
1999
2000
Hayabusa
GSX1300R
2001
2002
2003
2002 Special Edition
2003 40th Anniversary Edition
2003 Midnight Black
2003: www.industrialartistry.com

FOREWORD

This manual contains an introductory description on the SUZUKI GSX1300R 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.

IMPORTANT

All street-legal Suzuki motorcycles with engine displacement of 50 cc or greater are subject to Environmental Protection agency emission regulations. These regulations set specific standards for exhaust emission output levels as well as particular servicing requirements. This manual includes specific information required to properly inspect and service GSX1300R in accordance with all EPA regulations. It is strongly recommended that the chapter on Emission Control, Periodic Servicing and Carburetion be thoroughly reviewed before any type of service work is performed.
Further information concerning the EPA emission regulations and U.S. Suzuki's emission control program can be found in the U.S. SUZUKI EMISSION CONTROL PROGRAM MANUAL/SERVICE BULLETIN.

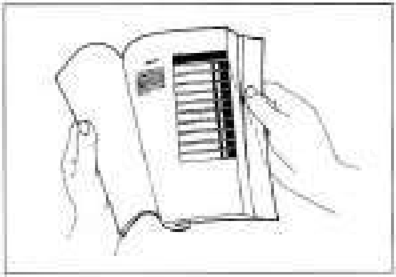
SUZUKI MOTOR CORPORATION
Motorcycle Service Department

GROUP INDEX

HOW TO USE THIS MANUAL

TO LOCATE WHAT YOU ARE LOOKING FOR:

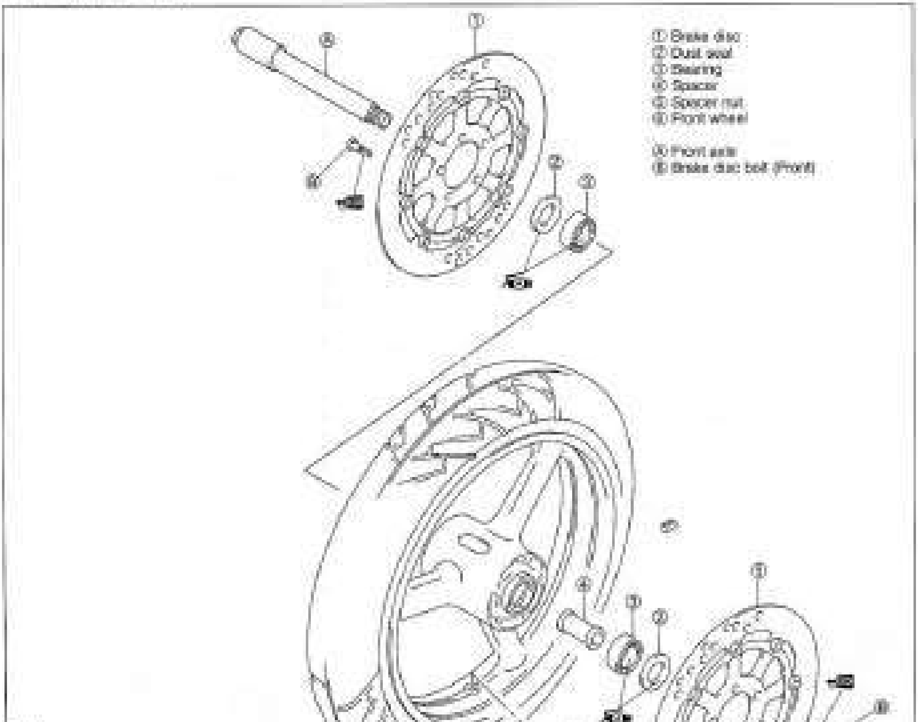
1. The text of this manual is divided into sections.
2. The section titles are listed in the GROUP INDEX.
3. Holding the manual as shown at the right will allow you to find the first page of the section easily.
4. The contents are listed on the first page of each section to help find the item and page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



ITEM	N·m	kgf-m	lb-ft
Ⓐ	100	[illegible]	[illegible]
Ⓑ	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
	Torque control required. Data beside it indicates specified torque.	LLC	Use engine coolant.
OIL	Apply oil. Use engine oil unless otherwise specified.	FORK	Use fork oil. 99000-99044-L01
M/O	Apply molybdenum oil solution. (Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1:1)	BF	Apply or use brake fluid.
A	Apply SUZUKI SUPER GREASE "A". 99000-25030 (For USA) 99000-25010 (For the other countries)	V	Measure in voltage range.
M	Apply SUZUKI MOLY PASTE. 99000-25140	A	Measure in current range.
1207B	Apply SUZUKI BOND "1207B". 99104-31140 (for USA) 99000-31140 (for the other countries)		Measure in diode test range.
1303	Apply THREAD LOCK SUPER "1303". 99000-32030		Measure in continuity test range.
1342	Apply THREAD LOCK "1342". 99000-32050	TOOL	Use special tool.
1360	Apply THREAD LOCK SUPER "1360". 99000-32130	DATA	Indication of service data.

ABBREVIATIONS MAY BE USED IN THIS MANUAL

A

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

B

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

C

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

D

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

E

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)

F

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

G

GEN	: Generator
GND	: [illegible]
GP Switch	: Gear Position Switch

H

HC	: Hydrocarbons

I

IAC Valve Actuator	: Intake Air Control Valve Actuator
IAP Sensor	: Intake Air Pressure Sensor (IAPS)
IAT Sensor	: Intake Air Temperature Sensor (IATS)
IG	: Ignition

L

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

M

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

N

NOx	: Nitrogen Oxides

O

OHC	: Over Head Camshaft
OPS	: Oil Pressure Switch

P

PCV	: Positive Crankcase Ventilation (Crankcase Breather)

R

RH	: Right Hand
ROM	: Read Only Memory

S

SAE	: Society of Automotive Engineers

T

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

V

VCSV	: Vacuum Control Solenoid Valve
[illegible]	: [illegible]per
VTV	: Vacuum Transmitting Valve

SEA-TO-FORMER SUZUKI TERM(ONLY FOR U.S.A.)

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

SAE TERM		FORMER SUZUKI TERM
FULL TERM	ABBREVIATION	
A		
Air Cleaner	ACL	Air Cleaner, Air Cleaner Box
B		
Barometric Pressure	BARO	Barometric Pressure, Atmospheric Pressure
Battery Positive Voltage	B+	Battery Voltage, +B
C		
Camshaft Position Sensor	CMP Sensor	Camshaft Position Sensor(CMPS)
Crankshaft Position Sensor	CKP Sensor	Crankshaft Position Sensor(CKPS), Crank Angle
D		
Data Link Connector	DLC	Dealer Mode Coupler
Diagnostic Test Mode	DTM	——
Diagnostic Trouble Code	DTC	Diagnostic Code, Malfunction Code
E		
Electronic Ignition	EI	——
Engine Control Module	ECM	Engine Control Module (ECM) FI Control Unit, Engine Control Unit(ECU)
Engine Coolant Level	ECL	Coolant Level
Engine Coolant Temperature	ECT	Coolant Temperature, Engine Coolant Temperature Water Temperature
Engine Speed	RPM	Engine Speed(RPM)
Evaporative Emission	EVAP	Evaporative Emission
Evaporative Emission Canister	EVAP Canister	—— (Canister)
Purge Valve	Purge Valve	Purge Valve(SP Valve)
F		
Fan Control	FC	——
Fuel Level Sensor	——	Fuel Level Sensor, Fuel Level Gauge
Fuel Pump	FP	Fuel Pump(FP)
G		
Generator	GEN	Generator
Ground	GND	Ground(GND, GRD)

SAE TERM		FORMER SUZUKI TERM
FULL TERM	ABBREVIATION	
I		
Idle Speed Control	ISC	—
Ignition Control	IC	Electronic Spark Advance(ESA)
Ignition Control Module	ICM	—
Intake Air Temperature	IAT	Intake Air Temperature(IAT), Air Temperature
M		
Malfunction Indicator Lamp	MIL	LED Lamp Malfunction Indicator Lamp(MIL)
Manifold Absolute Pressure	MAP	Intake Air Pressure, Intake Vacuum
Mass Air Flow	MAF	Air Flow
O		
On-Board Diagnostic	ODB	Self-Diagnosis Function Diagnostic
Open Loop	OL	—
P		
Programmable Read Only Memory	PROM	—
Pulsed Secondary Air Injection	PAIR	Pulse Air Control (PAIR)
R		
Random Access Memory	RAM	—
Read Only Memory	ROM	ROM
S		
Secondary Air Injection	AIR	—
T		
Throttle Body	TB	Throttle Body(TB)
Throttle Body Fuel Injection	TBI	Throttle Body Fuel Injection(TBI)
Throttle Position Sensor	TP Sensor	TP Sensor(TPS)
V		
Voltage Regulator	VR	Voltage Regulator
Volume Air Flow	[illegible]	Air Flow

GENERAL INFORMATION

1

CONTENTS

WARNING/CAUTION/NOTE

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

⚠ WARNING

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

⚠ CAUTION

Indicates a potential hazard that could result in motorcycle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

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

GENERAL PRECAUTIONS

⚠ WARNING

- **Proper service and repair procedures are important for the safety of the service mechanic and the safety and reliability of the motorcycle.**
- **When 2 or more persons work together, pay attention to the safety of each other.**
- **When it is necessary to run the engine indoors, make sure that exhaust gas is forced outdoors.**
- **When working with toxic or flammable materials, make sure that the area you work in is well-ventilated and that you follow all of the material manufacturer's instructions.**
- **Never use gasoline as a cleaning solvent.**
- **To avoid getting burned, do not touch the engine, engine oil, radiator and exhaust system until they have cooled.**
- **After servicing the fuel, oil, engine coolant, 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.
* 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 cover the positive terminal with the terminal cover.
* When performing service to electrical parts, disconnect the battery negative cable unless the service procedure requires the battery power.
* When tightening cylinder head and crankcase bolts and nuts, tighten the larger sizes first. Always tighten the bolts and nuts diagonally from the inside working out 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 the earth's natural resources, properly dispose of used motorcycles and parts.

SUZUKI GSX1300RX ('99-MODEL)

RIGHT SIDE

LEFT SIDE

* Difference between photograph and actual motorcycle depends on the markets.

SERIAL NUMBER LOCATION

The frame serial number or V.I.N. (Vehicle Identification Number) Ⓐ is stamped on the right side of the steering head pipe. The engine serial number Ⓑ is located on the rear side of the crankcase. These numbers are required especially for registering the machine and ordering spare parts.

FUEL, OIL AND ENGINE COOLANT RECOMMENDATION

FUEL (For U.S.A. model)

1. Use only unleaded gasoline of at least 87 pump octane ($\frac{R+M}{2}$) method or 91 octane or higher rated by the research method.
2. Suzuki recommends that customers use alcohol free, unleaded gasoline whenever possible.
3. Use of blended gasoline containing MTBE (Methyl Tertiary Butyl Ether) is permitted.
4. Use of blended gasoline/alcohol fuel is permitted, provided that the fuel contains not more than 10% ethanol. Gasoline/alcohol fuel may contain up to 5% methanol if appropriate cosolvents and corrosion inhibitors are present in it.
5. If the performance of the vehicle is unsatisfactory while using blended gasoline/alcohol fuel, you should switch to alcohol-free unleaded gasoline.
6. Failure to follow these guideline could possibly void applicable warranty coverage. Check with your fuel supplier to make sure that the fuel you intend to use meets the requirements listed above.

FUEL (For Canadian model)

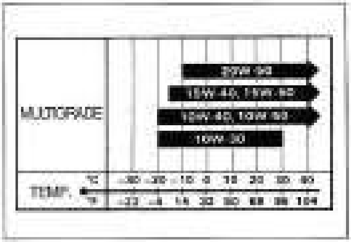
Use only unleaded gasoline of at least 87 pump octane ($\frac{R+M}{2}$) method or 91 octane or higher rated by the research method.

FUEL (For the other models)

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

ENGINE OIL (For U.S.A. model)

SUZUKI recommends the use of SUZUKI PERFORMANCE 4 MOTOR OIL or an oil which is rated SF or SG under the API (American Petroleum Institute) service classification. The recommended viscosity is SAE 10W/40. If an SAE 10W/40 oil is not available, select and alternative according to the right chart.



ENGINE OIL (For the other models)

Use a premium quality 4-stroke motor oil to ensure longer service life of your motorcycle. Use only oils which are rated SF or SG under the API service classification.
The recommended viscosity is SAE 10W-40. If an SAE 10W-40 motor oil is not available, select an alternative according to the following chart.

BRAKE FLUID

Use DOT4 brake fluid.

⚠ WARNING

Since the brake system of this motorcycle is filled with a glycol-based brake fluid by the manufacturer, do not use or mix different types of fluid such as silicone-based and petroleum-based fluid for refilling the system, otherwise serious damage will result.
Do not use any brake fluid taken from old or used or unsealed containers.
Never re-use brake fluid left over from a previous servicing, which has been stored for a long period.

FRONT FORK OIL

Use SUZUKI FORK OIL L01 or an equivalent fork oil.

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

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

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

LIQUID AMOUNT OF WATER/ENGINE COOLANT
Solution capacity (total): 2 950 ml (3.1/2.6 US/Imp qt)

For engine coolant mixture information, refer to cooling system section. (☞ 5-2)

⚠ 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.

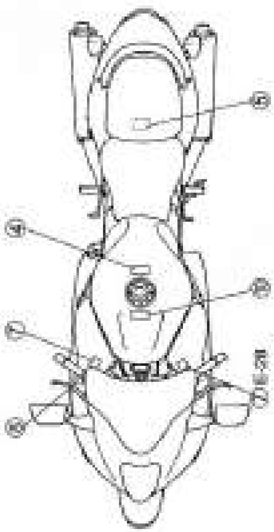
• Keep to these break-in procedures:

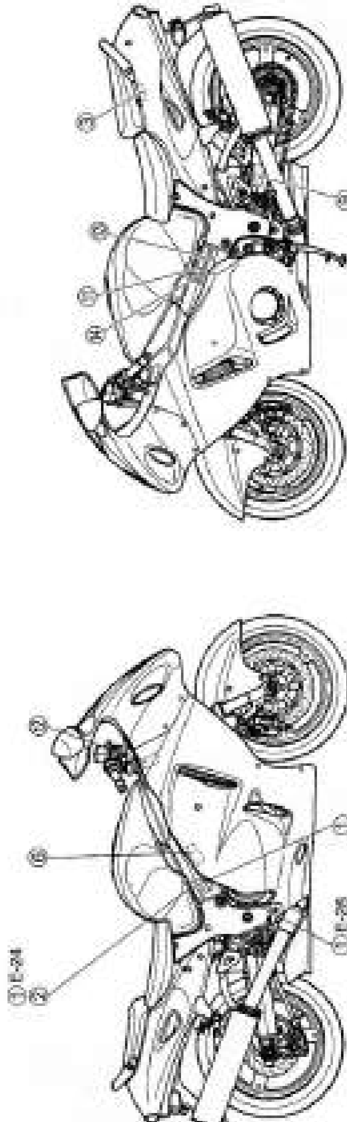
Initial	**800 km**	**(500 miles):**	**Below**	**5 500 r/min**
Up to	**1 600 km**	**(1 000 miles):**	**Below**	**8 000 r/min**
Over to	**1 600 km**	**(1 000 miles):**	**Below**	**11 000 r/min**

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

CYLINDER IDENTIFICATION
The 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





①	Noise label (For E-03, 24, 33, 34)
②	Information label (For E-03, 28, 33)
③	Vacuum hose routing label (For E-33)
④	Fuel caution label (For E-02, 19, 24)
⑤	Manual notice label (For E-03, 33)
⑥	Frame caution label (For E-03, 28, 33)
⑦	Screen warning label
⑧	Steering warning label
⑨	Tire pressure label
⑩	Warning safety label
⑪	ICES Canada label (For E-28)
⑫	I.D. plate (Except for E-03, 28, 33)
⑬	Safety plate (For E-03, 28, 33)
⑭	PPVL mark plate (For E-02)

SPECIFICATIONS

DIMENSIONS AND DRY MASS

Overall length	2 180 mm (85.8 in) .... (For E-18 model) 2 140 mm (84.3 in) .... (For the other models)
Overall width	740 mm (29.1 in)
Overall height	1 155 mm (45.5 in)
Wheelbase	1 485 mm (58.5 in)
Ground clearance	120 mm (4.7 in)
Seat height	805 mm (31.7 in)
Dry mass	216 kg (476 lbs) .... (For E-33 model) 215 kg (473 lbs) .... (For the other models)

ENGINE

Type	Four-stroke, Liquid-cooled, DOHC, TSCC,
Number of cylinders	4
Tappet clearance, IN	0.10–0.20 mm (0.004–0.008 in)
EX	0.20–0.30 mm (0.008–0.012 in)
Bore	81.0 mm (3.189 in)
Stroke	63.0 mm (2.480 in)
Piston displacement	1 299 cm^3 (79.3 cu. in)
Compression ratio	11.0 : 1
Fuel system	Fuel injection system
Air cleaner	Non-woven fabric element
Starter system	Electric starter
Lubrication system	Wet sump

TRANSMISSION

Clutch	Wet multi-plate type
Transmission	6-speed constant, mesh
Gearshift pattern	1-down, 5-up
Primary reduction ratio	1.596 (83/52)
Gear ratios, Low	2.615 (34/13)
2nd	1.937 (31/16)
3rd	1.526 (29/19)
4th	1.285 (27/21)
5th	1.136 (25/22)
Top	1.043 (24/23)
Final reduction ratio	[illegible]
Drive system	RK GB50GSV Z3, 112 links

CHASSIS

Front suspension	Inverted telescopic, coil spring, oil damped, spring pre-load fully adjustable, compression damping force 13-way adjustable, rebound damping force 14-way adjustable.
Rear suspension	Link type system, gas/oil damped, coil spring, spring pre-load fully adjustable, compression damping force 22-way adjustable, rebound damping force 22-way adjustable.
Front fork stroke	120 mm (4.7 in)
Rear wheel travel	140 mm (5.5 in)
Steering angle	30° (right & left)
Caster	24° 12'
Trail	97 mm (3.8 in)
Turning radius	3.3 m (10.8 ft)
Front brake	Disc brake, twin hydraulically operated
Rear brake	Disc brake, hydraulically operated
Front tire size	120/70 ZR17 (58 W), tubeless
Rear tire size	190/50 ZR17 (73 W), tubeless

ELECTRICAL

Ignition type	Electronic ignition (Transistorized)
Ignition timing	4° B.T.D.C. at 1 150 r/min
Spark plug	NGK CR9E, DENSO U27ESR-N
Battery	12V 36.0 kC(10 Ah)/10HR
Generator	Three-phase A.C. Generator
Main fuse	30A
Fuse	15/15/15/15/10/10A
Headlight	12V 65+55/55W
Turn signal light	12V 21W
Position light	12V 5W ....Except for E-03, 24, 28, 33 models
Brake light/Taillight	12V 21/5W×2
License plate light	12V 5W
Combination meter light	LED
Neutral indicator light	LED
High beam indicator light	LED
Turn signal indicator light	LED
Oil pressure indicator light	LED
Fuel level indicator light	LED
Engine coolant temp. indicator light	LED
FI indicator light	LED

CAPACITIES

Fuel tank, including reserve	20 L (5.3/4.4 US/Imp gal) E-33
	22 L (5.8/4.8 US/Imp gal)
Engine oil, oil change	3 300 ml (3.5/2.9 US/Imp qt)
with filter change	3 500 ml (3.7/3.1 US/Imp qt)
overhaul	4 200 ml (4.4/3.7 US/Imp qt)
Coolant	2 950 ml (3.1/2.6 US/Imp qt)
Front fork oil (each [illegible]	[illegible]

These specifications are subject to change without notice.

COUNTRY AND AREA CODES

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

CODE	COUNTRY or AREA
E-02	U.K.
E-03	USA (Except for california)
E-18	Switzerland
E-19	EU
E-24	Australia
E-28	Canada
E-33	California (USA)
P-37	[illegible]

PERIODIC MAINTENANCE

2

CONTENTS

PERIODIC MAINTENANCE SCHEDULE

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

NOTES:
More frequent servicing may be performed on motorcycles that are used under severe conditions.

IMPORTANT: 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.

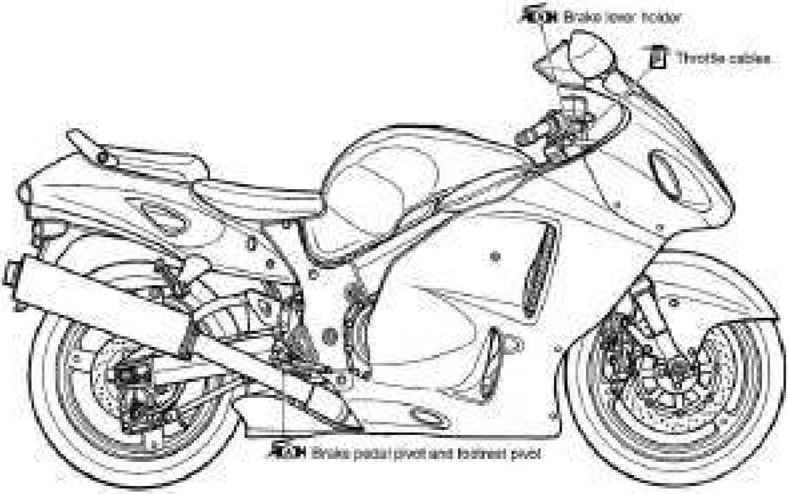
PERIODIC MAINTENANCE CHART

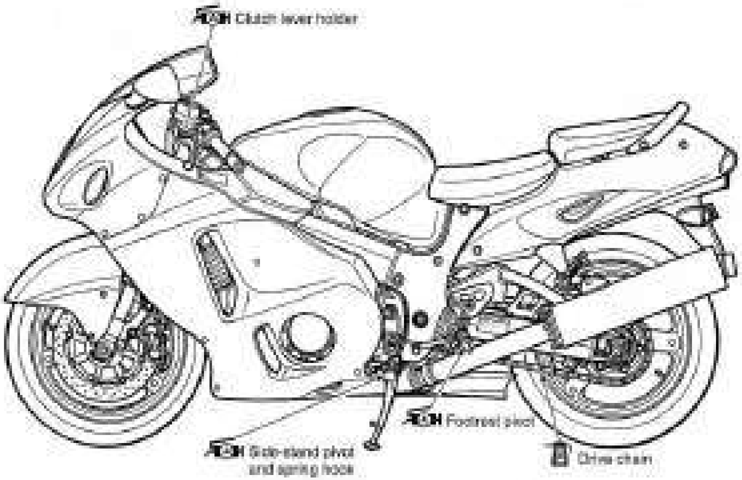
Item / Interval		1 000	6 000	12 000	18 000	24 000
	km	1 000	6 000	12 000	18 000	24 000
	miles	600	4 000	7 500	11 000	15 000
	months	1	6	12	18	24
Air cleaner		-	I	I	R	I
Spark plugs		-	I	R	I	R
Tappet clearance		-	-	-	-	I
Engine oil		R	R	R	R	R
Engine oil filter		R	-	-	R	-
Fuel hose		-	I	I	I	I
		Replace every 4 years.				
Engine idle speed		I	I	I	I	I
Throttle valve synchronization		I (E-33 only)	-	I	-	I
Evaporative emission control system (E-33 only)		-	-	I	-	I
		Replace vapor hose every 4 years.				
PAIR (air supply) system (E-33 only)		-	-	I	-	I
Throttle cable play		I	I	I	I	I
Clutch hose		-	I	I	I	I
		Replace every 4 years				
Clutch fluid		-	I	I	I	I
		Replace every 2 years				
Radiator hoses		-	I	I	I	I
Engine coolant		Replace every 2 years				
Drive chain		I	I	I	I	I
		Clean and lubricate every 1 000 km (600 miles).				
Brakes		I	I	I	I	I
Brake hoses		-	I	I	I	I
		Replace every 4 years.				
Brake fluid		-	I	I	I	I
		Replace every 2 years.				
Tire		-	I	I	I	I
Steering		I	-	I	-	I
Front forks		-	-	I	-	I
Rear suspension		-	-	I	-	I
Exhaust pipe bolt and nut		T	-	T	-	T
Chassis bolt and nuts		T	T	T	T	T

I = Inspect and adjust, clean, lubricate or replace 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 expos* *cially whenever the motorcycle has been operated under wet or rainy conditions.*

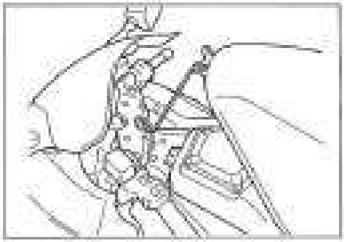
MAINTENANCE AND TUNE-UP PROCEDURES

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

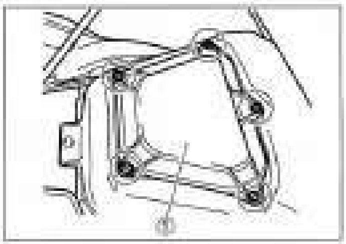
AIR CLEANER

Inspect every 6 000 km (4 000 miles, 6 months) and replace every 18 000 km (11 000 miles, 18 months).

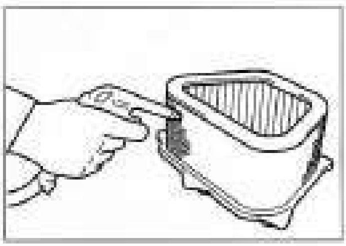
- Remove the front and rear seats. (☞ 6-11)
- Lift and support the fuel tank. (☞ 4-60)



- Remove the air cleaner element ① by removing the screws.



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



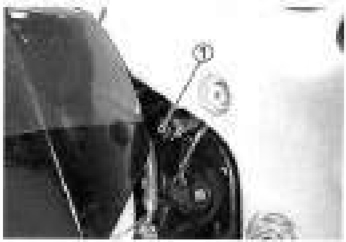
⚠ CAUTION

Always use air pressure on the outside of the air cleaner element. If air pressure is used on the inside, dirt will be forced into the pores of the air cleaner element thus restricting air flow through the air cleaner element.

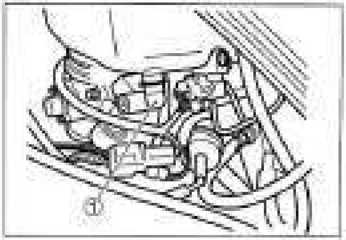
- Reinstall the cleaner element in the reverse order of removal.

▲ CAUTION

If driving under dusty conditions, clean the air cleaner element more frequently. The surest way to accelerate engine wear is to operate the engine without the element or to use a torn element. Make sure that the air cleaner is in good condition at all times. The life of the engine depends largely on this component!



- Remove the drain plugs ① from the air cleaner box to allow any water to drain out.

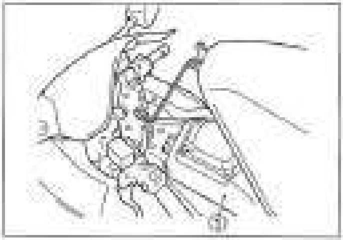


SPARK PLUG

Inspect every 6 000 km (4 000 miles, 6 months) and replace every 12 000 km (7 500 miles, 12 months).

SPARK PLUG AND IGNITION COIL/PLUG CAP REMOVAL

- Remove the front and rear seat. (☞ 8-11)
- Lift and support the fuel tank. (☞ 4-50)
- Remove the air cleaner box ①. (☞ 4-58)



- Disconnect all of the lead wire couplers from each ignition coil/plug cap and camshaft position sensor.

▲ CAUTION

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

- Remove all of the ignition coils/plug caps.

▲ CAUTION

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

- Remove the spark plugs with a spark plug wrench.

HEAT RANGE

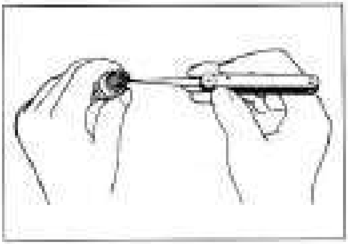
- Check to see the heat range of the plug.
  If the electrode of the plug is wet appearing or dark color, replace the plug with hotter type one. If it is white or glazed appearing, replace the plug with colder type one.

	NGK	DENSO
Hotter type	CR8E	U24ESR-N
Standard	CR9E	U27ESR-N
Colder type	CR10E	U31ESR-N

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

CARBON DEPOSITS

- Check to see if there are 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.

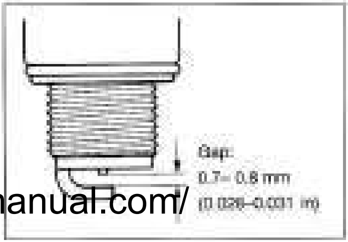


SPARK PLUG GAP

- Measure the spark plug gap using a thickness gauge.
- If out of specification, regap the spark plug.

DATA **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.

▲ CAUTION

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

SPARK PLUG AND IGNITION COIL/PLUG CAP INSTALLATION

- Install the spark plugs to the cylinder head by finger tight, and then tighten them to the specified torque.

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

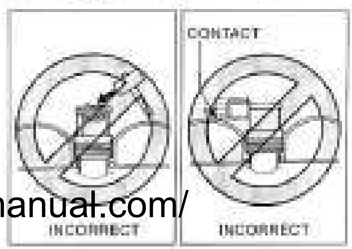
▲ CAUTION

To avoid damaging the cylinder head threads, first finger tighten the spark plug and then tighten it to the proper torque using the spark plug wrench.

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

▲ CAUTION

- **Do not strike the ignition coil/plug cap with a plastic hammer when installing it.**
- **When installing the ignition coil/plug cap, place its coupler not to contact with the cylinder head cover.**



TAPPET CLEARANCE

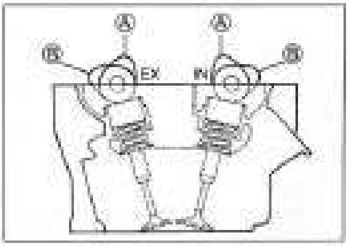
Inspect every 24 000 km (15 000 miles, 24 months).

- Remove the under cowling. (☞ 8-8)
- Remove the front and rear seats. (☞ 8-11)
- Lift and support the fuel tank. (☞ 4-50)
- Remove the spark plugs. (☞ 2-5)
- Remove the throttle body assembly. (☞ 4-60)
- Remove the heat shield rubber.
- Remove the cowling bracket.
- Remove the cylinder head covers. (☞ 3-23)

The tappet clearance specification is different for intake and exhaust valves.
Tappet 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 disturbed by removing them for servicing.

DATA **Tappet clearance (when cold)**
Standard: IN. : 0.10 – 0.20 mm (0.004 – 0.008 in)
EX.: 0.20 – 0.30 mm (0.008 – 0.012 in)

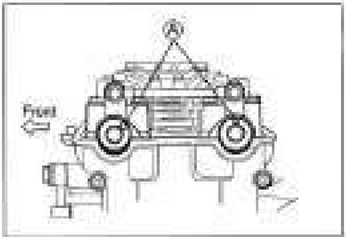
NOTE:
- *The cam must be at positions, Ⓐ or Ⓑ, in order to check the tappet clearance, or to adjust tappet clearance. Clearance readings should not be taken with the cam in any other position than these two positions.*
- *The clearance specification is for COLD state.*
- *To turn the crankshaft for clearance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



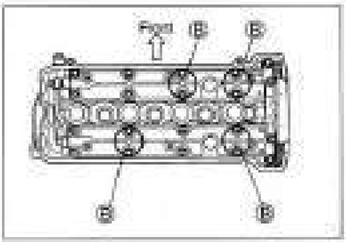
- Remove the starter clutch cover plug ① and the valve timing inspection plug ②.

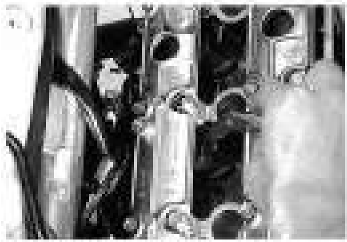
- Turn the crankshaft to bring the "Top" line on the starter clutch to the index mark of valve timing inspection hole and also to bring the notches Ⓐ on the left ends of both camshafts (Ex and In) to the positions as shown.

- In this condition, read the tappet clearance at the valves Ⓑ (In and Ex of No.4 cylinder, Ex of No.3 and In of No.2).
- If the clearance is out of specification, adjust the clearance. (☞ 2-10)

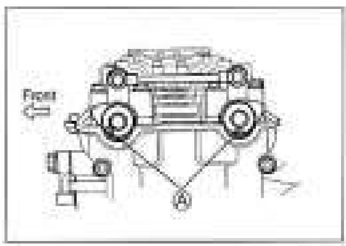


09900-20803: Thickness gauge

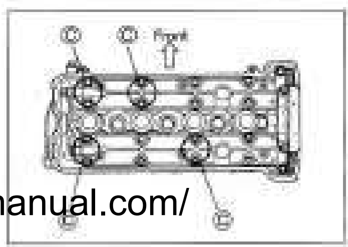




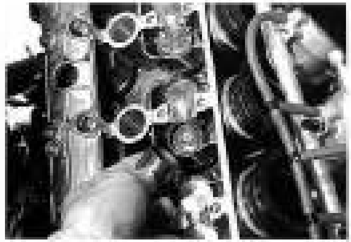
- Turn the crankshaft 360 degrees (one rotation) to bring the "TOP" line on the starter clutch to the index mark of valve timing inspection hole and also to bring the notches Ⓐ to the position as shown.
- Read the clearance at the remaining valves Ⓒ and adjust the clearance if necessary. (☞ 2-10)



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

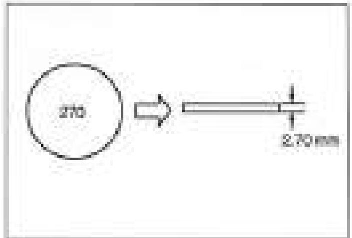


TAPPET CLEARANCE ADJUSTMENT

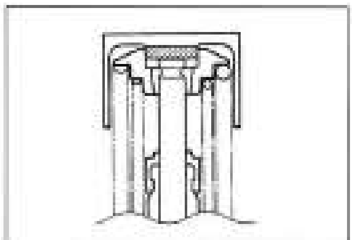


The clearance is adjusted by replacing the existing tappet shim by a thicker or thinner shim.

- Remove the intake or exhaust camshafts. (☞ 3-23)
- Remove the tappet and shim by fingers or magnetic hand.
- Check the figures printed on the shim. These figures indicate the thickness of the shim, as illustrated.
- Select a replacement shim that will provide a clearance within the specified range. For the purpose of this adjustment, a total of 25 sizes of tappet shim are available ranging from 2.30 to 3.50 mm in steps of 0.05 mm. Fit the selected shim to the valve stem end, with numbers toward tappet. Be sure to check shim size with micrometer to ensure its size. Refer to the tappet shim selection table (☞ 2-11, 2-12) for details.



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



⚠ CAUTION

Reinstall the camshafts as the specified manner. (☞ 3-122)

- 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 tappet clearance adjustment, reinstall the following items.

	Page
* Cylinder head cover	3-129
* Spark plug and plug cap	2-7
* Valve timing inspection plug	3-129
* Starter clutch cover plug	3-129
* Heat shield rubber	[illegible]
* Throttle body	4-65

(INTAKE SIDE)

TAPPET SHIM SELECTION TABLE [INTAKE]
TAPPET SHIM NO. (12892-41C00-XXX)

Option | TAPPET SHIM SET (12800-41810)

MEASURED TAPPET CLEARANCE (mm) / SUFFIX NO.	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350
PRESENT SHIM SIZE (mm)	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50
0.00 – 0.04			2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.05 – 0.09		2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.10 – 0.20	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																								
0.21 – 0.25	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50	
0.26 – 0.30	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50		
0.31 – 0.35	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50			
0.36 – 0.40	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50				
0.41 – 0.45	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50					
0.46 – 0.50	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50						
0.51 – 0.55	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50							
0.56 – 0.60	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50								
0.61 – 0.65	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50									
0.66 – 0.70	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50										
0.71 – 0.75	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50											
0.76 – 0.80	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50												
0.81 – 0.85	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50													
0.86 – 0.90	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50														
0.91 – 0.95	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50															
0.96 – 1.00	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																
1.01 – 1.05	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																	
1.06 – 1.10	3.25	3.30	3.35	3.40	3.45	3.50	3.50																		
1.11 – 1.15	3.30	3.35	3.40	3.45	3.50	3.50																			
1.16 – 1.20	3.35	3.40	3.45	3.50	3.50																				
1.21 – 1.25	3.40	3.45	3.50	3.50																					
1.26 – 1.30	3.45	3.50	3.50																						
1.31 – 1.35	3.50	3.50																							
1.36 – 1.40	3.50																								

HOW TO USE THIS CHART:

I. Measure tappet clearance. "ENGINE IS COLD"

II. Measure present shim size.

III. Match clearance in vertical column with present shim size in horizontal column.

EXAMPLE

Tappet clearance is	0.23 mm
Present shim size	2.70 mm
Shim size to be used	2.80 mm

(EXHAUST SIDE)

TAPPET SHIM SELECTION TABLE [EXHAUST]
TAPPET SHIM NO. (12892-41C00-XXX)

TAPPET SHIM SET (12800-41810)

Option: 230–245

MEASURED TAPPET CLEARANCE (mm) / SUFFIX NO.	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350
PRESENT SHIM SIZE (mm)	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50
0.00 – 0.04					2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30
0.05 – 0.09					2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35
0.10 – 0.14			2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.15 – 0.19		2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.20 – 0.30	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																								
0.31 – 0.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50	
0.36 – 0.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50		
0.41 – 0.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50			
0.46 – 0.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50				
0.51 – 0.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50					
0.56 – 0.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50						
0.61 – 0.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50							
0.66 – 0.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50								
0.71 – 0.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50									
0.76 – 0.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50										
0.81 – 0.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50											
0.86 – 0.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50												
0.91 – 0.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50													
0.96 – 1.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50														
1.01 – 1.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50															
1.06 – 1.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																
1.11 – 1.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																	
1.16 – 1.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																		
1.21 – 1.25	3.30	3.35	3.40	3.45	3.50	3.50																			
1.26 – 1.30	3.35	3.40	3.45	3.50	3.50																				
1.31 – 1.35	3.40	3.45	3.50	3.50																					
1.36 – 1.40	3.45	3.50	3.50																						
1.41 – 1.45	3.50	3.50																							
1.46 – 1.50	3.50																								

HOW TO USE THIS CHART:

I. Measure tappet clearance. "ENGINE IS COLD"

II. Measure present shim size.

III. Match clearance in vertical column with present shim size in horizontal column.

EXAMPLE

Tappet clearance is	0.38 mm
Present shim size	2.90 mm
Shim size to be used	3.05 mm

ENGINE OIL AND OIL FILTER

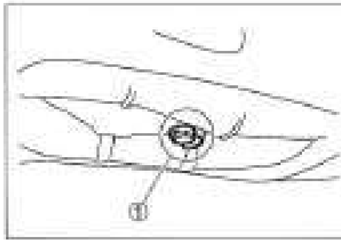
(ENGINE OIL) **Replace initially at 1 000 km (600 miles, 1 month) and every 6 000 km (4 000 miles, 6 months) thereafter.**

(OIL FILTER) **Replace initially at 1 000 km (600 miles, 1 month) and every 18 000 km (11 000 miles, 18 months) thereafter.**

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

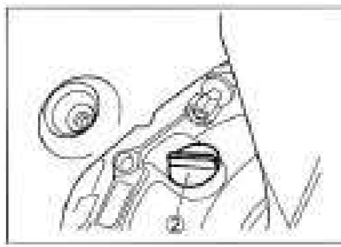
ENGINE OIL REPLACEMENT

- Keep the motorcycle upright.
- Place an oil pan below the engine, and drain oil by removing the oil drain plug ① and filler cap ②.



- Tighten the drain plug ① to the specified torque, and pour fresh oil through the oil filler. The engine will hold about 3.3 L (3.5/2.9 US/Imp qt) of oil. Use an API classification of SF or SG oil with SAE 10W/40 viscosity.

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.

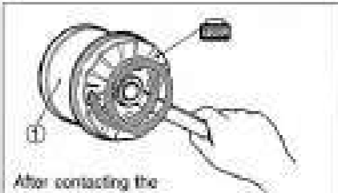
OIL FILTER REPLACEMENT

- Drain the engine oil as described in the engine oil replacement procedure.
- Remove the oil filter ① using the special tool.
- 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 has contacted the oil filter mounting surface. Then, tighten the oil filter two full turns using the special tool.

09915-40610: Oil filter wrench

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



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

NECESSARY AMOUNT OF ENGINE OIL

Oil change: 3 300 ml (3.5/2.9 US/Imp qt)
Oil and filter change: 3 500 ml (3.7/3.1 US/Imp qt)
Engine overhaul: 4 200 ml (4.4/3.7 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.

FUEL HOSE

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

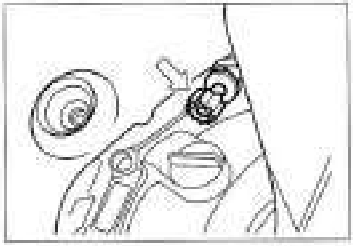
Inspect the fuel feed hose ① and the fuel return hose ② for damage and fuel leakage. If any defects are found, the hoses must be replaced.

ENGINE IDLE SPEED

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

NOTE:
Make this adjustment when the engine is hot.

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



DATA **Engine idle speed:**
1 150 ± 50 r/min ....For E-18 model
1 150 ± 100 r/min ....For the other models

THROTTLE VALVE SYNCHRONIZATION

Inspect initially at 1 000 km (600 miles, 1 month)(E-33 only) and every 12 000 km (7 500 miles, 12 months). (☞ 4-67)

EVAPORATIVE EMISSION CONTROL SYSTEM (E-33 ONLY)

Inspect every 12 000 km (7 500 miles, 12 months). **Replace vapor hoses every 4 years** (☞ 9-4)

PAIR (AIR SUPPLY) SYSTEM (E-33 ONLY)

Inspect every 12 000 km (7 500 miles, 12 months). (☞ 9-7)

THROTTLE CABLE PLAY

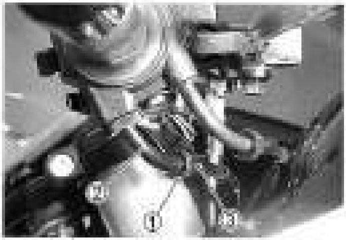
Inspect initially at 1 000 km (600 miles, 1 month) and every 6 000 km (4 000 miles, 6 months) thereafter.

Adjust the throttle cable play Ⓐ as follows.

MINOR ADJUSTMENT

1st step:

- Loosen the locknut ① of the throttle returning cable ② and fully turn in the adjuster ③.



2nd step:

- Loosen the locknut ④ of the throttle pulling cable ⑤.
- Turn the adjuster ⑥ in or out until the throttle cable play (at the throttle grip) Ⓐ is between 2.0 – 4.0 mm (0.08 – 0.16 in).
- Tighten the locknut ④ while holding the adjuster ⑥.

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

3rd step:

- While holding the throttle grip at the fully closed position, slowly turn out the adjuster ③ of the throttle returning cable ② until resistance is felt.
- Tighten the locknut ① while holding the adjuster ③.

⚠ 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.

NOTE:

Major adjustment can be made at the throttle body side adjuster.

MAJOR ADJUSTMENT

Lift and support the fuel tank with its prop stay. (☞ 4-50)

- Loosen the locknuts ① of the throttle returning cable ②.
- Turn the returning cable adjuster ③ to obtain proper cable play.
- Loosen the locknuts ④ of the throttle pulling cable ⑤.
- Turn the pulling cable adjuster ⑥ in or out until the throttle cable play Ⓐ should be 2.0 – 4.0 mm (0.08 – 0.16 in) at the throttle grip.
- Tighten the locknuts ④ securely while holding the adjuster ⑥.

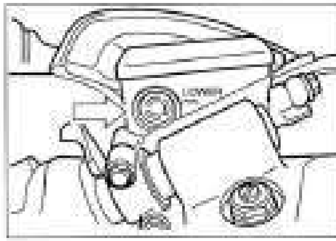
DATA **Throttle cable play Ⓐ: 2.0 – 4.0 mm (0.08 – 0.16 in)**

- While holding the throttle grip at the fully closed position, slowly turn the returning cable adjuster ③ to obtain a cable slack Ⓑ of 1.0 mm (0.04 in).
- Tighten the locknuts ① securely.

CLUTCH

(CLUTCH HOSE AND CLUTCH FLUID)
Inspect every 6 000 km (4 000 miles, 6 months).
Replace hose every 4 years.
Replace fluid every 2 years.

CLUTCH FLUID LEVEL



- Keep the motorcyle upright and place the handlebars straight.
- Check the clutch fluid level by observing the lower limit line on the clutch fluid reservoir.
- If the level is found to be lower than the lower mark, replenish with BRAKE FLUID that the following specification.

Specification and Classification: DOT 4

⚠ WARNING

The clutch 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 or petroleum-based. 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 periods. Check the clutch hose and hose joints for cracks and fluid leakage.

BLEEDING AIR FROM THE CLUTCH FLUID CIRCUIT

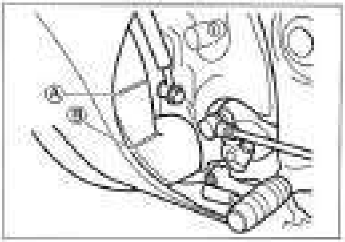
The clutch fluid circuit may be purged of air in the following manner.

- Remove the left under cowling. (☞ 6-8)
- Keep the motorcycle upright and place the handlebars straight.
- Fill up the master cylinder reservoir to the upper end of the inspection window. Replace the reservoir cap to prevent entry of dirt.
- Attach a pipe to the bleeder valve and insert the free end of the pipe into a receptacle.
- Squeeze and release the clutch lever several times in rapid succession, and squeeze the lever fully without releasing it. Loosen the bleeder valve by turning it a quarter of a turn so that the fluid runs into the receptacle; this will remove the tension of the clutch lever causing it to touch the handlebar grip. Then, close the valve, pump and squeeze the lever, and open the valve. Repeat this process until the fluid flowing into the receptacle no longer contains air bubbles.
- Close the bleeder valve, and disconnect the pipe. Fill the reservoir with brake fl

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

COOLING SYSTEM

Inspect every 6 000 km (4 000 miles, 6 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 reserve tank.

  Ⓐ Full line Ⓑ Lower line

- If the level is below the lower line, add engine coolant to the full line from the engine coolant reserve tank filler.

NOTE:
To remove the filler cap, remove the left under cowling. *(☞ 6-6)*

ENGINE COOLANT CHANGE

- Remove the under cowling. (☞ 6-6)
- 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.
- Bleed the air from the engine coolant circuit as following procedure.

NOTE:
For engine coolant information, refer to page 5-2.

AIR BLEEDING THE COOLING CIRCUIT

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

- Start up the engine and bleed air from the radiator inlet completely.
- Add engine coolant up to the radiator inlet.
- Repeat the above procedure until bleed no air from the radiator inlet.

- Close the radiator cap ① securely.
- After warming up and cooling down the engine several times, add the engine coolant up to the full level of the reserve tank.

⚠ CAUTION

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

Engine coolant capacity: 2 950 ml (3.1/2.6 US/Imp qt)

RADIATOR HOSES

- Remove the under cowling. (☞ 6-8)
- Check to see the radiator hoses for crack, damage or engine coolant leakage.
- If any defects are found, replace the radiator hoses with new ones.

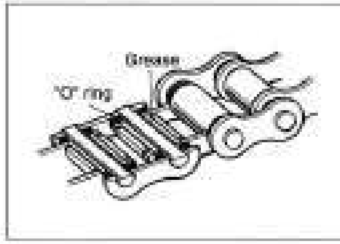
DRIVE CHAIN

Inspect initially at 1 000 km (500 miles, 1 month) and every 6 000 km (4 000 miles, 6 months) thereafter. Clean and lubricate every 1 000 km (500 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
* Damaged rollers
* Dry or rusted links
* Kinked or binding links
* Excessive wear
* Improper chain adjustment
* Missing O-ring seals

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

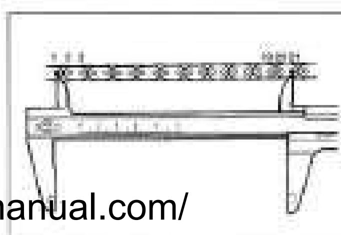


NOTE:
When replacing the drive chain, replace the drive chain and sprockets as a set.

CHECKING

- Remove the axle cotter pin. (For E-03, 28 and 33 models)
- Loosen the axle nut ①.
- Loosen the chain adjuster lock nuts ②.
- Loosen the torque link nut (Rear) ③.
- Tense the drive chain fully by turning both chain adjusters ④.

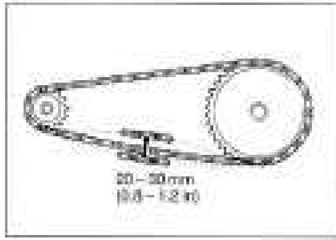
- Count out 21 pins (20 pitches) on the chain and measure the distance between the two points. If the distance exceeds the service limit, the chain must be replaced.



Drive chain 20-pitch length
Service limit: 319.4 mm (12.57 in)

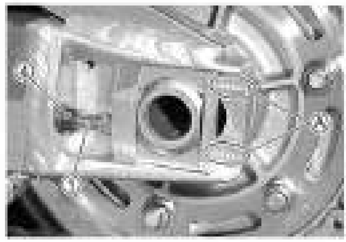
ADJUSTING

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



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

* Place the motorcycle on its side-stand for accurate adjustment.
* After adjusting the drive chain, tighten the axle nut ② and the torque link nut (Rear) ③ to the specified torque.
* Tighten both chain adjuster nuts ④ securely.



Rear axle nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)
Torque link nut (Rear): 35 N·m (3.5 kgf-m, 25.5 lb-ft)

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

CLEANING AND LUBRICATING

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

⚠ CAUTION

Do not use trichloroethylene, gasoline or any similar solvent. These fluids have too great a dissolving power for this chain and they can 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 a RK GB50GSV Z3 Suzuki recommends to use this standard drive chain as a replacement.**

BRAKE

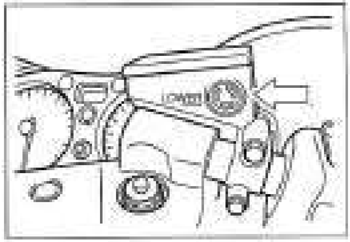
(BRAKE)
Inspect initially at 1 000 km (600 miles, 1 month) and every 6 000 km (4 000 miles, 6 months) thereafter.

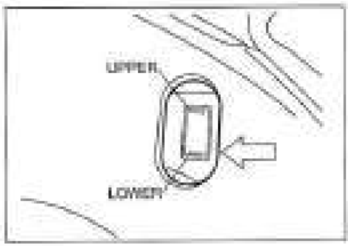
(BRAKE HOSE AND BRAKE FLUID)
Inspect every 6 000 km (4 000 miles, 6 months). Replace hoses every 4 years. Replace fluid every 2 years.

BRAKE FLUID LEVEL CHECK

- Keep the motorcycle upright and place the handlebars straight.
- Check the brake fluid level by observing the lower 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





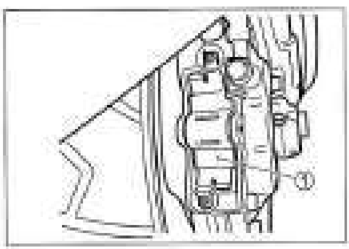
⚠ WARNING

- **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

- Remove the brake pad spring ① by removing bolts.



- The extent of brake pad wear can be checked by observing the grooved limit line Ⓐ on the pad. When the wear exceeds the grooved limit line, replace the pads with new ones. (☞ 6-64)

⚠ CAUTION

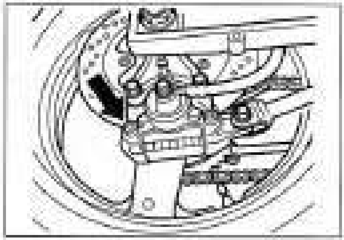
Replace the brake pads as a set, otherwise braking performance will be adversely affected.

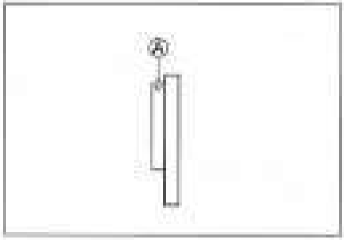
REAR BRAKE

- The extent of brake pad wear can be checked by observing the grooved limit line Ⓐ on the pad. When the wear exceeds the grooved limit line, replace the pads with new ones. (☞ 6-72)

⚠ CAUTION

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



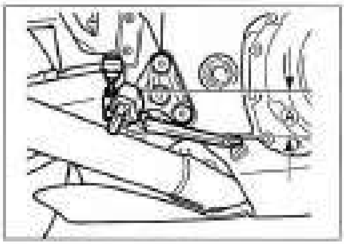


BRAKE PEDAL HEIGHT

- Loosen the locknut ①.
- Turn the push rod ② until the brake pedal is 55–65 mm (2.2 – 2.6 in) Ⓐ below the top of the footrest.
- Tighten the locknut ① securely.

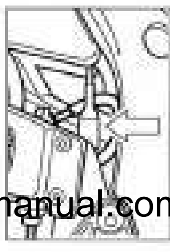
Rear brake master cylinder rod locknut:
18 N·m (1.8 kgf-m, 13.0 lb-ft)

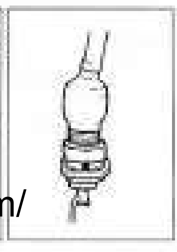
Brake pedal height Ⓐ
Standard: 55–65 mm (2.2 – 2.6 in)



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.



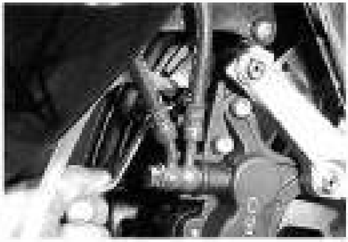


AIR BLEEDING THE BRAKE FLUID CIRCUIT

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

FRONT BRAKE

- Fill the master cylinder reservoir to the top of the inspection window. Replace the reservoir cap to prevent dirt from entering.
- Attach a hose to the air bleeder valve and insert the free end of the hose into a receptacle.



- Squeeze and release the brake lever several times in rapid succession and squeeze the lever fully without releasing it. Loosen the air bleeder valve by turning it a quarter of a turn so that the brake fluid runs into the receptacle, this will remove the tension of the brake lever causing it to touch the handlebar grip. 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.

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

⚠ CAUTION

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

REAR BRAKE

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

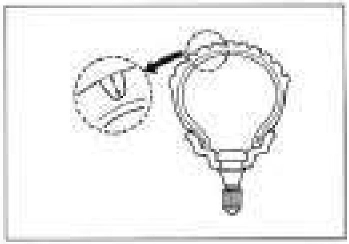
NOTE:
The only difference between bleeding the front and rear brakes is that the rear master cylinder is actuated by a pedal.

TIRES

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

TIRE TREAD CONDITION

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

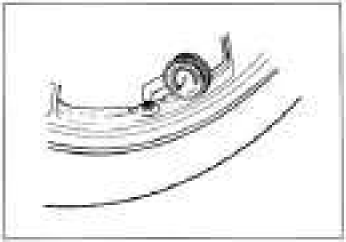


09900-20805: Tire depth gauge

Tire tread depth (Recommend 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: 290 kPa (2.90 kgf/cm², 42 psi)
Rear: 290 kPa (2.90 kgf/cm², 42 psi)
Dual riding: Front: 290 kPa (2.90 kgf/cm², 42 psi)
Rear: 290 kPa (2.90 kgf/cm², 42 psi)

⚠ CAUTION

The standard tire fitted on this motorcycle is a 120/70 ZR17 (58W) for the front and a 190/50 ZR17 (73W) 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 (BT56F J.....Front, BT56R J.....Rear)

STEERING

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

The steering should be adjusted properly for smooth turning of the handlebars and safe operation. Overtight 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. (☞ 6-37)

FRONT FORK

Inspect every 12 000 km (7 500 miles, 12 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. (☞ 6-22)

REAR SUSPENSION

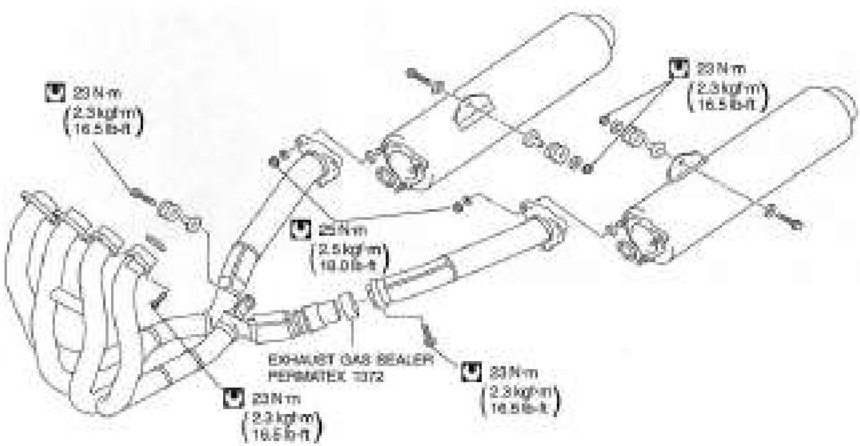
Inspect every 12 000 km (7 500 miles, 12 months).

Inspect the rear shock absorbers for oil leakage and check that there is no play in the swingarm. Replace any defective parts if necessary. (☞ 6-50, 6-55)

EXHAUST PIPE BOLT AND NUT

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

* Tighten the exhaust pipe bolts, nuts and muffler mounting bolts to the specified torque.

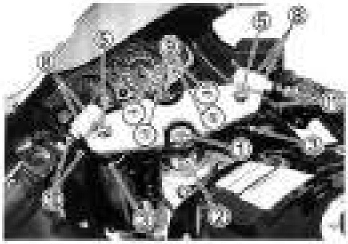


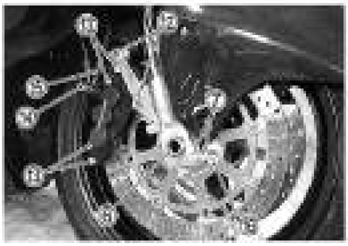
CHASSIS BOLT AND NUT

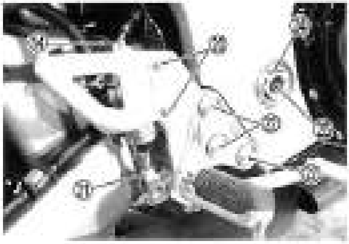
Tighten initially at 1 000 km (600 miles, 1 month) and every 6 000 km (4 000 miles, 6 months) thereafter.

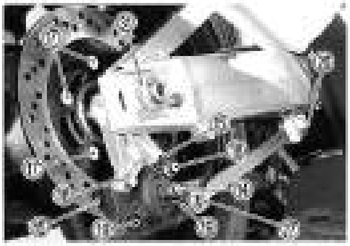
Check that all chassis bolts and nuts are tightened to their specified torque. (Refer to page 2-30 for the locations of the following nuts and bolts on the motorcycle.)

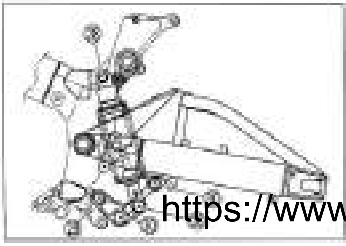
Item	N·m	kgf-m	lb-ft
① Steering stem head nut	90	9.0	65.0
② Steering stem lock nut	80	8.0	58.0
③ Front fork upper clamp bolt	23	2.3	16.5
④ Front fork lower clamp bolt	23	2.3	16.5
⑤ Front fork cap bolt	23	2.3	16.5
⑥ Front axle	100	10.0	72.5
⑦ Front axle pinch bolt	23	2.3	16.5
⑧ Handlebar clamp bolt	10	1.0	7.0
⑨ Handlebar holder mounting nut	35	3.5	25.5
⑩ Clutch master cylinder mounting bolt	10	1.0	7.0
⑪ Front brake master cylinder mounting bolt	10	1.0	7.0
⑫ Front brake caliper mounting bolt	39	3.9	28.0
⑬ Front brake caliper housing bolt	21	2.1	15.0
⑭ Union bolt	23	2.3	16.5
⑮ Air bleeder valve	7.5	0.75	5.5
⑯ Brake disc bolt (Front)	23	2.3	16.5
⑰ Brake disc bolt (Rear)	35	3.5	25.5
⑱ Rear brake caliper mounting bolt	26	2.6	19.0
⑲ Rear brake caliper housing bolt	30	3.0	21.5
⑳ Rear brake master cylinder mounting bolt	10	1.0	7.0
㉑ Rear brake master cylinder rod lock nut	18	1.8	13.0
㉒ Front footrest bracket mounting bolt	26	2.6	19.0
㉓ Swingarm pivot nut	100	10.0	72.5
㉔ Swingarm pivot lock nut	90	9.0	65.0
㉕ Swingarm pivot shaft	15	1.5	11.0
㉖ Torque link nut (Front)	28	2.8	20.5
㉗ Torque link nut (Rear)	35	3.5	25.5
㉘ Rear shock absorber mounting nut	50	5.0	36.0
㉙ Cushion lever mounting nut	78	7.8	56.5
㉚ Cushion rod mounting nut	78	7.8	56.5
㉛ Rear axle nut	100	10.0	72.5
㉜ Rear sprocket nut	60	6.0	43.5
㉝ Steering damper bolt	23	2.3	16.5











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
1 200 – 1 600 kPa (12 – 16 kgf/cm² 171 – 228 psi)	900 kPa (9 kgf/cm² 128 psi)	200kPa (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 less than 900 kPa (9 kg/cm², 128 psi).
* The difference in compression pressure between any two cylinders is more than 200 kPa (2 kgf/cm², 28 psi).
* All compression pressure readings are below 1 200 kPa (12 kgf/cm², 171 psi) even when they measure more than 900 kPa (9 kgf/cm², 128 psi).

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. (☞ 4-50)
- Remove all the spark plugs. (☞ 2-5)
- Install the compression gauge and adaptor in the spark plug hole. Make sure that the connection is tight.
- Keep the throttle grip in the fully opened position.
- Press the starter button and crank the engine for a few seconds. Record the maximum gauge reading as the cylinder compression.
- Repeat this procedure with the other cylinders.

09915-64510: Compression gauge set
09913-10750: Adapter

OIL PRESSURE CHECK

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

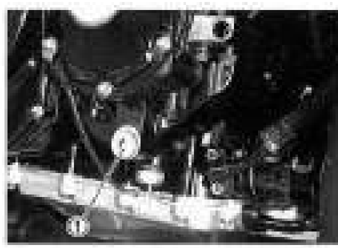
OIL PRESSURE SPECIFICATION

Above 200 kPa (2.0 kgf/cm², 28 psi) **Below 500 kPa (5.0 kgf/cm², 71 psi)**	**at 3 000 r/min., Oil temp. at 60°C (140°F)**

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

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

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



OIL PRESSURE TEST PROCEDURE

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

- Remove the 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.

09915-74520: Oil pressure gauge hose
09915-74540: Oil pressure gauge attachment
09915-77330: Meter (for high pressure)

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

ENGINE

CONTENTS

ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE

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

ENGINE LEFT SIDE

PARTS	REMOVAL	INSTALLATION
Engine sprocket	3-10	3-16
Speed sensor	3-10	3-16
Generator	3-36, 3-68	3-68, 3-105
Crankshaft position sensor	3-36, 3-68	3-68, 3-105
Clutch release cylinder	6-78	6-79
Water pump	5-11	5-15

ENGINE RIGHT SIDE

PARTS	REMOVAL	INSTALLATION
Clutch	3-31	3-110
Primary driven gear	3-33	3-110
Gear position switch	3-34	3-108
Oil pump	3-34	3-109
Oil pressure switch	3-63	3-63
Starter clutch	3-35	3-107
Starter idle gears	3-26	3-120

ENGINE CENTER

PARTS	REMOVAL	INSTALLATION
Throttle body	4-60	4-65
Cylinder head covers	3-23	3-129
Camshafts	3-23	3-122
Cam chain tension adjusters	3-24	3-125
Thermostat	5-9	5-10
Oil filter	2-14	2-14
Starter motor	3-26	3-122
PAIR valve	3-22	3-130

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. (☞ 6-7)
* Remove the front and rear seats (seat tail cover). (☞ 6-11)
* Lift and support the fuel tank with the prop stay. (☞ 4-50)

* Disconnect the battery ⊖ lead wire.

* Drain engine oil. (☞ 2-13)

* Drain engine coolant. (☞ 2-19)

* Remove the air cleaner box. (☞ 4-58)

* Remove the throttle body. (☞ 4-60)

* Remove the horn lead wire couplers.
* Remove the horn with its bracket.

* Remove the oil hoses ①, ②.

- Disconnect the radiator inlet hoses ①, ②.

- Remove the oil cooler mounting bolt.

- Disconnect the reserve tank hose.
- Remove the radiator mounting bolt ③.

- Disconnect the cooling fan thermo-switch lead wire and the cooling fan lead wire couplers.
- Remove the radiator mounting bolts ④, ⑤.

- Remove the radiator with the oil cooler.

▲ CAUTION

Be careful not to bent the radiator fin and the oil cooler fin.

* Loosen the left side exhaust pipe bolt ①.

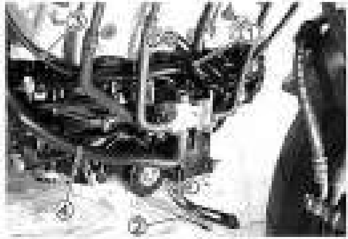
* Remove the left side muffler mounting bolt and nut.
* Remove the left side muffler.

* Remove the exhaust pipe bolts.

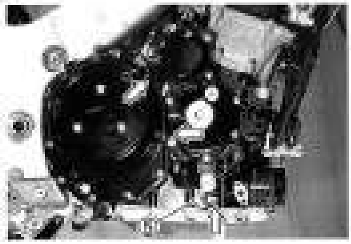
* Remove the right side muffler mounting bolt and nut.

* Remove the exhaust pipe bolts.
* Remove the exhaust pipe/muffler.

- Remove the radiator mounting bracket ①.
- Remove the oil cooler mounting bracket ②.
- Remove the PAIR valve vacuum hose ③ and the PAIR valve air cleaner hose ④.



- Disconnect the oil pressure switch lead wire ⑤ and remove it from the clamps.



- Disconnect the starter motor lead wire ⑥.
- Disconnect the ground lead wire ⑦.

- Disconnect the generator lead wire coupler ⑧.
- Disconnect the crankshaft position sensor lead wire coupler ⑨.
- Disconnect the gear position switch lead wire coupler ⑩.
- Disconnect the side-stand switch lead wire coupler ⑪.

- Disconnect the engine coolant temperature sensor lead wire ①.

- Disconnect the lead wire couplers from each ignition coil/plug cap and camshaft position sensor.

⚠ CAUTION

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

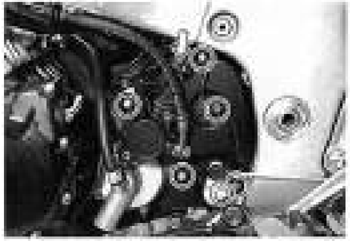
- Remove the ignition coils/plug caps.

⚠ CAUTION

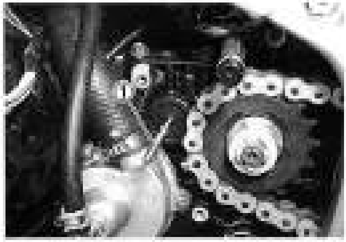
- **Do not pry up the ignition coil/plug cap with a driver or a bar to avoid its damage.**
- **Be careful not to drop the ignition coil/plug cap to prevent its short or open circuit.**

- Remove the reserve tank ②.

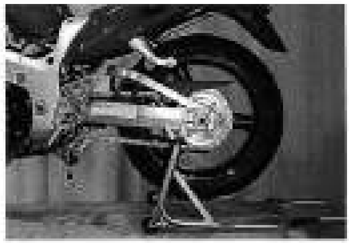
* Remove the speed sensor.
* Remove the gearshift lever.
* Remove the oil catch tank drain hose from the clamp.
* Remove the engine sprocket cover.



* Remove the clutch push rod ①.

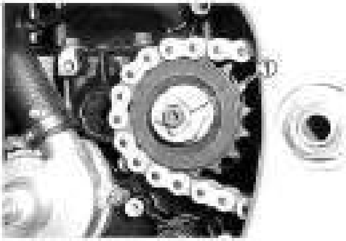


NOTE:
Jack up the motorcycle and fix it for safety.



* Remove the side-stand with its bracket.

- Remove the speed sensor rotor ①.

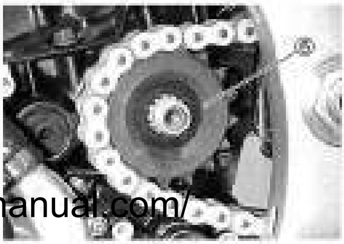


- Remove the engine sprocket nut ② and the washer.

- Remove the cotter pin. (For E-03, 28, 33)
- Loosen the rear axle nut ③ and the rear torque link nut ④.
- Loosen the left and right chain adjusters ⑤.

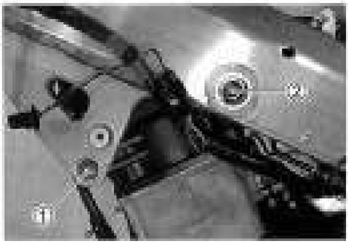
- Push the rear wheel forward and make sure that the drive chain has enough slack.
- Disengage the drive chain from the rear sprocket.

- Remove the engine sprocket ⑥.

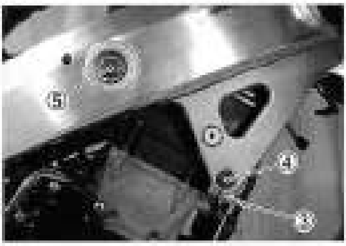


- Support the engine using an engine jack.

- Remove the engine mounting bolts ①, ②.

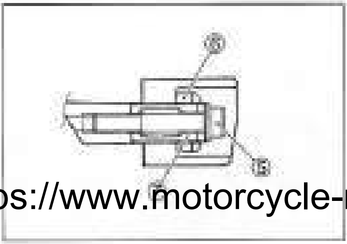


- Loosen the engine mounting pinch bolts ③.
- Remove the engine mounting bolts ④, ⑤.



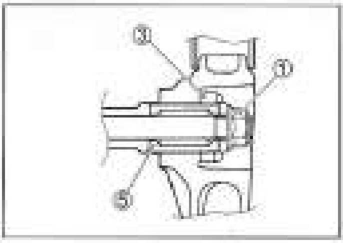
- Loosen the engine mounting thrust adjuster lock nut ⑥ with the special tool.
- Loosen the engine mounting thrust adjuster ⑦ fully with the special tool.

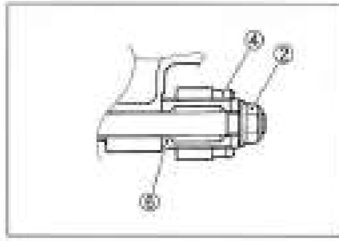
09940-14990: Engine mounting thrust adjuster socket wrench



- Remove the engine mounting nuts ① and ②.

①, ② : Engine mounting nut
③, ④ : Engine mounting thrust adjuster lock nut
⑤, ⑥ : Engine mounting thrust adjuster





- Loosen the engine mounting thrust adjuster lock nuts ③, ④ with the special tool.
- Loosen the engine mounting thrust adjusters ⑤, ⑥ fully with the special tool.

09940-14990: 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.

ENGINE INSTALLATION

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 spacer ①.

- Before installing the engine, install the engine mounting thrust adjusters ②, ③ and ④.

- Gradually raise the rear side of the engine assembly, and then put the drive chain ⑤ on the driveshaft.
- Install all engine mounting bolts, spacers and tighten them temporarily. (☞ 3-15)

⚠ 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 with the special tool.

09940-14990: **Engine mounting thrust adjuster socket wrench**

Engine mounting thrust adjuster: 10N·m (1.0 kgf-m, 7.0 lb-ft)

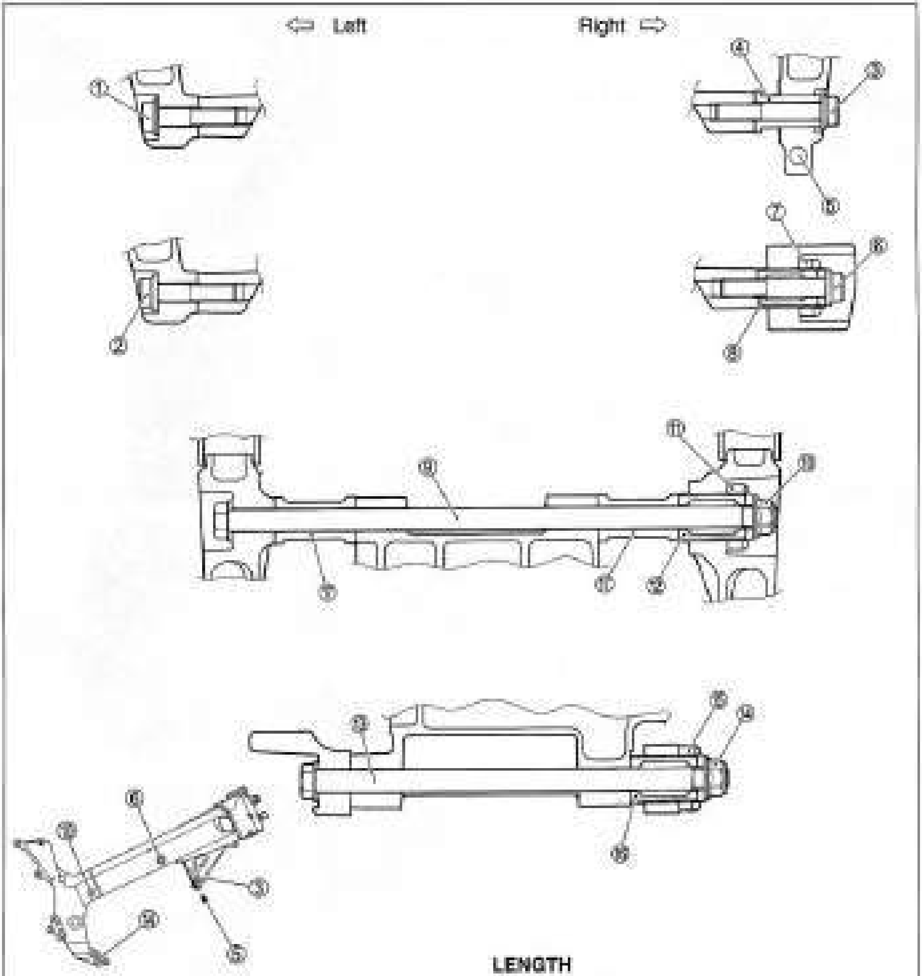
- Tighten the engine mounting thrust adjuster lock nuts to the specified torque with the special tool.

Engine mounting thrust adjuster locknut: 45 N·m (4.5 kgf-m, 32.5 lb-ft)

- Tighten all engine mounting bolts and nuts to the specified torque. (☞ 3-15)

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

- Tighten the engi[illegible]e. (☞ 3-16)



ITEM	N·m	kgf·m	lb-ft
①②③⑥	55	5.5	40.0
⑦⑪⑬	45	4.5	32.5
⑧⑫⑮	10	1.0	7.3
⑩⑭	75	7.5	54.0
⑤	35	3.5	25.5

LENGTH

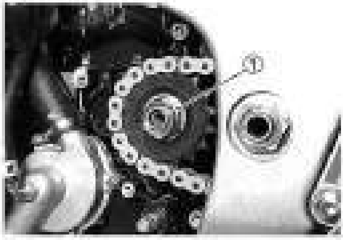
ITEM		mm	in
Bolt	①②	45	1.77
	③⑥	55	2.17
	⑨	320	12.60
	⑩	240	9.45
	⑤	30	1.18
Spacer	④	37.5	1.48
	⑦	47	1.85
[illegible]	⑫⑮	43	1.69
	⑧	39	1.54

- Install the engine sprocket and the washer.
- Apply a small quantity of THREAD LOCK "1342" to the drive shaft thread portion.

99000-32050: THREAD LOCK "1342"

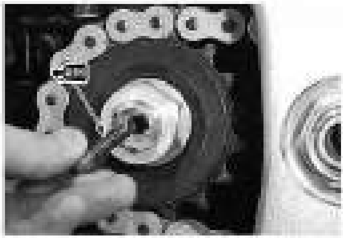
- Tighten the engine sprocket nut ① to the specified torque.

Engine sprocket nut: 145 N·m (14.5 kgf·m, 105 lb-ft)



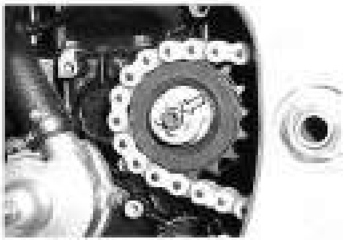
- Install the speed sensor rotor.
- Apply a small quantity of THREAD LOCK "1342" to the speed sensor rotor bolt.

99000-32050: THREAD LOCK "1342"



- Tighten the speed sensor rotor bolt to the specified torque.

Speed sensor rotor bolt: 18 N·m (1.8 kgf·m, 13.0 lb-ft)



- Adjust the drive chain slack. (☞ 2-22)
- Tighten the rear axle nut and the rear torque link nut to the specified torque.

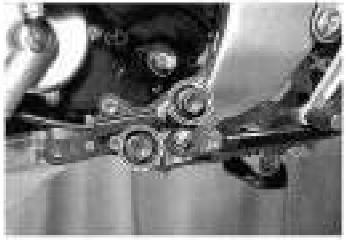
Rear axle nut: 100 N·m (10.0 kgf·m, 72.5 lb-ft)
Rear torque link nut: 35 N·m (3.5 kgf·m, 25.5 lb-ft)

- Apply a small quantity of THREAD LOCK "1342" to the side-stand bracket bolts.

99000-32050: THREAD LOCK "1342"

- Tighten the side-stand mounting bracket bolts to the specified torque.

Side-stand mounting bracket bolt:
95 N·m (9.5 kgf·m, 68.5 lb-ft)



- Apply grease to the clutch push rod and install it.

99000-25030: SUZUKI SUPER GREASE "A"

- Align the hole Ⓐ of the clutch release cylinder with the end Ⓑ of the clutch push rod when installing the engine sprocket cover.

- Tighten the speed sensor bolt ① to the specified torque.

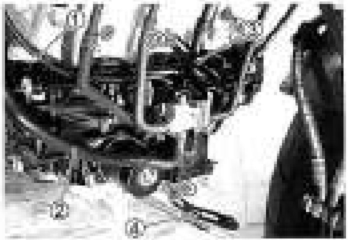
Speed sensor bolt: 4.5 N·m (0.45 kgf·m, 3.0 lb-ft)

- Install the engine sprocket cover and the gearshift lever.

NOTE:
Install the engine sprocket cover protector at the boss Ⓒ.

- Install the reserve tank. (☞ 8-25)
- Install all of the ignition coils/plug caps (☞ 2-7)
- Route wiring harness, cables and hoses properly referring to the sections for wire routing, cable routing and hose routing. (☞ 8-15)

- Install the PAIR valve vacuum hose ① and the PAIR valve air cleaner hose ②. (☞ 8-29)
- Install the radiator mounting bracket ③.
- Install the oil cooler mounting bracket ④.



③: Radiator mounting bracket (short)
④: Oil cooler mounting bracket (long)

- Install the exhaust pipe/muffler.

Exhaust pipe bolt ①: 23 N·m (2.3 kgf·m, 16.5 lb-ft)
Muffler mounting nut ②: 23 N·m (2.3 kgf·m, 16.5 lb-ft)

▲ CAUTION

Replace the gaskets with new ones.

NOTE:
Install the right side muffler first.

NOTE:
Apply gas sealer to inside and outside of the exhaust pipe connector.

EXHAUST GAS SEALER: PERMATEX 1372

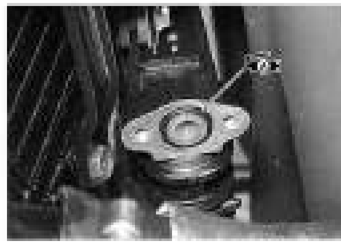
- Install the radiator with the oil cooler. (☞ 8-25)

- Install the O-rings between the oil cooler and the oil hoses and apply grease to them.

99000-25030: SUZUKI SUPER GREASE "A"

▲ CAUTION

Use the new O-rings to prevent oil leakage.



- Install the O-rings between the engine and the oil hoses and apply grease to them.

99000-25030: SUZUKI SUPER GREASE "A"

▲ CAUTION

Use the new O-rings to prevent oil leakage.

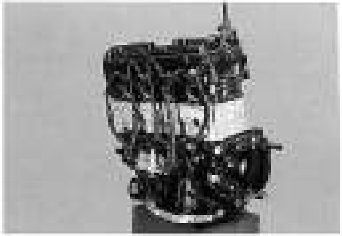
- Tighten the oil cooler hose bolts to the specified torque.

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

- Install the throttle body. (☞ 4-65)

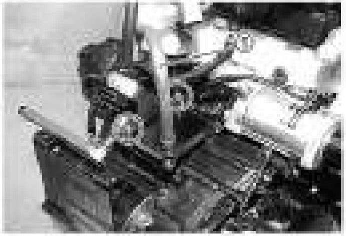
- Adjust the following items.
* Engine oil (☞ 2-13)
* Engine coolant (☞ 2-19)
* Throttle cable play (☞ 2-16)
* Clutch (☞ 2-18)
* Idling adjustment (☞ 2-15)
* Throttle valve synchronization (☞ 4-67)
* Drive chain slack (☞ [illegible])
* Gear shaft lever height (☞ 8-50)

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.

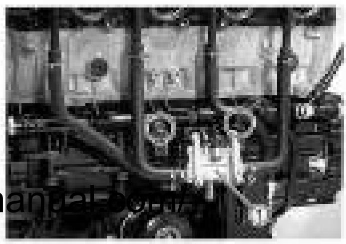


* Remove the spark plugs. (☞ 2-5)
* Disconnect the breather hose ① from the breather cover.
* Remove the oil catch tank.

BREATHER COVER

* Remove the breather cover.

* Remove the gasket.



PAIR VALVE

* Remove the PAIR valve ①.

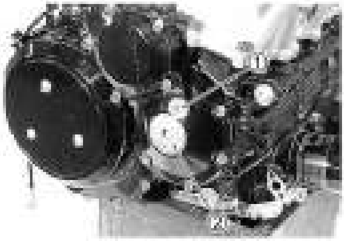
CYLINDER HEAD COVER

- Remove the cylinder head cover and its gaskets.

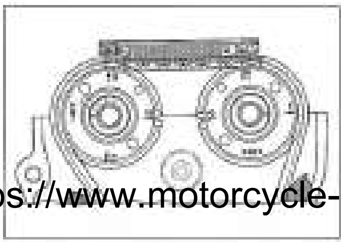
- Remove the dowel pins.

CAMSHAFTS

- Remove the valve timing inspection plug ① and the starter clutch cover plug ②.



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

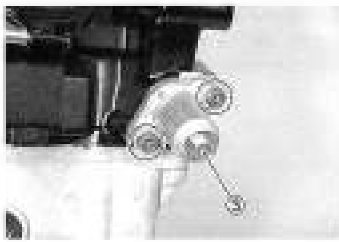


• Remove the oil pipe ①.

• Remove the cam chain guide ②.

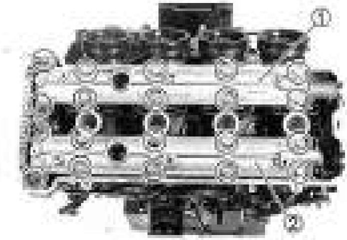
• Remove the cam chain tension adjuster.

NOTE:
Loosen the cam chain tension adjuster cap bolt ③ to facilitate later reassembly.



• Remove the gasket.

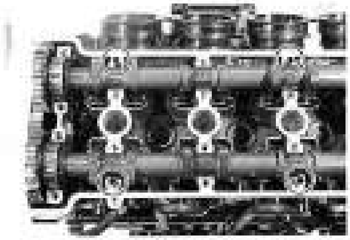
- Remove the intake camshaft journal holder ①.
- Remove the exhaust camshaft journal holder ②.



▲ CAUTION

> **Be sure to loosen the camshaft journal holder bolts evenly by shifting the wrench diagonally.**

- Remove the dowel pins.



- Remove the intake camshaft ③.
- Remove the exhaust camshaft ④.

- Remove the C-rings ⑤.

STARTER MOTOR

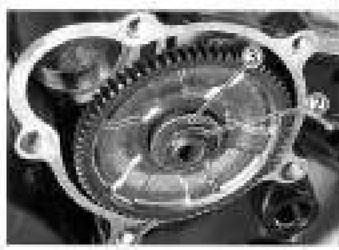
- Remove the starter motor.

STARTER IDLE GEAR

- Remove the starter idle gear cover.

- Remove the gasket ① and the dowel pins.

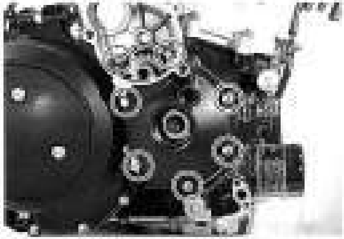
- Remove the wave washer ② and the washer ③.



- Remove the bearing ④ and the starter idle gear No.1 ⑤.

- Remove the thrust washer ① and the shaft ②.

- Remove the starter clutch cover.

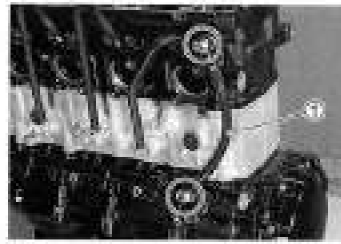


- Remove the gasket ③ and the dowel pins.

- Remove the wave washer ④, the starter idle gear No.2 ⑤ and its shaft ⑥.

CYLINDER HEAD

- Remove the oil hose ①.



- Remove the water hose ②.

- Remove the cylinder head side bolt ③ and its gasket ④.

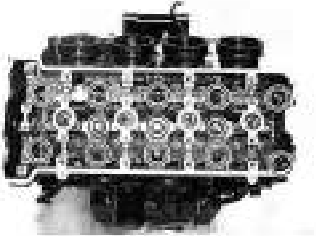
⚠ CAUTION

When removing the cylinder head side bolt ③, pull the cam chain upward, or the chain will be caught between the cylinder head and the side bolt ③.

- Remove the cylinder head bolts (M6) ⑤.
- Remove the cylinder head bolt (M6) ⑥.
- Loosen the cylinder nuts ⑦.

- 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.

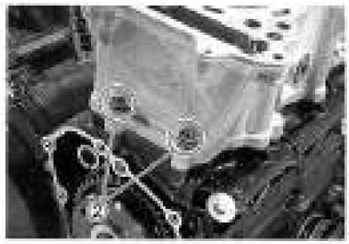
NOTE:
Refer to page 3-48 for cylinder head servicing.

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

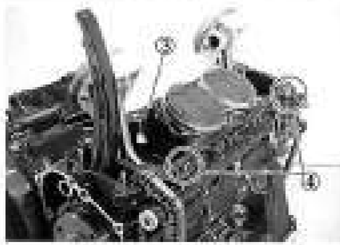
CYLINDER

- Remove the water hose ①.

- Remove the cylinder nuts ②.
- Remove the cylinder.



- Remove the cylinder base gasket ③ and the dowel pins ④.



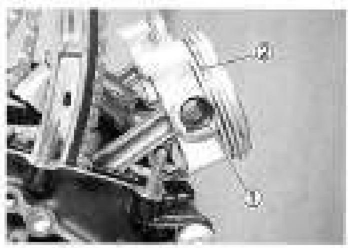
PISTON

- Remove the piston pin circlips ①.

NOTE:
Be careful not to drop the piston pin circlips ①.

- Remove the pistons ② by driving out the piston pins.

NOTE:
Scribe the cylinder number on the head of the piston.



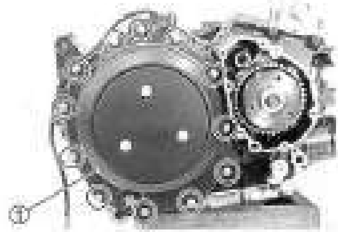
⚠ CAUTION

When turning the crankshaft, pull the cam chain upward, or the chain will be caught between the crankcase and the cam drive sprocket.

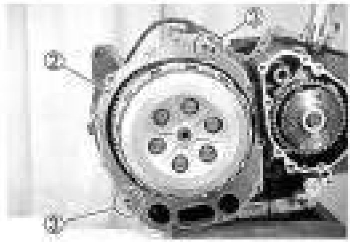
CLUTCH COVER

- Remove the clutch cover ①.

NOTE:
When removing the clutch outer cover, remove the three bolts.



- Remove the gasket ② and dowel pins ③.



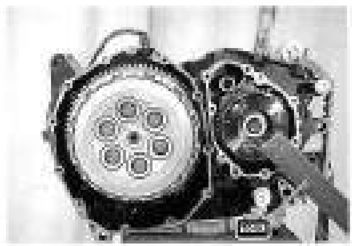
CLUTCH

- Hold the starter clutch with the special tool.

09920-34830: Starter clutch holder

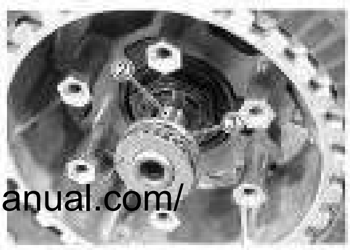
- Remove the clutch springs.

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



- Remove the pressure plate ①.

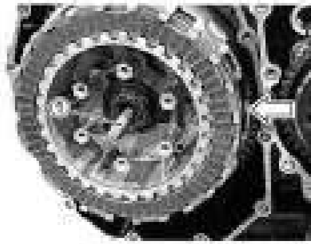
- Remove the clutch push piece ②, the bearing ③ and the thrust washer ④.



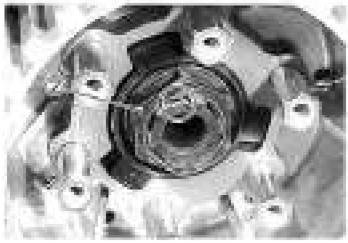
- Remove the clutch push rod ①.

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

- Remove the clutch drive and driven plates.



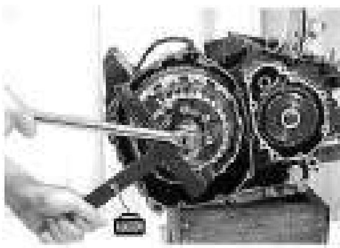
- Unlock the clutch sleeve hub nut ②.



- Hold the clutch sleeve hub with the special tool.

09920-53740: Clutch sleeve hub holder

- Remove the clutch sleeve hub nut.



- Remove the washer.

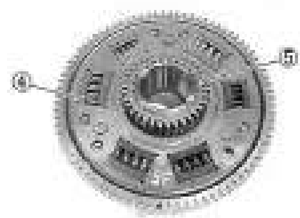
- Remove the clutch sleeve hub ③, the clutch drive cam ④ and the clutch driven cam ⑤.

- Remove the thrust washer ①.

- Remove the bearing ② and the spacer ③.

- Remove the primary driven gear assembly ④.

- Remove the oil pump drive gear ⑤ from the primary driven gear assembly ④.



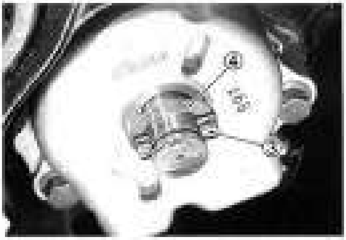
- Remove the thrust washer ⑥.

OIL PUMP

- Remove the circlip ①.
- Remove the oil pump driven gear ②.

NOTE:
Do not drop the circlip ①, the pin ③ and the washer ④ into the crankcase.

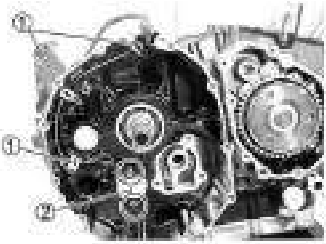
- Remove the pin ③ and the washer ④.



- Remove the oil pump ⑤.

GEAR POSITION SWITCH

- Remove the gear position switch lead wire clamps ①.
- Remove the gear position switch ②.



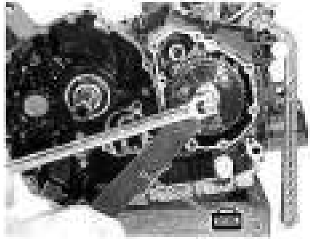
- Remove the switch contacts ③ and the springs ④.

STARTER CLUTCH

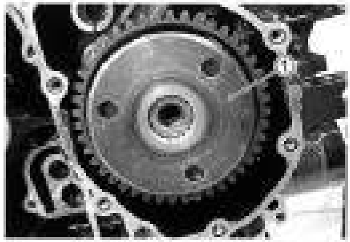
- Hold the starter clutch with the special tool.

09920-34830: Starter clutch holder

- Remove the starter clutch bolt and washer.



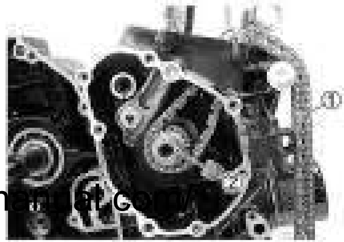
- Remove the starter clutch assembly ①.



- Remove the washer ②.

CAM CHAIN DRIVE SPROCKET

- Remove the cam chain ① and the cam chain drive sprocket ②.



CAM CHAIN TENSIONER

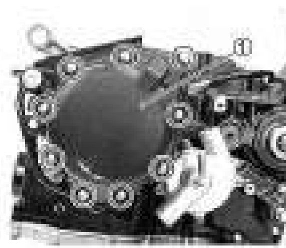
- Remove the cam chain tensioner ①.

① Cam chain tensioner
② Cam chain tensioner bolt
③ Wave washer

GENERATOR COVER

- Remove the generator cover ①.

NOTE:
Refer to the page 3-68 for the generator cover servicing.



- Remove the gasket ② and the dowel pins ③.

GENERATOR ROTOR

- Hold the generator rotor with the special tool.

09930-44530: Rotor holder

- Remove the generator rotor bolt and the washer.

- Remove the generator rotor ① with the special tool.

09930-30450: Rotor remover

- Remove the key ②.

WATER PUMP

- Remove the water pump ③.

NOTE:
Refer to the page 5-11 for the water pump servicing.

GEARSHIFT SYSTEM

- Remove the geashift cover ①.

- Remove the gasket ② and the dowel pins ③.

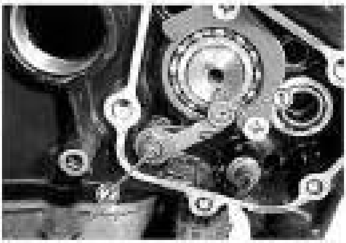
- Remove the gearshift shaft assembly ④ and the washers ⑤.

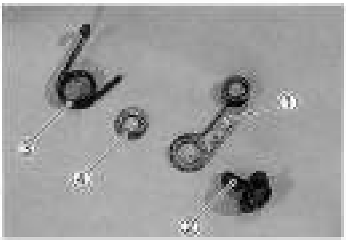
NOTE:
Refer to the page 3-70 for the gearshift shaft servicing.

- Remove the gearshift cam plate bolt ⑥.
- Remove the gearshift cam plate ⑦.

- Remove the following items.

① Gearshift cam stopper
② Gearshift cam stopper bolt
③ Gearshift cam stopper spring
④ Washer





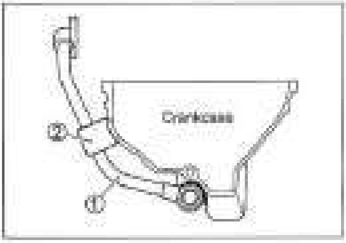
OIL FILTER

- Remove the oil filter ① with the special tool. (☞ 2-14)

09915-40610: Oil filter wrench

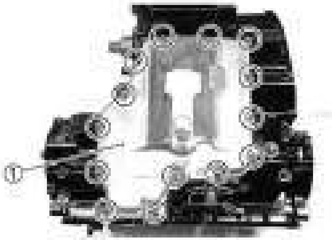
OIL PIPE

- Remove the oil pipe ①.
- Remove the cushion ②.

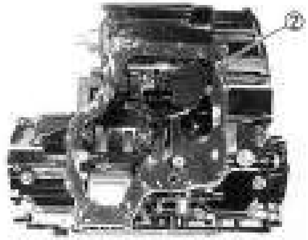


OIL PAN

- Remove the oil pan ①.

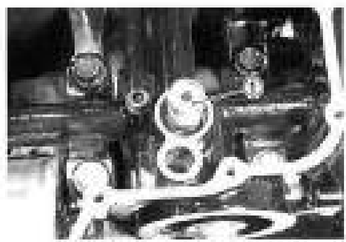


- Remove the gasket ②.



OIL PRESSURE REGULATOR

- Remove the oil pressure regulator ①.



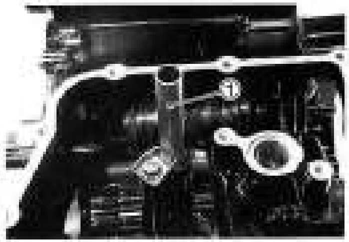
OIL STRAINER

- Remove the oil strainer ①.

- Remove the O-ring ②.

BREATHER PIPE

- Remove the breather pipe ①.



CRANK BALANCER

- Remove the balancer cover ①.

- Remove the balancer shaft arm ②.

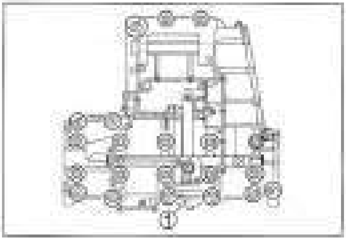
- Remove the balancer shaft ③.

- Remove the crank balancer assembly ④ with the washers ⑤.

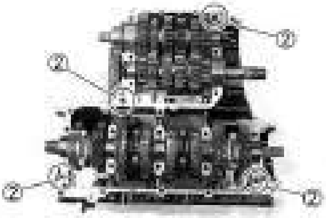
CRANKCASE

- Remove the crankcase bolts.
- Remove the PAIR valve bracket ①.

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



- Separate the crankcase into 2 parts, upper and lower.
- Remove the dowel pins ②.

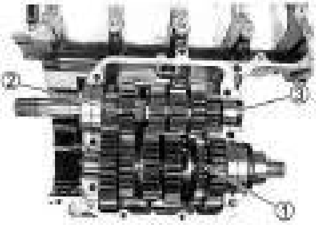


CRANKSHAFT

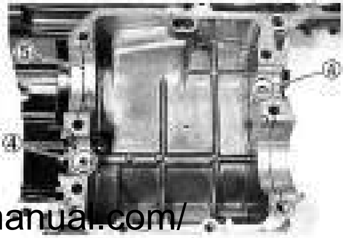
- Remove the crankshaft ① and the thrust washers ②.

TRANSMISSION

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



- Remove the bearing pins ④ and the C-ring ⑤.



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.

CAMSHAFT

CAMSHAFT IDENTIFICATION

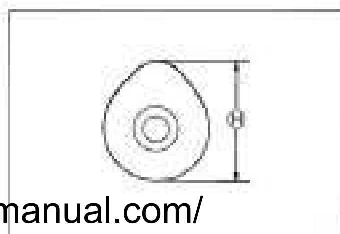
The exhaust camshaft can be distinguished from that of the intake by the embossed letters "EX" (for exhaust) as against letters "IN" (for intake).

CAM WEAR

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

09900-20202: Micrometer (25 – 50 mm)

Cam height Ⓗ
Service Limit: (Intake): 36.48 mm (1.436 in)
(Exhaust): 35.18 mm (1.385 in)



CAMSHAFT JOURNAL WEAR

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

DATA **Camshaft journal oil clearance**
Service Limit: (IN & EX): 0.150 mm (0.0059 in)

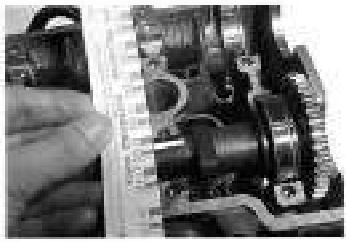
09900-22301: Plastigauge
09900-22302: Plastigauge

NOTE:
Install camshaft journal holders to their original positions.
(☞ 3-124, 3-125)

- 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.

