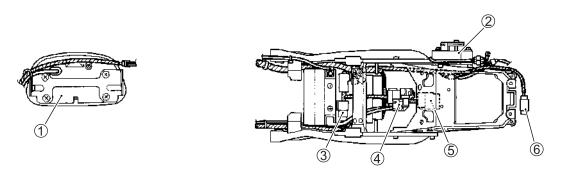
#### **BATTERY**

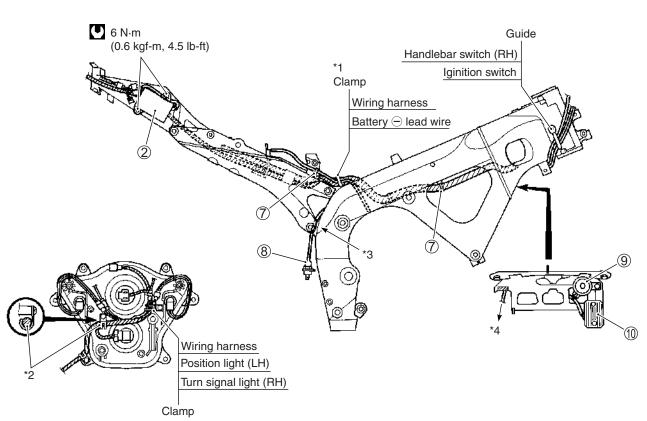
Complaint	Symptom and possible causes	Remedy
"Sulfation", acidic	Cracked battery case	Replace the battery.
white powdery sub-	2. Battery has been left in a run-down condition for	Replace the battery.
stance or spots on	a long time.	
surface of cell		
plates		
Battery runs down	Trouble in the charging system	Check the generator, regu-
quickly.		lator/rectifier and circuit
		connections and make nec-
		essary adjustments to
		obtain specified charging
		operation.
	Cell plates have lost much of their active	Replace the battery and
	material as a result of overcharging.	correct the charging sys-
		tem.
	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"	Battery "sulfation" 1. Incorrect charging rate	
	(When not in use batteries should be checked at	
	least once a month to avoid sulfation.)	
	2. The battery was left unused in a cold climate for	Replace the battery if badly
	too long.	sulfated.

# WIRING HARNESS, CABLE AND HOSE ROUTING **WIRING HARNESS ROUTING**

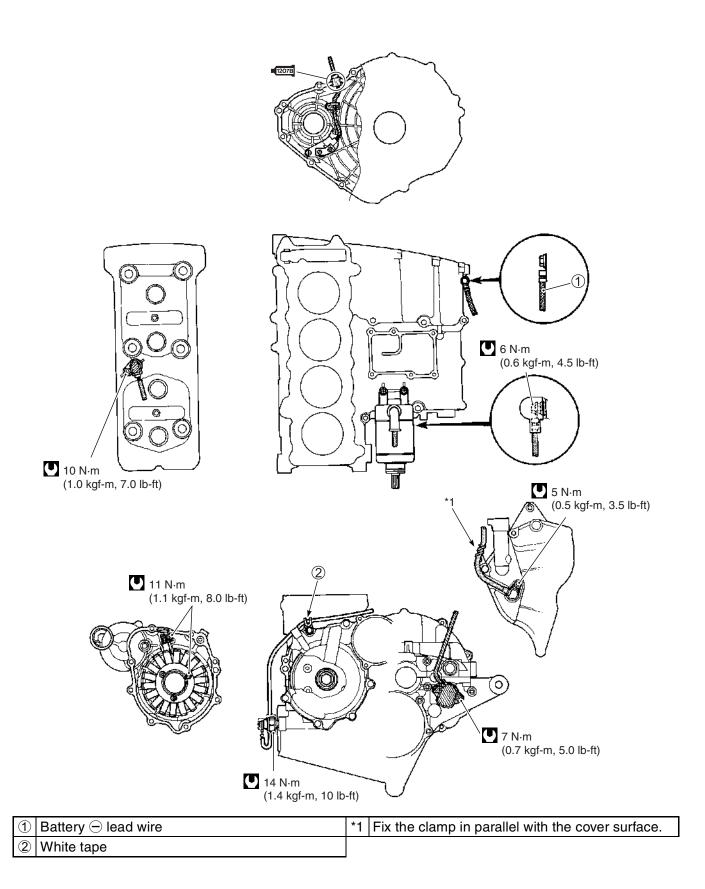


1	Integrated clamp	8	Protector
2	Cooling fan relay	*1	To ECT sensor
3	Fuel pump relay	*2	Cut the tip after clamping.
4	Horn	*3	To IAT sensor
<b>⑤</b>	Cooling fan motor	*4	To CMP sensor
6	Left handlebar switch lead wire	*5	Pass the lead wire through behind the frame and set it
	Len nandiebai switch lead whe		between the engine and frame.
7	Air intake (Frame) right inside		

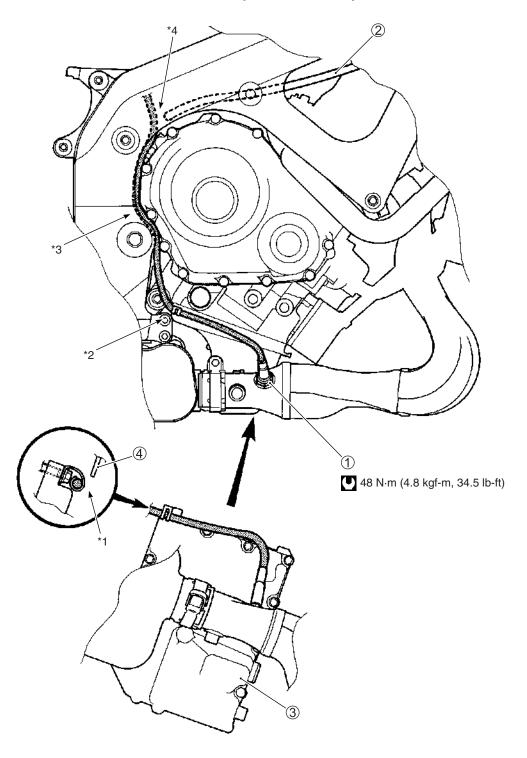




1	Rear combination light	8	Brake light switch
2	EXCVA	9	Horn
3	AP sensor	10	Regulator/rectifier
4	Starter relay	*1	Lock part of the clamp should face inside.
<b>⑤</b>	Turn signal/side-stand relay	*2	White marking.
6	TO sensor	*3	Pass the lead wire through under the frame bridge.
7	Integrated clamp	*4	To fan motor

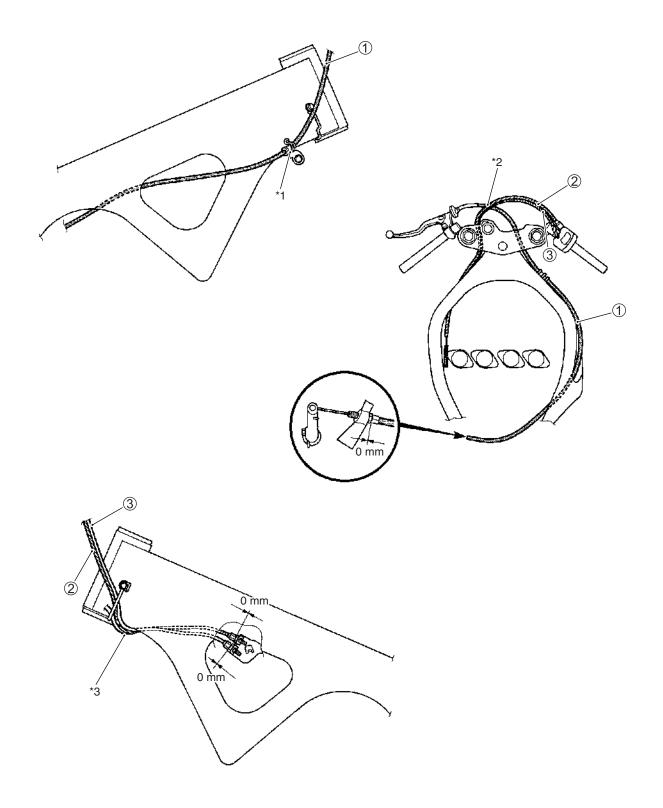


# **HO2 SENSOR HARNESS ROUTING (For E-02, 19)**



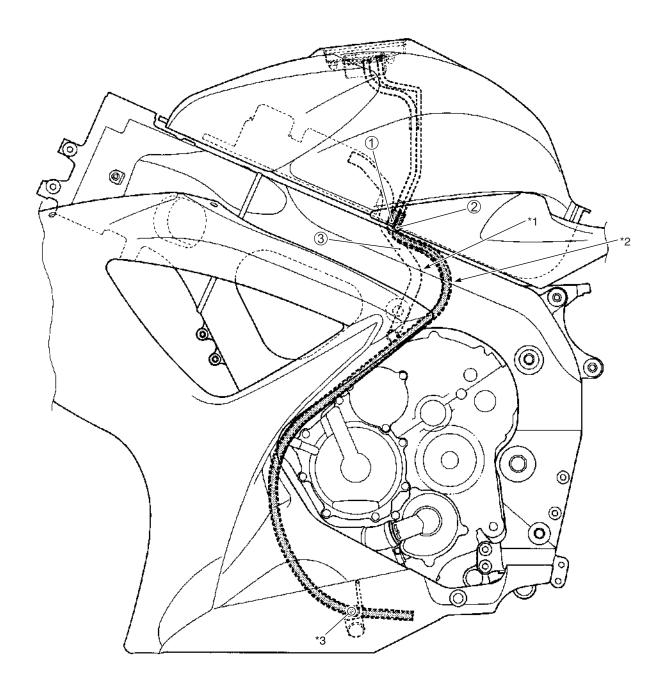
1	HO2 sensor	*9	Clamp the HO2 sensor lead wire so as not to over-
2	Clutch cable		lap the oil inspection window.
3	Oil pan	*2	Pass the HO2 sensor lead wire through between
4	Under cowling	3	the frame and engine.
*1	Clamp the HO2 sensor lead wire so as not to	*1	Pass the HO2 sensor lead wire through behind the
	contact with the under cowling.	4	clutch cable.

