

## FOREWORD

This manual contains an introductory description on the SUZUKI GSX-R1000 and procedures for its inspection/service and overhaul of its main components.

Other information considered as generally known is not included.

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

\* This manual has been prepared on the basis of the latest specifications at the time of publication. If modifications have been made since then, differences may exist between the content of this manual and the actual motorcycle.

\* Illustrations in this manual are used to show the basic principles of operation and work procedures. They may not represent the actual motorcycle exactly in detail.

\* This manual is written for persons who have enough knowledge, skills and tools, including special tools, for servicing SUZUKI motorcycles. If you do not have the proper knowledge and tools, ask your authorized SUZUKI motorcycle dealer to help you.

### **▲ WARNING**

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

**SUZUKI MOTOR CORPORATION**

© COPYRIGHT SUZUKI MOTOR CORPORATION 2003

## GROUP INDEX

**GENERAL INFORMATION**

**1**

**PERIODIC MAINTENANCE**

**2**

**ENGINE**

**3**

**FI SYSTEM DIAGNOSIS**

**4**

**FUEL SYSTEM AND THROTTLE BODY**

**5**

**EXHAUST SYSTEM**

**6**

**COOLING AND LUBRICATION SYSTEM**

**7**

**CHASSIS**

**8**

**ELECTRICAL SYSTEM**

**9**

**SERVICING INFORMATION**

**10**

**EMISSION CONTROL INFORMATION**

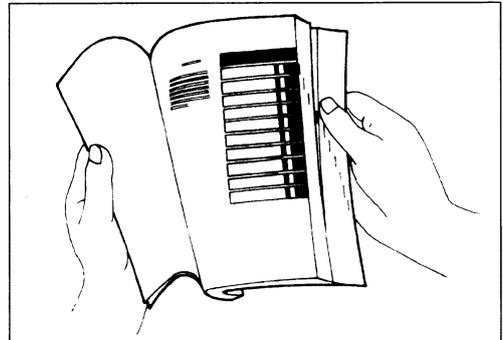
**11**

**WIRING DIAGRAM**

**12**

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

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



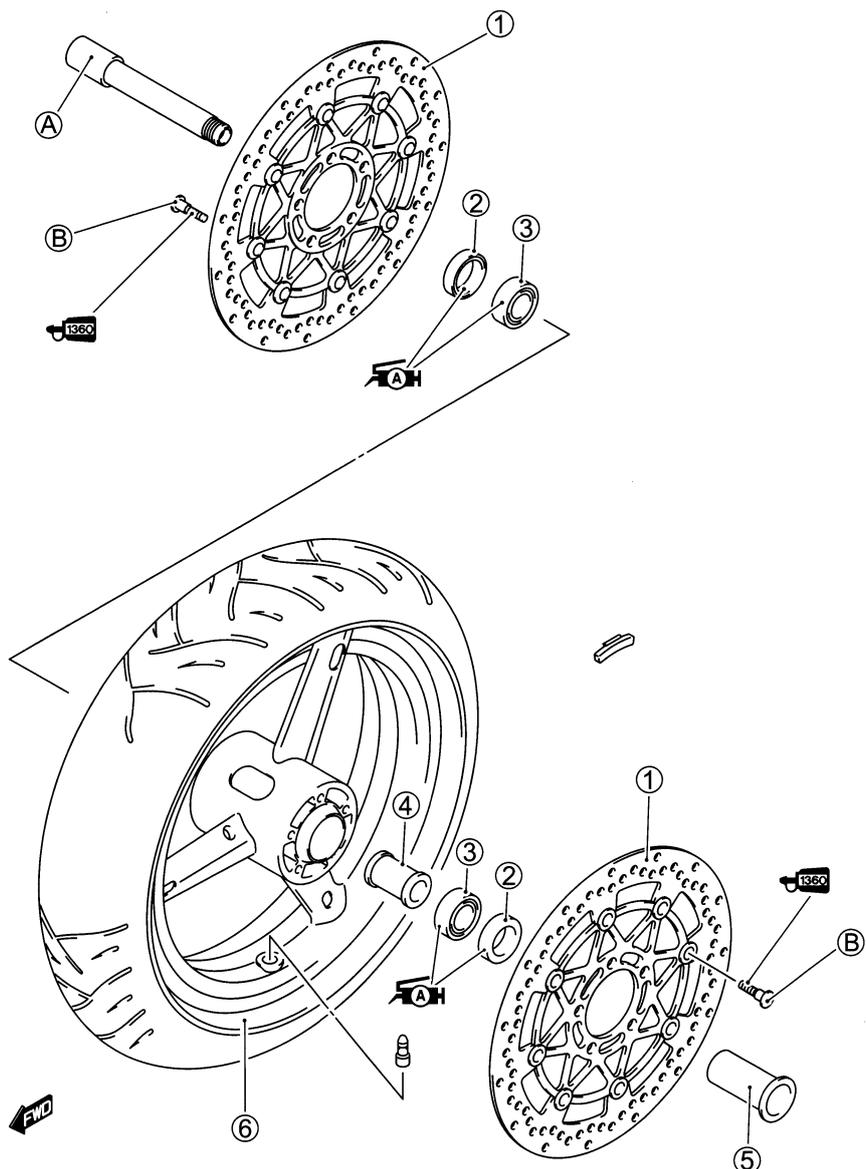
## COMPONENT PARTS AND WORK TO BE DONE

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

Example: Front wheel

- ① Brake disc
- ② Dust seal
- ③ Bearing
- ④ Spacer
- ⑤ Spacer nut
- ⑥ Front wheel

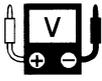
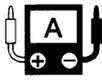
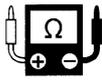
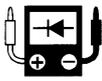
- Ⓐ Front axle
- Ⓑ Brake disc bolt (Front)



ITEM	N·m	kgf·m	lb-ft
Ⓐ	100	10.0	72.5
Ⓑ	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.		Apply THREAD LOCK SUPER "1360". 99000-32130
	Apply oil. Use engine oil unless otherwise specified.		Use engine coolant.
	Apply molybdenum oil solution. (Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1:1)		Use fork oil. 99000-99044-L01
	Apply SUZUKI SUPER GREASE "A". 99000-25010 (Others) 99000-25030 (USA)		Apply or use brake fluid.
	Apply SUZUKI MOLY PASTE. 99000-25140		Measure in voltage range.
	Apply SUZUKI BOND "1215". 99000-31110 (Except USA)		Measure in current range.
	Apply SUZUKI BOND "1207B". 99104-31140 (USA)		Measure in resistance range.
	Apply SUZUKI BOND "1207B". 99000-31140 (Except USA)		Measure in diode test range.
	Apply THREAD LOCK SUPER "1303". 99000-32030		Measure in continuity test range.
	Apply THREAD LOCK SUPER "1322". 99000-32110 (Except USA)		Use special tool.
	Apply THREAD LOCK "1342". 99000-32050 (USA)		Indication of service data.

# ABBREVIATIONS USED IN THIS MANUAL

## A

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

## B

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

## C

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

## D

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

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

## F

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

## G

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

## H

HC : Hydrocarbons

## I

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

## L

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

## **M**

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

## **N**

NOX : Nitrogen Oxides

## **O**

OHC : Over Head Camshaft  
OPS : Oil Pressure Switch

## **P**

PCV : Positive Crankcase  
Ventilation (Crankcase Breather)

## **R**

RH : Right Hand  
ROM : Read Only Memory

## **S**

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

## **T**

TO Sensor : Tip Over Sensor (TOS)  
TP Sensor : Throttle Position Sensor (TPS)  
TPC Valve : Tank Pressure Control Valve (TPCV)

## SAE-TO-FORMER SUZUKI TERM

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	
<b>A</b>		
Air Cleaner	ACL	Air Cleaner, Air Cleaner Box
<b>B</b>		
Barometric Pressure	BARO	Barometric Pressure, Atmospheric Pressure (APS, AP Sensor)
Battery Positive Voltage	B+	Battery Voltage, +B
<b>C</b>		
Camshaft Position Sensor	CMP Sensor	Camshaft Position Sensor (CMPS)
Crankshaft Position Sensor	CKP Sensor	Crankshaft Position Sensor (CKPS), Crank Angle
<b>D</b>		
Data Link Connector	DLC	Dealer Mode Coupler
Diagnostic Test Mode	DTM	—
Diagnostic Trouble Code	DTC	Diagnostic Code, Malfunction Code
<b>E</b>		
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)
Exhaust Control System	EXCS	EXC System (EXCS)
Exhaust Control Valve	EXCV	EXC Valve (EXCV)
Exhaust Control Valve Actuator	EXCVA	EXCV Actuator (EXCVA)
<b>F</b>		
Fan Control	FC	—
Fuel Level Sensor	—	Fuel Level Sensor, Fuel Level Gauge
Fuel Pump	FP	Fuel Pump (FP)

SAE TERM		FORMER SUZUKI TERM
FULL TERM	ABBREVIATION	
G		
Generator	GEN	Generator
Ground	GND	Ground (GND, GRD)
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 (IAP), Intake Vacuum
Mass Air Flow	MAF	Air Flow
O		
On-Board Diagnostic	OBD	Self-Diagnosis Function Diagnostic
Open Loop	OL	—
P		
Programmable Read Only Memory	PROM	—
Pulsed Secondary Air Injection	PAIR	Pulse Air Control (PAIR)
Purge Valve	Purge Valve	Purge Valve (SP Valve)
R		
Random Access Memory	RAM	—
Read Only Memory	ROM	ROM
S		
Secondary Air Injection	AIR	—
Secondary Throttle Control System	STCS	STC System (STCS)
Secondary Throttle Valve	STV	ST Valve (STV)
Secondary Throttle Valve Actuator	STVA	STV Actuator (STVA)
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)
Tank Pressure Control Valve	TPC Valve	TPC Valve (TPCV)
V		
Voltage Regulator	VR	Voltage Regulator
Volume Air Flow	VAF	Air Flow

## WIRE COLOR

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

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

# GENERAL INFORMATION

1

## CONTENTS

<b>WARNING/CAUTION/NOTE .....</b>	<b>1- 2</b>
<b>GENERAL PRECAUTIONS.....</b>	<b>1- 2</b>
<b>SUZUKI GSX-R1000K3 ('03-MODEL) .....</b>	<b>1- 4</b>
<b>SERIAL NUMBER LOCATION.....</b>	<b>1- 4</b>
<b>FUEL, OIL AND ENGINE COOLANT RECOMMENDATION.....</b>	<b>1- 5</b>
<b>FUEL (FOR USA AND CANADA).....</b>	<b>1- 5</b>
<b>FUEL (FOR OTHER COUNTRIES).....</b>	<b>1- 5</b>
<b>ENGINE OIL (FOR USA).....</b>	<b>1- 5</b>
<b>ENGINE OIL (FOR OTHER COUNTRIES) .....</b>	<b>1- 5</b>
<b>BRAKE FLUID.....</b>	<b>1- 5</b>
<b>FRONT FORK OIL .....</b>	<b>1- 6</b>
<b>ENGINE COOLANT .....</b>	<b>1- 6</b>
<b>WATER FOR MIXING .....</b>	<b>1- 6</b>
<b>ANTI-FREEZE/ENGINE COOLANT.....</b>	<b>1- 6</b>
<b>LIQUID AMOUNT OF WATER/ENGINE COOLANT .....</b>	<b>1- 6</b>
<b>BREAK-IN PROCEDURES .....</b>	<b>1- 7</b>
<b>CYLINDER IDENTIFICATION .....</b>	<b>1- 7</b>
<b>INFORMATION LABELS.....</b>	<b>1- 8</b>
<b>SPECIFICATIONS .....</b>	<b>1- 9</b>
<b>DIMENSIONS AND DRY MASS .....</b>	<b>1- 9</b>
<b>ENGINE .....</b>	<b>1- 9</b>
<b>DRIVE TRAIN.....</b>	<b>1- 9</b>
<b>CHASSIS.....</b>	<b>1-10</b>
<b>ELECTRICAL .....</b>	<b>1-10</b>
<b>CAPACITIES .....</b>	<b>1-10</b>
<b>COUNTRY AND AREA CODES.....</b>	<b>1-11</b>

## 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, water, exhaust or brake systems, check all lines and fittings related to the system for leaks.**

**CAUTION**

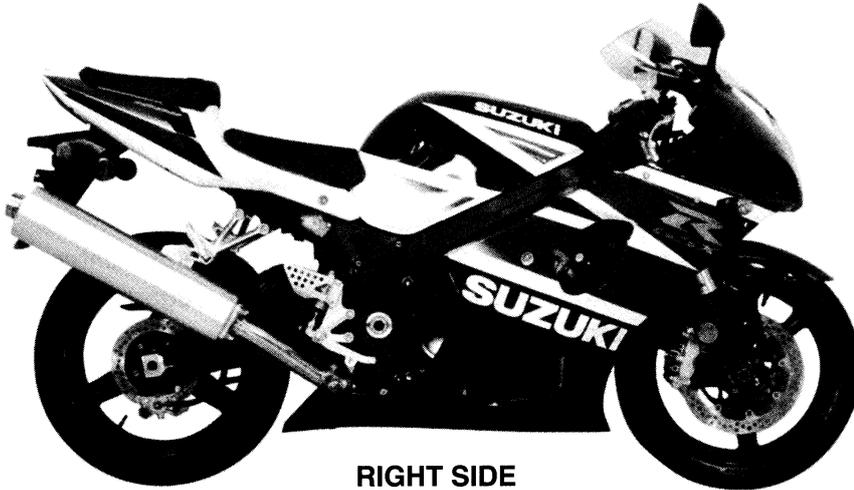
- \* If parts replacement is necessary, replace the parts with Suzuki Genuine Parts or their equivalent.
- \* When removing parts that are to be reused, keep them arranged in an orderly manner so that they may be reinstalled in the proper order and orientation.
- \* Be sure to use special tools when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

After reassembling, check parts for tightness and proper operation.

- \* To protect the environment, do not unlawfully dispose of used motor oil, engine coolant and other fluids: batteries, and tires.

To protect Earth's natural resources, properly dispose of used motorcycle and parts.

## SUZUKI GSX-R1000K3 ('03-MODEL)



RIGHT SIDE

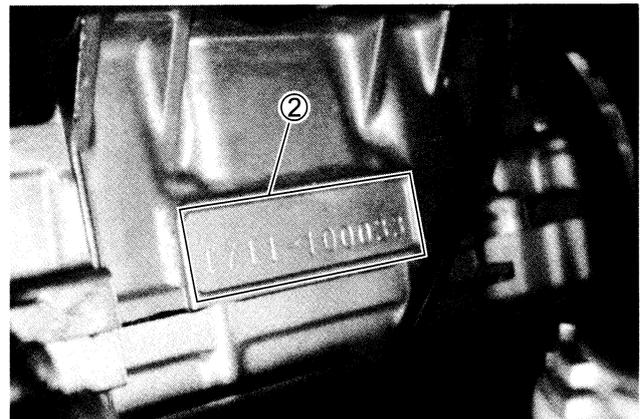
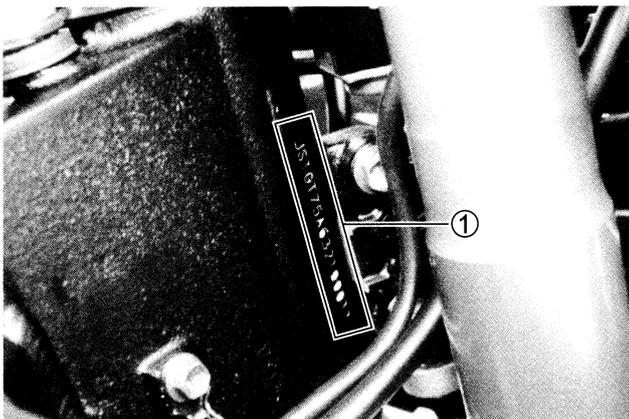


LEFT SIDE

- Difference between photographs and actual motorcycles depends on the markets.

## SERIAL NUMBER LOCATION

The frame serial number or V.I.N. (Vehicle Identification Number) ① is stamped on the right side of the steering head pipe. The engine serial number ② is located on the rear side of the crankcase. These numbers are required especially for registering the machine and ordering spare parts.





## FRONT FORK OIL

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

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

## LIQUID AMOUNT OF WATER/ENGINE COOLANT

**Solution capacity (total): Approx. 2 400 ml (2.5/2.1 US/Imp qt)**

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

### CAUTION

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

## BREAK-IN PROCEDURES

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

- Keep to these break-in engine speed limits:

**Initial 800 km ( 500 miles): Below 6 000 r/min**

**Up to 1 600 km (1 000 miles): Below 9 000 r/min**

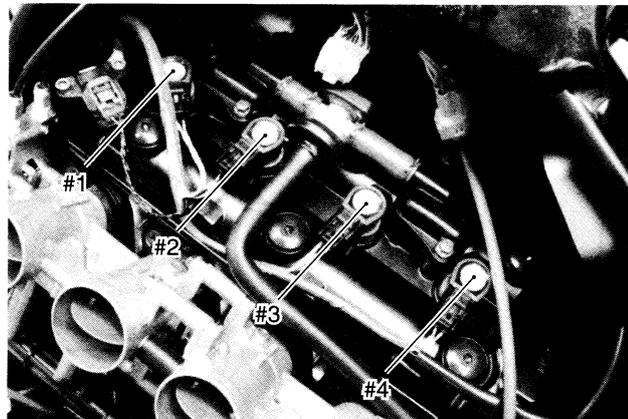
**Over to 1 600 km (1 000 miles): Below 12 500 r/min**

- 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 12 500 r/min at any time.

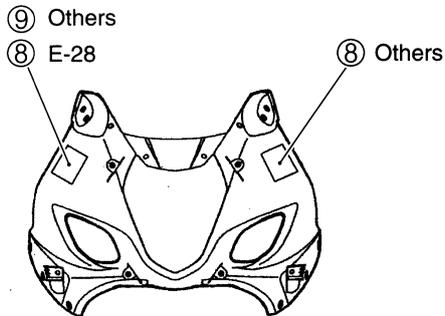
## CYLINDER IDENTIFICATION

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

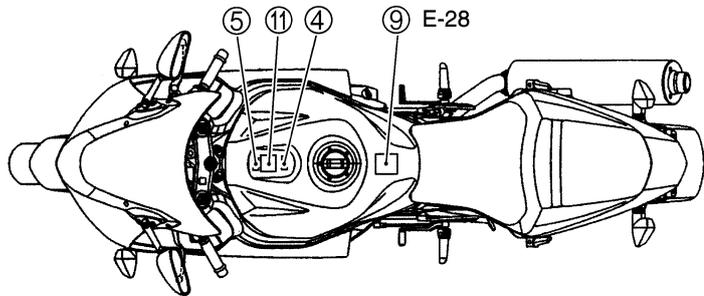


## INFORMATION LABELS

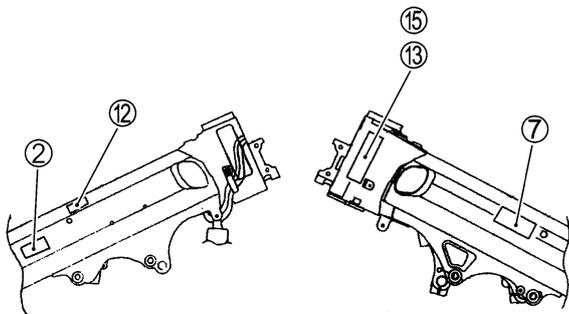
	GSX-R1000	GSX-R1000UF
① Noise label	○ For E-03, 24, 33	
② Information label	○ For E-03, 28, 33	
③ Vacuum hose routing label	○ For E-33	
④ Fuel caution label	○ For E-02, 24	
⑤ Fuel information label	○	○
⑥ Manual notice label	○ For E-03, 33	
⑦ Frame caution plate	○	○
⑧ Warning screen label	○	○
⑨ Warning steering label	○	○
⑩ Tire air pressure label	○	○
⑪ Warning safety label	○	○
⑫ ICES Canada label	○ For E-28	
⑬ ID plate	○ Except E-03, 28, 33	○
⑭ E-19 ID label		○
⑮ Safety plate	○ For E-03, 28, 33	



Body cowling

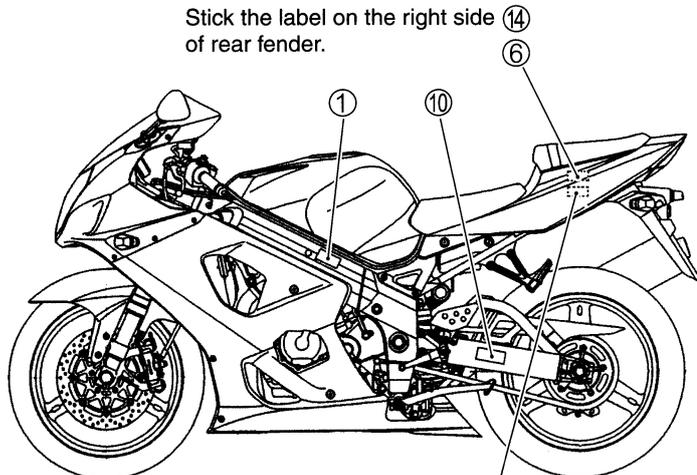


Stick the label on the right side ⑭ of rear fender.



Frame (Right side)

Frame (Left side)



Stick the label on the left side ③ of rear fender.

## SPECIFICATIONS

### DIMENSIONS AND DRY MASS

Overall length .....	2 070 mm (81.5 in)
Overall width .....	715 mm (28.1 in)
Overall height .....	1 145 mm (45.1 in)
Wheelbase .....	1 410 mm (55.5 in)
Ground clearance.....	130 mm (5.1 in)
Seat height.....	820 mm (32.3 in)
Dry mass .....	168 kg (370 lbs)
	169 kg (372 lbs).....E-33

### ENGINE

Type .....	Four stroke, liquid-cooled, DOHC
Number of cylinders .....	4
Bore.....	73.0 mm (2.874 in)
Stroke.....	59.0 mm (2.323 in)
Displacement .....	988 cm <sup>3</sup> (60.3 cu.in)
Compression ratio .....	12.0:1
Fuel system.....	Fuel injection
Air cleaner .....	Non-woven fabric element
Starter system .....	Electric
Lubrication system .....	Wet sump
Idle speed.....	1 150 ± 100 r/min

### DRIVE TRAIN

Clutch .....	Wet multi-plate type
Transmission.....	6-speed constant mesh
Gearshift pattern .....	1-down, 5-up
Primary reduction ratio .....	1.553 (73/47)
Gear ratios, Low .....	2.687 (43/16)
2nd.....	2.052 (39/19)
3rd.....	1.681 (37/22)
4th.....	1.450 (29/20)
5th.....	1.304 (30/23)
Top.....	1.208 (29/24)
Final reduction ratio.....	2.470 (42/17)
Drive chain .....	DID 530, 110 links

## CHASSIS

Front suspension .....	Inverted telescopic, coil spring, oil damped
Rear suspension .....	Link type, coil spring, oil damped
Front fork stroke.....	120 mm (4.7 in)
Rear wheel travel.....	130 mm (5.1 in)
Steering angle.....	27 °
Caster .....	23.5 °
Trail .....	91 mm (3.6 in)
Turning radius .....	3.4 m (11.2 ft)
Front brake.....	Disc brake, twin
Rear brake .....	Disc brake
Front tire size .....	120/70 ZR 17 M/C (58 W), tubeless
Rear tire size.....	190/50 ZR 17 M/C (73 W), tubeless

## ELECTRICAL

Ignition type.....	Electronic ignition (Transistorized)
Ignition timing.....	8 ° B.T.D.C.at 1 150 r/min.....#1.4 4 ° B.T.D.C.at 1 150 r/min.....#2.3
Spark plug .....	NGK CR9E or DENSO U27ESR-N
Battery.....	12 V 36.0 kC (10 Ah)/10 HR
Generator.....	Three-phase A.C.generator
Main fuse .....	30 A
Fuse .....	15/15/15/15/10/10 A
Headlight.....	12 V 55 W (H7) + 12 V 60/55 W (H4)
Turn signal light.....	12 V 18 W
License plate light .....	12 V 5 W
Brake light/Taillight.....	LED
Speedometer light.....	LED
Tachometer light .....	LED
Neutral indicator light .....	LED
High beam indicator light .....	LED
Turn signal indicator light.....	LED
Position/Parking light .....	12 V 5 W ..... Except E-03, 24, 28, 33
Oil pressure/Coolant temperature/Fuel injection warning light ....	LED
Fuel level indicator light .....	LED
Engine RPM indicator light.....	LED

## CAPACITIES

Fuel tank, including reserve .....	18 L (4.8/4.0 US/Imp gal)...Including E-33
Engine oil, oil change.....	3 000 ml (3.2/2.6 US/Imp qt)
with filter change .....	3 300 ml (3.5/2.9 US/Imp qt)
overhaul .....	3 600 ml (3.8/3.2 US/Imp qt)
Coolant.....	2 400 ml (2.5/2.1 US/Imp qt)
Front fork oil (each leg).....	509 ml (17.2/17.9 US/Imp oz)

These specifications are subject to change without notice.

## COUNTRY AND AREA CODES

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

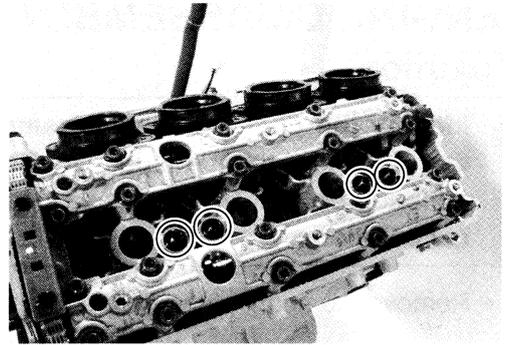
MODEL	CODE	COUNTRY or AREA
GSX-R1000	E-02	U.K.
	E-03	U.S.A. (Except for california)
	E-19	EU
	E-24	Australia
	E-28	Canada
	E-33	California (U.S.A.)
GSX-R1000UF	E-19	EU

# PERIODIC MAINTENANCE

## CONTENTS

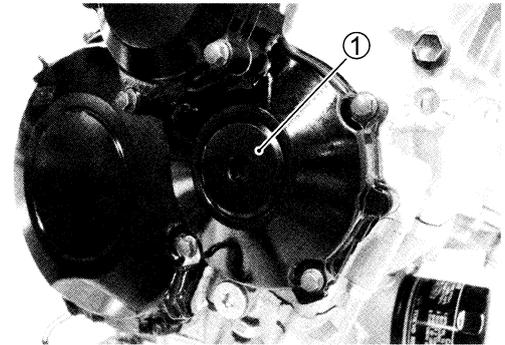
<b>PERIODIC MAINTENANCE SCHEDULE.....</b>	<b>2- 2</b>
<b>PERIODIC MAINTENANCE CHART .....</b>	<b>2- 2</b>
<b>LUBRICATION POINTS.....</b>	<b>2- 4</b>
<b>MAINTENANCE AND TUNE-UP PROCEDURES.....</b>	<b>2- 5</b>
<b>AIR CLEANER .....</b>	<b>2- 5</b>
<b>SPARK PLUG .....</b>	<b>2- 6</b>
<b>VALVE CLEARANCE .....</b>	<b>2- 8</b>
<b>ENGINE OIL AND OIL FILTER.....</b>	<b>2-13</b>
<b>EXHAUST CONTROL VALVE.....</b>	<b>2-14</b>
<b>FUEL LINE .....</b>	<b>2-15</b>
<b>ENGINE IDLE SPEED.....</b>	<b>2-15</b>
<b>THROTTLE VALVE SYNCHRONIZATION.....</b>	<b>2-16</b>
<b>EVAPORATIVE EMISSION CONTROL SYSTEM (E-33 ONLY).....</b>	<b>2-16</b>
<b>PAIR (AIR SUPPLY) SYSTEM.....</b>	<b>2-16</b>
<b>THROTTLE CABLE PLAY.....</b>	<b>2-17</b>
<b>CLUTCH .....</b>	<b>2-18</b>
<b>COOLING SYSTEM .....</b>	<b>2-19</b>
<b>DRIVE CHAIN.....</b>	<b>2-22</b>
<b>BRAKE .....</b>	<b>2-25</b>
<b>TIRES .....</b>	<b>2-28</b>
<b>STEERING.....</b>	<b>2-29</b>
<b>FRONT FORK .....</b>	<b>2-29</b>
<b>REAR SUSPENSION .....</b>	<b>2-29</b>
<b>EXHAUST PIPE BOLT AND NUT.....</b>	<b>2-30</b>
<b>CHASSIS BOLTS AND NUTS .....</b>	<b>2-31</b>
<b>COMPRESSION PRESSURE CHECK.....</b>	<b>2-33</b>
<b>COMPRESSION TEST PROCEDURE.....</b>	<b>2-33</b>
<b>OIL PRESSURE CHECK.....</b>	<b>2-34</b>

- Remove the dowel pins and O-rings.

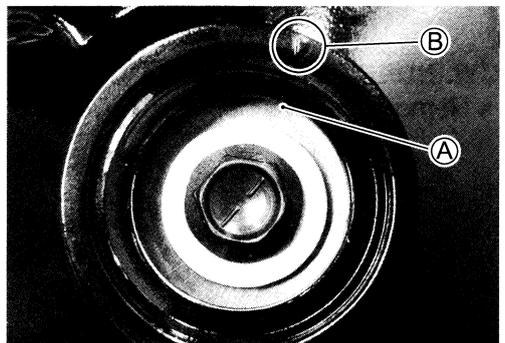
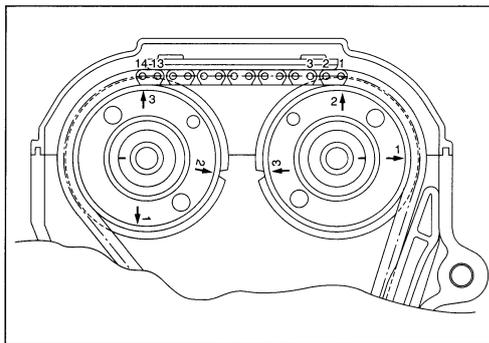
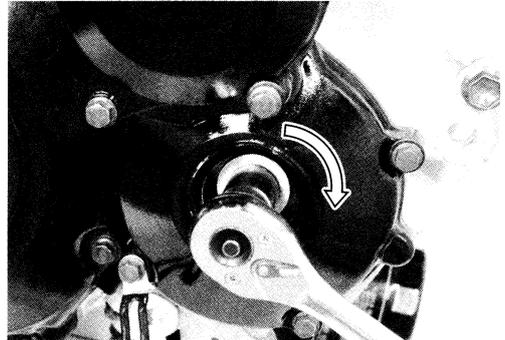


### CAMSHAFTS

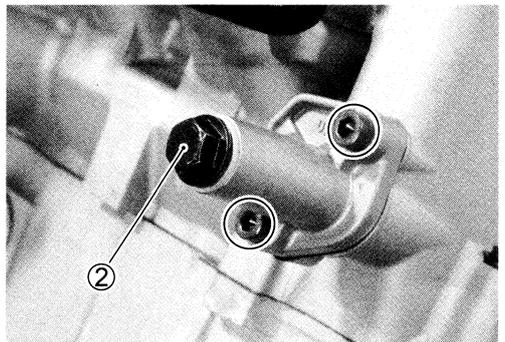
- Remove the valve timing inspection cap ①.



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



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



## PERIODIC MAINTENANCE SCHEDULE

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

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

**NOTE:**

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

## PERIODIC MAINTENANCE CHART

Item	Interval	miles	600	4 000	7 500	11 000	14 500
		km	1 000	6 000	12 000	18 000	24 000
		months	1	6	12	18	24
Air cleaner element			—			R	
Spark plugs			—		R		R
Valve clearance			—	—	—	—	
Exhaust valve				—		—	
Engine oil			R	R	R	R	R
Engine oil filter			R	—	—	R	—
Fuel line			—				
			Replace fuel hose every 4 years.				
Idle speed							
Throttle valve synchronization			 (E-33 only)	—		—	
Evaporative emission control system (E-33 only)			—	—		—	
			Replace vapor hose every 4 years.				
PAIR (air supply) system			—	—		—	
Throttle cable play							
Clutch cable play			—				
Radiator hoses			—				
			Replace every 4 years.				
Engine coolant			Replace every 2 years.				
Drive chain							
			Clean and lubricate every 1 000 km (600 miles).				
Brakes							
Brake hoses			—				
			Replace every 4 years.				

Item	Interval	miles	600	4 000	7 500	11 000	14 500
		km	1 000	6 000	12 000	18 000	24 000
		months	1	6	12	18	24
Brake fluid		—					
Replace every 2 years.							
Tires		—					
Steering			—		—		
Front forks		—	—		—		
Rear suspension		—	—		—		
Exhaust pipe bolts and muffler bolt and nut		T	—	T	—	T	T
Chassis bolts and nuts		T	T	T	T	T	T

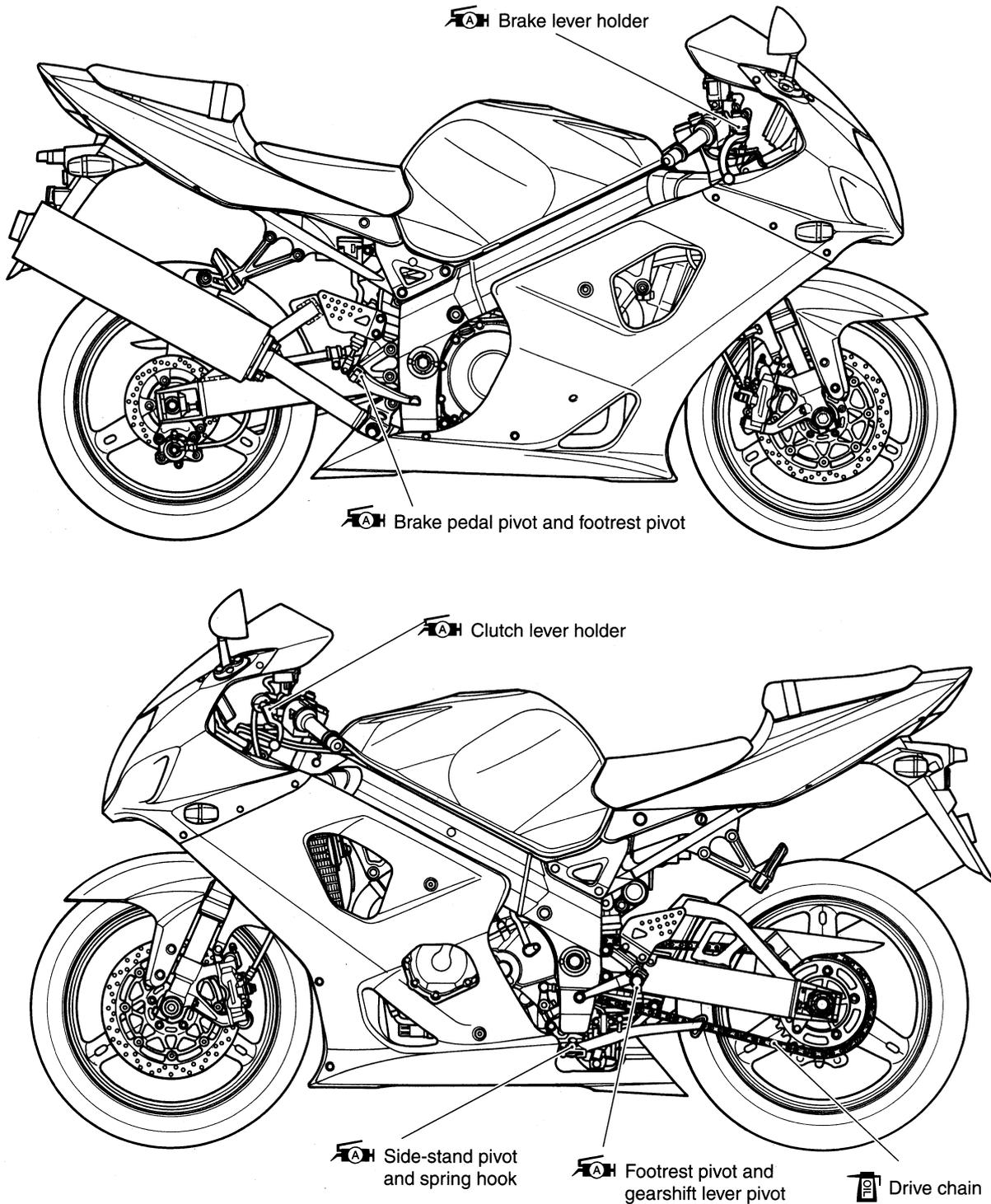
**NOTE:**

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

*R=Replace; T=Tighten*

## LUBRICATION POINTS

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



### NOTE:

- \* Before lubricating each part, clean off any rusty spots and wipe off any grease, oil, dirt or grime.
- \* Lubricate exposed parts which are subject to rust, with a rust preventative spray whenever the motorcycle has been operated under wet or rainy conditions.

## MAINTENANCE AND TUNE-UP PROCEDURES

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

### AIR CLEANER

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

- Remove the front and rear seats. (☞ 8-6)
- Lift and support the fuel tank. (☞ 5-5)
- Remove the air cleaner element by removing the screws.

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

**NOTE:**

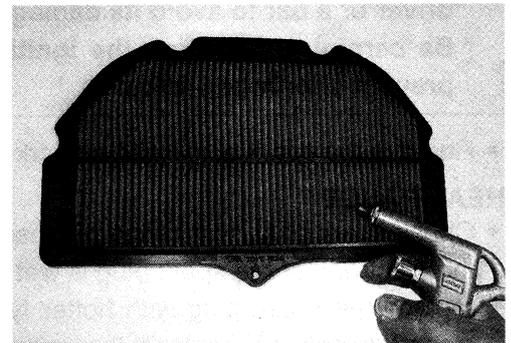
*Always apply air pressure on the throttle body side of the air cleaner element. If air pressure is applied improperly, dirt will be forced into the pores of the air cleaner element thus restricting air flow through the air cleaner element.*

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

**NOTE:**

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

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



## SPARK PLUG

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

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

- Remove the front and rear seat. (☞ 8-6)
- Lift and support the fuel tank. (☞ 5-5)
- Remove the air cleaner box. (☞ 5-15)
- Disconnect all lead wire couplers from ignition coil/plug caps.

#### CAUTION

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

- Remove the ignition coils/plug caps.

#### CAUTION

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

- Remove the spark plugs with a spark plug wrench.

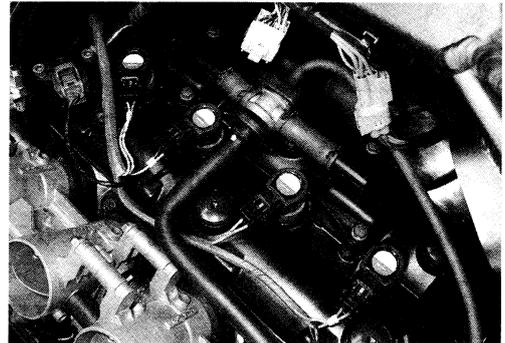
### HEAT RANGE

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

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

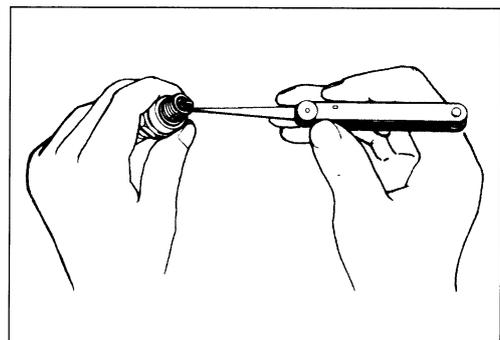
#### NOTE:

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



### CARBON DEPOSITS

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



**SPARK PLUG GAP**

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

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

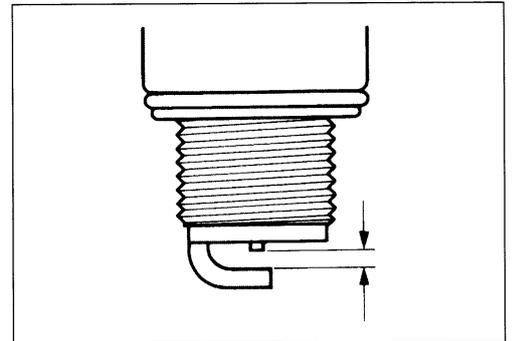
**TOOL** 09900-20803: Thickness gauge

**ELECTRODE'S CONDITION**

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

**CAUTION**

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



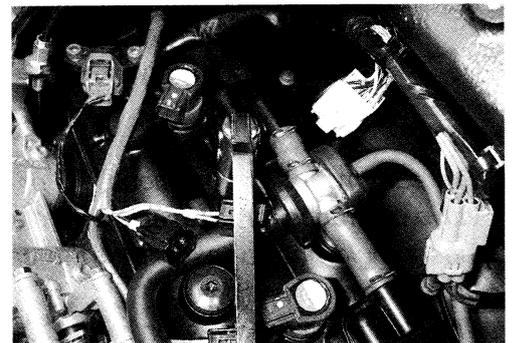
**SPARK PLUG AND IGNITION COIL/PLUG CAP INSTALLATION**

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

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

**CAUTION**

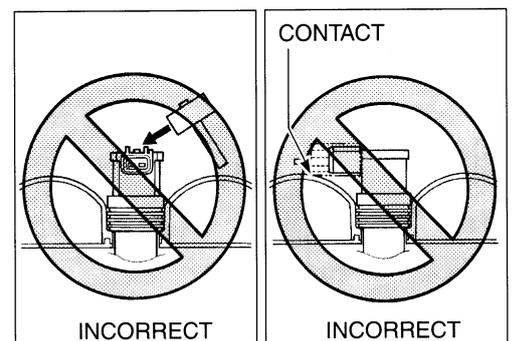
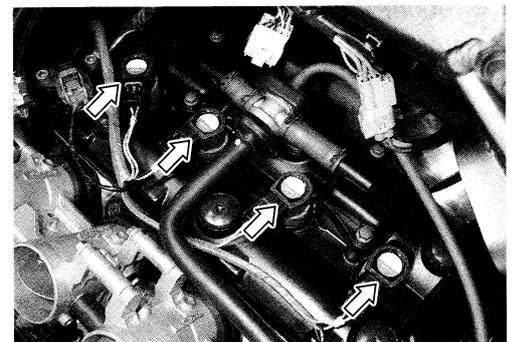
Do not crossthread or over tighten the spark plug, or the spark plug will damage the aluminum threads of the cylinder head.



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

**CAUTION**

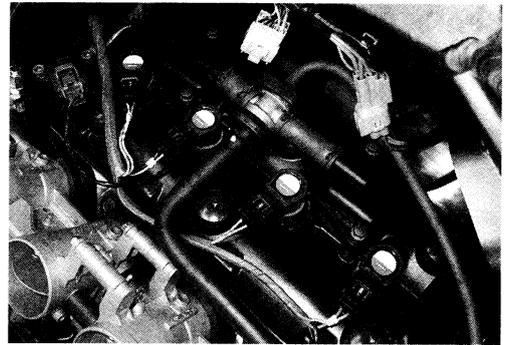
- \* Do not hit the ignition coil/plug cap with a plastic hammer when installing it.
- \* Place the ignition coil/spark plug cap so that the coupler does not touch the cylinder head cover.



## VALVE CLEARANCE

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

- Remove the right under cowling. (☞ 8-3)
- Remove the front and rear seats. (☞ 8-6)
- Lift and support the fuel tank. (☞ 5-5)
- Remove the spark plugs. (☞ 2-6)
- Remove the cylinder head covers. (☞ 3-15)



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

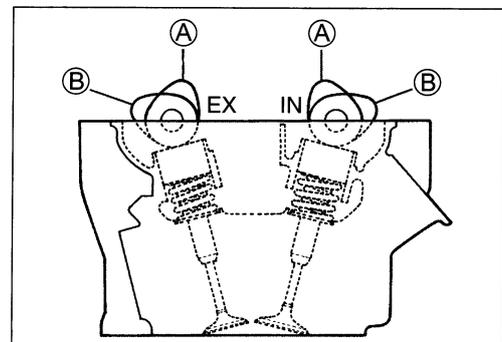
**DATA** Valve clearance (when cold):

**Standard: IN. : 0.10 – 0.20 mm (0.004 – 0.008 in)**

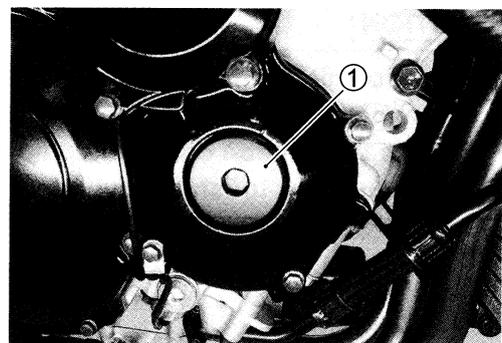
**EX. : 0.20 – 0.30 mm (0.008 – 0.012 in)**

**NOTE:**

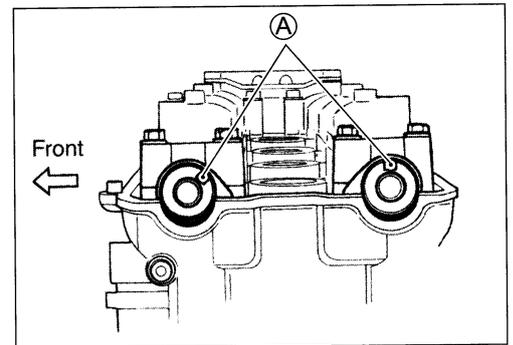
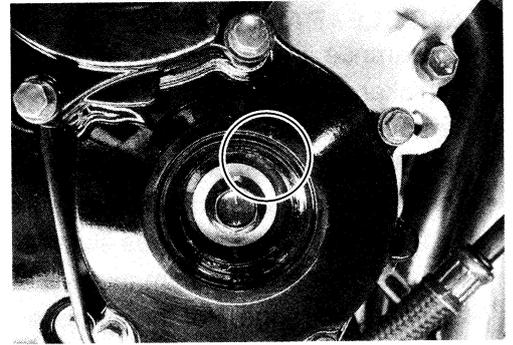
- \* The cam must be at positions, (A) or (B), in order to check the valve clearance, or to adjust valve clearance. Clearance readings should not be taken with the cam in any other position than these two positions.
- \* The clearance specification is for COLD state.
- \* To turn the crankshaft for clearance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



- Remove the valve timing inspection cap ①.

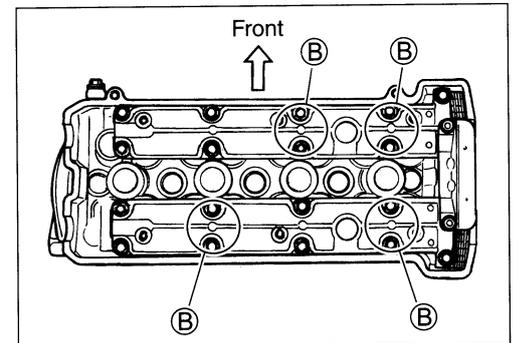


- Turn the crankshaft to bring the “Top” line on the starter clutch to the index mark and also to bring the notches (A) on the left ends of both camshafts (Ex and In) to the positions as shown.

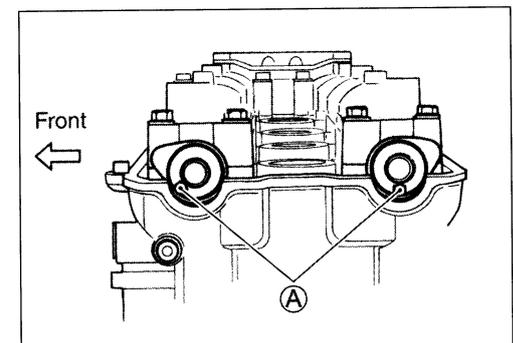


- In this condition, read the valve clearance at the valves (B) (In and Ex of No.4 cylinder, Ex of No.3 and In of No.2).
- If the clearance is out of specification, adjust the clearance. (↗ 2-10)

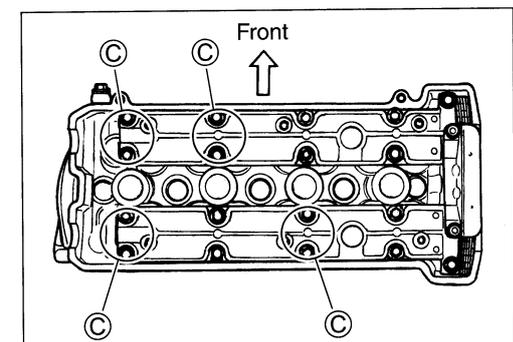
**TOOL** 09900-20803: Thickness gauge



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



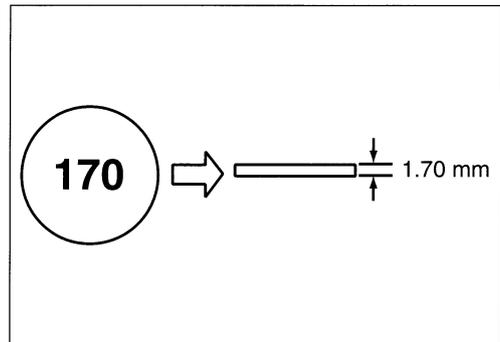
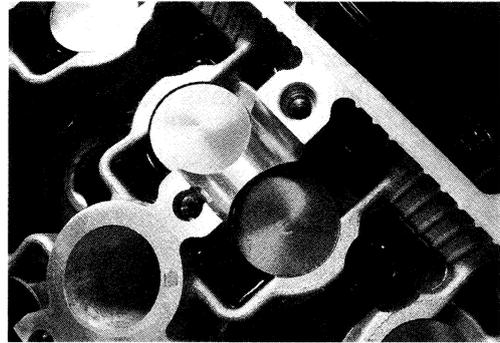
Cam position	Notch (A) position	
	Exhaust Camshaft	Intake Camshaft
(B)	←Front (C)	←Front (C)
(C)	←Front (C)	←Front (C)



### VALVE CLEARANCE ADJUSTMENT

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

- Remove the intake or exhaust camshafts. (☞ 3-16)
- Remove the tappet and shim by fingers or magnetic hand.
- Check the figures printed on the shim. These figures indicate the thickness of the shim, as illustrated.
- Select a replacement shim that will provide a clearance within the specified range. For the purpose of this adjustment, a total of 25 sizes of tappet shim are available ranging from 1.20 to 2.20 mm in steps of 0.05 mm. Fit the selected shim to the valve stem end, with numbers toward tappet. Be sure to check shim size with micrometer to ensure its size. Refer to the tappet shim selection table (☞ 2-11, 2-12) for details.



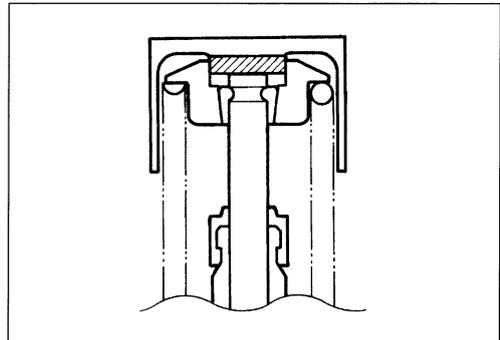
**NOTE:**

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

**NOTE:**

Reinstall the camshafts in the specified manner. (☞ 3-98)

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



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

- \* Cylinder head cover (☞ 3-103)
- \* Spark plug and plug cap (☞ 2-7)
- \* Valve timing inspection plug (☞ 3-103)

(INTAKE SIDE)

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

TAPPET SHIM SET (12800-05830)

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

HOW TO USE THIS CHART:

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

EXAMPLE

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

(EXHAUST SIDE)

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

TAPPET SHIM SET (12800-05830)

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

HOW TO USE THIS CHART:

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

EXAMPLE

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

## ENGINE OIL AND OIL FILTER

### (ENGINE OIL)

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

### (OIL FILTER)

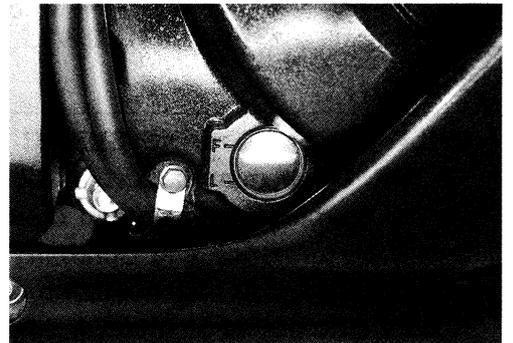
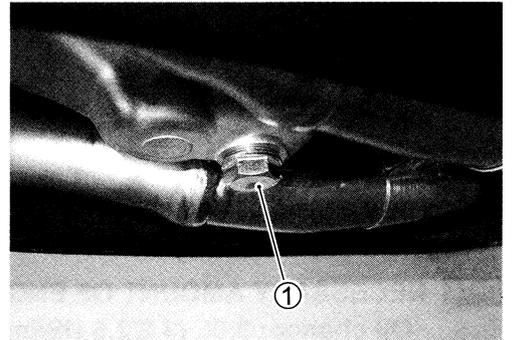
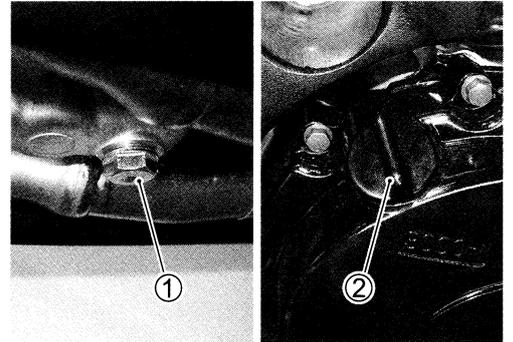
Replace initially at 1 000 km (600 miles, 1 months) and every 18 000 km (11 000 miles, 18 months) thereafter.

### ENGINE OIL REPLACEMENT

- Remove the under cowling. (☞ 8-3)
- 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 3.0 L (3.2/2.6 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.

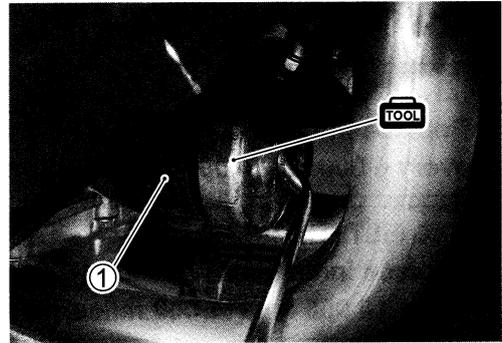


### OIL FILTER REPLACEMENT

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

**TOOL** 09915-40610: Oil filter wrench

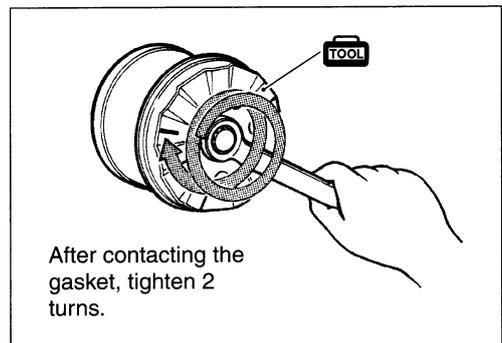
- Apply engine oil lightly to the gasket of the new oil filter before installation.



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

**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.

**DATA** NECESSARY AMOUNT OF ENGINE OIL:

Oil change: 3.0L (3.2/2.6 US/Imp qt)

Oil and filter change: 3.3L (3.5/2.9 US/Imp qt)

Engine overhaul: 3.6L (3.8/3.2 US/Imp qt)

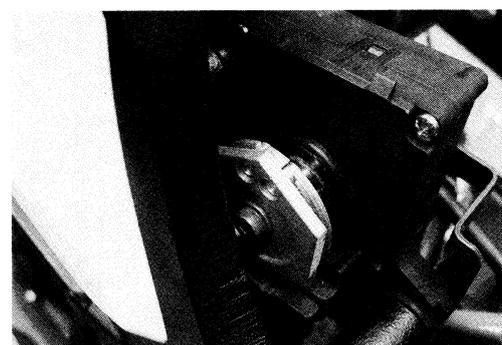
**CAUTION**

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

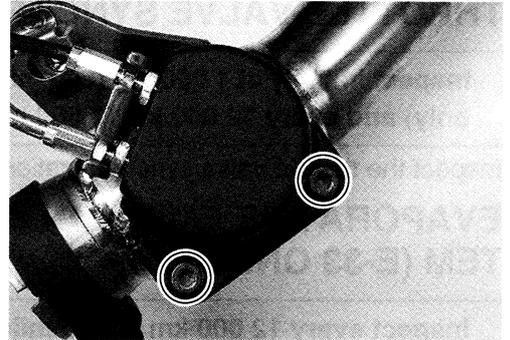
### EXHAUST CONTROL VALVE

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

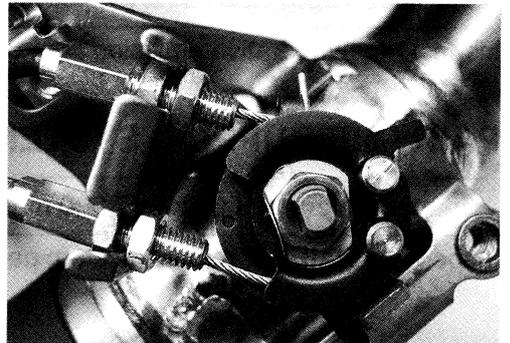
Check the exhaust control valve actuator for its movement when the ignition switch is turned on. If the exhaust valve actuator does not move, check exhaust valve actuator electrical circuit and exhaust valve carbon sticking. Check the exhaust control cable play. (6-14)



- Remove the two bolts and cover.



- Check the lock-nuts tightness. If the lock-nuts are loose, adjust the cable play and tighten the lock-nuts.



## FUEL LINE

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

- Inspect the fuel hose ① for damage and fuel leakage. If any defects are found, the fuel hose must be replaced.



## ENGINE IDLE SPEED

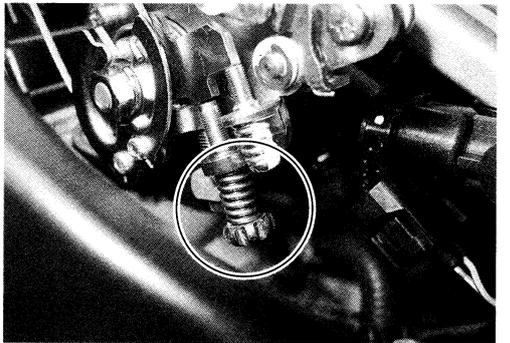
Inspect initially at 1 000 km (600 miles, 1 month) and  
every 6 000 km (4 000 miles, 6 months) thereafter.

### NOTE:

*Warm up the engine before adjusting the engine idle speed.*

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

**DATA** Engine idle speed: 1 150 ± 100 rpm



## THROTTLE VALVE SYNCHRONIZATION

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

Inspect the throttle valve synchronization periodically. (☞ 5-25)

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

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

Inspect the evaporative emission control system periodically. (☞ 11-9)

## PAIR (AIR SUPPLY) SYSTEM

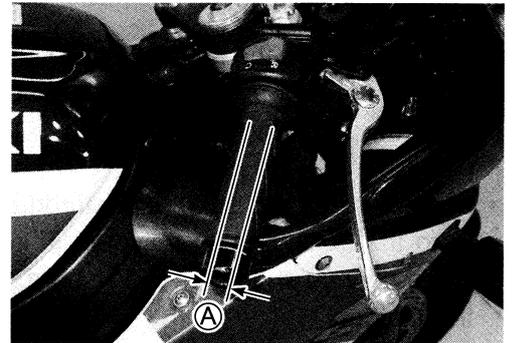
**Inspect every 12 000 km (7 500 miles, 12 months).**

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

## THROTTLE CABLE PLAY

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

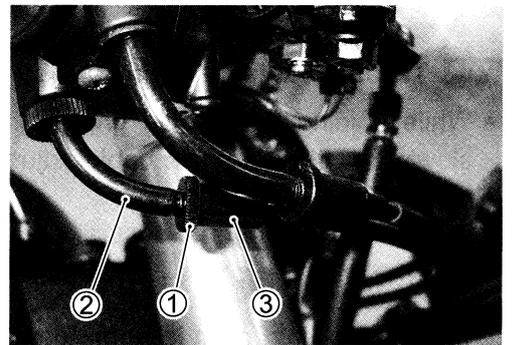
Adjust the throttle cable play  $\text{\textcircled{A}}$  as follows.



### MINOR ADJUSTMENT

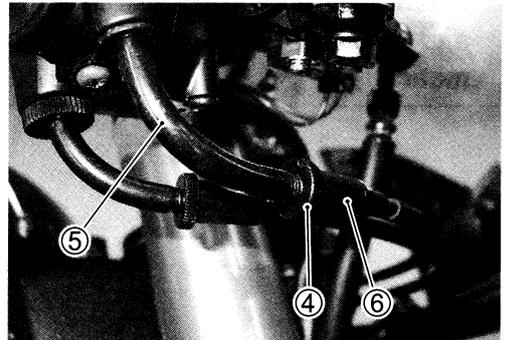
1st step:

- Loosen the lock-nut  $\text{\textcircled{1}}$  of the throttle returning cable  $\text{\textcircled{2}}$  and fully turn in the adjuster  $\text{\textcircled{3}}$ .



2nd step:

- Loosen the lock-nut  $\text{\textcircled{4}}$  of the throttle pulling cable  $\text{\textcircled{5}}$ .
- Turn the adjuster  $\text{\textcircled{6}}$  in or out until the throttle cable play (at the throttle grip)  $\text{\textcircled{A}}$  is between 2.0 – 4.0 mm (0.08 – 0.16 in).
- Tighten the lock-nut  $\text{\textcircled{4}}$  while holding the adjuster  $\text{\textcircled{6}}$ .



**DATA** Throttle cable play  $\text{\textcircled{A}}$ : 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  $\text{\textcircled{3}}$  of the throttle returning cable  $\text{\textcircled{2}}$  until resistance is felt.
- Tighten the lock-nut  $\text{\textcircled{1}}$  while holding the adjuster  $\text{\textcircled{3}}$ .

### **▲ 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

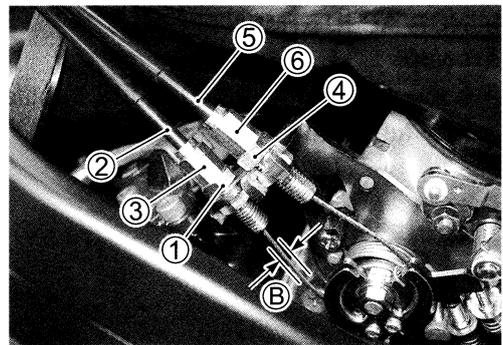
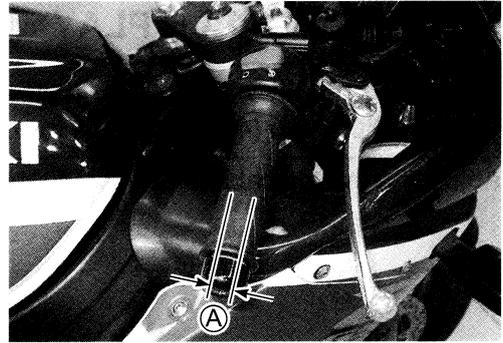
- Lift and support the fuel tank with its prop stay. (☞ 5-5)
- Loosen the lock-nuts ① of the throttle returning cable ②.
- Turn the returning cable adjuster ③ to obtain proper cable play.
- Loosen the lock-nuts ④ of the throttle pulling cable ⑤.
- Turn the pulling cable adjuster ⑥ in or out until the throttle cable play **A** 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.

**DATA** Throttle cable play **A**: 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 **B** of 1.0 mm (0.04 in).
- Tighten the lock-nuts ① securely.

### ⚠ WARNING

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



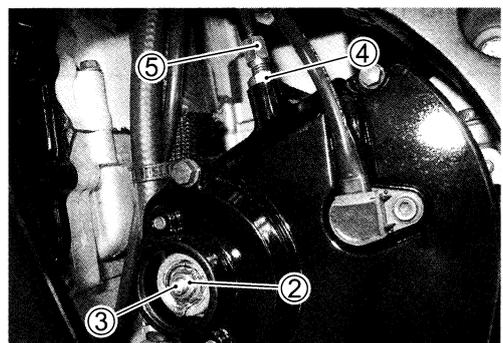
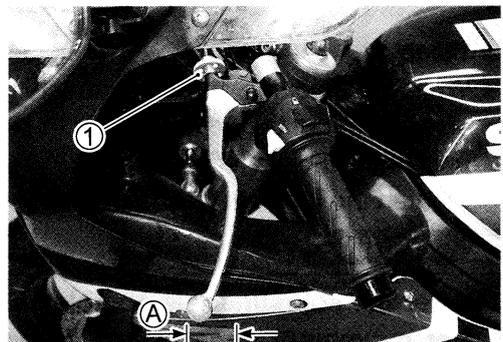
## CLUTCH

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

- Remove the left under cowling. (☞ 8-3)
- Turn in the adjuster ① all the way into the clutch lever assembly.
- Remove the clutch release cover.
- Loosen the lock-nut ② and turn out the adjusting screw ③ two or three rotations.
- From that position, slowly turn in the adjusting screw ③ until resistance is felt.
- From this position, turn out the adjusting screw ③ 1/4 rotation, and tighten the lock-nut ②.
- Loosen the lock-nut ④, and turn the cable adjuster ⑤ to obtain 10 – 15 mm (0.4 – 0.6 in) of free play **A** at the clutch lever end.
- Tighten the lock-nuts ④.

**DATA** Clutch lever play **A**: 10 – 15 mm (0.4 – 0.6 in)

Clutch release screw: 1/4 turn out

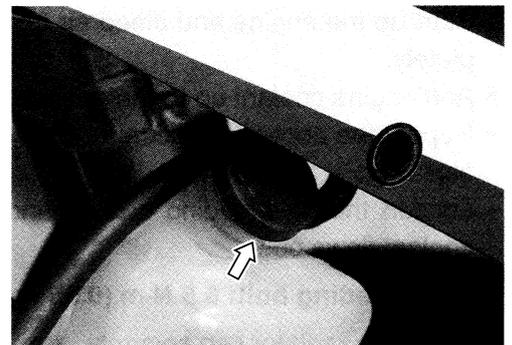
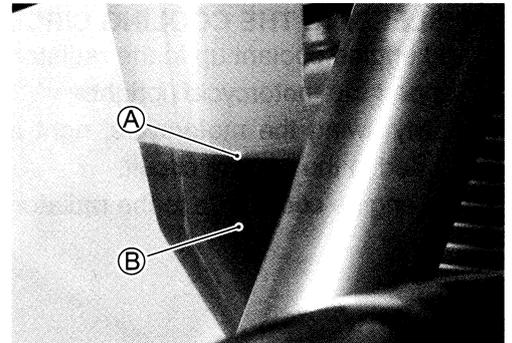


## COOLING SYSTEM

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

### ENGINE COOLANT LEVEL CHECK

- Keep the motorcycle upright.
  - Remove the under cowling. (☞ 8-3)
  - Check the engine coolant level by observing the full and lower lines on the engine coolant reservoir.
- Ⓐ Full line    Ⓑ Lower line
- If the level is below the lower line, remove the right under cowling (☞ 8-3), and add engine coolant to the full line from the engine coolant reservoir filler.



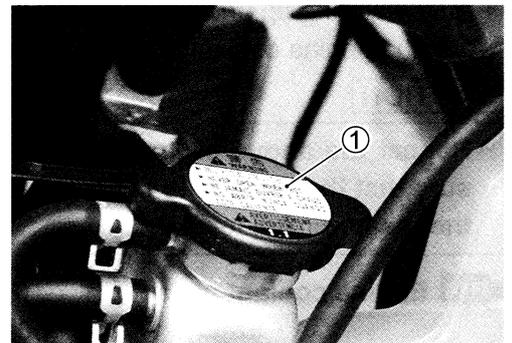
### ENGINE COOLANT CHANGE

- Remove the under cowling. (☞ 8-3)
- Remove the radiator cap ①.
- Drain engine coolant by disconnecting the radiator hose ② from the pump.

#### **⚠ WARNING**

\* Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.

\* Engine coolant may be harmful if swallowed or if it comes in contact with skin or eyes. If engine coolant gets into the eyes or in contact with the skin, flush thoroughly with plenty of water. If swallowed, induce vomiting and call physician immediately!

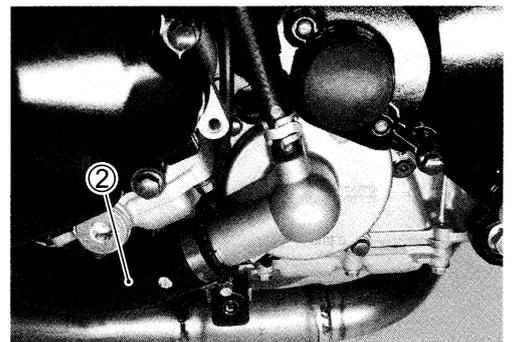


- Flush the radiator with fresh water if necessary.
- Connect the radiator hose ② securely.
- Pour the specified engine coolant up to the radiator inlet.

**LLC** Engine coolant capacity (excluding reservoir):  
 2 150 ml (2.3/1.9 US/Imp qt)

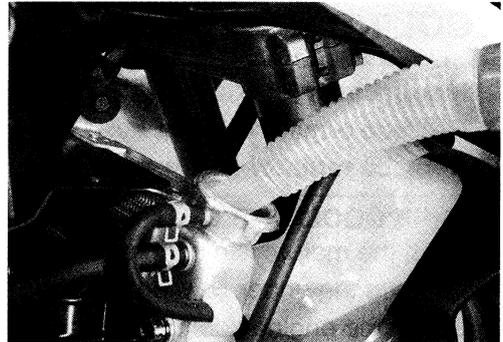
- Bleed the air from the engine coolant circuit in the following procedure. (☞ 2-20)

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

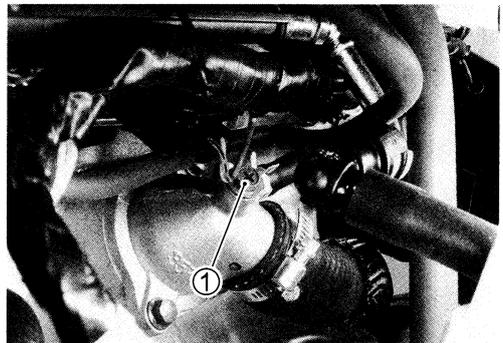


### AIR BLEEDING THE COOLING CIRCUIT

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



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



#### Air bleeding bolt: 5.5 N·m (0.55 kgf·m, 4.0 lb·ft)

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

#### CAUTION

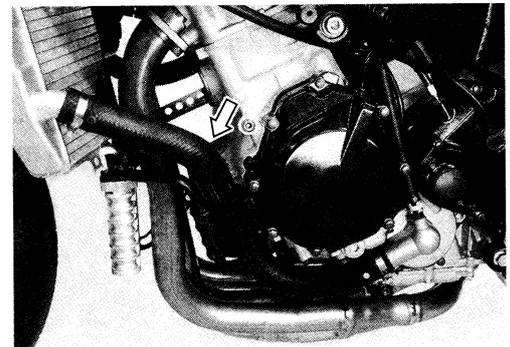
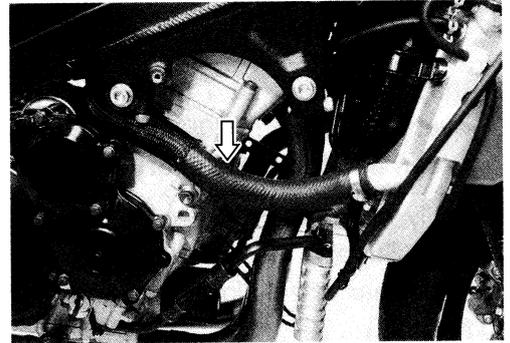
Repeat the above procedure several times and make sure that the radiator is filled with engine coolant up to the reservoir full level.

#### Engine coolant capacity:

Engine side: 2 150 ml (2.3/1.9 US/Imp qt)  
Reverse tank side: 250 ml (0.3/0.2 US/Imp qt)

**RADIATOR HOSES**

- Remove the under cowling. (☞ 8-3)
- Check the radiator hoses for crack, damage or engine coolant leakage.
- If any defect is found, replace the radiator hose with new one.



## DRIVE CHAIN

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

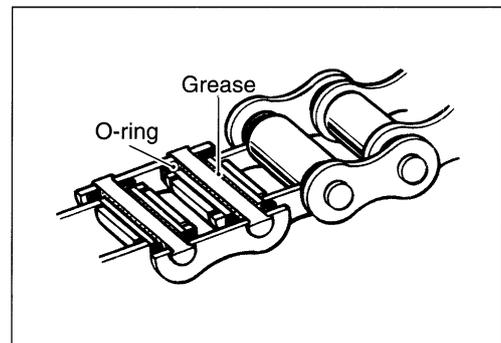
Visually check the drive chain for the possible defects listed below. (Support the motorcycle by a jack and a wooden block, turn the rear wheel slowly by hand with the transmission shifted to Neutral.)

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

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

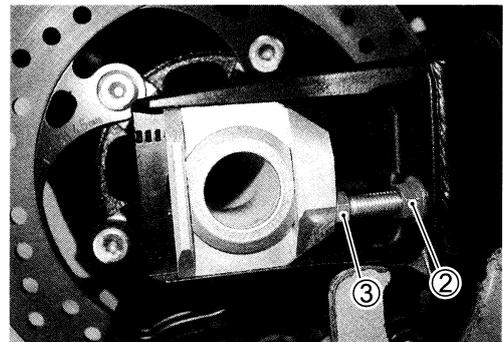
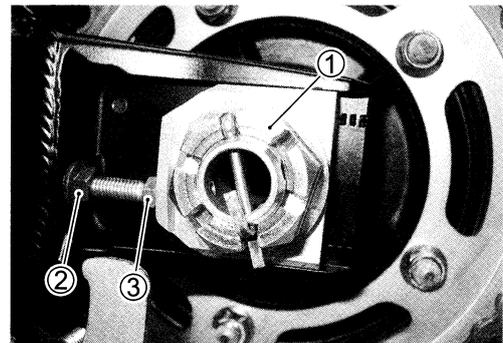
**NOTE:**

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



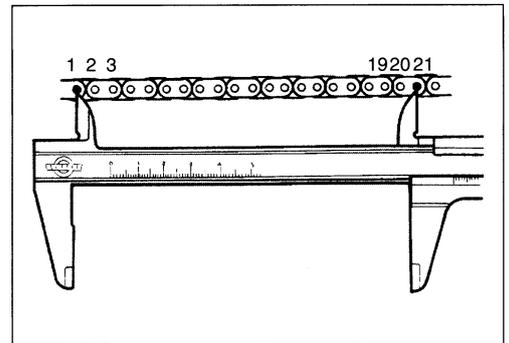
**CHECKING**

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



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

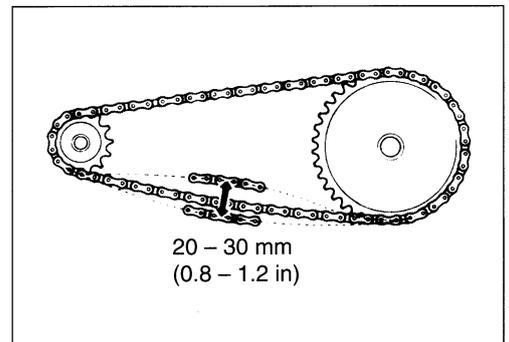
**DATA** Drive chain 20-pitch length:  
**Service limit: 319.4 mm (12.57 in)**



### ADJUSTING

- Loosen or tighten both chain adjuster bolts ① until there is 20 – 30 mm (0.8 – 1.2 in) of slack at the middle of the chain between the engine and rear sprockets as shown. The chain adjuster position relative to the reference marks A on both sides of the swingarm must be equal to ensure that the front and rear wheels are correctly aligned.

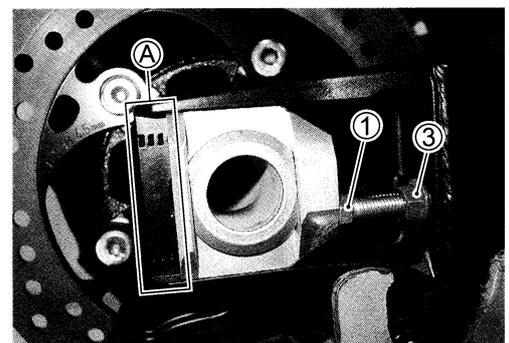
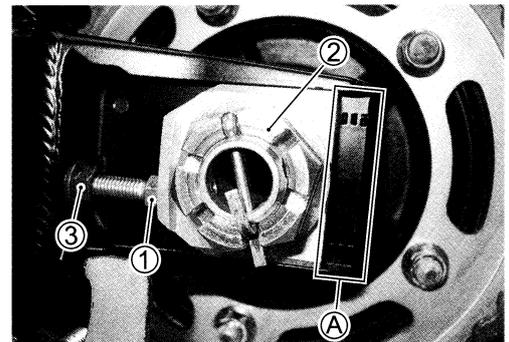
**DATA** Drive chain slack:  
**Standard: 20 – 30 mm (0.8 – 1.2 in)**



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

**🔧** Rear axle nut: 100 N·m (10.0 kgf·m, 72.5 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.

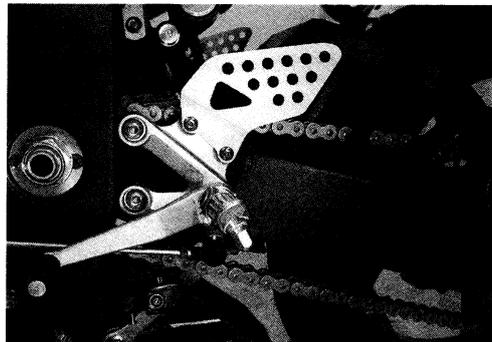
#### CAUTION

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

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

#### CAUTION

- \* Do not use any oil sold commercially as “drive chain oil”. Such oil can damage the O-rings.
- \* The standard drive chain is DID50V4. 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 relative to the lower limit lines on the front and rear brake fluid reservoirs.
- When the level is below the lower limit line, replenish with brake fluid that meets the following specification.



**Specification and Classification: DOT 4**

### ⚠ WARNING

- \* The brake system of this motorcycle is filled with a glycol-based brake fluid. Do not use or mix different types of fluid such as silicone-based and petroleum-based fluids. Do not use any brake fluid taken from old, used or unsealed containers. Never re-use brake fluid left over from the last servicing or stored for a long period of time.
- \* Brake fluid, if it leaks, will interfere with safe running and immediately discolor painted surfaces. Check the brake hoses and hose joints for cracks and fluid leakage before riding.

### BRAKE PADS

#### Front brake

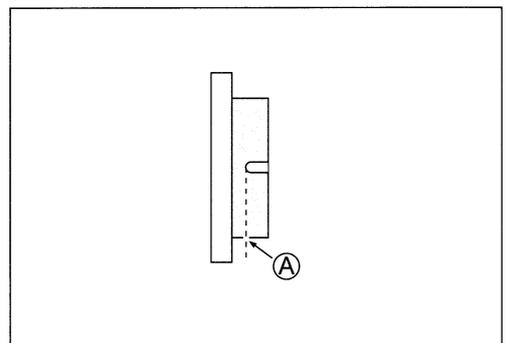
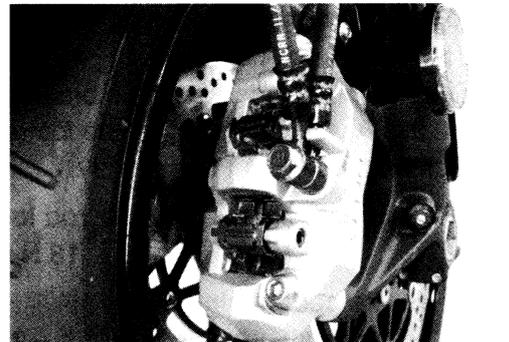
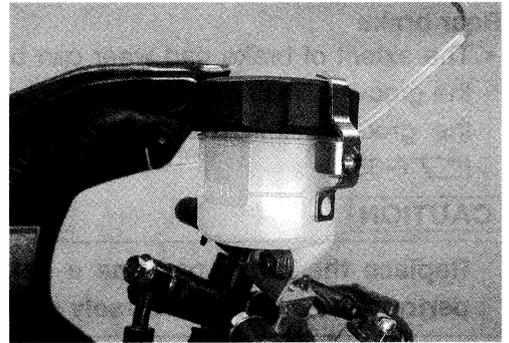
- The extent of brake pad wear can be checked by observing the grooved limit line **A** on the pad. When the wear exceeds the grooved limit line, replace the pads with new ones. (📄 8-56)

### CAUTION

- \* Replace the brake pads as a set, otherwise braking performance will be adversely affected.
- \* In replacing the pad, clean the piston. When reusing the pad, also clean the pad and attach a new tape on it.

### NOTE:

Before installation, degrease and clean the contact portions of pad and piston.

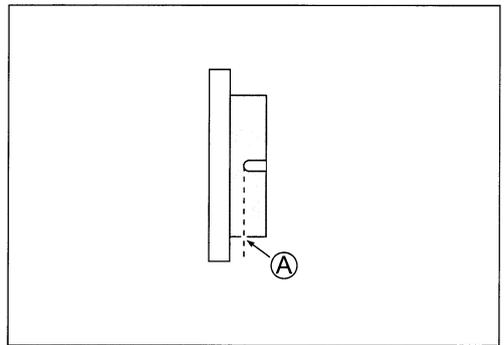
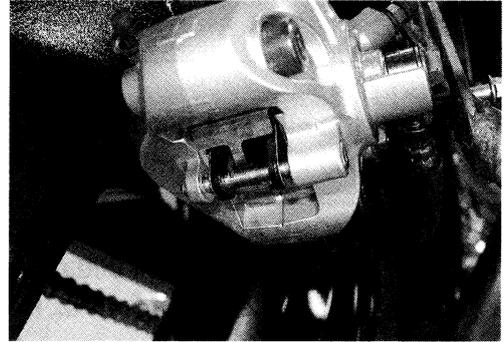


**Rear brake**

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

**CAUTION**

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

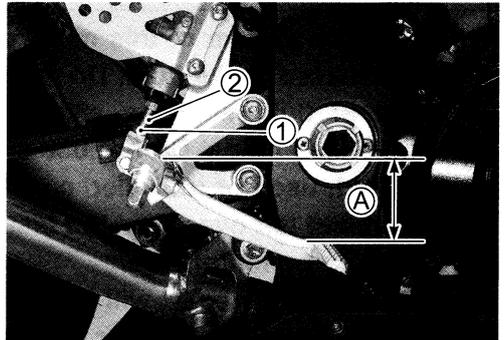


**BRAKE PEDAL HEIGHT**

- Loosen the lock-nut (1).
- Turn the push rod (2) until the brake pedal is 60 – 70 mm (2.4 – 2.8 in) (A) below the top of the footrest.
- Tighten the lock-nut (1) securely.

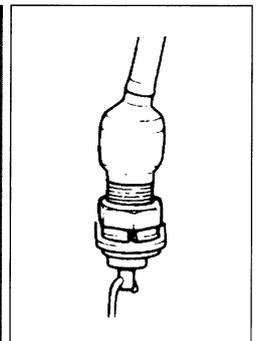
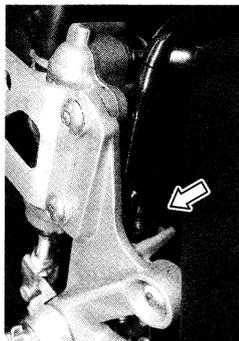
**U Rear brake master cylinder rod lock-nut:**  
18 N·m (1.8 kgf·m, 13.0 lb-ft)

**DATA Brake pedal height (A):**  
Standard: 60 – 70 mm (2.4 – 2.8 in)



**BRAKE LIGHT SWITCH**

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



### AIR BLEEDING FROM BRAKE FLUID CIRCUIT

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

#### FRONT BRAKE

- 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:

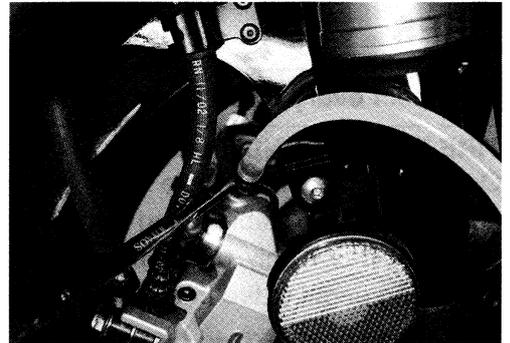
*While bleeding the brake system, replenish the brake fluid in the reservoir as necessary. Make sure that there is always some fluid visible in the reservoir.*

- 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: 8 N·m (0.8 kgf-m, 6.0 lb-ft)**

#### CAUTION

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

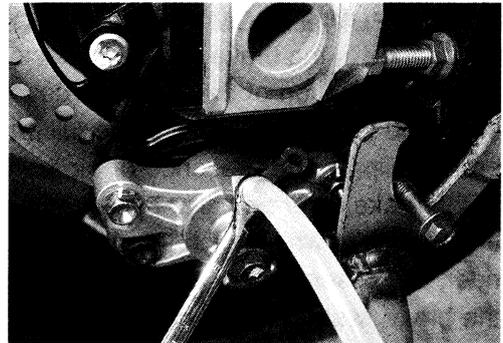


### REAR BRAKE

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

**NOTE:**

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



### TIRES

**Inspect every 6 000 km (4 000 miles, 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.

**TOOL** 09900-20805: Tire depth gauge

**DATA** Tire tread depth:

Service Limit: **FRONT 1.6 mm (0.06 in)**  
**REAR 2.0 mm (0.08 in)**

#### TIRE PRESSURE

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

**DATA** Cold inflation tire pressure

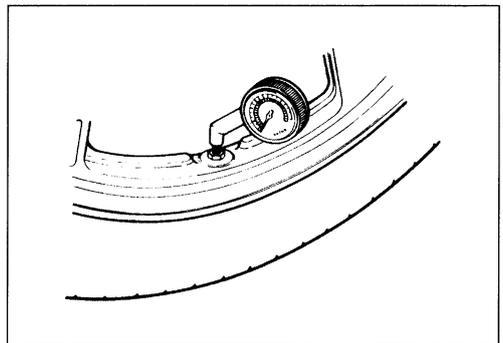
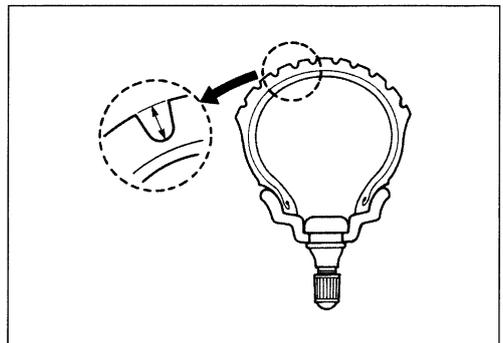
Solo riding: **Front: 250 kPa (2.50 kgf/cm<sup>2</sup>, 36 psi)**  
**Rear: 290 kPa (2.90 kgf/cm<sup>2</sup>, 42 psi)**  
 Dual riding: **Front: 250 kPa (2.50 kgf/cm<sup>2</sup>, 36 psi)**  
**Rear: 290 kPa (2.90 kgf/cm<sup>2</sup>, 42 psi)**

#### CAUTION

The standard tire fitted on this motorcycle is 120/70 ZR17 M/C (58 W) for the front and 190/50 ZR17 M/C (73 W) for the rear. The use of tires other than those specified may cause instability. It is highly recommended to use the specified tires.

**DATA** TIRE TYPE

**BRIDGESTONE (Front: BTO11F F, Rear: BTO12R F)**



## 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. (☞ 8-27)

## FRONT FORK

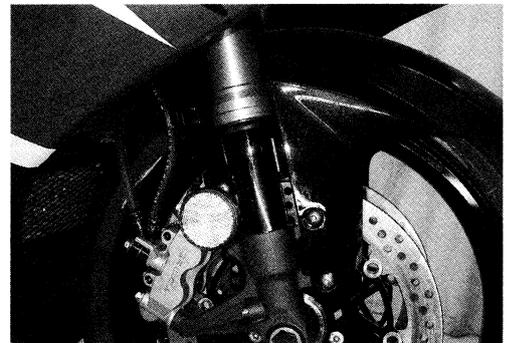
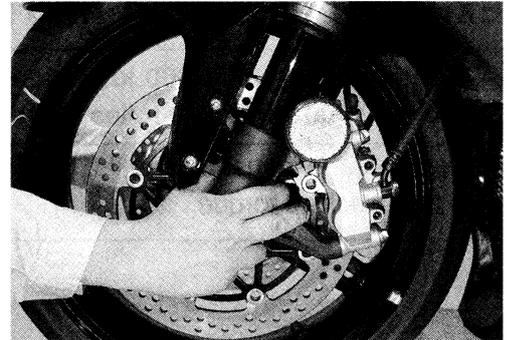
**Inspect every 12 000 km (7 500 miles, 12 months).**

Inspect the front forks for oil leakage, scoring or scratches on the outer surface of the inner tubes. Replace any defective parts, if necessary. (☞ 8-14)

## REAR SUSPENSION

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

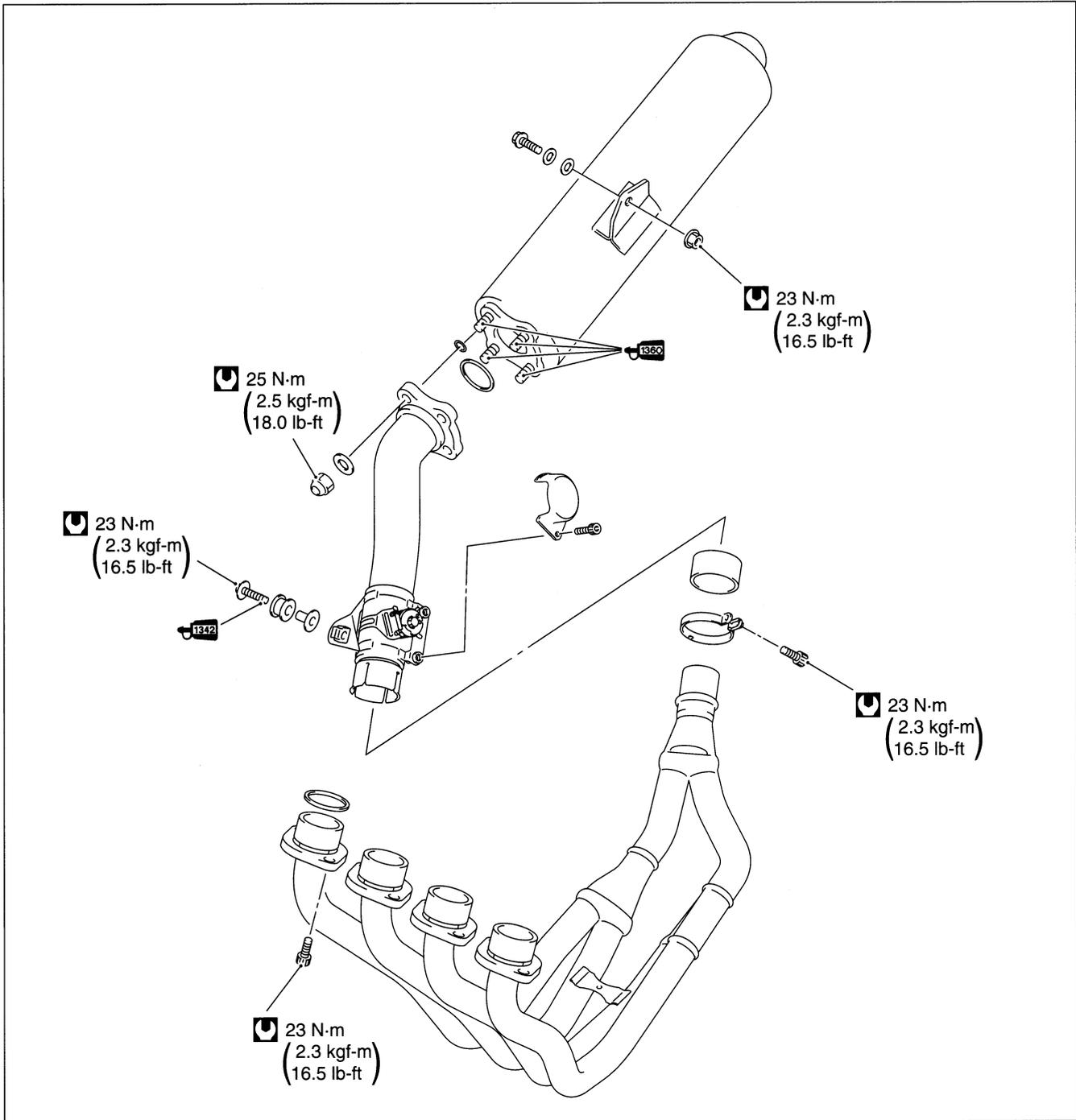
Inspect the rear shock absorbers for oil leakage and check that there is no play in the swingarm. Replace any defective parts if necessary. (☞ 8-45)



## 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, muffler mounting bolt and nut to the specified torque.

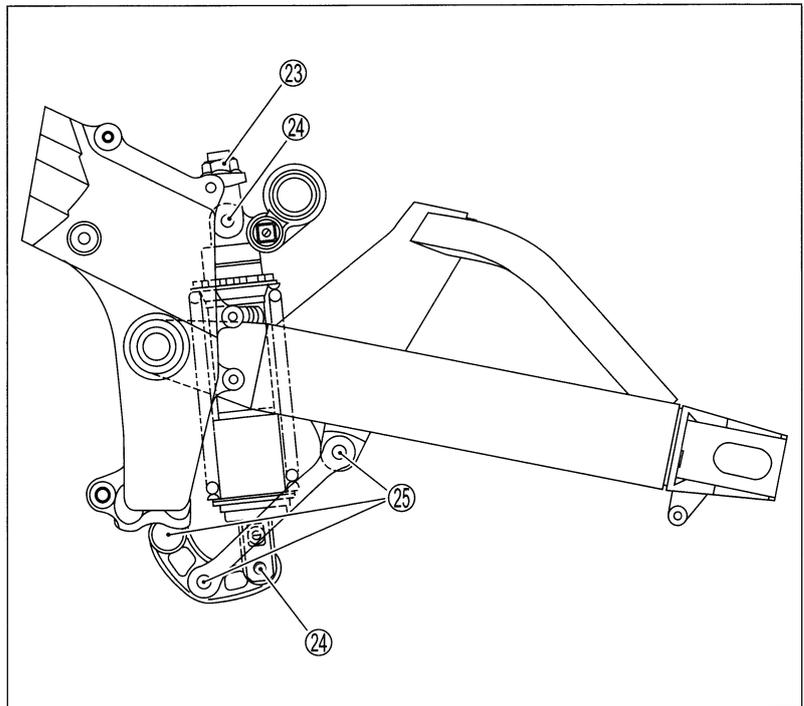
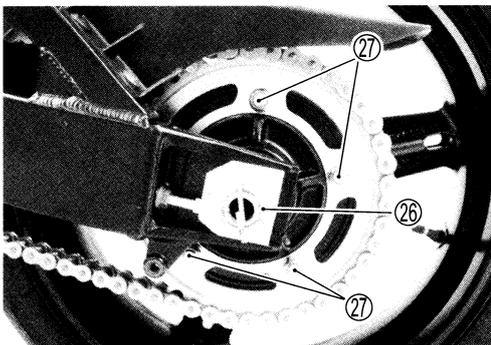
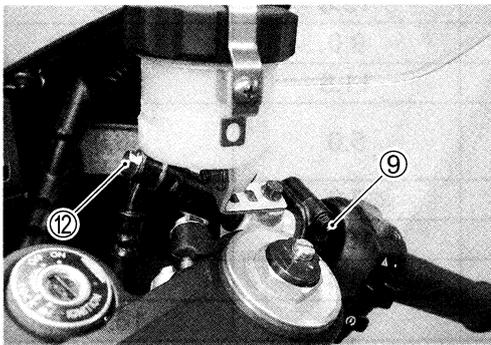
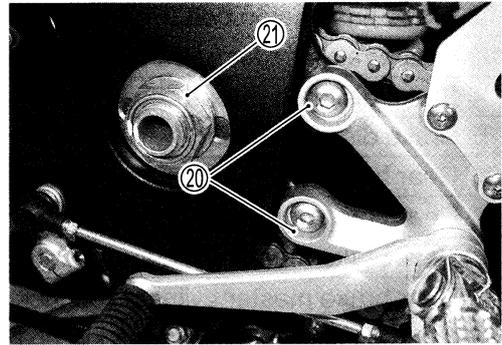
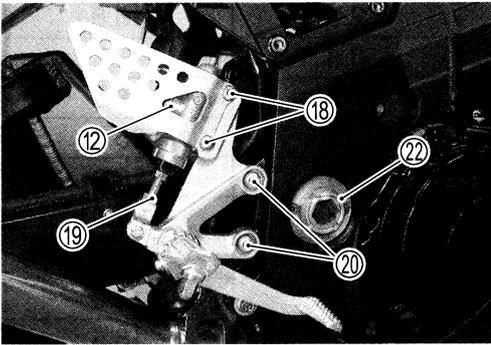
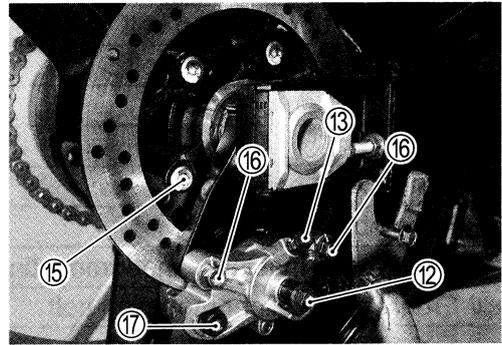
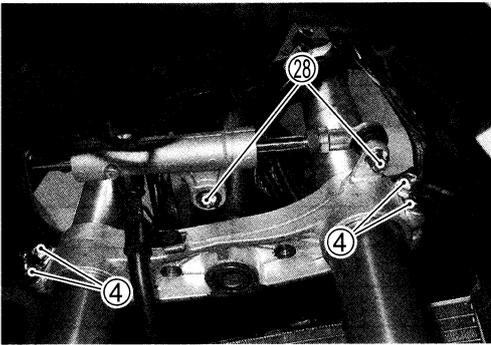
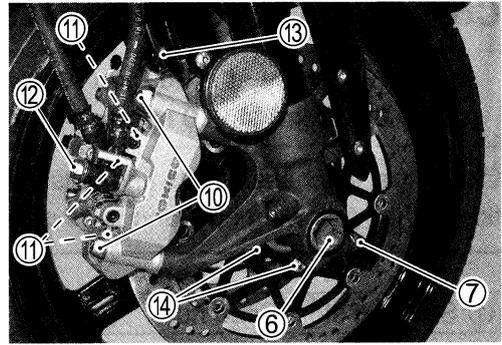
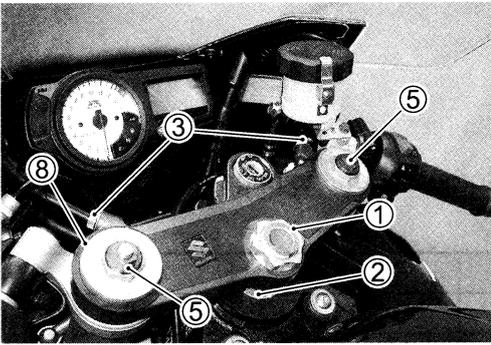


## CHASSIS BOLTS AND NUTS

**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 2-32 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	6.5
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	23	2.3	16.5
⑨ Front brake master cylinder mounting bolt	10	1.0	7.0
⑩ Front brake caliper mounting bolt	39	3.9	28.0
⑪ Front brake caliper housing bolt	22	2.2	16.0
⑫ Brake hose union bolt (Front & Rear)	23	2.3	16.5
⑬ Caliper air bleeder valve (Front & Rear)	8	0.8	6.0
⑭ Brake disc bolt (Front)	23	2.3	16.5
⑮ Brake disc bolt (Rear)	35	3.5	25.5
⑯ Rear brake caliper mounting bolt	25	2.5	18.0
⑰ Rear brake caliper housing bolt	37	3.7	27.0
⑱ Rear brake master cylinder mounting bolt	10	1.0	7.0
⑲ Rear brake master cylinder rod lock nut	18	1.8	13.0
⑳ Front footrest bracket mounting bolt	23	2.3	16.5
㉑ Swingarm pivot nut	100	10.0	72.5
㉒ Swingarm pivot lock nut	90	9.0	65.0
㉓ Rear suspension height adjuster nut	115	11.5	83.0
㉔ Rear shock absorber mounting bolt/nut (Upper & Lower)	50	5.0	36.0
㉕ Rear cushion lever/rod mounting nut	78	7.8	56.5
㉖ Rear axle nut	100	10.0	72.5
㉗ Rear sprocket nut	60	6.0	43.5
㉘ Steering damper bolt/nut	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
1300 – 1700 kPa (13 – 17 kgf/cm <sup>2</sup> ) (185 – 242 psi)	1000 kPa (10 kgf/cm <sup>2</sup> ) (148 psi)	200 kPa (2 kgf/cm <sup>2</sup> ) (28 psi)

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

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

#### Overhaul the engine in the following cases:

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

## COMPRESSION TEST PROCEDURE

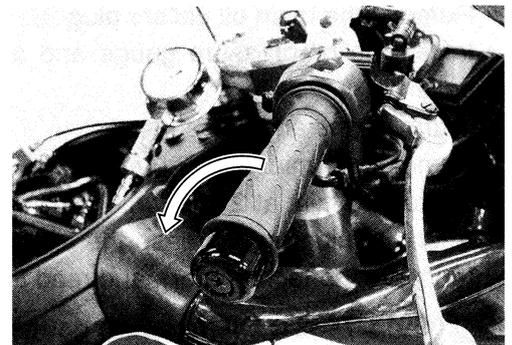
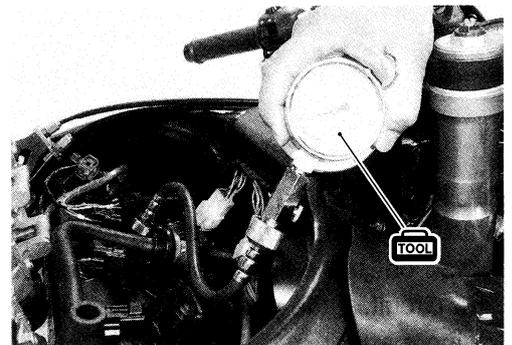
### NOTE:

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

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

- Lift and support the fuel tank. (☞ 5-5)
- Remove all the spark plugs. (☞ 2-6)
- Install the compression gauge and adaptor in the spark plug hole. Make sure that the connection is tight.
- Keep the throttle grip in the fully opened position.
- Press the starter button and crank the engine for a few seconds. Record the maximum gauge reading as the cylinder compression.
- Repeat this procedure with the other cylinders.