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

DATA **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)

DATA **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

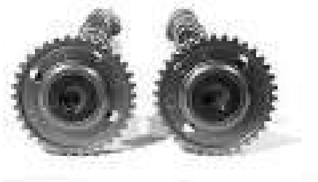
- Measure the runout using the dial gauge.
- Replace the camshaft if the runout exceeds the limit.

TOOL 09900-20606: Dial gauge (1/100 mm)
09900-20701: Magnetic stand
09900-21304: V-block set (100 mm)

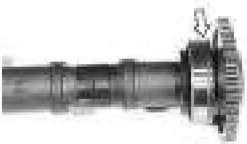
DATA Camshaft runout
Service Limit (IN & EX): 0.10 mm (0.004 in)

CAM SPROCKET/BEARING

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



- Rotate the bearing outer race by fingers, inspect for abnormal play, noise and smooth rotation.
- If it is unusual, replace the sprocket/camshaft assembly with a new one.



⚠ CAUTION

Do not attempt to disassemble the cam sprocket or right-side bearing. They are unserviceable.

CAM CHAIN TENSION ADJUSTER

INSPECTION

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

CAM CHAIN TENSIONER

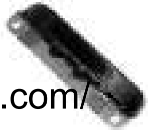
INSPECTION

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

CAM CHAIN GUIDE

INSPECTION

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



CYLINDER HEAD AND VALVE

VALVE AND VALVE SPRING DISASSEMBLY

- Remove the tappets ① and shims ② by fingers or magnetic hand.

▲ CAUTION

Identify the position of each removed part.

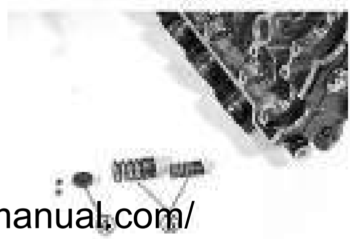
- Using special tools, compress the valve springs and remove the two cotter halves ③ from valve stem.

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

▲ CAUTION

Be careful not to damage the tappet sliding surface with the special tool.

- Remove the valve spring retainer ④ and valve springs ⑤.



- Pull out the valve from the other side.

- Remove the oil seal ① and the spring seat ②.

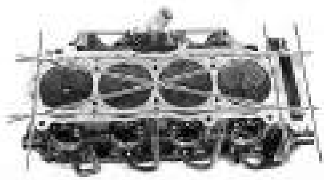
⚠ CAUTION

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.

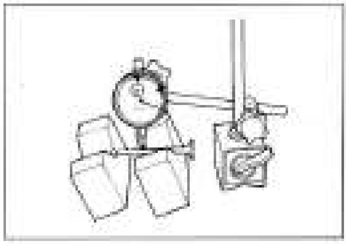


09900-20803: Thickness gauge

Cylinder head distortion
Service Limit: 0.20 mm (0.008 in)

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.

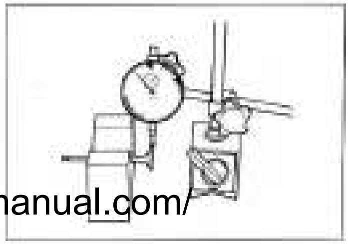


09900-20606: Dial gauge (1/100 mm)
09900-20701: Magnetic stand
09900-21304: V-block set (100 mm)

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

VALVE HEAD RADIAL RUNOUT

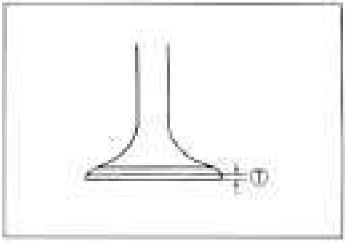
- Place the dial gauge at a right angle to the valve head face and measure the valve head radial runout.
- If it measures more than the service limit, replace the valve.



09900-20606: Dial gauge (1/100 mm)
09900-20701: Magnetic stand
09900-21304: V-block set (100 mm)

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

VALVE FACE WEAR



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

09900-20102: Vernier calipers

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

VALVE STEM DEFLECTION

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

09900-20606: Dial gauge (1/100 mm)
09900-20701: Magnetic stand

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

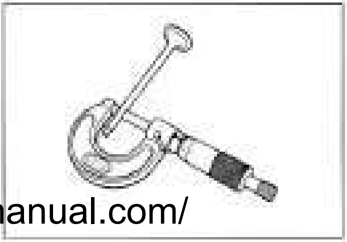
VALVE STEM WEAR

- 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 diflection.

09900-20205: Micrometer (0 – 25 mm)

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

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



VALVE GUIDE SERVICING

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

09916-44310: Valve guide remover/installer

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

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

09916-34580: Valve guide reamer
09916-34542: Reamer handle

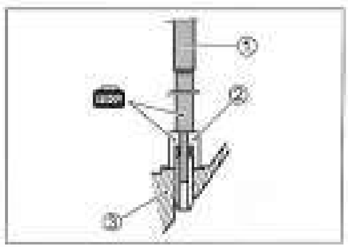
▲ CAUTION

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

- Apply engine oil to the valve guide hole.

- Drive the valve guide into the hole using the valve guide installer ① and attachment ②.

09916-44310: Valve guide installer/remover ①
09916-53350: Attachment ②



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

▲ CAUTION

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

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

09916-34570: Valve guide reamer
09916-34542: Valve guide reamer handle

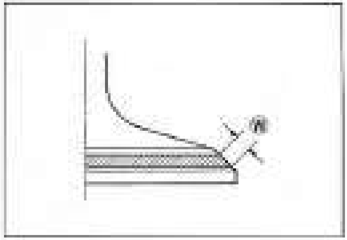
NOTE:
Insert the reamer [illegible] turn the reamer handle clockwise.

VALVE SEAT WIDTH INSPECTION

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

09916-10911: Valve lapper set

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

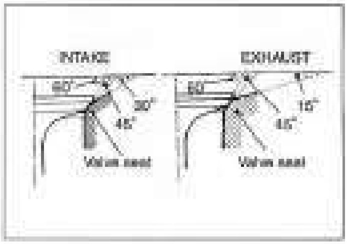


Valve seat width Ⓦ
Standard: 0.9 – 1.1 mm (0.035 – 0.043 in)

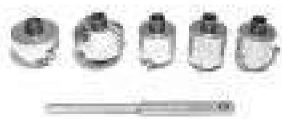
If the valve seat is out of specification, re-cut the seat.

VALVE SEAT SERVICING

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



	INTAKE	EXHAUST
15°		N-121
30°	N-126	
45°	N-126	N-122
60°	N-114	N-111



09916-21111: Valve seat cutter set
09916-22420: Valve seat cutter (N-114)
09916-22430: Valve seat cutter (N-126)
09916-24311: Solid pilot (N-100-5.0)

NOTE:
- *The valve seat cutters (N-121), (N-122) and (N-111) are included in the valve seat cutter set (09916-21111).*
- *Use the solid pilot (N-100-5.0) ① along with the valve seat cutters.*

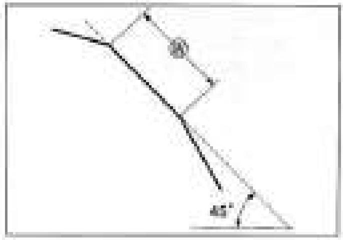
⚠ CAUTION

The valve seat contact area must be inspected after each cut.

- When installing the solid pilot ①, rotate it slightly. Seat the pilot snugly. Install the 45° cutter, attachment and T-handle.

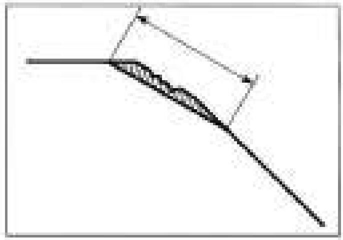
INITIAL SEAT CUT

- Using the 45° cutter, descale and clean up the seat. Rotate the cutter one or two turns.
- Measure the valve seat width Ⓦ after every cut.



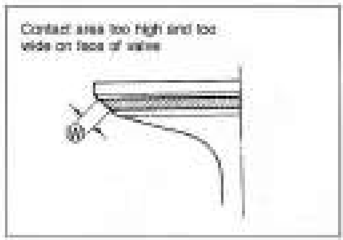
- If the valve seat is pitted or burned, use the 45° cutter to condition the seat some more.

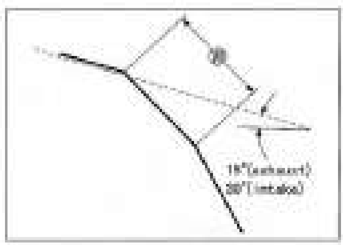
NOTE:
Cut only the minimum amount necessary from the seat to prevent the possibility of the valve stem becoming too close to the camshaft.



TOP NARROWING CUT

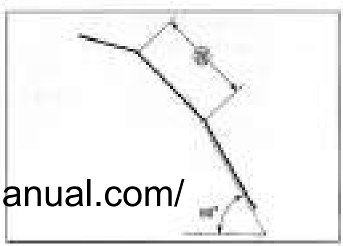
- If the contact area Ⓦ is too high on the valve, or if it is too wide, use the 15° (for the exhaust side) and the 30° (for the intake side) to lower and narrow the contact area.





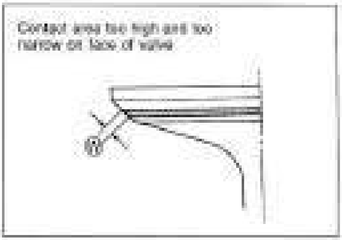
BOTTOM NARROWING CUT

- If the contact area Ⓦ is too wide or too low, use the 60° cutter to narrow and raise the contact area.

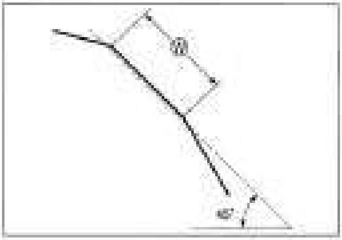


FINAL SEAT CUT

- If the contact area Ⓦ is too low or too narrow, use the 45° cutter to raise and widen the contact area.



NOTE:
After cutting the 15°, 30° and 60° angles, it is possible that the valve seat (45°) is too narrow. If so, re-cut the valve seat to the correct width.



- After the desired seat position and width is achieved, use the 45° cutter very lightly to clean up any burrs caused by the previous cutting operations.

⚠ CAUTION

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

NOTE:
After servicing the valve seats, be sure to check the tappet clearance after the cylinder head has been reinstalled. (☞ 2-8)

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

⚠ WARNING

Always use extreme caution when handling gasoline.

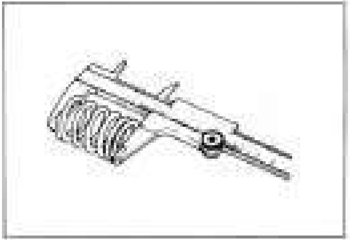
VALVE STEM END CONDITION

- Check the valve stem end face for pitting and wear.

VALVE SPRING

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

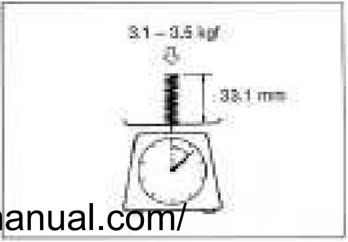
- Check the valve springs for proper strength by measuring their free length and also by the force required to compress them.
- If the spring length is less than the service limit, or if the force required to compress the spring does not fall within the range specified, replace both the inner and outer springs as a set.



09900-20102: Vernier calipers

Valve spring free length (IN & EX)
Service limit: INNER: 35.1 mm (1.38 in)
OUTER: 45.2 mm (1.77 in)

Valve spring tension
Standard: (IN & EX) INNER: 3.1 – 3.5 kgf/33.1 mm
(6.83 – 7.72 lbs/1.30 in)
OUTER: 15.5 – 17.9 kgf/36.6 mm
(34.17 – 39.46 lbs/1.44 in)



VALVE AND VALVE SPRING REASSEMBLY

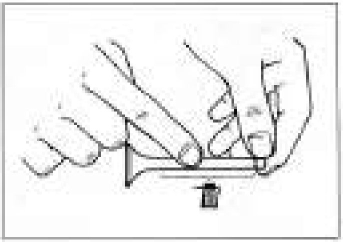
- Install the valve spring seats ①.
- Apply molybdenum oil solution to each oil seal ②, and press-fit them into position with the valve guide installer.

09916-44310: Valve guide remover/installer

99000-25140: SUZUKI MOLY PASTE

⚠ CAUTION

Do not reuse the removed oil seals.

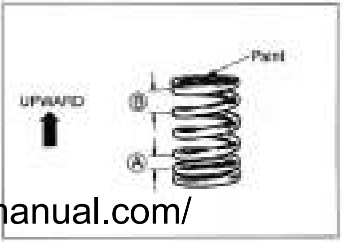


- Insert the valves, with their stems coated with molybdenum oil solution all around and along the full stem length without any break.

⚠ CAUTION

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

99000-25140: SUZUKI MOLY PASTE

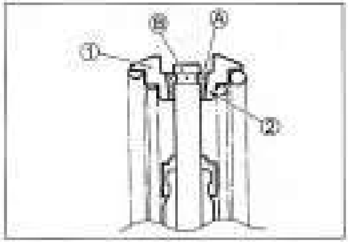


- Install the valve springs with the small-pitch portion Ⓐ facing cylinder head.

Ⓑ: Large-pitch portion

- Put on the valve spring retainer ①, and using the valve lifter, press down the springs, fit the cotter halves to the stem end, and release the lifter to allow the cotter ② to wedge in between retainer and stem. Be sure that the rounded lip Ⓐ of the cotter fits snugly into the groove Ⓑ in the stem end.

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



▲ CAUTION

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

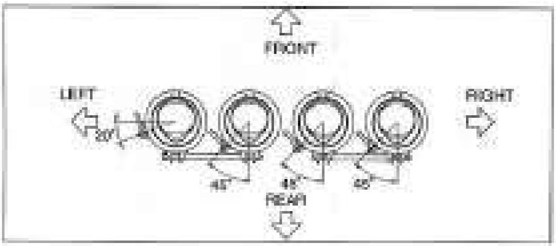
- Install the tappet shims and the tappets to their original position.

NOTE:
* *Apply engine oil to the shim and tappet before fitting them.*
* *When seating the tappet shim, be sure the figure printed surface faces the tappet.*

INTAKE PIPE

- Install the intake pipe in the following procedure.
- After aligning the boss Ⓐ on the cylinder head with the slit Ⓑ on the intake pipe, install the intake pipe.

- Tighten the clamp screws as shown.
- Install the throttle body side clamps as shown.



PAIR PIPE

- Install the gasket ①.

NOTE:
The seal side of the gasket must faces to the PAIR pipe.

- Tighten the PAIR pipe nuts to the specified torque.

PAIR pipe nut: 10 N·m (1.0 kgf·m, 7.0 lb-ft)

NOTE:
Refer to the page 8-29 for the pipe position.

ENGINE COOLANT TEMPERATURE SENSOR

- Tighten the coolant temperature sensor to the specified torque.

Engine coolant temperature sensor: 18 N·m (1.8 kgf·m, 13.0 lb-ft)

▲ CAUTION

Take special care when handling the temperature sensor. It may cause damage if it gets a sharp impact.

THERMOSTAT

- Install the thermostat.

NOTE:
The jiggle valve Ⓐ of the thermostat faces upside.

- Tighten the thermostat case bolts along with the clamp ① to the specified torque.

Thermostat case bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)

WATER BYPASS UNION

- Apply SUZUKI BOND "1207B" to the thread part of the water bypass union ① and tighten it to the specified torque.

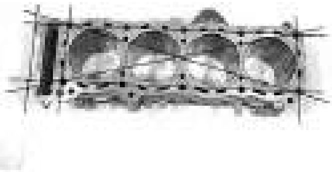
99104-31140: SUZUKI BOND "1207B"

Water bypass union: 14 N·m (1.4 kgf·m, 10.0 lb-ft)

CYLINDER

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 cylinder.

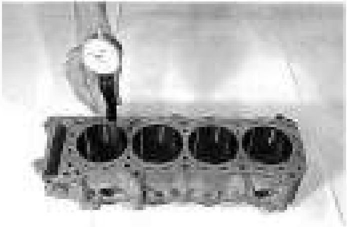


09900-20803: Thickness gauge

Cylinder distortion
Service Limit: 0.20 mm (0.008 in)

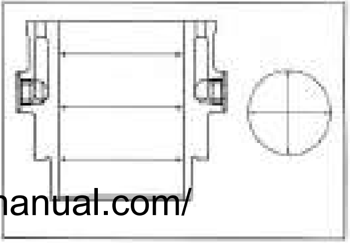
CYLINDER BORE

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



Cylinder bore
Standard: 81.000 – 81.015 mm (3.1890 – 3.1896 in)

09900-20508: Cylinder gauge set

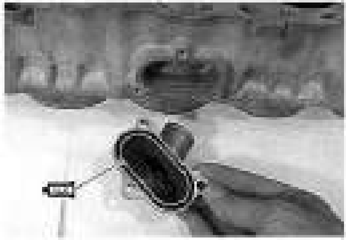


WATER INLET CONNECTOR

- Install the O-ring and apply engine coolant.

▲ CAUTION

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



- Tighten the water inlet connector bolt to the specified torque.

Water inlet connector bolt: 10 N·m (10 kgf-m, 7.0 lb-ft)

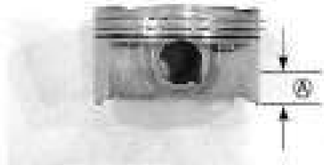
PISTON AND PISTON RING

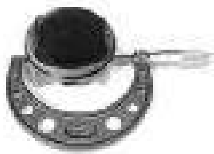
PISTON DIAMETER

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

DATA **Piston diameter**
Service Limit: 80.880 mm (3.1842 in)
at 15 mm (0.6 in) from the skirt end

09900-20204: Micrometer (75 – 100 mm)





PISTON TO CYLINDER CLEARANCE

- Subtract the piston diameter from the cylinder bore diameter. (☞ 3-60)
- If the piston to cylinder clearance exceeds the service limit, replace the cylinder and the piston.

DATA **Piston to cylinder clearance**
Standard: 0.020 – 0.030 mm (0.0008 – 0.0012 in)

PISTON RING TO GROOVE CLEARANCE

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

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

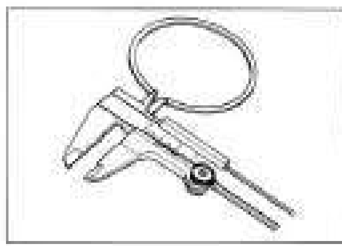
Piston ring to groove clearance
Service Limit (1st): 0.18 mm (0.0071 in)
(2nd): 0.15 mm (0.0059 in)

Piston ring groove width
Standard (1st): 1.21 – 1.23 mm (0.0476 – 0.0484 in)
(2nd): 1.01 – 1.03 mm (0.0398 – 0.0406 in)
(Oil): 2.01 – 2.03 mm (0.0791 – 0.0799 in)

Piston ring thickness
Standard (1st): 1.17 – 1.19 mm (0.0461 – 0.0469 in)
(2nd): 0.97 – 0.99 mm (0.0382 – 0.0390 in)

PISTON RING FREE END GAP AND PISTON RING END GAP

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



09900-20102: Vernier calipers

Piston ring free end gap
Service Limit (1st): 5.8 mm (0.23 in)
(2nd): 6.4 mm (0.25 in)

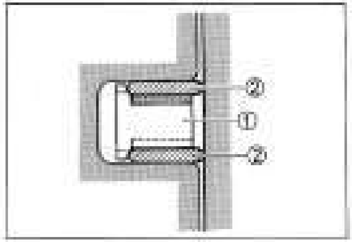
09900-20803: Thickness gauge

Piston ring end gap
Service Limit (1st): 0.50 mm (0.020 in)
(2nd): 0.50 mm (0.020 in)

PISTON RING REASSEMBLY

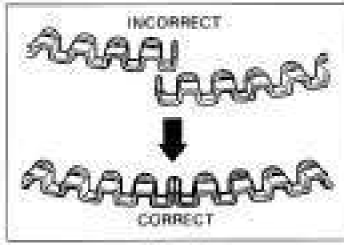
- Install the piston rings in the order of oil ring, 2nd ring and 1st ring.
- The first member to go into the oil ring groove is a spacer ①. After placing the spacer, fit the two side rails ②.

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



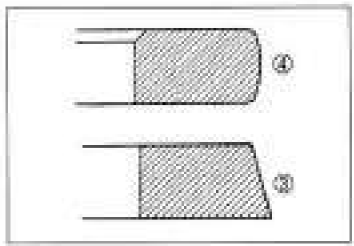
⚠ CAUTION

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

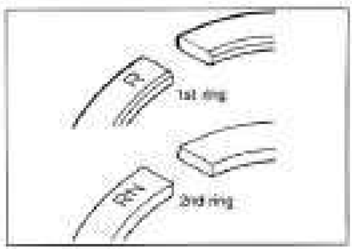


- Install the 2nd ring ③ and the 1st ring ④.

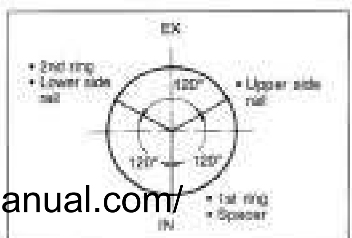
NOTE:
1st ring and 2nd ring differ in shape.



- 1st ring and 2nd ring have letters "R" and "RN" marked on the side. Be sure to bring the marked side to the top when fitting them to the piston.



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

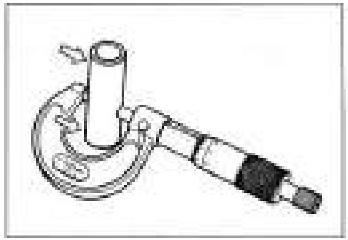


PISTON PINS AND PIN BORE

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

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

Piston pin bore I.D.
Service Limit: 20.030 mm (0.7886 in)



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

09900-20205: Micrometer (0 – 25 mm)

Piston pin O.D.
Service Limit: 19.980 mm (0.7866 in)

PAIR VALVE

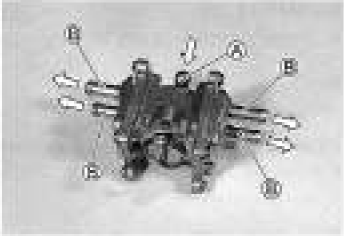
- Remove the PAIR valve mounting bracket.
- Inspect the PAIR valve body for damage.

PAIR REED VALVE

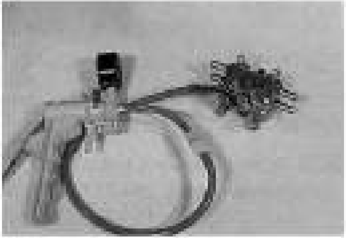
- Remove the PAIR valve cover.
- Inspect the reed valve for the carbon deposit.
- If the carbon deposit is found in the reed valve, replace the PAIR control valve with a new one.

PAIR CONTROL VALVE

- Inspect that air flows through the PAIR control valve air inlet port Ⓐ to the air outlet parts Ⓑ.
- If air does not flow out, replace the PAIR valve with a new one.



- Connect the vacuum pump gauge to the vacuum port of the control valve as shown in the photograph.
- Apply negative pressure slowly to the control valve and inspect the air flow.
- If air does not flow out within the specification, the control valve is in normal condition.
- If the control valve does not function within the specification, replace the control valve with a new one.



DATA Negative pressure range: 44 – 65.3 kPa
(330 – 490 mmHg)

TOOL 09917-47010: Vacuum pump gauge

⚠ CAUTION

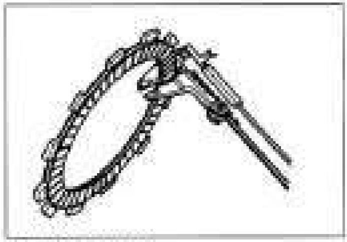
Use a hand operated vacuum pump to prevent the control valve damage.

CLUTCH

CLUTCH DRIVE PLATES INSPECTION

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

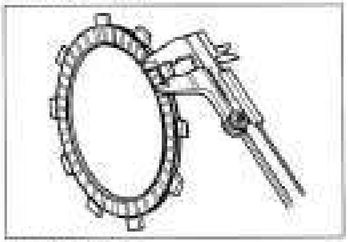
- Measure the thickness of drive plates with a vernier calipers.
- If each drive plate is not within the standard range, replace it with a new one.


Measuring thickness

Drive plate thickness
Standard (No.1): 2.92 – 3.08 mm (0.115 – 0.121 in)
(No.2): 3.72 – 3.88 mm (0.146 – 0.153 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.


Measuring claw width

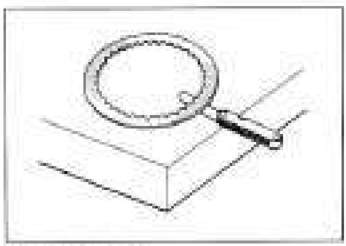
Drive plate claw width
Service Limit: (No.1) 13.05 mm (0.514 in)
(No.2) 13.10 mm (0.516 in)

09900-20102: Vernier calipers

CLUTCH DRIVEN PLATES INSPECTION

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

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


Measuring distortion

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

09900-20803: Thickness gauge

CLUTCH SPRING INSPECTION

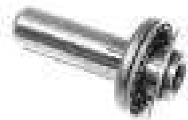
- Measure the free length of each coil spring with a vernier calipers, and compare the length with the specified limit.
- Replace all the springs if any spring is not within the limit.

Clutch spring free length
Service Limit: 23.7 mm (0.93 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.



OIL PUMP

INSPECTION

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

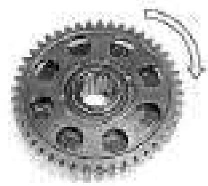
⚠ CAUTION

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

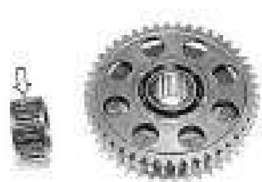
STARTER CLUTCH

INSPECTION

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



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



GENERATOR AND CRANKSHAFT POSITION SENSOR

INSPECTION

- Refer to the pages 7-9, 7-10, 7-26 and 7-27 for generator and crankshaft position sensor inspection.

REASSEMBLY

- When installing the generator stator set bolts ① and the crankshaft position sensor set bolts ②, apply THREAD LOCK "1342" to their thread and tighten them to the specified torque.

99000-32050: THREAD LOCK "1342"

Generator stator set bolt ①: 10 N·m (1.0 kgf-m, 7.0 lb-ft)
Crankshaft position sensor set bolt ②: 5.5 N·m (0.55 kgf-m, 4.0 lb-ft)

NOTE:
Be sure to install the grommet to the generator cover.

WATER PUMP

(☞ 5-11)

GEARSHIFT SYSTEM

GEARSHIFT COVER

- Inspect the gearshift cover oil seal and bearing for any damage or wear.
- Replace the gearshift cover oil seal and bearing if necessary.

- Remove the gearshift cover oil seal using the suitable bar.

⚠ CAUTION

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

- Remove the gearshift cover bearing using the special tool.

09921-20220: Bearing remover set

⚠ CAUTION

The removed bearing must be replaced with a new one.

- Install the new bearing using the special tool.

09913-70210: Bearing installer set

NOTE:
The stamped mark on the bearing faces outside.

- Install the oil seal using the special tool.

09913-70210: Bearing installer set

NOTE:
The stamped mark Ⓐ on the oil seal faces outside.

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

99000-25030: SUZUKI SUPER GREASE "A"

GEARSHIFT SHAFT/GEARSHIFT ARM DISASSEMBLY

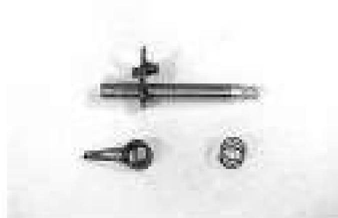
- Remove the following parts from the gearshift shaft/gearshift arm.

① Washer
② Circlip
③ Gearshift shaft return spring
④ Gearshift cam drive plate
⑤ Plate return spring
⑥ Washer
⑦ Circlip
⑧ Washer

09900-06107: Snap ring pliers

GEARSHIFT SHAFT/GEARSHIFT ARM INSPECTION

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

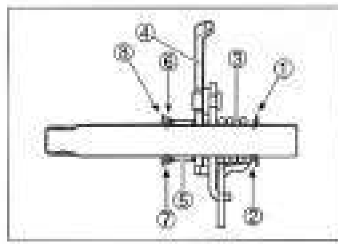


GEARSHIFT SHAFT/GEARSHIFT ARM REASSEMBLY

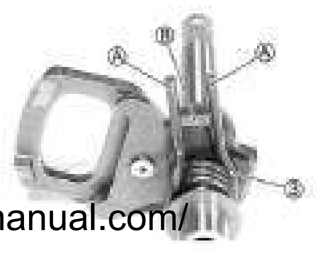
- Install the following parts to the gearshift shaft/gearshift arm as shown in the right illustration.

① Washer
② Circlip
③ Gearshift shaft return spring
④ Gearshift cam drive plate
⑤ Plate return spring
⑥ Washer
⑦ Circlip
⑧ Washer

09900-06107: Snap ring pliers



NOTE:
When installing the gearshift shaft return spring ③, position the stopper Ⓑ of the gearshift arm between the shaft return spring ends Ⓐ.



OIL PRESSURE REGULATOR

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

OIL STRAINER

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

CRANK BALANCER

DISASSEMBLY

- Disassemble the balancer assembly.

① Crank balancer
② Balancer gear damper
③ Balancer gear
④ Washer
⑤ Bearing
⑥ Spacer

INSPECTION

- Inspect the balancer shaft for wear or damage.
- Replace the balancer shaft if there is anything unusual.

- Inspect the bearings and the washers for wear or damage.
- Replace the bearing or the washer if there is anything unusual.

* Inspect the damper for wear and damage.
* Replace the damper if there is anything unusual.

REASSEMBLY

* Apply molybdenum oil solution to each part.

99000-25140: SUZUKI MOLY PASTE

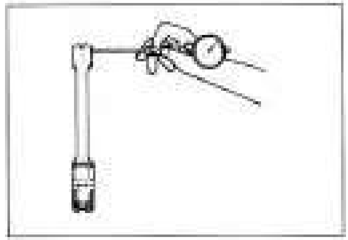
* Install the dampers to the balancer gear as shown.
* Install the crank balancer to the balancer gear.

NOTE:

* *Align the parts Ⓐ of the crank balancer with between the dampers.*
* *Align the engraved line Ⓑ on the crank balancer with the punched mark Ⓒ on the balancer gear.*

CONROD AND CRANKSHAFT

CONROD SMALL END I.D.



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

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

Conrod small end I.D.
Service Limit: 20.040 mm (0.7890 in)

- 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 (3-74) 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: 20.95 – 21.00 mm (0.825 – 0.827 in)

09900-20205: Micrometer (0 – 25 mm)

Crank pin width
Standard: 21.10 – 21.15 mm (0.831 – 0.833 in)

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

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.

09900-20606: Dial gauge (1/100 mm, 10 mm)
09900-20701: Magnetic stand
09900-21304: V-block (100 mm)

Crankshaft runout

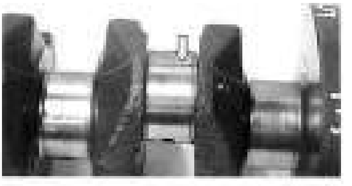
Service Limit: 0.05 mm (0.002 in)

CONROD REMOVAL AND BEARING INSPECTION

- Loosen the bearing cap bolts by using a 12 mm, 12 point socket wrench, and tap the bearing cap bolt lightly with plastic hammer to remove the bearing cap.

- Remove the conrods, and mark them to identify the cylinder position.
- Inspect the bearing surfaces for any sign of fusion, pitting, burn, or flaws. If any, replace them with a specified set of bearings.

CONROD-CRANK PIN BEARING SELECTION



- Place the 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. (3-76)

▲ CAUTION

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

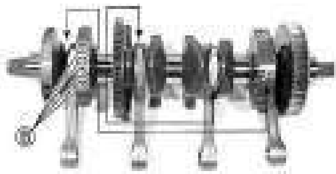
- Remove the bearing caps and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

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") Ⓑ.



Bearing selection table

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

DATA Conrod I.D.

Code	I.D. specification
1	41.000 – 41.008 mm (1.6142 – 1.6145 in)
2	41.008 – 41.016 mm (1.6145 – 1.6148 in)

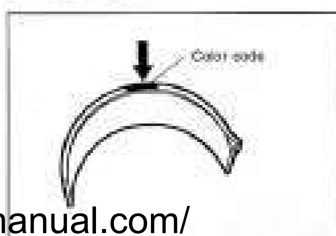
DATA Crank pin O.D.

Code	O.D. specification
1	37.992 – 38.000 mm (1.4957 – 1.4961 in)
2	37.984 – 37.992 mm (1.4954 – 1.4957 in)
3	37.976 – 37.984 mm (1.4951 – 1.4954 in)

09900-20202: Micrometer (25 – 50 mm)

DATA **Bearing thickness**

Color (Part No.)	Thickness
Green (12164-46E01-0A0)	1.480 – 1.484 mm (0.0583 – 0.0584 in)
Black (12164-46E01-0B0)	1.484 – 1.488 mm (0.0584 – 0.0586 in)
Brown (12164-46E01-0C0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)
Yellow (12164-46E01-0D0)	1.492 – 1.496 mm (0.0587 – 0.0589 in)



⚠ CAUTION

The bearings must be replaced as a set.

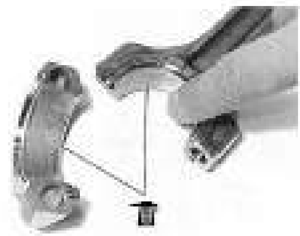
CONROD AND BEARING REASSEMBLY

- When fitting the bearings to the bearing cap and conrod, be sure to fix the stopper part Ⓐ first and press in the other end.

▲ CAUTION

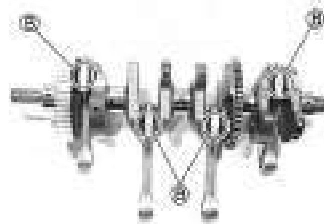
Be sure to clean the conrod big end.

- Apply molybdenum oil solution to the crank pin and bearing surface.



99000-25140: SUZUKI MOLY PASTE

- When fitting the conrods on the crankshaft, make sure that I.D. code Ⓑ on each conrod faces toward intake valve side.



- Apply engine molybdenum oil solution to the bearing cap bolts.

99000-25140: SUZUKI MOLY PASTE

- Tighten the bearing cap bolt by using a 12 mm, 12 point socket wrench as following two steps.

Conrod bearing cap bolt
(Initial): 35 N·m (3.5 kgf·m, 25.5 lb-ft)
(Final): 67 N·m (6.7 kgf·m, 48.5 lb-ft)

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

CRANKSHAFT JOURNAL BEARING

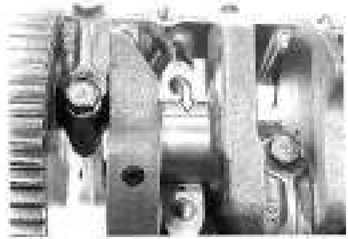
INSPECTION

- 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.

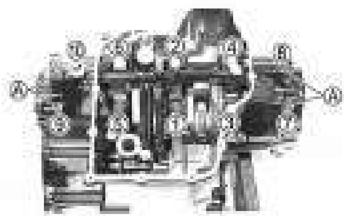
09900-22301: Plastigauge



▲ CAUTION

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

- Mate the lower crankcase with the upper crankcase, and tighten the crankcase bolts (M9) with the specified torque value in the indicated order.



Crankcase bolt (9 mm)

Initial : 18 N·m (1.8 kgf·m, 13.0 lb-ft)
Final : 32 N·m (3.2 kgf·m, 23.0 lb-ft)

NOTE:
Fit the copper washers to the crankcase bolts Ⓐ as shown.

- 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.

Crankshaft journal bearing oil clearance
Standard: 0.016 – 0.040 mm (0.0006 – 0.0016 in)
Service Limit: 0.080 mm (0.031 in)

- If the oil clear … fied bearings from the bearing selection table.

- Check the corresponding crankcase journal I.D. code number Ⓐ, "A" or "B" which are stamped on the rear of upper crankcase.

- Check the corresponding crankshaft journal O.D. code number Ⓑ, "A", "B" or "C" which are stamped on the crankshaft.

Bearing selection table

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

DATA Crankcase I.D. specification

Code	I.D. specification
A	43.000 – 43.008 mm (1.6929 – 1.6932 in)
B	43.008 – 43.016 mm (1.6932 – 1.6935 in)

DATA Crankshaft journal O.D. specification

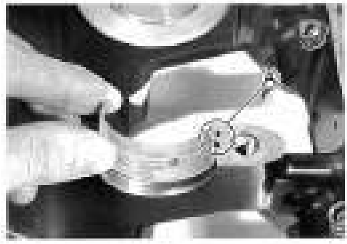
Code	O.D. specification
A	39.992 – 40.000 mm (1.5745 – 1.5748 in)
B	39.984 – 39.992 mm (1.5742 – 1.5745 in)
C	39.976 – 39.984 mm (1.5739 – 1.5742 in)

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

DATA Bearing thickness specification

Color (Part No.)	Thickness
Green (12229-24F00-0A0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)
Black (12229-24F00-0B0)	1.492 – 1.496 mm (0.0587 – 0.0589 in)
Brown (12229-24F00-0C0)	1.496 – 1.500 mm (0.0589 – 0.0591 in)
Yellow (12229-24F00-0D0)	1.500 – 1.504 mm (0.0591 – 0.0592 in)

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

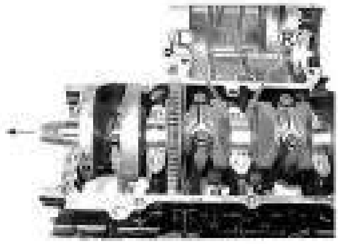


INSTALLATION

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

▲ CAUTION

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

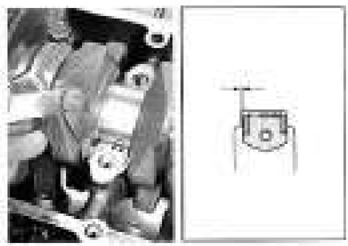


CRANKSHAFT THRUST BEARING

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

  Ⓑ: Right-side thrust bearing
  Ⓒ: Left-side thrust bearing

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



09900-20803: Thickness gauge

DATA Thrust clearance
Standard: 0.055 – 0.110 mm (0.0022 – 0.0043 in)

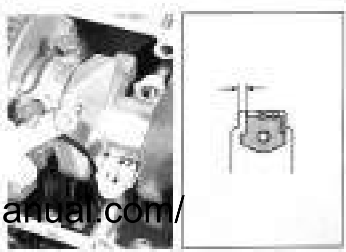
- If the thrust clearance exceeds the standard range, adjust the thrust clearance by the following procedures.

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 with a new bearing and once again perform the thrust clearance measurement listed above, checking to make sure it is within standard.

09900-20205: Micrometer

DATA Right-side thrust bearing thickness
Standard: 2.425 – 2.450 mm (0.0955 – 0.0965 in)



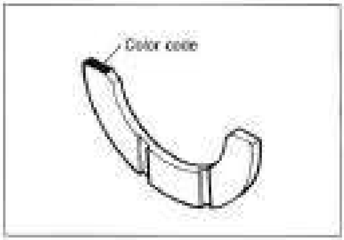
- If the right-side thrust bearing is within the standard range, reinsert the right-side thrust bearing and remove the left-side thrust bearing.
- As shown in the illustration, measure the clearance by using a thickness gauge before inserting of the left-side thrust bearing.
- Select a left-side thrust bearing from the selection table. (☞ 3-80)

Thrust bearing selection table

Clearance before inserting left-side thrust bearing	Color (Part No.)	Thrust bearing thickness	Thrust clearance
2.560 – 2.585 mm (0.1008 – 0.1018 in)	White (12228-24F00-0F0)	2.475 – 2.500 mm (0.0974 – 0.0984 in)	0.060 – 0.110 mm (0.0024 – 0.0043 in)
2.535 – 2.560 mm (0.0998 – 0.1008 in)	Yellow (12228-24F00-0E0)	2.450 – 2.475 mm (0.0965 – 0.0974 in)	0.060 – 0.110 mm (0.0024 – 0.0043 in)
2.510 – 2.535 mm (0.0988 – 0.0998 in)	Green (12228-24F00-0D0)	2.425 – 2.450 mm (0.0955 – 0.0965 in)	0.060 – 0.110 mm (0.0024 – 0.0043 in)
2.485 – 2.510 mm (0.0978 – 0.0988 in)	Blue (12228-24F00-0C0)	2.400 – 2.425 mm (0.0945 – 0.0955 in)	0.060 – 0.110 mm (0.0024 – 0.0043 in)
2.460 – 2.485 mm (0.0969 – 0.0978 in)	Black (12228-24F00-0B0)	2.375 – 2.400 mm (0.0935 – 0.0945 in)	0.060 – 0.110 mm (0.0024 – 0.0043 in)
2.430 – 2.460 mm (0.0957 – 0.0969 in)	Red (12228-24F00-0A0)	2.350 – 2.375 mm (0.0925 – 0.0935 in)	0.055 – 0.110 mm (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.

NOTE:
Right-side thrust bearing has the same specification as the GREEN (12228-24F00-0D0) of left-side thrust bearing.



CRANKCASE

GEARSHIFT FORK AND GEARSHIFT CAM

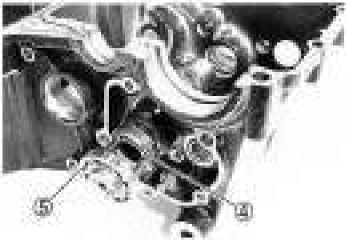
Removal

* Remove the gearshift cam bearing retainer ① from the lower crankcase.

* Remove the gearshift fork shafts and gearshift forks from the lower crankcase.

① For 3rd/4th drive gears
② For 6th driven gear
③ For 5th driven gear

- Remove the gearshift cam ④ and its bearing ⑤.



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

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

NOTE:
Refer to the page 3-93 for gearshift fork inspection.

Bearing removal

- Remove the gearshift shaft bearing using the special tool.

09921-20220: Bearing remover set

- Remove the gearshift cam bearing using the special tools.

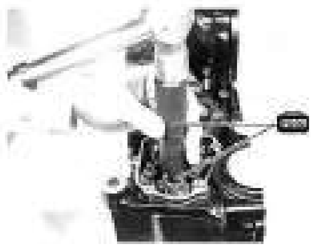
09921-20220: Bearing remover set ①
09910-20115: Conrod stopper ②

Installation

- Install the bearings using the special tool.

09913-70210: Bearing installer set

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

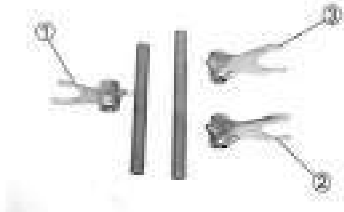


- Install the gearshift cam with the bearing.

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

- Install the gearshift forks and their shafts as shown.

① For 3rd/4th drive gears
② For 6th driven gear
③ For 5th driven gear



- Install the bearing retainer.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the bearing retainer screws and tighten them to the specified torque.

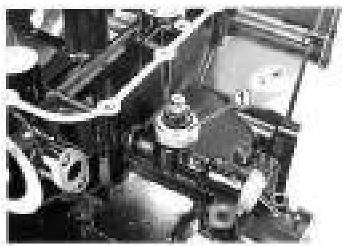
99000-32050: THREAD LOCK "1342"

Bearing retainer screw: 8 N·m (0.8 kgf-m, 6.0 lb-ft)

OIL PRESSURE SWITCH

Removal

- Remove the oil pressure switch ①.



Inspection

(☞ 7-39)

Installation

- Apply SUZUKI BOND "1207B" to the thread part of the oil pressure switch ① and tighten it to the specified torque.

99104-31140: SUZUKI BOND "1207B"

Oil pressure switch: 14 N·m (1.4 kgf-m, 10.0 lb-ft)

NOTE:
Be careful not to a[illegible] thread end.

OIL JET

Removal

- Remove the piston cooling oil jets ① from the upper crank-case.

- Remove the oil jet (for oil spray) from the upper crankcase.

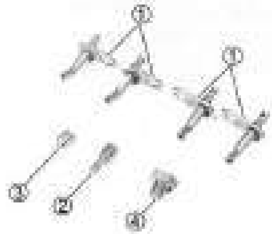
- Remove the oil jet (for generator) from the upper crankcase.

- Remove the oil jet (for transmission) from the lower crank-case.

Inspection and cleaning

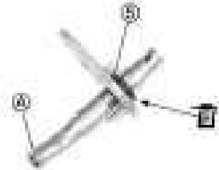
- Check the oil jets for clogging.
- If they are clogged, clean their oil passage with a proper wire and compressed air.

① Piston cooling oil jet
② Oil jet (#18) (For transmission)
③ Oil jet (For oil spray)
④ Oil jet (For generator)



Installation

- Fit the new O-rings ⑤ to each piston cooling oil jet as shown and apply engine oil to them.



▲ CAUTION

Use the new O-rings to prevent oil pressure down.

NOTE:
Be sure to face the oil hole Ⓐ on each piston cooling oil jet to the top when installing them.

- Install each piston cooling oil jet with the bolts.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the bolts and tighten them to the specified torque.

99000-32050: THREAD LOCK "1342"

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

- Install the oil jets (for transmission and oil spray).

- Install the oil jets (for generator) onto the upper crankcase and tighten it to the specified torque.

Oil jet (For generator): 5 N·m (0.5 kgf·m, 3.5 lb-ft)

GEARSHIFT ARM STOPPER

- When installing the gearshift arm stopper bolt ①, apply a small quantity of THREAD LOCK SUPER "1303" to its thread and tighten it to the specified torque.

99000-32030: THREAD LOCK SUPER "1303"

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

CAM CHAIN GUIDE RETAINER

- When installing the cam chain guide retainer screw apply a small quantity of THREAD LOCK "1342" to its thread and tighten it to the specified torque.

99000-32050: THREAD LOCK "1342"

Cam chain guide retainer screws: 8 N·m (0.8 kgf·m, 6.0 lb-ft)

TRANSMISSION

COUNTERSHAFT DISASSEMBLY

- Remove the left end bearing ① and oil seal ②.

- Remove the 6th drive gear circlip ③ from its groove and slide it towards the 3rd/4th drive gears ④.

09900-06104: Snap ring pliers

- Slide the 6th ⑤ and 2nd ⑥ drive gears toward the 3rd/4th drive gears ④, then remove the 2nd drive gear circlip ⑦.
- Remove the 2nd drive gear ⑥ and 6th drive gear ⑤.

- Remove the 2nd drive gear bushing ①, the washer ② and the circlip ③.

09900-06104: Snap ring pliers

- Remove the 3rd/4th drive gear ④.

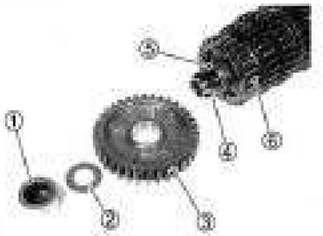
- Remove the circlip ⑤, washer ⑥ and 5th drive gear ⑦.

09900-06104: Snap ring pliers

- Remove the 5th drive gear bushing ⑧.

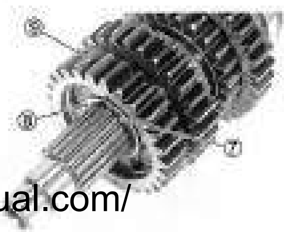
DRIVESHAFT DISASSEMBLY

- Remove the right end bearing ①, the washer ② and 1st driven gear ③.
- Remove the 1st driven gear bushing ④ and the washer ⑤.
- Remove the 5th driven gear ⑥.



- Remove the circlip ⑦, washer ⑧ and 4th driven gear ⑨.

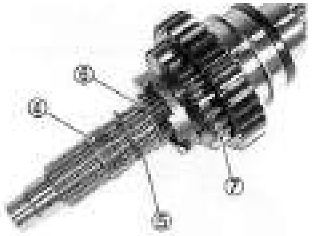
09900-06104: Snap ring pliers



- Remove the 4th driven gear bushing ①, the washer ② and 3rd driven gear ③.

- Remove the 3rd driven gear bushing ④ and washer ⑤.
- Remove the circlip ⑥ and 6th driven gear ⑦.

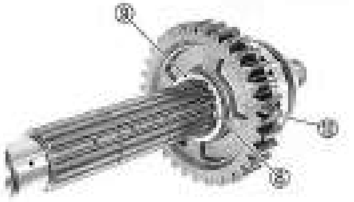
09900-06104: Snap ring pliers



- Remove the circlip ⑧ and the washer ⑨.

09900-06104: Snap ring pliers

- Remove the 2nd driven gear ⑩.



- Remove the 2nd driven gear bushing ⑪.

- Remove the oil seal ⑫.

NOTE:
The spacer ⑬ is press-fitted.

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 molybdenum oil solution to the driveshaft and countershaft.*
* *Before installing the oil seal, apply grease to oil seal.*

99000-25140: SUZUKI MOLY PASTE

99000-25030: SUZUKI SUPER GREASE "A"

⚠ CAUTION

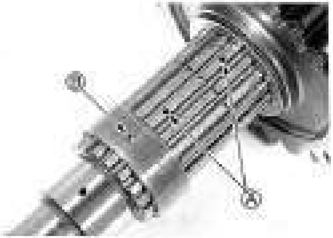
* **Never reuse a circlip. After a circlip has been removed from a shaft, it should be discarded and a new circlip must be installed.**
* **When installing a new circlip, do not expand the end gap larger than required to slip the circlip over the shaft.**
* **After installing a circlip, make sure that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

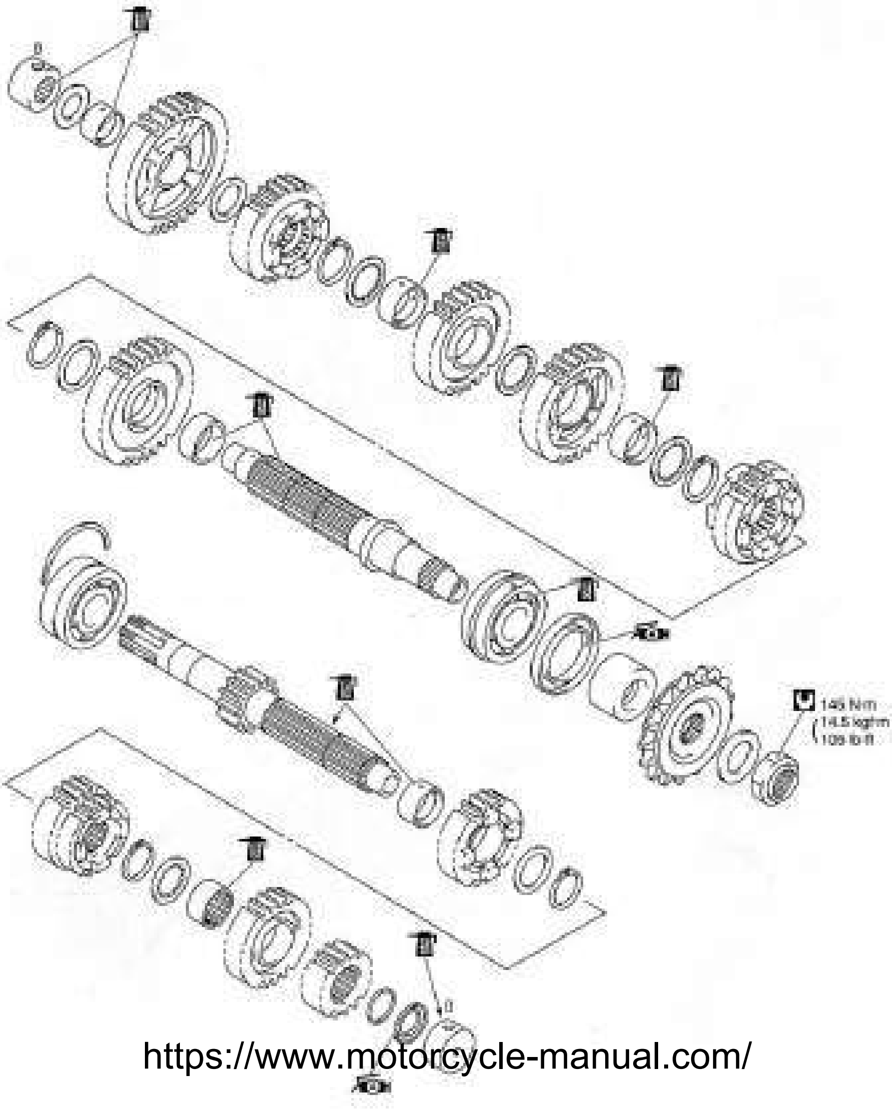
NOTE:
When reassembling the transmission, attention must be given to the locations and positions of washers and circlips. The cross sectional view shows the correct position of the gears, bushings, washers and circlips. *(☞ 3-91)*

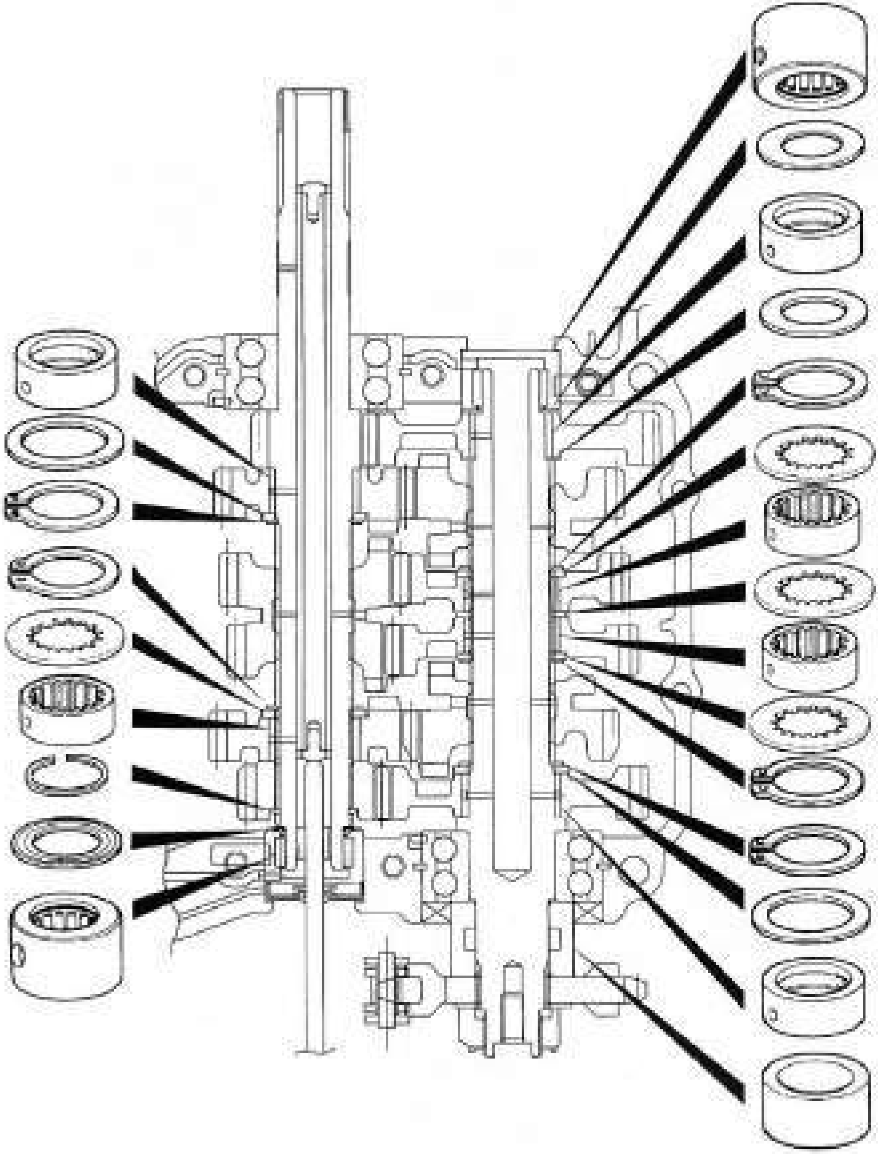
* When installing a new circlip, pay attention to the direction of the circlip. Fit it to the side where the thrust is as shown in the illustration.

⚠ CAUTION

Align the shaft oil hole Ⓐ with the bushing oil hole Ⓑ.




145 N·m
(14.5 kgf·m
105 lb-ft)



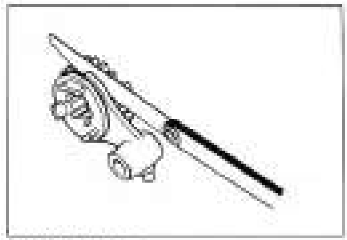
GEARSHIFT FORK TO GROOVE CLEARANCE

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

Shift fork to groove clearance
Service Limit: 0.50 mm (0.020 in)

09900-20803: Thickness gauge

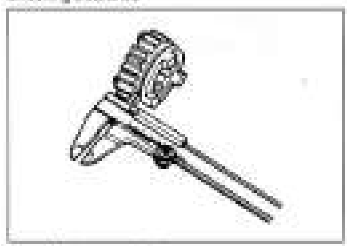
- If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.



Checking clearance

GEARSHIFT FORK GROOVE WIDTH

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



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

09900-20102: Vernier calipers

Checking groove width

GEARSHIFT FORK THICKNESS

- Measure the gearshift fork thickness using the vernier callipers.

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

09900-20102: Vernier calipers

Checking thickness

ENGINE REASSEMBLY

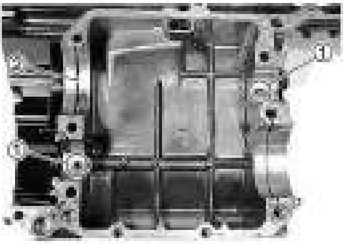
- Reassemble the engine in the reverse order of disassembly.
- The following steps require special attention or precautionary measures should be taken.

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

- Be sure to install the following items to the crankcase.
  * Crankshaft journal bearing (☞ 3-79)
  * Gearshift fork (☞ 3-83)
  * Gearshift fork shaft (☞ 3-83)
  * Gearshift shaft bearing (☞ 3-82)
  * Gearshift cam bearing (☞ 3-82)
  * Gearshift cam (☞ 3-82)
  * Bearing retainer (☞ 3-83)
  * Oil pressure switch (☞ 3-83)
  * Oil jets (☞ 3-85)
  * Gearshift arm stopper (☞ 3-86)
  * Cam chain guide retainer (☞ 3-86)

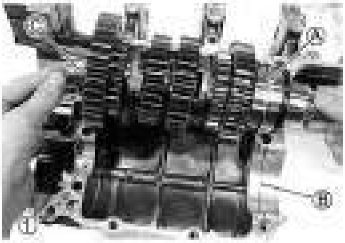
TRANSMISSION

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



- Install the driveshaft assembly on the upper crankcase.

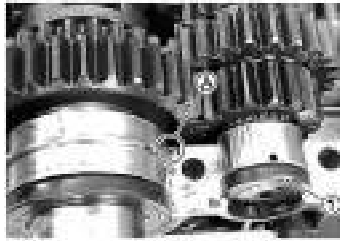
NOTE:
Align the bearing ring Ⓐ with the groove Ⓑ on the crankcase and the bearing pin ① with the indent Ⓒ on the bearing.



- Install the countershaft assembly on the upper crankcase.

NOTE:
Align the C-ring ② with the groove Ⓓ on the bearing and the bearing pin ① with the indent Ⓔ on the bearing.

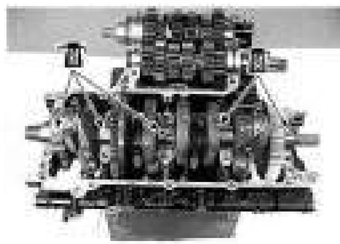
- Install the oil seal ①.
- Turn the bearings to install the bearing dowel pins Ⓐ in the respective positions.



CRANKSHAFT

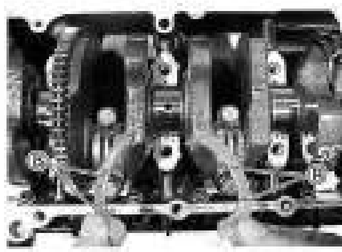
- Install the crankshaft to the upper crankcase.
- Apply molybdenum oil solution to each crankshaft journal bearing lightly.

99000-25140: SUZUKI MOLY PASTE



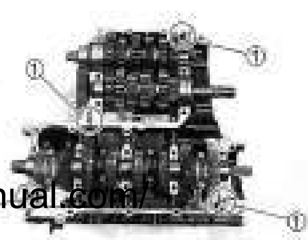
- Insert the right and left-thrust bearings with oil groove Ⓑ facing the crank web.

NOTE:
Right-thrust bearing has green painting.



CRANKCASE

- Clean the mating surfaces of the crankcases.
- Install the dowel pins ① to the upper crankcase.

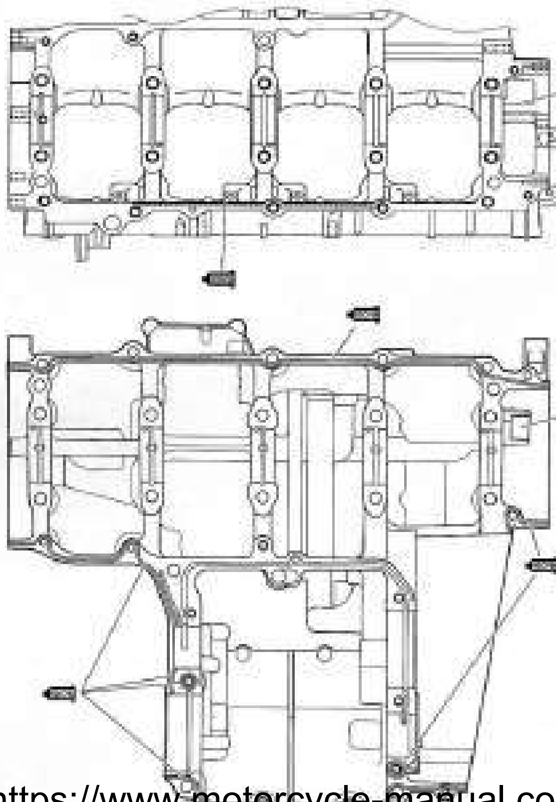


- Apply SUZUKI BOND "1207B" to the mating surface of the upper and lower crankcases.

99104-31140: SUZUKI BOND "1207B"

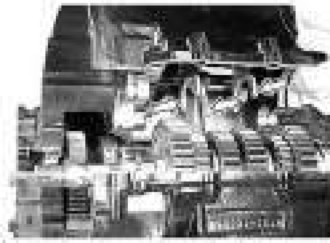
NOTE:
Use of SUZUKI BOND "1207B" is as follows:

* *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 "1207B" to the oil hole, oil groove and bearing.*
* *Apply to distorted surfaces as it forms a comparatively thick film.*

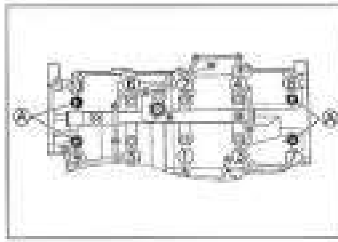


* Match the upper and lower crankcases.

NOTE:
Align the gearshift forks with the each gear.



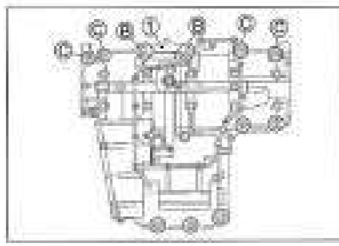
* Tighten the crankcase bolt (9 mm) in ascending order of numbers assigned to these bolts. Tighten each bolt a little at a time to equalize the pressure.



Crankcase bolt: (M9)
Initial: 18 N·m (1.8 kgf·m, 13.0 lb-ft)
Final: 32 N·m (3.2 kgf·m, 23.0 lb-ft)

NOTE:
Fit the copper washers to the crankcase bolts Ⓐ as shown.

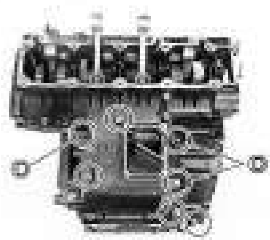
* Tighten the other crankcase bolts a little at a time to equalize the pressure.



Crankcase bolt:

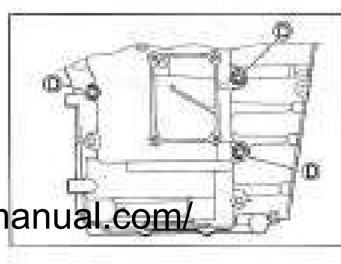
(M:6)	**Initial:**	**6 N·m (0.6 kgf·m, 4.5 lb-ft)**
	Final:	**11 N·m (1.1 kgf·m, 8.0 lb-ft)**
(M:8)	**Initial:**	**13 N·m (1.3 kgf·m, 9.5 lb-ft)**
	Final:	**26 N·m (2.6 kgf·m, 19.0 lb-ft)**
(M:9)	**Initial:**	**18 N·m (1.8 kgf·m, 13.0 lb-ft)**
	Final:	**32 N·m (3.2 kgf·m, 23.0 lb-ft)**
(M:10)	**Initial:**	**28 N·m (2.8 kgf·m, 20.0 lb-ft)**
	Final:	**50 N·m (5.0 kgf·m, 36.0 lb-ft)**

NOTE:
* *Fit the PAIR valve braket ① to the crankcase bolts Ⓑ as shown.*
* *Apply a small quantity of THREAD LOCK "1342" to the bolts Ⓑ and Ⓒ.*



1342 99000-32050: THREAD LOCK "1342"

* *Fit the copper washers to the crankcase bolts Ⓓ as shown.*



NOTE:
After the crankcase bolts have been tightened, check if the crankshaft, the driveshaft and the countershaft rotate smoothly.

CRANK BALANCER

- Install the cam chain drive sprocket, the starter clutch and the starter clutch cover temporarily. (☞ 3-107, 3-108 and 3-120)

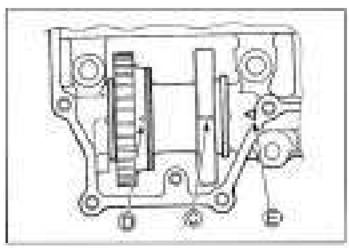
NOTE:
Before installing the starter clutch cover, install the dowel pins.

- Turn the crankshaft to bring the line mark Ⓐ on starter clutch to the index mark Ⓑ of the valve timing inspection hole.

- Hold the crankshaft and install the crank balancer assembly.

NOTE:
Refer to the page 3-72 for crank balancer assembling.

NOTE:
Align the engraved line Ⓒ on the crank balancer, the punched mark Ⓓ on the balancer gear and the triangle mark Ⓔ on the crankcase in line.



- Apply molybdenum oil solution to the balancer shaft and install it.

99000-25140: SUZUKI MOLY PASTE

* Install the balancer shaft arm.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the balancer shaft arm bolt and tighten it to the specified torque.

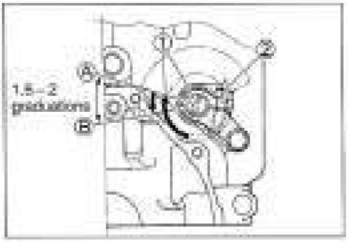
99000-32050: THREAD LOCK "1342"

Balancer shaft arm bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

* Slowly turn the balancer shaft ① clockwise until it is stop (position Ⓐ) with a ⊖ screwdriver.
* From this position, turn the balancer shaft ① counterclockwise by 1.5 – 2 graduations Ⓑ and tighten the lock bolt ②.

From Ⓐ to Ⓑ : 1.5 – 2 graduations

NOTE:
If the balancer gear is noisy after starting the engine, turn in or out the balancer shaft with in 1 graduation from standard setting to reduce the gear noise.



* Install the balancer cover.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the balancer cover bolt and tighten it to the specified torque.

99000-32050: THREAD LOCK "1342"

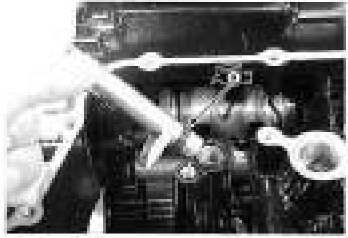
Balancer cover bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

* Remove the starter clutch cover, the starter clutch and the cam chain drive sprocket.

BREATHER PIPE

- Apply grease to the O-ring and install it to the breather pipe.

99000-25030: SUZUKI SUPER GREASE "A"



⚠ CAUTION

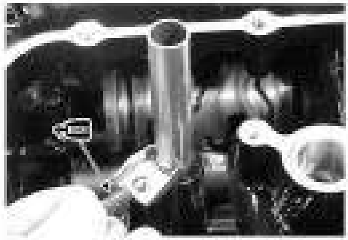
Use the new O-ring to prevent oil leakage.

- Install the breather pipe to the crankcase.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the breather pipe bolt and tighten it to the specified torque.

99000-32050: THREAD LOCK "1342"

Breather pipe bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)



OIL STRAINER

- Install the O-ring.

NOTE:
Apply grease to the O-ring.

99000-25030: SUZUKI SUPER GREASE "A"

⚠ CAUTION

Use the new O-ring to prevent oil leakage.

- Install the oil strainer as shown.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the strainer bolts and tighten it to the specified torque.

99000-32050: THREAD LOCK "1342"

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

OIL PRESSURE REGULATOR

- Apply grease to the O-ring and press in the oil pressure regulator to the crankcase.

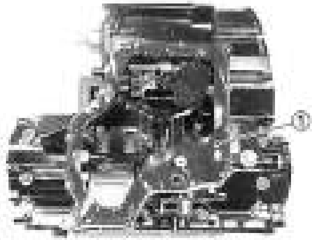
99000-25030: SUZUKI SUPER GREASE "A"

⚠ CAUTION

Use the new O-ring to prevent oil leakage.

OIL PAN

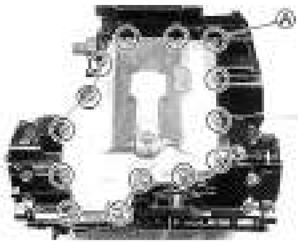
- Install the gasket ①.



⚠ CAUTION

Use the new gasket to prevent oil leakage.

- Install the oil pan.



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

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

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

OIL PIPE

- Install the O-ring to the oil pipe and apply grease to it.

⚠ CAUTION

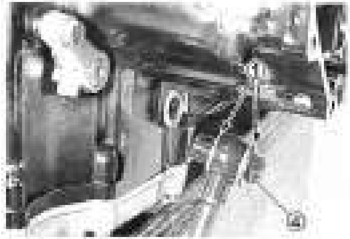
Use the new O-ring to prevent oil leakage.

99000-25030: SUZUKI SUPER GREASE "A"

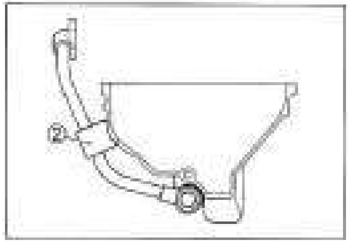
- Install the washers ①.

⚠ CAUTION

Use the new washers to prevent oil leakage.



- Install the cushion ②.



- Tighten the oil pipe bolts ③ and the oil pipe union bolt ④ to the specified torque.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the oil pipe bolts ③.

99000-32050: THREAD LOCK "1342"

Oil pipe bolt (M6): 10 N·m (1.0 kgf·m, 7.0 lb-ft)
Oil pipe union bolt (M14): 28 N·m (2.8 kgf·m, 20.5 lb-ft)

OIL FILTER

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

09915-40610: Oil filter wrench

GEARSHIFT SYSTEM

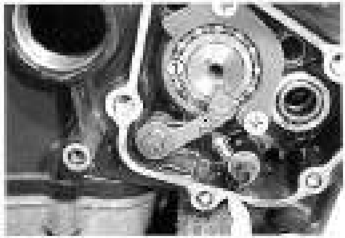
- Install the gearshift cam stopper ①, its bolt ②, the washer ③ and the return spring ④.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the gearshift cam stopper bolt ② and tighten it to the specified torque.

99000-32050: THREAD LOCK "1342"

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

NOTE:
Hook the return spring end to the stopper ①.



- Confirm the gearshift cam stopper movement.
- Check the neutral position.

- Install the gearshift cam stopper plate after aligning the gearshift cam pin Ⓐ with the gearshift cam stopper plate hole Ⓑ.

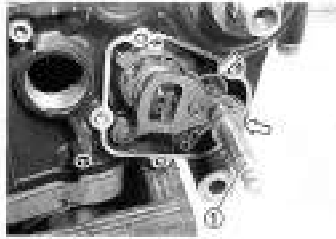
- Apply a small quantity of THREAD LOCK "1342" to the gearshift cam stopper plate bolt and tighten it to the specified torque.

99000-32050: THREAD LOCK "1342"

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

* Install the gearshift shaft/gearshift arm ① with the washers as shown.

NOTE:
* *Pinch the gearshift arm stopper ② with the return spring ends Ⓐ.*
* *Refer to the page 3-70 for the gearshift shaft/gearshift arm assembling.*



* Install the gasket ③ and the dowel pins ④.

▲ CAUTION

Use the new gasket to prevent oil leakage.

* Apply grease to the lip of the gearshift cover oil seal.

99000-25030: SUZUKI SUPER GREASE "A"

* Tighten the gearshift cover bolts to the specified torque.

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

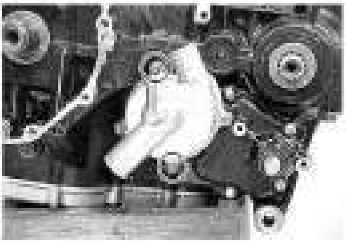
WATER PUMP

- Apply grease to the O-ring.

⚠ CAUTION

Use the new O-ring to prevent oil leakage.

99000-25030: SUZUKI SUPER GREASE "A"



- 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)

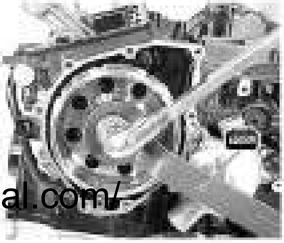
GENERATOR ROTOR

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

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

09930-44530: Rotor holder

Generator rotor bolt: 120 N·m (12.0 kgf·m, 87.0 lb-ft)



GENERATOR COVER

- Apply SUZUKI BOND "1207B" lightly to the mating surfaces Ⓐ at the parting line between the upper and lower crankcases as shown.

99104-31140: SUZUKI BOND "1207B"

- Install the dowel pins ② and new gasket ①.

▲ CAUTION

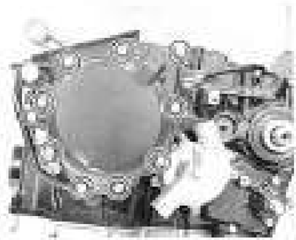
Use the new gaskets to prevent oil leakage.

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

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

▲ WARNING

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

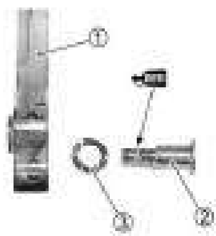


CAM CHAIN TENSIONER

- Install the cam chain tensioner ①.

② Cam chain tensioner bolt
③ Wave washer

NOTE:
Install the wave washer ③ between the cam chain tensioner ① and its bolt ②.



- Tighten the cam chain tensioner bolt ② to the specified torque.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the cam chain tensioner bolt ②.

99000-32050: THREAD LOCK "1342"

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

CAM CHAIN DRIVE SPROCKET

- Install the cam chain drive sprocket onto the crankshaft.

NOTE:
Align the punched mark Ⓐ on the cam chain drive sprocket with the punched mark Ⓑ on the crankshaft.

- Install the cam chain ①.

STARTER CLUTCH

- Install the washer ①.

- Install the starter clutch assembly onto the crankshaft.

NOTE:
* *Align the engraved line Ⓐ on the starter clutch with the punched mark Ⓑ on the crankshaft.*
* *Refer to the page 3-67 for the starter clutch assembling.*

- Install the starter clutch bolt with the washer.

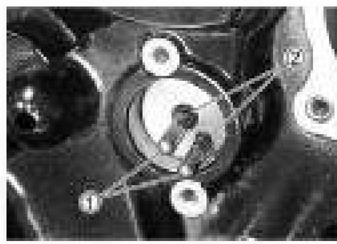
- Hold the starter clutch with special tool and tighten its bolt to the specified torque.

09920-34830: Starter clutch

Starter clutch bolt: 55 N·m (5.5 kgf-m, 40.0 lb-ft)

GEAR POSITION SWITCH

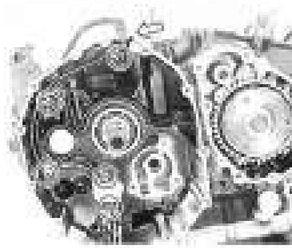
- Install the gear position switch contacts ① and the springs ②.



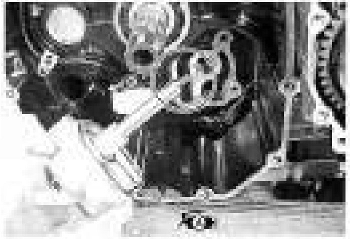
- Install the gear position switch as shown.
- Install the gear position switch lead wire clamps.

NOTE:

* *After touching the clamps to the stoppers Ⓐ of the crankcase, tighten their bolts.*
* *The flat surface of the clamp faces the lead wire.*
* *Be sure to install the grommet to the crankcase.*



OIL PUMP



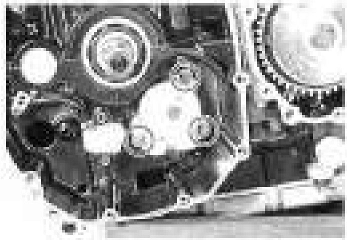
- Install the O-ring to the oil pump and apply grease to it.

▲ CAUTION

Use the new O-ring to prevent oil leakage.

99000-25030: SUZUKI SUPER GREASE "A"

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

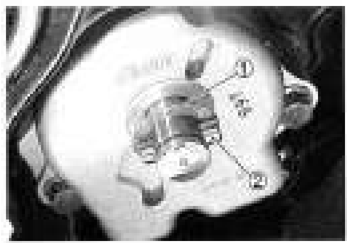


- Install the oil pump with the three bolts and then tighten them to the specified torque.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the bolts.

99000-32050: THREAD LOCK "1342"

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



- Install the washer ① and the pin ②.

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

- Install the oil pump driven gear ③.
- Install the circlip ④.

09900-06107: Snap ring pliers

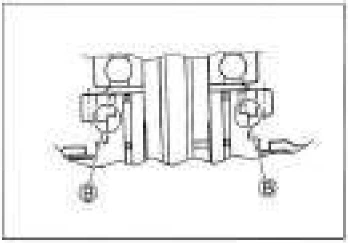
CLUTCH

- Install the thrust washer onto the countershaft.

NOTE:
The chamfer side Ⓐ of the thrust washer faces crankcase side.

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

NOTE:
The off-set side Ⓑ of the oil pump drive gear faces the primary driven gear side.

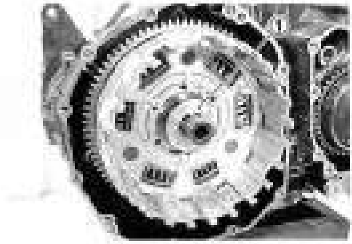


- Install the primary driven gear assembly.

NOTE:
Be sure to engage the oil pump drive and driven gears, primary drive and driven gears.

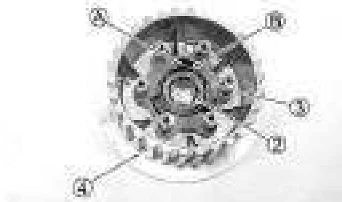
- Install the bearing ① and spacer ② and apply engine oil to them.

- Install the thrust washer ①.



- Install the clutch drive cam ②, driven cam ③ to the clutch sleeve hub ④.

NOTE:
* *Align the punched mark Ⓐ on the clutch drive cam ② with the punched mark Ⓑ on clutch driven cam ③.*
* *The clutch drive ② and driven ③ cams should be replaced as a set.*



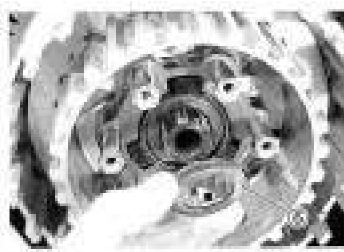
NOTE:
When replacing the clutch spring support bolts ⑤ apply THREAD LOCK SUPER "1303" and tighten them to the specified torque.

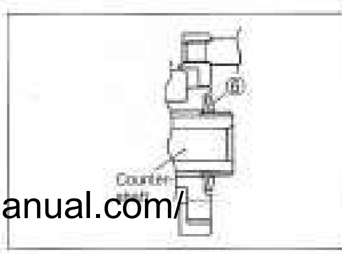
99000-32030: THREAD LOCK SUPER "1303"

Clutch spring support bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

- Install the clutch sleeve hub ④ with the clutch drive ② and driven ③ cams onto the countershaft.
- Install the washer ⑥.

NOTE:
The convex side of the washer ⑥ faces outside.





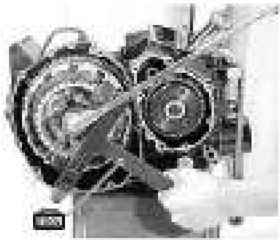
• Install the clutch sleeve hub nut ①.

• Hold the clutch sleeve hub using the special tool.

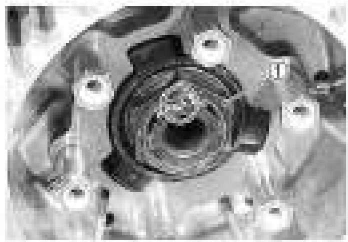
09920-53740: Clutch sleeve hub holder

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

Clutch sleeve hub nut: 95 N·m (9.5 kgf-m, 68.5 lb-ft)

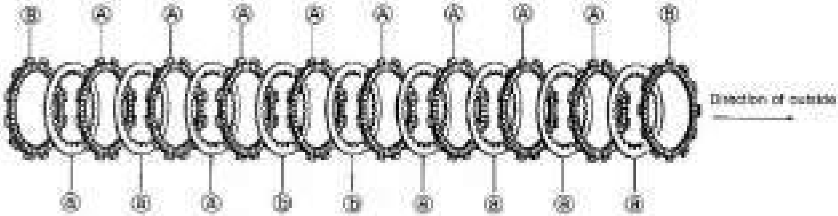


• Lock the clutch sleeve hub nut ① with a center punch.



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

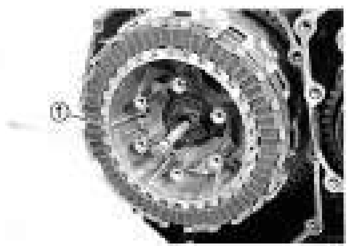
NOTE:
Insert the outermost No.1 drive plate claws Ⓐ to the other slits Ⓑ of clutch housing as shown.



DRIVE PLATE:
Ⓐ No.1 Drive Plate (Thickness): 3.0 mm (0.12 in) ... 8 pcs
Ⓑ No.2 Drive Plate (Thickness): 3.8 mm (0.15 in) ... 2 pcs

DRIVEN PLATE:
ⓐ Driven Plate (Thickness): 2.0 mm (0.08 in) ... 7 pcs
ⓑ Driven Plate (Thickness): 2.3 mm (0.09 in) ... 2 pcs

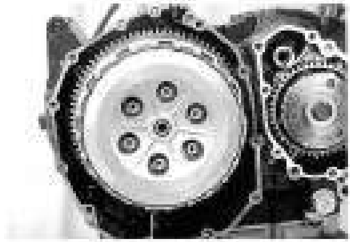
- Install the clutch push rod ① into the countershaft.



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

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

- Install the clutch pressure plate.



- Hold the starter clutch using the special tool.

09920-34830: Starter clutch holder

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

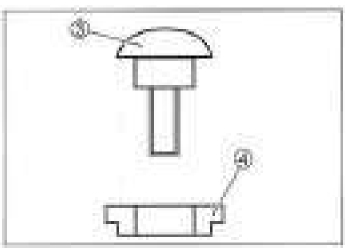
Clutch spring set bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

NOTE:
Tighten the clutch spring set bolt diagonally.

CLUTCH COVER

- Install the cushion ① and clutch outer cover ② to the clutch cover.

- Tighten the clutch outer cover bolts ③ with the washers ④ securely.



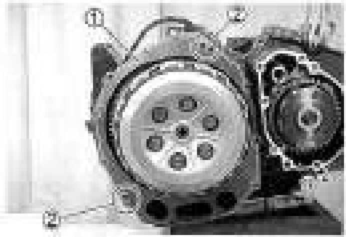
- Apply SUZUKI BOND "1207B" lightly to the mating surfaces Ⓐ at the parting line between the upper and lower crankcases as shown.

99104-31140: SUZUKI BOND "1207B"

- Install the gasket ① and the dowel pins ②.

▲ CAUTION

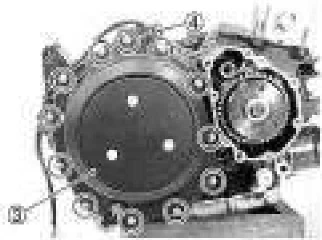
Use the new gasket to prevent oil leakage.



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

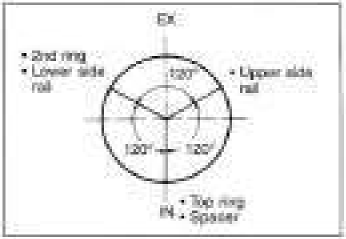
Clutch cover bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

NOTE:
Fit the clamp ④ to the bolt as shown.



PISTON

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



- Rub a small quantity of molybdenum oil solution onto each piston pin.

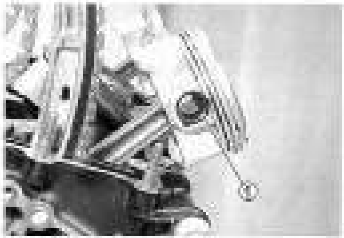
99000-25140: SUZUKI MOLY PASTE

NOTE:
When installing the pistons, the indent ⑤ on the piston head must be faced to each exhaust side.

- Install the pistons.

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

- Install the piston pin circlips ①.



⚠ CAUTION

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

NOTE:
* *Be careful not to drop the piston pin circlips into the crankcase.*
* *End gap of the circlip should not be aligned with the cutaway in the piston pin bore.*

⚠ CAUTION

When turning the crankshaft, pull the cam chain upward, or the chain will be caught between the crankcase and the cam drive sprocket.

CYLINDER

- Apply engine oil to the sliding surface of the pistons.
- Fit the dowel pins ① and new gasket ② to the crankcase.

⚠ CAUTION

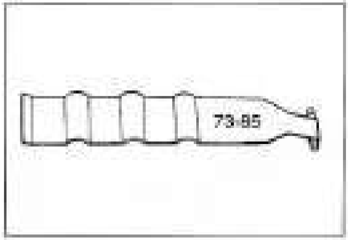
Use the new gasket to prevent oil leakage.

- Install piston ring holders to the No.2 and No.3 pistons.

09916-74521: Holder body
09916-74550: Band

NOTE:
Do not overtighten the special tool bands or the pistons entry into the cylinders will be difficult.

- Apply engine oil to the sliding surface of the cylinders.
- Insert the No.2 and No.3 pistons into the cylinder block.



NOTE:
Some light resistance must be overcome to lower the cylinder block.

- After inserting the No.2 and No.3 pistons in place, insert the No.1 and No.4 pistons in the same manner of the No.2 and No.3 pistons.

NOTE:
When installing the cylinder block, keep the cam chain taut. The cam chain must not be caught between cam drive sprocket and crankcase when turning the crankshaft.

- Tighten the cylinder nuts (M6) temporarily.

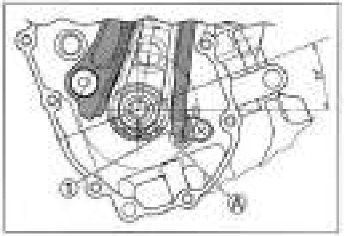
- Install the water hose ①. (☞ 6-25)

CYLINDER HEAD

- Pull the cam chain out of the cylinder and install the cam chain guide ①.

⚠ CAUTION

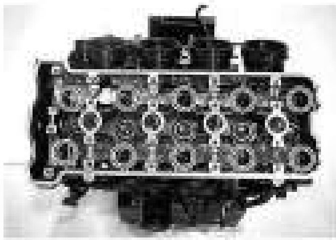
> * **There is the guide holder Ⓐ for the bottom end of the cam chain guide ① cast in the crankcase.**
> * **Be sure that the cam chain guide ① is installed properly.**



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

⚠ CAUTION

> **Use the new gasket to prevent gas leakage.**

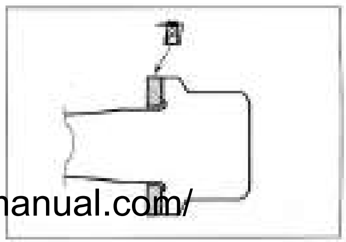


- Place the cylinder head on the cylinder.

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

- Tighten the cylinder head bolts (M10) to the specified two-step torque with a torque wrench sequentially and diagonally.

Cylinder head bolt (M10): Initial 25 N·m (2.5 kgf-m, 18.0 lb-ft)
Final 52 N·m (5.2 kgf-m, 37.6 lb-ft)



NOTE:
* *Install the washers to the cylinder head bolts (M10) as shown.*
* *Apply engine oil to the washers and thread portion of the bolts before installing the cylinder head bolts.*

* After firmly tightening the cylinder head bolts (M10), install the cylinder head bolts (M6) ①, ②.
* Tighten the cylinder head bolts ①, ② and the cylinder nuts ③ to the specified torque.

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

* Install the cylinder head side bolt ④ and gasket ⑤ and tighten it to the specified torque.

Cylinder head side bolt ④: 14 N·m (1.4 kgf-m, 10.0 lb-ft)

NOTE:
* *The metal side Ⓐ of the gasket ⑤ faces out.*
* *Install the cylinder head side bolt between the cam chain.*

* Install the water hose ⑥. (☞ 8-26)

* Install the oil hose with the union bolts and the washers ⑦.

NOTE:
Install the new washes ⑦ to both sides of the union bolt.

▲ CAUTION

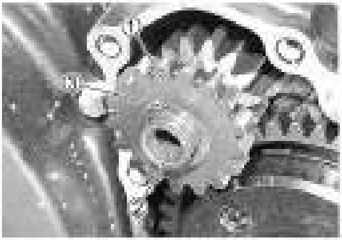
Use the new washer to prevent oil leakage.

* With the union bolts contacted to the stopper ⑧, tighten them to the specified torque.

Oil hose union bolt: 20 N·m (2.0 kgf-m, 14.5 lb-ft)

STARTER IDLE GEAR

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



- Apply SUZUKI BOND "1207B" lightly to the mating surfaces Ⓐ at the parting line between the upper and lower crankcases as shown.

99104-31140: SUZUKI BOND "1207B"

- Install the new gasket ④ and the dowel pins ⑤.

⚠ CAUTION

Use the new gasket to prevent oil leakage.

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

NOTE:
* *Fit the wire clamp to the starter clutch cover bolt Ⓑ as shown.*
* *Fit the new gasket washer to the starter clutch cover bolt Ⓒ as shown.*

⚠ CAUTION

Use the new gasket washer to prevent oil leakage.

Starter idle gear cover: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

- Install the starter idle gear No.1 shaft ① and the thrust washer ②.

- Install the bearing ③ and the starter idle gear No.1 ④.

- Install the washer ⑤ and the wave washer ⑥.

- Install the dowel pins and the new gasket ⑦.

▲ CAUTION

Use a new gasket to prevent oil leakage.

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

Starter idle gear cover: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

STARTER MOTOR

* Install the new O-ring to the starter motor.

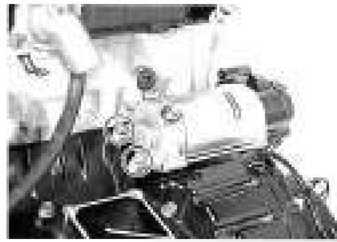
⚠ CAUTION

Use the new O-ring to prevent oil leakage.

* Apply grease to the O-ring.

99000-25030: SUZUKI SUPER GREASE "A"

* Install the starter motor.
* Tighten the starter motor mounting bolts securely.



CAMSHAFT

* The cam shafts are identified by the embossed letters.
  IN: Intake camshaft
  EX: Exhaust camshaft
* Before placing the camshafts on cylinder head, apply SUZUKI MOLY PASTE to their journals.
* Apply engine oil to the camshaft journal holders.

99000-25140: SUZUKI MOLY PASTE

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

⚠ CAUTION

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

⚠ CAUTION

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

* Install the C-rings ①.

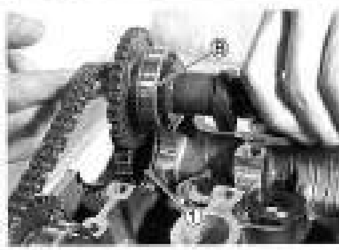
* Pull the cam chain lightly.
* The exhaust camshaft sprocket has an arrow marked "1" Ⓐ. Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head.
* Engage the cam chain with the exhaust camshaft sprocket.

NOTE:
* *Before installing the camshaft, check that the tappets are installed correctly.*
* *Align the groove Ⓑ of the camshaft bearing with the C-ring ①.*

* Bind the cam chain and the sprocket with a proper wire clamp ② to prevent the cam chain disengagement while installing the camshaft journal holders.

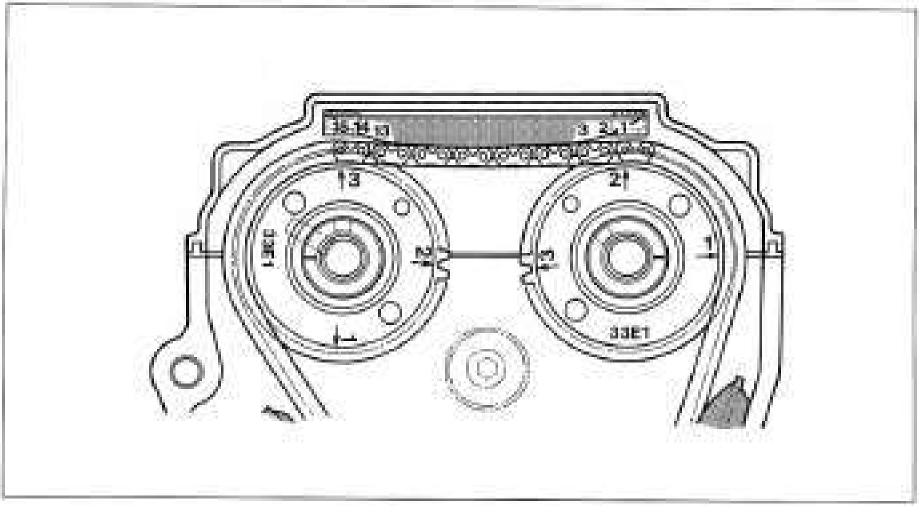
* The other arrow marked "2" Ⓒ should now be pointing straight up. Starting from the roller pin that is directly above the arrow marked "2" Ⓒ, count out 15 roller pins (from the exhaust camshaft side going towards the intake camshaft side).
* Engage the 15 roller pin Ⓓ on the cam chain with the arrow marked "3" on the intake sprocket. (☞ 3-124)

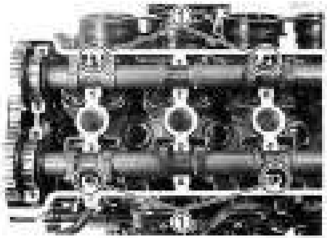
NOTE:
* *Before installing the camshaft, check that the tappets are installed correctly.*
* *Align the groove Ⓑ of the camshaft bearing with the C-ring ①.*



* Bind the cam chain and the sprocket with a proper wire clamp ② to prevent the cam chain disengagement while installing the camshaft journal holders.

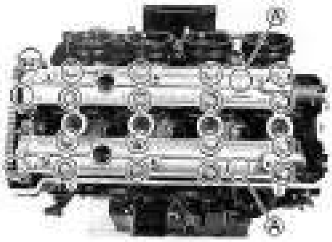
NOTE:
The cam chain should now be on all three sprockets. Be careful not to move the crankshaft until the camshaft journal holders and cam chain tension adjuster are secured.





* Install the dowel pins ①.
* Install the camshaft journal holders, intake and exhaust.
* Fasten the camshaft journal holders evenly by tightening the camshaft journal holder bolts sequentially and diagonally.

NOTE:
* *Damage to head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not drawn down evenly.*
* *Each camshaft journal holder is identified with a cast-on letters Ⓐ.*

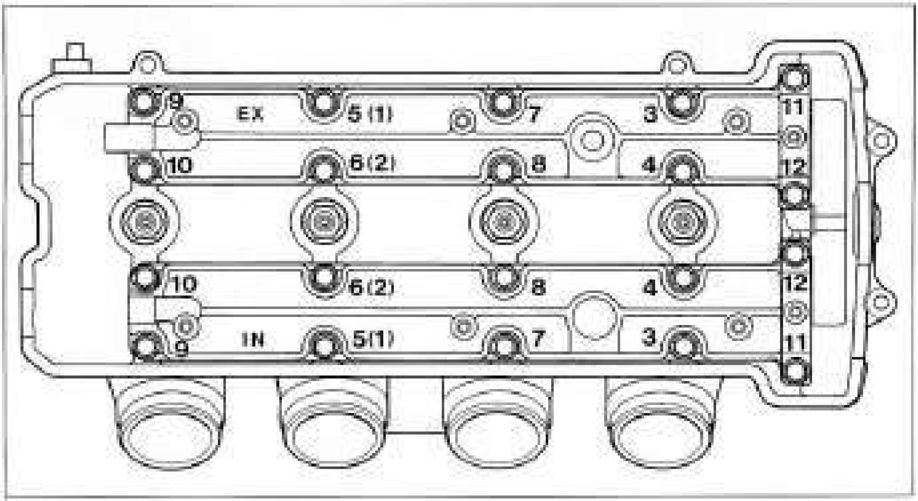


* Tighten the camshaft journal holder bolts to the specified torque.

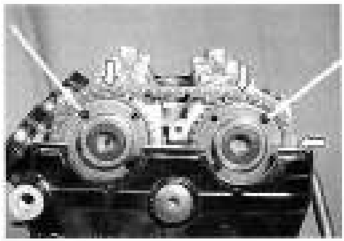
Camshaft journal holder bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

▲ 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 instead of these special bolts. To identify these bolts, each of them has a figure "9" on its head.



* Recheck the intake and exhaust camshaft positions.



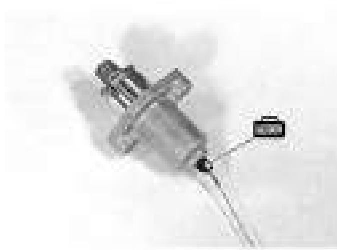
Cam chain tension adjuster

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

* Retract the push rod ② with a screwdriver by turning it clockwise.

- Hold the push rod using the special tool, the cam chain tension adjuster installation is ready.

09917-62430: Cam chain tension adjuster locking tool



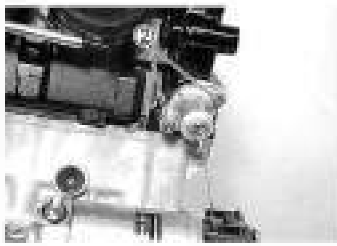
- Install the new gasket ①.

▲ CAUTION

Use the new gasket to prevent oil leakage.

- Install the cam chain tension adjuster as shown and tighten its mounting bolts ② to the specified torque.

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



- Release the cam chain tension adjuster by removing the special tool.

NOTE:
Click sound is heard when the cam chain tension adjuster rod is released.

- Install the gasket ③ and the cam chain tension adjuster cap bolt.

▲ CAUTION

Use the new gasket to prevent oil leakage.

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

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

▲ CAUTION

After installing the cam chain tension adjuster, check to be sure that [illegible] the slack of cam chain.

- Install the oil pipe and tighten oil pipe bolts to the specified torque.