# **CABLE ROUTING**



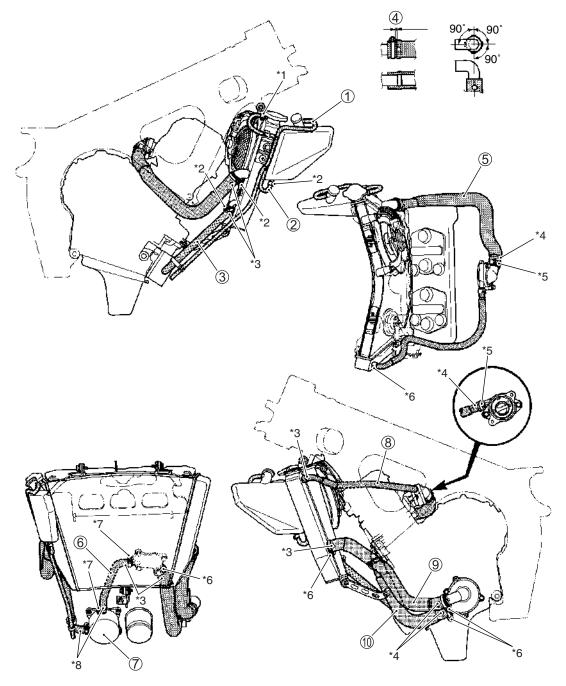
1	Clutch cable	*1	Clutch cable must be clamped on the grommet.
2	Throttle cable No.1	*2	Pass the throttle cables above the clutch cable.
3	Throttle cable No.2	*3	Pass the throttle cable No.2 outer from No.1.

# **FUEL TANK HOSE ROUTING**



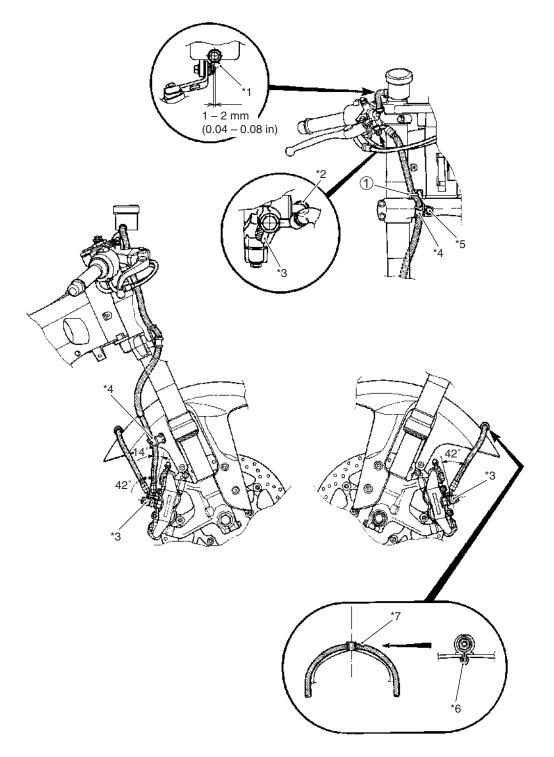
1	Fuel tank water drain hose		Pass the fuel tank drain hose and breather hose through behind the PCV hose.
2	Fuel tank breather hose	〜ツ	Set the fuel tank drain hose and breather hose with lengthwise backward.
3	PCV (breather) hose	*3	White marking

# **COOLING SYSTEM HOSE ROUTING**



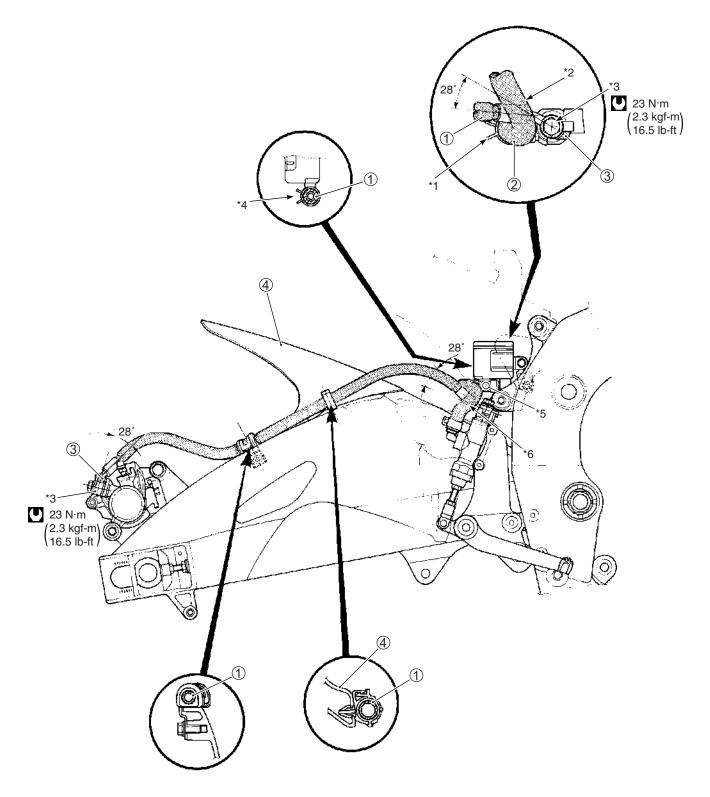
1	Reservoir tank overflow hose	*1	Clamp should face downward.
2	Reservoir tank inlet hose	*2	Clamp should face right side.
3	Oil cooler outlet hose	*3	Yellow marking
4	Clearance	*4	White marking
<b>⑤</b>	Radiator inlet hose	*5	Clamp should face backward.
6	Oil cooler inlet hose	*6	Clamp should face left side.
7	Oil cooler	*7	Clamp should face foreword.
8	Bypass hose	*8	Red marking
9	Radiator outlet hose		
10	Cylinder inlet hose		

### FRONT BRAKE HOSE ROUTING



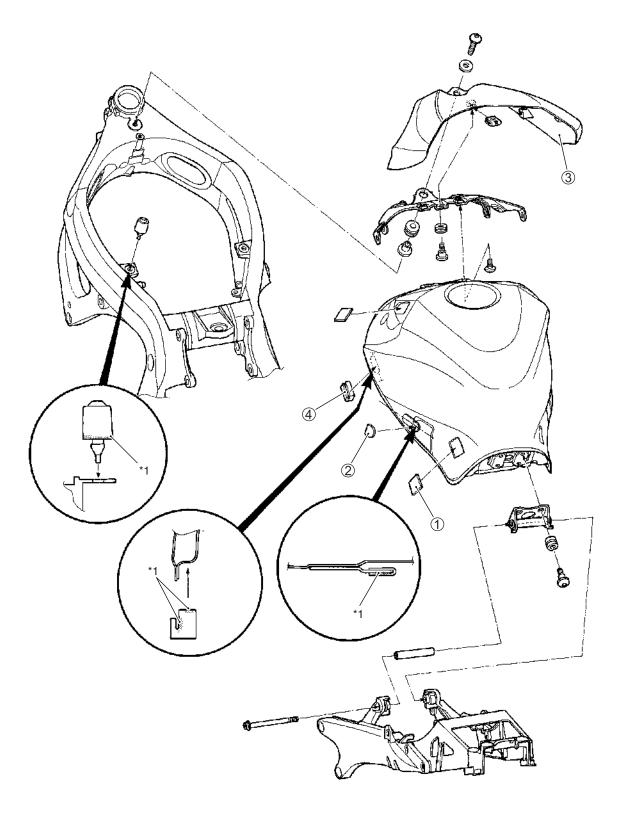
1	Brake hose guide	*4	Clamp the brake hose firmly.
*1	Clamp should face downward.  Clamp should face backward.	*6	After positioning the clamp with stopper, tighten
"			the clamp bolt.
*0			Insert the clamp to the hole of the front fender
2			fully.
*2	After the brake hose union has contacted the	*7	The green paint is right side and face upside.
3	stopper, tighten the union bolt.	<b>'</b>	The green paint is right side and lace upside.