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



## OIL PRESSURE CHECK

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

### OIL PRESSURE SPECIFICATION

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

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

#### LOW OIL PRESSURE

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

#### HIGH OIL PRESSURE

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

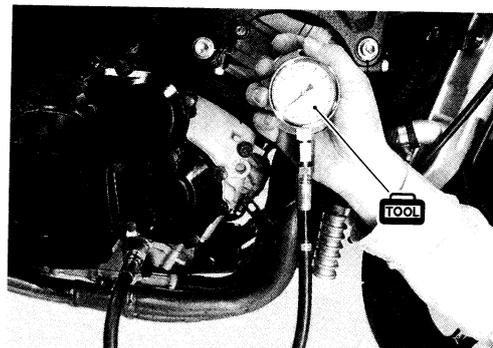
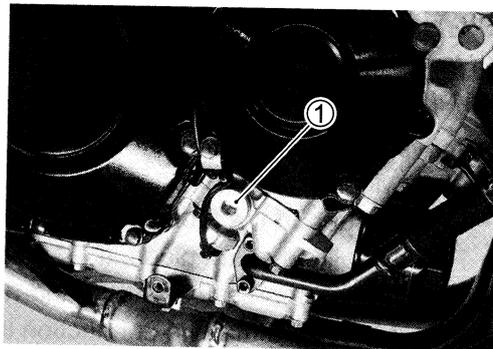
### OIL PRESSURE TEST PROCEDURE

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

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

- TOOL** 09915-74521: Oil pressure gauge hose
- 09915-74540: Oil pressure gauge attachment
- 09915-77331: Meter (for high pressure)

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



# ENGINE

## CONTENTS

<b>ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE</b> .....	<b>3- 2</b>
<b>ENGINE REMOVAL AND INSTALLATION</b> .....	<b>3- 3</b>
<b>ENGINE REMOVAL</b> .....	<b>3- 3</b>
<b>ENGINE INSTALLATION</b> .....	<b>3-10</b>
<b>ENGINE DISASSEMBLY</b> .....	<b>3-15</b>
<b>ENGINE COMPONENTS INSPECTION AND SERVICE</b> .....	<b>3-28</b>
<b>CYLINDER HEAD COVER</b> .....	<b>3-28</b>
<b>PAIR CONTROL VALVE</b> .....	<b>3-29</b>
<b>CAMSHAFT</b> .....	<b>3-29</b>
<b>CAM CHAIN TENSION ADJUSTER</b> .....	<b>3-31</b>
<b>CAM CHAIN TENSIONER</b> .....	<b>3-32</b>
<b>CAM CHAIN GUIDE</b> .....	<b>3-32</b>
<b>CYLINDER HEAD AND VALVE</b> .....	<b>3-32</b>
<b>CLUTCH</b> .....	<b>3-43</b>
<b>OIL PUMP</b> .....	<b>3-44</b>
<b>STARTER CLUTCH</b> .....	<b>3-44</b>
<b>GENERATOR</b> .....	<b>3-44</b>
<b>WATER PUMP</b> .....	<b>3-45</b>
<b>GEARSHIFT SYSTEM</b> .....	<b>3-45</b>
<b>OIL PRESSURE REGULATOR</b> .....	<b>3-46</b>
<b>OIL STRAINER</b> .....	<b>3-46</b>
<b>TRANSMISSION</b> .....	<b>3-47</b>
<b>CYLINDER</b> .....	<b>3-50</b>
<b>PISTON AND PISTON RING</b> .....	<b>3-51</b>
<b>CRANKCASE</b> .....	<b>3-53</b>
<b>BALANCER SHAFT</b> .....	<b>3-60</b>
<b>BALANCER SHAFT JOURNAL BEARING</b> .....	<b>3-60</b>
<b>CRANKSHAFT AND CONROD</b> .....	<b>3-63</b>
<b>CRANKSHAFT JOURNAL BEARING</b> .....	<b>3-67</b>
<b>CRANKSHAFT THRUST BEARING</b> .....	<b>3-70</b>
<b>ENGINE REASSEMBLY</b> .....	<b>3-72</b>

## ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE

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

### ENGINE CENTER

ITEM	REMOVAL	INSPECTION	REINSTALLATION
PAIR valve	 3-28	 3-28	 3-28
Starter motor	 3-15	 9-13	 3-104
Breather cover	 3-24	—	 3-83
Thermostat	 3-17	 7-10	 7-10
Cylinder head cover	 3-15	—	 3-103
Camshaft	 3-16	 3-29	 3-98
Intake pipe	—	—	 3-42
Oil filter	 3-24	—	 3-83
Oil cooler	 3-4	—	 7-19
Oil pan	 3-24	—	 3-82

### ENGINE RIGHT SIDE

ITEM	REMOVAL	INSPECTION	REINSTALLATION
Exhaust pipe and muffler	 3-5	—	 3-14
Cam chain tension adjuster	 3-16	 3-31	 3-101
Clutch cover	 3-18	—	 3-95
Clutch (plates)	 3-18	 3-43	 3-92
Primary driven gear	 3-19	—	 3-92
Oil pump	 3-20	 3-44	 3-91
Gearshift shaft	 3-20	 3-45	 3-91
Starter idle gear cover	 3-21	—	 3-89
Starter idle gear	 3-21	—	 3-88
Starter clutch cover	 3-21	—	 3-89
Starter clutch	 3-22	 3-44	 3-87
CKP sensor	 3-22	 4-28	 3-86
Oil pump driven gear	 3-20	—	 3-91
Cam chain tensioner	 3-22	 3-32	 3-87
Cam chain guide	 3-22	 3-32	 3-87

### ENGINE LEFT SIDE

ITEM	REMOVAL	INSPECTION	REINSTALLATION
Engine sprocket	 3-8	—	 3-13
Gear position switch	 3-24	 4-50	 3-84
Generator (cover)	 3-23	 3-44	 3-86
Generator rotor	 3-23	—	 3-85
Water pump	 3-23	 7-14	 3-85

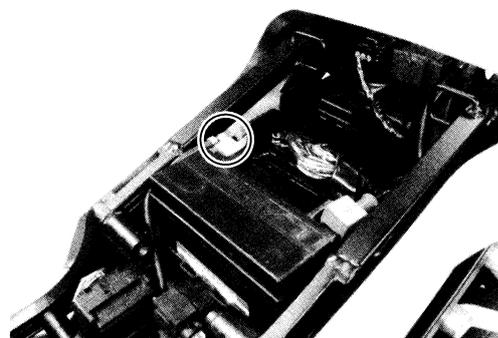
## ENGINE REMOVAL AND INSTALLATION

### ENGINE REMOVAL

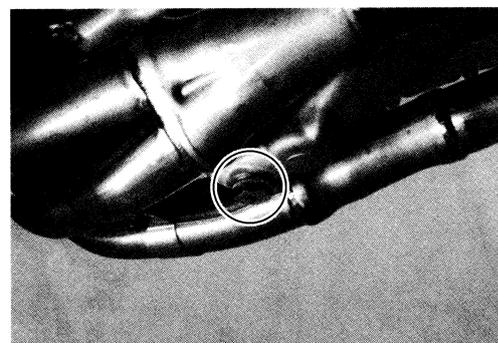
Before taking the engine out of the frame, wash the engine using a steam cleaner. Engine removal is sequentially explained in the following steps. Reinstall the engine by reversing the removal procedure.

- Remove the under cowlings. (☞ 8-3)
- Remove the front and rear seats (seat tail cover). (☞ 8-6)
- Lift and support the fuel tank with the prop stay. (☞ 5-5)

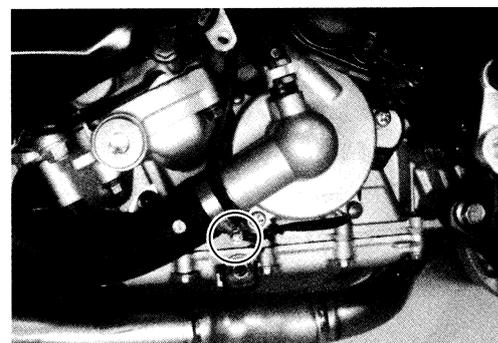
- Disconnect the battery ⊖ lead wire.



- Drain engine oil. (☞ 2-13)



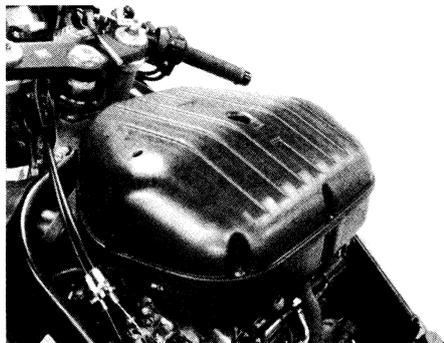
- Drain engine coolant. (☞ 2-19)



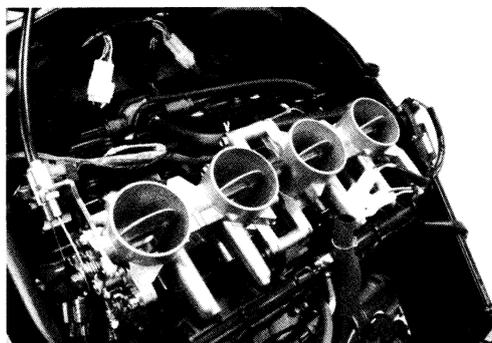
## 3-4 ENGINE

---

- Remove the air cleaner box. (📄 5-15)

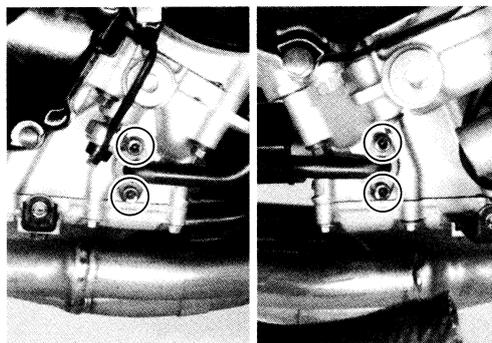


- Remove the throttle body. (📄 5-16)

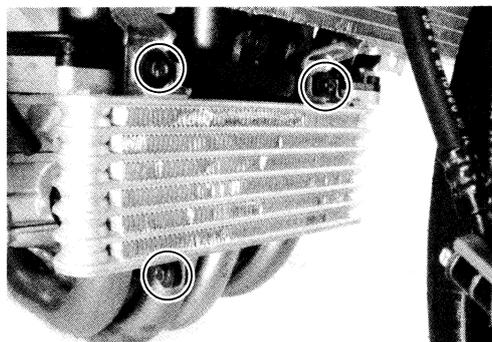


### OIL COOLER

- Remove the oil cooler pipes.

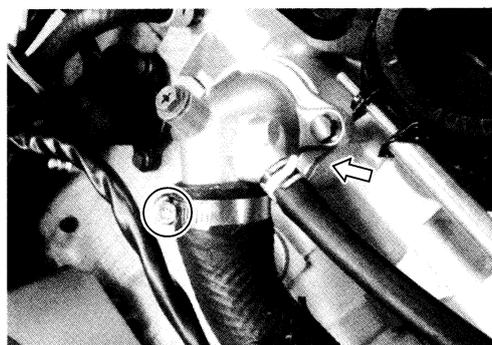


- Remove the oil cooler.

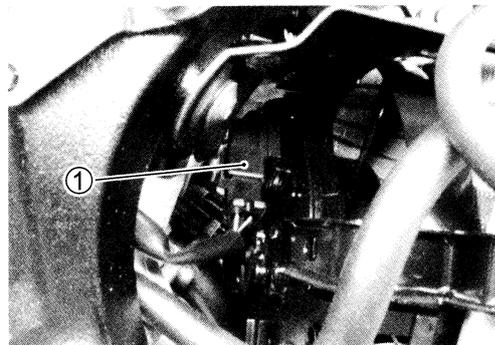


### RADIATOR

- Disconnect the reservoir inlet hoses.



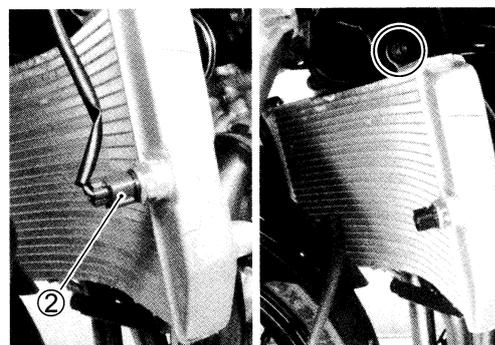
- Disconnect the cooling fan coupler ①.



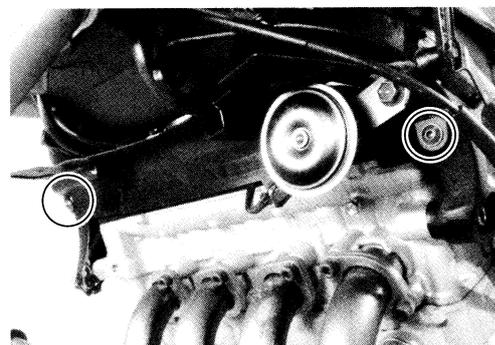
- Disconnect the cooling fan thermo-switch coupler ②.
- Remove the radiator mounting bolts.
- Remove the radiator.

**CAUTION**

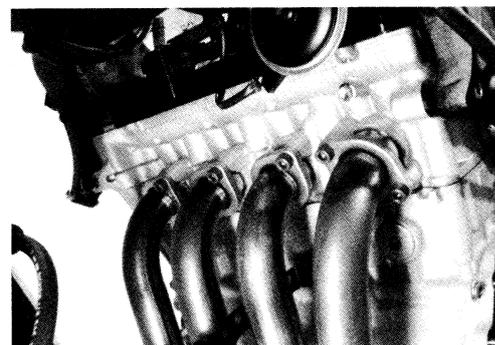
Be careful not to bent the radiator fin.



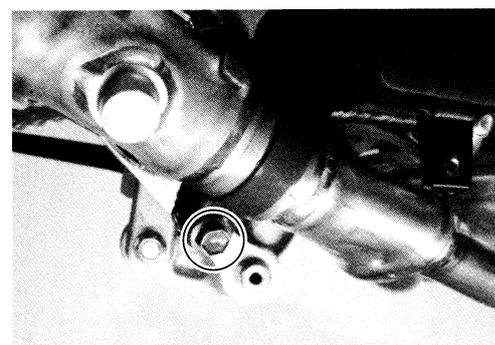
- Remove the front engine cover.

**EXHAUST PIPE AND MUFFLER**

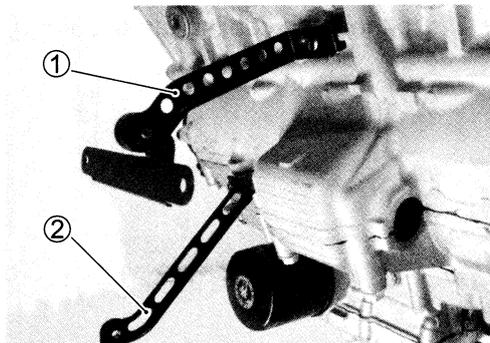
- Remove the exhaust pipe bolts.



- With the muffler connecting bolt loosened, remove the exhaust pipe.

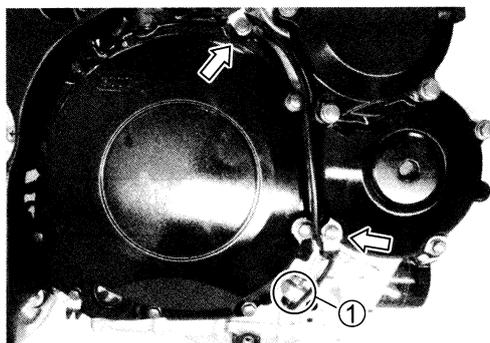


- Remove the radiator mounting bracket ① and the oil cooler mounting bracket ②.

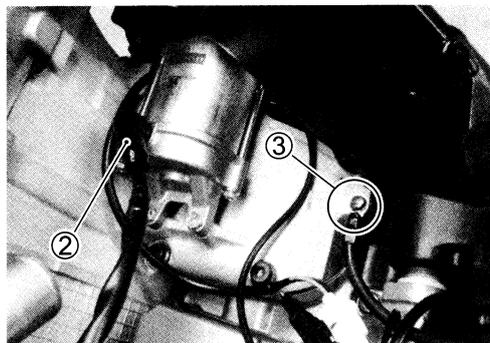


### ELECTRIC PARTS

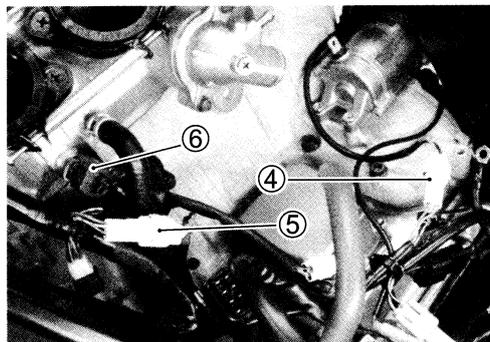
- Disconnect the oil pressure switch lead wire ① and remove it from the clamps.



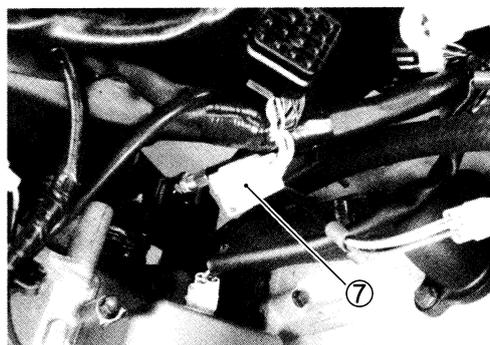
- Disconnect the starter motor lead wire ②.
- Disconnect the ground lead wire ③.



- Disconnect the crankshaft position sensor coupler ④.
- Disconnect the gear position switch coupler ⑤.
- Disconnect the ECT sensor coupler ⑥.



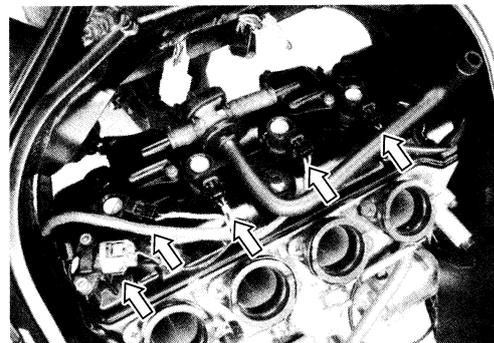
- Disconnect the generator coupler ⑦.



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

**CAUTION**

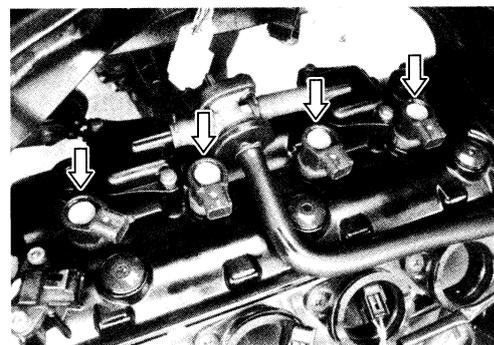
**Do not remove the ignition coil/plug cap before disconnecting its coupler.**



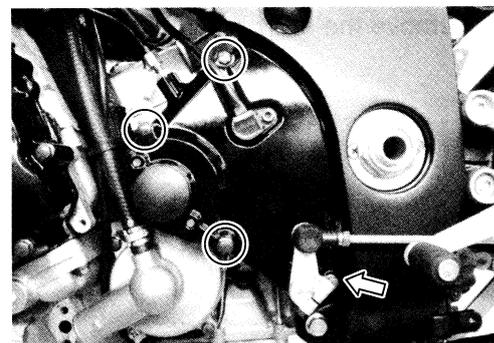
- Remove the ignition coils/plug caps.

**CAUTION**

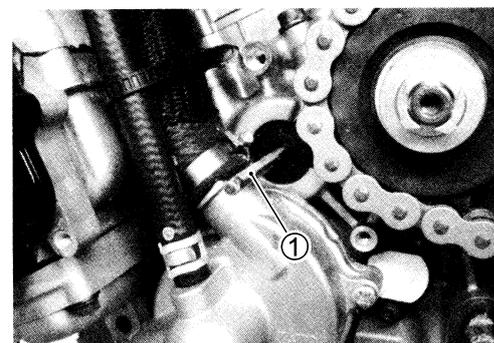
\* **Do not pry up the ignition coil/plug cap with a screw driver or a bar to avoid its damage.**  
 \* **Be careful not to drop the ignition coil/plug cap to prevent its short or open circuit.**

**ENGINE SPROCKET AND GEAR SHIFT LEVER**

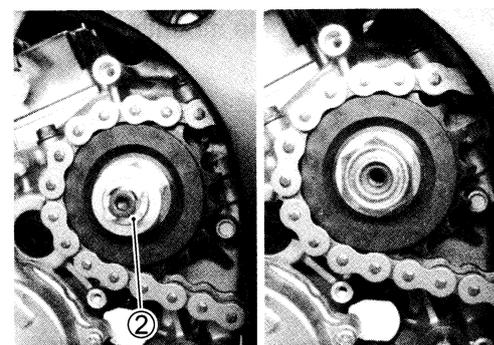
- Remove the gearshift lever.
- Remove the engine sprocket cover.



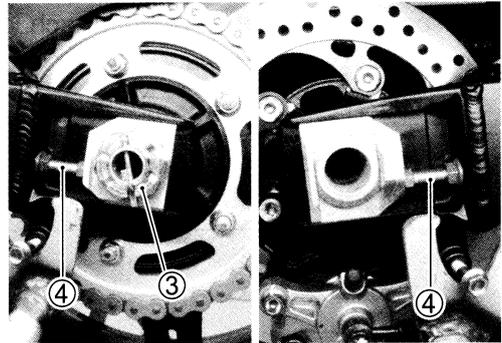
- Remove the clutch push rod ①.



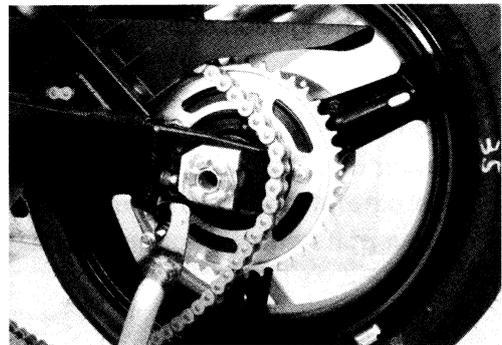
- Remove the speed sensor rotor ②.
- Remove the engine sprocket nut and the washer.



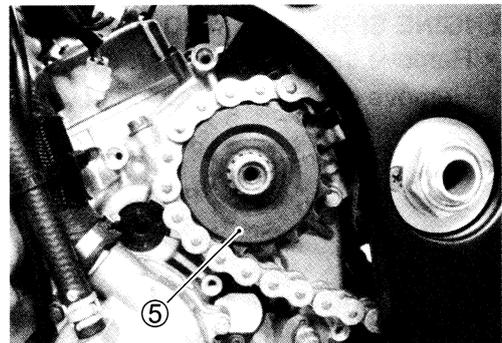
- Remove the cotter pin. (For E-03, 28, 33)
- Loosen the rear axle nut ③.
- Loosen the left and right chain adjusters ④.



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

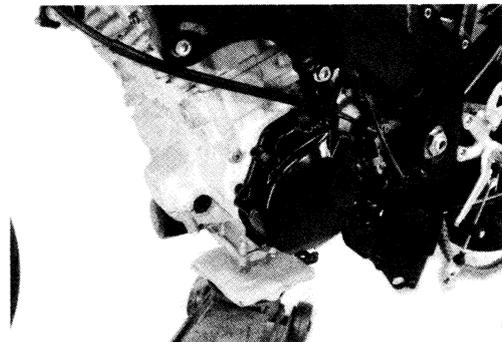


- Remove the engine sprocket ⑤.

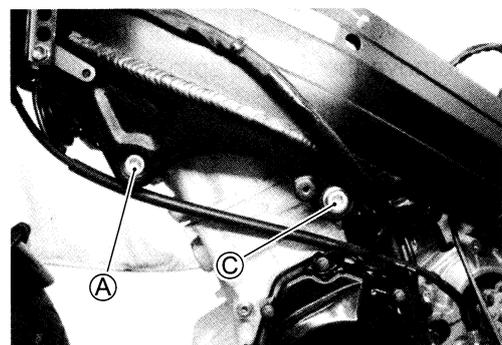


### ENGINE MOUNTING

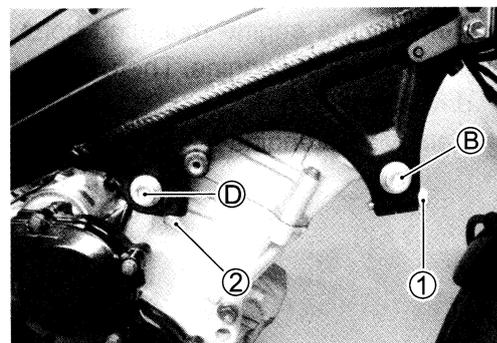
- Support the engine using an engine jack.



- Remove the engine mounting bolts (A) and (C).

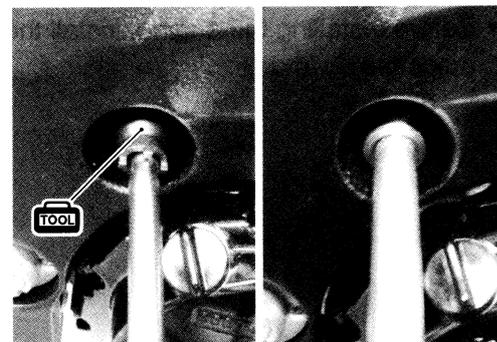
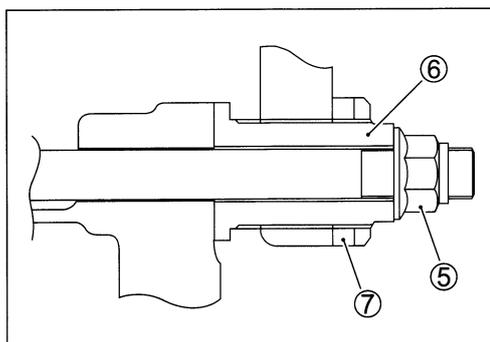
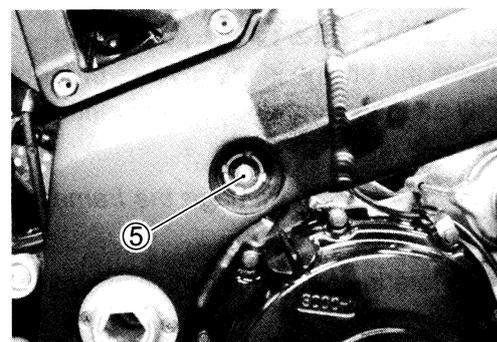


- Loosen the engine mounting pinch bolts ① and ②.
- Remove the engine mounting bolts ③ and ④.



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

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

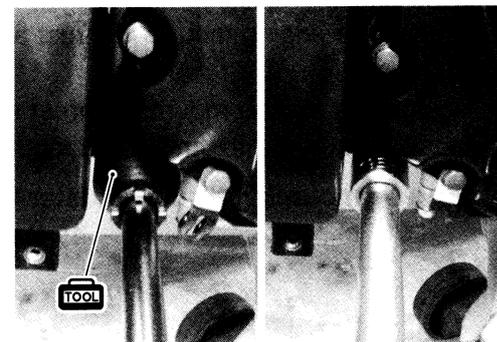
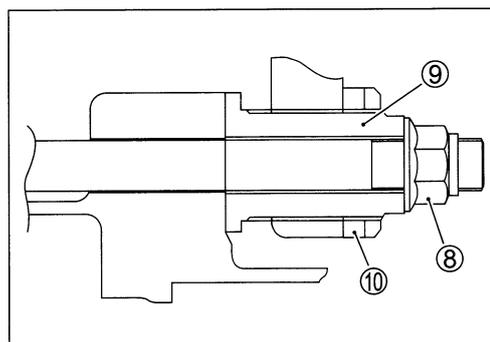
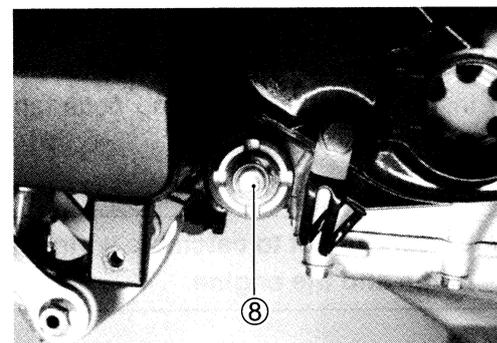


- Remove the engine mounting nut ⑧.
- Loosen the engine mounting thrust adjuster lock-nut ⑩ with the special tool.
- Loosen the engine mounting thrust adjuster ⑨.

**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.

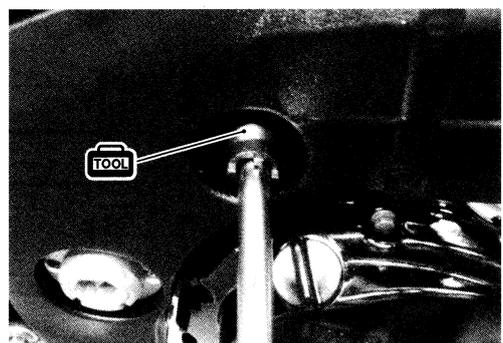
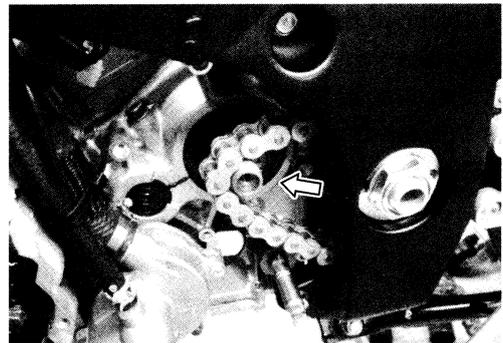
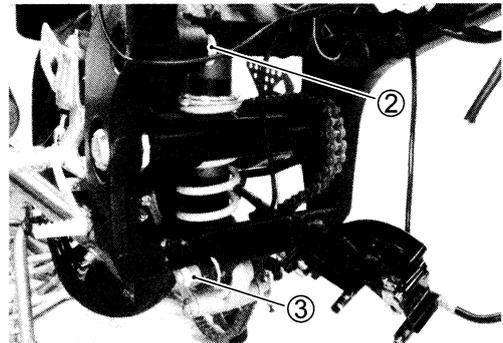
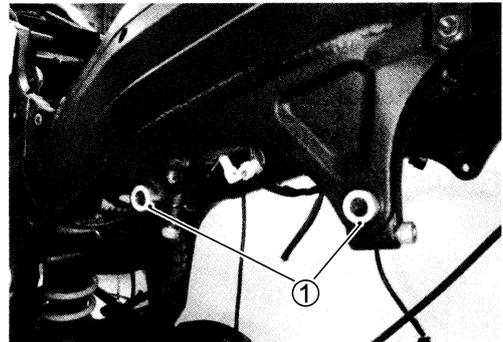
- Before installing the engine, install the spacer ①.
- Before installing the engine, install the engine mounting thrust adjusters ② and ③.
- Gradually raise the rear side of the engine assembly, and then put the drive chain on the driveshaft.
- Install all engine mounting bolts, spacers and tighten them temporarily. (☞ 3-12)

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

**🔧 Engine mounting thrust adjuster lock-nut:**  
 45 N·m (4.5 kgf-m, 32.5 lb-ft)

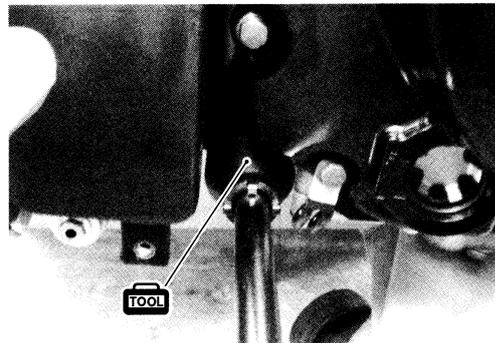


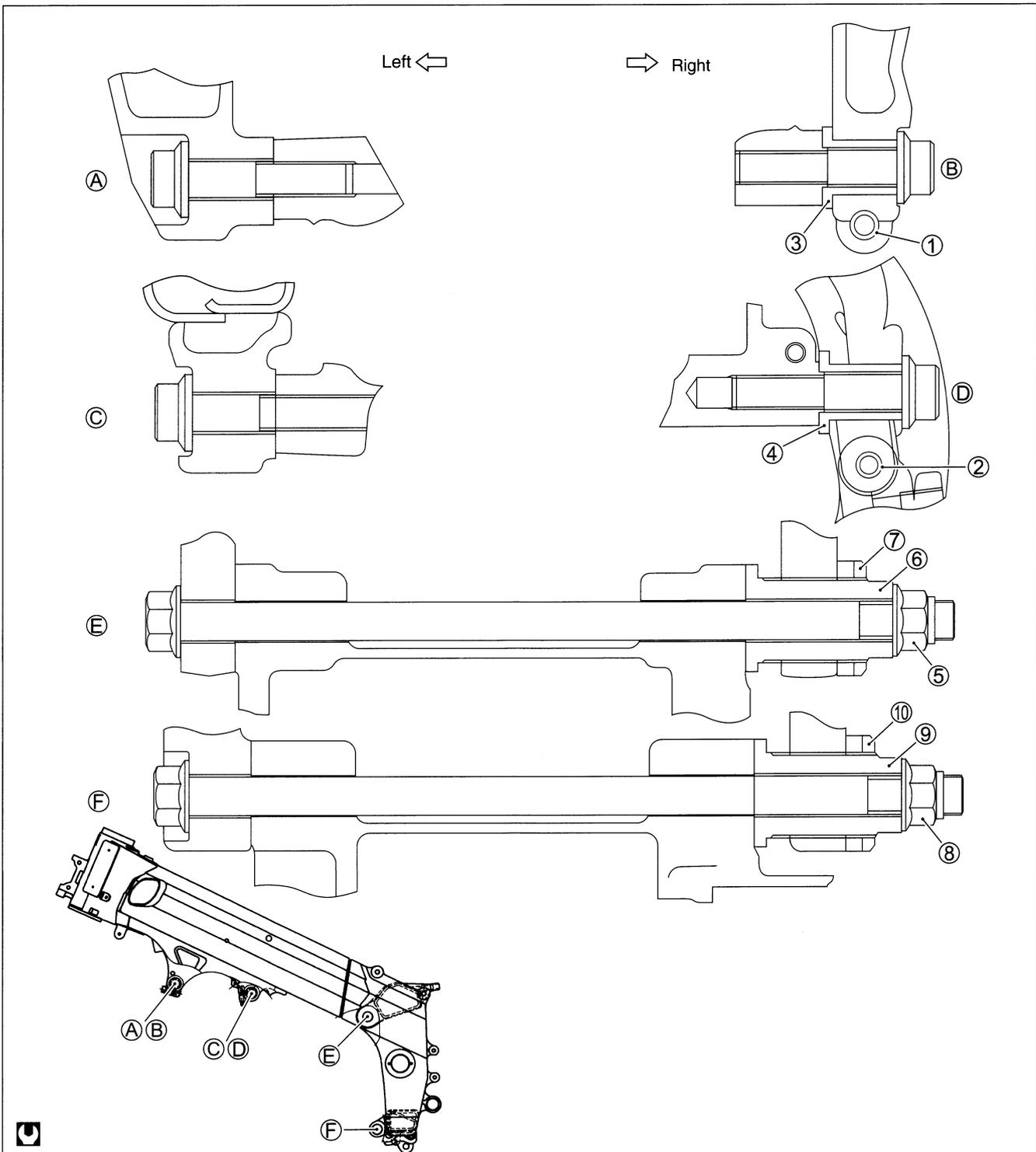
- Tighten all engine mounting bolts and nuts to the specified torque. (☞ 3-12)

**NOTE:**

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

- Tighten the engine mounting pinch bolt to the specified torque. (☞ 3-12)





ITEM	N-m	kgf-m	lb-ft
A B C D	55	5.5	39.8
5 8	75	7.5	54.0
1 2	23	2.3	16.5
6 9	23	2.3	16.5
7 10	45	4.5	32.5

**LENGTH**

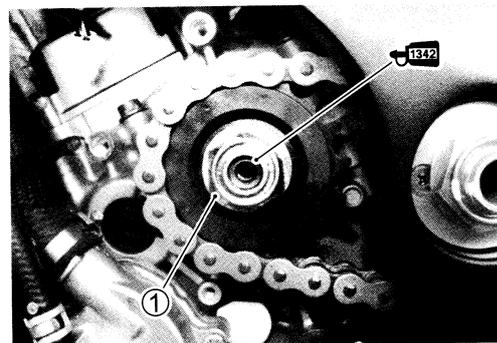
ITEM		mm	in
Bolt	A C	45	1.77
	B D	55	2.17
	E F	215	8.46
Spacer	3 4	30.5	1.20
Adjuster	6 9	40	1.57

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

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

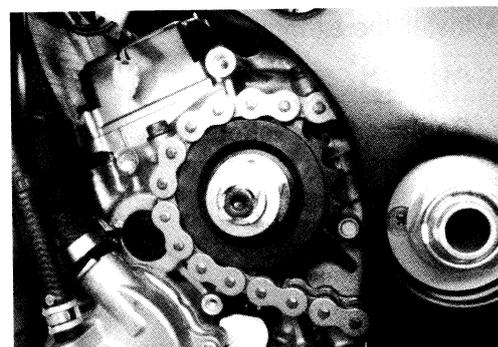
- Tighten the engine sprocket nut ① to the specified torque.

**Engine sprocket nut: 115 N·m (11.5 kgf-m, 83.2 lb-ft)**



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

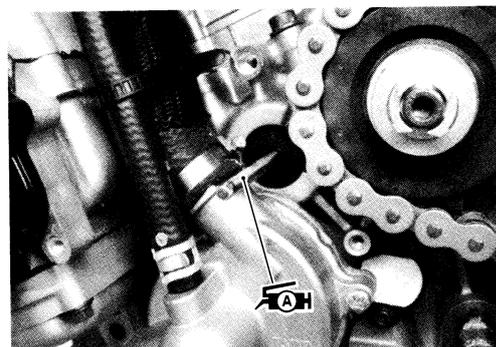
**Speed sensor rotor bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)**



- Apply SUZUKI SUPER GREASE to the clutch push rod and install it.

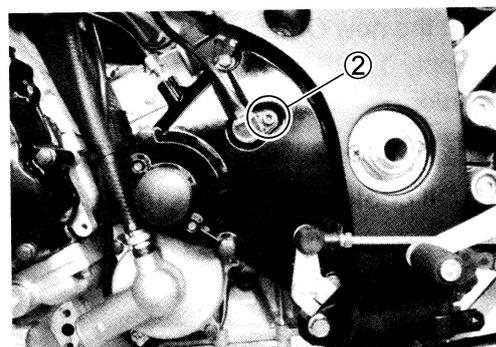
**AH 99000-25030: SUZUKI SUPER GREASE "A" (USA)**  
**99000-25010: SUZUKI SUPER GREASE "A" (Others)**

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

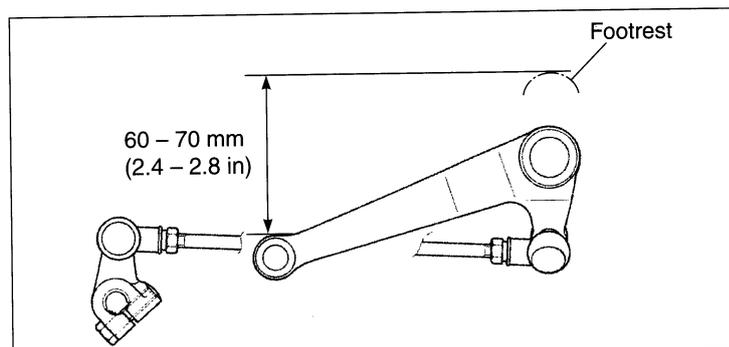


- Tighten the speed sensor bolt ② to the specified torque.

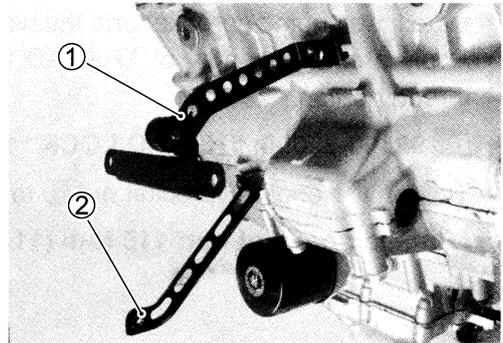
**Speed sensor bolt: 4.5 N·m (0.45 kgf-m, 3.0 lb-ft)**



- Install the engine sprocket cover and the gearshift lever.



- Install the radiator mounting bracket ① and oil cooler bracket ②.



- Install the exhaust pipe.

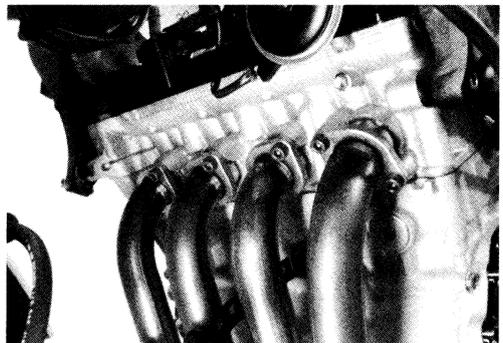
**CAUTION**

Replace the gaskets with new ones.

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



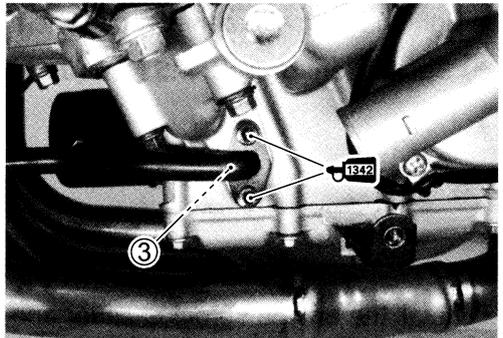
- 🔧 Muffler connecting bolt: 23 N·m (2.3 kgf·m, 16.5 lb-ft)



- Fit the new O-ring ③.
- Apply THREAD LOCK to the bolts, install the oil cooler pipe union.

🔧 1342 99000-32050: THREAD LOCK "1342"

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



- Perform service and adjustment in the following items.
  - \* Engine oil (📄 2-14)
  - \* Engine coolant (📄 2-19)
  - \* Throttle cable play (📄 2-17)
  - \* Clutch (📄 2-18)
  - \* Idling adjustment (📄 2-15)
  - \* Throttle valve synchronization (📄 5-25)
  - \* Drive chain slack (📄 2-22)
  - \* Wiring harness, cables and hoses (📄 10-14)

## ENGINE DISASSEMBLY

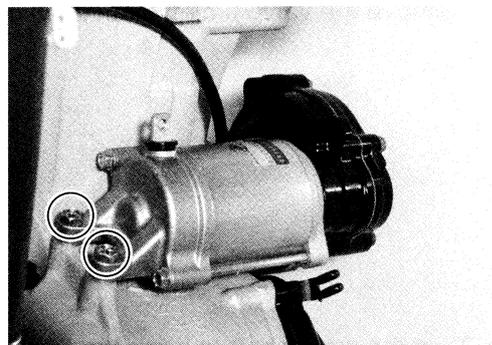
### CAUTION

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. (☞ 2-6)

### STARTER MOTOR

- Remove the starter motor.



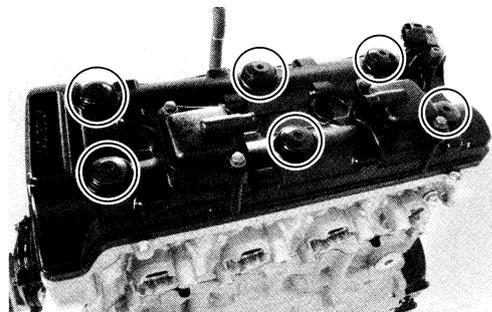
### PAIR CONTROL VALVE

- Remove the PAIR control valve ①.

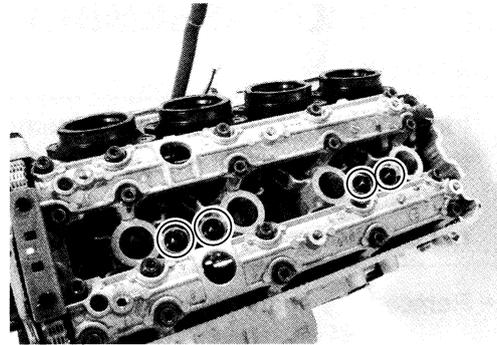


### CYLINDER HEAD COVER

- Remove the cylinder head cover and its gaskets.

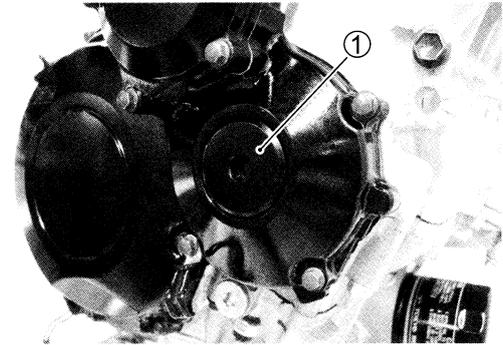


- Remove the dowel pins and O-rings.

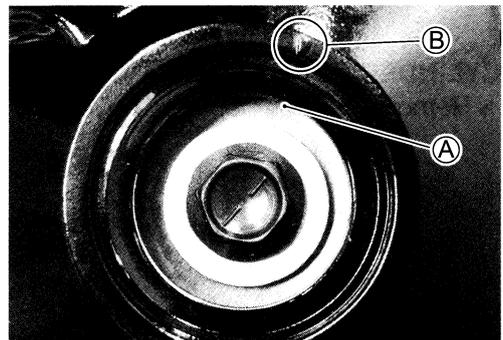
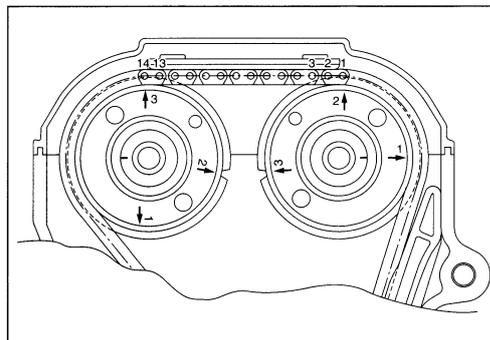
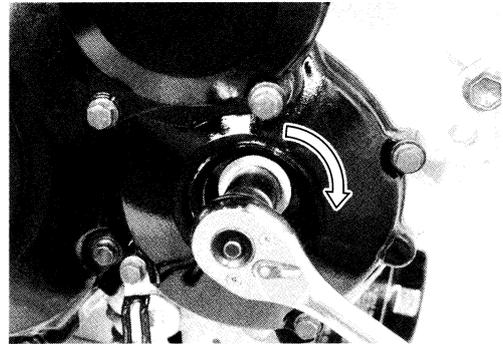


### CAMSHAFTS

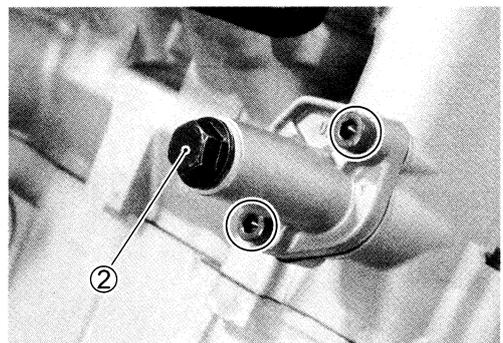
- Remove the valve timing inspection cap ①.



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



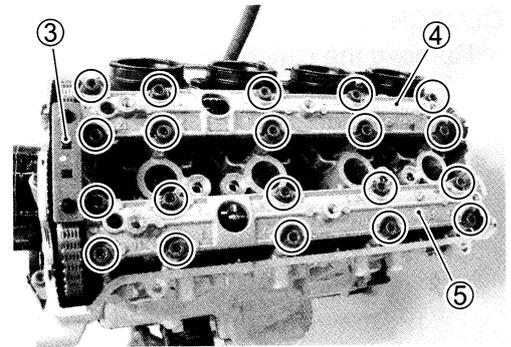
- Remove the cam chain tension adjuster cap bolt ②.
- Remove the cam chain tension adjuster with the spring and ball.



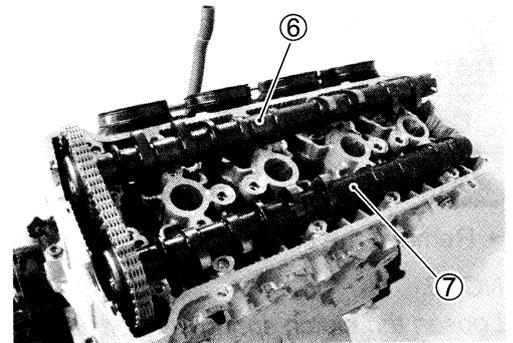
- Remove the cam chain guide ③.
- Remove the intake camshaft journal holder ④.
- Remove the exhaust camshaft journal holder ⑤.
- Remove the dowel pins.

**CAUTION**

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



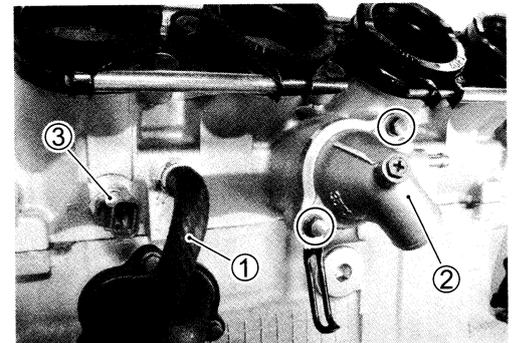
- Remove the intake camshaft ⑥.
- Remove the exhaust camshaft ⑦.

**CYLINDER HEAD**

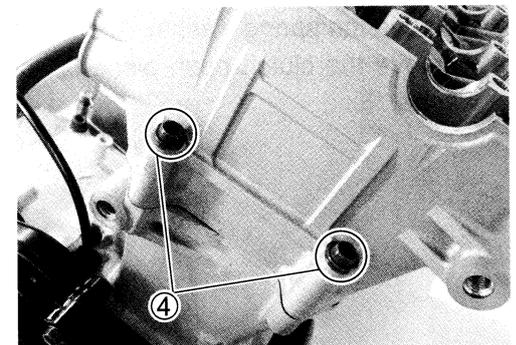
- Remove the water hose ①.
- Remove the thermostat cover ② and thermostat.

**THERMOSTAT INSPECTION (7-10)**

- Remove the ECT sensor ③.

**ECT SENSOR INSPECTION (7-8)**

- Remove the cylinder head bolts (M6) ④.

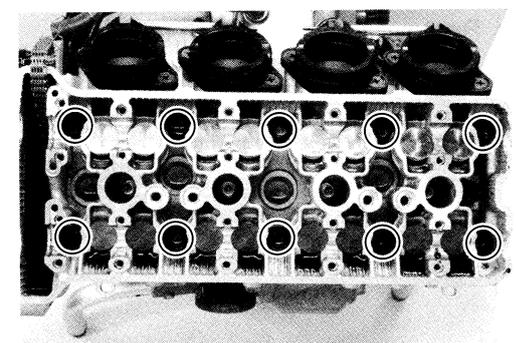


- Remove the cylinder head bolts and washers.

**NOTE:**

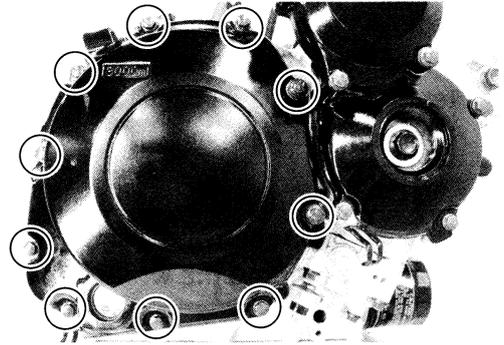
When loosening the cylinder head bolts, loosen each bolt little by little diagonally.

- Remove the cylinder head.



### CLUTCH

- Remove the clutch cover.



- Hold the clutch housing with the special tool.

#### CAUTION

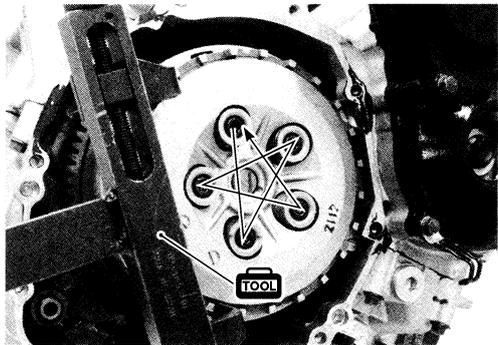
Do not damage the clutch plates by the special tool.

**TOOL** 09920-53740: Clutch sleeve hub holder

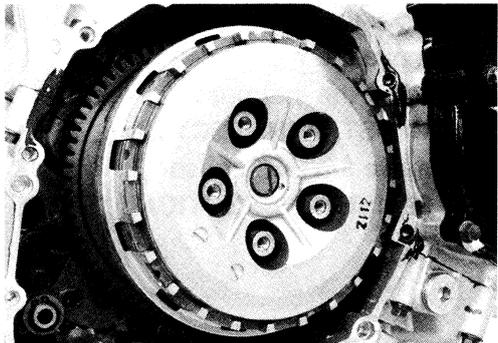
- Remove the clutch springs.

#### NOTE:

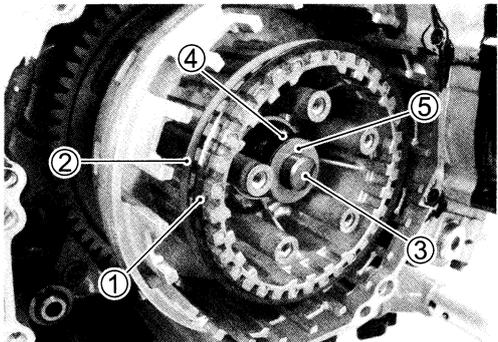
Loosen the clutch spring set bolts little by little and diagonally.



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



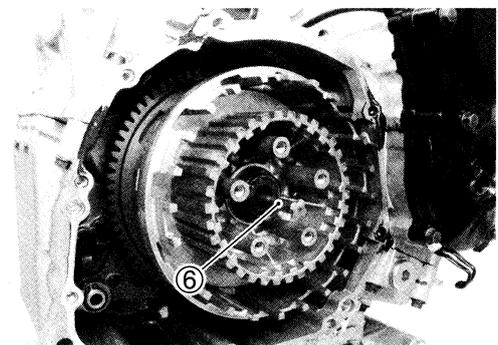
- Remove the spring washer ① and washer ②.
- Remove the clutch push piece ③, bearing ④ and the thrust washer ⑤.



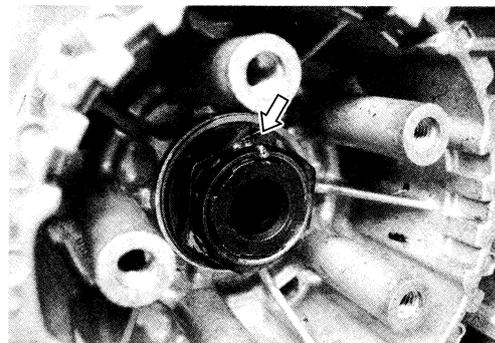
- Remove the clutch push rod ⑥.

#### NOTE:

If it is difficult to pull out the push rod ⑥, use a magnetic hand or a wire.



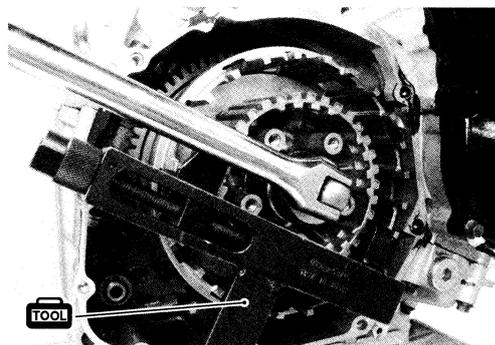
- Unlock the clutch sleeve hub nut.



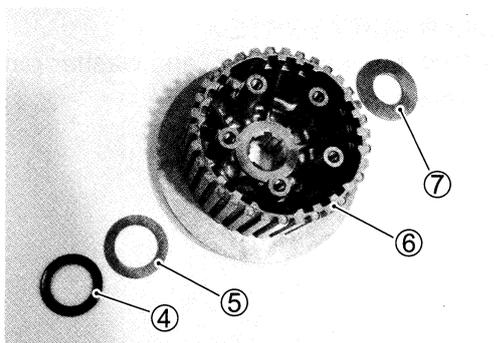
- Hold the clutch sleeve hub with the special tool.

**TOOL** 09920-53740: Clutch sleeve hub holder

- Remove the clutch sleeve hub nut.



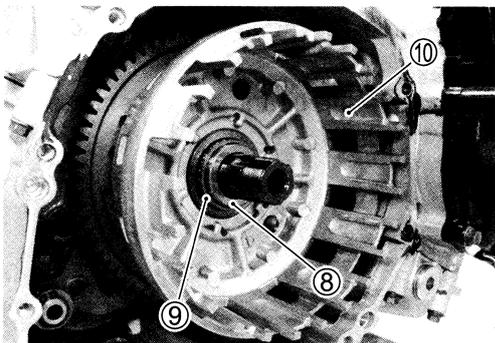
- Remove the concaved washer ④, washer ⑤, clutch sleeve hub ⑥ and washer ⑦.



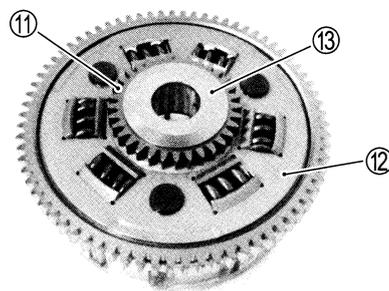
- Remove the spacer ⑧ and bearing ⑨.
- Remove the primary driven gear assembly ⑩.

**NOTE:**

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



- Remove the oil pump drive gear ⑪ from the primary driven gear assembly ⑫.
- Remove the thrust washer ⑬.

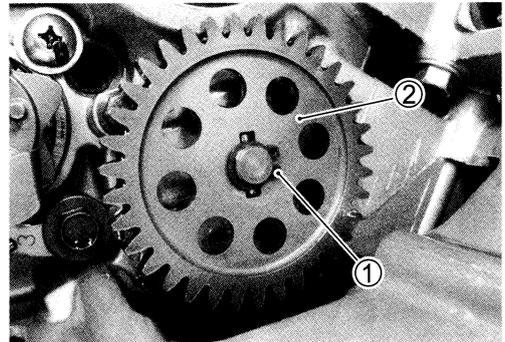


**OIL PUMP**

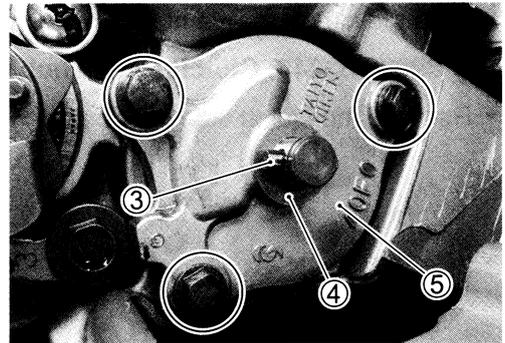
- Remove the snap ring ①.
- Remove the oil pump driven gear ②.

**NOTE:**

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

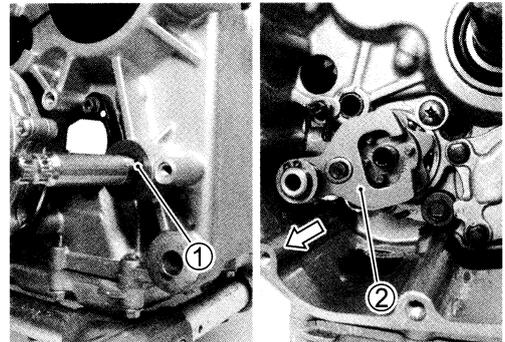


- Remove the pin ③ and the washer ④.
- Remove the oil pump ⑤.

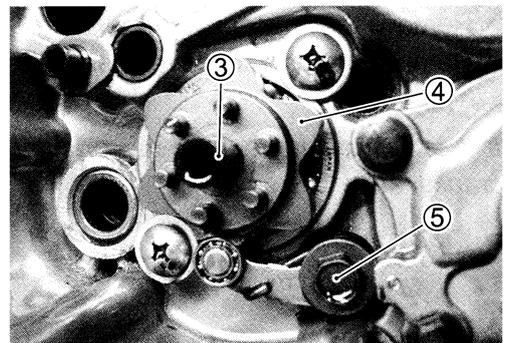


**GEAR SHIFT SYSTEM**

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

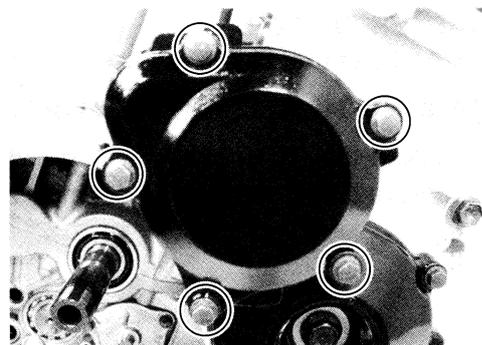


- Remove the gearshift cam plate bolt ③ and gearshift cam plate ④.
- Remove the gearshift cam stopper ⑤.

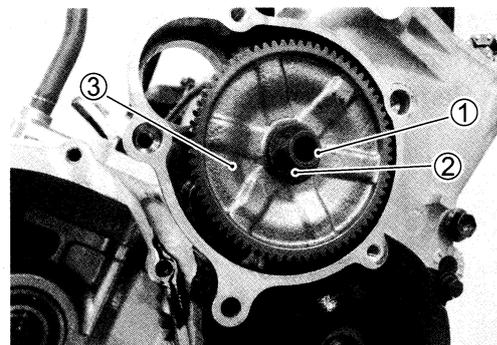


**STARTER IDLE GEAR**

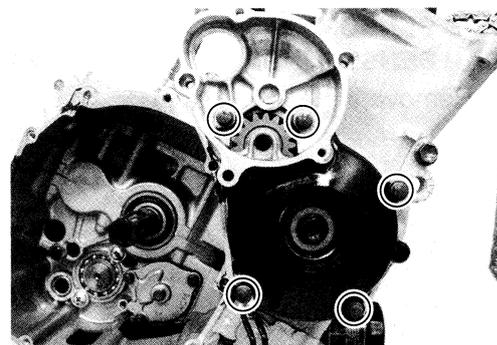
- Remove the starter idle gear cover.
- Remove the dowel pins and gasket.



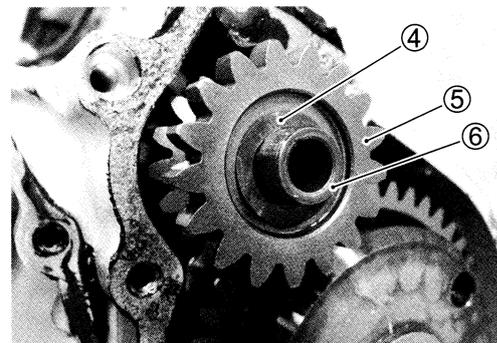
- Remove the shaft ①, washer ②, starter idle gear No.1 ③, concaved washer, bearing and washer.



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



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

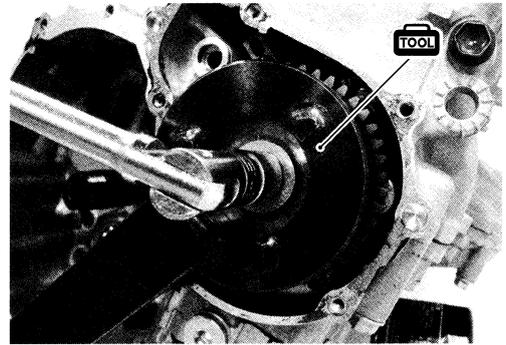


### STARTER CLUTCH

- Hold the starter clutch with the special tool.

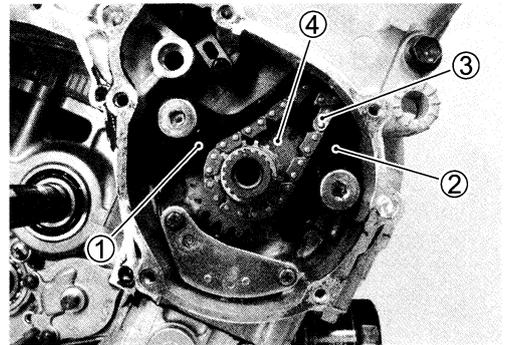
**TOOL** 09920-34830: Starter clutch holder

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



### CAM CHAIN, CAM CHAIN TENSIONER, CAM CHAIN GUIDE

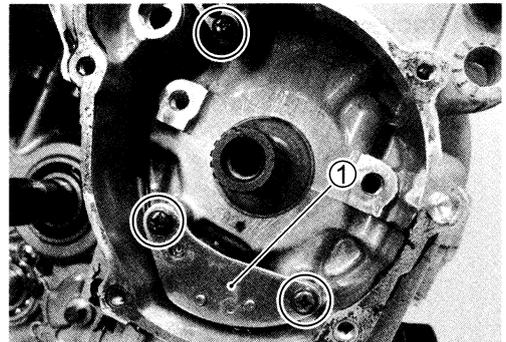
- Remove the cam chain tensioner ① and cam chain guide ②.
- Remove the cam chain ③ and cam chain drive sprocket ④.



### CKP SENSOR

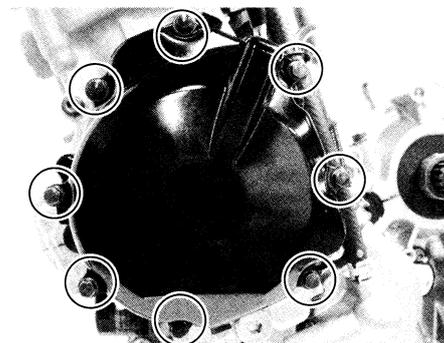
#### CKP SENSOR INSPECTION (☞ 4-28)

- Remove the CKP sensor ①.



**GENERATOR COVER**

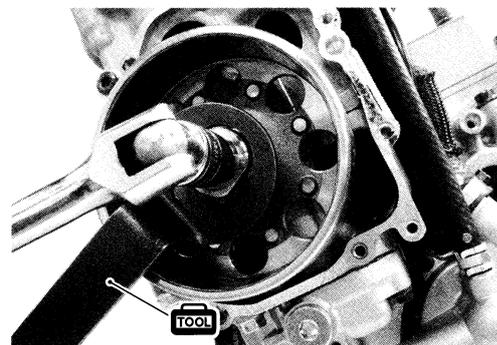
- Remove the generator cover.

**GENERATOR ROTOR**

- Hold the generator rotor with the special tool.

**TOOL** 09930-44520: Rotor holder

- Remove the generator rotor bolt.

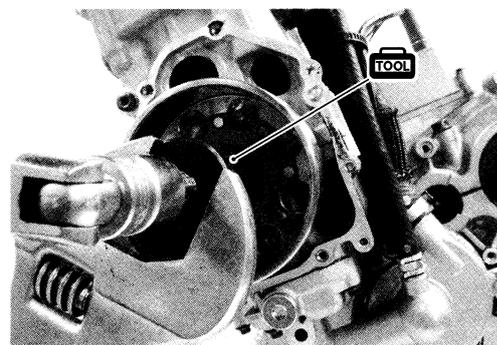
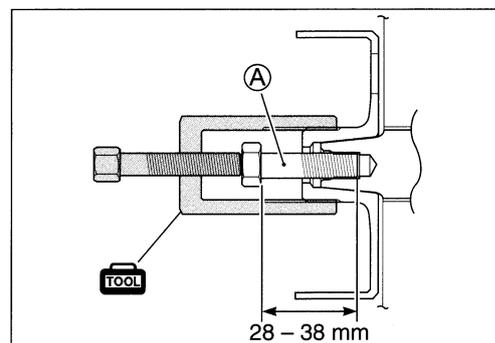


- Install a bolt (A) of suitable size to the left end of crankshaft.

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

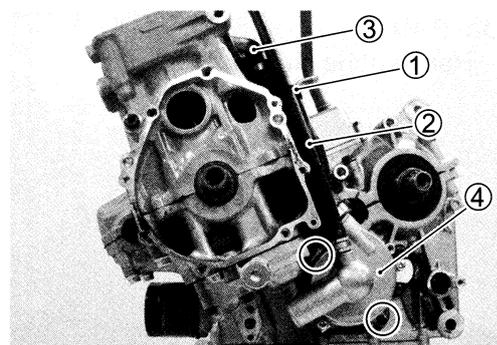
- Remove the generator rotor with the special tool.

**TOOL** 09930-34980: Rotor remover

**WATER PUMP**

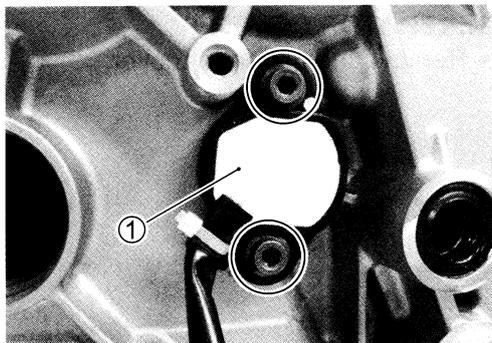
- Disconnect the clamp ①.
- Remove the water hose ② and inlet cover ③.
- Remove the water pump ④.

**WATER PUMP SERVICING (7-11)**

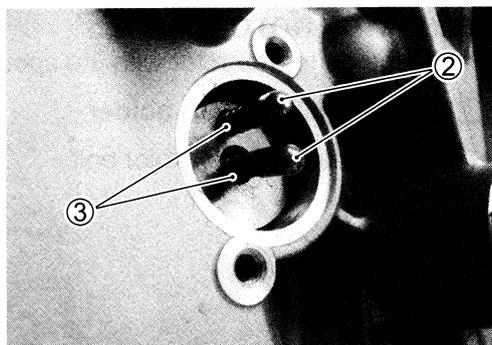


### GEAR POSITION SWITCH

- Remove the gear position switch ①.

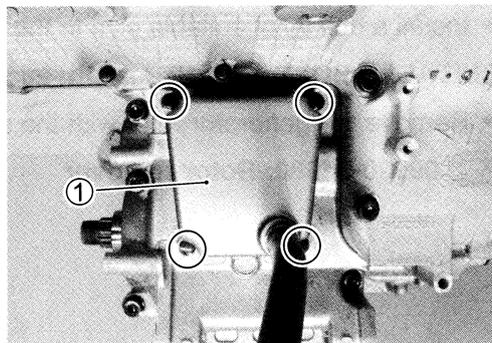


- Remove the switch contacts ② and springs ③.



### BREATHER COVER

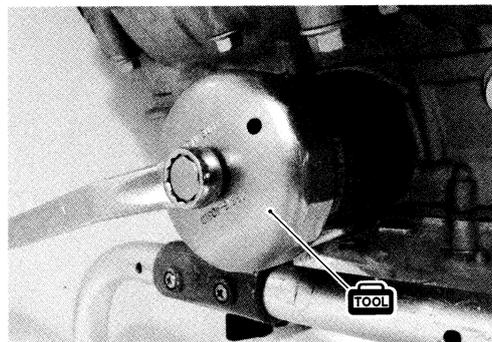
- Remove the breather cover ①.



### OIL FILTER

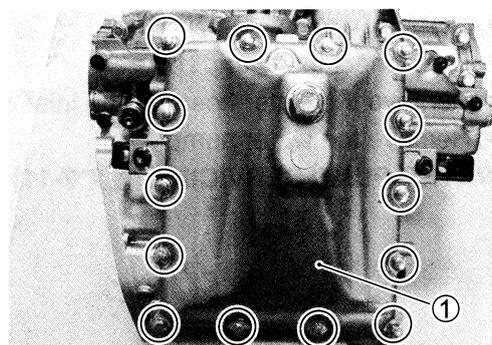
- Remove the oil filter with the special tool. (☞ 2-14)

 09915-40610: Oil filter wrench



### OIL PAN

- Remove the oil pan ①.



**OIL PRESSURE REGULATOR**

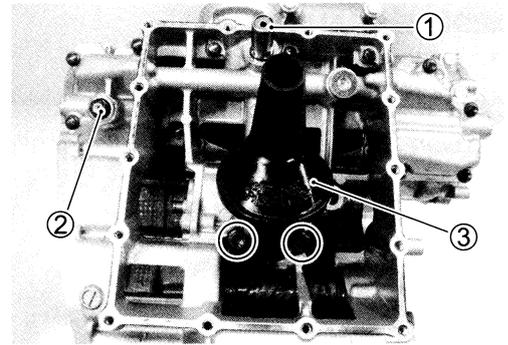
- Remove the oil pressure regulator ①.

**OIL PRESSURE SWITCH**

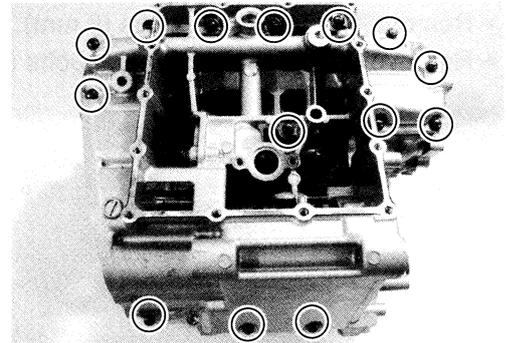
- Remove the oil pressure switch ②.

**OIL STRAINER**

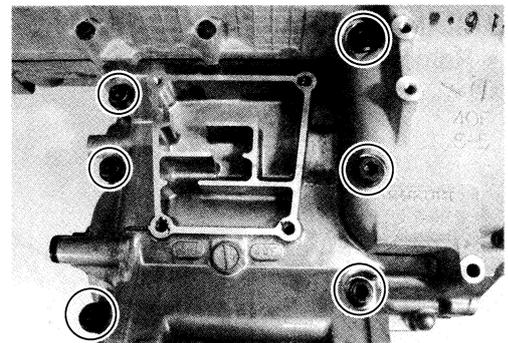
- Remove the oil strainer ③ and O-ring.

**LOWER CRANK CASE**

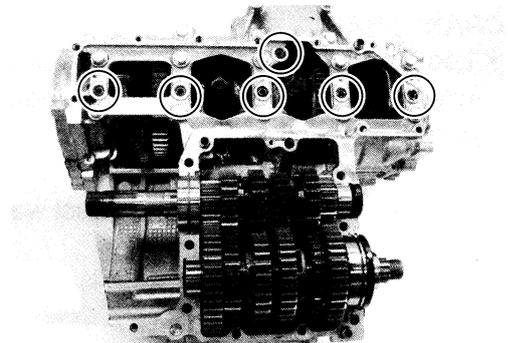
- Remove the lower crankcase bolts (6 mm).



- Remove the lower crankcase bolts (8 mm).
- Remove the lower crankcase assembly.

**TRANSMISSION**

- Remove the transmission and O-rings.

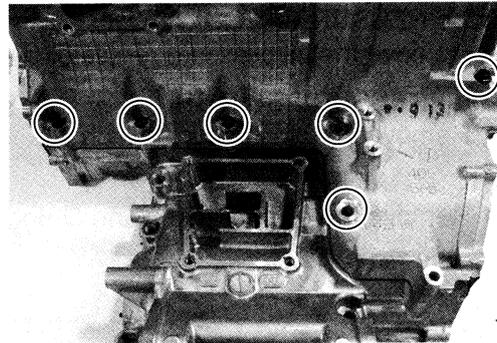


### MIDDLE CRANKCASE

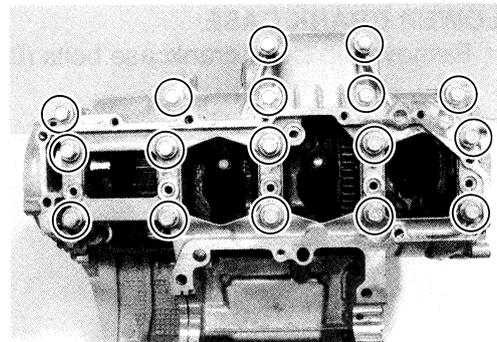
- Remove the crankcase bolts.

**NOTE:**

*Loosen the crankcase bolts diagonally with the smaller sizes first.*

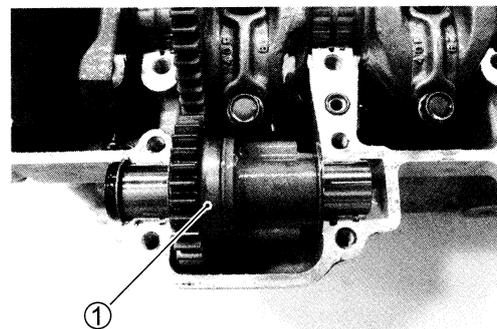


- Remove the crankcase bolts (8 mm).
- Remove the crankshaft journal bolts (9 mm).



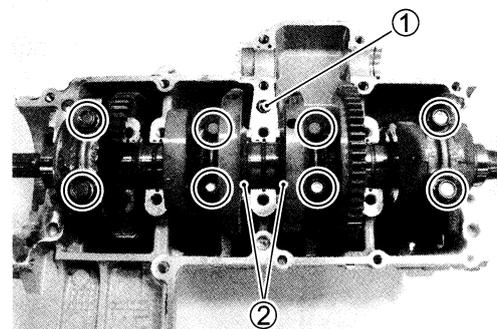
### BALANCER SHAFT

- Remove the balancer shaft ①.



### CRANKSHAFT

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

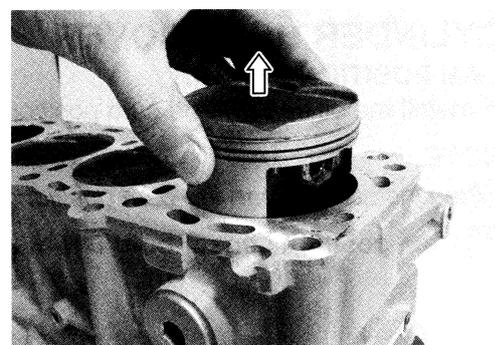
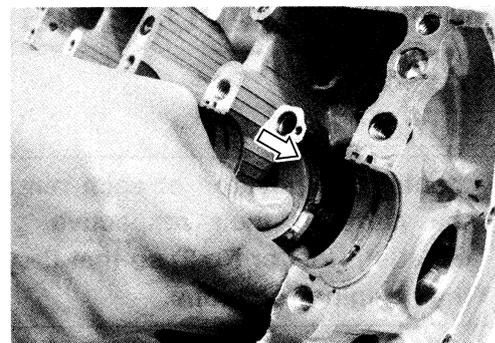


**PISTON AND CONROD**

- Push the conrod upward and remove the piston and conrod from the upper crankcase.

**CAUTION**

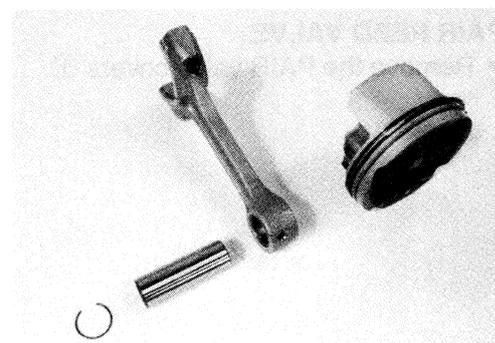
Be careful not to damage the cylinder wall by the conrod.



- Remove the piston pin circlip.
- Separate the piston and conrod by driving out the piston pin.

**NOTE:**

*Scribe the cylinder number on the head of the piston.*



## ENGINE COMPONENTS INSPECTION AND SERVICE

### CAUTION

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

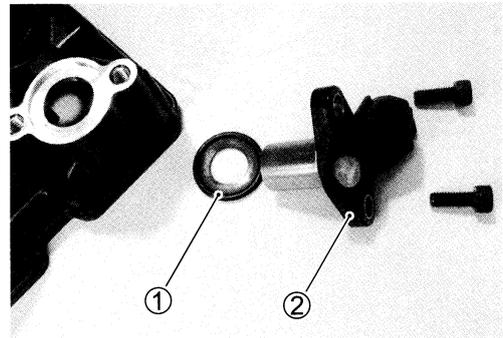
### CYLINDER HEAD COVER CAM POSITION SENSOR

- Install the oil seal ① and cam position sensor ②.

**NOTE:**

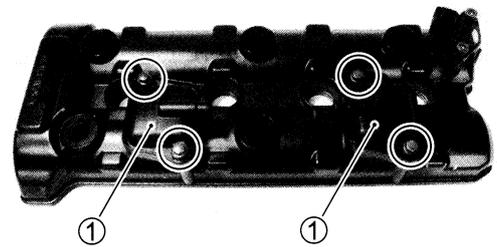
When installing, clean the cam position sensor's face.

- 🔧 **Cam position sensor bolt: 8 N·m (0.8 kgf·m, 5.8 lb-ft)**



### PAIR REED VALVE

- Remove the PAIR valve covers ①.



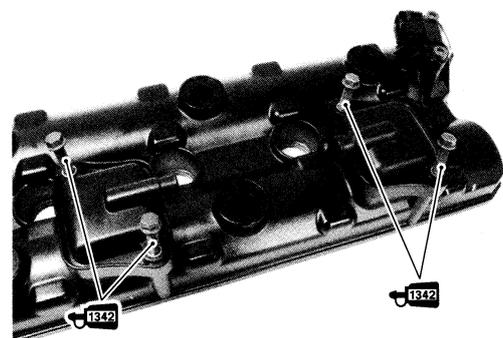
- Inspect the reed valve for the carbon deposit.
- If the carbon deposit is found in the reed valve, replace the PAIR control valve with a new one.



- Install the PAIR valves and PAIR valve covers.
- Apply **THREAD LOCK** to the bolts and tighten to the specified torque.

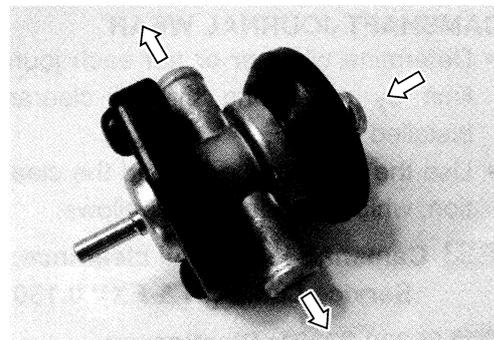
🔧 **1342 99000-32050: THREAD LOCK "1342"**

- 🔧 **PAIR reed valve bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)**

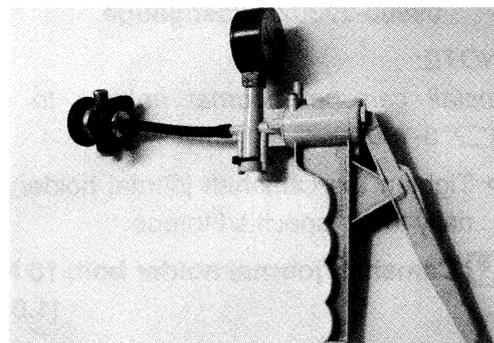


## PAIR CONTROL VALVE

- Inspect that air flows through the PAIR control valve air inlet port to the air outlet ports.
- 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 of the specification slowly to the control valve and inspect the air flow.
- If air does not flow out, 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: More than 66.6 kPa  
(491 mmHg)

**TOOL** 09917-47010: Vacuum pump gauge

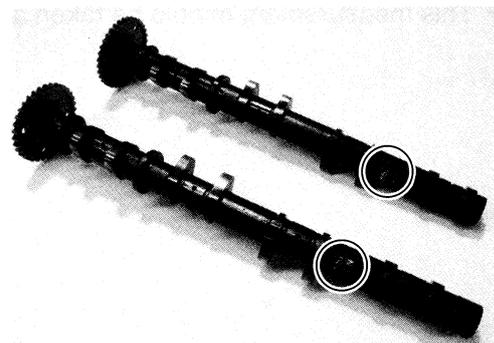
### CAUTION

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

## 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).



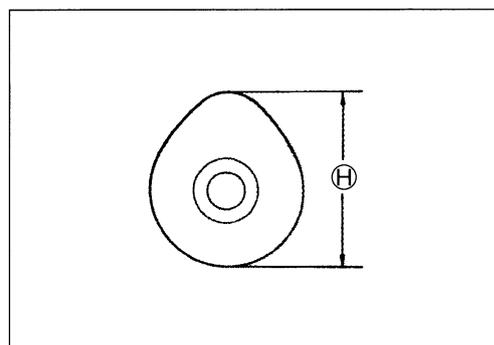
### CAM WEAR

- Check the camshaft for wear or damage.
- Measure the cam height  $\ominus$  with a micrometer.

**DATA** Cam height  $\ominus$ :

Service Limit: (IN.) : 36.71 mm (1.445 in)  
(EX.) : 35.68 mm (1.405 in)

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



**CAMSHAFT JOURNAL WEAR**

- Determine whether or not each journal is worn down to the limit by measuring the oil clearance with the camshaft installed in place.
- Use the 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)**

**TOOL** 09900-22301: Plastigauge  
 09900-22302: Plastigauge

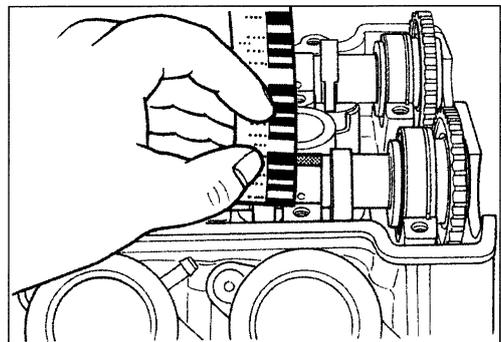
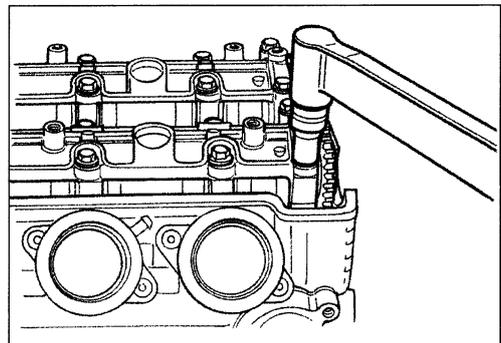
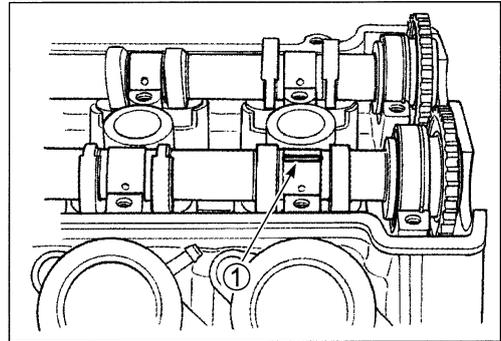
**NOTE:**  
 Install camshaft journal holders to their original positions.  
 (↖ 3-100)

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

**W** 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.:

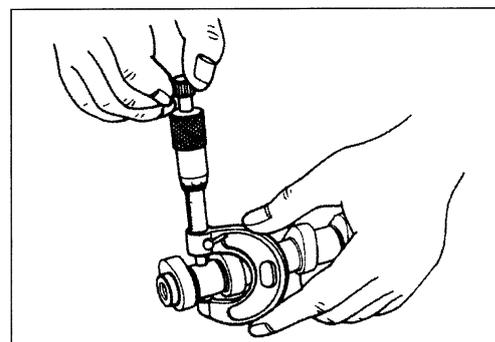
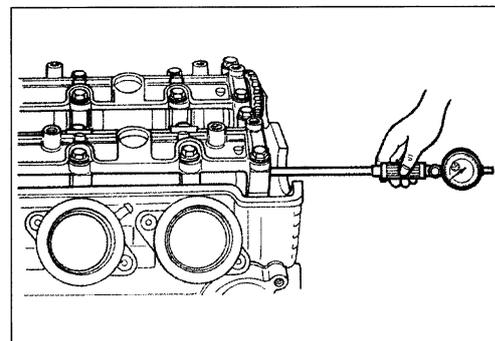
Standard: (IN & EX): 24.012 – 24.025 mm  
(0.9454 – 0.9459 in)

- TOOL** 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)

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

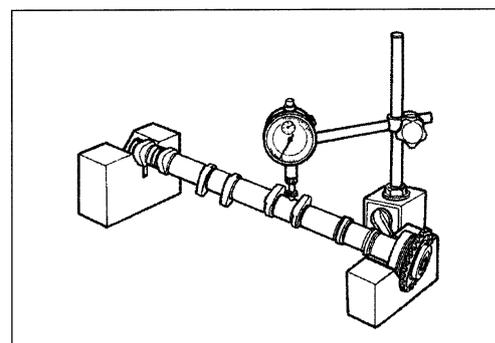
**CAMSHAFT RUNOUT**

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

**DATA** Camshaft runout:

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

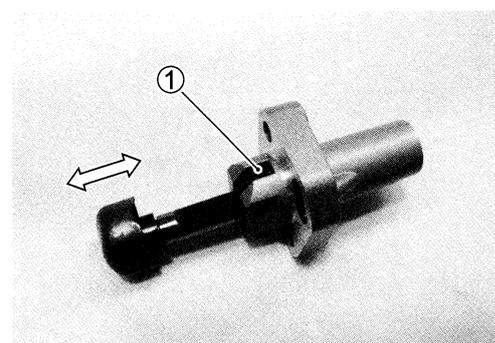
- TOOL** 09900-20607: Dial gauge (1/100 mm)  
09900-20701: Magnetic stand  
09900-21304: V-block set (100 mm)

**CAM SPROCKET**

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

**CAM CHAIN TENSION ADJUSTER INSPECTION**

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



## CAM CHAIN TENSIONER

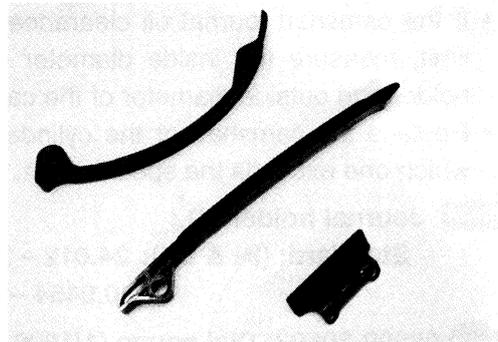
### INSPECTION

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

## CAM CHAIN GUIDE

### INSPECTION

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



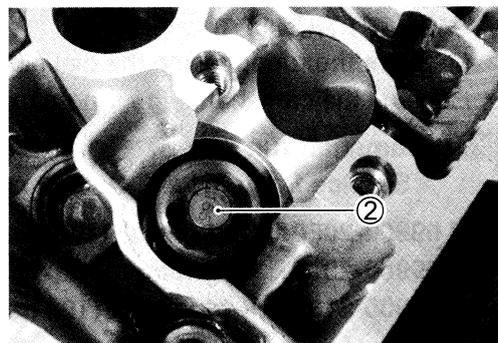
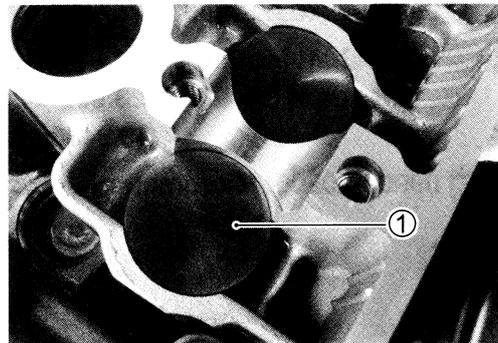
## CYLINDER HEAD AND VALVE

### VALVE AND VALVE SPRING DISASSEMBLY

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

### CAUTION

Identify the position of each removed part.