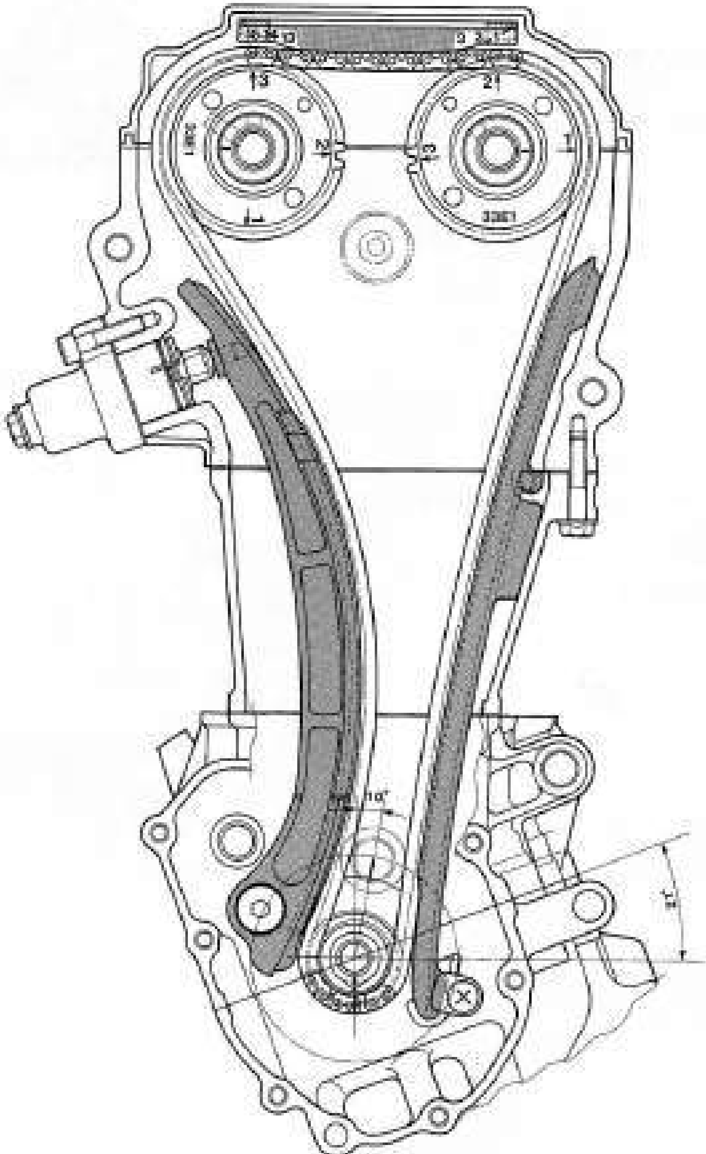
NOTE:
* *Install a washer ① between the bolt and the oil pipe.*
* *The exhaust side oil pipe bolt ③ is longer than the intake side one ②.*

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

- Install the cam chain guide.

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

- Cut the wire clamps.
- After installing the cam chain guide, rotate the starter clutch (some turns), and recheck the positions of the camshafts. (☞ 3-126)



* Tighten the valve timing inspection plug ① and the starter clutch cover plug ② to the specified torque.

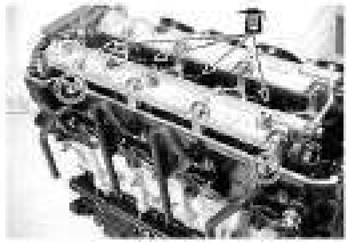
Valve timing inspection plug: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Starter clutch cover plug: 11 N·m (1.1 kgf-m, 8.0 lb-ft)

CYLINDER HEAD COVER

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

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

* Install the dowel pins.



NOTE:
When replacing the camshaft position sensor, tighten its mounting bolt to the specified torque.

Camshaft position sensor mounting bolt: 8 N·m (0.8 kgf-m, 6.0 lb-ft)

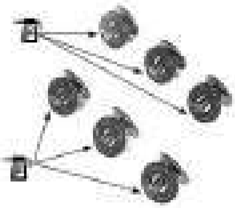
* Install the new gaskets to the cylinder head cover.
* Apply SUZUKI BOND "1207B" to the cam end caps of the gaskets as shown.

99104-31140: SUZUKI BOND "1207B"

⚠ CAUTION

Use the new gaskets to prevent oil leakage.

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

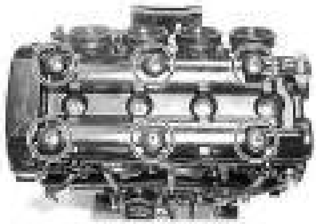


⚠ CAUTION

Use the new gaskets to prevent oil leakage.

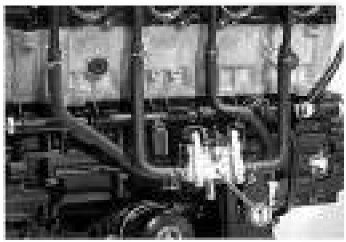
- After applying engine oil to the gaskets tighten the head cover bolts to the specified torque.

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



PAIR VALVE

- Install the PAIR valve ①. (☞ 5-29)



BREATHER COVER AND OIL CATCH TANK

- Install the new gasket.

⚠ CAUTION

Use the new gasket to prevent oil leakage.

- Install the breather cover ① and the oil catch tank ② as shown.

- Install the spark plugs. (☞ 2-7)

FI SYSTEM AND INTAKE AIR SYSTEM

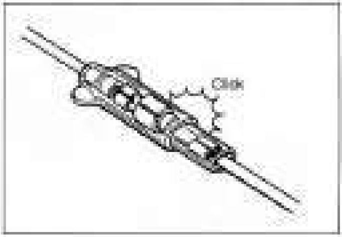
CONTENTS

4

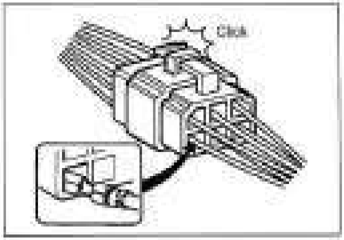
PRECAUTIONS IN SERVICING

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

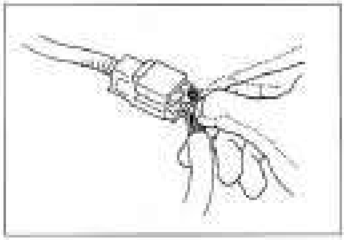
CONNECTOR/COUPLER



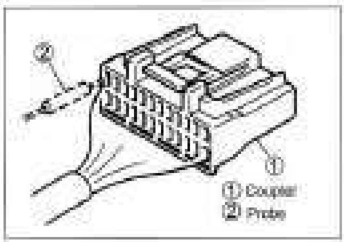
- When connecting a connector, be sure to push it in until a click is felt.
- With a lock type coupler, be sure to release the lock when disconnecting, and push it in fully till the lock works when connecting it.



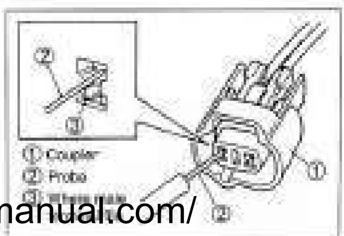
- When disconnecting the coupler, be sure to hold the coupler body and do not pull the lead wires.
- Inspect each terminal on the connector/coupler for looseness or bending.
- Inspect each terminal for corrosion and contamination.
  The terminals must be clean and free of any foreign material which could 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.



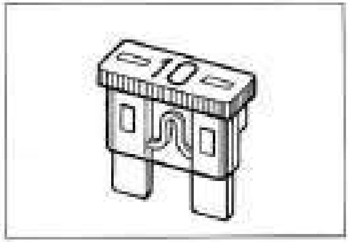
- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (backside) of the connector/coupler.



- When connecting meter probe from the terminal side of the coupler (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.

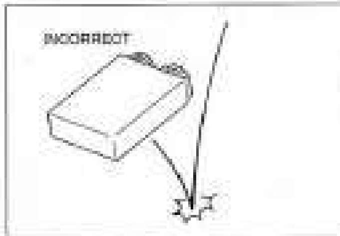
FUSE

- When a fuse blows, always investigate the cause, 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.

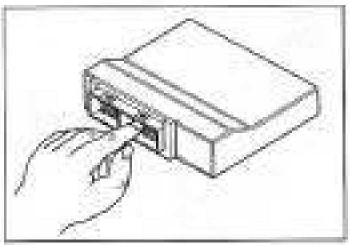


ECM/VARIOUS SENSORS

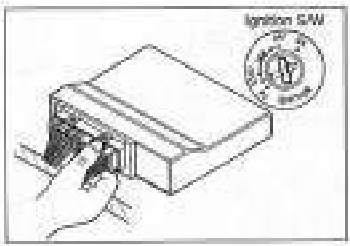
- Since each component is a high-precision part, great care should be taken not to apply any sharp impacts during removal and installation.



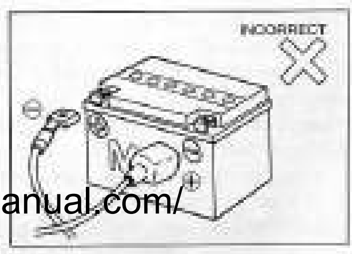
- Be careful not to touch the electrical terminals of the ECM. The static electricity from your body may damage this part.



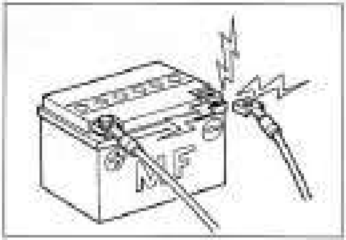
- When disconnecting and connecting the ECM couplers, make sure to turn OFF the ignition switch, or electronic parts may get damaged.



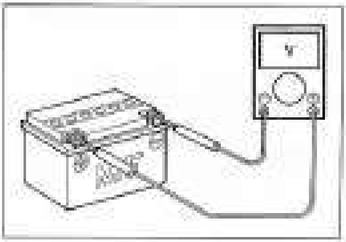
- Battery connection in reverse polarity is strictly prohibited. Such a wrong connection will damage the components of the FI system instantly when reverse power is applied.



* 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 11V or higher. Terminal voltage check at low battery voltage 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

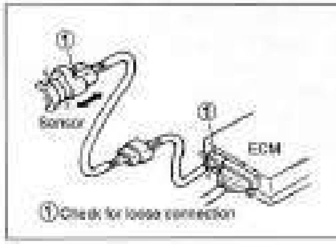
While there are various methods for electrical circuit inspection, described here is a general method to check for open and short circuit using an ohmmeter and a voltmeter.

OPEN CIRCUIT CHECK

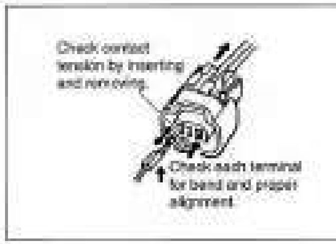
Possible causes for the open circuit are as follows. As the cause can exist in the connector/coupler or terminal, they need to be checked carefully.

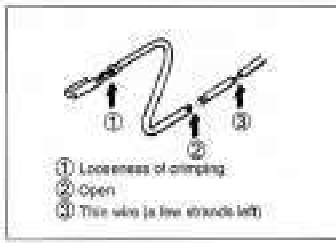
* Loose connection of connector/coupler
* Poor contact of terminal (due to dirt, corrosion or rust, poor contact tension, entry of foreign object etc.)
* Wire harness being open
* Poor terminal-to-wire connection

- 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.



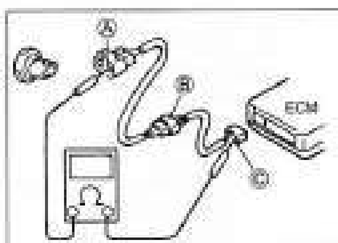
- Using a test male terminal, check the female terminals of the circuit being checked for contact tension.
  Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted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



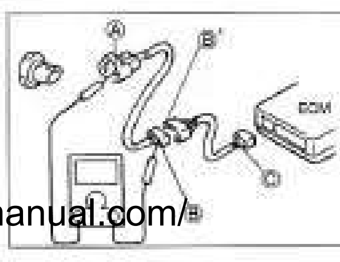


Continuity check

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



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



VOLTAGE CHECK

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

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

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

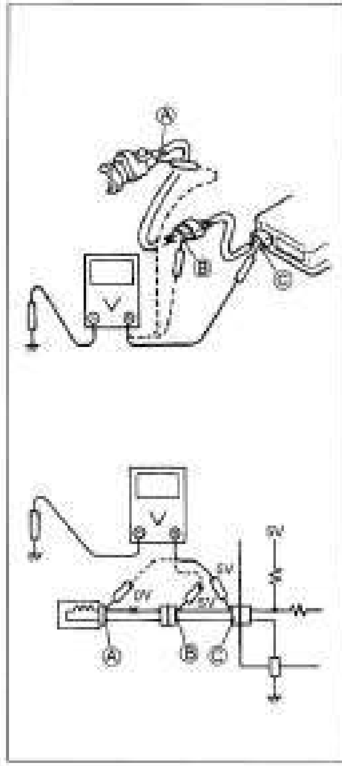
Voltage Between:

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

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

Voltage Between:

Ⓒ and body ground: Approx. 5V
Ⓑ and body ground: Approx. 5V — 2V voltage drop
Ⓐ and body ground: Approx. 3V

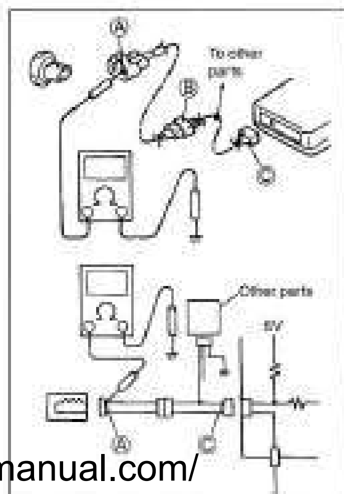


SHORT CIRCUIT CHECK (WIRE HARNESS TO GROUND)

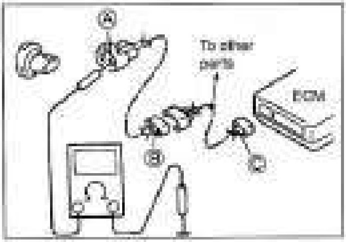
- Disconnect the negative cable from the battery.
- Disconnect the connectors/couplers at both ends of the circuit to be checked.

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

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



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



USING TESTERS

- Use the Suzuki multi-circuit tester (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.
- Reset the pocket tester to 0Ω before measuring each resistance or after changing the resistance range.
- When measuring the resistance with the multi-circuit tester, also measure the resistance with no-load. Sub-tract that resistance from the resistance measured under load in order to get the true resistance.

(Measured resistance) − (No-load resistance) = (True resistance)

- When measuring the resistance with the multi-circuit tester, ∞ will be shown as 10.00MΩ and "1" flashes in the display.
- Check that no voltage is applied before making the measurement. If voltage is applied, the tester may be damaged.
- After using the tester, turn the power off.

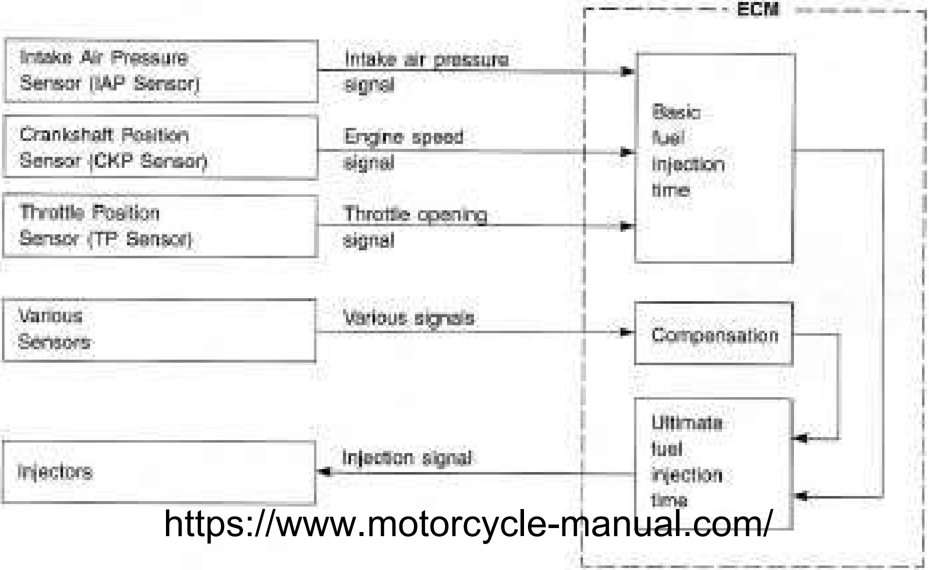
09900-25008: Multi-circuit tester

NOTE:
* *When connecting the multi circuit tester, install fine copper wires (O.D is below 0.5 mm) to the back side of the lead wire coupler and connect the probes of tester to them.*
* *Use a fine copper wire, the outer diameter being below 0.5 mm, to prevent [illegible] 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 the intake air pressure, engine speed and throttle opening angle, and various compensations which are determined according to the signals from various sensors that detect the engine and driving conditions.



COMPENSATION OF INJECTION TIME (VOLUME)

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

SIGNAL	DESCRIPTION
ATMOSPHERIC PRESSURE SENSOR SIGNAL	When atmospheric pressure is low, the sensor sends the signal to the ECM and reduce the injection time (volume).
ENGINE COOLANT TEMPERATURE SENSOR SIGNAL	When engine coolant temperature is low, injection time (volume) is increased.
INTAKE AIR TEMPERATURE SENSOR SIGNAL	When intake air temperature is low, injection time (volume) is increased.
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/ DECELERATION SIGNAL	During acceleration, the fuel injection time (volume) is increased, in accordance with the throttle opening speed and engine rpm. *During deceleration, the fuel injection is interrupted. Injection recovers when throttle valve is opened thereafter. (*Except for E-03, 28)

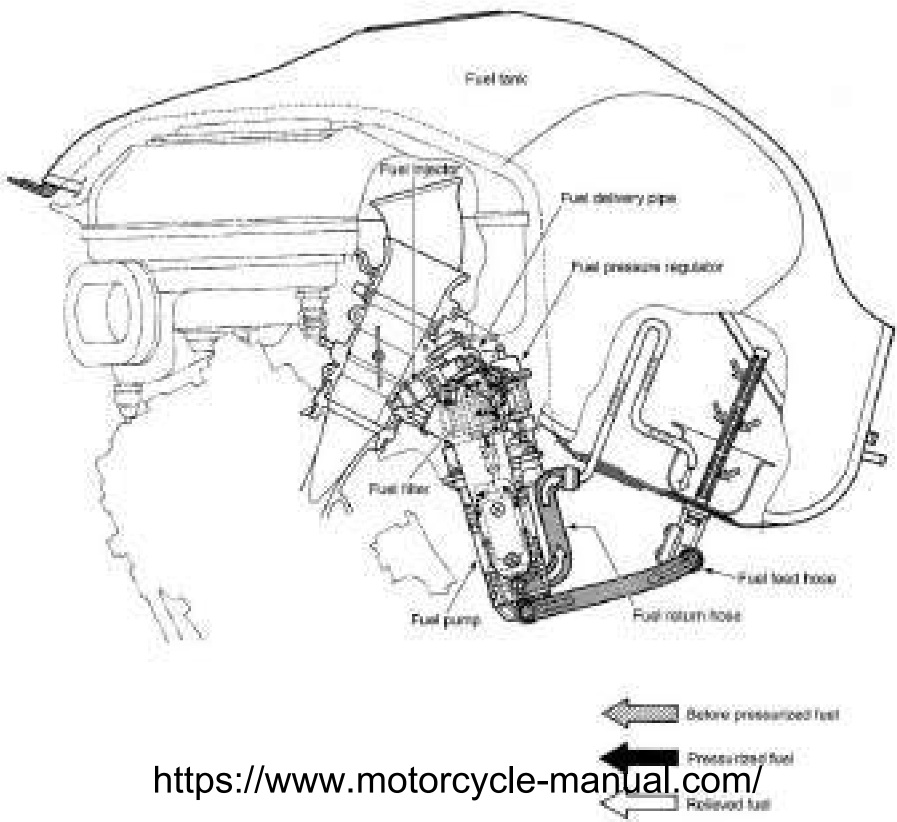
INJECTION STOP CONTROL

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

FUEL DELIVERY SYSTEM

The fuel delivery system consists of the fuel tank, fuel pump, fuel filter, fuel feed hose, fuel delivery pipe (including fuel injectors), fuel pressure regulator and fuel return hose. Fuel in the fuel tank is pumped up by the fuel pump and pressurized fuel to flow into the injector installed in the fuel delivery pipe. As the fuel pressure applied to the fuel injector (the pressure in the fuel delivery pipe) is always kept to a certain amount higher than the vacuum pressure in the throttle body by the fuel pressure regulator, the fuel is injected into the throttle body in conic dispersion when the injector opens according to the injection signal from the ECM.

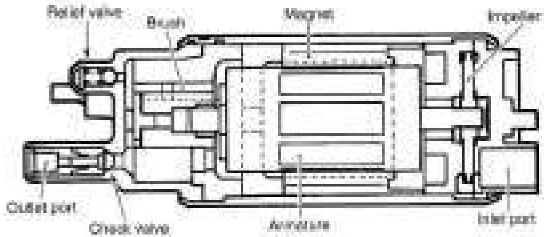
The fuel relieved by the fuel pressure regulator returns through the fuel return hose to the fuel tank.



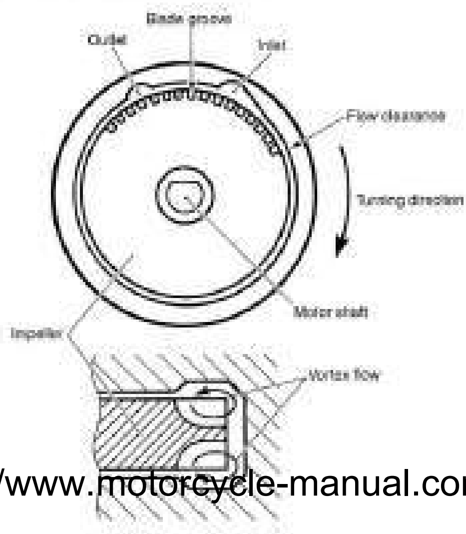
FUEL PUMP

The electric fuel pump is located under the fuel tank, which consists of the armature, magnet, impeller, brush, check valve and relief valve. The ECM controls its ON/OFF operation as controlled under the FUEL PUMP CONTROL SYSTEM.

When electrical energy is supplied to the fuel pump, the motor in the pump runs and so does the impeller. This causes a pressure difference to occur between both sides of the impeller as there are many grooves around it. Then the fuel is drawn through the inlet port, and with its pressure increased, it is discharged through the outlet port. The fuel pump has a check valve to keep some pressure in the fuel feed hose even when the fuel pump is stopped. Also, the relief valve is equipped in the fuel pump, which releases pressurized fuel to the fuel tank when the outlet of the fuel pressure has increased up to 4.5 – 6.0 kgf/cm² (450 – 600 kPa, 64 – 85 psi).



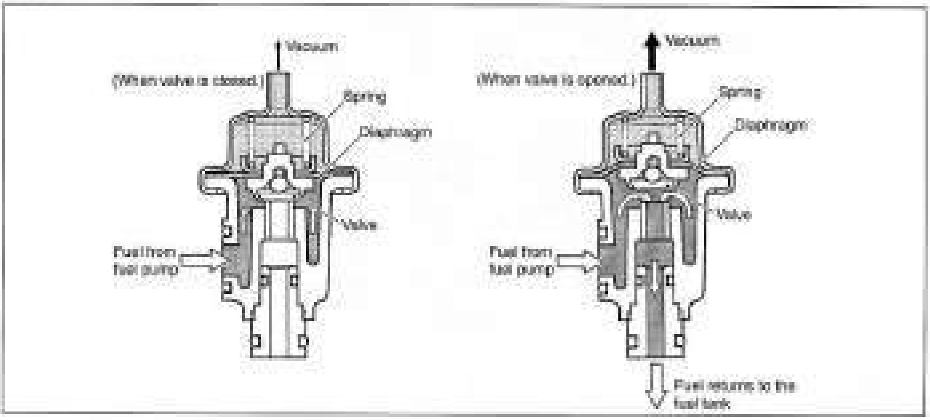
When the impeller is driven by the motor, pressure differential occurs between the front part and the rear part of the blade groove as viewed in angular direction due to fluid friction. This process continuously takes place causing fuel pressure to be built up. The pressurized fuel is then let out from the pump chamber and discharged through the motor section and the check valve.



FUEL PRESSURE REGULATOR

The fuel pressure regulator is diaphragm-operated type consisting of the diaphragm, spring and valve. It keeps the fuel pressure applied to the injector at 3.0 kg/cm² (300 kPa, 43 psi) higher than that in the throttle body at all times.

When the fuel pressure rises more than 3.0 kg/cm² (300 kPa, 43 psi) higher than the throttle body pressure, the fuel pushes the valve in the regulator open and excess fuel returns to the fuel tank via the fuel return hose.

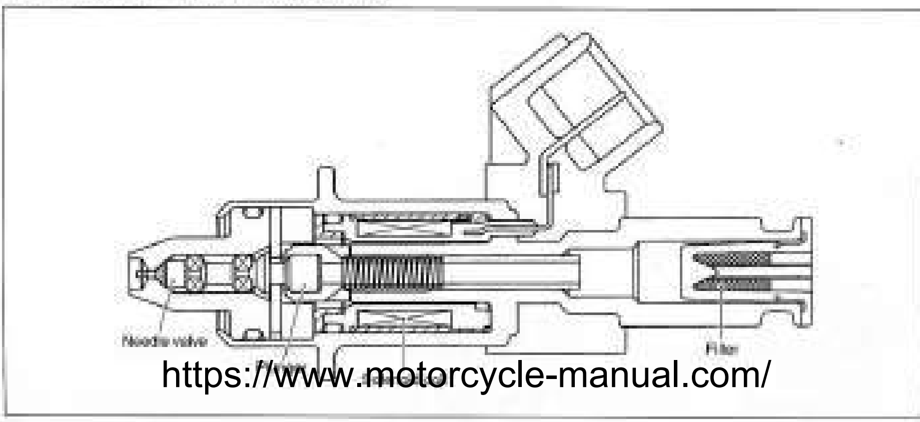


FUEL INJECTOR

The fuel injector consists of the solenoid coil, plunger, needle valve and filter.

It is an electromagnetic type injection nozzle which injects fuel in the throttle body according to the signal from the ECM.

When the solenoid coil of the injector is energized by the ECM, it becomes an electromagnet and attracts the plunger. At the same time, the needle valve incorporated with the plunger opens and the injector which is under the fuel pressure injects fuel in conic dispersion. As the lift stroke of the needle valve of the injector is set constant, the volume of the fuel injected at one time is determined by the length of time during which the solenoid coil is energized (injection time).



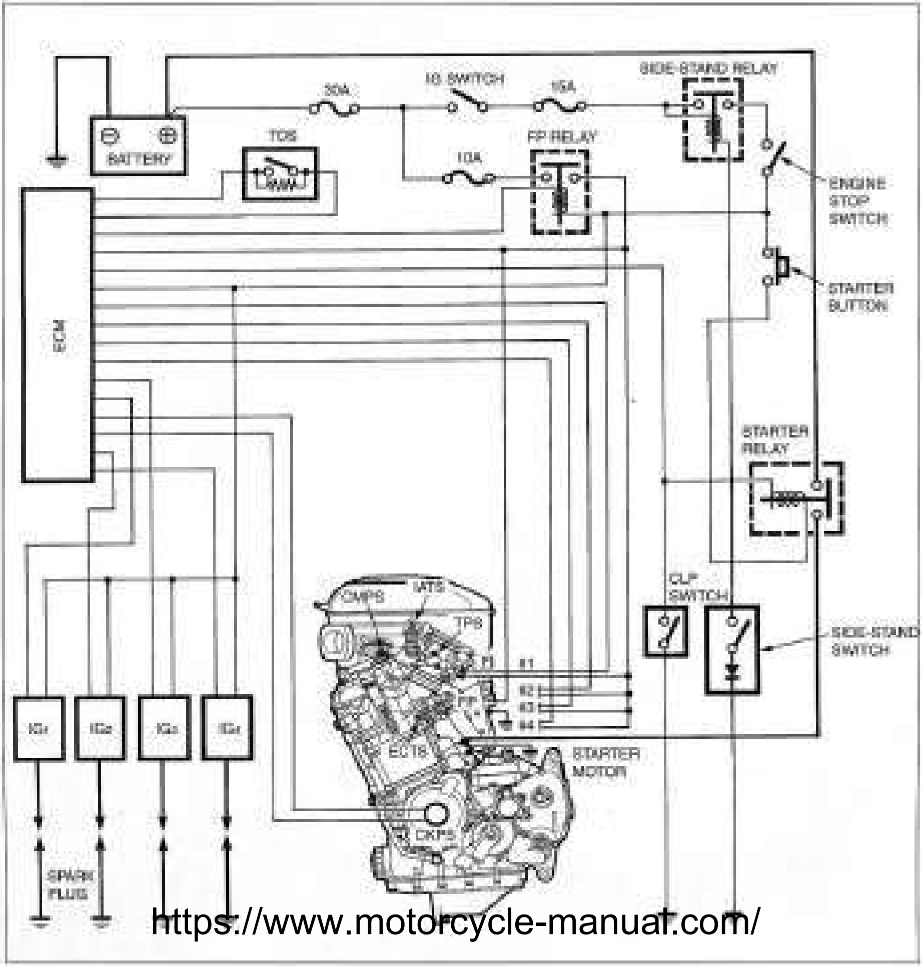
FUEL PUMP CONTROL SYSTEM

When the ignition switch is turned on, current from the battery flows to the fuel pump motor through the side-stand relay and the fuel pump relay causing the motor to turn.

Since the ECM has a timer function, the fuel pump motor stops turning in three seconds after the switch has been turned on.

Thereafter, when the crankshaft is turned by the starter motor or the engine has been started, the engine revolving signal is input to the ECM. Then, current flows to the fuel pump motor from the battery through the side-stand relay and the fuel pump relay so that the pump continues to function.

A tip over sensor is provided in the fuel pump control circuit. By this provision, anytime the motorcycle tips over, the tip over sensor sends a signal to the ECM to turn off power to the fuel pump relay, causing the fuel pump motor to stop. At the same time, current to the fuel injectors as well as the ignition coil is interrupted, which then stops the engine.



ECM (FI CONTROL UNIT)

The ECM is located under the seat.

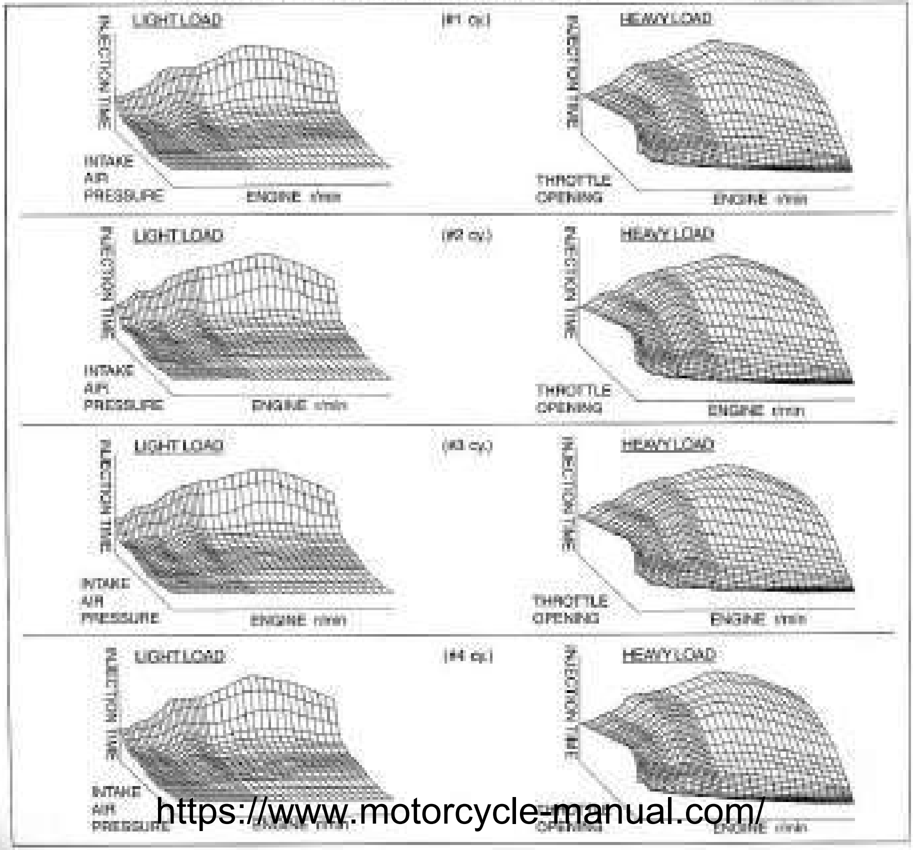
The ECM consists of CPU (Central Processing Unit), memory (ROM) and I/O (Input/Output) sections. The signal from each sensor is sent to the input section and then sent to CPU. On the basis of signal information received, CPU calculates the volume of fuel necessary for injection using maps programmed for varying engine conditions. Then, the operation signal of the fuel injection is sent from the output section to the fuel injector.

The eight kinds of independent program maps are programmed in the ROM.

These eight kinds of maps are designed to compensate for differences of the intake/exhaust systems and cooling performance.

LIGHT LOAD: When the engine is running in a light load, the fuel injected volume (time) is determined the basis of the intake air pressure and engine speed.

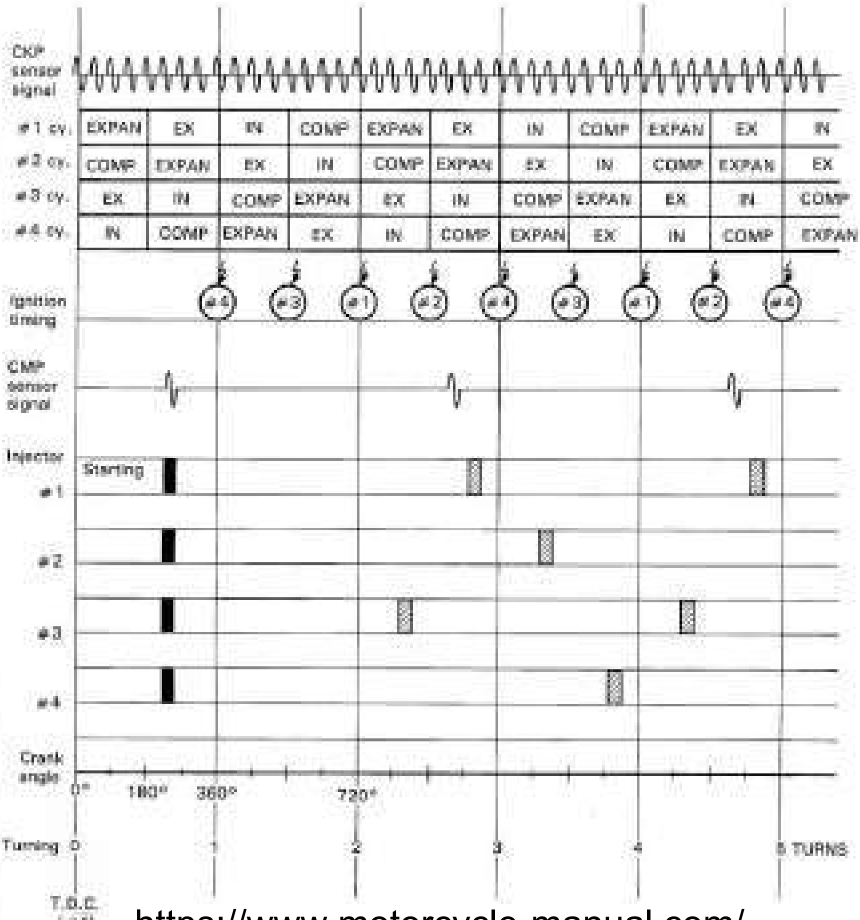
HEAVY LOAD: When the engine is running in a heavy load, the fuel injected volume (time) is determined the basis of the throttle valve opening and engine speed.



INJECTION TIMING

The system employs a sequential, four-cylinder independent injection type, using the crankshaft position sensor (signal generator) to determine the piston position (injection timing and ignition timing) and the camshaft position sensor to identify the cylinder during operation, and these information are sent to the ECM. This makes it possible to inject the optimum volume of fuel in the best timing for the engine operating conditions.

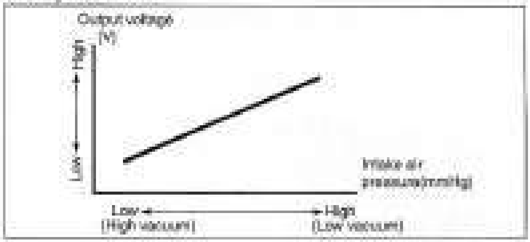
When the crankshaft begins to turn at the time of starting, the ECM sends the signals to the four injectors, #1, #2, #3 and #4 to have them inject fuel simultaneously. From the second turn onward, the sequential four-cylinder independent injection occurs as explained above.



SENSORS

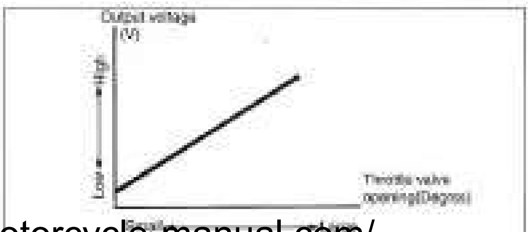
INTAKE AIR PRESSURE SENSOR (IAP SENSOR)

The intake air pressure sensor is located at the rear side of the air cleaner box and its vacuum hose is connected to the throttle body.
The sensor detects the intake air pressure, which is then converted into voltage signal and sent to the ECM.
The basic fuel injection time (volume) is determined according to the voltage signal (output voltage).
The voltage signal increases when the intake air pressure is high.



THROTTLE POSITION SENSOR (TP SENSOR)

The throttle position sensor is installed on the No.1 throttle body.
The throttle position sensor is a kind of variable resistor which detects the throttle opening angle.
The battery voltage in the sensor is changed to the throttle position voltage which is then sent to the ECM.
The basic fuel injection time (volume) is determined according to the voltage signal (output voltage).
The voltage signal increases as the throttle is opened wider.



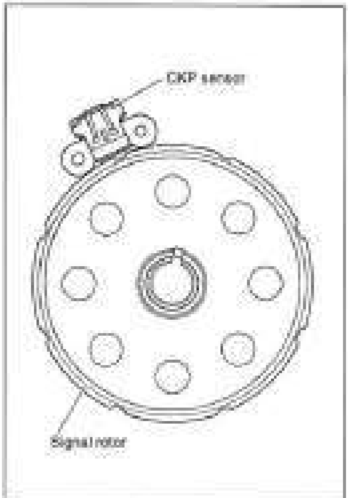
CRANKSHAFT POSITION SENSOR (CKP SENSOR)

The signal rotor is mounted on the left end of the crankshaft, and the crankshaft position sensor (Pick-up coil) is installed on the generator cover.

The sensor generates the pick-up signal to be supplied to the ECM.

The ECM calculates and decides both the fuel injection timing and ignition timing.

The injection volume increases when the engine rpm is high.

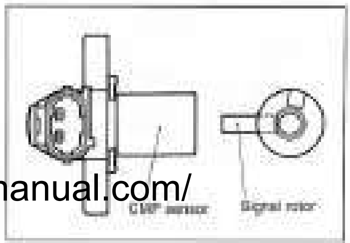


CAMSHAFT POSITION SENSOR (CMP SENSOR)

The signal rotor is installed on the intake camshaft, and the camshaft position sensor (Pick-up coil) is installed on the cylinder head cover.

The sensor generates the pick-up signal to be supplied to the ECM.

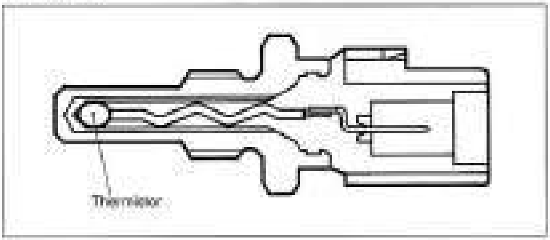
The ECM calculates and decides the cylinder identity and sequential injection timing.

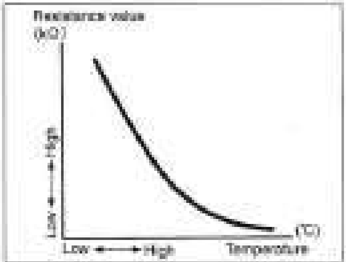


INTAKE AIR TEMPERATURE SENSOR (IAT SENSOR)

The intake air temperature sensor is installed at the left side of the air cleaner box.
The sensor detects the intake air temperature in thermistor resistance value. With this resistance value converted to voltage signal, the signal is sent to the ECM. The injection volume increases as intake air temperature decreases.

The thermistor resistance value increases when the intake air temperature is low, and decreases when the intake air temperature is high.

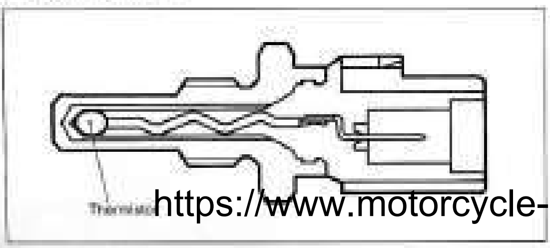


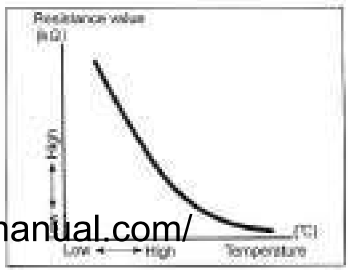


ENGINE COOLANT TEMPERATURE SENSOR (ECT SENSOR)

The engine coolant temperature sensor is installed at the rear side of the cylinder head.
The sensor detects the engine coolant temperature in thermistor resistance value, which is then converted to voltage signal and sent to the ECM. The injection volume increases as coolant temperature decreases.

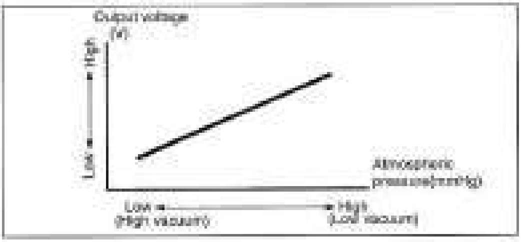
The thermistor resistance value increases when the engine coolant temperature is low, and decreases when the engine coolant temperature is high.



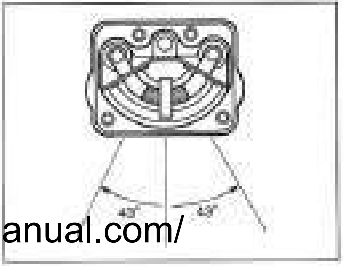


ATMOSPHERIC PRESSURE SENSOR (AP SENSOR)
The atmospheric pressure sensor is located behind the left side of the main frame.
The sensor detects the atmospheric pressure. The detected pressure is converted into voltage signal and sent to the ECM.
The injection time (volume) is controlled according to the voltage signal (output voltage).

The voltage signal increases as the atmospheric pressure rises.

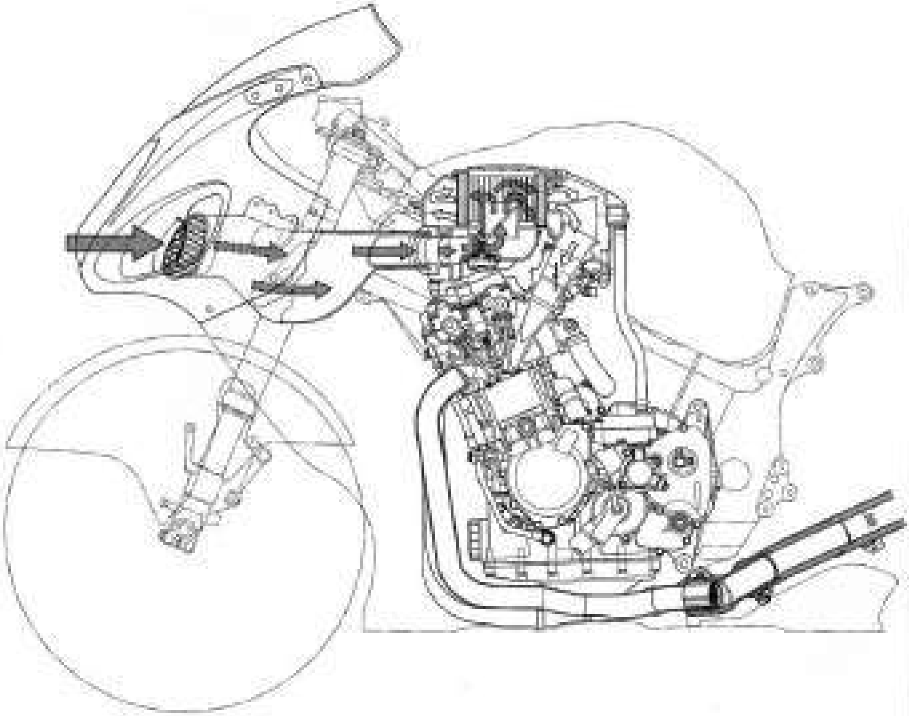


TIP OVER SENSOR (TO SENSOR)
The tip over sensor is located beneath the fuel tank bracket.
The sensor detects the leaning of the motorcycle. When it leans more than 43°, the mechanical switch turns ON and a signal is sent to the ECM. At the same time, this signal cuts OFF current supply to the fuel pump, fuel injectors and ignition coils.



INTAKE AIR SYSTEM TECHNICAL FEATURES

This motorcycle uses SRAD (Suzuki Ram Air Direct induction) in the intake air system.
In this system, frontal wind pressure during running is guided into the air cleaner box in order to pressurize intake air, thereby improving intake efficiency for increased engine output.



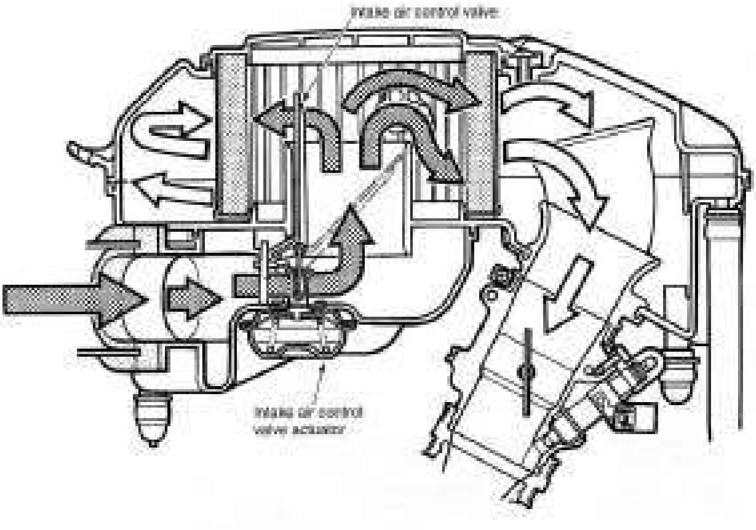
INTAKE AIR CONTROL VALVE

The intake air control valve is installed on the bottom part of the air cleaner box.

This system is designed to control the volume of intake air so as to improve engine output power. This is performed by opening or closing the air cleaner intake port according to the engine speed.

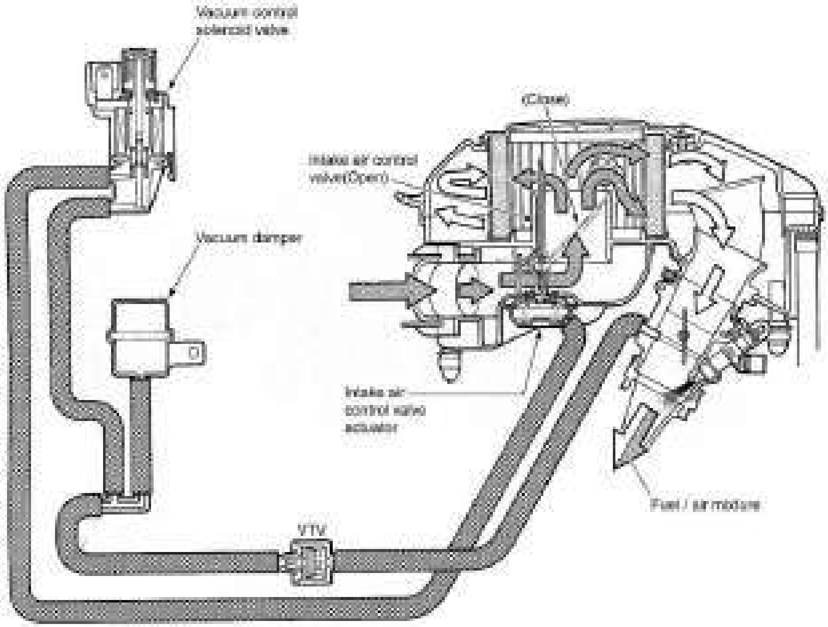
When the engine is running in a low to medium speed range, the intake port is closed for controlled intake air volume. This improves the effect of intake air flow pulsation so that the engine can output higher power in this speed range.

When the engine is running in a medium to high speed range, the intake port is now fully open for guiding the maximum volume of air into the air cleaner box so that the engine can produce the maximum power in this speed range.

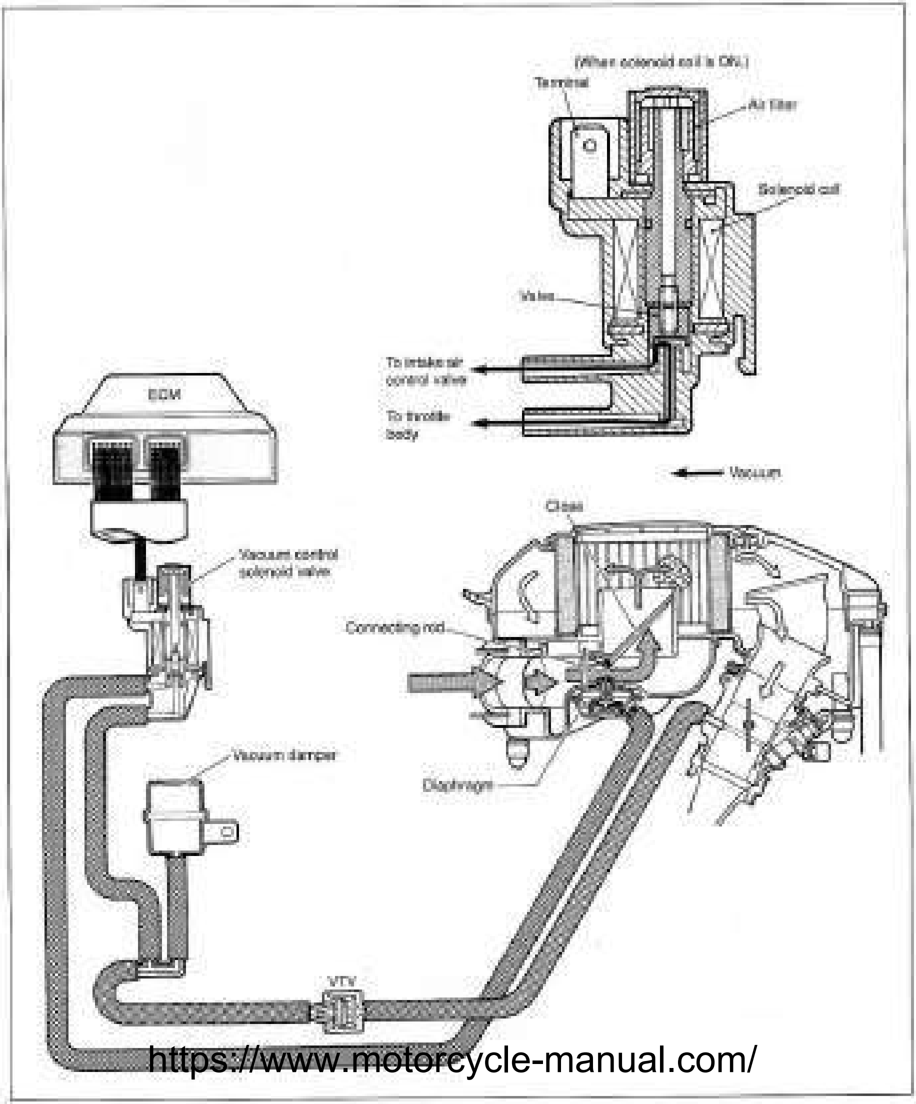


OPERATION

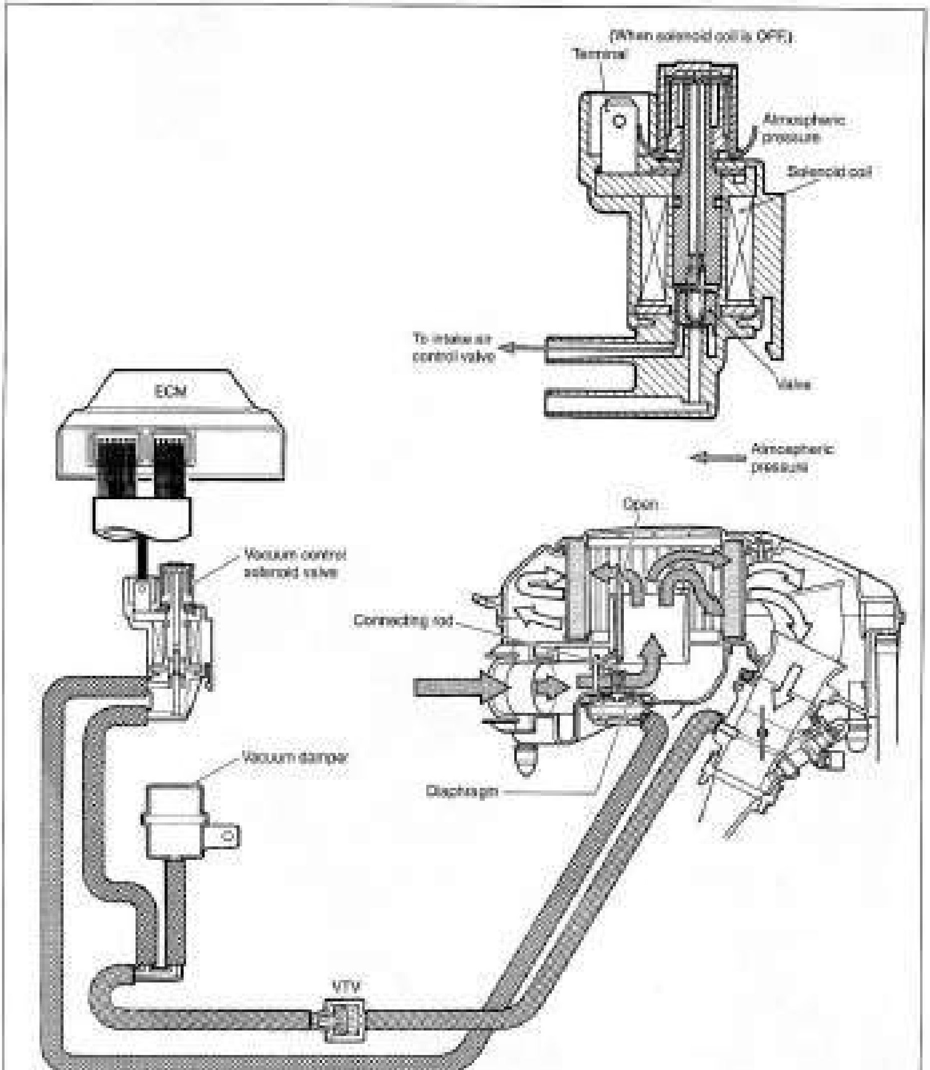
The intake air control valve system operates on the signal supplied from the ECM. The open/close operation of the air control valve is performed by an actuator which incorporates a vacuum operated diaphragm. The vacuum to operate this diaphragm is taken from the air stream inside the throttle body and transmitted through the vacuum transmitting valve and the vacuum control solenoid valve. (The vacuum control solenoid valve is located behind the left side of the main frame). The vacuum control solenoid valve allows the vacuum line to open or close on the basis of electrical signal supplied from the ECM. The vacuum damper is also provided in the vacuum line for the purpose of suppressing and stabilizing vacuum fluctuation.



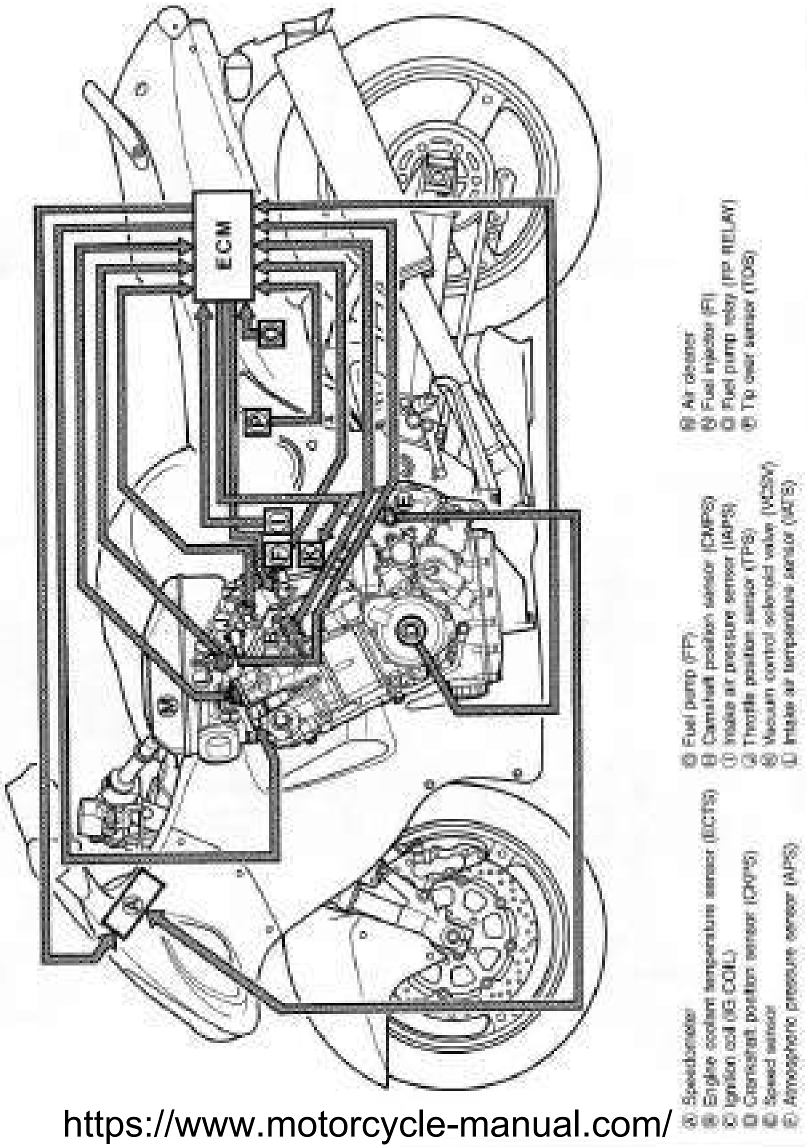
When the engine is running in a low to medium speed range, the electrical signal from the ECM energizes the solenoid coil in the vacuum control solenoid valve to create magnetism causing the valve to be pulled open. With the vacuum control solenoid valve open, the vacuum line on the throttle body side connects to that on the intake air control valve side allowing vacuum to transmit to the diaphragm to move downward. Since the diaphragm is mechanically connected with the intake air control valve via connecting rod, the diaphragm pulls down the intake air control valve to close.



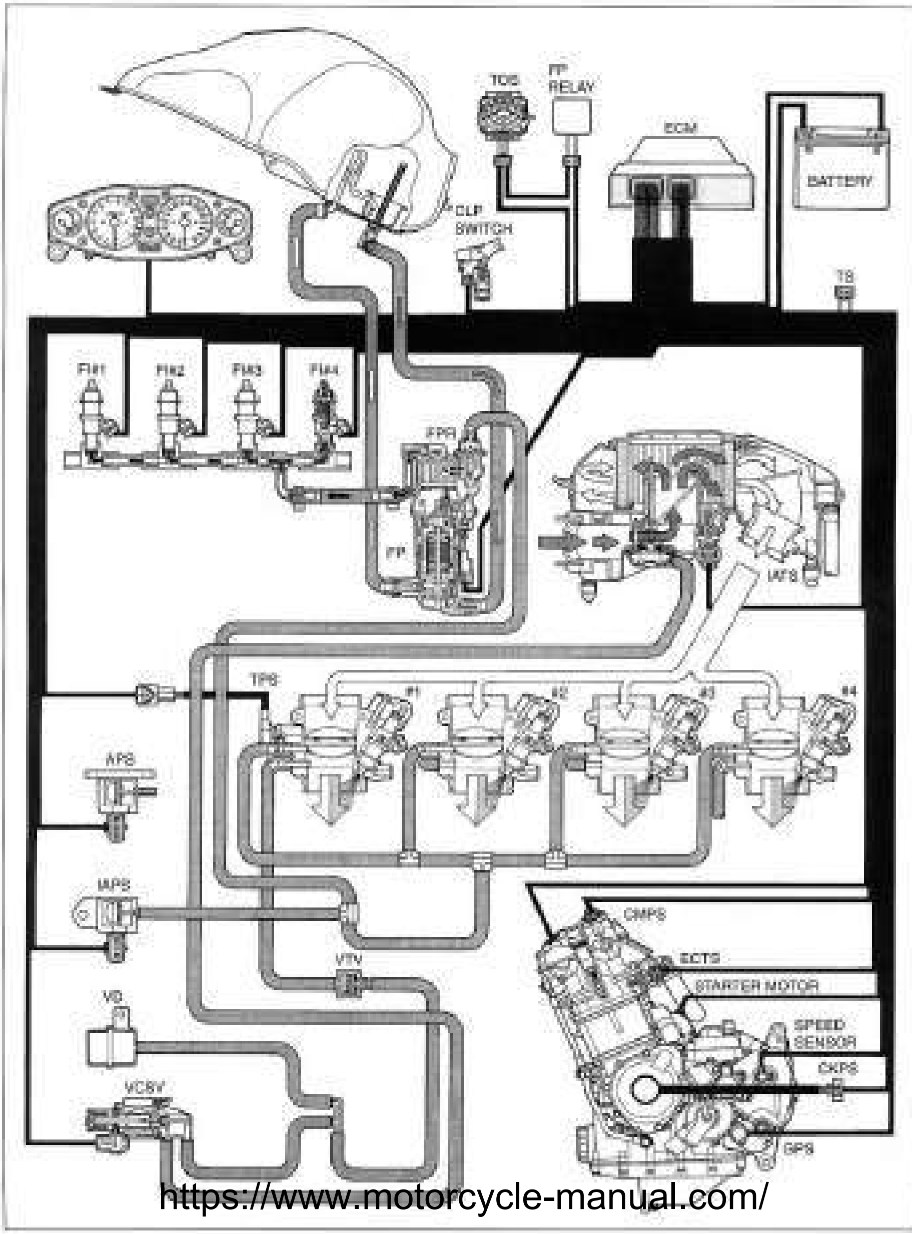
When the engine is running in a medium to high speed range, the signal from the ECM discontinues. Then, the solenoid coil is de-energized, causing vacuum on the throttle body side to stop being transmitted to the intake air control valve side. At the same time, the vacuum control solenoid valve let atmospheric pressure into the diaphragm side vacuum line, which deactivates the diaphragm and allows the spring to return and open the intake air control valve through the connecting rod.



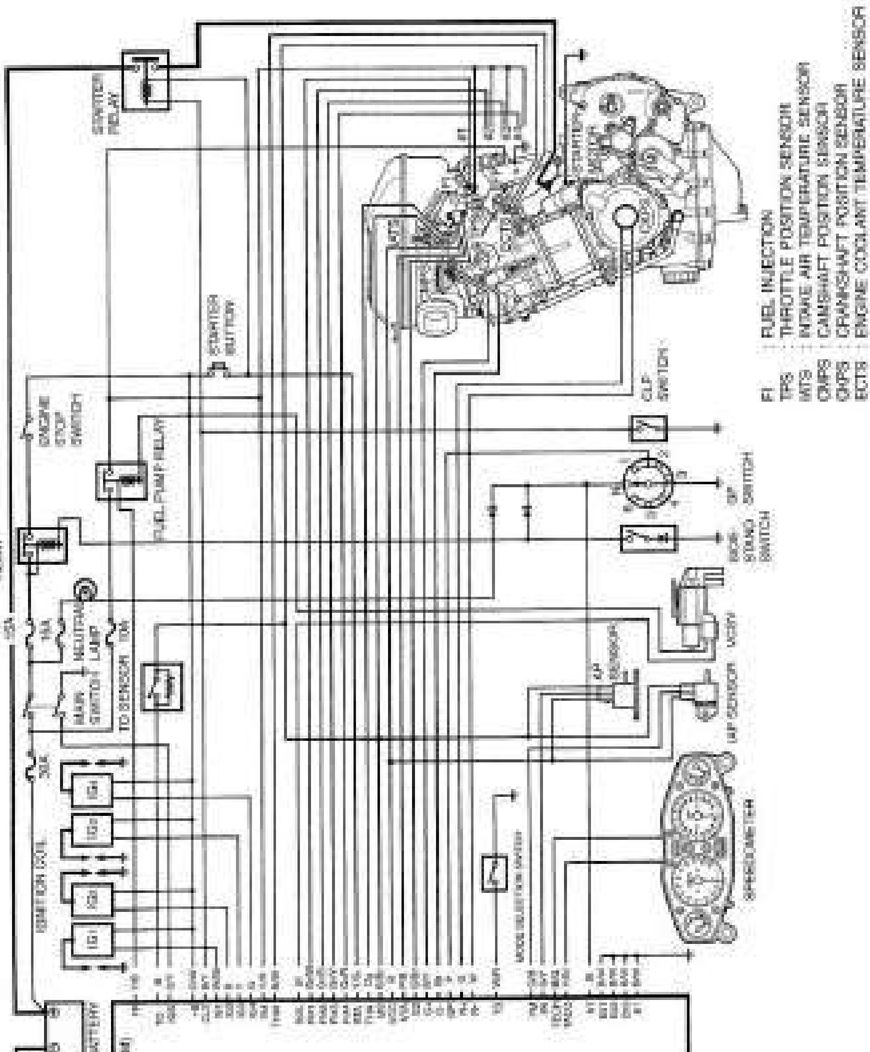
FI SYSTEM PARTS LOCATION



FI SYSTEM DIAGRAM



FI SYSTEM WIRING DIAGRAM



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 lamp. To check the function of the individual FI system devices, the dealer mode is prepared. In this check, the special tool is necessary to read the code of the malfunction items.

USER MODE

MALFUNCTION	LCD (DISPLAY) INDICATION	FI LAMP INDICATION	INDICATION MODE
"NO"	Clock	——	——
"YES" Engine can start	Clock and "FI" letters *1	FI lamp turns ON.	Each 2 sec. clock or "FI" is indicated.
"YES" Engine can not start	"FI" letter *2	FI lamp turns ON and blinks.	"FI" is indicated continuously.

*1
When one of the signals is not received by ECM, the fail-safe circuit works and injection is not stopped. In this case, "FI" and clock are indicated in the LCD panel and motorcycle can run.
*2
The injection signal is stopped, when the camshaft position sensor signal, crankshaft position sensor signal, tip over sensor signal , #1/#2, #3 and #4 ignition signals, #1, #2, #3 and #4 injector signals, fuel pump relay signal or ignition switch signal is not sent to ECM. In this case, "FI" is indicated in the LCD panel when depressing the starter button. 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 speedometer does not receive any signal from the 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 st[illegible] working. Ignition fuse is burnt.

DEALER MODE

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

09930-82710: 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 checked.

MALFUNCTION	LCD (DISPLAY) INDICATION	FI LAMP INDICATION	INDICATION MODE
"NO"	c00	FI lamp turns OFF.	—
"YES"	c** code is indicated from small numeral to large one.		For each 2 sec., code is indicated.

CODE	MALFUNCTION PART	REMARKS
c00	None	No defective part
c11	Camshaft position sensor (CMP sensor)	
c12	Crankshaft position sensor (CKP sensor)	Pick-up coil signal, signal generator
c13	Intake air pressure sensor (IAP sensor)	
c14	Throttle position sensor (TP sensor)	*3
c15	Engine coolant temp. sensor (ECT sensor)	
c21	Intake air temp. sensor (IAT sensor)	
c22	Atmospheric pressure sensor (AP sensor)	
c23	Tip over sensor (TO sensor)	
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
c31	Gear position signal (GP switch)	
c32	Injector signal #1 (FI #1)	For #1 cylinder
c33	Injector signal #2 (FI #2)	For #2 cylinder
c34	Injector signal #3 (FI #3)	For #3 cylinder
c35	Injector signal #4 (FI #4)	For #4 cylinder
c41	Fuel pump control system (FP control system)	Fuel pump, Fuel pump relay
c42	Ignition switch signal (IG switch signal)	Anti-theft
c92	Fuel level gauge signal (gauge sending unit)	

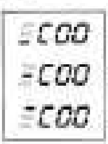
In the LCD (DISPLAY) panel, the malfunction code is indicated from small code to large code.

*3
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 position, upper, middle or lower line. If the indication is upper or lower line when engine rpm is 1 150 rpm, slightly turn the throttle position sensor and bring the line to middle.
In the normal condition, the throttle valve stop screw pushes throttle valves slightly, and indication point is middle line.

Setting procedure:

1. Connect the special tool (Mode select switch) to the dealer mode coupler at the wiring harness, and start the engine.
2. Adjust the engine rpm to 1 150 rpm.
3. If the throttle position sensor adjustment is necessary, loosen the screws and turn the throttle position sensor and bring the line to middle.
4. Then, tighten the screws to fix the throttle position sensor.

09930-11950: Torx wrench



← Incorrect
← Correct position
← Incorrect

The LCD indicat... rect position, where it is fixed.

FAIL-SAFE FUNCTION

FI system is provided with fail-safe function to allow the engine to start and the motorcycle to run in a minimum performance necessary even under malfunction condition.

ITEM		FAIL-SAFE MODE	STARTING ABILITY	RUNNING ABILITY
Camshaft position sensor		When camshaft position signal has failed during running, the ECM determines cylinder as # before occurrence of such a failure.	"NO"	"YES"
			Motorcycle can run, but once engine stops, engine can not start.	
Crankshaft position sensor		The motorcycle stops.	"NO"	"NO"
Intake air pressure sensor		Intake air pressure is fixed to 760 mmHg.	"YES"	"YES"
Throttle position sensor		The throttle opening is fixed to full open position. Ignition timing is also fixed.	"YES"	"YES"
Engine coolant temperature sensor		Engine coolant temperature value is fixed to 80°C.	"YES"	"YES"
Intake air temperature sensor		Intake air temperature value is fixed to 40°C.	"YES"	"YES"
Atmospheric pressure sensor		Atmospheric pressure is fixed to 760 mmHg.	"YES"	"YES"
Ignition signal	#1	#1 Ignition-off	"YES"	"YES"
			#2, #3 & #4 cylinders can run.	
	#2	#2 Ignition-off	"YES"	"YES"
			#1, #3 & #4 cylinders can run.	
	#3	#3 Ignition-off	"YES"	"YES"
			#1, #2 & #4 cylinders can run.	
	#4	#4 Ignition-off	"YES"	"YES"
			#1, #2 & #3 cylinders can run.	
Injection	#1	#1 Fuel-cut	"YES"	"YES"
			#2, #3 & #4 cylinders can run.	
	#2	#2 Fuel-cut	"YES"	"YES"
			#1, #3 & #4 cylinders can run.	
	#3	#3 Fuel-cut	"YES"	"YES"
			#1, #2 & #4 cylinders can run.	
	#4	#4 Fuel-cut	"YES"	"YES"
			#1, #2 & #3 cylinders can run.	
Gear position signal		Gear position signal is fixed to 6th gear.	"YES"	"YES"

"Yes" means that 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 [illegible] circuit can not work and ignition or injection is stopped.

FI SYSTEM TROUBLE SHOOTING

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 will facilitate collecting information to the point required for proper analysis and diagnosis.

EXAMPLE: CUSTOMER PROBLEM INSPECTION FORM

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

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

PROBLEM SYMPTOMS	
☐ **Difficult Starting**	☐ **Poor Driveability**
☐ No cranking	☐ Hesitation on acceleration
☐ No initial combustion	☐ Back fire/☐ After fire
☐ No combustion	☐ Lack of power
☐ Poor starting at	☐ Surging
(☐ cold ☐ warm ☐ always)	☐ Abnormal knocking
☐ Other ______	☐ 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:	

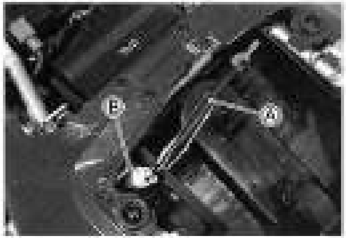
MOTORCYCLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental condition	
Weather	☐ Fair ☐ Cloudy ☐ Rain ☐ Snow ☐ Always ☐ Other
Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold (°F/ °C) ☐ Always
Frequency	☐ Always ☐ Sometimes (times/ day, month) ☐ Only once
	☐ Under certain condition
Road	☐ Urban ☐ Suburb ☐ Highway ☐ Mountainous (☐ Uphill ☐ Downhill)
	☐ Tarmacadam ☐ Gravel ☐ Other
Motorcycle condition	
Engine condition	☐ Cold ☐ Warming up phase ☐ Warmed up ☐ Always ☐ Other at starting
	☐ Immediately after start ☐ Racing without load ☐ Engine speed (r/min)
Motorcycle condition	During driving: ☐ Constant speed ☐ Accelerating ☐ Decelerating
	☐ Right hand corner ☐ Left hand corner ☐ When shifting (Gear position)
	☐ At stop ☐ Motorcycle speed when problem occurs (km/h, Mile/h)
	☐ Other ______

NOTE:
The above form is *racteristic of each market.*

SELF-DIAGNOSTIC PROCEDURES

- Don't disconnect couplers from ECM, battery cable from battery, ECM ground wire harness from engine or main fuse before confirming malfunction code (self-diagnostic trouble code) stored in memory. Such disconnection will erase 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" (☞ 4-28 and -29) carefully to have good understanding as to what functions are available and how to use it.
- Be sure to read "PRECAUTIONS for Electrical Circuit Service" (☞ 4-4) before inspection and observe what is written there.
- Remove the rear seat.
- Connect the special tool Ⓐ to the dealer mode coupler Ⓑ at the wiring harness, and start the engine or crank the engine for more than 4 seconds.
- Turn the special tool's switch ON and check the malfunction code to determine the malfunction part.

09930-82710 : Mode select switch



SELF-DIAGNOSIS RESET PROCEDURE

- After repairing the trouble, turn OFF the ignition switch and turn ON again.
  If the malfunction code indicates (c00), the malfunction is cleared.
- Disconnect the special tool from the dealer mode coupler.

MALFUNCTION CODE AND DEFECTIVE CONDITION

MALFUNCTION CODE	DETECTED ITEM	DETECTED FAILURE CONDITION	CHECK FOR
c00	NO FAULT	———	
c11	Camshaft position sensor	The signal does not reach ECM for more than 2 sec. after receiving the starter signal.	The camshaft position sensor wiring and mechanical parts. (Camshaft position sensor, intake cam pin, wiring/coupler connection)
c12	Crankshaft position sensor	The signal does not reach ECM for more than 2 sec. after receiving the starter signal.	The crankshaft position sensor wiring and mechanical parts. (Crankshaft position sensor, wiring/coupler connection)
c13	Intake air pressure sensor	The sensor should produce following voltage. ($0.5\ V \leq$ sensor voltage $< 4.5\ V$) Without the above range, c13 is indicated.	Intake air pressure sensor, wiring/coupler connection.
c14	Throttle position sensor	The sensor should produce following voltage. ($0.2\ V \leq$ sensor voltage $< 4.8\ V$) Without the above range, c14 is indicated.	Throttle position sensor, wiring/coupler connection.
c15	Engine coolant temperature sensor	The sensor voltage should be the following. ($0.15\ V \leq$ sensor voltage $< 4.85\ V$) Without the above range, c15 is indicated.	Engine coolant temperature sensor, wiring/coupler connection.
c21	Intake air temperature sensor	The sensor voltage should be the following. ($0.15\ V \leq$ sensor voltage $< 4.85\ V$) Without the above range, c21 is indicated.	Intake air temperature sensor, wiring/coupler connection.
c22	Atmospheric pressure sensor	The sensor voltage should be the following. ($0.5\ V \leq$ sensor voltage $< 4.85\ V$) Without the above range, c22 is indicated.	Atm. pressure sensor, wiring/coupler connection.
c23	Tip over sensor	The sensor voltage should be less than the following for more than 3 sec. after ignition switch turns ON. (sensor voltage $< 4.85\ V$) Without the above value, c23 is indicated.	Tip over sensor, wiring/coupler connection.
c24, c25, c26 or c27	Ignition signal	Crankshaft position sensor (pick-up coil) signal is produced but signal from ignition coil is interrupted continuous by two times or more. In this case, the code c24, c25, c26 or c27 is indicated.	Ignition coil, wiring/coupler connection, power supply from the battery.

c31	Gear position signal	Gear position signal voltage should be higher than the following for more than 3 seconds. (Gear position sensor voltage > 0.60 V) Without the above value, c31 is indicated.
		Gear position sensor, wiring/coupler connection. Gearshift cam etc.
c32, c33, c34 or c35	Fuel injector signal	When fuel injection signal stops, the c32, c33, c34 or c35 is indicated.
		Injector, wiring/coupler connection, power supply to the injector.
c41	Fuel pump relay signal	When no signal is supplied from fuel pump relay, c41 is indicated.
		Fuel pump relay, connecting lead, power source to fuel pump relay.
c42	Ignition switch signal	Ignition switch signal is not input in the ECM.
		Ignition switch, lead wire/coupler.
c92	Fuel level gauge signal	When no signal is supplied from fuel level gauge, C92 is indicated.
		Fuel level gauge sending unit, lead wire/coupler.

"C11" CMP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
No CMP sensor signal for 2 seconds at engine cranking.	• Metal particles or foreign material being attached on the CMP sensor and rotor tip. • CMP sensor circuit open or short. • CMP sensor malfunction. • ECM malfunction.

INSPECTION

- Lift and support the fuel tank with its prop stay. (☞ 4-50)
- Remove the air cleaner box. (☞ 4-58 and -59)

1 Turn the ignition switch OFF.
Check the CMP sensor coupler for loose or poor contacts.
If OK, then measure the CMP sensor resistance.
Disconnect the CMP sensor coupler and measure the resistance.

DATA **CMP sensor resistance: 0.9 – 1.3 kΩ**
(Terminal – Terminal)

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

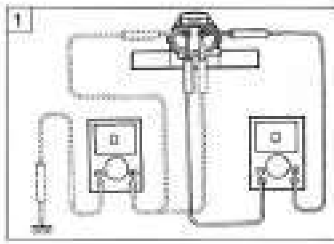
DATA **CMP sensor continuity: ∞Ω (Infinity)**
(Terminal – Ground)

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

Tester knob indication: Resistance (Ω)

No → Replace the CMP sensor with a new one.

Yes ↓



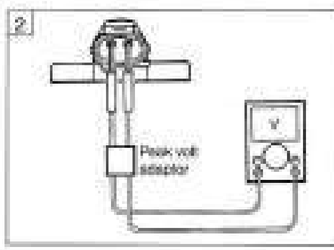
2 Disconnect the CMP sensor coupler.
Crank the engine a few seconds with the starter motor, and measure the CMP sensor peak voltage at the sensor.

DATA **CMP sensor peak voltage: More than 0.7 V**
(B/Y – Br)

Repeat the above test procedure a few times and measure the highest peak voltage.
If OK, then measure the CMP sensor peak voltage at the ECM terminals. (G+/G – or ③/④)

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

Tester knob indication: Voltage (⎓)

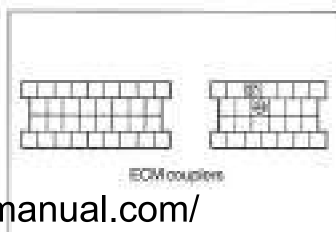


No → Loose or poor contacts on the CMP sensor coupler or ECM coupler.
Replace the CMP sensor with a new one.

Yes ↓

B/Y or Br wire open or shorted to ground, or poor ③ or ④ connection. (☞ 4-27)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-5)

→ Replace the ECM with a new one, and inspect it again.



"C12" CKP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
No CKP sensor signal for 2 seconds at engine cranking.	• Metal particles or foreign material being attached on the CKP sensor and rotor tips. • CKP sensor circuit open or short. • CKP sensor malfunction. • ECM malfunction.

INSPECTION

• Lift and support the fuel tank with its prop stay. (☞ 4-50)

Step 1

Turn the ignition switch OFF.
Check the CKP sensor coupler for loose or poor contacts.
If OK, then measure the CKP sensor resistance.
Disconnect the CKP sensor coupler and measure the resistance.

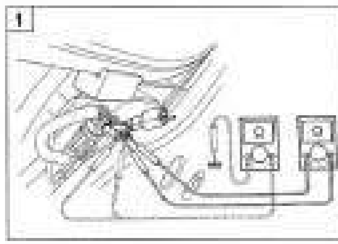
DATA **CKP sensor resistance: 180 – 280 Ω (Blue or White – Green)**

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

DATA **CKP sensor continuity: ∞ Ω (Infinity) (Blue or White – Ground / Green – Ground)**

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

Tester knob indication: Resistance (Ω)



- No → Replace the CKP sensor with a new one.
- Yes ↓

Step 2

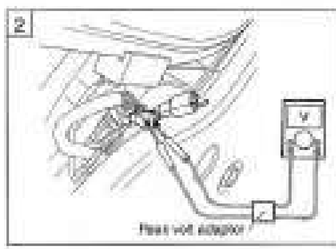
Disconnect the CKP sensor coupler.
Crank the engine a few seconds with the starter motor, and measure the CKP sensor peak voltage at the coupler.

DATA **CKP sensor peak voltage: More than 0.3 V (Blue or White – Green)**

Repeat the above test procedure a few times and measure the highest peak voltage.
If OK, then measure the CKP sensor peak voltage at the ECM terminals. (N+/N – or [illegible]/[illegible])

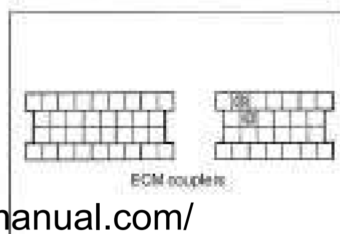
TOOL **09900-25008: Multi circuit tester**

Tester knob indication: Voltage (⎓)



- No → Loose or poor contacts on the CKP sensor coupler or ECM coupler. Replace the CKP sensor with a new one.
- Yes ↓

Blue (White) or Green wire open or shorted to ground, or poor [illegible] or [illegible] connection. (☞ 4-27)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-5)



→ and inspect it again.

"C13" IAP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
Low pressure and low voltage. High pressure and high voltage. (0.5 V ≤ Sensor voltage 4.5 V without the above range.) *NOTE:* *Note that atmospheric pressure varies depending on weather conditions as well as altitude.* *Take that into consideration when inspecting voltage.*	• Clogged vacuum passage between throttle body and IAP sensor. • Air being drawn from vacuum passage between throttle body and IAP sensor. • Red wire circuit open or shorted to ground. • B/Br or G/B wire circuit shorted to ground. • IAP sensor malfunction. • ECM malfunction.

INSPECTION

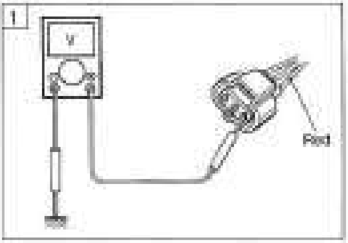
• Lift and support the fuel tank with its prop stay. (☞ 4-50)

1
Turn the ignition switch OFF.
Check the IAP sensor coupler for loose or poor contacts.
If OK, then measure the IAP sensor input voltage.
Disconnect the IAP sensor coupler.
Turn the ignition switch ON.
Measure the voltage at the Red wire and ground.
If OK, then measure the voltage at the Red wire and B/Br wire.

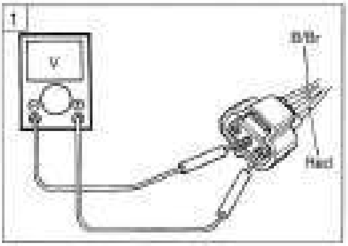
DATA **IAP sensor input voltage: 4.5 – 5.5 V**
(⊕Red – ⊖Ground
⊕Red – ⊖B/Br)

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

Tester knob indication: Voltage (⎓)



No → Loose or poor contacts on the ECM coupler.
Open or short circuit in the Red wire or B/Br wire.



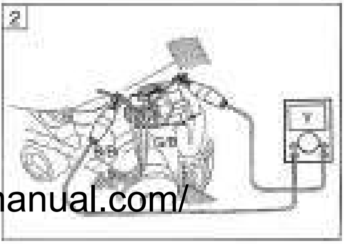
↓ Yes

2
Connect the IAP sensor coupler.
Insert the copper wires to the lead wire coupler.
Start the engine at idling speed.
Measure the IAP sensor output voltage at the wire side coupler (between G/B and B/Br wires).

DATA **IAP sensor output voltage: Approx. 2.5 V at idle speed (⊕G/B – ⊖B/Br)**

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

Tester knob indication: Voltage (⎓)



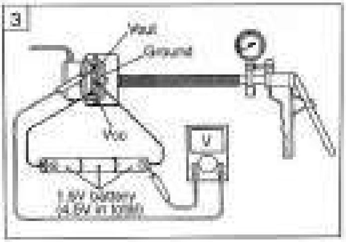
No → Check the vacuum hose for crack or damage.
Open or short circuit in the G/B wire.
Replace the IAP sensor with a new one.

↓ Yes

3 Remove the IAP sensor.
Connect the vacuum pump gauge to the vacuum port of the IAP sensor.
Arrange 3 new 1.5 V batteries in series (check that total voltage is 4.5 – 5.0 V) and connect ⊖ terminal to the ground terminal and ⊕ terminal to the Vcc terminal.
Check the voltage between Vout and ground. Also, check if voltage reduces when vacuum is applied up to 40 cmHg by using vacuum pump gauge. (See table below.)

09917-47010: Vacuum pump gauge
09900-25008: Multi circuit tester

Tester knob indication: Voltage (⎓)

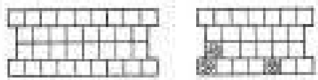


No → If check result is not satisfactory, replace IAP sensor with a new one.

↓ Yes

Red, G/B or B/Br wire open or shorted to ground, or poor ⑱, ⑤ or ⑲ connection. (☞ 4-27)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-5)

→ Replace the ECM with a new one, and inspect it again.


ECM couplers

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

ALTITUDE (Reference)		ATMOSPHERIC PRESSURE		OUTPUT VOLTAGE
(ft)	(m)	(mmHg)	kPa	(V)
0 – 2 000	0 – 610	760 – 707	100 – 94	3.1 – 3.6
2 001 – 5 000	611 – 1 524	Under 707 Over 634	94 – 85	2.8 – 3.4
5 001 – 8 000	1 525 – 2 438	Under 634 Over 567	85 – 76	2.6 – 3.1
8 001 – 10 000	2 439 – 3 048	Under 567 Over [illegible]	76 – 70	[illegible]

"C14" TP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
Signal voltage low or high. Difference between actual throttle opening and opening calculated by ECM in larger than specified value. (0.2 V ≦ Sensor Voltage < 4.8 V without the above range.)	• TP sensor maladjusted. • TP sensor circuit open or short. • TP sensor malfunction. • ECM malfunction.

INSPECTION

• Lift and support the fuel tank with its prop stay. (☞ 4-50)

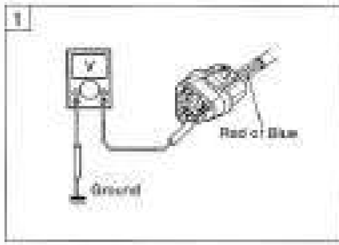
1

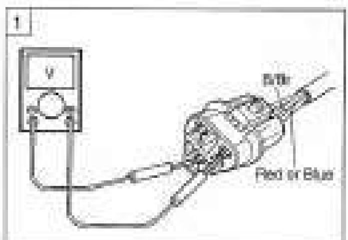
Turn the ignition switch OFF.
Check the TP sensor coupler for loose or poor contacts.
If OK, then measure the TP sensor input voltage.
Disconnect the TP sensor coupler.
Turn the ignition switch ON.
Measure the voltage at the Red wire and ground.
If OK, then measure the voltage at the Red wire and B/Br wire.

DATA **TPS sensor input voltage: 4.5 – 5.5 V**
(⊕Red or Blue – ⊖Ground)
(⊕Red or Blue – ⊖B/Br)

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

Tester knob indication: Voltage (⎓)





No → Loose or poor contacts on the ECM coupler.
Open or short circuit in the Red wire or B/Br wire.

↓ Yes

2

Turn the ignition switch OFF.
Disconnect the TP sensor coupler.
Check the continuity between Yellow wire and ground.

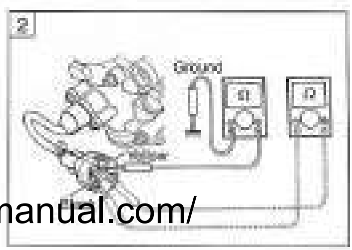
DATA **TP sensor continuity: ∞Ω (Infinity)**
(Yellow wire – Ground)

If OK, then measure the TP sensor resistance at the coupler (between Yellow and Black wires).
Turn the throttle grip and measure the resistance.

DATA **TP sensor resistance**
Throttle valve is closed: Approx. 1.3 kΩ
Throttle valve is opened: Approx. 4.5 kΩ

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

Tester knob indication: Resistance (Ω)



No → Reset the TP sensor position correctly.
Replace the TP sensor with a new one.

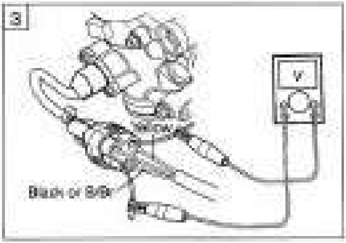
↓ Yes

3 Connect the TP sensor coupler.
Insert the copper wires to the lead wire coupler.
Turn the ignition switch ON.
Measure the TP sensor output voltage at the coupler (between Yellow and Black wires) by turning the throttle grip.

DATA **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

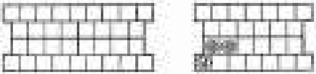
Tester knob indication: Voltage (⎓)



No → If check result is not satisfactory, replace TP sensor with a new one.

↓ Yes

Red, P/B or B/Br wire open or shorted to ground, or poor ⑨, [illegible] or ⑨ connection. (☞ 4-27)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-5)


ECM couplers

and inspect it again.

"C15" ECT SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
High engine coolant temp. (Low voltage – Low resistance) Low engine coolant temp. (High voltage – High resistance)	• B/Bl circuit shorted to ground. • B/Br circuit open. • ECT sensor malfunction. • ECM malfunction.

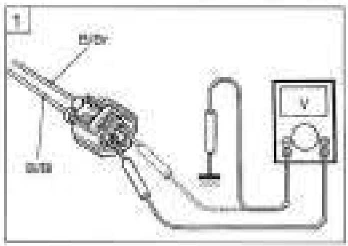
INSPECTION

- Lift and support the fuel tank with its prop stay. (☞ 4-50)

1
Turn the ignition switch OFF.
Check the ECT sensor coupler for loose or poor contacts.
If OK, then measure the ECT sensor voltage at the wire side coupler.
Disconnect the coupler and turn the ignition switch ON.
Measure the voltage between B/Bl wire terminal and ground.
If OK, then measure the voltage between B/Bl wire terminal and B/Br wire terminal.

DATA **ECT sensor voltage: 4.5 – 5.5 V**
(⊕B/Bl – ⊖Ground)
(⊕B/Bl – ⊖B/Br)

09900-25008: Multi circuit tester
Tester knob indication: Voltage (⎓)



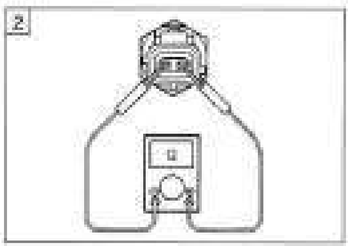
No → Loose or poor contacts on the ECM coupler.
Open or short circuit in the B/Bl wire or B/Br wire.

Yes ↓

2
Turn the ignition switch OFF.
Measure the ECT sensor resistance.

DATA **ECT sensor resistance: 2.3 – 2.6 kΩ at 20 °C (68 °F)**
(Terminal – Terminal)

09900-25008: Multi circuit tester
Tester knob indication: Resistance (Ω)
Refer to page 5-8 for details.



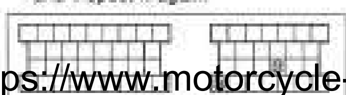
No → Replace the ECT sensor with a new one.

Yes ↓

B/Bl or B/Br wire open or shorted to ground, or poor ⑦ or ⑭ connection. (☞ 4-27)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-6)

→ Replace the ECM with a new one, and inspect it again.

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


ECM couplers

"C21" IAT SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
High intake air temp. (Low voltage – Low resistance) Low intake air temp. (High voltage – High resistance)	• Dg circuit shorted to ground. • B/Br circuit open. • IAT sensor malfunction. • ECM malfunction.

INSPECTION

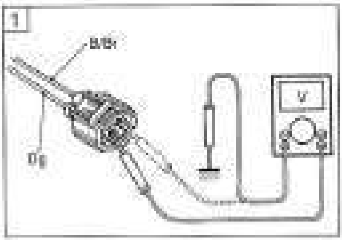
• Lift and support the fuel tank with its prop stay. (☞ 4-50)

1 Turn the ignition switch OFF.
Check the IAT sensor coupler for loose or poor contacts.
If OK, then measure the IAT sensor voltage at the wire side coupler.
Disconnect the coupler and turn the ignition switch ON.
Measure the voltage between Dg wire terminal and ground.
If OK, then measure the voltage between Dg wire terminal and B/Br wire terminal.

DATA **IAT sensor voltage: 4.5 – 5.5 V**
(⊕Dg – ⊖Ground)
(⊕Dg – ⊖B/Br)

09900-25008: Multi circuit tester

Tester knob indication: Voltage (⎓)



No → Loose or poor contacts on the ECM coupler.
Open or short circuit in the Dg wire or B/Br wire.

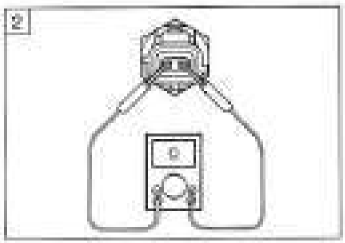
Yes ↓

2 Turn the ignition switch OFF.
Measure the IAT sensor resistance.

DATA **IAT sensor resistance: 2.2 – 2.7 kΩ at 20°C (68°F)**
(Terminal – Terminal)

09900-25008: Multi circuit tester

Tester knob indication: Resistance (Ω)



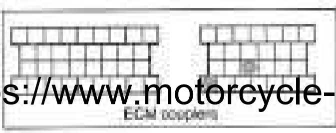
No → Replace the IAT sensor with a new one.

Yes ↓

Dg or B/Br wire open or shorted to ground, or poor [illegible] or [illegible] connection. (☞ 4-27)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-6)

→ Replace the ECM with a new one, and inspect it again.

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 5-6 for details.

"C22" AP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
Low pressure and low voltage. High pressure and high voltage. (0.5 V ≤ Sensor Voltage < 4.5 V without the above range.) *NOTE:* *Note that atmospheric pressure varies depending on weather conditions as well as altitude. Take that into consideration when inspecting voltage.*	• Clogged air passage with dust. • Red wire circuit open or shorted to ground. • B/Br or G/Y wire circuit shorted to ground. • AP sensor malfunction. • ECM malfunction.

INSPECTION

- Lift and support the fuel tank with its prop stay. (☞ 4-50)

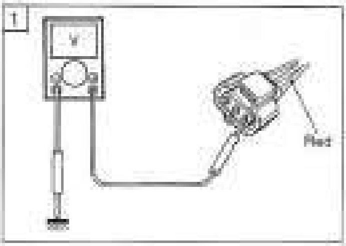
1

Turn the ignition switch OFF.
Check the AP sensor coupler for loose or poor contacts.
If OK, then measure the AP sensor input voltage.
Turn the ignition switch ON.
Disconnect the AP sensor coupler.
Measure the voltage between Red wire and ground.
If OK, then measure the voltage between Red wire and B/Br wire.

DATA **AP sensor input voltage: 4.5 – 5.5 V**
(⊕Red – ⊖Ground)
(⊕Red – ⊖B/Br)

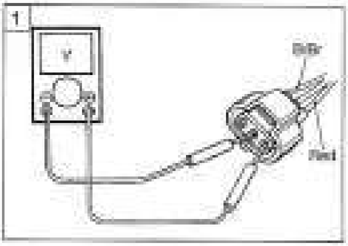
09900-25008: Multi circuit tester

Tester knob indication: Voltage (⎓)



No → Loose or poor contacts on the ECM coupler.
Open or short circuit in the Red wire or B/Br wire.

Yes ↓



2

Connect the AP sensor coupler.
Insert the copper wires to the lead wire coupler.
Turn the ignition switch ON.
Measure the AP sensor output voltage at the wire side coupler between G/Y and B/Br wires.

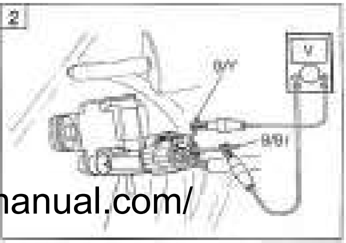
DATA **AP sensor output voltage: Approx. 3.6 V**
at 760 mmHg (100 kPa)
(⊕G/Y – ⊖B/Br)

09900-25008: Multi circuit tester

Tester knob indication: Voltage (⎓)

No → Check the air passage for clogging.
Open or short circuit in the G/Y wire.
Replace the AP sensor with a new one.

Yes ↓



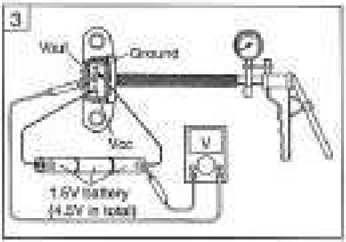
3	Remove the AP sensor. Connect the vacuum pump gauge to the air passage port of the AP sensor. Arrange 3 new 1.5 V batteries in series (check that total voltage is 4.5 – 5.0 V) and connect ⊖ terminal to the ground terminal and ⊕ terminal to the Vcc terminal. Check the voltage between Vout and ground. Also, check if voltage reduces when vacuum is applied up to 40 cmHg by using vacuum pump gauge. (See table below) **09917-47010: Vacuum pump gauge** **09900-25008: Multi circuit tester** **Tester knob indication: Voltage (⎓)**

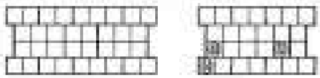
No → If check result is not satisfactory, replace AP sensor with a new one.

Yes ↓

Red, G/Y or B/Br wire open or shorted to ground, or poor ④, ⑤ or ⑥ connection. (☞ 4-27)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-5)

→ Replace the ECM with a new one, and inspect it again.





ECM couplers

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

ALTITUDE (Reference)		ATMOSPHERIC PRESSURE		OUTPUT VOLTAGE
(ft)	(m)	(mmHg)	kPa	(V)
0 | 2 000	0 | 610	760 | 707	100 | 94	3.1 – 3.6
2 001 | 5 000	611 | 1 524	Under 707 Over 634	94 | 85	2.8 – 3.4
5 001 | 8 000	1 525 | 2 438	Under 634 Over 567	85 | 76	2.6 – 3.1
8 001 | 10 000	2 439 | 3 048	Under 567 Over [illegible]	76 | 70	[illegible]

"C23" TO SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
No TO sensor signal for a few seconds, after ignition switch turns ON. Sensor voltage high. (0.25 V ≤ Sensor Voltage < 4.85 V without the above range.)	• TO sensor circuit open or short. • TO sensor malfunction. • ECM malfunction.

INSPECTION

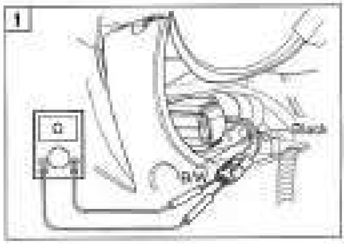
- Lift and support the fuel tank with its prop stay. (☞ 4-50)

1 Turn the ignition switch OFF.
Check the TO sensor coupler for loose or poor contacts.
If OK, then measure the TO sensor resistance.
Disconnect the TO sensor coupler.
Measure the resistance between Black and B/W wire terminals.

DATA **TO sensor resistance: 60 – 64 kΩ (Black – B/W)**

09900-25008: Multi circuit tester

Tester knob indication: Resistance (Ω)



No → Replace the TO sensor with a new one.

Yes ↓

2 Connect the TO sensor coupler.
Insert the copper wires to the wire lead coupler.
Turn the ignition switch ON.
Measure the voltage at the wire side coupler between Black and B/Br wires.