#### **REAR BRAKE HOSE ROUTING**



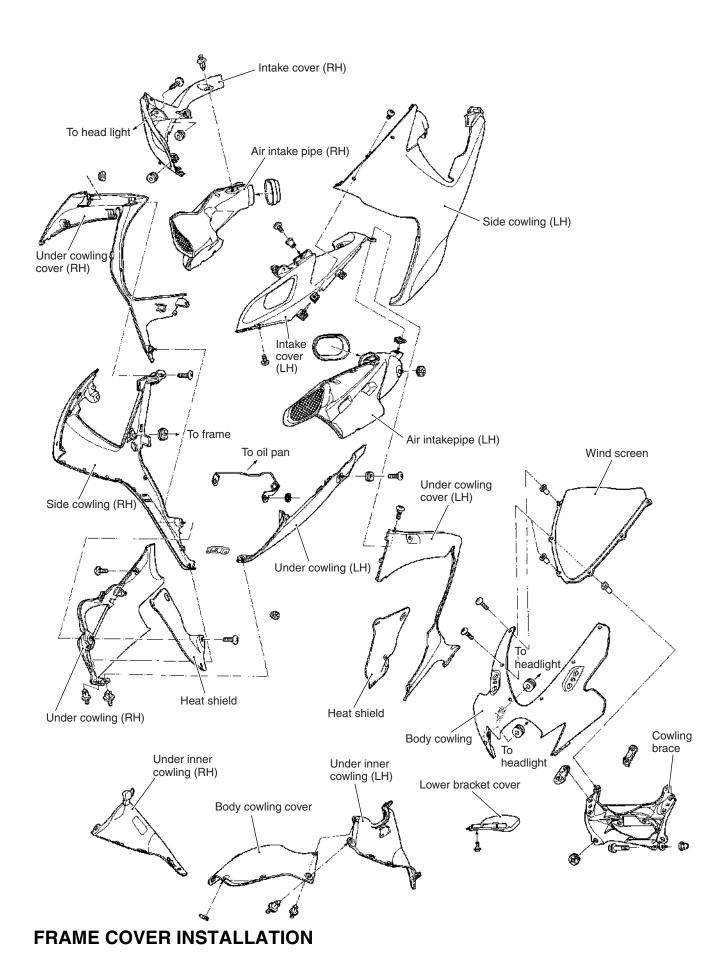
1	Rear brake hose	*2	Pass the reservoir hose above the brake hose.		
2	Brake fluid reservoir hose	*3 Position the brake union with the stopper before tig			
3	Stopper	*4	Face the clamp end inside.		
4	Rear lower fender	*5	White marking		
*1	Face the clamp end backward.	*6	Insert the reservoir hose into the hose connector to the root.		

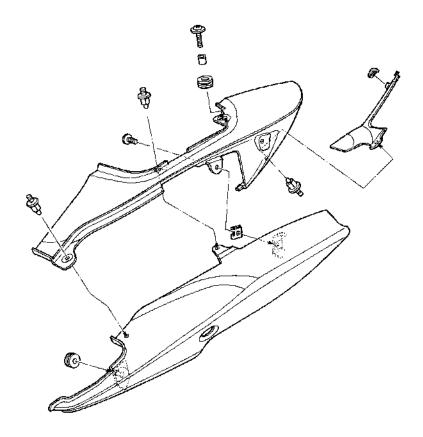
### **FUEL TANK INSTALLATION**



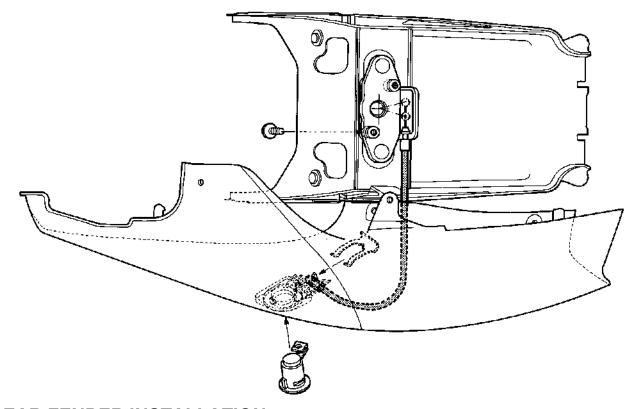
1	Velcro fastening	4	Fuel tank side cushion
2	Frame cover cushion	*1	Apply adhesive agent.
3	Fuel tank front cover	•	(equivalent to ARONALPHA 201)

### **COWLING INSTALLATION**

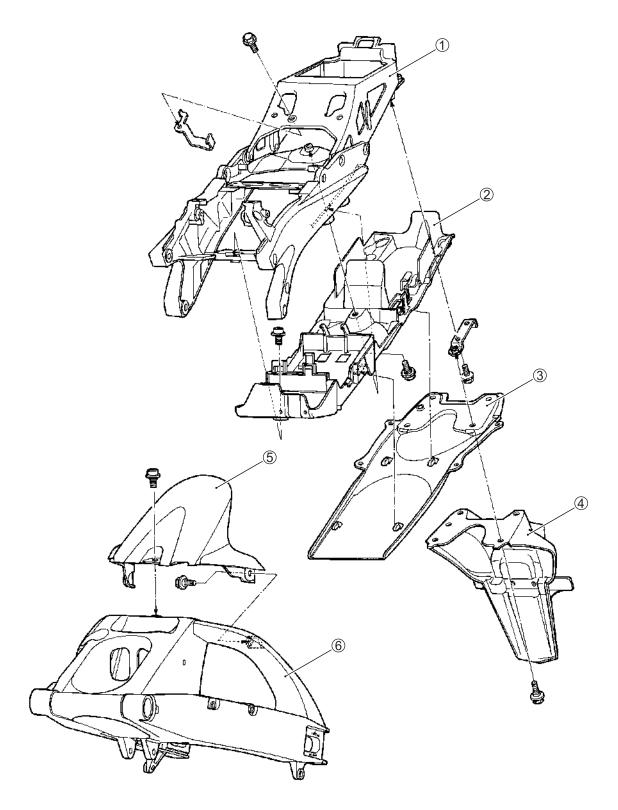




# **SEAT LOCK CABLE ROUTING**

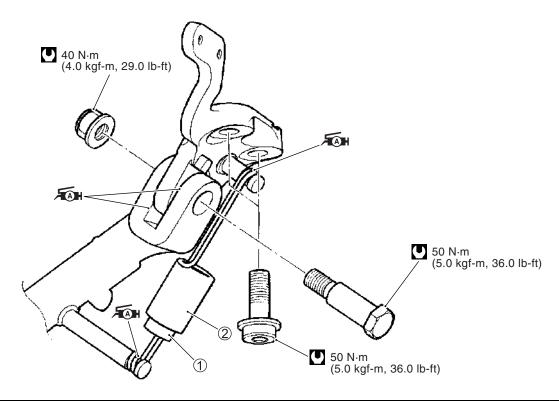


**REAR FENDER INSTALLATION** 



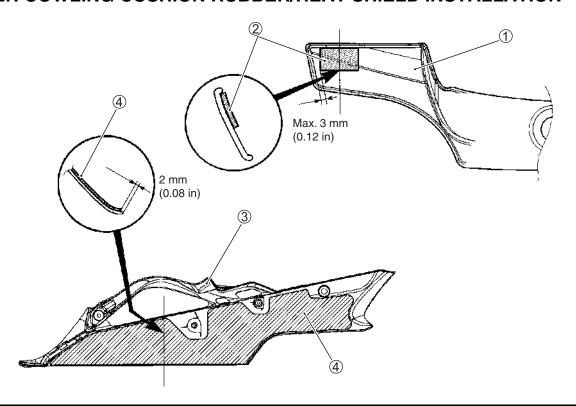
1	Seat rail	4	Rear fender (rear)
2	Rear fender (front)	<b>⑤</b>	Rear fender (lower)
3	Rear fender cover (front)	6	Swingarm

#### **SIDE-STAND INSTALLATION**



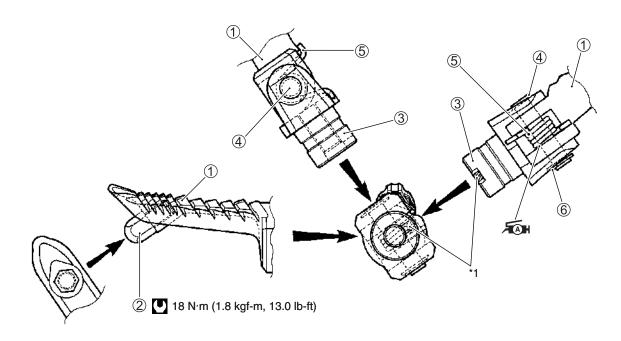
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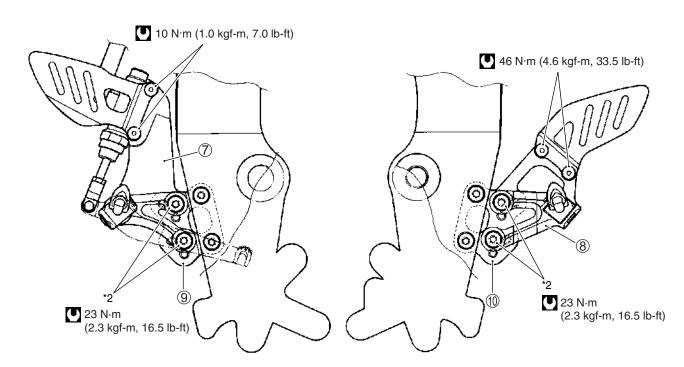
### **UNDER COWLING CUSHION RUBBER/HEAT SHIELD INSTALLATION**