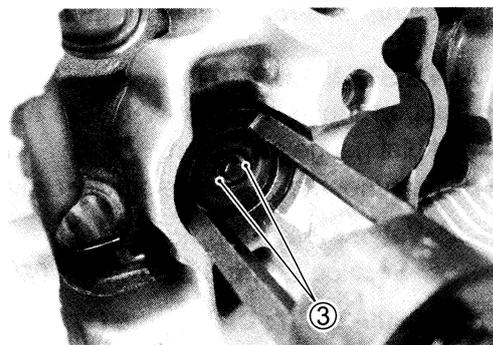
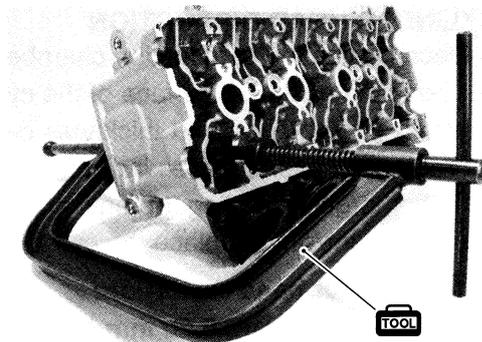


- Using special tools, compress the valve springs and remove the two cotter halves ③ from valve stem.

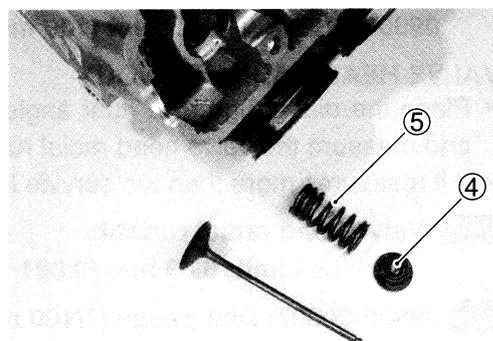
**TOOL** 09916-14510: Valve lifter  
 09916-14910: Valve lifter attachment  
 09916-84511: Tweezers

**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.

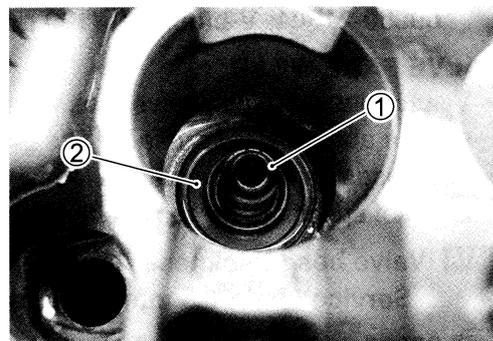


- Remove the oil seal ① and the spring seat ②.

**CAUTION**

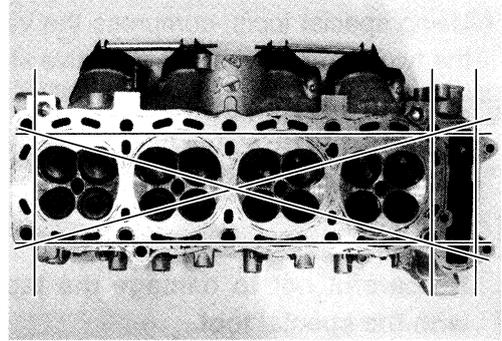
Do not reuse the removed oil seal.

- 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.



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

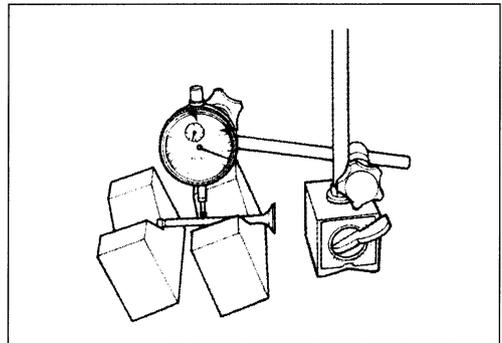
**TOOL** 09900-20803: Thickness gauge

**VALVE STEM RUNOUT**

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

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

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

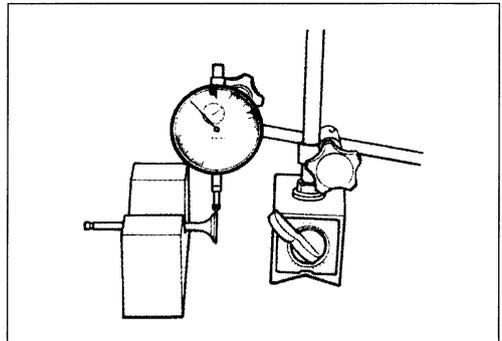


**VALVE HEAD RADIAL RUNOUT**

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

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

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

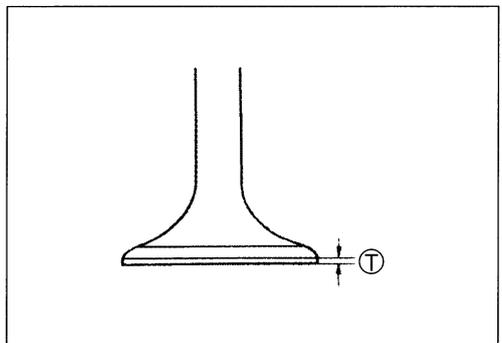


**VALVE FACE WEAR**

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

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

**TOOL** 09900-20102: Vernier calipers



**VALVE STEM DEFLECTION**

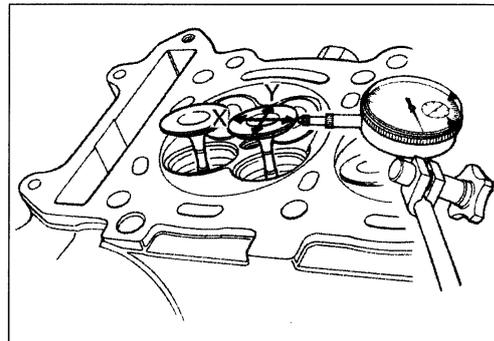
- Lift the valve about 10 mm (0.39 in) from the valve seat.
- Measure the valve stem deflection in two directions, perpendicular to each other, by positioning the dial gauge as shown.
- If the deflection measured exceeds the limit, then determine whether the valve or the guide should be replaced with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

**DATA** Valve stem deflection (IN & EX):

Service Limit: 0.35 mm (0.014 in)

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

09900-20701: Magnetic stand

**VALVE STEM WEAR**

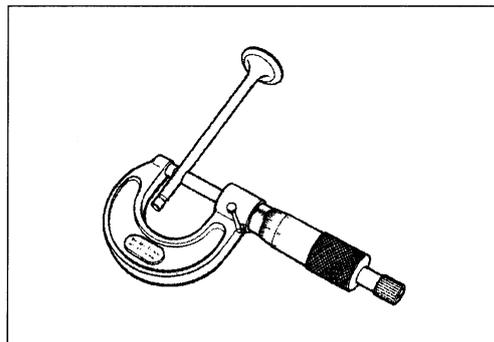
- If the valve stem is worn down to the limit, as measured with a micrometer, replace the valve.
- If the stem is within the limit, then replace the guide.
- After replacing valve or guide, be sure to recheck the deflection.

**DATA** Valve stem O.D.:

Standard (IN) : 3.975 – 3.990 mm (0.1565 – 0.1571 in)

(EX) : 3.955 – 3.970 mm (0.1557 – 0.1563 in)

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

**NOTE:**

If valve guides have to be removed for replacement after inspecting related parts, carry out the steps shown in valve guide servicing. (☞ 3-36)

**VALVE GUIDE SERVICING**

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

**TOOL** 09916-53310: Valve guide remover/installer

**NOTE:**

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

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

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

**CAUTION**

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

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

**TOOL** 09916-53310: Valve guide installer/remover ①  
09916-53321: Attachment ②

**NOTE:**

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

**CAUTION**

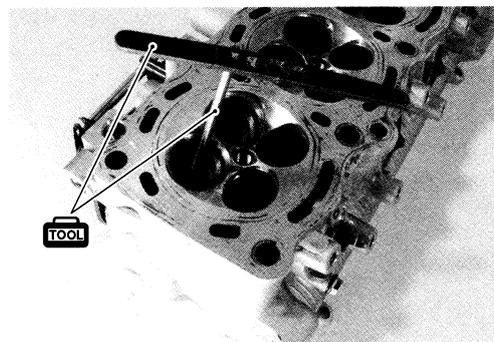
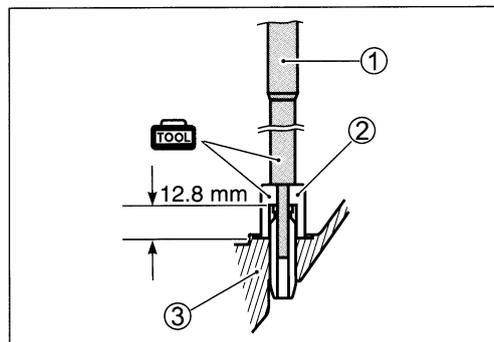
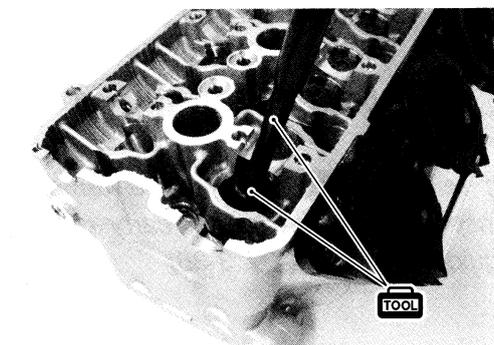
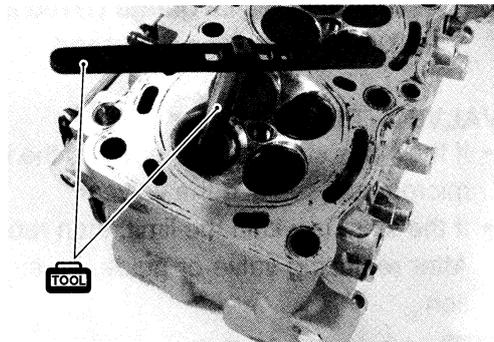
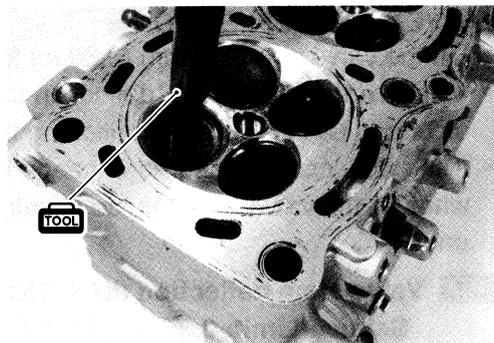
Failure to oil the valve guide hole before driving the new guide into place may result in a damaged guide or head.

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

**TOOL** 09916-33310: Valve guide reamer  
09916-34542: Valve guide reamer handle

**NOTE:**

Insert the reamer from the combustion chamber and always turn the reamer handle clockwise.



**VALVE SEAT WIDTH INSPECTION**

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

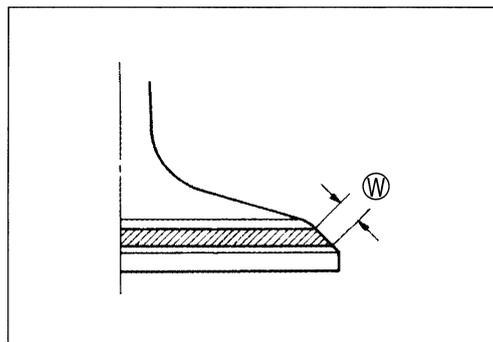
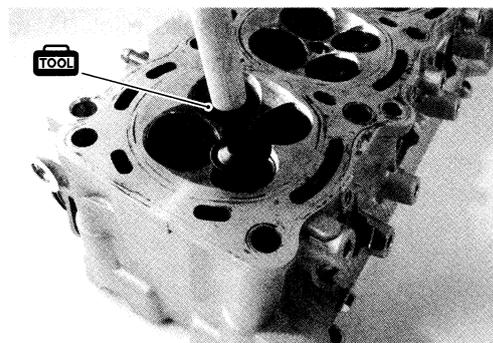
**TOOL** 09916-10911: Valve lapper set

- If the seat width  $\text{W}$  measured exceeds the standard value or seat width is not uniform, reface the seat using the seat cutter.

**DATA** Valve seat width  $\text{W}$ :

**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-122	N-122
60°	N-111	N-111

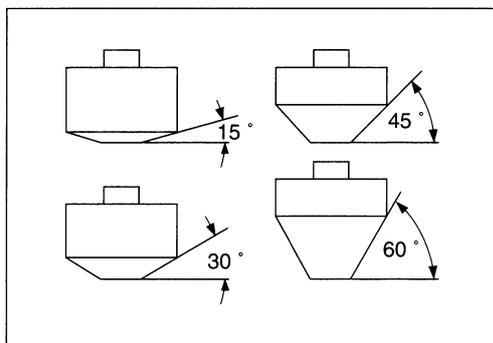
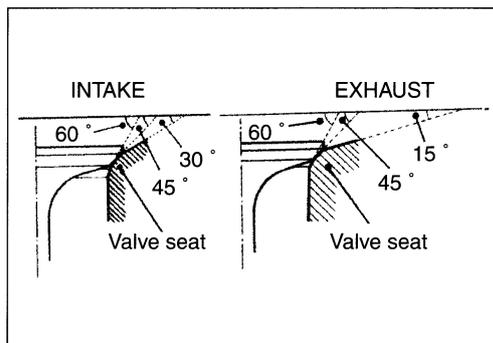
**TOOL** 09916-21111: Valve seat cutter set  
 09916-20630: Valve seat cutter (N-126)  
 09916-20650: Solid pilot (N-100-4.0)

**NOTE:**

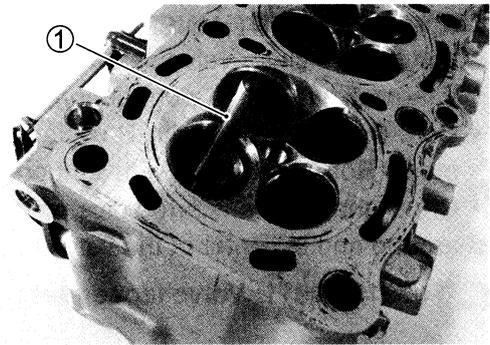
The valve seat cutters (N-121), (N-122) and (N-111) are included in the valve seat cutter set (09916-21111).

**CAUTION**

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

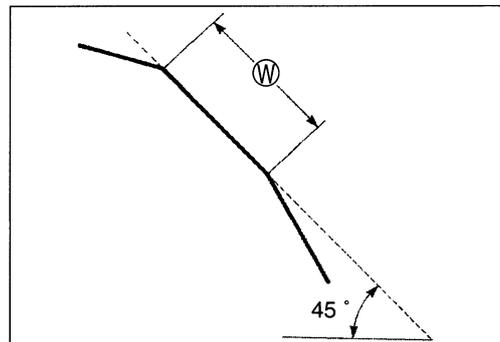


- When installing the solid pilot ①, rotate it slightly. Seat the pilot snugly. Install the 45 ° cutter, attachment and T-handle.



**INITIAL SEAT CUT**

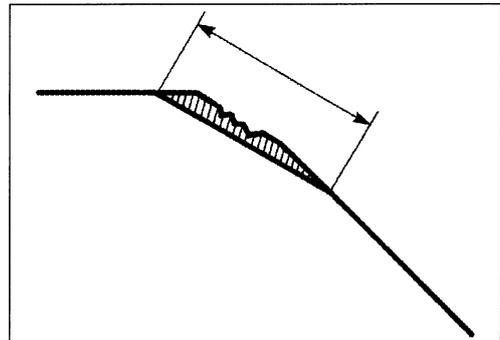
- Using the 45 ° cutter, descale and clean up the seat. Rotate the cutter one or two turns.
- Measure the valve seat width ④ after every cut.



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

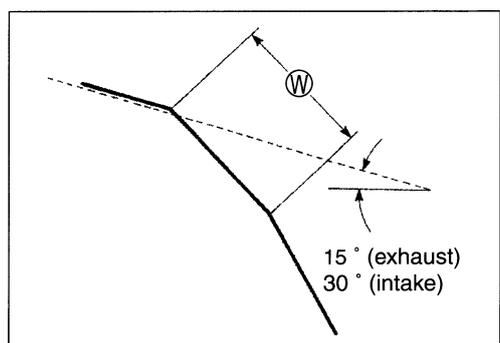
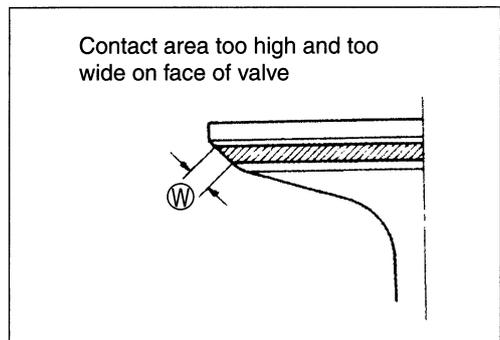
**NOTE:**

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



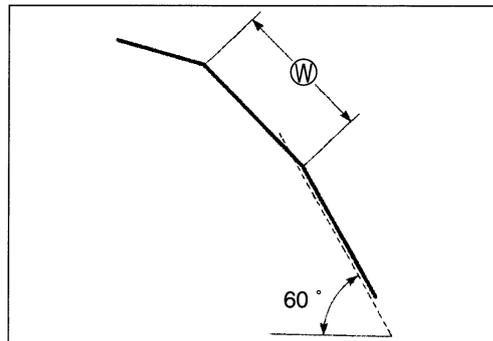
**TOP NARROWING CUT**

- If the contact area ④ 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**

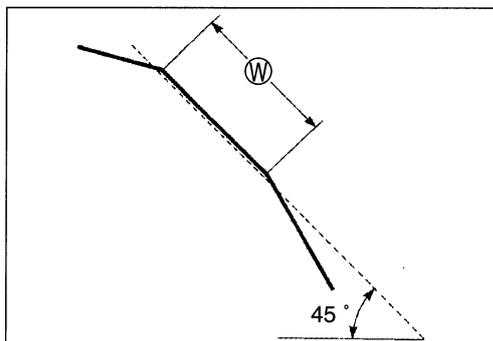
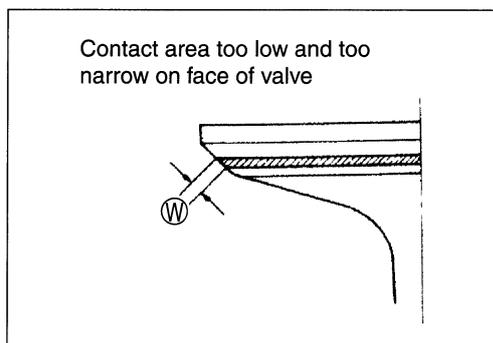
- If the contact area  $\textcircled{W}$  is too wide or too low, use the  $60^\circ$  cutter to narrow and raise the contact area.

**FINAL SEAT CUT**

- If the contact area  $\textcircled{W}$  is too low or too narrow, use the  $45^\circ$  cutter to raise and widen the contact area.

**NOTE:**

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



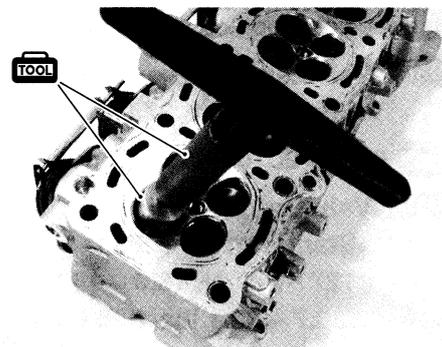
- After the desired seat position and width is achieved, use the  $45^\circ$  cutter very lightly to clean up any burrs caused by the previous cutting operations.

**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:**

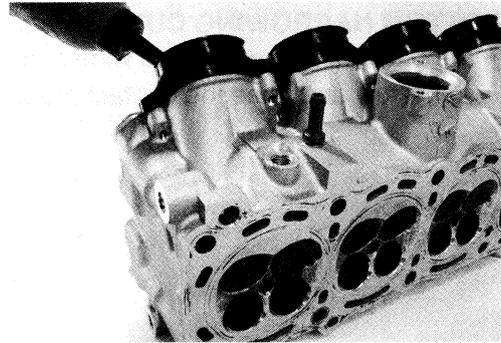
After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. (2-8)



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

**⚠ WARNING**

**Always use extreme caution when handling gasoline.**



**VALVE STEM END CONDITION**

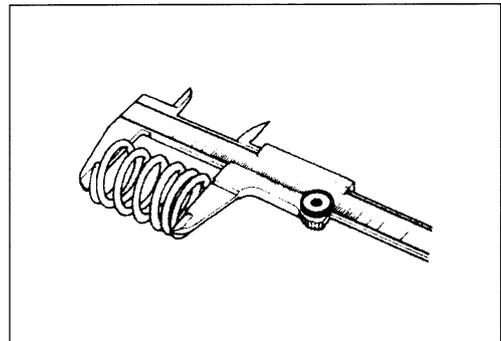
- Check the valve stem end face for pitting and wear.



**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.

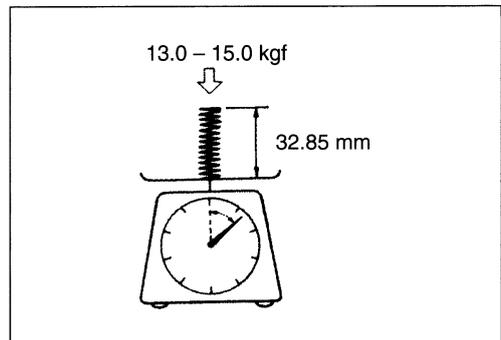
- Check the valve springs for proper strength by measuring their free length and also by the force required to compress them.
- If the spring length is less than the service limit, or if the force required to compress the spring does not fall within the range specified, replace the spring.



**DATA** Valve spring free length (IN & EX):  
 Service limit: 37.0 mm (1.46 in)

**TOOL** 09900-20102: Vernier calipers

**DATA** Valve spring tension:  
 Standard: (IN & EX):  
 127 – 147 N, 13.0 – 15.0 kgf/32.85 mm  
 (28.7 – 33.1 lbs/1.28 in)



**VALVE AND VALVE SPRING REASSEMBLY**

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

**MOLYBDENUM OIL SOLUTION****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.**

**MOLYBDENUM OIL SOLUTION**

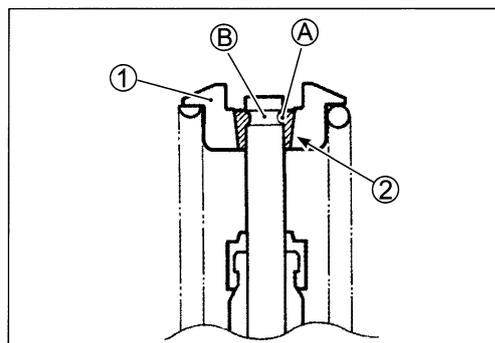
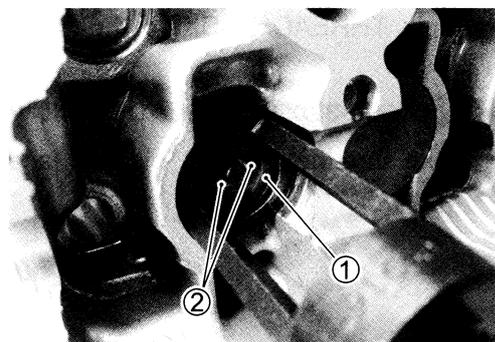
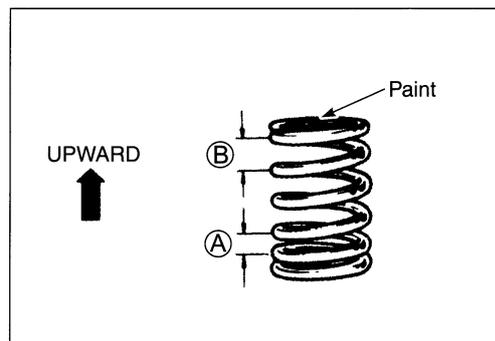
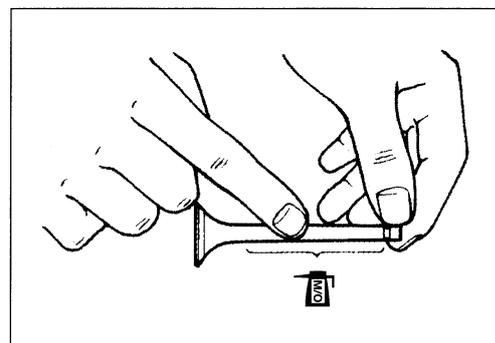
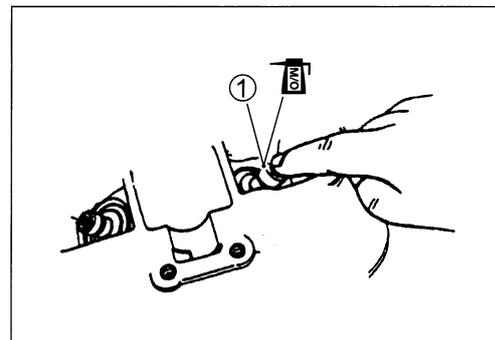
- Install the valve springs with the small-pitch portion (A) facing cylinder head.
- ⓑ: Large-pitch portion

- 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 (A) of the cotter fits snugly into the groove (B) in the stem end.

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

**CAUTION**

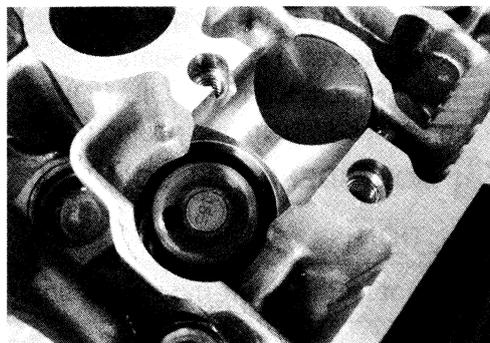
**Be sure to restore each spring and valve to their original positions.**



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

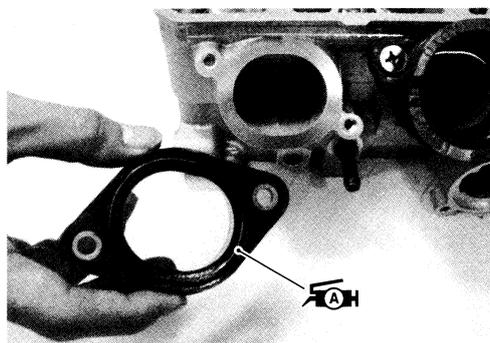
**NOTE:**

- \* 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**

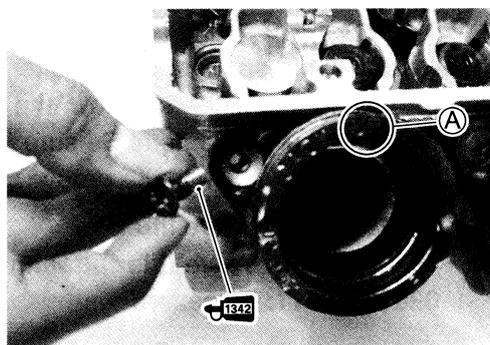
- Remove the intake pipe.
- Install the intake pipe in the following procedure.
- Apply SUZUKI SUPER GREASE to the O-rings.



- Apply THREAD LOCK to the screw and install the intake pipes.

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

- Make sure that the "UP" mark  face upward.



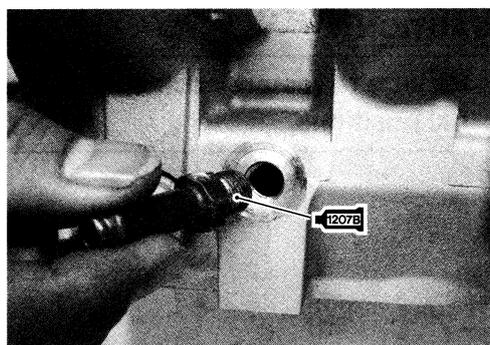
**WATER BYPASS UNION**

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

 **1207B** 99104-31140: SUZUKI BOND "1207B" (USA)

99000-31140: SUZUKI BOND "1207B" (Others)

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



## CLUTCH

### CLUTCH DRIVE PLATES INSPECTION

#### NOTE:

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

\* Clutch drive plate No.1: Green paint

\* Clutch drive plate No.2: Brown paint

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

**DATA** Drive plate thickness:

Service Limit: 2.42 mm (0.095 in)

**TOOL** 09900-20102: Vernier calipers

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

**DATA** Drive plate claw width:

Service Limit: 13.05 mm (0.5138 in)

**TOOL** 09900-20102: Vernier calipers

### CLUTCH DRIVEN PLATES INSPECTION

#### NOTE:

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

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

**DATA** Driven plate distortion:

Service Limit: 0.10 mm (0.004 in)

**TOOL** 09900-20803: Thickness gauge

### CLUTCH SPRING INSPECTION

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

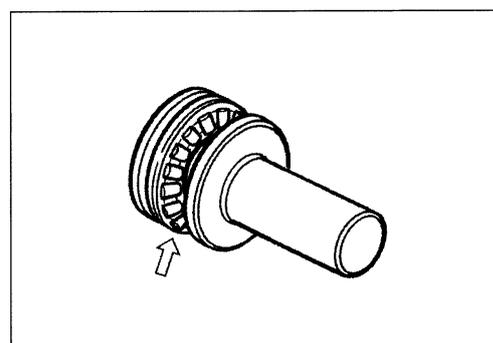
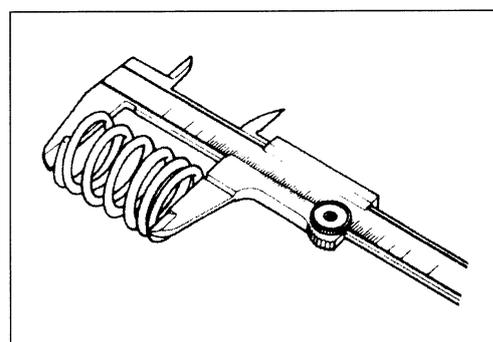
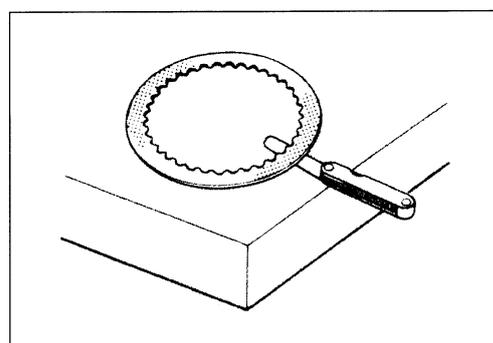
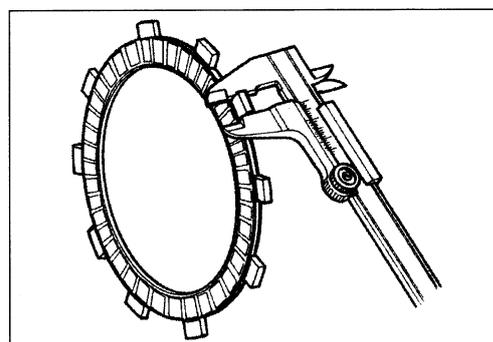
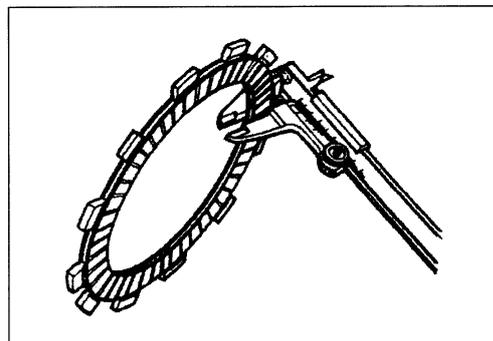
**DATA** Clutch spring free length:

Service Limit: 73.9 mm (2.909 in)

**TOOL** 09900-20102: Vernier calipers

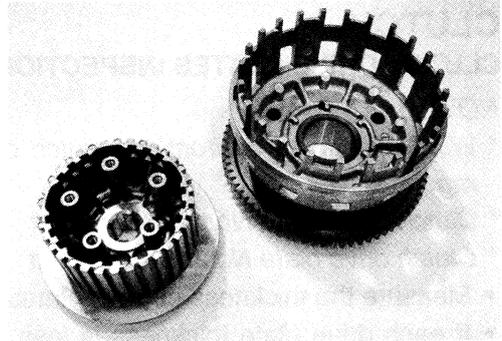
### CLUTCH BEARING INSPECTION

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



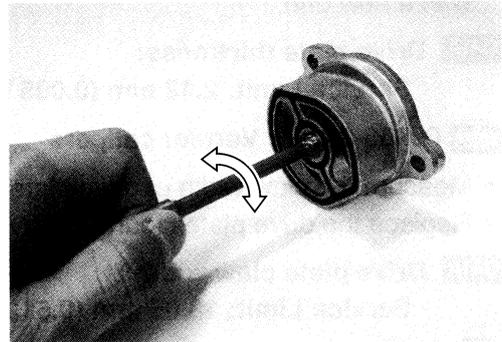
**CLUTCH SLEEVE HUB/PRIMARY DRIVEN GEAR ASSEMBLY**

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



**OIL PUMP INSPECTION**

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

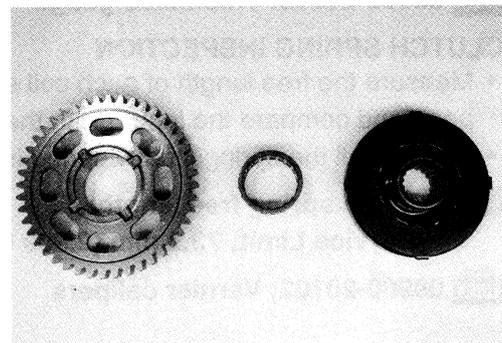
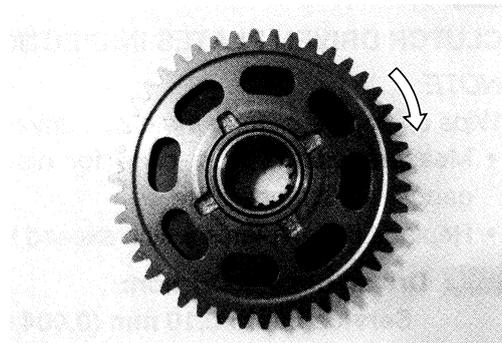


**CAUTION**

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

**STARTER CLUTCH INSPECTION**

- Install the starter driven gear 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.



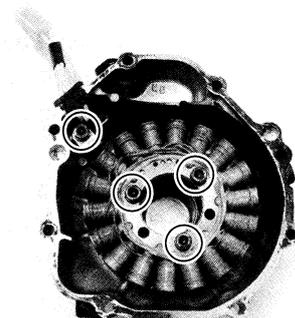
**GENERATOR INSPECTION (9-9) REASSEMBLY**

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

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

**NOTE:**

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



## WATER PUMP

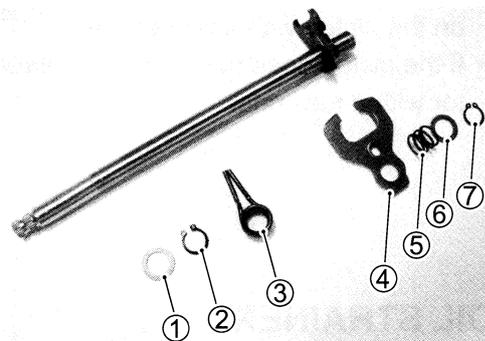
(☞ 7-14)

## GEARSHIFT SYSTEM

### GEARSHIFT SHAFT/GEARSHIFT ARM DISASSEMBLY

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

- |                                 |                       |
|---------------------------------|-----------------------|
| ① Washer                        | ⑤ Plate return spring |
| ② Snap ring                     | ⑥ Washer              |
| ③ Gearshift shaft return spring | ⑦ Snap ring           |
| ④ Gearshift cam drive plate     |                       |



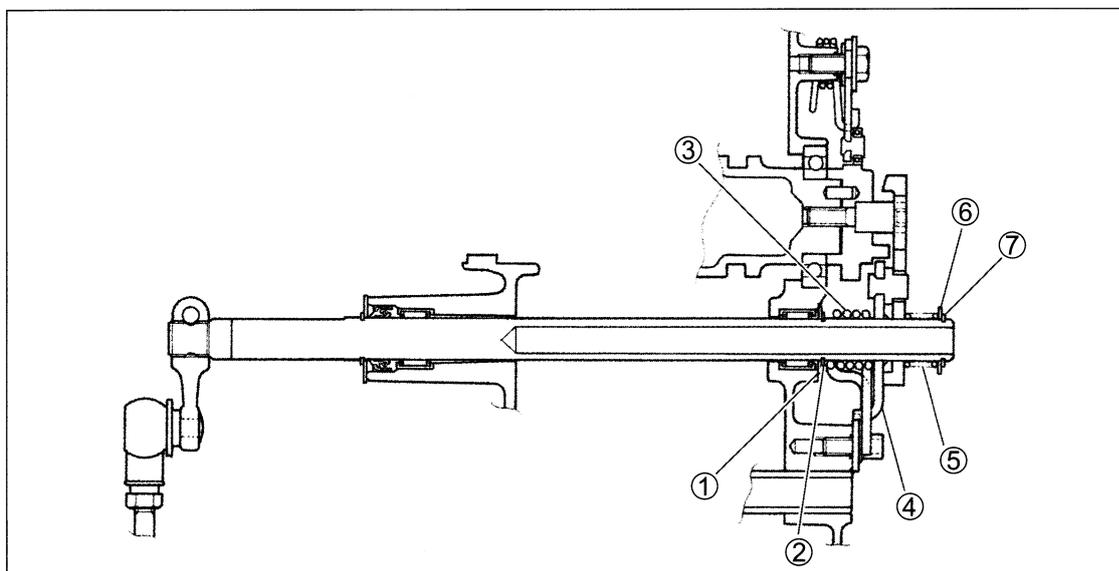
### GEARSHIFT SHAFT/GEARSHIFT ARM INSPECTION

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

### GEARSHIFT SHAFT/GEARSHIFT ARM REASSEMBLY

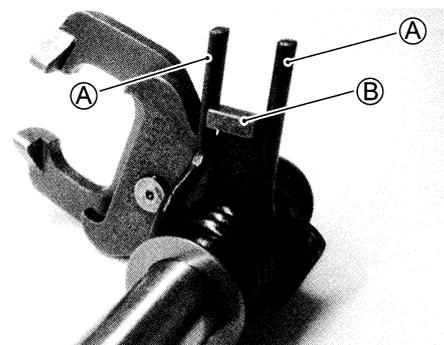
- Install the following parts to the gearshift shaft/gearshift arm as shown in the right illustration.

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



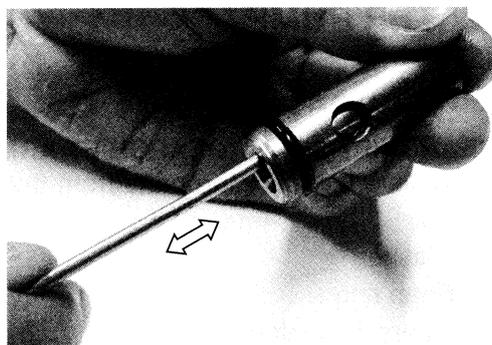
#### NOTE:

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



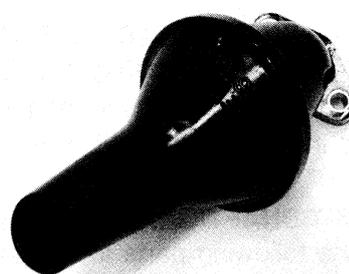
### OIL PRESSURE REGULATOR

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



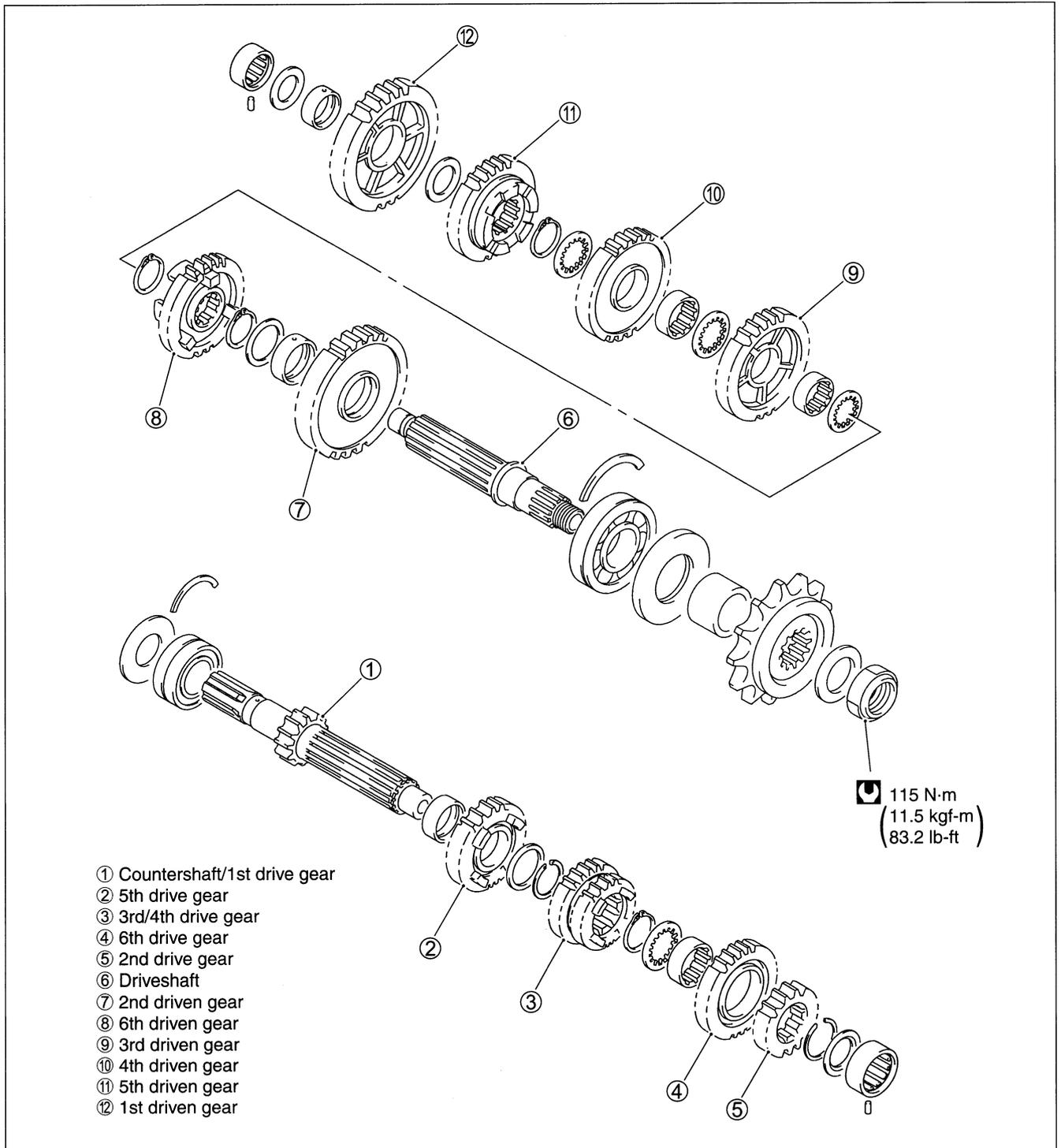
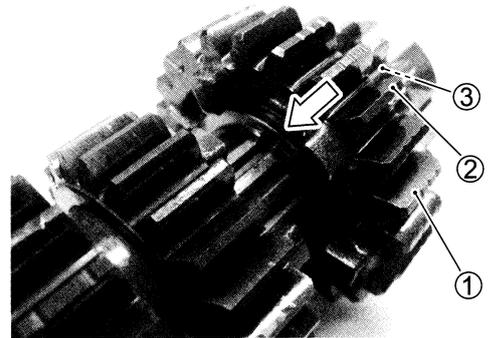
### OIL STRAINER

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



## TRANSMISSION

- Disassemble the countershaft and drive shaft.  
Pay attention to the following point.
- Remove the 6th drive gear circlip from its groove and slide it towards the 3rd/4th drive gear.
- Slide the 6th ① and 2nd ② drive gears toward the 3rd/4th drive gears, then remove the 2nd drive gear circlip ③.



**REASSEMBLY**

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

**NOTE:**

- \* Rotate the bearings by hand to inspect for smooth rotation. Replace the bearings if there is anything unusual.
- \* Before installing the gears, apply engine oil to the driveshaft and countershaft.
- \* When installing the oil seal, apply SUZUKI SUPER GREASE to it.

 **99000-25030: SUZUKI SUPER GREASE "A" (USA)**  
**99000-25010: SUZUKI SUPER GREASE "A" (Others)**

**CAUTION**

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

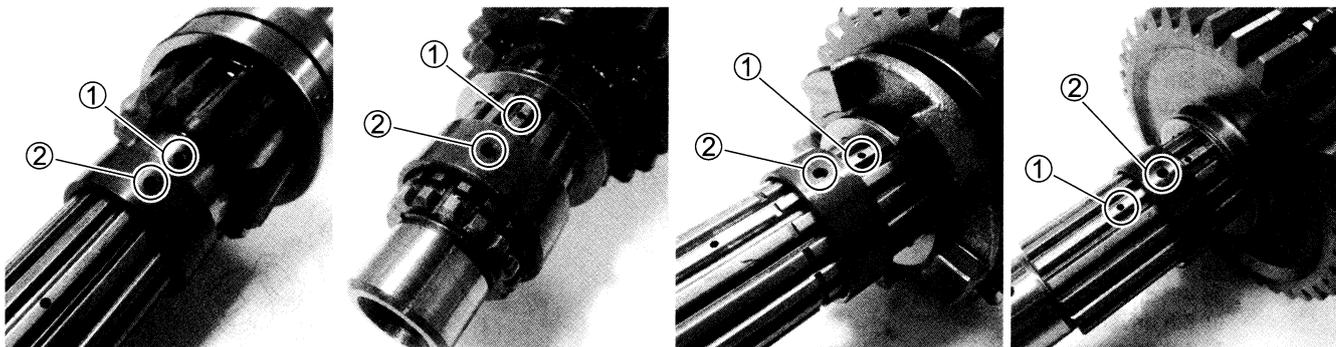
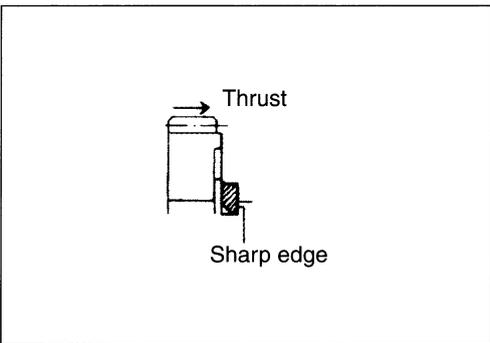
**NOTE:**

When reassembling the transmission, attention must be given to the locations and positions of washers and snap rings. The cross sectional view shows the correct position of the gears, bushings, washers and snap rings. (Fig 3-49)

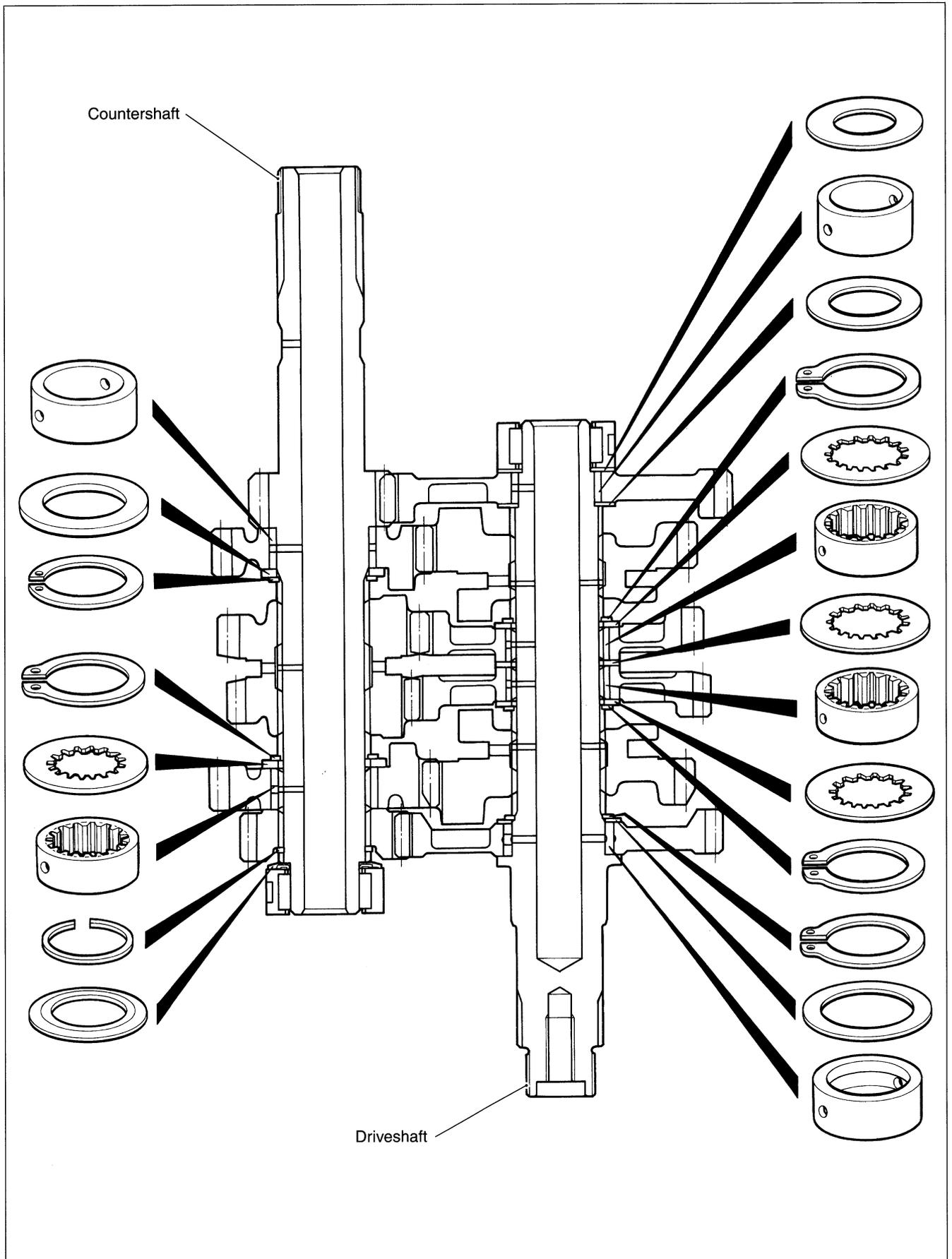
- When installing a new snap ring, pay attention to its direction of the circlip. Fit it to the side where the thrust is as shown in the illustration.

**CAUTION**

When installing the gear bushing onto the shaft, align the shaft oil hole ① with the bushing oil hole ②.



### TRANSMISSION PARTS LOCATION



## CYLINDER

### CRANKCASE SERVICING (☞ 3-53)

#### 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.

**DATA** Cylinder distortion:

Service Limit: 0.20 mm (0.008 in)

**TOOL** 09900-20803: Thickness gauge

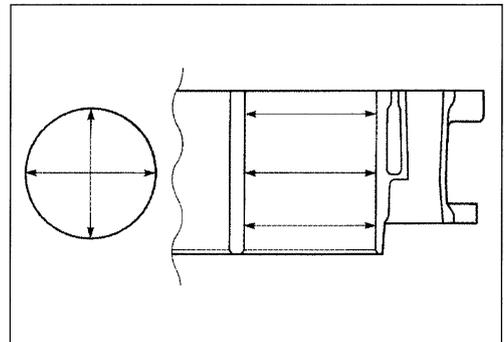
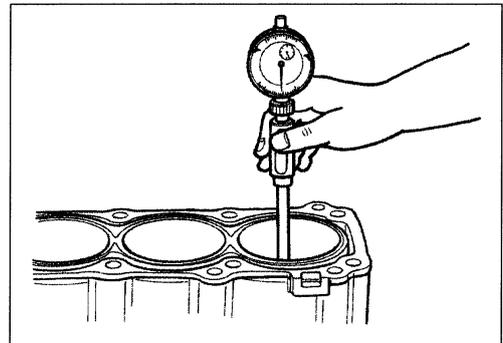
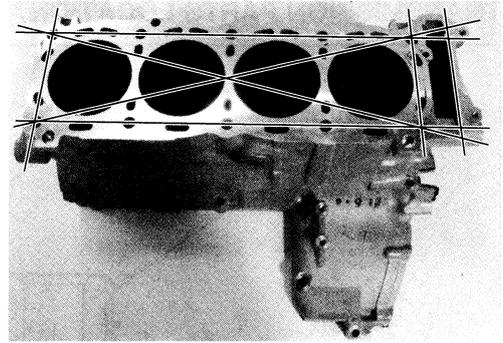
#### CYLINDER BORE

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

**DATA** Cylinder bore:

Standard: 73.000 – 73.015 mm (2.8740 – 2.8746 in)

**TOOL** 09900-20508: Cylinder gauge set



## PISTON AND PISTON RING

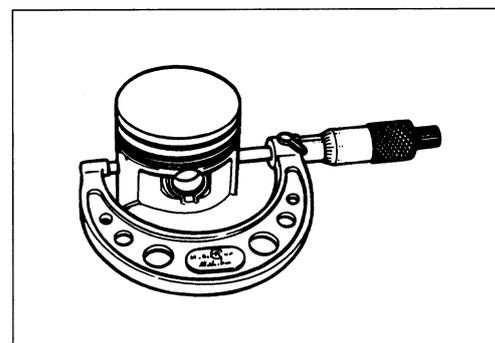
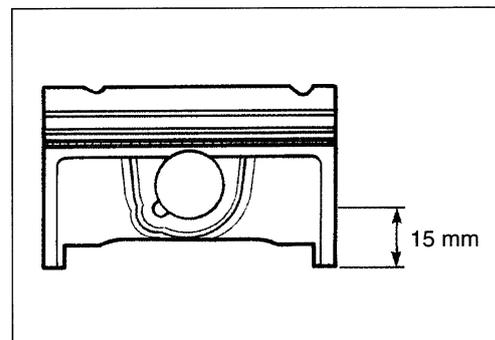
### PISTON DIAMETER

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

**DATA** Piston diameter:

**Service Limit: 72.880 mm (2.8693 in)**  
**at 15 mm (0.6 in) from the skirt end**

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



### PISTON TO CYLINDER CLEARANCE

- Subtract the piston diameter from the cylinder bore diameter. (3-50)
- If the piston to cylinder clearance exceeds the service limit, replace both the cylinder and the piston.

**DATA** Piston to cylinder clearance:

**Service Limit: 0.120 mm (0.0047 in)**

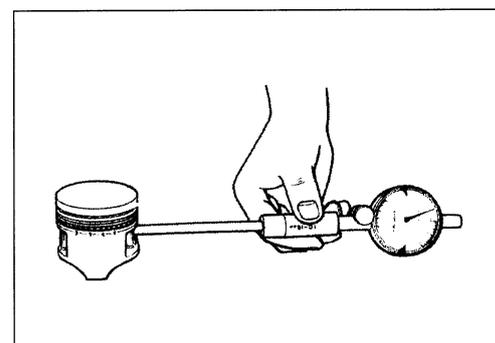
### PISTON PINS AND PIN BORE

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

**DATA** Piston pin bore I.D.:

**Service Limit: 16.030 mm (0.6311 in)**

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

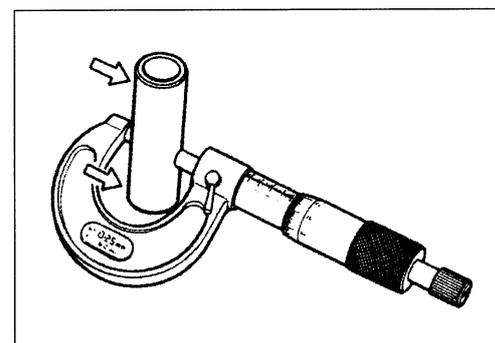


- Measure the piston pin outside diameter at three positions using the micrometer.
- If any of the measurements are out of specification, replace the piston pin.

**DATA** Piston pin O.D.:

**Service Limit: 15.980 mm (0.6291 in)**

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



**PISTON RING TO GROOVE CLEARANCE**

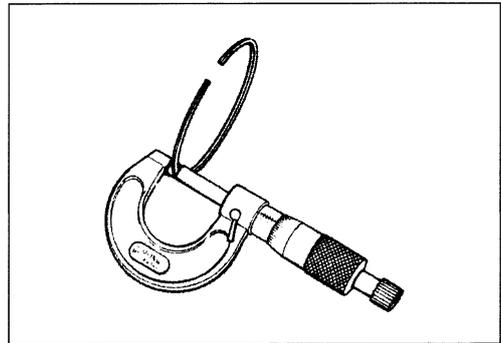
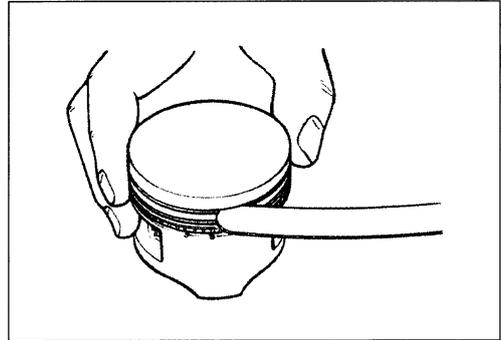
- Measure the side clearances of the 1st and 2nd piston rings using the thickness gauge.
- If any of the clearances exceed the limit, replace both the piston and piston rings.

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

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

**DATA** Piston ring groove width:  
Standard (1st) : 1.01 – 1.03 mm (0.0398 – 0.0406 in)  
(2nd) : 0.81 – 0.83 mm (0.0319 – 0.0327 in)  
(Oil) : 1.51 – 1.53 mm (0.0594 – 0.0602 in)

**DATA** Piston ring thickness:  
Standard (1st) : 0.97 – 0.99 mm (0.0382 – 0.0390 in)  
(2nd): 0.77 – 0.79 mm (0.0303 – 0.0311 in)

**PISTON RING FREE END GAP AND PISTON RING END GAP**

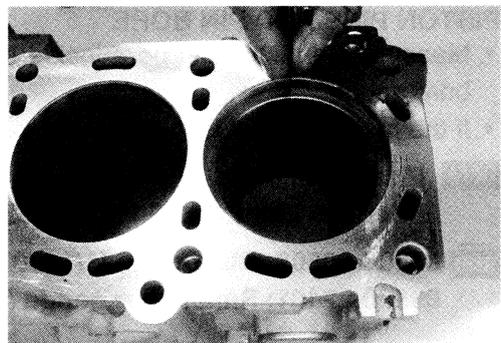
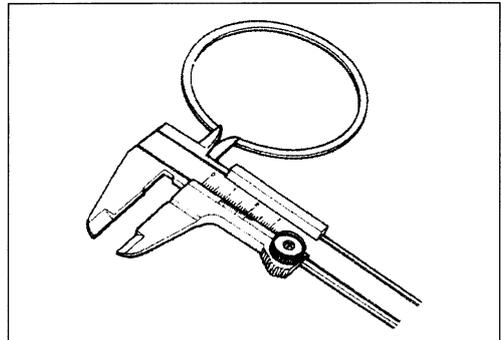
- Measure the piston ring free end gap using vernier calipers.
- Next, fit the piston ring squarely into the cylinder and measure the piston ring end gap using the thickness gauge.
- If any of the measurements exceed the service limit, replace the piston ring with a new one.

**DATA** Piston ring free end gap:  
Service Limit (1st) : 6.4 mm (0.25 in)  
(2nd): 8.2 mm (0.32 in)

**TOOL** 09900-20102: Vernier calipers

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

**TOOL** 09900-20803: Thickness gauge

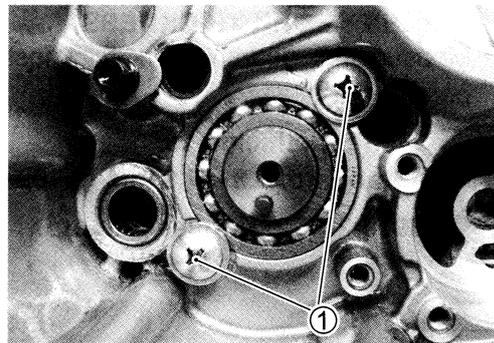


## CRANKCASE

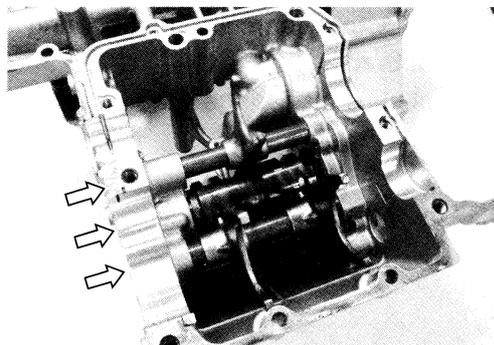
### GEARSHIFT FORK AND GEARSHIFT CAM

#### Removal

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



- Remove the gearshift fork shafts and gearshift forks from the lower crankcase.
- Remove the gear shift cam and its bearing.



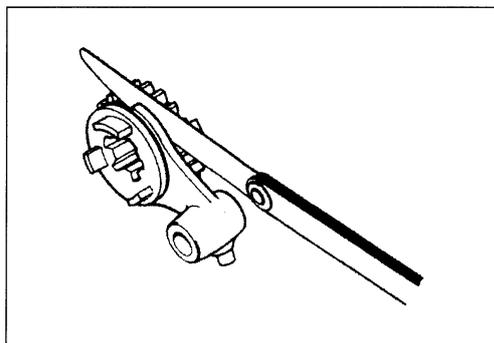
### GEARSHIFT FORK TO GROOVE CLEARANCE

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

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

**TOOL** 09900-20803: Thickness gauge

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

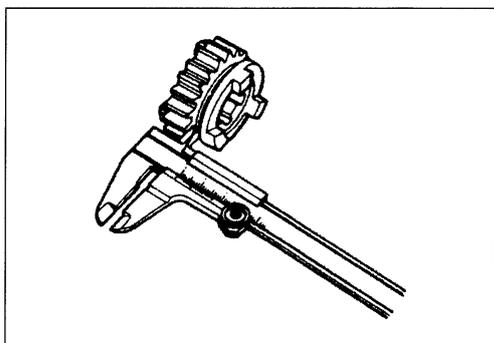


### GEARSHIFT FORK GROOVE WIDTH

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

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

**TOOL** 09900-20102: Vernier calipers

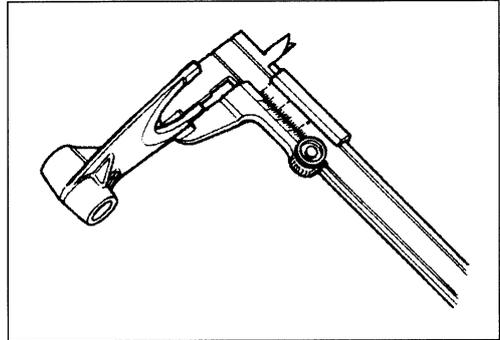


**GEARSHIFT FORK THICKNESS**

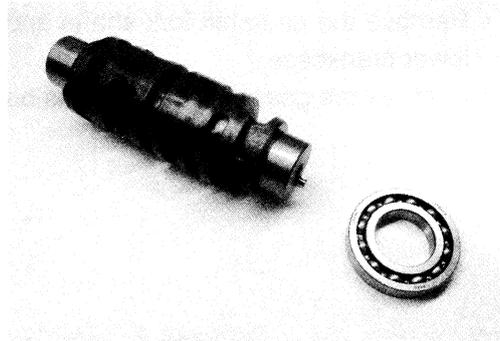
- Measure the gearshift fork thickness using the vernier calipers.

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

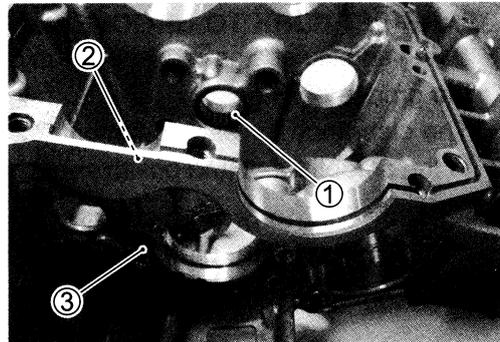
**TOOL** 09900-20102: Vernier calipers



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



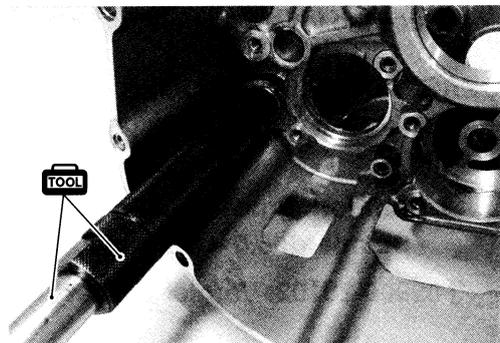
- Inspect the gearshift cam bearing ①, and gearshift shaft bearings ②, ③ for abnormal noise and smooth rotation while they are in the crankcase.
- Replace a bearing if there is anything unusual.



**Bearing removal**

- Remove the gearshift shaft bearing with the special tool.

**TOOL** 09921-20210: Bearing remover  
 09930-30102: Sliding shaft

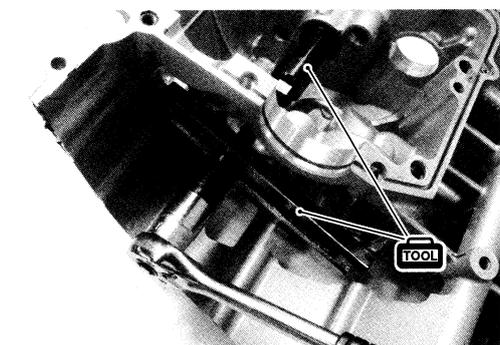


- Remove the gearshift cam bearing with the special tools.

**TOOL** 09921-20240: Bearing remover set (25 mm)  
 09910-20115: Conrod stopper

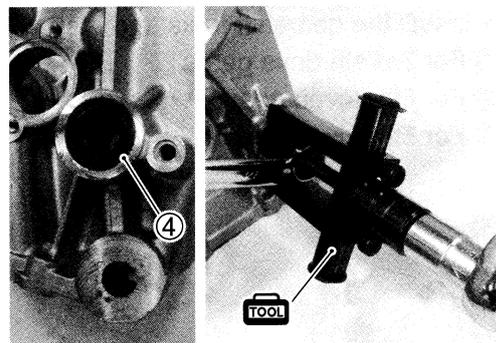
**CAUTION**

- \* Don't damage the crankcase by the conrod stopper.
- \* Be careful not to lean the bearing remover.



- Remove the oil seal ④.
- Remove the gearshift shaft bearing with the special tool.

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



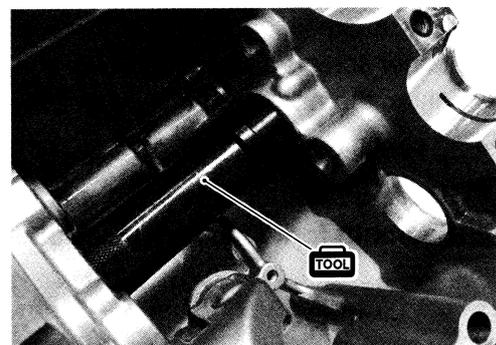
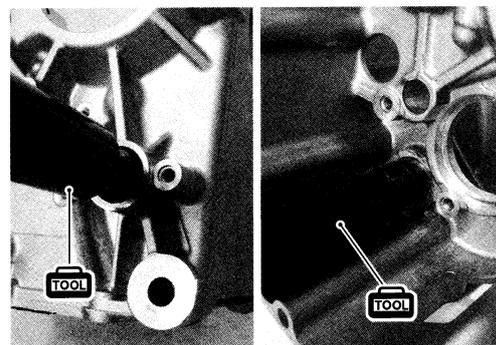
### Installation

- Install the bearings with the special tool.

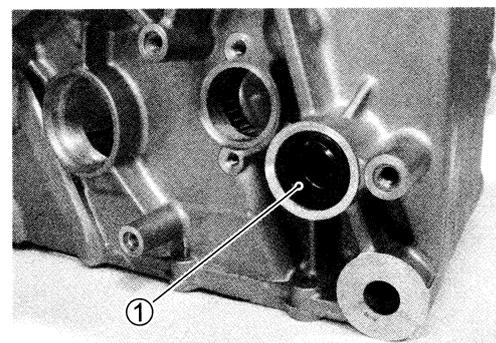
 **09913-70210: Bearing installer set (15 mm)**

#### NOTE:

*The stamped mark side of the gearshift shaft bearing faces out-side.*



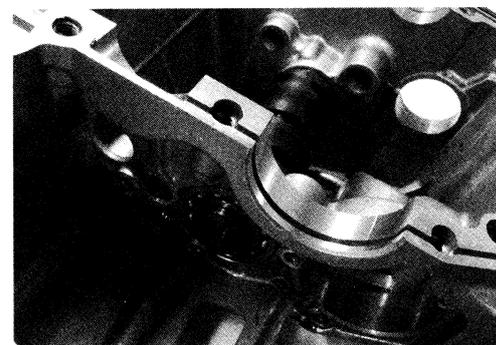
- Install the oil seal ①.



- Install the gearshift cam with the bearing.

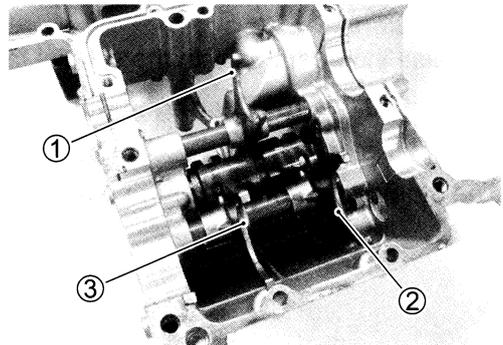
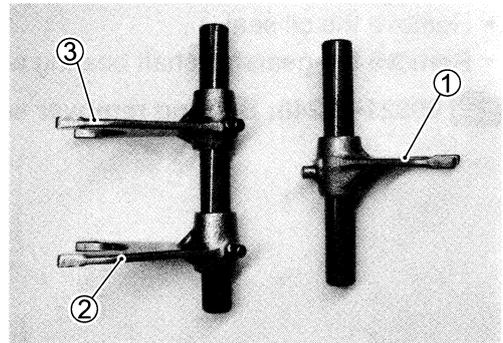
#### NOTE:

*The stamped mark side of the gearshift cam bearing faces out-side.*



- 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

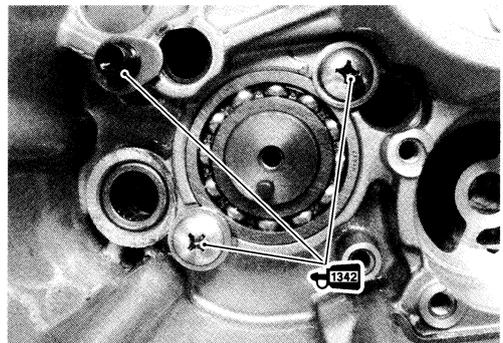


- Apply a small quantity of THREAD LOCK to the bearing retainer screws and the shift fork shaft retainer bolt.
- Tighten them to the specified torque.

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

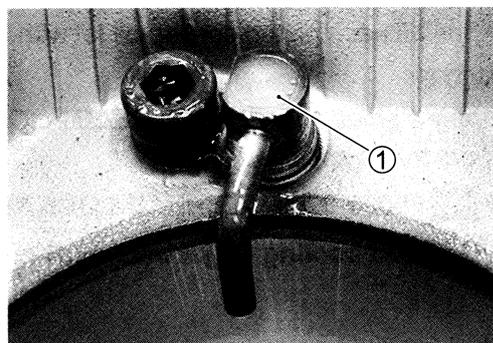
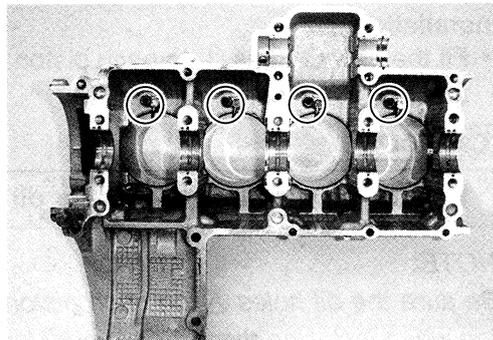
 **Bearing retainer screw: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**

**Gearshift fork shaft retainer bolt: 19 N·m  
(1.9 kgf-m, 13.7 lb-ft)**



## OIL JET Removal

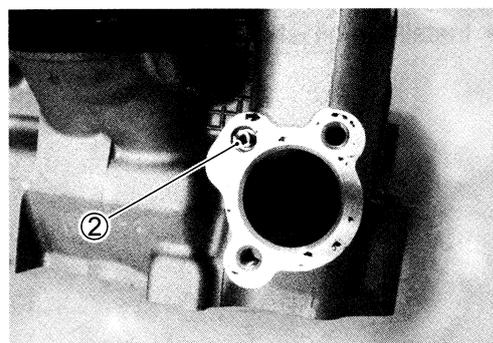
- Remove the piston cooling oil jets ① from the upper crankcase.



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



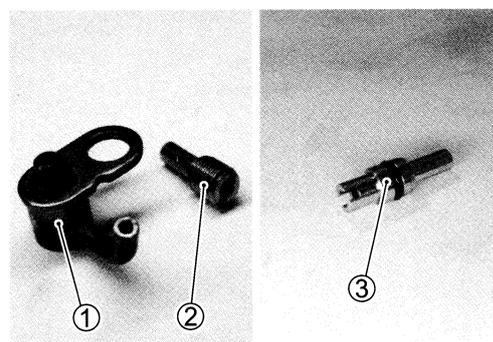
- Remove the oil jet ② (for cam chain tension adjuster) from the cylinder head.



## Inspection and cleaning

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

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



**Installation**

- Fit the new O-rings ① to each piston cooling oil jets as shown and apply engine oil to them.

**CAUTION**

**Use the new O-rings to prevent oil pressure leak.**

**NOTE:**

Be sure the oil holes ① on each piston cooling oil jet faces the top when installing them.

- Install each piston cooling oil jet with the bolt.

**NOTE:**

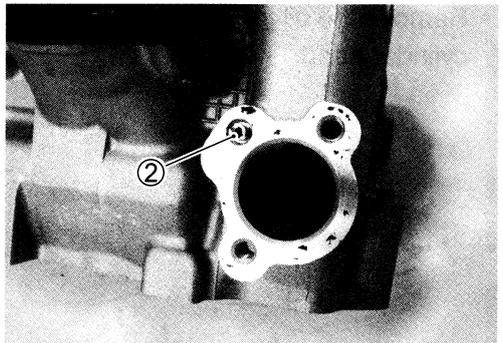
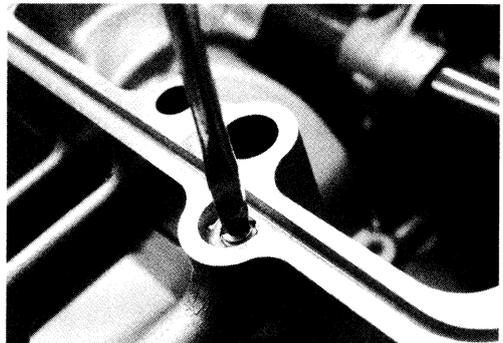
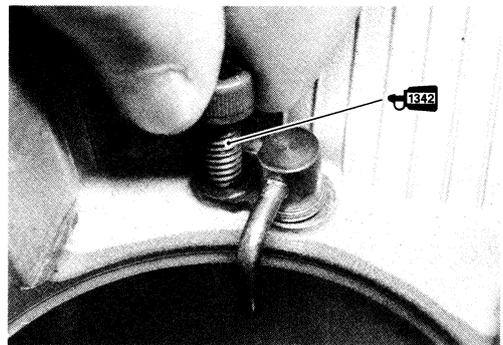
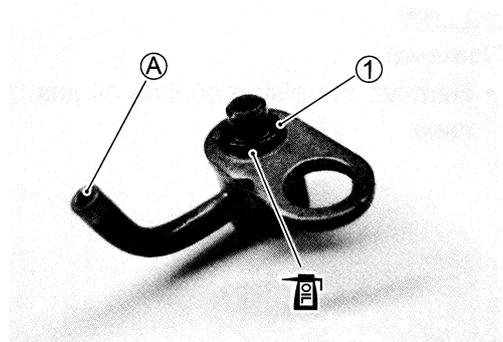
Apply a small quantity of **THREAD LOCK** to the bolts and tighten them to the specified torque.

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

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

- Install the oil jet (for transmission).

- Install the oil jet ② (for cam chain tension adjuster).



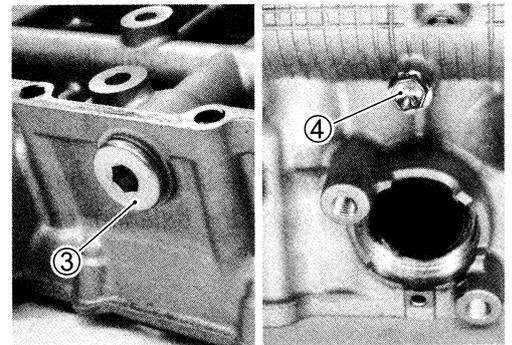
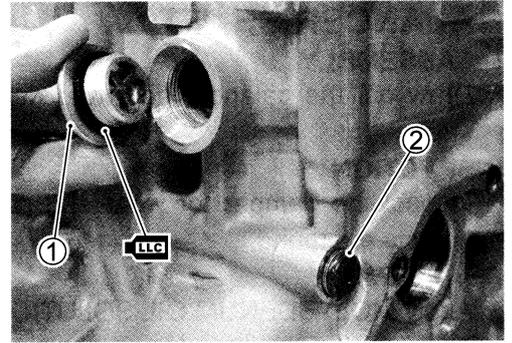
**PLUGS**

- Install each plug.

- ① **Water jacket plug:** 9.5 N·m (0.95 kgf-m, 6.9 lb-ft)
- ② **Oil gallery plug (upper crankcase):**  
18 N·m (1.8 kgf-m, 13.0 lb-ft)
- ③ **Oil gallery plug (lower crankcase):**  
35 N·m (3.5 kgf-m, 25.3 lb-ft)
- ④ **Oil gallery plug (cylinder head):**  
10 N·m (1.0 kgf-m, 7.0 lb-ft)

**NOTE:**

*Apply engine coolant to the O-ring.*



## BALANCER SHAFT

### DISASSEMBLY

- Draw out the balancer gear and damper from the balancer shaft.

### INSPECTION

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

### REASSEMBLY

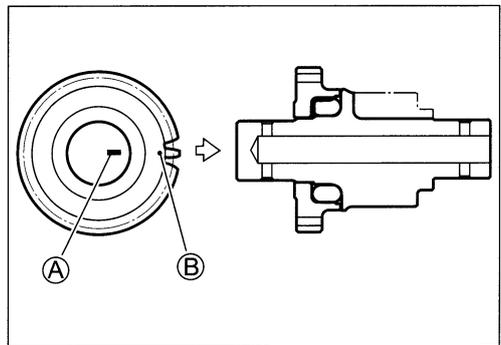
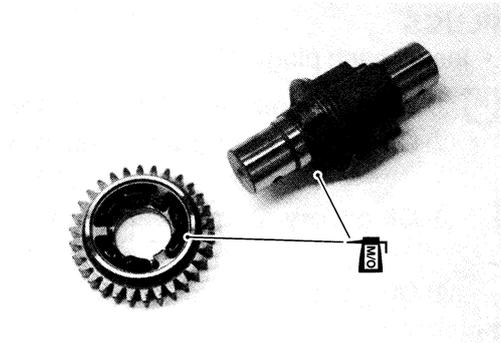
- Apply MOLYBDENUM OIL SOLUTION to each part.

#### MOLYBDENUM OIL SOLUTION

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

#### NOTE:

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



## BALANCER SHAFT JOURNAL BEARING

### INSPECTION

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

### SELECTION

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

 09900-22301: Plastigauge

#### CAUTION

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

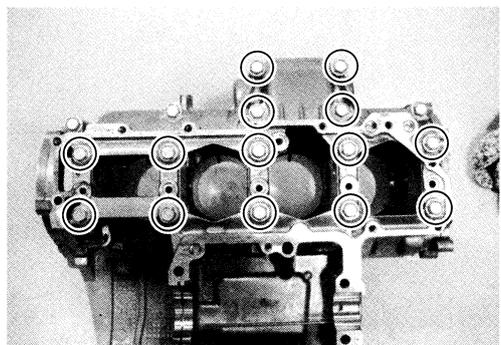
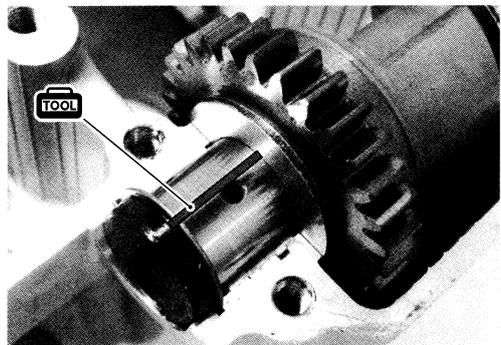
- Mate the middle crankcase with the upper crankcase, and tighten the crankcase bolts (M9 and M8) to the specified torque.

#### Crankcase bolt (9 mm):

Initial : 18 N·m (1.8 kgf-m, 13.0 lb-ft)  
Final : 50 °

#### Crankcase bolt (M8):

Initial : 15 N·m (1.5 kgf-m, 10.8 lb-ft)  
Final : 26 N·m (2.6 kgf-m, 19.0 lb-ft)



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

**DATA** Balancer shaft journal oil clearance:

**Standard: 0.020 – 0.044 mm (0.00079 – 0.00173 in)**

**Service Limit: 0.080 mm (0.031 in)**

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

**DATA** Bearing selection table

	Code	Balancer shaft journal O.D. Ⓑ	
		A	B
<b>Crankcase</b>	A	Green	Black
<b>I.D. Ⓐ</b>	B	Black	Brown

**DATA** Crankcase I.D. specification

Code	I.D. specification
A	26.000 – 26.008 mm (1.0236 – 1.0239 in)
B	26.008 – 26.016 mm (1.0239 – 1.0243 in)

**DATA** Balancer shaft journal O.D. specification

Code	O.D. specification
A	22.992 – 23.000 mm (0.9052 – 0.9055 in)
B	22.984 – 22.992 mm (0.9049 – 0.9052 in)

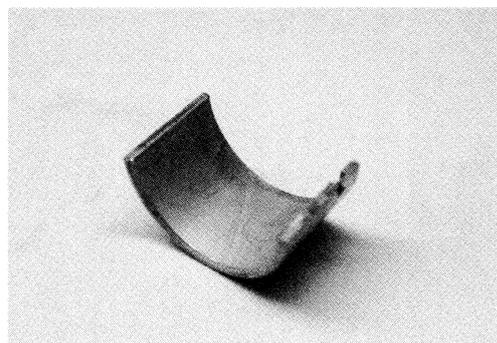
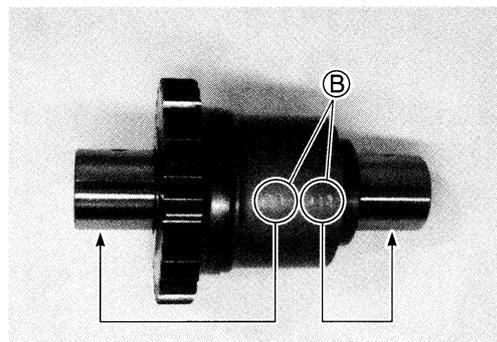
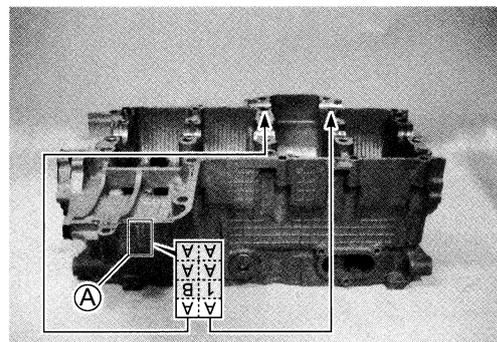
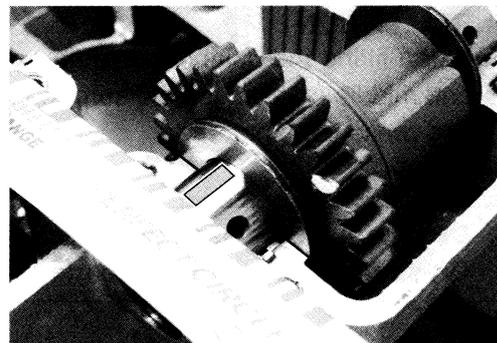
**TOOL** 09900-20205: Micrometer (0 – 25 mm)

**DATA** Bearing thickness specification

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

**NOTE:**

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

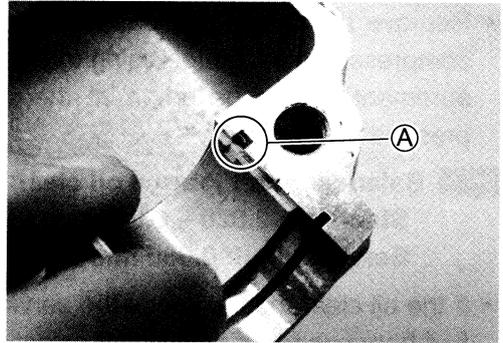


**INSTALLATION**

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

**CAUTION**

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



## CRANKSHAFT AND CONROD

### CRANKSHAFT RUNOUT

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

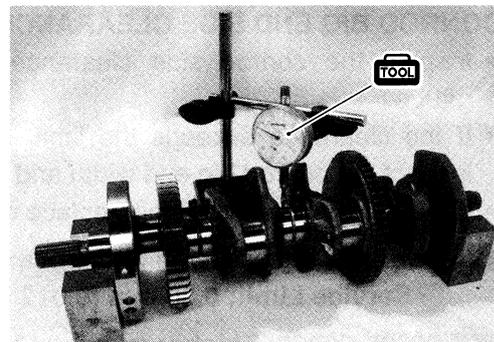
#### **DATA** Crankshaft runout:

Service Limit: 0.05 mm (0.002 in)

**TOOL** 09900-20607: Dial gauge (1/100 mm, 10 mm)

09900-20701: Magnetic stand

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



### CONROD SMALL END I.D.

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

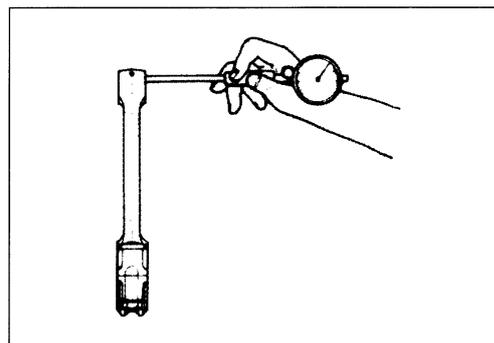
#### **DATA** Conrod small end I.D.:

Service Limit: 16.040 mm (0.6315 in)

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

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

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



**CONROD BIG END SIDE CLEARANCE**

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

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

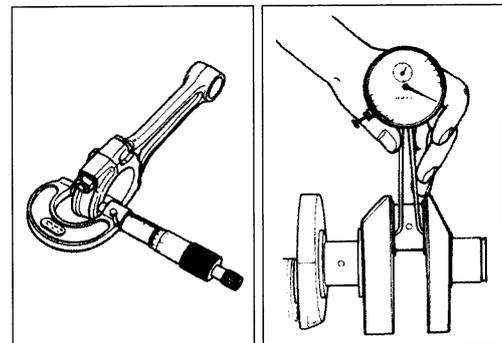
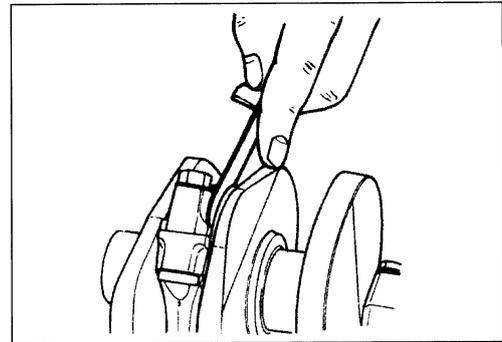
**TOOL** 09900-20803: Thickness gauge

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

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

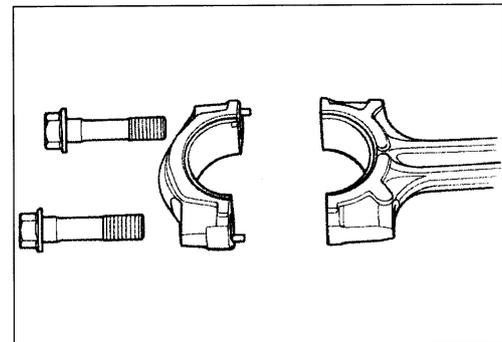
**DATA** Crank pin width:  
 Standard: 20.10 – 20.15 mm (0.7913 – 0.7933 in)

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



**CONROD-BIG END BEARING INSPECTION**

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

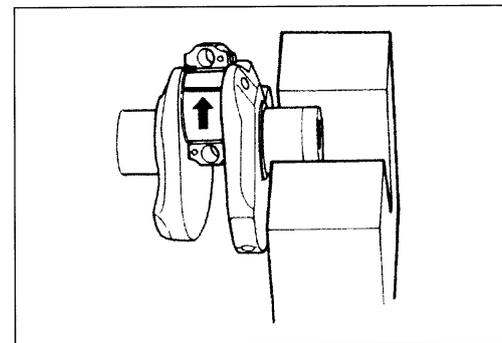


**CONROD-BIG END BEARING SELECTION**

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

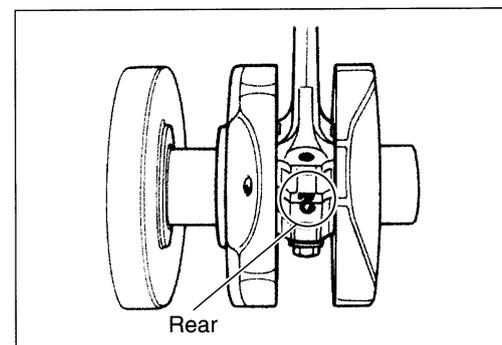
**TOOL** 09900-22301: Plastigauge

- Tighten the conrod cap bolts to the specified torque, in two stages. (3-75)



**CAUTION**

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



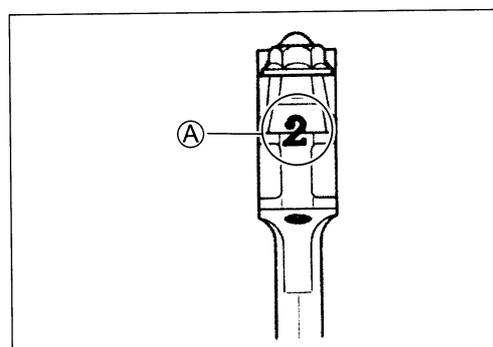
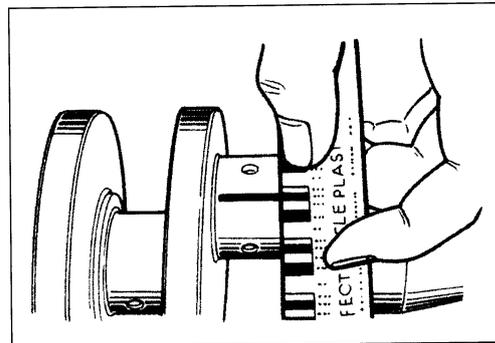
- Remove the bearing caps and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

**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)**

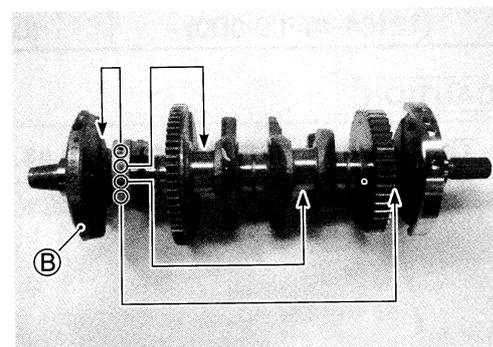
- If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.
- Check the corresponding conrod I.D. code number ("1" or "2") **(A)**.