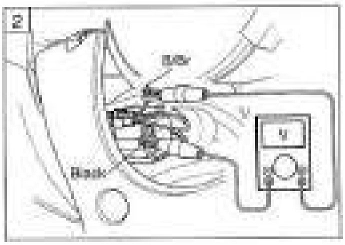
DATA **TO sensor peak voltage: Approx. 2.5 V (Black – B/Br)**

Also, measure the voltage when leaning of the motorcycle.
Dismount the TO sensor from its bracket and measure the voltage when it is leaned more than 43°, left and right, from the horizontal level.

DATA **TO sensor voltage: 0 V (Black – B/Br)**

09900-25008: Multi circuit tester

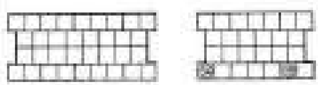
Tester knob indication: Voltage (⎓)



No → Loose or poor contacts on the ECM coupler.
Open or short circuit in the Black wire or B/Br wire.
Replace the TO sensor with a new one.

Yes ↓

Black or B/Br wire open or shorted to ground, or poor ⑤ or ⑮ connection. (☞ 4-27)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-5)



ECM couplers

→ Replace the ECM with a known good one, and inspect it again.

"C24", "C25", "C26" or "C27" IGNITION SYSTEM MALFUNCTION

***Refer to the IGNITION SYSTEM for details. (☞ 7-20)**

"C31" GEAR POSITION (GP) SWITCH CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
No Gear Position switch voltage Switch voltage low. (Sensor Voltage > 0.6 V without the above range.)	• Gear Position switch circuit open or short. • Gear Position switch malfunction. • ECM malfunction.

INSPECTION

- Lift and support the fuel tank with its prop stay. (☞ 4-50)

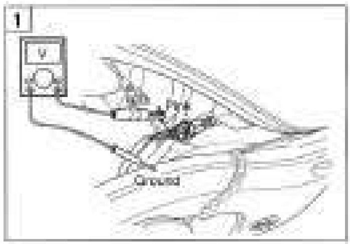
Step 1

Turn the ignition switch OFF.
Check the GP switch coupler for loose or poor contacts.
If OK, then measure the GP switch voltage.
Support the motorcycle with a jack.
Turn the side-stand to up-right position.
Turn the engine stop switch ON.
Insert the copper wire to the lead wire coupler.
Turn the ignition switch ON.
Measure the voltage at the wire side coupler between Pink wire and ground, when shifting the gearshift lever from 1st to Top.

DATA **GP switch voltage: More than 0.6 V (Pink – Ground)**

09900-25008: Multi circuit tester

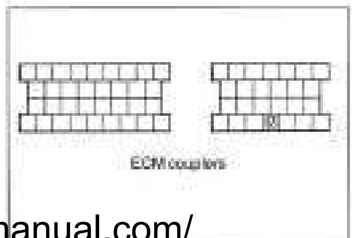
Tester knob indication: Voltage (⎓)



No → Open or short circuit in the Pink wire. Replace the GP switch with a new one.

Yes ↓

Pink wire open or shorted to ground, or poor ⑤ connection. (☞ 4-27)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-5)



→ Replace the ECM with a new one, and inspect it again.

"C32", "C33", "C34" or "C35" FUEL INJECTION MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
No injector current.	• Injector circuit open or short. • Injector malfunction. • ECM malfunction.

INSPECTION

- Lift and support the fuel tank with its prop stay. (☞ 4-50)

1

Turn the ignition switch OFF.
Check the injector coupler for loose or poor contacts.
If OK, then measure the injector resistance.
Disconnect the coupler and measure the resistance between terminals.

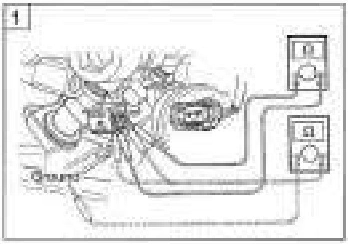
DATA **Injector resistance: 11 – 15 Ω at 20°C (68°F)**
(Terminal – Terminal)

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

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

09900-25008: Multi circuit tester

Tester knob indication: Resistance (Ω)



No → Replace the injector with a new one. (☞ 4-65)

Yes ↓

2

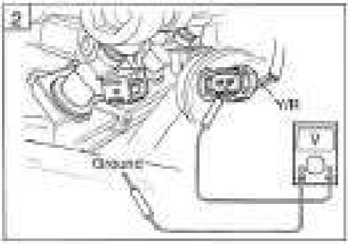
Turn the ignition switch ON.
Measure the injector voltage between Y/R wire and ground.

DATA **Injector voltage: Battery voltage**
(Y/R - Ground)

NOTE:
Injector voltage can be detected only 3 seconds after ignition switch is turned ON.

09900-25008: Multi circuit tester

Tester knob indication: Voltage (⎓)

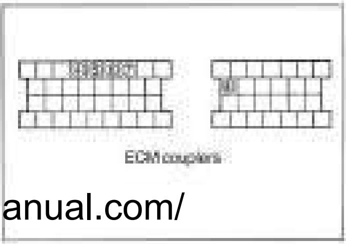


No → Open circuit in the Yellow/Red wire.

Yes ↓

Gr/W, Gr/B, Gr/Y, Gr/R or Y/R wire open or shorted to ground, or poor ④, ⑤, ⑥, ⑦ or ⑫ connection. (☞ 4-27)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-5)

→ Replace the ECM with a new one, and inspect it again.



"C41" FP RELAY CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
No signal from fuel pump relay.	• Fuel pump relay circuit open or short. • Fuel pump relay malfunction. • ECM malfunction.

INSPECTION

- Remove the front and rear seats.
- Remove the frame cover. (☞ 6-12)

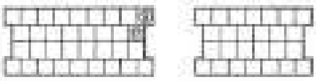
1 Turn the ignition switch OFF.
Check the FP relay coupler for loose or poor contacts.
If OK, then check the insulation and continuity. Refer to page 4-53 for details.

No → Replace the FP relay with a new one.

Yes ↓

Y/B or O/W wire open or shorted to ground, or poor ⑨ or ⑪ connection. (☞ 4-27)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-5)

→ Replace the ECM with a new one, and inspect it again.



ECM couplers

"C42" IG SWITCH CIRCUIT MALFUNCTION

* **Refer to the IGNITION SWITCH INSPECTION for details.**
- Remove the left upper panel. (☞ 6-7)
- Inspect the ignition switch. (☞ 7-38)

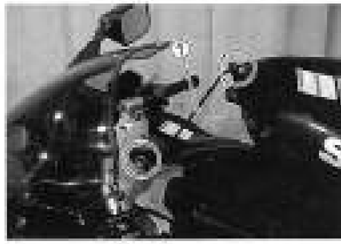
"C92" FUEL LEVEL GAUGE CIRCUIT MALFUNCTION

* **Refer to the FUEL LEVEL GAUGE INSPECTION for details.**
- Remove the fuel tank. (☞ 4-50)
- Remove the fuel level gauge. (☞ 7-34)
- Inspect the fuel level gauge. (☞ 7-34)

FUEL SYSTEM

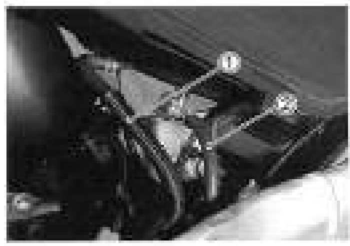
FUEL TANK LIFT-UP

- Remove the front and rear seats.
- Remove the fuel tank mounting bolts.
- Remove the fuel tank prop stay ① from the frame.
- Lift and support the fuel tank with its prop stay ①.



FUEL TANK REMOVAL

- Remove the front and rear seats.
- Lift and support the fuel tank with its prop stay. (See above)
- Before disconnecting the fuel hoses ① and ② from the fuel tank, pinch the fuel hoses ① and ② with a soft clip to prevent fuel leakage from the fuel tank.
- Disconnect the fuel hoses ① and ②.



- Install the fuel tank plugs ③ and ④ to the fuel inlet and outlet ports.

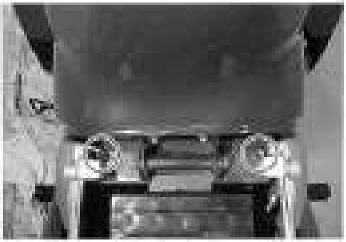
NOTE:
Fuel tank plugs are equipped on the rear fender.

⚠ WARNING

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

- Disconnect the fuel level gauge lead wire coupler ⑤.

- Remove the fuel tank bracket mounting bolts.



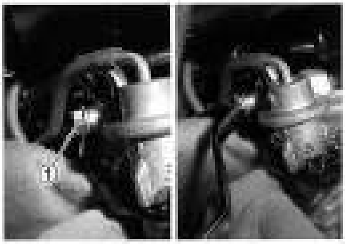
- Disconnect the tip over sensor coupler ①.
- Disconnect the fuel tank breather hose ② and fuel tank drain hose ③ from the fuel tank.
- Remove the fuel tank.

FUEL TANK INSTALLATION

- Installation is in the reverse order of removal.

FUEL PRESSURE INSPECTION

- Lift and support the fuel tank with its prop stay. (☞ 4-50)
- Place a rag under the fuel pressure check bolt ① and slowly loosen it and catch the remaining fuel using a suitable container.
- Remove the fuel pressure check bolt ① and install the special tools.



09940-40210: Fuel pressure gauge adaptor
09915-77330: Oil pressure gauge
09915-74520: Oil pressure gauge hose

Turn the ignition switch ON and check the fuel pressure.

DATA **Fuel pressure: 3.0 kgf/cm² (300 kPa, 43 psi)**

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

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

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

* Clogged or pinched fuel return hose
* Fuel pump check valve
* Pressure regulator

– Continued on next page –

⚠ WARNING

* **Before removing the special tools, turn the ignition switch OFF position and release the fuel pressure slowly.**
* **Gasoline is highly flammable and explosive. Keep heat, sparks and flame away.**

⚠ CAUTION

Use a new gasket washer installed on the check bolt to prevent fuel leakage.

* Tighten the fuel pressure check bolt to the specified torque.

Fuel pressure check bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)

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, replace the fuel pump assembly or inspect the fuel pump relay and tip over sensor.

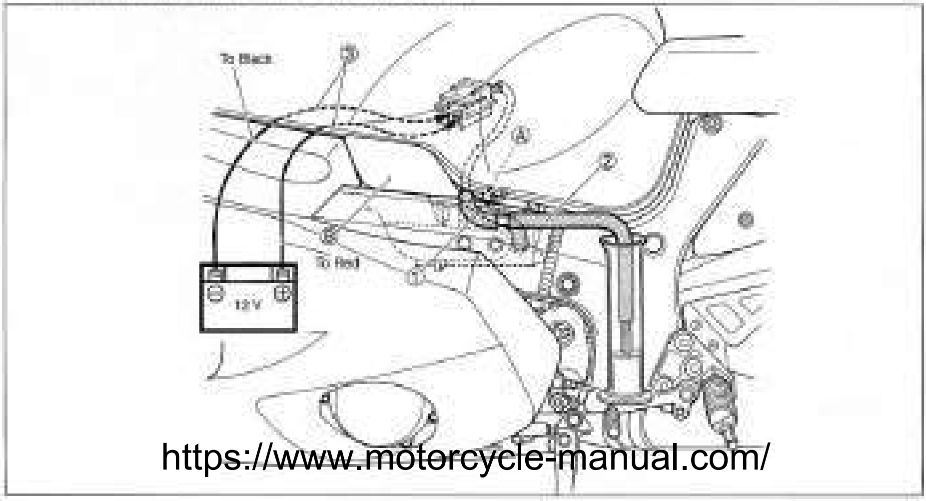
FUEL DISCHARGE AMOUNT INSPECTION

* Adjust the fuel level to the reserve level. (The fuel indicator light comes on position.)
* Lift and support the fuel tank with its prop stay. (4-50)
* Disconnect the fuel return hose ① from the fuel tank and install the fuel tank plug Ⓐ to the fuel inlet port.
* Connect a proper extension fuel hose ② to the disconnected fuel return hose ① and pass through the fuel return hose ① from rear side of the fuel tank garnish Ⓑ.
* Disconnect the fuel pump lead wire coupler and connect the power source lead wires ③ to the disconnected fuel pump lead wire coupler. (Battery ⊕ terminal to Red lead wire and ⊖ terminal to Black lead wire)
* Place the fuel tank.
* Place the measuring cylinder and insert the fuel return hose end into the measuring cylinder.
* Connect 12 volts battery to the power source lead wires ③ which is applied 30 seconds and measure the amount of fuel discharged.

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

DATA Fuel discharge amount: Approx. 458 ml/30 sec. (15.5/16.1 US/Imp oz)/30 sec.

NOTE:
* *The battery must be in fully charged condition.*
* *Fill the fuel tank with more than 3.5 liters of gasoline.*

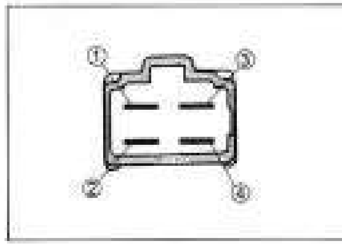


FUEL PUMP RELAY INSPECTION

Fuel pump relay is located behind the left frame cover.

- Remove the seats and frame cover.

First, check the insulation between ① and ② terminals with pocket tester. Then apply 12 volts to ③ and ④ terminals, ⊕ to ③ and ⊖ to ④, and check the continuity between ① and ②.
If there is no continuity, replace it with a new one.



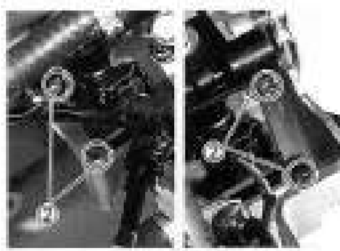
FUEL PUMP REMOVAL

- Lift and support the fuel tank with its prop stay. (☞ 4-50)
- Remove the fuel pump cover boot.
- Place a rag under the fuel pressure check bolt ① and slowly loosen it and catch the remaining fuel using a suitable container.
- Disconnect the fuel hoses from the fuel tank and install the fuel tank plugs (fuel tank plugs are equipped on the rear fender) to the fuel inlet and outlet ports. (☞ 4-50)

⚠ WARNING

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

- Disconnect the fuel pump lead wire coupler, fuel pressure regulator vacuum hose and fuel feed hose.
- Remove the fuel pump assembly by removing its bracket screws ②.



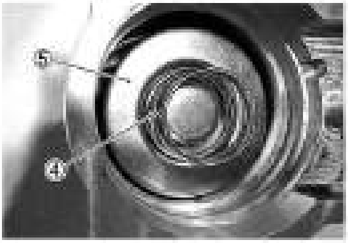
FUEL PUMP DISASSEMBLY

- Remove the fuel pressure regulator ① from the fuel pump.

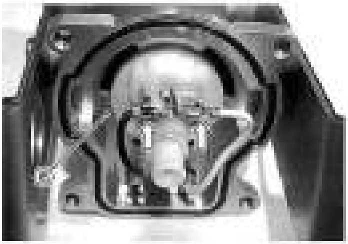
- Remove the fuel filter cap ②.

- Remove the fuel filter retainer plate ③.

- Remove the fuel filter spring ④ and fuel filter ⑤.



- Disconnect the fuel pump lead wires.
- Remove the fuel pump retainer ⑥.



- Remove the fuel pump from the fuel pump case.

FUEL MESH FILTER INSPECTION AND CLEANING

If the 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 REASSEMBLY AND INSTALLATION

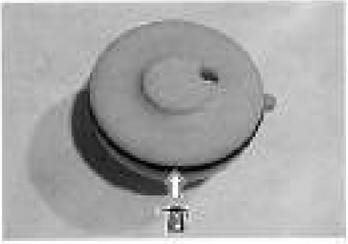
Assembly and installation are in the reverse oder of removal and disassembly.

- Apply thin coat of the engine oil to the O-rings.
- Install the fuel filter ① and spring ② correctly.

NOTE:
The open end ③ of the fuel filter should be positioned inside.

⚠ CAUTION

Replace the O-ring with a new one.



- Fix the fuel pump lead wires securely.

- Install the fuel filter cap and tighten the screws to the specified torque.

Fuel filter cap mounting screw: 3 N·m (0.3 kgf-m, 2.0 lb-ft)

- Apply thin coat of the engine oil to the O-ring.

▲ CAUTION

Replace the O-ring with a new one.

- Install the fuel pressure regulator and tighten the screws to the specified torque.

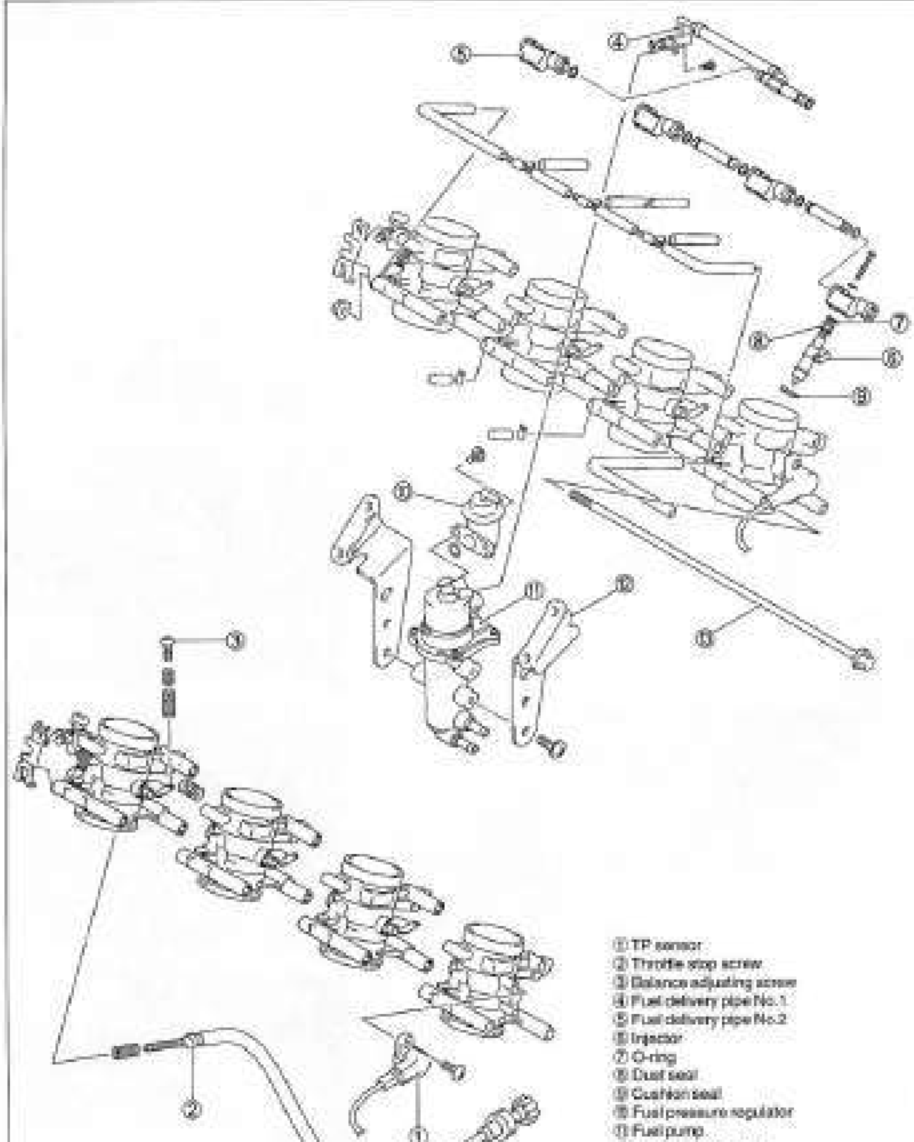
Fuel pressure regulator mounting screw: 3 N·m (0.3 kgf-m, 2.0 lb-ft)

- Install the fuel pump assembly and tighten the screws to the specified torque.

Fuel pump mounting screw: 5 N·m (0.5 kgf-m, 3.5 lb-ft)

THROTTLE BODY

CONSTRUCTION



① TP sensor
② Throttle stop screw
③ Balance adjusting screw
④ Fuel delivery pipe No.1
⑤ Fuel delivery pipe No.2
⑥ Injector
⑦ O-ring
⑧ Dust seal
⑨ Cushion seal
⑩ Fuel pressure regulator
⑪ Fuel pump
⑫ Fuel pump bracket
⑬ [illegible]ding bolt

THROTTLE BODY REMOVAL

- Lift and support the fuel tank with its prop stay. (☞ 4-50)
- Disconnect the IAT sensor coupler ①.
- Disconnect the IAP sensor coupler ② and vacuum hose ③.

- Disconnect the crankcase breather hose ④ and PAIR hose ⑤.

- Disconnect the throttle cables from their drum.
- Disconnect the fast idle cable from its cam.

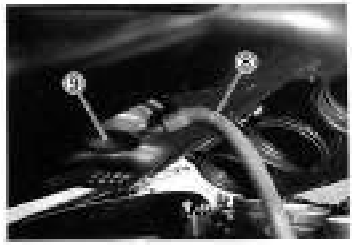
▲ CAUTION

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.

- Loosen the throttle body clamp screws ⑥ at the air cleaner box side.

- Remove the air cleaner box mounting bolt ⑦.

- Disconnect the vacuum hose ⑧ from the intake air control valve actuator ⑨.
- Remove the air cleaner box.



- Place a rag under the fuel pressure check bolt and slowly loosen it to release the fuel pressure.
- Disconnect the fuel hoses ⑩ and ⑪ from the fuel tank.
- Install the fuel tank plugs to the fuel inlet and outlet ports. (☞ 4-50)

⚠ WARNING

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

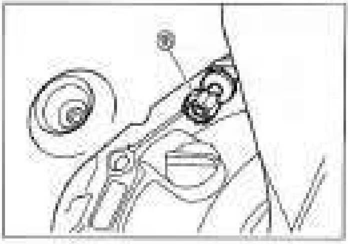
- Disconnect the fuel pump/fuel injector/TPS coupler ⑫.

- Disconnect the vacuum hose ⑬ from the No.4 throttle body.

- Disconnect the vacuum hose ④ from the No.1 throttle body.

- Loosen the throttle body clamp screws ⑤ at the intake pipe side.

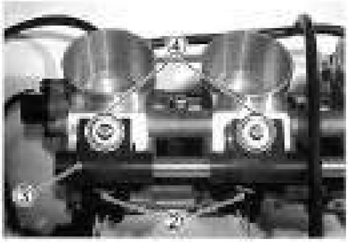
- Remove the throttle stop screw ⑥ from the cable guide.
- Remove the throttle body along with the fuel pump.

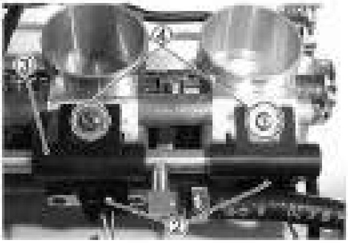


THROTTLE BODY DISASSEMBLY

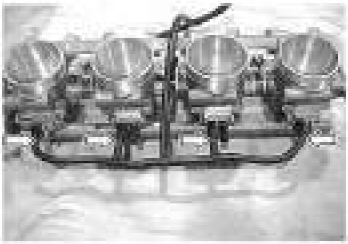
- Disconnect the fuel pump lead wire coupler, fuel pressure regulator vacuum hose and fuel feed hose.
- Remove the fuel pump assembly by removing its bracket screws ①.

- Disconnect the fuel injector couplers ②.
- Remove the fuel delivery pipe assembly ③ by removing its mounting screws ④.
- Remove the fuel injectors from the fuel delivery pipe.





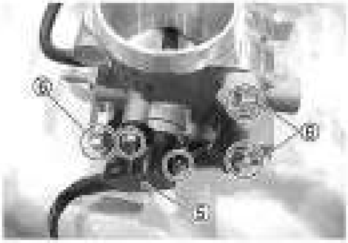
- Disconnect the respective vacuum hoses from each throttle body.



- Remove the TP sensor ⑤.

09930-11960: Torx wrench

- Separate the four throttle bodies respectively by removing their connecting bolts ⑥.



- Remove the air jets.

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.

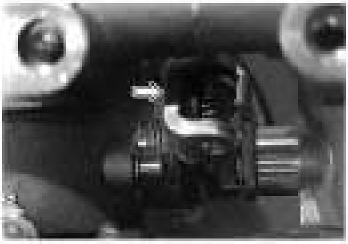
INSPECTION

Check following items for any damage or clogging.

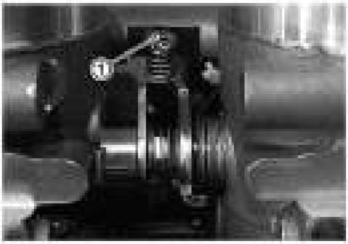
* O-ring
* Throttle shaft bushing and seal
* Throttle valve
* Fuel injector filter
* Injector cushion seal
* Injector dust seal
* Vacuum hose
* Jet

THROTTLE BODY REASSEMBLY

- When engaging the two throttle bodies or two pairs of throttle bodies, position the throttle valve control lever correctly.



- Set each throttle valve to the same opening by turning the balance screws ①.



- Place the throttle body assembly on the surface plate and tighten the connecting bolts ②.
- Install the TP sensor to the No. 1 throttle body.
  Refer to page 4-30 for TP sensor setting procedure.

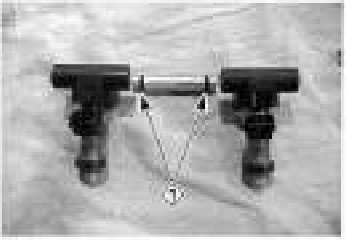
09930-11960: Torx wrench

- Install the air jets.

NOTE:
Check the air jet for clogging.

- Connect the respective vacuum hoses correctly as shown in the photo.

- Apply thin coat of the engine oil to the new O-rings ①.

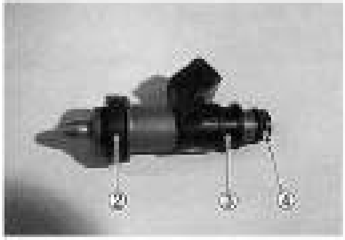


⚠ CAUTION

Replace the O-ring with a new one.

- Assemble the fuel delivery pipes.

- Apply thin coat of the engine oil to the new fuel injector cushion seals ②, and install them to each fuel injector.



⚠ CAUTION

Replace the cushion seal with a new one.

- Install the seals ③ and O-rings ④ to each fuel injector.
- Apply thin coat of the engine oil to the new O-rings ④.
- Install the fuel injectors by pushing them straight to each throttle body.

⚠ CAUTION

Replace the dust seal and O-ring with the new ones.
Never turn the injector while pushing it.

- Install the fuel delivery pipe assembly to the throttle body assembly.

⚠ CAUTION

Never turn the fuel injectors while installing them.

- Tighten the fuel delivery pipe mounting screws.

Fuel delivery pipe mounting screw: 5 N·m (0.5 kgf-m, 3.5 lb-ft)

- Connect the fuel injector couplers to each fuel injector.

WIRE COLOR
No.1 coupler: Gray/White
No.2 coupler: Gray/Black
No.3 coupler: Gray/Yellow
No.4 coupler: Gray/Red

* Install the fuel pump assembly.

Fuel pump mounting screw: 5 N·m (0.5 kgf-m, 3.5 lb-ft)

THROTTLE BODY INSTALLATION

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

* Connect the throttle pulling cable ① and throttle returning cable ② to the throttle cable drum.
* Adjust the throttle cable play with the cable adjusters ③ and ④.
  Refer to page 4-70 for details.
* Connect the fast idle cable ⑤ and adjust the fast idle cable play with the cable adjuster ⑥.

FUEL INJECTOR INSPECTION

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

Refer to page 4-48 for details.

FUEL INJECTOR REMOVAL

* Lift and support the fuel tank with its prop stay. (☞ 4-50)
* Remove the air cleaner box. (☞ 4-58 and -59)
* With battery negative cable disconnected, disconnect the injector couplers.
* Remove the fuel delivery pipe assembly. (☞ 4-61)
* Remove the fuel injectors No.1, No.2, No.3 and No.4. (☞ 4-61)

INSPECTION

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

FUEL INJECTOR INSTALLATION

* Apply thin coat of the engine oil to new injector cushion seals and O-rings.
* Install the injec[illegible]
  Never turn the injector while pushing it. (☞ 4-64)

FAST IDLE ADJUSTMENT

The fast idle system is a kind of starter system, which opens throttle valve by the fast idle cam mechanically. The fast idle cam is turned by the fast idle cable and the cam pushes throttle valve shaft bracket. The bracket then opens throttle valve a little to increase the engine speed, and at the fully-pulled condition the engine speed rises to 3 500 rpm when warmed up.

- Connect a tachometer.
- Start up the engine and run it in idle condition for warming up.
- Set the idle speed to 1 150 rpm.
- Turn the fast idle lever (choke lever) ① fully and check the fast idle setting rpm. If the engine speed is not in the specified range, adjust it to 3 500 rpm as explained in the following procedures:

1)Lift and support the fuel tank with its prop stay. (☞ 4-50)

2)Start up the engine and keep the fast idle lever in fully-pulled condition.

3)Adjust the fast idle engine speed to 3 500 rpm by turning the fast idle adjusting screw ②.

4)After adjusting the fast idle speed, set the idle speed to 1 150 rpm.

DATA **Fast idle setting rpm : 3 500 rpm**
(When the engine is warmed.)
Engine idle rpm : 1 150 rpm
(When the engine is warmed.)

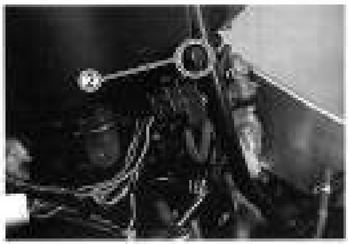
THROTTLE VALVE SYNCHRONIZATION

Check and adjust the throttle valve synchronization among four cylinders.

CALIBRATING EACH GAUGE

- Lift and support the fuel tank. (☞ 4-50)
- Start up the engine and run it in idling condition for warming up.
- Stop the warmed-up engine.
- Disconnect the IAT sensor coupler ① and remove the IAT sensor from the air cleaner box.
- Connect the removed IAT sensor to its coupler and place it on the frame.

- Remove the IAP sensor mounting screw ②.
- Remove the air cleaner box. (☞ 4-56 and -58)



- Disconnect the vacuum hoses ③ and ④ from the No.1 and No.4 throttle bodies.

- Install the proper plugs Ⓐ into the vacuum hoses ③ and ④.

- Connect one of the four rubber hoses of the vacuum balancer gauge to the nipple ⑤ on the No.1 throttle body.

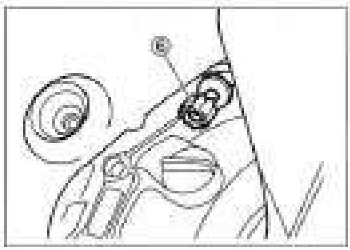
09913-13121: Vacuum balancer gauge

- Connect the proper rubber cap to the nipple on the No.4 throttle body.

- Connect a tachometer.
- Start up the engine and keep it running at 1 150 rpm by turning throttle stop screw ⑥.

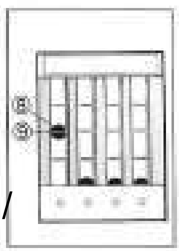
▲ CAUTION

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



- Turn the air screw ⑦ of the gauge so that the vacuum acting on the tube of that hose will bring the steel ball ⑧ in the tube to the center line ⑨.

NOTE:
The vacuum gauge is positioned approx. 30° from the horizontal level.



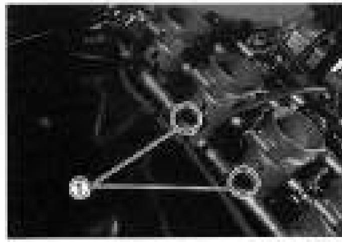
* After making sure that the steel ball stays steady at the center line, disconnect the hose from the No.1 throttle body nipple and connect the next hose to this nipple.
* Turn air screw to bring the other steel ball ⑮ to the center line.
* Repeat the above process on the third and fourth hoses.

The balancer gauge is now ready for use in balancing the throttle valves.

THROTTLE VALVE SYNCHRONIZATION

* To synchronize throttle valves, remove the rubber caps ① from each vacuum nipple and connect the vacuum balancer gauge hoses to the vacuum nipples respectively.

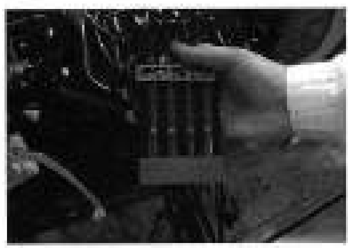
09913-13121: Vacuum balancer gauge



* Connect a tachometer and start up the engine.
* Bring the engine rpm to 1 150 rpm by the throttle stop screw.
* Check the vacuum of the four cylinders and balance the four throttle valves.

The vacuum gauge is positioned approx. 30° from the horizontal level, and in this position the four balls should be within one ball dia. If the difference is larger than one ball, turn the balance adjusting screw on the throttle body and bring the ball to the same level.

A correctly adjusted throttle valve synchronization has the balls in the Nos. 1 through 4 at the same level.



⚠ CAUTION

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

NOTE:

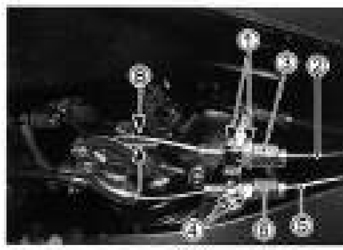
* *During balancing the throttle valves, always set the engine rpm at 1 150 rpm, using throttle stop screw.*
* *After balancing the four valves, set the idle rpm to 1 150 rpm by the throttle stop screw after installing the air cleaner box.*

THROTTLE POSITION SENSOR (TPS) SETTING

After all adjustments are completed, check or adjust the TPS setting condition.
(Refer to page 4-30 for TPS setting procedure.)

THROTTLE CABLE ADJUSTMENT

NOTE:
Minor adjustment can be made by the throttle grip side adjuster.
(2-16)



MAJOR ADJUSTMENT

- Loosen the lock nuts ① of the throttle returning cable ②.
- Turn the returning cable adjuster ③ to obtain proper cable play.
- Loosen the lock nuts ④ of the throttle pulling cable ⑤.
- Turn the pulling cable adjuster ⑥ in or out until the throttle cable play Ⓐ should be 2.0 – 4.0 mm (0.08 – 0.16 in) at the throttle grip.
- Tighten the lock nuts ④ securely while holding the adjuster ⑥.
- While holding the throttle grip at the fully closed position, slowly turn the returning cable adjuster ③ to obtain a cable slack Ⓑ of 1.0 mm (0.04 in).
- Tighten the lock nuts ① securely.

INTAKE AIR SYSTEM

INTAKE AIR SYSTEM INSPECTION

- Lift and support the fuel tank with its prop stay. (☞ 4-50)
- Remove the air cleaner element ① by removing the screws.

- Start up the engine and increase its speed gradually and check the RPM at which the intake air control valve begins to open.

DATA **Intake air control valve opening rpm: Above 2 500 rpm**

- Then, decrease the engine speed gradually and check the RPM at which the intake air control valve begins to close.

DATA **Intake air control valve closing rpm: Below 2 200 rpm**

If they are not within the standard range, check the vacuum hoses for damage and clogged or pinched. If OK, then check the VCSV, VTV, diaphragm and vacuum damper.

VCSV INSPECTION

The VCSV is located behind the left side of the main frame.

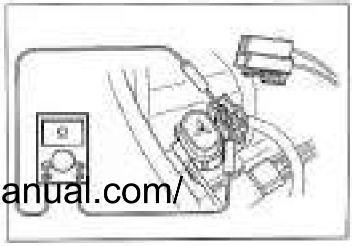
- Lift and support the fuel tank with its prop stay. (☞ 4-50)
- Disconnect the VCSV coupler ①.
- Measure the VCSV resistance.

DATA **Standard: 36 – 44Ω (Terminal – Terminal)**

If the resistance is incorrect, replace the VCSV with a new one.

09900-25008: Multi circuit tester

Tester knob indication: Resistance (Ω)



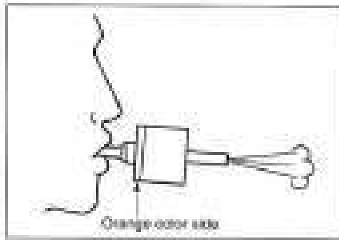
VTV INSPECTION

- Lift and support the fuel tank with its prop stay. (☞ 4-50)
- Remove the VTV by disconnecting the vacuum hoses.

NOTE:
Orange color side Ⓐ of the VTV should face rear side (to VCSV side).

- Blow the VTV from the Orange color side. Air must flow out.
- Also, blow the VTV from opposite side. Air should not flow out.

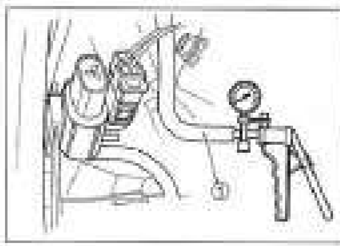
If the operation is incorrect, replace the VTV with a new one.



INTAKE AIR CONTROL VALVE ACTUATOR INSPECTION

- Lift and support the fuel tank with its prop stay. (☞ 4-50)
- Remove the air cleaner element. (☞ 4-71)
- Disconnect the vacuum hose ① from the VCSV and connect the vacuum pump gauge to the disconnected vacuum hose ①.
- Apply vacuum with the vacuum pump gauge and check the intake air control valve operation.

09917-47010: Vacuum pump gauge



▲ CAUTION

Use a hand operated vacuum pump. Do not apply high negative pressure (More than – 180 mmHg) to prevent the diaphragm damage.

If the operation is incorrect, replace the intake air control valve actuator with a new one.

VACUUM DAMPER INSPECTION

The vacuum damper is located under the IAP sensor.

- Lift and support the fuel tank with its prop stay. (☞ 4-50)
  Check the vacuum damper for damage and flaws or scratches, and replace it if necessary.

SENSORS

IAP SENSOR INSPECTION

The intake air pressure sensor is located at the rear side of the air cleaner box. (☞ 4-38)

IAP SENSOR REMOVAL/INSTALLATION

- Lift and support the fuel tank. (☞ 4-50)
- Remove the IAP sensor mounting screw ① and disconnect the coupler ② and vacuum hose ③.
- Installation is in the reverse order of removal.

TP SENSOR INSPECTION

The throttle position sensor is installed on the No.1 throttle body. (☞ 4-40)

TP SENSOR REMOVAL/INSTALLATION

- Lift and support the fuel tank. (☞ 4-50)
- Remove the TP sensor setting screws ① and disconnect the coupler ②.
- Install the TP sensor to the No.1 throttle body. Refer to page 4-30 for TP sensor setting procedure.

CKP SENSOR INSPECTION

The signal rotor is mounted on the left end of the crankshaft, and the crankshaft position sensor (Pick-up coil) is installed on the generator cover. (☞ 4-37)

CKP SENSOR REMOVAL/INSTALLATION

(☞ 3-68)

CMP SENSOR INSPECTION

The signal rotor is installed on the intake camshaft, and the camshaft position sensor (Pick-up coil) is installed on the cylinder head cover. (☞ 4-36)

CMP SENSOR REMOVAL/INSTALLATION

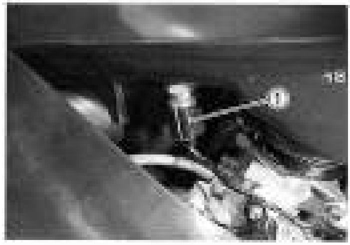
- Lift and support the fuel tank. (☞ 4-50)
- Remove the air cleaner box. (☞ 4-58 and -59)
- Remove the CMP sensor. (☞ [illegible])
  Installation is in the reverse order of removal.

IAT SENSOR INSPECTION

The intake air temperature sensor is installed at the left side of the air cleaner box. (☞ 4-43)

IAT SENSOR REMOVAL/INSTALLATION

- Lift and support the fuel tank. (☞ 4-50)
- Disconnect the IAT sensor coupler ① and remove the IAT sensor from the air cleaner box.
- Installation is in the reverse order of removal.



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

ECT SENSOR INSPECTION

The engine coolant temperature sensor is installed at the rear side of the cylinder head. (☞ 4-42 and 5-8)

ECT SENSOR REMOVAL/INSTALLATION

(☞ 5-8 and -9)

AP SENSOR INSPECTION

The atmospheric pressure sensor is located behind the left side of the main frame. (☞ 4-44)

AP SENSOR REMOVAL/INSTALLATION

- Lift and support the fuel tank. (☞ 4-50)
- Disconnect the coupler ① and remove the AP sensor by removing the screws.
- Installation is in the reverse order of removal.

TO SENSOR INSPECTION

The tip over sensor is located beneath the fuel tank bracket.

TO SENSOR REMOVAL/INSTALLATION

- Lift the rear side of the fuel tank. (☞ 4-51)
- Disconnect the coupler ① and remove the TO sensor from the fuel tank bracket.
- Installation is in the reverse order of removal.

NOTE:
When installing the [illegible] the top.

COOLING AND LUBRICATION SYSTEM

5

CONTENTS

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.

⚠ 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 more than 60% anti-freeze or less than 50%. (Refer to Right figure.)**
* **Do not use a radiator anti-leak additive.**

50% Engine coolant including reserve tank capacity

Anti-freeze	1 475 ml (3.1/2.6 US/Imp. pt)
Water	1 475 ml (3.1/2.6 US/Imp. pt)

Anti-freeze density	Freezing point
50%	–30°C (–24°F)
55%	–40°C (–44°F)
60%	–55°C (–67°F)

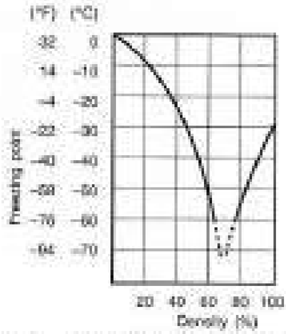


Fig.1 Engine coolant density-freezing point curve.

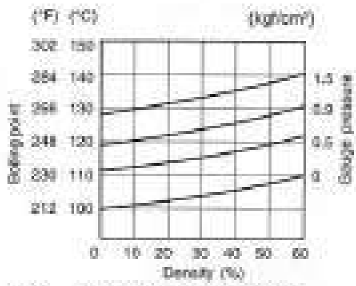
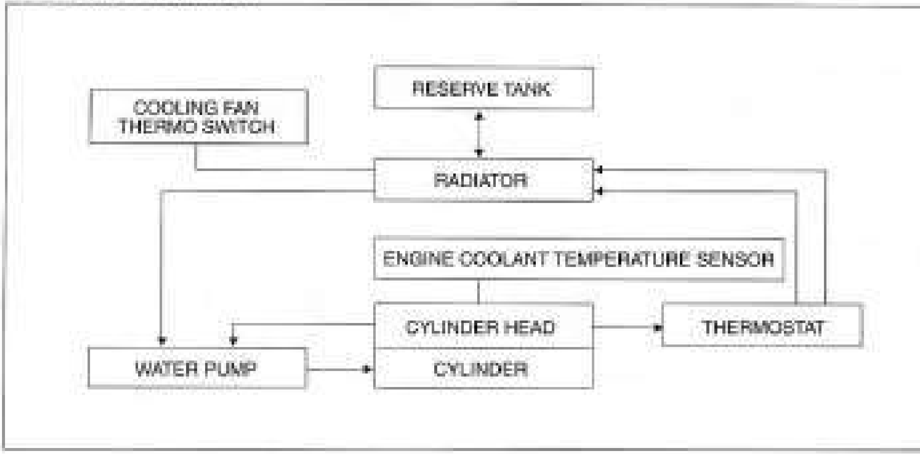


Fig.2 Engine coolant density-boiling point curve.

⚠ 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, induce vomiting and call physician immediately.**
  * **Keep it away from children.**

COOLING CIRCUIT



COOLING CIRCUIT INSPECTION

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

- Remove the under cowling. (☞ 6-8)
- Remove the radiator cap ① and connect the tester ② to the filler.

⚠ WARNING

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

- Give a pressure of about 120 kPa (1.2 kgf/cm², 17 psi) and see if the system holds this pressure for 10 seconds.
- If the pressure should fall during this 10-second interval, it means that there is a leaking point in the system. In such a case, inspect the entire system and replace the leaking component or part.

⚠ WARNING

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

⚠ CAUTION

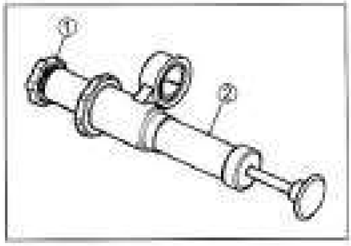
Do not allow the pressure to exceed the radiator cap release pressure, or the radiator can be damaged.

RADIATOR AND WATER HOSES

RADIATOR REMOVAL

* Remove the under cowling. (☞ 8-8)
* Drain engine oil. (☞ 2-13)
* Drain engine coolant. (☞ 2-19)
* Remove the radiator. (☞ 3-4, 3-5)

RADIATOR CAP INSPECTION

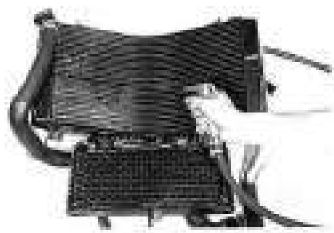


* Fit the cap ① to the radiator cap tester ②.
* Build up pressure slowly by operating the tester. Make sure that the pressure build-up stops at 95–125 kPa (0.95–12.5 kgf/cm², 13.5–17.8 psi) and that, with the tester held standstill, the cap is capable of holding that pressure for at least 10 seconds.
* Replace the cap if it is found not to satisfy either of these two requirements.

DATA **Radiator cap valve opening pressure**
Standard: 95 – 125 kPa
(0.95 – 1.25 kgf/cm², 13.5 – 17.8 psi)

RADIATOR INSPECTION AND CLEANING

* Road dirt or trash stuck to 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.



WATER HOSE INSPECTION

- Any water hose found in a cracked condition or flattened must be replaced.
- Any leakage from the connecting section should be corrected by proper tightening.

RADIATOR REMOUNTING

- Install the radiator with the oil cooler. (☞ 3-20)
- Route the radiator hoses. (☞ 8-25)
- Pour engine oil. (☞ 2-13)
- Pour engine coolant. (☞ 2-19)
- Bleed the air from the cooling circuit. (☞ 2-20)
- Install the under cowling. (☞ 6-8)

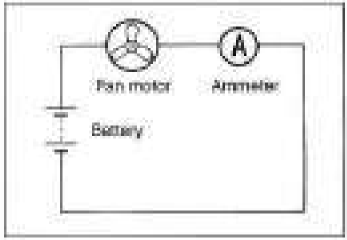
COOLING FAN

REMOVAL

- Remove the under cowling. (☞ 6-8)
- Drain engine oil. (☞ 2-13)
- Drain engine coolant. (☞ 2-19)
- Remove the radiator. (☞ 3-4, 3-5)
- Remove the cooling fan.

INSPECTION

- Remove the under cowling. (☞ 6-8)
- Disconnect the cooling fan lead wire coupler ①.
- Test the cooling fan motor for load current with an ammeter connected as shown in the illustration.



- The voltmeter is for making sure that the battery applies 12 volts to the motor. With the motor with electric motor fan running at full speed, the ammeter should be indicating not more than 5 amperes.
- 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

- Install the radiator with the oil cooler. (☞ 3-20)
- Route the radiator hoses. (☞ 8-25)
- Pour engine oil. (☞ 2-13)
- Pour engine coolant. (☞ 2-19)
- Bleed the air from the cooling circuit. (☞ 2-20)
- Install the under cowling. (☞ 6-8)

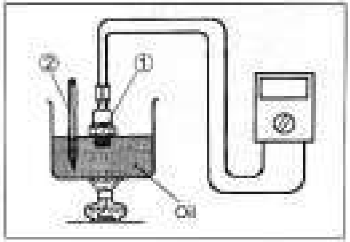
COOLING FAN THERMO-SWITCH

REMOVAL

- Remove the under cowling. (☞ 6-8)
- Drain engine coolant. (☞ 2-19)
- Disconnect the cooling fan thermo-switch lead wire coupler.
- Remove the cooling fan thermo-switch ①.

INSPECTION

- Check the thermo-switch closing or opening temperatures by testing it at the bench as shown in the figure. Connect the thermo-switch to a circuit tester and place it in the oil contained in a pan, which is placed on a stove.
- Heat the oil to raise its temperature slowly, and read the column thermometer when the switch closes or opens.



09900-25008: Multi circuit tester set

Tester knob indication: Continuity test (•))

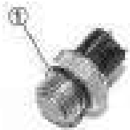
Cooling fan thermo-switch operating temperature
Standard (OFF→ON): Approx. 105°C (221°F)
(ON→OFF): Approx. 100°C (212°F)

▲ CAUTION

- **Take special care when handling the thermo-switch. It may cause damage if it gets a sharp impact.**
- **Do not contact the cooling fan thermo-switch ① and the column thermometer ② with a pan.**

INSTALLATION

- Install the O-ring ①.
- Tighten the cooling fan thermo-switch to the specified torque.



Cooling fan thermo-switch: 17 N·m (1.7 kgf·m, 12.5 lb-ft)

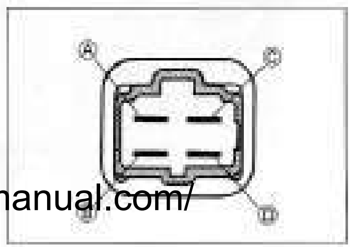
- Pour engine coolant. (☞ 2-19)
- Install the under cowling. (☞ 6-8)

COOLING FAN CONTROL RELAY

INSPECTION

- Remove the left side upper panel. (☞ 6-7)
- Remove the cooling fan control relay ①.

- Check the insulation between Ⓐ and Ⓑ terminals with pocket tester.
- When applying 12 volts to Ⓒ and Ⓓ terminals, ⊕ to Ⓒ and ⊖ to Ⓓ, and check the continuity between Ⓐ and Ⓑ. If there is anything unusual, replace it with a new one.



ENGINE COOLANT TEMPERATURE SENSOR

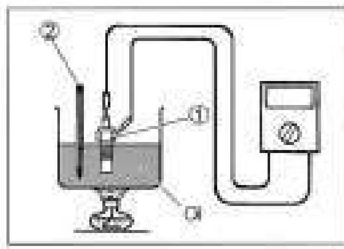
REMOVAL

* Remove the under cowling. (☞ 6-6)
* Drain engine coolant. (☞ 2-19)
* Remove the front and rear seats. (☞ 6-11)
* Lift and support the fuel tank. (☞ 4-50)
* Remove the air cleaner box. (☞ 4-58)
* Remove the throttle body. (☞ 4-60)

* Disconnect the engine coolant temperature switch lead wire.
* Remove the engine coolant temperature sensor ①.

INSPECTION

* Check the engine coolant temperature sensor by testing it at the bench as shown in the figure. Connect the temperature sensor ① to a circuit tester and place it in the oil contained in a pan, which is placed on a stove.
* Heat the oil to raise its temperature slowly and read the column thermometer and the ohmmeter.



* If the temperature 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 (112°F)	Approx. 0.811 kΩ
80°C (176°F)	Approx. 0.318 kΩ
110°C (230°F)	Approx. 0.142 kΩ
130°C (266°F)	Approx. 0.088 kΩ

If the resistance noted to show infinity or too much different resistance value, replace the temperature sensor with a new one.

⚠ CAUTION

* **Take special care when handling the temperature sensor. It may cause damage if it gets a sharp impact.**
* **Do not contact the temperature sensor ① and the column thermometer ② with a pan.**

INSTALLATION

- Tighten the engine coolant temperature switch to the specified torque.

Engine coolant temperature sensor: 18N·m (1.8 kgf·m, 13.0 lb-ft)

▲ CAUTION

Take special care when handling the temperature-sensor. It may cause damage if it gets a sharp impact.

- Install the throttle body. (☞ 4-65)
- Install the air cleaner box.
- Install the fuel tank. (☞ 4-51)
- Install the front and rear seats. (☞ 6-11)
- Pour engine coolant. (☞ 2-19)
- Install the under cowling. (☞ 6-8)

THERMOSTAT

REMOVAL

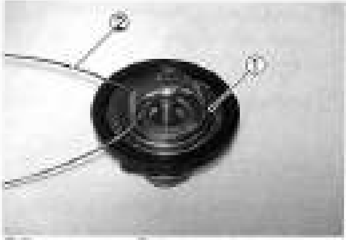
- Remove the under cowling. (☞ 6-8)
- Drain engine coolant. (☞ 2-19)
- Remove the front and rear seats. (☞ 6-11)
- Lift and support the fuel tank. (☞ 4-50)
- Remove the air cleaner box. (☞ 4-58)
- Remove the throttle body. (☞ 4-60)
- Remove the thermostat case.

- Remove the thermostat ①.

INSPECTION

Inspect the thermostat pellet for signs of cracking.
Test the thermostat at the bench for control action, in the following manner.

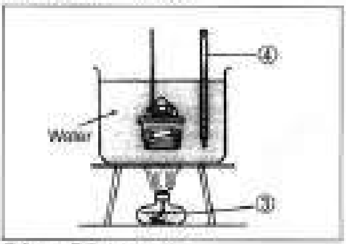
- Pass a string between flange, as shown in the illustration.
- Immerse the thermostat in the water contained in a beaker, as shown in the illustration. Note that the immersed thermostat is in suspension. Heat the water by placing the beaker on a stove and observe the rising temperature on a thermometer.



① Thermostat ② String

- Read the thermometer just when opening the thermostat. This reading, which is the temperature level at which the thermostat valve begins to open, should be within the standard value.

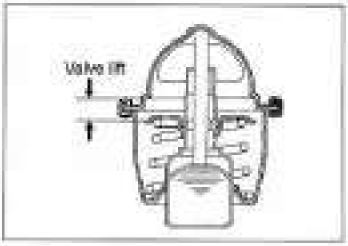
DATA **Thermostat valve opening temperature**
Standard: Approx. 82°C (179.6°F)



③ Stove ④ Thermometer

- 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 8.0 mm (0.31 in).

DATA **Thermostat valve lift**
Standard: Over 8.0 mm at 95°C (Over 0.31 in 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.

NOTE:
The jiggle valve Ⓐ of the thermostat faces upside.

- Install the thermostat case.

NOTE:
Fit the clamp to the thermostat case bolt Ⓐ.

- Tighten the thermostat case bolt to the specified torque.

Thermostat case bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

- Install the throttle body. (☞ 4-65)
- Install the air cleaner box.
- Install the fuel tank. (☞ 4-51)
- Install the front and rear seat. (☞ 6-11)
- Pour engine coolant. (☞ 2-19)
- Install the under cowling. (☞ 6-8)

WATER PUMP

REMOVAL AND DISASSEMBLY

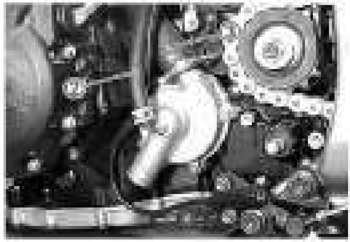
- Remove the under cowling. (☞ 6-8)
- Drain engine coolant. (☞ 2-19)
- Drain engine oil. (☞ 2-13)

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. (☞ 5-14)

- Remove the reserve tank ①.

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

- Disconnect the water hoses ②, ③.



- Remove the water pump.

- Remove the water pump cover.

- Remove the impeller securing bolt by holding the impeller shaft with a water pump pliers.

* Remove the mechanical seal ring ① and the rubber seal ② from the impeller.

* Remove the impeller shaft ③.

* Remove the bearing using the special tool.

09921-20220: Bearing remover set

NOTE:
If no abnormal noise, bearing removal is not necessary.

▲ CAUTION

The removed bearing must be replaced with a new one.

* Remove the mechanical seal using the special tool.

09921-20220: Bearing remover set

NOTE:
If no abnormal, the mechanical seal removal is not necessary.

▲ CAUTION

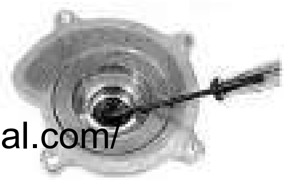
The removed mechanical seal must be replaced with a new one.

* Remove the oil seal using a suitable bar.

NOTE:
If no abnormal, the oil seal removal is not necessary.

▲ CAUTION

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



INSPECTION

BEARING

- Inspect the play of the bearing by hand while it is in the water pump case.
- Rotate the inner race by hand to inspect for abnormal noise and smooth rotation.
- Replace the bearing if there is anything unusual.

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

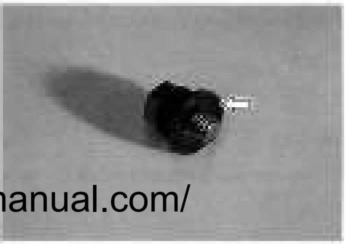
- Visually inspect the oil seal for damage, with particular attention given to the lip.
- Replace the oil seal that shows indications of leakage.

BUSHING

- Visually inspect the bushing for damage.
- 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 using the special tool.

09913-70210: Bearing installer set

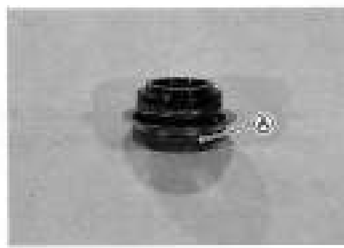
NOTE:
The stamped mark on the oil seal faces outside.

* Apply a small quantity of the SUZUKI SUPER GREASE "A" to the oil seal lip.

99000-25030: SUZUKI SUPER GREASE "A"

* Install the new mechanical seal using a suitable size socket wrench.

NOTE:
The new mechanical seal has been applied the sealer Ⓐ.



* Install the new bearing using the special tool.

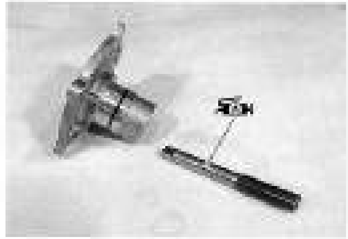
09913-70210: Bearing installer set

NOTE:
The stamped mark on the bearing faces crankcase side.

* Apply grease to the impeller shaft.

99000-25030: SUZUKI SUPER GREASE "A"

* Install the impeller shaft to the water pump body.



* 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 marked side Ⓐ of the mechanical seal ring faces the impeller.

* Install the seal washer and the washer onto the impeller securing bolt ②.

NOTE:
The metal side Ⓑ of the seal washer and the convex side Ⓒ of the washer face the impeller securing bolt head.

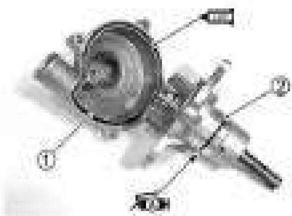
* Install the impeller ③ and its securing bolt ② onto the shaft.
* Tighten the impeller securing bolt ② to the specified torque.

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 "1342" to it.

99000-32050: THREAD LOCK "1342"

- Install the new O-rings, ① and ②.



▲ CAUTION

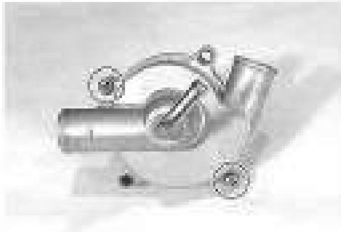
Use the new O-rings to prevent engine coolant leakage.

NOTE:
* *Apply engine coolant to the O-ring ①.*
* *Apply grease to the O-ring ②.*

99000-25030: SUZUKI SUPER GREASE "A"

- Tighten the water pump cover screws to the specified torque.

Water pump cover screw: 6 N·m (0.6 kgf-m, 4.5 lb-ft)

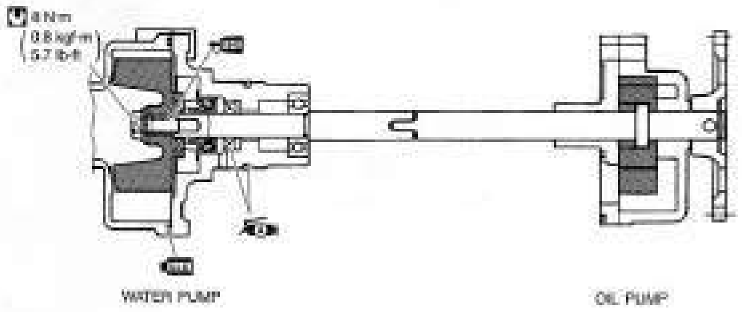


- Install the water pump and tighten its mounting bolt to the specified torque.

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

NOTE:
Set the water pump shaft end Ⓐ to the oil pump shaft as shown in the following illustration. (☞ 5-18)

- Connect the water hoses. (☞ 8-25)
- Install the engine sprocket cover.
- Install the reserve tank. (☞ 8-25)
- Pour engine coolant. (☞ 2-19)
- Pour engine oi[illegible]
- Install the right cowling. (☞ 6-8)



LUBRICATION SYSTEM

OIL PRESSURE
2-32

OIL FILTER
2-13

OIL PRESSURE REGULATOR
3-71

OIL STRAINER
3-71

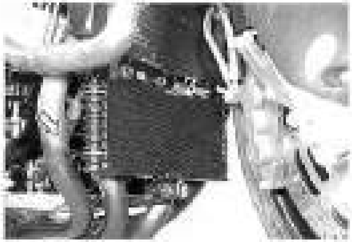
OIL JET
3-64

OIL PUMP
3-67

OIL PRESSURE SWITCH
7-39

OIL COOLER

OIL COOLER HOSE INSPECTION

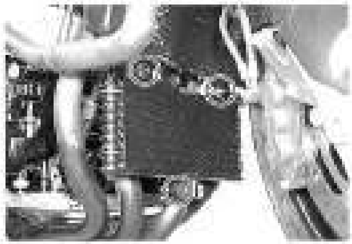


- Remove the under cowling. (☞ 6-8)
- Inspect the oil cooler hoses for any damage and oil leakage.
- If any defects are found, replace the oil cooler hose with new ones.

OIL COOLER INSPECTION AND CLEANING

- Remove the under cowling. (☞ 6-8)
- Remove the oil cooler guard.
- Remove the road dirt or trash struck to the oil fins with a compressed air.
- Inspect the oil cooler for oil leakage.
- If any defects are found, replace the oil cooler with a new one.
- If the fins bent down or dented, repair by straightening them with the blade of a small screwdriver.

REMOVAL



- Remove the under cowling. (☞ 6-8)
- Drain engine oil. (☞ 2-13)
- Disconnect the oil cooler hoses.
- Remove the oil cooler.

INSTALLATION

- Install the oil cooler.
- Connect the oil cooler hoses.

NOTE:
Before connecting the oil cooler hoses install the O-rings and apply grease to them.

99000-25030: SUZUKI SUPER GREASE "A"

⚠ CAUTION

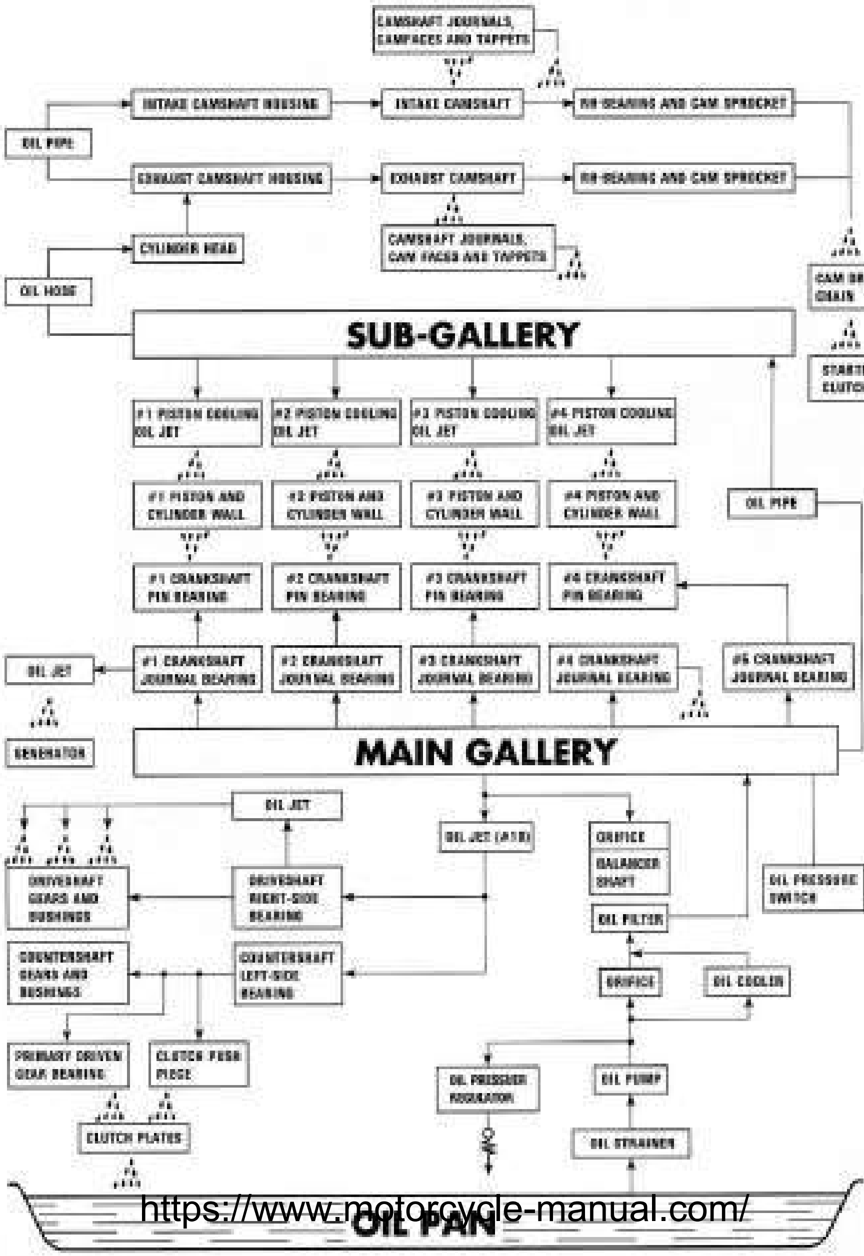
Use the new O-rings to prevent the oil leakage.

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

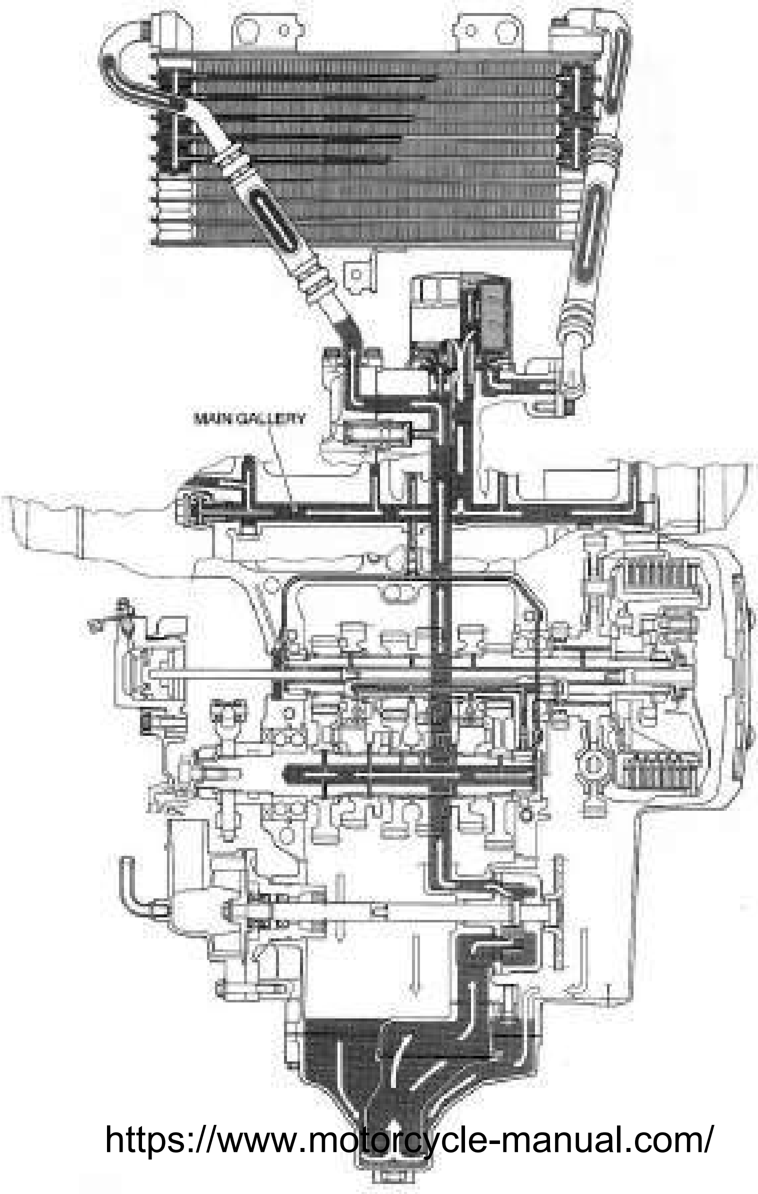
Oil cooler hose bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

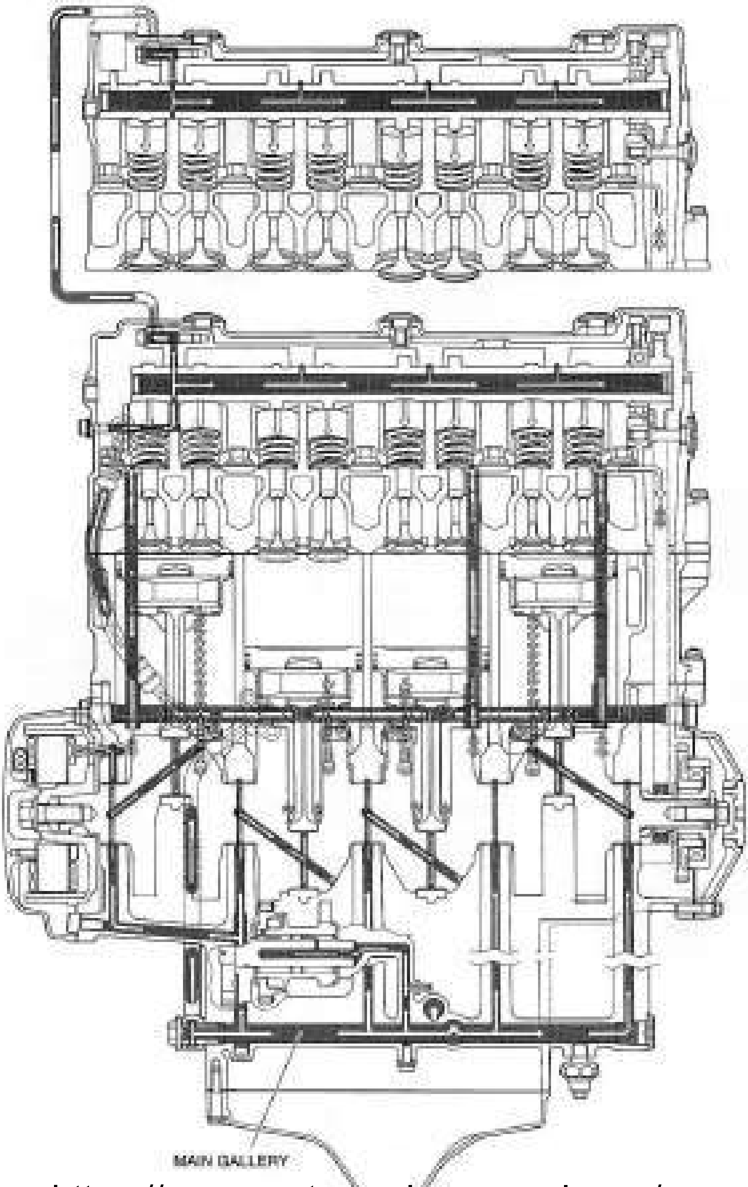
- Pour engine oil. (☞ 2-13)
- Install the under cowling. (☞ 6-8)

ENGINE LUBRICATION SYSTEM CHART



ENGINE LUBRICATION SYSTEM




MAIN GALLERY

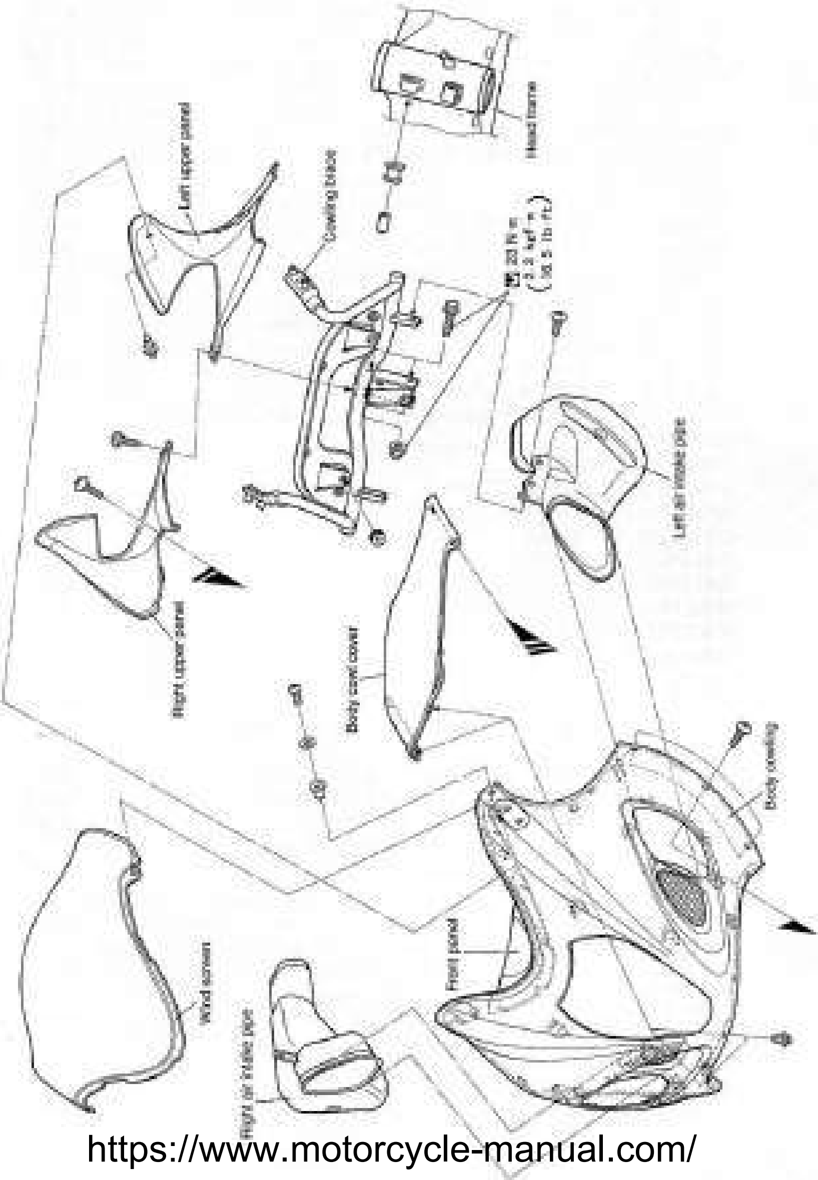
CHASSIS

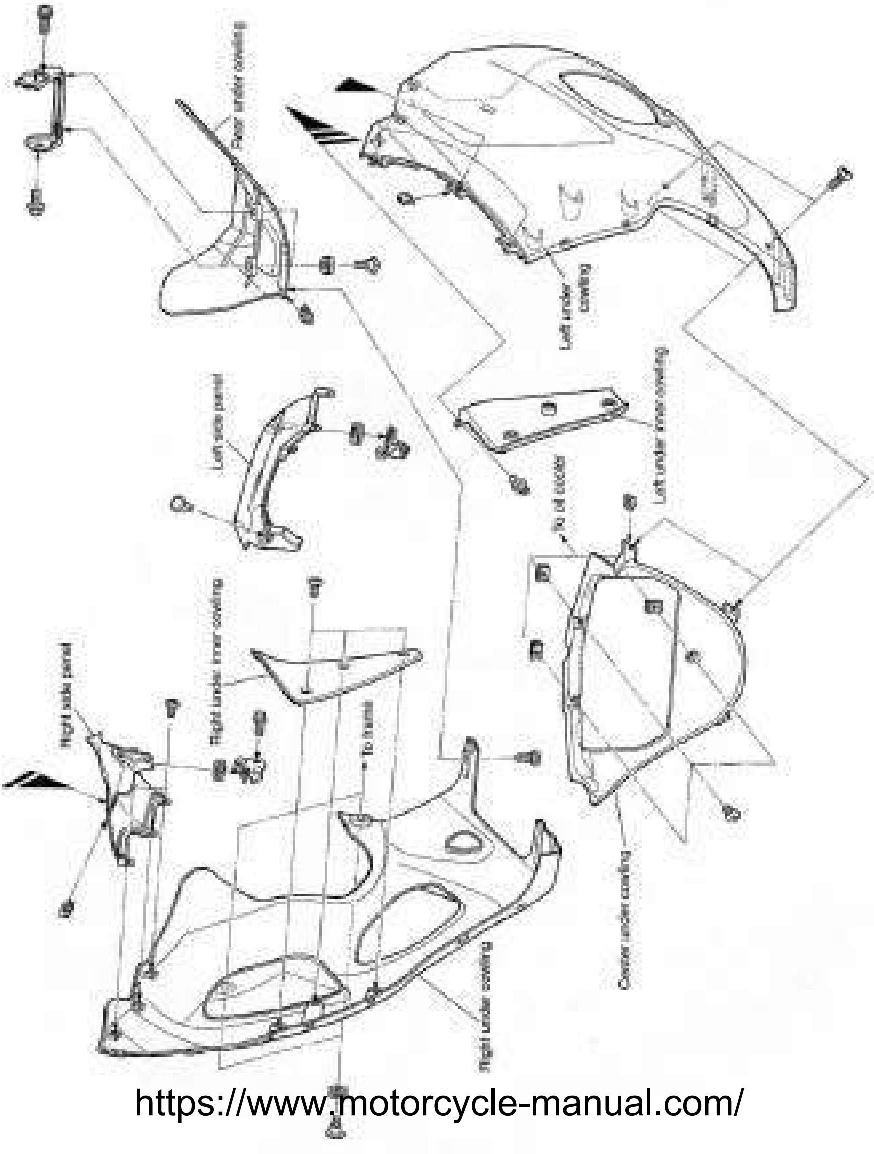
CONTENTS

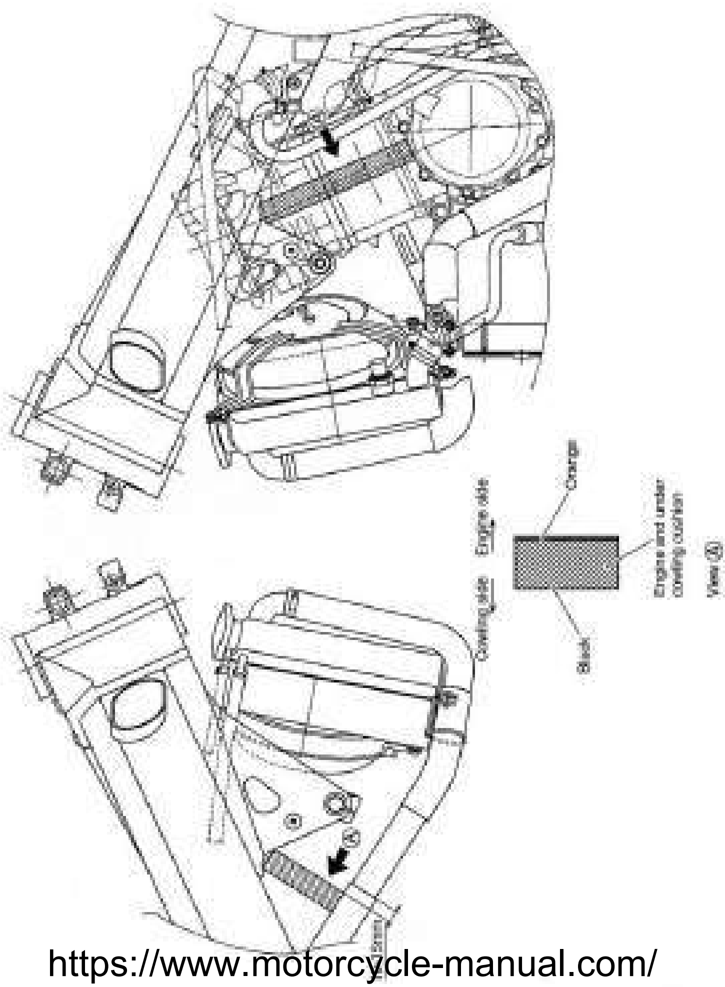
6

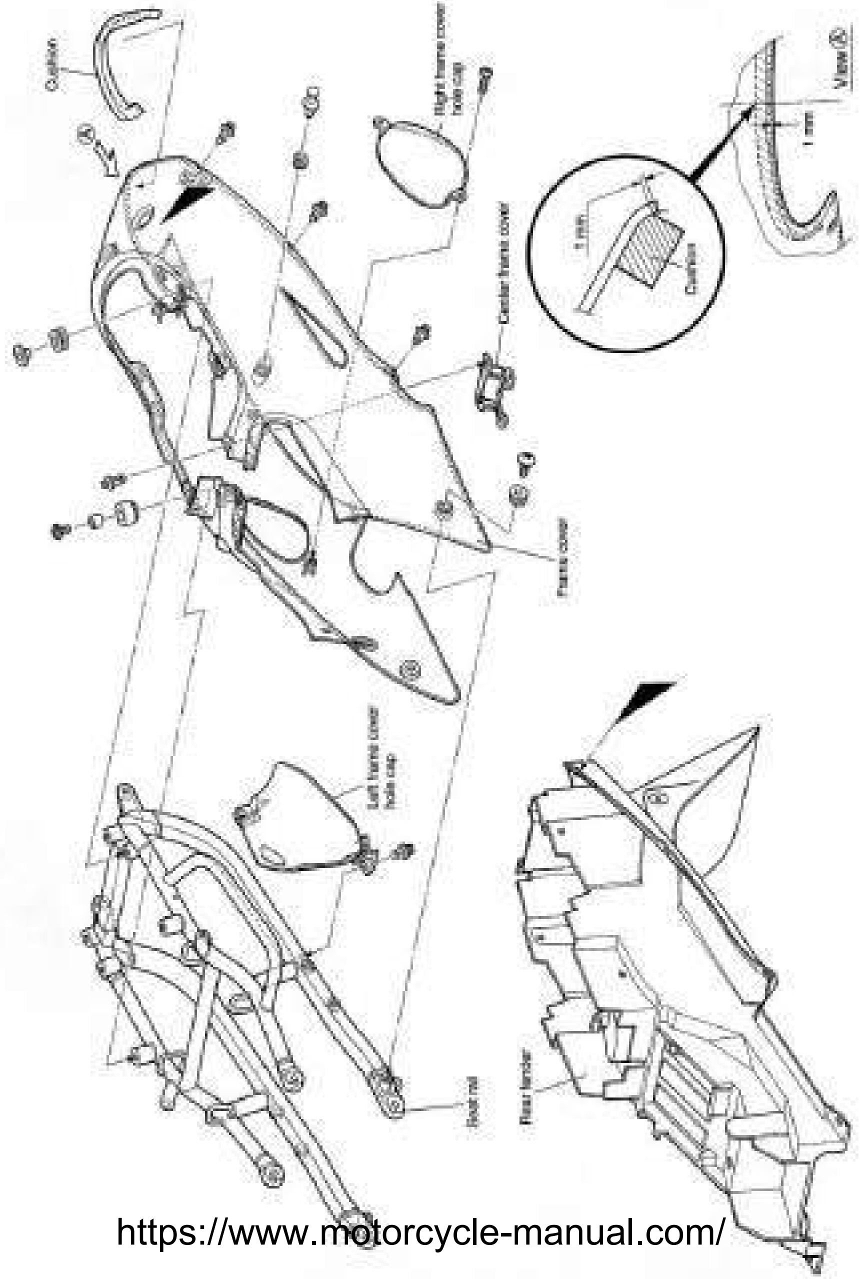
EXTERIOR PARTS

CONSTRUCTION




Left under cowling
Left side panel
Left under inner cowling
Right side panel
Right under inner cowling
To frame
Right under cowling
Center under cowling


Engine side
Cowling side
Orange
Black
Engine and under cowling cushion
View (A)

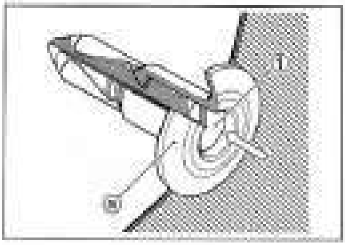

Cushion
Right frame cover hole cap
Center frame cover
Frame cover
5 mm
Cushion
1 mm
View Ⓐ
Left frame cover hole cap
Seat rail
Rear fender

FASTENER REMOVAL AND REINSTALLATION

FASTENER ⓐ

REMOVAL

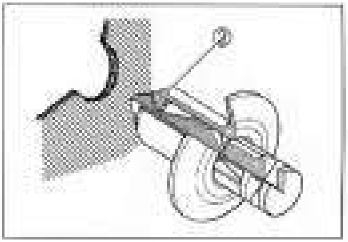
- Depress the head of fasteners center piece ①.
- Pull out the fastener.



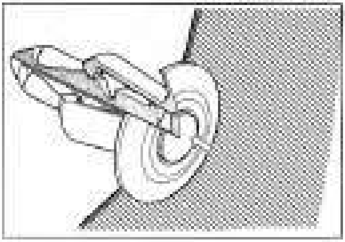
INSTALLATION

- Let the center piece stick out toward the head so that the pawls ② close.
- Insert the fastener into the installation hole.

NOTE:
To prevent the pawl ② from damage, insert the fastener all the way into the installation hole.



- Push in the head of center piece until it becomes flush with the fastener outside face.



FASTENER ⓑ

REMOVAL

- Pull the head of fastener center piece.
- Pull out the fastener.

INSTALLATION

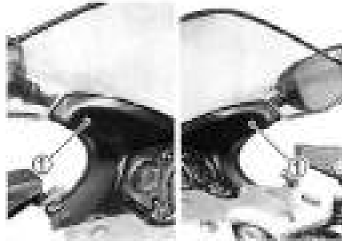
- Let the center piece stick out toward the head so that the pawls close.
- Insert the fastener into the installation hole.
- Push in the head of center piece.

SCREEN

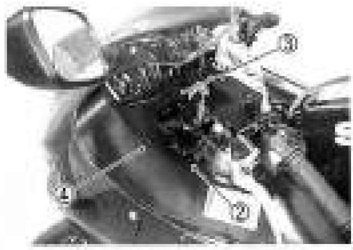
- With the bolts ① loosened, take out the bolts and nuts, and remove the screen.

RIGHT AND LEFT UPPER PANELS

- Remove the fastener ①.



- Remove the bolts ②, ③.
- Remove the left upper panel ④.



- Remove the bolt ⑤.
- Remove the right upper panel ⑥.

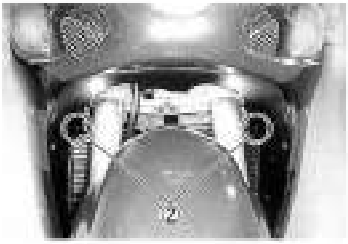
REAR UNDER COWLING

- Remove the bolts ① and remove the rear under cowling.

RIGHT AND LEFT UNDER COWLINGS

- Remove the right and left upper panels and rear under cowling. (☞ 6-7)
- Remove the fastener ①.

- Remove the fastener ②.



- Remove all the bolts.
- With the hook Ⓐ removed, remove the right under cowling.

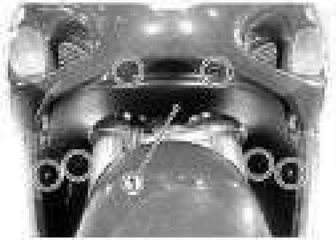
- With the hook Ⓐ removed, remove the left under cowling.

CENTER UNDER COWLING

- Remove the right and left under cowlings.(See above.)
- With the bolts removed, remove the center cowling.

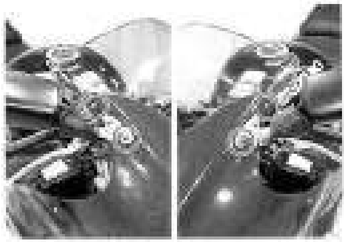
BODY COWLING COVER

- With all the fasteners removed, remove the body cowling cover ①.

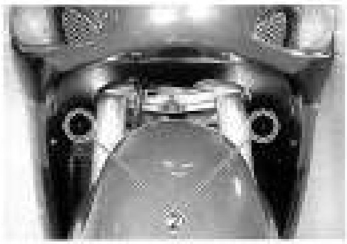


BODY COWLING

- Remove the right and left upper panels.(☞ 6-7)
- Remove the rear view mirrors, right and left, by removing the bolts.



- Remove the fastener ②.

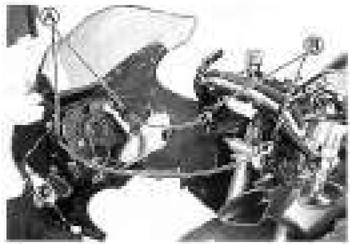


- Remove all the bolts.

* Disconnect the lead wire coupler ①, and remove the body cowling.

REMOUNTING

NOTE:
When remounting the body cowling, install the hooks Ⓐ to the cowling brace holes Ⓑ.



RIGHT AND LEFT AIR INTAKE PIPES

* Remove the body cowling.
* Remove the screw, and remove the right air intake pipe ①.

* Remove the turn signal relay bracket and screw, and remove the left air intake pipe ②.

COWLING BRACE

REMOVAL

- Remove the body cowling. (☞ 6-9)
- Remove the speedometer. (☞ 7-31)
- Remove the cowling brace bolts and nut, and remove the cowling brace.

REMOUNTING

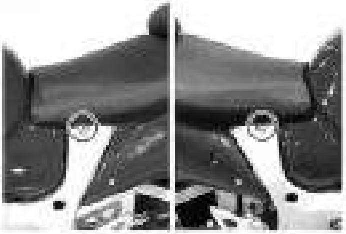
- Tighten the cowling brace bolts and nut.

Cowling brace bolt and nut : 23 N·m (2.3 kgf-m, 16.5 lb-ft)

- Clamp the wire harness and the brake hose. (☞ 8-19 – 28)

FRONT SEAT

- With the bolts removed, remove the front seat.



REAR SEAT AND SEAT TAIL COVER

- Remove the rear seat (seat tail cover) with the ignition key.

FRAME COVER

- Remove the seats. (☞ 6-11)
- Remove the pillion rider handle.

- Disconnect the seat lock cable.

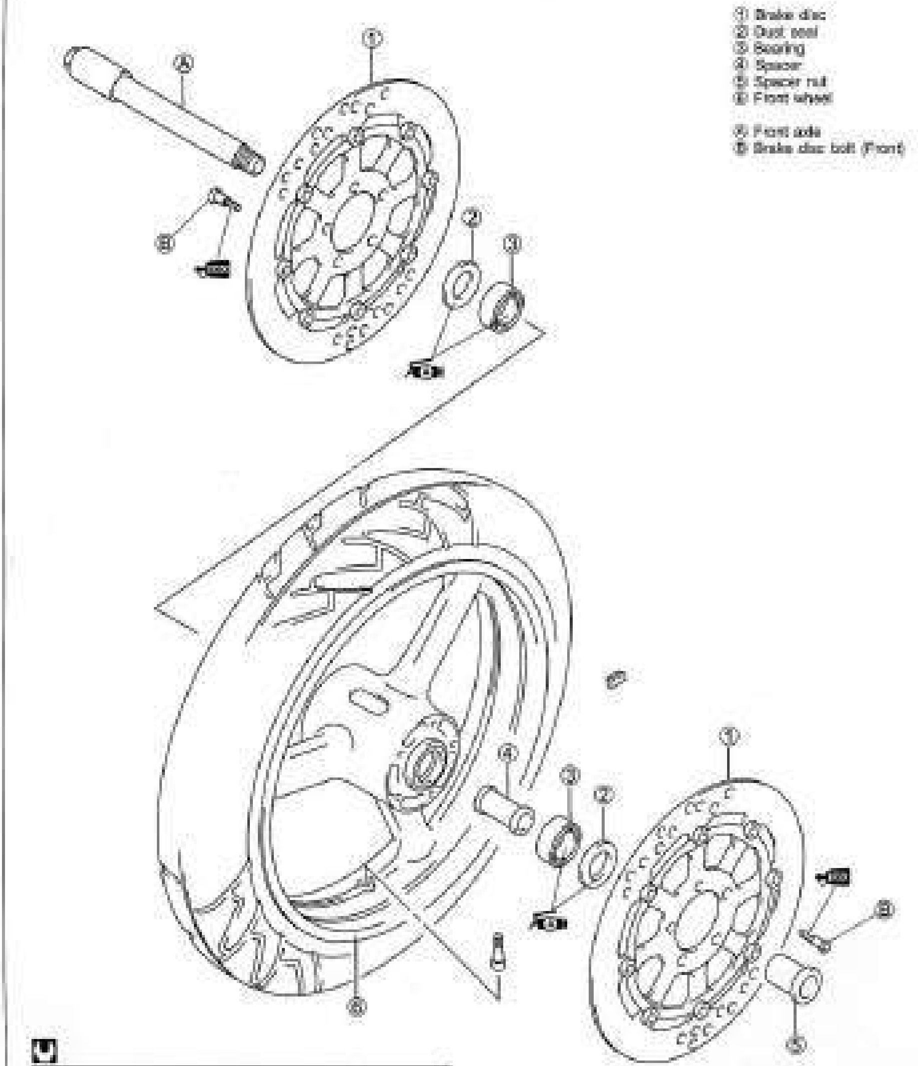
- Remove the screws and the fasteners.

- Remove the bolts and fasteners.

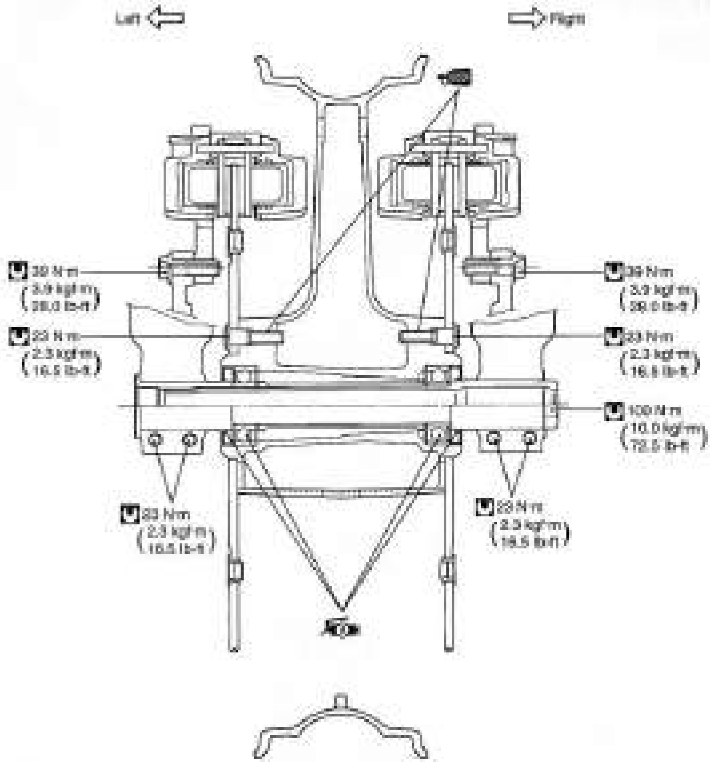
- Disconnect the rear combination light lead wire coupler.
- Remove the frame cover.

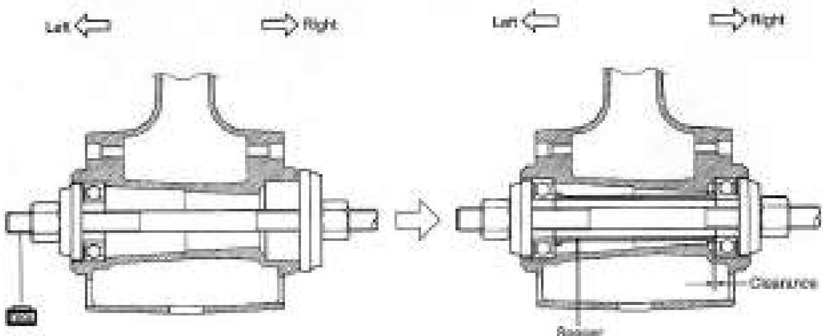
FRONT WHEEL

CONSTRUCTION



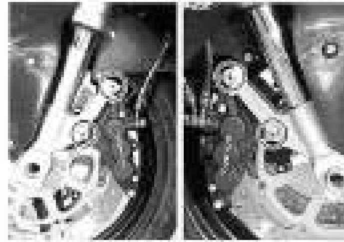
ITEM	N·m	kgf·m	lb-ft
Ⓐ	100	10.0	72.5
Ⓑ	[illegible]	[illegible]	[illegible]


Left
Right
39 N·m
(3.9 kgf·m
28.0 lb-ft)
23 N·m
(2.3 kgf·m
16.5 lb-ft)
39 N·m
(3.9 kgf·m
28.0 lb-ft)
23 N·m
(2.3 kgf·m
16.5 lb-ft)
100 N·m
(10.0 kgf·m
72.5 lb-ft)
23 N·m
(2.3 kgf·m
16.5 lb-ft)
23 N·m
(2.3 kgf·m
16.5 lb-ft)


Left
Right
Left
Right
Clearance
Spacer

REMOVAL

- Remove the brake calipers, left and right.



▲ CAUTION

Do not operate the brake lever while removing the calipers.

- Loosen two axle pinch bolts on the right front fork leg.
- Loosen the front axle.

- Raise the front wheel off the ground and support the motorcycle with a jack or a wooden block.

NOTE:
Remove the left and right under cowlings, if necessary. (☞ 6-6)

▲ 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 axle and the front wheel.

NOTE:
After removing the front wheel, fit the calipers temporarily to the original positions.

- Loosen two axle pinch bolts on the left front fork leg and remove the spacer nut ①.

INSPECTION AND DISASSEMBLY

TIRE INSPECTION: ☞ 6-81

- Remove the brake disc.

BRAKE DISC INSPECTION: ☞ 6-67

- Remove both side dust seals by using the oil seal remover.

09913-50121: Oil seal remover

⚠ CAUTION

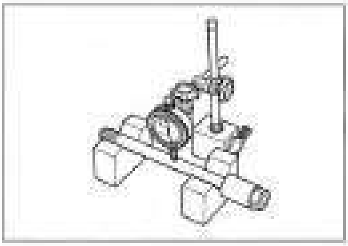
The removed dust seals must be replaced with new ones.

AXLE SHAFT

Using a dial gauge, check the axle shaft for runout and replace it if the runout exceeds the limit.

09900-20606: Dial gauge (1/100)
09900-20701: Magnetic stand
09900-21304: V-block set (100 mm)

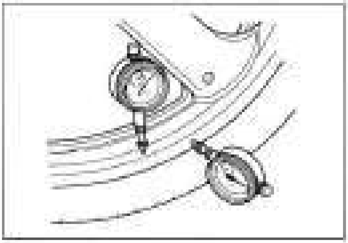
DATA Axle shaft runout: Service Limit: 0.25 mm (0.010 in)



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.

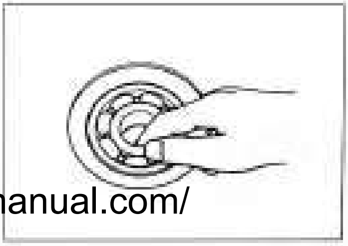
DATA Wheel runout: Service Limit (Axial and Radial): 2.0 mm (0.08 in)



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.

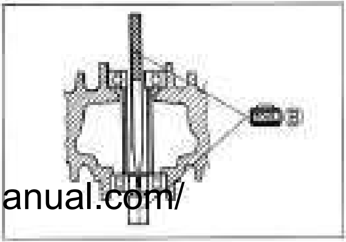


- Remove the wheel bearings by using the special tool Ⓐ or Ⓑ.