1	Under cowling (LH)	3	Under cowling (RH)
2	Cushion rubber	4	Head shield

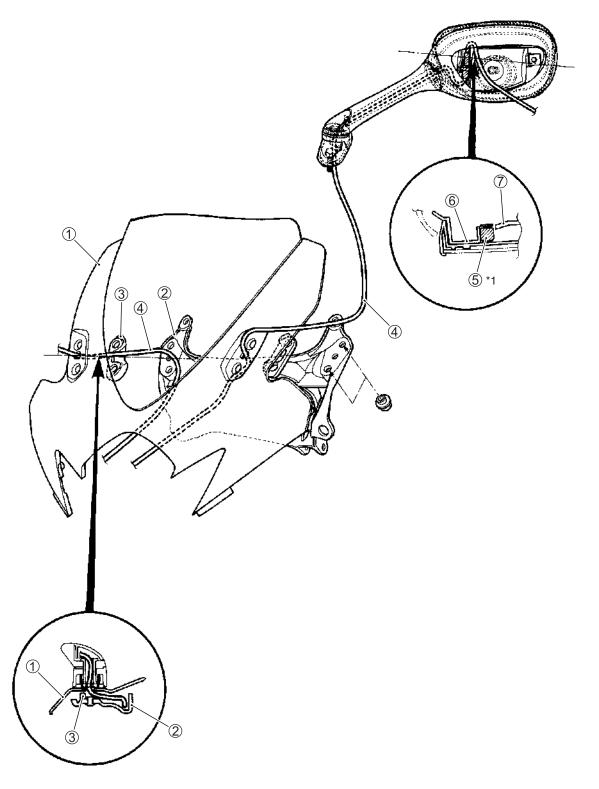
#### FRONT FOOTREST INSTALLATION





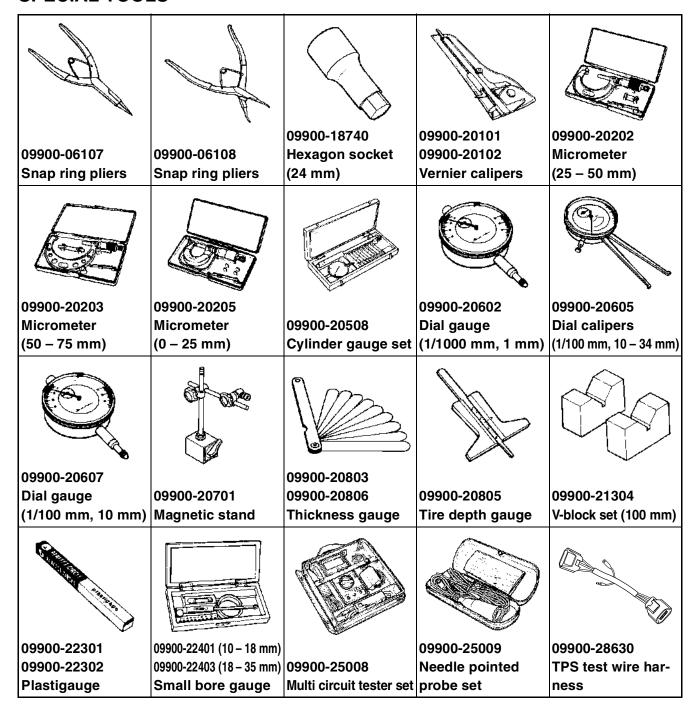
1	Footrest	7	Front footrest No. 2 bracket (RH)
2	Bank sensor	8	Front footrest No. 2 bracket (LH)
3	Holder	9	Front footrest No. 1 bracket (RH)
4	Pin	10	Front footrest No. 2 bracket (LH)
<b>⑤</b>	Spring	*1	Align the cutaway.
6	E-ring	*2	Set this to shown position.

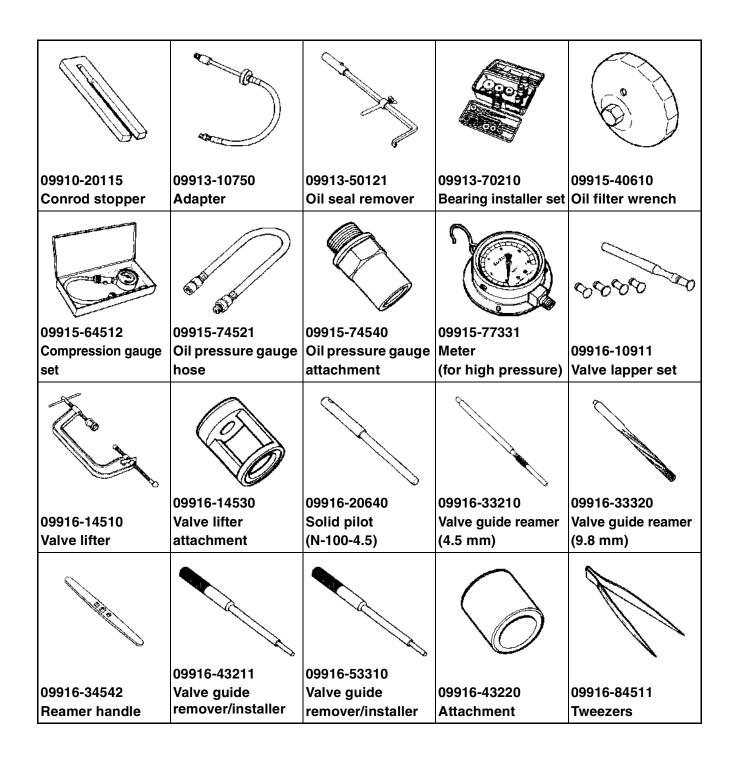
### **REAR VIEW MIRROR INSTALLATION**

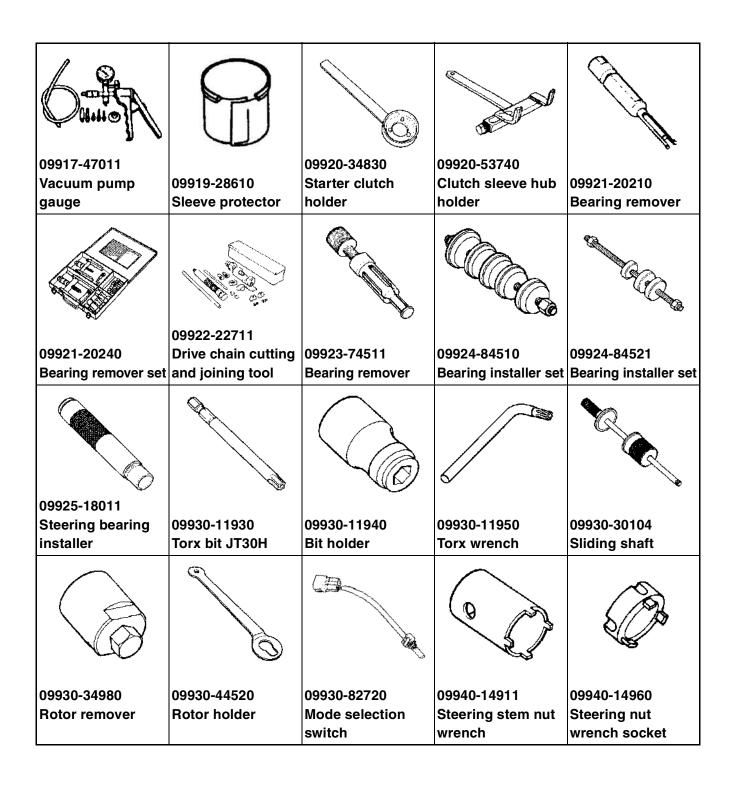


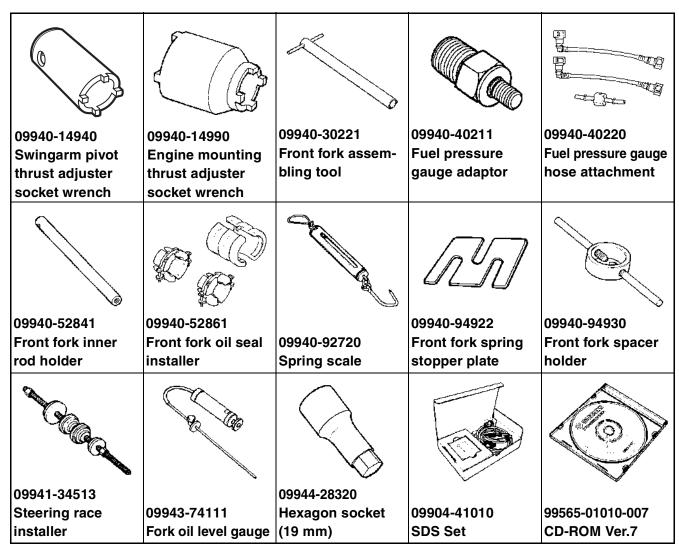
1	① Body cowling ⑤ Turn signal lead wire coupler				
2	Cowling brace	6 Mirror cover			
3	Cushion	7	Mirror body		
	Turn signal lead wire		Locate the turn signal lead wire coupler ⑤		
4			between the mirror cover 6 and mirror body 7.		

#### SPECIAL TOOLS









#### NOTE:

When order the special tool, please confirm whether it is available or not.