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

**DATA** Bearing selection table

	Code	Crank pin O.D. <b>(B)</b>		
		1	2	3
Conrod I.D. <b>(A)</b>	1	Green	Black	Brown
	2	Black	Brown	Yellow

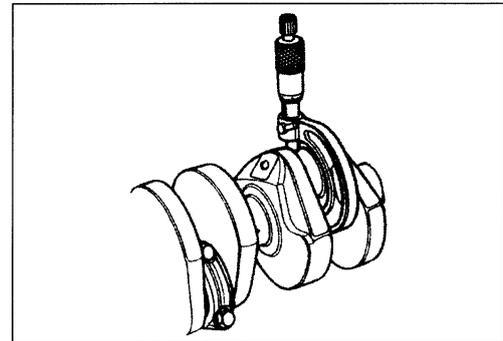


**DATA** Conrod I.D.

Code	I.D. specification
1	38.000 – 38.008 mm (1.4961 – 1.4964 in)
2	38.008 – 38.016 mm (1.4964 – 1.4967 in)

**DATA** Crank pin O.D.

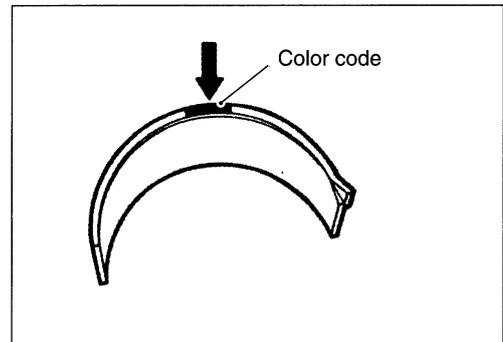
Code	O.D. specification
1	34.992 – 35.000 mm (1.3776 – 1.3780 in)
2	34.984 – 34.992 mm (1.3773 – 1.3776 in)
3	34.976 – 34.984 mm (1.3770 – 1.3773 in)



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

**DATA** Bearing thickness

Color (Part No.)	Thickness
Green (12164-40F00-0A0)	1.480 – 1.484 mm (0.0583 – 0.0584 in)
Black (12164-40F00-0B0)	1.484 – 1.488 mm (0.0584 – 0.0586 in)
Brown (12164-40F00-0C0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)
Yellow (12164-40F00-0D0)	1.492 – 1.496 mm (0.0587 – 0.0589 in)



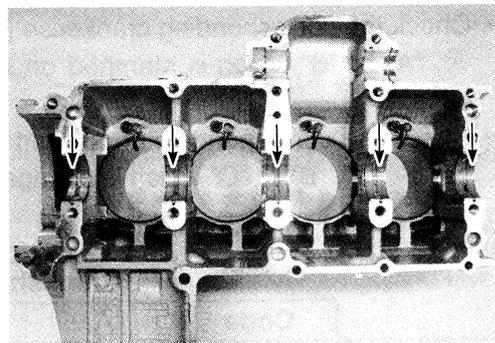
**CAUTION**

The bearings must be replaced as a set.

## CRANKSHAFT JOURNAL BEARING

### INSPECTION

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



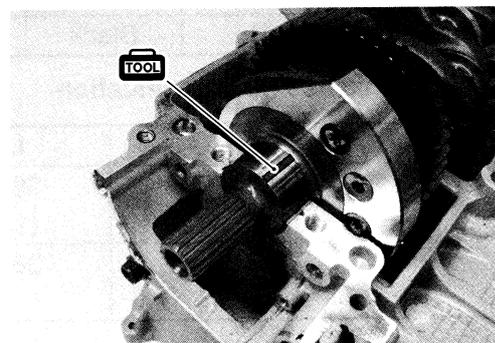
### SELECTION

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

**TOOL** 09900-22301: Plastigauge

### CAUTION

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

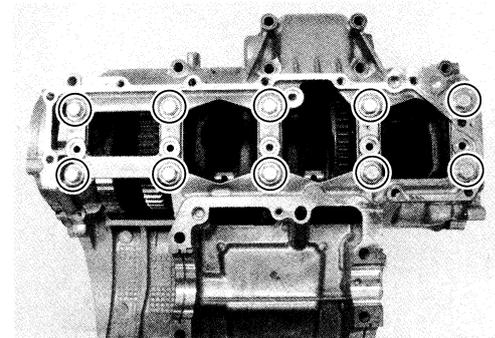


- Mate the lower crankcase with the upper crankcase, and tighten the crankcase bolts (M9) in the following two steps in the indicated order.

**TOOL** Crankcase bolt (9 mm)

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

Final : 50 °



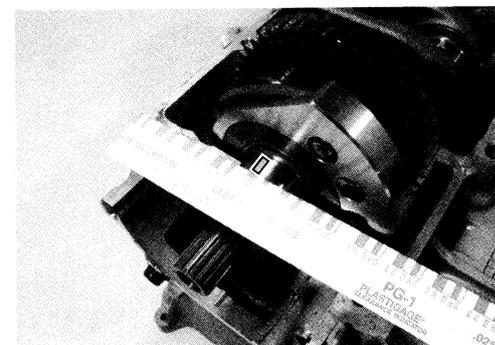
- Remove the lower crankcase and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

**DATA** Crankshaft journal oil clearance:

Standard: 0.016 – 0.040 mm (0.0006 – 0.0016 in)

Service Limit: 0.080 mm (0.031 in)

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





**DATA** Crankshaft journal O.D. specification

Code	O.D. specification
A	34.992 – 35.000 mm (1.3776 – 1.3780 in)
B	34.984 – 34.992 mm (1.3773 – 1.3776 in)
C	34.976 – 34.984 mm (1.3770 – 1.3773 in)

**TOOL** 09900-20202: Micrometer (25 – 50 mm)**DATA** Bearing thickness specification

Color (Part No.)	Thickness
Green (12229-40F00-0A0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)
Black (12229-40F00-0B0)	1.492 – 1.496 mm (0.0587 – 0.0589 in)
Brown (12229-40F00-0C0)	1.496 – 1.500 mm (0.0589 – 0.0591 in)
Yellow (12229-40F00-0D0)	1.500 – 1.504 mm (0.0591 – 0.0592 in)

**NOTE:**

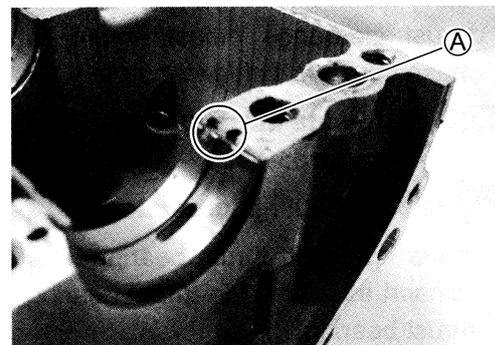
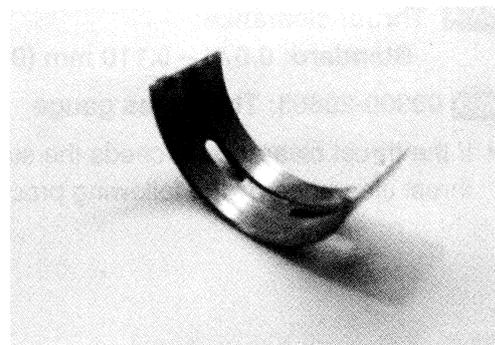
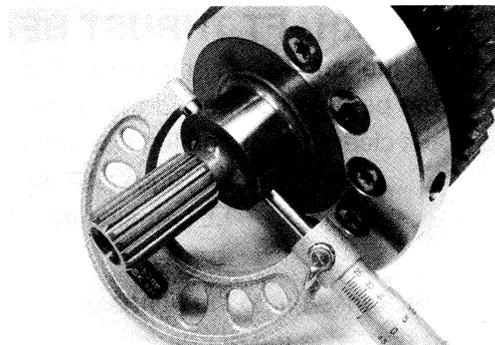
Upper and middle crankshaft journal bearings are the same.

**INSTALLATION**

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

**CAUTION**

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



## CRANKSHAFT THRUST BEARING

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

Ⓡ: Right-side thrust bearing

Ⓛ: Left-side thrust bearing

### NOTE:

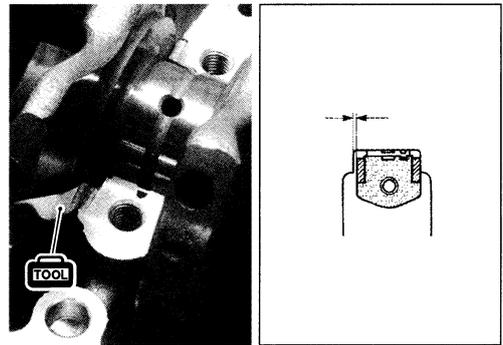
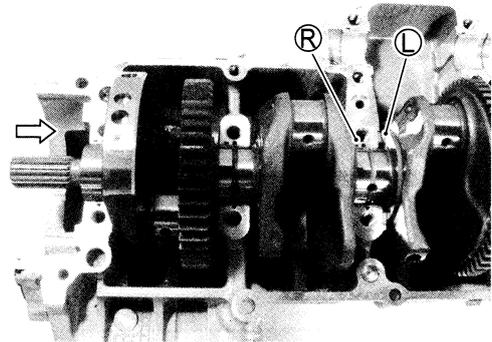
Pull the crankshaft to the right-side, so that there is no clearance on the right-side thrust bearing.

### DATA Thrust clearance:

Standard: 0.070 – 0.110 mm (0.0028 – 0.0043 in)

### TOOL 09900-20803: Thickness gauge

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



## CRANKSHAFT THRUST CLEARANCE ADJUSTMENT

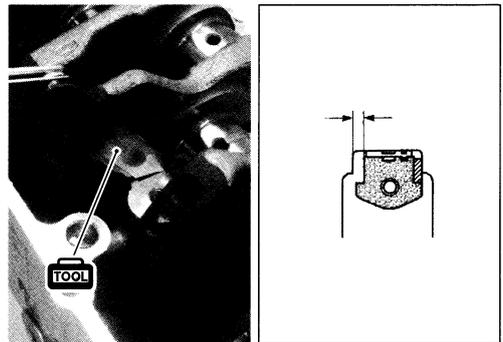
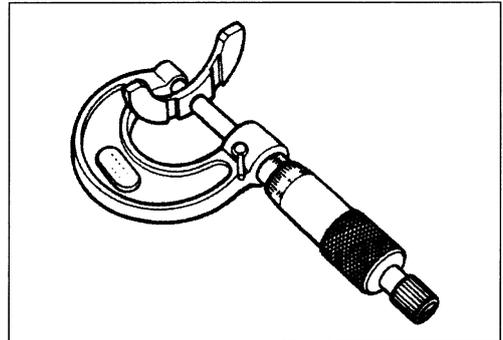
- Remove the right-side thrust bearing and measure its thickness with a micrometer.
- If the thickness of the right-side thrust bearing is below standard, replace it with a new one and once again perform the thrust clearance measurement listed above, checking to make sure it is within standard.

### DATA Right-side thrust bearing thickness:

Standard: 2.420 – 2.440 mm (0.0953 – 0.0961 in)

### TOOL 09900-20205: Micrometer

- 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. (☞ 3-71)



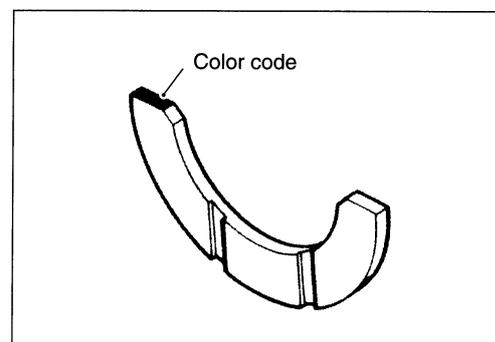
**DATA** Thrust bearing selection table

Clearance before inserting left-side thrust bearing	Color (Part No.)	Thrust bearing thickness	Thrust clearance
2.570 – 2.590 mm (0.1012 – 0.1020 in)	Brown (12228-48B00-0B0)	2.480 – 2.500 mm (0.0976 – 0.0984 in)	0.070 – 0.110 mm (0.0028 – 0.0043 in)
2.550 – 2.570 mm (0.1004 – 0.1012 in)	Red (12228-48B00-0C0)	2.460 – 2.480 mm (0.0969 – 0.0976 in)	0.070 – 0.110 mm (0.0028 – 0.0043 in)
2.530 – 2.550 mm (0.0996 – 0.1004 in)	Yellow (12228-48B00-0D0)	2.440 – 2.460 mm (0.0961 – 0.0969 in)	0.070 – 0.110 mm (0.0028 – 0.0043 in)
2.510 – 2.530 mm (0.0988 – 0.0996 in)	Green (12228-48B00-0E0)	2.420 – 2.440 mm (0.0953 – 0.0961 in)	0.070 – 0.110 mm (0.0028 – 0.0043 in)
2.490 – 2.510 mm (0.0980 – 0.0988 in)	Blue (12228-48B00-0F0)	2.400 – 2.420 mm (0.0945 – 0.0953 in)	0.070 – 0.110 mm (0.0028 – 0.0043 in)
2.470 – 2.490 mm (0.0972 – 0.0980 in)	Orange (12228-48B00-0G0)	2.380 – 2.400 mm (0.0937 – 0.0945 in)	0.070 – 0.110 mm (0.0028 – 0.0043 in)
2.440 – 2.470 mm (0.0961 – 0.0972 in)	Black (12228-48B00-0H0)	2.360 – 2.380 mm (0.0929 – 0.0937 in)	0.060 – 0.110 mm (0.0024 – 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 (12228-48B00-0E0) of left-side thrust bearing.*



## ENGINE REASSEMBLY

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

**NOTE:**

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

- Be sure to install the following items to the crankcase.
  - \* Crankshaft journal bearing (☞ 3-67)
  - \* Gearshift fork (☞ 3-56)
  - \* Gearshift fork shaft (☞ 3-56)
  - \* Gearshift shaft bearing (☞ 3-54)
  - \* Gearshift cam bearing (☞ 3-54)
  - \* Gearshift cam (☞ 3-55)
  - \* Bearing retainer (☞ 3-56)
  - \* Oil jets (☞ 3-57)

### PISTON RING

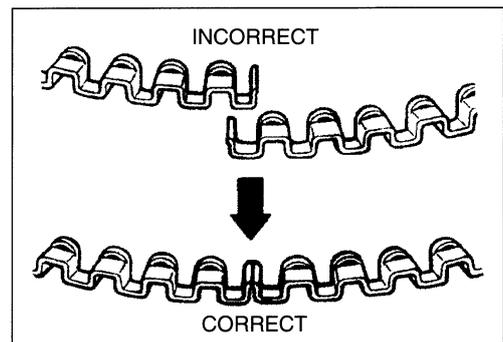
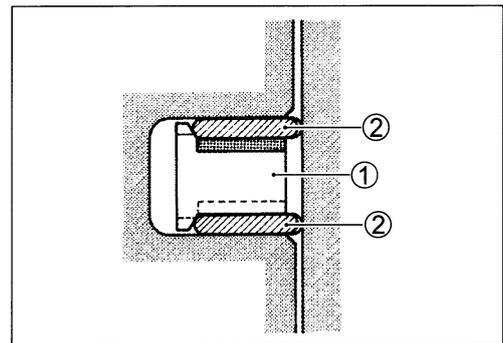
- Install the piston rings in the order of oil ring, 2nd ring and 1st ring.
- The first member to go into the oil ring groove is a spacer ①. After placing the spacer, fit the two side rails ②.

**NOTE:**

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

**CAUTION**

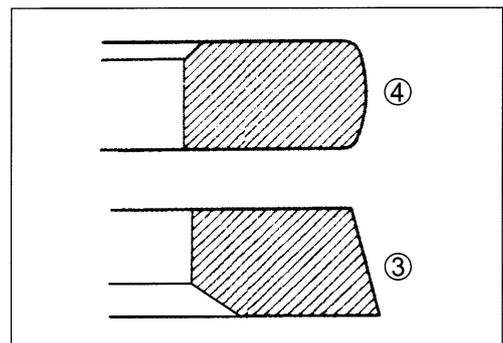
When installing the spacer, be careful not to allow its two ends to overlap in the groove.



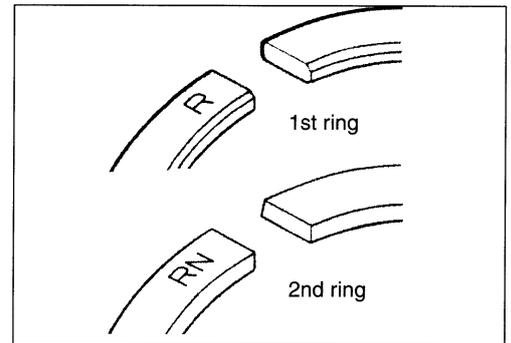
- Install the 2nd ring ③ and the 1st ring ④.

**NOTE:**

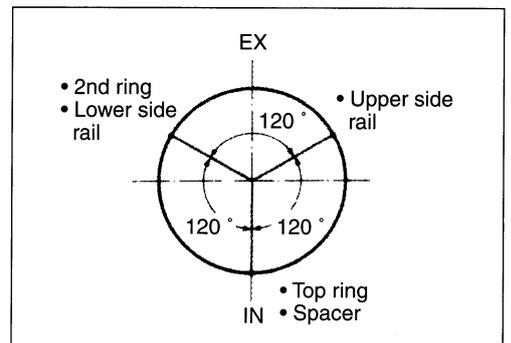
1st ring and 2nd ring differ in shape.



- 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 AND CONROD

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

#### **MOLYBDENUM OIL SOLUTION**

- Assemble the piston and conrod.

#### NOTE:

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

- Install the piston pin circlips **1**.

#### CAUTION

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

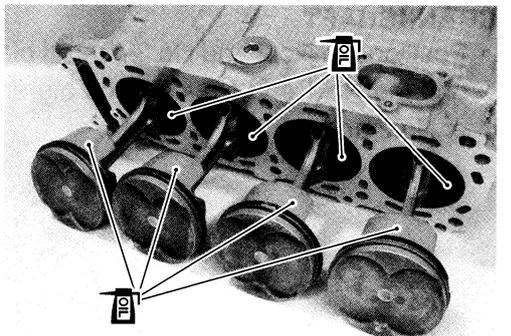
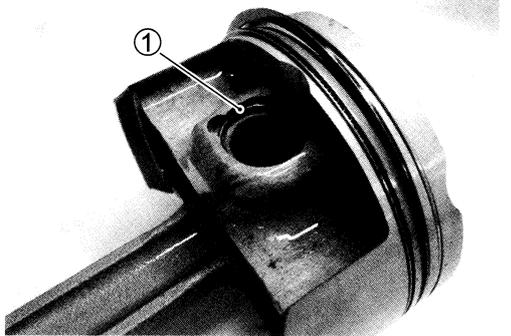
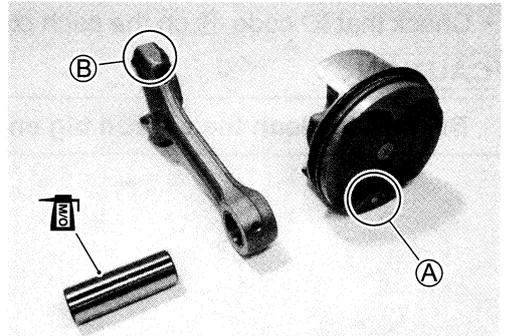
#### NOTE:

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

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

#### NOTE:

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



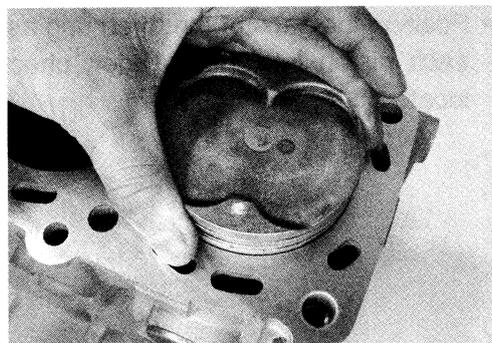
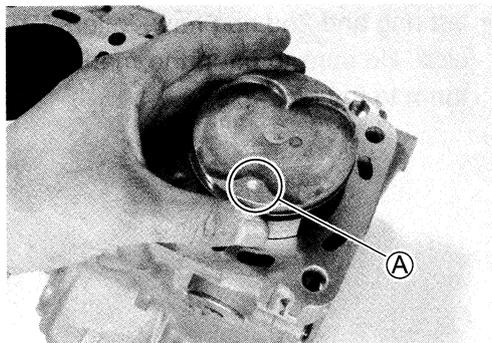
- Install the pistons and conrods into the cylinders from upside.

**NOTE:**

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

**CAUTION**

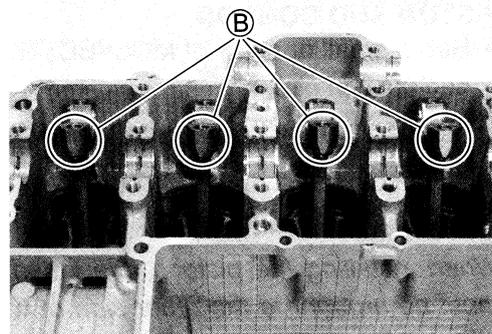
Be careful not to damage the cylinder wall and piston jet by the conrod.



- Check that ID code (B) on the each conrod faces intake side.

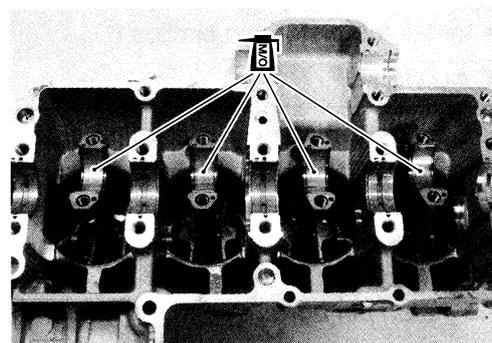
**CAUTION**

Be sure to clean the conrod big end.



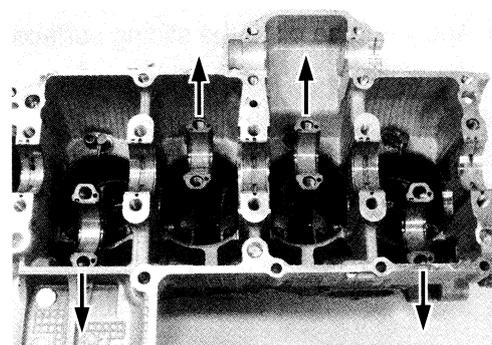
- Apply MOLYBDENUM OIL SOLUTION to the crank pin bearings surface.

 MOLYBDENUM OIL SOLUTION

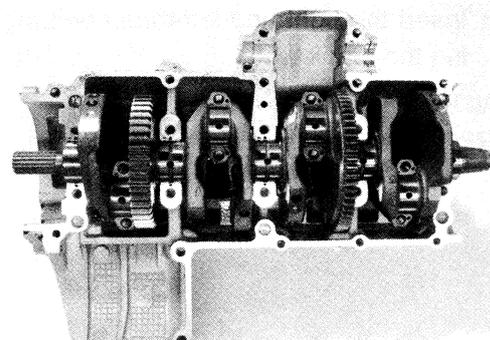


**CRANKSHAFT**

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



- Set the crankshaft to the conrods and upper crankcase.



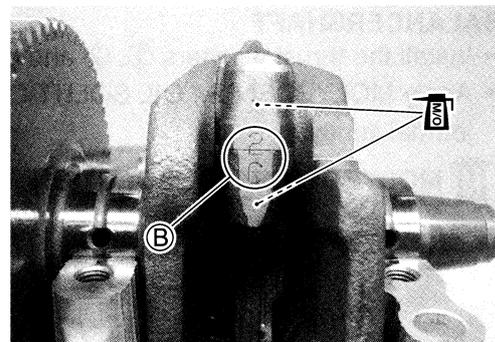
- Apply MOLYBDENUM OIL SOLUTION to the crank pin and bearing surface.

### MOLYBDENUM OIL SOLUTION

#### CAUTION

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

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

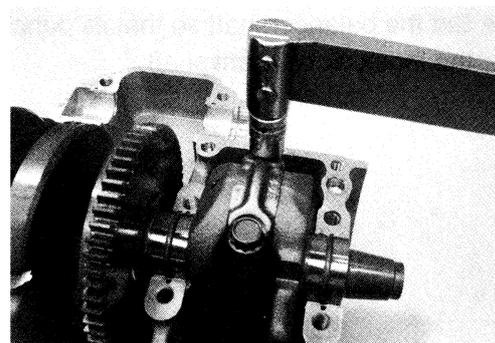


- Apply engine oil to the bearing cap bolts.
- Tighten the bearing cap bolt by using a 12 mm, 12 point socket wrench in the following two steps.

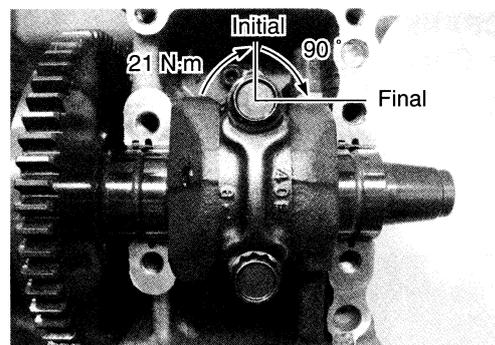
#### Conrod bearing cap bolt:

**Initial: 21 N·m (2.1 kgf-m, 15.5 lb-ft)**

**Final : 90 ° (1/4 turn)**

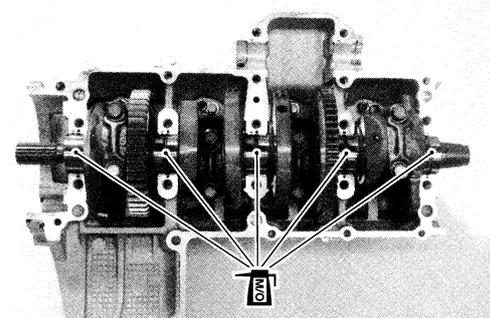


- Apply engine oil to the conrod big end side surfaces.
- Check the conrod movement for smooth turning.



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

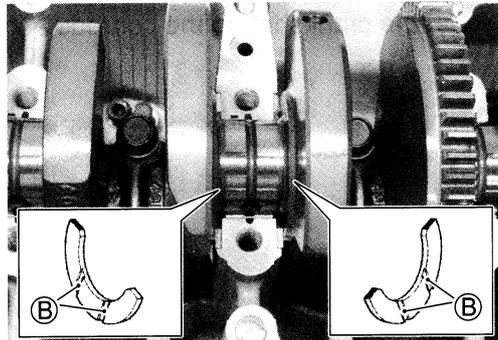
### MOLYBDENUM OIL SOLUTION



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

**NOTE:**

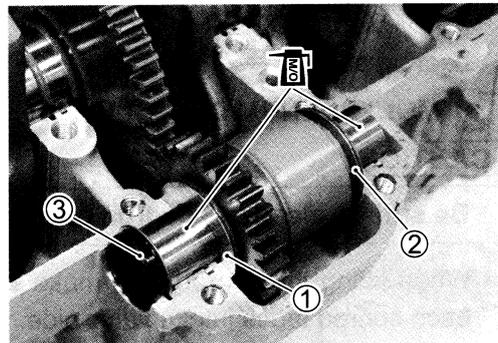
*Right-thrust bearing has green painting.*



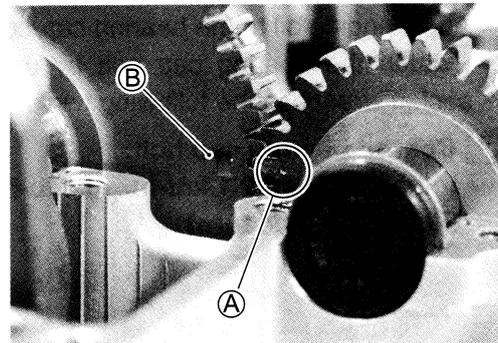
**BALANCERSHAFT**

- Install the thrust washers **1**, **2** and oil seal **3**.
- Apply MOLYBDENUM OIL SOLUTION to each balancershaft journal lightly.

**MOLYBDENUM OIL SOLUTION**

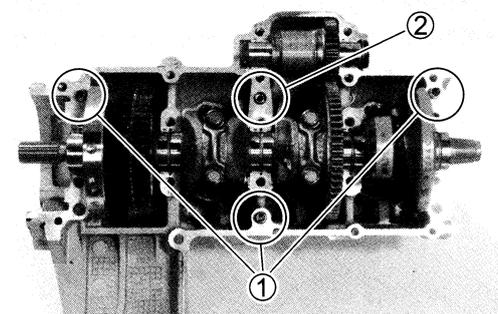


- Set the balancershaft so that its punch mark **A** is aligned with the index **B** on crankshaft.



**CRANKCASE**

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



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

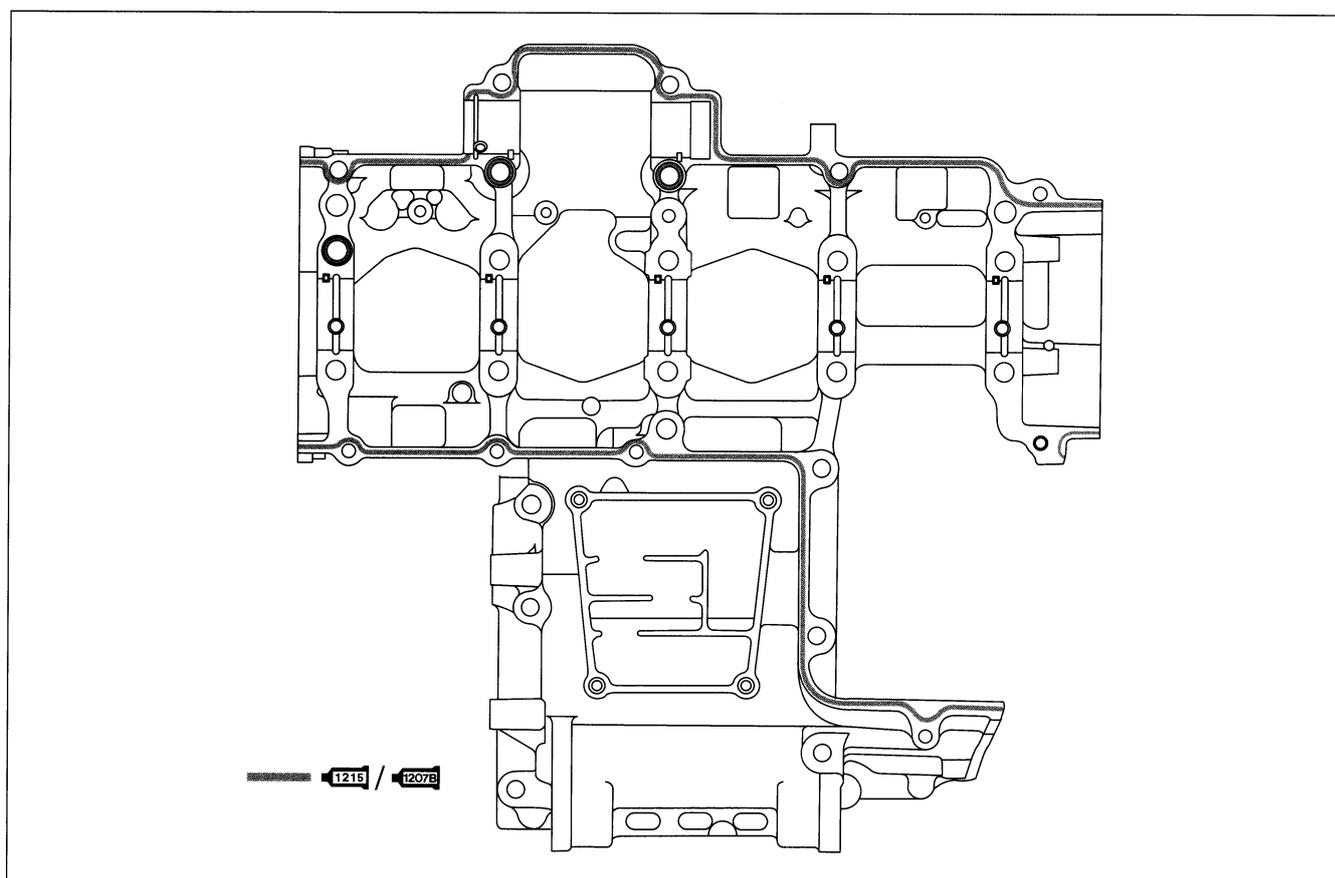
1207B 99104-31140: SUZUKI BOND "1207B" (USA)

1215 99000-31110: SUZUKI BOND "1215" (Others)

**NOTE:**

*Use of SUZUKI BOND is as follows:*

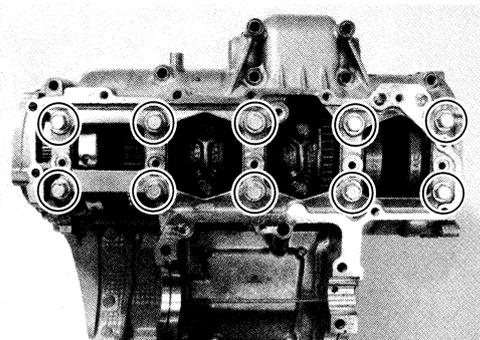
- \* *Make surfaces free from moisture, oil, dust and other foreign materials.*
- \* *Spread on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.*
- \* *Take extreme care not to apply any BOND to the oil hole, oil groove and bearing.*
- \* *Apply to distorted surfaces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



- Tighten the 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 in the following two steps.

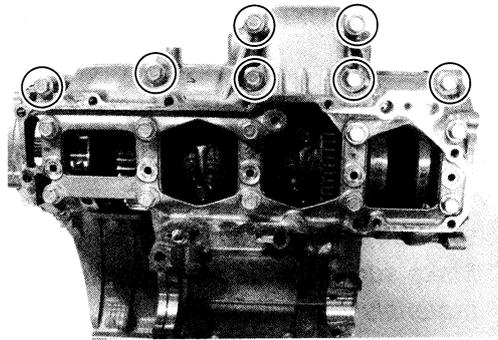
**1 Crankcase bolt: (M9)**

**initial: 18 N·m (1.8 kgf·m, 13.0 lb-ft)**  
**Final : 50 °**



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

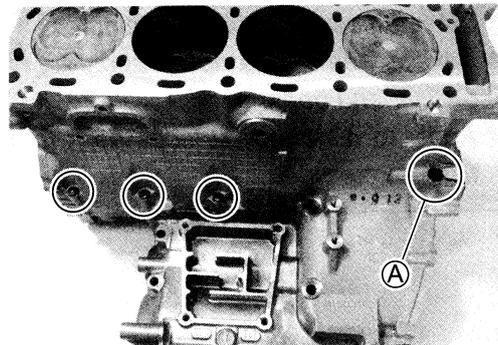
 **Crankcase bolt: (M8) initial: 15 N·m (1.5 kgf-m, 10.8 lb-ft)  
Final : 26 N·m (2.6 kgf-m, 19.0 lb-ft)**



 **Crankcase bolt: (M6) initial : 6 N·m (0.6 kgf-m, 4.5 lb-ft)  
Final : 11 N·m (1.1 kgf-m, 8.0 lb-ft)**

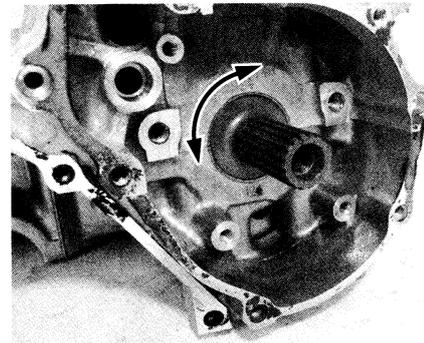
**NOTE:**

*Fit the new gasket to the crankcase bolt (A).*



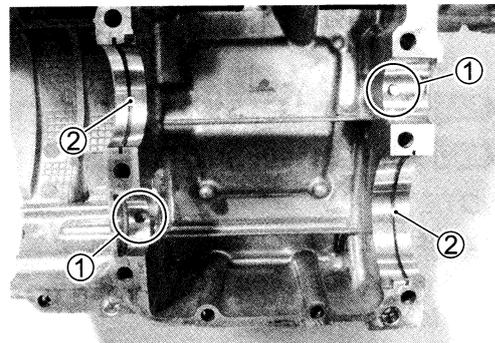
**NOTE:**

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



**TRANSMISSION**

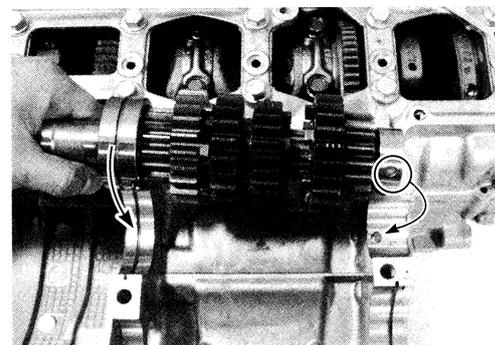
- Install the bearing pins ① and the C-ring ② on the upper crankcase.



- Install the countershaft assembly on the upper crankcase.

**NOTE:**

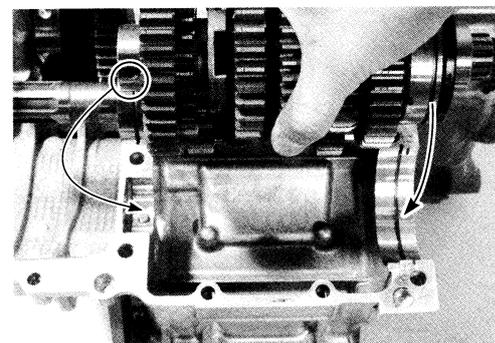
*Align the C-ring with the groove on the bearing and the bearing pin with the indent on the bearing.*



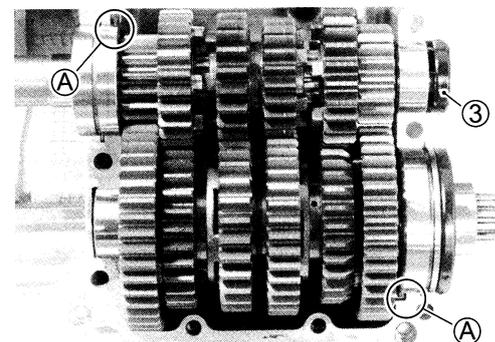
- Install the driveshaft assembly on the upper crankcase.

**NOTE:**

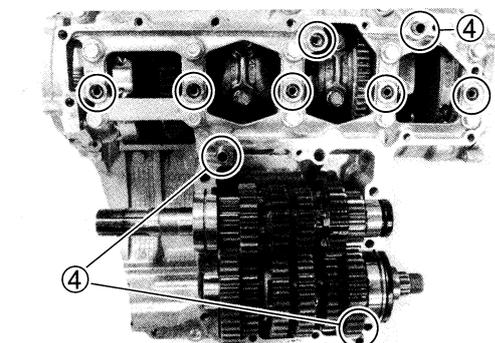
*Align the bearing ring with the groove on the crankcase and the bearing pin with the indent on the bearing.*



- Install the oil seal ③.
- Turn the bearings to install the bearing dowel pins ④ in the respective positions.



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



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

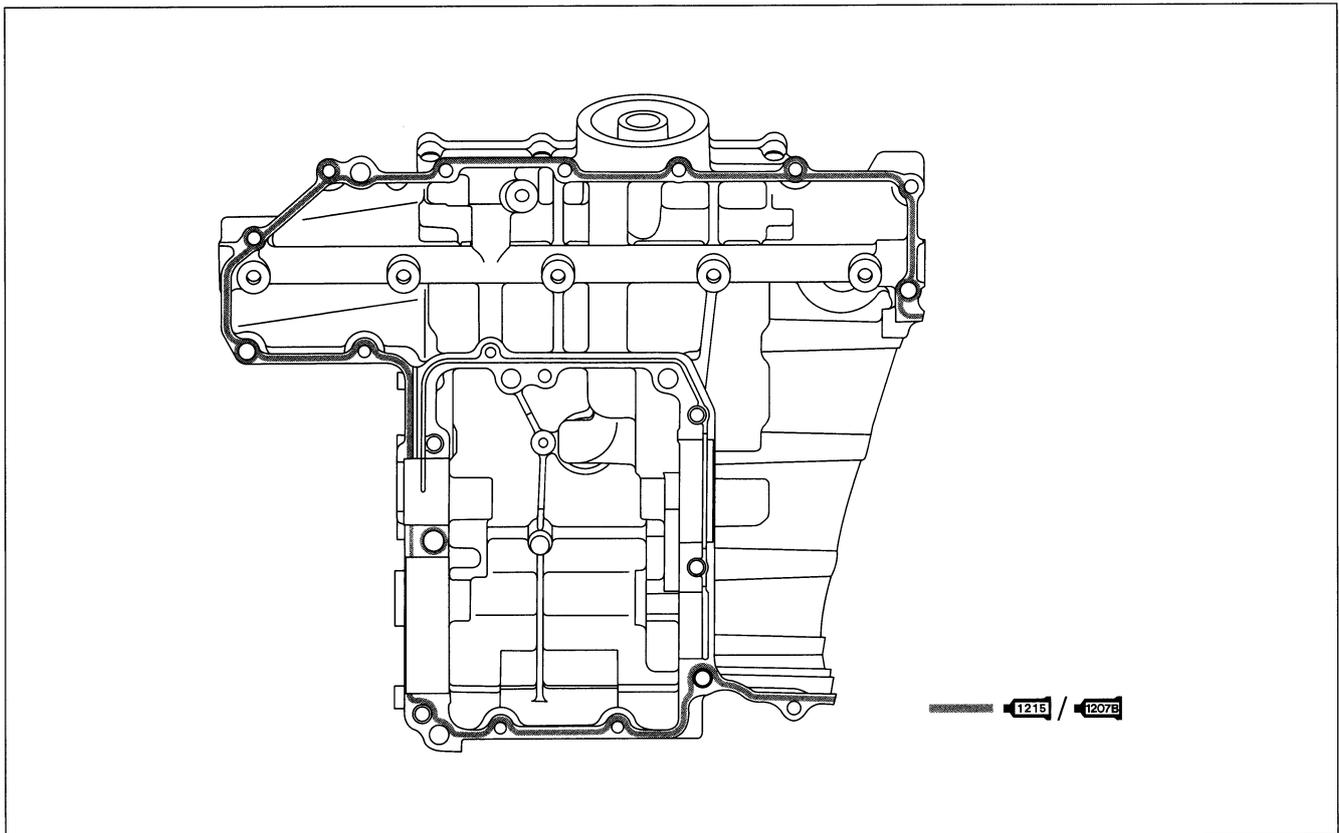
 99104-31140: SUZUKI BOND "1207B" (USA)

 99000-31110: SUZUKI BOND "1215" (Others)

**NOTE:**

*Use of SUZUKI BOND is as follows:*

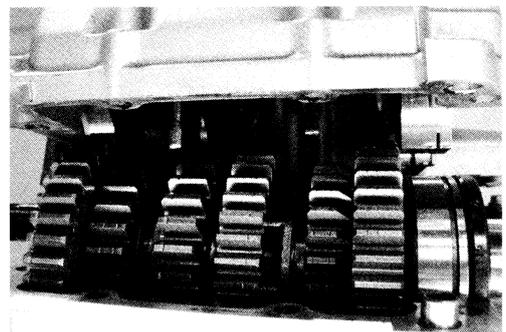
- \* *Make surfaces free from moisture, oil, dust and other foreign materials.*
- \* *Spread on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.*
- \* *Take extreme care not to apply any BOND to the oil hole, oil groove and bearing.*
- \* *Apply to distorted surfaces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



- Match the middle and lower crankcases.

**NOTE:**

*Align the gearshift forks with their grooves.*

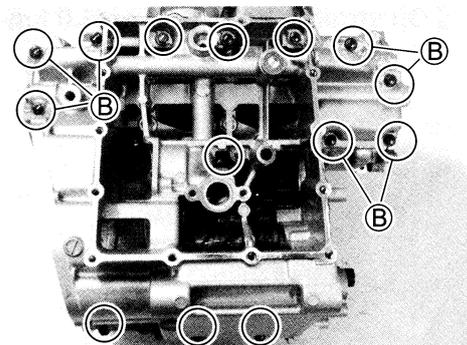
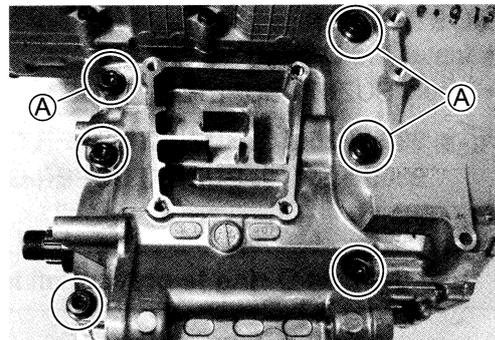


- Tighten the crankcase bolts a little at a time to equalize the pressure.

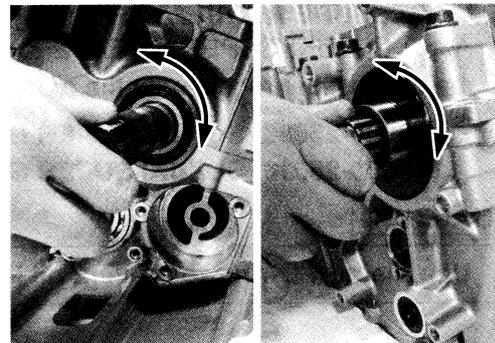
**🔧 Crankcase bolt:** (M6) initial: 6 N·m (0.6 kgf-m, 4.5 lb-ft)  
Final : 11 N·m (1.1 kgf-m, 8.0 lb-ft)  
(M8) initial: 15 N·m (1.5 kgf-m, 10.8 lb-ft)  
Final : 26 N·m (2.6 kgf-m, 19.0 lb-ft)

**NOTE:**

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



- Check that the driveshaft and countershaft rotate smoothly.



### OIL STRAINER

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

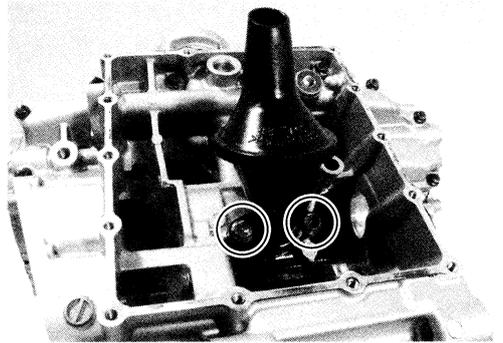
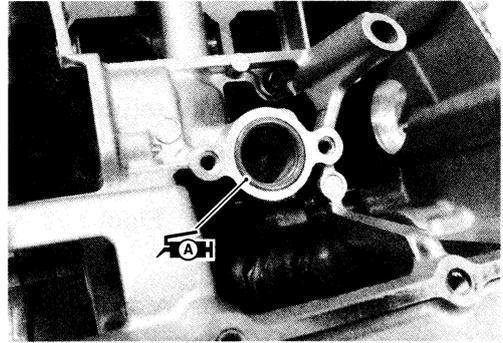
 **99000-25030: SUZUKI SUPER GREASE "A" (USA)**  
**99000-25010: SUZUKI SUPER GREASE "A" (Others)**

#### CAUTION

**Use the new O-ring to prevent oil leakage.**

- Install the oil strainer as shown.

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



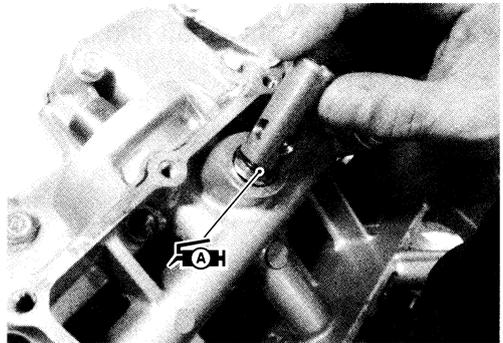
### OIL PRESSURE REGULATOR

- Apply SUZUKI SUPER GREASE to the O-ring and press in the oil pressure regulator to the crankcase.

 **99000-25030: SUZUKI SUPER GREASE "A" (USA)**  
**99000-25010: SUZUKI SUPER GREASE "A" (Others)**

#### CAUTION

**Use the new O-ring to prevent oil leakage.**



### OIL PAN

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

 **99104-31140: SUZUKI BOND "1207B" (USA)**

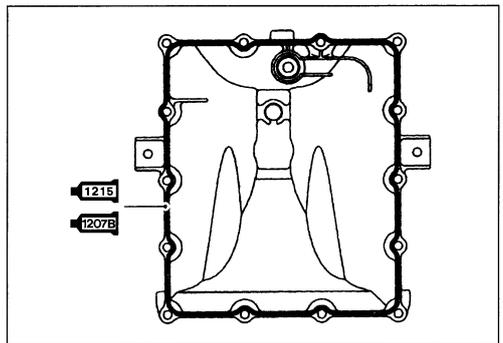
 **99000-31110: SUZUKI BOND "1215" (Others)**

#### NOTE:

*Use of SUZUKI BOND is as follows:*

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

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



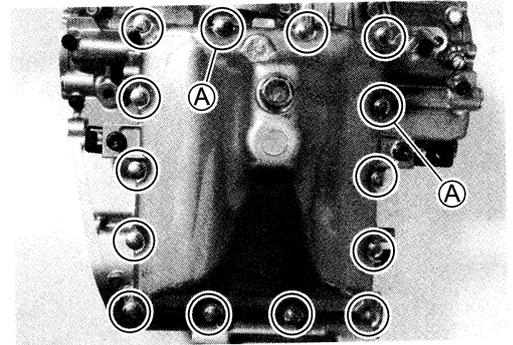
- Install the oil pan.

**NOTE:**

Fit the gasket washer to the oil pan bolt (A).

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

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

**OIL PRESSURE SWITCH**

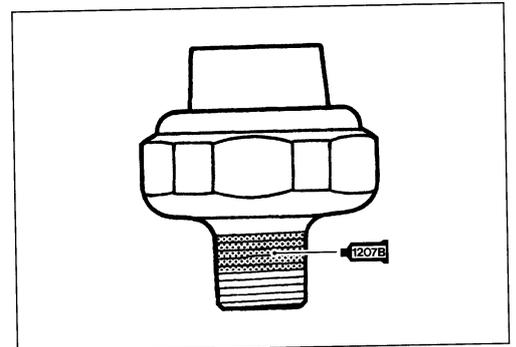
- Apply SUZUKI BOND to the thread part of the oil pressure switch ① and tighten it to the specified torque.

 **99104-31140: SUZUKI BOND "1207B" (USA)**  
**99000-31140: SUZUKI BOND "1207B" (Others)**

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

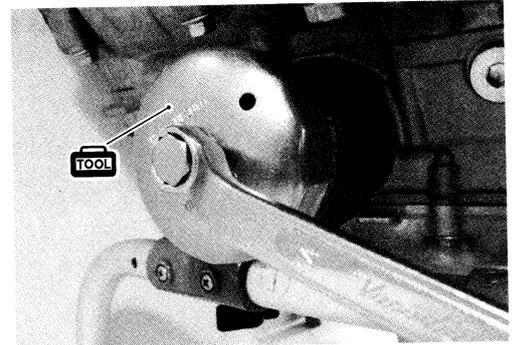
**NOTE:**

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

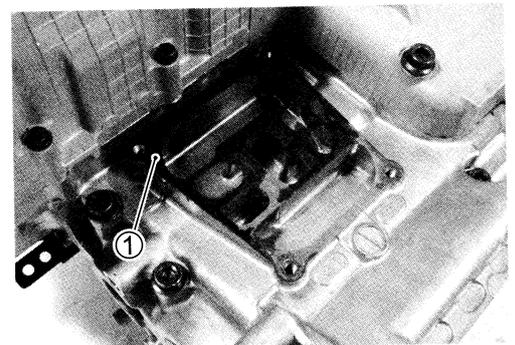
**OIL FILTER**

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

 **09915-40610: Oil filter wrench**

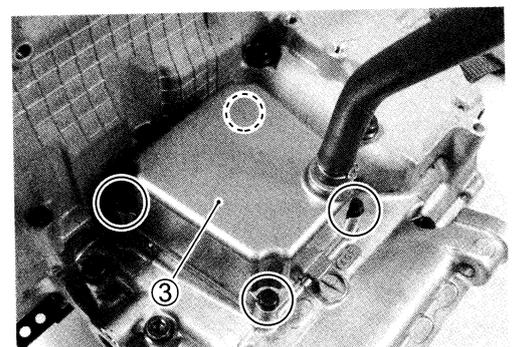
**BREATHER COVER**

- Install the new gasket ①.



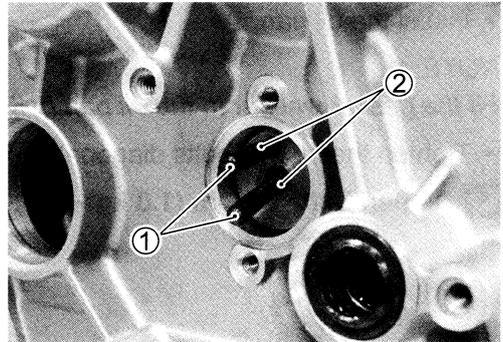
- Install the breather cover ②.

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



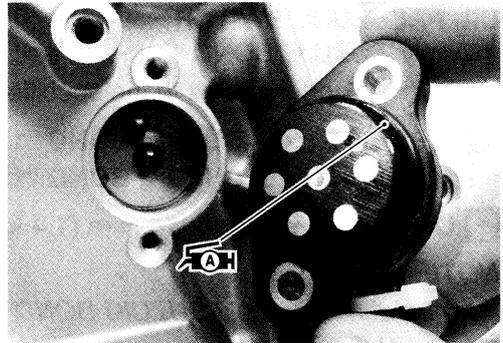
### GEAR POSITION SWITCH

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

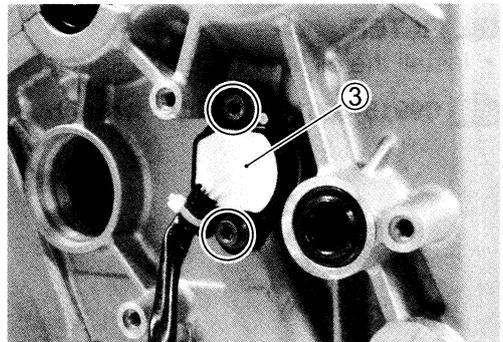


- Apply the SUZUKI SUPER GREASE to the O-ring.

 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
99000-25010: SUZUKI SUPER GREASE "A" (Others)



- Install the gear position switch ③ as shown.



**WATER PUMP**

- Apply SUZUKI SUPER GREASE to the O-ring.

**CAUTION**

Use the new O-ring to prevent oil leakage.

-  99000-25030: SUZUKI SUPER GREASE "A" (USA)
- 99000-25010: SUZUKI SUPER GREASE "A" (Others)

- 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)**

**NOTE:**

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

Ⓐ.

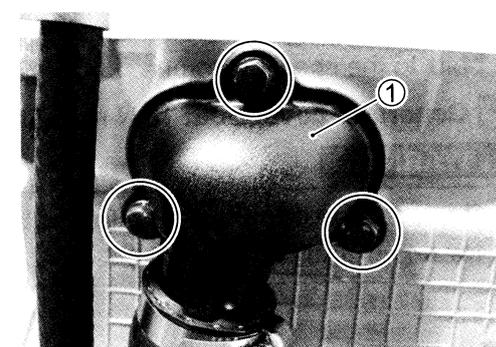
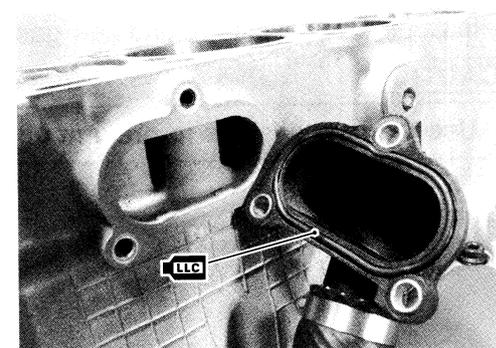
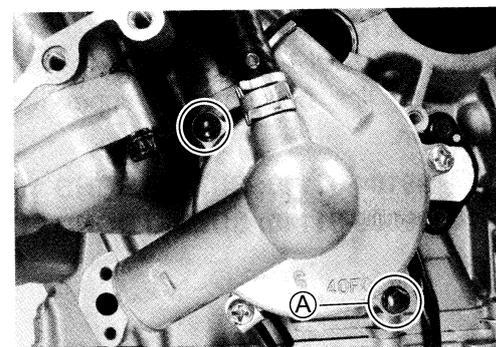
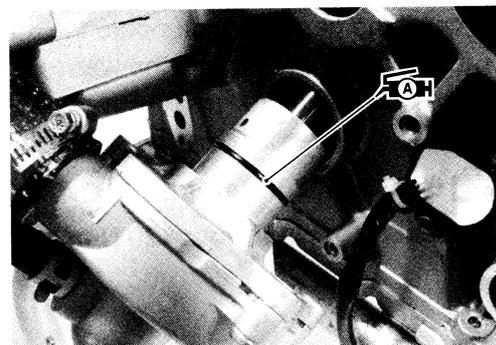
- Apply engine coolant to the O-ring.

- Install the water inlet cover ①.

 **Water inlet cover bolt: 10 N·m (1.0 kgf·m, 7.0 lb·ft)**

**GENERATOR ROTOR**

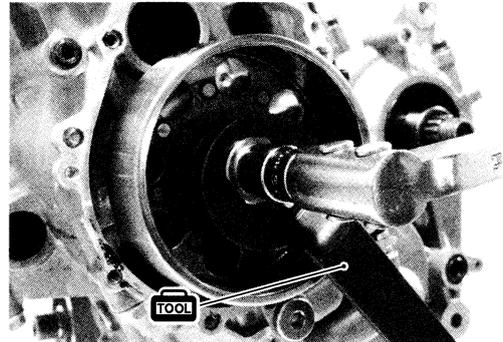
- Degrease the tapered portion of the generator rotor and also the crankshaft. Use nonflammable cleaning solvent to wipe off oily or greasy matter and make these surfaces completely dry.



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

**TOOL** 09930-44520: Rotor holder

**Generator rotor bolt: 120 N·m (12.0 kgf-m, 88.5 lb-ft)**

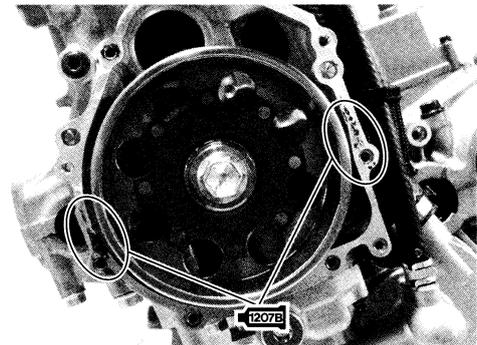


### GENERATOR COVER

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

**1207B** 99104-31140: SUZUKI BOND “1207B” (USA)

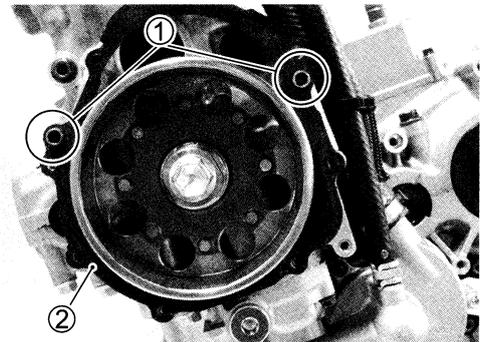
99000-31140: SUZUKI BOND “1207B” (Others)



- Install the dowel pins ① and new gasket ②.

#### CAUTION

Use the new gaskets to prevent oil leakage.

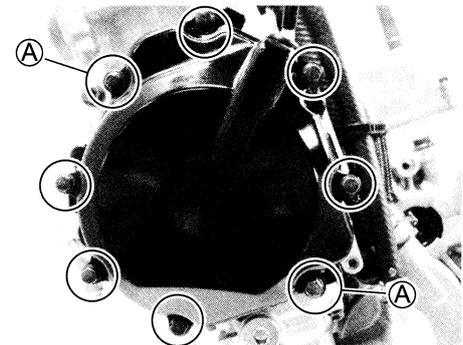


- Install the generator cover and tighten the generator cover bolts to the specified torque.

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

#### WARNING

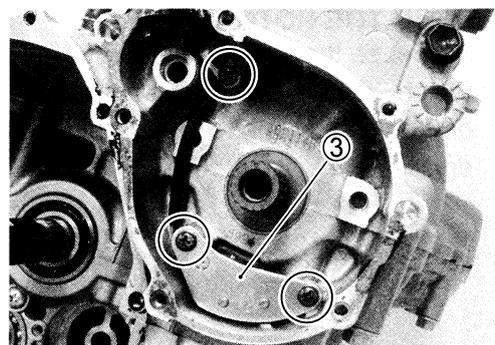
Be careful not to pinch the finger between the generator cover and the crankcase.



#### NOTE:

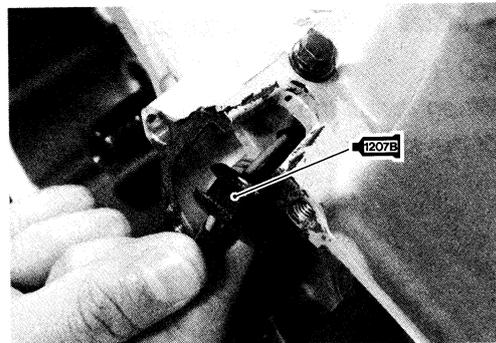
Fit the gasket washer to the bolts (A).

- Install the CKP sensor ③.



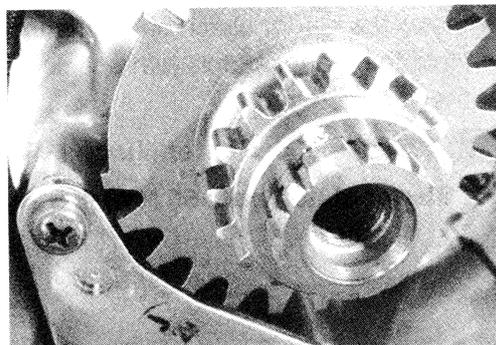
- Apply SUZUKI BOND light to the groove of the signal generator lead wire gromet.

**1207B** 99104-31140: SUZUKI BOND "1207B" (USA)  
99000-31140: SUZUKI BOND "1207B" (Others)



### CAM CHAIN DRIVE SPROCKET

- Install the cam chain drive sprocket onto the crankshaft.

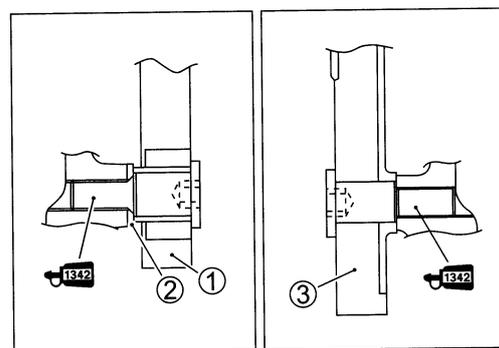
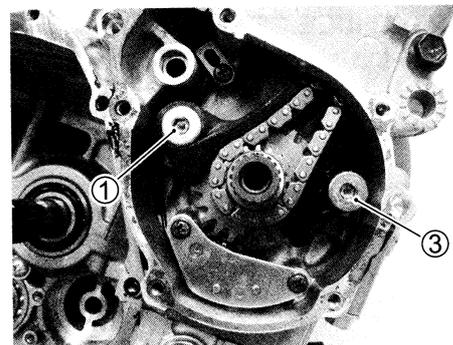


### CAM CHAIN TENSIONER AND CAM CHAIN GUIDE

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

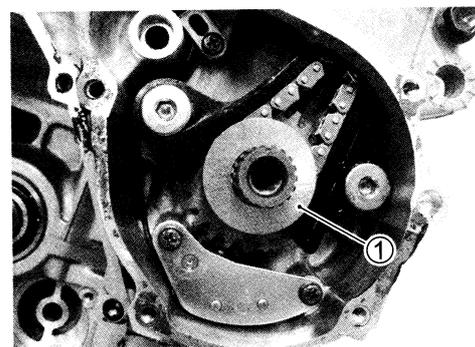
**1342** 99000-32050: THREAD LOCK "1342"

**1342** Cam chain tensioner bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)  
Cam chain guide bolt: 10 N·m (1.0 kgf·m, 7.0 lb-ft)



### STARTER CLUTCH

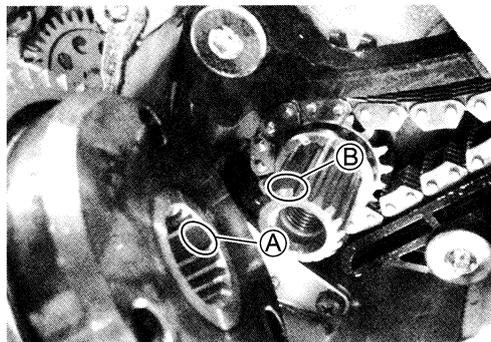
- Install the washer ①.



- Install the starter clutch assembly onto the crankshaft.

**NOTE:**

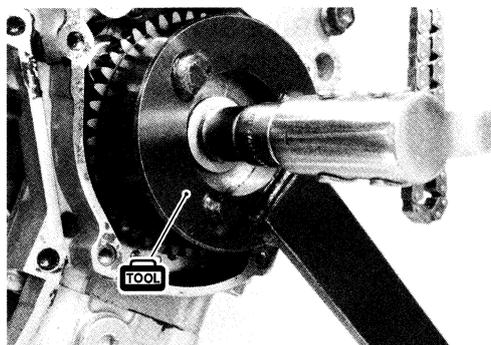
When install the starter clutch assembly, fit the concave part **(A)** of the starter clutch onto the convex part **(B)** of the crankshaft.



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

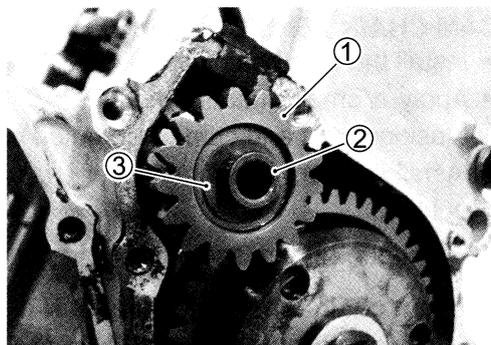
**TOOL** 09920-34830: Starter clutch holder

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



**STARTER IDLE GEAR**

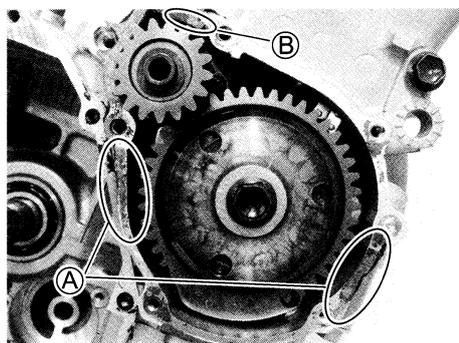
- Install the starter idle gear No.2 **(1)**, its shaft **(2)** and the concaved washer **(3)**.



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

**1207B** 99104-31140: SUZUKI BOND "1207B" (USA)

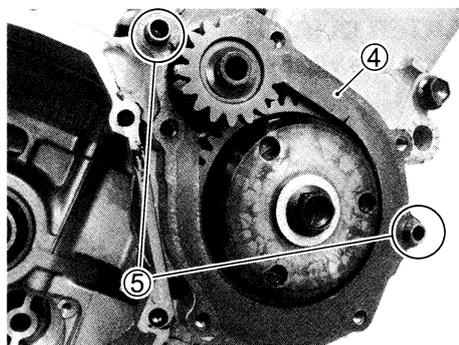
99000-31140: SUZUKI BOND "1207B" (Others)



- Install the new gasket **(4)** and the dowel pins **(5)**.

**CAUTION**

Use a new gasket to prevent oil leakage.



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

**NOTE:**

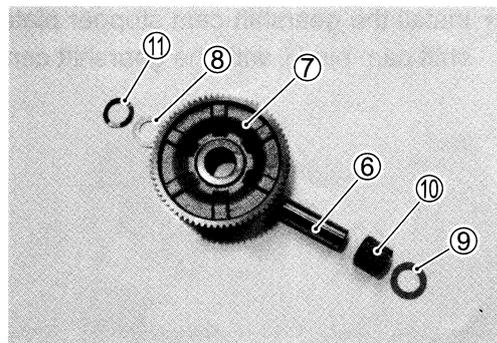
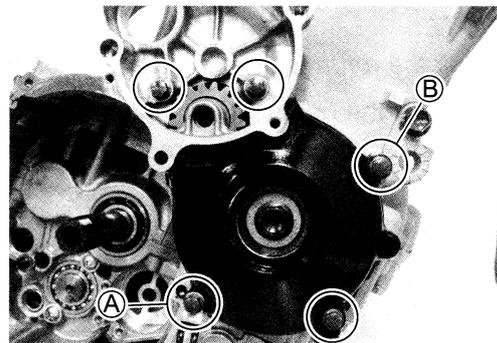
- \* Fit the wire clamp to the starter clutch cover bolt (A) as shown.
- \* Fit the new gasket washer to the starter clutch cover bolt (B) as shown.

**CAUTION**

Use the new gasket washer to prevent oil leakage.

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

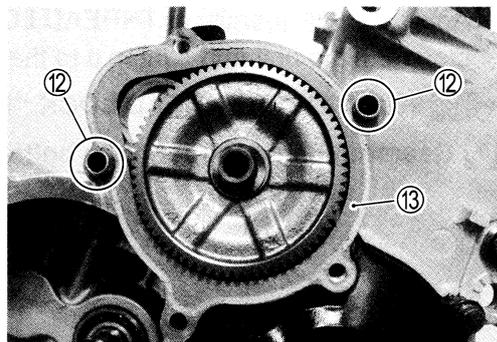
- Install the starter idle gear No.1 shaft (6), starter idle gear No.1 (7), washer (8), thrust washer (9), bearing (10) and concaved washer (11).



- Install the dowel pins (12) and the new gasket (13).

**CAUTION**

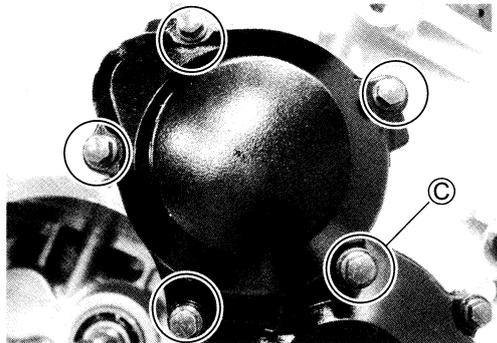
Use a new gasket to prevent oil leakage.



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

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

Fit the gasket washer to the bolt (C).

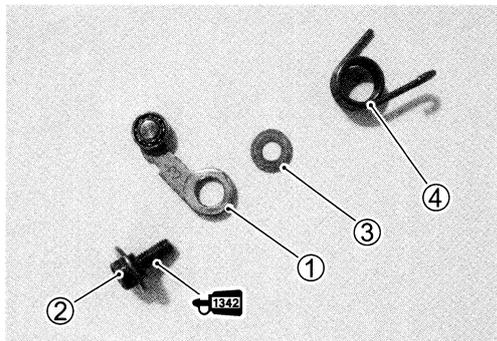
**GEARSHIFT SYSTEM**

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

**NOTE:**

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

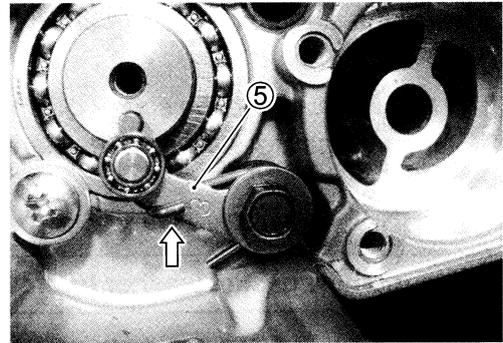
**1342** 99000-32050: **THREAD LOCK "1342"**

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

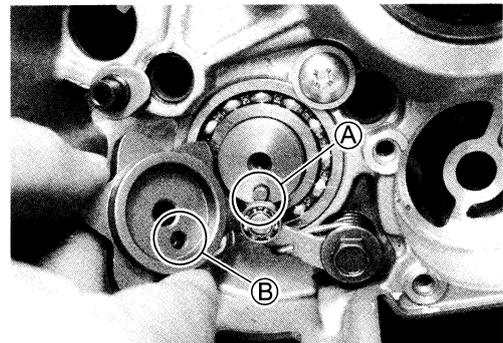
**NOTE:**

Hook the return spring end to the stopper ⑤.

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



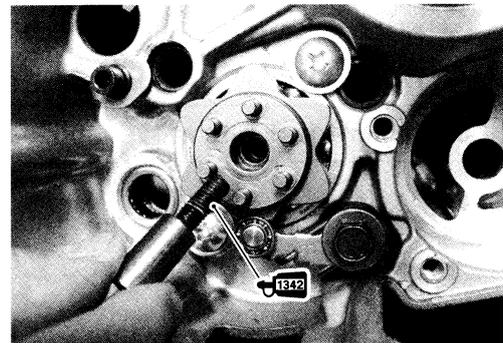
- Install the gearshift cam stopper plate after aligning the gearshift cam pin ① with the gearshift cam stopper plate hole ②.



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

 99000-32050: THREAD LOCK "1342"

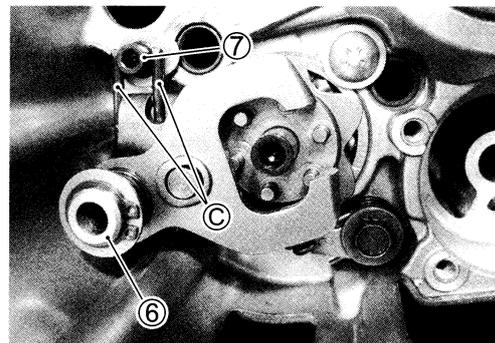
 Gearshift cam stopper plate bolt: 13 N·m  
(1.3 kgf-m, 9.5 lb-ft)



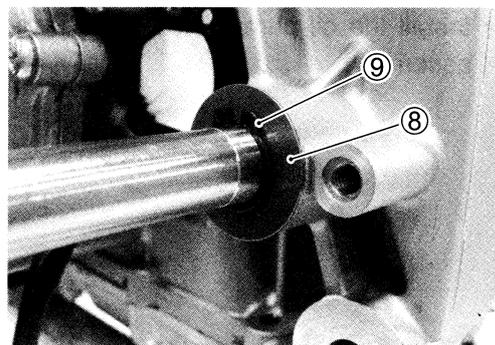
- Install the gearshift shaft/gearshift arm ⑥ with the washers as shown.

**NOTE:**

Pinch the gearshift arm stopper ⑦ with return spring ends ③.



- Install the washer ⑧ and snap ring ⑨.

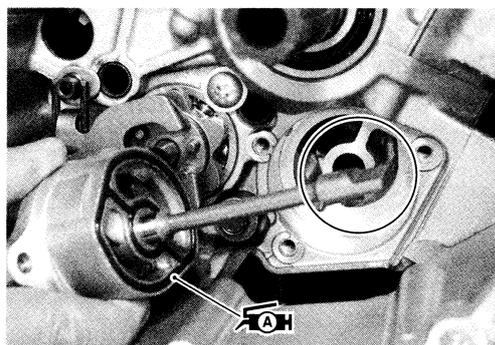
**OIL PUMP**

- 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" (USA)  
 99000-25010: SUZUKI SUPER GREASE "A" (Others)

**NOTE:**

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

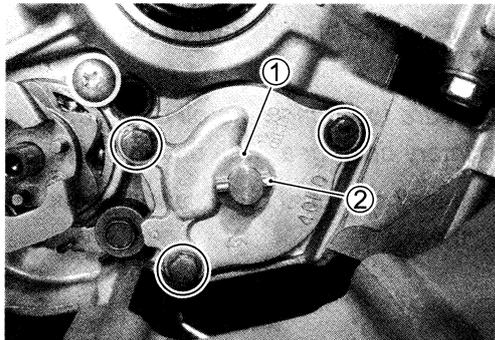
- Install the oil pump with the three bolts and then tighten them to the specified torque.

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

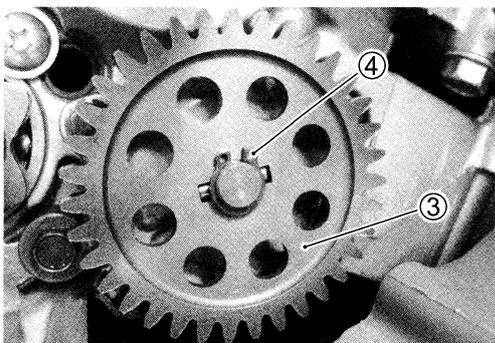
- Install the washer ① and the pin ②.

**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 snap ring ④.

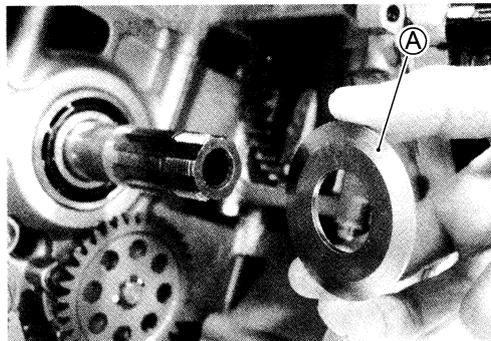


**CLUTCH**

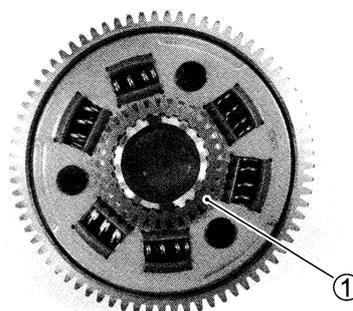
- Install the thrust washer onto the countershaft.

**NOTE:**

*The chamfer side Ⓐ of the thrust washer faces inner side.*

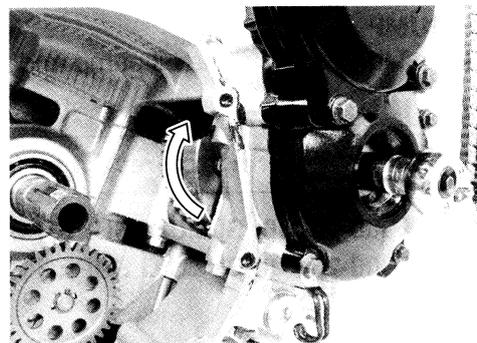


- Install the oil pump drive gear ① to the primary driven gear assembly.



**NOTE:**

*Be careful not to contact the primary driven gear with the crankweb when installing the clutch housing.*

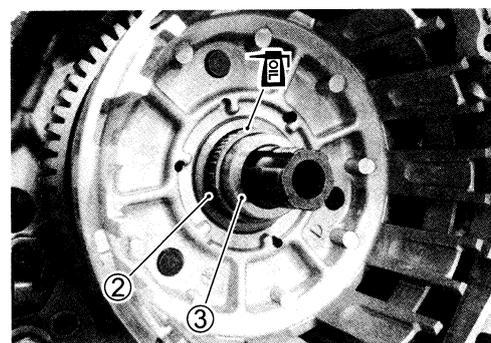


- Install the primary driven gear assembly.

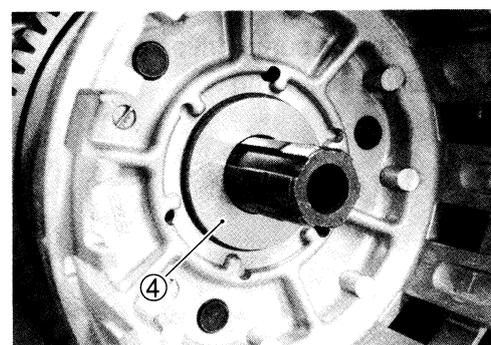
**NOTE:**

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

- Install the bearing ② and spacer ③ and apply engine oil to them.



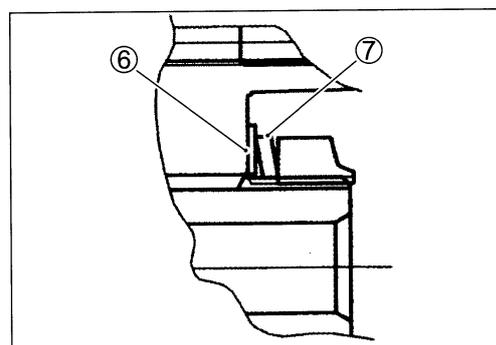
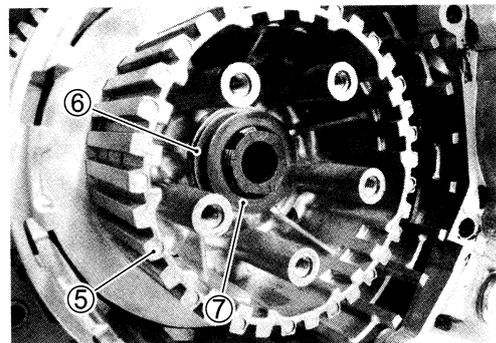
- Install the thrust washer ④.



- Install the clutch sleeve hub ⑤ onto the countershaft.
- Install the washer ⑥ and spring washer ⑦.

**NOTE:**

The convex side of the spring washer ⑦ faces outside.

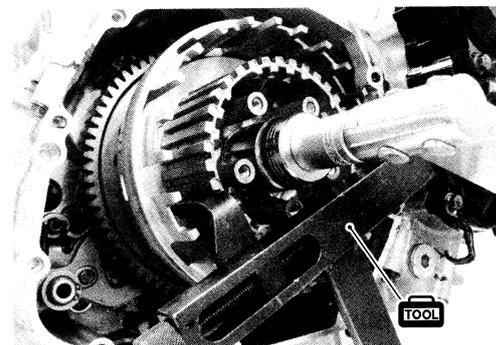


- Install the clutch sleeve hub nut.
- Hold the clutch sleeve hub with the special tool.

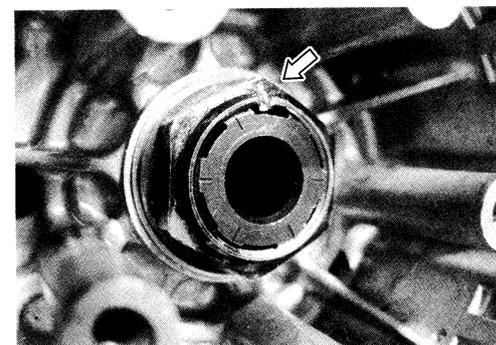
**TOOL** 09920-53740: Clutch sleeve hub holder

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

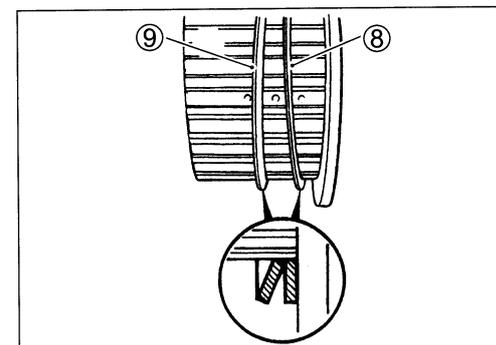
**TOOL** Clutch sleeve hub nut: 150 N·m (15.0 kgf-m, 108 lb-ft)



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



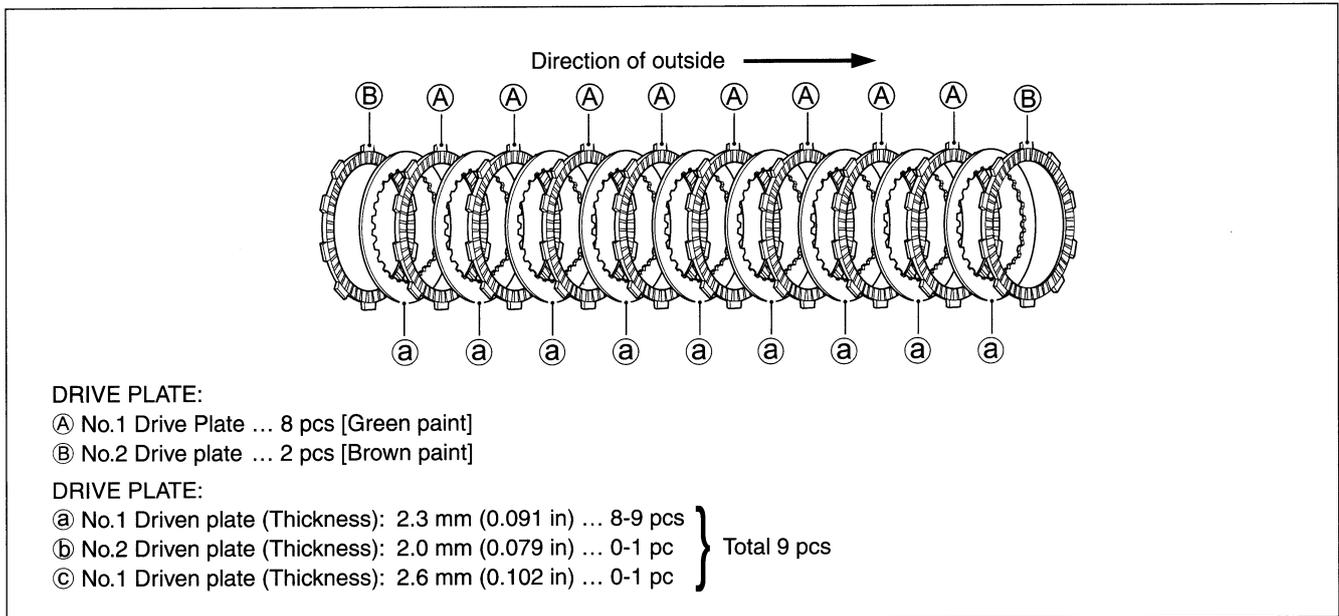
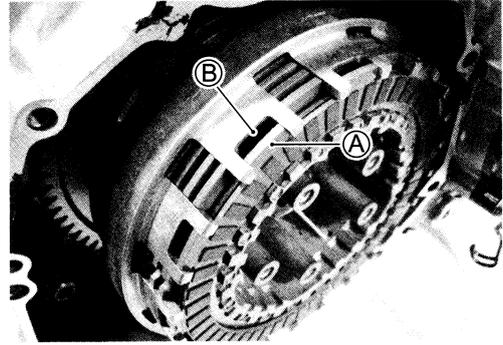
- Install the spring washer seat ⑧ and spring washer ⑨ onto the clutch sleeve hub correctly.



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

**NOTE:**

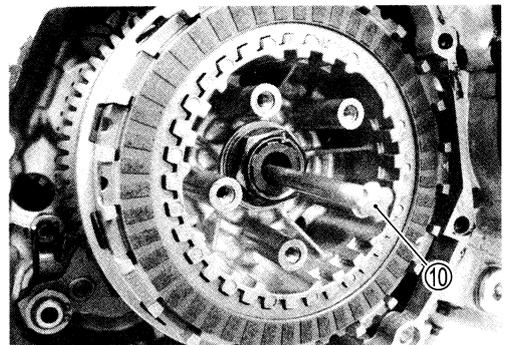
Insert the outermost No.1 drive plate claws (A) to the other slits (B) of clutch housing as shown.



**NOTE:**

It is not necessary to use the No. 2 driven plate (b) and the No. 3 driven plate (c) when replacing the driven plates with the new ones. Because, they are factory setting parts.

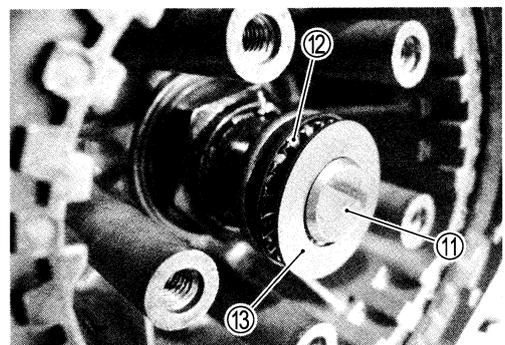
- Install the clutch push rod (10) into the countershaft.



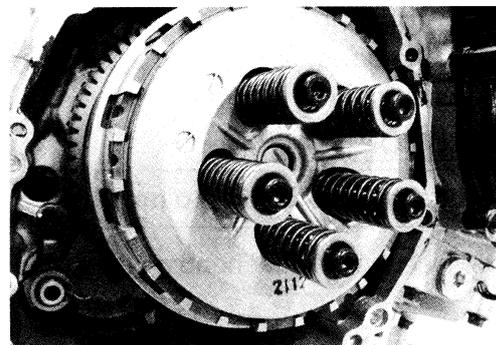
- Install the clutch push piece (11), the bearing (12) and the thrust washer (13) to the countershaft.

**NOTE:**

Thrust washer (13) is located between the pressure plate and the bearing (12).



- Install the clutch pressure plate.
- Install the clutch springs.



- Hold the clutch housing with the special tool.

**CAUTION**

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

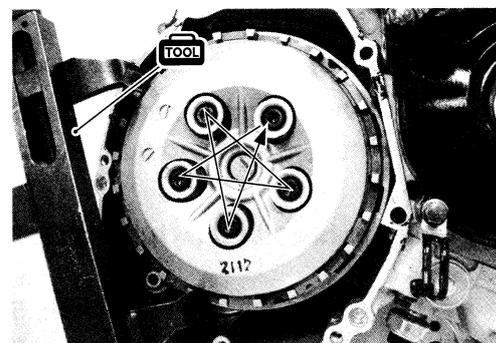
**TOOL** 09920-53740: Clutch sleeve hub holder

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

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

**NOTE:**

Tighten the clutch spring set bolts diagonally.

**CLUTCH COVER**

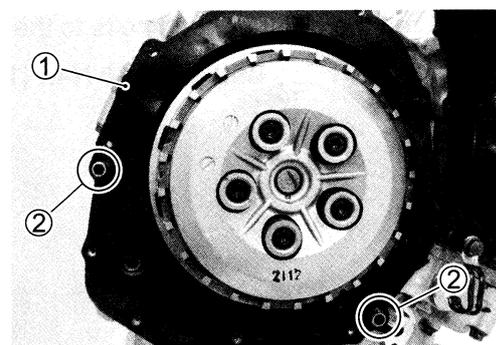
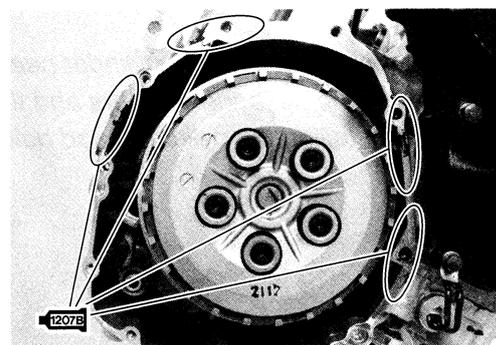
- Apply SUZUKI BOND lightly to the mating surfaces at the parting line between the upper, middle and lower crankcases as shown.

**1207B** 99104-31140: SUZUKI BOND "1207B" (USA)  
99000-31140: SUZUKI BOND "1207B" (Others)

- Install the gasket ① and the dowel pins ②.

**CAUTION**

Use the new gasket to prevent oil leakage.



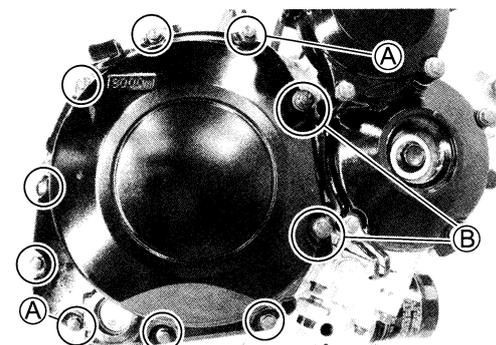
- Install the clutch cover and tighten its bolts to the specified torque.

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

**NOTE:**

\* Fit the clamp to the bolt (A) as shown.

\* Fit the gaskets to the bolts (B) as shown.



**CYLINDER HEAD**

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

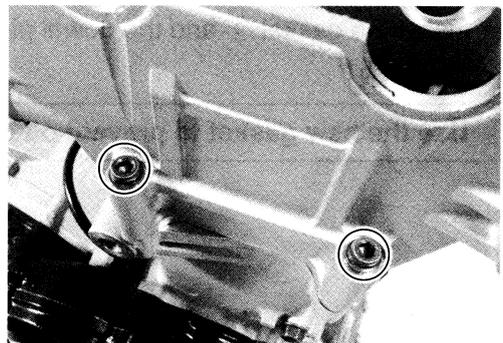
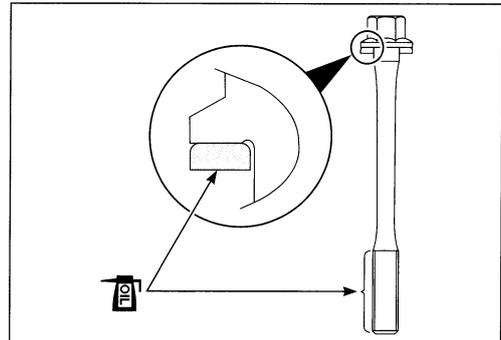
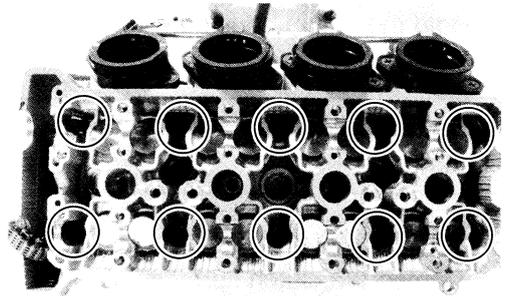
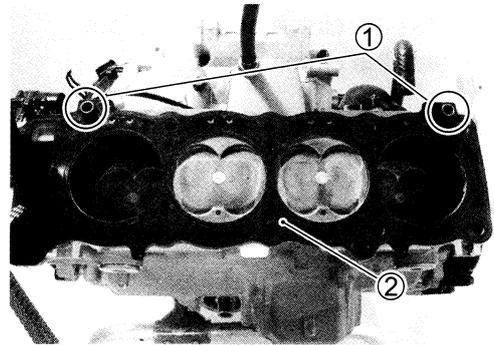
- 🔩 Cylinder head bolt (M10): Initial: 25 N·m (2.5 kgf-m, 18.0 lb-ft)**  
**Final: 51 N·m (5.1 kgf-m, 37.6 lb-ft)**

**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.*

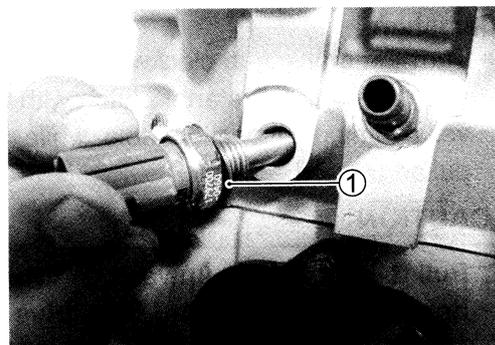
- Tighten the cylinder head bolts to the specified torque.

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

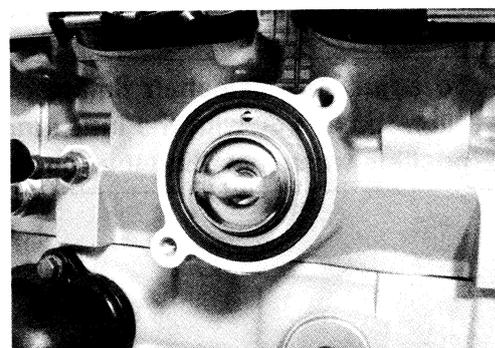


- Fit the gasket ③ and tighten the ECT sensor gauge.