09921-20220: Ⓐ **Bearing remover set**
or 09944-60210: Ⓑ **Wheel bearing remover**

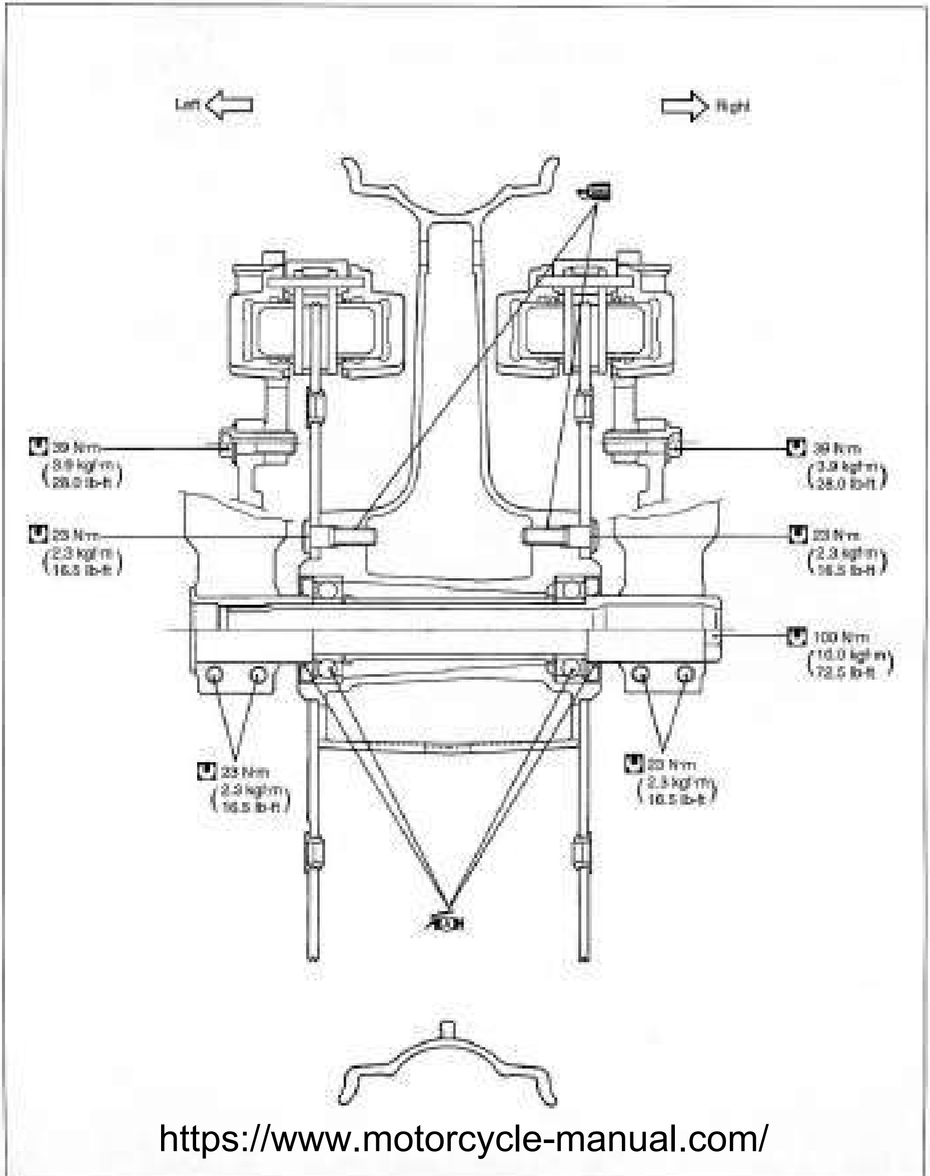
⚠ CAUTION

The removed bearings should be replaced with new ones.



REASSEMBLY AND REMOUNTING

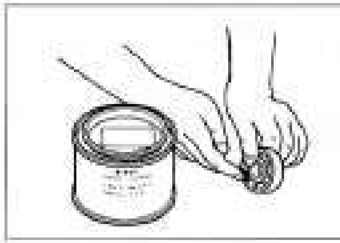
Reassemble and remount the front wheel in the reverse order of removal and disassembly. Pay attention to the following points:



WHEEL BEARING

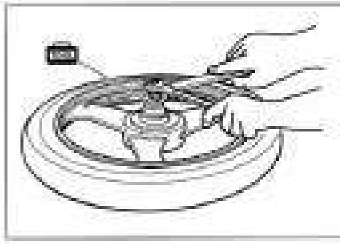
- Apply grease to the wheel bearings.

99000-25030: SUZUKI SUPER GREASE "A"



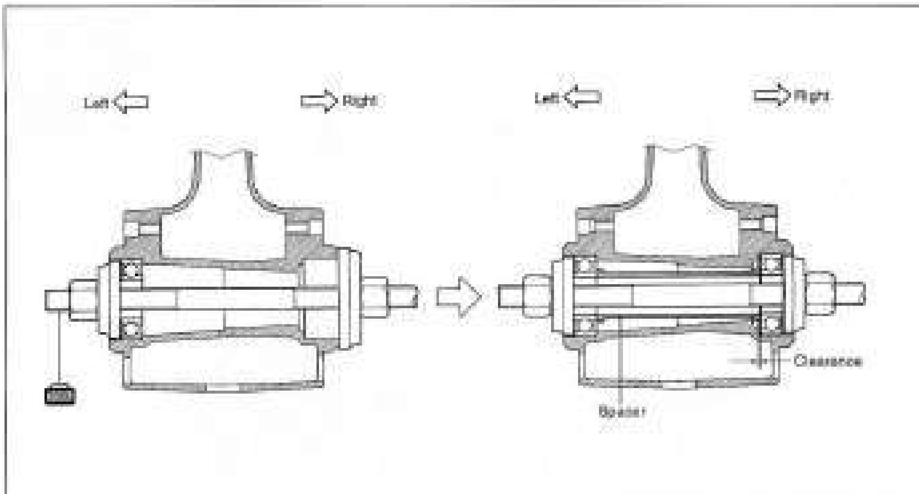
- Install the wheel bearings as follows by using the special tools.

09941-34513: Bearing/Steering race installer set



⚠ CAUTION

> **First install the left wheel bearing, then install the right wheel bearing.**
> **The sealed cover of the bearing must face outside.**



BRAKE DISC

Make sure that the brake disc is clean and free of any greasy matter.

- Apply THREAD LOCK SUPER "1360" to the disc mounting bolts and tighten them to the specified torque.

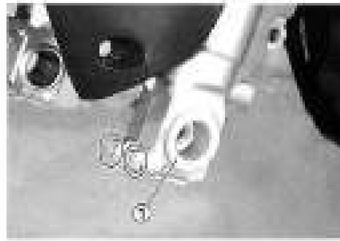
Brake disc bolt (Front): 23 N·m (2.3 kgf·m, 16.5 lb-ft)

99000-32130: THREAD LOCK SUPER "1360"

SPACER NUT

After touching the flange ① of spacer nut being contact with the left front fork leg, tighten the 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)

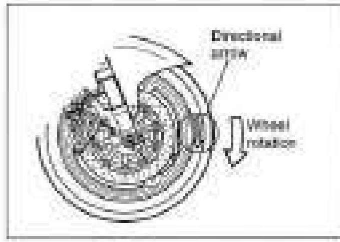


WHEEL

Install the front wheel with the front axle and hand-tighten the front axle temporarily.

⚠ WARNING

The directional arrow on the tire should point to the wheel rotation, when remounting the wheel.

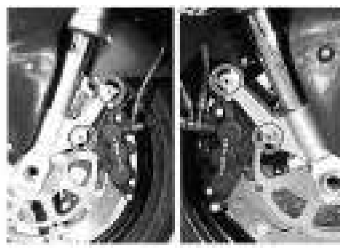


BRAKE CALIPER

- Tighten the brake caliper mounting bolts to the specified torque.

Front brake caliper mounting bolt: 39 N·m (3.9 kgf-m, 28.0 lb-ft)

NOTE:
Push the pistons all the way into the calper and remount the calipers.



FRONT AXLE

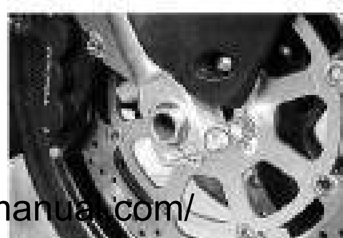
- Tighten the front axle to the specified torque.

Front axle: 100 N·m (10.0 kgf-m, 72.5 lb-ft)

NOTE:
Before tightening the two axle pinch bolts on the right front fork leg, move the front fork up and down 4 or 5 times.

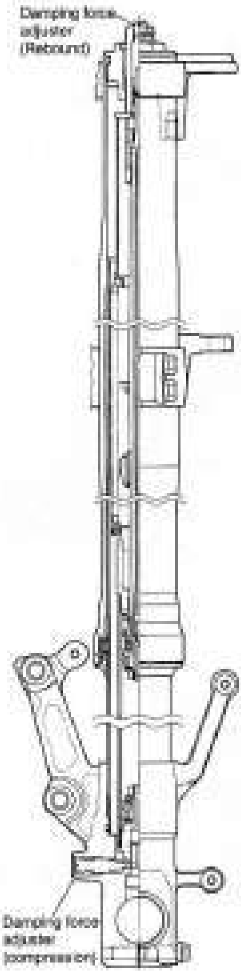
- Tighten two axle pinch bolts on the right front fork leg to the specified torque.

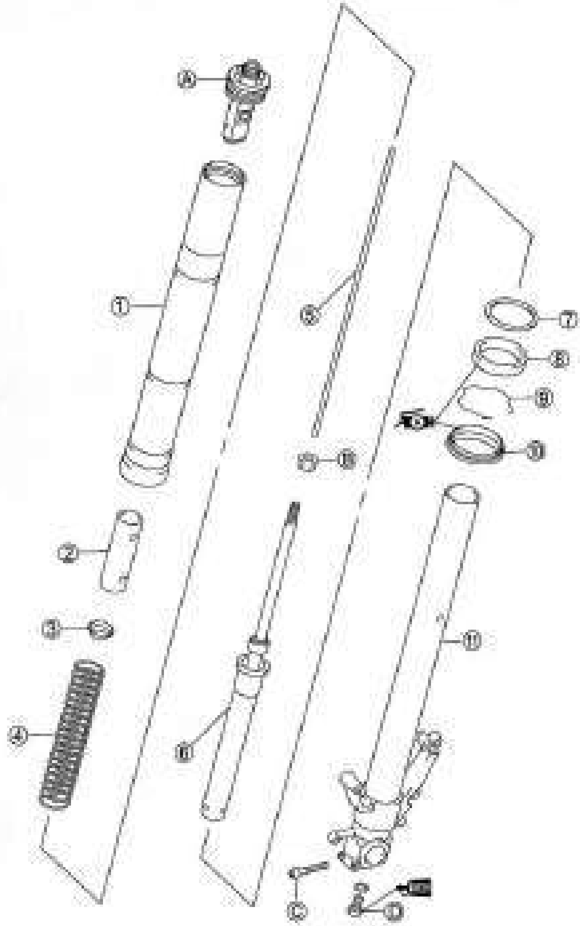
Front axle pinch bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)



FRONT FORK

CONSTRUCTION





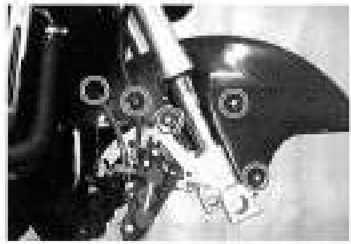
① Outer tube
② Spacer
③ Spring retainer
④ Spring
⑤ Adjuster rod
⑥ Inner rod/damper rod (cartridge)
⑦ Oil seal retainer
⑧ Oil seal
⑨ Oil seal stopper ring
⑩ Dust seal
⑪ Inner tube

Ⓐ Front fork cap bolt
Ⓑ Front fork inner rod lock nut
Ⓒ [illegible]
Ⓓ Damper rod bolt

ITEM	N·m	kgf·m	lb-ft
Ⓐ	23	2.3	16.5
Ⓑ	29	2.9	20.8
Ⓒ	23	2.3	16.5
Ⓓ	[illegible]	4.0	29.0

REMOVAL AND DISASSEMBLY

- Remove the body cowling. (☞ 6-9)
- Remove the front wheel. (☞ 6-13)
- Disconnect the brake hose from the brake hose guides at the front fender.
- Remove the front fender.



- Loosen the front fork upper clamp bolts, left and right.

NOTE:
Slightly loosen the front fork cap bolts before loosening the lower clamp bolts to facilitate later disassembly.

- Loosen the front fork lower clamp bolts, left and right.
- Remove the front forks, left and right.

- Loosen the front fork cap bolt.

NOTE:
Align the holes Ⓐ of the spacer with the cutaway Ⓑ of the fork cap bolt before installing the special tool.

- Install the special tool to the holes Ⓐ.

09940-94930: Front fork spacer holder

- Compress the fork spring with the special tool ① and insert the special tool ② under the lock nut ③.

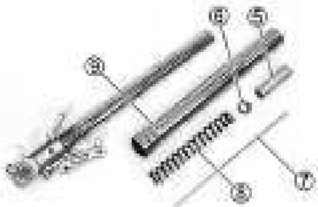
09940-94922: Stopper plate ②

- Remove the front fork cap bolt ④ from the inner rod by loosening the lock nut ③.
- Compress the fork spring with the special tool ① and remove the special tool ②.

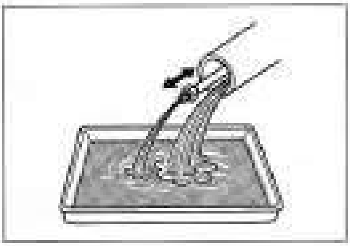
▲ CAUTION

Do not disassemble the front fork cap ④.

- Remove spacer ⑤, spring retainer ⑥, adjuster rod ⑦ and spring ⑧.
- Remove the outer tube ⑨ from the inner tube.

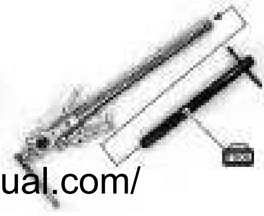


- Invert the front fork and stroke the inner rod several times to let out fork oil.
- Under the inverted condition of front fork, drain oil to hold it for a few time.



- Remove the damper rod bolt with the special tool and a 10 mm hexagon wrench.

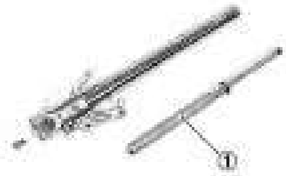
09940-30221: Front fork assembling tool



- Remove the inner rod/damper rod (cartridge) ①.

▲ CAUTION

Do not disassemble the inner rod/damper rod (cartridge).



- Remove the dust seal ② and the oil seal stopper ring ③.

- Remove the oil seal ④ by using the special tool.

09913-50121: Oil seal remover

▲ CAUTION

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

INSPECTION

INNER AND OUTER TUBES

Inspect the inner tube outer surface and outer tube metal Ⓐ face for scratches.
If any defects are found, replace them with a new one.

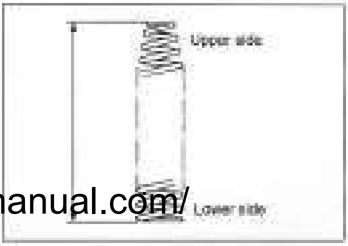
▲ CAUTION

Don't remove the outer tube metal Ⓐ.

FORK SPRING

Measure the fork spring free length.
If it is shorter than the service limit, replace it with a new one.

DATA Front fork spring free length:
Service Limit: 240 mm (9.4 in)



INNER ROD/DAMPER ROD

Move the inner rod by hand to examine it for smoothness.
If any abnormal points are found, replace the inner rod/damper rod with a new one.

REASSEMBLY AND REMOUNTING

Reassemble and remount the front fork in the reverse order of removal and disassembly. Pay attention to the following points:

DAMPER ROD BOLT

- Insert the inner rod/damper rod (cartridge) into the inner tube.
- Install the gasket ① to the damper rod bolt, and apply THREAD LOCK "1342" to the damper rod bolt and tighten it to the specified torque with the special tool and a 10 mm hexagon wrench.

99000-32050: THREAD LOCK "1342"

09940-30221: Front fork assembling tool

Damper rod bolt: 40 N·m (4.0 kgf-m, 29.0 lb-ft)

⚠ CAUTION

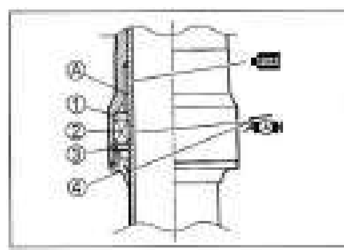
Use a new gasket to prevent oil leakage.

OIL SEAL AND DUST SEAL

- Apply grease to the new oil seal and dust seal lips lightly before installing it.

99000-25030: SUZUKI SUPER GREASE "A"

- Install the oil seal retainer ①, oil seal ②, oil seal stopper ring ③ and dust seal ④ to the outer tube.



⚠ CAUTION

- **When installing the oil seal to outer tube, be careful not to damage the oil seal lip.**
- **Do not use solvents for washing to prevent oil seal damage.**
- **Apply fork oil to the Anti-friction metals Ⓐ.**
- **Make sure that the oil seal stopper ring ③ has been fitted securely.**

OUTER TUBE

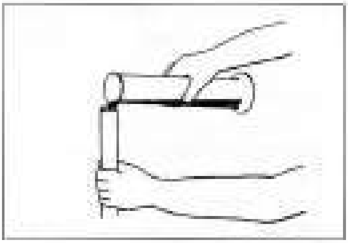
- Install the outer tube to the inner tube.

⚠ CAUTION

Be careful not to damage the dust seal lip and the oil seal lip, when installing the outer tube.

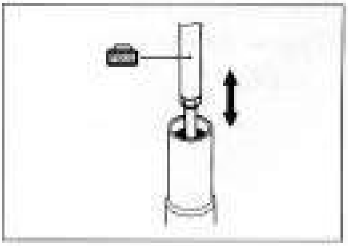
FORK OIL

- Place the front fork vertically without spring.
- Compress it fully.
- Pour specified front fork oil up to the top level of the outer tube.
- Move the inner rod slowly with the special tool more than ten times until bubbles do not come out from the oil.



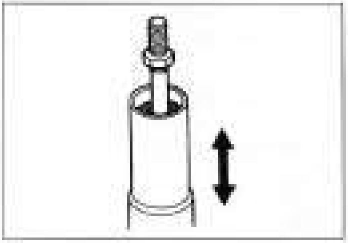
09940-50120: Inner rod holder

NOTE:
Refill front fork oil up to the top of the outer tube to find bubbles while bleeding air.



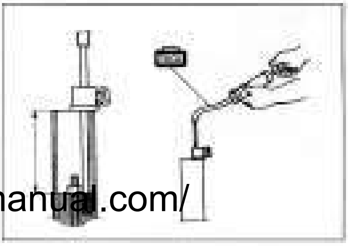
- Refill specified front fork oil up to the top level of the outer tube again. Move the outer tube up and down several strokes until bubbles do not come out from the oil.
- Keep the front fork vertically and wait 5 – 6 minutes.

NOTE:
* *Always keep oil level over the cartridge top end, or air may enter the cartridge during this procedure.*
* *Take extreme attention 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, remove the fork spring and compress the outer tube fully.



09943-74111: Front fork oil level gauge

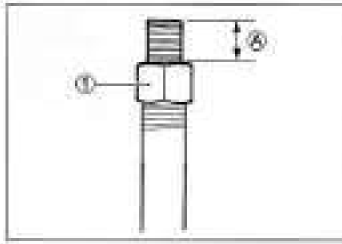
DATA Fork oil level: 98 mm (3.9 in)

99000-99044-L01: SUZUKI FORK OIL L01

DATA Capacity (each leg): 480 ml (16.2/16.9 US/Imp oz)

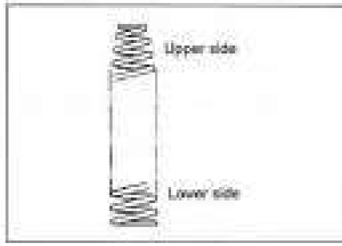
FRONT FORK INNER ROD LOCK NUT

- Adjust the height Ⓐ of the inner rod threads by turning the lock nut ① at 11 mm (0.43 in) as shown in illustration.



FORK SPRING

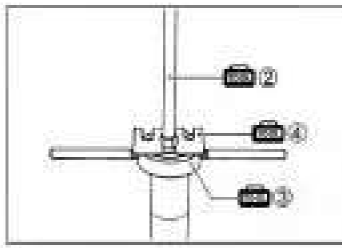
- Install the fork spring as shown in the illustration.
- Install the adjuster rod, the spring retainer and the spacer.



FRONT FORK CAP BOLT

- Pull up the inner rod with the special tool ②.
- Compress the spring with the special tool ③ and then insert the special tool ④ under the lock nut.

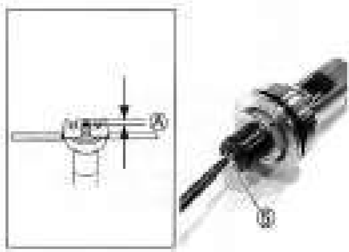
09940-60120: Inner rod holder ②
09940-94930: Front fork spacer holder ③
09940-94922: Stopper plate ④



- Make sure that the height Ⓐ of the inner rod threads after removing the special tool ②.

Ⓐ: 11 mm (0.43 in)

- Slowly turn the cap bolt complete by hand until the end of the cap bolt seats on the lock nut is as follows.



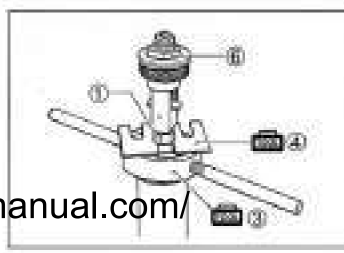
▲ CAUTION

Be sure to adjust the rebound damping force adjuster ⑤ to the softest position before installing the cap bolt.

- Hold the cap bolt ⑥ and tighten the lock nut ① to the specified torque.

Inner rod lock nut: 29 N·m (2.9 kgf·m, 20.8 lb-ft)

- Remove the special tools.

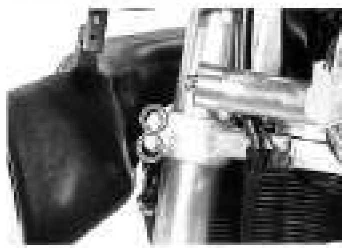


- Install the front fork cap bolt to the outer tube temporarily.
- Set the front fork to the lower bracket temporarily, tighten the front fork cap bolt ① to the specified torque.

Front fork cap bolt ①: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

- With the front fork upper face contacted with the handlebar holder, tighten the front fork upper and lower clamp bolts to the specified torque.

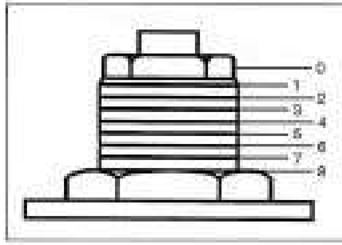
Front fork upper clamp bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Front fork lower clamp bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)



- Install the left front fork in the same manner as the right one.
- Install the front fender and tighten its mounting bolts with finger.
- Install the front wheel. (☞ 6-18)
- Install the brake calipers. (☞ 6-66)
- Swing the motorcycle up and down several times.
- Tighten the front fender mounting bolts.
- Install the brake hose securely.

SUSPENSION SETTING

After installing the front fork, adjust the spring pre-load and damping force as follows.



SPRING PRE-LOAD ADJUSTMENT

There are eight grooved lines on the side of the spring adjuster. Position 0 provides the maximum spring pre-load and position 8 provides the minimum spring pre-load.
(STD position: 5th groove line)

DAMPING FORCE ADJUSTMENT

(Rebound side)

Fully turn the damping force adjuster clockwise. It is at stiffest position and turn it out to standard setting position.
(STD position: 3 clicks out from stiffest position)


Rebound side

(Compression side)

Fully turn the damping force adjuster clockwise. It is at stiffest position and turn it out to standard setting position.
(STD position: 9 clicks out from stiffest position)


Compression side

STANDARD FRONT SUSPENSION SETTING

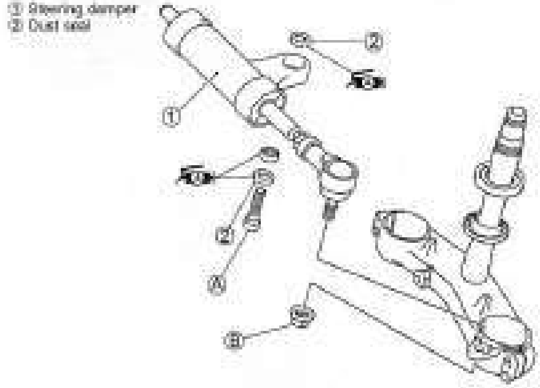
		Spring pre-load adjuster	Damping force adjuster	
			Rebound	Compression
Solo riding	Softer	5	4 clicks out	11 clicks out
	Standard	5	3 clicks out	9 clicks out
	Stiffer	6	3 clicks out	9 clicks out
Dual riding		5	3 clicks out	9 clicks out

⚠ WARNING

Be sure to adjust the spring pre-load and damping force on both front fork legs equally.

STEERING DAMPER

CONSTRUCTION



ITEM	N·m	kgf·m	lb-ft
Ⓐ	23	2.3	16.5
Ⓑ	23	2.3	16.5

REMOVAL

- Remove the body cowling cover. (☞ 6-9)
- With the nut Ⓐ held immovable, remove the nut ①.
- With the bolt ② removed, 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.

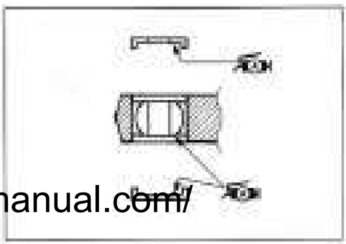
REMOUNTING

- Install the steering damper and tighten the bolt and nut.

Steering damper bolt and nut: 23 N·m
(2.3 kgf·m, 16.5 lb-ft)

- Apply grease to the bearings and dust seals.

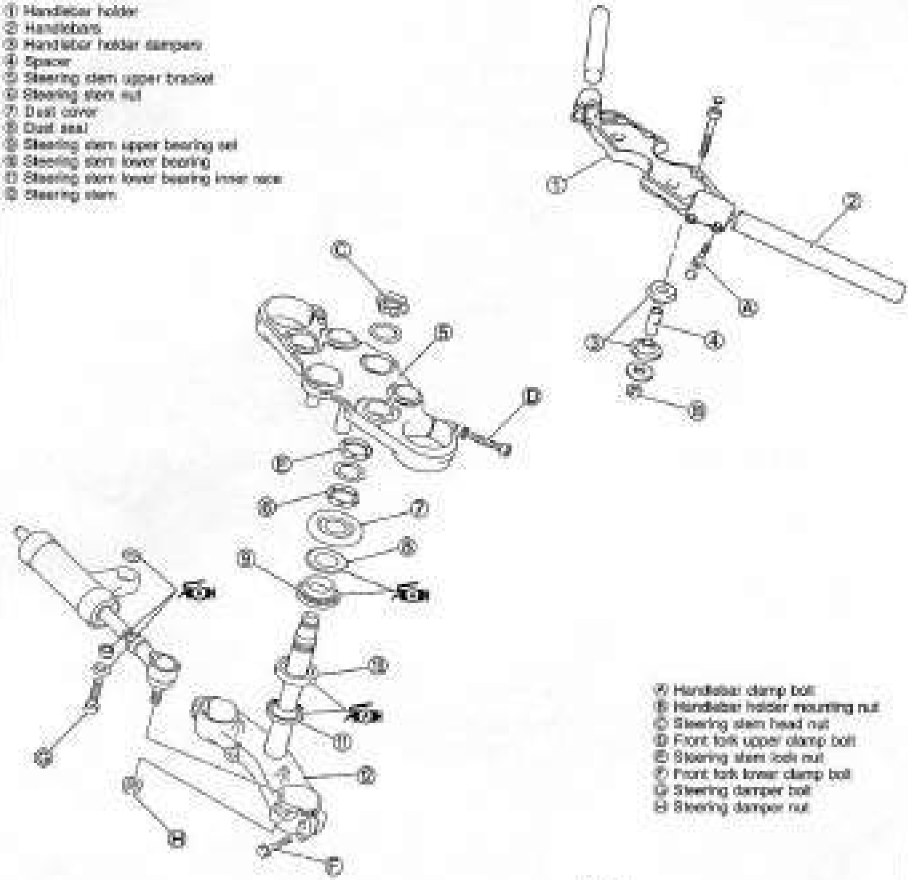
99000-25030: SUZUKI SUPER GREASE "A"



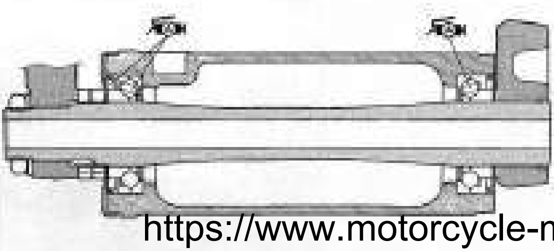
STEERING

CONSTRUCTION

① Handlebar holder
② Handlebars
③ Handlebar holder dampers
④ Spacer
⑤ Steering stem upper bracket
⑥ Steering stem nut
⑦ Dust cover
⑧ Dust seal
⑨ Steering stem upper bearing set
⑩ Steering stem lower bearing
⑪ Steering stem lower bearing inner race
⑫ Steering stem



Ⓐ Handlebar clamp bolt
Ⓑ Handlebar holder mounting nut
Ⓒ Steering stem head nut
Ⓓ Front fork upper clamp bolt
Ⓔ Steering stem lock nut
Ⓕ Front fork lower clamp bolt
Ⓖ Steering damper bolt
Ⓗ Steering damper nut



ITEM	N·m	kgf-m	lb-ft
Ⓐ	10	1.0	7.0
Ⓑ	35	3.5	25.5
Ⓒ	90	9.0	65.0
Ⓓ	23	2.3	16.5
Ⓔ	80	8.0	58.0
Ⓕ	23	2.3	16.5
Ⓖ	23	2.3	16.5
Ⓗ	23	2.3	16.5

REMOVAL AND DISASSEMBLY

* Remove the body cowling. (☞ 6-9)
* Remove the front wheel. (☞ 6-13)
* Remove the front forks. (☞ 6-21)
* Remove the steering damper. (☞ 6-30)
* Remove the right and left handlebar. (☞ 6-38)

NOTE:
Place a rag under the handlebar to prevent the other parts from scratch.

* Remove the wire harnesses from the clamp/guide.

* Disconnect the ignition switch lead wire coupler ①.

* Remove the steering stem upper bracket along with the ignition switch and handlebar bracket by removing the head nut.

* Remove the brake hose clamp/guide ②.

* Remove the steering stem lock nut, washer and steering stem nut with the special tools.

09940-14911: Steering stem nut wrench
09940-14960: Steering stem nut wrench socket

* Draw out the steering stem lower bracket.

NOTE:
Hold the steering stem lower bracket by hand to prevent it from falling.

* Remove the dust cover ①, the dust seal ②, upper bearing inner race ③ and the bearing ④.

* Remove the ignition switch with the special tool.

09930-11920: Torx bit JT40H
09930-11940: Bit holder

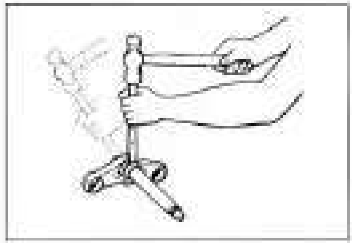
* With the nut removed, separate the handlebar bracket from the upper bracket.

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

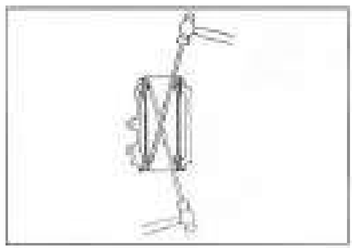
If any abnormal points are found, replace defective parts with the new ones.



- Remove the steering stem lower bearing inner race with a chisel.

⚠ CAUTION

The removed bearing inner race must be replaced with a new one.

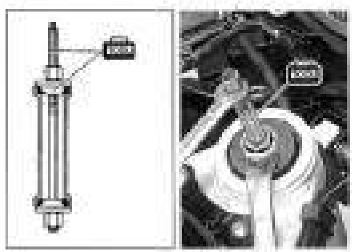


- Drive out the steering stem bearing outer races, upper and lower, using a suitable wedge bar.

⚠ CAUTION

The removed bearing outer race must be replaced with a new one.

REASSEMBLY AND REMOUNTING



Reassemble and remount the steering stem in the reverse order of removal and 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

INNER RACE

- Press in the lower bearing inner race with the special tool.

09925-18011: Steering bearing installer

HANDLEBAR HOLDER

- Install the spacer ①, damper ②, and washer ③ and reassemble the handlebar holder and the upper bracket.
- Tighten the nut to the specified torque.

Handlebar holder mounting nut: 35 N·m
(3.5 kgf·m, 25.5 lb-ft)

IGNITION SWITCH

- Install the ignition switch.

09930-11920: Torx bit JT40H
09930-11940: Bit holder

▲ CAUTION

When reusing the ignition switch bolt, clean thread and apply the THREAD LOCK "1342".

BEARING

- Apply grease to the bearings and lip of dust seal.

99000-25030: SUZUKI SUPER GREASE "A"

- Install the lower bearing ① to the steering stem lower bracket.
- Install the upper bearing ② and bearing inner race ③.

- Install the dust seal ④ and dust cover ⑤.

NOTE:
Dust seal's lip should face downwards.

STEM NUT

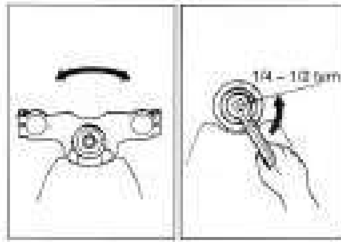
- Tighten the steering stem nut to the specified torque with the special tools.

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 the steering stem.

- Tighten the steering stem lock nut 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 upper bracket, washer ① and steering stem head nut ② temporarily.

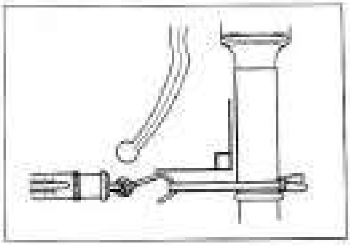
- Install the front forks temporarily.
- Tighten the steering stem head nut to the specified torque.

Steering stem head nut: 90 N·m (9.0 kgf·m, 65 lb-ft)

- Install the front forks. (☞ 6-24)
- Install the handlebars. (☞ 6-38)
- Install the front wheel. (☞ 6-18)

STEERING TENSION ADJUSTMENT

Check the steering movement in the following procedure.



- By supporting the motorcycle with a jack, lift the front wheel until it is off the floor by 20–30 mm (0.8–1.2 in). (☞ 6-15)
- Remove the steering damper. (☞ 6-29)
- Check to make sure that the cables and wire harnesses are properly routed. (☞ 8-19 – 28)
- With the front wheel in the straight ahead state, hitch the spring scale (special tool) on one handlebar grip end as shown in the figure and read the graduation when the handlebar starts moving. Do the same on the other grip end.

DATA Initial force: 200–500 grams

09940-92720: Spring scale

- If the initial force read on the scale when the handlebar starts turning is either too heavy or too light, adjust it till it satisfies the specification.

1)First, loosen the front fork upper and lower clamp bolts, steering stem head nut and steering stem lock nut, and then adjust the steering stem nut by loosening or tightening it.

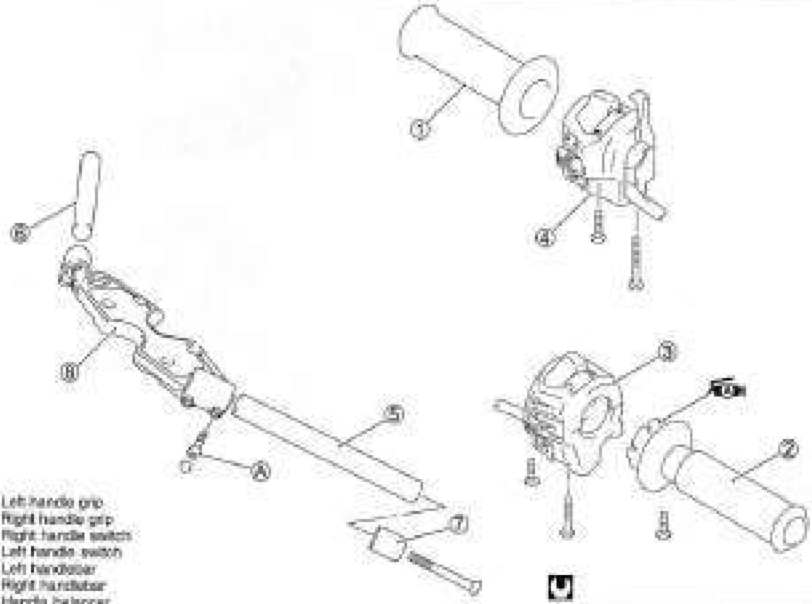
2)Tighten the steering stem lock nut, stem head nut and front fork upper and lower clamp bolts to the specified torque and re-check the initial force with the spring scale according to the previously described procedure.

3)If the initial force is found within the specified range, adjustment has been completed.

NOTE:
Hold the front fo[illegible] sure that the steering is not loose.

HANDLEBAR

CONSTRUCTION



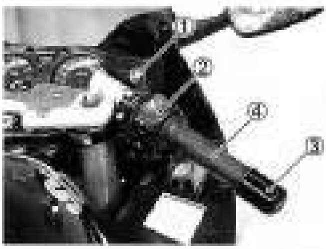
① Left handle grip
② Right handle grip
③ Right handle switch
④ Left handle switch
⑤ Left handlebar
⑥ Right handlebar
⑦ Handle balancer
⑧ Handlebar holder

Ⓐ Handlebar clamp bolt

ITEM	N·m	kgf·m	lb-ft
Ⓐ	10	1.0	7.0

REMOVAL AND DISASSEMBLY

RIGHT HANDLEBAR



- Remove the brake master cylinder ①. (☞ 6-68)
- Remove the right handle switch ②.
- With the screw removed, remove the handle balancer ③.
- Remove the right handle grip ④.

LEFT HANDLEBAR

- Remove the clutch master cylinder ①. (☞ 6-80)
- Remove the left handle switch ②.
- With the screw removed, remove the handle balancer ③.
- Remove the left handle grip ④.

- Remove the handlebar clamp bolts, and detach the right and left handlebars.

REASSEMBLY AND REMOUNTING

Reassemble and remount the handlebar in the reverse order of removal and disassembly.

Pay attention to the following points:

- Install the handlebar and align the cutaway of handlebar with the handlebar clamp bolts hole ②.

- Tighten the handlebar clamp bolts.

Handlebar clamp bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)

- Install the plugs ①.

- When remounting the right and left handle switches, engage the stopper with the handlebar hole.

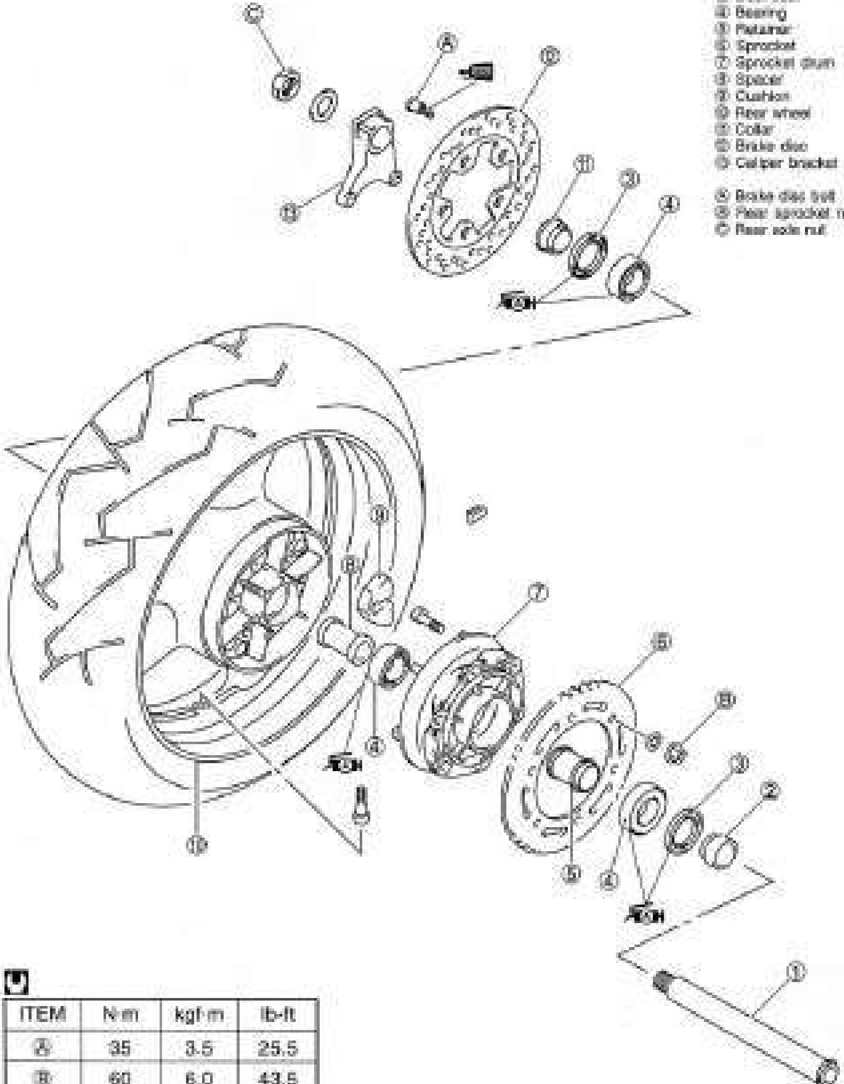
- Apply the grease to the throttle cables and their holder.

AH 99000-25030: SUZUKI SUPER GREASE "A"

- Install the front brake master cylinder. (☞ 6-69)
- Install the clutch master cylinder. (☞ 6-80)

REAR WHEEL

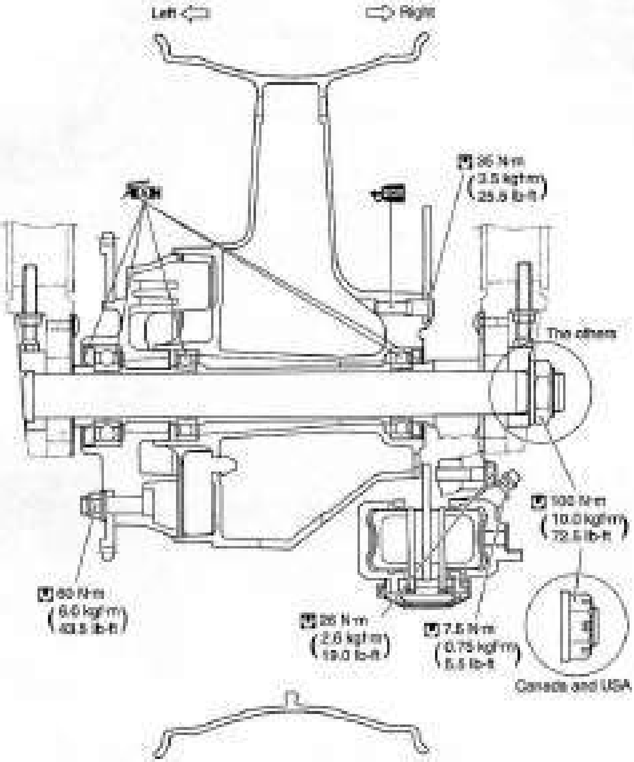
CONSTRUCTION

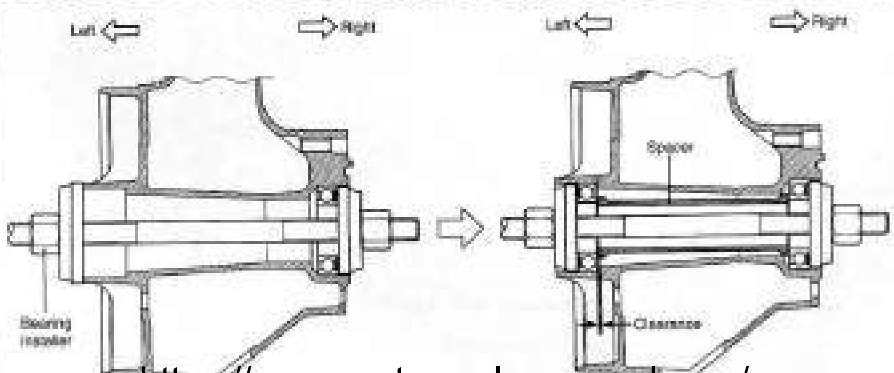


① Rear axle
② Collar
③ Dust seal
④ Bearing
⑤ Retainer
⑥ Sprocket
⑦ Sprocket drum
⑧ Spacer
⑨ Cushion
⑩ Rear wheel
⑪ Collar
⑫ Brake disc
⑬ Caliper bracket

Ⓐ Brake disc bolt
Ⓑ Rear sprocket nut
Ⓒ Rear axle nut

ITEM	N·m	kgf-m	lb-ft
Ⓐ	35	3.5	25.5
Ⓑ	60	6.0	43.5
Ⓒ	100	[illegible]	[illegible]


Left
Right
35 N·m
(3.5 kgf-m
25.5 lb-ft)
The others
100 N·m
(10.0 kgf-m
72.5 lb-ft)
60 N·m
(6.0 kgf-m
43.5 lb-ft)
26 N·m
(2.6 kgf-m
19.0 lb-ft)
7.5 N·m
(0.75 kgf-m
5.5 lb-ft)
Canada and USA


Left
Right
Bearing
installer
Left
Right
Spacer
Clearance

REMOVAL

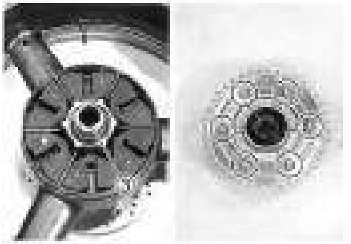
- Remove the cotter pin. (For Canada and USA)
- Loosen the axle nut.
- Raise the rear wheel off the ground and support the motorcycle with a jack or wooden block.
- Remove the axle nut and draw out the rear axle.
- Remove the rear wheel by disengaging the drive chain.

▲ CAUTION

Do not operate the brake pedal while removing the rear wheel.

- Remove the collar ①.
- Draw out the rear sprocket mounting drum ② from the wheel hub.

- Remove the rear sprocket mounting drum retainer ③.
- Separate the rear sprocket from its mounting drum by removing nuts.



- Remove the dust seal by using special tool.

TOOL 09913-50121: Oil seal remover

▲ CAUTION

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

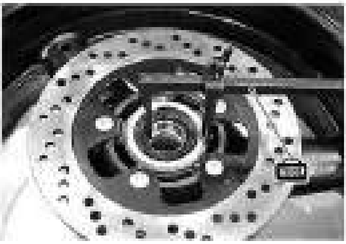
- Remove the collar ①.
- Remove the brake disc.

- Remove the dust seal by using special tool.

09913-50121: Oil seal remover

⚠ CAUTION

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



INSPECTION AND DISASSEMBLY

TIRE INSPECTION: 6-81

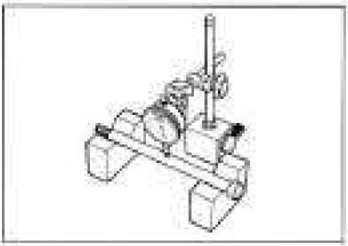
WHEEL INSPECTION: 6-16 and 81

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)

09900-20606: Dial gauge (1/100 mm)
09900-20701: Magnetic stand
09900-21304: V-block set (100 mm)

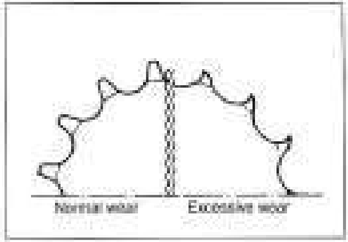


WHEEL DAMPER

Inspect the damper for wear and damage.
Replace the damper if there is anything unusual.

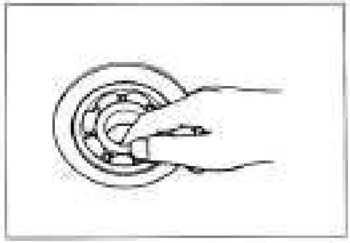
SPROCKET

Inspect the sprocket teeth for wear. If they are worn as shown, replace the two sprockets and drive chain as a set.



BEARINGS

Inspect the play of the wheel and sprocket mounting drum bearings by hand while they are in the wheel and drum. 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 and wheel bearings by using the special tool.

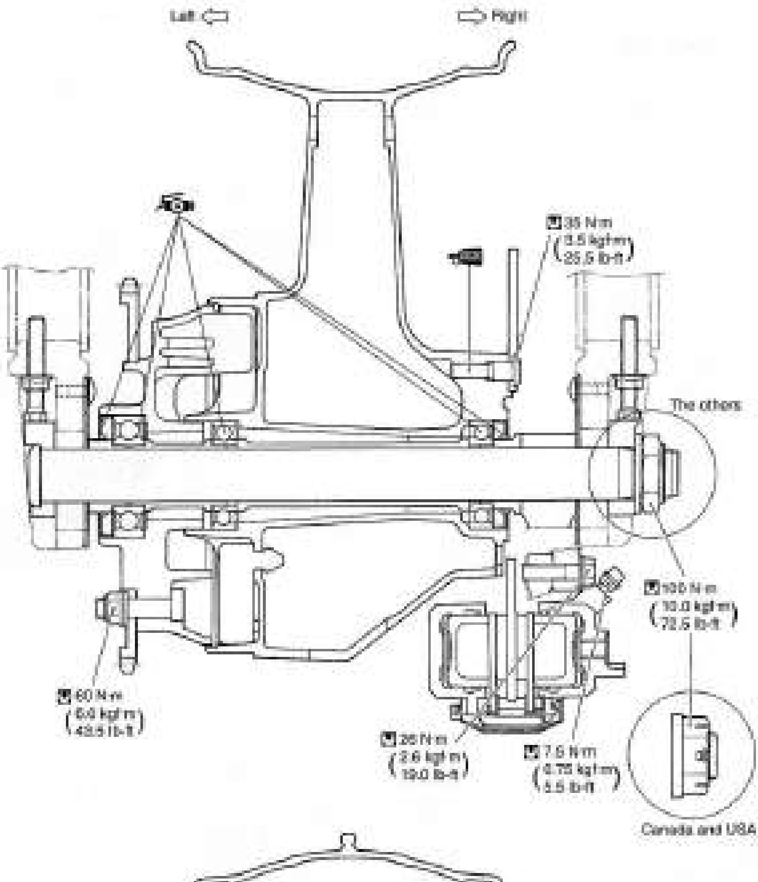
09921-20220: Bearing remover set

▲ CAUTION

The removed bearings must be replaced with new ones.

REASSEMBLY AND REMOUNTING

Reassemble and remount the rear wheel in the reverse order of removal and disassembly. Pay attention to the following points:



BEARINGS

- Apply grease to the bearings before installing.

99000-25030: SUZUKI SUPER GREASE "A"

- Install the new bearing to the sprocket mounting drum using the special tool.

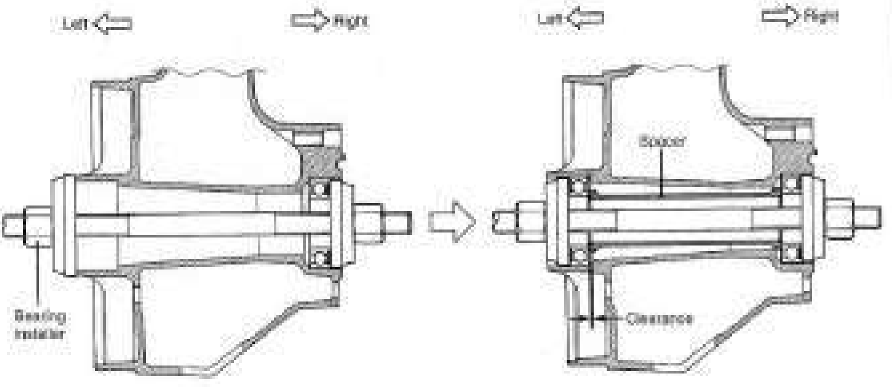
09941-34513: Bearing/Steering race installer set

- First install the right wheel bearing, then install the left wheel bearing using the special tool.

09941-34513: Bearing/Steering race installer set

▲ CAUTION

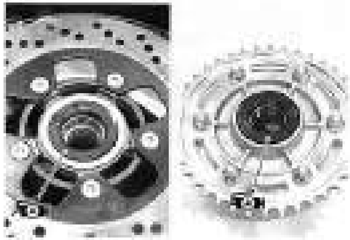
The sealed cover of the bearing must face outside.



DUST SEALS

- Install the new dust seals using proper drift.
- Apply grease to the dust seal lip before assembling rear wheel.

99000-25030: SUZUKI SUPER GREASE "A"



BRAKE DISC

- Apply THREAD LOCK SUPER "1360" 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"

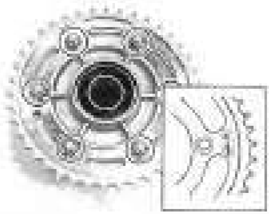
Brake disc bolt: 35 N·m (3.5 kgf·m, 25.5 lb-ft)

REAR SPROCKET

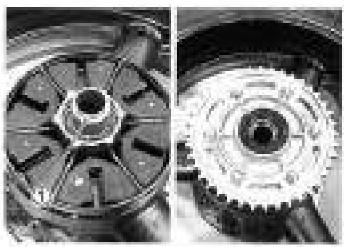
- Tighten the sprocket mounting nuts to the specified torque.

Rear sprocket nut: 60 N·m (6.0 kgf·m, 43.5 lb-ft)

NOTE:
Stamped mark on the sprocket should face outside.

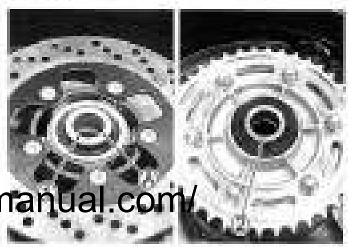


- Install the rear sprocket mounting drum retainer ①.
- Install the rear sprocket mounting drum.



- Install the collars ① and ②.

NOTE:
The collar ① (brake disc side) is equipped with the flange Ⓐ.

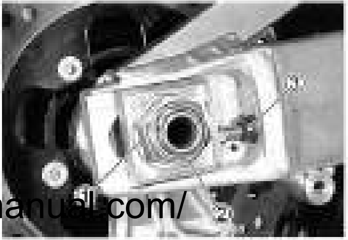


REAR AXLE

- Remount the rear wheel and rear axle shaft, install the washer ① and rear axle nut ②.
- Adjust the chain slack after rear wheel installation. (☞ 2-22)
- Tighten the rear axle nut ② to the specified torque.

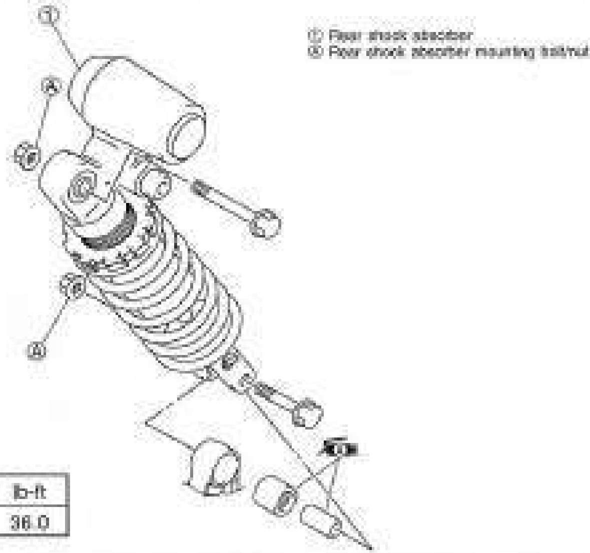
Rear axle nut: 100 N·m (10.0 kgf·m, 72.5 lb-ft)

- Tighten both chain adjuster lock nuts ③ securely.
- Install the new [illegible]

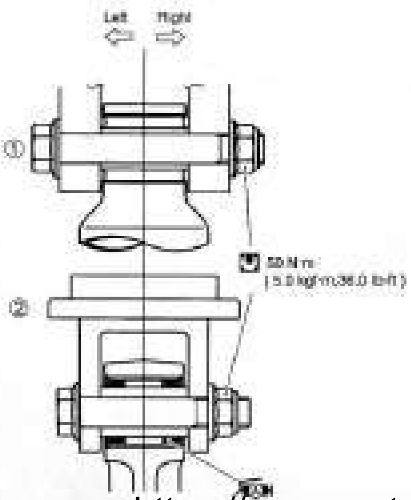


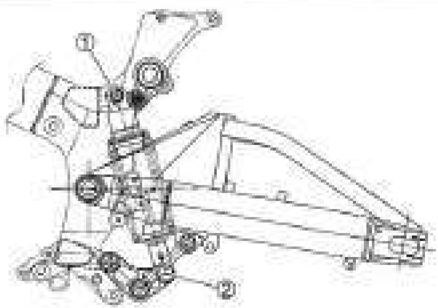
REAR SHOCK ABSORBER

CONSTRUCTION



ITEM	N·m	kgf·m	lb-ft
Ⓐ	50	5.0	36.0





REMOVAL

- Remove the rear under cowling. (☞ 6-7)
- Remove the front seat. (☞ 6-11)
- Remove the fuel tank. (☞ 4-50)
- Remove the battery.
- Support the motorcycle with a jack to be no load for the rear shock absorber.

- Remove the rear shock absorber upper mounting bolt and nut.

- Remove the rear shock absorber lower mounting bolt and nut.
- Take out the rear shock absorber to upward.

INSPECTION

Inspect the shock absorber body and bushing for damage and oil leakage.
If any defects are found, replace the shock absorber with a new one.

⚠ CAUTION

Do not attempt to disassemble the rear shock absorber unit. It is unserviceable.

REAR SHOCK ABSORBER SCRAPPING PROCEDURE

⚠ WARNING

* **Handle the rear shock absorber with caution since a high pressure nitrogen gas is contained.**
* **Avoid incineration, exposure to high pressure or overhauling.**

⚠ WARNING

In the case of scrapping the rear shock absorber, evacuate gas in the following procedures. In the case of scrapping the rear shock absorber, evacuate gas in the following procedures.

REAR SHOCK ABSORBER GAS EVACUATION

* Remove the valve cap cover ① and valve cap.
* Evacuate gas through the valve hole.

⚠ WARNING

Keep your face away from the valve hole.

REMOUNTING

Remount the rear shock absorber in the reverse ordar 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)

SUSPENSION SETTING

After installing the rear suspension, adjust the spring pre-load and damping force as follows.

SPRING PRE-LOAD ADJUSTMENT

The set length 180 mm provides the maximum spring pre-load.
The set length 190 mm provides the minimum spring pre-load.
(STD length: 183 mm)

DAMPING FORCE ADJUSTMENT

(Rebound side)

Fully turn the damping force adjuster ① clockwise. It is at stiffest position and turn it out to standard setting position.
(STD position: about 11 clicks [Fine-tune the adjuster by turning it slightly until two punch marks align.])

(Compression side)

Fully turn the damping force adjuster ② clockwise. It is at stiffest position and turn it out to standard setting position.
(STD position: about 8 clicks [Fine-tune the adjuster by turning it slightly until two punch marks align.])

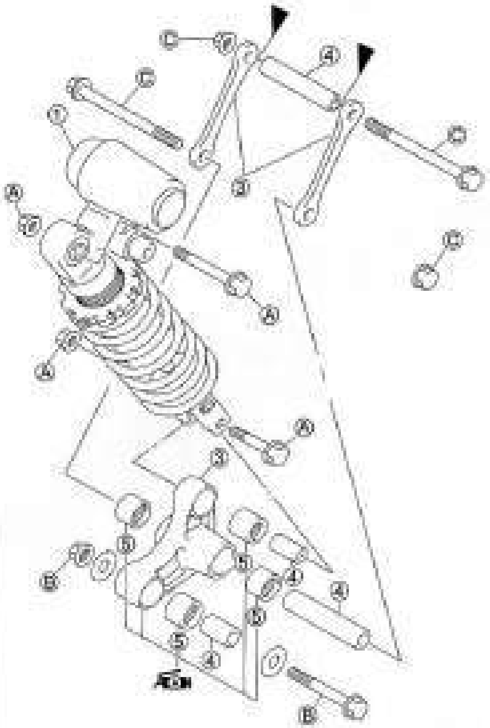
Rebound side

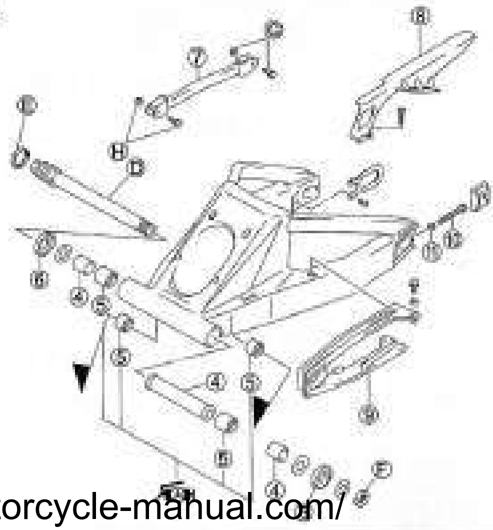
Compression side

STANDARD SUSPENSION SETTING

		REAR		
		Spring set length	Damping force adjuster	
			Rebound	Compression
Solo riding	Softer	183 mm (7.6 in)	13 clicks	9 clicks
	Standard	183 mm (7.6 in)	11 clicks	8 clicks
	Stiffer	183 mm (7.6 in)	10 clicks	7 clicks
Dual riding		183 mm (7.6 in)	11 clicks	8 clicks

REAR SUSPENSION CONSTRUCTION

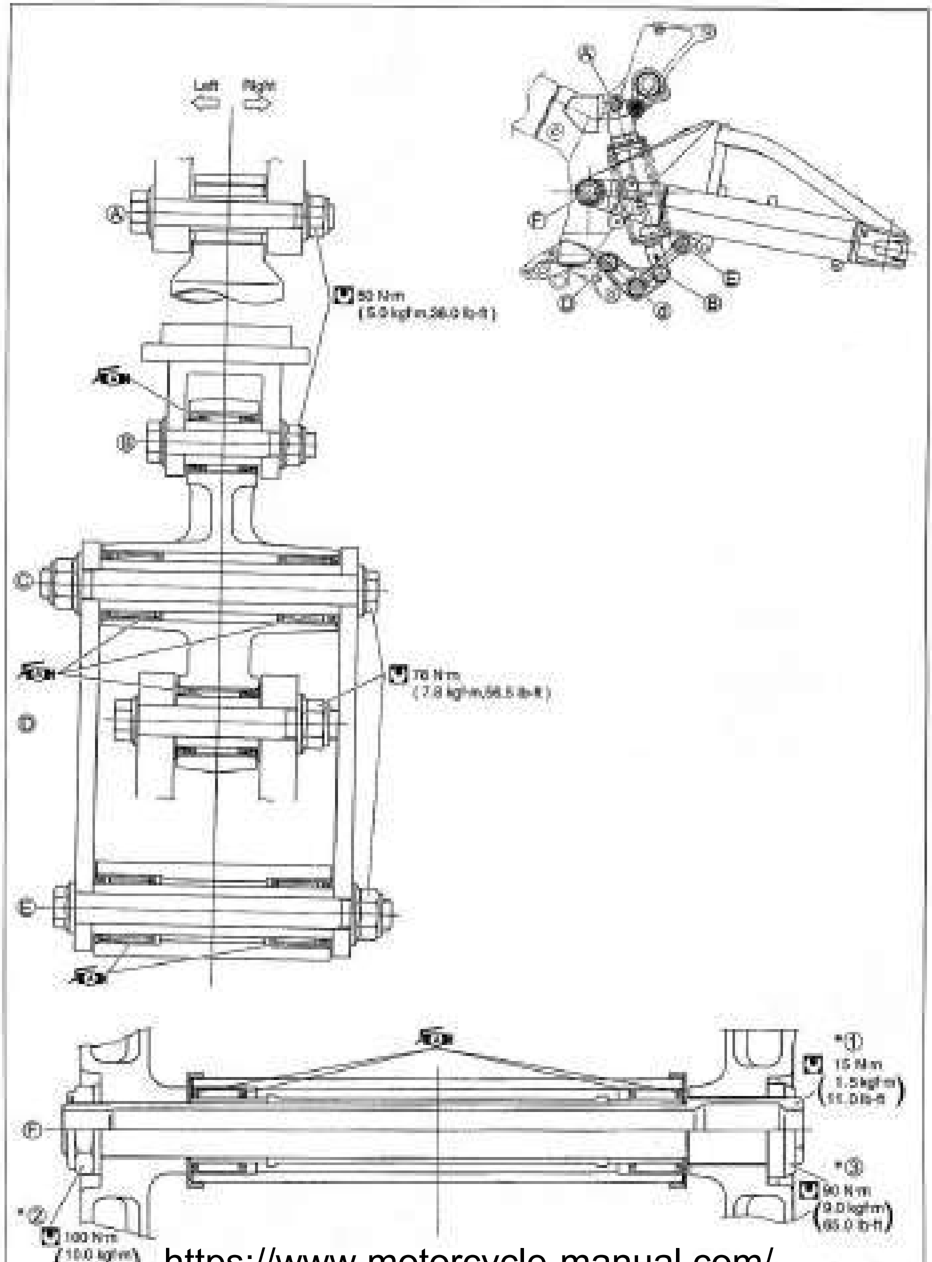




① Rear shock absorber
② Rear cushion rod
③ Rear cushion lever
④ Spacer
⑤ Bearing
⑥ Dust seal
⑦ Torque link
⑧ Chain cover
⑨ Chain buffer
⑩ Chain adjuster
⑪ Chain adjuster lock nut

Ⓐ Rear shock absorber mounting bolt/nut
Ⓑ Rear cushion lever bolt/nut
Ⓒ Rear cushion rod bolt/nut
Ⓓ Swingarm pivot shaft
Ⓔ Swingarm pivot lock nut
Ⓕ Swingarm pivot nut
Ⓖ Torque link bolt/nut (Rear)
Ⓗ Torque link bolt/nut (Front)

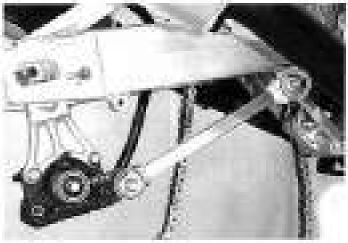
ITEM	N·m	kgf-m	lb-ft
Ⓐ	50	5.0	36.0
Ⓑ	78	7.8	56.5
Ⓒ	78	7.8	56.5
Ⓓ	15	1.5	11.0
Ⓔ	90	9.0	65.0
Ⓕ	100	10.0	72.5
Ⓖ	35	3.5	25.5
Ⓗ	28	[illegible]	[illegible]



* Tighten in ascending order.

REMOVAL

- Remove the rear wheel. (☞ 6-40)
- Remove the rear brake hose union bolt.
- Remove the rear brake caliper along with its bracket by removing the torque link bolts.



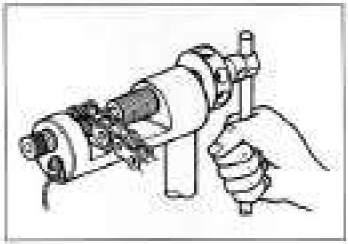
▲ CAUTION

Completely wipe off any brake fluid adhering to any part of motorcycle. The fluid reacts chemically with paint, plastics, rubber materials and so on.

- Remove the brake hose from the brake hose guides at inside of swingarm.

- Cut the drive chain. (☞ 6-64)

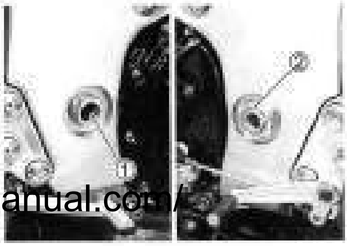
NOTE:
It is necessary to cut the drive chain, only when replacing drive chain or swingarm.



- Remove the swingarm pivot shaft lock nut by using the special tool.

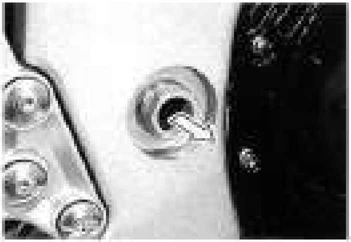
09940-14970: Swingarm pivot thrust adjuster socket wrench

- Hold the swingarm pivot shaft ① with a 27 mm socket wrench and remove the swingarm pivot nut ② with a 36 mm socket wrench.

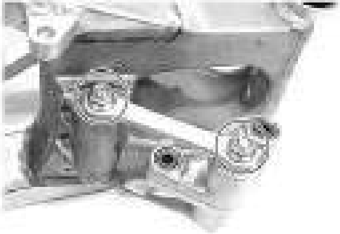


- Remove the cushion lever mounting bolt/nut and rear shock absorber lower mounting bolt/nut.

- Remove the swingarm pivot shaft.
- Remove the rear suspension assembly.



- Remove the cushion lever and cushion rod.



- Remove the chain cover ① and chain buffer ② from the swingarm.
- Remove the fasteners and remove the mudguard ③.

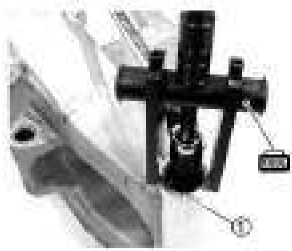
INSPECTION AND DISASSEMBLY

SPACER

- Remove the dust seals, washers and spacers from swingarm.
- Remove the spacers from the cushion lever.
- 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.



- Draw out the swingarm pivot bearings ① and the swingarm cushion rod upper bearings ② with the special tools.

09921-20220: Bearing remover set

⚠ CAUTION

The removed bearings must be replaced with new ones.

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.

- Draw out the cushion lever bearings with the special tools.

09921-20220: Bearing remover set

⚠ CAUTION

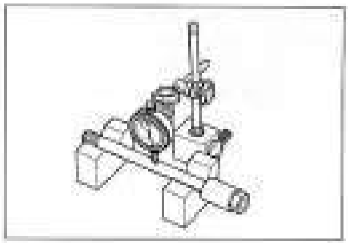
The removed bearings must be replaced with new ones.

SWINGARM PIVOT SHAFT

Using a dial gauge, check the pivot shaft runout and replace it if the runout exceeds the limit.

09900-20606: Dial gauge (1/100 mm, 10 mm)
09900-20701: Magnetic stand
09900-21304: V-block (100 mm)

Swingarm pivot shaft runout:
Service limit: 0.3 mm (0.01 in)



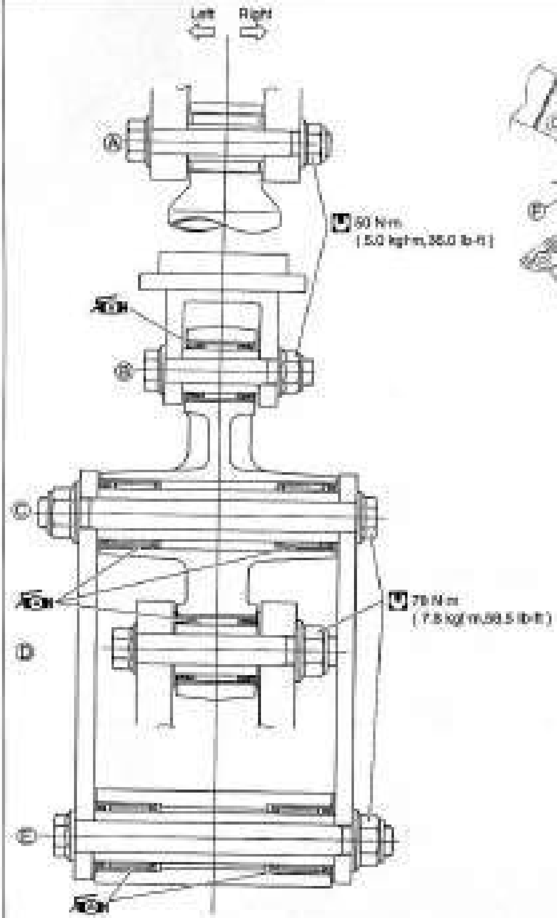
CHAIN BUFFER

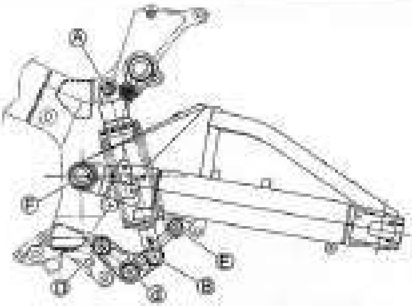
Inspect the chain buffer for wear and damage.
If any defects are found, replace the chain buffer with a new one.

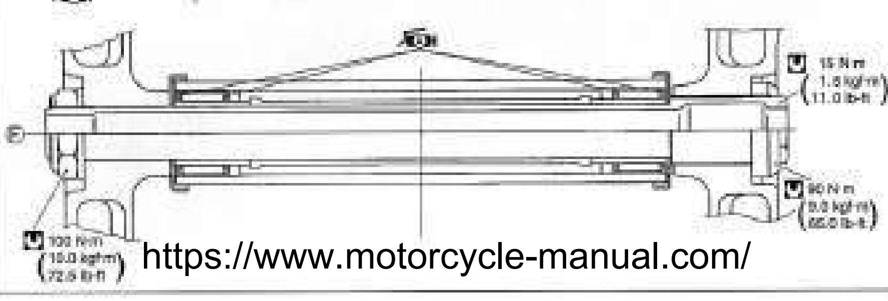
REASSEMBLY

Reassemble the swingarm in the reverse order of disassembly and removal.

Pay attention to the following points:







SWINGARM BEARING

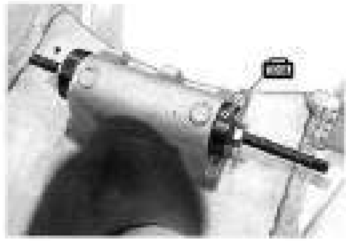
- Press the bearing into the swingarm pivot by using the special tool.

09941-34513: Steering race installer

- Press the swingarm cushion rod upper side bearing with the special tool.

09924-84521: Bearing installer

NOTE:
When reinstalling the bearing, stamped mark on the bearing must face outside.



CUSHION LEVER BEARING

- Press the bearings into the cushion lever with the special tool.

09941-34513: Steering race installer

NOTE:
When installing the bearing, stamped mark on the bearing must face outside.

- Apply grease to the bearings, spacers, washers and dust seals.

99000-25030: SUZUKI SUPER GREASE "A"

- Assemble the cushion lever and cushion rod onto the swingarm. (☞ 6-59)

Cushion rod mounting nut: 78 N·m (7.8 kgf-m, 56.5 lb-ft)

REMOUNTING

Remount the swingarm in the reverse order of disassembly and removal, and pay attention to the following points.

SWINGARM PIVOT THRUST CLEARANCE ADJUSTMENT

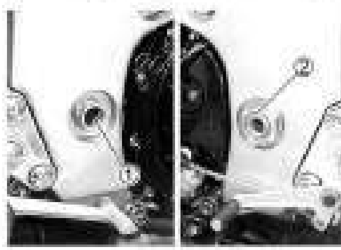
Adjust swingarm pivot thrust clearance as following procedure.

- Insert the swingarm pivot shaft and tighten it to the specified torque.

Swingarm pivot shaft: 15 N·m (1.5 kgf-m, 11.0 lb-ft)

- Hold the swingarm pivot shaft ① with a 27 mm socket wrench and tighten the swingarm pivot nut ② with a 36 mm socket wrench to the specified torque.

Swingarm pivot nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)

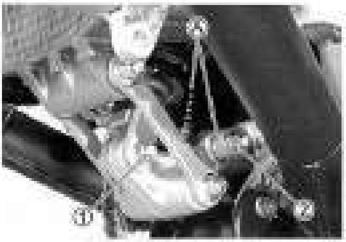


- Tighten the swingarm pivot lock nut to the specified torque with the special tool.

09940-14970: Swingarm pivot thrust adjuster lock nut wrench

Swingarm pivot lock nut: 90 N·m (9.0 kgf-m, 65.0 lb-ft)

SHOCK ABSORBER AND CUSHION LEVER MOUNTING NUT



- Install the lower part of rear shock absorber onto the cushion lever and tighten it to the specified torque. (☞ 6-34)

Shock absorber mounting nut ①: 50 N·m (5.0 kgf-m, 36.0 lb-ft)

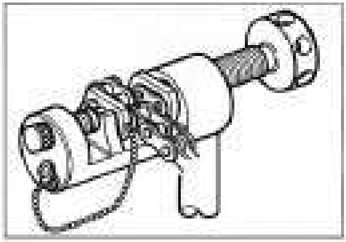
- Install the front of cushion lever onto the frame.

Cushion lever mounting nut ②: 78 N·m (7.8 kgf-m, 56.5 lb-ft)

NOTE:
Install the washers Ⓐ between cushion lever and frame.

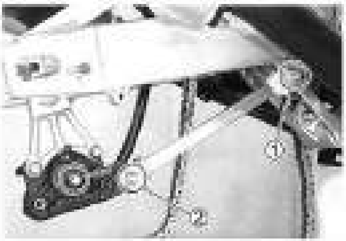
DRIVE CHAIN

- Connect the drive chain. (☞ 6-65)



TORQUE LINK

- Tighten the front and rear torque link nuts to the specified torque.



Torque link nut (front) ① : 28 N·m (2.8 kgf-m, 20.5 lb-ft)
(rear) ② : 35 N·m (3.5 kgf-m, 25.5 lb-ft)

- Route the brake hose and tighten the brake hose union bolt to the specified torque. (Brake hose routing: ☞ 8-27, Brake fluid replacement: ☞ 6-64)

Brake hose union bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)

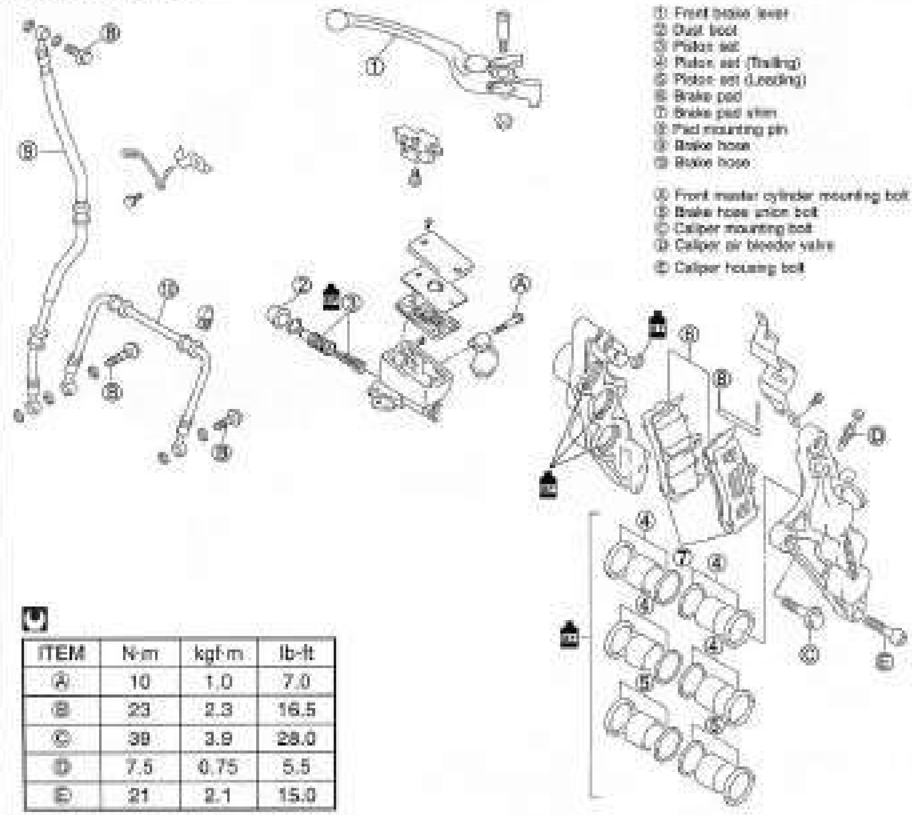
FINAL INSPECTION AND ADJUSTMENT

After installing the rear suspension and wheel, the following adjustments are required before driving.

* Drive chain: ☞ 2-21
* Rear brake: ☞ 2-23
* Tire pressure: ☞ 2-27
* Chassis bolts and nuts: ☞ 2-29

FRONT BRAKE

CONSTRUCTION



① Front brake lever
② Dust boot
③ Piston set
④ Piston set (Trailing)
⑤ Piston set (Leading)
⑥ Brake pad
⑦ Brake pad shim
⑧ Pad mounting pin
⑨ Brake hose
⑩ Brake hose

Ⓐ Front master cylinder mounting bolt
Ⓑ Brake hose union bolt
Ⓒ Caliper mounting bolt
Ⓓ Caliper air bleeder valve
Ⓔ Caliper housing bolt

ITEM	N·m	kgf·m	lb-ft
Ⓐ	10	1.0	7.0
Ⓑ	23	2.3	16.5
Ⓒ	39	3.9	28.0
Ⓓ	7.5	0.75	5.5
Ⓔ	21	2.1	15.0

⚠ 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.

BRAKE PAD REPLACEMENT

- Remove the spring ①.
- Remove the brake pads by removing the clip ② and pad mounting pin ③.

▲ CAUTION

> * **Do not operate the brake lever while dismounting the pads.**
> * **Replace the brake pads as a set, otherwise braking performance will be adversely affected.**

- Install the new brake pads.

NOTE:
After replacing the brake pads, pump the brake lever few times to check for proper brake operation and then check the brake fluid level.

BRAKE FLUID REPLACEMENT

- Place the motorcycle on a level surface and keep the handlebars straight.
- Remove the brake fluid reservoir cap and diaphragm.
- Suck up the old brake fluid as much as possible.
- Fill the reservoir with new brake fluid.

- Connect a clear hose to the caliper air bleeder valve and insert the other end of hose into a receptacle.
- Loosen the air bleeder valve and pump the brake lever until old brake fluid flows out of the bleeder system.
- Close the caliper air bleeder valve and disconnect a clear hose. Fill the reservoir with new fluid to the upper mark of the reservoir.

Specification and Classification: DOT 4

▲ CAUTION

> **Bleed air from the brake system. (☞ 2-25)**

CALIPER REMOVAL AND DISASSEMBLY

- 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 spilt brake fluid.

- Remove the brake caliper by removing the caliper mounting bolts ②.

⚠ 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.

NOTE:
Slightly loosen the caliper housing bolts before removing the caliper mounting bolts to facilitate later disassembly.

- Remove the brake pads. (☞ 6-64)
- Separate the caliper halves to remove the caliper housing bolts.

- Remove the O-rings.

⚠ CAUTION

Replace the O-rings with new ones.

- Place a rag over the pistons to prevent it from popping out and then force out the pistons using compressed air.

⚠ CAUTION

Do not use high pressure air to prevent piston damage.

- Remove the dust seals and piston seals.

▲ CAUTION

Do not reuse the dust seals and piston seals to prevent fluid leakage.

CALIPER INSPECTION

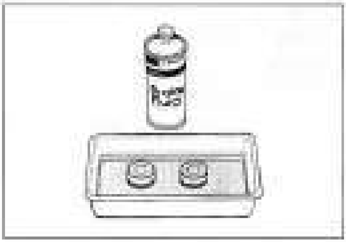
BRAKE CALIPER

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 AND REMOUNTING



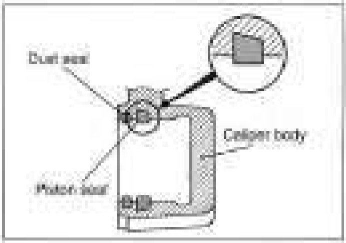
Reassemble the caliper in the reverse order of removal and disassembly. Pay attention to the following points:

- Wash the caliper bores and pistons with specified brake fluid. Particularly wash the dust seal grooves and piston seal grooves.

Specification and Classification: DOT 4

▲ CAUTION

- **Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.**
- **Do not wipe the brake fluid off after washing the components.**
- **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.**
- **Replace the piston seals and dust seals with new ones when reassembly. Apply the brake fluid to both seals when installing them.**



PISTON SEAL

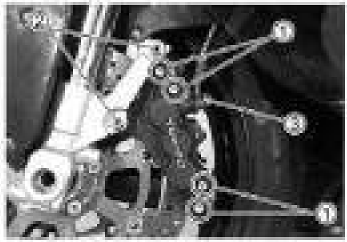
- Install the piston seals as shown in the right illustration.

O-ring

- Install the O-rings and put caliper halves together.

* Tighten each bolt to the specified torque.

Front brake caliper housing bolt ①:
21 N·m (2.1 kgf·m, 15.0 lb-ft)
Front brake caliper mounting bolt ②:
39 N·m (3.9 kgf·m, 28.0 lb-ft)
Front brake hose union bolt ③:
23 N·m (2.3 kgf·m, 16.5 lb-ft)



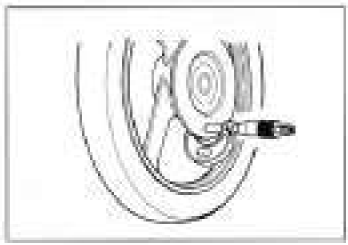
NOTE:
Before remounting the caliper, push the piston all the way into the caliper.

⚠ CAUTION

Bleed air from the system after reassembling the caliper. (☞ 2-25)

BRAKE DISC INSPECTION

Visually check the brake disc for damage or cracks.
Measure the thickness with a micrometer.
Replace the disc if the thickness is less than the service limit or if damage is found.

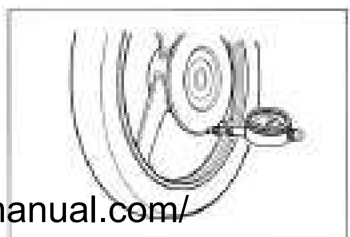


DATA Front disc thickness: Service Limit: 4.5 mm (0.18 in)

09900-20205: Micrometer (0–25 mm)

* Remove the brake calipers. (☞ 6-65)

Measure the runout with a dial gauge.
Replace the disc if the runout exceeds the service limit.



DATA Front disc runout: Service Limit: 0.30 mm (0.012 in)

09900-20606: Dial gauge (1/100 mm)
09900-20701: Magnetic stand

* **Brake disc removal (☞ 6-13)**

* **Brake disc installation (☞ 6-16)**

MASTER CYLINDER REMOVAL AND DISASSEMBLY

- Disconnect the front brake light switch lead wires.

- Place a rag underneath the union bolt on the master cylinder to catch any spilt 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 ①, insulator ② and diaphragm ③.

- Remove the brake lever ④ and brake switch ⑤.

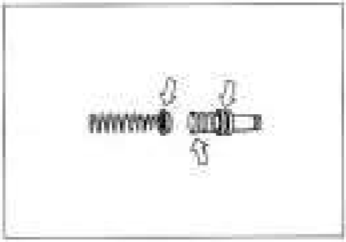
- Pull out the dust boot ① and remove the circlip ②.

09900-06108: Snap ring pliers.

- Remove the piston/secondary cup, primary cup and return spring.
  ③ Secondary cup
  ④ Piston
  ⑤ Primary cup
  ⑥ Return spring

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 AND REMOUNTING

Reassemble the master cylinder in the reverse order of removal and disassembly. Pay attention to the following points:

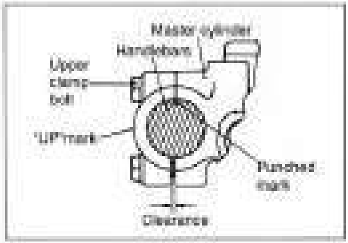
▲ CAUTION

- * **Wash the master cylinder components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash 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

* When remounting the brake master cylinder onto the handlebar, align the master cylinder holder's mating surface ① with punched mark ② on the handlebar and tighten the upper clamp bolt 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: ☞ 8-26)

Brake hose union bolt: 23 N·m (2.3 kgf·m, 16.5 lb-ft)

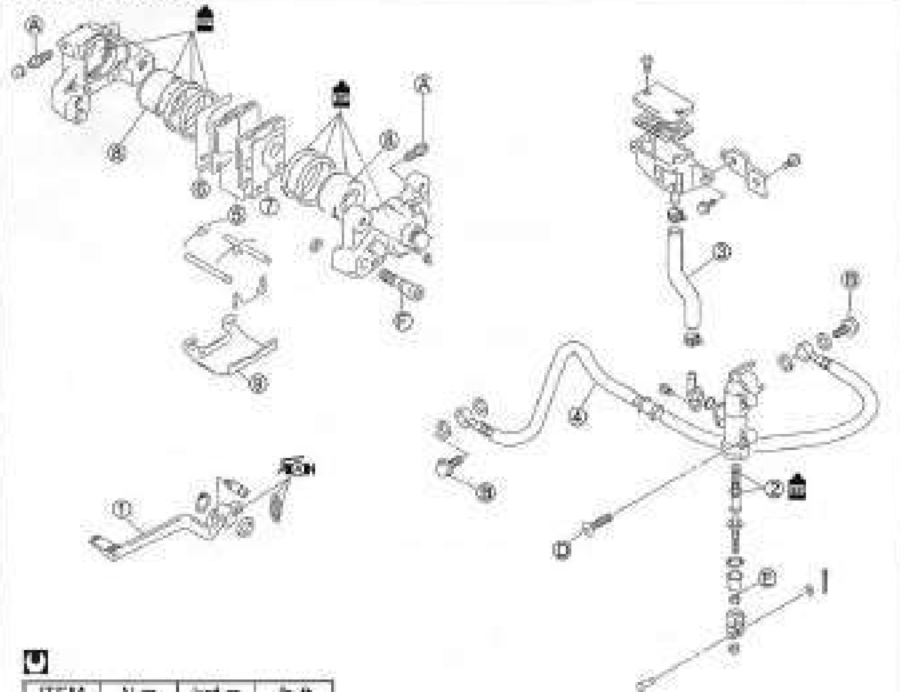
* Bleed air from the brake system. (☞ 2-25)

INSPECTION AFTER REASSEMBLY

* Front brake: ☞ 2-23

REAR BRAKE

CONSTRUCTION



ITEM	N·m	kgf·m	lb-ft
Ⓐ	7.5	0.75	5.5
Ⓑ	23	2.3	16.5
Ⓒ	26	2.6	19.0
Ⓓ	10	1.0	7.0
Ⓔ	18	1.8	13.0
Ⓕ	30	3.0	21.5

① Brake pedal
② Piston/cup set
③ Reservoir tank hose
④ Brake hose
⑤ Pad
⑥ Inner shim
⑦ Outer shim
⑧ Piston
⑨ Brake pad cover

Ⓐ Caliper air bleeder valve
Ⓑ Brake hose union bolt
Ⓒ Rear brake caliper mounting bolt
Ⓓ Rear brake master cylinder mounting bolt
Ⓔ Rear brake master cylinder rod lock nut
Ⓕ Rear brake caliper housing bolt

⚠ WARNING

* This brake system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid such as silicone-based or petroleum-based.
* Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or stored for long periods.
* When storing the brake fluid, seal the container completely and keep away from children.
* When replenishing brake fluid, take care not to get dust into fluid.
* When washing brake components, use fresh brake fluid. Never use cleaning solvent.
* A contaminated brake disc or brake pad reduces braking performance. Discard contaminated pads and clean the disc with high quality brake cleaner or neutral detergent.

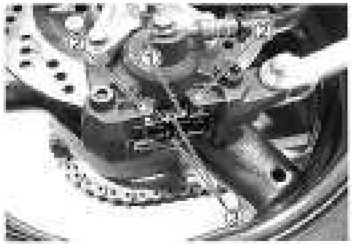
⚠ CAUTION

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

BRAKE PAD REPLACEMENT

- Remove the brake pad cover.

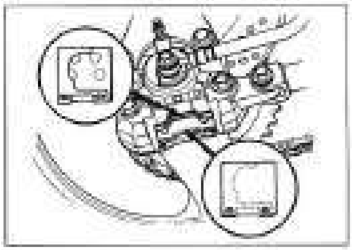
- Remove the clip ①.
- Remove the brake pads along with the shims by removing the brake pad mounting pins ② and springs ③.



▲ CAUTION

- **Do not operate the brake pedal while dismounting the pads.**
- **Replace the brake pads as a set, otherwise braking performance will be adversely affected.**

- Install the new brake pads and shims.



▲ CAUTION

Be sure to install the shims properly as shown in the illustration.

NOTE:
After replacing the brake pads, pump the brake pedal few times to operate the brake correctly and then check the brake fluid level.

BRAKE FLUID REPLACEMENT

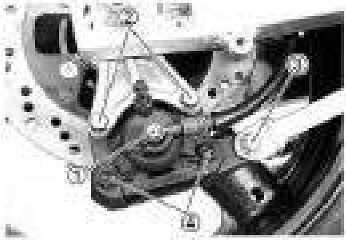
- Remove the frame cover. (☞ 6-11)
- Remove the brake fluid reservoir cap.
- Replace the brake fluid in the same manner as the front brake. (☞ 6-64)

Specification and Classification: DOT 4

▲ CAUTION

Bleed air from the brake system. (☞ 2-26)

CALIPER REMOVAL AND DISASSEMBLY



- Remove the union bolt ① and catch the brake fluid in a suitable receptacle.

⚠ 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 caliper mounting bolts ② and torque link bolt ③.

NOTE:
Slightly loosen the caliper housing bolts ④ to facilitate later disassembly before removing the caliper mounting bolts.

- Remove the brake pads. (☞ 6-72)
- Remove the caliper housing bolts ④.
- Separate the caliper halves.
- Remove the O-ring ⑤.

⚠ CAUTION

Replace the O-ring with a new one.

- Place a rag over the piston to prevent it from popping out and then force out the pistons using compressed air.

⚠ CAUTION

Do not use high pressure air to prevent piston damage.

- Remove the dust seals and piston seals.

⚠ CAUTION

Do not reuse the dust seals and piston seals to prevent fluid leakage.

CALIPER INSPECTION

CALIPER INSPECTION: ☞ 6-66
PISTON: ☞ 6-66
DISC: ☞ 6-67

Service Limit:
Rear disc thickness: 4.5 mm (0.18 in)
Rear disc runout: 0.30 mm (0.012 in)

CALIPER REASSEMBLY AND REMOUNTING

Reassemble and remount the caliper in the reverse order of removal and disassembly. Pay attention to the following points:

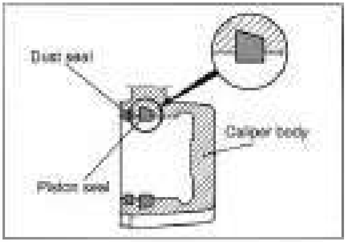
⚠ CAUTION

* **Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.**
* **Apply brake fluid to the caliper bore and piston to be inserted into the bore.**

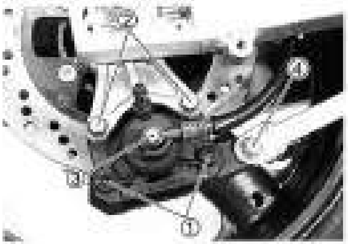
Specification and Classification: DOT 4

PISTON SEAL

* Install the piston seals as shown in the right illustration.



* Tighten each bolt to the specified torque.



Rear brake caliper housing bolt ①: 30 N·m (3.0 kgf·m, 21.5 lb-ft)
Rear brake caliper mounting bolt ②: 26 N·m (2.6 kgf·m, 19.0 lb-ft)
Brake hose union bolt ③: 23 N·m (2.3 kgf·m, 16.5 lb-ft)
Rear torque link nut ④: 35 N·m (3.5 kgf·m, 25.5 lb-ft)

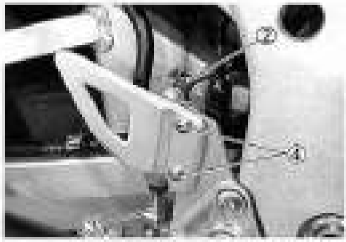
⚠ CAUTION

Bleed air from the system after reassembling the caliper. (☞ 2-26)

MASTER CYLINDER REMOVAL AND DISASSEMBLY

- Remove the frame cover. (☞ 6-11)
- Remove the brake fluid reservoir tank mounting bolt ①.

- Place a rag underneath the union bolt on the master cylinder to catch spilled drops of brake fluid. Remove the union bolt ② and disconnect the brake hose.
- Loosen the lock nut ③.
- Remove the mounting bolts ④.



⚠ CAUTION

Immediately and completely wipe off any brake fluid contacting any parts of the motorcycle. The fluid reacts chemically with paint, plastic and rubber materials, etc. and will damage them severely.

- With the clip removed, disconnect the hose.
- Remove the master cylinder by turning the master cylinder rod ⑤.

- Remove the reservoir cap and diaphragm.
- Remove the connector by removing the screw.
- Remove the O-ring ⑥.

⚠ CAUTION

Replace the O-ring with a new one.

- Pull out the dust seal then remove the circlip with the special tool.

09900-06108: Snap ring pliers

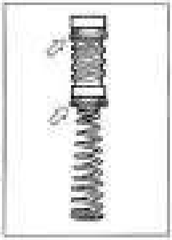
- Remove the push rod, piston/primary cup and spring.

MASTER CYLINDER INSPECTION

CYLINDER, PISTON AND CUP SET

Inspect the cylinder bore wall for any scratches or other damage.

Inspect the cup set and each rubber part for damage.



MASTER CYLINDER REASSEMBLY AND REMOUNTING

Reassemble and remount the master cylinder in the reverse order of removal and disassembly. Pay attention to the following points:

⚠ CAUTION

- **Wash the master cylinder components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.**
- **Apply brake fluid to the cylinder bore and all the component to be inserted into the bore.**

Specification and Classification: DOT 4

- Tighten each bolt to the specified torque.
  (Brake hose routing: 6-27)

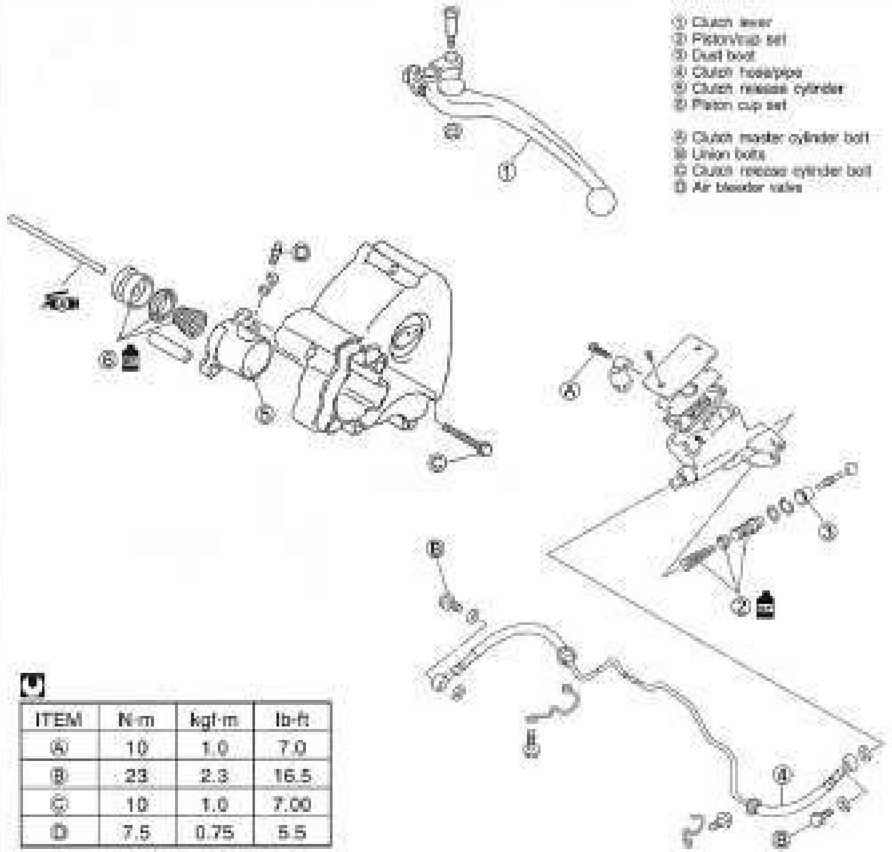
Brake hose union bolt ①: 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Rear master cylinder mounting bolt ②: 10 N·m (1.0 kgf-m, 7.0 lb-ft)
Rear master cylinder rod lock nut ③: 18 N·m (1.8 kgf-m, 13.0 lb-ft)

- Bleed air from the brake system. (2-25)

INSPECTION AFTER REASSEMBLY

- Rear brake: 2-23

CLUTCH RELEASE CYLINDER AND MASTER CYLINDER



ITEM	N·m	kgf·m	lb-ft
Ⓐ	10	1.0	7.0
Ⓑ	23	2.3	16.5
Ⓒ	10	1.0	7.00
Ⓓ	7.5	0.75	5.5

⚠ WARNING

* This clutch system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid such as silicone-based or petroleum-based.
* Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or stored for long periods.
* When storing the brake fluid, seal the container completely and keep away from children.
* When replenishing brake fluid, take care not to get dust into fluid.
* When washing brake components, use fresh brake fluid. Never use cleaning solvent.