# **TIGHTENING TORQUE ENGINE**

ITEM		N⋅m	kgf-m	lb-ft
Exhaust pipe bolt		23	2.3	16.5
Muffler connecting bolt		23	2.3	16.5
Muffler mounting bolt		23	2.3	16.5
Speed sensor rotor bolt		25	2.5	18.0
Speed sensor bolt		4.5	0.45	3.0
Engine sprocket nut		115	11.5	83.0
Engine mounting bolt (Cylinder)		55	5.5	39.8
Engine mounting nut (Crankcase)		75	7.5	54.0
Engine mounting thrust adjuster	23	2.3	16.5	
Engine mounting thrust adjuster lock-nu	ut	45	4.5	32.5
Engine mounting pinch bolt		23	2.3	16.5
Cylinder head cover bolt		14	1.4	10.0
Spark plug		11	1.1	8.0
Cam chain guide No.1 bolt		23	2.3	16.5
Camshaft journal holder bolt		10	1.0	7.0
Cam chain tension adjuster cap bolt		23	2.3	16.5
Cam chain tension adjuster mounting b	oolt	10	1.0	7.0
Cam chain tensioner bolt		23	2.3	16.5
Cam chain drive sprocket bolt		54	5.4	39.0
Cylinder head bolt	(M. 10) Step 1/step 3	31	3.1	22.5
	(M: 10) Final step		60°	
	(M: 6)	10	1.0	7.0
Water jacket plug		9.5	0.95	6.9
Clutch cover bolt		10	1.0	7.0
Clutch sleeve hub nut		95	9.5	68.5
Clutch spring set bolt		10	1.0	7.0
Clutch release adjuster cap		11	1.1	8.0
Clutch lifter adjuster lock-nut		23	2.3	16.5
Starter idle gear cover bolt	10	1.0	7.0	
Valve timing inspection plug	11	1.1	8.0	
Starter clutch bolt		10	1.0	7.0
Generator cover bolt		10	1.0	7.0
Generator rotor bolt	120	12.0	87.0	
Generator stator set bolt	10	1.0	7.0	
Gearshift cam stopper bolt		10	1.0	7.0
Gearshift cam stopper plate bolt		13	1.3	9.5
Oil pressure switch		14	1.4	10.0
Oil filter		20	2.0	14.5

#### FI SYSTEM AND INTAKE AIR SYSTEM

ITEM	N∙m	kgf-m	lb-ft
CKP sensor mounting bolt	8	0.8	6.0
HO2 sensor (For E-02, 19)	48	4.8	34.5
Fuel delivery pipe mounting screw	5	0.5	3.5
Fuel pump mounting bolt	10	1.0	7.0
TPS and STPS mounting screw	3.5	0.35	2.5
EXCVA mounting bolt	6	0.6	4.5
EXCVA pulley mounting bolt	5	0.5	3.5

#### **COOLING SYSTEM**

ITEM	N∙m	kgf-m	lb-ft
Impeller securing bolt	8	0.8	6.0
Water pump cover screw	5	0.5	3.5
Water pump mounting bolt	10	1.0	7.0
Cooling fan mounting bolt	8	0.8	6.0
ECT sensor	18	1.8	13.0
Thermostat connector bolt	10	1.0	7.0
Thermostat cover bolt	10	1.0	7.0
Water inlet connector bolt	10	1.0	7.0

### **CHASSIS**

ITEM	N⋅m	kgf-m	lb-ft
Steering stem head nut	90	9.0	65.0
Steering stem lock-nut	80	8.0	58.0
Steering damper bolt and nut	23	2.3	16.5
Front fork upper clamp bolt	23	2.3	16.5
Front fork lower clamp bolt	23	2.3	16.5
Front fork cap bolt	35	3.5	25.5
Front fork inner rod lock-nut	20	2.0	14.5
Front fork damper rod bolt	35	3.5	25.5
Front axle bolt	100	10.0	72.5
Front axle pinch bolt	23	2.3	16.5
Handlebar clamp bolt	23	2.3	16.5
Clutch lever pivot bolt	1.0	0.1	0.7
Clutch lever lock-nut	6.0	0.6	4.5
Brake lever pivot bolt	1.0	0.1	0.7
Brake lever lock-nut	6.0	0.6	4.5
Front brake master cylinder mounting bolt	10	1.0	7.0
Front brake caliper mounting bolt	35	3.5	25.5
Front brake caliper housing bolt	22	2.2	16.0
Front brake pad mounting pin	15	1.5	11.0
Brake hose union bolt	23	2.3	16.5
Clutch lever holder mounting bolt	10	1.0	7.0
Air bleeder valve (Front and rear brake caliper)	7.5	0.75	5.5
Air breeder valve (Master cylinder)	6.0	0.6	4.5
Brake disc bolt (Front)	23	2.3	16.5
Brake disc bolt (Rear)	35	3.5	25.5
Rear brake caliper mounting bolt	17	1.7	12.5
Rear brake caliper pin bolt	32	3.2	23.0
Rear brake pad mounting pin	15	1.5	11.0
Rear brake master cylinder mounting bolt	10	1.0	7.0
Rear brake master cylinder rod lock-nut	18	1.8	13.0
Front footrest bracket mounting bolt	23	2.3	16.5
Swingarm pivot shaft	15	1.5	11.0
Swingarm pivot nut	100	10.0	72.5
Swingarm pivot lock-nut	90	9.0	65.0
Cushion lever mounting nut	98	9.8	71.0
Cushion rod mounting nut	78	7.8	56.5
Rear shock absorber mounting bolt and nut	50	5.0	26.0
(Upper and Lower)	50	5.0	36.0
Rear axle nut	100	10.0	72.5
Rear sprocket nut	93	9.3	67.5
Side-stand mounting bracket bolt	50	5.0	36.0
Rear shock absorber bracket nut	115	11.5	83.0
Cowling brace bolt and nut	23	2.3	16.5

ITEM	N⋅m	kgf-m	lb-ft
Seat rail bolt	50	5.0	36.0
Rear view mirror nut	10	1.0	7.0

#### **TIGHTENING TORQUE CHART**

For other nuts and bolts not listed in the preceding page, refer to this chart:

<b>Bolt Diameter</b>	Conventi	onal or "4" ma	rked bolt	61	7" marked bol	t
<b>(mm)</b>	N⋅m	kgf-m	lb-ft	N⋅m	kgf-m	lb-ft
4	1.5	0.15	1.0	2.3	0.23	1.5
5	3	0.3	2.0	4.5	0.45	3.0
6	5.5	0.55	4.0	10	1.0	7.0
8	13	1.3	9.5	23	2.3	16.5
10	29	2.9	21.0	50	5.0	36.0
12	45	4.5	32.5	85	8.5	61.5
14	65	6.5	47.0	135	13.5	97.5
16	105	10.5	76.0	210	21.0	152.0
18	160	16.0	115.5	240	24.0	173.5







Conventional bolt

"4" marked bolt

"7" marked bolt

## **SERVICE DATA VALVE + VALVE GUIDE**

Unit: mm (in)

ITEM		STANDARD	LIMIT
Valve diam.	IN.	29.0 (1.14)	_
	EX.	23.0 (0.91)	_
Valve clearance (when cold)	IN.	0.08 - 0.18 (0.0031 - 0.0071)	_
	EX.	0.18 - 0.28 (0.0071 - 0.0110)	_
Valve guide to valve stem clearance	IN.	0.010 - 0.037 (0.0004 - 0.0015)	_
	EX.	0.030 - 0.057 (0.0012 - 0.0022)	_
Valve guide I.D.	IN. & EX.	4.500 - 4.512 (0.1772 - 0.1776)	_
Valve stem O.D.	IN.	4.475 - 4.490 (0.1762 - 0.1768)	_
	EX.	4.455 - 4.470 (0.1754 - 0.1760)	_
Valve stem deflection	IN. & EX.		0.25 (0.010)
Valve stem runout	IN. & EX.	_	0.05 (0.002)
Valve seat width	IN. & EX.	0.9 - 1.1 (0.035 - 0.043)	_
Valve head radial runout	IN. & EX.	_	0.03 (0.001)
Valve spring free length	IN. & EX.	_	37.1 (1.46)
Valve spring tension	IN. & EX.	Approx. 147 N (15.0 kgf, 33.1 lbs) at length 33.55 mm (1.32 in)	_

# **CAMSHAFT + CYLINDER HEAD**

Unit: mm (in)

ITEM		STANDARD	LIMIT
Cam height	IN.	36.78 - 36.83 (1.448 - 1.450)	35.48 (1.397)
	EX.	35.38 - 35.43 (1.393 - 1.395)	35.08 (1.381)
Camshaft journal oil clearance	IN. & EX.	0.032 - 0.066 (0.0013 - 0.0026)	0.150 (0.0059)
Camshaft journal holder I.D.	IN. & EX.	24.012 - 24.025 (0.9454 - 0.9459)	
Camshaft journal O.D.	IN. & EX.	23.959 - 23.980 (0.9433 - 0.9441)	
Camshaft runout	_		0.10 (0.004)
Cam chain pin (at arrow "3")		_	
Cylinder head distortion			0.20 (0.008)

### **CYLINDER + PISTON + PISTON RING**

Unit: mm (in)