 **Water temp. gauge: 18 N·m (1.8 kgf-m, 13.0 lb-ft)**



- Install the thermostat. ( 7-10)

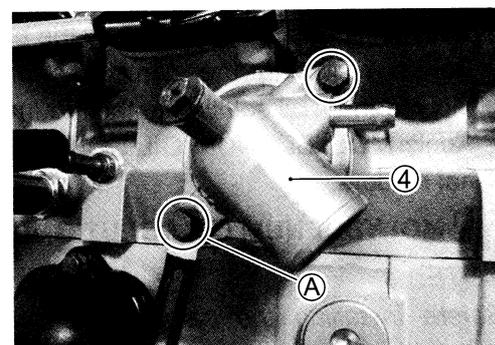


- Install the thermostat cover ④.

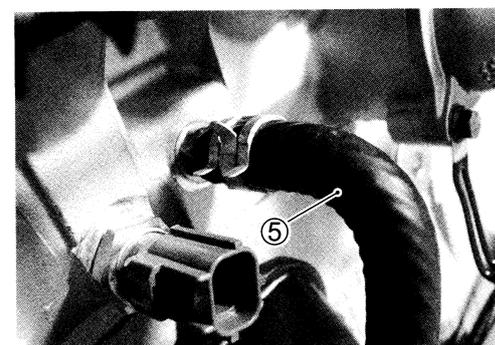
 **Thermostat cover bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)**

*NOTE:*

*Fit the clamp to the bolt (A).*



- Install the water hose ⑤. ( 10-19)



**Camshaft**

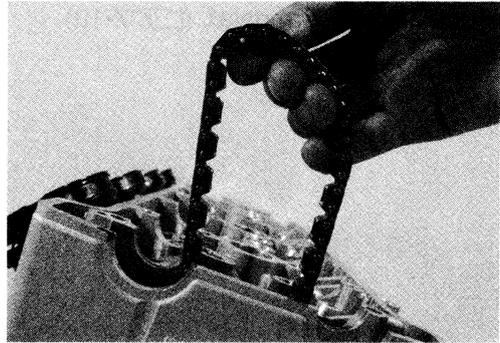
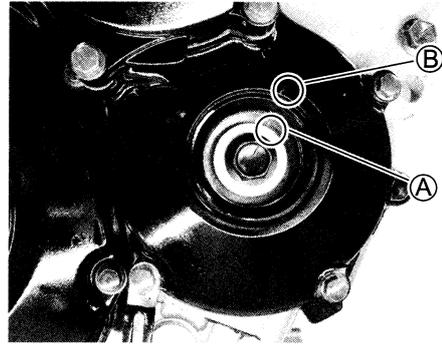
- Turn the crankshaft clockwise with the box wrench and align the line (A) on the starter clutch with the index mark (B) of the valve timing inspection hole while keeping the cam chain pulled upward.

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

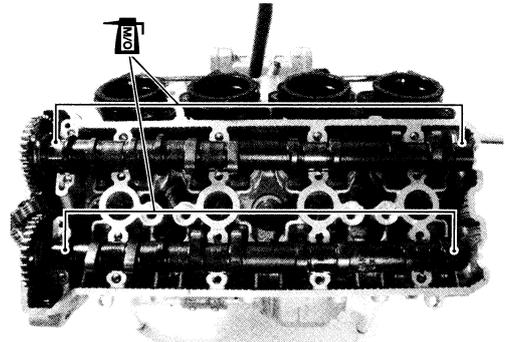


- The camshafts are identified by the embossed letters.
- Before replacing the camshafts on cylinder head, apply molybdenum oil solution to their journals and cam faces.
- Apply MOLYBDENUM OIL SOLUTION to the camshaft journal holders.

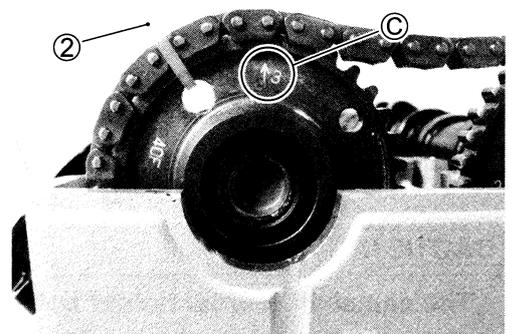
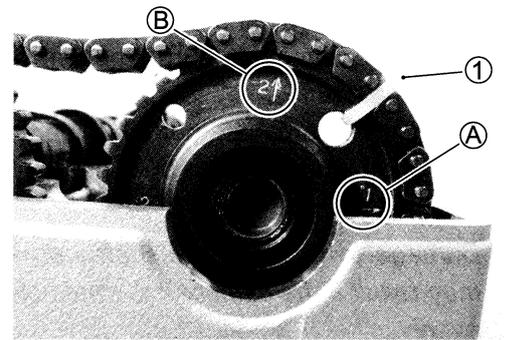
**MOLYBDENUM OIL SOLUTION**

**NOTE:**

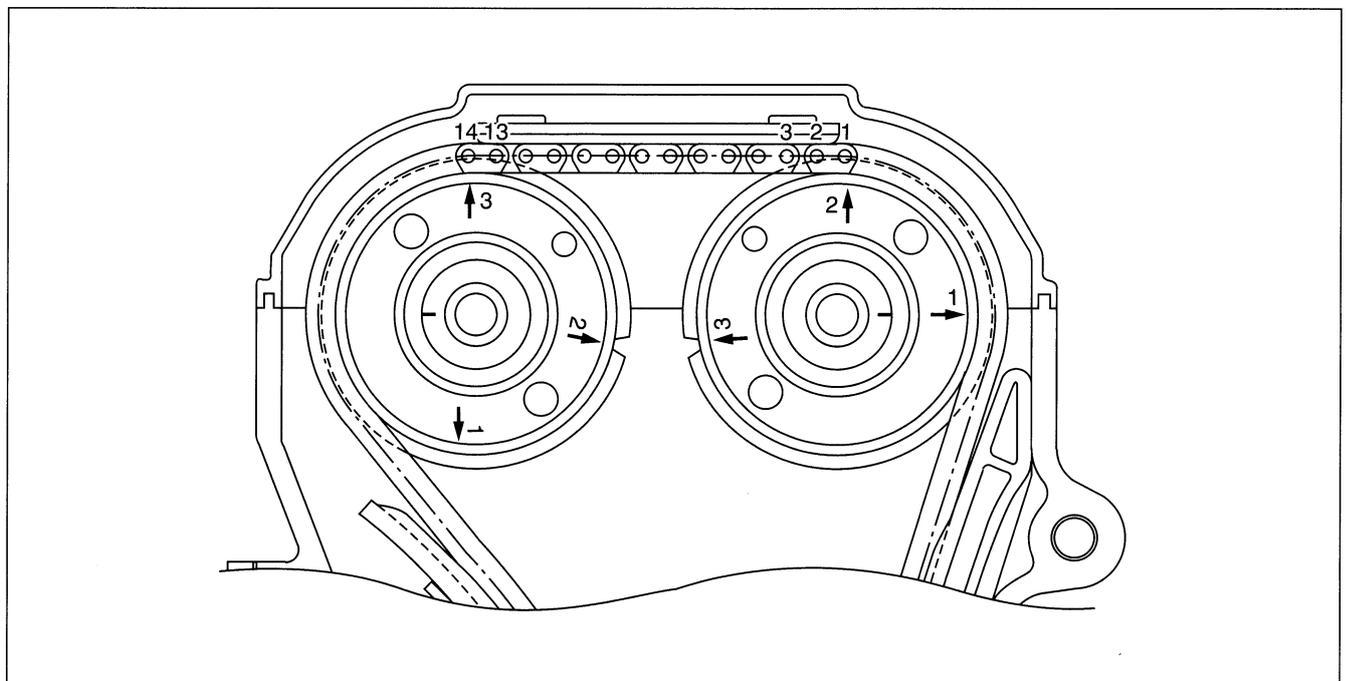
*Before installing the camshaft, check that the tappets are installed correctly.*



- Pull the cam chain lightly.
- The exhaust camshaft sprocket has an arrow marked "1" (A). Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head.
- Engage the cam chain with the exhaust camshaft sprocket.
- Bind the cam chain and the sprocket with a proper wire clamp (1) to prevent the cam chain disengagement while installing the camshaft journal holders.
- The other arrow marked "2" (B) should now be pointing straight up. Starting from the roller pin that is directly above the arrow marked "2" (B), count out 14 roller pins (from the exhaust camshaft side going towards the intake camshaft side).
- Engage the 14th roller pin (C) on the cam chain with the arrow marked "3" on the intake sprocket.
- 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, and cam chain guide.
- Fasten the camshaft journal holders evenly by tightening the camshaft journal holder bolts sequentially and diagonally.

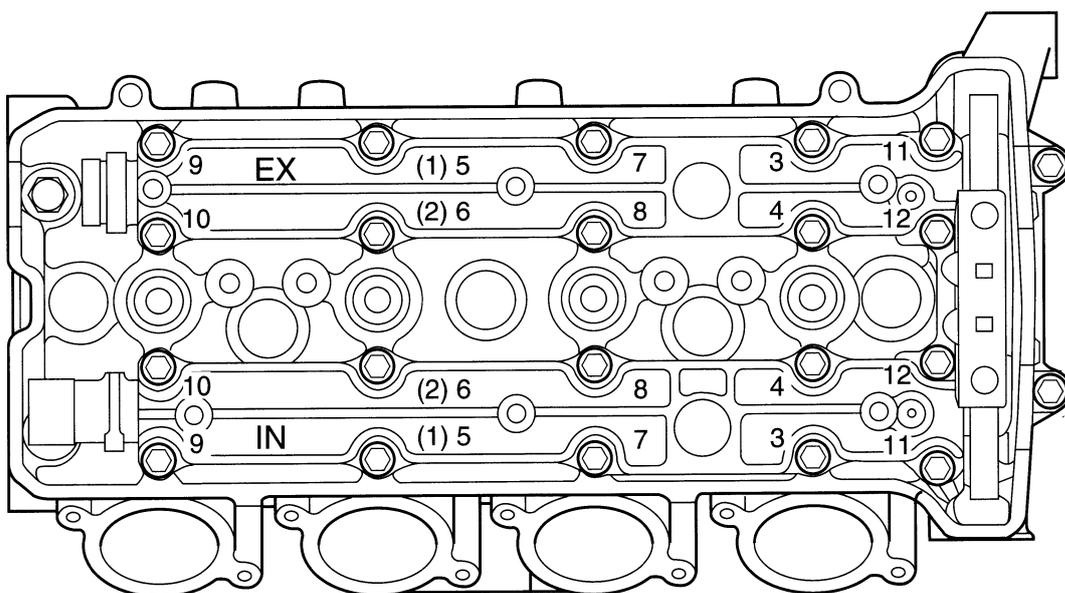
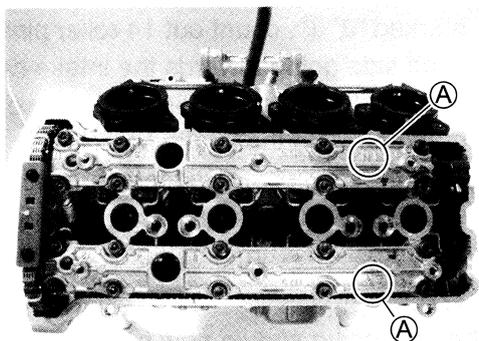
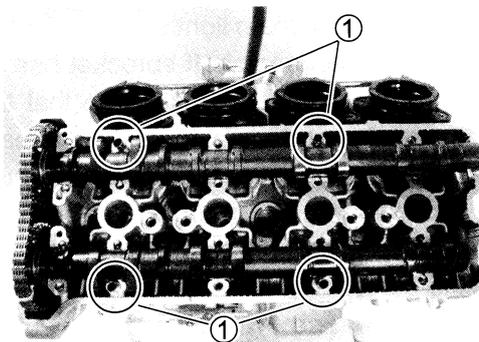
**NOTE:**

- \* *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 letter (A).*
- Tighten the camshaft journal holder bolts in ascending order of numbers to the specified torque.

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

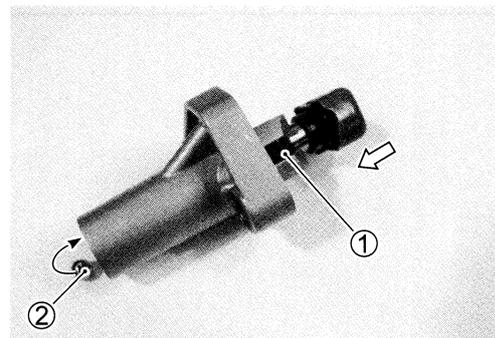
**CAUTION**

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.



**Cam chain tension adjuster**

- Retract the push rod by pushing the stopper ①.
- Install the ball ② to the cam chain tension adjuster.



- Install the new gasket.

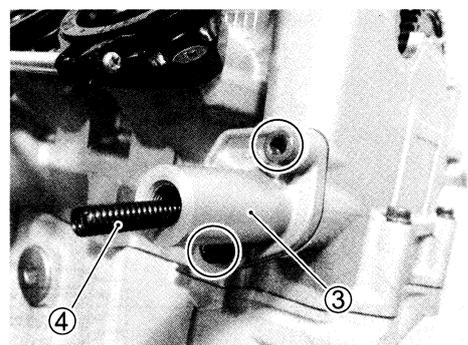
**CAUTION**

**Use the new gasket to prevent oil leakage.**

- Install the cam chain tension adjuster ③ and tighten the mounting bolt.

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

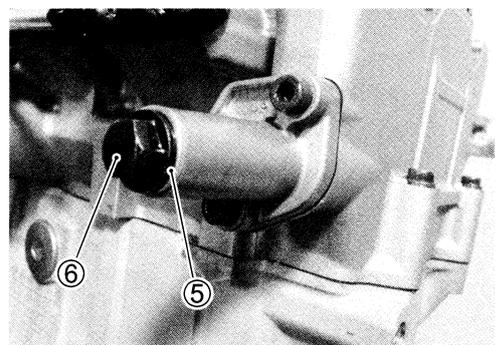
- Install the spring ④.
- Install the gasket ⑤ and cam chain tension adjuster cap bolt ⑥.

**NOTE:**

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

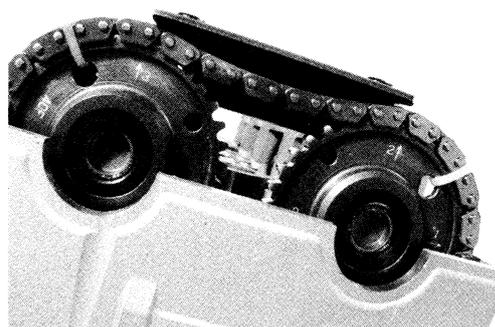
- Tighten the cam chain tension adjuster cap bolt to the specified torque.

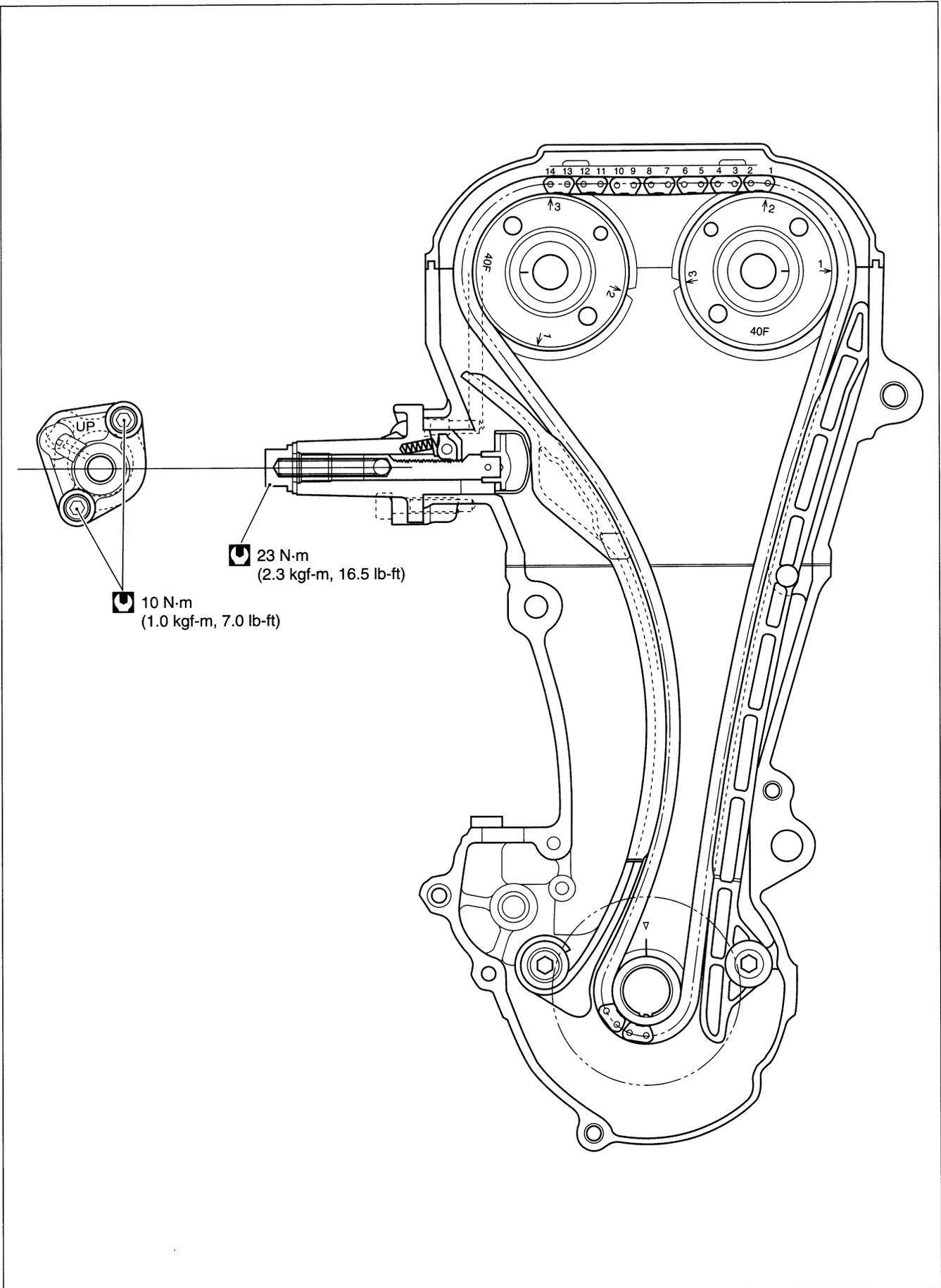
**🔧 Cam chain tension adjuster cap bolt: 23 N·m  
(2.3 kgf-m, 16.5 lb-ft)**

**CAUTION**

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

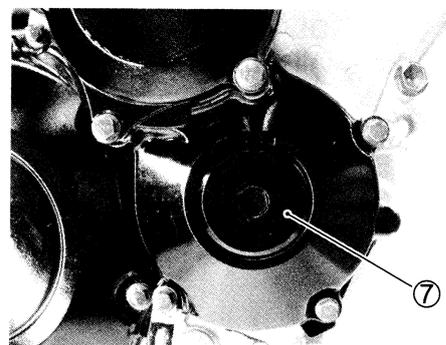
- Cut the wire clamps.
- After installing the cam chain tension adjuster, rotate the crankshaft (some turns), and recheck the positions of the camshafts. (🔧 3-102)





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

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



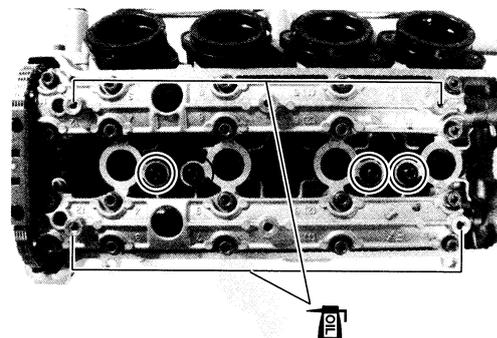
### CYLINDER HEAD COVER

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

#### NOTE:

*Be sure to check the valve clearance. (🔧 2-8)*

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

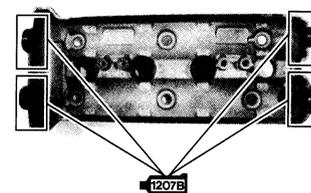
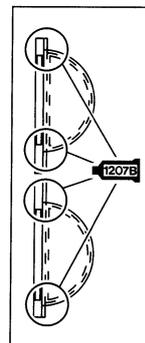


- Install the new gaskets to the cylinder head cover.
- Apply SUZUKI BOND to the cam end caps of the gaskets as shown.

**🔧 99104-31140: SUZUKI BOND "1207B" (USA)**  
**99000-31140: SUZUKI BOND "1207B" (Others)**

#### 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.

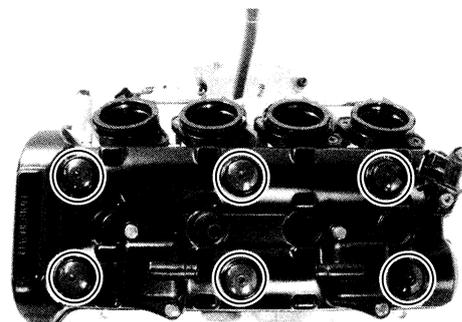
#### CAUTION

**Use the new gaskets to prevent oil leakage.**



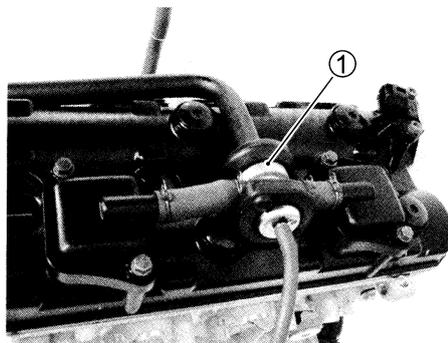
- Tighten the head cover bolts to the specified torque.

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



### PAIR CONTROL VALVE

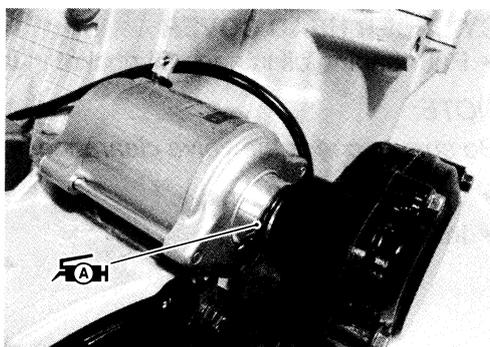
- Install the PAIR control valve ①.



### STARTER MOTOR

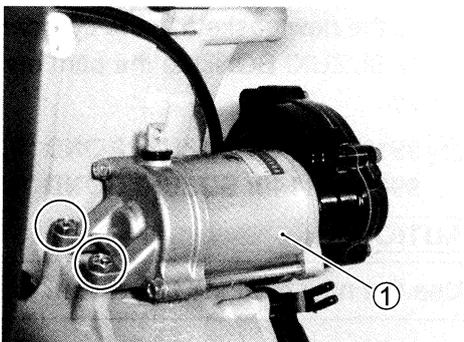
- Apply SUZUKI SUPER GREASE to the O-ring.

 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
99000-25010: SUZUKI SUPER GREASE "A" (Others)



- Install the starter motor ①.

 Starter motor mounting bolt: 10 N·m (1.0 kgf-m, 7 lb-ft)



- Install the spark plugs. ( 2-6)

# FI SYSTEM DIAGNOSIS

## CONTENTS

<b>PRECAUTIONS IN SERVICING.....</b>	<b>4- 2</b>
<b>ELETRICAL PARTS .....</b>	<b>4- 2</b>
<b>FUSE .....</b>	<b>4- 3</b>
<b>ECM/VARIOUS SENSORS.....</b>	<b>4- 3</b>
<b>ELECTRICAL CIRCUIT INSPECTION PROCEDURE .....</b>	<b>4- 5</b>
<b>USING TESTERS.....</b>	<b>4- 8</b>
<b>FI SYSTEM TECHNICAL FEATURES.....</b>	<b>4- 9</b>
<b>INJECTION TIME (INJECTION VOLUME).....</b>	<b>4- 9</b>
<b>COMPENSATION OF INJECTION TIME (VOLUME).....</b>	<b>4-10</b>
<b>INJECTION STOP CONTROL .....</b>	<b>4-10</b>
<b>INJECTION TIMING.....</b>	<b>4-11</b>
<b>FI SYSTEM PARTS LOCATION.....</b>	<b>4-12</b>
<b>FI SYSTEM WIRING DIAGRAM .....</b>	<b>4-14</b>
<b>SELF-DIAGNOSIS FUNCTION.....</b>	<b>4-15</b>
<b>USER MODE.....</b>	<b>4-15</b>
<b>DEALER MODE .....</b>	<b>4-16</b>
<b>TPS ADJUSTMENT .....</b>	<b>4-18</b>
<b>FAIL-SAFE FUNCTION.....</b>	<b>4-19</b>
<b>FI SYSTEM TROUBLESHOOTING.....</b>	<b>4-21</b>
<b>CUSTOMER COMPLAINT ANALYSIS .....</b>	<b>4-21</b>
<b>SELF-DIAGNOSTIC PROCEDURES .....</b>	<b>4-23</b>
<b>SELF-DIAGNOSIS RESET PROCEDURE .....</b>	<b>4-23</b>
<b>MALFUNCTION CODE AND DEFECTIVE CONDITION.....</b>	<b>4-24</b>
<b>“C11” CMP SENSOR CIRCUIT MALFUNCTION .....</b>	<b>4-26</b>
<b>“C12” CKP SENSOR CIRCUIT MALFUNCTION.....</b>	<b>4-28</b>
<b>“C13” IAP SENSOR CIRCUIT MALFUNCTION .....</b>	<b>4-30</b>
<b>“C14” TP SENSOR CIRCUIT MALFUNCTION.....</b>	<b>4-33</b>
<b>“C15” ECT SENSOR CIRCUIT MALFUNCTION .....</b>	<b>4-36</b>
<b>“C21” IAT SENSOR CIRCUIT MALFUNCTION .....</b>	<b>4-38</b>
<b>“C22” AP SENSOR CIRCUIT MALFUNCTION .....</b>	<b>4-40</b>
<b>“C23” TO SENSOR CIRCUIT MALFUNCTION .....</b>	<b>4-43</b>
<b>“C24”, “C25”, “C26” or “C27” IGINTION SYSTEM     MALFUNCTION .....</b>	<b>4-44</b>
<b>“C28” STV ACTUATOR CIRCUIT MALFUNCTION .....</b>	<b>4-45</b>
<b>“C29” STP SENSOR CIRCUIT MALFUNCTION .....</b>	<b>4-47</b>
<b>“C31” GEAR POSITION (GP) SWITCH CIRCUIT     MALFUNCTION .....</b>	<b>4-50</b>
<b>“C32”, “C33”, “C34” or “C35” FUEL INJECTOR CIRCUIT     MALFUNCTION .....</b>	<b>4-51</b>

<b>"C41" FP RELAY CIRCUIT MALFUNCTION .....</b>	<b>4-53</b>
<b>"C42" IG SWITCH CIRCUIT MALFUNCTION.....</b>	<b>4-53</b>
<b>"C46" EXCV ACTUATOR CIRCUIT MALFUNCTION.....</b>	<b>4-54</b>
<b>SENSORS.....</b>	<b>4-60</b>
<b>CMP SENSOR INSPECTION.....</b>	<b>4-60</b>
<b>CMP SENSOR REMOVAL AND INSTALLATION.....</b>	<b>4-60</b>
<b>CKP SENSOR INSPECTION .....</b>	<b>4-60</b>
<b>CKP SENSOR REMOVAL AND INSTALLATION.....</b>	<b>4-60</b>
<b>IAP SENSOR INSPECTION.....</b>	<b>4-60</b>
<b>IAP SENSOR REMOVAL AND INSTALLATION.....</b>	<b>4-60</b>
<b>TP SENSOR INSPECTION .....</b>	<b>4-60</b>
<b>TP SENSOR REMOVAL AND INSTALLATION.....</b>	<b>4-60</b>
<b>TPS ADJUSTMENT .....</b>	<b>4-60</b>
<b>ECT SENSOR INSPECTION.....</b>	<b>4-61</b>
<b>ECT SENSOR REMOVAL AND INSTALLATION .....</b>	<b>4-61</b>
<b>IAT SENSOR INSPECTION.....</b>	<b>4-61</b>
<b>IAT SENSOR REMOVAL AND INSTALLATION.....</b>	<b>4-61</b>
<b>AP SENSOR INSPECTION.....</b>	<b>4-61</b>
<b>AP SENSOR REMOVAL AND INSTALLATION.....</b>	<b>4-61</b>
<b>TO SENSOR INSPECTION.....</b>	<b>4-61</b>
<b>TO SENSOR REMOVAL AND INSTALLATION.....</b>	<b>4-61</b>
<b>STP SENSOR INSPECTION.....</b>	<b>4-62</b>
<b>STP SENSOR REMOVAL AND INSTALLATION.....</b>	<b>4-62</b>
<b>STP SENSOR ADJUSTMENT .....</b>	<b>4-62</b>

## PRECAUTIONS IN SERVICING

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

### ELETRICAL PARTS

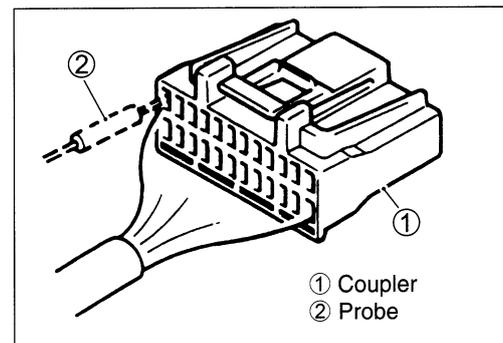
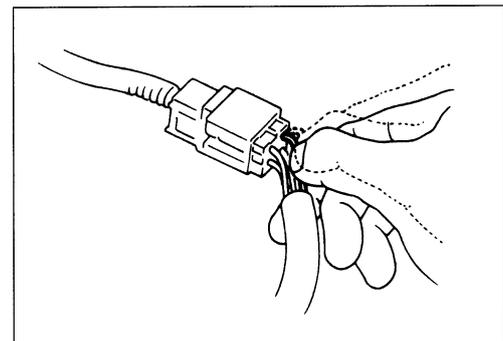
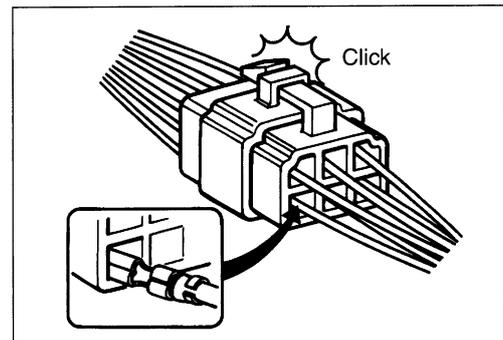
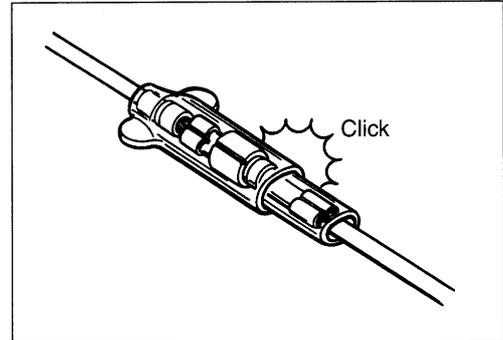
#### CONNECTOR/COUPLER

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

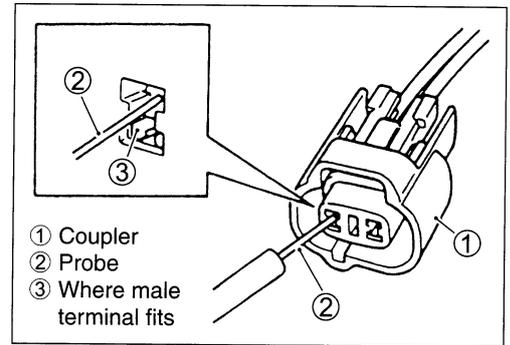


- When connecting meter probe from the terminal side of the coupler (connection from harness side not being possible), use extra care not to force and cause the male terminal to bend or the female terminal to open.

Connect the probe as shown to avoid opening of female terminal.

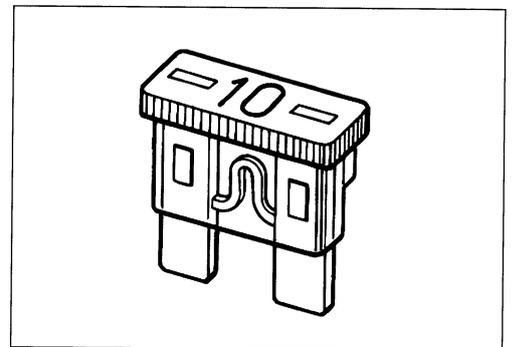
Never push in the probe where male terminal is supposed to fit.

- Check the male connector for bend and female connector for excessive opening. Also check the coupler for locking (looseness), corrosion, dust, etc.



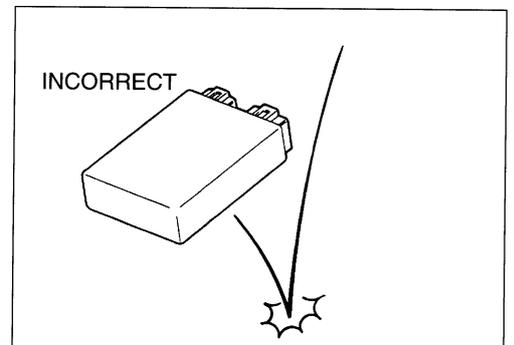
## FUSE

- 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.

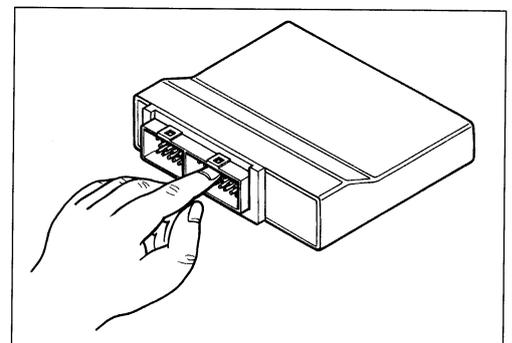


## ECM/VARIOUS SENSORS

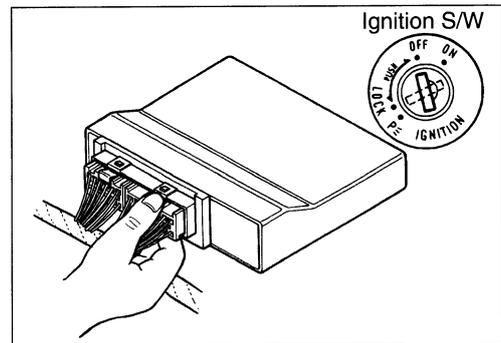
- Since each component is a high-precision part, great care should be taken not to apply any sharp impacts during removal and installation.



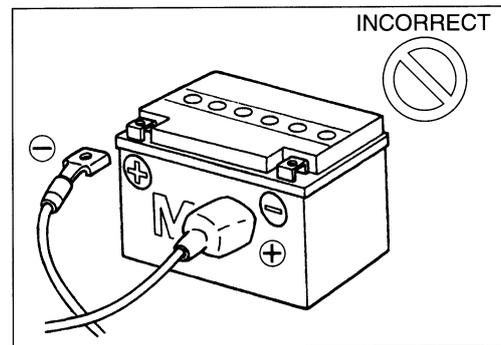
- Be careful not to touch the electrical terminals of the ECM. The static electricity from your body may damage this part.



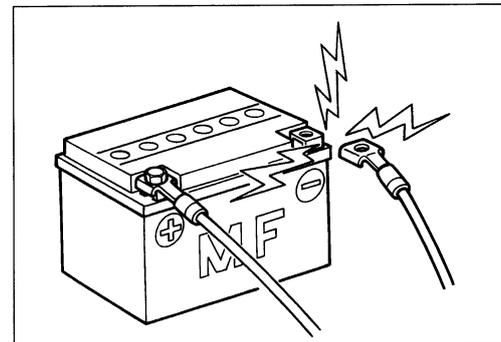
- When disconnecting and connecting the ECM, make sure to turn OFF the ignition switch, or electronic parts may get damaged.



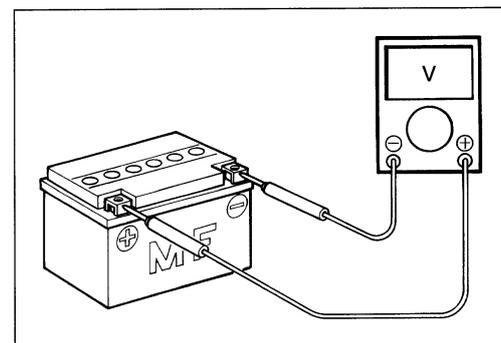
- Battery connection in reverse polarity is strictly prohibited. Such a wrong connection will damage the components of the FI system instantly when reverse power is applied.



- 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 11 V 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.

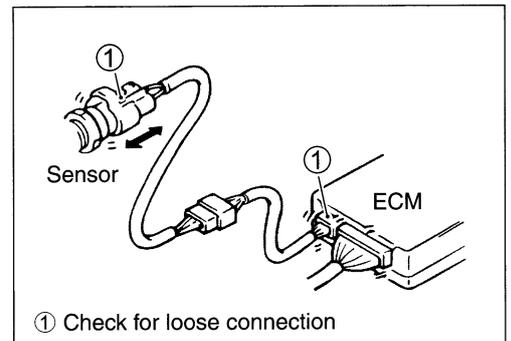
## ELECTRICAL CIRCUIT INSPECTION PROCEDURE

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.

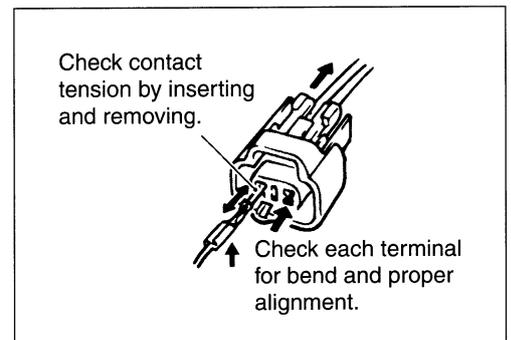
### OPEN CIRCUIT CHECK

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

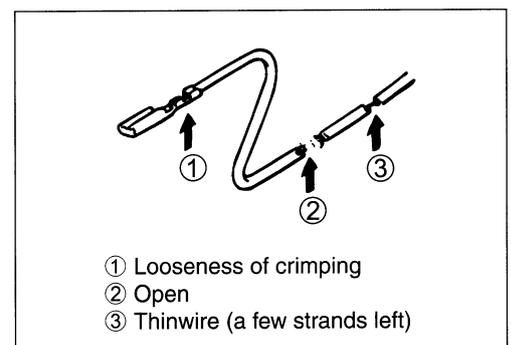
- Loose connection of connector/coupler.
- Poor contact of terminal (due to dirt, corrosion or rust, poor contact tension, entry of foreign object etc.)
- Wire harness being open.
- Poor terminal-to-wire connection
- Disconnect the negative cable from the battery.
- Check each connector/coupler at both ends of the circuit being checked for loose connection. Also check for condition of the coupler lock if equipped.



- 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.

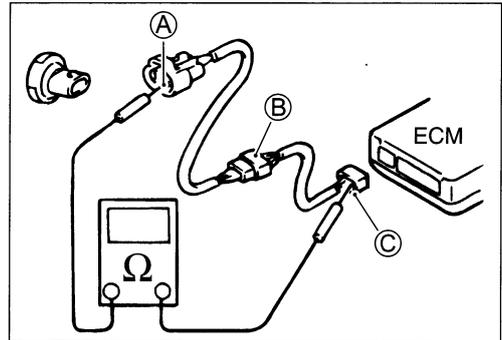


- Using continuity inspect or voltage check procedure as described below, inspect the wire harness terminals for open circuit and poor connection. Locate abnormality, if any.

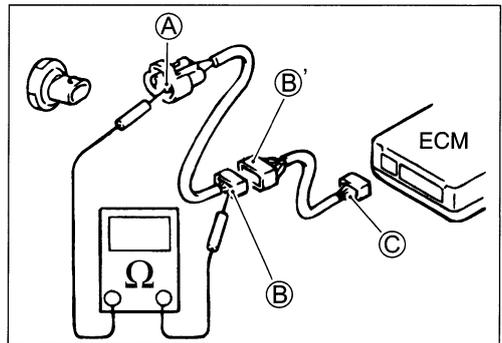


**Continuity check**

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



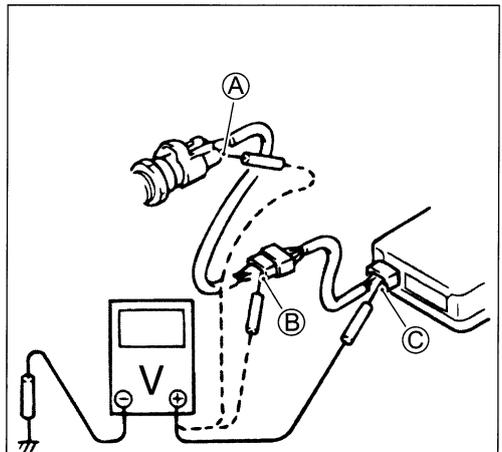
- Disconnect the coupler (B) and measure resistance between couplers (A) and (B).  
If no continuity is indicated, the circuit is open between couplers (A) and (B). If continuity is indicated, there is an open circuit between couplers (B') and (C) or an abnormality in coupler (B') or coupler (C).



**VOLTAGE CHECK**

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

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



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

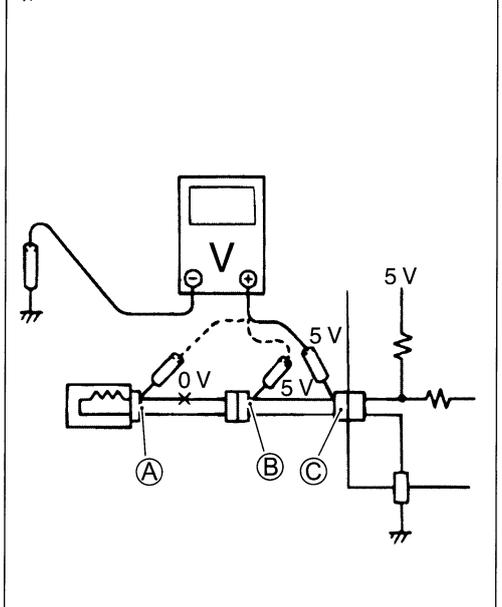
**Voltage Between:**

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

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

**Voltage Between:**

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



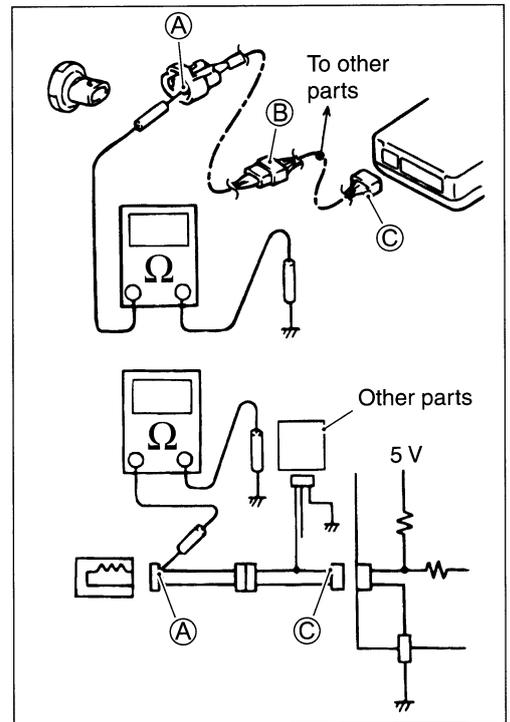
**SHORT CIRCUIT CHECK (WIRE HARNESS TO GROUND)**

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

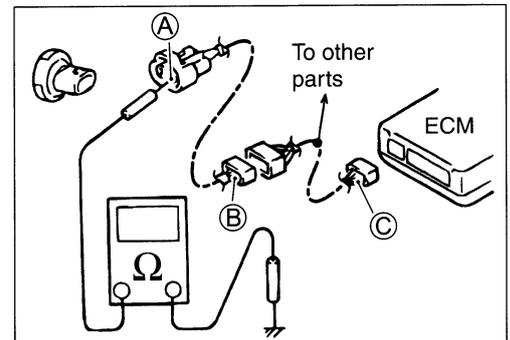
**NOTE:**

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

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



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



## USING TESTERS

- Use the Suzuki multi-circuit tester set (09990-25008).
- Use well-charged batteries in the tester.
- Be sure to set the tester to the correct testing range.

### USING THE TESTER

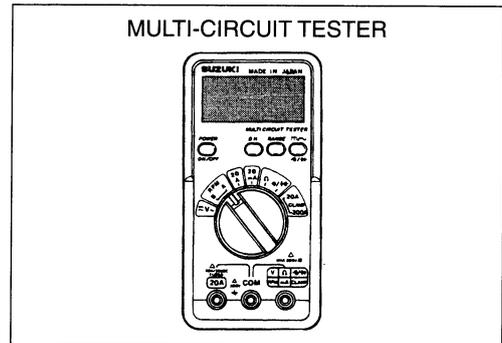
- Incorrectly connecting the ⊕ and ⊖ probes may cause the inside of the tester to burnout.
- If the voltage and current are not known, make measurements using the highest range.
- When measuring the resistance with the multi-circuit tester, ∞ will be shown as 10.00 MΩ and “1” flashes in the display.
- Check that no voltage is applied before making the measurement. If voltage is applied the tester may be damaged.
- After using the tester, turn the power off.

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

#### NOTE:

- \* When connecting the multi-circuit tester, use the needle pointed probe to the back side of the lead wire coupler and connect the probes of tester to them.
- \* Use the needle pointed probe to prevent the rubber of the water proof coupler from damage.

**TOOL** 09900-25009: Needle pointed probe set

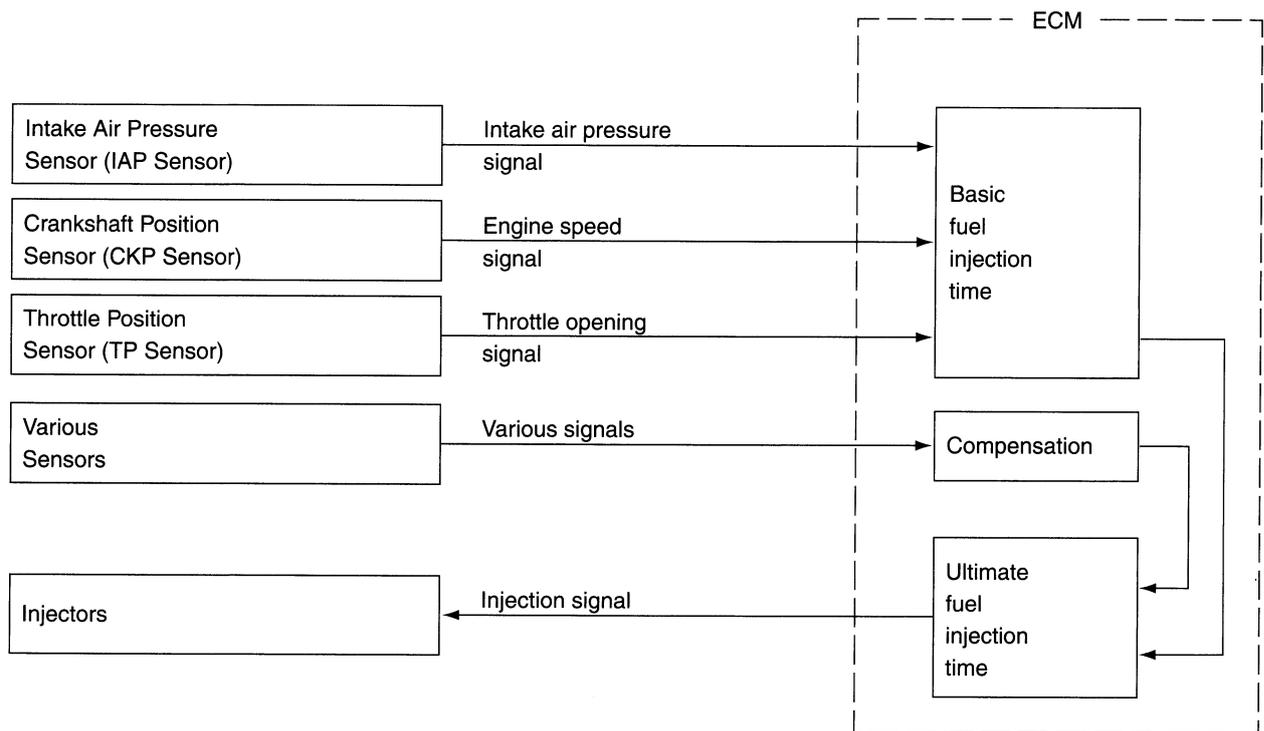


## FI SYSTEM TECHNICAL FEATURES

### INJECTION TIME (INJECTION VOLUME)

The factors to determine the injection time include the basic fuel injection time, which is calculated on the basis of intake air pressure, engine speed and throttle opening angle, and various compensations.

These compensations are determined according to the signals from various sensors that detect the engine and driving conditions.



## COMPENSATION OF INJECTION TIME (VOLUME)

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

SIGNAL	DESCRIPTION
ATMOSPHERIC PRESSURE SENSOR SIGNAL	When atmospheric pressure is low, the sensor sends the signal to the ECM and reduce the injection time (volume).
ENGINE COOLANT TEMPERATURE SENSOR SIGNAL	When engine coolant temperature is low, injection time (volume) is increased.
INTAKE AIR TEMPERATURE SENSOR SIGNAL	When intake air temperature is low, injection time (volume) is increased.
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 time (volume) is decreased.

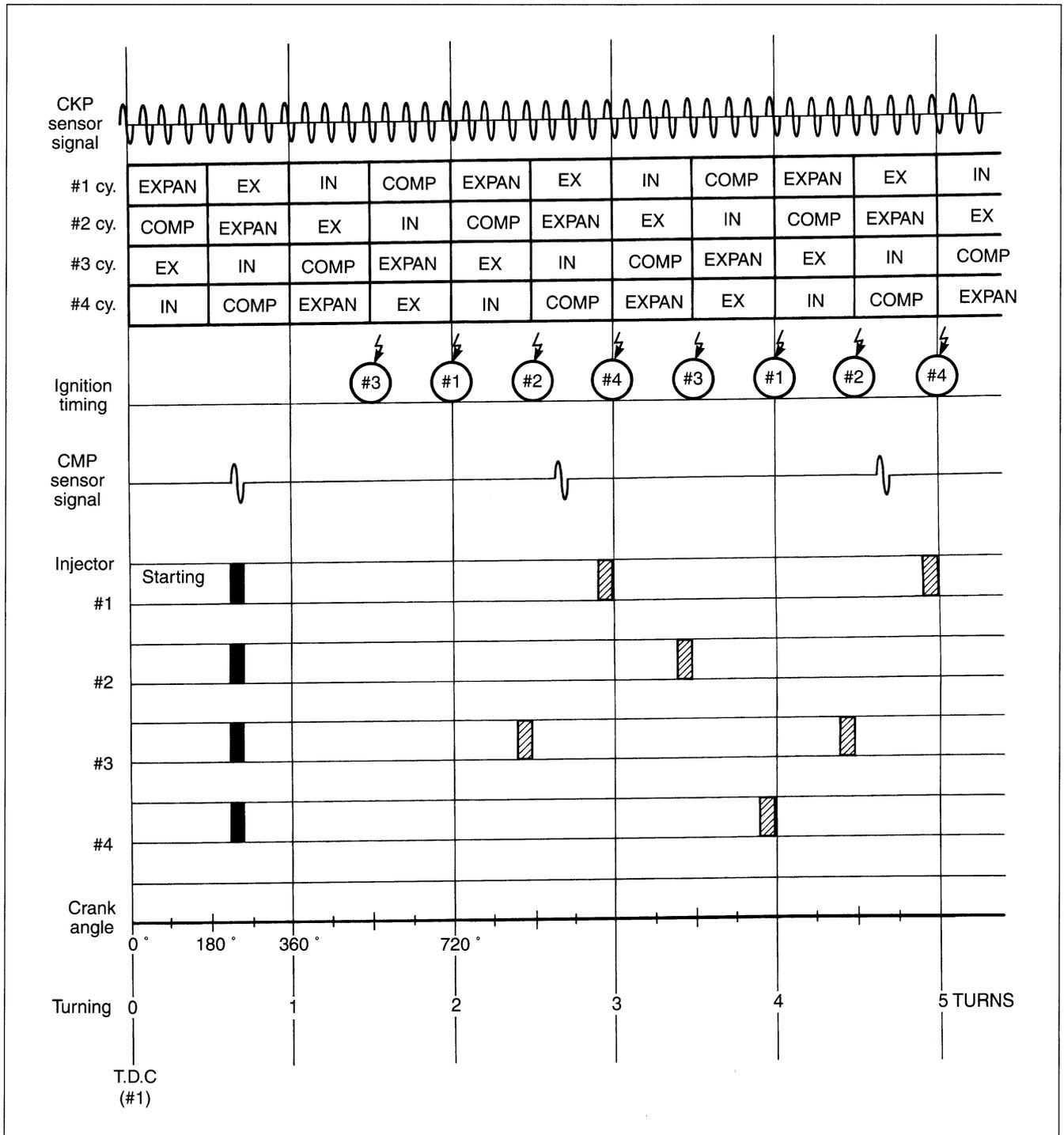
## INJECTION STOP CONTROL

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

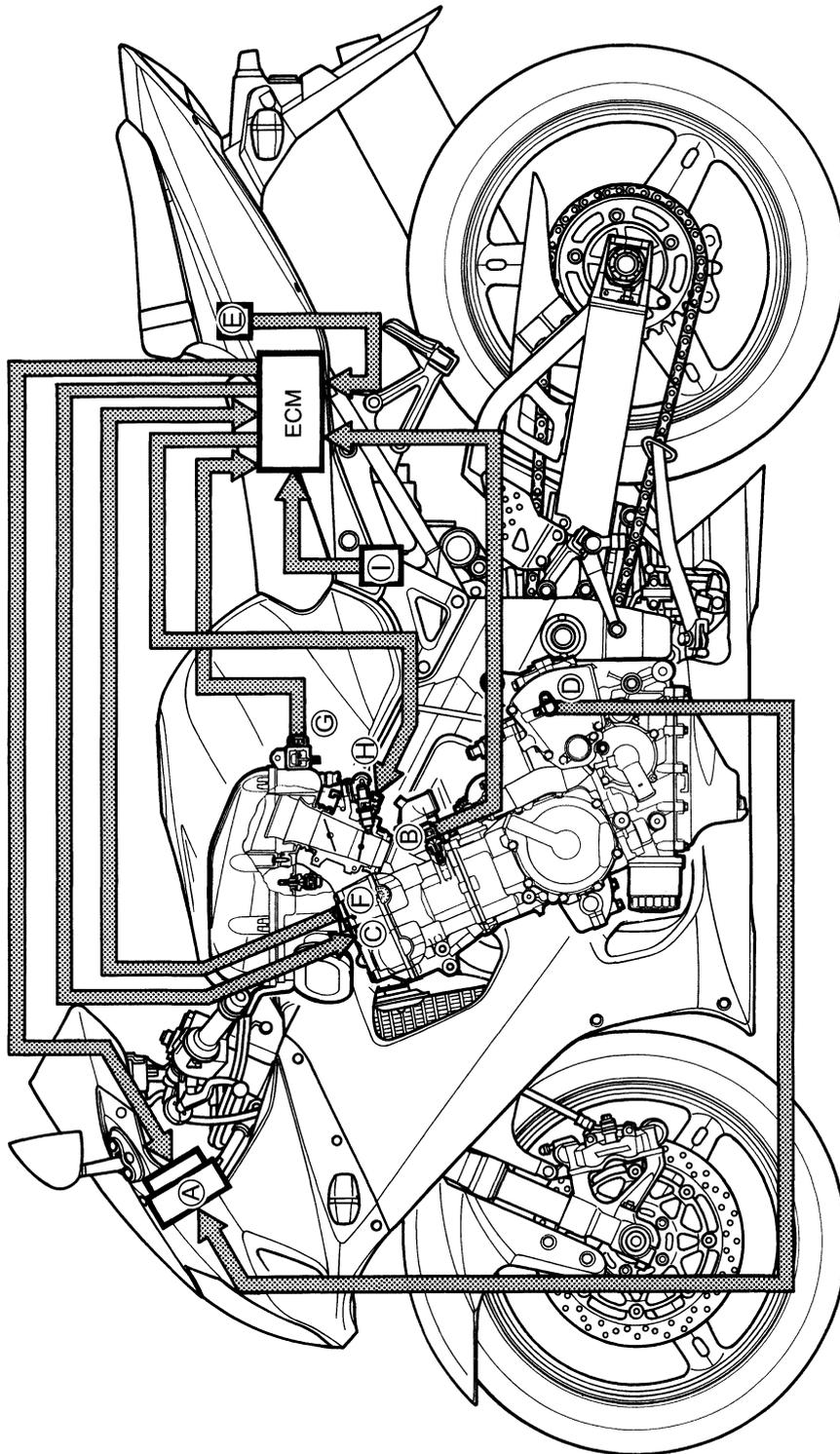
## INJECTION TIMING

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.

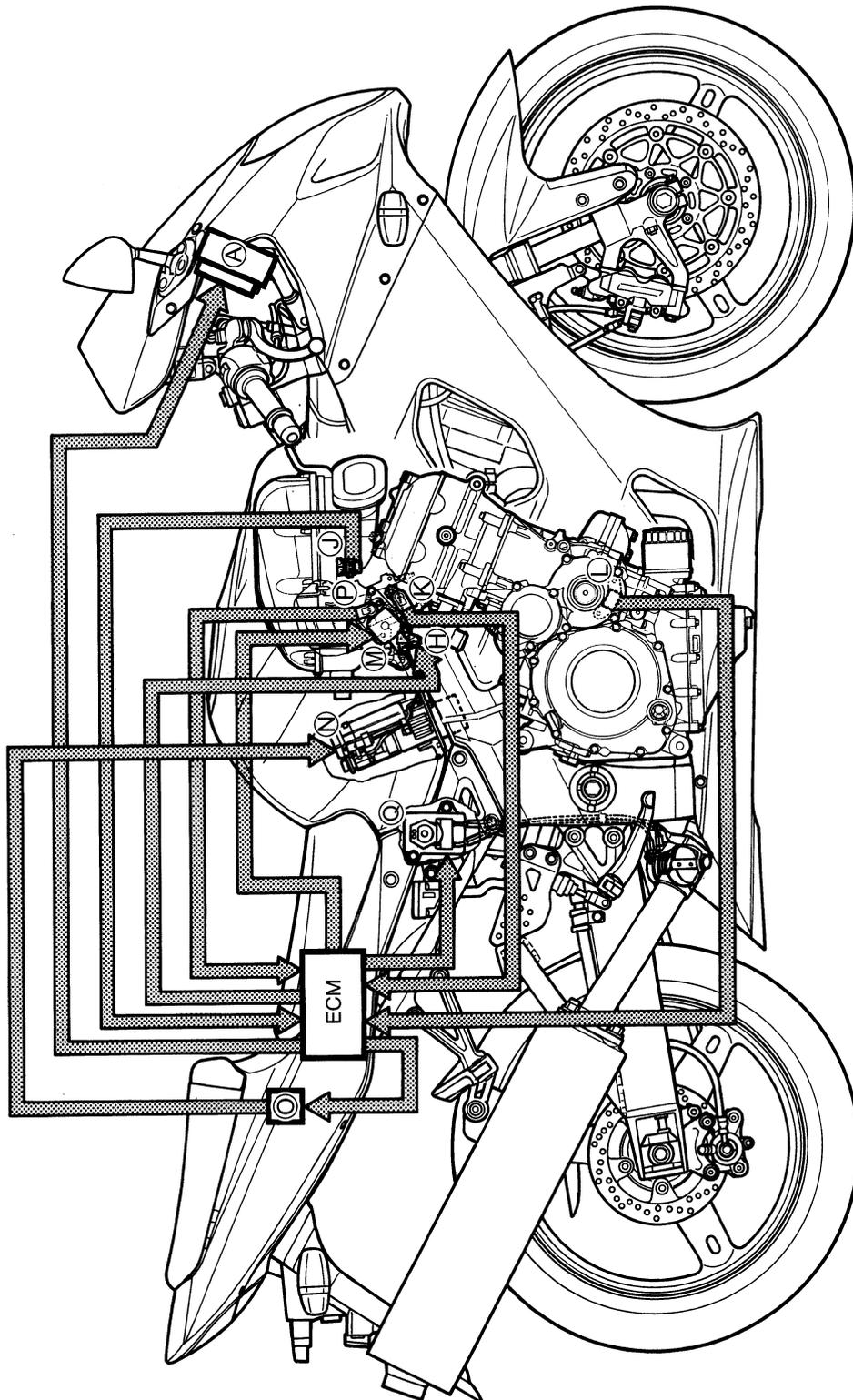
When the crankshaft begins to turn at the time of starting, the ECM sends the signals to the four injectors, #1, #2, #3 and #4 to have them inject fuel simultaneously. From the second turn onward, the sequential four-cylinder independent injection occurs as explained above.



## FI SYSTEM PARTS LOCATION



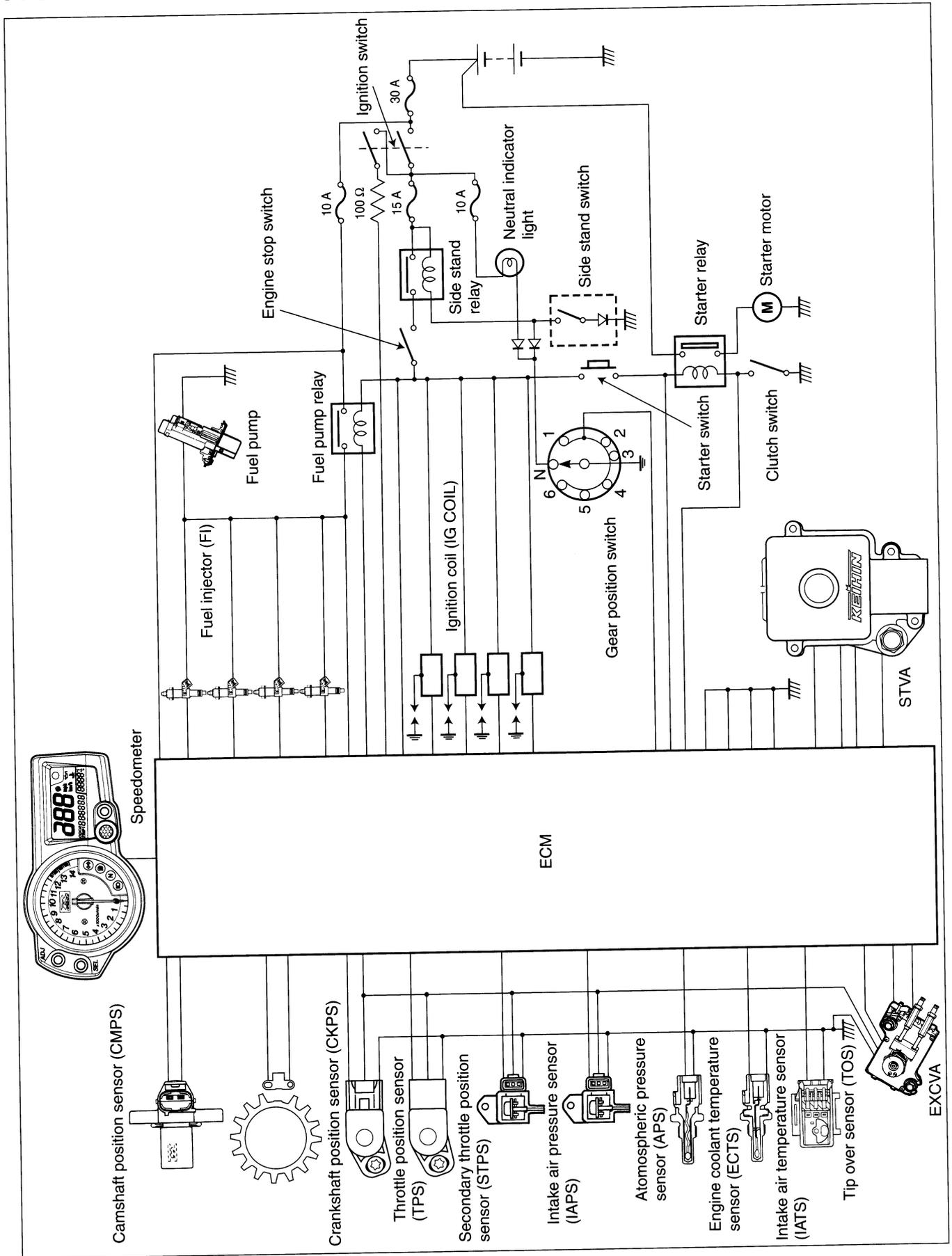
- (A) Speedometer
- (B) Engine coolant temperature sensor (ECTS)
- (C) Ignition coil (IG COIL)
- (D) Speed sensor
- (E) Atmospheric pressure sensor (APS)
- (F) Camshaft position sensor (CMPS)
- (G) Intake air pressure sensor (IAPS)
- (H) Fuel injector (FI)
- (I) Tip over sensor (TOS)



- Ⓝ Intake air temperature sensor (IATS)
- Ⓞ Throttle position sensor (TPS)
- Ⓟ Crankshaft position sensor (CKPS)
- Ⓠ Secondary throttle valve actuator (STVA)

- Ⓡ Fuel pump (FP)
- Ⓢ Fuel pump relay (FP RELAY)
- Ⓣ Secondary throttle position sensor (STPS)
- Ⓤ Exhaust control valve actuator (EXCVA)

# 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 (FI light). 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 LIGHT INDICATION	INDICATION MODE
"NO"	Coolant temperature	—	—
"YES"	Coolant temperature and "FI" letters *1	FI light turns ON.	Each 2 sec. Coolant temperature or "FI" is indicated.
	Engine can start Engine can not start	"FI" letter *2	FI light turns ON and blinks. "FI" is indicated continuously.

\*1

When one of the signals is not received by ECM, the fail-safe circuit works and injection is not stopped. In this case, "FI" and coolant temperature are indicated in the LCD panel and motorcycle can run.

\*2

The injection signal is stopped, when the camshaft position sensor signal, crankshaft position sensor signal, tip over sensor signal, #1, #2, #3 and #4 ignition signals, #1, #2, #3 and #4 injector signals, fuel pump relay signal or ignition switch signal is not sent to ECM. In this case, "FI" is indicated in the LCD panel. Motorcycle does not run.

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

For Example

: The ignition switch is turned ON, and the engine stop switch is turned OFF. In this case, the speedometer does not receive any signal from ECM, and the panel indicates "CHEC".

If CHEC is indicated, the LCD does not indicate the trouble code. It is necessary to check the wiring harness between ECM and speedometer couplers.

The possible cause of this indication is as follows;

Engine stop switch is in OFF position. Side-stand/ignition inter-lock system is not working. Ignition fuse is burnt.

**NOTE:**

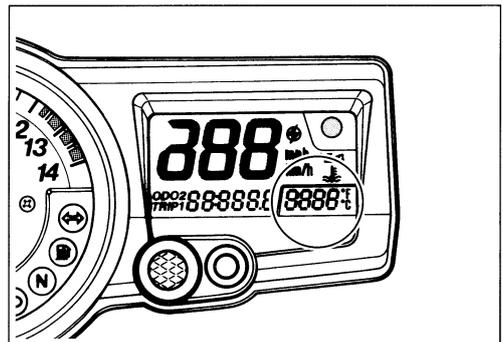
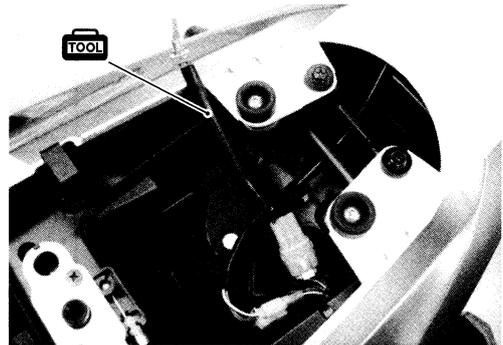
*Until starting the engine, the FI light turns ON.*

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

## DEALER MODE

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

 **09930-82720: Mode select switch**



### CAUTION

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

MALFUNCTION	LCD (DISPLAY) INDICATION	FI LIGHT INDICATION	INDICATION MODE
"NO"	C00	FI light turns OFF.	—
"YES"	C**code is indicated from small numeral to large one.		For each 2 sec., code is indicated.

CODE	MALFUNCTION PART	REMARKS
C00	None	No defective part
C11	Camshaft position sensor (CMPS)	
C12	Crankshaft position sensor (CKPS)	Pick-up coil signal, signal generator
C13	Intake air pressure sensor (IAPS)	
C14	Throttle position sensor (TPS)	*1
C15	Engine coolant temperature sensor (ECTS)	
C21	Intake air temperature sensor (IATS)	
C22	Atmospheric pressure sensor (APS)	
C23	Tip over sensor (TOS)	
C24	Ignition signal #1 (IG coil #1)	For #1 cylinder
C25	Ignition signal #2 (IG coil #2)	For #2 cylinder
C26	Ignition signal #3 (IG coil #3)	For #3 cylinder
C27	Ignition signal #4 (IG coil #4)	For #4 cylinder
C28	Secondary throttle valve actuator (STVA)	*2
C29	Secondary throttle position sensor (STPS)	
C31	Gear position signal (GP switch)	
C32	Injector signal #1 (FI #1)	For #1 cylinder
C33	Injector signal #2 (FI #2)	For #2 cylinder
C34	Injector signal #3 (FI #3)	For #3 cylinder
C35	Injector signal #4 (FI #4)	For #4 cylinder
C41	Fuel pump control system (FP control system)	Fuel pump, Fuel pump relay
C42	Ignition switch signal (IG switch signal)	Anti-theft
C46	Exhaust control valve actuator (EXCVA)	

In the LCD (DISPLAY) panel, the malfunction code is indicated from small code to large code.

\*1

To get the proper signal from the throttle position sensor, the sensor basic position is indicated in the LCD (DISPLAY) panel. The malfunction code is indicated in three digits. In front of the three digits, a line appears in any of the 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.

\*2

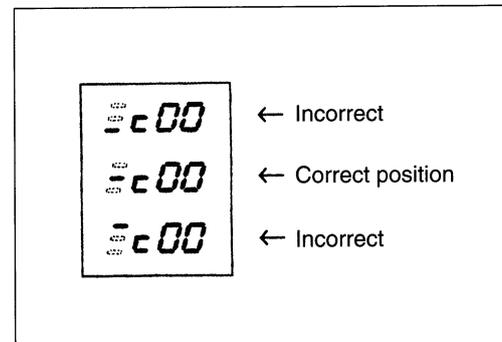
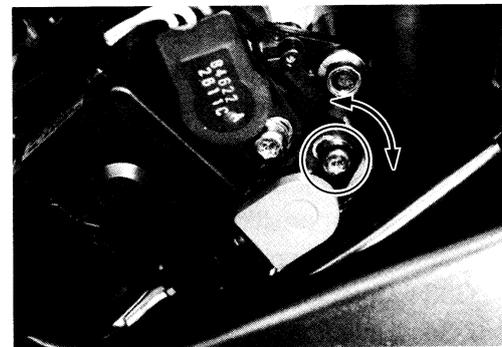
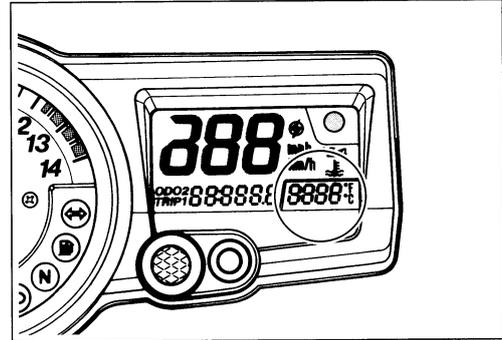
When the secondary throttle valve actuator and secondary throttle position sensor signals are not sent to ECM. In this case, C29 is indicated.

## TPS ADJUSTMENT

1. Adjust the engine rpm to 1 150 rpm. (☞ 2-15)
2. Connect the special tool (Mode select switch) to the dealer mode coupler at the wiring harness.
3. If the throttle position sensor adjustment is necessary, 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.

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

The LCD indicates 0.4 sec./time, and two times show the correct 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 (176 °F).	"YES"	"YES"
Intake air temperature sensor	Intake air temperature value is fixed to 40 °C (104 °F).	"YES"	"YES"
Atmospheric pressure sensor	Atmospheric pressure is fixed to 760 mmHg.	"YES"	"YES"
Ignition signal	#1 Ignition-off	"YES"	"YES"
	#2, #3 & #4 cylinders can run.		
	#2 Ignition-off	"YES"	"YES"
	#1, #3 & #4 cylinders can run.		
	#3 Ignition-off	"YES"	"YES"
	#1, #2 & #4 cylinders can run.		
Injection signal	#1 Fuel-cut	"YES"	"YES"
	#2, #3 & #4 cylinders can run.		
	#2 Fuel-cut	"YES"	"YES"
	#1, #3 & #4 cylinders can run.		
	#3 Fuel-cut	"YES"	"YES"
	#1, #2 & #4 cylinders can run.		
#4 Fuel-cut	"YES"	"YES"	
	#1, #2 & #3 cylinders can run.		

ITEM	FAIL-SAFE MODE	STARTING ABILITY	RUNNING ABILITY
Secondary throttle valve actuator	Secondary throttle valve is fixed to full close position. When motor disconnection or lock occurs, power from ECM is shut off.	"YES"	"YES"
Secondary throttle position sensor	Secondary throttle valve is fixed to full close position.	"YES"	"YES"
Exhaust control valve actuator	Exhaust control valve is fixed to full open position. When motor disconnection or lock occurs, power from ECM is shut off.	"YES"	"YES"
Gear position signal	Gear position signal is fixed to 6th gear.	"YES"	"YES"

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

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

## FI SYSTEM TROUBLESHOOTING CUSTOMER COMPLAINT ANALYSIS

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such an inspection form 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)	<input type="checkbox"/> Always ON <input type="checkbox"/> Sometimes ON <input type="checkbox"/> Always OFF <input type="checkbox"/> Good condition
Malfunction display/code (LCD)	User mode: <input type="checkbox"/> No display <input type="checkbox"/> Malfunction display (            )
	Dealer mode: <input type="checkbox"/> No code <input type="checkbox"/> Malfunction code (            )

PROBLEM SYMPTOMS	
<input type="checkbox"/> <b>Difficult Starting</b> <input type="checkbox"/> No cranking <input type="checkbox"/> No initial combustion <input type="checkbox"/> No combustion <input type="checkbox"/> Poor starting at ( <input type="checkbox"/> cold <input type="checkbox"/> warm <input type="checkbox"/> always) <input type="checkbox"/> Other _____	<input type="checkbox"/> <b>Poor Driveability</b> <input type="checkbox"/> Hesitation on acceleration <input type="checkbox"/> Back fire/ <input type="checkbox"/> After fire <input type="checkbox"/> Lack of power <input type="checkbox"/> Surging <input type="checkbox"/> Abnormal knocking <input type="checkbox"/> Engine rpm jumps briefly <input type="checkbox"/> Other _____
<input type="checkbox"/> <b>Poor Idling</b> <input type="checkbox"/> Poor fast Idle <input type="checkbox"/> Abnormal idling speed ( <input type="checkbox"/> High <input type="checkbox"/> Low) (        r/min) <input type="checkbox"/> Unstable <input type="checkbox"/> Hunting (        r/min. to        r/min) <input type="checkbox"/> Other _____	<input type="checkbox"/> <b>Engine Stall when</b> <input type="checkbox"/> Immediately after start <input type="checkbox"/> Throttle valve is opened <input type="checkbox"/> Throttle valve is closed <input type="checkbox"/> Load is applied <input type="checkbox"/> Other _____
<input type="checkbox"/> OTHERS:	

<b>MOTORCYCLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS</b>	
<b>Environmental condition</b>	
Weather	<input type="checkbox"/> Fair <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Snow <input type="checkbox"/> Always <input type="checkbox"/> Other
Temperature	<input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold (    °F/    °C) <input type="checkbox"/> Always
Frequency	<input type="checkbox"/> Always <input type="checkbox"/> Sometimes (    times/    day, month) <input type="checkbox"/> Only once
	<input type="checkbox"/> Under certain condition
Road	<input type="checkbox"/> Urban <input type="checkbox"/> Suburb <input type="checkbox"/> Highway <input type="checkbox"/> Mountainous ( <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill)
	<input type="checkbox"/> Tarmacadam <input type="checkbox"/> Gravel <input type="checkbox"/> Other
<b>Motorcycle condition</b>	
Engine condition	<input type="checkbox"/> Cold <input type="checkbox"/> Warming up phase <input type="checkbox"/> Warmed up <input type="checkbox"/> Always <input type="checkbox"/> Other at starting
	<input type="checkbox"/> Immediately after start <input type="checkbox"/> Racing without load <input type="checkbox"/> Engine speed (    r/min)
Motorcycle condition	During driving: <input type="checkbox"/> Constant speed <input type="checkbox"/> Accelerating <input type="checkbox"/> Decelerating
	<input type="checkbox"/> Right hand corner <input type="checkbox"/> Left hand corner <input type="checkbox"/> At stop
	<input type="checkbox"/> Motorcycle speed when problem occurs (    km/h,    Mile/h)
	<input type="checkbox"/> Other _____

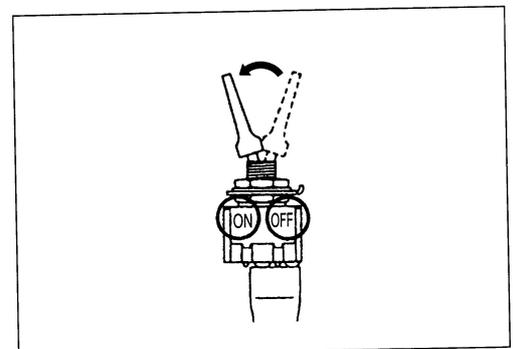
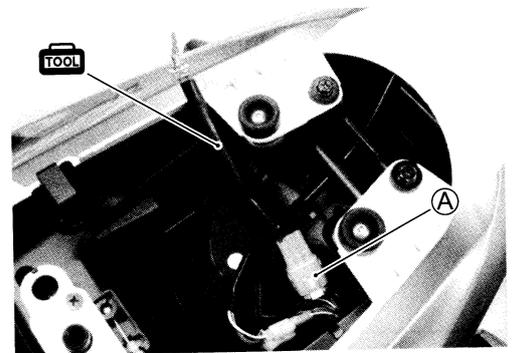
**NOTE:**

\* The above form is a standard sample. It should be modified according to conditions characteristic of each market.

## SELF-DIAGNOSTIC PROCEDURES

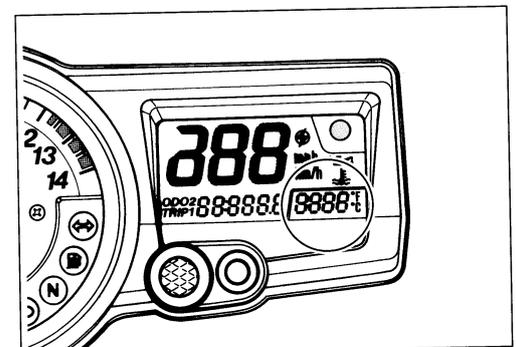
- Don't disconnect couplers from ECM, battery cable from battery, ECM ground wire harness from engine or main fuse before confirming malfunction code (self-diagnostic trouble code) stored in memory. Such disconnection will erase memorized information in ECM memory.
- Malfunction code stored in ECM memory can be checked by the special tool.
- Before checking malfunction code, read SELF-DIAGNOSIS FUNCTION "USER MODE and DEALER MODE" (4-15, 16) 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" (4-2) before inspection and observe what is written there.
- Remove the rear seat (seat tail cover).
- Connect the special tool to the dealer mode coupler (A) at the wiring harness, and start the engine or crank the engine for more than 4 seconds.
- Turn the special tool's switch ON and check the malfunction code to determine the malfunction part.

 **09930-82720: Mode select switch**



## SELF-DIAGNOSIS RESET PROCEDURE

- After repairing the trouble, turn OFF the ignition switch and turn ON again.
- If the malfunction code indicates (C00), the malfunction is 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 4 sec. and more, 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 4 sec. and more, after receiving the starter signal.
		The crankshaft position sensor wiring and mechanical parts. (Crankshaft position sensor, lead wire/coupler connection)
C13	Intake air pressure sensor	The sensor should produce following voltage. $0.5\text{ V} \leq \text{sensor voltage} < 4.85\text{ V}$ Without the above range, C13 is indicated.
		Intake air pressure sensor, lead wire/coupler connection.
C14	Throttle position sensor	The sensor should produce following voltage. $0.2\text{ V} \leq \text{sensor voltage} < 4.8\text{ V}$ Without the above range, C14 is indicated.
		Throttle position sensor, lead wire/coupler connection.
C15	Engine coolant temperature sensor	The sensor voltage should be the following. $0.15\text{ V} \leq \text{sensor voltage} < 4.85\text{ V}$ Without the above range, C15 is indicated.
		Engine coolant temperature sensor, lead wire/coupler connection.
C21	Intake air temperature sensor	The sensor voltage should be the following. $0.15\text{ V} \leq \text{sensor voltage} < 4.85\text{ V}$ Without the above range, C21 is indicated.
		Intake air temperature sensor, lead wire/coupler connection.
C22	Atmospheric pressure sensor	The sensor voltage should be the following. $0.5\text{ V} \leq \text{sensor voltage} < 4.85\text{ V}$ Without the above range, C22 is indicated.
		Atm. pressure sensor, wiring/coupler connection.
C23	Tip over sensor	The sensor voltage should be the following for 2 sec. and more, after ignition switch turns ON. $0.2\text{ V} \leq \text{sensor voltage} \leq 4.8\text{ V}$ Without the above value, C23 is indicated.
		Tip over sensor, lead wire/coupler connection.
C24/C25 C26/C27	Ignition signal	Crankshaft position sensor (pick-up coil) signal is produced, but signal from ignition coil is interrupted continuous by 8 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.

MALFUNCTION CODE	DETECTED ITEM	DETECTED FAILURE CONDITION CHECK FOR
C28	Secondary throttle valve actuator	When no actuator control signal is supplied from the ECM or communication signal does not reach ECM or operation voltage does not reach STVA motor, C28 is indicated. STVA can not operate.
		STVA lead wire/coupler.
C29	Secondary throttle position sensor	The sensor should produce following voltage. $0.15 \text{ V} \leq \text{sensor voltage} < 4.85 \text{ V}$ Without the above value, C29 is indicated.
		Secondary throttle position sensor, lead wire/coupler connection.
C31	Gear position signal	Gear position signal voltage should be higher than the following for 3 seconds and more. (Gear position sensor voltage $> 0.6 \text{ V}$ ) Without the above value, C31 is indicated.
		Gear position sensor, wiring/coupler connection. Gearshift cam etc.
C32/C33 C34/C35	Fuel injector	Crankshaft position sensor (pickup coil) signal is produced, but fuel injector signal is interrupted continuous by 4 times or more. In this case, the code C24, C25, C26 or C27 is indicated.
		Injector, wiring/coupler connection, power supply to the injector.
C41	Fuel pump relay	No voltage is applied to the fuel pump, although fuel pump relay is turned ON, or voltage is applied to fuel pump although fuel pump relay is turned OFF.
		Fuel pump relay, connecting lead wire, power source to fuel pump relay, fuel injectors.
C42	Ignition switch	Ignition switch signal is not input in ECM.
		Ignition switch, lead wire/coupler.
C46	Exhaust control valve actuator	EXCVA position sensor produces following voltage. $0.1 \text{ V} \leq \text{sensor voltage} < 4.9 \text{ V}$ Without the above value, C46 is indicated. EXCVA motor can not move.
		EXCVA, EXCVA adjustment, lead wire/coupler.

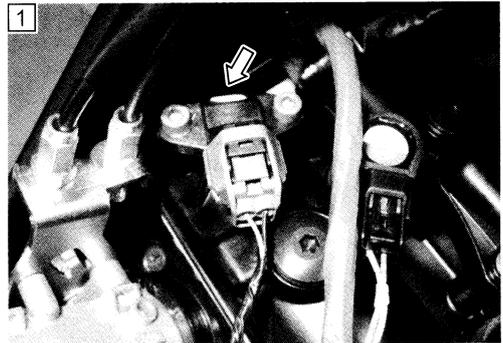
### “C11” CMP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
The signal does not reach ECM for 4 sec. and more, after receiving the starter signal.	<ul style="list-style-type: none"> <li>• Metal particles or foreign material being attached on the CMP sensor and rotor tip.</li> <li>• CMP sensor circuit open or short.</li> <li>• CMP sensor malfunction.</li> <li>• ECM malfunction.</li> </ul>

#### INSPECTION

##### Step1

- 1) Lift and support the fuel tank with its prop stay. (☞ 5-5)
- 2) Remove the air cleaner box. (☞ 5-15)
- 3) Turn the ignition switch OFF.
- 4) Check the CMP sensor coupler for loose or poor contacts.  
If OK, then measure the CMP sensor resistance.



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

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

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

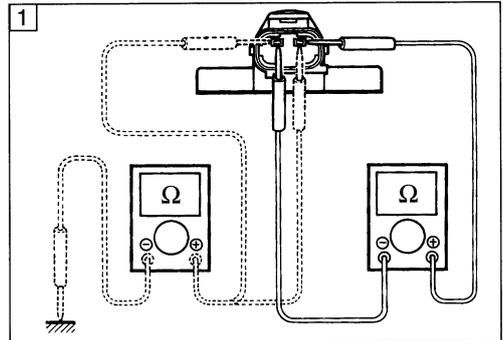
**DATA** CMP sensor continuity: ∞ Ω (Infinity)  
(Terminal – Ground)

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

**Tester knob indication: Resistance (Ω)**

Is the resistance OK?

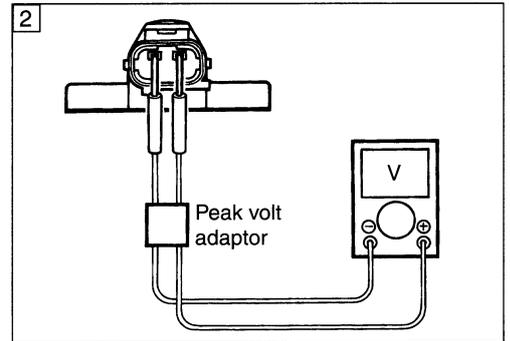
YES	Go to step 2.
NO	Replace the CMP sensor with a new one.



**Step2**

- 1) Disconnect the CMP sensor coupler.
- 2) 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: **0.5 V and more**  
 (+ B/Y – Br -)

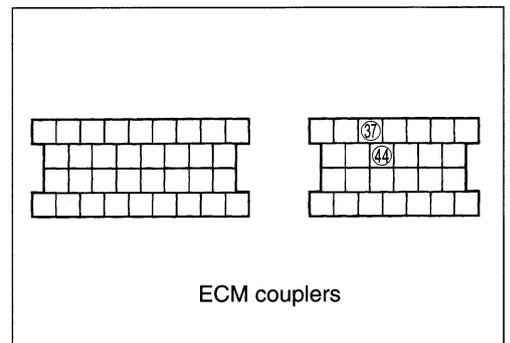


- 3) Repeat the above test procedure a few times and measure the highest peak voltage.  
 If OK, then measure the CMP sensor peak voltage at the ECM terminals. (37 – 44)

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

**V** Tester knob indication: Voltage (---)

Is the voltage OK?



YES	<ul style="list-style-type: none"> <li>• B/Y or Br wire open or shorted to ground, or poor 37 or 44 connection.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>• Replace the ECM with a new one, and inspect it again.</li> </ul>
NO	<ul style="list-style-type: none"> <li>• Loose or poor contacts on the CMP sensor coupler or ECM coupler.</li> <li>• Replace the CMP sensor with a new one.</li> </ul>

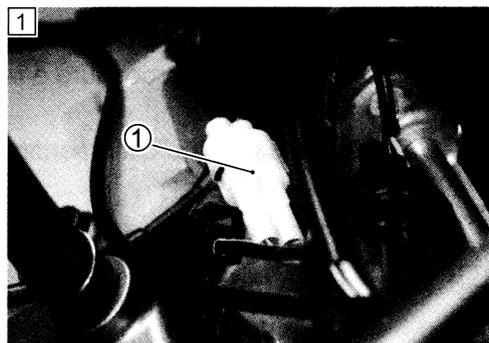
## “C12” CKP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
The signal does not reach ECM for 4 sec. and more, after receiving the starter signal.	<ul style="list-style-type: none"> <li>• Metal particles or foreign materiel being attached on the CKP sensor and rotor tip.</li> <li>• CKP sensor circuit open or short.</li> <li>• CKP sensor malfunction.</li> <li>• ECM malfunction.</li> </ul>

### INSPECTION

#### Step1

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



- 4) Disconnect the CKP sensor coupler ① and measure the resistance.

**DATA** CKP sensor resistance: 70 – 220 Ω  
(Black – Green)

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

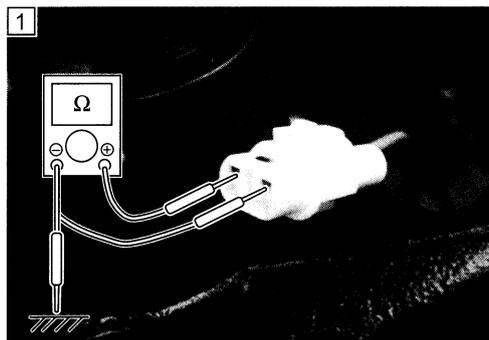
**DATA** CKP sensor continuity: ∞ Ω (Infinity)  
(Black – Ground)  
(Green – Ground)

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

**Tester knob indication: Resistance (Ω)**

Are the resistance and continuity OK?

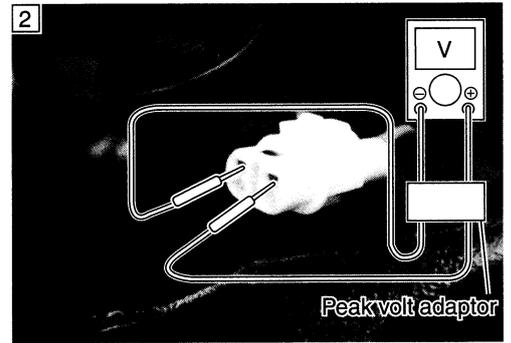
YES	Go to step 2.
NO	Replace the CKP sensor with a new one.



**Step2**

- 1) Disconnect the CKP sensor coupler.
- 2) 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: **0.5 V and more**  
 (+ Black – (–) Green)



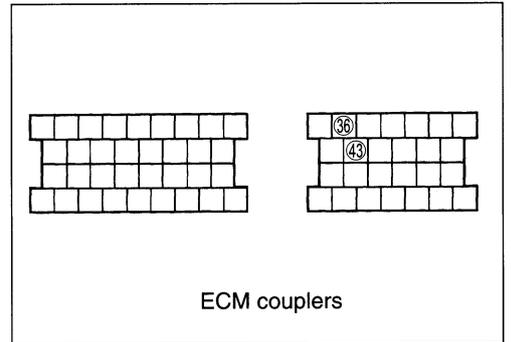
- 3) Repeat the above test procedure a few times and measure the highest peak voltage.

If OK, then measure the CKP sensor peak voltage at the ECM terminals. (36 – 43)

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

**Tester knob indication: voltage (---)**

Is the voltage OK?



YES	<ul style="list-style-type: none"> <li>• Black or Green wire open or shorted to ground, or poor 36 or 43 connection.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> </ul>
NO	<ul style="list-style-type: none"> <li>• Loose or poor contacts on the CKP sensor coupler or ECM coupler.</li> <li>• Replace the CKP sensor with a new one.</li> </ul>

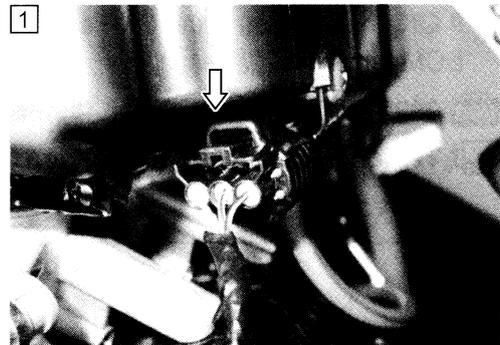
## “C13” IAP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
IAP sensor voltage low or high. $0.5\text{ V} \leq \text{Sensor voltage} < 4.85\text{ V}$ (without the above range.)  <b>NOTE:</b> <i>Note that atmospheric pressure varies depending on weather conditions as well as altitude.</i> <i>Take that into consideration when inspecting voltage.</i>	<ul style="list-style-type: none"> <li>• Clogged vacuum passage between throttle body and IAP sensor.</li> <li>• Air being drawn from vacuum passage between throttle body and IAP sensor.</li> <li>• IAP sensor circuit open or shorted to ground.</li> <li>• IAP sensor malfunction.</li> <li>• ECM malfunction.</li> </ul>

### INSPECTION

#### Step 1

- 1) Lift and support the fuel tank with its prop stay. (☞ 5-5)
- 2) Turn the ignition switch OFF.
- 3) Check the IAP sensor coupler for loose or poor contacts.  
If OK, then measure the IAP sensor input voltage.



- 4) Disconnect the IAP sensor coupler.
- 5) Turn the ignition switch ON.
- 6) Measure the voltage at the Red wire and ground.  
If OK, then measure the voltage at the Red wire and B/Br wire.

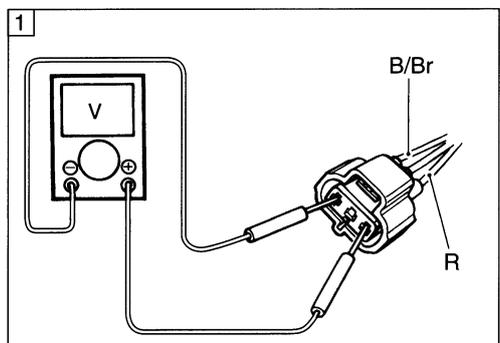
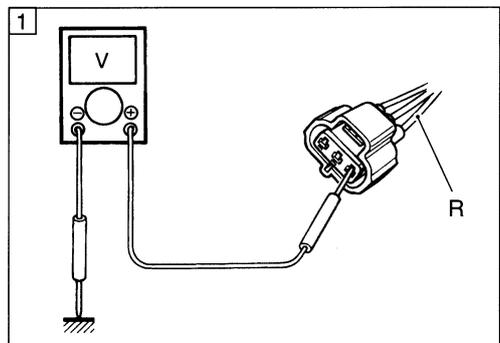
**DATA** IAP sensor input voltage: 4.5 – 5.5 V  
 (+ Red – (–) Ground)  
 (+ Red – (–) B/Br)

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

**V** Tester knob indication: Voltage (---)

Is the voltage OK?

YES	Go to Step 2.
NO	<ul style="list-style-type: none"> <li>• Loose or poor contacts on the ECM coupler.</li> <li>• Open or short circuit in the Red wire or B/Br wire.</li> </ul>



**Step 2**

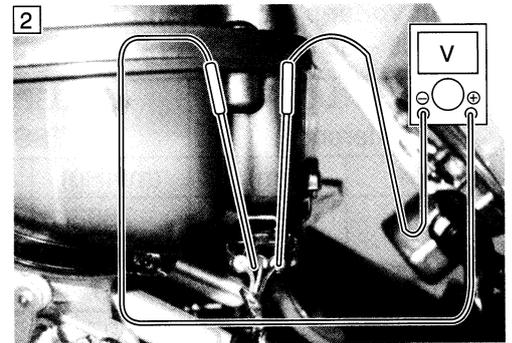
- 1) Connect the IAP sensor coupler.
- 2) Insert the needle pointed probes to the lead wire coupler.  
Start the engine at idle speed.
- 3) Measure the IAP sensor output voltage at the wire side coupler (between G/B and B/Br wires).