⚠ CAUTION

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

CLUTCH FLUID REPLACEMENT

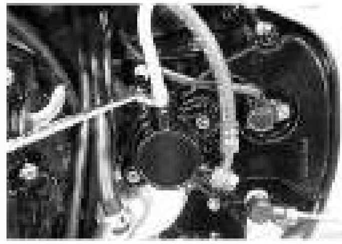
- Place the motorcycle on a level surface and keep the handlebars straight.
- Remove the left under cowling (☞ 6-8)
- Remove the master cylinder reservoir cap and diaphragm.
- Suck up the old clutch fluid as much as possible.
- Fill the reservoir with new clutch fluid.

Specification and Classification: DOT 4

- Connect a clear hose to the clutch release cylinder air bleeder valve and insert the other end of hose into a receptacle.
- Loosen the air bleeder valve and pump the clutch lever until old clutch fluid flows out of the bleeder system.
- Close the clutch release cylinder air bleeder valve, and disconnect a clear hose. Fill the reservoir with fresh brake fluid to the upper level.

⚠ CAUTION

Bleed air in the clutch fluid system. (☞ 2-18)



CLUTCH RELEASE CYLINDER REMOVAL AND DISASSEMBLY

- Remove the left under cowling. (☞ 6-8)
- Remove the coolant reservoir tank. (☞ 5-11)
- Remove the clutch hydraulic line by removing the union bolt ①.

NOTE:
Completely wipe off any clutch fluid adhering to any part of motorcycle.
The fluid reacts chemically with paint, plastics, rubber materials, etc.

- Remove the air bleeder valve ②.
- Remove the clutch release cylinder bolts.
- Remove the engine sprocket cover bolts.

- Remove the clutch release cylinder from the engine sprocket cover.

- Place a rag over the piston to prevent popping up. Force out the piston by using air gun.

▲ CAUTION

Do not use high pressure air to prevent piston damage.

CLUTCH RELEASE CYLINDER INSPECTION

Inspect the clutch cylinder bore wall for nicks, scratches or other damage. Inspect the oil seal for damage and wear. Inspect the piston surface for any scratches or other damage.

CLUTCH RELEASE CYLINDER REASSEMBLY

Reassemble the clutch cylinder in the reverse order of disassembly and by taking the following steps.

▲ CAUTION

- **Wash the clutch cylinder components with fresh brake fluid before reassembly.**
- **Never use cleaning solvent or gasoline to wash them.**
- **Apply brake fluid to the cylinder bore and piston to be inserted into the bore.**

Specification and Classification: DOT 4

- Apply grease to the clutch push rod.

99000-25030: SUZUKI SUPER GREASE "A"

- Tighten each bolt to the specified torque.

Clutch hose union bolt ①: 23 N.m (2.3 kgf.m, 16.5 lb-ft)
Air bleeder valve ②: 7.5 N.m (0.75 kgf.m, 5.5 lb-ft)

- Bleed air from the clutch fluid system. (☞ 2-18)

CLUTCH MASTER CYLINDER REMOVAL

- Disconnect the clutch lever position switch lead wires.
- Place a rag underneath the union bolt on the master cylinder to catch spilled drops of brake fluid. Unscrew the union bolt and disconnect the clutch hose from the master cylinder.

⚠ CAUTION

Completely wipe off any brake fluid adhering to any parts of motorcycle. The fluid reacts chemically with paint, plastics, rubber materials, etc. and will damage them severely.

- Remove the clutch master cylinder by removing its clamp bolts.

CLUTCH MASTER CYLINDER DISASSEMBLY, INSPECTION AND REASSEMBLY

Disassemble, inspect and reassemble the clutch master cylinder in the same manner as the front brake master cylinder. (☞ 6-68)

REMOUNTING

- When remounting the master cylinder on the handlebar, align the master cylinder holder's mating surface ① with punched mark ② on the handlebar and tighten the upper clamp bolt first as shown.

Clutch master cylinder mounting bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)
Clutch master cylinder union bolt: 23 N·m [illegible]

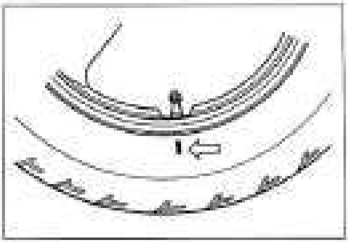
- Bleed air from the clutch fluid system. (☞ 2-18)

TIRE AND WHEEL

TIRE REMOVAL

The most critical factor of a 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.



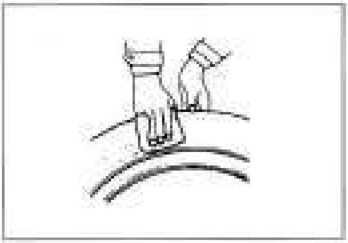
INSPECTION

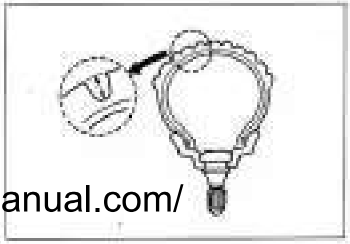
WHEEL INSPECTION

Wipe the wheel clean and check for the following:
- Distortion and crack
- Nick or scratch on bead
- Wheel rim runout (☞ 6-16)

TIRE INSPECTION

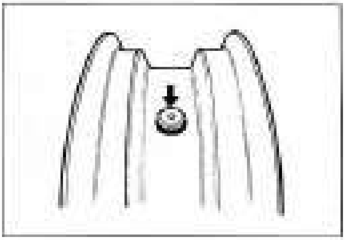
Tire must be checked for the following points:
- Nick and rupture on side wall
- Thread remaining depth (☞ 2-28)
- Separation of cord
- Abnormal, uneven wear on tread
- Surface damage on bead
- Localized tread wear due to skidding (Flat spot)
- Abnormal condition of inner liner





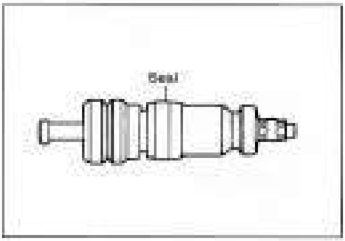
VALVE INSPECTION

Inspect the valve after the tire is removed from the rim. Replace the valve with a new one if the seal 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.

Inspect the valve core.
If the seal has abnormal deformation, replace the valve with a new one.



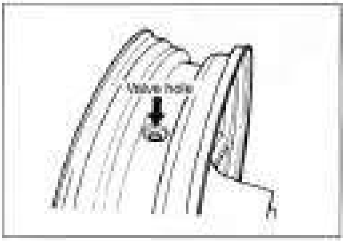
VALVE INSTALLATION

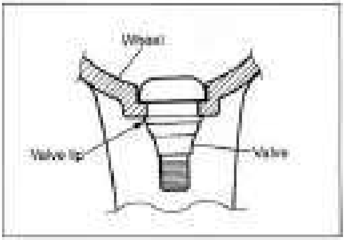
Any dust or rust around the valve hole must be cleaned off. Then install the valve in the rim.

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 of valve.





TIRE INSTALLATION

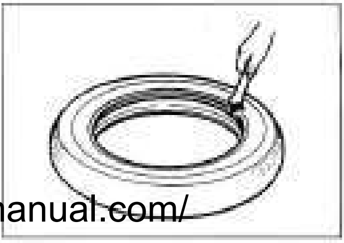
- Apply tire lubricant to the tire bead.
- When installing the tire onto the wheel, observe the following points.

⚠ CAUTION

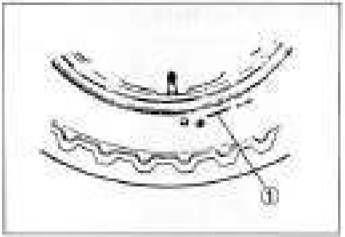
Do not reuse the valve which has been once removed.

⚠ CAUTION

Never use oil, grease or gasoline on the tire bead in place of tire lubricant.



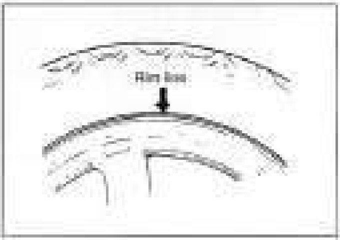
- When installing the tire, the arrow ① on the side wall should point to the direction of wheel rotation.
- Align the chalk mark put on the tire at the time of removal with the valve position.



- 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.
- Pump up the tire with air.

⚠ WARNING

> * **Do not inflate the tire to more than 400 kPa (4.0kgf/cm²). If inflated beyond this limit, the tire can burst and possibly cause injury. Do not stand directly over the tire while inflating.**
> * **In the case of preset pressure air inflator, pay special care for the set pressure adjustment.**



- In this 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, inflate air and adjust the pressure to specification.
- As necessary, adjust the tire balance.

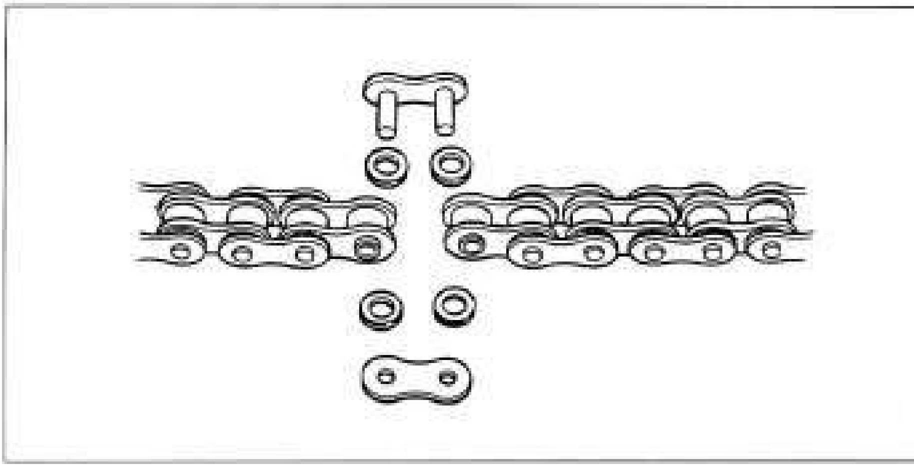
⚠ CAUTION

> **Do not run with a repaired tire at a high speed.**

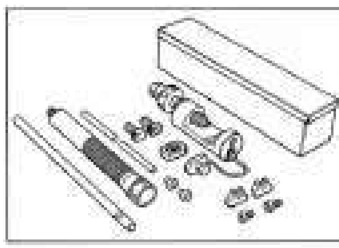
DATA Cold inflation tire pressure

Solo riding: Front: 290 kPa (2.90 kgf/cm², 42 psi)
Rear: 290kPa (2.90 kgf/cm², 42 psi)
Dual riding: Front: 290 kPa (2.90 kgf/cm², 42 psi)
Rear: 290kPa (2.90 kgf/cm², 42 psi)

DRIVE CHAIN



Use the special tool in the following procedures, to cut and re-join the drive chain.

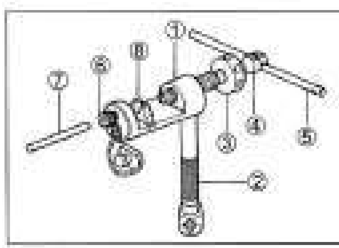


09922-22711: Drive chain cutting and joining tool set

NOTE:

When using the special tool, apply a small quantity of grease to the threaded parts of the special tool.

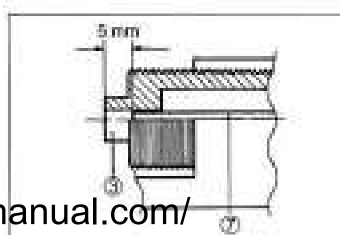
DRIVE CHAIN CUTTING



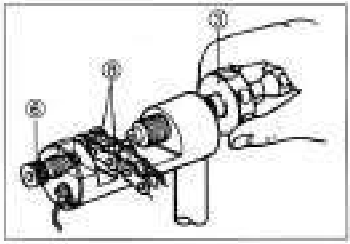
- Set up the special tool as shown in the illustration.
  ① Tool body
  ② Grip handle
  ③ Pressure bolt "A"
  ④ Pressure bolt "B"
  ⑤ Bar
  ⑥ Adjuster bolt (with through hole)
  ⑦ Pin remover
  ⑧ Chain holder (engraved mark 500)
  with reamer bolt M5×10

NOTE:

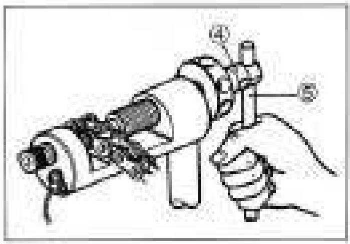
The tip of pin remover ⑦ should be positioned inside approximately 5 mm (0.2 in) from the end face of pressure bolt "A" ③ as shown in the illustration.



- Place the drive chain link being disjointed on the 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.

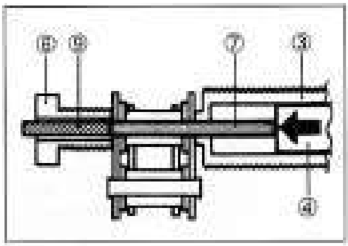


▲ CAUTION

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.



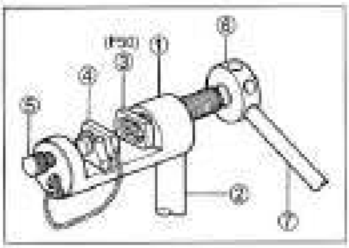
▲ CAUTION

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.

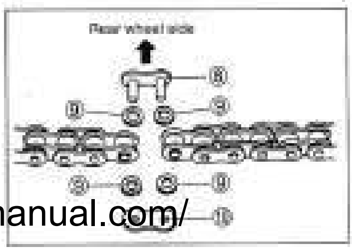
DRIVE CHAIN CONNECTING

JOINT PLATE INSTALLATION

- Set up the special tool as shown in the illustration.
  - ① Tool body
  - ② Grip handle
  - ③ Joint plate holder (engraved mark "F50")
  - ④ Wedge holder & wedge pin
  - ⑤ Adjuster bolt (without hole)
  - ⑥ Pressure bolt "A"
  - ⑦ Bar



- Connect both ends of the drive chain with the joint pin ⑥ inserted from the wheel side as installed on the motorcycle.
  - ⑨ O-ring .....4 pcs
  - ⑩ Joint plate
  - Joint set part number
  - RK: 27620-24F00

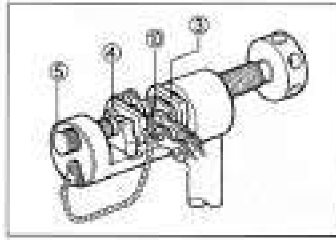


▲ WARNING

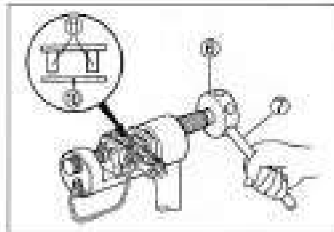
Do not use joint clip type of drive chain. The joint clip may have a chance to drop which may cause severe damage to motorcycle and severe injury.

- Apply grease on the recessed portion of the joint plate holder ③ and set the joint plate ⑤.

NOTE:
When positioning the joint plate ⑤ on the tool, bring its stamp mark on the joint plate holder ③ side.



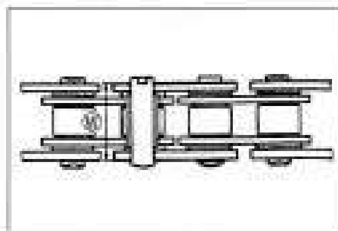
- Set the drive chain on the tool as illustrated and turn in the adjuster bolt ⑥ to secure the wedge holder & wedge pin ④.
- Turn in the pressure bolt "A" ⑥ and align two joint pins ① properly with the respective holes in joint plate ⑤.
- Turn in the pressure bolt "A" ⑥ further using the bar ⑦ to press the joint plate over the joint pins.



- Continue pressing the joint plate until the distance between the two joint plates comes to the specification.

Joint plate distance specification ⑧

RK	21.85 – 22.15 mm (0.860–0.872 in)

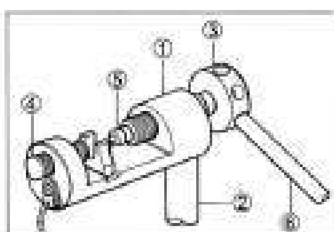


⚠ CAUTION

Should pressing of the joint plate be made excessively beyond the specified dimension, the work should be redone using the new joint parts.

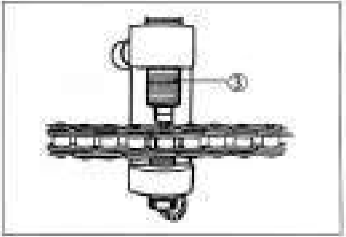
JOINT PIN STAKING

- 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 [illegible] 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.



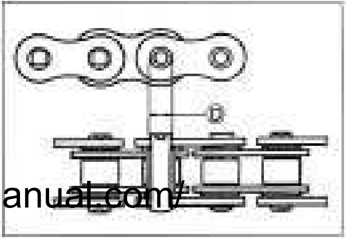
Pin end diameter specification D

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. (☞ 2-22)



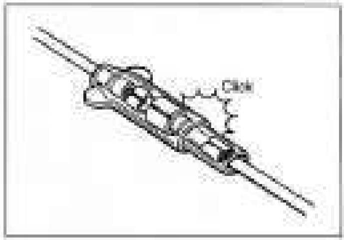
ELECTRICAL SYSTEM

CONTENTS

7

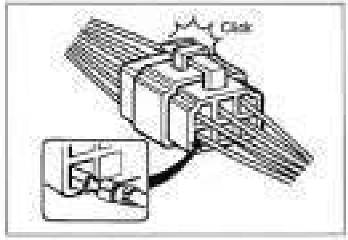
CAUTIONS IN SERVICING

CONNECTOR



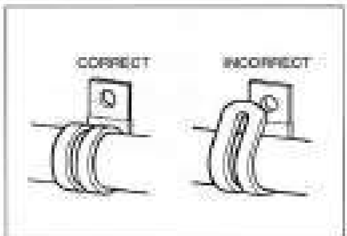
- When connecting a connector, be sure to push it in until a click is felt.
- Inspect the connector for corrosion, contamination and breakage in its cover.

COUPLER



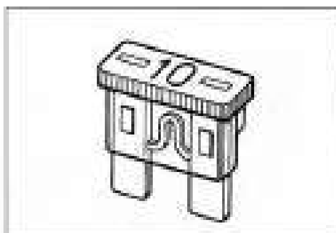
- With a lock type coupler, be sure to release the lock before disconnecting it and push it in fully till the lock works when connecting it.
- When disconnecting the coupler, be sure to hold the coupler itself and do not pull the lead wires.
- Inspect each terminal on the coupler for being loose or bent.
- Inspect each terminal for corrosion and contamination.

CLAMP



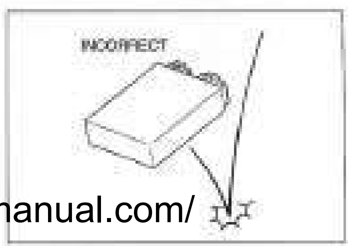
- Clamp the wire harness at such positions as indicated in "WIRE HARNESS ROUTING". (☞ 8-19 – 21)
- Bend the clamp properly so that the wire harness is clamped securely.
- In clamping the wire harness, use care not to allow it to hang down.
- Do not use wire or any other substitute for the band type clamp.

FUSE



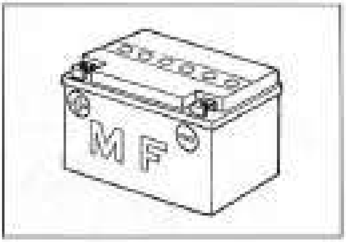
- When a fuse blows, always investigate the cause, correct it and then replace the fuse.
- Do not use a fuse of a different capacity.
- Do not use wire or any other substitute for the fuse.

SEMI-CONDUCTOR EQUIPPED PART



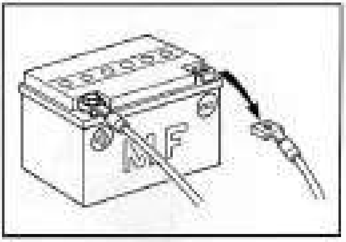
- Be careful not to drop the part with a semi-conductor built in such as a ECM.
- When inspecting this part, follow inspection instruction strictly. Neglecting proper procedure may cause damage to this part.

BATTERY

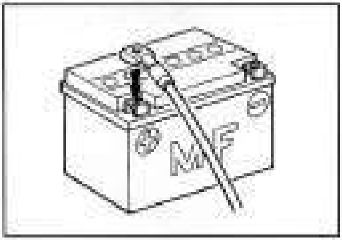


- The MF battery used in this vehicle does not require maintenance as inspection of electrolyte level and replenishment of water.
- No hydrogen gas is produced during normal charging of the battery, but such gas may be produced when it is overcharged. Therefore, do not bring fire near the battery while it is being charged.
- Note that the charging system for the MF battery is different from that of an ordinary battery. Do not replace with an ordinary battery.

CONNECTING BATTERY



- When disconnecting terminals from the battery for disassembly or servicing, be sure to disconnect the negative (⊖) terminal first.
- When connecting terminals to the battery, be sure to connect the positive (⊕) terminal first.
- If the terminal is found corroded, remove the battery, pour warm water over it and clean with a wire brush.
- Upon completion of connection, apply grease lightly.
- Put a cover over the positive (⊕) terminal.



WIRING PROCEDURE

- Route the wire harness properly according to "WIRE HARNESS ROUTING". (☞ 8-19 – 21)

USING MULTI CIRCUIT TESTER

- Use the Suzuki multi-circuit tester (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.
- Reset the pocket tester to 0Ω before measuring each resistance or after changing the resistance range.
- When measuring the resistance with the multi-circuit tester, also measure the resistance with no-load. Sub-tract that resistance from the resistance measured under load in order to get the true resistance.
- When measuring the resistance with the multi-circuit tester, ∞ becomes 10.00MΩ 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.

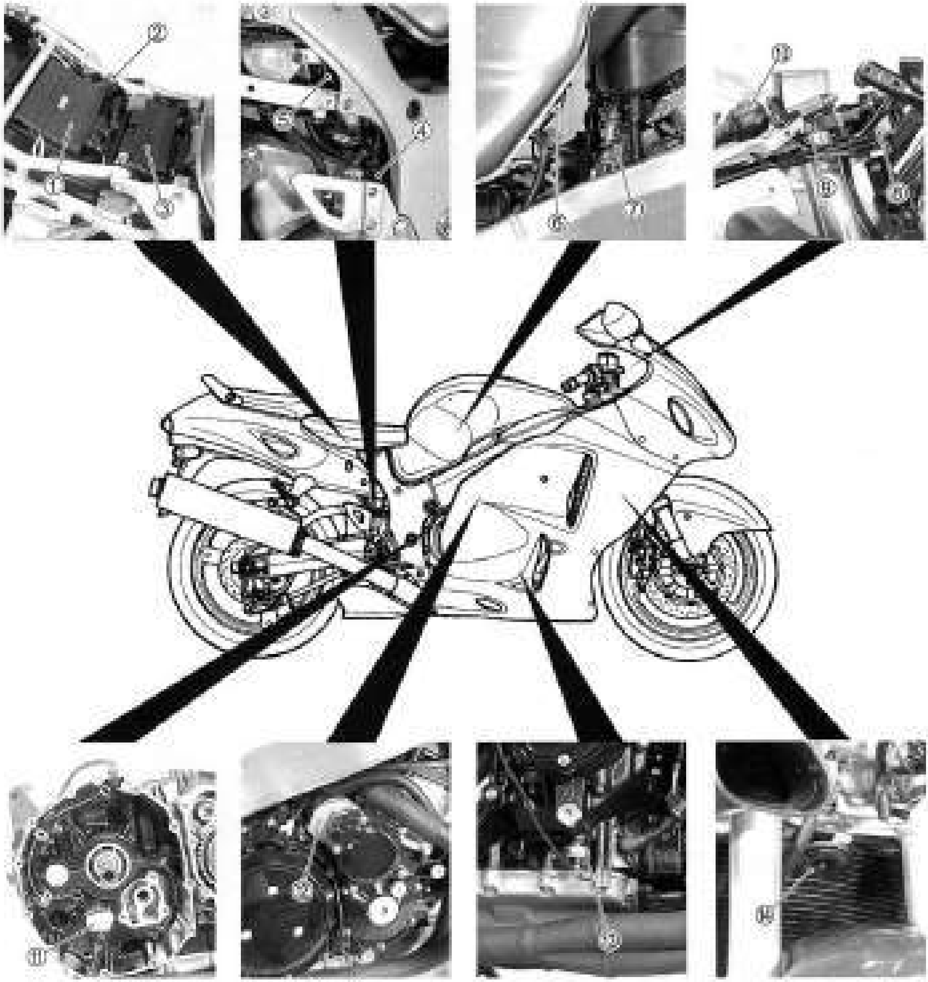
[Measured resistance] – [No load resistance] = [True resistance]

09900-25008: Multi-circuit tester

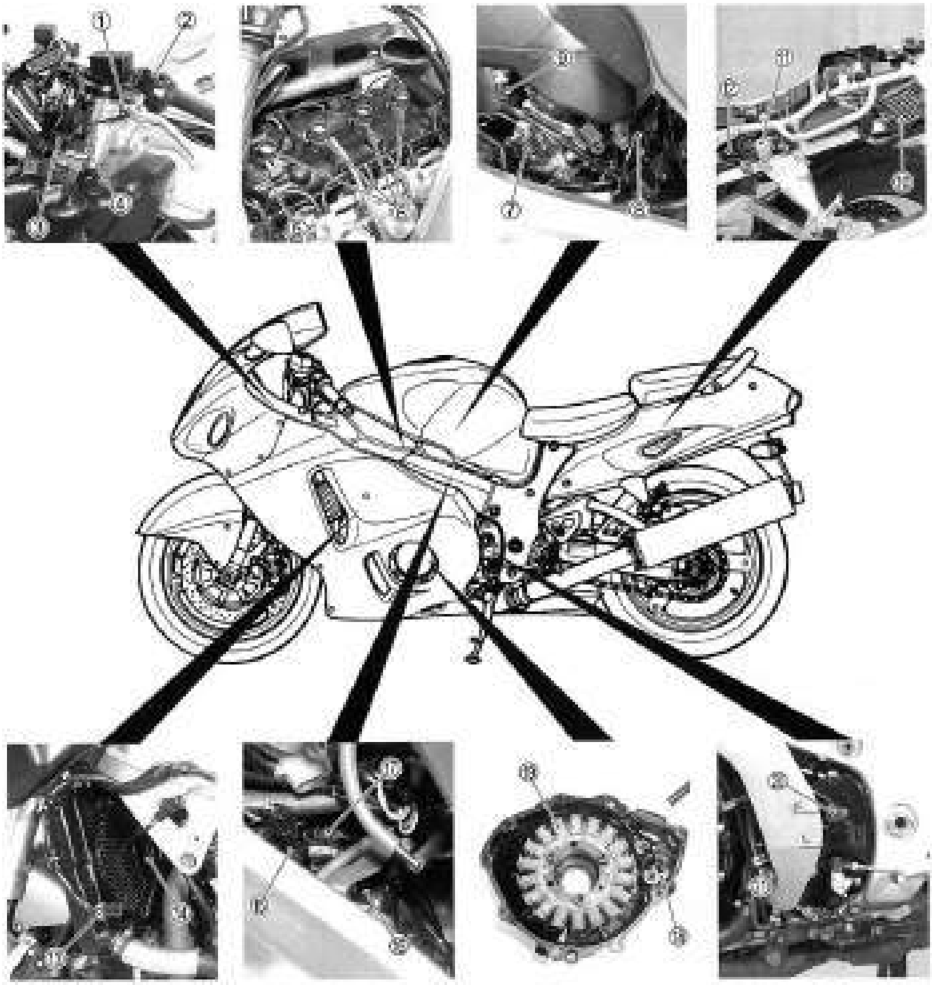
NOTE:

- *When connecting the multi circuit tester, install fine copper wires (O.D is below 0.5 mm) to the back side of the lead wire coupler and connect the probes of tester to them.*
- *Use a fine copper wire, the outer diameter being below 0.5 mm, to prevent ... damage.*

LOCATION OF ELECTRICAL COMPONENTS



① ECM (Engine Control Module)
② Mode selection switch coupler (☞ 4-33)
③ Battery
④ Rear brake switch
⑤ Tip over sensor (☞ 4-74)
⑥ Fuel level gauge
⑦ Fuel pump (☞ 4-52)
⑧ Ignition switch
⑨ Front brake switch
⑩ Handlebar switch (R)
⑪ Gear position switch
⑫ Starter motor
⑬ Oil pressure switch
⑭ Horn



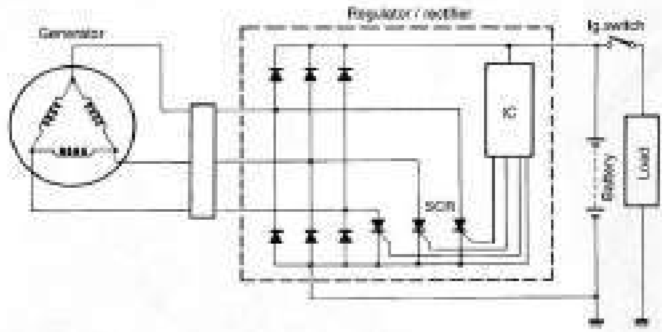
① Clutch lever position switch
② Handlebar switch (L)
③ Turn signal/ side-stand relay
④ Fuse box
⑤ Cam position sensor (☞ 4-74)
⑥ Ignition coil (No. 1, 2, 3, 4)
⑦ Throttle position sensor (☞ 4-73)
⑧ Intake air pressure sensor (☞ 4-73)
⑨ Intake air temp. sensor (☞ 4-74)
⑩ Regulator/ Re[illegible]
⑪ Starter relay/Main fuse
⑫ Fuel pump relay (☞ 4-60)
⑬ Cooling fan thermo-switch (☞ 5-6)
⑭ Cooling fan (☞ 5-5)
⑮ Vacuum control solenoid valve (☞ 4-71)
⑯ Atmospheric pressure sensor (☞ 4-74)
⑰ Engine coolant temp. sensor (☞ 5-8)
⑱ Crankshaft position sensor
⑲ Generator
⑳ Speedometer sensor
[illegible]

CHARGING SYSTEM

DESCRIPTION

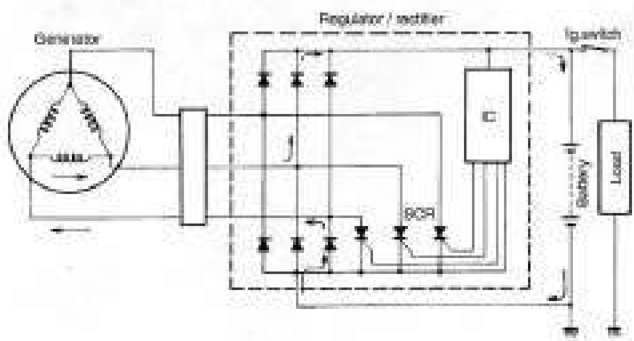
The circuit of the charging system is indicated in the figure, which is composed of the generator, regulator/rectifier unit and battery.

The AC current generated from the generator is rectified by the rectifier and is turned into DC current, then it charges the battery.

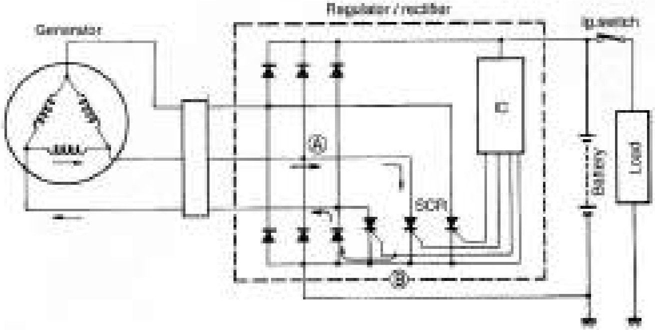


FUNCTION OF REGULATOR

While the engine r/min is low and the generated voltage of the generator is lower than the adjusted voltage of regulator, the regulator does not function. However, the generated current charges the battery directly at this time.



When the engine r/min becomes higher, the generated voltage of the generator also becomes higher and the voltage between the battery terminals becomes high accordingly. When it reaches the adjusted voltage of the I.C., (Integrated Circuit) and it is turned "ON", a signal will be sent to the SCR (Thyristor) gate probe and the SCR will be turned "ON".
Than, the SCR becomes conductive in the direction from point Ⓐ to point Ⓑ. At this time, the current generated from the generator gets through the SCR without charging the battery and returns to generator again. At the end of this state, since the AC current generated from generator flows to point Ⓑ, the reverse current tends to flow to SCR. Then, the circuit of SCR turns to the OFF mode and begins to charge the battery again. Thus these repetitions maintain charging voltage and current to the battery constant and protect it from overcharging.



TROUBLESHOOTING

Battery runs down quickly.

↓

Check accessories which use excessive amounts of electricity. — Accessories are installed → • Remove accessories.

↓ No accessories

Check the battery for current leaks. (☞ 7-9) — Current leaks → • Short circuit of wire harness • Loose or disconnected wires • Faulty battery

↓ No current leaks

Measure the charging voltage between the battery terminals. (☞ 7-9) — Correct → • Faulty battery • Abnormal driving condition

↓ Incorrect

Measure the continuity of the generator coil. (☞ 7-10) — No continuity → • Faulty generator coil or disconnected lead wires

↓ Continuity

Measure the generator no-load voltage. (☞ 7-10) — No good → • Faulty generator

↓ OK

Inspect the regulator/rectifier. (☞ 7-10) — No good → • Faulty regulator/rectifier

↓ OK

Inspect wirings. — No good → • Short circuit of wire harness • Poor contact of couplers

↓ OK → • Faulty battery

Others

Battery overcharge	• Faulty regulator/rectifier • Faulty battery • Poor contact of generator lead wire coupler

INSPECTION

BATTERY CURRENT LEAK INSPECTION

- Remove the front seat. (☞ 6-11)
- Turn the ignition switch to the OFF position.
- Disconnect the battery ⊖ lead wire.
- Connect the multi circuit tester between the ⊖ terminal and ⊖ lead wire of the battery.

NOTE:
Leakage is evident if the reading is over 3mA.

09900-25008: Multi circuit tester set

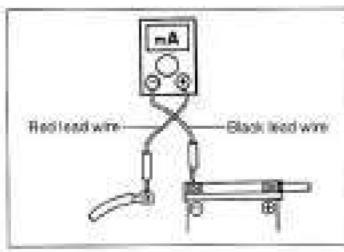
Battery current leak: Under 3mA

Tester knob indication: Current (⎓, 20mA)

⚠ CAUTION

- **Because the current leak might be large, turn the tester to high range first to avoid tester damage.**
- **Do not turn the ignition switch to the ON position when measuring current.**

When leakage is found, look for the part where the tester reads under 3mA through the couplers and connectors by removing them one by one.



CHARGING OUTPUT INSPECTION

- Remove the front seat. (☞ 6-11)
- Start the engine and keep it running at 5 000 r/min. with lighting switch turned ON and dimmer switch turned HI position.

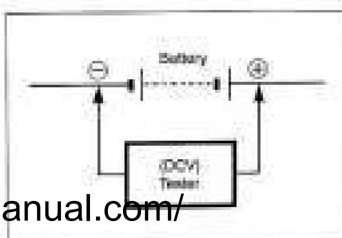
Measure the DC voltage between the battery terminals ⊕ and ⊖ with the multi circuit tester. If the tester reads under 13.4 V or over 15.1 V, inspect the generator coil and regulator/rectifier.

NOTE:
When making this test, be sure that the battery is in fully-charged condition.

09900-25008: Multi circuit tester set

Charging output (Regulated voltage):
13.5 – 15.0 V at 5 000 r/min.

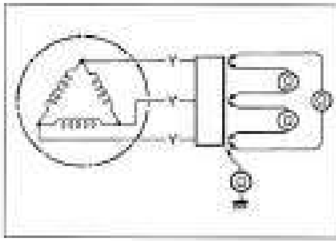
Tester knob indication: Voltage (⎓)



GENERATOR COIL RESISTANCE INSPECTION

- Remove the frame cover. (☞ 6-12)
- Disconnect the generator coupler.

Measure the resistance between the three lead wires.
Also check that the stator core is insulated.
If the resistance is not specified value, replace the stator with a new one.



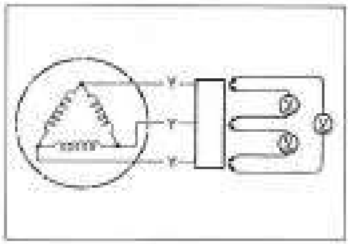
09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

Generator coil resistance: 0.2 – 0.4 Ω

NOTE:
When making above test, it is not necessary to remove the generator.

GENERATOR NO-LOAD PERFORMANCE INSPECTION



- 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:
More than 65 V at 5 000 r/min (When engine is cold)

REGULATOR/RECTIFIER INSPECTION

- Remove the frame cover. (☞ 6-12)
- Disconnect the regulator/rectifier couplers.

Using the multi circuit tester, measure the voltage between the lead wires in the following table.
If voltage is incorrect, replace the regulator/rectifier.

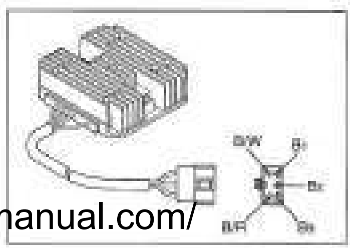
09900-25008: Multi circuit tester set

Tester knob indication: Diode test (→|-)

Unit: V

⊖ Probe of tester to:	⊕ Probe of tester to: B/R	B1	B2	B3	B/W
B/R		0.4–0.7	0.4–0.7	0.4–0.7	0.5–1.2
B1	Approx. 1.5		Approx. 1.5	Approx. 1.5	0.4–0.7
B2	Approx. 1.5	Approx. 1.5		Approx. 1.5	0.4–0.7
B3	Approx. 1.5	Approx. 1.5	Approx. 1.5		0.4–0.7
B/W	Approx. 1.5	Approx. 1.5	Approx. 1.5	Approx. 1.5	

B: Black, B/R: Black with Red tracer, B/W: Black with White tracer

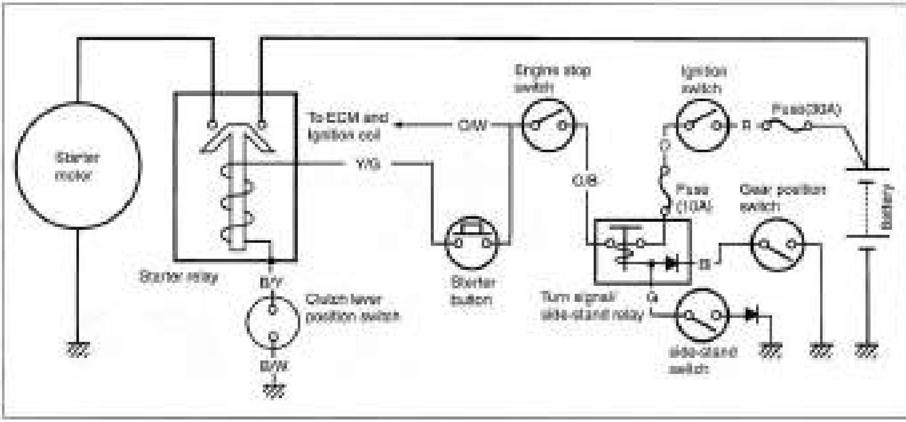


NOTE:
If the tester reads [illegible] connected, replace the battery of multi circuit tester.

STARTER SYSTEM AND SIDE-STAND/IGNITION INTERLOCK SYSTEM

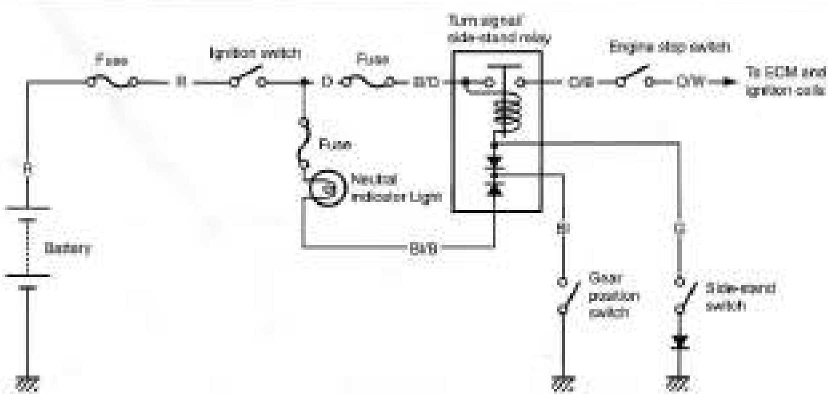
STARTER SYSTEM DESCRIPTION

The starter system consists of the following components: the starter motor, starter relay, clutch lever position switch, turn signal/side-stand relay, side-stand switch, gear position switch, starter button, engine stop switch, ignition switch and battery. Pressing the starter button (on the right handlebar switch) energizes the starter relay, causing the contact points to close, thus completing the circuit from the starter motor to the battery. The starter motor draws about 80 amperes to start the engine.



SIDE-STAND/IGNITION INTERLOCK SYSTEM DESCRIPTION

This side-stand/ignition interlock system prevents the motorcycle from being started with the side-stand down. The system is operated by an electric circuit provided between the battery and ignition coils.

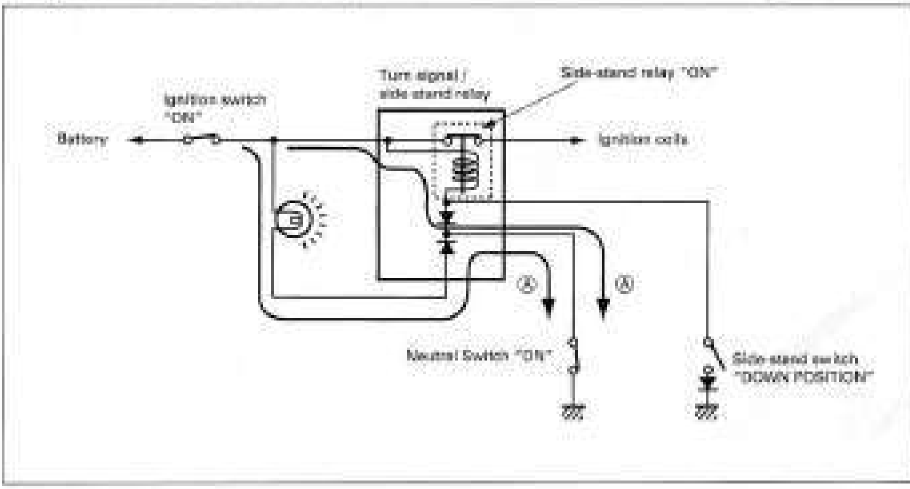


WIRE COLOR

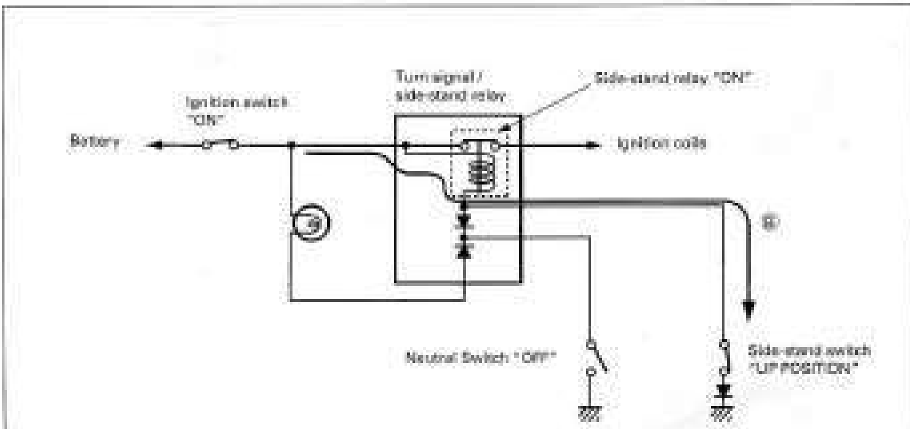
G : Green
R : Red
Bl : Blue
O : Orange
B/O : Black with Orange tracer
O/B : Orange with Black tracer
O/W : Orange with White tracer

The circuit consists of the turn signal/side-stand relay, neutral indicator light, gear position switch and side-stand switch. The ignition coils will send voltage to the spark plugs dependant on what gear the transmission is in and whether the side-stand is either up or down. The gear position and side-stand switches work together in this system. The ignition coils work only in two situations as follows.

1. Transmission: Neutral (ON) Side-stand: Down (OFF)
   The current flow Ⓐ switches "on" the side-stand relay and the ignition coils send voltage to the spark plugs even when the side-stand is kept down.



2. Side-stand: Up (ON)
   The current flow Ⓑ switches "on" the side-stand relay and the ignition coils send voltage to the spark plugs. The engine can be started in any gear.



TROUBLE SHOOTING

Starter motor will not run.

The transmission is in neutral. Grasp the clutch lever, turn on the ignition switch with the engine stop switch in the "RUN" position and listen for a click from the starter relay when the starter button is pushed.

— Clicks →

Check if the starter motor runs when its terminal is connected to the battery ⊕ terminal (Do not use thin "wire" because a large amount of current flows).

- Runs →
  - Faulty starter relay
  - Loose or disconnected starter motor lead wire
- Does not run →
  - Faulty starter motor

— No click ↓

Measure the starter relay voltage at the starter relay connectors (between Y/G ⊕ and B/Y ⊖) when the starter button is pushed.

— No voltage →

- Faulty ignition switch
- Faulty engine stop switch
- Faulty clutch lever position switch
- Faulty gear position switch
- Faulty turn signal/side-stand relay
- Faulty starter button
- Poor contact of connector
- Open circuit in wire harness

— Voltage ↓

Check the starter relay. (☞ 7-16)

— No good →

- Faulty starter relay

— OK →

- Poor contact of the starter relay

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.

Check the side-stand switch. (☞ 7-17)

— No good →

- Faulty side-stand switch

— OK →

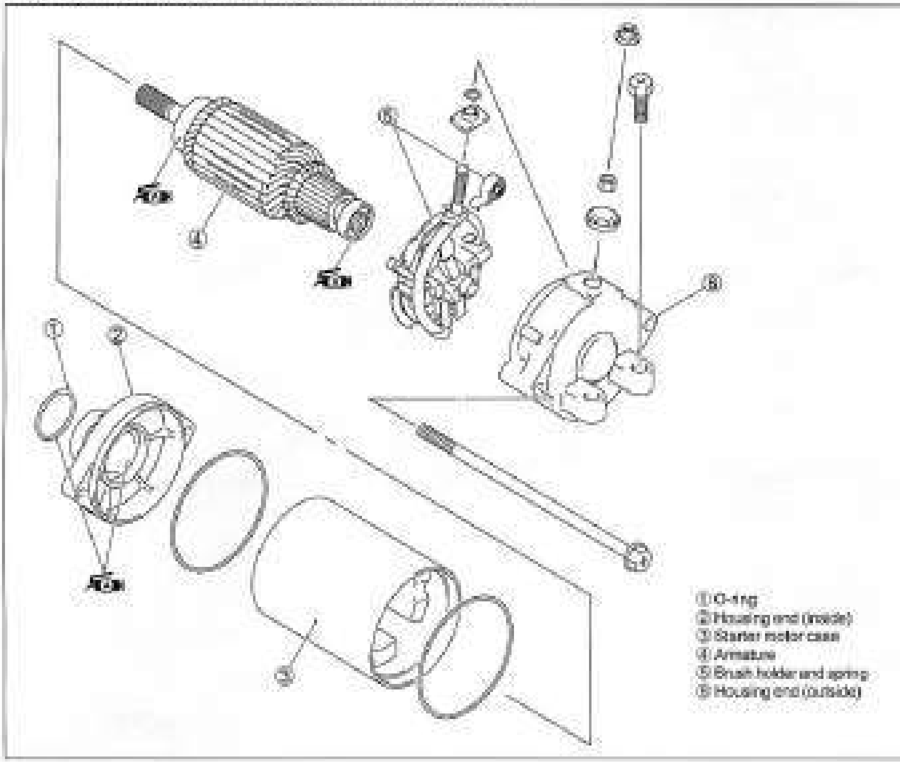
- Open circuit in wire harness
- Poor contact of connector

Others

Engine does not turn though the starter motor runs.	• Faulty starter clutch • Faulty starter torque limiter

STARTER MOTOR REMOVAL AND DISASSEMBLY

- Remove the air cleaner box and throttle body. (☞ 3-4)
- Disconnect the starter motor lead wire. (☞ 3-7)
- Remove the starter motor. (☞ 3-26)
- Disassemble the starter motor as shown in the illustration.



① O-ring
② Housing end (inside)
③ Starter motor case
④ Armature
⑤ Brush holder and spring
⑥ Housing end (outside)

STARTER MOTOR INSPECTION

CARBON BRUSH

Inspect the brushes for abnormal wear, crack or smoothness in the brush holder.
If the brush has failed, replace the brush sub assy.

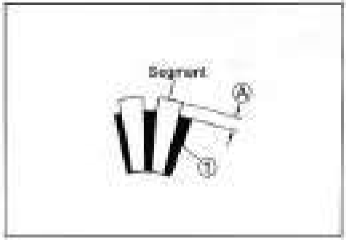
COMMUTATOR

Inspect the commutator for discoloration, abnormal wear or undercut Ⓐ.

If the commutator is abnormally worn, replace the armature.

When surface is discolored, polish it with #400 sand paper and clean it with dry cloth.

If there is no undercut, scrape out the insulator ① with saw blade.

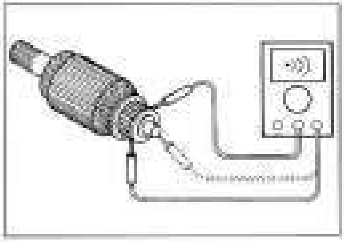


ARMATURE COIL INSPECTION

Check for continuity between each segment.

Check for continuity between each segment and the armature shaft.

If there is no continuity between the segments or there is continuity between the segments and shaft, replace the starter motor 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:

⚠ CAUTION

Replace the O-ring with a new one to prevent oil leakage and moisture.

- Apply grease to the lip of the oil seal and bearings.

99000-25030: SUZUKI SUPER GREASE "A"

- Apply grease to the O-ring, and remount the starter motor.

99000-25030: SUZUKI SUPER GREASE "A"

STARTER RELAY INSPECTION

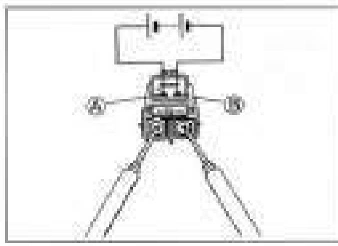
- Remove the front seat and frame cover. (☞ 8-11, -12)
- Disconnect the battery ⊖ lead wire ①, and starter relay cover ②.

- Disconnect the starter motor lead wire ③, and battery lead wire ④ and starter relay coupler ⑤ from the starter relay.
- Remove the starter relay.

Apply 12 volts to Ⓐ and Ⓑ terminals, inspect the continuity between the terminals, positive and negative.
If continuity is found, the starter relay is in sound condition.

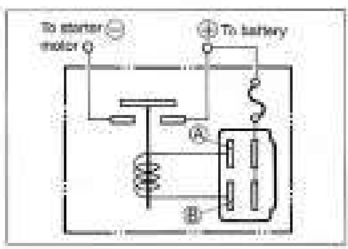
09900-25008: Multi circuit tester set

Tester knob indication: Continuity test (•))))



▲ CAUTION

Do not apply a battery voltage more than 5 seconds to the starter relay as it may overheat and cause damage to the relay coil.



- Check the coil for "open", "ground" and ohmic resistance. The coil is in good condition if the resistance is as follows.

09900-25008: Multi circuit tester set

DATA Starter relay resistance: 3 – 5 Ω

SIDE-STAND/IGNITION INTERLOCK SYSTEM PART INSPECTION

If the interlock system does not operate properly, check each component. If any abnormality is found, replace the component with a new one.

SIDE-STAND SWITCH

The side-stand switch coupler is located behind the left upper fairing.

- Lift the fuel tank. (☞ 4-50)
- Disconnect the side-stand switch coupler and measure the voltage between Green and Black/White lead wires.

09900-25008: Multi circuit tester set

Tester knob indication: Diode test (→|←)

	Green (⊕ Probe)	Black/White (⊖ Probe)
ON (Side-stand up)	0.4–0.6 V	
OFF (Side-stand down)	1.4–1.5 V	

NOTE:

If the tester reads under 1.4V when the tester probes are not connected, replace its battery.

GEAR POSITION SWITCH

- Lift the fuel tank. (☞ 4-50)
- Disconnect the gear position switch lead wire and check the continuity between Blue and Black/White with the transmission in "NEUTRAL".

	Blue	Black/White
ON (Neutral)	○—	—○
OFF (Except neutral)		

⚠ CAUTION

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

- Connect the gear position switch lead wire coupler to the wiring harness.
- Turn the ignition switch to "ON" position and side-stand to upright position.

Using a multi circuit tester, measure the voltage between Pink and Black/White lead wires with low to top gear positions.

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

DATA Gear position switch voltage: More than 0.6V
(* Low to top gear position) (Pink - B/W)
(* Except neutral position)

NOTE:
- *When connecting the multi circuit tester, install the copper stings (O.D is below 0.5 mm) to the back side of the lead wire coupler and connect the probes of tester to them.*
- *Use the copper stings … to prevent the rubber of the water proof coupler from damage.*

TURN SIGNAL/SIDE-STAND RELAY

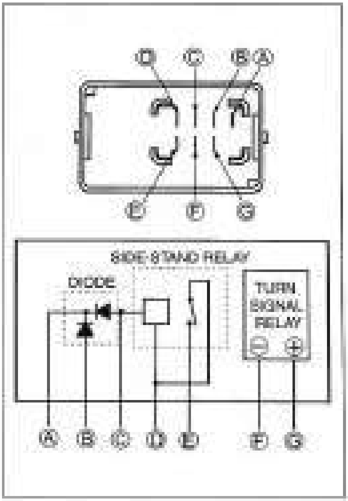
REMOVAL

The turn signal/side-stand relay is composed of the turn signal relay, and the side-stand relay and diode.

- Remove the left upper panel. (☞ 6-7)
- Remove the turn signal/side-stand relay.

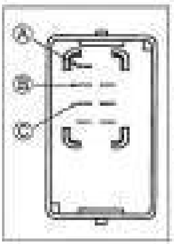
SIDE-STAND RELAY INSPECTION

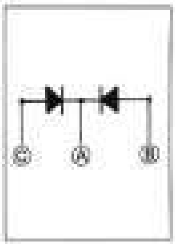
First check the insulation between Ⓓ and Ⓔ terminals with the tester. Then apply 12V to terminals Ⓓ and Ⓒ (⊕ to Ⓓ and ⊖ to Ⓒ) and check the continuity between Ⓓ and Ⓔ. If there is no continuity, replace the turn signal/side-stand relay with a new one.



DIODE INSPECTION

Measure the voltage between the terminals using the multi circuit tester. Refer to the following table.





Unit: V

⊖ Probe of tester to:	⊕ Probe of tester to: Ⓒ,Ⓑ	⊕ Probe of tester to: Ⓐ
Ⓒ,Ⓑ		1.4–1.5
Ⓐ	0.4–0.6	

09900-25008: Multi circuit tester set

Tester knob indication: Diode test (-▶|-)

NOTE:

If the multi circuit te[illegible] are not connected, replace its battery .

IGNITION SYSTEM

DESCRIPTION

The ignition system is controlled by the ECM. The system is called fully transistorized ignition system which decides accurate ignition timing according to the engine rpm, gear position and throttle position.
The ignition system has four ignition coils called DIRECT IGNITION. In this system, the plug cap and ignition coil for each cylinder are unified.
This system consists of the crankshaft position sensor (pick up coil), ECM, ignition coils/spark plug caps and spark plugs.

1. The ignition coil power source is supplied through the side-stand relay from the battery, which means that the ignition coil power source is controlled by the side-stand and gear position switch.
2. The ignition timing is accurately controlled by the throttle position and engine rpm.
   In addition to this basic map, the engine coolant temp. sensor affects the ignition timing when the engine is started using fast idle system with coolant temperature low.
3. The ignition timing is also compensated according to the gear position and throttle position.

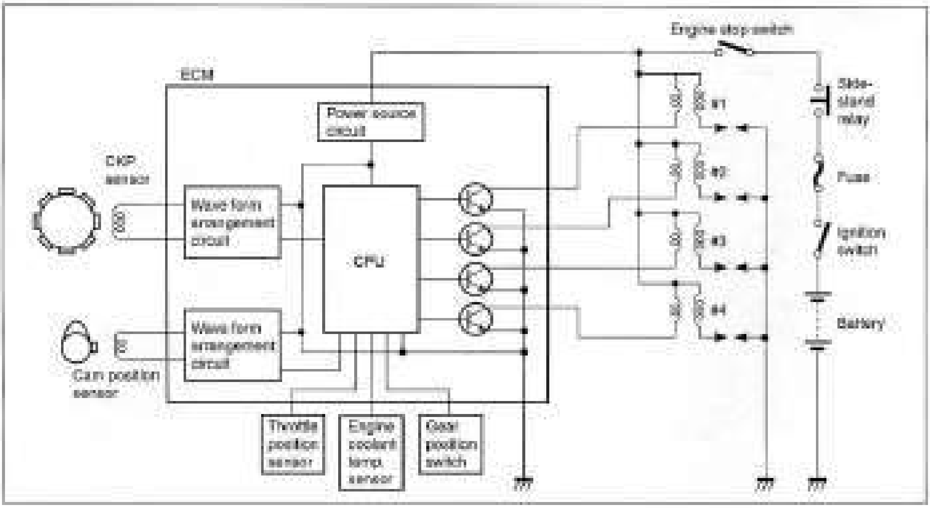
The following devices affects the ignition timing.

Crankshaft position sensor:
The pick up coil is provided at the left end of the crankshaft, which produces signal waveform when meeting with the protrusion on the generator rotor.
The generated wave is sent to the ECM that calculates the engine rpm.
This signal decides the ignition timing and signal to the tachometer.

Throttle position sensor:
This sensor is set at the throttle body, and it is a kind of variable resistor, which changes resistance value according to the throttle opening. With this signal, the ECM decides the ignition timing in response to the engine rpm.
The ignition timing map is composed of two factors, throttle position and engine rpm.

Gear position switch:
The gear position switch has a different resistance for each gear, and ECM understands the gear position.
The ECM selects the ignition timing when the gear position is changed.

Engine coolant temp. sensor:
This sensor changes ignition timing to advance side when the temperature is low. The timing advance returns to the basic map when engine coolant temperature rise.

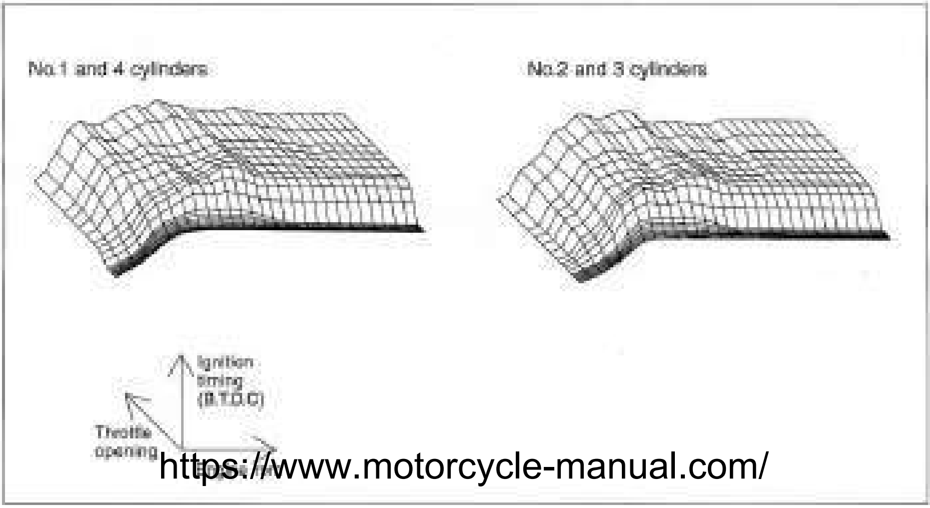


NOTE:
The ignition cut-off circuit is incorporated in this ECM to prevent over-running of engine. If engine rpm reaches 10 600 r/min., this circuit cuts off the ignition primary current for all spark plugs.

▲ CAUTION

Under no load, the engine can run over 10 600 r/min, even if the ignition cut-off circuit is effective, and it may cause engine damage. Do not run the engine without load over 10 600 r/min at anytime.

IGNITION TIMING MAP



TROUBLESHOOTING

*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.

No spark or poor spark

↓

Check the ignition system couplers for poor connections.

- Looseness → • Poor connection of couplers
- Correct ↓

Measure the battery voltage between input lead wires (O/W and B/W) at the ECM with the ignition switch in the "ON" position.

- Incorrect →
  - Faulty ignition switch
  - Faulty turn signal/side-stand relay
  - Faulty engine stop switch
  - Broken wire harness or poor connection of related circuit couplers
- Correct ↓

Measure the ignition coil primary peak voltage. (☞ 7-23, -24)
NOTE: This inspection method is applicable only with the multi circuit tester and the peak volt adaptor.

- Correct → Inspect the spark plugs. (☞ 2-6)
  - Correct → • Poor connection of the spark plug cap (-s)
  - Incorrect → • Faulty spark plug (-s)
- Incorrect ↓

Inspect the ignition coils. (☞ 7-25)

- Incorrect → • Faulty ignition coil (-s)
- Correct ↓

Measure the crankshaft position sensor peak voltage and its resistance. (☞ 7-26, -27)
NOTE: The crankshaft position sensor peak voltage inspection is applicable only with the multi circuit tester and peak volt adaptor.

- Incorrect → • Faulty crankshaft position sensor
- Correct →
  - Faulty ECM
  - Poor connection of ignition couplers

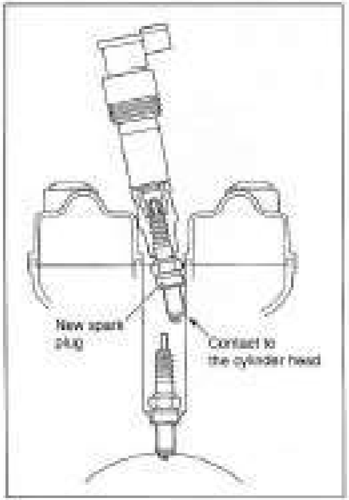
INSPECTION

IGNITION COIL PRIMARY PEAK VOLTAGE

- Remove the air cleaner box. (☞ 3-4)
- 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.**

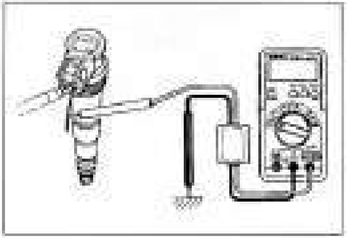


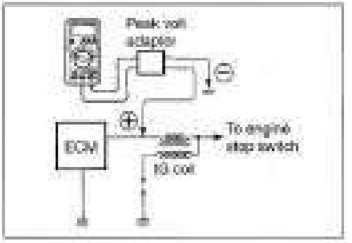
- Connect the new four spark plugs to each ignition coil/plug cap.
- Connect all the ignition coil/plug cap lead wire couplers to the ignition coil/plug caps respectively, and ground them on the cylinder head (each spark plug hole).

⚠ CAUTION

Avoid grounding the spark plugs and suppling the electrical shock to the magnesium parts (cylinder head cover, clutch cover, starter clutch cover, starter idle gear cover and generator cover) 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 terminal (⊕ Probe) – Ground (⊖ Probe) terminal
  No.2 ignition coil/plug cap:
  B terminal (⊕ Probe) – Ground (⊖ Probe) terminal
  No.3 ignition coil/plug cap:
  Y terminal (⊕ Probe) – Ground (⊖ Probe) terminal
  No.4 ignition coil/plug cap:
  G terminal (⊕ Probe) – Ground (⊖ Probe) terminal

09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

⚠ CAUTION

When using the multi circuit tester and peak volt adaptor, follow the instruction manual.

NOTE:

- *When connecting the multi circuit tester, insert the stings (O.D is below 0.5 mm) to the back side of the ignition coil lead wire coupler and connect the tester probes to them.*
- *Use the sting, its outer diameter being below 0.5 mm, 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.

DATA **Ignition coil primary peak voltage: More than 80 V**

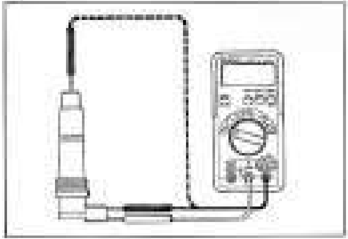
⚠ WARNING

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 peak voltage at the ECM coupler.

IGNITION COIL/PLUG CAP RESISTANCE

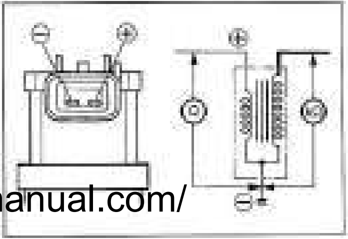
- Check the ignition coil/plug cap for resistance in both primary and secondary windings. If the resistance is not within the standard range, replace the ignition coil/plug cap with a new one.



09900-25008: Multi circuit tester set

Tester knob indication: Resistance (W)

Ignition coil/plug cap resistance
Primary : 0.8 – 1.2 Ω (⊕ tap – ⊖ tap)
Secondary : 8 – 15 kΩ (Plug cap – ⊖ tap)



CKP SENSOR PEAK VOLTAGE

- Remove the front seat. (☞ 6-11)

NOTE:
Be sure that all couplers are connected properly and the battery used is in fully-charged condition.

- Connect the multi circuit tester with peak volt adaptor as follows.
- Measure the CKP sensor peak voltage between White and Green lead wires at the ECM coupler.

Green (⊕ Probe) – White (⊖ Probe)

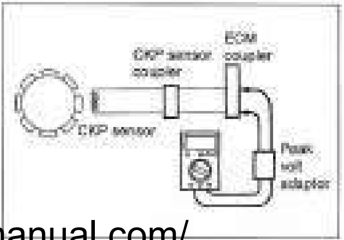
09900-25008: Multi circuit tester set

Tester knob indication: Voltage (⎓)

▲ CAUTION

When using the multi circuit tester and peak volt adaptor, follow the instruction manual.

- 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.



CKP sensor peak voltage: More than 3 V (Green–White)

If the peak voltag[illegible] peak voltage at the CKP sensor lead wire coupler.

- Lift up the fuel tank. (☞ 4-50)
- Disconnect the CKP sensor lead wire coupler and connect the multi circuit tester with the peak volt adaptor.

Green (⊕ Probe) – White (⊖ Probe)

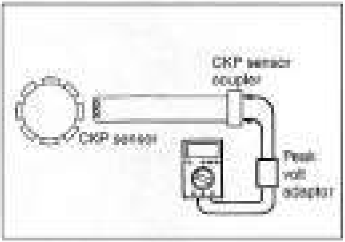
- Measure the CKP sensor peak voltage at the CKP sensor lead wire coupler.

Tester knob indication: Voltage (⎓)

CKP sensor peak voltage:

More than 3 V (Green–White)

If the peak voltage is lower than the standard range, check each coupler at both ends of the circuit or replace the CKP sensor and inspect it again.



CKP SENSOR RESISTANCE

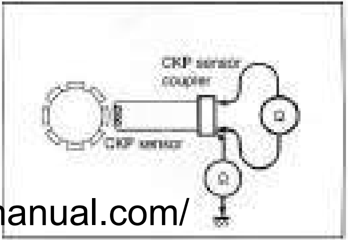
- Measure the resistance between the lead wires and ground. If the resistance is not specified value, the CKP sensor must be replaced.

09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

Signal coil resistance : 180 – 280 Ω (Green – White)

[illegible]



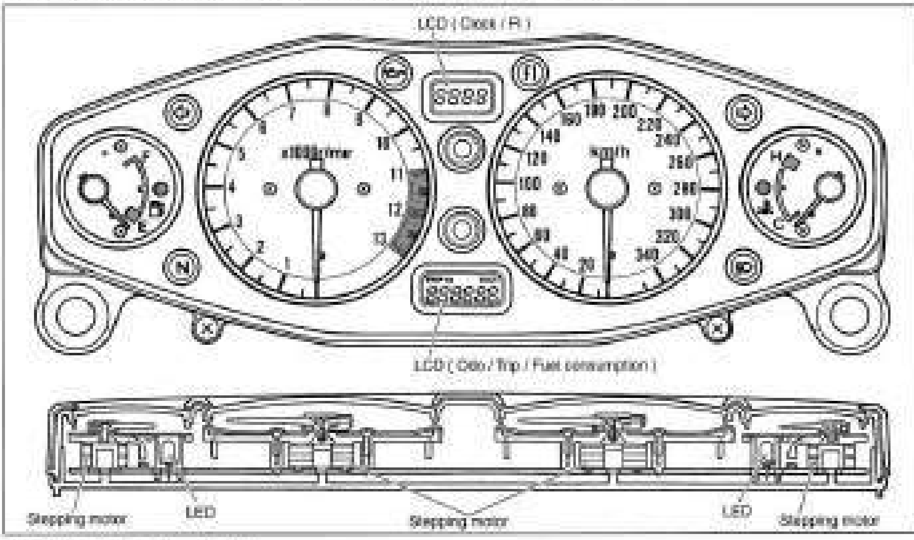
COMBINATION METER

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 high response on those currently in use because of this composition.

Four pointers (speed, rpm, fuel and engine coolant temp.) are illuminated type and driven by the stepping motors.

Two LCDs indicate Clock/FI and Odo/Trip/Fuel consumption respectively.

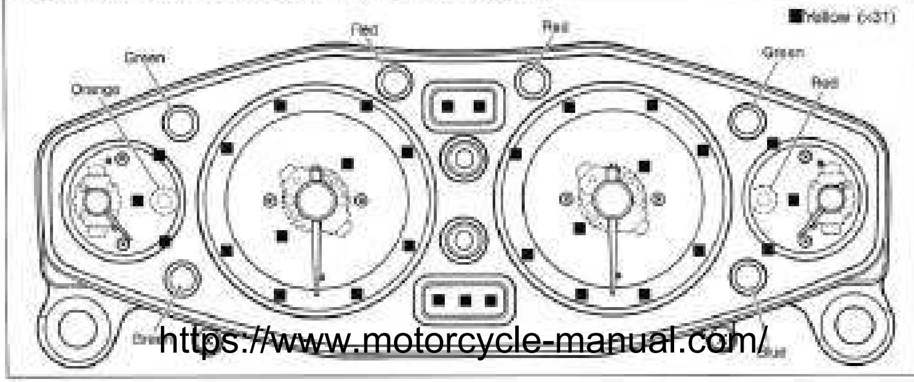


LED (Light Emitting Diode)

LED is used for the illumination light and each indicator light.

LED is maintenance free. LED is less consuming electric power and stronger to vibration resistance compared to the bulb.

All LEDs light up immediately after turning the ignition switch on.

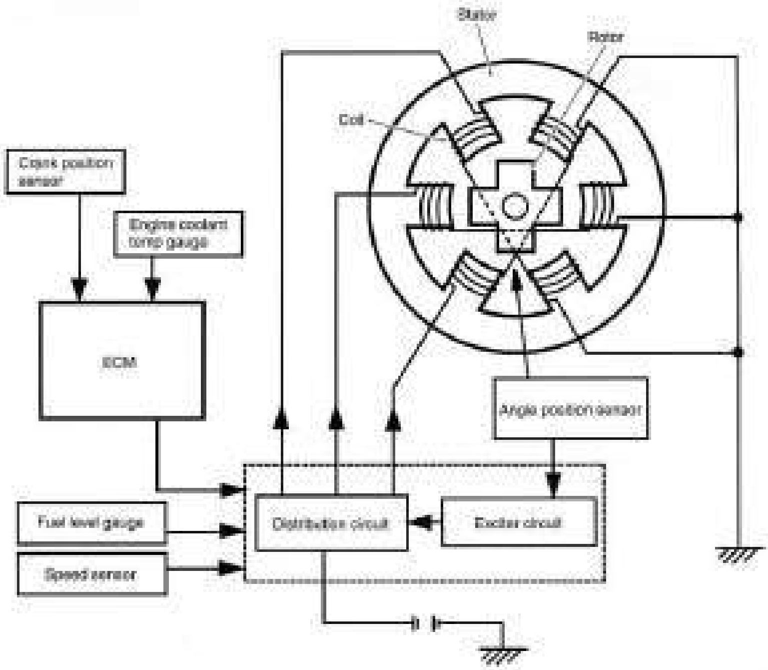


STEPPING MOTOR

The following contents and illustration shows the explanation of stepping motor's basic principle by using a simple structure.

Speedometer, tachometer, fuel meter and engine coolant temp. meter are driven by each stepping motor. All meters move to the full-scale immediately after the ignition switch is turned on to enable self-calibration. The stepping motor consists of the stator, coils, rotor, angle position sensor, exciter circuit and distribution circuit. The stator has 6 poles and the rotor has 4 poles. 6 coils are installed in each poles of stator and connected in series.

The rotor can be turned freely to any position by changing electric current sent through the coils. The rotor angle position is constantly monitored by the angle position sensor, which then feeds back signal to the distribution circuit so as to control the exciter circuit current.



STEPPING MOTOR OPERATION

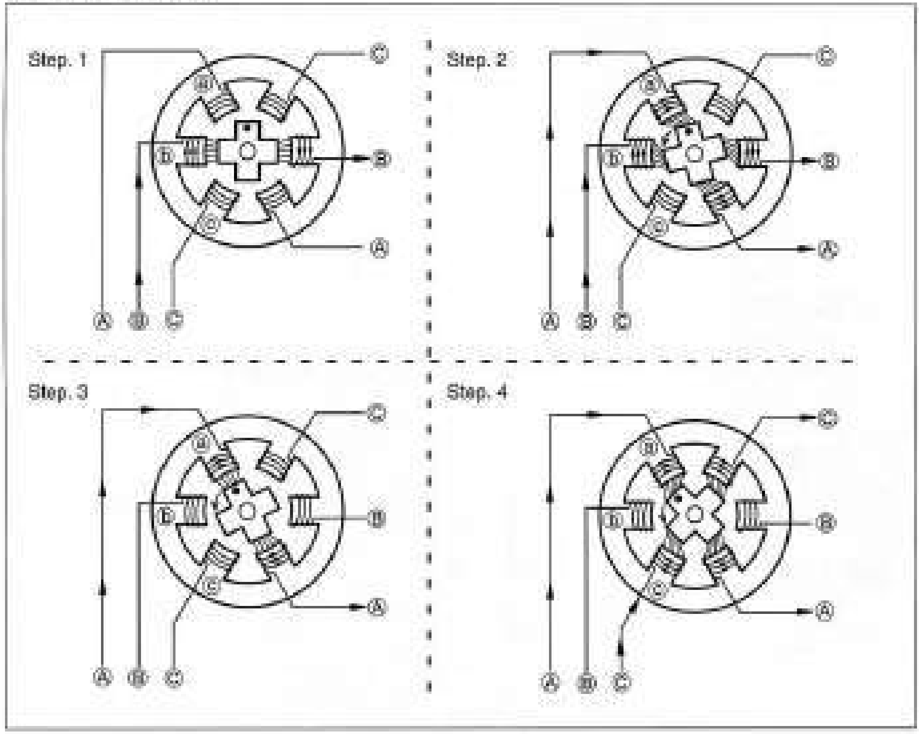
Step.1) When current is sent only through circuit Ⓑ, the magnetic force is equilibrated and causes the rotor to stay at position ⓑ.

Step.2) When the same amount of current as circuit Ⓑ is sent also through circuit Ⓐ, the rotor turns 15° counterclockwise by the same amount of magnetic force both from ⓐ and ⓑ.

Step.3) When cut off the circuit Ⓑ current and sending the current only through the circuit Ⓐ, the magnetic force is equilibrated and causes the rotor to turn 30°.

Step.4) When sending the same amount of current both through circuit Ⓐ and Ⓒ, the rotor turns 15° more to the above.

Thus, the rotor can smoothly turn and stay at any position by electronically controlling the current through the circuit Ⓐ, Ⓑ and Ⓒ.



FUEL CONSUMPTION

The fuel injection amount from ECM and mileage from speed sensor are calculated by the microcomputer of combination meter and indicated in LCD as a fuel consumption.

- Average fuel consumption indication

  E02 —— mile/l

  E03 —— mile/gal

  Others —— km/l or Liter/100km

REMOVAL

- Remove the body cowling. (☞ 8-9)
- Disconnect the lead wire coupler.

- Remove the combination meter.

▲ CAUTION

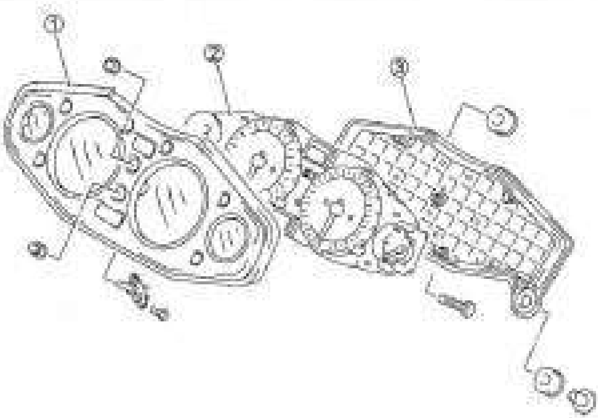
When disconnecting and connecting the combination meter coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.

DISASSEMBLY

- Disassemble the combination meter as follows.

▲ CAUTION

Do not attempt to disassemble the combination meter unit ②.



① Combination meter cover
② Combination meter unit
③ Combination meter case

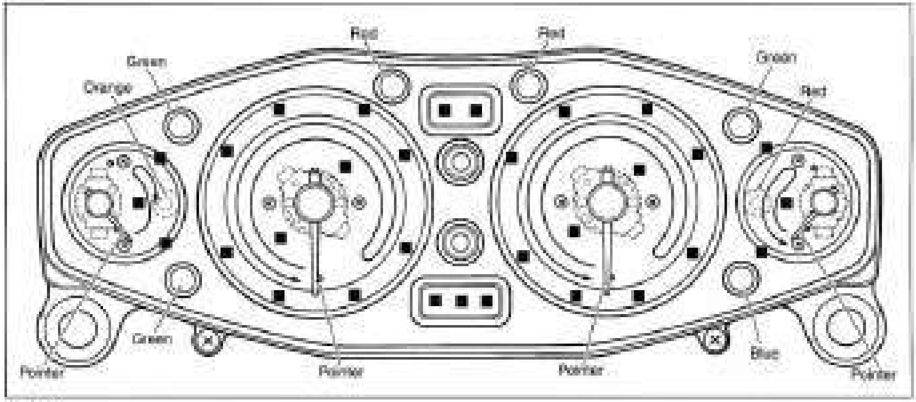
INSPECTION

LED (LIGHT EMITTING DIODE)

Check that the LED lights immediately after turning the ignition switch on.
If the LED fails in operation, replace the combination meter unit with a new one.

STEP MOTOR

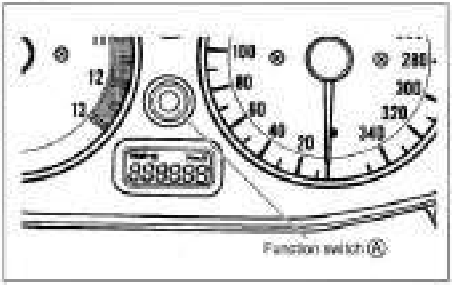
Check that the pointer calibrates itself immediately after turning the ignition switch on and stops at starting point.
If abnormal condition is found, replace the combination meter unit with a new one.



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 function switch Ⓐ pressed, turn the ignition switch on.
2) Release the function switch Ⓐ, 3 to 5 seconds after turning the ignition switch on.
3) Press the function switch Ⓐ twice (within 1 second). → Reset
* Complete the operation within 10 seconds after the ignition switch has been turned on.

Time	Ignition switch	Function switch Ⓐ
	OFF	PUSH
0	ON	
• •		
3 sec • 5 sec		Release
• • • •		Push Push→Reset
10 sec		



Pointer will return to the starting point right after the completion of the operation. In the case of the pointer not returning to th ... unit.

ENGINE COOLANT TEMPERATURE METER AND INDICATOR

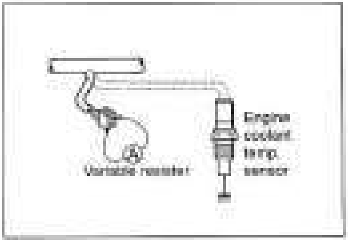
Engine coolant temp. sensor inspection: ☞ 5-8

- Lift up the fuel tank. (☞ 4-50)
- Disconnect the engine coolant temp. sensor coupler ①.

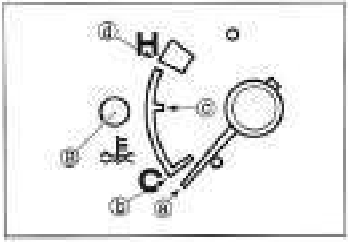
⚠ CAUTION

When connecting and disconnecting the engine coolant temp. sensor lead wire coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.

- Connect the variable resister Ⓐ between the terminals.
- Turn the ignition switch on.
- Check the pointer and LED operations when the resistance is adjusted to the specified values.



Resistance Ⓐ	LED Ⓑ	Pointer position	Water temperature
Over 2.45 kΩ	ON	ⓐ	—
Approx. 0.811 kΩ	OFF	ⓑ	Approx. 50 °C
Approx. 0.142 kΩ	OFF	ⓒ	Approx. 110 °C
Approx. 0.1 Ω	ON	ⓓ	Approx. 123 °C



If either one or all indications are abnormal, replace the combination meter with a new one.

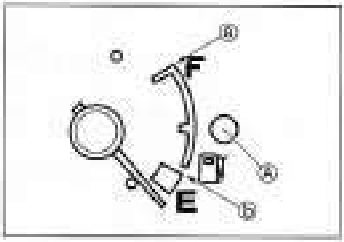
NOTE:
If the engine stop switch is turned OFF while the ignition switch is ON, the water temp. meter pointer indicates "H" position, the LED lights and the LCD displays "CHEC". But it is not malfunction.
This codition implies that water temp. meter recieves no signal from the ECM.
In that case, mey

the engine stop switch RUN.

FUEL LEVEL METER AND INDICATOR

NOTE:
Prior to this inspection, check that the fuel level gauge is functioning properly.

- Remove the fuel tank. (☞ 4-50)
- Remove the fuel level gauge.
- Reconnect the fuel level gauge lead wire coupler.



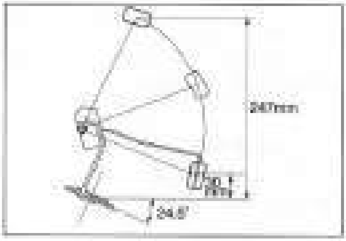
- Turn the ignition switch on.

Check the pointer and LED operations when the fuel level gauge is moved to the specified position.

Gauge position	LED Ⓐ	Pointer position
247 mm	OFF	Ⓑ
30 mm	ON	Ⓒ

If either indication is abnormal, replace the combination meter with a new one.

NOTE:
When installing the fuel level gauge, lightly tighter all the fuel level gauge mounting bolts and then tighten them to the specified torqre diagonally.



Fuel level gauge mounting bolt: 4 N·m (0.4 kgf-m, 3.0 lb-ft)

⚠ CAUTION

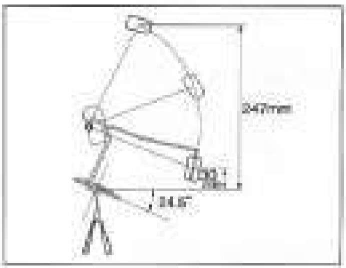
Use a new gasket to pervent fuel leakage.

FUEL LEVEL GAUGE INSPECTION

- Remove the fuel tank. (☞ 4-50)
- Remove the fuel level gauge.

Measure resistance between the terminals when the float is at the position listed below.

09900-25008: Multi-circuit tester



Gauge position	Resistance between terminals
247 mm	11 – 13 Ω
30 mm	130 – 133 Ω

If the resistance measured is out of the specification, replace the gauge with a new one.

NOTE:
Install the fuel level gauge in the same manner as described above.

SPEEDOMETER

If the speedometer, odometer or trip meter does not function properly, inspect the speedometer sensor and connection of couplers. If the speedometer sensor and connection are all right, replace the meter with a new one.

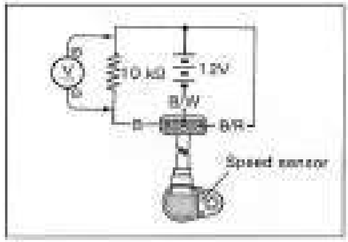
SPEEDOMETER SENSOR

- Remove the left under cowling. (☞ 6-8)
- Disconnect speedometer sensor lead wire coupler.
- Remove the speedometer sensor ① by removing its mounting bolt. (☞ 3-9)
- Connect 12V battery (between B/R and B/W), 10 kΩ resistor (between B/R and B) and the multi circuit tester (⊕ probe of tester to B/R and ⊖ to B) as shown right illustration.

B/R: Black with Red tracer

B/W: Black with White tracer

B: Black

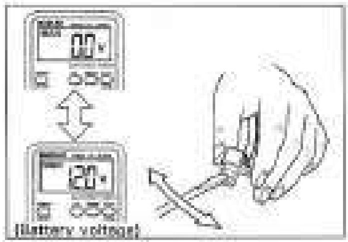


09900-25008: Multi circuit tester set

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 (0V→12V or 12V→0V). If the tester reading voltage does not change, replace the speedometer sensor with a new one.

NOTE:
The highest tester reading voltage (12V) while testing is same as battery voltage.



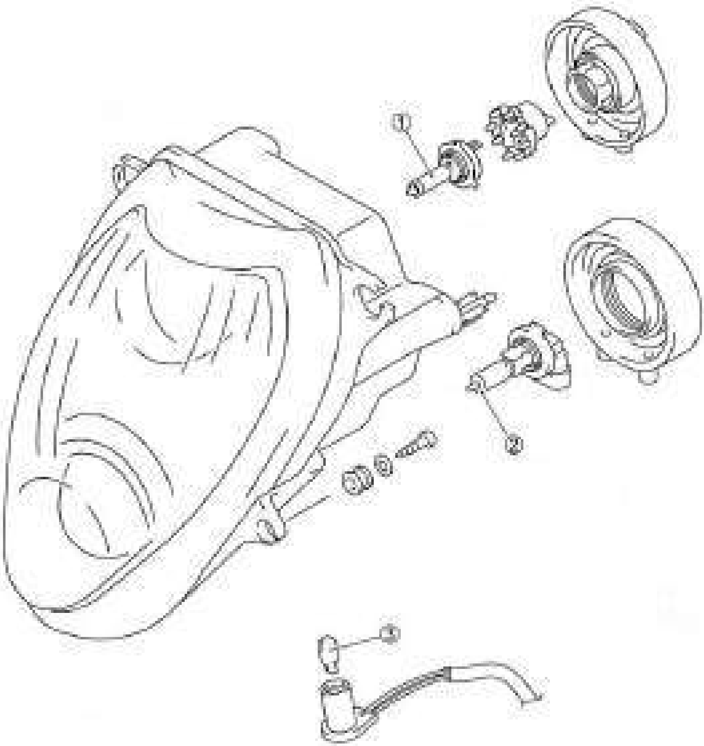
OIL PRESSURE INDICATOR

- Remove the left under cowling. (☞ 6-8)
- Disconnect the oil pressure switch lead wire from the oil pressure switch.
- Turn the ignition switch ON.
- Check if the oil pressure indicator will light, when grounding the lead wire.

If the indicator does not light, replace the unit with a new one after checking connection of couplers.

LAMPS

HEADLIGHT



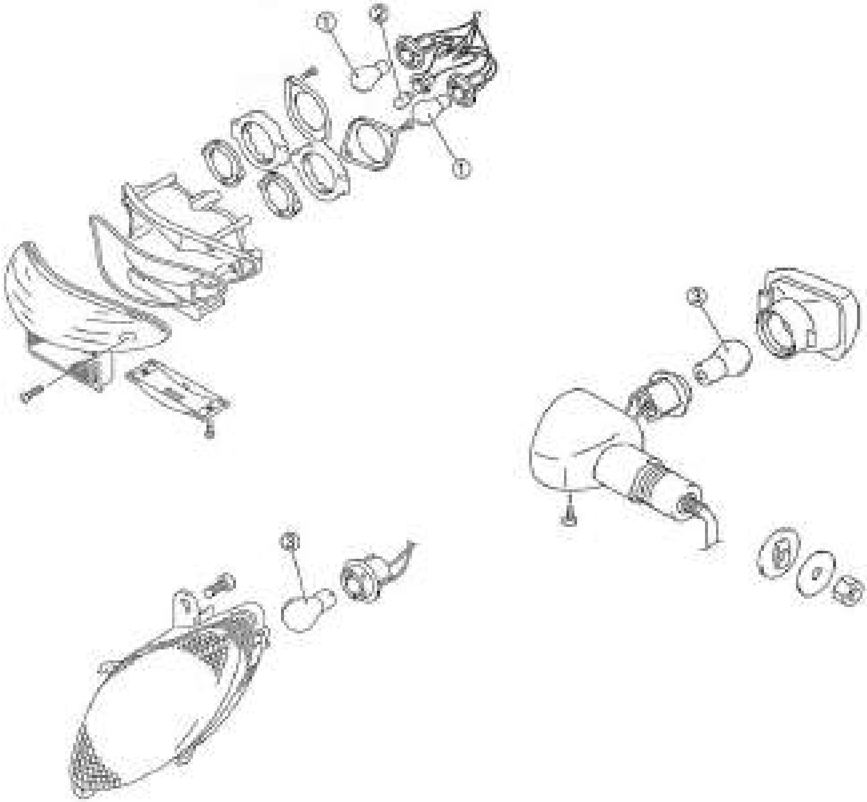
Headlight bulb ①: 55W (H7)
②: 65W (HB3)
Lo: ①
Hi: ① + ②
Position light bulb ③: 12V 5W (Except for E-03, 24, 28 and 33)

NOTE:
* *Adjust the headlight, both vertical and horizontal, after reassembling.*
* *Refer to the owner's manual for the headlight bulb replacement and the headlight beam adjustment.*

▲ CAUTION

If you touch the bulb with your bare hands, clean it with a cloth moistened with alcohol or soapy water to prevent early bulb failure.

BRAKE LIGHT/TAILLIGHT, LICENSE LIGHT AND TURN SIGNAL LIGHT



Brake light / Taillight bulb ①: 12V 21/5W × 2
License light bulb ②: 12V 5W
Turn signal light bulb ③: 12V 21W × 4

NOTE:
Refer to the owner's manual for the bulb replacement.

⚠ CAUTION

If you touch the bulb with your bare hands, clean it with a cloth moistened with alcohol or soapy water to prevent early failure.

TURN SIGNAL/SIDE-STAND RELAY

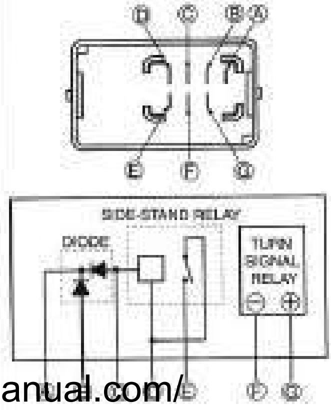
The turn signal/side-stand relay is composed of the turn signal relay, side-stand relay and diode.

* Remove the left upper panel. (☞ 6-7)

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; therefore, replace the turn signal/side-stand relay with a new one.

NOTE:
* *Make sure that the battery is fully charged.*
* *Refer to the page 7-19 for the side-stand relay and diode inspection.*



SWITCHES

Inspect each switch for continuity with a tester. If any abnormality is found, replace the respective switch assemblies with new ones.

IGNITION SWITCH

(For E-24)

Position \ Color	R	O	O/Y	B/W
ON	○	○	○	○
OFF				
LOCK				

(For Others)

Position \ Color	R	O	O/Y	B/W	Gr	Br
ON	○	○	○	○	○	○
OFF						
LOCK						
P	○					○

LIGHTING SWITCH

(Except for E-03, 24, 28 and 33)

Position \ Color	O/Bl	Gr	O/R	Y/W
OFF				
S	○	○		
ON	○	○	○	○

DIMMER SWITCH

Position \ Color	W	Y	Y/W
HI		○	○
LO	○		○

TURN SIGNAL SWITCH

Position \ Color	Lg	Lbl	B
L		○	○
PUSH			
R	○	○	

PASSING LIGHT SWITCH

(Except for E-03, 28 and 33)

Position \ Color	O/R	Y
•		
PUSH	○	○

ENGINE STOP SWITCH

Position \ Color	O/B	O/W
OFF		
RUN	○	○

STARTER BUTTON

Position \ Color	O/W	Y/G
•		
PUSH	○	○

HORN BUTTON

Position \ Color	B/Bl	B/W
•		
PUSH	○	○

FRONT BRAKE SWITCH

Position \ Color	B/R	B
OFF		
ON	○	○

REAR BRAKE SWITCH

Position \ Color	O/G	W/B
OFF		
ON	○	○

CLUTCH LEVER POSITION SWITCH

Position \ Color	B/Y	B/Y
OFF		
ON	○	○

OIL PRESSURE SWITCH

Position \ Color	G/Y	Ground
ON	○	○
OFF		

NOTE:
Before inspecting the oil pressure switch, check if the engine oil level is enough. (☞ 2-13)

WIRE COLOR

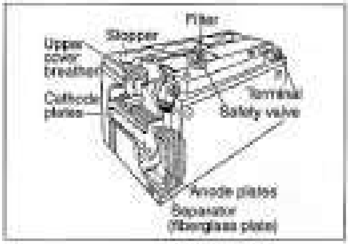
B : Black	Lbl : Light blue	R : Red
Br : Brown	Lg : Light green	Y : Yellow
Gr : Gray	O : Orange	W : White

B/Bl : Black with Blue tracer
B/W : Black with White tracer
B/Y : Black with Yellow tracer
B/R : Black with Red tracer
O/B : Orange with Black tracer
O/Bl : Orange with Blue 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
[illegible]
Y/W : Yellow with White tracer

BATTERY

SPECIFICATIONS

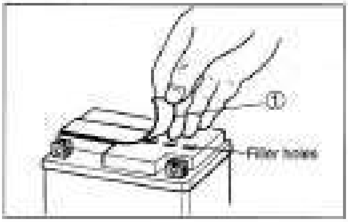
Type designation	YT12A-BS
Capacity	12V, 36 kC (10 Ah)/10HR



INITIAL CHARGING

Filling electrolyte

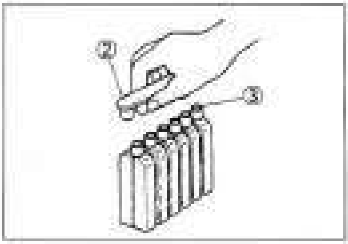
- Remove the aluminum tape ① sealing the battery electrolyte filler holes.



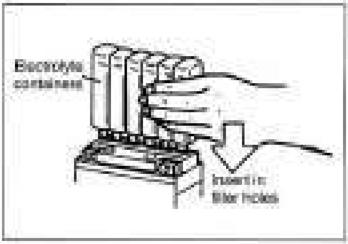
- Remove the caps ②.

NOTE:

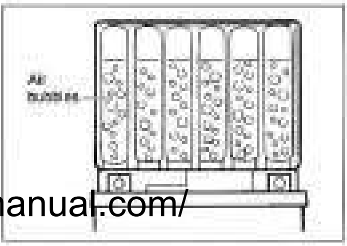
* *After filling the electrolyte completely, use the removed cap ② as the sealed caps of battery-filler holes.*
* *Do not remove or pierce the sealed areas ③ of the electrolyte container.*



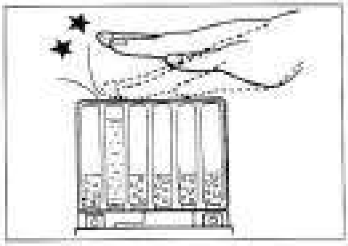
- Insert the nozzles of the electrolyte container into the battery's electrolyte filler holes, holding the container firmly so that it does not fall. Take precaution not to allow any of the fluid to spill.



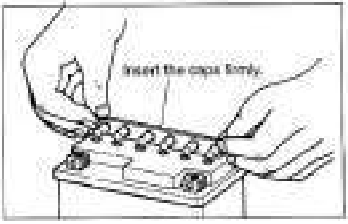
- Make sure air bubbles are coming up each electrolyte container, and leave in this position for about more than 20 minutes.



NOTE:
If no air bubbles are coming up from a filer port, tap the bottom of the two or three times.
Never remove the container from the battery.

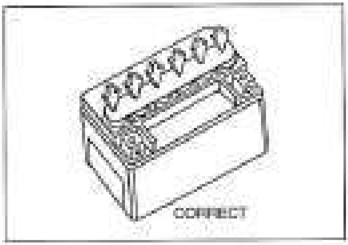


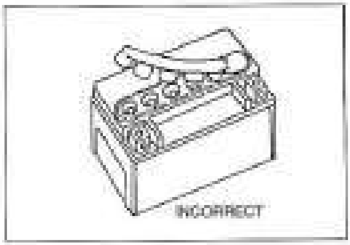
- After confirming that the electrolyte has entered the battery completely, remove the electrolyte containers from the battery. Wait for around 20 minutes.
- Insert the caps into the filler holes, pressing in firmly so that the top of the caps do not protrude above the upper surface of the battery's top cover.



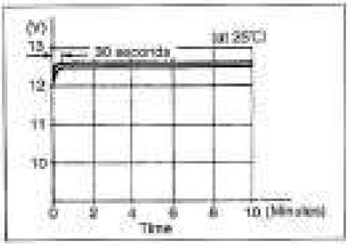
⚠ CAUTION

- **Never use anything except the specified battery.**
- **Once install the caps to the battery; do not remove the caps.**





- Using multi circuit tester, measure the battery voltage. The tester should indicate more than 12.5 – 12.6V (DC) as shown in the Fig. If the battery voltage is lower than the specification, charge the battery with a battery charger. (Refer to the recharging operation)



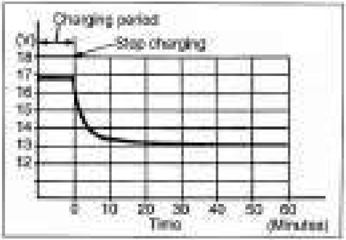
NOTE:
Initial charging for a new battery is recommended if two years have elapsed since the date of manufacture.

SERVICING

Visually inspect the surface of the battery container. If any signs of cracking or electrolyte leakage from the sides of the battery have occurred, replace the battery with a new one. If the battery terminals are found to be coated with rust or an acidic white powdery substance, then this can be cleaned away with sandpaper.

RECHARGING OPERATION

- Using the multi circuit tester, check the battery voltage. If the voltage reading is less than the 12.0V (DC), recharge the battery with a battery charger.

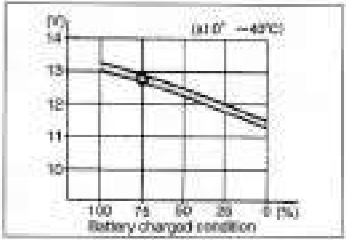


▲ CAUTION

When recharging the battery, remove the battery from the motorcycle.

NOTE:
Do not remove the caps on the battery top while recharging.

Recharging time: 5A for one hour or 1.2A for 5 to 10 hours



▲ CAUTION

Be careful not to permit the charging current to exceed 5A at any time.

- After recharging, wait for more than 30 minutes and check the battery voltage with a multi circuit tester.
- If the battery voltage is less than the 12.5V, recharge the battery again.
- If battery voltage is still less than 12.5V, after recharging, replace the battery with a new one.
- When the motorcycle is not used for a long period, check the battery every 1 month to prevent the battery discharge.