ITEM			STANDARD	LIMIT
Compression pressure		(1	1 300 – 1 700 kPa 3 – 17 kgf/cm², 185 – 242 psi)	1 000 kPa (10 kgf/cm², 142 psi)
Compression pressure difference			_	200 kPa (2 kgf/cm², 28 psi)
Piston to cylinder clearance			0.030 - 0.040 (0.0012 - 0.0016)	0.120 (0.0047)
Cylinder bore			70.000 – 70.015 (2.7559 – 2.7565)	Nicks or Scratches
Piston diam.	Mea	asure	69.965 – 69.980 (2.7545 – 2.7551) at 15 mm (0.6 in) from the skirt end.	69.880 (2.7512)
Cylinder distortion			_	0.02 (0.008)
Piston ring free end gap	1st	R	Approx. 9.2 (0.36)	7.3 (0.29)
	2nd	R	Approx. 7.3 (0.29)	5.8 (0.23)
Piston ring end gap	1st	R	0.06 - 0.21 (0.002 - 0.008)	0.50 (0.020)
	2nd	R	0.06 - 0.18 (0.002 - 0.007)	0.50 (0.020)
Piston ring to groove clearance	1st		_	0.180 (0.0071)
	2n	d	_	0.150 (0.0059)
Piston ring groove width	1s	t	1.01 - 1.03 (0.0398 - 0.0406)	_
	2n	d	0.81 - 0.83 (0.0319 - 0.0327)	
	Oi	l	1.51 - 1.53 (0.0594 - 0.0602)	_
Piston ring thickness	1s	t	0.97 - 0.99 (0.0382 - 0.0390)	_
	2n	d	0.77 - 0.79 (0.0303 - 0.0311)	_
Piston pin bore I.D.			15.002 - 15.008 (0.5906 - 0.5909)	15.030 (0.5917)
Piston pin O.D.			14.995 – 15.000 (0.5903 – 0.5512)	14.980 (0.5898)

### **CONROD + CRANKSHAFT**

Unit: mm (in)

ITEM		STANDARD	LIMIT
Conrod small end I.D.	15.010 – 15.018 (0.5909 – 0.5913)		15.040 (0.5921)
Conrod big end side clearance		0.10 - 0.20 (0.004 - 0.008)	0.30 (0.012)
Conrod big end width		_	
Crank pin width		_	
Conrod big end oil clearance		0.080 (0.0031)	
Crank pin O.D.	32.976 – 33.000 (1.2983 – 1.2992)		_
Crankshaft journal oil clearance	0.010 - 0.028 (0.0004 - 0.0011)		0.080 (0.0031)
Crankshaft journal O.D.	31.982 – 32.000 (1.2591 – 1.2598)		_
Crankshaft thrust bearing thickness	Right side 2.425 – 2.450 (0.0955 – 0.0965)		_
	Left side	2.350 - 2.500 (0.0925 - 0.0984)	_
Crankshaft thrust clearance	0.055 - 0.110 (0.0022 - 0.0043)		_
Crankshaft runout		<del>-</del>	0.05 (0.002)

**BALANCER** Unit: mm (in)

ITEM	STANDARD	LIMIT
Balancer shaft journal oil clearance	0.028 - 0.052 (0.0011 - 0.0020)	0.080 (0.0031)
Balancer shaft journal O.D.	22.976 - 22.992 (0.9046 - 0.9052)	_

# **OIL PUMP**

ITEM	STANDARD	LIMIT
Oil pressure (at 60 °C, 140 °F)	100 – 400 kPa (1.0 – 4.0 kgf/cm², 14 – 57 psi) at 3 000 r/min	_

CLUTCH Unit: mm (in)

ITEM		STANDARD			
Clutch lever play		10 – 15 (0.4 – 0.6)			
Clutch release screw		1/2 turn back	_		
Drive plate thickness	No. 1, 2 and 3	2.72 - 2.88 (0.107 - 0.113)	2.42 (0.095)		
Drive plate claw width	No. 1, 2 and 3	13.85 – 14.04 (0.5453 – 0.5528)	13.05 (0.5138)		
Driven plate distortion		_			
Clutch spring free length		56.0 (2.205)			
Clutch lifter adjusting pin screw height		_			
Wave spring washer height		_	4.30 (0.169)		

### **TRANSMISSION + DRIVE CHAIN**

Unit: mm (in) Except ratio

ITEI	M		STANDARD	LIMIT
Primary reduction ratio		1.761 (74/42)		_
Final reduction ratio	0		2.647 (45/17)	_
Gear ratios	Low		2.785 (39/14)	_
	2nd		2.052 (39/19)	_
	3rd		1.714 (36/21)	_
	4th		1.500 (36/24)	_
	5th		1.347 (31/23)	_
	Тор		1.208 (29/24)	_
Shift fork to groove	clearance	0.10 - 0.30 (0.004 - 0.012)		0.50 (0.020)
Shift fork groove wi	dth	5.0 - 5.1 (0.197 - 0.201)		_
Shift fork thickness		4.8 – 4.9 (0.189 – 0.193)		_
Drive chain		Туре	RK525ROZ5Y	_
		Links	116 links	_
		20-pitch length	_	319.4 (12.57)
Drive chain slack (on side-stand)			20 – 30 (0.79 – 1.18)	_
Gearshift lever heig	ght	65 – 75 (2.56 – 2.95)		_

#### THERMOSTAT + RADIATOR + FAN + COOLANT

ITEM	S	TANDARD/SPECIFICATION	NOTE
Thermostat valve opening temperature	Approx. 82 °C (180 °F)		_
Thermostat valve lift	8 mm (	0.31 in) and over at 95 °C (203 °F)	
ECT sensor resistance	20 °C (68 °F)	Approx. 2.45 kΩ	_
	50 °C (122 °F)	Approx. 0.811 kΩ	
	80 °C (176 °F)	Approx. 0.318 kΩ	_
	110 °C (230 °F)	Approx. 0.142 kΩ	_
Radiator cap valve opening pressure	(1.1		
Cooling fan operating temperature	OFF→ON	Approx. 105 °C (221 °F)	_
	ON→OFF	Approx. 100 °C (212 °F)	_
Engine coolant type	Use an ant	ifreeze/coolant compatible with alumi-	
	num radiato	_	
	ratio of 50:50.		
Engine coolant	Reservoir Approx. 250 ml tank side (0.3/0.2 US/lmp qt)		
	Engine side	Approx. 2 400 ml (2.5/2.1 US/lmp qt)	_

#### INJECTOR + FUEL PUMP + FUEL PRESSURE REGULATOR

ITEM	SPECIFICATION	NOTE
Injector resistance (primary and secondary)	11 – 13 Ω at 20 °C (68 °F)	
Fuel pump discharge amount	168 ml (5.7/5.9 US/lmp oz) and more/10 sec.	
Fuel pressure regulator operating set pressure	Approx. 300 kPa (3.0 kgf/cm², 43 psi)	

### **FI SENSORS**

ITEM	SPECIFICATION		NOTE
CKP sensor resistance	142 – 194 Ω		
CKP sensor peak voltage	0.28 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		Approx. 4.68 kΩ	
	Closed	Approx. 1.1 kΩ	
	Opened	Approx. 4.3 kΩ	
TP sensor output voltage	Closed	Approx. 1.1 V	
	Opened	Approx. 4.3 V	
ECT sensor input voltage		4.5 – 5.5 V	
ECT sensor output voltage		0.15 – 4.85 V	
ECT sensor resistance	Ap	prox. 2.45 kΩ at 20 °C (68 °F)	
IAT sensor input voltage	-	4.5 – 5.5 V	
IAT sensor output voltage		0.15 – 4.85 V	
IAT sensor resistance	Ap	prox. 2.45 kΩ at 20 °C (68 °F)	
AP sensor input voltage	-	4.5 – 5.5 V	
AP sensor output voltage	Appro	ox. 3.6 V at 760 mmHg (100 kPa)	
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		80 V and more	When cranking
STP sensor input voltage		4.5 – 5.5 V	
STP sensor resistance		Approx. 4.69 kΩ	
	Closed	Approx. 0.5 kΩ	
	Opened	Approx. 3.9 kΩ	
STP sensor output voltage	Closed	Approx. 0.5 V	
	Opened	Approx. 3.9 V	
STV actuator resistance		Approx. 6.5 Ω	
EXCVA position sensor input voltage		4.5 – 5.5 V	
EXCVA position sensor resistance		At adjustment position	
EXCVA position sensor output volt-	Closed	0.5 – 1.3 V	
age	Opened	3.7 – 4.5 V	
PAIR control solenoid valve resistance	18 –	22 Ω at 20 – 30 °C (68 – 86 °F)	
HO2 sensor output voltage	(	0.4 V and less at idle speed	E-02, 19
	0	.6 V and more at 5 000 r/min	E-02, 19
HO2 sonsor resistance		4 – 5 Ω at 23 °C	E-02, 19

# THROTTLE BODY

ITEM	SPECIFICATION
Bore size	42 mm
I.D. No.	02H1 (For E-33), 02H0 (For the others)
Idle r/min	1 200 ± 100 r/min
Fast idle r/min	1 500 – 2 000 r/min (When cold engine)
Throttle cable play	2.0 – 4.0 mm (0.08 – 0.16 in)