**DATA** IAP sensor output voltage: Approx. 2.6 V at idle speed (+ G/B – - B/Br)

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

**Tester knob indication: Voltage (---)**

YES	Go to Step 3.
NO	<ul style="list-style-type: none"> <li>• Check the vacuum hose for crack or damage.</li> <li>• Open or short circuit in the G/B wire.</li> <li>• Replace the IAP sensor with a new one.</li> </ul>



**Step 3**

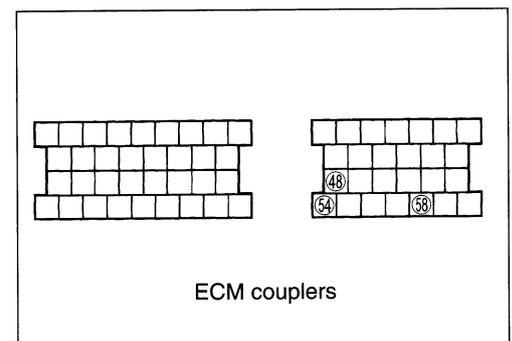
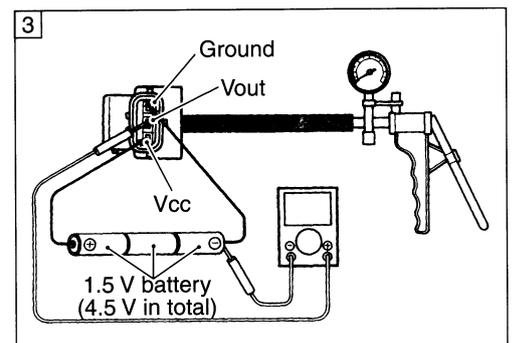
- 1) Remove the IAP sensor.
- 2) Connect the vacuum pump gauge to the vacuum port of the IAP sensor.  
Arrange 3 new 1.5 V batteries in series (check that total voltage is 4.5 – 5.0 V) and connect - terminal to the ground terminal and + terminal to the Vcc terminal.  
Check the voltage between Vout and ground. Also, check if voltage reduces when vacuum is applied up to 400 mmHg by using vacuum pump gauge. (↪ 4-32)

**TOOL** 09917-47010: Vacuum pump gauge  
09900-25008: Multi circuit tester set

**Tester knob indication: Voltage (---)**

Is the voltage OK?

YES	<ul style="list-style-type: none"> <li>• Red, G/B or B/Br wire open or shorted to ground, or poor ④⑧, ⑤④ or ⑤⑧ connection.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> </ul>
NO	If check result is not satisfactory, replace IAP sensor with a new one.



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	707   634	94   85	2.8 – 3.4
5 001   8 000	1 524   2 438	634   567	85   76	2.6 – 3.1
8 001   10 000	2 439   3 048	567   526	76   70	2.4 – 2.9

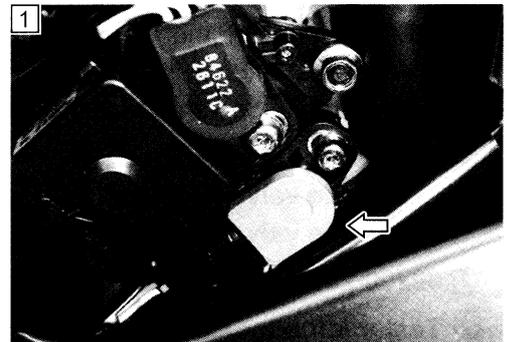
## “C14” TP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
Output voltage low or high Difference between actual throttle opening and opening calculated by ECM is larger than specified value. $0.2\text{ V} \leq \text{Sensor voltage} < 4.8\text{V}$ (without the above range.)	<ul style="list-style-type: none"> <li>• TP sensor maladjusted.</li> <li>• TP sensor circuit open or short.</li> <li>• TP sensor malfunction.</li> <li>• ECM malfunction.</li> </ul>

### INSPECTION

#### Step 1

- 1) Lift and support the fuel tank with its prop stay. (☞ 5-5)
- 2) Turn the ignition switch OFF.
- 3) Check the TP sensor coupler for loose or poor contacts.  
If OK, then measure the TP sensor input voltage.
- 4) Disconnect the TP sensor coupler ①.



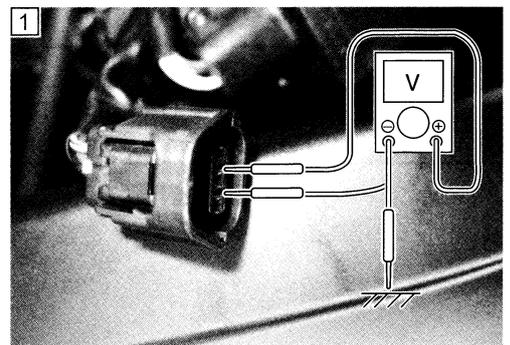
- 5) Turn the ignition switch ON.
- 6) Measure the voltage at the Red wire and ground.
- 7) If OK, then measure the voltage at the Red wire and B/Br wire.

**DATA** TP sensor input voltage: 4.5 – 5.5 V  
 (+ Red – (–) Ground)  
 (+ Red – (–) B/Br)

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

**Tester knob indication: Voltage (V)**

Is the voltage OK?



YES	Go to Step 2.
NO	<ul style="list-style-type: none"> <li>• Loose or poor contacts on the ECM coupler.</li> <li>• Open or short circuit in the Red wire or B/Br wire.</li> </ul>

**Step 2**

- 1) Turn the ignition switch OFF.
- 2) Disconnect the TP sensor coupler.
- 3) Check the continuity between terminal Ⓐ and ground.

**DATA** TP sensor continuity:  $\infty \Omega$  (Infinity)  
(Terminal Ⓐ – Ground)

- 4) If OK, then measure the TP sensor resistance at the terminal (between Ⓐ and Ⓑ).
- 5) Turn the throttle grip and measure the resistance.

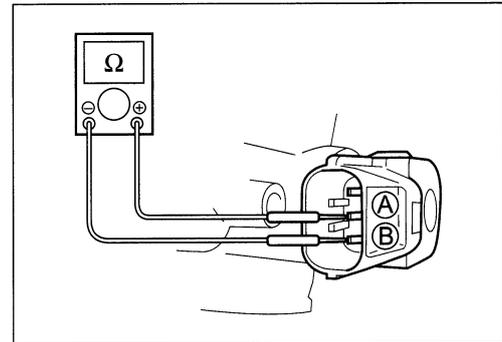
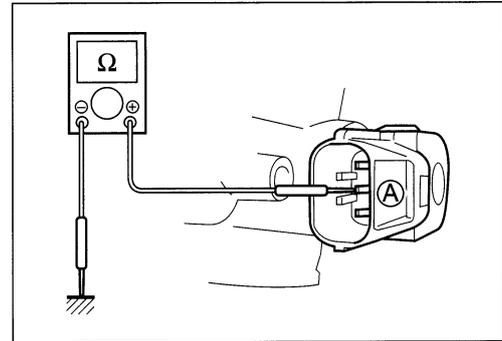
**DATA** TP sensor resistance  
Throttle valve is closed : Approx. 1.1 k $\Omega$   
Throttle valve is opened: Approx. 4.3 k $\Omega$

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

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

Are the resistance and continuity OK?

YES	Go to Step 3.
NO	<ul style="list-style-type: none"> <li>• Reset the TP sensor position correctly.</li> <li>• Replace the TP sensor with a new one.</li> </ul>



**Step 3**

- 1) Connect the TP sensor coupler.
- 2) Insert the needle pointed probes to the injector/TP sensor lead wire coupler.
- 3) Turn the ignition switch ON.  
Measure the TP sensor output voltage at the coupler (between ⊕ P/B and ⊖ B/Br) by turning the throttle grip.

**DATA TP sensor output voltage**

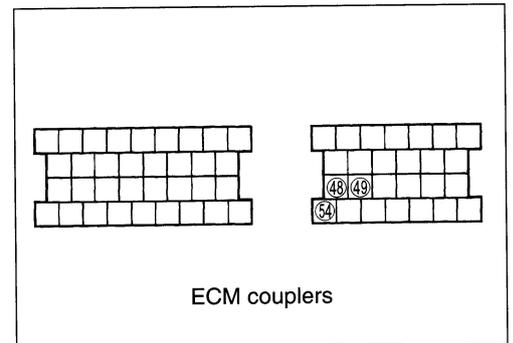
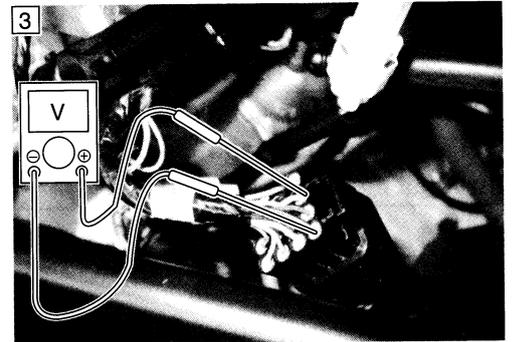
Throttle valve is closed : Approx. 1.1 V  
Throttle valve is opened: Approx. 4.3 V

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

**Tester knob indication: Voltage (---)**

Is the voltage OK?

YES	<ul style="list-style-type: none"> <li>• Red, P/B or B/Br wire open or shorted to ground, or poor ④⑧, ④⑨ or ⑤④ connection.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> </ul>
NO	If check result is not satisfactory, replace TP sensor with a new one.



### “C15” ECT SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
Output voltage low or high $0.15 \leq \text{Sensor voltage} < 4.85 \text{ V}$ (without the above range.)	<ul style="list-style-type: none"> <li>ECT sensor circuit open or short.</li> <li>ECT sensor malfunction.</li> <li>ECM malfunction.</li> </ul>

#### INSPECTION

##### Step 1

- Lift and support the fuel tank with its prop stay. (☞ 5-5)
- 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/BI wire terminal and ground.
- If OK, then measure the voltage between B/BI wire terminal and B/Br wire terminal.

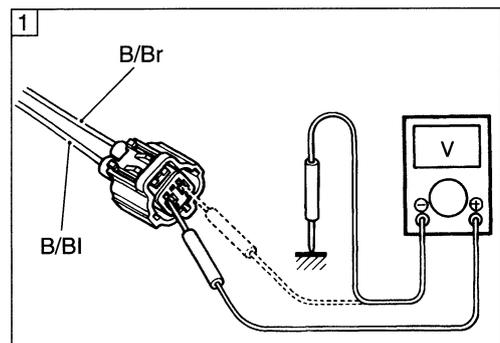
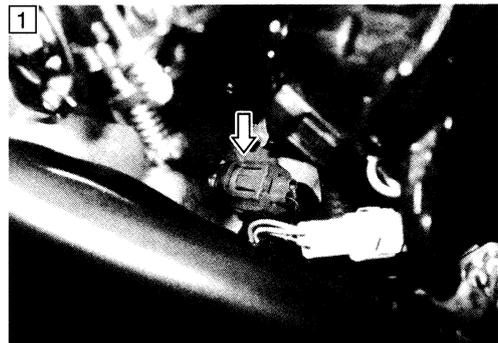
**DATA** ETC sensor voltage: 4.5 – 5.5 V  
 (+ B/BI – (– Ground)  
 (+ B/BI – (– B/Br)

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

**Tester knob indication: Voltage (V)**

Is the voltage OK?

YES	Go to Step 2
NO	<ul style="list-style-type: none"> <li>Loose or poor contacts on the ECM coupler.</li> <li>Open or short circuit in the B/BI wire or B/Br wire.</li> </ul>



**Step 2**

- 1) Turn the ignition switch OFF.
- 2) Measure the ECT sensor resistance.

**DATA** ECT sensor resistance:  
 Approx. 2.3 – 2.6 kΩ at 20 °C (68 °F)  
 (Terminal – Terminal)

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

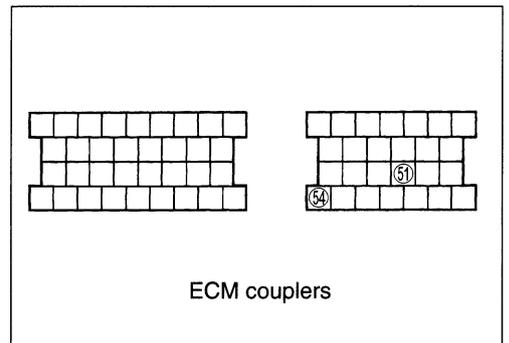
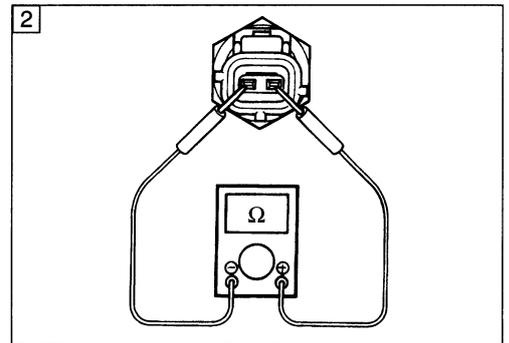
**Tester knob indication: Resistance (Ω)**

Refer to page 7-8 for details.

Is the resistance OK?

YES	<ul style="list-style-type: none"> <li>• B/Bl or B/Br wire open or shorted to ground, or poor ⑤1 or ⑤4 connection.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> </ul>
NO	Replace the ECT sensor with a new one.

Engine Coolant Temp	Resistance
20 °C (68 °F)	Approx. 2.45 kΩ
50 °C (122 °F)	Approx. 0.811 kΩ
80 °C (176 °F)	Approx. 0.318 kΩ
110 °C (230 °F)	Approx. 0.142 kΩ



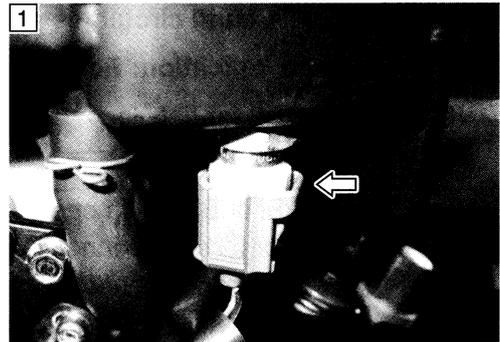
## “C21” IAT SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
Output voltage low or high $0.15 \leq \text{Sensor voltage} < 4.85 \text{ V}$ (without the above range.)	<ul style="list-style-type: none"> <li>• IAT sensor circuit open or short.</li> <li>• IAT sensor malfunction.</li> <li>• ECM malfunction.</li> </ul>

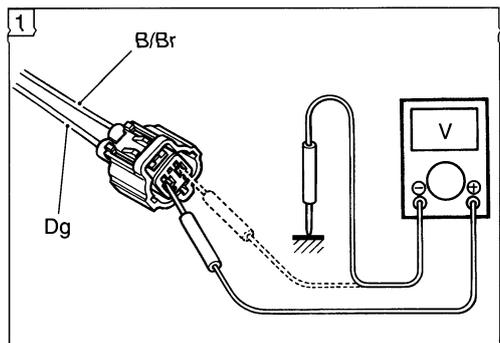
### INSPECTION

#### Step 1

- 1) Lift and support the fuel tank with its prop stay. (↖ 5-5)
- 2) Turn the ignition switch OFF.
- 3) Check the IAT sensor coupler for loose or poor contacts.  
If OK, then measure the IAT sensor voltage at the wire side coupler.
- 4) Disconnect the coupler and turn the ignition switch ON.



- 5) Measure the voltage between Dg wire terminal and ground.
- 6) If OK, then measure the voltage between Dg wire terminal and B/Br wire terminal.



**DATA** IAT sensor voltage: 4.5 – 5.5 V  
 (+ Dg – (–) Ground)  
 (+ Dg – (–) B/Br)

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

**Tester knob indication: Voltage (---)**

Is the voltage OK?

YES	Go to Step 2.
NO	<ul style="list-style-type: none"> <li>• Loose or poor contacts on the ECM coupler.</li> <li>• Open or short circuit in the B/BI wire or B/Br wire.</li> </ul>

**Step 2**

- 1) Turn the ignition switch OFF.
- 2) Measure the IAT sensor resistance.

**DATA** IAT sensor resistance:  
 Approx. 2.2 – 2.7 kΩ at 20 °C (68 °F)  
 (Terminal – Terminal)

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

**Tester knob indication: Resistance (Ω)**

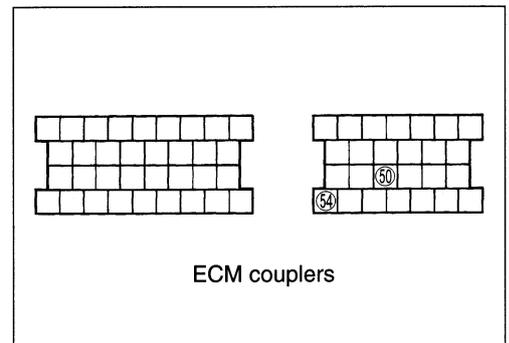
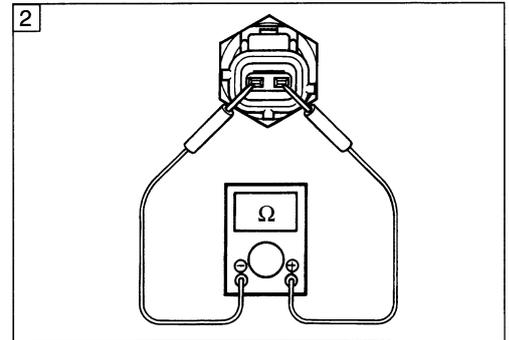
Is the resistance OK?

YES	<ul style="list-style-type: none"> <li>• Dg or B/Br wire open or shorted to ground, or poor 50 or 54 connection.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> </ul>
NO	Replace the IAT sensor with a new one.

Intake Air Temp	Resistance
20 °C (68 °F)	Approx. 2.45 kΩ
50 °C (122 °F)	Approx. 0.808 kΩ
80 °C (176 °F)	Approx. 0.322 kΩ
110 °C (230 °F)	Approx. 0.148 kΩ

**NOTE:**

IAT sensor resistance measurement method is the same way as that of the ECT sensor. Refer to page 7-8 for details.



## “C22” AP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
AP sensor voltage low or high. $0.5\text{ V} \leq \text{Sensor voltage} < 4.85\text{ V}$ (without the above range.) <b>NOTE:</b> <i>Note that atmospheric pressure varies depending on weather conditions as well as altitude.</i> <i>Take that into consideration when inspecting voltage.</i>	<ul style="list-style-type: none"> <li>• Clogged air passage with dust.</li> <li>• Red wire circuit open or shorted to ground.</li> <li>• B/Br or G/Y wire circuit shorted to ground.</li> <li>• AP sensor malfunction.</li> <li>• ECM malfunction.</li> </ul>

### INSPECTION

#### Step 1

- 1) Remove the front seat. (☞ 8-6)
- 2) Turn the ignition switch OFF.
- 3) Check the AP sensor coupler for loose or poor contacts.  
If OK, then measure the AP sensor input voltage.

- 4) Disconnect the AP sensor coupler ①.
- 5) Turn the ignition switch ON.
- 6) Measure the voltage at the Red wire and ground.  
If OK, then measure the voltage at the Red wire and B/Br wire.

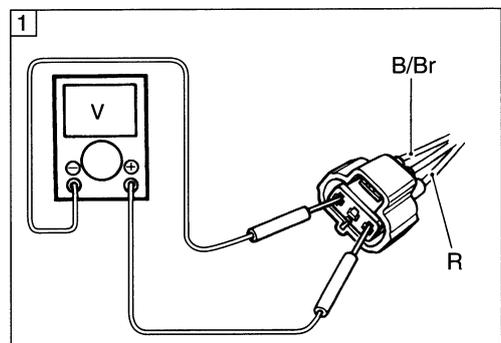
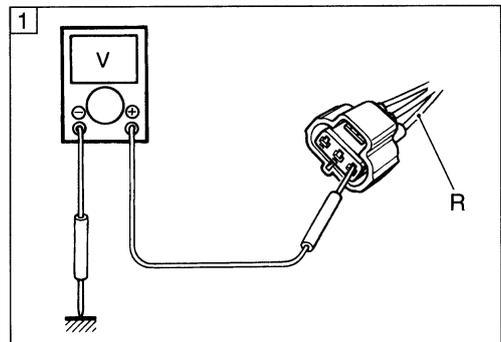
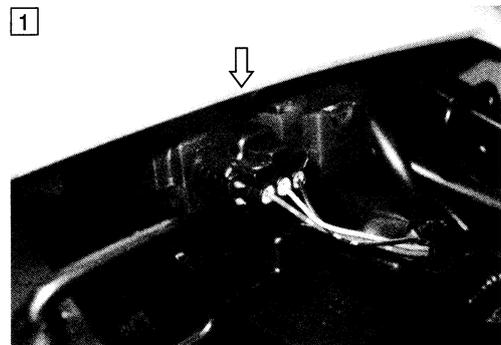
**DATA** AP sensor input voltage: 4.5 – 5.5 V  
 (+ Red – (–) Ground)  
 (+ Red – (–) B/Br)

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

**Tester knob indication: Voltage (V)**

Is the voltage OK?

YES	Go to Step 2.
NO	<ul style="list-style-type: none"> <li>• Loose or poor contacts on the ECM coupler.</li> <li>• Open or short circuit in the Red wire or B/Br wire.</li> </ul>



**Step 2**

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

**DATA** AP sensor output voltage: Approx. 2.6 V at 760 mmHg (100 kPa)  
(+ G/Y - - B/Br)

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

**Tester knob indication: Voltage (---)**

YES	Go to Step 3.
NO	<ul style="list-style-type: none"> <li>• Check the vacuum hose for crack or damage.</li> <li>• Open or short circuit in the G/Y wire.</li> <li>• Replace the AP sensor with a new one.</li> </ul>

**Step 3**

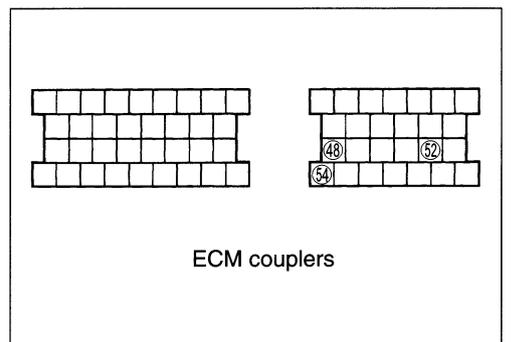
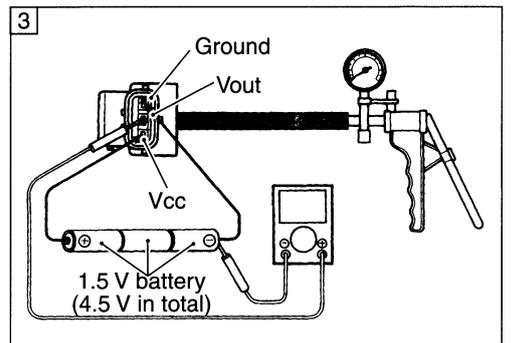
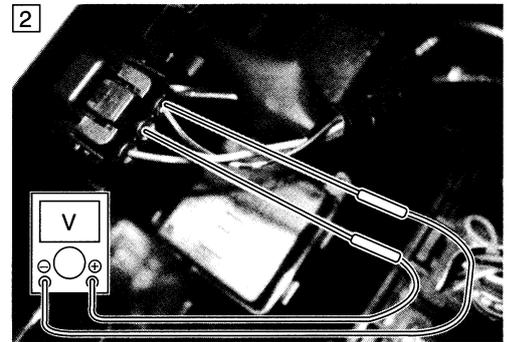
- 1) Remove the AP sensor.
- 2) Connect the vacuum pump gauge to the vacuum port of the AP sensor.  
Arrange 3 new 1.5 V batteries in series (check that total voltage is 4.5 – 5.0 V) and connect - terminal to the ground terminal and + terminal to the Vcc terminal.  
Check the voltage between Vout and ground. Also, check if voltage reduces when vacuum is applied up to 400 mmHg by using vacuum pump gauge. (↪ 4-42)

**TOOL** 09917-47010: Vacuum pump gauge  
09900-25008: Multi circuit tester set

**Tester knob indication: Voltage (---)**

Is the voltage OK?

YES	<ul style="list-style-type: none"> <li>• Red, G/Y or B/Br wire open or shorted to ground, or poor ④⑧, ⑤② or ⑤④ connection.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> </ul>
NO	If check result is not satisfactory, replace AP sensor with a new one.



**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	707   634	94   85	2.8 – 3.4
5 001   8 000	1 524   2 438	634   567	85   76	2.6 – 3.1
8 001   10 000	2 439   3 048	567   526	76   70	2.4 – 2.9

## “C23” TO SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
Output voltage low or high $0.2 \leq \text{Sensor voltage} < 4.8 \text{ V}$ (without the above range.)	<ul style="list-style-type: none"> <li>• TO sensor circuit open or short.</li> <li>• TO sensor malfunction.</li> <li>• ECM malfunction.</li> </ul>

### INSPECTION

#### Step 1

- 1) Lift and support the fuel tank with its prop stay. (📄 5-5)
- 2) Turn the ignition switch OFF.
- 3) Check the TO sensor coupler for loose or poor contacts.  
If OK, then measure the TO sensor resistance.
- 4) Disconnect the TO sensor coupler.
- 5) Measure the resistance between Red wire and B/Br wire terminals.

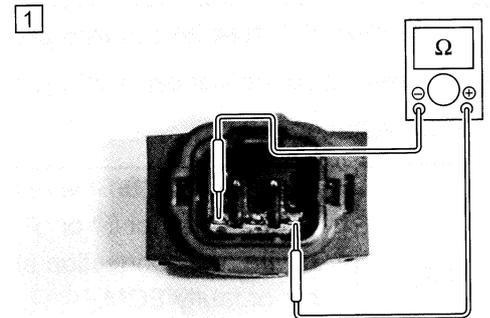
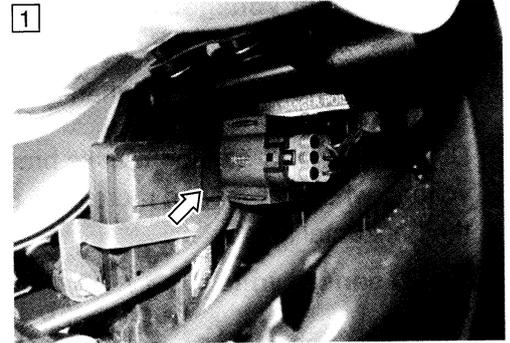
**DATA** TO sensor resistance: 19.1 – 19.7 kΩ (Red – B/Br)

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

**Tester knob indication: Resistance (Ω)**

Is the resistance OK?

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



**Step 2**

- 1) Connect the TO sensor coupler.
- 2) Insert the needle pointed probes to the lead wire coupler.
- 3) Turn the ignition switch ON.
- 4) Measure the voltage at the wire side coupler between Black and B/Br wires.

**DATA** TO sensor voltage: 0.4 – 1.4 V  
(⊕ Black – ⊖ B/Br)

Also, measure the voltage when leaning of the motorcycle.

- 5) Dismount the TO sensor from its bracket and measure the voltage when it is leaned more than 65 °, left and right, from the horizontal level.

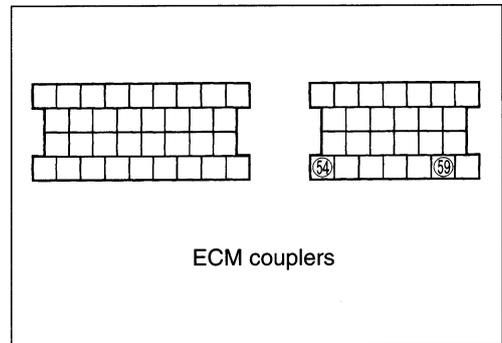
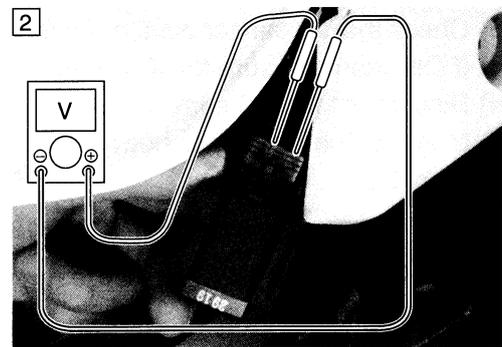
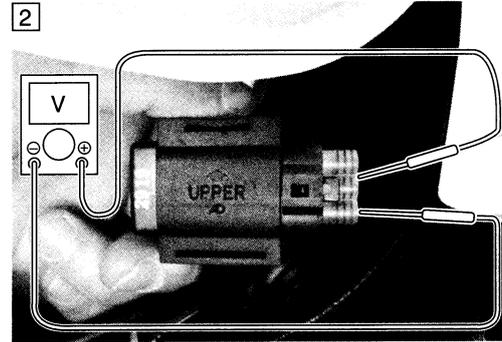
**DATA** TO sensor voltage: 3.7 – 4.4 V  
(⊕ Black – ⊖ B/Br)

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

**V** Tester knob indication: Voltage (---)

Is the voltage OK?

YES	<ul style="list-style-type: none"> <li>• Red, Black or B/Br wire open or shorted to ground, or poor 54 or 59 connection.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> </ul>
NO	<ul style="list-style-type: none"> <li>• Loose or poor contacts on the ECM coupler.</li> <li>• Open or short circuit.</li> <li>• Replace the TO sensor with a new one.</li> </ul>



**“C24”, “C25”, “C26” or “C27” IGNITION SYSTEM MALFUNCTION**

\*Refer to the IGNITION SYSTEM for details. (9-18)

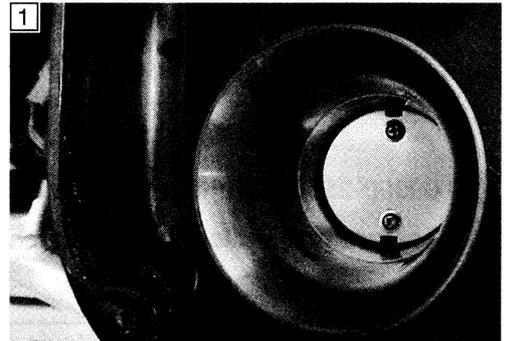
## “C28” STV ACTUATOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
The operation voltage does not reach the STVA. ECM does not receive communication signal from the STVA.	<ul style="list-style-type: none"> <li>• STVA malfunction.</li> <li>• STVA circuit open or short.</li> <li>• STVA motor malfunction.</li> </ul>

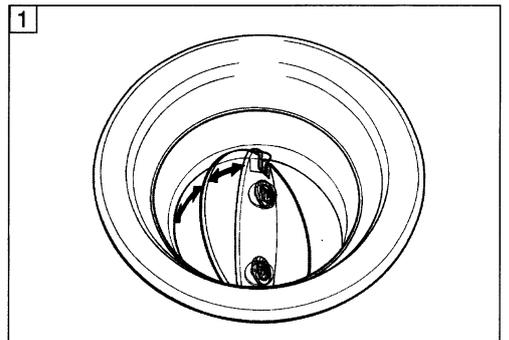
### INSPECTION

#### Step 1

- 1) Lift and support the fuel tank with its prop stay. (☞ 5-5)
- 2) Remove the air cleaner element.
- 3) Turn the ignition switch OFF.
- 4) Check the STVA lead wire coupler for loose or poor contacts.



- 5) Turn the ignition switch ON to check the STVA operation. (STV operating order: Full open → 95 % open)



Is the operation OK?

YES	Go to Step 2.
NO	<ul style="list-style-type: none"> <li>• Loose or poor contacts on the STVA coupler.</li> <li>• Open or short circuit in the (Pink or Black) and (W/Bl or Green) wires.</li> </ul>

**Step 2**

- 1) Turn the ignition switch OFF.
- 2) Disconnect the STVA lead wire coupler.
- 3) Check the continuity between each wire and ground.

**DATA** STVA continuity:  $\infty \Omega$  (Infinity)

If OK, then measure the STVA resistance. (between Pink and Black wires) and (between W/BI and Green wires)

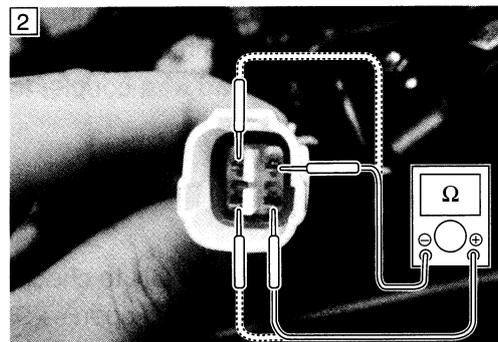
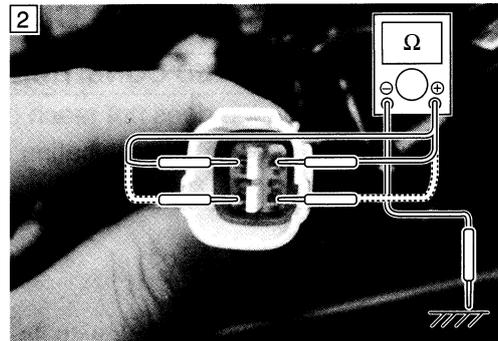
**DATA** STVA resistance: **Approx. 6.5  $\Omega$**   
 (+ Pink – – Black)  
 (+ W/BI – – Green)

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

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

Is the resistance OK?

YES	<ul style="list-style-type: none"> <li>• Loose or poor contacts on the STVA coupler.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>• Replace the ECM with new one, and inspect it again.</li> </ul>
NO	Replace the STVA with a new one.



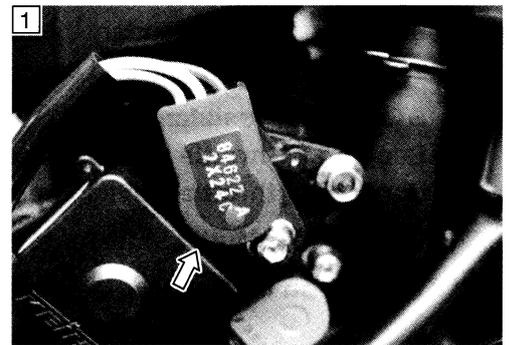
## “C29” STP SENSOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
Signal voltage low or high. Difference between actual throttle opening and opening calculated by ECM is larger than specified value. $0.15\text{ V} \leq \text{Sensor voltage} < 4.85\text{ V}$ (without the above range.)	<ul style="list-style-type: none"> <li>• STP sensor maladjusted.</li> <li>• STP sensor circuit open or short.</li> <li>• STP sensor malfunction.</li> <li>• ECM malfunction.</li> </ul>

### INSPECTION

#### Step 1

- 1) Lift and support the fuel tank with its prop stay. (↔ 5-5)
- 2) Turn the ignition switch OFF.
- 3) Check the STP sensor coupler for loose or poor contacts.  
If OK, then measure the STP sensor input voltage.

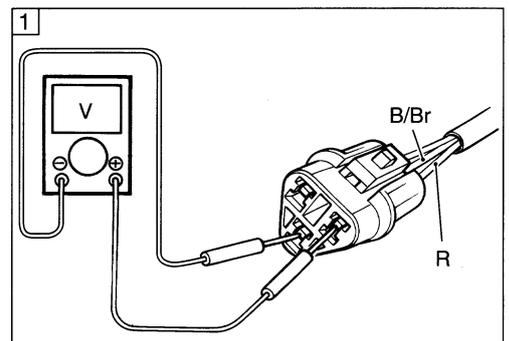
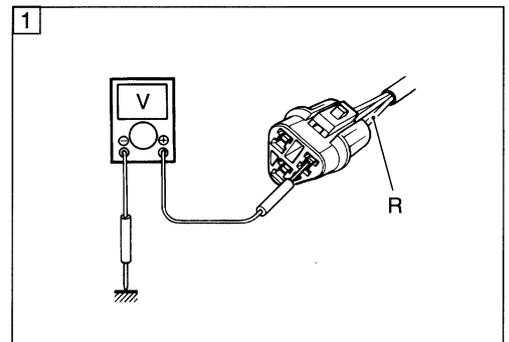


- 4) Disconnect the STP sensor coupler.
- 5) Turn the ignition switch ON.
- 6) Measure the voltage at the Red wire and ground.  
If OK, then measure the voltage at the Red wire and B/Br wire.

**DATA** STP sensor input voltage: 4.5 – 5.5 V  
 (+ Red – (–) Ground)  
 (+ Red – (–) B/Br)

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

**Tester knob indication: Voltage (V)**



Is the voltage OK?

YES	Go to Step 2.
NO	<ul style="list-style-type: none"> <li>• Loose or poor contacts on the ECM coupler.</li> <li>• Open or short circuit in the Red wire or B/Br wire.</li> </ul>

**Step 2**

- 1) Turn the ignition switch OFF.
- 2) Remove the air cleaner element.
- 3) Disconnect the STP sensor coupler (White color).
- 4) Check the continuity between Yellow wire and ground.

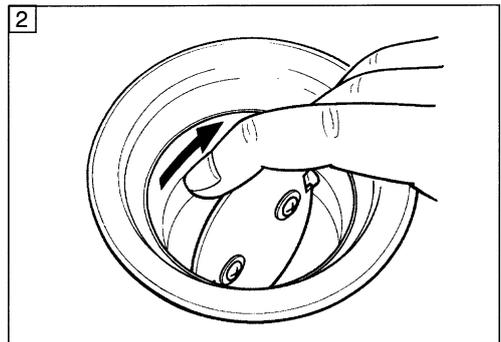
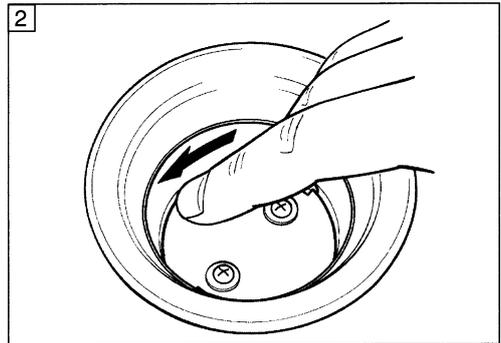
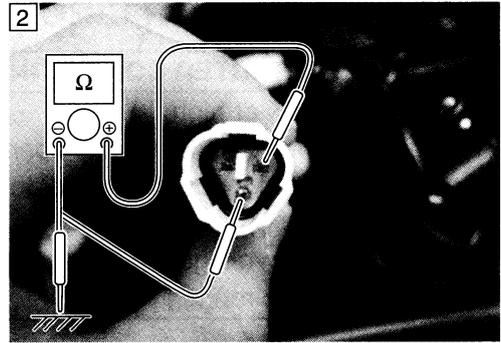
**DATA** STP sensor continuity:  $\infty \Omega$  (Infinity)  
(Yellow wire – Ground)

- 5) If OK, then measure the STP sensor resistance at the coupler (between Yellow and Black wires).
- 6) Close and open the secondary throttle valve by finger, and measure the valve closing and opening resistance.

**DATA** STP sensor resistance  
 Secondary throttle valve is closed : Approx. 0.5 k $\Omega$   
 Secondary throttle valve is opened: Approx. 3.9 k $\Omega$

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

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

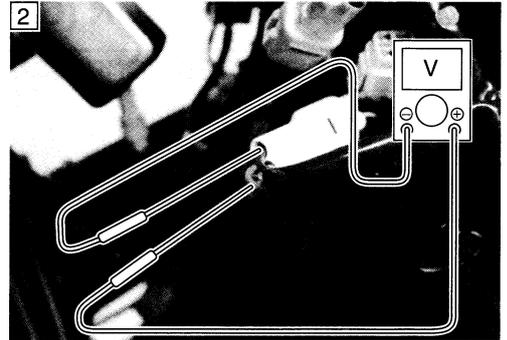


Is the resistance OK?

YES	Go to Step 3.
NO	<ul style="list-style-type: none"> <li>• Reset the STP sensor position correctly.</li> <li>• Replace the STP sensor with a new one.</li> </ul>

**Step 3**

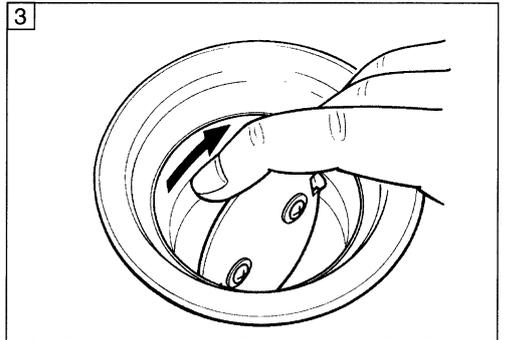
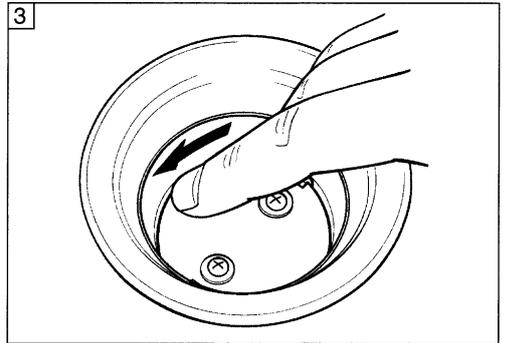
- 1) Turn the ignition switch OFF.
- 2) Connect the STP sensor coupler.
- 3) Insert the needle pointed probes to the lead wire coupler.
- 4) Disconnect the STVA lead wire coupler.
- 5) Turn the ignition switch ON.
- 6) Measure the STP sensor output voltage at the coupler (between ⊕ Yellow and ⊖ Black wires) by turning the secondary throttle valve (close and open) with a finger.



**DATA** STP sensor output voltage  
 Throttle valve is closed : Approx. 0.5 V  
 Throttle valve is opened: Approx. 3.7 V

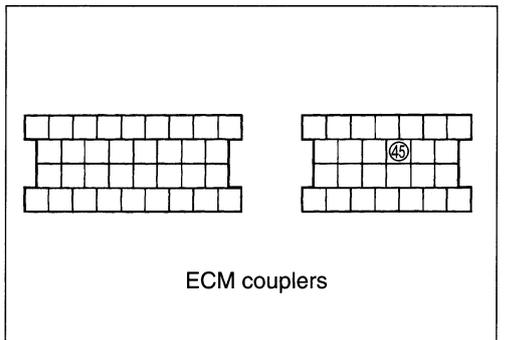
**TOOL** 09900-25008: Multi circuit tester set  
 09900-25009: Needle pointed probe set

**V** Tester knob indication: Voltage (---)



Is the voltage OK?

YES	<ul style="list-style-type: none"> <li>• Blue, Yellow or Black wire open or shorted to ground, or poor ④ connection.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>• Replace the ECM with a new one, and inspect it again.</li> </ul>
NO	If check result is not satisfactory, replace STP sensor with a new one.



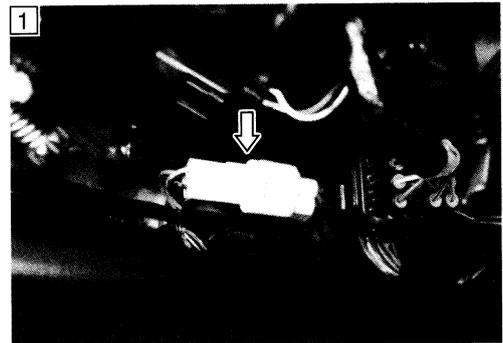
## “C31” GEAR POSITION (GP) SWITCH CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
No Gear Position switch voltage Switch voltage low. Sensor voltage > 0.6 V (without the above range.)	<ul style="list-style-type: none"> <li>• Gear Position switch circuit open or short.</li> <li>• Gear Position switch malfunction.</li> <li>• ECM malfunction.</li> </ul>

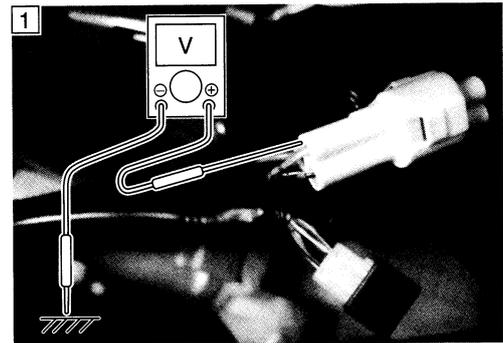
### INSPECTION

#### Step 1

- 1) Lift and support the fuel tank with its prop stay. (☞ 5-5)
- 2) Turn the ignition switch OFF.
- 3) Check the GP switch coupler for loose or poor contacts.  
If OK, then measure the GP switch voltage.



- 4) Support the motorcycle with a jack.
- 5) Turn the side-stand to up-right position.
- 6) Make sure the engine stop switch is in the “RUN” position.
- 7) Insert the needle pointed probes to the lead wire coupler.
- 8) Turn the ignition switch ON.
- 9) Measure the voltage at the wire side coupler between Pink wire and ground, when shifting the gearshift lever from 1st to Top.



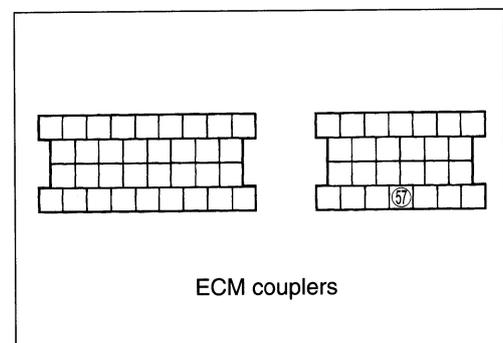
**DATA** GP switch voltage: 0.6 V and more  
(Pink – Ground)

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

**Tester knob indication: Voltage (V)**

Is the voltage OK?

YES	<ul style="list-style-type: none"> <li>• Pink wire open or shorted to ground, or poor connection.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> <li>• Replace the ECM with a new one, and inspect it again.</li> </ul>
NO	<ul style="list-style-type: none"> <li>• Open or short circuit in the Pink wire.</li> <li>• Replace the GP switch with a new one.</li> </ul>



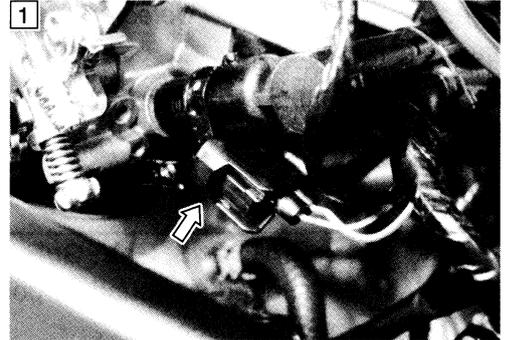
**“C32”, “C33”, “C34” or “C35” FUEL INJECTOR CIRCUIT MALFUNCTION**

DETECTED CONDITION	POSSIBLE CAUSE
CKP signals produced but fuel injector signal is interrupted continuous by 4 times or more.	<ul style="list-style-type: none"> <li>• Injector circuit open or short.</li> <li>• Injector malfunction.</li> <li>• ECM malfunction.</li> </ul>

**INSPECTION**

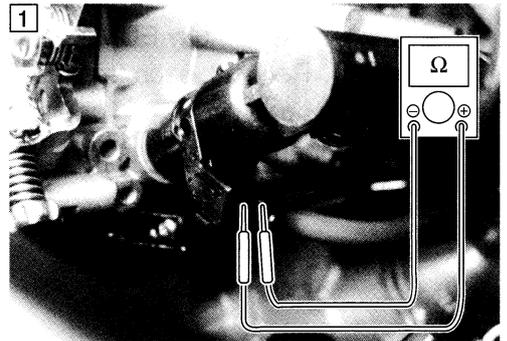
**Step 1**

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



- 4) Disconnect the injector coupler and measure the resistance between terminals.

**DATA** Injector resistance: 11 – 13 Ω at 20 °C (68 °F)  
(Terminal – Terminal)



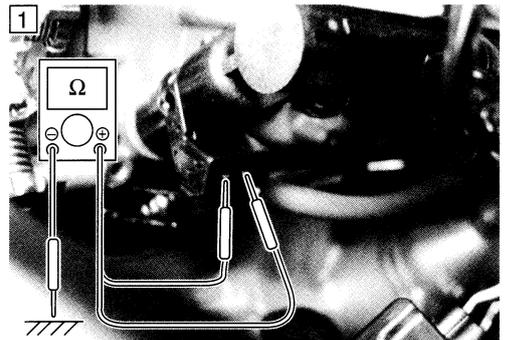
- 5) If OK, then check the continuity between each terminal and ground.

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

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

**Tester knob indication: Resistance (Ω)**

Is the resistance OK?



YES	Go to Step 2.
NO	Replace the Injector with a new one. (☞ 5-17)

**Step 2**

- 1) Turn the ignition switch ON.
- 2) Measure the injector voltage between Y/R wire and ground.

**DATA** **Injector voltage: Battery voltage**  
 (+ Y/R - - Ground)

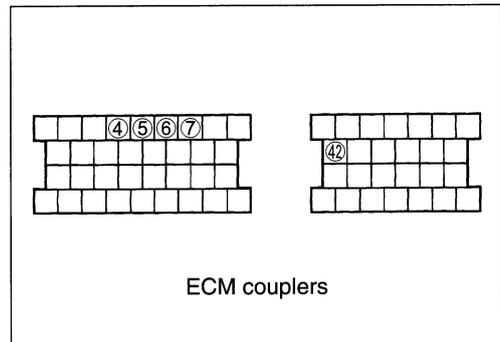
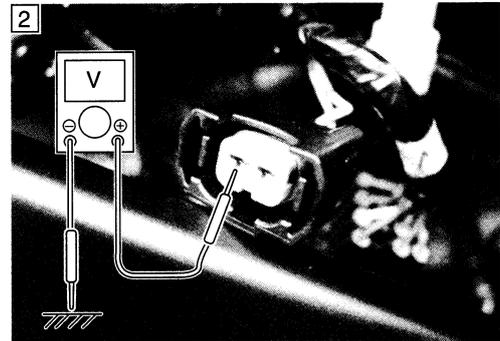
**NOTE:**  
 Injector voltage can be detected only 3 seconds after ignition switch is turned ON.

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

**Tester knob indication: Voltage (---)**

Is the voltage OK?

YES	<ul style="list-style-type: none"> <li>• Gr/W, Gr/B, Gr/Y, Gr/R or Y/R wire open or shorted to ground, or poor ④, ⑤, ⑥, ⑦ or ④② connection.</li> <li>• If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>• Recheck each terminal and wire harness for open circuit and poor connection.</li> </ul>
NO	Open circuit in the Y/R wire.



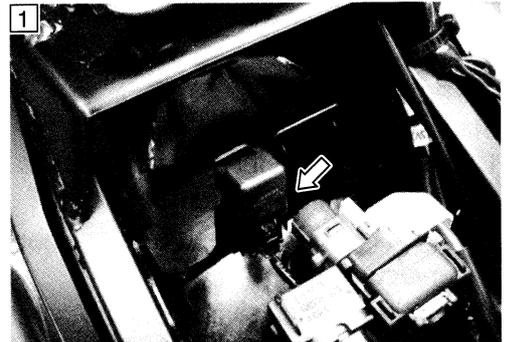
### “C41” FP RELAY CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
No voltage is applied to fuel pump although fuel pump relay is turned ON, or voltage is applied to fuel pump although fuel pump relay is turned OFF.	<ul style="list-style-type: none"> <li>Fuel pump relay circuit open or short.</li> <li>Fuel pump relay malfunction.</li> <li>ECM malfunction.</li> </ul>

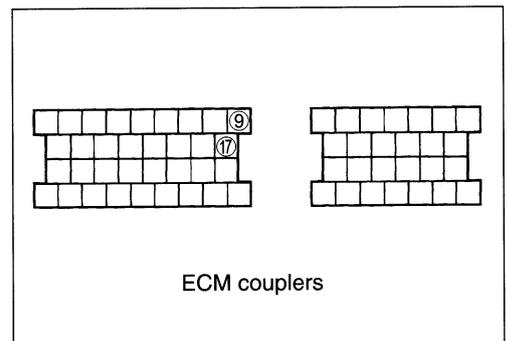
#### INSPECTION

##### Step 1

- 1) Remove the frame cover. (☞ 8-6)
  - 2) Turn the ignition switch OFF.
  - 3) Check the FP relay coupler for loose or poor contacts.
  - 4) If OK, then check the insulation and continuity. Refer to page 5-9 for details.
- Is the FP relay OK?



YES	<ul style="list-style-type: none"> <li>Y/B or O/W wire open or shorted to ground, or poor ⑨ or ⑰ connection.</li> <li>If wire and connection are OK, intermittent trouble or faulty ECM.</li> <li>Recheck each terminal and wire harness for open circuit and poor connection.</li> </ul>
NO	Replace the FP relay with a new one.



### “C42” IG SWITCH CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
Ignition switch signal is not input in the ECM.	<ul style="list-style-type: none"> <li>Ignition system circuit open or short.</li> <li>ECM malfunction.</li> </ul>

#### INSPECTION

\*Refer to the IGNITION SWITCH INSPECTION for details. (☞ 9-32)

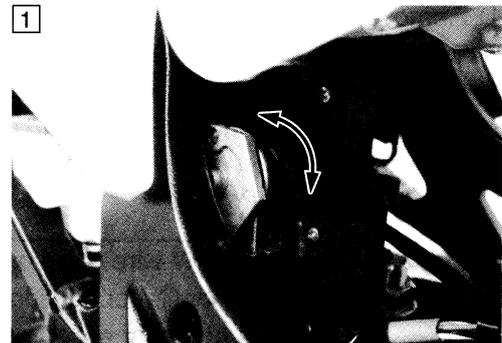
### “C46” EXCV ACTUATOR CIRCUIT MALFUNCTION

DETECTED CONDITION	POSSIBLE CAUSE
The operation signal does not reach the EXCV actuator. EXCVA position sensor voltage low or high. $0.1 \leq \text{Sensor voltage} \leq 4.9 \text{ V}$ (without the above range.)	<ul style="list-style-type: none"> <li>• EXCVA maladjusted.</li> <li>• EXCVA circuit open or short.</li> <li>• EXCVA motor malfunction.</li> <li>• EXCVA position sensor malfunction.</li> </ul>

#### INSPECTION

##### Step 1

- 1) Lift and support the fuel tank with its prop stay. (☞ 5-5)
- 2) Turn the ignition switch OFF.
- 3) Check the EXCVA lead wire coupler for loose or poor contacts.
- 4) Turn the ignition switch ON.
- 5) Check the operation of the EXCVA.



Is the operation OK?

YES	Go to Step 2.
NO	Go to Step 6.

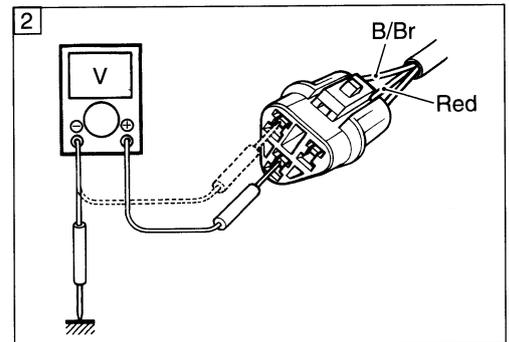
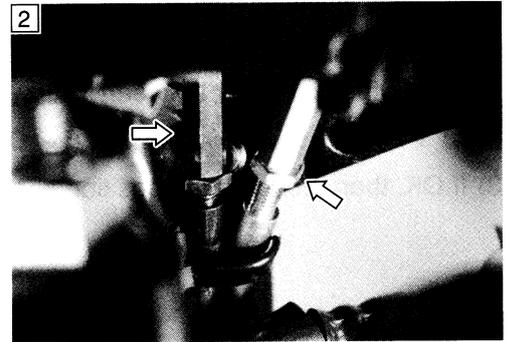
**Step 2**

- 1) Check the installation of EXCV cables. (☞ 6-14)  
If it is necessary, adjust the EXCV cables. (☞ 6-8)
- 2) Turn the ignition switch OFF.
- 3) Disconnect the EXCVA position sensor lead wire coupler.
- 4) Turn the ignition switch ON.
- 5) Measure the voltage between the Red wire terminal and ground.
- 6) If OK, then measure the voltage between the Red wire terminal and B/Br wire terminal.

**DATA** Position sensor input voltage: 4.5 – 5.5 V  
 (⊕ Red – ⊖ Ground)  
 (⊕ Red – ⊖ B/Br)

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

**Tester knob indication: Voltage (V)**



Is the voltage OK?

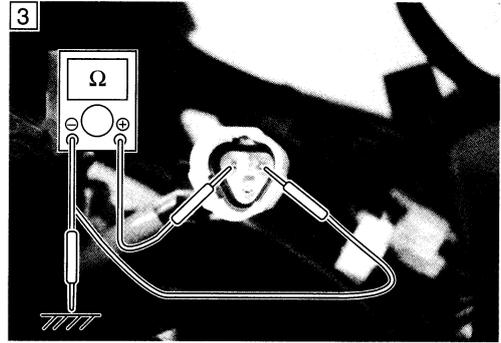
YES	Go to Step 3.
NO	<ul style="list-style-type: none"> <li>• Loose or poor contacts on the ECM coupler.</li> <li>• Open or short circuit in the Red wire or B/Br wire.</li> </ul>

**Step 3**

- 1) Turn the ignition switch OFF.
- 2) Check the continuity between Yellow wire and ground.

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

- 3) If OK, then measure the position sensor resistance.



- 4) Connect the position sensor coupler.
- 5) Set the EXCVA to adjustment position. (↪ 6-4)
- 6) Disconnect the position sensor coupler and measure the resistance. (between Yellow and White wires)

**DATA** Position sensor resistance at adjustment position:  
Approx. 3.1 k $\Omega$  (+ Yellow – - White)

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

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

Is the resistance OK?



YES	Go to Step 4.
NO	Replace the EXCVA with a new one.

**Step 4**

- 1) Turn the ignition switch OFF.
- 2) Connect the position sensor coupler.
- 3) Measure the position sensor output voltage at fully close position and fully open position.
- 4) Insert the needle pointed probes to the back side of the position sensor lead wire coupler. (+ Yellow – - White)
- 5) Disconnect the EXCVA motor lead wire coupler ②.
- 6) To set the EXCV to fully close position, apply 12 volts to ① and ② terminals.  
Positive wire – ① (Pink wire) terminal  
Negative wire – ② (Gray wire) terminal
- 7) Turn the ignition switch ON.
- 8) Measure the position sensor output voltage at fully close position.
- 9) Then, to set the EXCV to fully open position, apply 12 volts to ② and ① terminals.  
Positive wire – ② (Gray wire) terminal  
Negative wire – ① (Pink wire) terminal
- 10) Measure the position sensor output voltage at fully open position.

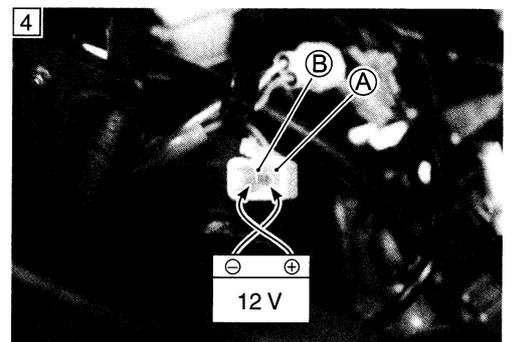
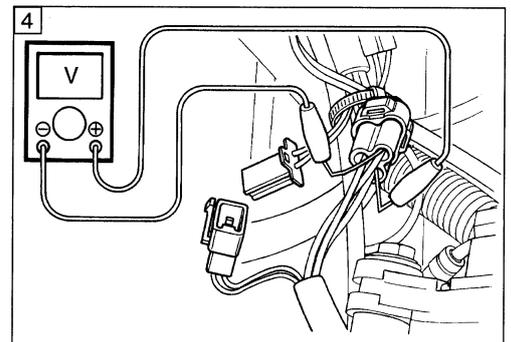
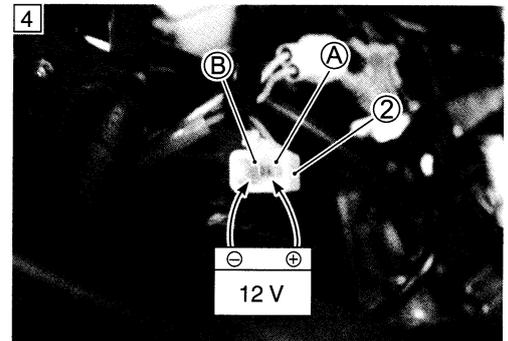
**DATA** Position sensor output voltage  
 EXCV is fully close: 0.5 – 1.3 V  
 EXCV is fully open : 3.7 – 4.5 V  
 (+ Yellow – - White)

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

**V** Tester knob indication: Voltage (---)

Is the voltage OK?

YES	Replace the ECM with a new one.
NO	Go to Step 5.

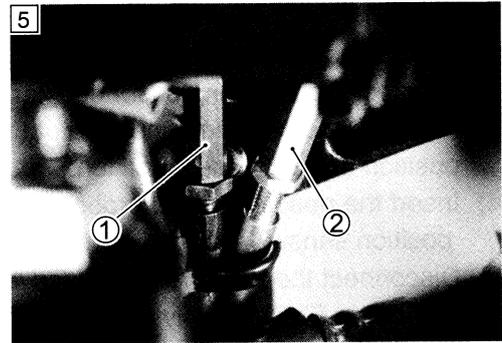


**Step 5**

- 1) If the position sensor output voltage is 0.5 V and less at fully close position, adjust the output voltage to specified by turning out the No.1 cable adjuster ①.
- 2) Repeat the above procedure (Step 4) until the out put voltage becomes specified value. (If C46 code is indicated after adjusting the voltage, increase the voltage to 0.4 V.)

**CAUTION**

- \* Adjusting the cable with the EXCV fully opened or fully closed can damage the EXCVA. Be sure to adjust the cable with the EXCV set in adjustment position. (↔6-4)
- \* Do not turn the EXCVA pulley using the wrench.



- 3) If the position sensor output voltage is 4.5 V and more at fully open position, adjust the output voltage to specified by turning out the No.2 cable adjuster ②.  
Repeat the above procedure (Step 4) until the output voltage is within the specified value.

**DATA** Position sensor output voltage

**EXCV is fully close:  $0.5 \leq \text{Output Voltage} \leq 1.3$**

**EXCV is fully open :  $3.7 \leq \text{Output Voltage} \leq 4.5$**

Is the voltage OK?

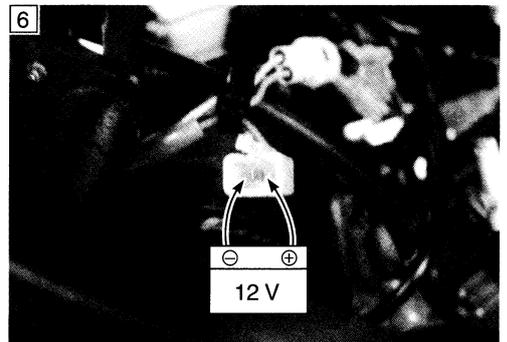
YES	Replace the ECM with a new one
NO	Replace the EXCVA with a new one.

**Step 6**

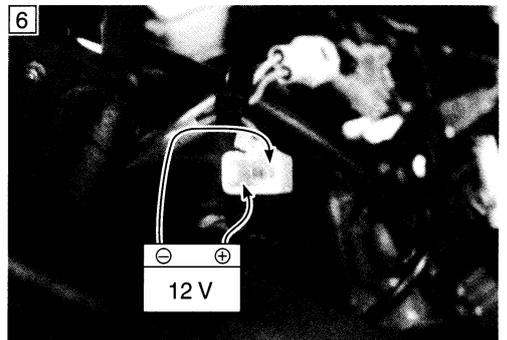
- 1) Turn the ignition switch OFF.
- 2) Disconnect the motor lead wire coupler of the EXCVA.



- 3) Apply 12 volts to the terminal and check the operation of EXCVA.



- 4) Then, swap the wires supplied 12 volts and check the operation of EXCVA.  
(Check the operation of EXCVA both way)



Is the operation OK?

YES	Loose or poor contacts on the EXCVA or ECM coupler.
NO	Replace the EXCVA with a new one.

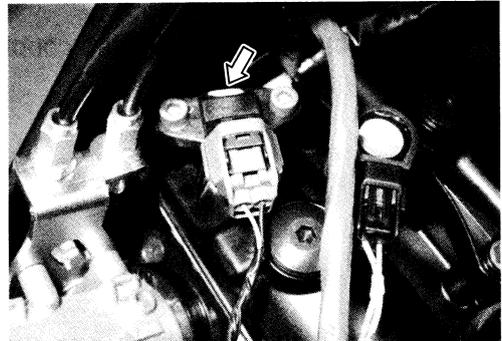
## SENSORS

### CMP SENSOR INSPECTION

The camshaft position sensor is installed on the cylinder head cover. (☞ 4-26)

### CMP SENSOR REMOVAL AND INSTALLATION

- Remove the CMP sensor. (☞ 3-28)
- Install the CMP sensor in the reverse order of removal.

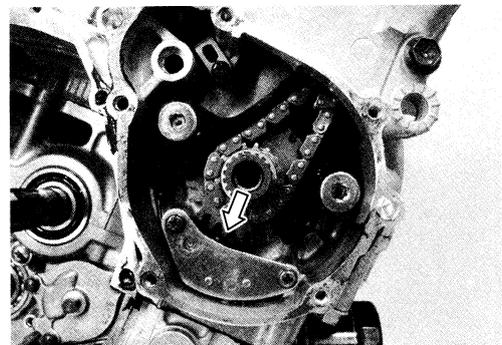


### CKP SENSOR INSPECTION

The crankshaft position sensor is installed on the right side of middle crankcase cover. (☞ 4-28)

### CKP SENSOR REMOVAL AND INSTALLATION

- Remove the generator cover. (☞ 3-23)
- Install the generator cover in the reverse order of removal.

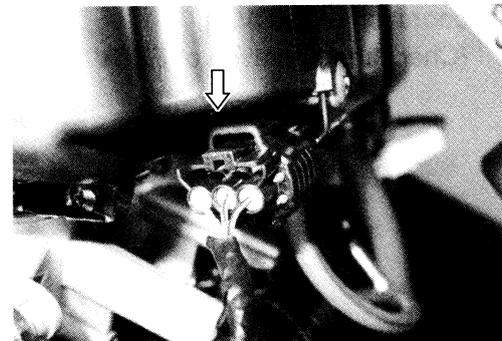


### IAP SENSOR INSPECTION

The intake air pressure sensor is installed at the front side of the air cleaner case. (☞ 4-30)

### IAP SENSOR REMOVAL AND INSTALLATION

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



### TP SENSOR INSPECTION

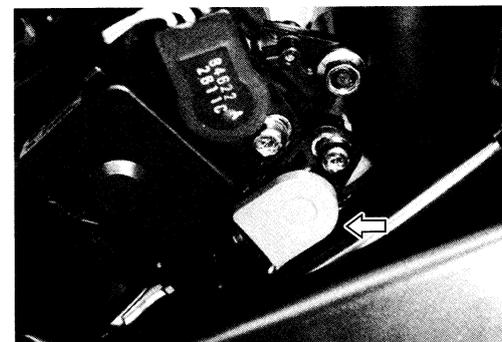
The throttle position sensor is installed at the right side of the No.4 throttle body. (☞ 4-33)

### TP SENSOR REMOVAL AND INSTALLATION

- Remove the TP sensor. (☞ 5-17)
- Install the TP sensor in the reverse order of removal.

### TPS ADJUSTMENT

- Adjust the TP sensor. (☞ 4-18)



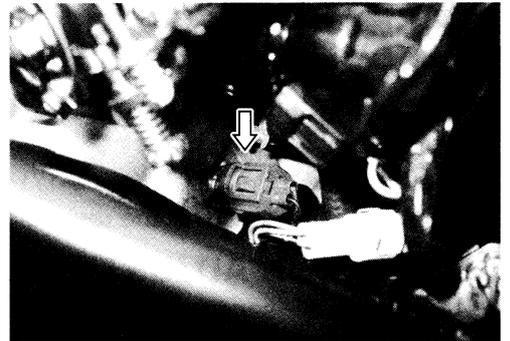
## ECT SENSOR INSPECTION

The engine coolant temperature sensor is installed at the cylinder head. (☞ 4-36)

## ECT SENSOR REMOVAL AND INSTALLATION

- Remove the ECT sensor. (☞ 7-8)
  - Install the ECT sensor in the reverse order of removal.
- Pay attention to the following points:

 **ECT sensor: 18 N·m (1.8 kgf-m, 13 lb-ft)**



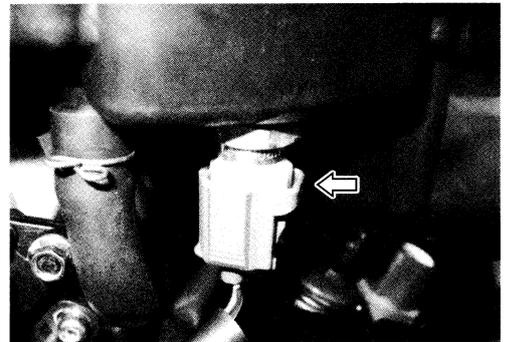
## IAT SENSOR INSPECTION

The intake air temperature sensor is installed on the right side of the air cleaner box. (☞ 4-38)

## IAT SENSOR REMOVAL AND INSTALLATION

- Lift and support the fuel tank with its prop stay. (☞ 5-5)
  - Remove the IAT sensor from the air cleaner box.
  - Install the IAT sensor in the reverse order of removal.
- Pay attention to the following points:

 **IAT sensor: 18 N·m (1.8 kgf-m, 13 lb-ft)**

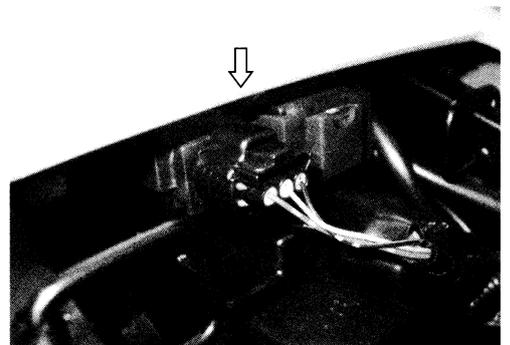


## AP SENSOR INSPECTION

The AP sensor is located under the front seat. (☞ 4-40)

## AP SENSOR REMOVAL AND INSTALLATION

- Remove the AP sensor from the frame.
- Install the AP sensor in the reverse order of removal.



## TO SENSOR INSPECTION

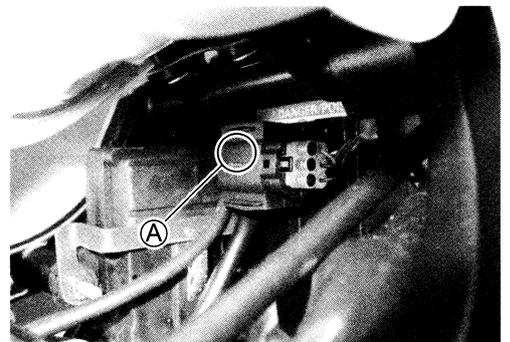
## TO SENSOR REMOVAL AND INSTALLATION

The tip over sensor is located under the fuel tank. (☞ 4-43)

- Lift and support the fuel tank with its prop stay. (☞ 5-5)
- Remove the TO sensor from the battery case.
- Install the TO sensor in the reverse order of removal.

### NOTE:

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



## STP SENSOR INSPECTION

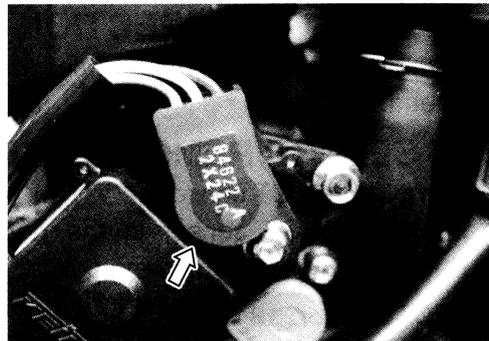
### STP SENSOR REMOVAL AND INSTALLATION

The secondary throttle position sensor is installed at the right side of the No.4 throttle body.

- Remove the STP sensor. (☞ 5-17)
- Install the STP sensor in the reverse order of removal.

### STP SENSOR ADJUSTMENT

- Adjust the STP sensor. (☞ 5-22)



# FUEL SYSTEM AND THROTTLE BODY

## CONTENTS

<b>FUEL DELIVERY SYSTEM .....</b>	<b>5- 2</b>
<b>INTAKE AIR SYSTEM .....</b>	<b>5- 3</b>
<b>SECONDARY THROTTLE CONTROL SYSTEM .....</b>	<b>5- 3</b>
<b>OPERATION.....</b>	<b>5- 4</b>
<b>FUEL SYSTEM .....</b>	<b>5- 5</b>
<b>FUEL TANK LIFT-UP.....</b>	<b>5- 5</b>
<b>FUEL TANK REMOVAL.....</b>	<b>5- 5</b>
<b>FUEL TANK INSTALLATION .....</b>	<b>5- 5</b>
<b>FUEL PRESSURE INSPECTION.....</b>	<b>5- 6</b>
<b>FUEL PUMP INSPECTION .....</b>	<b>5- 7</b>
<b>FUEL PUMP RELAY INSPECTION.....</b>	<b>5- 9</b>
<b>FUEL PUMP AND FUEL FILTER REMOVAL .....</b>	<b>5- 9</b>
<b>FUEL MESH FILTER INSPECTION AND CLEANING.....</b>	<b>5-11</b>
<b>FUEL PUMP AND FUEL MESH FILTER INSTALLATION.....</b>	<b>5-11</b>
<b>THROTTLE BODY.....</b>	<b>5-14</b>
<b>CONSTRUCTION.....</b>	<b>5-14</b>
<b>AIR CLEANER BOX AND THROTTLE BODY REMOVAL .....</b>	<b>5-15</b>
<b>THROTTLE BODY DISASSEMBLY .....</b>	<b>5-17</b>
<b>THROTTLE BODY CLEANING.....</b>	<b>5-18</b>
<b>INSPECTION.....</b>	<b>5-18</b>
<b>THROTTLE BODY REASSEMBLY .....</b>	<b>5-19</b>
<b>THROTTLE BODY INSTALLATION.....</b>	<b>5-21</b>
<b>STP SENSOR ADJUSTMENT .....</b>	<b>5-22</b>
<b>FUEL INJECTOR INSPECTION .....</b>	<b>5-23</b>
<b>FUEL INJECTOR REMOVAL .....</b>	<b>5-23</b>
<b>FUEL INJECTOR INSTALLATION.....</b>	<b>5-23</b>
<b>FAST IDLE ADJUSTMENT.....</b>	<b>5-24</b>
<b>THROTTLE VALVE SYNCHRONIZATION.....</b>	<b>5-25</b>
<b>THROTTLE POSITION SENSOR (TPS) SETTING .....</b>	<b>5-29</b>
<b>THROTTLE CABLE ADJUSTMENT.....</b>	<b>5-29</b>

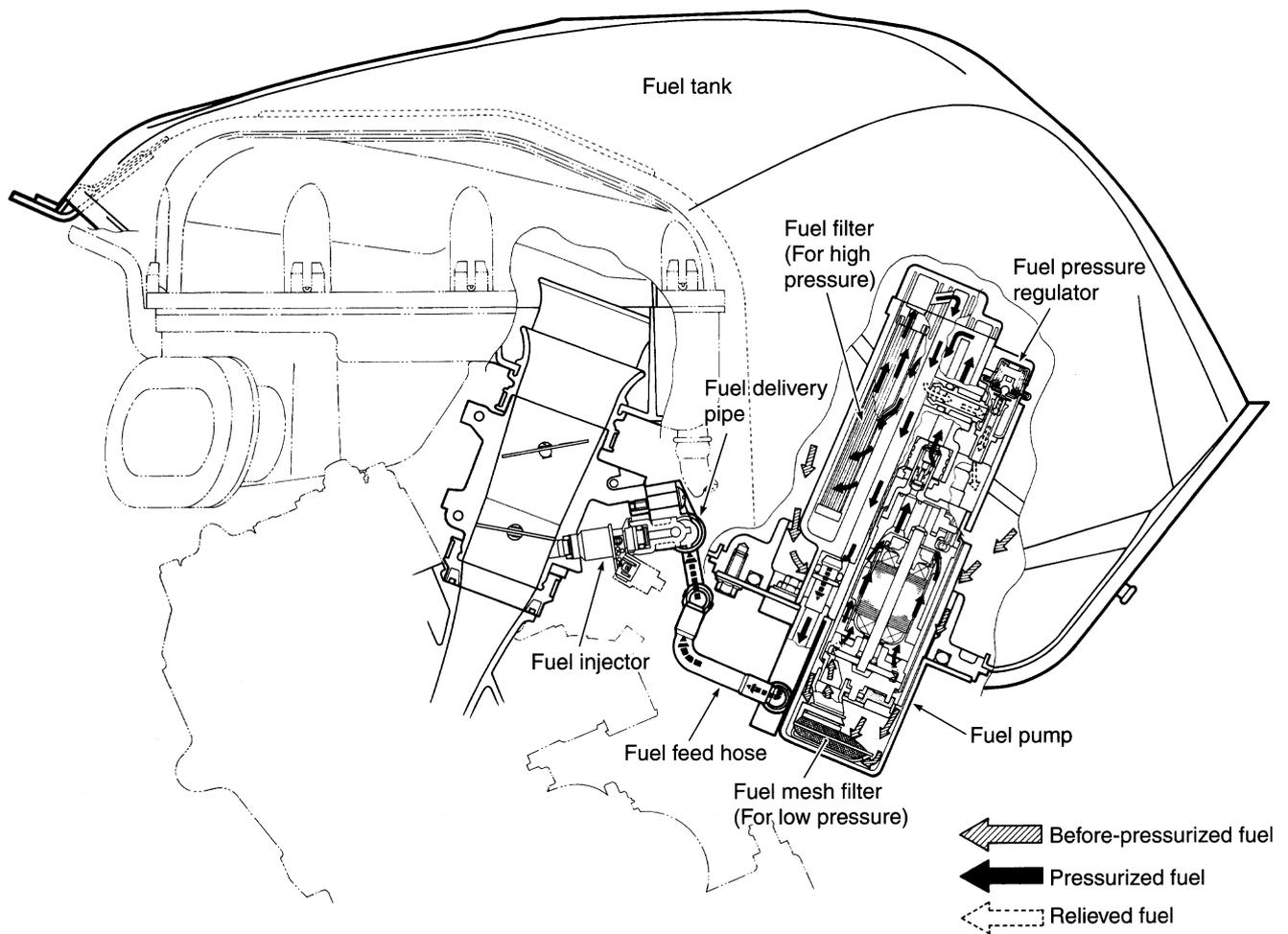
### **⚠ WARNING**

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

## FUEL DELIVERY SYSTEM

The fuel delivery system consists of the fuel tank, fuel pump, fuel filters, fuel feed hose, fuel delivery pipe (including fuel injectors) and fuel pressure regulator. There is no fuel return hose. The fuel in the fuel tank is pumped up by the fuel pump and pressurized fuel flows into the injector installed in the fuel delivery pipe. Fuel pressure is regulated by the fuel pressure regulator. As the fuel pressure applied to the fuel injector (the fuel pressure in the fuel delivery pipe) is always kept at absolute fuel pressure of 3.0 kgf/cm<sup>2</sup> (300 kPa, 43 psi), the fuel is injected into the throttle body in conic dispersion when the injector opens according to the injection signal from the ECM.

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



## INTAKE AIR SYSTEM SECONDARY THROTTLE CONTROL SYSTEM

The secondary throttle control system (STCS) consists of the secondary throttle valve (STV), secondary throttle valve actuator (STVA) and secondary throttle position sensor (STPS).

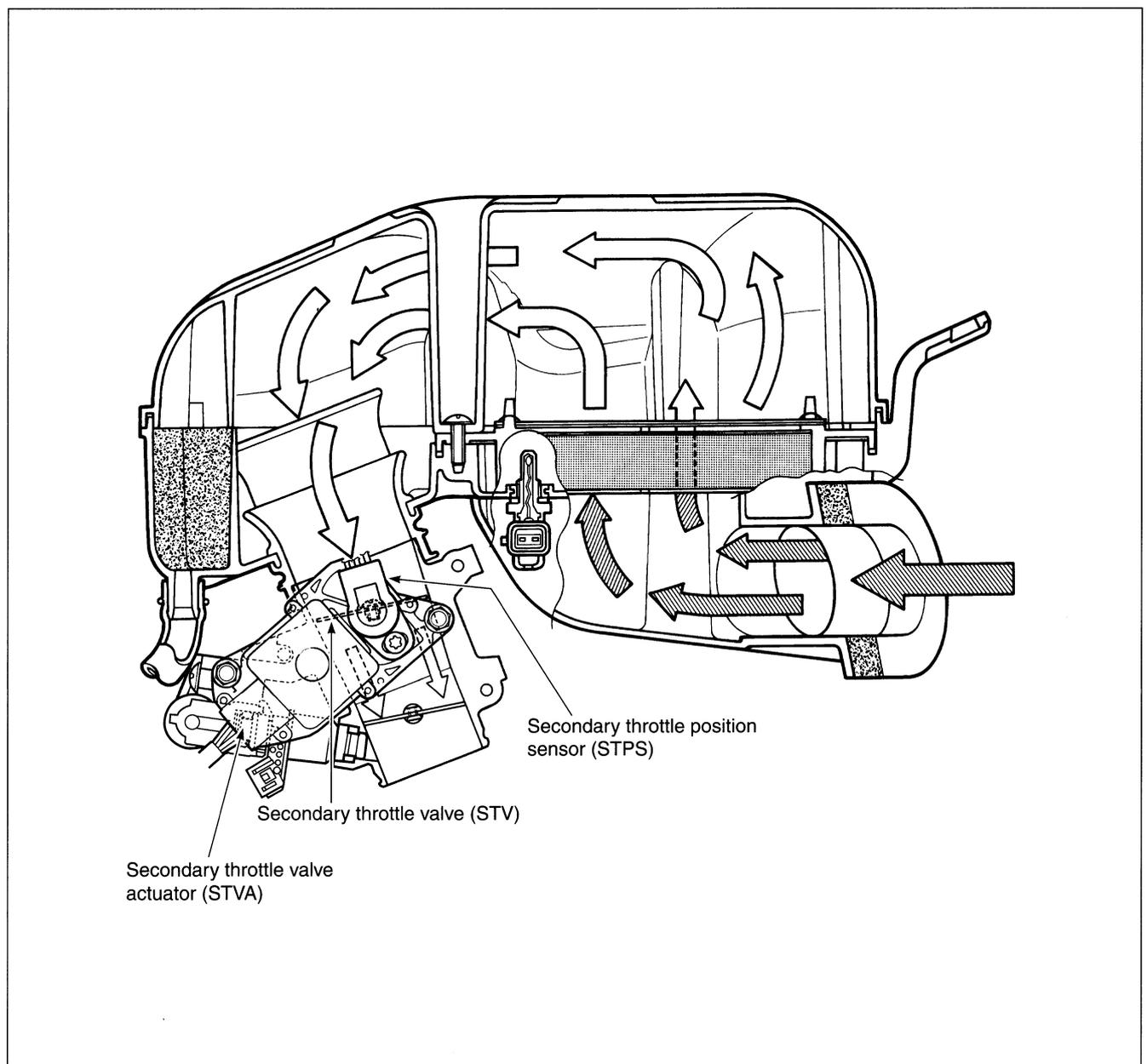
STV is installed in each throttle body. STVA and STPS are installed on the right side of the throttle body assembly. The STV is turned by the STVA.

This system is designed to control the volume and the velocity of intake air so as to improve engine output power. The system produces smoother and linear throttle response.

This is performed by opening or closing the throttle body intake port according to the gear positions and engine rpm.

When the engine is running in a low speed range, the intake port is almost closed for controlled intake air volume. This improves the effect to intake air flow pulsation so that the engine can output higher power in this speed range.

As the engine speed grows faster, the intake port gradually opens for guiding the proper volume of air into the throttle body so that the engine can produce the maximum power in each speed range.

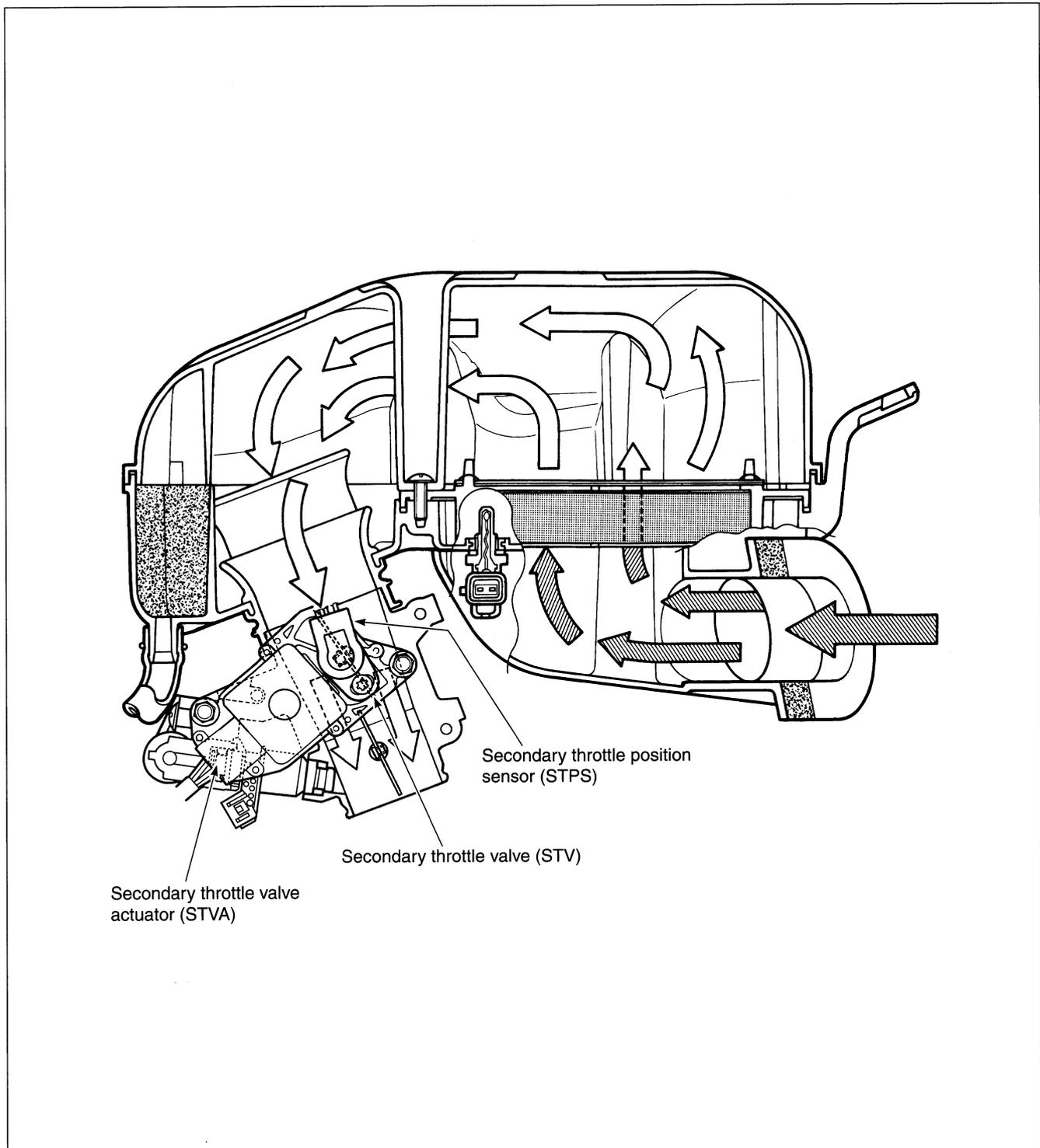


## OPERATION

The secondary throttle control system (STCS) is operated by the signal supplied from the ECM. The open/close operation of the secondary throttle valve (STV) is performed by the secondary throttle valve actuator (STVA) which is controlled by the ECM.

The STPS detects the STVA movement by measuring the voltage and then the ECM determines the STV angle based on the operation map.

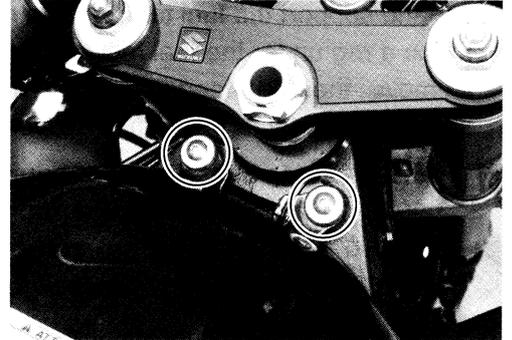
Whenever turning the ignition switch ON, the STVA automatically drives the STV and detects full open position voltages and sets to original position.



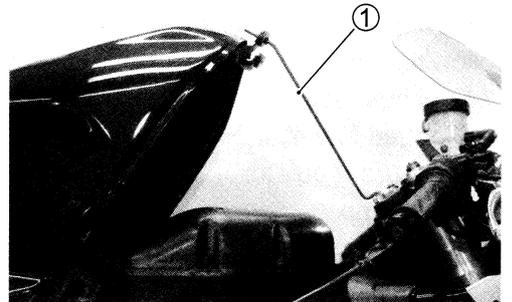
## FUEL SYSTEM

### FUEL TANK LIFT-UP

- Remove the front seat.
- Remove the frame cover. (☞ 8-6)
- Remove the fuel tank mounting bolts.



- Lift and support the fuel tank with the fuel tank prop stay ①.



### FUEL TANK REMOVAL

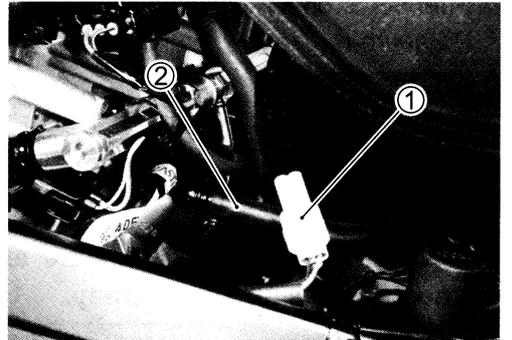
- Lift and support the fuel tank with the fuel tank prop stay.
- Disconnect the fuel pump coupler ①.
- Place a rag under the fuel feed hose and remove the fuel feed hose ②.

#### CAUTION

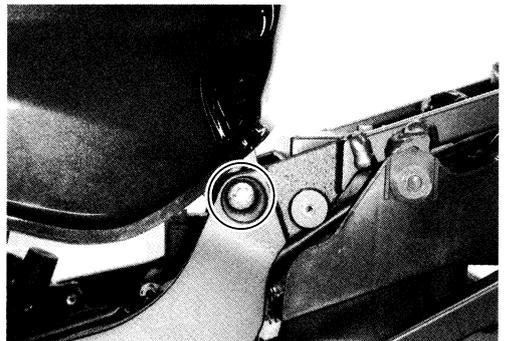
When removing the fuel tank, do not leave the fuel feed hose ② on the fuel tank side.

#### ⚠ WARNING

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



- Remove the fuel tank bracket mounting bolts.
- 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. (☞ 5-5)
- Place a rag under the fuel feed hose. (☞ 5-5)
- Remove the fuel feed hose and install the special tools between the fuel tank and fuel delivery pipe.

- TOOL** 09940-40211: Fuel pressure gauge adaptor
- 09940-40220: Fuel pressure gauge hose attachment
- 09915-77331: Oil pressure gauge
- 09915-74521: Oil pressure gauge hose

Turn the ignition switch ON and check the fuel pressure.

**DATA** Fuel pressure: Approx. 300 kPa (3.0 kgf/cm<sup>2</sup>, 43 psi)

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

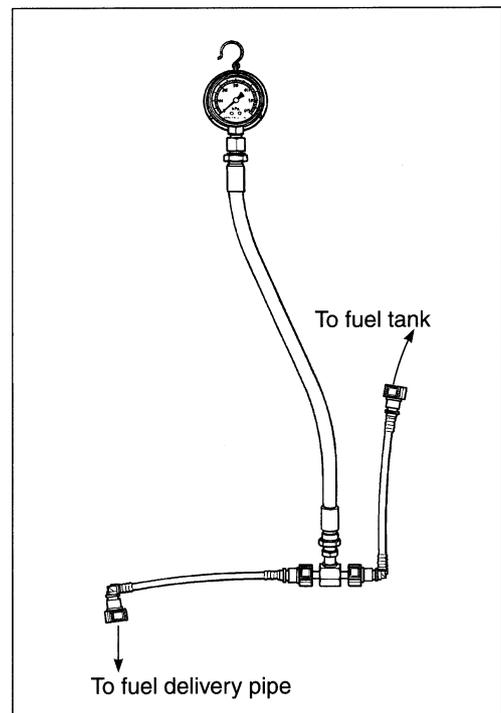
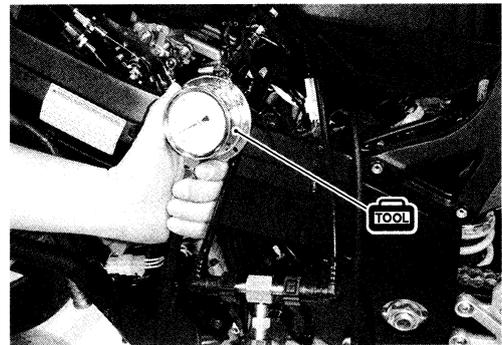
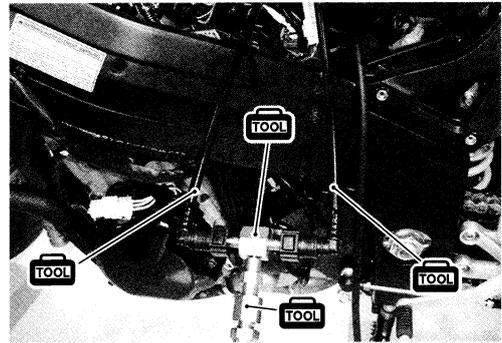
- \* Fuel hose leakage
- \* Clogged fuel filter
- \* Pressure regulator
- \* Fuel pump

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

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

### **⚠ WARNING**

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



## FUEL PUMP INSPECTION

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

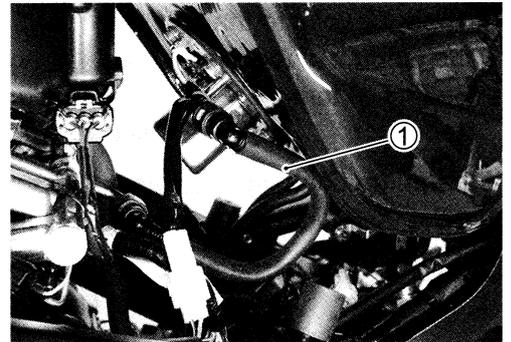
If the fuel pump motor does not make operating sound, replace the fuel pump assembly or inspect the fuel pump relay and tip over sensor.