SERVICING INFORMATION

CONTENTS

TROUBLESHOOTING

FI SYSTEM MALFUNCTION CODE AND DEFECTIVE CONDITION

MALFUNCTION CODE	DETECTED ITEM	DETECTED FAILURE CONDITION / CHECK FOR
c00	NO FAULT	———
c11	Camshaft position sensor or circuit malfunction	The signal does not reach ECM for more than 2 sec. after receiving the starter signal.
		The CMP sensor wiring and mechanical parts. (CMP sensor, intake cam pin, wiring/coupler connection)
c12	Crankshaft position sensor or circuit malfunction	The signal does not reach ECM for more than 2 sec. after receiving the starter signal.
		The CKP sensor wiring and mechanical parts. (CKP sensor, wiring/coupler connection)
c13	Intake air pressure sensor malfunction	The sensor should produce following voltage. (0.5 V ≦ sensor voltage < 4.5 V) Without the above range, c13 is indicated.
	Intake air pressure sensor circuit low input	Low pressure – high vacuum – low voltage (or IAP sensor circuit shorted to ground)
	Intake air pressure sensor circuit high input	High pressure – low vacuum – high voltage (or IAP sensor circuit open)
		IAP sensor, wiring/coupler connection.
c14	Throttle position sensor malfunction	The sensor should produce following voltage. (0.2 V ≦ sensor voltage < 4.8 V) Without the above range, c14 is indicated.
	Throttle position circuit low input	Low voltage (or TP sensor circuit shorted)
	Throttle position circuit high input	High voltage (or TP sensor circuit open)
		TP sensor, wiring/coupler connection.
c15	Engine coolant temp. sensor malfunction	The sensor voltage should be the following. (0.15 V ≦ sensor voltage < 4.85 V) Without the above range, c15 is indicated.
	Engine coolant temp. circuit low input	High temperature – low voltage (or ECT sensor circuit shorted to ground)
	Engine coolant temp. circuit high input	Low temperature – high voltage (or ECT sensor circuit open)
		ECT sensor, wiring/coupler connection.
c21	Intake air temp. sensor malfunction	The sensor voltage should be the following. (0.15 V ≦ sensor voltage < 4.85 V) Without the above range, c21 is indicated.
	Intake air temp. circuit low input	High temperature – low voltage (or IAT sensor circuit shorted to ground)
	Intake air temp. circuit high input	Low temperature – high voltage (or IAT sensor circuit open)
		IAT sensor, wiring/coupler connection.

c22	Atmospheric pressure sensor malfunction	The sensor voltage should be the following. (0.5 V ≤ sensor voltage < 4.85 V) Without the above range, c22 is indicated.
	Atmospheric pressure sensor low/high input	Atmospheric pressure is lower or higher than specification. AP sensor, wiring/coupler connection.
c23	Tip over sensor or circuit malfunction	The sensor voltage should be less than the following for more than 3 sec. after ignition switch turns ON. (0.25 V ≤ sensor voltage < 4.85 V) Without the above value, c23 is indicated. TO sensor, wiring/coupler connection.
c24, c25, c26 or c27	*Ignition signal circuit malfunction	CKP sensor (pick-up coil) signal is produced but signal from ignition coil is not produced continuous two times. In this case, the code c24, c25, c26 or c27 is indicated. Ignition coil, wiring/coupler connection, power supply from the battery.
c31	Gear position signal circuit malfunction	Gear position signal voltage should be higher than the following for more than 3 seconds. (Gear position sensor voltage > 0.60 V) Without the above value, c31 is indicated. Gear position sensor, wiring/coupler connection. Gearshift cam etc.
c32, c33, c34 or c35	*Fuel injector signal circuit malfunction	Fuel injection signal stops, the c32, c33, c34 or c35 is indicated. Injector, wiring/coupler connection, power supply to the injector.
c41	Fuel pump relay signal circuit malfunction	When no signal from fuel pump relay, c41 is indicated. Fuel pump relay, connecting lead, power source to fuel pump relay.
c42	Ignition switch signal circuit malfunction	Ignition switch signal is not input in the ECM. Ignition switch, lead wire/coupler.
c92	Fuel level gauge circuit signal malfunction	When no signal is supplied from fuel level gauge, c92 is indicated. Fuel level gauge sending unit, lead wire/coupler.

* 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.

ENGINE

Complaint	Symptom and possible causes	Remedy
Engine will not start, or is hard to start.	**Compression too low**	
	1. Out of adjustment tappet clearance.	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.
	Plugs not sparking	
	1. Fouled spark plugs.	Clean.
	2. Wet spark plugs.	Clean and dry.
	3. Defective ignition coil/plug cap.	Replace.
	4. Defective signal generator or ignitor unit.	Replace.
	5. Defective ECM.	Replace.
	6. Open-circuited wiring connections.	Repair or replace.
	No fuel reaching intake manifold	
	1. Clogged fuel filter or fuel hose.	Clean or replace.
	2. Defective fuel pump.	Replace.
	3. Defective fuel pressure regulator.	Replace.
	4. Defective fuel injector.	Replace.
	5. Defective fuel pump relay.	Replace.
	6. Defective ECM.	Replace.
	7. Open-circuited wiring connections.	Check and repair.
	Incorrect fuel/air mixture	
	1. Out of adjustment throttle position sensor.	Adjust.
	2. Defective fuel pump.	Replace.
	3. Defective fuel pressure regulator.	Replace.
	4. Defective throttle position sensor.	Replace.
	5. Defective crankshaft position sensor.	Replace.
	6. Defective intake air pressure sensor.	Replace.
	7. Defective atmospheric pressure sensor.	Replace.
	8. Defective ECM.	Replace.
	9. Defective vacuum control solenoid valve.	Replace.
	10. Defective engine coolant temp. sensor.	Replace.
	11. Defective intake air temp. sensor.	Replace.

Complaint	Symptom and possible causes	Remedy
Engine idles poorly.	1. Out of adjustment tappet clearance. 2. Poor seating of valves. 3. Defective valve guides. 4. Worn down camshaft. 5. Too wide spark plug gaps. 6. Defective ignition coil/plug cap. 7. Defective crankshaft position sensor. 8. Defective ECM. 9. Defective throttle position sensor. 10. Defective fuel pump. 11. Imbalanced throttle valve. 12. Damaged or cracked vacuum hose.	Adjust. Replace or repair. Replace. Replace. Adjust or replace. Replace. Replace. Replace. Replace. Replace. Adjust. Replace.
Engine stalls easily.	**Incorrect fuel/air mixture** 1. Defective intake air pressure sensor or circuit. 2. Clogged fuel filter. 3. Defective fuel pump. 4. Defective fuel pressure regulator. 5. Damaged or cracked vacuum hose. 6. Defective engine coolant temp. sensor. 7. Defective thermostat. 8. Defective intake air temp. sensor. **Improperly working fuel injector** 1. Defective fuel injector. 2. No injection signal from ECM. 3. Open or short circuited wiring connection. 4. Defective battery or low battery voltage. **Improperly working control circuit or sensors** 1. Defective ECM. 2. Defective fuel pressure regulator. 3. Defective throttle position sensor. 4. Defective intake air temp. sensor. 5. Defective camshaft position sensor. 6. Defective crankshaft position sensor. 7. Defective engine coolant temp. sensor. 8. Defective fuel pump relay. **Improperly working engine internal parts** 1. Fouled spark plugs. 2. Defective crankshaft position sensor or ECM. 3. Clogged fuel hose. 4. [illegible]	 Repair or replace. Clean or replace. Replace. Replace. Replace. Replace. Replace. Replace. Replace. Repair or replace. Repair or replace. Replace or recharge. Replace. Replace. Replace. Replace. Replace. Replace. Replace. Replace. Clean. Replace. Clean. [illegible]

Complaint	Symptom and possible causes	Remedy
Noisy engine.	**Excessive valve chatter**	
	1. Too large tappet clearance.	Adjust.
	2. Weakened or broken valve springs.	Replace.
	3. Worn tappet or cam surface.	Replace.
	4. Worn and burnt camshaft journal.	Replace.
	Noise seems to come from piston	
	1. Worn down pistons or cylinders.	Replace.
	2. Fouled with carbon combustion chambers.	Clean.
	3. Worn piston pins or piston pin bore.	Replace.
	4. Worn piston rings or ring grooves.	Replace.
	Noise seems to come from timing chain	
	1. Stretched chain.	Replace.
	2. Worn sprockets.	Replace.
	3. Not working tension adjuster.	Repair or replace.
	Noise seems to come from clutch	
	1. Worn splines of countershaft or hub.	Replace.
	2. Worn teeth of clutch plates.	Replace.
	3. Distorted clutch plates, driven and drive.	Replace.
	4. Worn clutch release bearing.	Replace.
	5. Weakened clutch dampers.	Replace the primary driven gear.
	Noise seems to come from crankshaft	
	1. Due to wear rattling bearings.	Replace.
	2. Worn and burnt big-end bearings.	Replace.
	3. Worn and burnt journal bearings.	Replace.
	4. Too large thrust clearance.	Replace thrust bearing.
	Noise seems to come from transmission	
	1. Worn or rubbing gears.	Replace.
	2. Worn splines.	Replace.
	3. Worn or rubbing primary gears.	Replace.
	4. Worn bearings.	Replace.
	Noise seems to come from water pump	
	1. Too much play on pump shaft bearing.	Replace.
	2. Worn or damaged impeller shaft.	Replace.
	3. Worn or damaged mechanical seal.	Replace.
	4. Touches pump case and impeller.	Replace.
Engine runs poorly in high speed range.	**Defective engine internal/electrical parts**	
	1. Weakened valve springs.	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 working timing advance circuit.	Replace ECM.
	6. Defective ignition coil.	Replace.
	7. Defective crankshaft position sensor.	Replace.
	8. Defective ECM.	Replace.
	9. Clogged air cleaner element.	Clean.
	10. Clogged fuel hose, resulting in inadequate fuel supply to injector.	Clean and prime.
	11. [illegible]	Replace.
	12. Defective throttle position sensor.	Replace.

Complaint	Symptom and possible causes	Remedy
Engine runs poorly in high speed range.	**Defective air flow system**	
	1. Clogged air cleaner element.	Clean or replace.
	2. Defective throttle valve.	Adjuster or replace.
	3. Sucking air from throttle body joint.	Repair or replace.
	4. Defective ECM.	Replace.
	5. Defective vacuum control solenoid valve.	Replace.
	6. Defective intake air control valve actuator.	Replace.
	Defective control circuit or sensor	
	1. Low fuel pressure.	Repair or replace.
	2. Defective throttle position sensor.	Replace.
	3. Defective intake air temp. sensor.	Replace.
	4. Defective camshaft position sensor.	Replace.
	5. Defective crankshaft position sensor.	Replace.
	6. Defective gear position sensor.	Replace.
	7. Defective intake air pressure sensor.	Replace.
	8. Defective atmospheric pressure sensor.	Replace.
	9. Defective ECM.	Replace.
	10. Imbalancing throttle valve synchronization.	Adjust.
Engine lacks power.	**Defective engine internal/electrical parts**	
	1. Loss of tappet clearance.	Adjust.
	2. Weakened valve springs.	Replace.
	3. Out of adjustment valve timing.	Adjust.
	4. Worn piston rings or cylinders.	Replace.
	5. Poor seating of valves.	Repair.
	6. Fouled spark plug.	Clean or replace.
	7. Incorrect spark plug.	Adjust or replace.
	8. Clogged injector.	Clean.
	9. Out of adjustment throttle position sensor.	Adjust.
	10. Clogged air cleaner element.	Clean.
	11. Imbalancing throttle valve synchronization.	Adjust.
	12. Sucking air from throttle valve or vacuum hose.	Retighten or replace.
	13. Too much engine oil.	Drain out excess oil.
	14. Defective fuel pump or ECM.	Replace.
	15. Defective crankshaft position sensor and ignition coil.	Replace.
	Defective control circuit or sensor	
	1. Low fuel pressure.	Repair or replace.
	2. Defective throttle position sensor.	Replace.
	3. Defective intake air temp. sensor.	Replace.
	4. Defective camshaft position sensor.	Replace.
	5. Defective crankshaft position sensor.	Replace.
	6. Defective gear position sensor.	Replace.
	7. Defective intake air pressure sensor.	Replace.
	8. Defective atmospheric pressure sensor.	Replace.
	9. Defective ECM.	Replace.
	10. Imbalancing throttle valve synchronization.	Adjust.

Complaint	Symptom and possible causes	Remedy
Engine overheats.	**Defective engine internal parts**	
	1. Heavy carbon deposit on piston crowns.	Clean.
	2. Not enough oil in the engine.	Add oil.
	3. Defective oil pump or clogged oil circuit.	Replace or clean.
	4. Sucking air from intake pipes.	Retighten or replace.
	5. Use incorrect engine oil.	Change.
	6. Defective cooling system.	See radiator section.
	Lean fuel/air mixture	
	1. Short-circuited intake air pressure sensor/lead wire.	Repair or replace.
	2. Short-circuited intake air temp. sensor/lead wire.	Repair or replace.
	3. Clogged or defective fuel pressure vacuum hose.	Repair or replace.
	4. Sucking air from intake pipe joint.	Clean or replace.
	5. Defective fuel injector.	Repair or replace.
	6. Defective engine coolant temp. sensor.	Replace.
	The other factors	
	1. Ignition timing is too advanced due to defective timing advance system (engine coolant temp. sensor, gear position sensor, crankshaft position sensor and ECM.)	Replace.
	2. Drive chain is too tight.	Adjust.
Dirty or heavy exhaust smoke.	1. Too much engine oil in the engine.	Check with inspection window drain out excess oil.
	2. Worn piston rings or cylinders.	Replace.
	3. Worn valve guides.	Replace.
	4. Scored or scuffed cylinder walls.	Replace.
	5. Worn valves stems.	Replace.
	6. Defective stem seal.	Replace.
	7. Worn oil ring side rails.	Replace.
Slipping clutch.	1. Weakened clutch springs.	Replace.
	2. Worn or distorted pressure plate.	Replace.
	3. Distorted clutch plates or clutch plate.	Replace.
Dragging clutch.	1. Some clutch spring weakened while others are not.	Replace.
	2. Distorted pressure plate or clutch plate.	Replace.
Transmission will not shift.	1. Broken gearshift cam.	Replace.
	2. Distorted gearshift forks.	Replace.
	3. Worn gearshift pawl.	Replace.
Transmission will not shift back.	1. Broken return spring on shift shaft.	Replace.
	2. Rubbing or stickly shift shaft.	Repair or replace.
	3. Distorted or worn gearshift forks.	Replace.
Transmission jumps out of gear.	1. Worn shifting gears on driveshaft or countershaft.	Replace.
	2. Distorted or worn gearshift forks.	Replace.
	3. Weakened stopper spring on gearshift stopper.	Replace.
	4. Worn gearshift cam plate.	Replace.

RADIATOR (COOLING SYSTEM)

Complaint	Symptom and possible causes	Remedy
Engine overheats.	1. Not enough engine coolant. 2. Clogged with dirt or trashes radiator core. 3. Faulty cooling fan. 4. Defective cooling fan thermo-switch. 5. Clogged water passage. 6. Air trapped in the cooling circuit. 7. Defective water pump. 8. Use incorrect coolant. 9. Defective thermostat.	Add coolant. Clean. Repair or replace. Replace. Clean. Bleed out air. Replace. Replace. Replace.
Engine overcools.	1. Defective cooling fan thermo-switch. 2. Extremely cold weather. 3. Defective thermostat.	Replace. Put on the radiator cover. Replace.

CHASSIS

Complaint	Symptom and possible causes	Remedy
Heavy steering.	1. Overtightened steering stem nut. 2. Broken bearing in steering stem. 3. Distorted steering stem. 4. Not enough pressure in tires.	Adjust. Replace. Replace. Adjust.
Wobbly handlebars.	1. Loss of balance between right and left front forks. 2. Distorted front fork. 3. Distorted front axle or crooked tire. 4. Loose steering stem nut. 5. Worn or incorrect tire or wrong tire pressure. 6. Worn bearing/race in steering stem.	Replace. Repair or replace. Replace. Adjust. Adjust or replace. Replace.
Wobbly front wheel.	1. Distorted wheel rim. 2. Worn front wheel bearings. 3. Defective or incorrect tire. 4. Loose axle or axle pinch bolt. 5. Incorrect front fork oil level.	Replace. Replace. Replace. Retighten. Adjust.
Front suspension too soft.	1. Weakened springs. 2. Not enough fork oil. 3. Wrong weight fork oil. 4. Improperly set front fork spring adjuster. 5. Improperly set front fork damping force adjuster.	Replace. Replenish. Replace. Adjust. Adjust.
Front suspension too stiff.	1. Too viscous fork oil. 2. Too much fork oil. 3. Improperly set front fork spring adjuster. 4. Improperly set front fork damping force adjuster. 5. Bent front axle.	Replace. Drain excess oil. Adjust. Adjust. Replace.
Noisy front suspension.	1. Not enough fork oil. 2. Loose bolts on suspension.	Replenish. Retighten.
Wobbly rear wheel.	1. Distorted wheel rim. 2. Worn rear wheel bearing or swingarm bearings. 3. Defective or incorrect tire. 4. Worn swingarm and rear suspension bearings. 5. Loose nuts or bolts on rear suspensions.	Replace. Replace. Replace. Replace. Retighten.
Rear suspension too soft.	1. Weakened spring of shock absorber. 2. Leakage oil or gas of shock absorber. 3. Improperly set rear spring unit adjuster. 4. Improperly set rotary damper damping force adjuster.	Replace. Replace. Adjust. Adjust.
Rear suspension too stiff.	1. Bent shock absorber shaft. 2. Bent swingarm. 3. Worn swingarm and rear suspension bearings. 4. Improperly set rear suspension adjuster. 5. Improperly set rotary damper damping force adjuster.	Replace. Replace. Replace. Adjust. Adjust.
Noisy rear suspension.	1. [illegible] 2. Worn swingarm and suspension bearings.	Retighten. Replace.

BRAKES

Complaint	Symptom and possible causes	Remedy
Insufficient brake power.	1. Leakage of brake fluid from hydraulic system.	Repair or replace.
	2. Worn pads.	Replace.
	3. 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.	1. Carbon adhesion on pad surface.	Repair surface with sandpaper.
	2. Tilted pad.	Modify pad fitting or replace.
	3. Damaged wheel bearing.	Replace.
	4. Loosen front-wheel axle or rear-wheel axle.	Tighten to specified torque.
	5. Worn pads.	Replace.
	6. Foreign material in brake fluid.	Replace brake fluid.
	7. Clogged return port of master cylinder.	Disassemble and clean master cylinder.
Excessive brake lever stroke.	1. Air in hydraulic system.	Bleed air.
	2. Insufficient brake fluid.	Replenish fluid to specified level; bleed air.
	3. Improper quality of brake fluid.	Replace with correct fluid.
Leakage of brake fluid	1. Insufficient tightening of connection joints.	Tighten to specified torque.
	2. Cracked hose.	Replace.
	3. Worn piston and/or cup.	Replace piston and/or cup.
Brake drags.	1. Rusty part.	Clean and lubricate.
	2. Insufficient brake lever or brake pedal pivot lubrication.	Lubricate.

ELECTRICAL

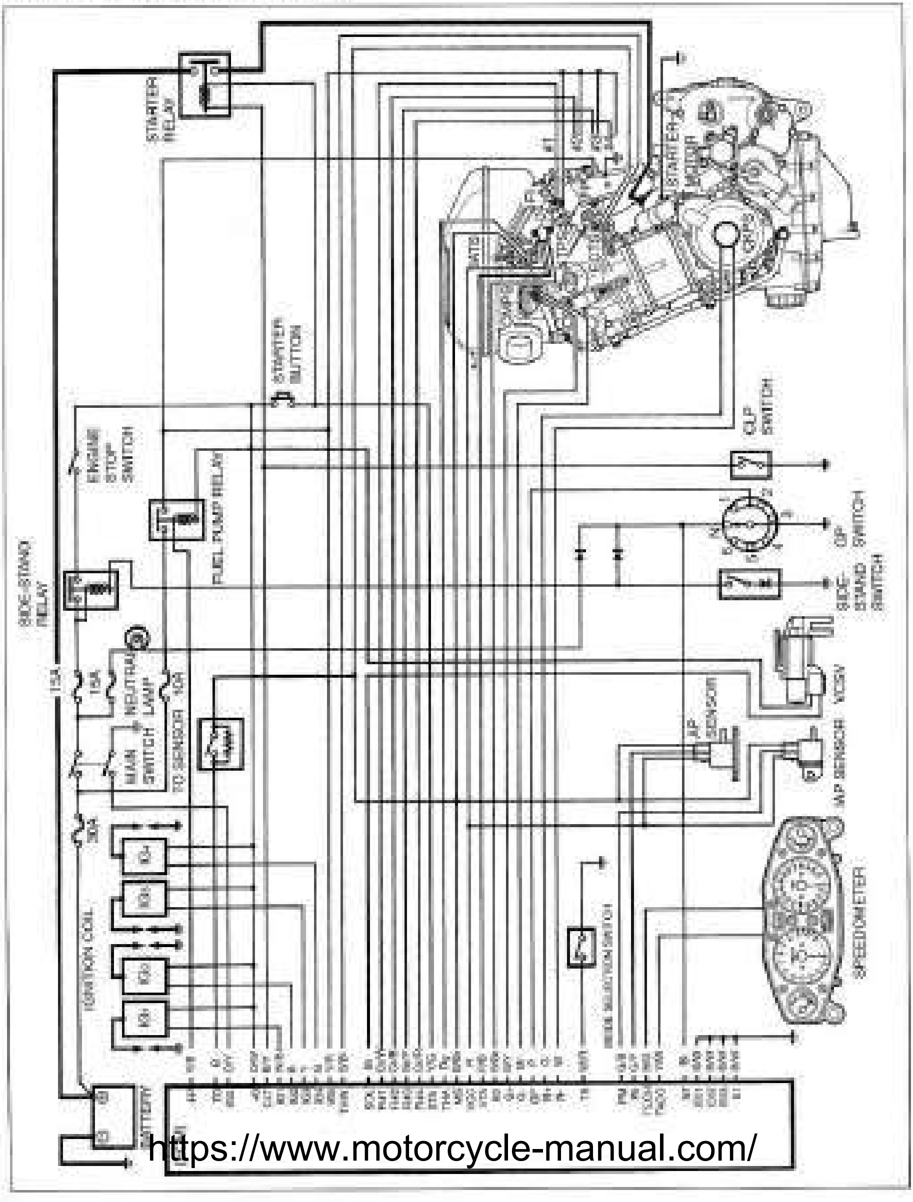
Complaint	Symptom and possible causes	Remedy
No sparking or poor sparking.	1. Defective ignition coil/plug cap or camshaft position sensor. 2. Defective spark plugs. 3. Defective crankshaft position sensor. 4. Defective ECM. 5. Defective tip over sensor. 6. Open-circuited wiring connections.	Replace. Replace. Replace. Replace. Replace. Check and repair.
Spark plug soon become fouled with carbon.	1. Mixture too rich. 2. Idling speed set too high. 3. Incorrect gasoline. 4. Dirty element in air cleaner. 5. Too cold spark plugs.	Consult FI system. Adjust fast idle or throttle stop screw. Change. Clean or replace. Replace with hot type plugs.
Spark plugs become fouled too soon.	1. Worn piston rings. 2. Worn piston or cylinders. 3. Excessive clearance of valve stems in valve guides. 4. Worn stem oil seal.	Replace. Replace. Replace. Replace.
Spark plug electrodes overheat or burn.	1. Too hot spark plugs. 2. Overheated the engine. 3. Loose spark plugs. 4. Too lean mixture.	Replace with cold type plugs. Tune up. Retighten. Consult FI system.
Generator does not charge.	1. Open or short lead wires, or loose lead connections. 2. Shorted, grounded or open generator coils. 3. Shorted or panctured regulator/rectifiers.	Repair or replace or retighten. Replace. Replace.
Generator does charge, but charging rate is below the specification.	1. Lead wires tend to get shorted or open-circuited or loosely connected at terminals. 2. Grounded or open-circuited stator coils or generator. 3. Defective regulator/rectifier. 4. Defective cell plates in the battery.	Repair or retighten. Replace. Replace. Replace the battery.
Generator overcharges.	1. Internal short-circuit in the battery. 2. Damaged or defective resistor element in the regulator/rectifier. 3. Poorly grounded regulator/rectifier.	Replace the battery. Replace. Clean and tighten ground connection.
Unstable charging.	1. Lead wire insulation frayed due to vibration, resulting in intermittent shorting. 2. Internally shorted generator. 3. Defective regulator/rectifier.	Repair or replace. Replace. Replace.
Starter button is not effective.	1. Run down battery. 2. Defective switch contacts. 3. Not seating properly brushes on commutator in starter motor. 4. Defective starter relay/starter interlock switch. 5. Defective main fuse.	Repair or replace. Replace. Repair or replace. Replace. Replace.

BATTERY

Complaint	Symptom and possible causes	Remedy
"Sulfation", acidic white powdery substance or spots on surface of cell plates.	1. Cracked battery case. 2. Battery has been left in a run-down condition for a long time.	Replace the battery. Replace the battery.
Battery runs down quickly.	1. Not correct the charging system.	Check the generator, regulator/rectifier and circuit connections and make necessary adjustments to obtain specified charging operation.
	2. Cell plates have lost much of their active material as a result of overcharging.	Replace the battery, and correct the charging system.
	3. A short-circuit condition exists within the battery.	Replace the battery.
	4. Too low battery voltage.	Recharge the battery fully.
	5. Too old battery.	Replace the battery.
Battery "sulfation".	1. Too low or too high charging rate. (When not in use batteries should be checked at least once a month to avoid sulfation.)	Replace the battery.
	2. Left unused the battery for too long in cold climate.	Replace the battery, if badly sulfated.
Battery discharges too rapidly.	1. Dirty container top and sides.	Clean.

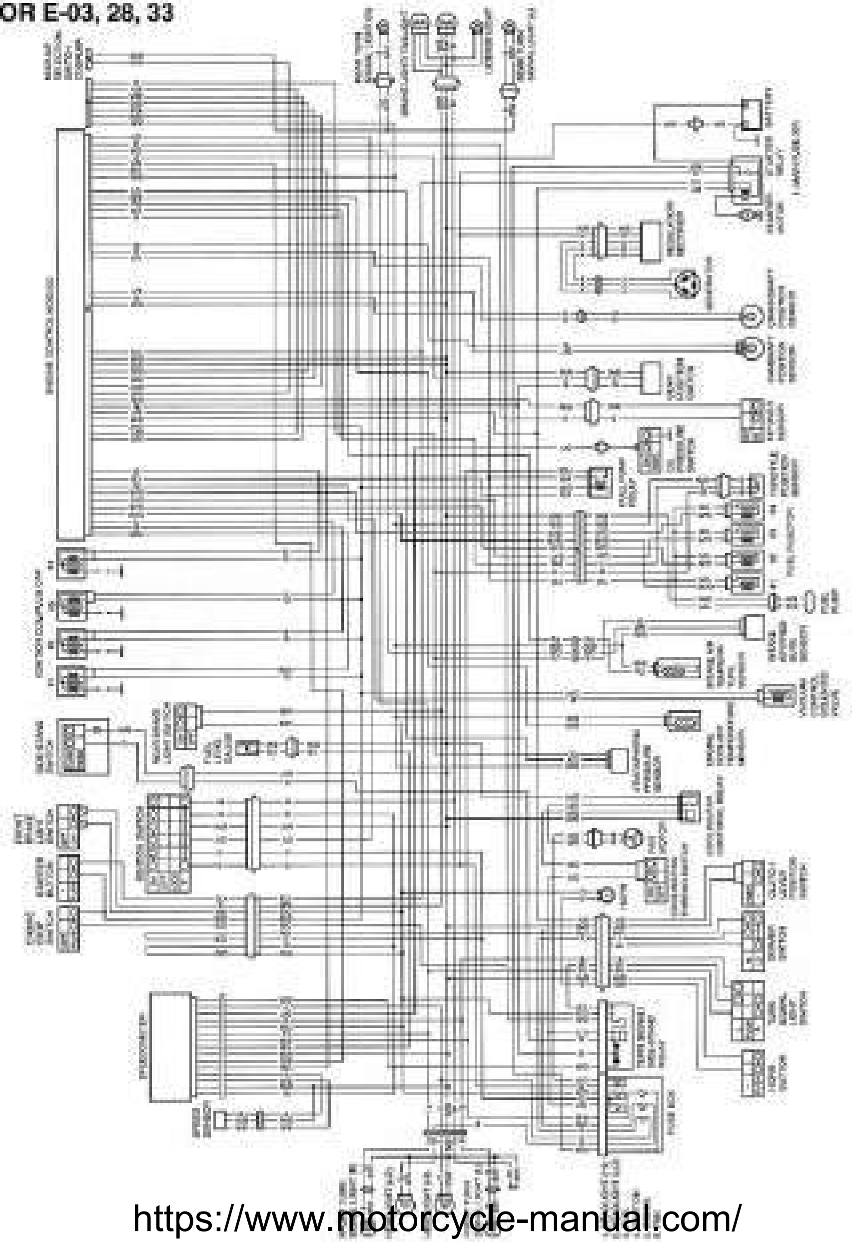
WIRING DIAGRAM

FI SYSTEM WIRING DIAGRAM

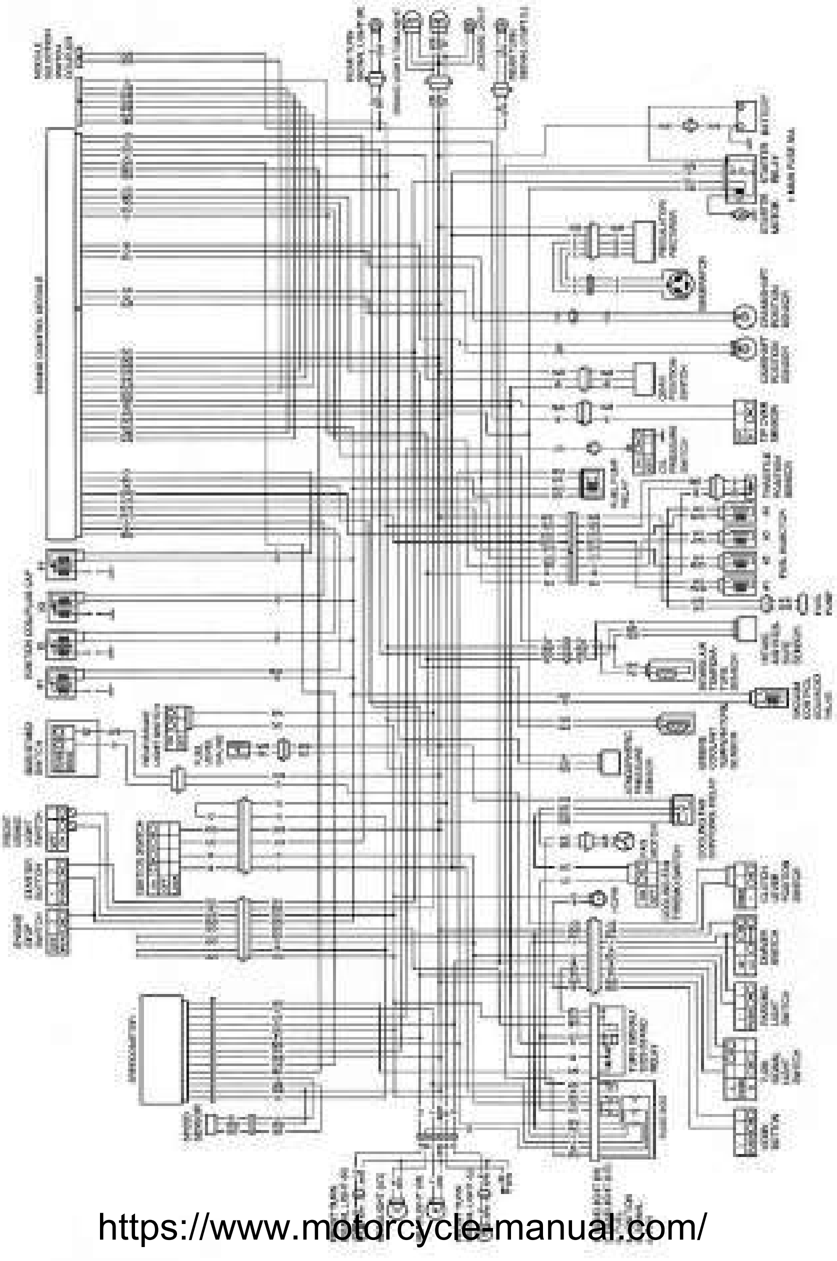


WIRING DIAGRAM

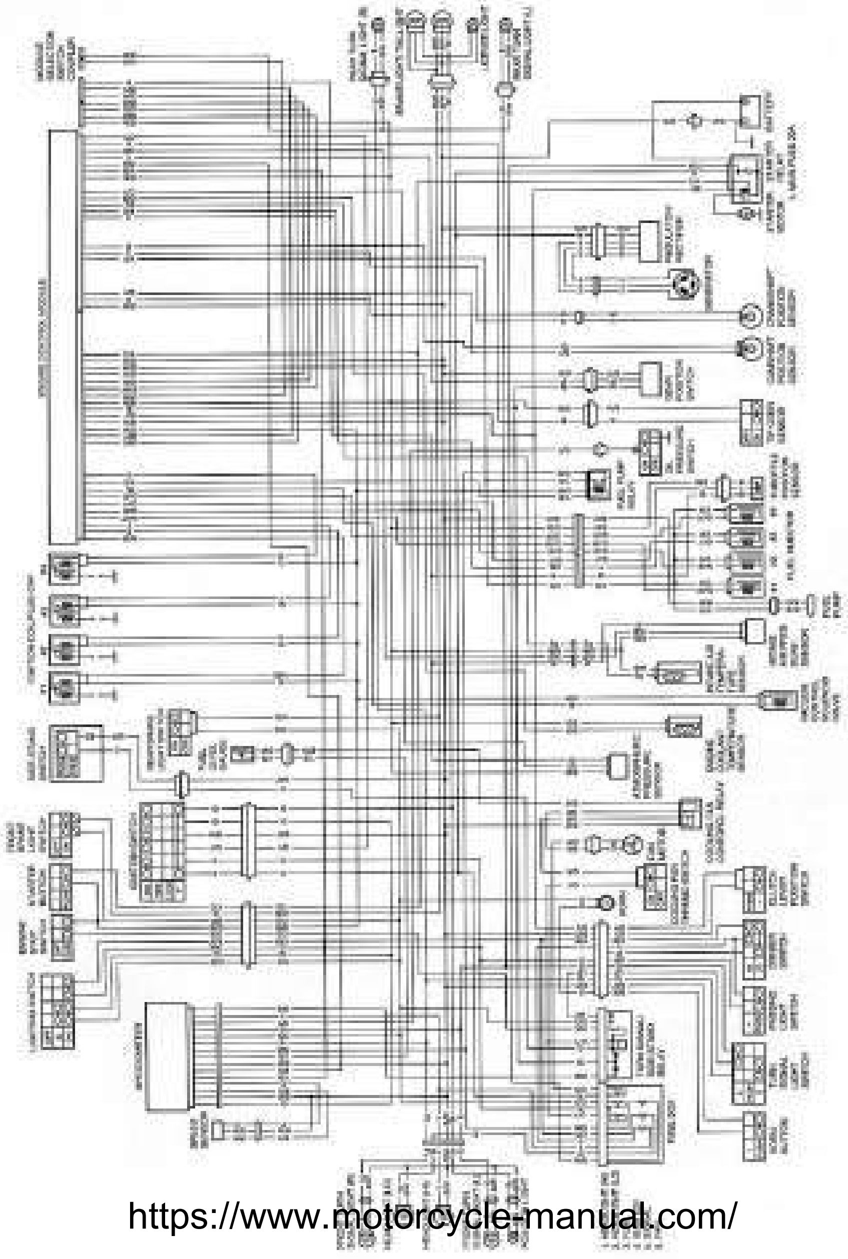
FOR E-03, 28, 33



FOR E-24



FOR THE OTHERS

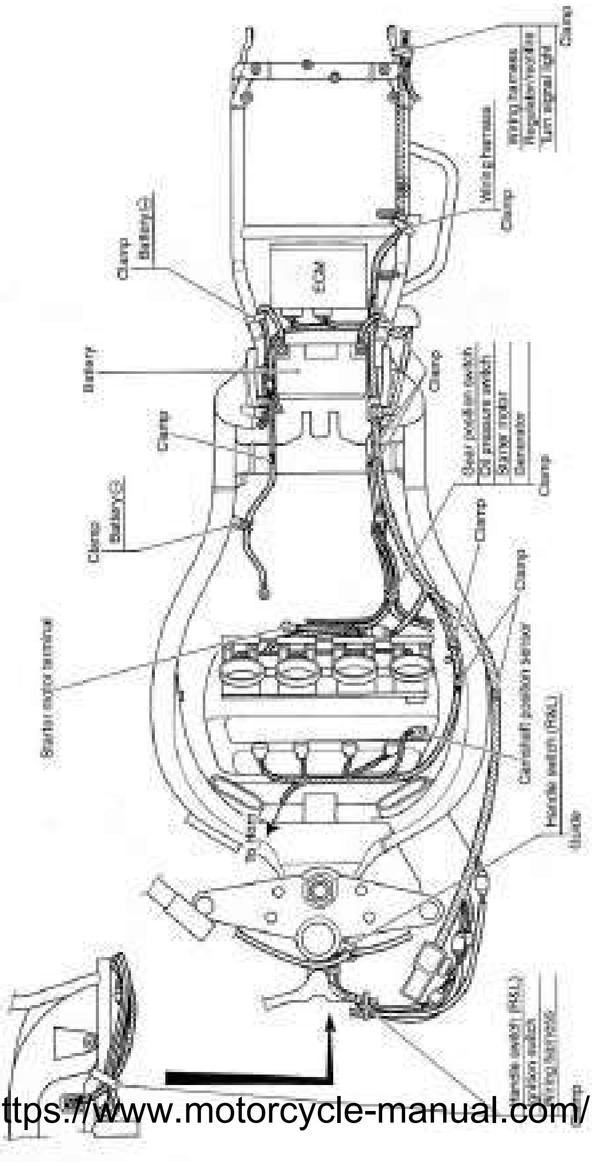


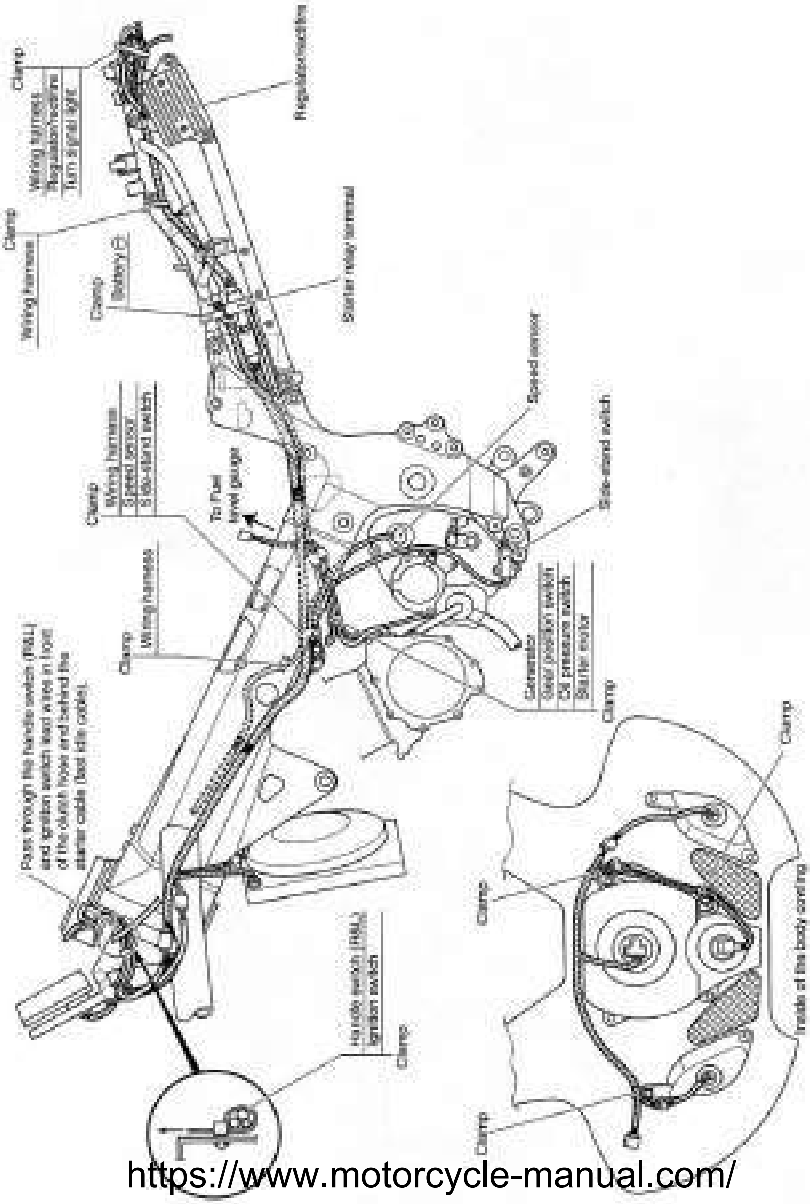
WIRE COLOR

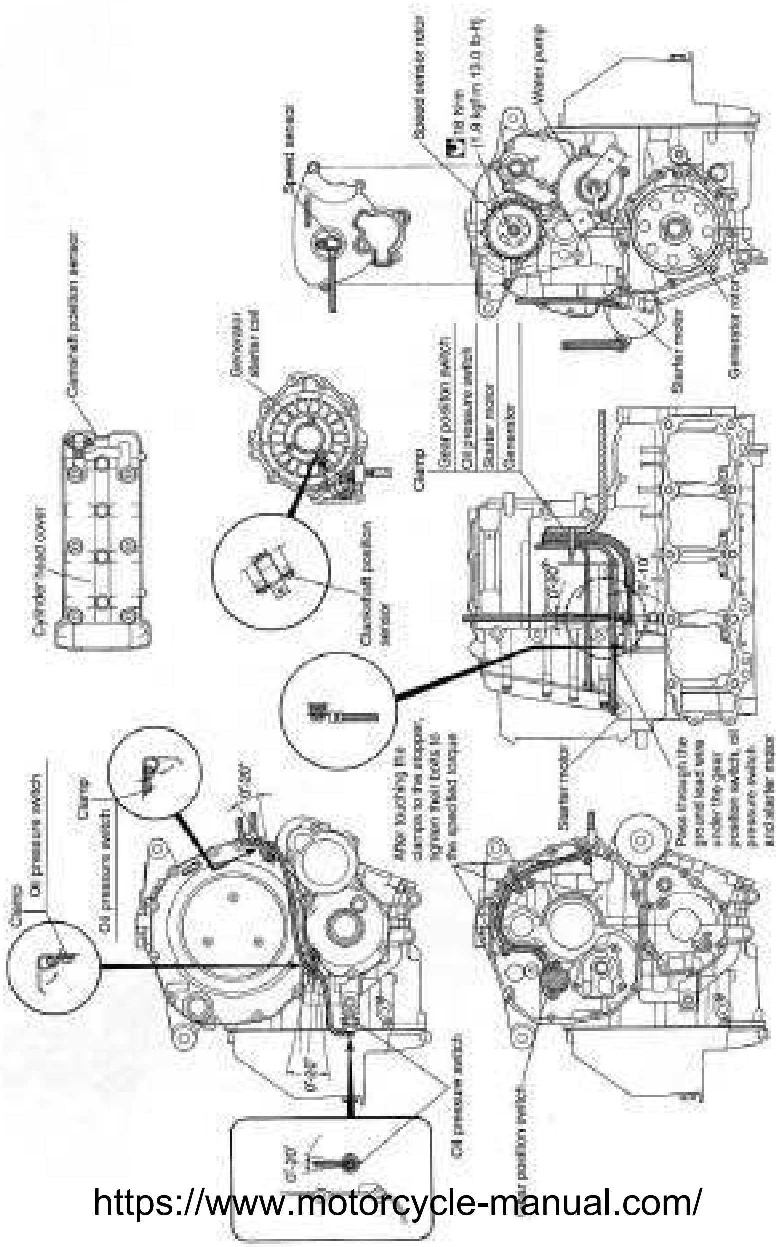
B	: Black
Bl	: Blue
Br	: Brown
Dbr	: Dark brown
Dg	: Dark green
G	: Green
Gr	: Gray
Lbl	: Light blue
Lg	: Light green
O	: Orange
P	: Pink
R	: Red
V	: Violet
W	: White
Y	: Yellow
B/Bl	: Black with Blue tracer
B/Br	: Black with Brown tracer
B/G	: Black with Green tracer
B/Lg	: Black with Light green tracer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

WIRING HARNESS, CABLE AND HOSE ROUTING

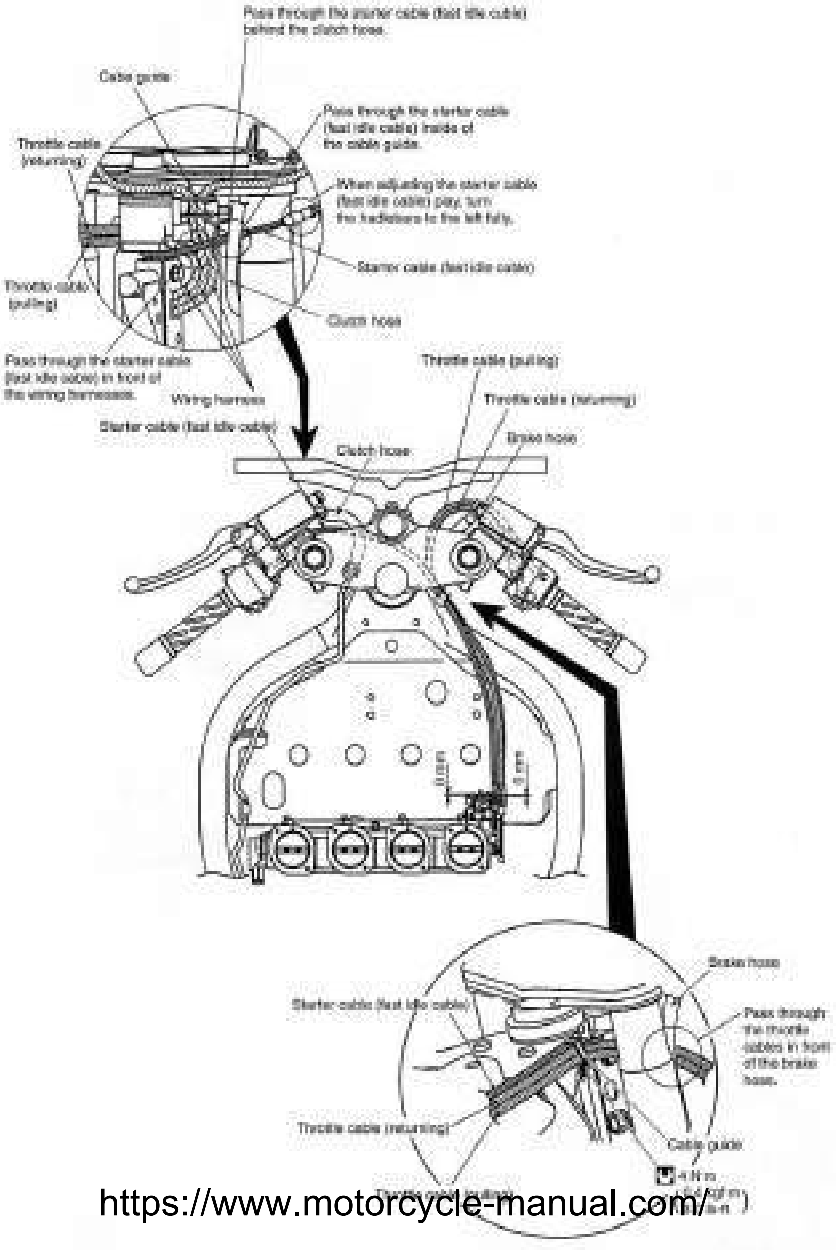
WIRING HARNESS ROUTING



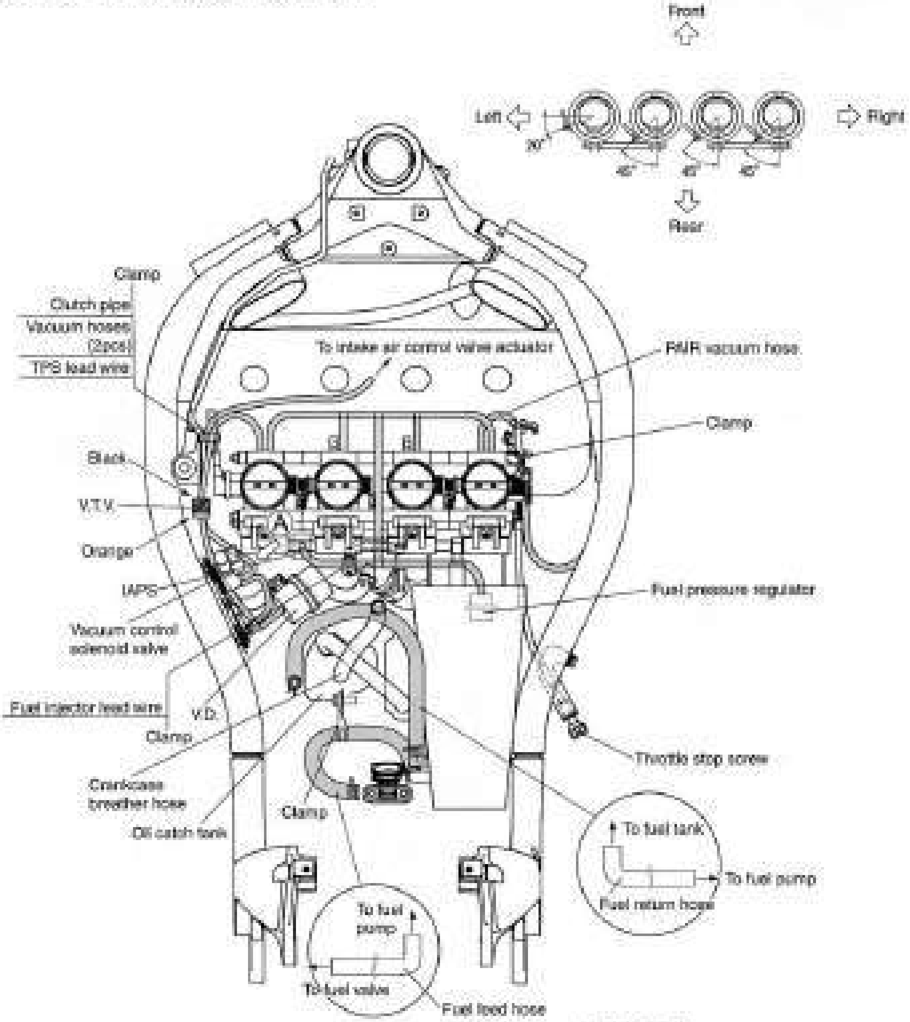

Clamp
Wiring harness, Regulator/rectifier, Turn signal light
Regulator/rectifier
Clamp
Wiring harness
Clamp
Battery (-)
Starter relay terminal
Speed sensor
Clamp
Wiring harness, Speed sensor, Side-stand switch
To Fuel level gauge
Side-stand switch
Clamp
Wiring harness
Generator, Gear position switch, Oil pressure switch, Starter motor
Clamp
Pass through the handle switch (R&L) and ignition switch lead wire in front of the clutch hose and behind the starter cable (fast idle cable).
Handle switch (R&L), Ignition switch
Clamp
Clamp
Clamp
Clamp
Inside of the body cowling

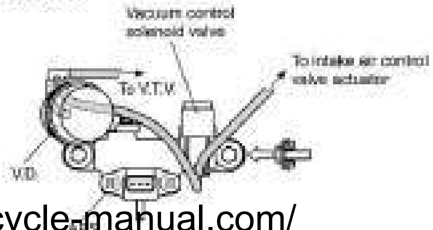

Cylinder head cover
Camshaft position sensor
Generator starter coil
Crankshaft position sensor
Speed sensor
Speed sensor rotor
Water pump
Starter motor
Generator rotor
Clamp
Gear position switch
Oil pressure switch
Starter motor
Generator
After touching the clamps to the stopper, tighten their bolts to the specified torque
Pass through the ground lead wire under the gear position switch, oil pressure switch and starter motor lead wires.
Clamp
Oil pressure switch
Oil pressure switch
Gear position switch

CABLE ROUTING



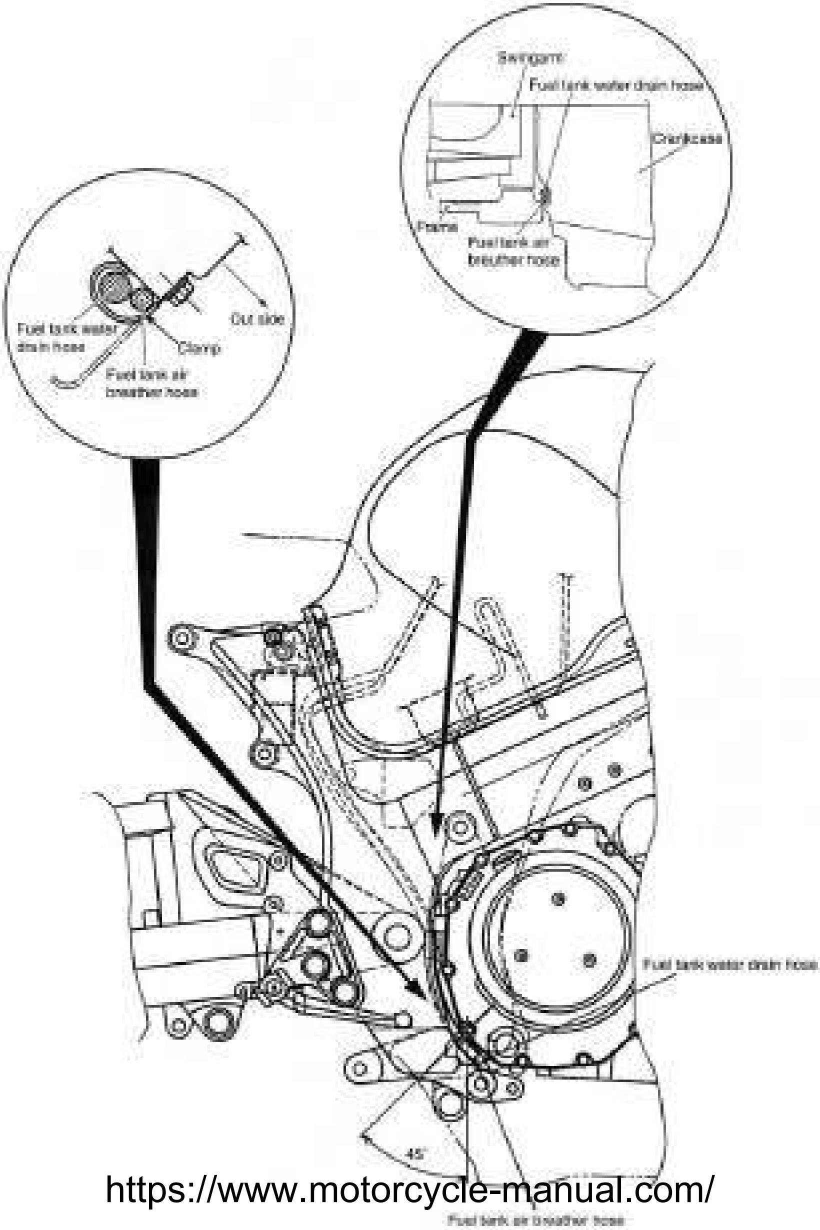
FUEL SYSTEM HOSE ROUTING



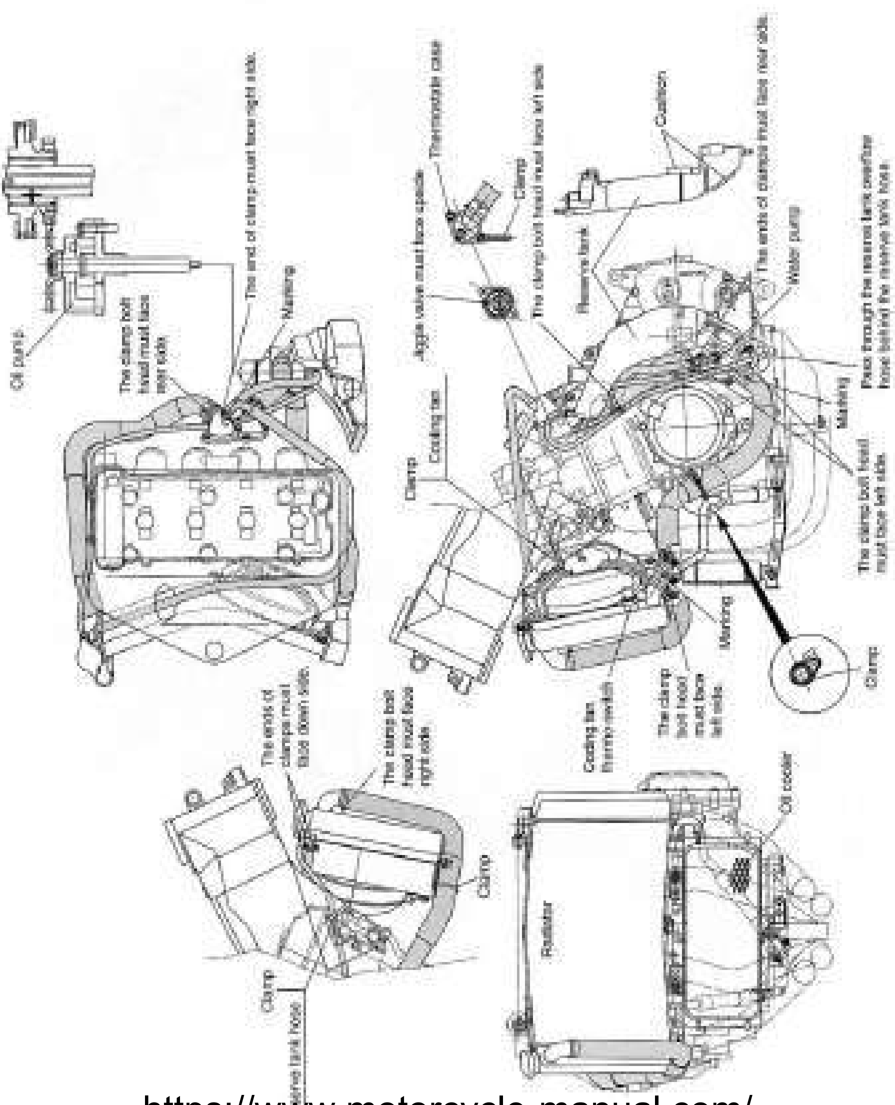


View A

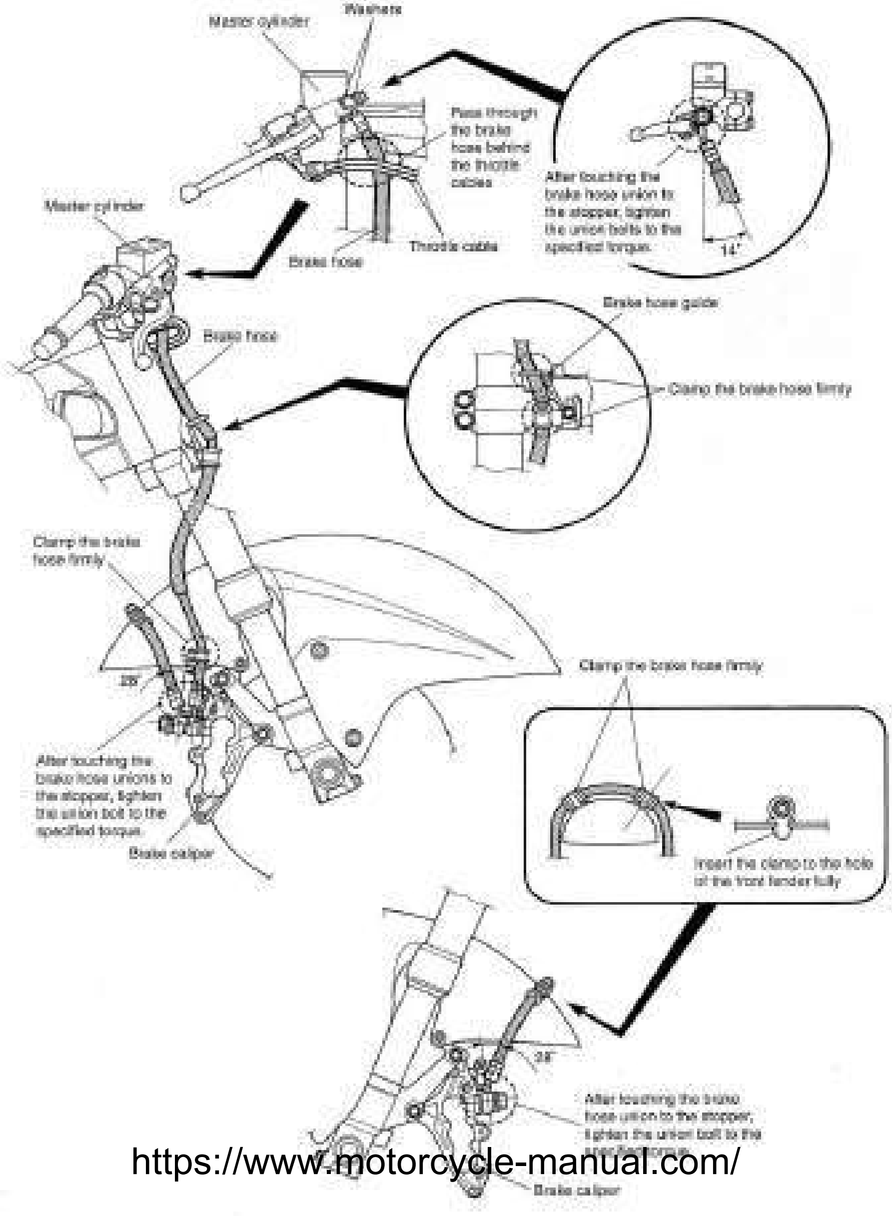
FUEL TANK DRAIN HOSE ROUTING



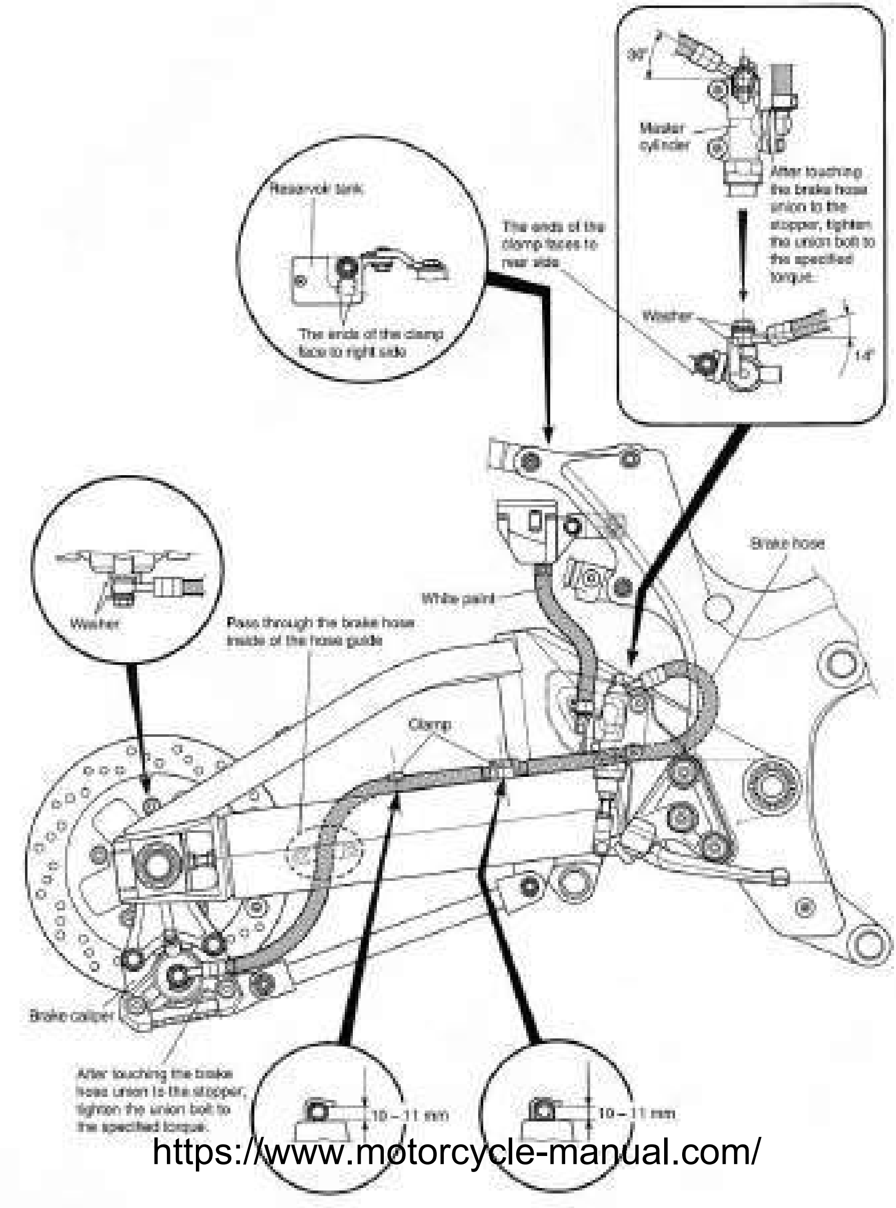
COOLING SYSTEM HOSE ROUTING



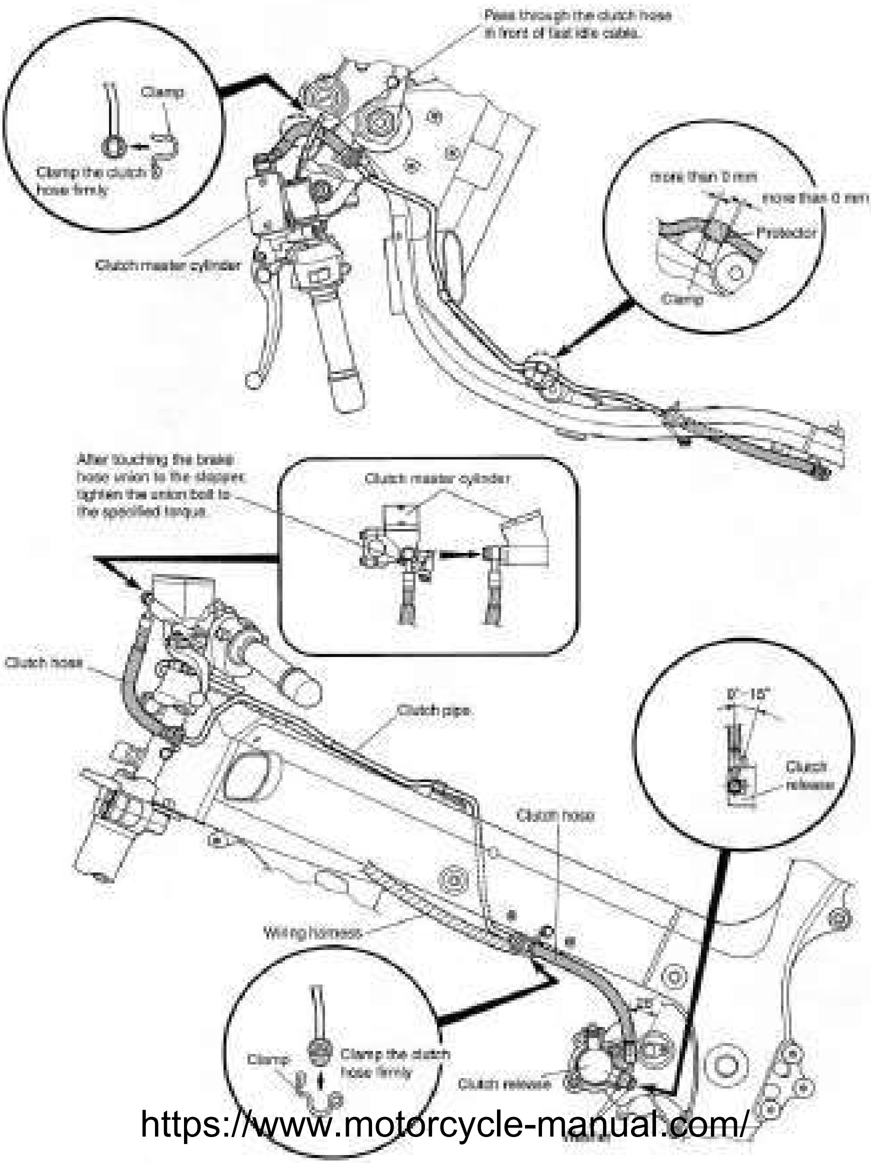
FRONT BRAKE HOSE ROUTING



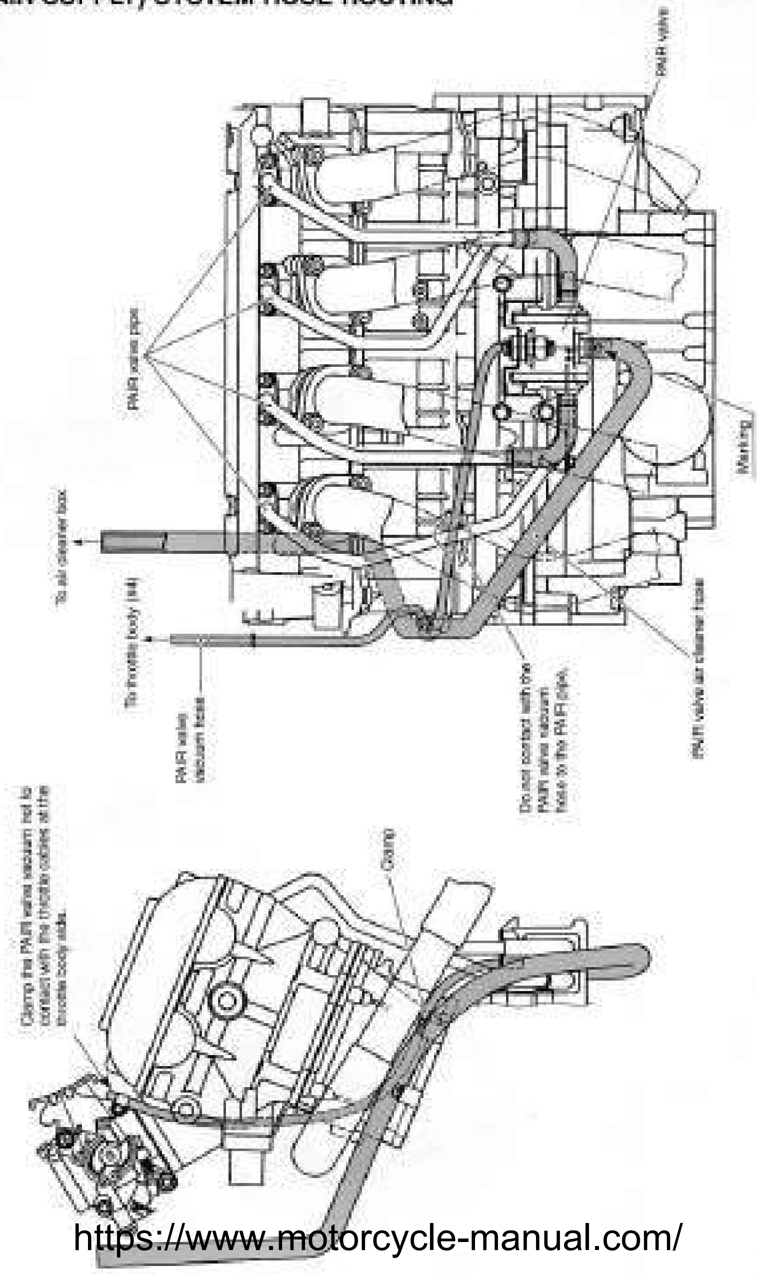
REAR BRAKE HOSE ROUTING



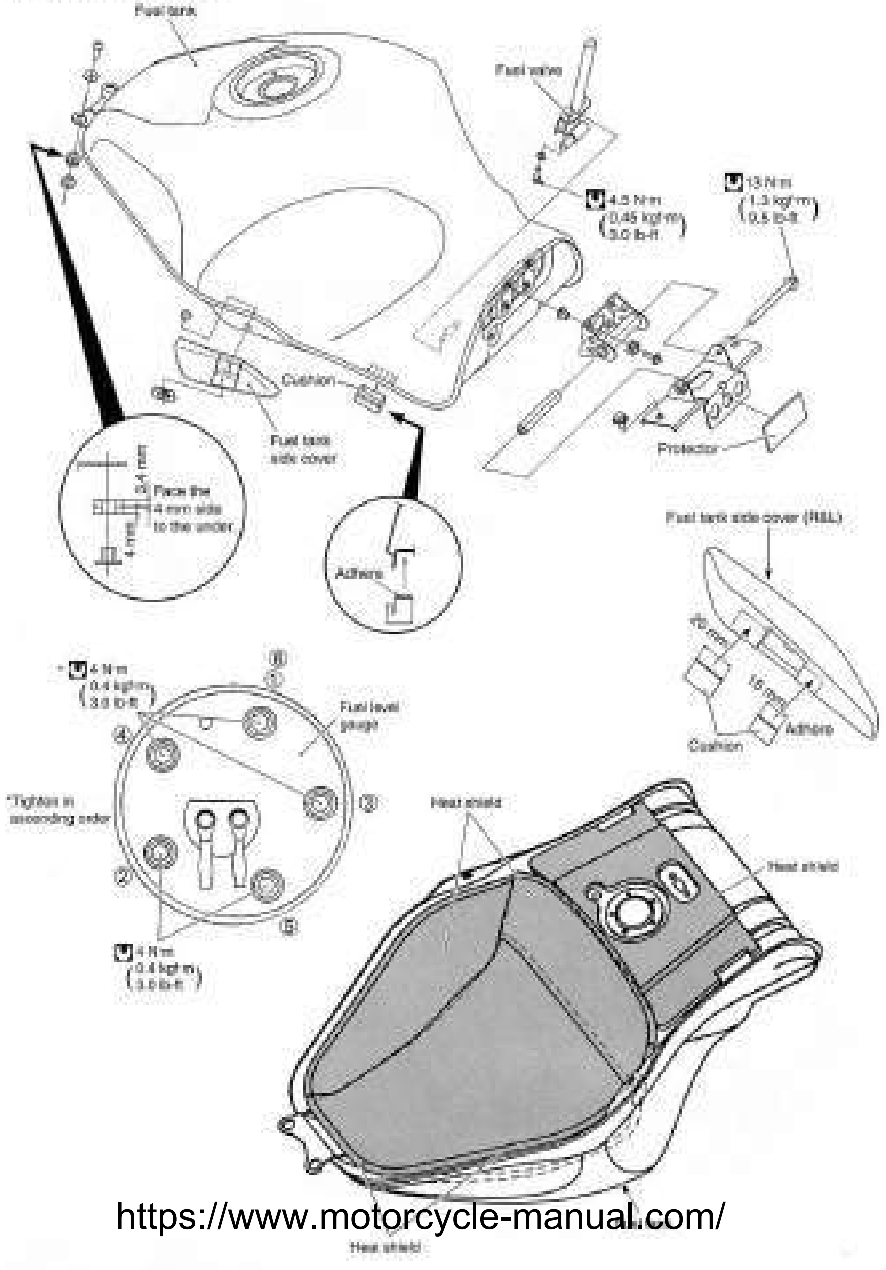
CLUTCH HOSE ROUTING



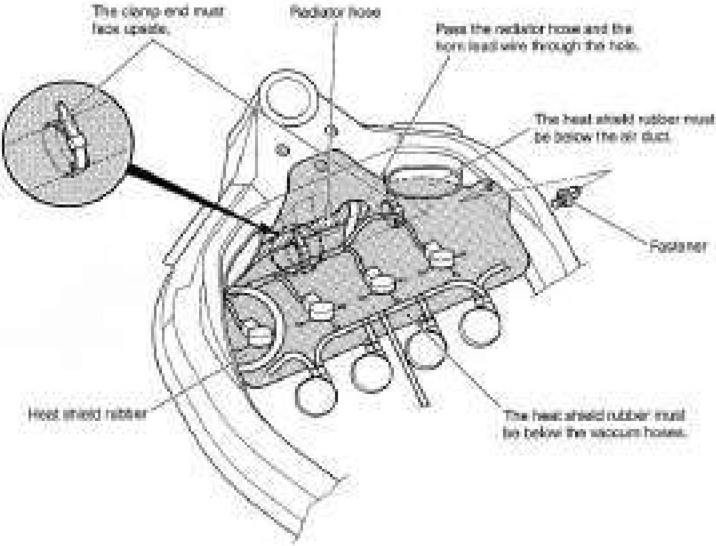
PAIR (AIR SUPPLY) SYSTEM HOSE ROUTING

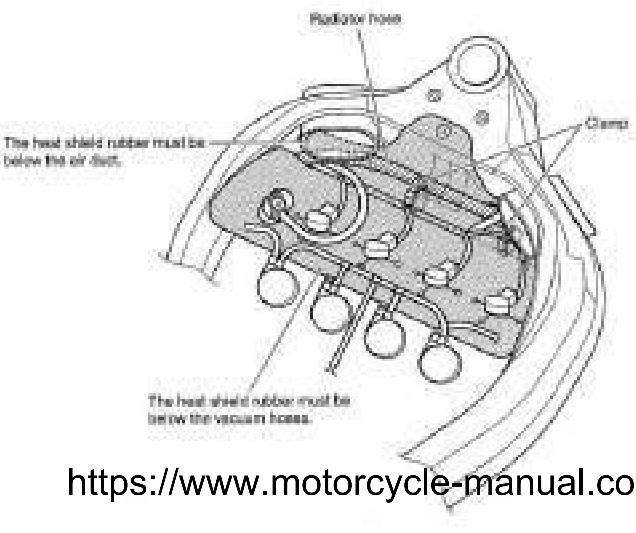


FUEL TANK SET-UP

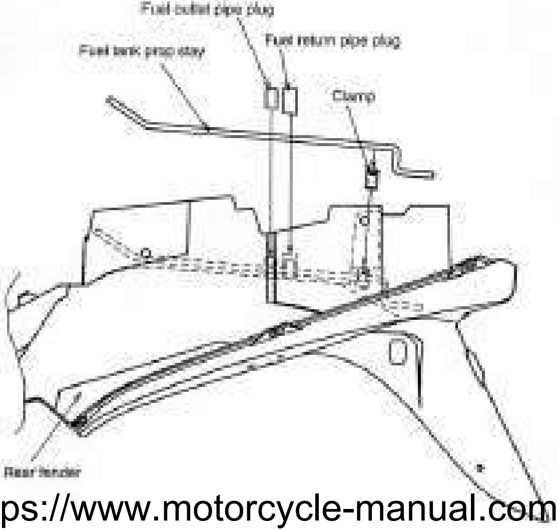


HEAT SHIELD RUBBER

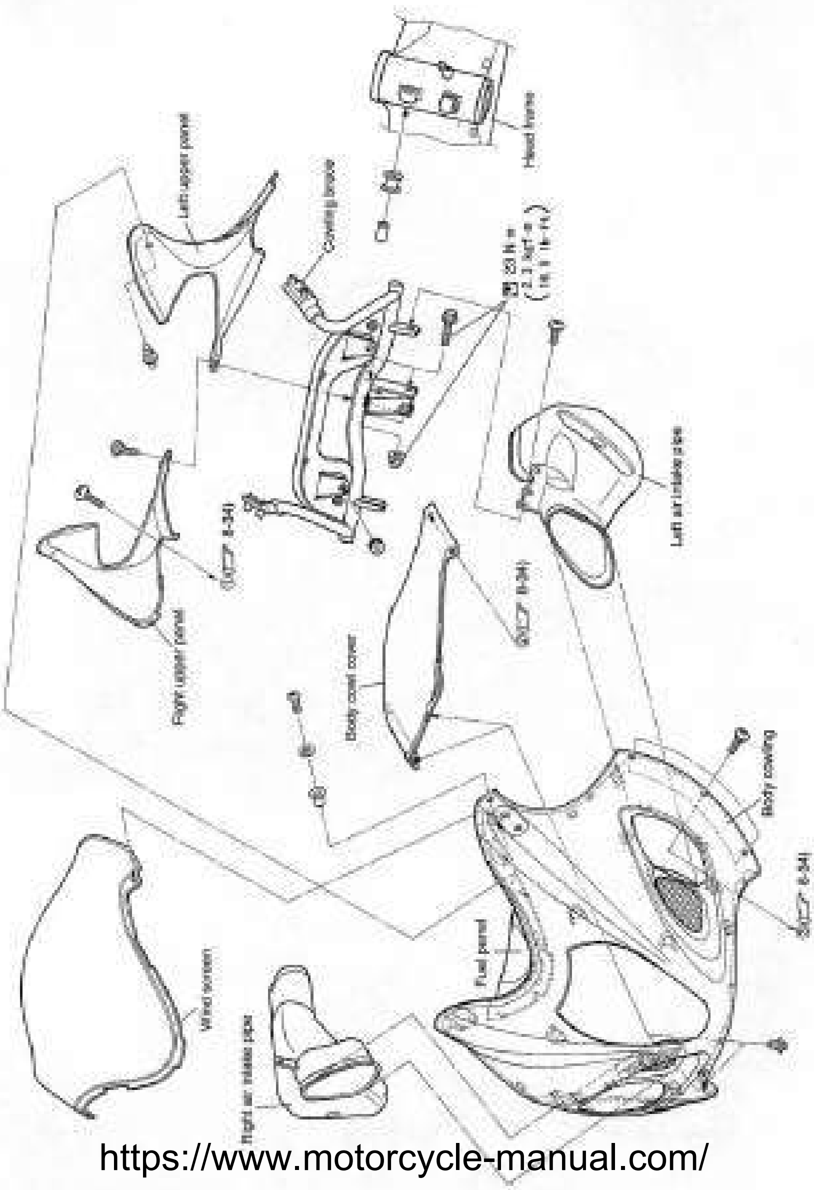


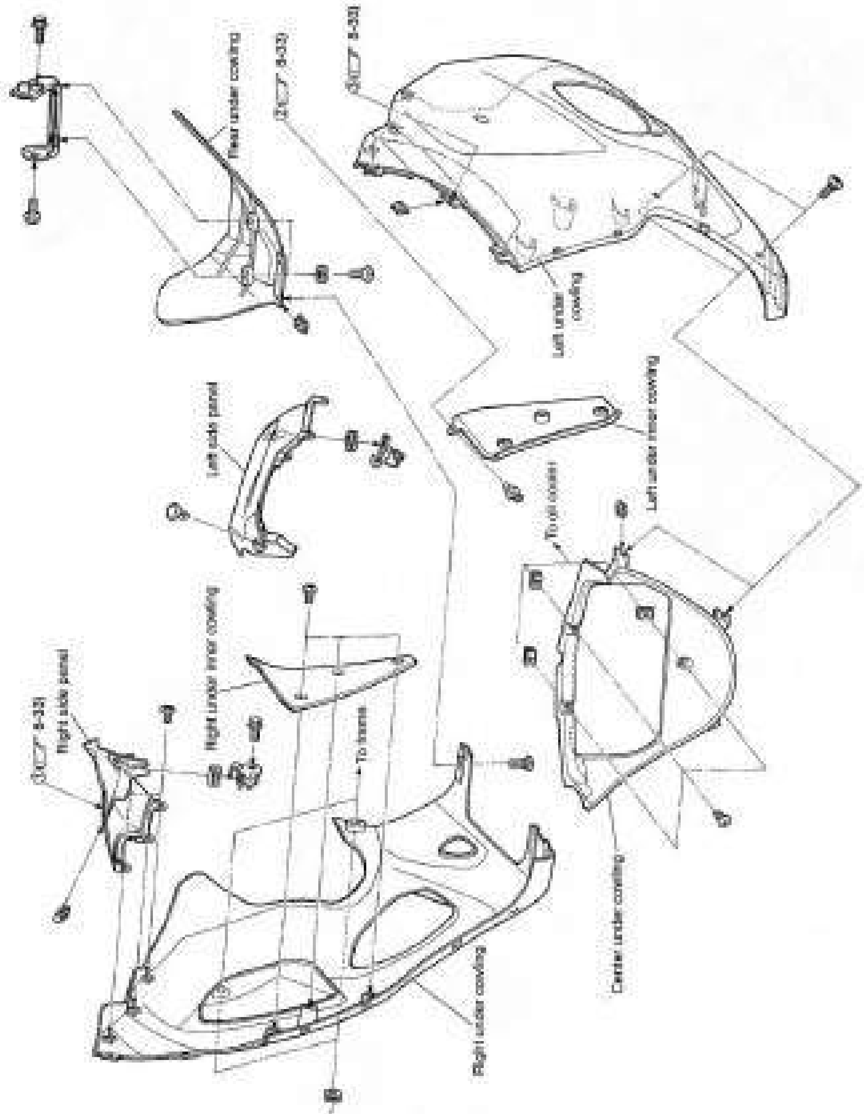


FUEL TANK PROP STAY

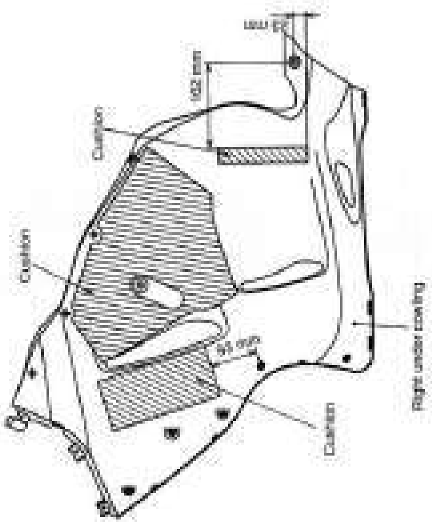


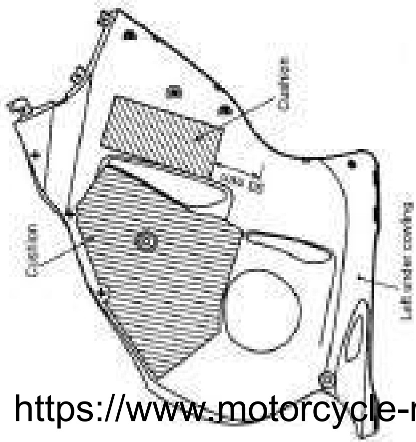
COWLING SET-UP

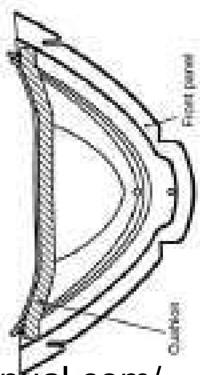



Rear under cowling
8-33
8-33
Left under cowling
Left side panel
Left under inner cowling
To front
Center under cowling
Right under inner cowling
To frame
8-33
Right side panel
Right under cowling

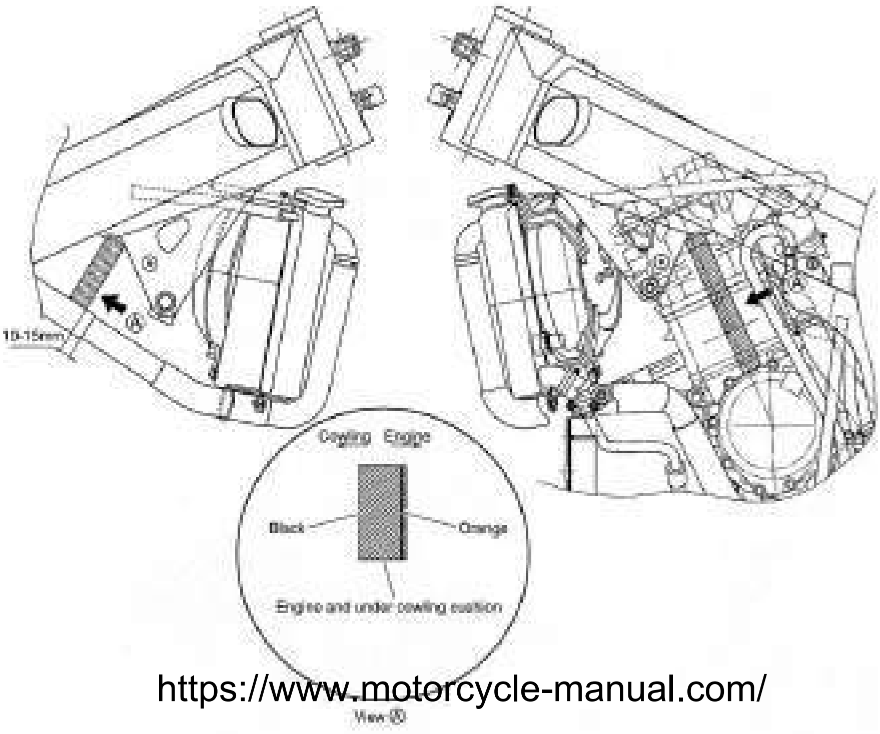
COWLING CUSHION



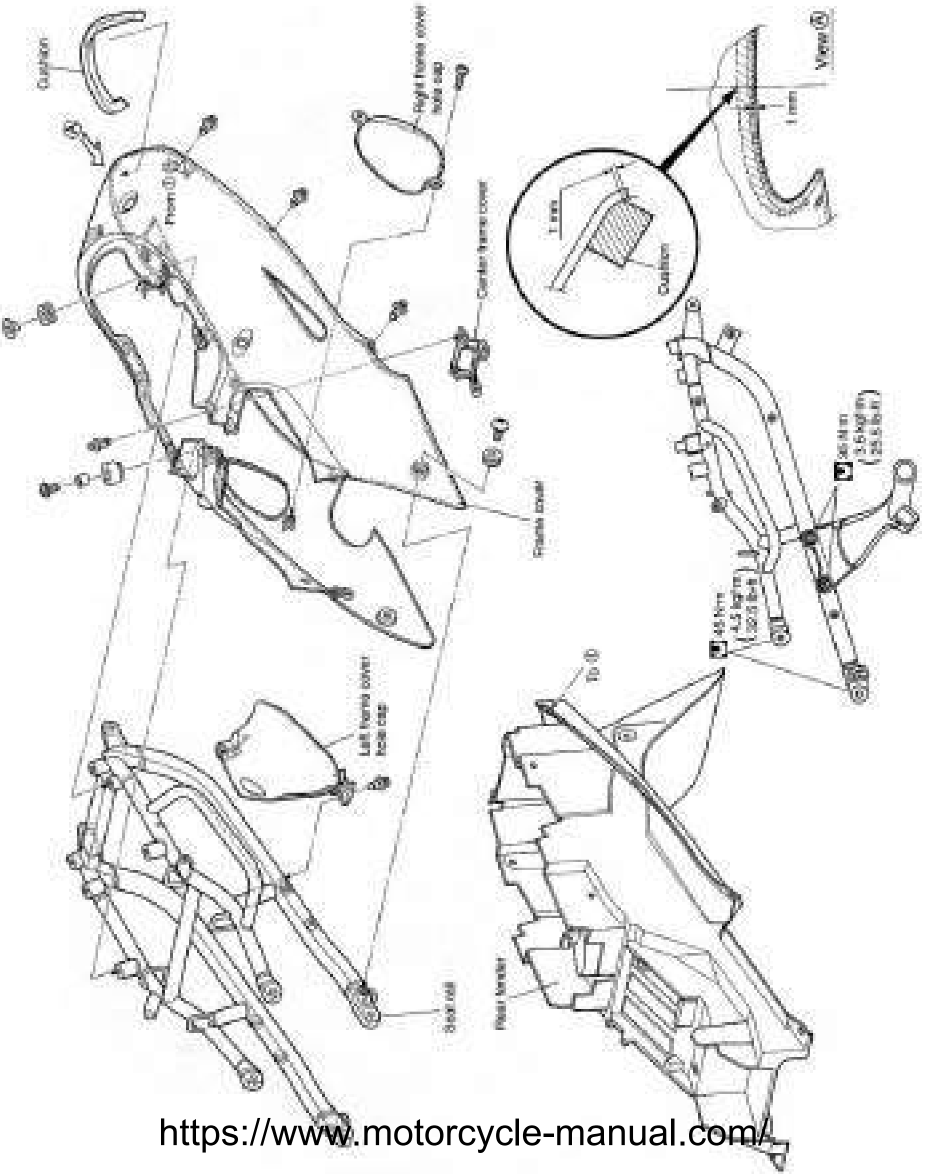




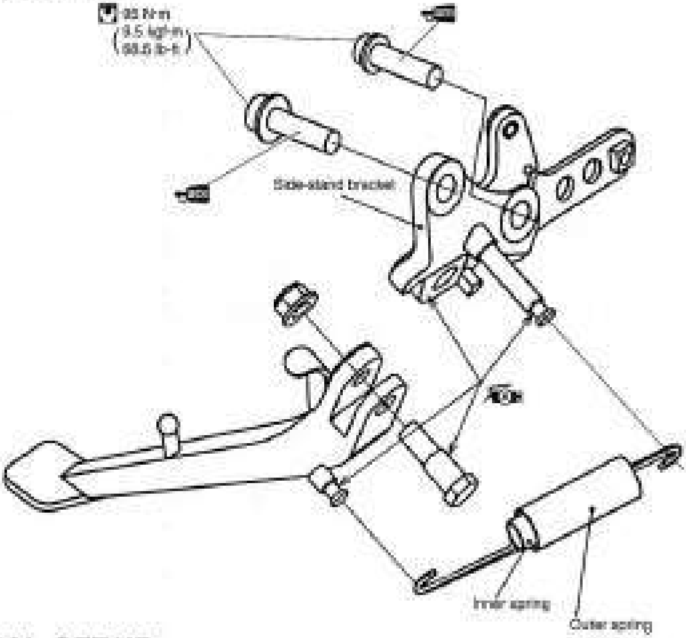
ENGINE AND UNDER COWLING CUSHION



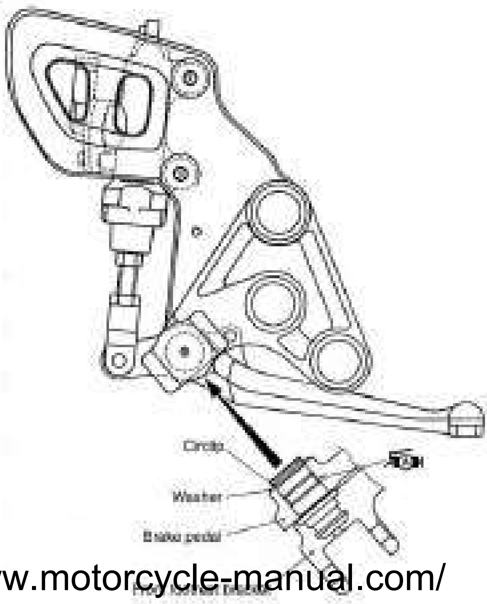
FRAME COVER SET-UP



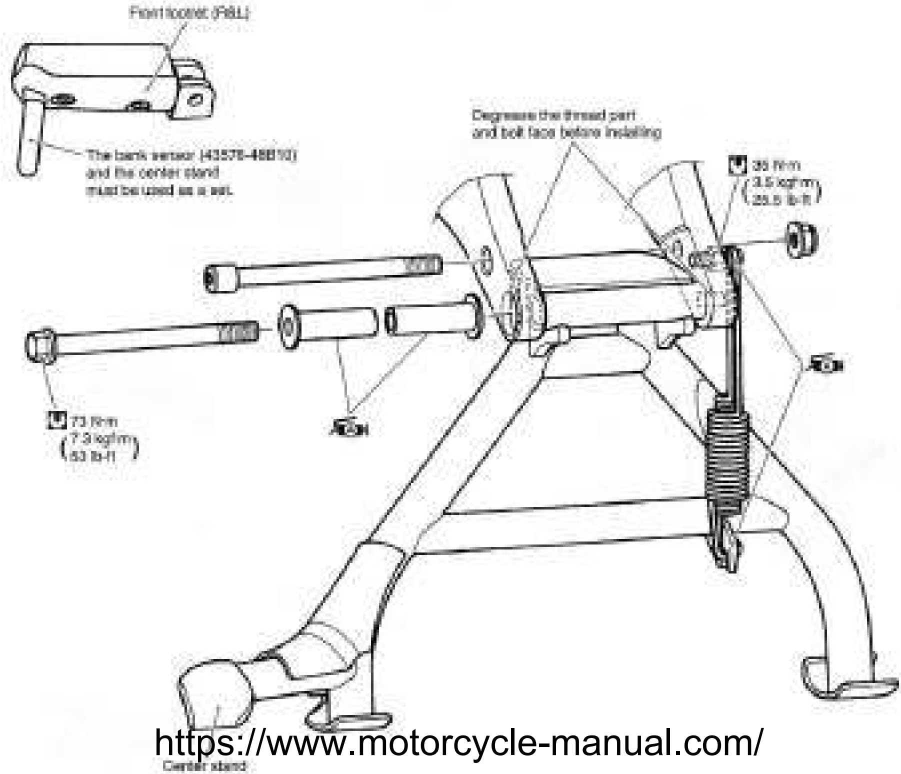
SIDE-STAND SPRING



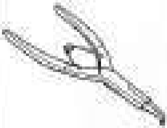
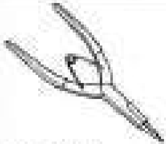
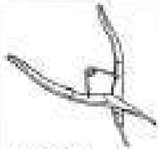
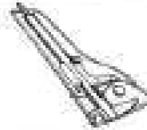
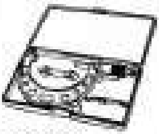
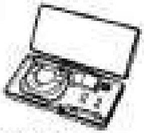
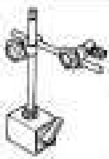
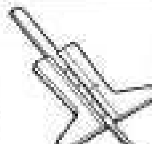
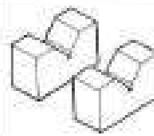
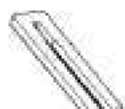
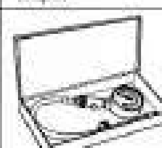
BRAKE PEDAL SET-UP

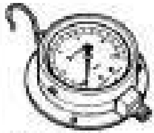
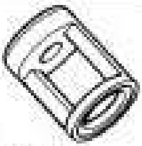
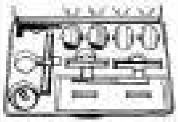
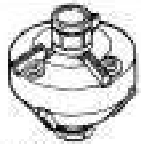
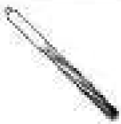
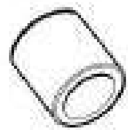
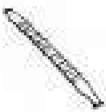
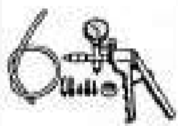
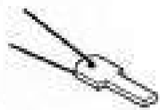
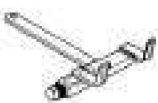
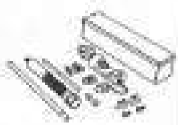
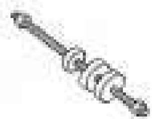


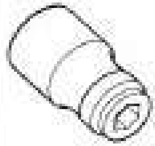
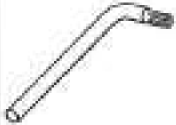
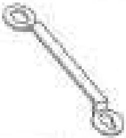
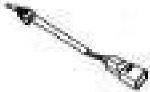
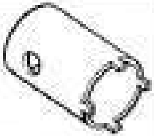
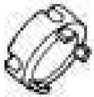
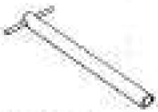
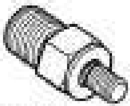
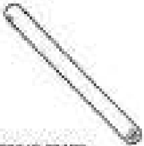
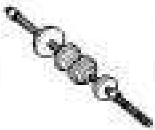
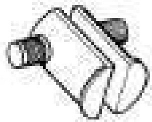
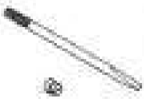
CENTER STAND SET-UP



SPECIAL TOOLS

 09900-06104 Snap ring pliers	 09900-06107 Snap ring pliers	 09900-06108 Snap ring pliers	 09900-20101 09900-20102 Vernier calipers	 09900-20202 Micrometer (25–50 mm)
 09900-20204 Micrometer (75–100 mm)	 09900-20205 Micrometer (0–25 mm)	 09900-20508 Cylinder gauge set	 09900-20602 Dial gauge (1/1000 mm, 1 mm)	 09900-20605 Dial calipers (1/100 mm, 10–34 mm)
 09900-20606 Dial gauge (1/100 mm, 10 mm)	 09900-20701 Magnetic stand	 09900-20803 09900-20806 Thickness gauge	 09900-20805 Tire depth gauge	 09900-21304 V-block (100 mm)
 09900-22301 09900-22302 Plastigauge	 09900-22403 Small bore gauge (18–35 mm)	 09900-25008 Multi circuit tester set	 09910-20115 Conrod holder	 09913-10750 Compression gauge adapter
 09913-13121 Carburetor balancer set	 [illegible] Oil seal remover	 [illegible] Bearing installer set	 [illegible] [illegible]	 09915-64510 Compression gauge