**ELECTRICAL** Unit: mm (in)

EM			SPECIFICATION	NOTE	
			1.2.4.3		
Spark plug		Type NGK: CR9E DENSO: U27ESR-N			
		Gap 0.7 - 0.8 (0.028 - 0.031)			
e			Over 8 (0.3) at 1 atm.		
tance			142 $-$ 194 $\Omega$		
voltage			0.28 V and more		
ance		Primary	1.1 – 1.9 Ω	Terminal – Terminal	
		Secondary	10.8 – 16.2 kΩ	Plug cap – Terminal	
ry peak volta	ge	80 V and more			
istance		0.2 – 1.0 Ω			
Generator no-load voltage (When engine is cold)		65 V (AC) and more at 5 000 r/min			
sh length			10 mm (0.39 in)	6.5 (0.26)	
)		,	14.0 – 15.5 V at 5 000 r/min		
tance		3 – 6 Ω			
,		0.6 V and more (From 1st to Top)			
Type designatio	n	YT12A-BS			
Capacity	,	12 V 36 kC (10 Ah)/10 HR			
l la a alli ala t	HI				
neadiigni	LO		10 A		
Signal		15 A			
Ignition			10 A		
Fuel		10 A			
Fan					
Main			30 A		
	e ance voltage ance ry peak voltage stance voltage old) sh length tance Capacity Headlight Signal Ignition Fuel Fan	e ance voltage ance ry peak voltage istance I voltage old) sh length tance  Type designation Capacity Headlight HI LO Signal Ignition Fuel Fan	Type Gap  e ance voltage ance Primary Secondary  ry peak voltage istance I voltage old) Sh length tance  Type designation Capacity Headlight HI LO Signal Ignition Fuel Fan	Type	

WATTAGE Unit: W

ITEM		STANDARD/SPECIFICATION				
		E-03, 28, 33	Others			
Headlight	HI	65	<b>←</b>			
	LO	55	<b>←</b>			
Position/Parking light		5 × 2	<b>←</b>			
Brake light/Taillight		LED	<b>←</b>			
Turn signal light		21 × 4	<b>←</b>			
License plate light		5	<b>←</b>			
Combination meter light		LED	<b>←</b>			
Turn signal indicator light		LED	<b>←</b>			
High beam indicator light		LED	<b>←</b>			
Neutral indicator light		LED	<b>←</b>			
FI indicator light/Oil pressure indicator light/Engine coolant temp. indicator light		LED	<b>←</b>			
Fuel level indicator light		LED	<b>←</b>			
Engine RPM indicator light		LED	<b>←</b>			
Immobilizer indicator light			LED			

# **BRAKE + WHEEL**

Unit: mm (in)

ITEM		STANDARD		
Rear brake pedal height		65 – 75 (2.56 – 2.95)		
Brake disc thickness	Front	5.3 – 5.7 (0.209 – 0.224)		5.0 (0.20)
	Rear		4.8 - 5.2 (0.189 - 0.205)	4.5 (0.18)
Brake disc runout			_	0.30 (0.012)
Master cylinder bore	Front		19.050 – 19.093 0.7500 – 0.7517)	
	Rear	Rear 14.000 – 14.043 (0.5512 – 0.5529)		_
Master cylinder piston diam	Front	19.018 – 19.034 (0.7487 – 0.7494)		_
	Rear	13.957 - 13.984 (0.5495 - 0.5506)		_
Brake caliper cylinder bore	Front	Leading	30.280 - 30.356 (1.1921 - 1.1951)	_
	FIOIII	Trailing	34.010 - 34.086 (1.3390 - 1.3420)	_
	Rear		38.180 - 38.256 1.5031 - 1.5062)	_
Brake caliper piston diam	Front	Leading	30.150 - 30.200 (1.1870 - 1.1890)	_
	FIOIIL	Trailing	33.884 - 33.934 (1.3340 - 1.3360)	_
	Rear	38.098 - 38.148 (1.4999 - 1.5019)		_
Brake fluid type		DOT 4 —		

ITEM		STANDARD		
Wheel rim runout	Axial	_	2.0 (0.08)	
	Radial	_	2.0 (0.08)	
Wheel rim size	Front	17 M/C × MT 3.50	_	
	Rear	17 M/C × MT 5.50	_	
Wheel axle runout	Front	_	0.25 (0.010)	
	Rear	_	0.25 (0.010)	

## **TIRE**

ITEM		STANDARD	LIMIT
Cold inflation tire pressure (Solo riding)	Front	250 kPa (2.50 kgf/cm², 36 psi)	_
	Rear	290 kPa (2.90 kgf/cm², 42 psi)	_
Cold inflation tire pressure (Dual riding)	Front	250 kPa (2.50 kgf/cm², 36 psi)	_
	Rear	290 kPa (2.90 kgf/cm², 42 psi)	_
Tire size	Front	120/70 ZR17 M/C (58 W)	_
	Rear	180/55 ZR17 M/C (73 W)	_
Tire type	Front	BRIDGESTONE: BT014F SJ	_
	Rear	BRIDGESTONE: BT014R W	_
Tire tread depth (Recommended depth)	Front	_	1.6 (0.06)
	Rear	_	2.0 (0.08)

**SUSPENSION** Unit: mm (in)

ITEM		STANDARD	LIMIT	
Front fork stroke				
Front fork spring free length		264.8 (10.43)	259.5 (10.22)	
Front fork oil level (without spring, outer tube fully compressed)		112 (4.41)		
Front fork oil type	SUZUKI FO	RK OIL SS-05 or equivalent fork oil	_	
Front fork oil capacity (each leg)		408 ml (13.8/14.4 US/Imp oz)		
Front fork inner tube O.D.		41 (1.61)		
Front fork spring adjuster	7 t	urns from softest position	_	
Front fork damping force adjuster	Rebound	1-1/2 turns from stiffest position	_	
	Compression	1-3/4 turns from stiffest position	_	
Rear shock absorber spring pre-set length		181.4 (7.14)	_	
Rear shock absorber damping	Rebound	1-1/2 turns from stiffest position	_	
force adjuster	Compression	Lo: 1-3/4 turns from stiffest position Hi: 3 turns from stiffest position		
Rear wheel travel				
Swingarm pivot shaft runout		(5.12) —		

## **FUEL + OIL**

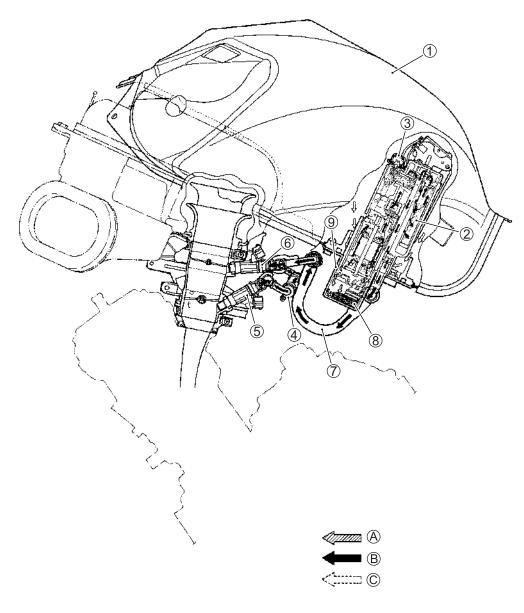
ITEM		NOTE		
Fuel type	Use only unle	Use only unleaded gasoline of at least 90 pump		
	octane (R/2 +			
	Gasoline cont	aining MTBE (Methyl Tertiary Butyl	E-03, 28, 33	
	Ether), less th	nan 10% ethanol, or less than 5%	L-03, 26, 33	
	methanol with	appropriate cosolvents and corro-		
	sion inhibitor is	s permissible.		
		d should be graded 95 octane or eaded gasoline is recommended.	Others	
Fuel tank capacity	Including	15.5 L (4.1/3.4 US/lmp gal)	E-33	
	reserve	16.5 L (4.4/3.6 US/Imp gal)	Others	
	Fuel level indicator light lighting	Approx. 3.5 L (3.7/3.1 US/Imp gal)		
Engine oil type	SAE 10 W-40,	API SF/SG or SH/SJ with JASO MA		
Engine oil capacity	Change	2.2 L (2.3/1.9 US/Imp qt)		
	Filter change	2.5 L (2.6/2.2 US/Imp qt)		
	Overhaul	2.9 L (3.1/2.6 US/Imp qt)		

# **EMISSION CONTROL INFORMATION**

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### **EMISSION CONTROL SYSTEMS FUEL INJECTION SYSTEM**

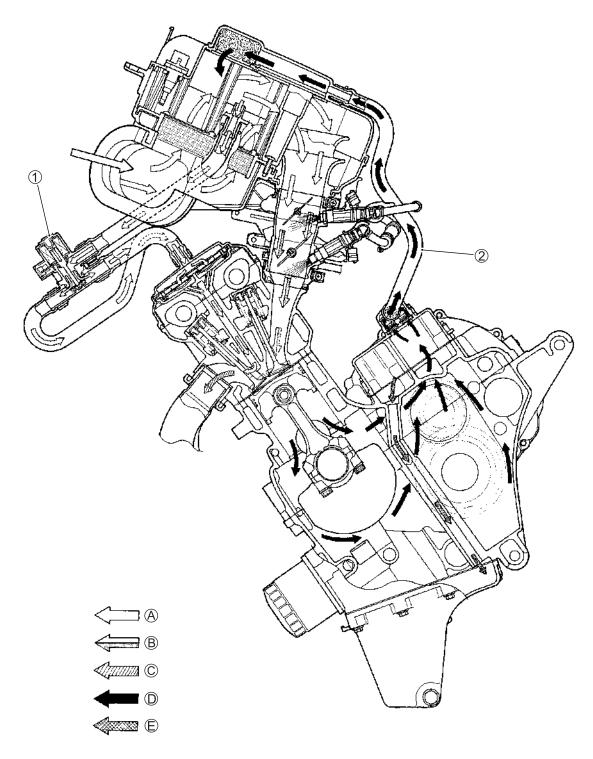
GSX-R750 motocycles are equipped with a fuel injection system for emission level control. This fuel injection system is precision designed, manufactured and adjusted to comply with the applicable emission limits. With a view to reducing CO, NOX and HC, all of the fuel injection volumes are stringently controlled with the programmed injection maps in the ECM by varying engine conditions. Adjusting, interfering with, improper replacement, or resetting of any of the fuel injection components may adversely affect injection performance and cause the motorcycle to exceed the exhaust emission level limits. if unable to effect repairs, contact the distributor's representative for further technical information and assistance.