## FUEL DISCHARGE AMOUNT INSPECTION

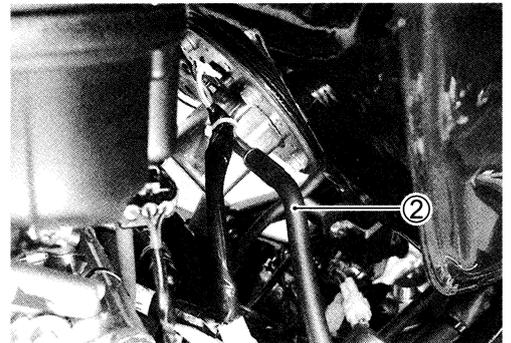
### ⚠ WARNING

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

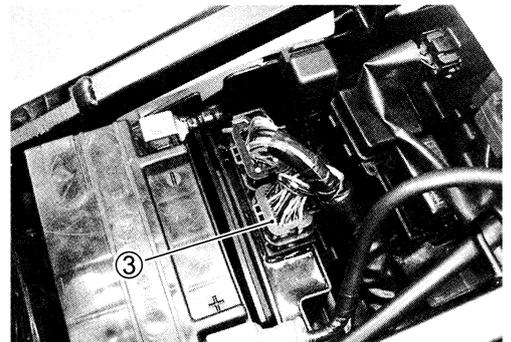
- Lift and support the fuel tank with its prop stay. (↖ 5-5)
- Disconnect the fuel feed hose ① from the fuel pump.



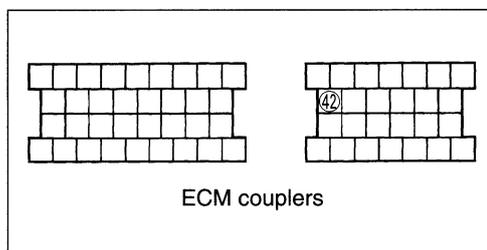
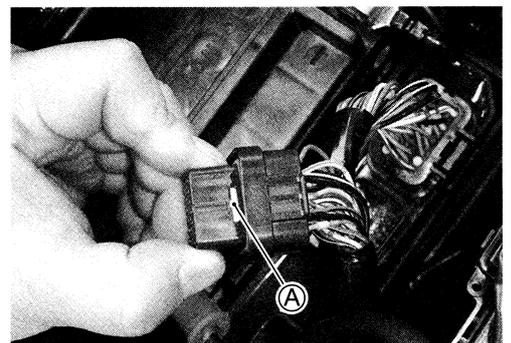
- Connect a proper fuel hose ② to the fuel pump.



- Disconnect the ECM coupler ③.



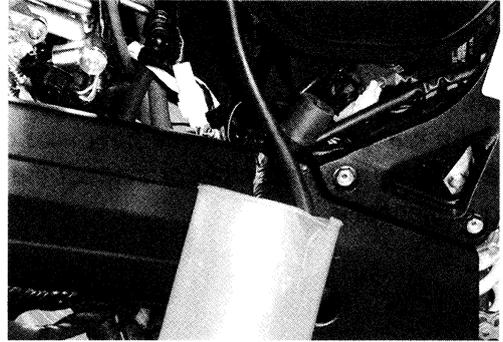
- Push the lock Ⓐ to pull out the power source lead wire (Yellow with red tracer ④).



## 5-8 FUEL SYSTEM AND THROTTLE BODY

---

- Place the measuring cylinder and insert the fuel hose end into the measuring cylinder.



- Apply 12 volts to the fuel pump for 30 seconds and measure the amount of fuel discharged.

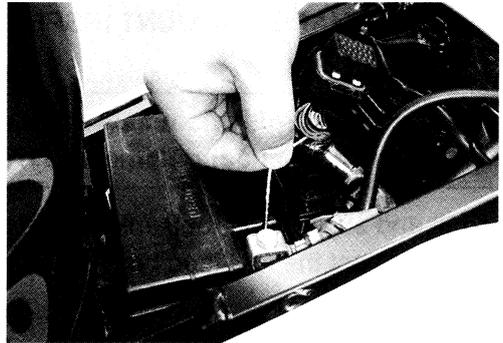
Battery ⊕ terminal ——— Power source lead wire ①  
(Yellow with red tracer)

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

**DATA** Fuel discharge amount: **Approx. 1 200 ml/30 sec.**  
**(1.3/1.1 US/Imp oz)/30 sec.**

**NOTE:**

*The battery must be in fully charged condition.*

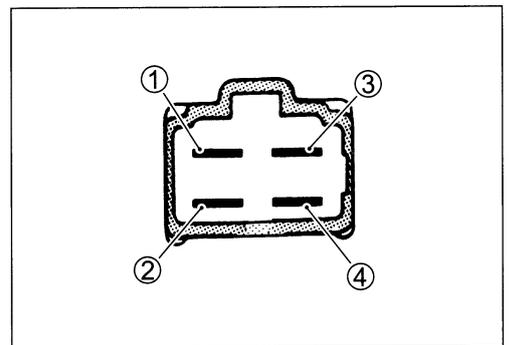


### FUEL PUMP RELAY INSPECTION

Fuel pump relay is located in front of the battery.

- Remove the front and rear seats.
- Lift and support the fuel tank with its prop stay. (☞ 5-5)
- Remove the fuel pump relay.

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 AND FUEL FILTER REMOVAL CONSTRUCTION

ITEM	N·m	kgf·m	lb·ft
Ⓐ	10	1.0	7.0

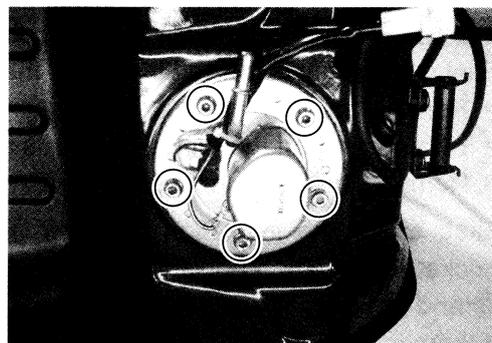
- ① Fuel pressure regulator
- ② Fuel pump case/Fuel filter cartridge
- ③ Fuel pump
- ④ Fuel mesh filter
- ⑤ Thermistor
- ⑥ O-ring

**REMOVAL**

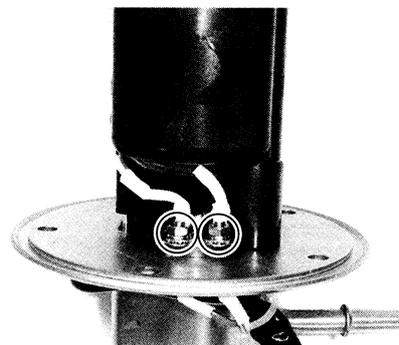
- Remove the fuel tank. (☞ 5-5)
- Remove the fuel pump assembly by removing its mounting bolts diagonally.

**⚠ WARNING**

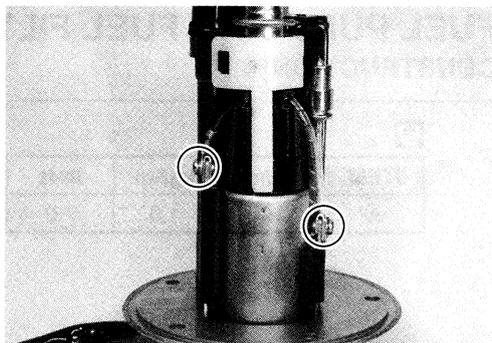
**Gasoline is highly flammable and explosive.  
Keep heat, spark and flame away.**



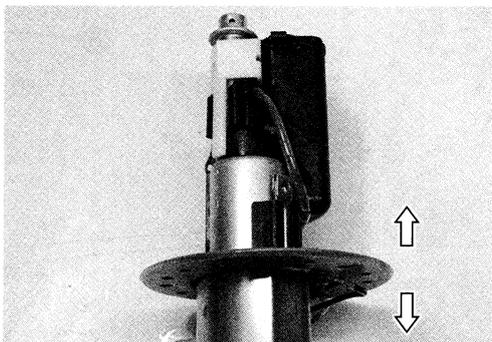
- Remove the nuts.



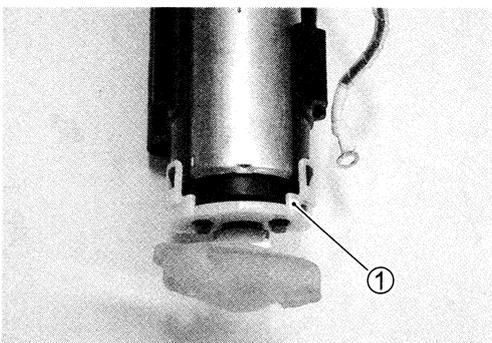
- Remove the screws.



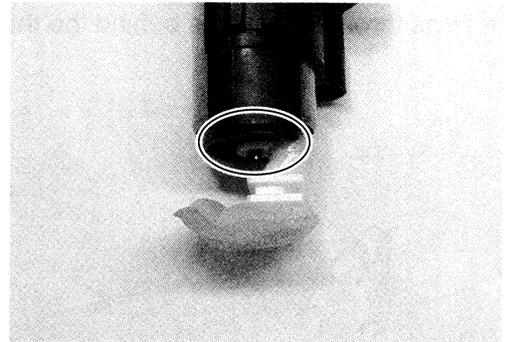
- Remove the fuel pump assy from the fuel pump plate.



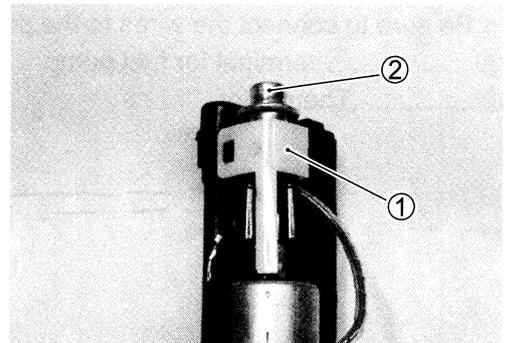
- Remove the fuel pump holder ①.



- Remove the fuel mesh filter.



- Remove the fuel pressure regulator holder ① and the fuel pressure regulator ②.

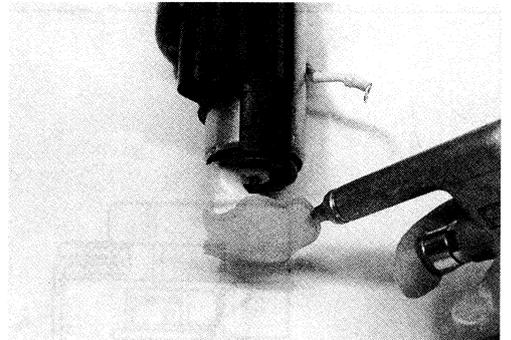


## FUEL MESH FILTER INSPECTION AND CLEANING

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

### NOTE:

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



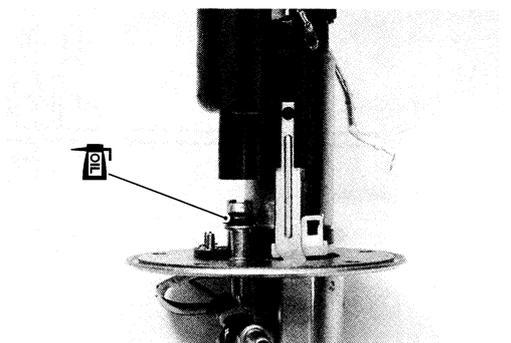
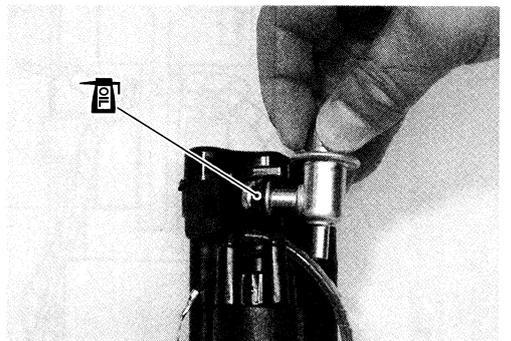
## FUEL PUMP AND FUEL MESH FILTER INSTALLATION

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

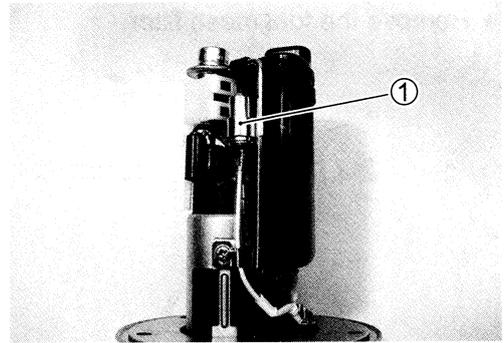
- Install the new O-rings to the fuel pressure regulator and fuel pipe.
- Apply thin coat of the engine oil to the O-rings.

### CAUTION

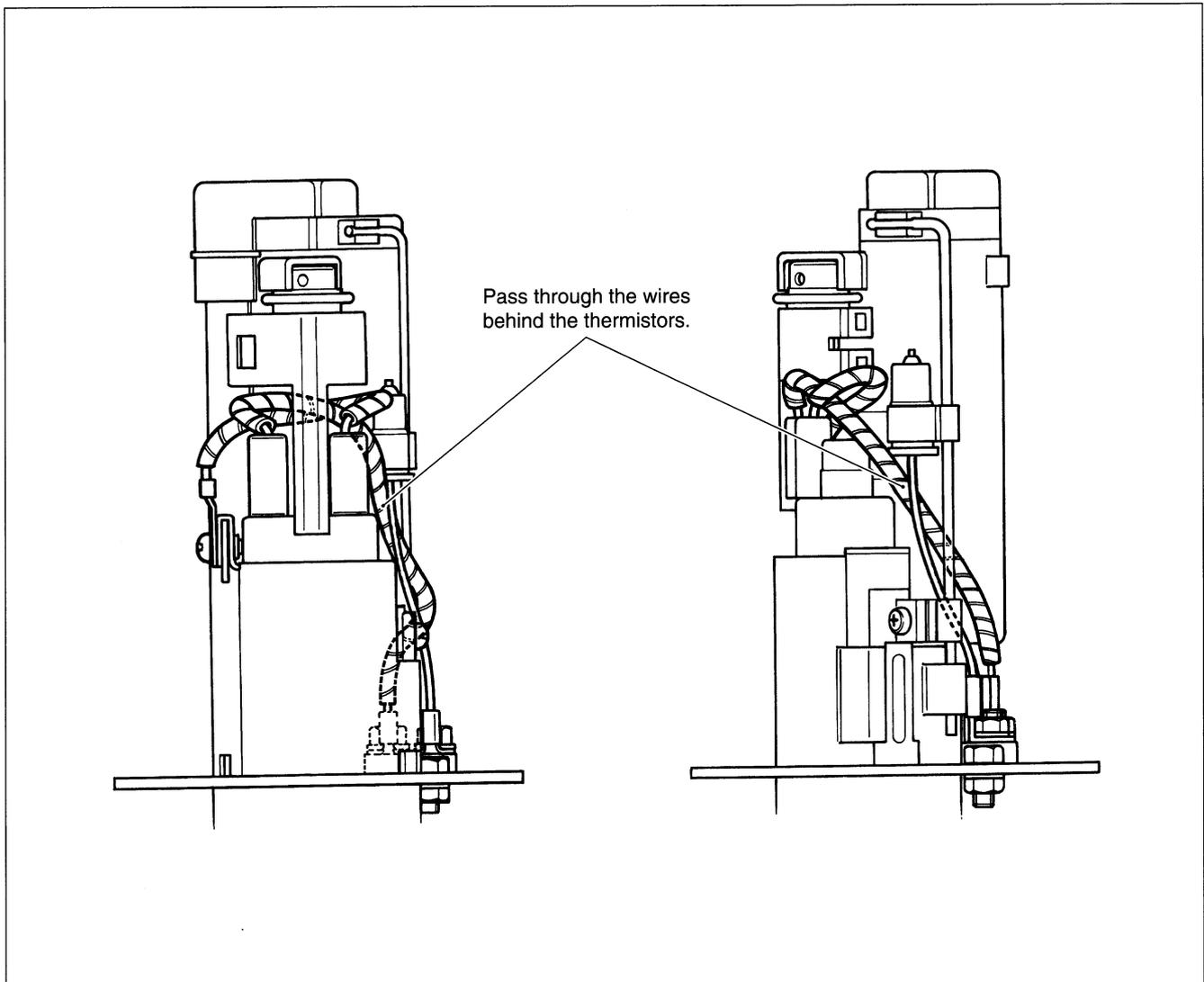
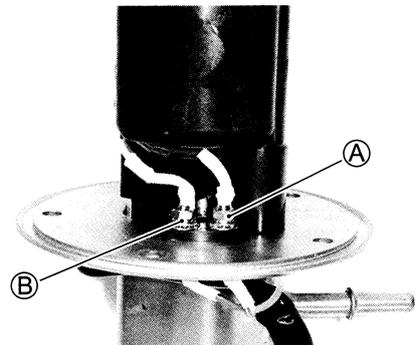
**Use the new O-rings to prevent fuel leakage.**



- Pass through the wires behind the thermistor ①.



- Be sure to connect the wires to the proper terminals.  
Ⓐ .....⊕ terminal for fuel pump  
Ⓑ .....Thermistor

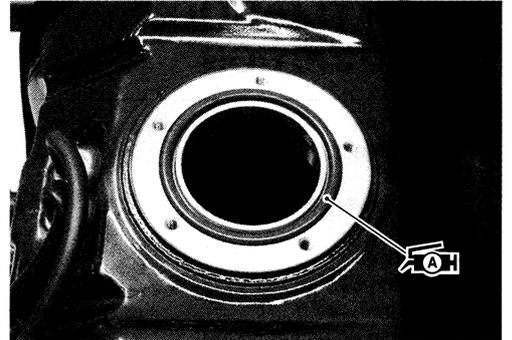


- Install the O-ring and apply SUZUKI SUPER GREASE to it.

 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
99000-25010: SUZUKI SUPER GREASE "A" (Others)

**⚠ WARNING**

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



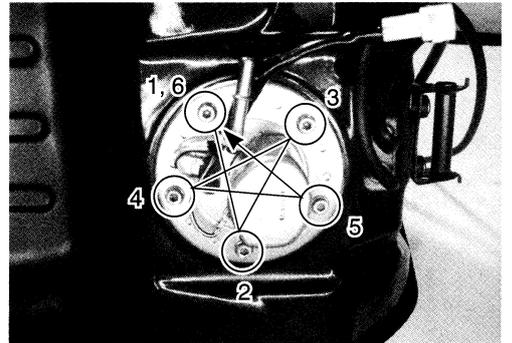
- When installing the fuel pump assembly, lightly tighten all the fuel pump assembly mounting bolts in the ascending order of numbers, and then tighten them to the specified torque in the above manner.

 Fuel pump mounting bolt: 10 N·m (1.0 kgf·m, 7.0 lb·ft)

**NOTE:**

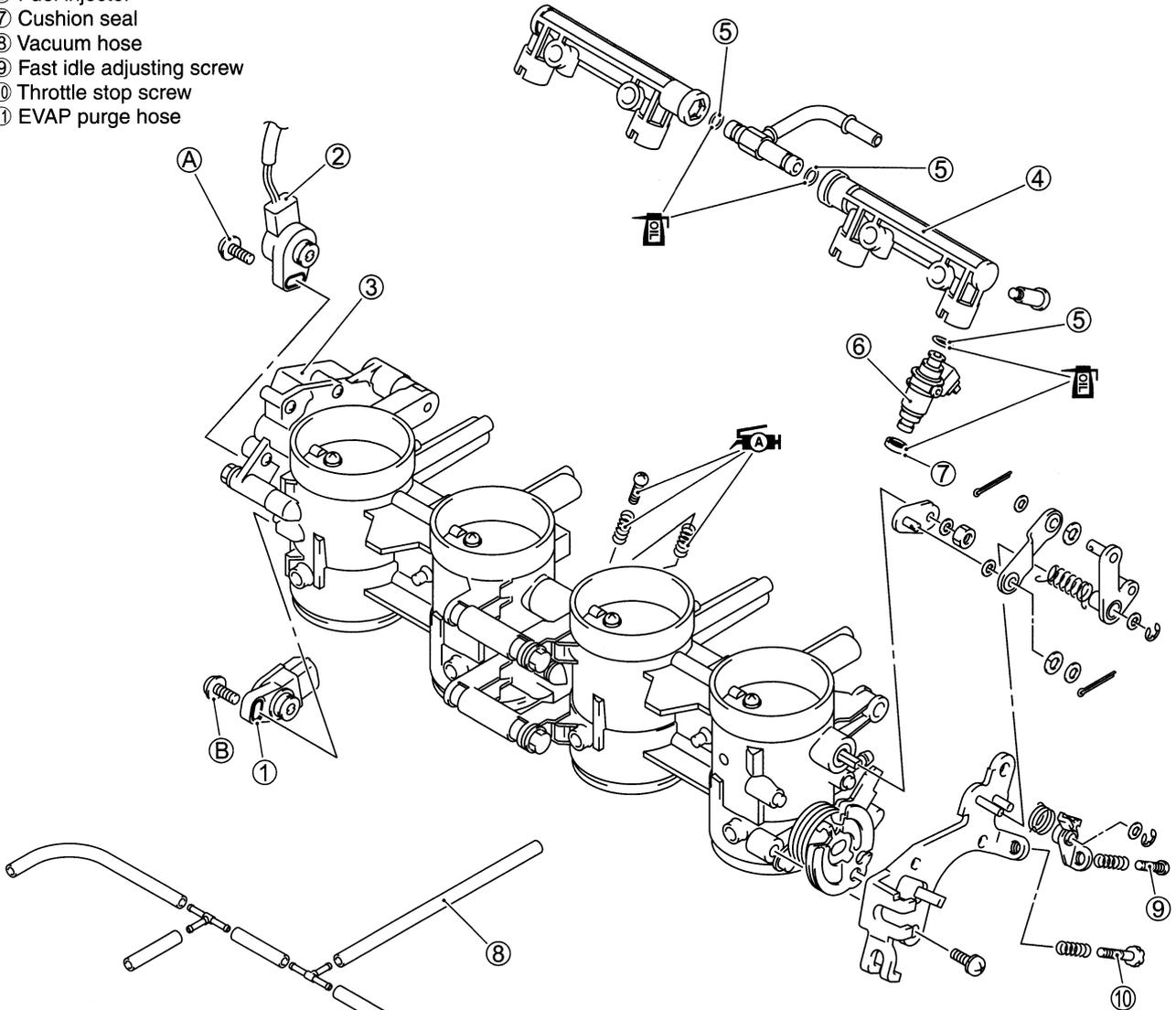
Apply a small quantity of the **THREAD LOCK** to the thread portion of the fuel pump mounting bolt.

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



# THROTTLE BODY CONSTRUCTION

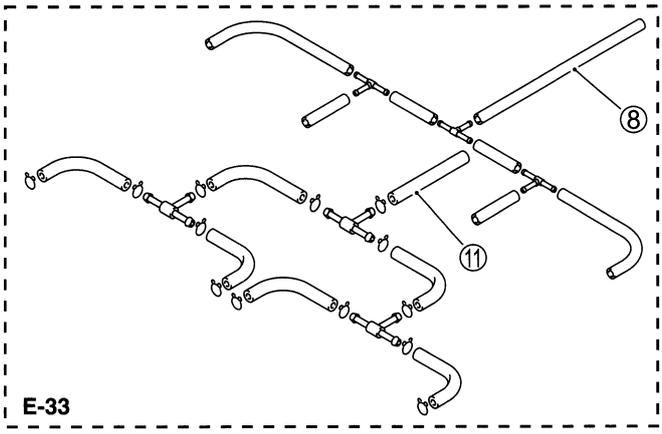
- ① TP sensor
- ② STP sensor
- ③ STVA
- ④ Fuel delivery pipe
- ⑤ O-ring
- ⑥ Fuel injector
- ⑦ Cushion seal
- ⑧ Vacuum hose
- ⑨ Fast idle adjusting screw
- ⑩ Throttle stop screw
- ⑪ EVAP purge hose



Except E-33



ITEM	N-m	kgf-m	lb-ft
Ⓐ	3.5	0.35	2.5
Ⓑ	3.5	0.35	2.5

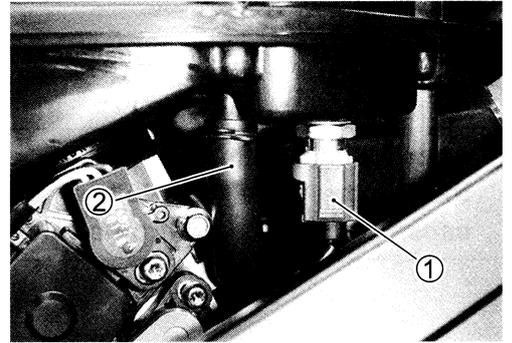


E-33

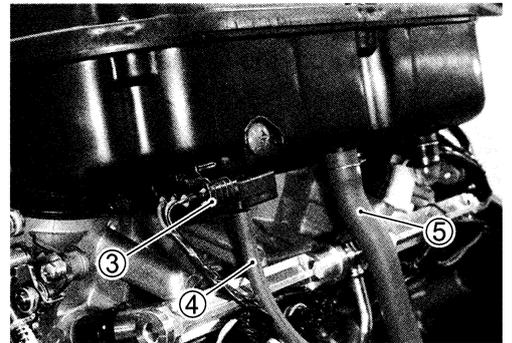
## AIR CLEANER BOX AND THROTTLE BODY REMOVAL

### AIR CLEANER BOX

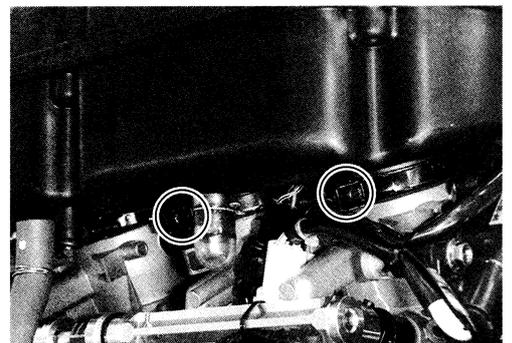
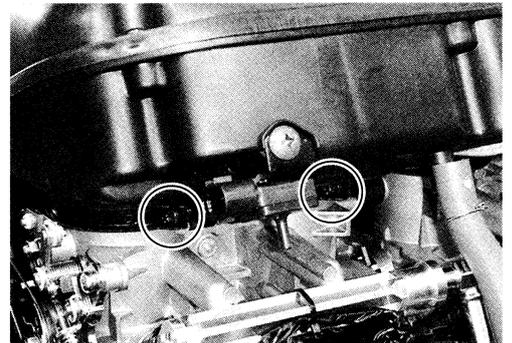
- Lift and support the fuel tank with its prop stay. (☞ 5-5)
- Disconnect the IAT sensor coupler ① and PAIR hose ②.



- Disconnect the IAP sensor coupler ③ and vacuum hose ④.
- Disconnect the crankcase breather hose ⑤.



- Loosen the throttle body clamp screws.



- Remove the air cleaner box mounting bolt.
- Remove the air cleaner box.



### THROTTLE BODY

- Disconnect the throttle cables from their drum.

#### CAUTION

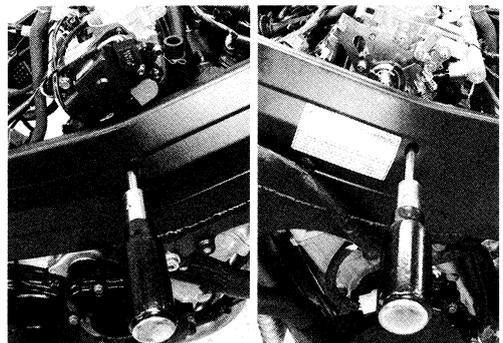
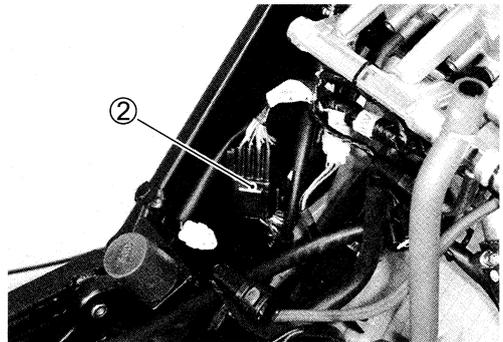
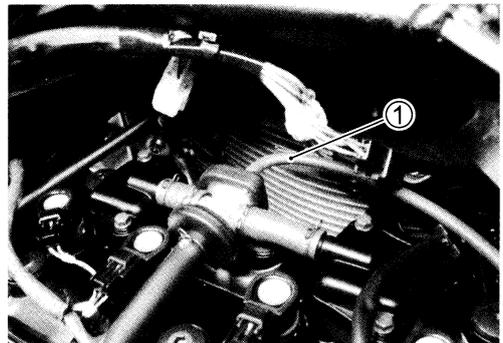
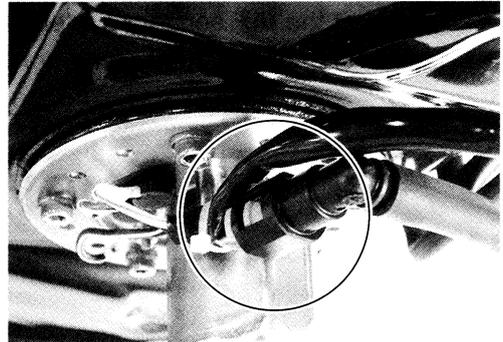
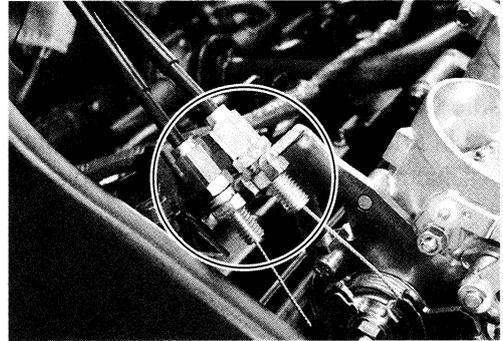
After disconnecting the throttle cables, do not snap the throttle valve from full open to full close. It may cause damage to the throttle valve and throttle body.

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

- Disconnect the vacuum hose ① from the PAIR valve.

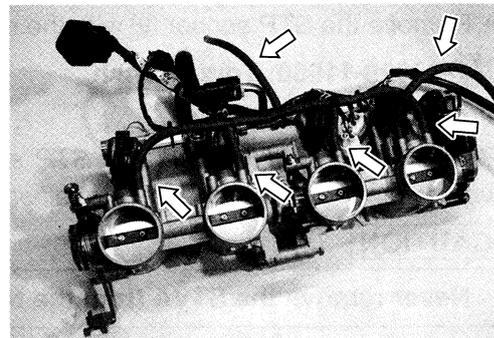
- Disconnect the fuel injector coupler ②.

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

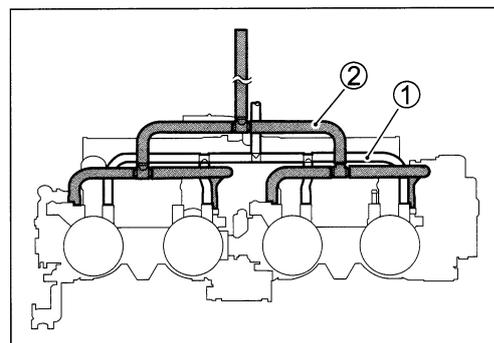


## THROTTLE BODY DISASSEMBLY

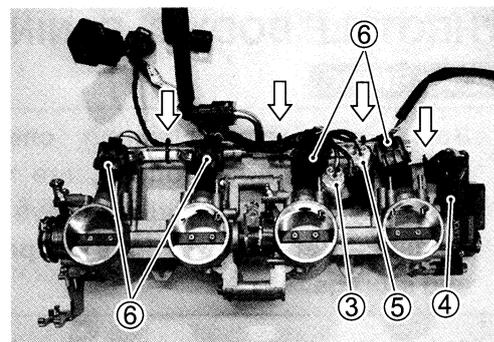
- Disconnect the respective vacuum hoses from each throttle body. (Except E-33)



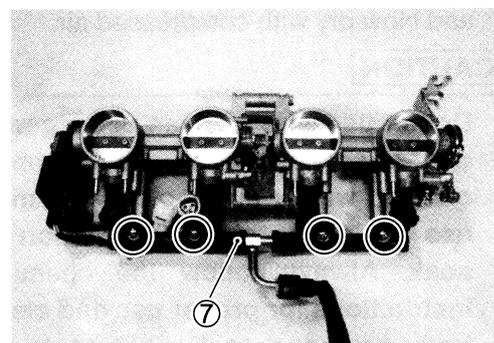
- Disconnect the respective vacuum hoses ① and EVAP purge hoses ② from each throttle body. (For E-33)



- Remove the lead wire clamps.
- Disconnect the TP sensor coupler ③, STP sensor coupler ④, STVA motor lead wire coupler ⑤ and fuel injector couplers ⑥.



- Remove the fuel delivery pipe assembly ⑦ by removing its mounting screws.
- Remove the fuel injectors.

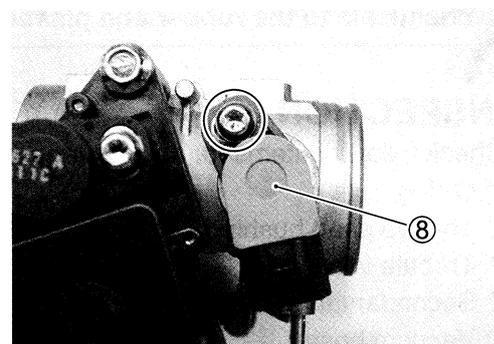


- Remove the TP sensor ⑧ with the special tool.

**TOOL** 09930-11950: Torx wrench

**NOTE:**

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



- Remove the STP sensor ⑨ with the special tool.

**TOOL** 09930-11950: Torx wrench

**NOTE:**

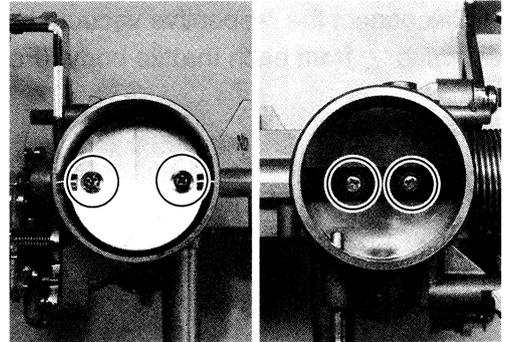
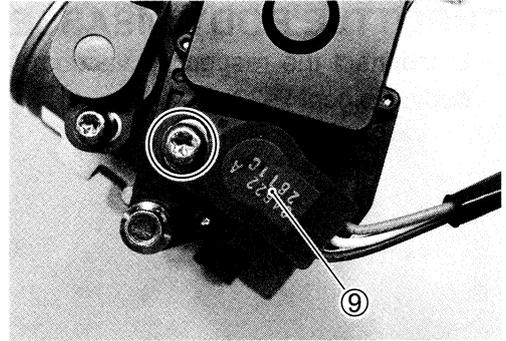
Prior to disassembly, mark the STP sensor's original position with a paint or scribe for accurate reinstallation.

**CAUTION**

Never remove the STVA from the throttle body.

**CAUTION**

Never remove the secondary throttle valve and throttle valve.



## 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
- \* Secondary throttle valve
- \* Vacuum hose

## THROTTLE BODY REASSEMBLY

Reassemble the throttle body in the reverse order of disassembly.

Pay attention to the following points:

- With the STV fully opened, install the STP sensor ①.

NOTE:

\* Align the secondary throttle shaft end ① with the groove ② of the STP sensor.

\* Apply SUZUKI SUPER GREASE to the secondary throttle shaft end ① if necessary.

 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
99000-25010: SUZUKI SUPER GREASE "A" (Others)

 09930-11950: Torx wrench

 STP sensor mounting screw: 3.5 N·m (0.35 kgf·m, 2.5 lb-ft)

NOTE:

If the STP sensor adjustment is necessary, refer to page 5-22 for STP sensor setting procedure.

- With the throttle valve fully opened, install the TP sensor ②.

 09930-11950: Torx wrench

 TP sensor mounting screw: 3.5 N·m (0.35 kgf·m, 2.5 lb-ft)

NOTE:

\* Align the throttle shaft end ③ with the groove ④ of the TP sensor.

\* Apply SUZUKI SUPER GREASE to the throttle shaft end ③ if necessary.

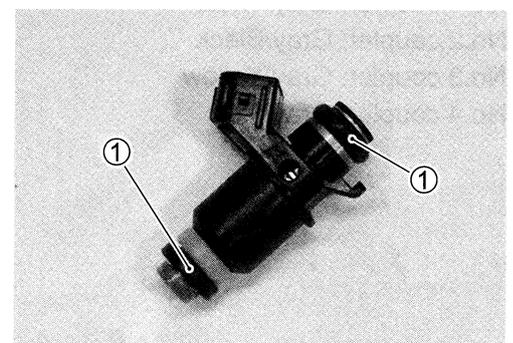
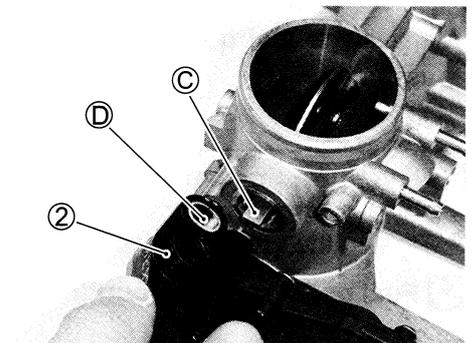
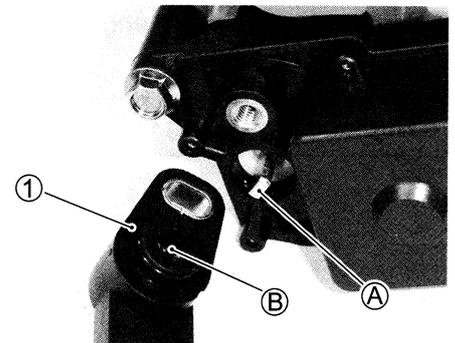
TP sensor setting procedure. (☞ 4-18)

 99000-25030: SUZUKI SUPER GREASE "A" (USA)  
99000-25010: SUZUKI SUPER GREASE "A" (Others)

- Install the O-rings ① to each fuel injector.
- Apply thin coat of the engine oil to the new O-rings.
- Install the fuel injectors by pushing them straight to each throttle body.

### CAUTION

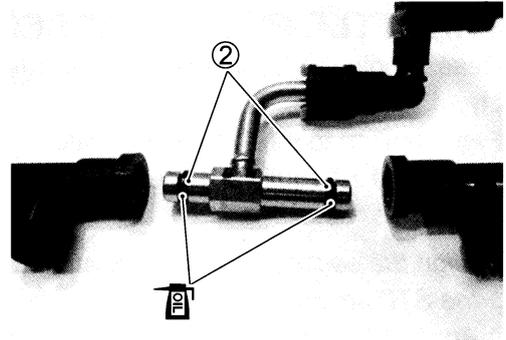
Replace the dust seal and O-ring with the new ones.  
Never turn the injector while pushing it.



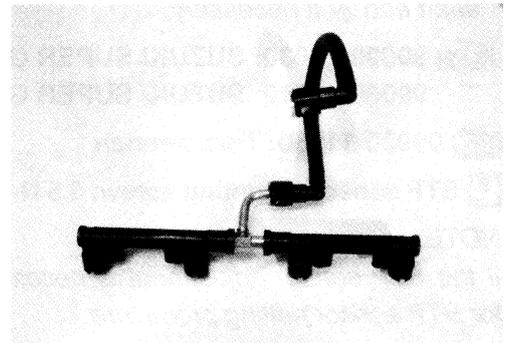
- Apply thin coat of the engine oil to the new O-rings ②.

**CAUTION**

**Replace the O-ring with a new one.**



- Assemble the fuel delivery pipes.



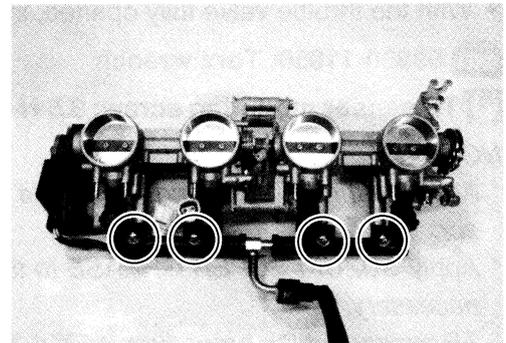
- Install the fuel delivery pipe assembly to the throttle body assembly.

**CAUTION**

**Never turn the fuel injectors while installing them.**

- Tighten the fuel delivery pipe mounting screws.

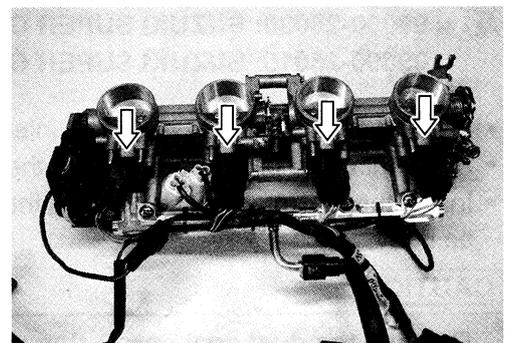
 **Fuel delivery pipe mounting screw: 3.5 N·m  
(0.35 kgf-m, 2.5 lb-ft)**



- 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

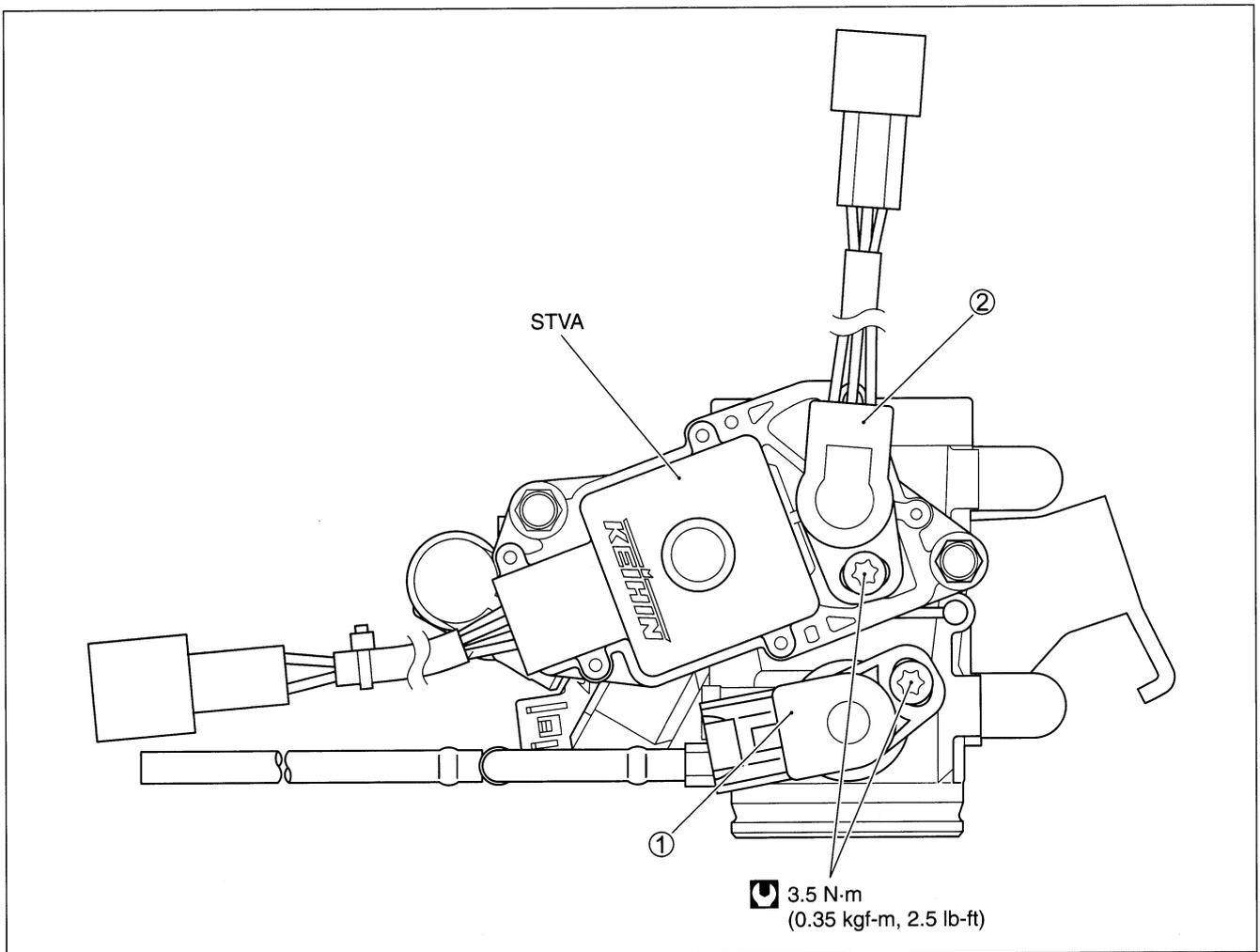
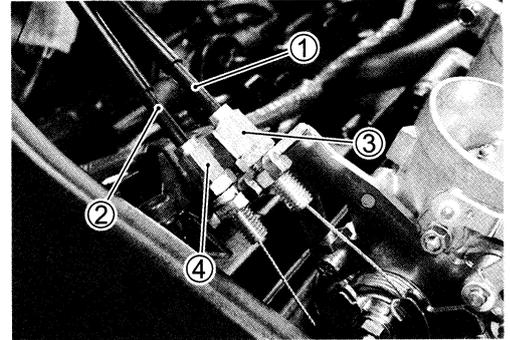


## THROTTLE BODY INSTALLATION

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 5-29 for details.



### CAUTION

When installing the TPS ① and STPS ② as shown in the illustration.

## STP SENSOR ADJUSTMENT

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

- Disconnect the STVA coupler.
- Turn the ignition switch ON.
- Close the secondary throttle valve by finger, and measure the STP sensor output voltage.

### **DATA** STP sensor output voltage

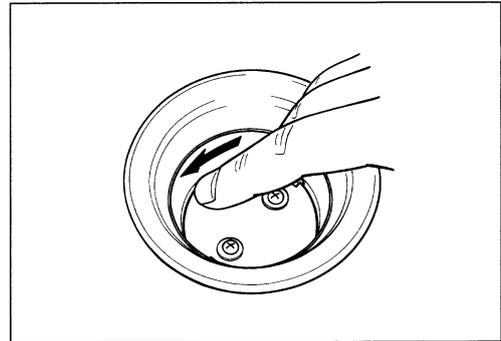
ST valve is fully closed: 0.48 – 0.52 V

(⊕ Yellow – ⊖ Black)

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

09900-25009: Needle pointed probe set

**TESTER** Tester knob indication: Resistance ( $\Omega$ )



- Loosen the STP sensor mounting screws.
- Adjust the STP sensor until resistance comes to specification and tighten the STP sensor mounting screws.

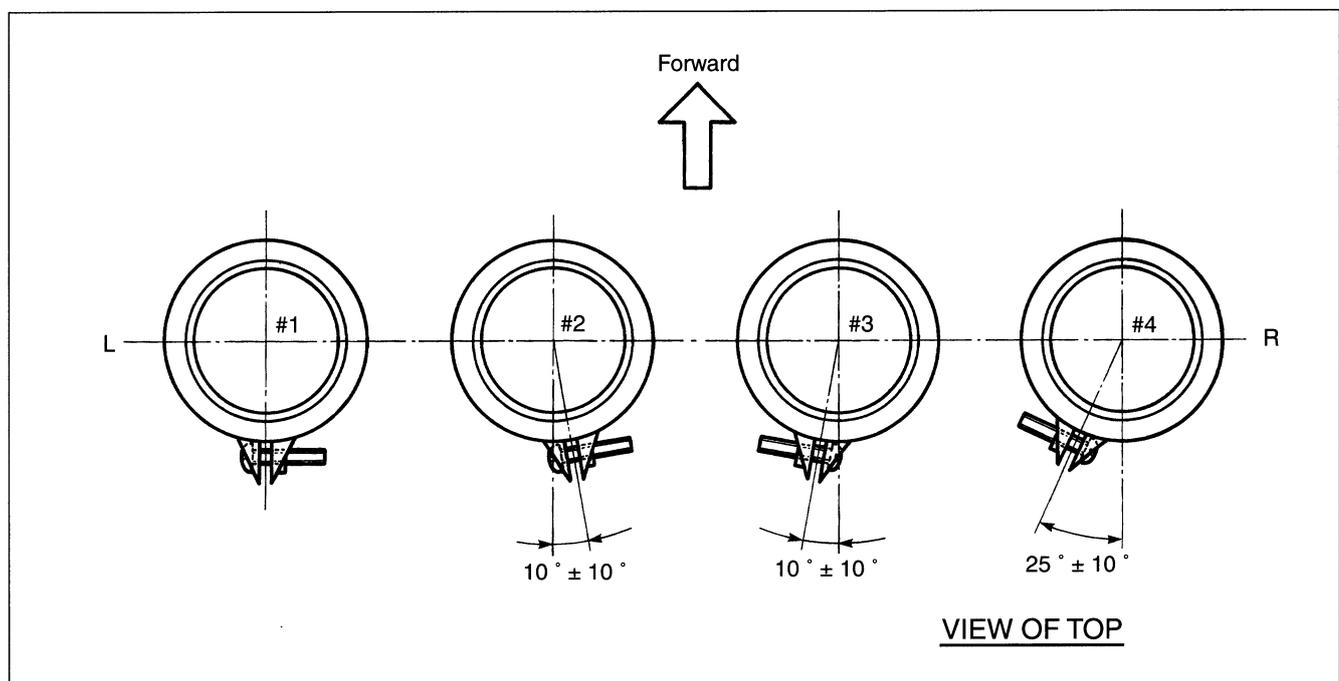
**TOOL** 09930-11950: Torx wrench

**WRENCH** STP sensor mounting screw: 3.5 N·m

(0.35 kgf-m, 2.5 lb-ft)



## THROTTLE BODY CLAMP POSITION



## FUEL INJECTOR INSPECTION

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

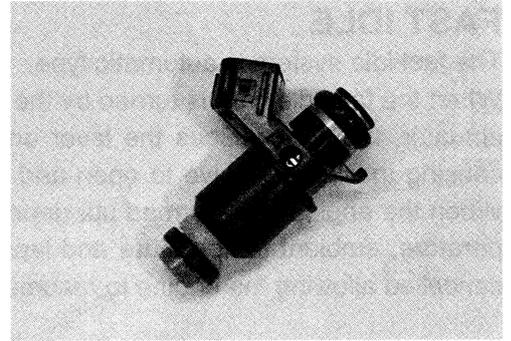
Refer to page 4-51 for details.

## FUEL INJECTOR REMOVAL

- Lift and support the fuel tank with its prop stay. (☞ 5-5)
- Remove the air cleaner box. (☞ 5-15)
- With battery negative cable disconnected, disconnect the injector couplers.
- Remove the fuel delivery pipe assembly. (☞ 5-17)
- Remove the fuel injectors No.1, No.2, No.3 and No.4. (☞ 5-17)

## 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 O-rings.
- Install the injector by pushing it straight to the throttle body. Never turn the injector while pushing it. (☞ 5-19)

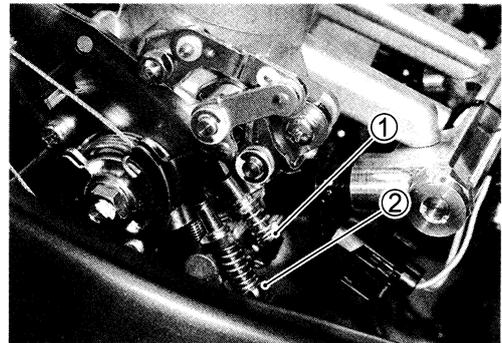
## FAST IDLE

The fast idle system is automatic type.

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

## INSPECTION AND ADJUSTMENT

- Fast idle adjustment must be performed while the engine is cold.
- Lift and support the fuel tank with its prop stay.
- Start up the engine and check the fast idle speed.
- If the fast idle speed is out of specification, stop the engine and wait until the engine is cool enough.
- After cooling down engine, turn in or out the fast idle adjusting screw ①.
- Start the engine and check the fast idle speed.
- Repeat the above procedure until the fast idle speed comes within the specified rpm.
- Set the idle speed to 1 050 – 1 250 rpm by turning the throttle stop screw ②.



### **DATA** Fast idle rpm

**Standard : 1 500 – 2 000 rpm/Cold engine**

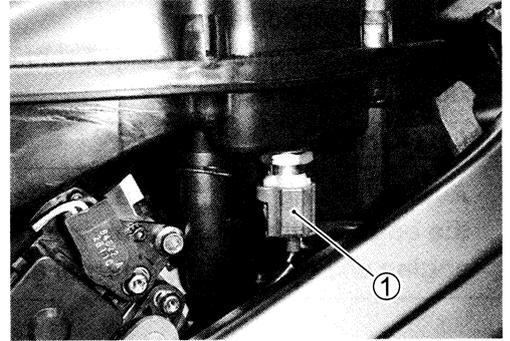
**Idle rpm : 1 050 – 1 250 rpm/Warmed engine**

## THROTTLE VALVE SYNCHRONIZATION

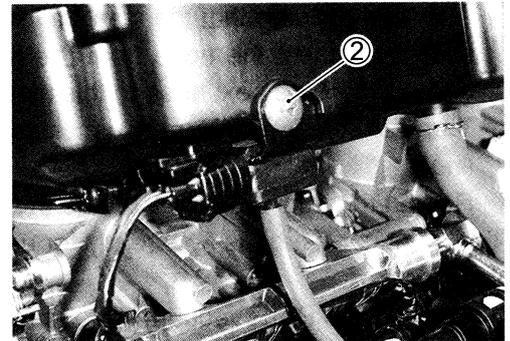
Check and adjust the throttle valve synchronization among four cylinders.

### CALIBRATING EACH VACUUM GAUGE

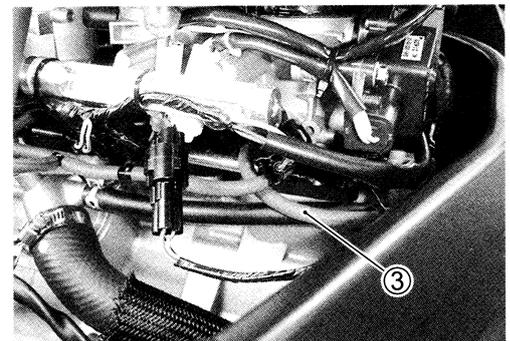
- Lift and support the fuel tank. (☞ 5-5)
- Start up the engine and run it in idling condition for warming up.
- Stop the warmed-up engine.
- Disconnect the IAT sensor coupler ① and remove the IAT sensor from the air cleaner box.
- Connect the removed IAT sensor to its coupler and place it on the frame.



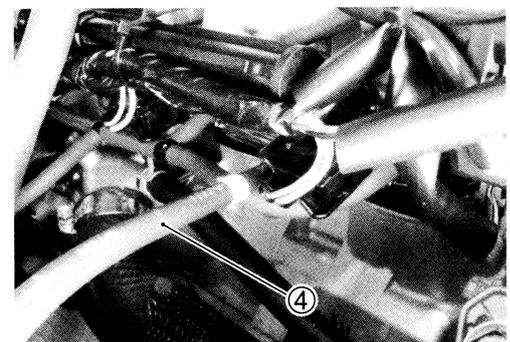
- Remove the IAP sensor coupler screw ②.
- Remove the air cleaner box. (☞ 5-15)



- Disconnect the PAIR vacuum hose ③ from the No.4 throttle body.



- Connect one of the vacuum balancer gauge hose ④ to the nipple on the No.4 throttle body.

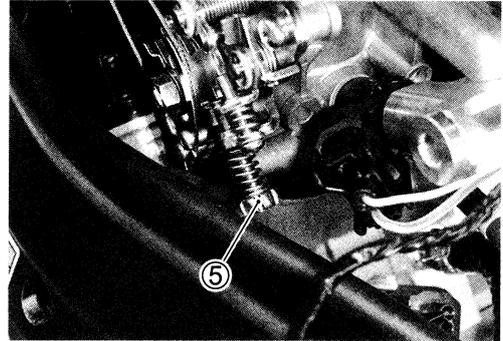


**TOOL** 09913-13121: Vacuum balancer gauge

- Connect a tachometer.
- Start up the engine and keep it running at 1 150 rpm by turning throttle stop screw ⑤.

**CAUTION**

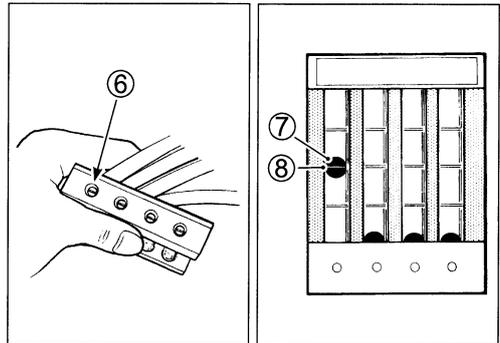
**Avoid drawing dirt into the throttle body while running the engine without air cleaner box. Dirt drawn into the engine will damage the internal engine parts.**



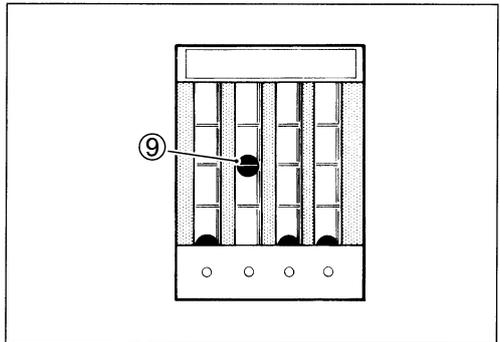
- Turn the air screw ⑥ of the gauge so that the vacuum acting on the tube of that hose will bring the steel ball ⑦ in the tube to the center line ⑧.

**NOTE:**

*The vacuum gauge is positioned approx. 30 ° from the horizontal level.*



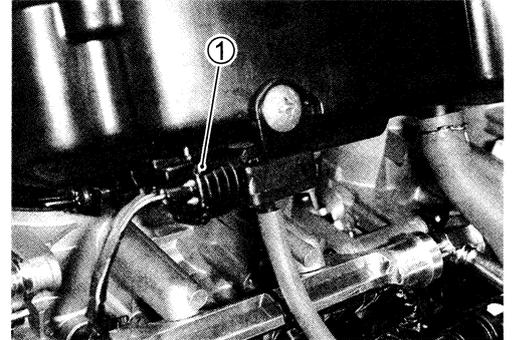
- After making sure that the steel ball stays steady at the center line, disconnect the hose from the No.4 throttle body nipple and connect the next hose to this nipple.
  - Turn air screw to bring the other steel ball ⑨ to the center line.
  - Repeat the above process on the third and fourth hoses.
- The balancer gauge is now ready for use in balancing the throttle valves.
- Connect the PAIR vacuum hose to the No.4 throttle body.



## THROTTLE VALVE SYNCHRONIZATION

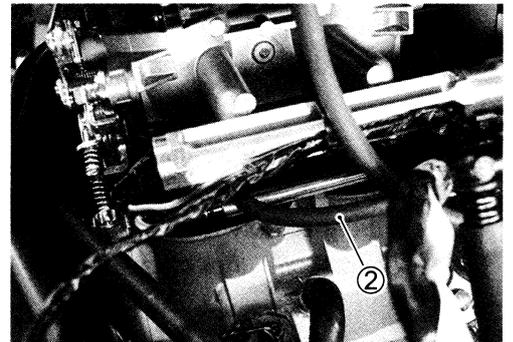
### Step 1

- Disconnect the IAP sensor coupler ①.



- To synchronize throttle valves, remove the vacuum hoses ② from each vacuum nipple and connect the vacuum balancer gauge hoses to the vacuum nipples respectively.

**TOOL** 09913-13121: Vacuum balancer gauge



### Step 2

- 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.

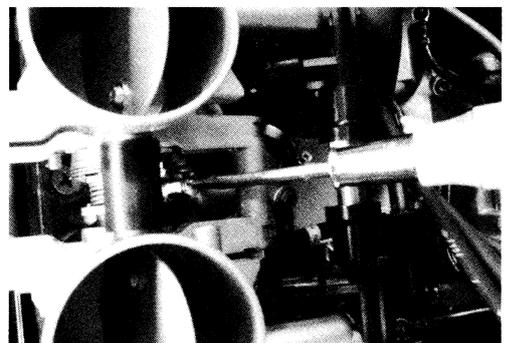
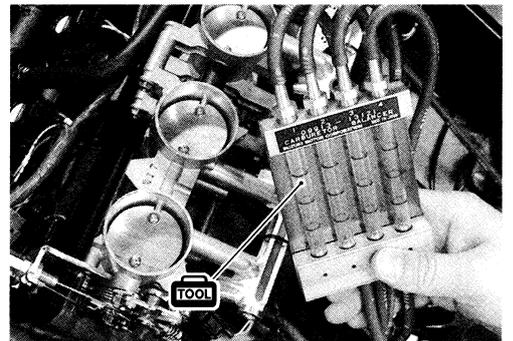
A correctly adjusted throttle valve synchronization has the balls in the No. 1 through 4 at the same level.

### 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.
- \* If the above procedures cannot still synchronize the valves, proceed to the next step.



**Step 3**

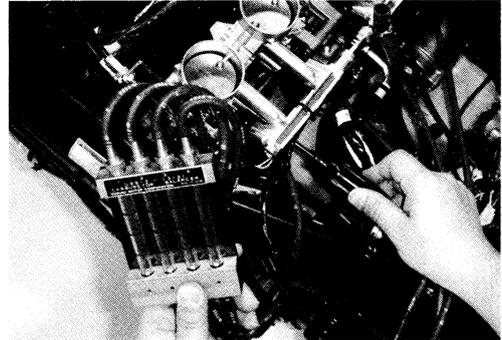
- Turn in all the idle air screws to the complete close position.
- Check for difference of vacuum between No.1 and No.2.
- Equalize these two by gradually turning back the air screw on the higher vacuum side until the vacuum comes down to the lower. Similarly perform the same procedures between No. 3 and No. 4.
- Check for the synchronization adjustment. If the adjustment is not yet correct, remove each idle air screw and clean them with a spray-type carburetor cleaner and blow dry with a compressed air.
- Also, clean the idle air screw passageways.

**NOTE:**

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

**Step 4**

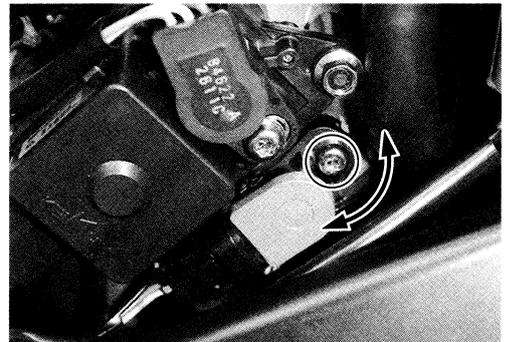
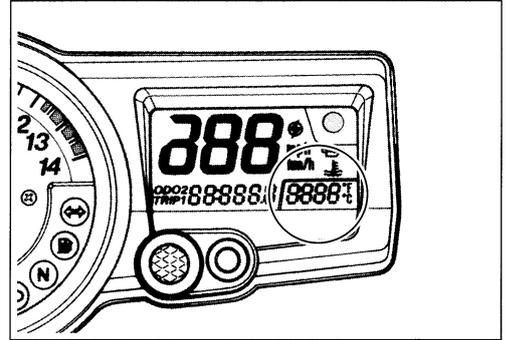
- Repeat the procedures of Step 2 and Step 3.



## THROTTLE POSITION SENSOR (TPS) SETTING

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

(Refer to page 4-18 for TPS setting procedure.)



## THROTTLE CABLE ADJUSTMENT

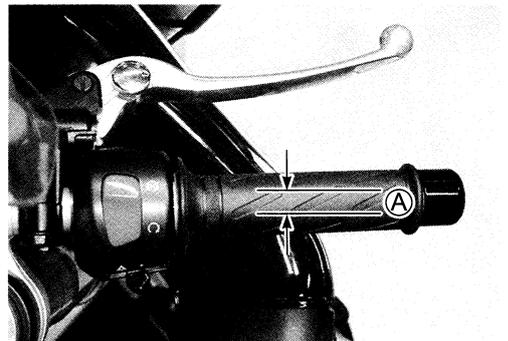
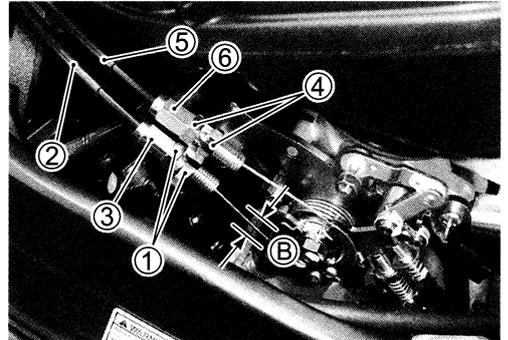
### NOTE:

Minor adjustment can be made by the throttle grip side adjuster.

( 2-17)

### 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 ① 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 ② of 1.0 mm (0.04 in).
- Tighten the lock-nuts ① securely.



# EXHAUST SYSTEM

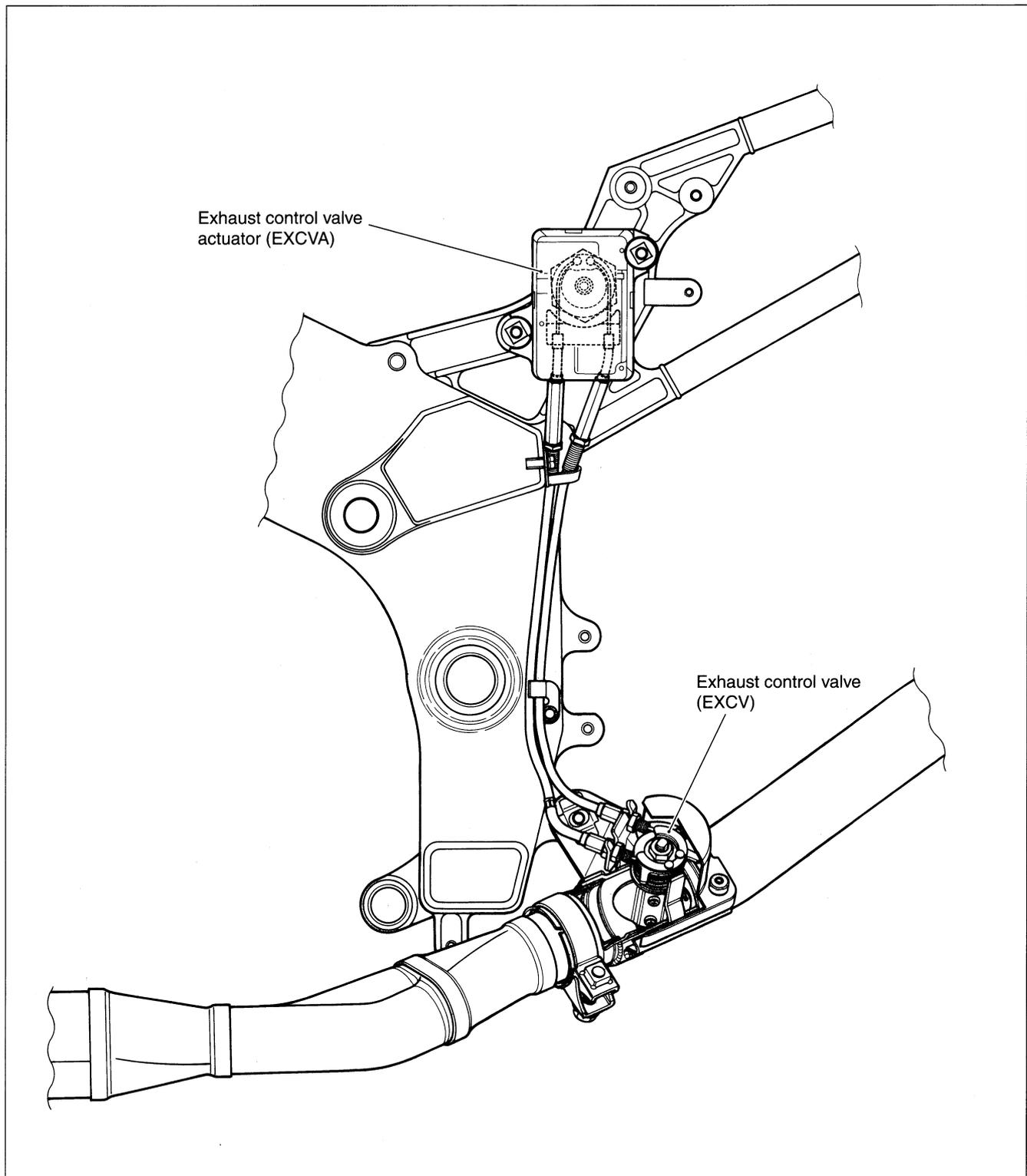
## CONTENTS

<b>EXHAUST SYSTEM .....</b>	<b>6- 2</b>
<b>EXHAUST CONTROL SYSTEM .....</b>	<b>6- 2</b>
<b>OPERATION.....</b>	<b>6- 3</b>
<b>EXCVA (EXHAUST CONTROL VALVE ACTUATOR) AND EXCV</b>	
<b>(EXHAUST CONTROL VALVE).....</b>	<b>6- 4</b>
<b>EXCVA REMOVAL.....</b>	<b>6- 4</b>
<b>EXCVA INSTALLATION .....</b>	<b>6- 5</b>
<b>EXCVA INSPECTION.....</b>	<b>6- 6</b>
<b>EXCV CABLE REPLACEMENT .....</b>	<b>6- 6</b>
<b>EXCVA ADJUSTMENT .....</b>	<b>6- 9</b>
<b>EXCV REMOVAL .....</b>	<b>6-12</b>
<b>EXCV INSPECTION .....</b>	<b>6-12</b>
<b>EXCV INSTALLATION.....</b>	<b>6-13</b>

## EXHAUST SYSTEM EXHAUST CONTROL SYSTEM

The exhaust control system (EXCS) consists of the exhaust control valve (EXCV), exhaust control valve actuator (EXCVA) and exhaust control valve cables (EXCV cables).

EXCV is installed between the exhaust pipes and joint pipe. EXCVA is mounted on the right side of the seat rail. The EXCV is operated by the EXCVA via the cables. This system is designed to improve the engine torque at low engine rpm and to reduce the exhaust noise.

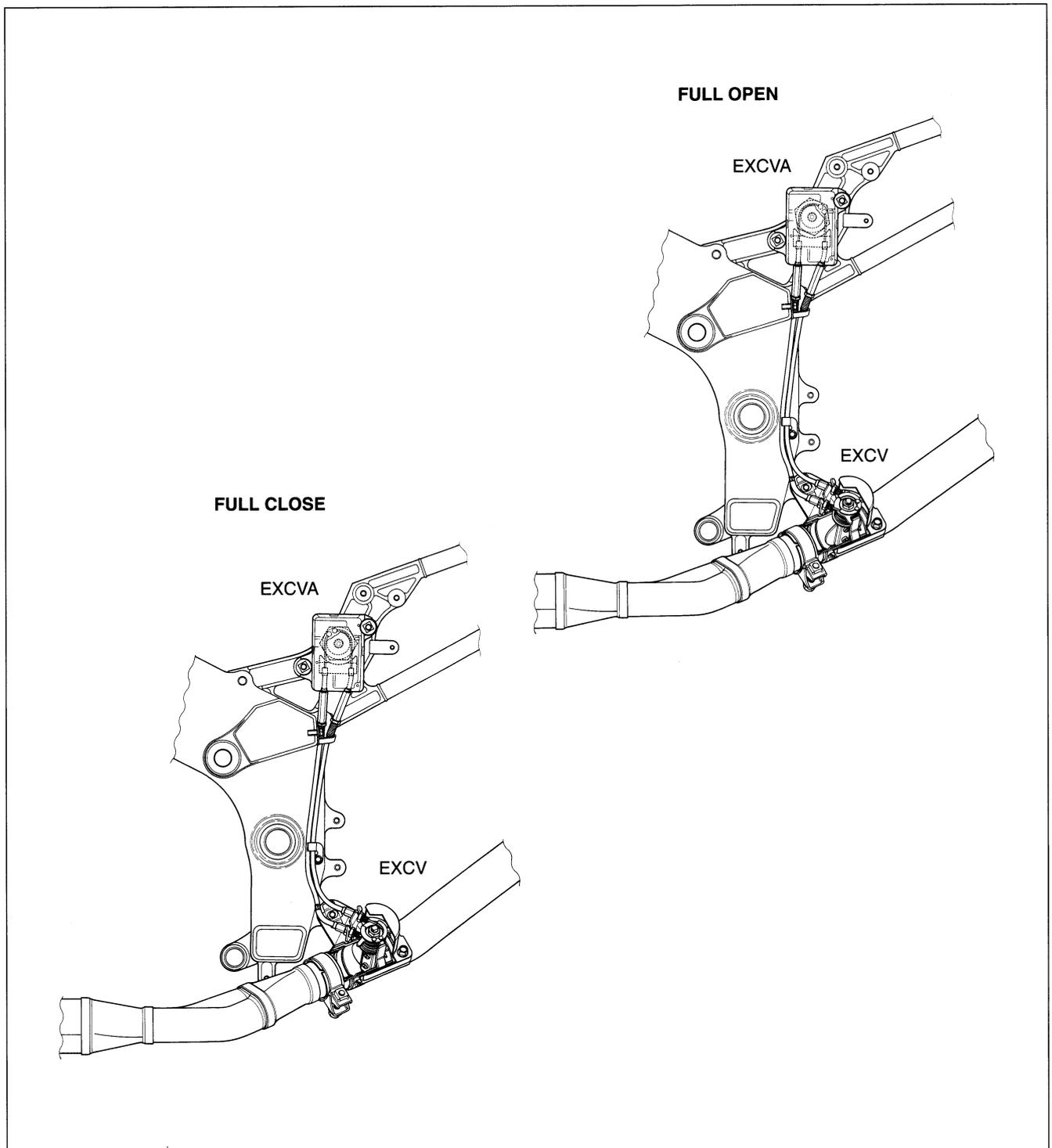


## OPERATION

The EXCS is operated by the signal supplied from the ECM.

The open/close operation of the EXCV is performed by the EXCVA which is controlled by the ECM by changing the current direction of the actuator motor. The position sensor (incorporated in the EXCVA) detects the EXCVA movement by measuring the voltage and then the ECM determines the EXCV opening angle based on the engine rpm and gear positions.

Every time the ignition switch is turned ON, the EXCVA automatically drives the EXCV and detects full close/open position voltages and sets the EXCV to middle position.



## EXCVA (EXHAUST CONTROL VALVE ACTUATOR) AND EXCV (EXHAUST CONTROL VALVE)

### EXCVA REMOVAL

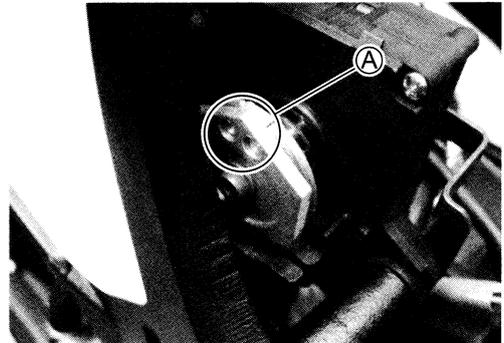
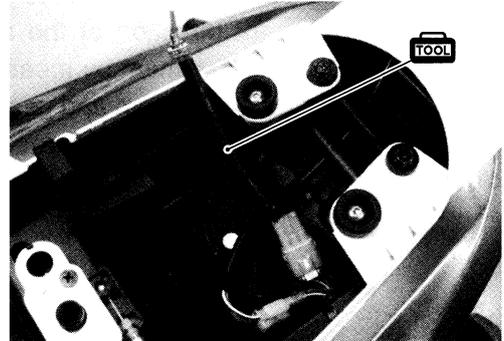
- Turn the ignition switch OFF.
- Remove the front and rear seats.
- Remove the fuel tank. (☞ 5-5)
- Connect the special tool (Mode select switch) to the dealer mode coupler. (☞ 4-16)
- After turning the special tool's switch ON, turn the ignition switch ON.

**TOOL 09930-82720: Mode select switch**

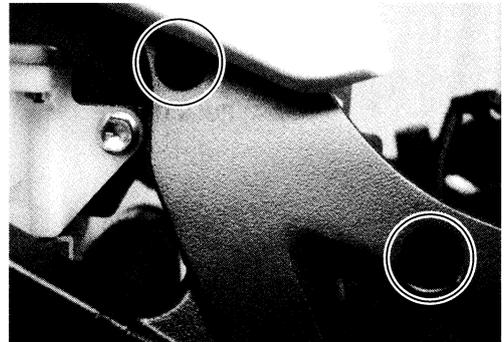
- Check the cable slots **A** of the EXCVA pulley face upward (adjustment position) as shown.
- Turn the ignition switch OFF.

**CAUTION**

Before removing the EXCVA, be sure to set the EXCVA pulley to the adjustment position.



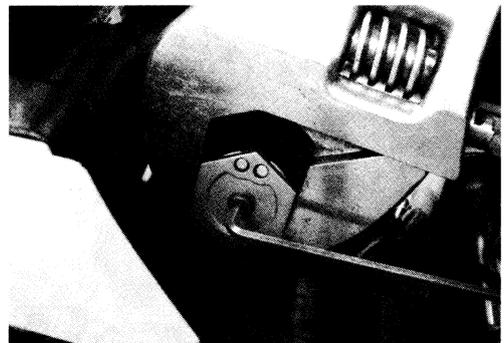
- Remove the EXCVA mounting bolts.



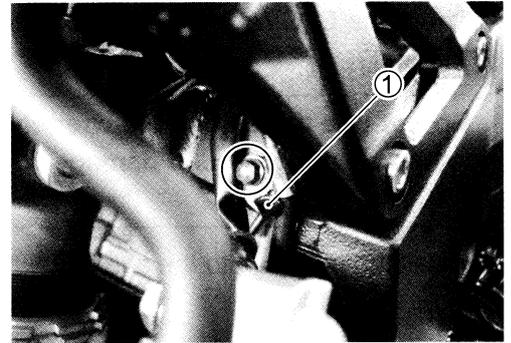
- Hold the EXCVA pulley with an adjustable wrench, and loosen the pulley mounting bolt .

**CAUTION**

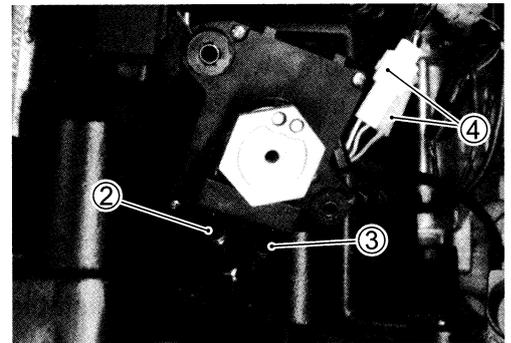
- \* When loosening or tightening the pulley bolt, be sure to fix the pulley with an adjustable wrench, or EXCVA may get damaged.
- \* Do not use the adjustable wrench to turn EXCVA pulley so as not to cause damage to the internal gear of EXCVA.



- Remove the clamp ①.

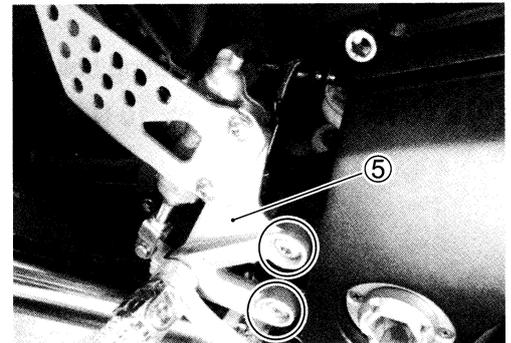


- Disconnect the No.2 cable ② and then No.1 cable ③ from the pulley.
- Disconnect the EXCVA lead wire couplers ④.
- Remove the EXCVA.



EXCVA can also be removed in the following procedures.

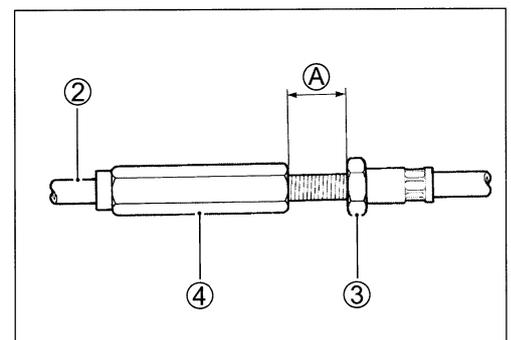
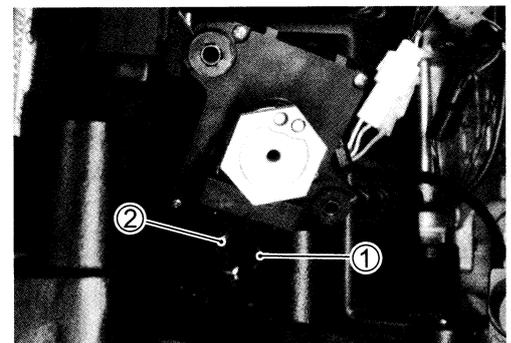
- Remove the front footrest ⑤.
- Disconnect the EXCV cable. (6-12)
- Remove the EXCVA mounting bolt. (6-4)
- Remove EXCVA, cable and EXCV together as a unit.



## EXCVA INSTALLATION

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

- Connect the No.1 cable ① (Black chrome plated adjuster) and No.2 cable ② (Silver chrome plated adjuster) to the EXCVA pulley.
- After connecting the No.2 cable ②, loosen the lock-nut ③ and turn the adjuster ④ in or out until 11.0 mm (0.43 in) and more of the thread length A on the cable adjuster can be provided and tighten the lock-nut ③.



- Check the EXCVA to adjustment position. (🔧 6-4)

**CAUTION**

Do not use the adjustable wrench to turn EXCVA pulley so as not to cause damage to the internal gear of EXCVA.

- Install the pulley ⑤ to the shaft ⑥.

**NOTE:**

Make sure that the shaft's line ⑥ and cable slots ③ facing upward as shown.

- Hold the pulley with an adjustable wrench, and then tighten the pulley mounting bolt to the specified torque.

🔧 EXCVA pulley mounting bolt: 5 N·m (0.5 kgf-m, 3.5 lb-ft)

**CAUTION**

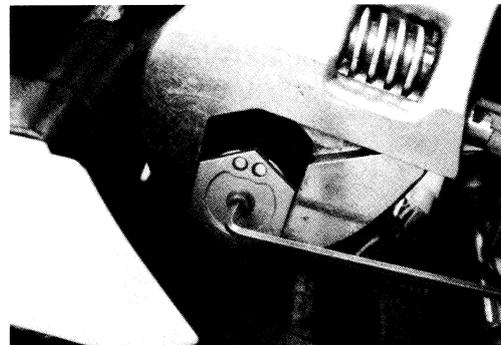
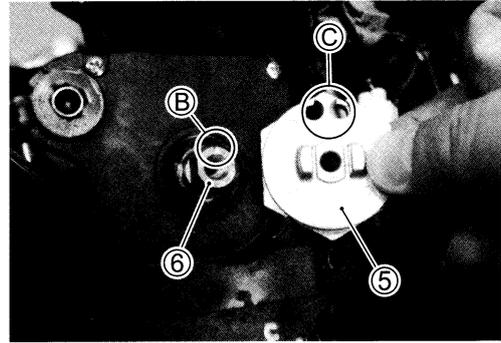
When loosening or tightening the pulley bolt, be sure to fix the pulley with an adjustable wrench, or EXCVA may get damaged.

- Tighten the EXCVA mounting bolt to the specified torque.

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

**CAUTION**

The cable slots of EXCVA pulley must be located upward (adjustment position). (🔧 6-4)



**EXCVA INSPECTION**

🔧 4-54

**EXCV CABLE REPLACEMENT**

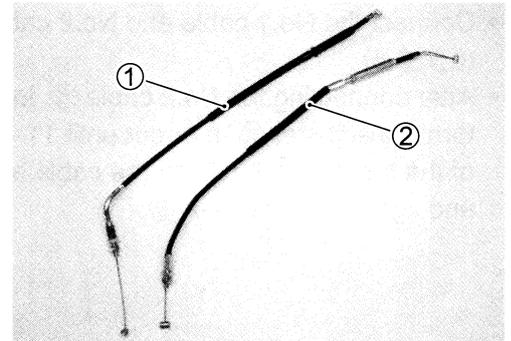
- Disconnect the EXCV cables from the EXCVA pulley. (🔧 6-5)
- Disconnect the EXCV cables from the EXCV pulley. (🔧 6-12)

**NOTE:**

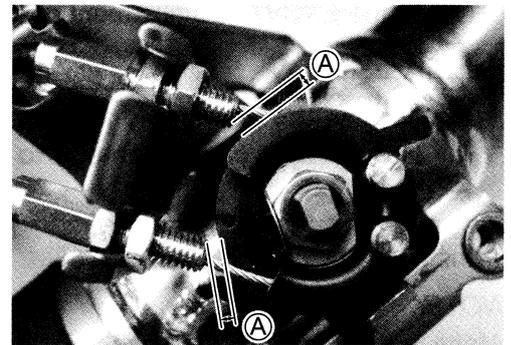
The EXCV cables are identified by the plated chrome color and shape.

Black chrome plated adjuster: No.1 cable ①

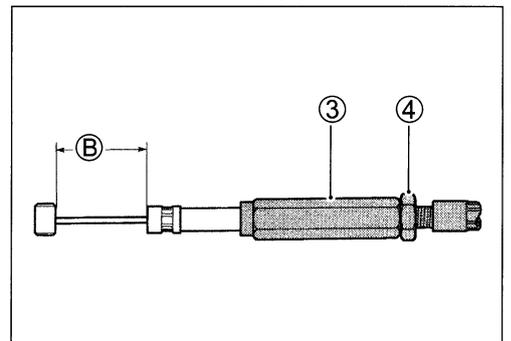
Silver chrome plated adjuster: No.2 cable ②



- Connect the EXCV cables (No.1 and No.2) temporarily to the EXCVA pulley.
- Check or adjust the clearance ① becomes the adjuster end and EXCVA pulley to provide 3 mm (0.12 in) and more.
- Install the muffler joint pipe together with the muffler body. (→ 6-13)

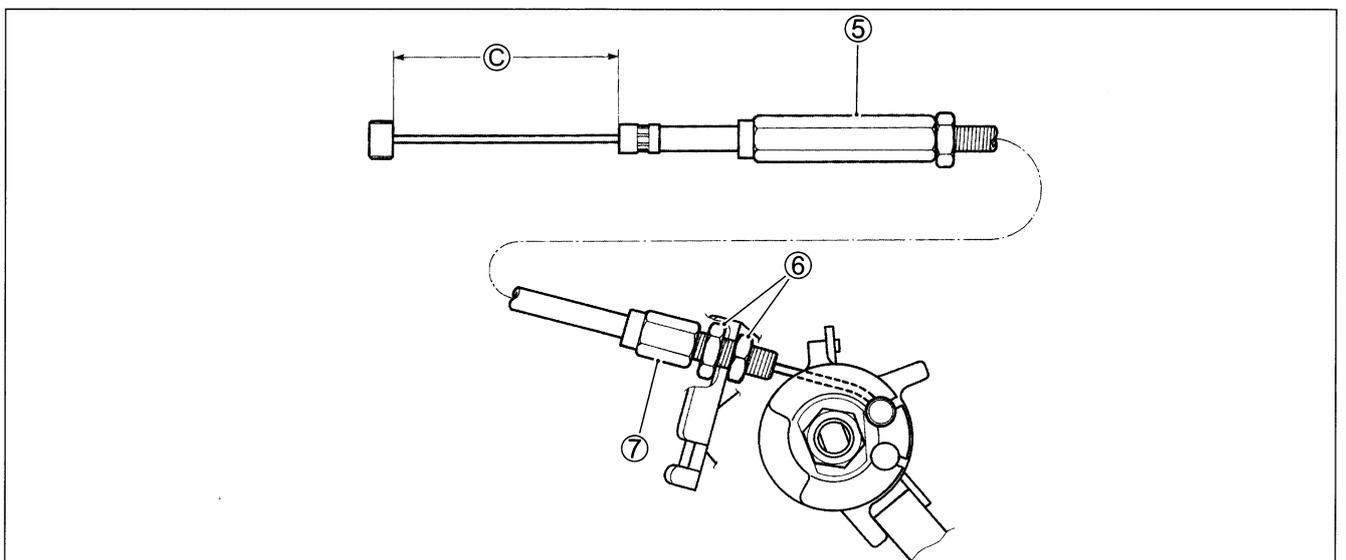


- Make the No.1 cable straight and turn the No.1 cable adjuster ③ in or out until the inner cable length ② becomes 42 – 43 mm (1.65 – 1.69 in).
- After adjusting the inner cable length ②, tighten the lock-nut ④.

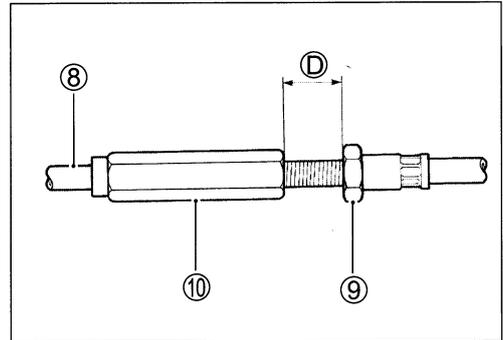


No.1 cable adjuster: Black chrome plated

- Make the No.2 cable straight and turn in the cable adjuster ⑤ fully.
- Loosen the lock-nuts ⑥ and turn the No.2 cable adjuster ⑦ in or out until the inner cable length ③ becomes 58 – 59 mm (2.28 – 2.32 in).
- After adjusting the inner cable length ③, tighten the lock-nuts ⑥.



- Connect the No.1 cable and No.2 cable to the EXCVA pulley. (☞6-5)
- After connecting the No.2 cable ⑧, loosen the lock-nut ⑨ and turn the adjuster ⑩ in or out until 11 – 12 mm (0.43 – 0.47 in) of the thread length ① on the cable adjuster can be provided and tighten the lock-nut ⑨.



- Check the EXCVA to adjustment position. (☞6-4)

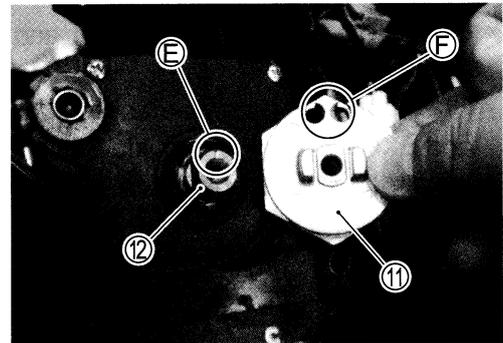
**CAUTION**

Do not use the adjustable wrench to turn EXCVA pulley so as not to cause damage to the internal gear of EXCVA.

- Install the pulley ⑪ to the shaft ⑫.

**NOTE:**

Make sure that the shaft's line ⑤ and cable slots ⑥ facing upward as shown.

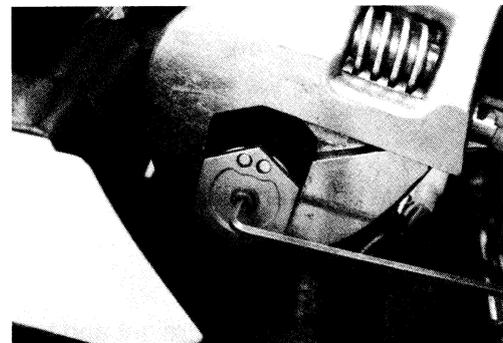


- Hold the EXCVA pulley with an adjustable wrench, and then tighten the pulley mounting bolt to the specified torque.

**🔧 EXCVA pulley mounting bolt: 5 N·m (0.5 kgf-m, 3.7 lb-ft)**

**CAUTION**

When loosening or tightening the pulley bolt, be sure to fix the pulley with an adjustable wrench, or EXCVA may get damaged.



**CAUTION**

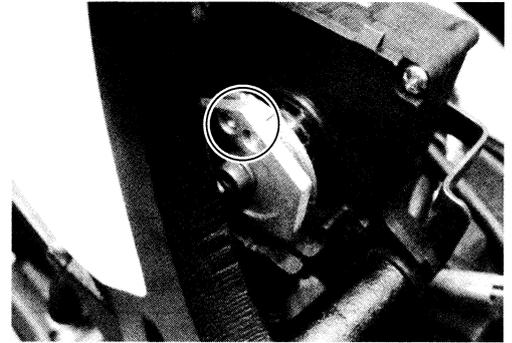
The cable slots of the EXCVA pulley must be located upward (adjustment position). (☞6-4)



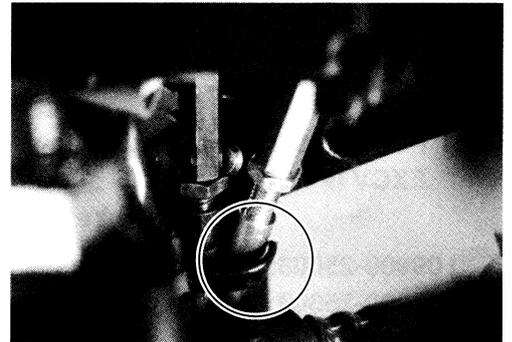
## EXCVA ADJUSTMENT

### 1st step:

- Set the EXCVA to adjustment position. (☞ 6-4)

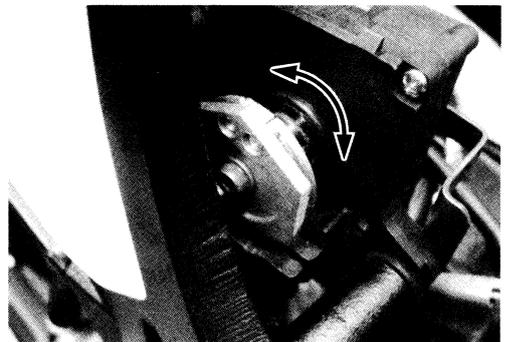
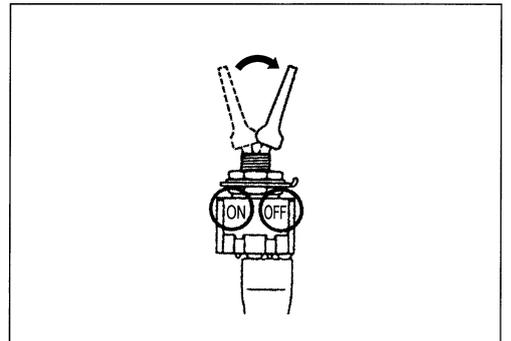


- Make sure that the No.2 cable and No.1 cable are fixed into the clamp.



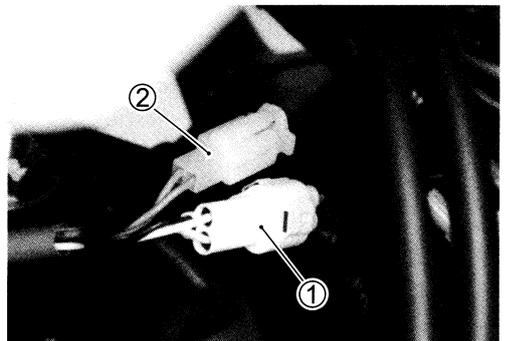
### 2nd step:

- Turn the mode select switch OFF.
- Turn the ignition switch ON to check the EXCVA operation.
- Turn the mode select switch ON.
- If C46 is not indicated on the LCD (DISPLAY), the adjustment is correctly completed. In this case, it is unnecessary to proceed to 3rd step.
- If C46 is indicated, repeat the adjustment procedure from 3rd and 4th step.