 09915-74520 Oil pressure gauge hose	 09915-74540 Oil pressure gauge adaptor	 09915-77330 Meter (for high pressure)	 09916-10911 Valve lapper set	 09916-14510 Valve spring compressor
 09916-14910 Valve spring compressor attachment	 09916-21111 Valve seat cutter set	 09916-22420 Valve seat cutter head (N-114)	 09916-22430 Valve seat cutter head (N-128)	 09916-24311 Solid pilot (N-100-5.0)
 09916-34542 Reamer handle	 09916-34570 Valve guide reamer (5.0 mm)	 09916-34580 Valve guide reamer (10.8 mm)	 09916-44310 Valve guide remover/installer	 09916-53350 Attachment
 09916-74521 Piston ring compressor body	 09916-74550 Piston ring compressor band	 09916-84511 Tweezers	 09917-47010 Vacuum pump gauge	 09917-62430 Cam chain tension adjuster locking tool
 09920-34830 Starter clutch holder	 09920-53740 [illegible] holder	 [illegible] Bearing remover set	 09922-22711 [illegible] and joining tool	 09924-84521 Bearing installer set

 09925-18011 Steering bearing installer	 09930-11920 Torx bit JT40H	 09930-11940 Bit holder	 09930-11960 Torx wrench	 09930-30450 Rotor remover
 09930-44530 Rotor holder	 09930-82710 Mode selection switch	 09940-14911 Steering stem nut wrench	 09940-14960 Steering nut wrench socket	 09940-14970 Swingarm pivot shaft lock nut socket wrench
 09940-14990 Engine mounting thrust adjuster socket wrench	 09940-30221 Front fork assembling tool	 09940-40210 Fuel pressure gauge adaptor	 09940-50120 Front fork inner rod holder	 09940-92720 Spring scale
 09940-94922 Front fork spring stop-per plate	 09940-94930 Front fork space holder	 09941-34513 Steering race installer	 09941-54911 Bearing outer race remover	 09943-74111 Fork oil level gauge
 09944-90210 Wheel bearing remover				

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 mounting nut		23	2.3	16.5
Muffler joint nut		25	2.5	18.0
Speed sensor rotor bolt		18	1.8	13.0
Engine sprocket nut		145	14.5	105.0
Engine mounting bolt and nut	(M:12)	75	7.5	54.0
	(M:10)	55	5.5	40.0
Engine mounting thrust adjuster		10	1.0	7.0
Engine mounting thrust adjuster lock nut		45	4.5	32.5
Engine mounting pinch bolt		35	3.5	25.5
Cylinder head cover bolt		14	1.4	10.0
Spark plug		11	1.1	8.0
Cam chain guide bolt		10	1.0	7.0
Camshaft journal holder bolt		10	1.0	7.0
Cam chain tension adjuster bolt		8	0.8	6.0
Cam chain tension adjuster mounting bolt		10	1.0	7.0
Cylinder head side bolt		14	1.4	10.0
Cam chain tensioner bolt		10	1.0	7.0
Cylinder head bolt	(M:10)	52	5.2	37.5
	(M:6)	10	1.0	7.0
Cylinder nut		10	1.0	7.0
PAIR pipe nut		10	1.0	7.0
Water bypass union		14	1.4	10.0
Water inlet connector bolt		10	1.0	7.0
Oil hose union bolt		20	2.0	14.5
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 spring support bolt		23	2.3	16.5
Starter clutch cover bolt		10	1.0	7.0
Starter idle gear cover bolt		10	1.0	7.0
Starter clutch cover plug		11	1.1	8.0
Valve timing inspection plug		23	2.3	16.5
Starter clutch bolt		55	5.5	40.0
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
Crankshaft position sensor set bolt		5.5	0.55	4.0
Gearshift cover bolt		10	1.0	7.0
Gearshift cam stopper bolt		10	1.0	7.0
Gearshift cam stopper plate bolt		10	1.0	7.0
Gearshift arm stopper bolt		19	1.9	13.5
Oil pressure switch		14	1.4	10.0
Crankcase bolt	[M:6]	11	1.1	8.0
	[M:8]	26	2.6	19.0
	[M:9]	32	3.2	23.0
	[M:10]	50	5.0	36.0
Oil gallery plug	[M:6]	10	1.0	7.0
	[M:8] [M:10]	16	1.6	11.5
	[illegible]	[illegible]	[illegible]	26.5
Oil drain plug		23	2.3	16.5

ITEM		N·m	kgf·m	lb-ft
Piston cooling oil jet bolt		10	1.0	7.0
Oil jet (For generator)		5	0.5	3.5
Oil pump mounting bolt		10	1.0	7.0
Conrod bearing cap bolt	(Initial)	35	3.5	25.5
	(Final)	67	6.7	48.5
Bearing retainer screw		8	0.8	6.0
Cam chain guide retainer screw		8	0.8	6.0
Balancer arm bolt		10	1.0	7.0
Balancer cover bolt		10	1.0	7.0
Breather pipe bolt		10	1.0	7.0
Oil strainer bolt		10	1.0	7.0
Oil pan bolt		10	1.0	7.0
Oil pipe bolt	[M:6]	10	1.0	7.0
Oil pipe union bolt	[M:14]	28	2.8	20.5

FI ASYSTEM AND INTAKE AIR SYSTEM

ITEM	N·m	kgf·m	lb-ft
Camshaft position sensor mounting bolt	8	0.8	6.0
Intake air temperature sensor	18	1.8	13.0
Fuel pressure check plug	10	1.0	7.0
Fuel pressure regulator mounting screw	3	0.3	2.0
Fuel filter cap mounting screw	3	0.3	2.0
Fuel delivery pipe mounting screw	5	0.5	3.5
Fuel pump mounting screw	5	0.5	3.5

COOLING AND LUBRICATION SYSTEM

ITEM	N·m	kgf·m	lb-ft
Impeller securing bolt	8	0.8	6.0
Water pump cover bolt	6	0.6	4.5
Water pump mounting bolt	10	1.0	7.0
Cooling fan thermo-switch	17	1.7	12.5
Engine coolant temperature sensor	18	1.8	13.0
Thermostat case bolt	10	1.0	7.0
Oil cooler hose 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	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	23	2.3	16.5
Front fork inner rod lock nut	29	2.9	20.0
Front fork damper rod bolt	40	4.0	29.0
Front axle	100	10.0	72.5
Front axle pinch bolt	23	2.3	16.5
Handlebar clam[illegible]	[illegible]	[illegible]	7.0
Handlebar holder nut	35	3.5	25.5

ITEM	N·m	kgf·m	lb-ft
Front brake master cylinder mounting bolt	10	1.0	7.0
Front brake caliper mounting bolt	39	3.9	28.0
Front brake caliper housing bolt	21	2.1	15.0
Brake hose union bolt	23	2.3	16.5
Clutch master cylinder mounting bolt	10	1.0	7.0
Clutch hose union bolt	23	2.3	16.5
Air bleeder valve	7.5	0.75	5.5
Brake disc bolt (Front)	23	2.3	16.5
Brake disc bolt (Rear)	35	3.5	25.5
Rear brake caliper mounting bolt	26	2.6	19.0
Rear brake caliper housing bolt	30	3.0	21.5
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	26	2.6	19.0
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
Torque link nut (Front)	28	2.8	20.5
Torque link nut (Rear)	35	3.5	25.5
Cushion lever mounting nut	78	7.8	56.5
Cushion rod mounting nut	78	7.8	56.5
Rear shock absorber mounting nut	50	5.0	36.0
Rear axle nut	100	10.0	72.5
Rear sprocket nut	60	6.0	43.5
Side-stand mounting bracket bolt	[illegible]	[illegible]	68.5
Cowling brace bolt and nut	23	2.3	16.5

TIGHTENING TORQUE CHART

For other bolts and nuts listed previously, refer to this chart:

Bolt Diameter Ⓐ (mm)	Conventional or "4" marked bolt			"7" marked bolt		
	N·m	kgf·m	lb-ft	N·m	kgf·m	lb-ft
4	1.5	0.15	1.0	2.3	0.23	1.5
5	3	0.3	2.0	4.5	0.45	3.0
6	5.5	0.55	4.0	10	1.0	7.0
8	13	1.3	9.5	23	2.3	16.5
10	29	2.9	21.0	50	5.0	36.0
12	45	4.5	32.5	85	8.5	61.5
14	65	6.5	47.0	135	13.5	97.5
16	105	10.5	76.0	210	21.0	152.0
18	160	16.0	115.5	240	24.0	173.5

Conventional bolt

"4" marked bolt

"7" marked bolt

SERVICE DATA

VALVE + GUIDE

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Valve diam.	IN.	33 (1.30)	——
	EX.	27.5 (1.08)	——
Valve clearance (when cold)	IN.	0.10 – 0.20 (0.004 – 0.008)	——
	EX.	0.20 – 0.30 (0.008 – 0.012)	——
Valve guide to valve stem clearance	IN.	0.010 – 0.037 (0.0004 – 0.0015)	——
	EX.	0.030 – 0.057 (0.0012 – 0.0022)	——
Valve guide I.D.	IN. & EX.	5.000 – 5.012 (0.1969 – 0.1973)	——
Valve stem O.D.	IN.	4.975 – 4.990 (0.1959 – 0.1965)	——
	EX.	4.955 – 4.970 (0.1951 – 0.1957)	——
Valve stem deflection	IN. & EX.	——	0.35 (0.014)
Valve stem runout	IN. & EX.	——	0.05 (0.002)
Valve head thickness	IN. & EX.	——	0.5 (0.02)
Valve seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	——
Valve head radial runout	IN. & EX.	——	0.03 (0.001)
Valve spring free length (IN. & EX.)	INNER	——	35.1 (1.38)
	OUTER	——	45.2 (1.77)
Valve spring tension (IN. & EX.)	INNER	3.1 – 3.5 kgf (6.83 – 7.72 lbs) at length 33.1 mm (1.30 in)	——
	OUTER	15.5 – 17.9 kgf (34.17 – 39.46 lbs) at length 36.6 mm (1.44 in)	——

CAMSHAFT + CYLINDER HEAD

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Cam height	IN.	36.780 – 36.848 (1.4480 – 1.4506)	36.48 (1.436)
	EX.	35.480 – 35.548 (1.3968 – 1.3995)	35.18 (1.385)
Camshaft journal oil clearance	IN. & EX.	0.032 – 0.066 (0.0013 – 0.0026)	0.150 (0.0059)
Camshaft journal [illegible]	[illegible]	[illegible] (0.9454 – 0.9459)	——

ITEM	STD/SPEC.		LIMIT
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")	16th pin		———
Cylinder head distortion	———		0.20 (0.008)

CYLINDER + PISTON + PISTON RING

Unit: mm (in)

ITEM	STD/SPEC.			LIMIT
Compression pressure	1 200 – 1 600 kPa (12 – 16 kgf/cm², 171 – 228 psi)			900 kPa (9 kgf/cm², 128 psi)
Compression pressure difference	———			200 kPa (2 kgf/cm², 28 psi)
Piston to cylinder clearance	0.020 – 0.030 (0.0008 – 0.0012)			0.120 (0.0047)
Cylinder bore	81.000 – 81.015 (3.1890 – 3.1896)			Nicks or scratches
Piston diam.	80.975 – 80.990 (3.1880 – 3.1886) Measure at 15 mm (0.6 in) from the skirt end.			80.880 (3.1842)
Cylinder distortion	———			0.20 (0.008)
Piston ring free end gap	1st	R	Approx. 7.3 (0.29)	5.8 (0.23)
	2nd	RN	Approx. 8.1 (0.32)	6.4 (0.25)
Piston ring end gap	1st	R	0.08 – 0.20 (0.003 – 0.008)	0.50 (0.020)
	2nd	RN	0.08 – 0.20 (0.003 – 0.008)	0.50 (0.020)
Piston ring to groove clearance	1st		———	0.180 (0.0071)
	2nd		———	0.150 (0.0059)
Piston ring groove width	1st		1.21 – 1.23 (0.0476 – 0.0484)	———
	2nd		1.01 – 1.03 (0.0398 – 0.0406)	———
	Oil		2.01 – 2.03 (0.0791 – 0.0799)	———
Piston ring thickness	1st		1.17 – 1.19 (0.0461 – 0.0469)	———
	2nd		0.97 – 0.99 (0.0382 – 0.0390)	———
Piston pin bore	20.002 – 20.008 (0.7875 – 0.7877)			20.030 (0.7886)
Piston pin O.D.	[illegible] (0.7872 – 0.7874)			19.980 (0.7866)

CONROD + CRANKSHAFT

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Conrod small end I.D.	20.010 – 20.018 (0.7878 – 0.7881)		20.040 (0.7890)
Conrod big end side clearance	0.10 – 0.20 (0.004 – 0.008)		0.30 (0.012)
Conrod big end width	20.95 – 21.00 (0.825 – 0.827)		———
Crank pin width	21.10 – 21.15 (0.831 – 0.833)		———
Conrod big end oil clearance	0.032 – 0.056 (0.0013 – 0.0022)		0.080 (0.0031)
Crank pin O.D.	37.976 – 38.000 (1.4951 – 1.4960)		———
Crankshaft journal oil clearance	0.016 – 0.040 (0.0006 – 0.0016)		0.080 (0.0031)
Crankshaft journal O.D.	39.976 – 40.000 (1.5739 – 1.5748)		———
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	———		0.05 (0.002)

OIL PUMP

ITEM	STD/SPEC.	LIMIT
Oil pressure (at 60°C, 140°F)	Above 200 kPa (2.0 kgf/cm², 43 psi) Below 500 kPa (5.0 kgf/cm², 71 psi) at 3 000 r/min	———

CLUTCH

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Drive plate thickness	No.1	2.92 – 3.08 (0.115 – 0.121)	2.62 (0.103)
	No.2	3.72 – 3.88 (0.146 – 0.153)	3.42 (0.135)
Drive plate claw width	No.1	13.85 – 13.96 (0.542 – 0.550)	13.05 (0.514)
	No.2	13.90 – 14.00 (0.547 – 0.551)	13.10 (0.516)
Driven plate distortion	———		0.10 (0.004)
Clutch spring free height	24.88 (0.980)		23.7 (0.93)
Clutch master cylinder bore	14.000 – 14.043 (0.5512 – 0.5529)		———
Clutch master cy[illegible]	[illegible] (0.5495 – 0.5506)		———

ITEM	STD/SPEC.	LIMIT
Clutch release cylinder bore	38.100 – 38.162 (1.5000 – 1.5024)	———
Clutch release cylinder piston diam.	38.042 – 38.075 (1.4977 – 1.4990)	———
Clutch fluid type	Brake fluid (DOT 4)	———

TRANSMISSION + DRIVE CHAIN

Unit: mm (in) Except ratio

ITEM		STD/SPEC.		LIMIT
Primary reduction ratio		1.596 (83/52)		———
Final reduction ratio		2.352 (40/17)		———
Gear ratios	Low	2.615 (34/13)		———
	2nd	1.937 (31/16)		———
	3rd	1.526 (29/19)		———
	4th	1.285 (27/21)		———
	5th	1.136 (25/22)		———
	Top	1.043 (24/23)		———
Shift fork to groove clearance		0.10 – 0.30 (0.004 – 0.012)		0.50 (0.020)
Shift fork groove width		5.0 – 5.1 (0.197 – 0.201)		———
Shift fork thickness		4.8 – 4.9 (0.189 – 0.193)		———
Drive chain		Type	RK GB50GSV Z3	———
		Links	112 links	———
		20-pitch length	———	319.4 (12.57)
Drive chain slack (on side-stand)		20 – 30 (0.79 – 1.18)		———
Gearshift lever height		50 – 60 (1.97 – 2.36)		———

THERMOSTAT + RADIATOR + FAN + COOLANT

ITEM	STD/SPEC.		LIMIT
Thermostat valve opening temperature	Approx. 82°C (179.6°F)		———
Thermostat valve lift	Over 8 mm (0.31 in) at 95°C (203°F)		———
Engine coolant temperature 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	———
	130°C (226°F)	Approx. 0.088 kΩ	———
Radiator cap valve opening pressure	95 – 125 kPa (0.95 – 1.25 kgf/cm², 13.5 – 17.8 psi)		———
Cooling fan thermo-switch operating temperature	OFF → ON	Approx. 105°C (221°F)	———
	ON → OFF	Approx. 100°C (212°F)	———

ITEM	STD/SPEC.		LIMIT
Engine coolant type	Use an antifreeze/coolant compatible with aluminum radiator, mixed with distilled water only, at the ratio of 50:50.		——
Engine coolant including reserve	Reserve tank side	Approx. 250ml (0.3/0.2 US/Imp qt)	——
	Engine side	Approx. 2 700ml (2.9/2.4 US/Imp qt)	——

INJECTOR + FUEL PUMP + FUEL PRESSURE REGULATOR

ITEM	STD/SPEC.	NOTE
Injector resistance	11 – 16 Ω at 20°C (68°F)	
Fuel pump discharge amount	Approx. 65 L (68.7/57.2 US/Imp qt) for 1 hour at 300 kPa (3.0 kgf/cm², 43 psi)	
Fuel pressure regulator operating set pressure	Approx. 300 kPa (3.0 kgf/cm², 43 psi)	

FI SENSORS + INTAKE AIR CONTROL VALVE

ITEM	STD/SPEC.		NOTE
CMP sensor resistance	0.9 – 1.3 kΩ		
CMP sensor peak voltage	More than 0.7 V		
CKP sensor resistance	180 – 280 Ω		
CKP sensor peak voltage	More than 3 V		
IAP sensor input voltage	4.5 – 5.5 V		
IAP sensor output voltage	Approx. 2.5 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor resistance	Closed	Approx. 1.3 kΩ	
	Opened	Approx. 4.5 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 resistance	2.3 – 2.6 kΩ at 20°C (68°F)		
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor resistance	2.2 – 2.7 kΩ at 20°C (68°F)		
AP sensor input voltage	4.5 – 5.5 V		
AP sensor output voltage	Approx. 3.6 V at 100 kPa (760 mmHg)		
TO sensor resistance	60 – 64 kΩ		
TO sensor voltage	Approx. 2.5 V		
GP switch voltage	More than 0.6 V (From 1st to Top)		
Injector voltage	Battery voltage		
Ignition coil primary peak voltage	More than 80 V (When cranking)		
VCSV resistance	36 – 44 Ω		
Intake air control valve operating rpm	Opening	Above 2 500 rpm	
	Closing	Below 2 200 rpm	

THROTTLE BODY

ITEM	STD/SPEC.	
Fast idle r/min.	3 500 r/min. (After warming up)	
Idle r/min.	E-18	1 150 ± 50 r/min.
	The others	1 150 ± 100 r/min.
Throttle cable play	2.0 – 4.0 mm (0.08 – 0.16 in)	

ELECTRICAL

Unit: mm (in)

ITEM	STD/SPEC.			NOTE
Firing order	1-2-4-3			
Spark plug	Type		NGK: CR9E DENSO: U27ESR-N	
	Gap		0.7 – 0.8 (0.028 – 0.031)	
Spark performance	Over 8 (0.3) at 1 atm.			
CKP sensor resistance	180 – 280 Ω			
CKP sensor peak voltage	More than 3 V			G – W
Ignition coil resistance	Primary		0.8 – 1.2 Ω	Terminal – Terminal
	Secondary		8 – 15 kΩ	Plug cap – Terminal
Ignition coil primary peak voltage	More than 80 V			
Generator coil resistance	0.2 – 0.4 Ω			
Generator Max. output	Approx. 400 W at 5 000 r/min.			
Generator no-load voltage (when cold)	More than 65 V (AC) at 5 000 r/min.			
Regulated voltage	13.5 – 15.0 V at 5 000 r/min.			
Starter relay resistance	3 – 5 Ω			
Battery	Type designation		YT12A-BS	
	Capacity		12V 36kC (10Ah)/10HR	
Fuse size	Headlight	(HI)	15 A	
		(LO)	15 A	
	Signal		15 A	
	Ignition		15 A	
	Fuel		10 A	
	[illegible]		[illegible]	
	Main		30 A	

WATTAGE

ITEM		STD/SPEC. E-03, -24, -28, -33	STD/SPEC. The other countries
Headlight	HI	65 + 55 W	←
	LO	55 W	←
Parking or position light			5 W
Brake light / Taillight		21/5 W × 2	←
Turn signal light		21 W × 4	←
License light		5 W	←
Tachometer light		LED	←
Speedometer light		LED	←
Fuel meter light		LED	←
Engine coolant temp. meter light		LED	←
Turn signal indicator light		LED	←
High beam indicator light		LED	←
Neutral indicator light		LED	←
Oil pressure indicator light		LED	←
FI indicator light		LED	←
Fuel level indicator light		LED	←
Engine coolant temp. indicator light		LED	←

BRAKE + WHEEL

Unit: mm (in)

ITEM			STD/SPEC.	LIMIT
Rear brake pedal height			55 – 65 (2.2 – 2.6)	———
Brake disc thickness	Front		4.8 – 5.2 (0.189 – 0.205)	4.5 (0.177)
	Rear		4.8 – 5.2 (0.189 – 0.205)	4.5 (0.177)
Brake disc runout			———	0.30 (0.012)
Master cylinder bore	Front		15.870 – 15.913 (0.6248 – 0.6265)	———
	Rear		12.700 – 12.743 (0.5000 – 0.5017)	———
Master cylinder piston diam.	Front		15.827 – 15.854 (0.6231 – 0.6242)	———
	Rear		12.657 – 12.684 (0.4983 – 0.4994)	———
Brake caliper cylinder bore	Front	Leading	24.000 – 24.076 (0.9449 – 0.9479)	———
		Trailing	27.000 – 27.076 (1.0630 – 1.0660)	———
	Rear		38.180 – 38.256 (1.5031 – 1.5061)	———
Brake caliper piston diam.	Front	Leading	23.925 – 23.975 (0.9419 – 0.9439)	———
		Trailing	26.920 – 26.970 (1.0598 – 1.0618)	———
	Rear		38.098 – 38.148 (1.4999 – 1.5019)	———
Brake fluid type			DOT 4	———

ITEM	STD/SPEC.		LIMIT
Wheel rim runout	Axial	———	2.0 (0.08)
	Radial	———	2.0 (0.08)
Wheel rim size	Front	17 × MT3.50	———
	Rear	17 × MT6.00	———
Wheel axle runout	Front	———	0.25 (0.010)
	Rear	———	0.25 (0.010)

TIRE

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Cold inflation tire pressure (Solo riding)	Front	290 kPa (2.90 kgf/cm², 42 psi)	———
	Rear	290 kPa (2.90 kgf/cm², 42 psi)	———
Cold inflation tire pressure (Dual riding)	Front	290 kPa (2.90 kgf/cm², 42 psi)	———
	Rear	290 kPa (2.90 kgf/cm², 42 psi)	———
Tire size	Front	120/70 ZR17 (58W)	———
	Rear	190/50 ZR17 (73W)	———
Tire type	Front	BRIDGESTONE : BT56F J	———
	Rear	BRIDGESTONE : BT56R J	———
Tire tread depth (Recommended depth)	Front	———	1.6 (0.06)
	Rear	———	2.0 (0.08)

SUSPENSION

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Front fork stroke	120 (4.7)		———
Front fork spring free length	245.1 (9.65)		240 (9.4)
Front fork oil level (without spring, outer tube fully compressed)	98 (3.9)		———
Front fork oil type	SUZUKI FORK OIL L01 or equivalent fork oil		———
Front fork oil capacity (each leg)	480 ml (16.2/16.9 US/Imp oz)		———
Front fork spring adjuster	5th groove from top		———
Front fork damping force adjuster	Rebound	3 clicks	———
	Compression	9 clicks	———
Rear shock absorber spring pre-set length	183 (7.20)		———
Rear shock absorber damping force adjuster	Rebound	11 clicks	———
	Compression	8 clicks	———

ITEM	STD/SPEC.	LIMIT
Rear wheel travel	140 (5.5)	———
Swingarm pivot shaft runout	———	0.3 (0.01)

FUEL + OIL

ITEM	STD/SPEC.		NOTE
Fuel type	Use only unleaded gasoline of at least 87 pump octane ($\frac{R+M}{2}$) or 91 octane or higher rated by the research method. Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.		E-03, -33
	Use only unleaded gasoline of at least 87 pump octane ($\frac{R+M}{2}$ method) or 91 octane or higher rated by the Research Method.		E-28
	Gasoline used should be graded 91 octane or higher. An unleaded gasoline is recommended.		The others
Fuel tank capacity	Including reserve	20.0 L (5.3/4.4 US/Imp gal)	E-33
		22.0 L (5.8/4.8 US/Imp gal)	The others
Engine oil type	SAE 10W/40, API SF or SG		
Engine oil capacity	Change	3.3 L (3.5/2.9 US/Imp qt)	
	Filter change	3.5 L (3.7/3.1 US/Imp qt)	
	Overhaul	4.2 L (4.4/3.7 US/Imp qt)	

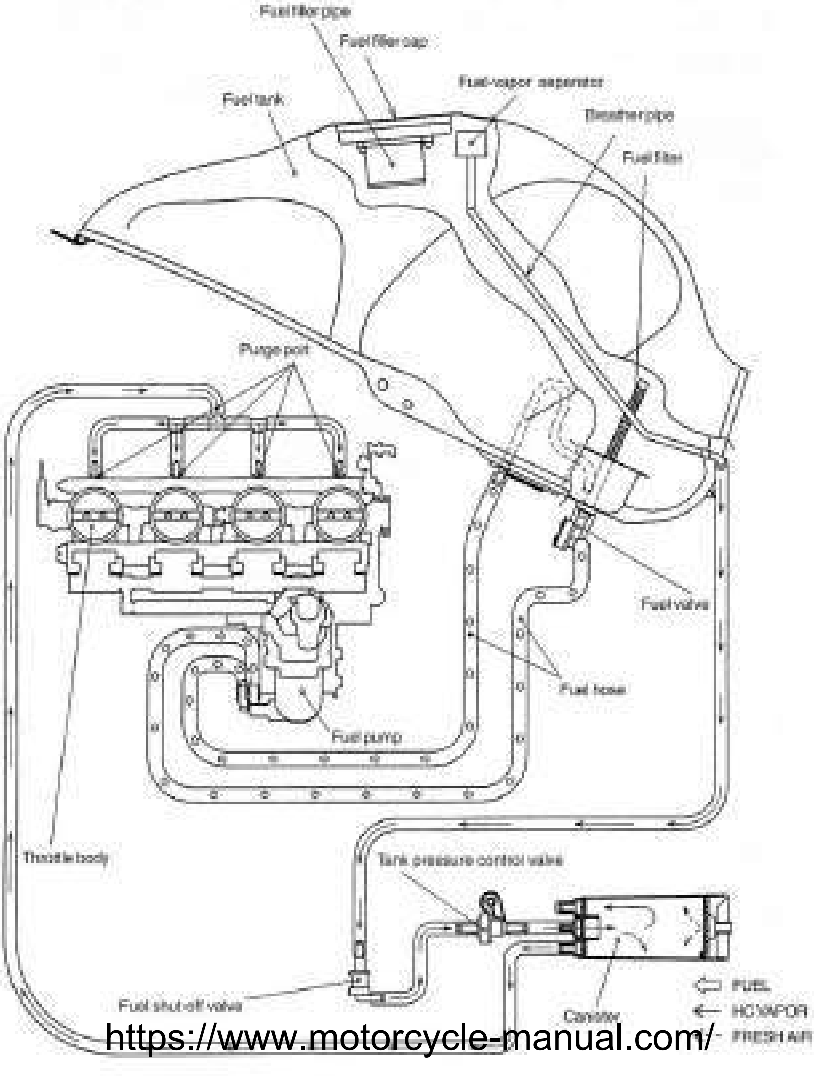
EMISSION CONTROL INFORMATION

CONTENTS

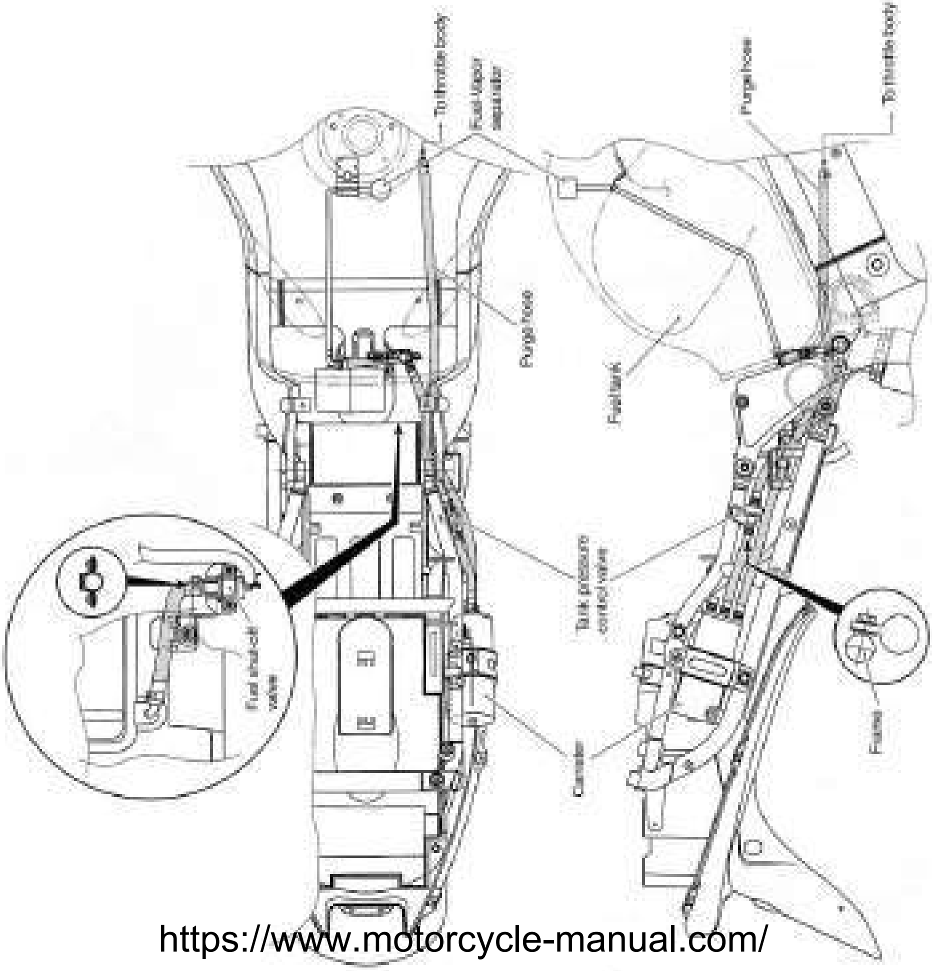
FUEL INJECTION SYSTEM

GSX1300R motorcycles 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.

EVAPORATIVE EMISSION CONTROL SYSTEM (California model only)



CANISTER HOSE ROUTING (California model only)



EVAPORATIVE EMISSION CONTROL SYSTEM INSPECTION (California model only)

- Remove the seats and frame cover.
- Remove the fuel tank. (☞4-50)

HOSES

Inspect the hoses for wear or damage.
Make sure that the hoses are securely connected.

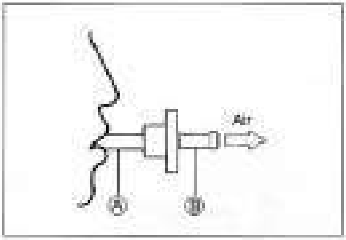
CANISTER

Inspect the canister for damage to the body.

TANK PRESSURE CONTROL VALVE

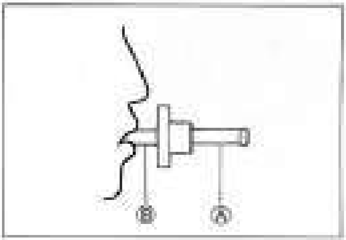
Inspect the tank pressure contorol valve body for damage.
Inspect the tank pressure control valve operation as following procedure.

- Remove the tank pressure control valve.
- When air pressure is applied to the tank pressure control valve from the side Ⓐ, there should be flow out through the purge control valve.
- When air pressure is applied to the tank pressure control valve from the side Ⓑ, there should be hard to flow through the purge valve.
- If operation differs from that listed above, the tank pressure control valve must be replaced.



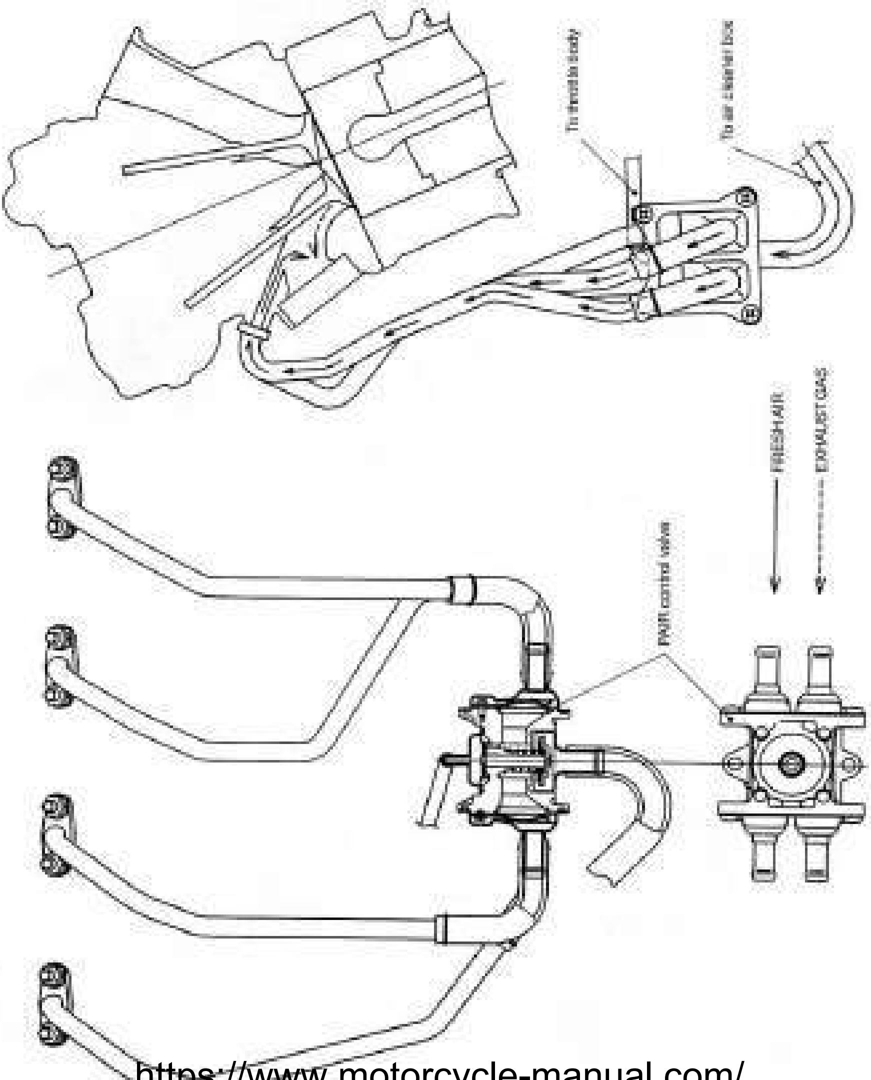
⚠ WARNING

Gasoline and gasoline vapor is toxic. A small amount of fuel is remaining in the tank pressure control valve, when checking it.
Do not swallow the fuel when blowing the tank pressure control valve.

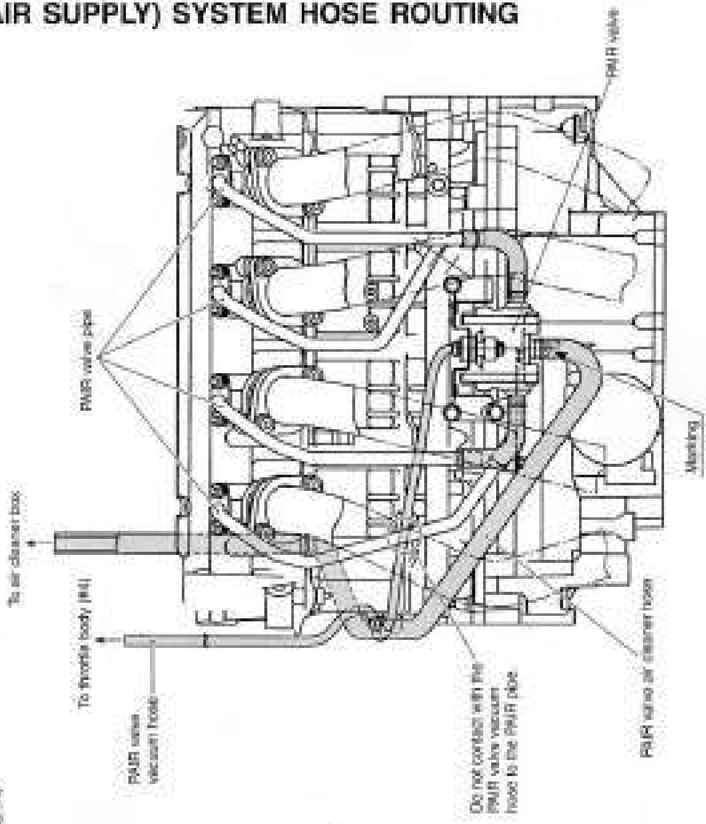


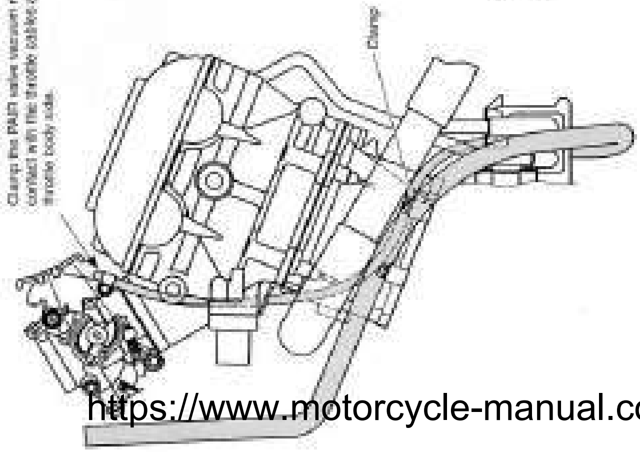
NOTE:
When connecting the tank pressure control valve to the hose, the side Ⓑ should [illegible] *the side Ⓐ should face toward the canister side.*

PAIR (AIR SUPPLY) SYSTEM DIAGRAM



PAIR (AIR SUPPLY) SYSTEM HOSE ROUTING





PAIR (AIR SUPPLY) SYSTEM INSPECTION

HOSES AND PIPES

- Inspect the hoses and pipes for wear or damage.
- Inspect that the hoses and pipes are securely connected.

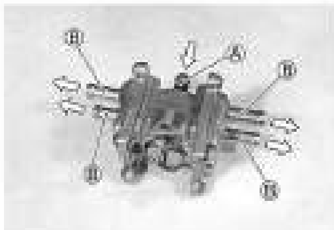
PAIR VALVE

- Remove the PAIR valve mounting bracket.
- Inspect the PAIR valve body for damage.

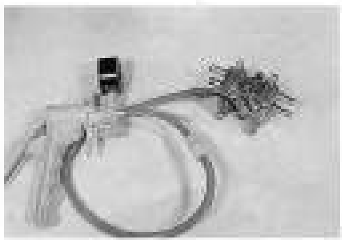
PAIR REED VAVLE

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

PAIR CONTROL VALVE



- Inspect that air flows through the PAIR control valve air inlet port Ⓐ to the air outlet parts Ⓑ.
- If air does not flow out, replace the PAIR valve with a new one.



- Connect the vacuum pump gauge to the vacuum port of the control valve as shown in the photograph.
- Apply negative pressure slowly to the control valve and inspect the air flow.
- If air does not flow out within the specification, the control valve is in normal condition.
- If the control valve does not function within the specification, replace the control valve with a new one.

Negative pressure range: 44 – 65.3 kPa
(330 – 490 mmHg)

09917-47010: Vacuum pump gauge

▲ CAUTION

Use a hand operated vacuum pump to prevent the control valve damage.

This chapter describes service data, service specifications and servicing procedures which differ from those of the GSX1300RX ('99-model).

NOTE:
* Any differences between the GSX1300RX (1999-model) and GSX1300RY (2000-model) in specifications and service data are indicated with an asterisk mark (*).
* Please refer to the chapters 1 through 9 for details which are not given in this chapter.

GROUP INDEX

GENERAL INFORMATION

CONTENTS

SPECIFICATIONS

DIMENSIONS AND DRY MASS

Overall length	2 140 mm (84.3 in)
Overall width	740 mm (29.1 in)
Overall height	1 155 mm (45.5 in)
Wheelbase	1 485 mm (58.5 in)
Ground clearance	120 mm (4.7 in)
Seat height	805 mm (31.7 in)
Dry mass	216 kg (476 lbs) .... (For E-33 model)
	215 kg (473 lbs) .... (For the other models)

ENGINE

Type	Four-stroke, Liquid-cooled, DOHC, TSCC.
Number of cylinders	4
Tappet clearance, IN	0.10 – 0.20 mm (0.004 – 0.008 in)
EX	0.20 – 0.30 mm (0.008 – 0.012 in)
Bore	81.0 mm (3.189 in)
Stroke	63.0 mm (2.480 in)
Piston displacement	1 299 cm^3 (79.3 cu. in)
Compression ratio	11.0 : 1
Fuel system	Fuel injection system
Air cleaner	Non-woven fabric element
Starter system	Electric starter
Lubrication system	Wet sump

TRANSMISSION

Clutch	Wet multi-plate type
Transmission	6-speed constant, mesh
Gearshift pattern	1-down, 5-up
Primary reduction ratio	1.596 (83/52)
Gear ratios, Low	2.615 (34/13)
2nd	1.937 (31/16)
3rd	1.526 (29/19)
4th	1.285 (27/21)
5th	1.136 (25/22)
Top	[illegible]
Final reduction ratio	2.352 (40/17)
Drive system	RK GB50GSV Z5, 112 links

CHASSIS

Front suspension	Inverted telescopic, coil spring, oil damped, spring pre-load fully adjustable, compression damping force 13-way adjustable, rebound damping force 14-way adjustable.
Rear suspension	Link type system, gas/oil damped, coil spring, spring pre-road fully adjustable, compression damping force 22-way adjustable, rebound damping force 22-way adjustable.
Front fork stroke	120 mm (4.7 in)
Rear wheel travel	140 mm (5.5 in)
Steering angle	30° (right & left)
Caster	24° 12'
Trail	97 mm (3.8 in)
Turning radius	3.3 m (10.8 ft)
Front brake	Disc brake, twin hydraulically operated
Rear brake	Disc brake, hydraulically operated
Front tire size	120/70 ZR17 (58 W), tubeless
Rear tire size	190/50 ZR17 (73 W), tubeless

ELECTRICAL

Ignition type	Electronic ignition (Transistorized)
Ignition timing	11° B.T.D.C. at 1 150 r/min (1 & 4 cylinders) 3° B.T.D.C. at 1 150 r/min (2 & 3 cylinders)
Spark plug	NGK CR9E, DENSO U27ESR-N
Battery	12V 36.0 kC(10 Ah)/10HR
Generator	Three-phase A.C. Generator
Main fuse	30 A
Fuse	15/15/15/15/10/10 A
Headlight	12 V 65 + 55/55 W
Turn signal light	12 V 21 W × 4
Position light	12 V 5 W ....Except for E-03, 24, 28, 33 models
Brake light/Taillight	12 V 21/5 W × 2
License plate light	12 V 5 W
Combination meter light	LED
Neutral indicator light	LED
High beam indicator light	LED
Turn signal indicator light	LED
Oil pressure indicator light	LED
Fuel level indicator light	LED
Engine coolant temp. indicator light	LED
FI indicator light	LED

CAPACITIES

Fuel tank, including reserve	20 L (5.3/4.4 US/Imp gal) ....E-33 22 L (5.8/4.8 US/Imp gal)
Engine oil, oil change	* 3 100 ml (3.3/2.7 US/Imp qt)
with filter change	* 3 300 ml (3.5/2.9 US/Imp qt)
overhaul	* 4 000 ml (4.2/3.5 US/Imp qt)
Coolant	2 950 ml (3.1/2.6 US/Imp qt)
Front fork oil (each leg)	480 ml (16.2/16.9 US/Imp oz)

These specifications are subject to change without notice.

ENGINE

CONTENTS

ENGINE DISASSEMBLY AND REASSEMBLY

OIL CATCH TANK/ENGINE OIL

The oil catch tank has been eliminated. In accordance with this elimination, the engine oil capacity has been changed as follows.
Refer to 2-13, 3-22 and 3-131 pages of the GSX1300R Service Manual.

Engine oil capacity

Oil change	3 100 ml (3.3/2.7 US/Imp qt)
Oil and oil filter change	3 300 ml (3.5/2.9 US/Imp qt)
Engine overhaul	4 000 ml (4.2/3.5 US/Imp qt)

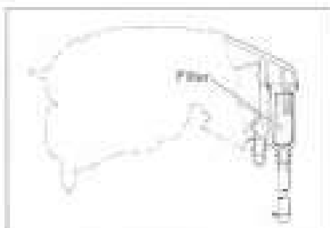
CRANKCASE BREATHER HOSE/CRANKCASE BREATHER FILTER

For details other than the following, refer to 3-22 page of the GSX1300R Service Manual.

Crankcase breather hose length

1999-MODEL	2000-MODEL
260 mm (10.2 in)	190 mm (7.5 in)

The crankcase breather hose has been directly connected from the crankcase breather cover to the air cleaner box and crankcase breather filter is attached in the air cleaner box.

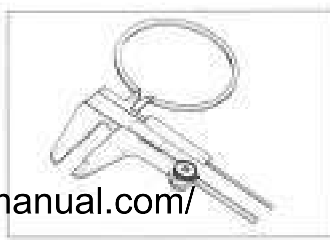


ENGINE COMPONENTS INSPECTION AND SERVICE

PISTON RING

PISTON RING FREE END GAP

For details other than the following, refer to 3-62 page of the GSX1300R Service Manual.

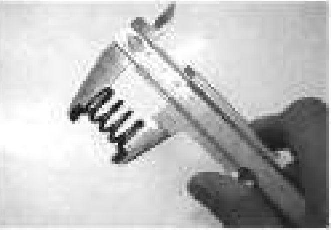


DATA **Piston ring free end gap**
Standard
2nd Ring: Approx. 11.4 mm (0.45 in)
Service Limit
2nd Ring: 9.1 mm (0.36 in)

CLUTCH

CLUTCH SPRING INSPECTION

For details other than the following, refer to 3-66 page of the GSX1300R Service Manual.



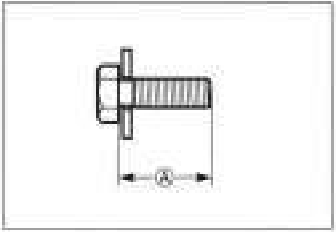
Clutch spring free length
Standard: 28.96 mm (1.140 in)
Service Limit: 27.6 mm (1.087 in)

CLUTCH SPRING SET BOLT

Bolt length Ⓐ

1999-MODEL	2000-MODEL
16 mm (0.63 in)	18 mm (0.71 in)

Refer to 3-114 page of the GSX1300R Service Manual.

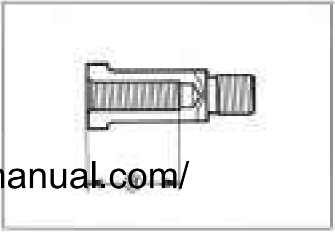


CLUTCH SPRING SUPPORT BOLT

Thread depth Ⓑ

1999-MODEL	2000-MODEL
16 mm (0.63 in)	18 mm (0.71 in)

Refer to 3-111 page of the GSX1300R Service Manual.



FI SYSTEM AND INTAKE AIR SYSTEM

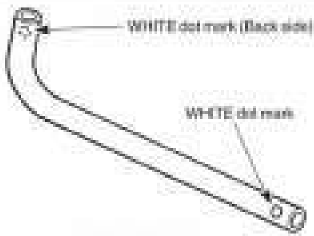
CONTENTS

FUEL SYSTEM

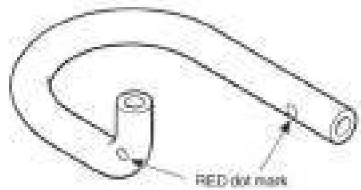
FUEL RETURN HOSE

The shape of the fuel return hose has been changed. In accordance with this change, the fuel return hose clamps and dot mark color on the fuel return hose have been changed as follows.

	1999-MODEL	2000-MODEL
PART NAME	PART NO.	PART NO.
FUEL RETURN HOSE (DOT MARK COLOR)	15801-24F00 (WHITE)	15801-24F10 (RED)

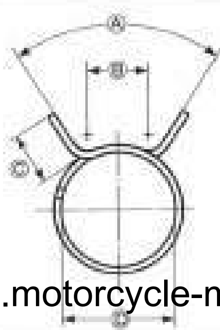


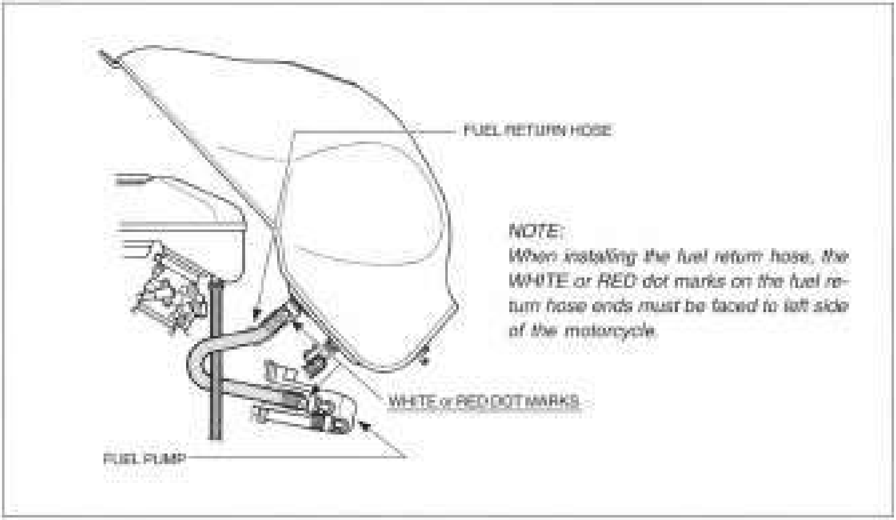
1999-MODEL



2000-MODEL

	1999-MODEL			2000-MODEL		
PART NAME	PART NO.	DIMENSION		PART NO.	DIMENSION	
HOSE CLAMP (TANK SIDE)	09401-11407	Ⓐ	62°	09401-12405	Ⓐ	60°
		Ⓑ	6.2 mm		Ⓑ	4.5 mm
		Ⓒ	6 mm		Ⓒ	12 mm
		Ⓓ	11.6 mm		Ⓓ	11 mm
HOSE CLAMP (PUMP SIDE)	09401-13417	Ⓐ	65°	09401-14404	Ⓐ	73° 30'
		Ⓑ	7 mm		Ⓑ	9.1 mm
		Ⓒ	6 mm		Ⓒ	6 mm
		Ⓓ	13.2 mm		Ⓓ	14.5 mm



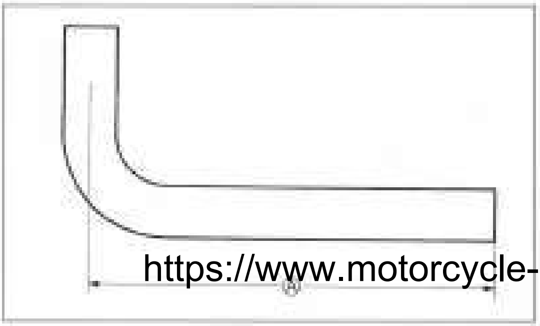


FUEL FEED HOSE

Fuel feed hose length Ⓐ

1999-MODEL	2000-MODEL
236 mm (9.3 in)	206 mm (8.1 in)

The fuel feed hose clamp has been eliminated.

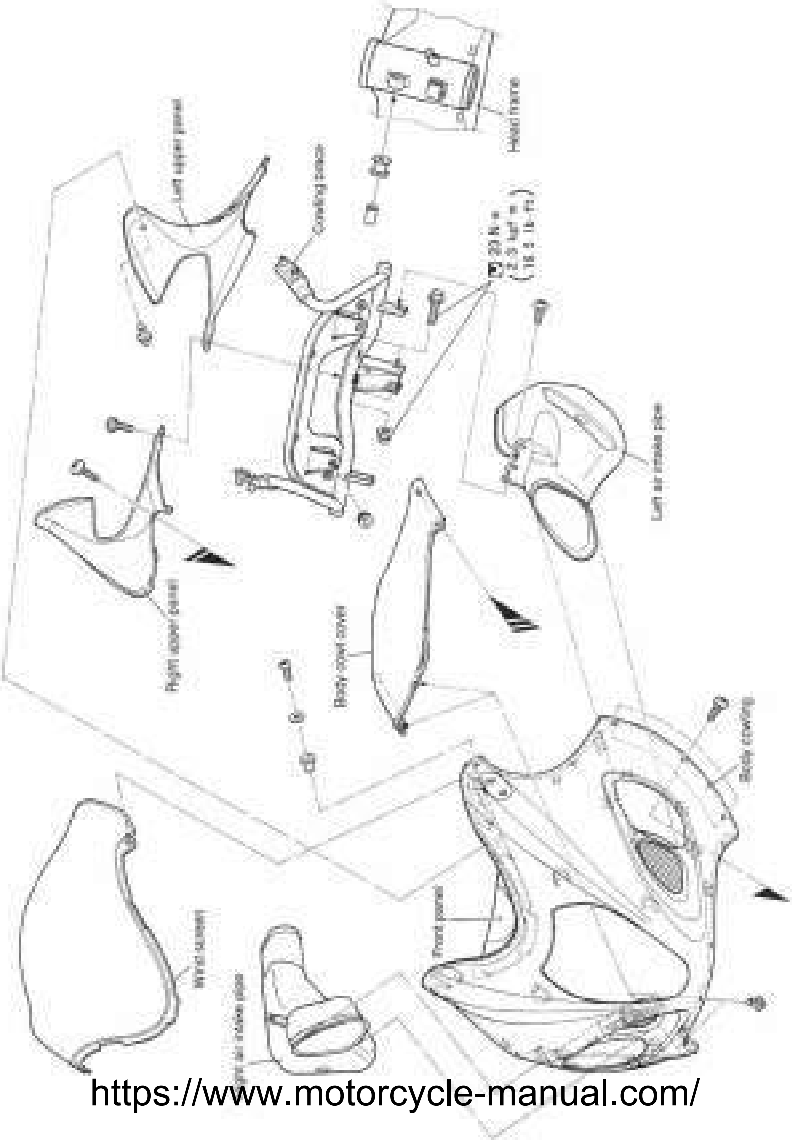


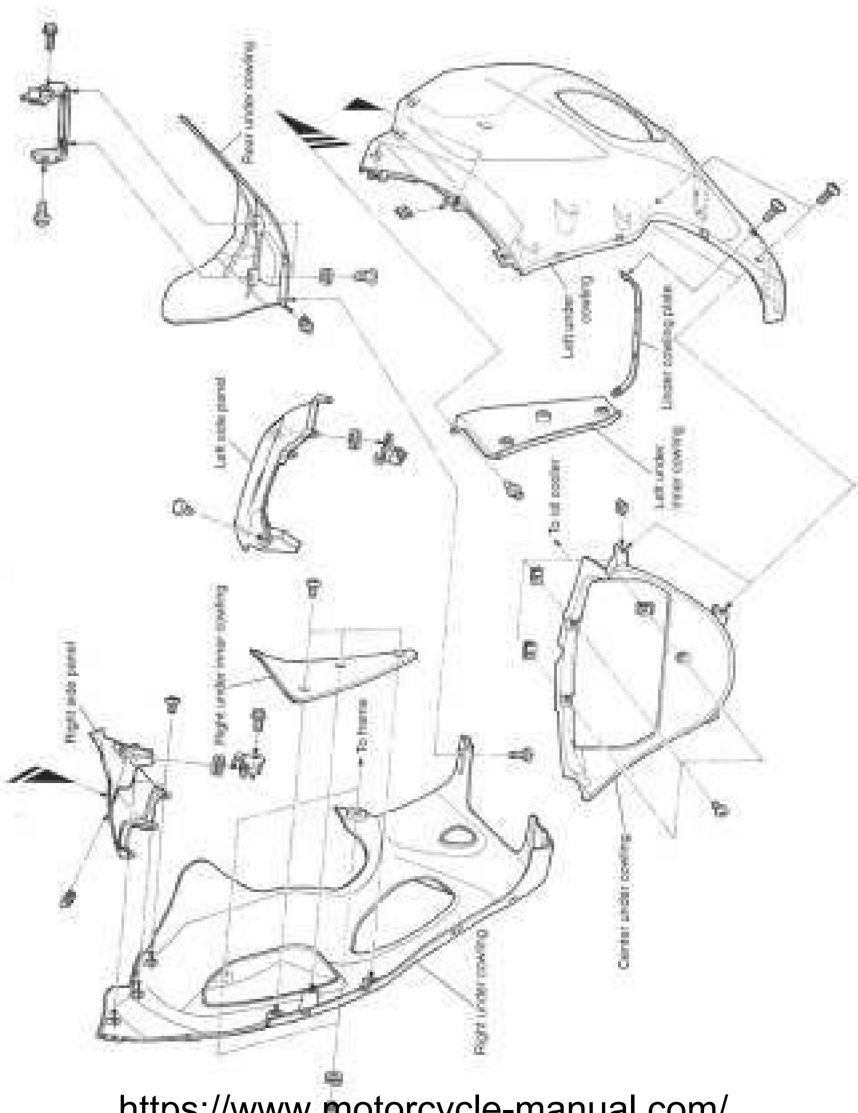
CHASSIS

CONTENTS

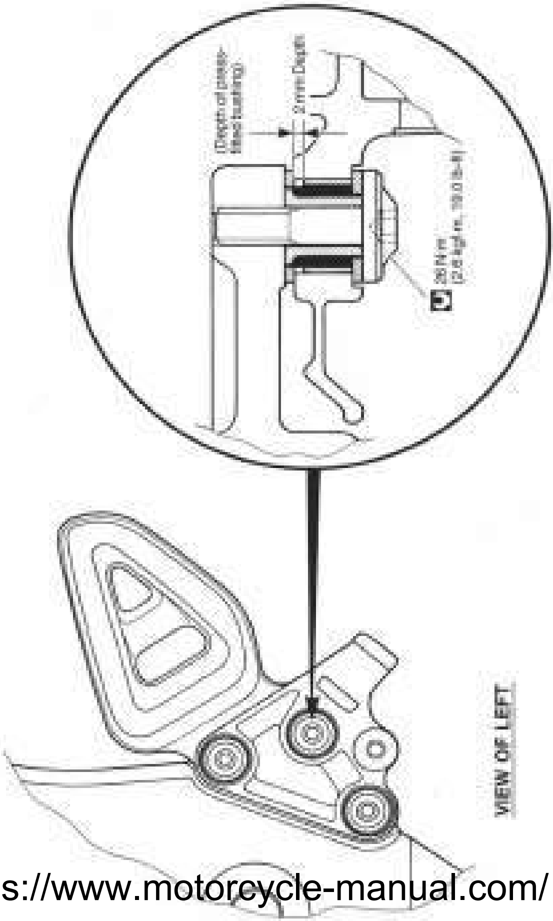
EXTERIOR PARTS

CONSTRUCTION




Rear under cowling
Left under cowling
Under cowling plate
Left side panel
Left under inner cowling
To oil cooler
Right side panel
Right under inner cowling
To frame
Center under cowling
Right under cowling

FOOTREST BRACKET BUSHING



ELECTRICAL SYSTEM

CONTENTS

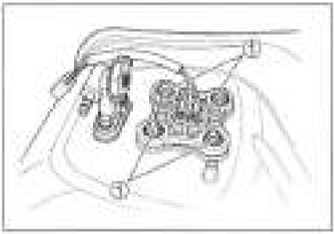
COMBINATION METER

FUEL LEVEL GAUGE

REMOVAL

For details other than the following, refer to 4-50 and 7-34 pages of the GSX1300R Service Manual.

- Disconnect the fuel level gauge lead wire coupler.
- Remove the fuel tank.
- Remove the fuel level gauge mounting nuts ① and washers.



INSTALLATION

- Apply thin coat of the engine to the O-ring ②.

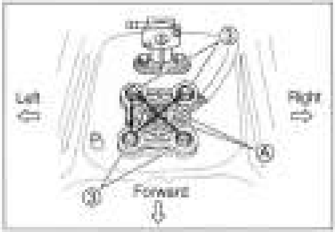
▲ CAUTION

Replace the O-ring with a new one.

- Install the fuel level gauge correctly and tighten the nuts ③ to the specified torque diagonally.

Fuel level gauge mounting nut: 6 N·m (0.6 kgf-m, 4.5 lb-ft)

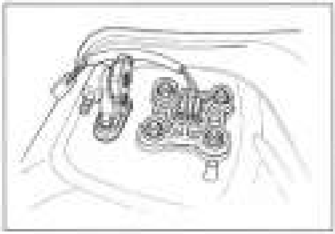
NOTE:
When installing the fuel level gauge to the fuel tank, the lead wire terminals Ⓐ on the fuel level gauge must be faced to the right side of the motorcycle.



FUEL LEVEL METER AND INDICATOR INSPECTION

NOTE:
Prior to this inspection, check that the fuel level gauge is functioning properly.

- Remove the fuel tank. (☞ 4-50 of the GSX1300R Service Manual)
- Remove the fuel level gauge.
- Reconnect the fuel level gauge lead wire coupler.

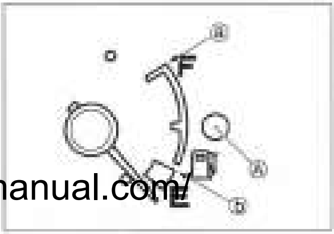


- Turn the ignition switch on.

Check the pointer and LED operations when the fuel level gauge is moved to the specified position. (See next page.)

Gauge position	LED Ⓐ	Pointer position
244 mm	OFF	ⓐ
30 mm	ON	ⓑ

If either indication is abnormal, replace the combination meter with a new one.



FUEL LEVEL GAUGE INSPECTION

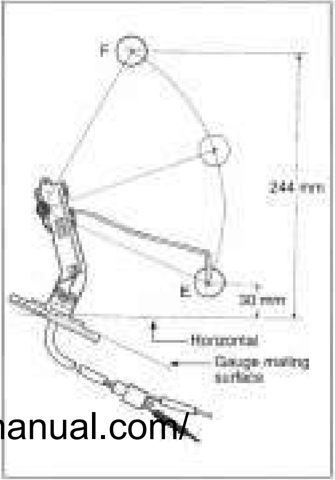
- Remove the fuel tank. (☞ 4-50 of the GSX1300R Service Manual)
- Remove the fuel level gauge.

Measure resistance between the terminals when the float is at the position listed below.

09900-25008: Multi-circuit tester

Gauge position	Resistance between terminals
244 mm	11 – 13 Ω
30 mm	130 – 133 Ω

If the resistance measured is out of the specification, replace the gauge with a new one.

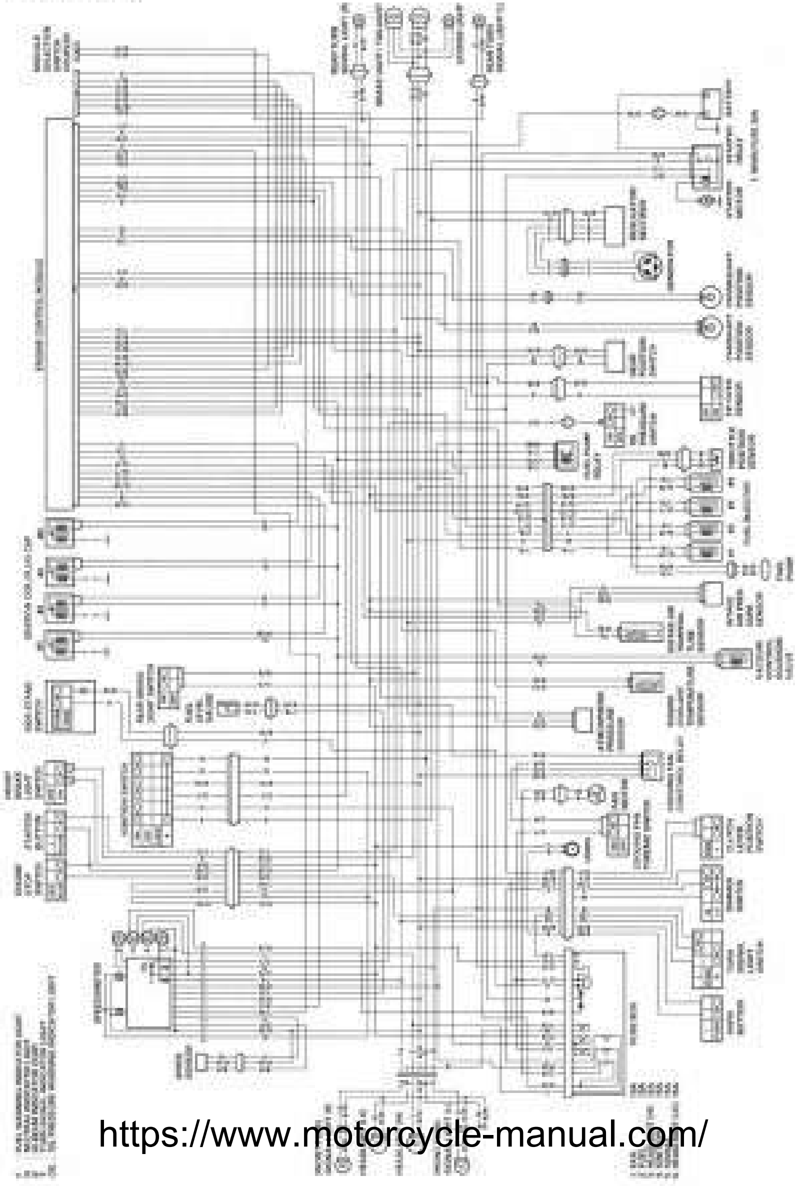


SERVICING INFORMATION

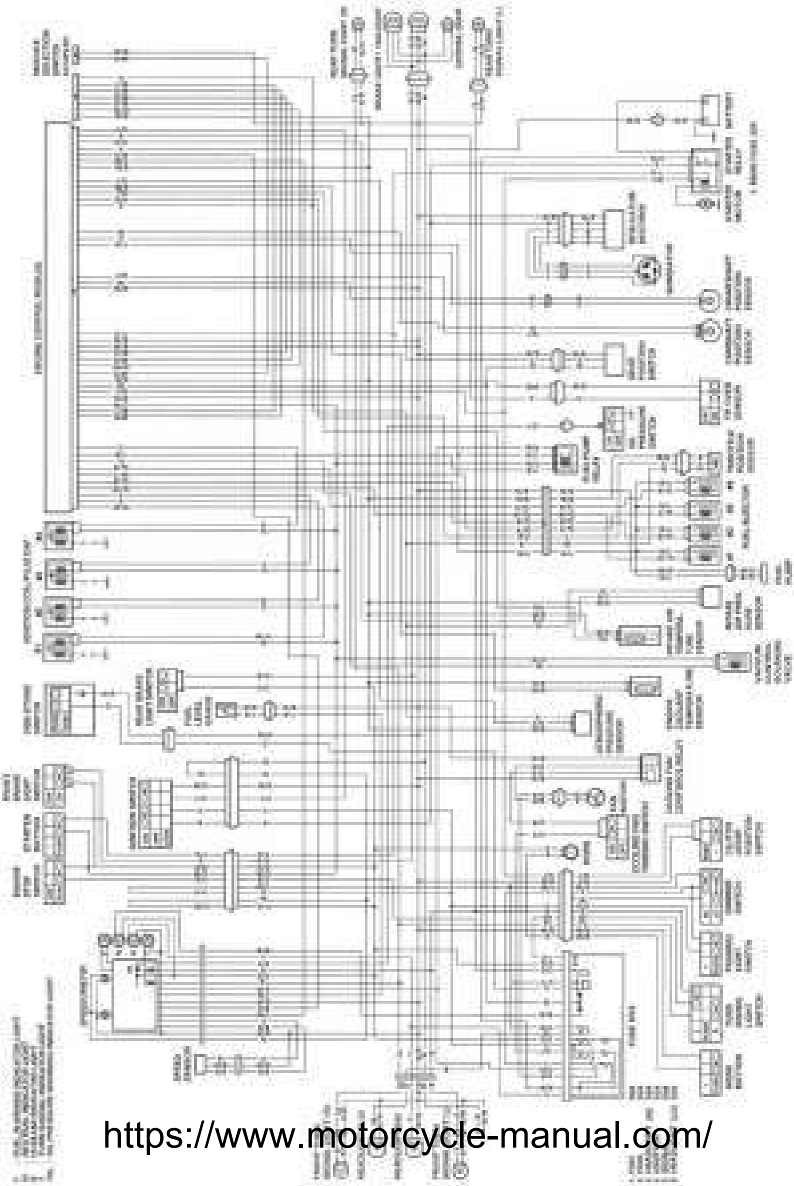
CONTENTS

WIRING DIAGRAM

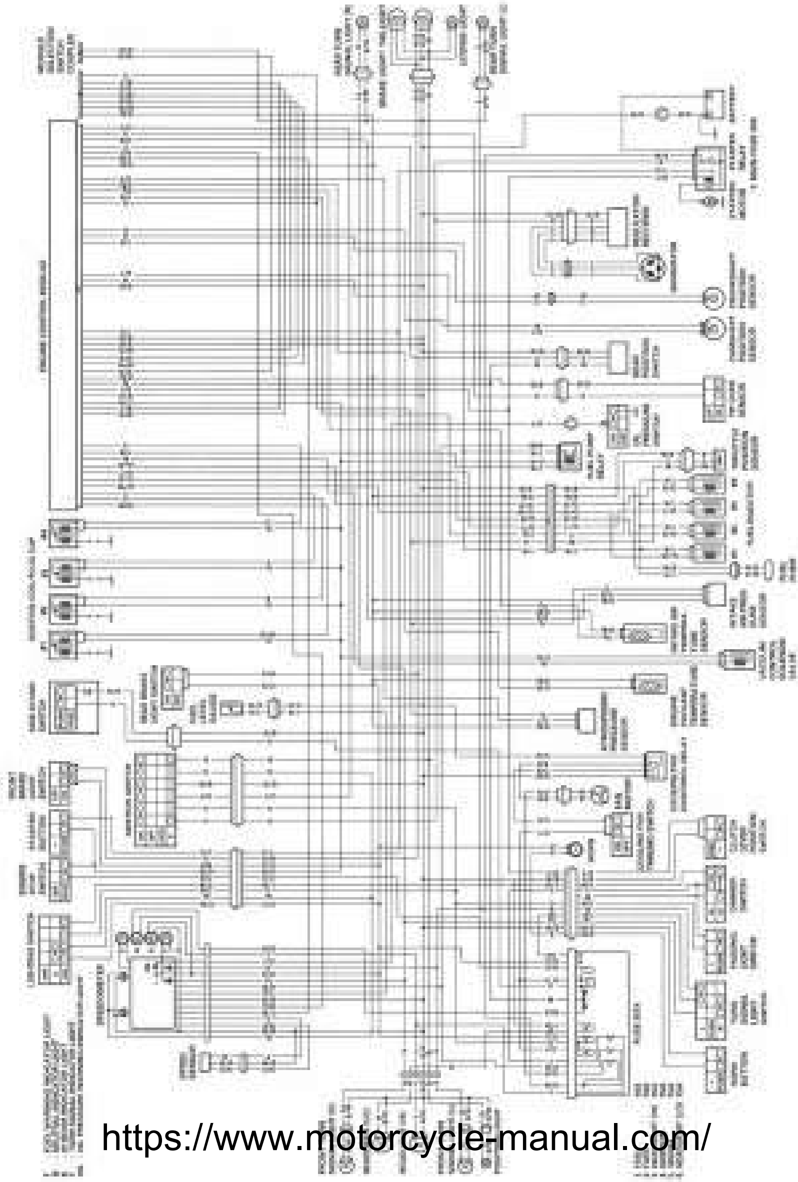
FOR E-03, 28, 33



FOR E-24

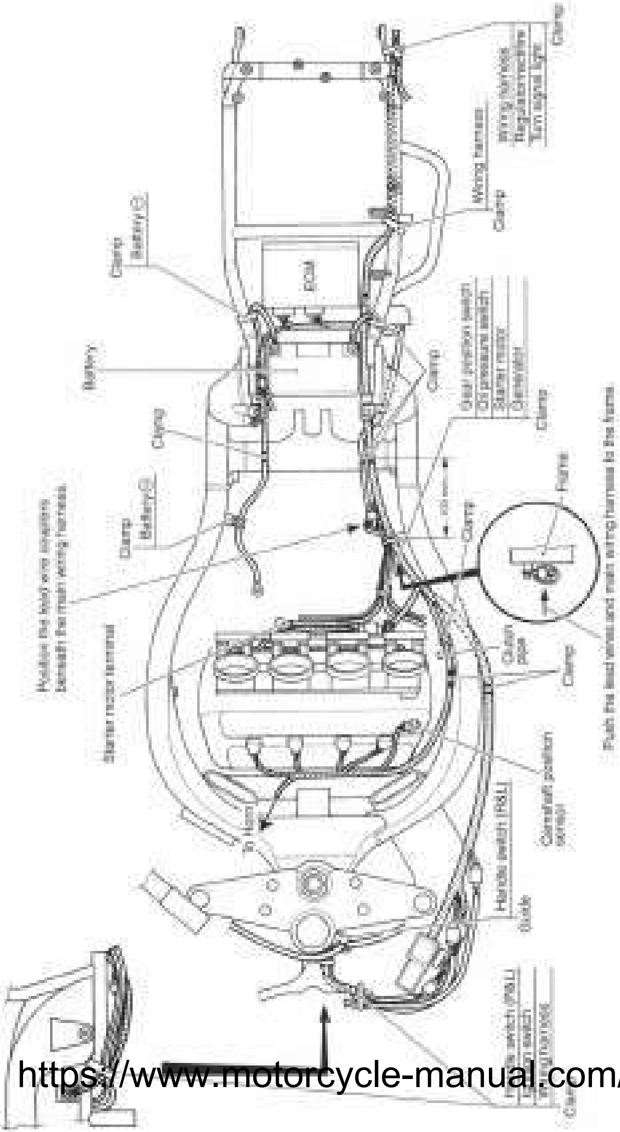


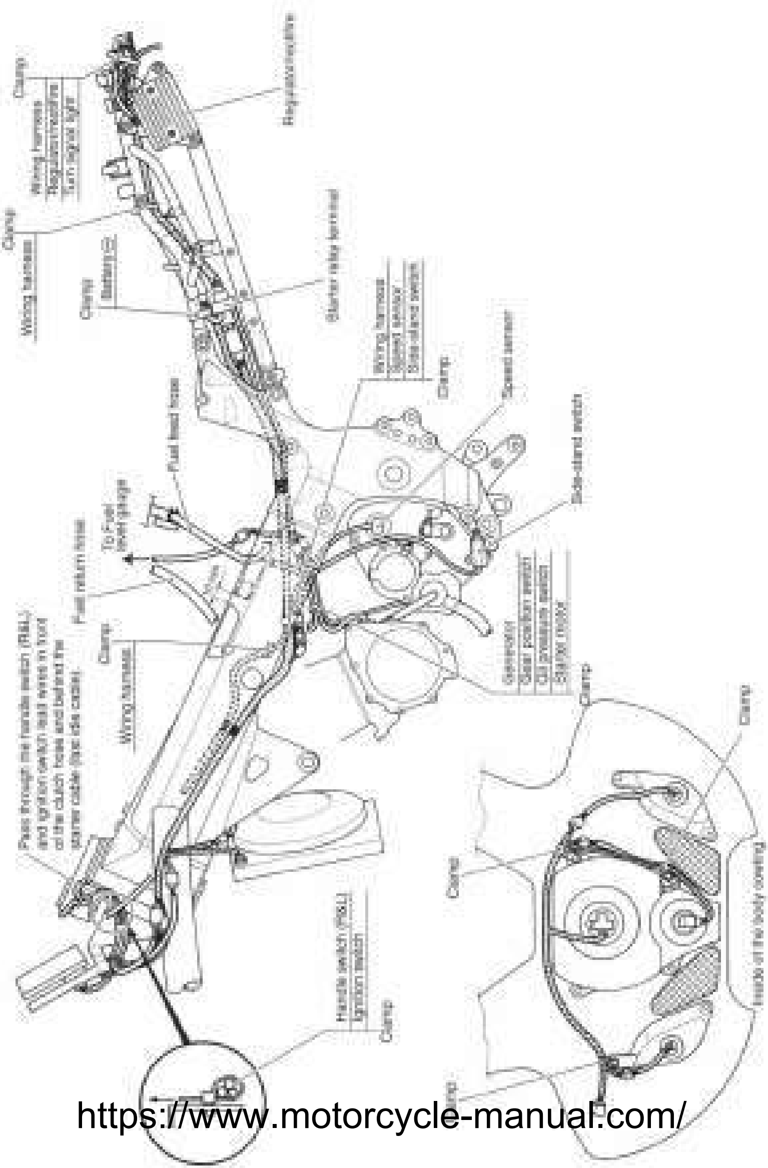
FOR THE OTHERS



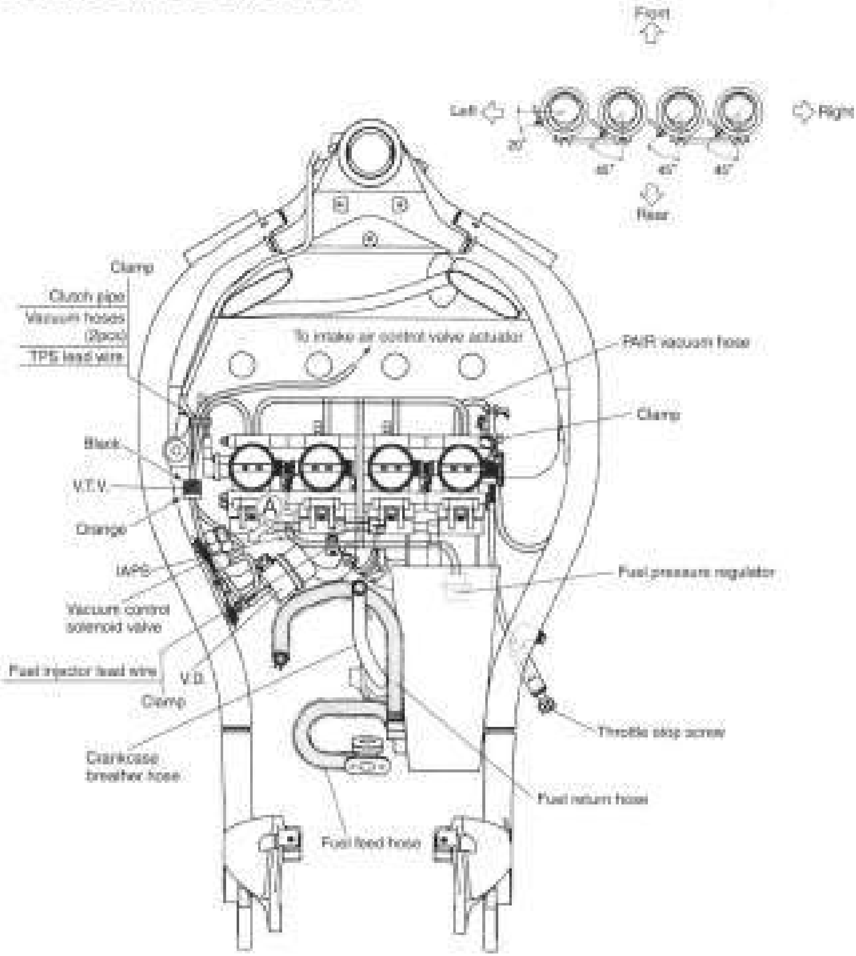
WIRE HARNESS, CABLE AND HOSE ROUTING

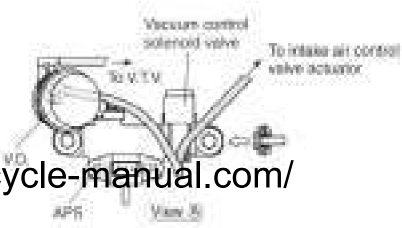
WIRE HARNESS ROUTING



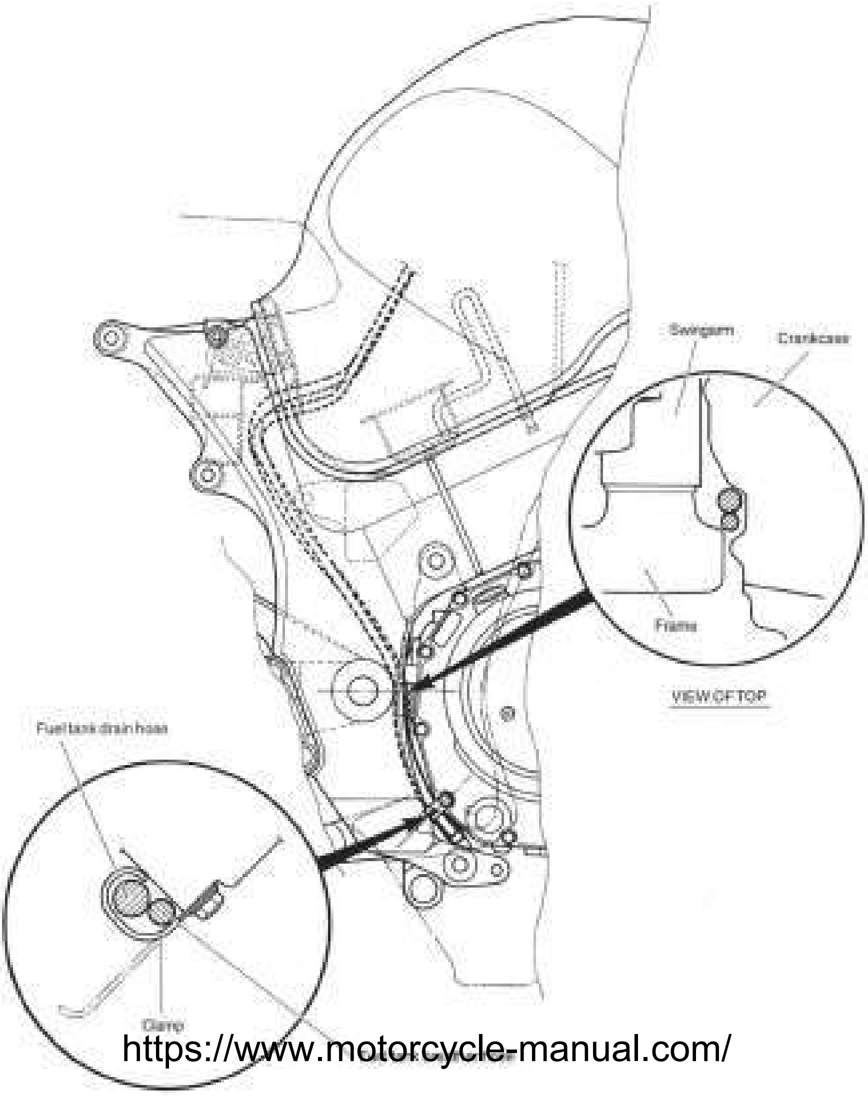

Clamp
Wiring harness
Regulator/rectifier
Turn signal light
Battery (-)
Starter relay terminal
Fuel feed hose
Fuel return hose
Speed sensor
Side-stand switch
Generator
Gear position switch
Oil pressure switch
Starter motor
Handle switch (R&L)
Ignition switch
Inside of the body cowling

FUEL SYSTEM HOSE ROUTING





FUEL TANK DRAIN HOSE AND BREATHER HOSE ROUTING



SERVICE DATA

VALVE + GUIDE

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Valve diam.	IN.	33 (1.30)	———
	EX.	27.5 (1.08)	———
Valve clearance (when cold)	IN.	0.10 – 0.20 (0.004 – 0.008)	———
	EX.	0.20 – 0.30 (0.008 – 0.012)	———
Valve guide to valve stem clearance	IN.	0.010 – 0.037 (0.0004 – 0.0015)	———
	EX.	0.030 – 0.057 (0.0012 – 0.0022)	———
Valve guide I.D.	IN. & EX.	5.000 – 5.012 (0.1969 – 0.1973)	———
Valve stem O.D.	IN.	4.975 – 4.990 (0.1959 – 0.1965)	———
	EX.	4.955 – 4.970 (0.1951 – 0.1957)	———
Valve stem deflection	IN. & EX.	———	0.35 (0.014)
Valve stem runout	IN. & EX.	———	0.05 (0.002)
Valve head thickness	IN. & EX.	———	0.5 (0.02)
Valve seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	———
Valve head radial runout	IN. & EX.	———	0.03 (0.001)
Valve spring free length (IN. & EX.)	INNER	———	35.1 (1.38)
	OUTER	———	45.2 (1.77)
Valve spring tension (IN. & EX.)	INNER	3.1 – 3.5 kgf (6.83 – 7.72 lbs) at length 33.1 mm (1.30 in)	———
	OUTER	15.5 – 17.9 kgf (34.17 – 39.46 lbs) at length 36.6 mm (1.44 in)	———

CAMSHAFT + CYLINDER HEAD

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Cam height	IN.	36.780 – 36.848 (1.4480 – 1.4506)	36.48 (1.436)
	EX.	35.480 – 35.548 (1.3968 – 1.3995)	35.18 (1.385)
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)	———

ITEM	STD/SPEC.			LIMIT
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")	15th pin			———
Cylinder head distortion	———			0.20 (0.008)

CYLINDER + PISTON + PISTON RING

Unit: mm (in)

ITEM	STD/SPEC.			LIMIT
Compression pressure	1 200 – 1 600 kPa ($12 – 16$ kgf/cm^2, 171 – 228 psi)			900 kPa (9 kgf/cm^2, 128 psi)
Compression pressure difference	———			200 kPa (2 kgf/cm^2, 28 psi)
Piston to cylinder clearance	0.020 – 0.030 (0.0008 – 0.0012)			0.120 (0.0047)
Cylinder bore	81.000 – 81.015 (3.1890 – 3.1896)			Nicks or scratches
Piston diam.	80.975 – 80.990 (3.1880 – 3.1886) Measure at 15 mm (0.6 in) from the skirt end.			80.880 (3.1842)
Cylinder distortion	———			0.20 (0.008)
Piston ring free end gap	1st	R	Approx. 7.3 (0.29)	5.8 (0.23)
	2nd	RN	Approx. *11.4 (0.45)	*9.1 (0.36)
Piston ring end gap	1st	R	0.08 – 0.20 (0.003 – 0.008)	0.50 (0.020)
	2nd	RN	0.08 – 0.20 (0.003 – 0.008)	0.50 (0.020)
Piston ring to groove clearance	1st		———	0.180 (0.0071)
	2nd		———	0.150 (0.0059)
Piston ring groove width	1st		1.21 – 1.23 (0.0476 – 0.0484)	———
	2nd		1.01 – 1.03 (0.0398 – 0.0406)	———
	Oil		2.01 – 2.03 (0.0791 – 0.0799)	———
Piston ring thickness	1st		1.17 – 1.19 (0.0461 – 0.0469)	———
	2nd		0.97 – 0.99 (0.0382 – 0.0390)	———
Piston pin bore	20.002 – 20.008 (0.7875 – 0.7877)			20.030 (0.7886)
Piston pin O.D.	19.996 – 20.000 (0.7872 – 0.7874)			19.980 (0.7866)

CONROD + CRANKSHAFT

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Conrod small end I.D.	20.010 – 20.018 (0.7878 – 0.7881)		20.040 (0.7890)
Conrod big end side clearance	0.10 – 0.20 (0.004 – 0.008)		0.30 (0.012)
Conrod big end width	20.95 – 21.00 (0.825 – 0.827)		———
Crank pin width	21.10 – 21.15 (0.831 – 0.833)		———
Conrod big end oil clearance	0.032 – 0.056 (0.0013 – 0.0022)		0.080 (0.0031)
Crank pin O.D.	37.976 – 38.000 (1.4951 – 1.4960)		———
Crankshaft journal oil clearance	0.016 – 0.040 (0.0006 – 0.0016)		0.080 (0.0031)
Crankshaft journal O.D.	39.976 – 40.000 (1.5739 – 1.5748)		———
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	———		0.05 (0.002)

OIL PUMP

ITEM	STD/SPEC.	LIMIT
Oil pressure (at 60°C, 140°F)	Above 200 kPa (2.0 kgf/cm², 43 psi) Below 500 kPa (5.0 kgf/cm², 71 psi) at 3 000 r/min.	———

CLUTCH

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Drive plate thickness	No. 1	2.92 – 3.08 (0.115 – 0.121)	2.62 (0.103)
	No. 2	3.72 – 3.88 (0.146 – 0.153)	3.42 (0.135)
Drive plate claw width	No. 1	13.85 – 13.96 (0.542 – 0.550)	13.05 (0.514)
	No. 2	13.90 – 14.00 (0.547 – 0.551)	13.10 (0.516)
Driven plate distortion	———		0.10 (0.004)
Clutch spring free height	*28.96 (1.140)		*27.6 (1.09)
Clutch master cylinder bore	14.000 – 14.043 (0.5512 – 0.5529)		———
Clutch master cylinder piston diam.	13.957 – 13.984 (0.5495 – 0.5506)		———

ITEM		STD/SPEC.	LIMIT
Clutch release cylinder bore		38.100 – 38.162 (1.5000 – 1.5024)	———
Clutch release cylinder piston diam.		38.042 – 38.075 (1.4977 – 1.4990)	———
Clutch fluid type		Brake fluid (DOT 4)	———

TRANSMISSION + DRIVE CHAIN

Unit: mm (in) Except rati

ITEM			STD/SPEC.	LIMIT
Primary reduction ratio			1.596 (83/52)	———
Final reduction ratio			2.352 (40/17)	———
Gear ratios	Low		2.615 (34/13)	———
	2nd		1.937 (31/16)	———
	3rd		1.526 (29/19)	———
	4th		1.285 (27/21)	———
	5th		1.136 (25/22)	———
	Top		1.043 (24/23)	———
Shift fork to groove clearance			0.10 – 0.30 (0.004 – 0.012)	0.50 (0.020)
Shift fork groove width			5.0 – 5.1 (0.197 – 0.201)	———
Shift fork thickness			4.8 – 4.9 (0.189 – 0.193)	———
Drive chain		Type	RK GB50GSV Z3	———
		Links	112 links	———
		20-pitch length	———	319.4 (12.57)
Drive chain slack (on side-stand)			20 – 30 (0.79 – 1.18)	———
Gearshift lever height			50 – 60 (1.97 – 2.36)	———

THERMOSTAT + RADIATOR + FAN + COOLANT

ITEM		STD/SPEC.	LIMIT
Thermostat valve opening temperature		Approx. 82°C (179.6°F)	———
Thermostat valve lift		Over 8 mm (0.31 in) at 95°C (203°F)	———
Engine coolant temperature 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	———
	130°C (226°F)	Approx. 0.088 kΩ	———
Radiator cap valve opening pressure		95 – 125 kPa (0.95 – 1.25 kgf/cm², 13.5 – 17.8 psi)	———
Cooling fan thermo-switch operating temperature	OFF → ON	Approx. 105°C (221°F)	———
	ON → OFF	Approx. 100°C (212°F)	———

ITEM	STD/SPEC.		LIMIT
Engine coolant type	Use an antifreeze/coolant compatible with aluminum radiator, mixed with distilled water only, at the ratio of 50:50.		———
Engine coolant including reserve	Reserve tank side	Approx. 250 ml (0.3/0.2 US/Imp qt)	———
	Engine side	Approx. 2 700 ml (2.9/2.4 US/Imp qt)	———

INJECTOR + FUEL PUMP + FUEL PRESSURE REGULATOR

ITEM	STD/SPEC.	NOTE
Injector resistance	11 – 16 Ω at 20°C (68°F)	———
Fuel pump discharge amount	Approx. 65 L (68.7/57.2 US/Imp qt) for 1 hour at 300 kPa (3.0 kgf/cm², 43 psi)	———
Fuel pressure regulator operating set pressure	Approx. 300 kPa (3.0 kgf/cm², 43 psi)	———

FI SENSORS + INTAKE AIR CONTROL VALVE

ITEM	STD/SPEC.		NOTE
CMP sensor resistance	0.9 – 1.3 kΩ		
CMP sensor peak voltage	More than 0.7 V		
CKP sensor resistance	180 – 280 Ω		
CKP sensor peak voltage	More than 3 V		
IAP sensor input voltage	4.5 – 5.5 V		
IAP sensor output voltage	Approx. 2.5 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor resistance	Closed	Approx. 1.3 kΩ	
	Opened	Approx. 4.5 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 resistance	2.3 – 2.6 kΩ at 20°C (68°F)		
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor resistance	2.2 – 2.7 kΩ at 20°C (68°F)		
AP sensor input voltage	4.5 – 5.5 V		
AP sensor output voltage	Approx. 3.6 V at 100 kPa (760 mmHg)		
TO sensor resistance	60 – 64 kΩ		
TO sensor voltage	Approx. 2.5 V		
GP switch voltage	More than 0.6 V (From 1st to Top)		
Injector voltage	Battery voltage		
Ignition coil primary peak voltage	More than 80 V (When cranking)		
VCSV resistance	36 – 44 Ω		
Intake air control valve operating rpm	Opening	[illegible]	
	Closing	Below 2 200 rpm	

THROTTLE BODY

ITEM		STD/SPEC.
Fast idle r/min.		3 500 r/min. (After warming up)
Idle r/min.	E-18	1 150 ± 50 r/min.
	The others	1 150 ± 100 r/min.
Throttle cable play		2.0 – 4.0 mm (0.08 – 0.16 in)

ELECTRICAL

Unit: mm (in)

ITEM			STD/SPEC.	NOTE
Firing order			1-2-4-3	
Spark plug	Type		NGK: CR9E DENSO: U27ESR-N	
	Gap		0.7 – 0.8 (0.028 – 0.031)	
Spark performance			Over 8 (0.3) at 1 atm.	
CKP sensor resistance			180 – 280 Ω	
CKP sensor peak voltage			More than 3 V	G – Bl
Ignition coil resistance	Primary		0.8 – 1.2 Ω	Terminal – Terminal
	Secondary		8 – 15 kΩ	Plug cap – Terminal
Ignition coil primary peak voltage			More than 80 V	
Generator coil resistance			0.2 – 0.4 Ω	
Generator Max. output			Approx. 400 W at 5 000 r/min.	
Generator no-load voltage (when cold)			More than 65 V (AC) at 5 000 r/min.	
Regulated voltage			13.5 – 15.0 V at 5 000 r/min.	
Starter relay resistance			3 – 5 Ω	
Battery	Type designation		YT12A-BS	
	Capacity		12V 36kC (10Ah)/10HR	
Fuse size	Headlight	(HI)	15 A	
		(LO)	15 A	
	Signal		15 A	
	Ignition		15 A	
	Fuel		10 A	
	[illegible]		[illegible]	
	Main		30 A	

WATTAGE

ITEM		STD/SPEC.	
		E-03, -24, -28, -33	The other countries
Headlight	HI	65 + 55 W	←
	LO	55 W	←
Parking or position light			5 W
Brake light / Taillight		21/5 W × 2	←
Turn signal light		21 W × 4	←
License light		5 W	←
Tachometer light		LED	←
Speedometer light		LED	←
Fuel meter light		LED	←
Engine coolant temp. meter light		LED	←
Turn signal indicator light		LED	←
High beam indicator light		LED	←
Neutral indicator light		LED	←
Oil pressure indicator light		LED	←
FI indicator light		LED	←
Fuel level indicator light		LED	←
Engine coolant temp. indicator light		LED	←

BRAKE + WHEEL

Unit: mm (in)

ITEM	STD/SPEC.			LIMIT
Rear brake pedal height	55 – 65 (2.2 – 2.6)			———
Brake disc thickness	Front		4.8 – 5.2 (0.189 – 0.205)	4.5 (0.177)
	Rear		4.8 – 5.2 (0.189 – 0.205)	4.5 (0.177)
Brake disc runout	———			0.30 (0.012)
Master cylinder bore	Front		15.870 – 15.913 (0.6248 – 0.6265)	———
	Rear		12.700 – 12.743 (0.5000 – 0.5017)	———
Master cylinder piston diam.	Front		15.827 – 15.854 (0.6231 – 0.6242)	———
	Rear		12.657 – 12.684 (0.4983 – 0.4994)	———
Brake caliper cylinder bore	Front	Leading	24.000 – 24.076 (0.9449 – 0.9479)	———
		Trailing	27.000 – 27.076 (1.0630 – 1.0660)	———
	Rear		38.180 – 38.256 (1.5031 – 1.5061)	———
Brake caliper piston diam.	Front	Leading	23.925 – 23.975 (0.9419 – 0.9439)	———
		Trailing	26.920 – 26.970 (1.0598 – 1.0618)	———
	Rear		[illegible]	———
Brake fluid type	DOT 4			———

ITEM	STD/SPEC.		LIMIT
Wheel rim runout	Axial	———	2.0 (0.08)
	Radial	———	2.0 (0.08)
Wheel rim size	Front	17 × MT3.50	———
	Rear	17 × MT6.00	———
Wheel axle runout	Front	———	0.25 (0.010)
	Rear	———	0.25 (0.010)

TIRE

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Cold inflation tire pressure (Solo riding)	Front	290 kPa (2.90 kgf/cm², 42 psi)	———
	Rear	290 kPa (2.90 kgf/cm², 42 psi)	———
Cold inflation tire pressure (Dual riding)	Front	290 kPa (2.90 kgf/cm², 42 psi)	———
	Rear	290 kPa (2.90 kgf/cm², 42 psi)	———
Tire size	Front	120/70 ZR17 (58W)	———
	Rear	190/50 ZR17 (73W)	———
Tire type	Front	BRIDGESTONE BT56F J	———
	Rear	BRIDGESTONE BT56R J	———
Tire tread depth (Recommended depth)	Front	———	1.6 (0.06)
	Rear	———	2.0 (0.08)

SUSPENSION

Unit: mm (in)

ITEM	STD/SPEC.		LIMIT
Front fork stroke	120 (4.7)		———
Front fork spring free length	245.1 (9.65)		240 (9.4)
Front fork oil level (without spring, outer tube fully compressed)	98 (3.9)		———
Front fork oil type	SUZUKI FORK OIL L01 or equivalent fork oil		———
Front fork oil capacity (each leg)	480 ml (16.2/16.9 US/Imp oz)		———
Front fork spring adjuster	5th groove from top		———
Front fork damping force adjuster	Rebound	3 turns back	———
	Compression	9 turns back	———
Rear shock absorber spring pre-set length	183 (7.20)		———
Rear shock absorber damping force adjuster	Rebound	11 turns back	———
	Compression	8 turns back	———

ITEM	STD/SPEC.	LIMIT
Rear wheel travel	140 (5.5)	———
Swingarm pivot shaft runout	———	0.3 (0.01)

FUEL + OIL

ITEM	STD/SPEC.		NOTE
Fuel type	Use only unleaded gasoline of at least 87 pump octane ($\frac{R+M}{2}$) or 91 octane or higher rated by the research method. Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.		E-03, -33
	Use only unleaded gasoline of at least 87 pump octane ($\frac{R+M}{2}$ method) or 91 octane or higher rated by the Research Method.		E-28
	Gasoline used should be graded 91 octane or higher. An unleaded gasoline is recommended.		The others
Fuel tank capacity	including reserve	20.0 L (5.3/4.4 US/Imp gal)	E-33
		22.0 L (5.8/4.8 US/Imp gal)	The others
Engine oil type	SAE 10W/40, API SF or SG		
Engine oil capacity	Change	*3.1 L (3.3/2.7 US/Imp qt)	
	Filter change	*3.3 L (3.5/2.9 US/Imp qt)	
	Overhaul	4.0 L (4.2/3.5 US/Imp qt)	