1	Fuel tank	7	Fuel feed hose
2	Fuel filter (For high pressure)	8	Fuel mesh filter (For low pressure)
3	Fuel pressure regulator	9	Fuel pump
4	Fuel delivery pipe	A	Before-pressurized fuel
<b>⑤</b>	Primary fuel injector	$^{\odot}$	Pressurized fuel
6	Secondary fuel injector	$\bigcirc$	Relieved fuel

### **CRANKCASE EMISSION CONTROL SYSTEM**

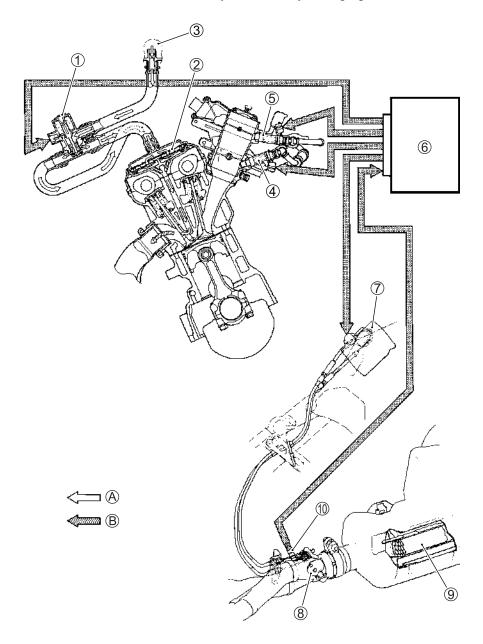
The engine is equipped with a PCV system. Blow-by gas in the engine is constantly drawn into the crankcase, which is returned to the combustion chamber through the PCV (breather) hose, air cleaner and throttle body.



1	PAIR control solenoid valve	©	EXHAUSTGAS
2	PCV hose	<b>D</b>	BLOW-BY GAS
A	FRESH AIR	E	RETURN OIL
$^{\odot}$	FUEL/AIR MIXTURE		

### **EXHAUST EMISSION CONTROL SYSTEM (PAIR SYSTEM)**

The exhaust emission control system is composed of the PAIR system, exhaust control system and three-way catalyst system. The fresh air is drawn into the exhaust port through 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. The exhaust gas flow is performed by the exhaust control valve actuator which is controlled by the ECM by changing the exhaust control valve angle.



1	PAIR control solenoid valve	7	Exhaust control valve actuator
2	PAIR reed valve	8	Exhaust control valve
3	Air cleaner box	9	Three-way catalyst
4	Primary fuel injector	10	HO2 sensor (For E-02, 19)
<b>⑤</b>	Secondary fuel injector	A	FRESH AIR
6	ECM	$^{\circ}$	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.

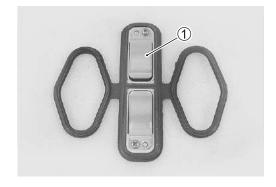
# PAIR (AIR SUPPLY) SYSTEM AND EMISSION CONTROL SYSTEM **INSPECTION**

### 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. ( 3-14)
- 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.
- · Install the PAIR reed valve assembly on the cam shaft journal holder with facing the projection A exhaust side.
- Install the cylinder head cover. ( 3-102)



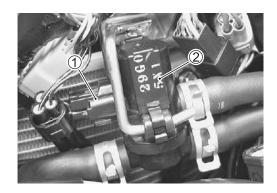
#### **PCV HOSE**

- · Remove the PCV hose between air cleaner box and 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. ( 5-14)
- Disconnect the PAIR control solenoid valve lead wire coupler
   and PAIR hoses.
- Remove the PAIR control solenoid valve 2.

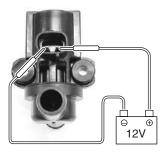


- Check that air flows through the air inlet port to the air outlet port.
- If air does not flow out, replace the PAIR control solenoid valve with a new one.

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/68 °F - 30 °C/86 °F)

09900-25008: Multi-circuit tester set

Tester knob indication: Resistance ( $\Omega$ )

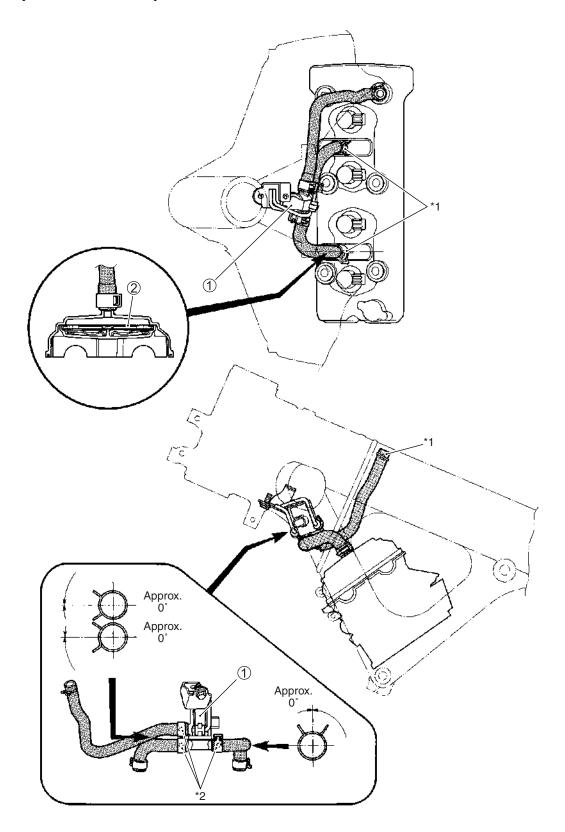


If the resistance is not within the standard range, replace the PAIR control solenoid valve with a new one.

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

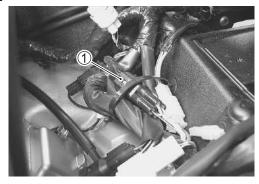


1	PAIR control solenoid valve	*1	White marking
2	PAIR reed valve	*2	Yellow marking (Opposite side)

### **HO2 SENSOR INSPECTION (For E-02, 19)**

The HO2 sensor coupler ① is located under the fuel tank.

• 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/73 °F (W - W)

09900-25008: Multi-circuit tester set

 $\square$  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

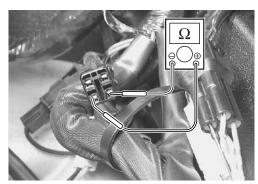
Do not remove the HO2 sensor while it is hot.

#### CAUTION

Be careful not to expose it to excessive shock.

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

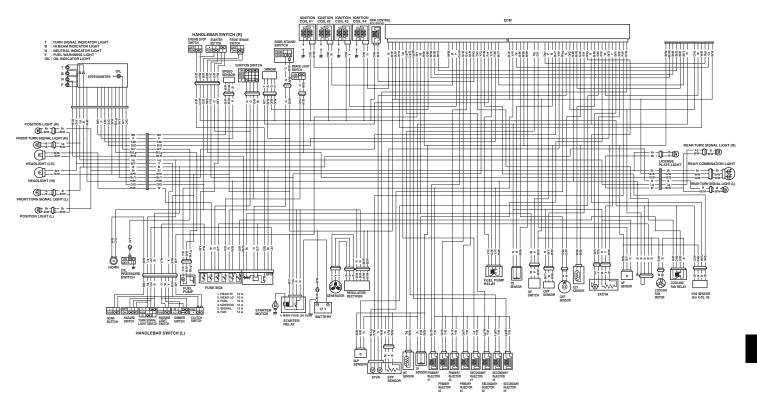
Be careful not to twist or damage the sensor lead wire.



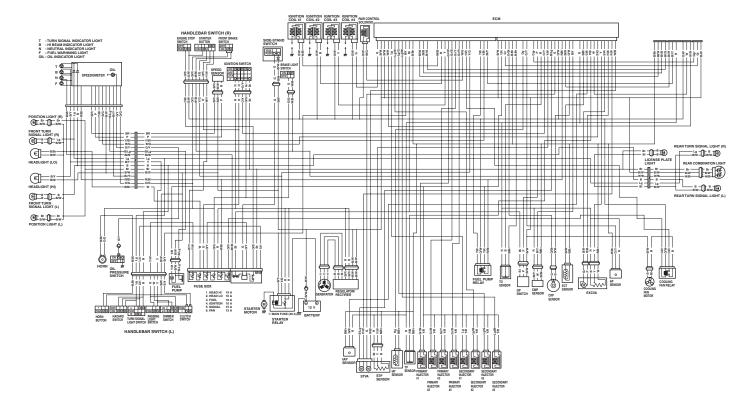
#### **WIRING DIAGRAM**

E-02, 19, 24

Wiring diagrams wire color, refer to section "WIRE COLOR".



#### E-03, 28, 33



Prepared by

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