### 3rd step:

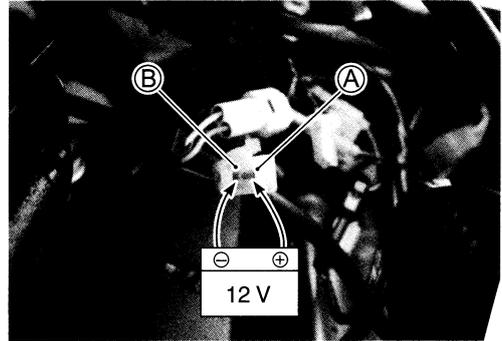
- This procedure is only required when C46 is indicated.
- Turn the ignition switch OFF.
- Insert the two copper wires into the back side of the position sensor lead wire coupler ①.
- Disconnect the EXCVA motor lead wire coupler ②.



- To set the EXCV to fully close position, apply 12 volts to ① and ② terminals.  
 Positive wire — ① (Pink wire) terminal  
 Negative wire — ② (Gray wire) terminal

**CAUTION**

To prevent the motor damage, stop applying 12 V as soon as the EXCV reaches fully close position.

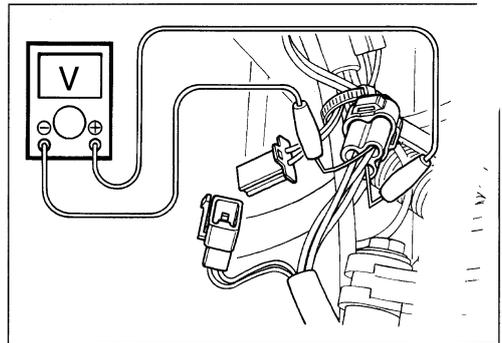


- Turn the ignition switch ON.
- Measure the position sensor output voltage at fully close position.

**DATA** Position sensor output voltage  
 EXCV is fully close:  $0.5 \leq \text{output voltage} \leq 1.3 \text{ V}$   
 (+ Yellow - - White)

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

**V** Tester knob indication: Voltage (---)

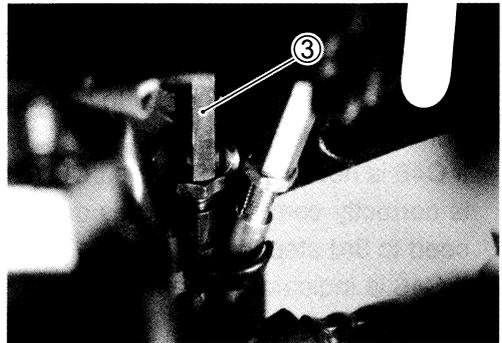


If the measured voltage is less than specification, adjust the No.1 cable adjuster as follows:

- Set the EXCV to adjustment position. (6-4)

**CAUTION**

Adjusting the No.1 cable with the EXCV fully closed can damage the EXCV. Be sure to adjust the No.1 cable with the EXCV set in adjustment position.



- Turn out the No.1 cable adjuster ③.
- Repeat the above procedure until the output voltage becomes specified value.

**DATA** Position sensor output voltage  
 EXCV is fully close:  $0.5 \leq \text{output voltage} \leq 1.3 \text{ V}$

- To next step.

**NOTE:**

If C46 code is indicated after adjusting the voltage, increase the voltage to 0.9 V.

**4th step:**

To set the EXCV to fully open position, apply 12 volts to Ⓐ and Ⓑ terminals.

Positive wire — Ⓑ (Gray wire) terminal

Negative wire — Ⓐ (Pink wire) terminal

**CAUTION**

To prevent the motor damage, stop applying 12 V as soon as the EXCV reaches fully open position.

Measure the position sensor output voltage at fully open position.

**DATA** Position sensor output voltage

EXCV is fully open:  $3.7 \leq \text{output voltage} \leq 4.5 \text{ V}$   
(+ Yellow - White)

If the measured voltage is more than specification, adjust the No.2 cable adjuster as follows:

- Set the EXCVA to adjustment position. (↔ 6-4)

**CAUTION**

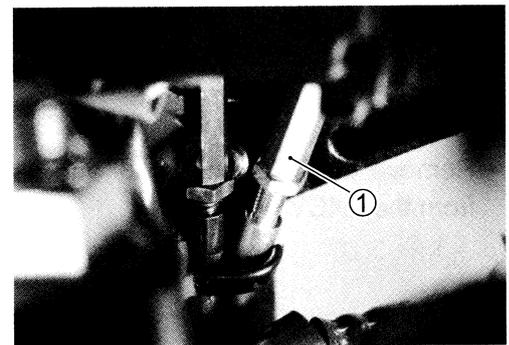
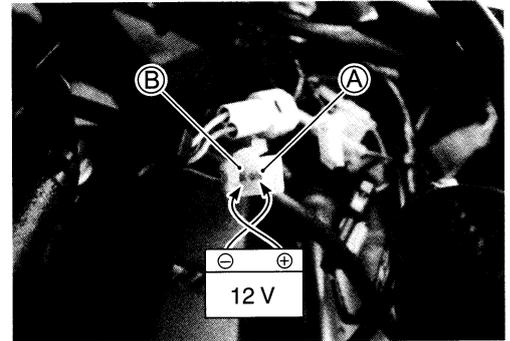
Adjusting the No.2 cable with the EXCV fully opened can damage the EXCVA. Be sure to adjust the No.2 cable with the EXCV set in adjustment position.

- Turn out the No.2 cable adjuster ①.
- Repeat the above procedure until the output voltage comes within the specified value.

**DATA** Position sensor output voltage

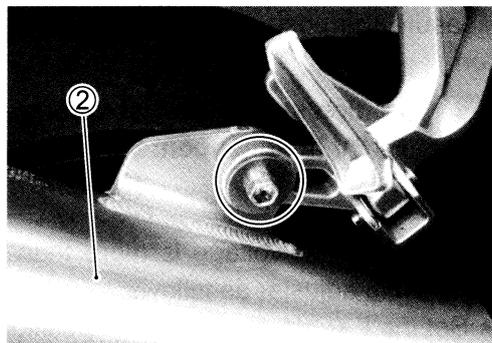
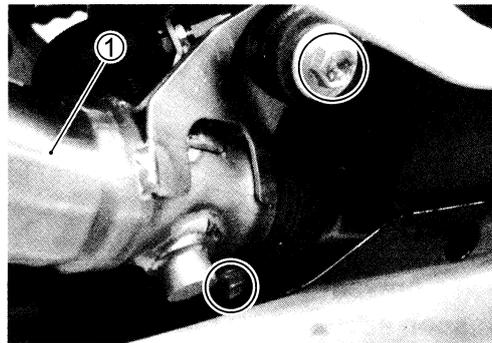
EXCV is fully open:  $3.7 \leq \text{output voltage} \leq 4.5 \text{ V}$

- After adjusting the EXCV cables, perform 1st step to confirm C46 is not indicated.

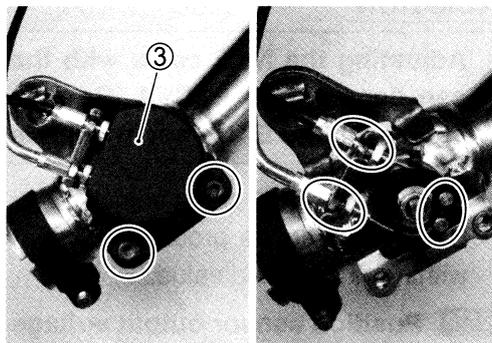


## EXCV REMOVAL

- Disconnect the two cables from the EXCVA pulley. (Refer to the EXCVA REMOVAL procedures.) (  6-4)
- Remove the muffler joint pipe ① together with the muffler body ② by removing the mounting bolts and loosen the connector bolt.



- Remove the EXCV cover ③ and disconnect the two cables from the EXCV pulley.

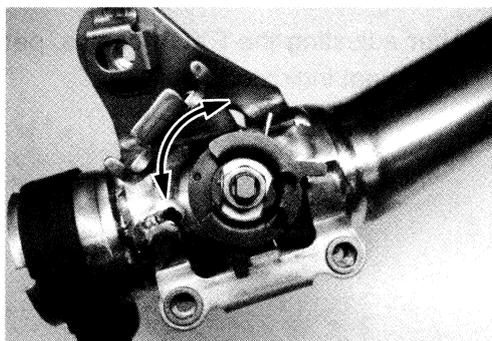


## EXCV INSPECTION

- Turn the EXCV by hand and check that it moves smoothly.
- If it does not move smoothly, replace the EXCV together with the muffler joint pipe.
- Decarbonize the EXCV if necessary.

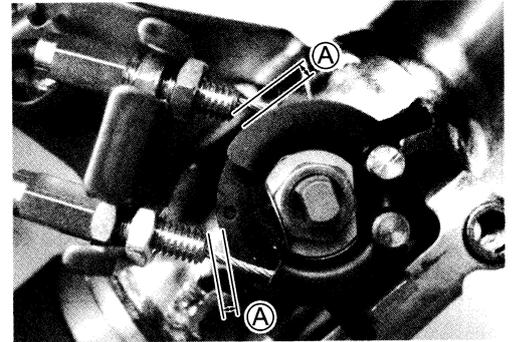
### CAUTION

- \* Do not attempt to disassemble the EXCV.
- \* The EXCV is available only as the muffler joint pipe assembly.



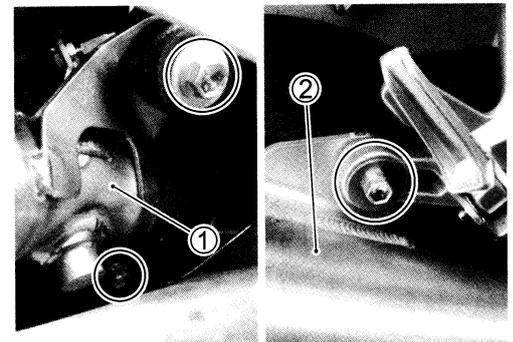
## EXCV INSTALLATION

- Connect the EXCV cables temporarily to the EXCV pulley.
- Adjust the clearance  $\textcircled{A}$  between the adjuster end and EXCV pulley to provide 3 mm (0.12 in) and more.
- Adjust the inner cable length of the No.2 cable. (☞ 6-7)
- Install the EXCV cover.

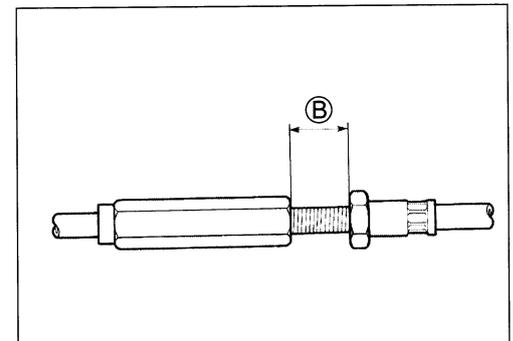


- Install the muffler joint pipe  $\textcircled{1}$  together with the muffler body  $\textcircled{2}$ .

**☑ Exhaust pipe connector bolt: 23 N·m  
(2.3 kgf·m, 16.5 lb·ft)**  
**Muffler mounting bolt: 23 N·m (2.3 kgf·m, 16.5 lb·ft)**



- Connect the No.1 and No.2 cables to the EXCVA pulley. (☞ 6-5 and 14)
- Adjust the No.2 cable adjuster thread length  $\textcircled{B}$ . (☞ 6-5 and 14)
- Install the EXCVA pulley to its shaft. (☞ 6-6)

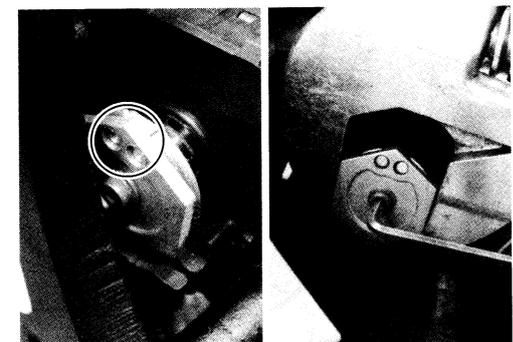


### CAUTION

- \* The cable slots of EXCVA pulley must be located forward (adjustment position). (☞ 6-4)
- \* Do not use the adjustable wrench to turn EXCVA pulley so as not to cause damage to the internal gear of EXCVA.

- Tighten the EXCVA pulley mounting bolt to the specified torque. (☞ 6-14)

**☑ EXCVA pulley mounting bolt: 5 N·m (0.5 kgf·m, 3.5 lb·ft)**





# COOLING AND LUBRICATION SYSTEM

## CONTENTS

<b>ENGINE COOLANT .....</b>	<b>7- 2</b>
<b>COOLING CIRCUIT .....</b>	<b>7- 3</b>
<b>COOLING CIRCUIT INSPECTION.....</b>	<b>7- 3</b>
<b>RADIATOR AND WATER HOSES.....</b>	<b>7- 4</b>
<b>RADIATOR REMOVAL .....</b>	<b>7- 4</b>
<b>RADIATOR CAP INSPECTION .....</b>	<b>7- 4</b>
<b>RADIATOR INSPECTION AND CLEANING .....</b>	<b>7- 4</b>
<b>RADIATOR REMOUNTING .....</b>	<b>7- 5</b>
<b>WATER HOSE INSPECTION.....</b>	<b>7- 5</b>
<b>COOLING FAN .....</b>	<b>7- 6</b>
<b>INSPECTION .....</b>	<b>7- 6</b>
<b>INSTALLATION.....</b>	<b>7- 6</b>
<b>COOLING FAN THERMO-SWITCH .....</b>	<b>7- 7</b>
<b>REMOVAL .....</b>	<b>7- 7</b>
<b>INSPECTION .....</b>	<b>7- 7</b>
<b>ININSTALLATION.....</b>	<b>7- 7</b>
<b>ENGINE COOLANT TEMPERATURE SENSOR .....</b>	<b>7- 8</b>
<b>REMOVAL .....</b>	<b>7- 8</b>
<b>INSPECTION .....</b>	<b>7- 8</b>
<b>INSTALLATION.....</b>	<b>7- 9</b>
<b>THERMOSTAT .....</b>	<b>7- 9</b>
<b>REMOVAL .....</b>	<b>7- 9</b>
<b>INSPECTION .....</b>	<b>7-10</b>
<b>INSTALLTATION .....</b>	<b>7-10</b>
<b>WATER PUMP.....</b>	<b>7-11</b>
<b>REMOVAL AND DISASSEMBLY .....</b>	<b>7-11</b>
<b>LUBRICATION SYSTEM.....</b>	<b>7-18</b>
<b>OIL PRESSURE .....</b>	<b>7-18</b>
<b>OIL FILTER .....</b>	<b>7-18</b>
<b>OIL PRESSURE REGULATOR .....</b>	<b>7-18</b>
<b>OIL STRAINER.....</b>	<b>7-18</b>
<b>OIL JET .....</b>	<b>7-18</b>
<b>OIL PUMP.....</b>	<b>7-18</b>
<b>OIL PRESSURE SWITCH.....</b>	<b>7-18</b>
<b>ENGINEENGINE LUBRICATION SYSTEM CHART .....</b>	<b>7-20</b>
<b>ENGINEENGINE LUBRICATION SYSTEM.....</b>	<b>7-21</b>

## 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  $-31\text{ }^{\circ}\text{C}$  ( $-24\text{ }^{\circ}\text{F}$ ).

If the motorcycle is to be exposed to temperatures below  $-31\text{ }^{\circ}\text{C}$  ( $-24\text{ }^{\circ}\text{F}$ ), 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	1 200 ml (3.1/2.6 US/lmp.pt)
Water	1 200 ml (3.1/2.6 US/lmp.pt)

Anti-freeze density	Freezing point
50 %	$-30\text{ }^{\circ}\text{C}$ ( $-24\text{ }^{\circ}\text{F}$ )
55 %	$-40\text{ }^{\circ}\text{C}$ ( $-44\text{ }^{\circ}\text{F}$ )
60 %	$-55\text{ }^{\circ}\text{C}$ ( $-67\text{ }^{\circ}\text{F}$ )

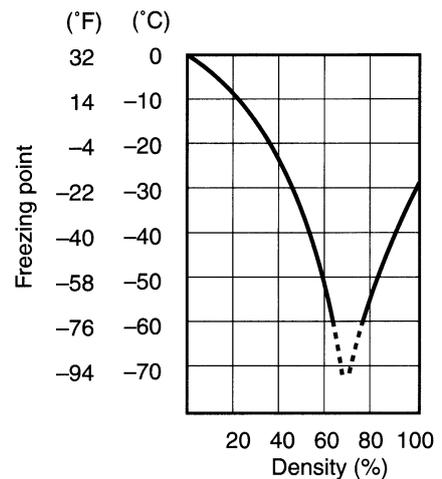


Fig.1 Engine coolant density-freezing point curve.

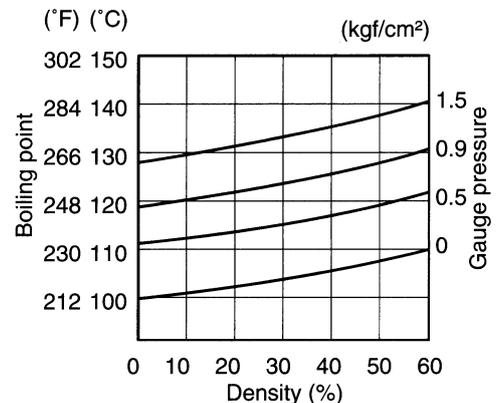
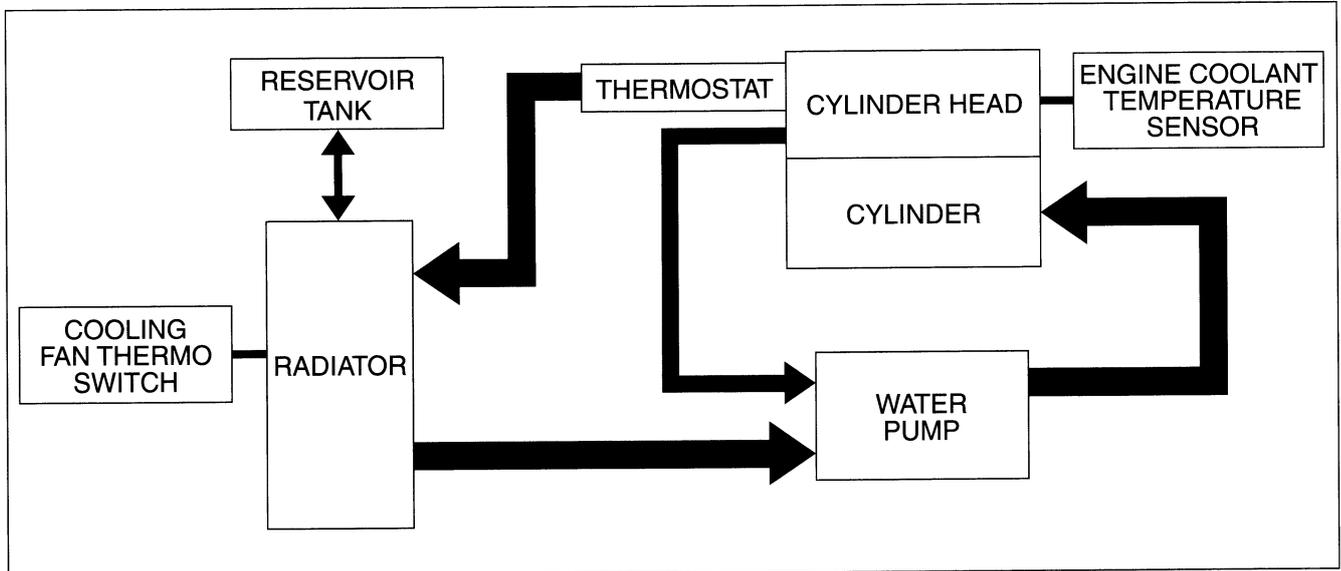


Fig.2 Engine coolant density-boiling point curve.

### 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 accidentally, induce vomiting and call physician immediately.
  - Keep it away from children.

## COOLING CIRCUIT



## COOLING CIRCUIT INSPECTION

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

- Remove the under cowl. (☞ 8-3)
- Remove the radiator cap ① and connect the tester ② to the filler.

### ⚠ WARNING

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

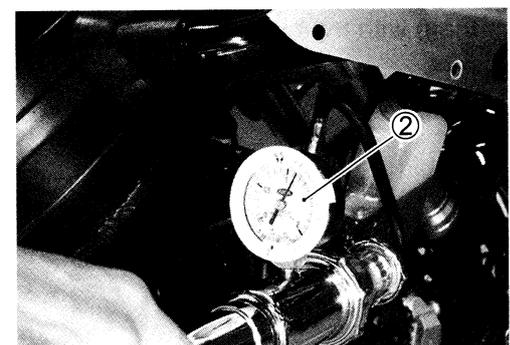
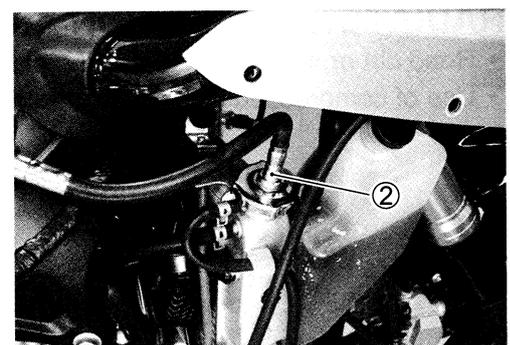
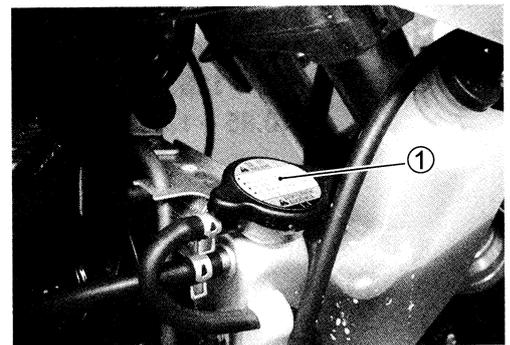
- Give a pressure of about 120 kPa (1.2 kgf/cm<sup>2</sup>, 17 psi) and see if the system holds this pressure for 10 seconds.
- If the pressure should fall during this 10-second interval, it means that there is a leaking point in the system. In such a case, inspect the entire system and replace the leaking component or part.

### ⚠ WARNING

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

### CAUTION

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



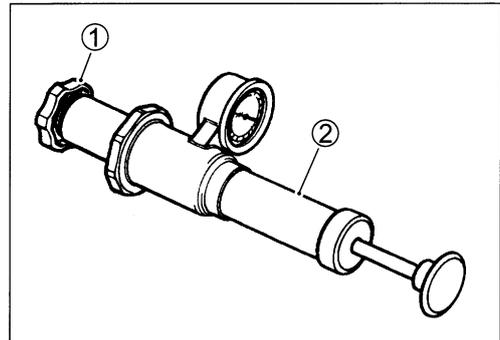
## RADIATOR AND WATER HOSES

### RADIATOR REMOVAL

- Remove the under cowling. (☞ 8-3)
- Drain the engine coolant. (☞ 2-19)
- Remove the radiator. (☞ 3-4)

### 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/cm<sup>2</sup>, 13.5 – 17.8 psi) and that, with the tester held stand-still, 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.



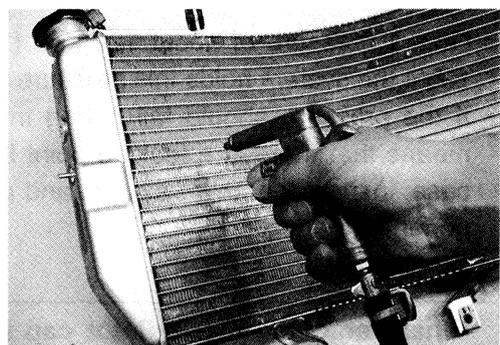
**DATA** Radiator cap valve opening pressure

Standard: 95 – 125 kPa

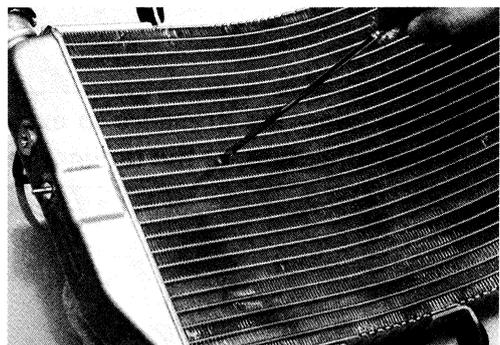
(0.95 – 1.25 kgf/cm<sup>2</sup>, 13.5 – 17.8 psi)

### 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.

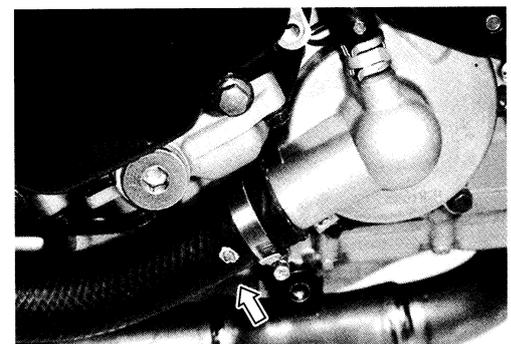
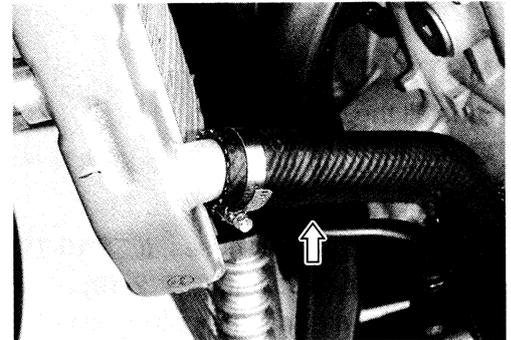
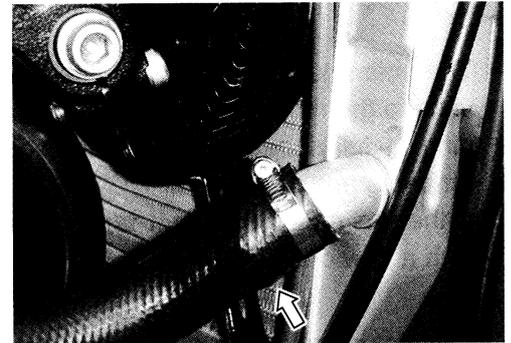
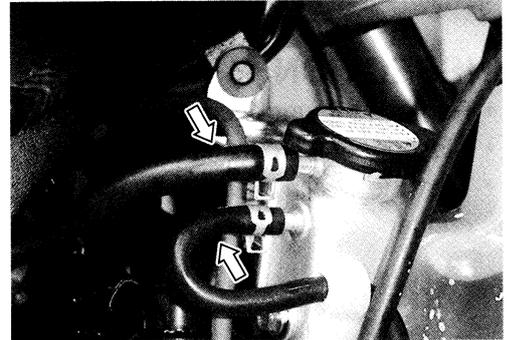


## RADIATOR REMOUNTING

- Install the radiator.
- Route the radiator hoses. (☞ 10-19)
- Pour engine coolant. (☞ 2-19)
- Bleed air from the cooling circuit. (☞ 2-20)
- Install the under cowling.

## WATER HOSE INSPECTION

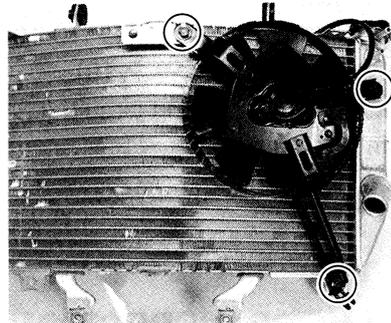
- Remove the under cowling. (☞ 8-3)
- Any water hose found in a cracked condition or flattened must be replaced.
- Any leakage from the connecting section should be corrected by proper tightening.



## COOLING FAN

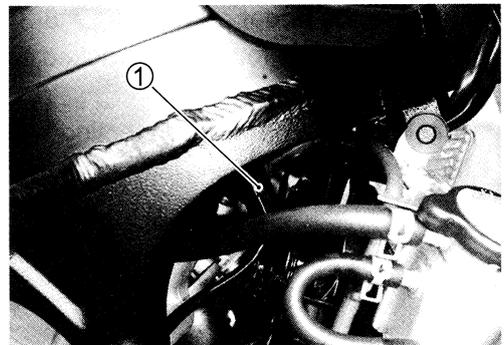
### REMOVAL

- Remove the under cowling. (☞ 8-3)
- Drain the engine coolant. (☞ 2-19)
- Remove the radiator. (☞ 3-4)
- Remove the cooling fan.

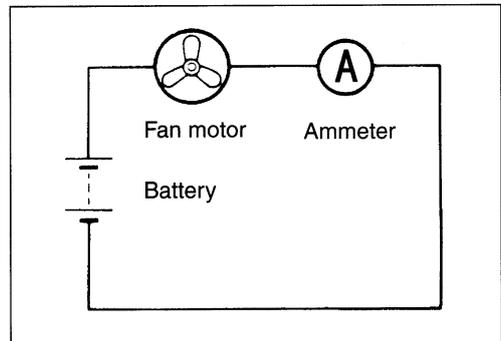


### INSPECTION

- Remove the under cowling. (☞ 8-3)
- Disconnect the cooling fan coupler ①.
- Test the cooling fan motor for load current with an ammeter connected as shown in the illustration.



- The voltmeter is for making sure that the battery applies 12 volts to the motor. With the motor with electric motor fan running at full speed, the ammeter should be indicating not 5 amperes and more.
- If the fan motor does not turn, replace the motor assembly with a new one.

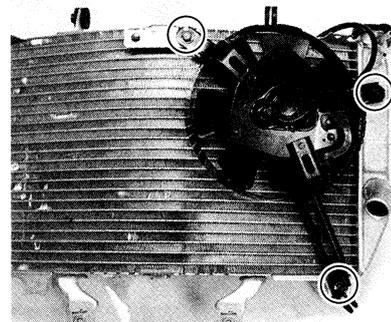


**NOTE:**

When making above test, it is not necessary to remove the cooling fan.

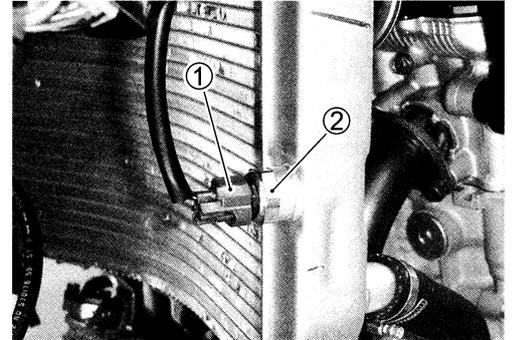
### INSTALLATION

- Install the cooling fan.
- ☑ **Cooling fan mounting bolt: 8 N-m (0.8 kgf-m, 6.0 lb-ft)**
- Install the radiator.
- Route the radiator hoses. (☞ 10-19)
- Pour engine coolant. (☞ 2-19)
- Bleed the air from the cooling circuit. (☞ 2-20)
- Install the under cowling. (☞ 10-24)



## COOLING FAN THERMO-SWITCH REMOVAL

- Remove the under cowling. (☞ 8-3)
- Drain the engine coolant. (☞ 2-19)
- Disconnect the cooling fan thermo-switch coupler ①.
- Remove the cooling fan thermo-switch ②.



## 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.

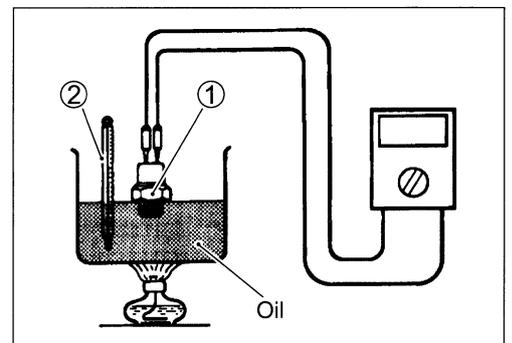
**TOOL** 09900-25008: Multi circuit tester set

**Tester knob indication: Continuity test (•••)**

**DATA** 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.

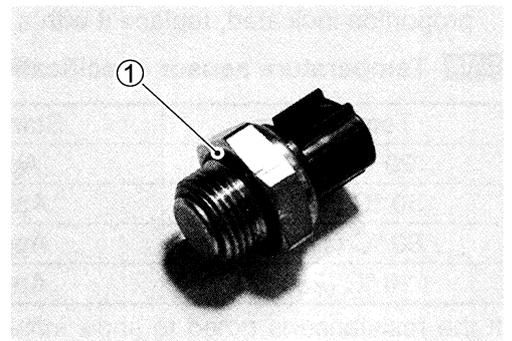


## INSTALLATION

- 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. (☞ 10-24)

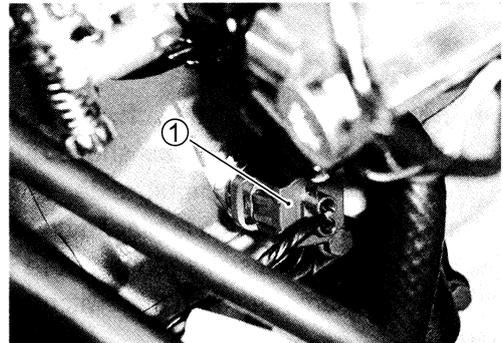


## ENGINE COOLANT TEMPERATURE SENSOR

### REMOVAL

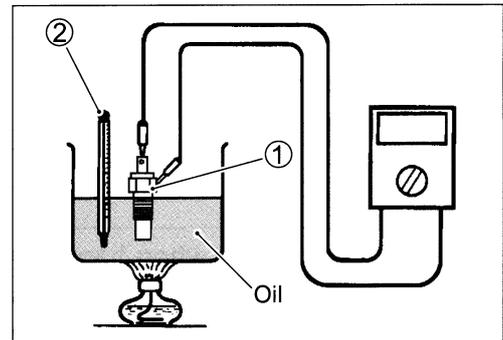
- Remove the front seat. (☞ 8-6)
- Lift and support the fuel tank. (☞ 5-5)

- Disconnect the engine coolant temperature sensor coupler.
- Keep the motorcycle upright.
- Place a rag under the sensor and 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 ② 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 (122 °F)	Approx. 0.811 kΩ
80 °C (176 °F)	Approx. 0.318 kΩ
110 °C (230 °F)	Approx. 0.142 kΩ

If the resistance is 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 engine coolant temperature sensor ① and the column thermometer ② with a pan.

## INSTALLATION

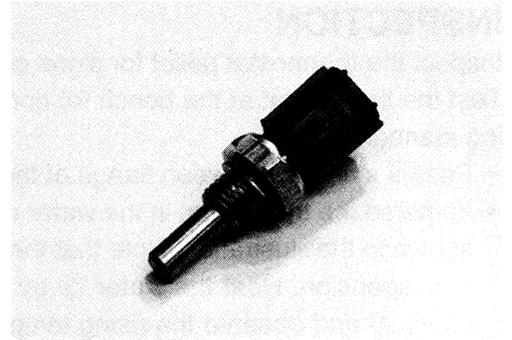
- Tighten the engine coolant temperature sensor to the specified torque.

 **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.**

- Install the fuel tank. (☞ 5-5)
- Install the front seat.

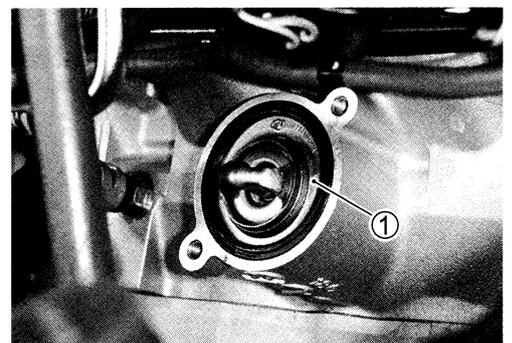
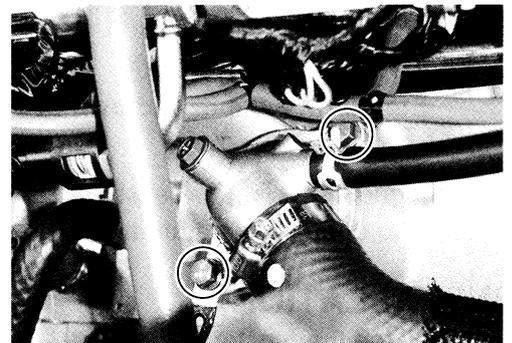


## THERMOSTAT

### REMOVAL

- Remove the front seat. (☞ 8-6)
- Lift and support the fuel tank. (☞ 5-5)
- Place a rag under the thermostat cover.
- Remove the thermostat cover.

- 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 ① between flange of thermostat ②, as shown.
- Immerse the thermostat in the water contained in a beaker, as shown in the illustration. Note that the immersed thermostat is in suspension. Heat the water ③ by placing the beaker on a stove ④ and observe the rising temperature on a thermometer ⑤.
- Read the thermometer just when opening the thermostat. This reading, which is the temperature level at which the thermostat valve begins to open, should satisfy the standard value.

### **DATA** Thermostat valve opening temperature

**Standard: Approx. 82 °C (180 °F)**

- Keep on heating the water to raise its temperature.
- Just when the water temperature reaches specified value, the thermostat valve should have lifted by at least 8.0 mm (0.31 in).

### **DATA** Thermostat valve lift <sup>Ⓐ</sup>

**Standard: 8.0 mm and over at 95 °C  
(0.31 in and over at 203 °F)**

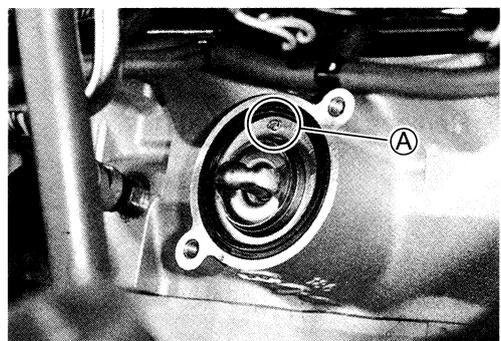
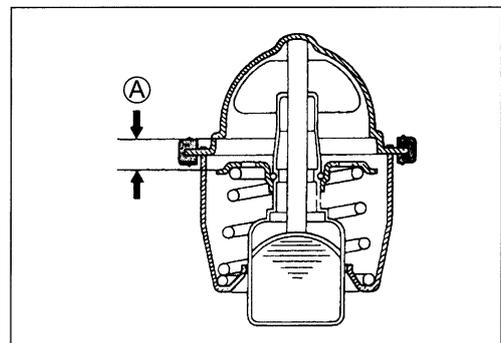
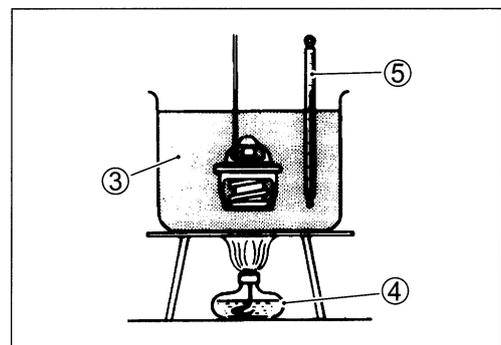
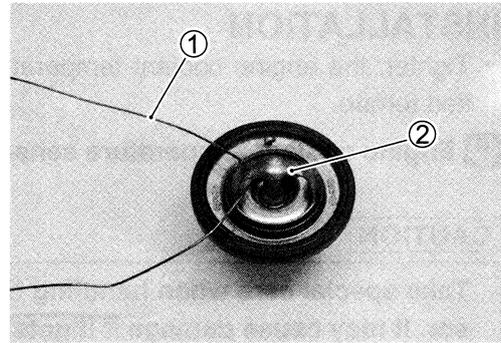
- A thermostat failing to satisfy either of the two requirements (start-to-open temperature and valve lift) must be replaced.

## INSTALLATION

- Install the thermostat.

### NOTE:

The jiggle valve <sup>Ⓐ</sup> of the thermostat faces upside.



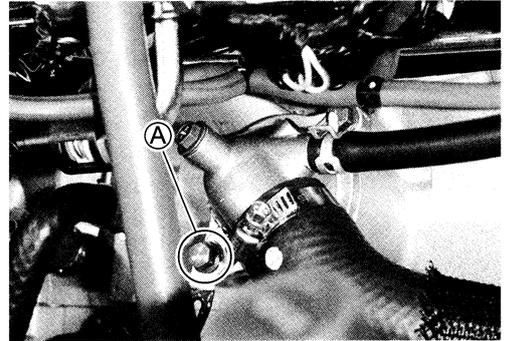
- Install the thermostat case.

**NOTE:**

Fit the clamp to the thermostat case bolt (A).

- Tighten the thermostat cover bolt to the specified torque.

 **Thermostat cover bolt: 10 N·m (1.0 kgf·m 7.0 lb·ft)**



- Install the fuel tank. (☞ 5-5)
- Install the front seat.

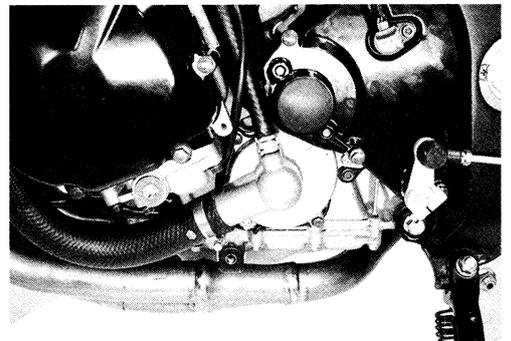
## WATER PUMP

### REMOVAL AND DISASSEMBLY

- Remove the under cowling. (☞ 8-3)
- Drain the engine coolant. (☞ 2-19)
- Drain the engine oil. (☞ 2-13)

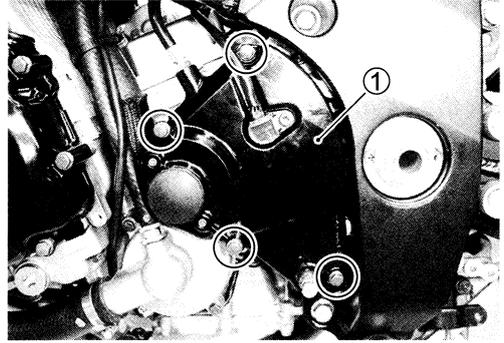
**NOTE:**

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. (☞ 7-3)

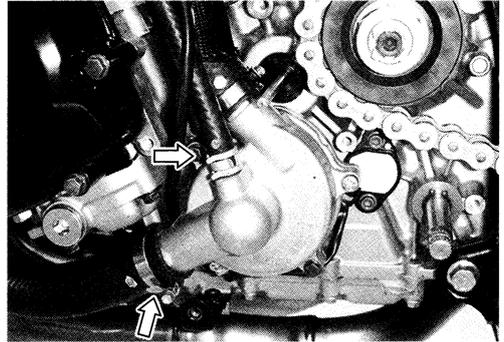


## 7-12 COOLING AND LUBRICATION SYSTEM

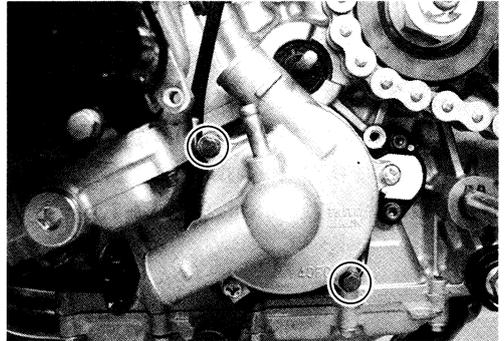
- Remove the gearshift lever.
- Remove the engine sprocket cover ①.



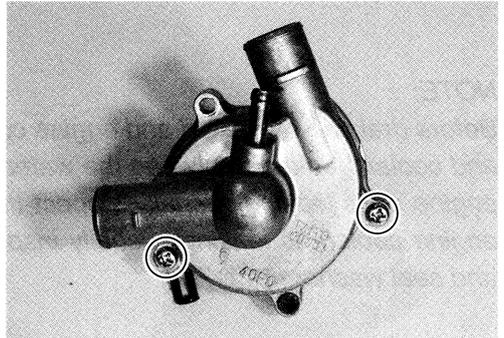
- Disconnect the water hoses.



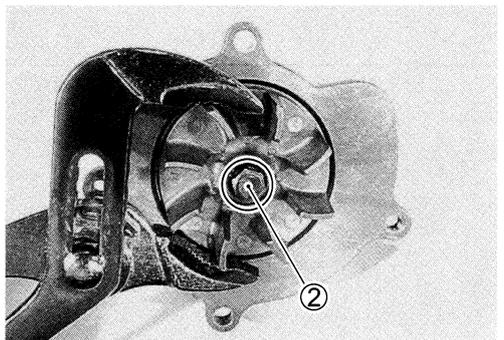
- Remove the water pump.



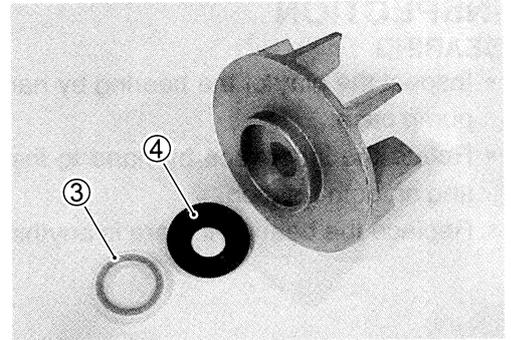
- Remove the water pump cover.



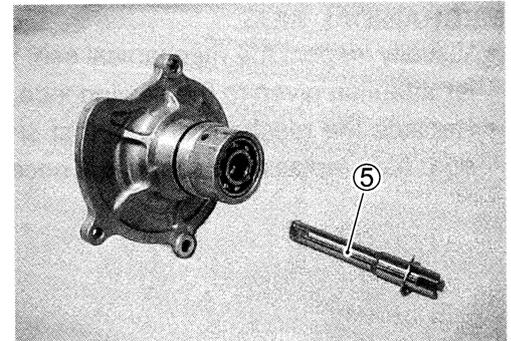
- Remove the impeller securing bolt ② by holding the impeller shaft with a water pump pliers.



- Remove the mechanical seal ring ③ and the rubber seal ④ from the impeller.



- Remove the impeller shaft ⑤.



- Remove the bearings with the special tool.

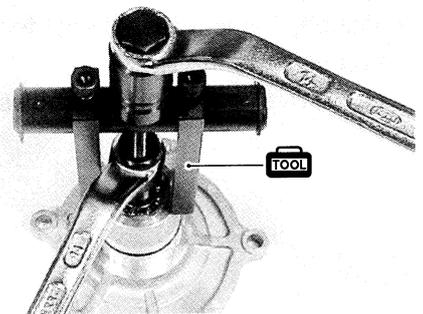
**TOOL** 09921-20240: Bearing remover set

**NOTE:**

*If there is no abnormal noise condition, bearing removal is not necessary.*

**CAUTION**

**The removed bearing must be replaced with a new one.**



- Remove the mechanical seal with the special tool.

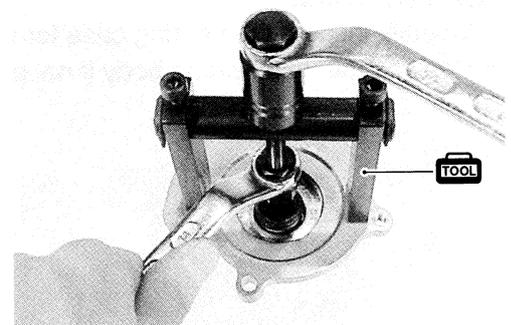
**TOOL** 09921-20240: Bearing remover set

**NOTE:**

*If there is no abnormal condition, the mechanical seal removal is not necessary.*

**CAUTION**

**The removed mechanical seal must be replaced with a new one.**



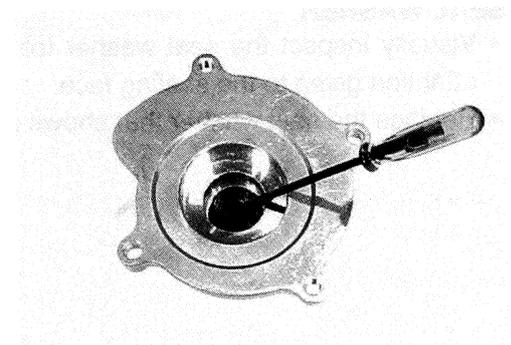
- Remove the oil seal using a suitable bar.

**NOTE:**

*If no abnormal, the oil seal removal is not necessary.*

**CAUTION**

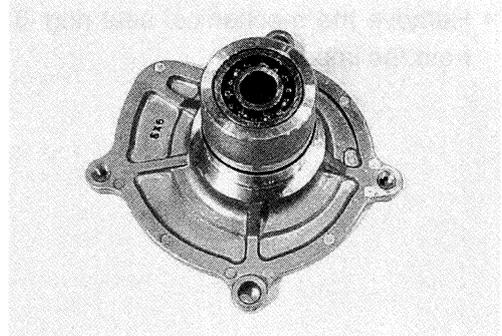
**The removed oil seal must be replaced with a new one.**



## INSPECTION

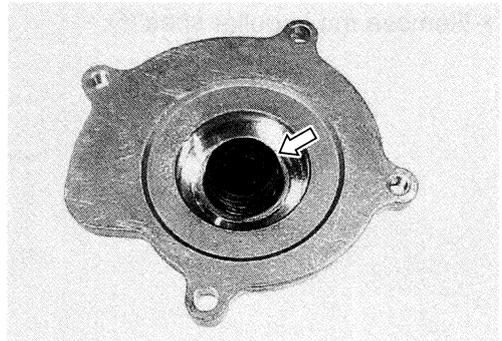
### BEARING

- 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.



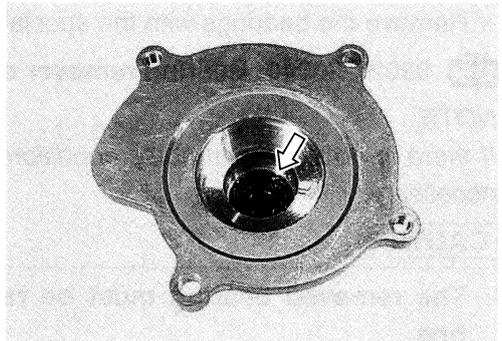
### MECHANICAL SEAL

- 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.



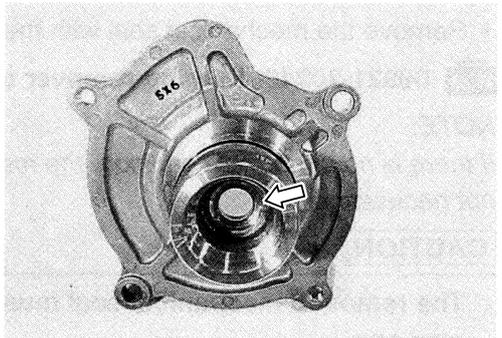
### OIL SEAL

- Visually inspect the oil seal for damage, with particular attention given to the lip.
- Replace the oil seal that shows indications of leakage.



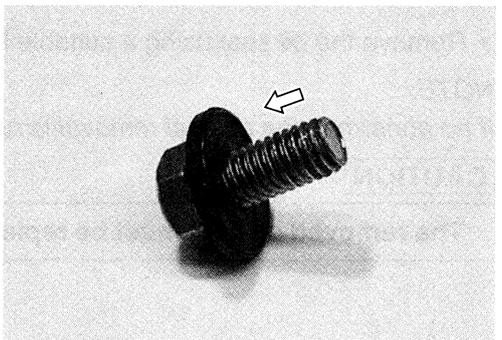
### BEARING CASE

- Visually inspect the bearing case 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 with 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 to the oil seal lip.

 **99000-25030: SUZUKI SUPER GREASE "A" (USA)**  
**99000-25010: SUZUKI SUPER GREASE "A" (Others)**

- Install the new mechanical seal using a suitable size socket wrench.

**NOTE:**

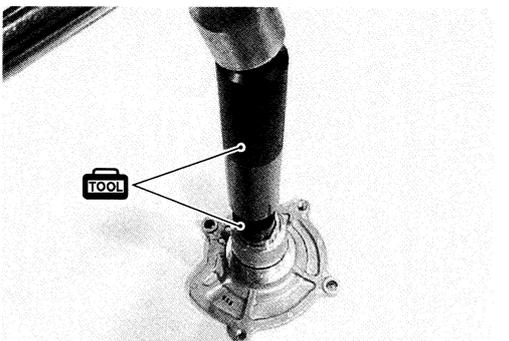
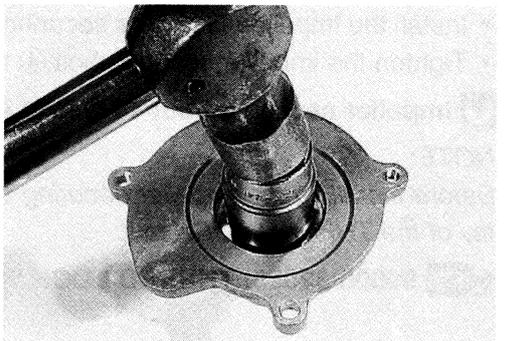
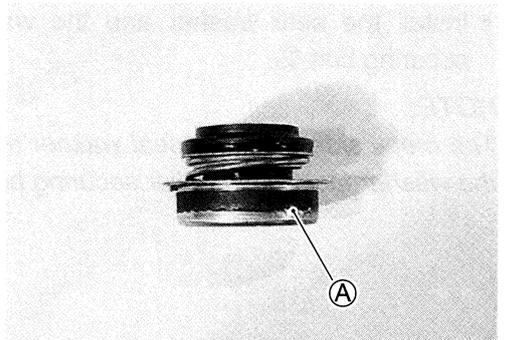
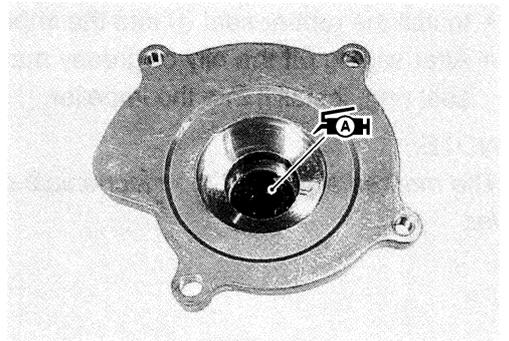
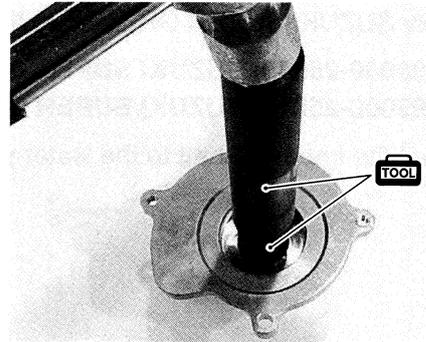
*On the new mechanical seal, the sealer  has been applied.*

- Install the new bearings with the special tool.

 **09913-70210: Bearing installer set**

**NOTE:**

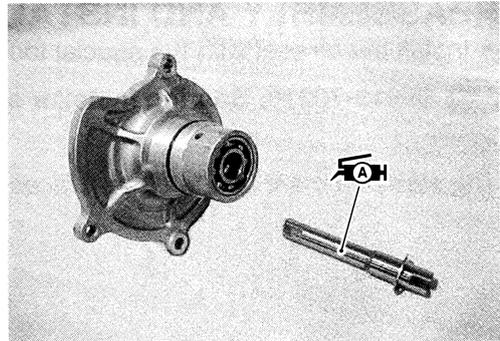
*The stamped mark on the bearing faces crankcase side.*



- Apply SUZUKI SUPER GREASE to the impeller shaft.

 **99000-25030: SUZUKI SUPER GREASE "A" (USA)**  
**99000-25010: SUZUKI SUPER GREASE "A" (Others)**

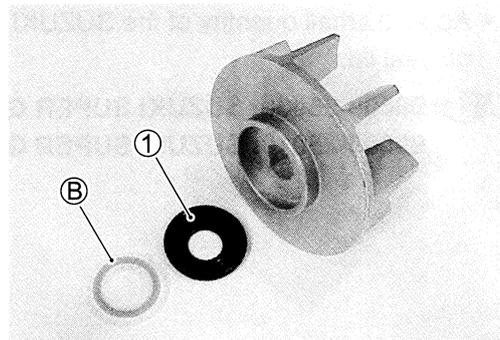
- Install the impeller shaft to the water pump body.



- 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:**

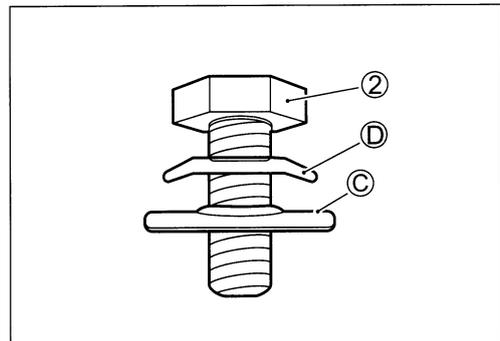
The marked side **Ⓑ** of the mechanical seal ring faces the impeller.



- Install the seal washer and the washer onto the impeller securing bolt ②.

**NOTE:**

The metal side **Ⓒ** of the seal washer and the curved side **Ⓓ** of the washer face the impeller securing bolt head.



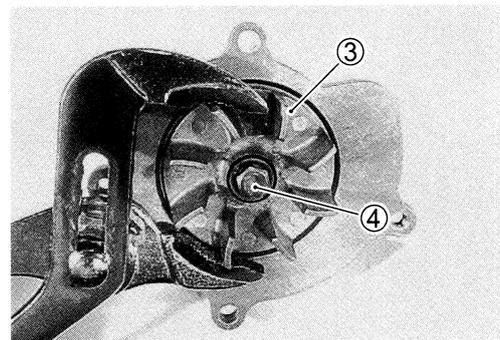
- Install the impeller ③ and its securing bolt ④ onto the shaft.
- Tighten the impeller securing bolt ④ to the specified torque.

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

**NOTE:**

Before installing the impeller securing bolt, apply a small quantity of the **THREAD LOCK** to it.

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



- Install the new O-rings, ⑤ and ⑥.

**CAUTION**

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

**NOTE:**

- \* Apply engine coolant to the O-ring ⑤.
- \* Apply SUZUKI SUPER GREASE to the O-ring ⑥.

-  **99000-25030: SUZUKI SUPER GREASE "A" (USA)**  
**99000-25010: SUZUKI SUPER GREASE "A" (Others)**

- Tighten the water pump cover screws to the specified torque.

-  **Water pump cover screw: 5 N·m (0.5 kgf-m, 3.7 lb-ft)**

**NOTE:**

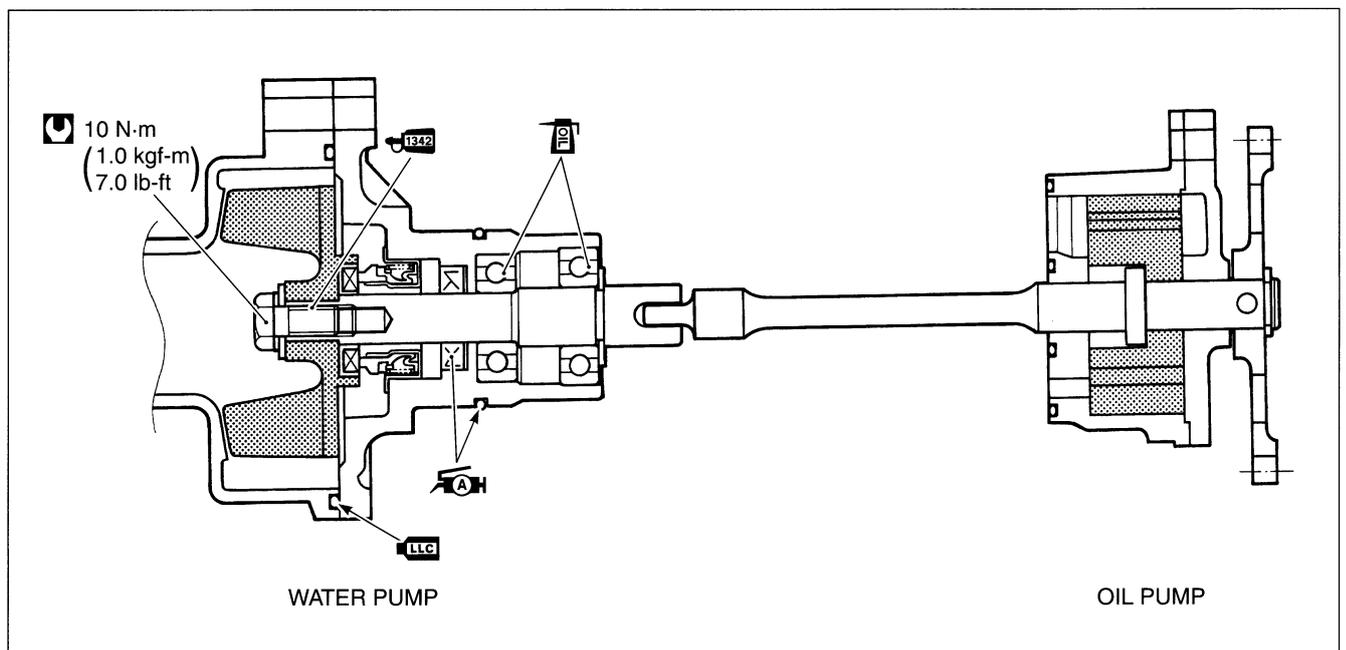
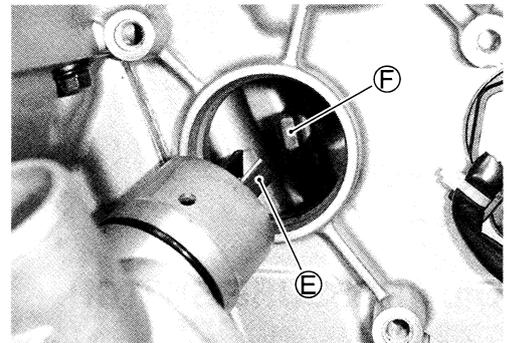
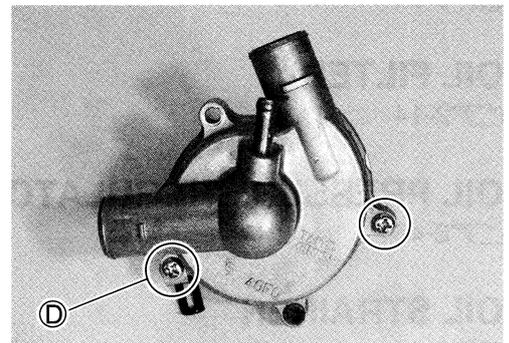
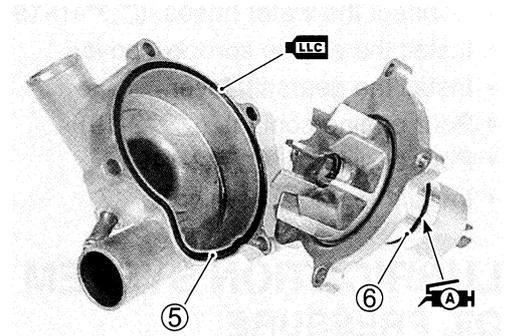
Fit the clamp to the water pump cover screw ④.

- Install the water pump and tighten its mounting bolts 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 ⑤ to the oil pump shaft ⑥ as shown.



- Connect the water hoses. (🔧 10-19)
- Install the engine sprocket cover.
- Install the gearshift lever.
- Pour engine coolant. (🔧 2-19)
- Pour engine oil. (🔧 2-14)
- Install the under cowling.

## LUBRICATION SYSTEM

### OIL PRESSURE

🔧 2-34

### OIL FILTER

🔧 2-14

### OIL PRESSURE REGULATOR

🔧 3-46

### OIL STRAINER

🔧 3-46

### OIL JET

🔧 3-57

### OIL PUMP

🔧 3-44

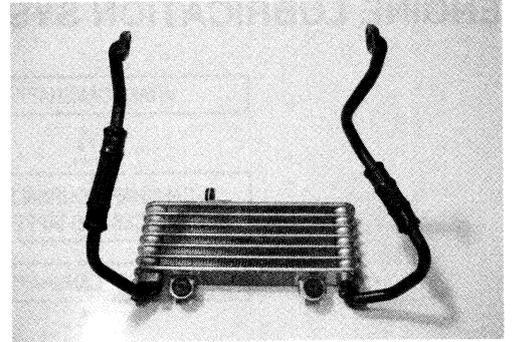
### OIL PRESSURE SWITCH

🔧 9-29

## OIL COOLER

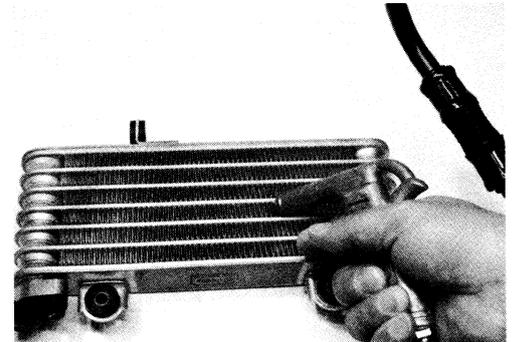
### REMOVAL

- Remove the under cowling. (☞ 8-3)
- Drain the engine oil. (☞ 2-13)
- Remove the oil cooler. (☞ 3-4)

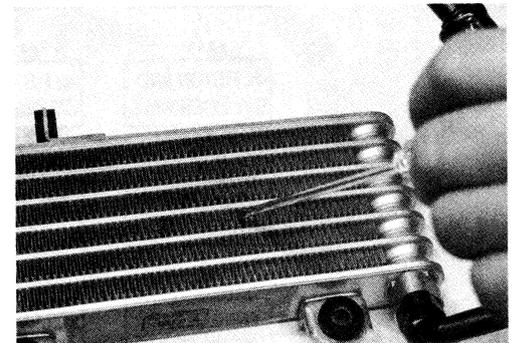


### INSPECTION AND CLEANING

- 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.



### INSTALLATION

- Install a new O-ring ①.

#### CAUTION

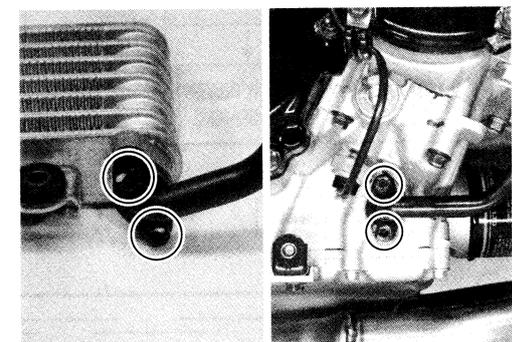
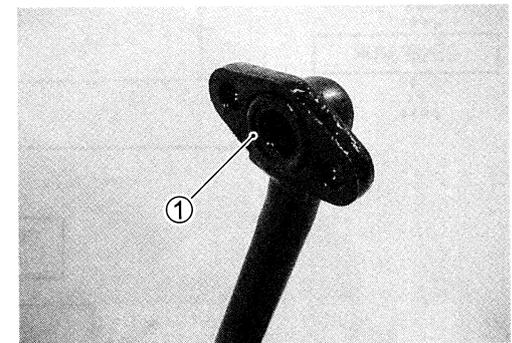
Use the new O-rings to prevent engine oil leakage.

#### NOTE:

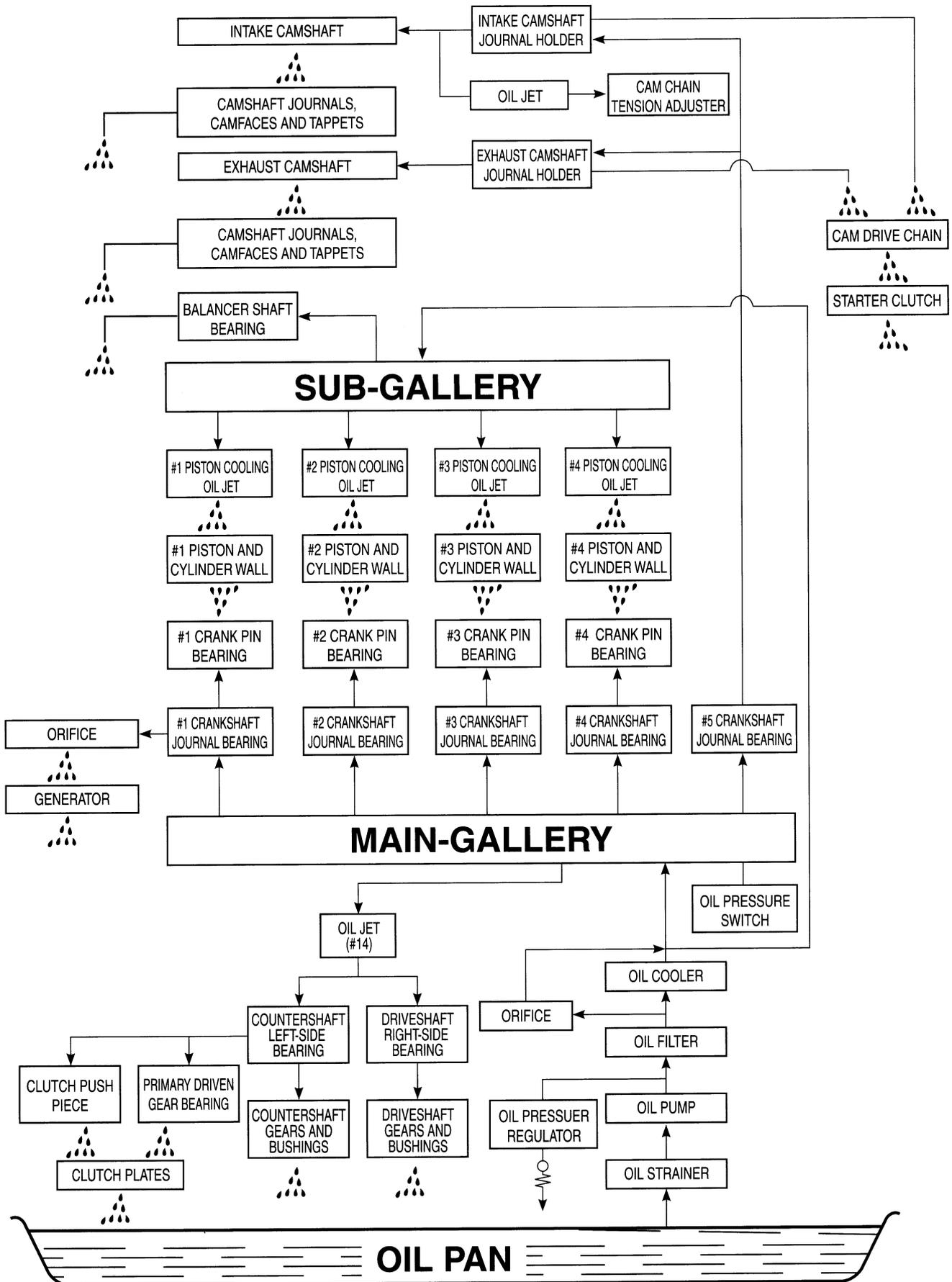
Apply engine oil to the O-ring ①.

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

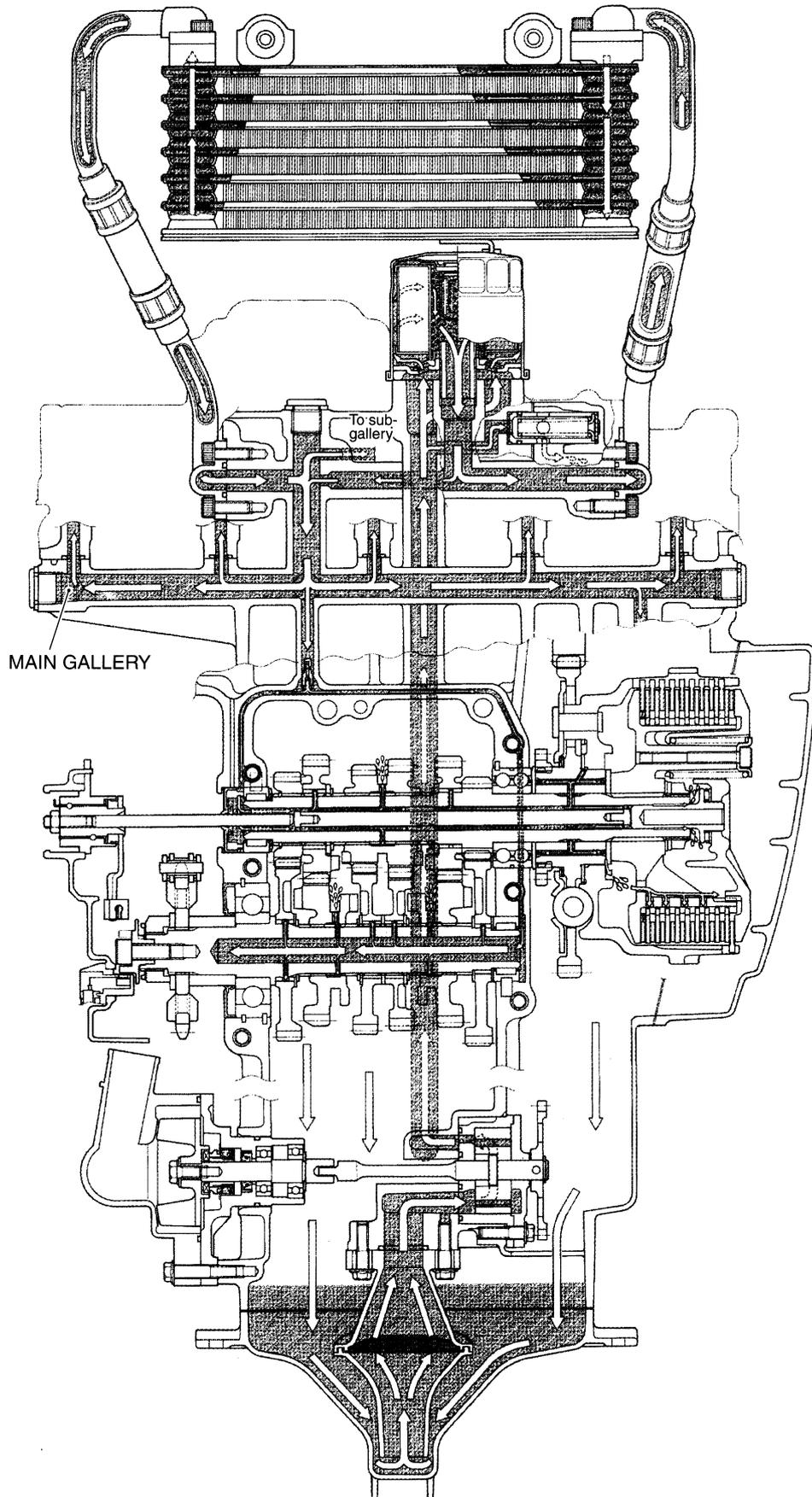
**🔧 Oil cooler hose bolt: 10 N·m (1.0 kgf·m, 7.0 lb·ft)**

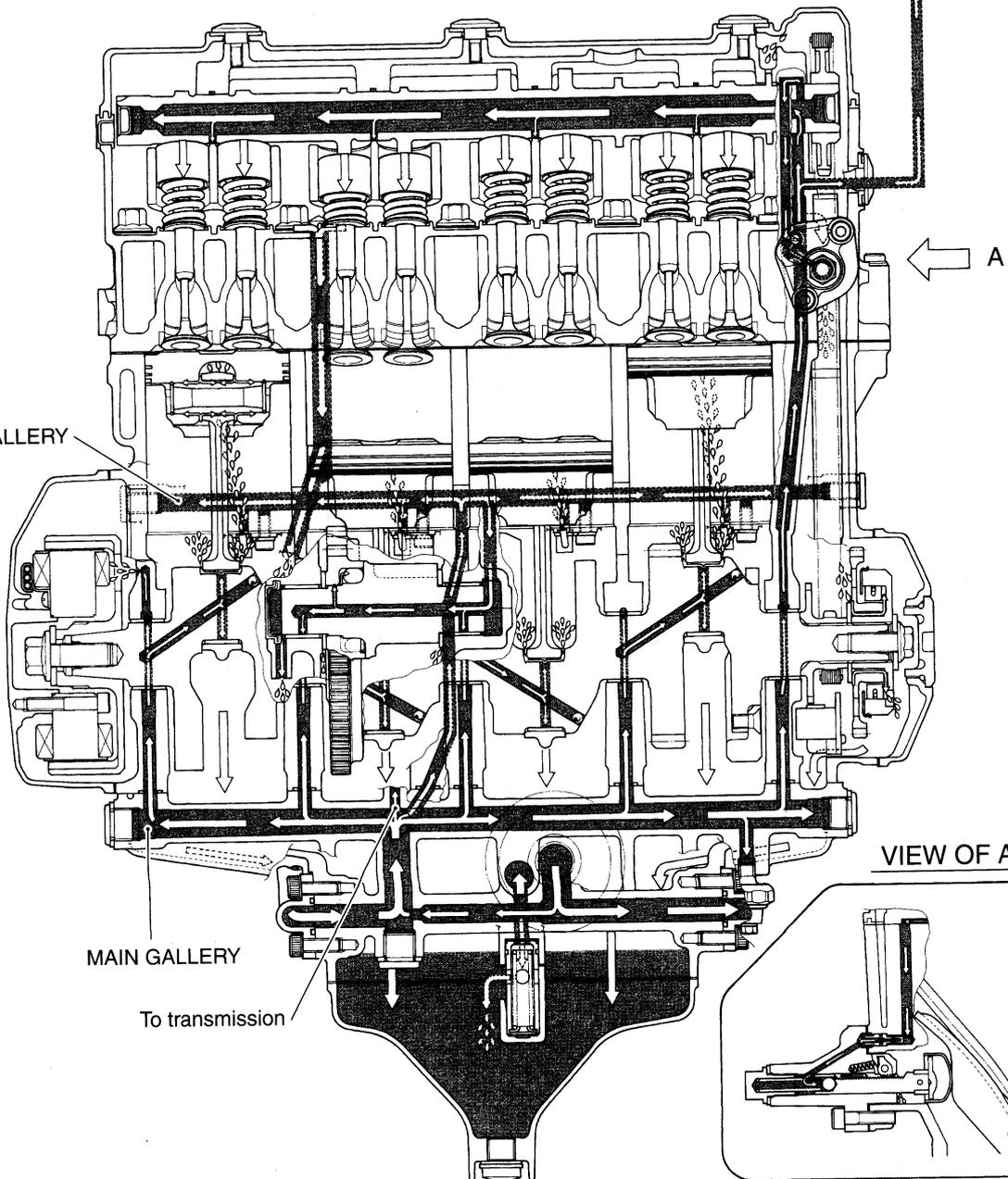
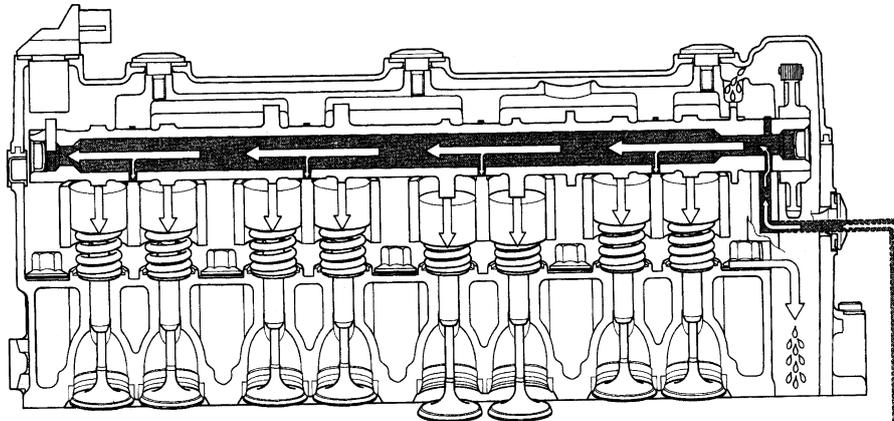


### ENGINE LUBRICATION SYSTEM CHART

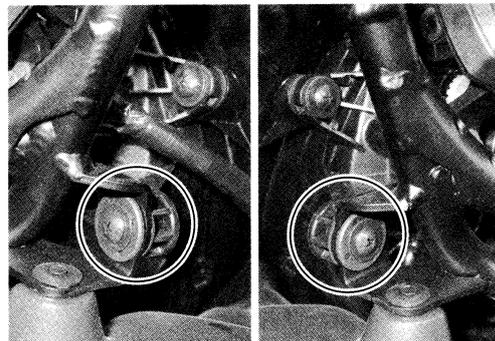


# ENGINE LUBRICATION SYSTEM





- Remove the screws.



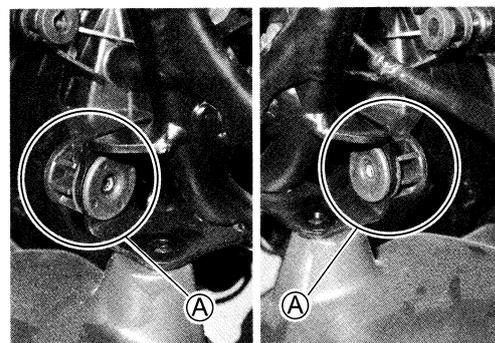
- Disconnect the coupler and clamp.
- Remove the body cowling.



## REMountING

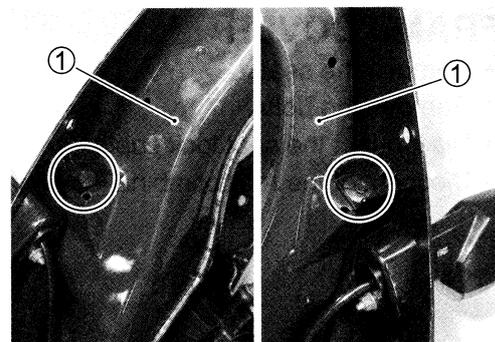
### NOTE:

When remounting the body cowling, install the hooks **(A)** to the cowling brace holes.



## RIGHT AND LEFT AIR INTAKE PIPES

- Remove the body cowling. (☞ 8-4)
- Remove the fastener.
- Remove the air intake pipes **(1)**.



## COWLING BRACE

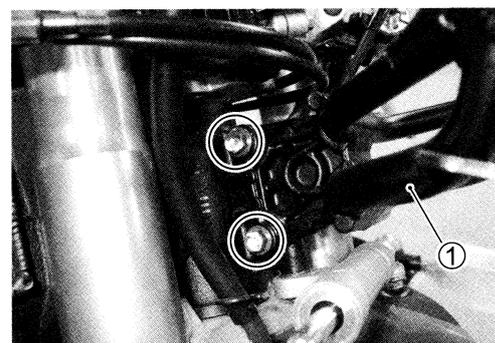
### REMOVAL

- Remove the body cowling. (☞ 8-4)
- Remove the cowling brace **(1)**.

### REMountING

- Tighten the cowling brace bolt.

 Cowling brace bolt: 23 N·m (2.3 kgf-m, 16.5 lb-ft)



# CHASSIS

## CONTENTS

<b>EXTERIOR PARTS .....</b>	<b>8- 2</b>
<b>FASTENER REMOVAL AND REINSTALLATION .....</b>	<b>8- 2</b>
<b>SCREEN.....</b>	<b>8- 3</b>
<b>BODY COWLING COVER AND LOWER BRACKET COVER .....</b>	<b>8- 3</b>
<b>RIGHT AND LEFT UNDER COWLINGS .....</b>	<b>8- 3</b>
<b>BODY COWLING.....</b>	<b>8- 4</b>
<b>RIGHT AND LEFT AIR INTAKE PIPES .....</b>	<b>8- 5</b>
<b>COWLING BRACE .....</b>	<b>8- 5</b>
<b>FRONT SEAT.....</b>	<b>8- 6</b>
<b>REAR SEAT AND SEAT TAIL COVER.....</b>	<b>8- 6</b>
<b>FRAME COVER .....</b>	<b>8- 6</b>
<b>FRONT WHEEL.....</b>	<b>8- 7</b>
<b>CONSTRUCTION.....</b>	<b>8- 7</b>
<b>REMOVAL.....</b>	<b>8- 8</b>
<b>INSPECTION AND DISASSEMBLY.....</b>	<b>8- 8</b>
<b>REASSEMBLY AND REMOUNTING .....</b>	<b>8-10</b>
<b>FRONT FORK .....</b>	<b>8-13</b>
<b>CONSTRUCTION.....</b>	<b>8-13</b>
<b>REMOVAL AND DISASSEMBLY.....</b>	<b>8-14</b>
<b>INSPECTION.....</b>	<b>8-16</b>
<b>REASSEMBLY AND REMOUNTING .....</b>	<b>8-18</b>
<b>SUSPENSION SETTING .....</b>	<b>8-22</b>
<b>STEERING DAMPER .....</b>	<b>8-23</b>
<b>CONSTRUCTION.....</b>	<b>8-23</b>
<b>REMOVAL.....</b>	<b>8-23</b>
<b>INSPECTION.....</b>	<b>8-23</b>
<b>REMOUNTING .....</b>	<b>8-23</b>
<b>STEERING.....</b>	<b>8-24</b>
<b>CONSTRUCTION.....</b>	<b>8-24</b>
<b>REMOVAL AND DISASSEMBLY .....</b>	<b>8-24</b>
<b>INSPECTION AND DISASSEMBLY.....</b>	<b>8-26</b>
<b>REASSEMBLY AND REMOUNTING .....</b>	<b>8-26</b>
<b>STEERING TENSION ADJUSTMENT.....</b>	<b>8-29</b>
<b>HANDLEBAR .....</b>	<b>8-30</b>
<b>CONSTRUCTION.....</b>	<b>8-30</b>
<b>REMOVAL AND DISASSEMBLY.....</b>	<b>8-30</b>
<b>REASSEMBLY AND REMOUNTING .....</b>	<b>8-31</b>
<b>REAR WHEEL.....</b>	<b>8-33</b>
<b>CONSTRUCTION.....</b>	<b>8-33</b>
<b>REMOVAL.....</b>	<b>8-34</b>
<b>INSPECTION AND DISASSEMBLY.....</b>	<b>8-35</b>
<b>REASSEMBLY AND REMOUNTING .....</b>	<b>8-37</b>
<b>REAR SHOCK ABSORBER .....</b>	<b>8-41</b>
<b>CONSTRUCTION.....</b>	<b>8-41</b>

REMOVAL .....	8-42
INSPECTION .....	8-42
REAR SHOCK ABSORBER DISPOSAL .....	8-43
REMOUNTING .....	8-44
SUSPENSION SETTING .....	8-44
<b>REAR SUSPENSION .....</b>	<b>8-45</b>
<b>CONSTRUCTION .....</b>	<b>8-45</b>
REMOVAL .....	8-46
INSPECTION AND DISASSEMBLY .....	8-48
REASSEMBLY .....	8-51
REMOUNTING .....	8-53
FINAL INSPECTION AND ADJUSTMENT .....	8-54
<b>FRONT BRAKE .....</b>	<b>8-55</b>
<b>CONSTRUCTION .....</b>	<b>8-55</b>
BRAKE PAD REPLACEMENT .....	8-56
BRAKE FLUID REPLACEMENT .....	8-56
CALIPER REMOVAL AND DISASSEMBLY .....	8-57
CALIPER INSPECTION .....	8-58
CALIPER REASSEMBLY AND REMOUNTING .....	8-58
BRAKE DISC INSPECTION .....	8-60
MASTER CYLINDER REMOVAL AND DISASSEMBLY .....	8-61
MASTER CYLINDER INSPECTION .....	8-62
MASTER CYLINDER REASSEMBLY AND REMOUNTING .....	8-62
<b>REAR BRAKE .....</b>	<b>8-64</b>
<b>CONSTRUCTION .....</b>	<b>8-64</b>
BRAKE PAD REPLACEMENT .....	8-65
BRAKE FLUID REPLACEMENT .....	8-65
CALIPER REMOVAL AND DISASSEMBLY .....	8-66
CALIPER INSPECTION .....	8-67
CALIPER REASSEMBLY AND REMOUNTING .....	8-67
MASTER CYLINDER REMOVAL AND .....	8-68
DISASSEMBLY .....	8-68
MASTER CYLINDER INSPECTION .....	8-69
MASTER CYLINDER REASSEMBLY AND REMOUNTING .....	8-69
<b>TIRE AND WHEEL .....</b>	<b>8-70</b>
TIRE REMOVAL .....	8-70
INSPECTION .....	8-70
VALVE INSPECTION .....	8-71
TIRE INSTALLATION .....	8-72
BALANCER WEIGHT INSTALLATION .....	8-73
<b>DRIVE CHAIN .....</b>	<b>8-74</b>
DRIVE CHAIN CUTTING .....	8-74
DRIVE CHAIN CONNECTING .....	8-75

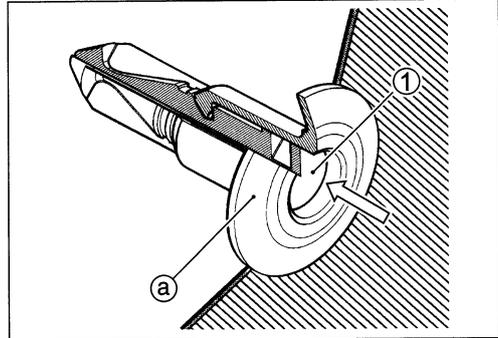
## EXTERIOR PARTS

### FASTENER REMOVAL AND REINSTALLATION

#### FASTENER

##### Removal

- Depress the head of fastener center piece ①.
- Pull out the fastener ②.

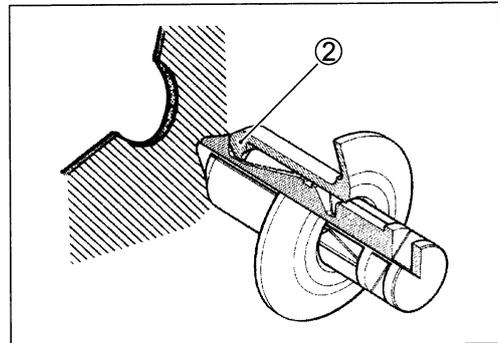


##### Installation

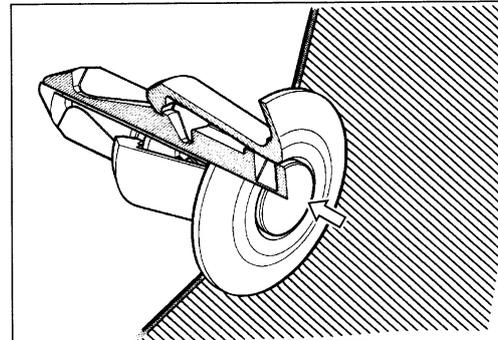
- Let the center piece stick out toward the head so that the pawls ② close.
- Insert the fastener into the installation hole.

##### 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.



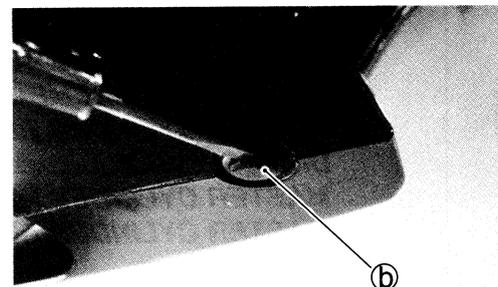
#### FASTENER

##### Removal

- Pull the head of fastener center piece
- Pull out the fastener ③.

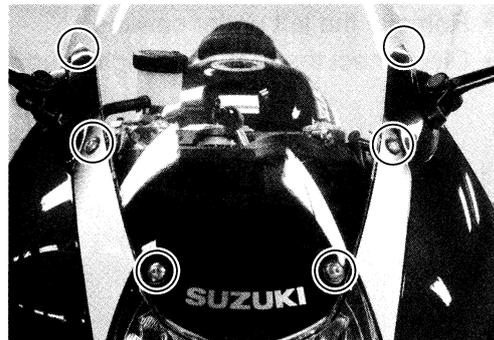
##### Installation

- 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.



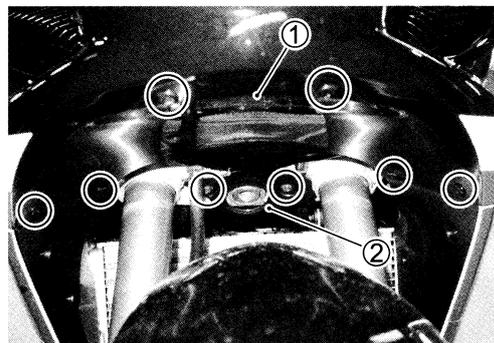
## SCREEN

- Remove the bolts and nuts.
- Remove the screen.



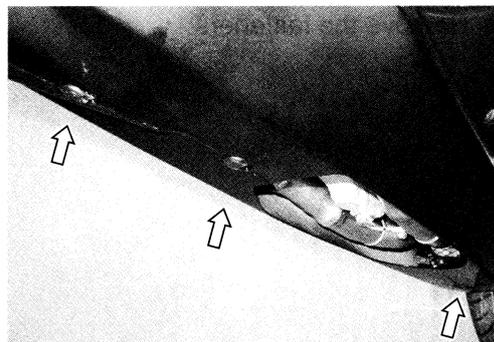
## BODY COWLING COVER AND LOWER BRACKET COVER

- Remove the body cowling cover ① by removing the fasteners.
- Remove the lower bracket cover ② by removing the bolts.



## RIGHT AND LEFT UNDER COWLINGS

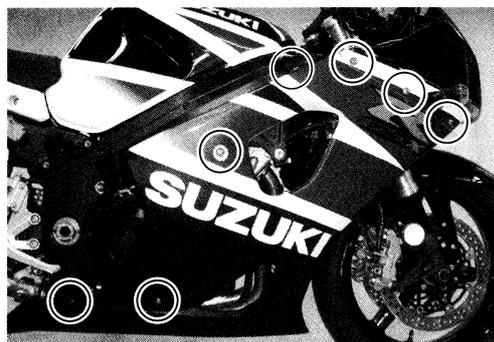
- Remove the fastener.



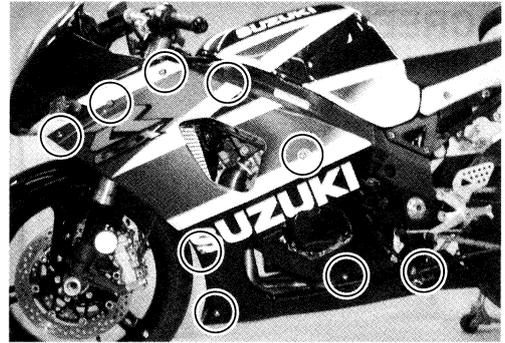
- Remove the fastener.



- Remove the right under cowling.
- Disconnect the turn signal light lead wire coupler.

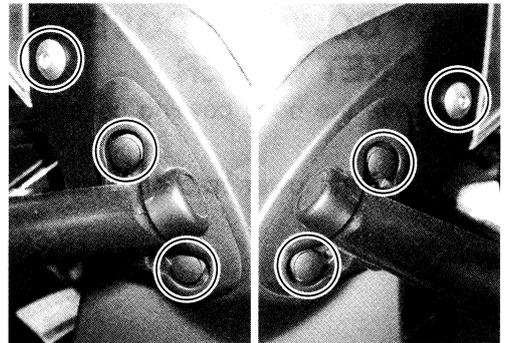


- Remove the left under cowling.
- Disconnect the turn signal light lead wire coupler.

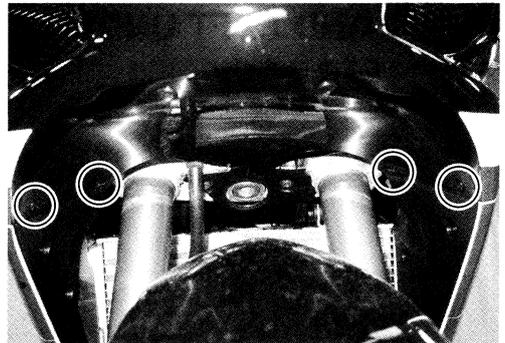


## BODY COWLING REMOVAL

- Remove the rear view mirrors and bolts.



- Remove the fasteners.



- Remove the bolts.



