

SUZUKI

GSX1400

SERVICE MANUAL



99500-39222-01E

FOREWORD

This manual contains an introductory description on the SUZUKI GSX1400 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.

GROUP INDEX

GENERAL INFORMATION

1

PERIODIC MAINTENANCE

2

ENGINE

3

FI SYSTEM

4

**OIL COOLING AND
LUBRICATION SYSTEM**

5

CHASSIS

6

ELECTRICAL SYSTEM

7

SERVICING INFORMATION

8

GSX1400K3 ('03-MODEL)

9

GSX1400K4 ('04-MODEL)

10

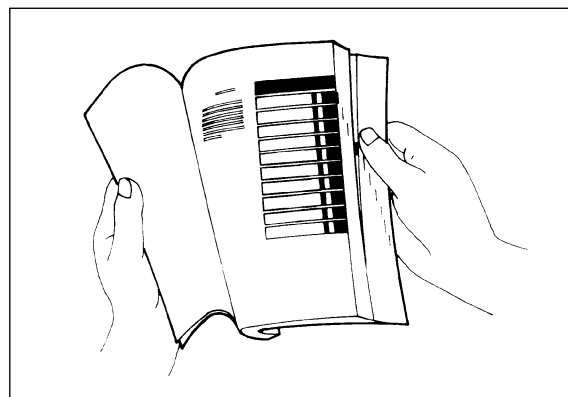
GSX1400K5/UDK5 ('05-MODEL)

11

SUZUKI MOTOR CORPORATION

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

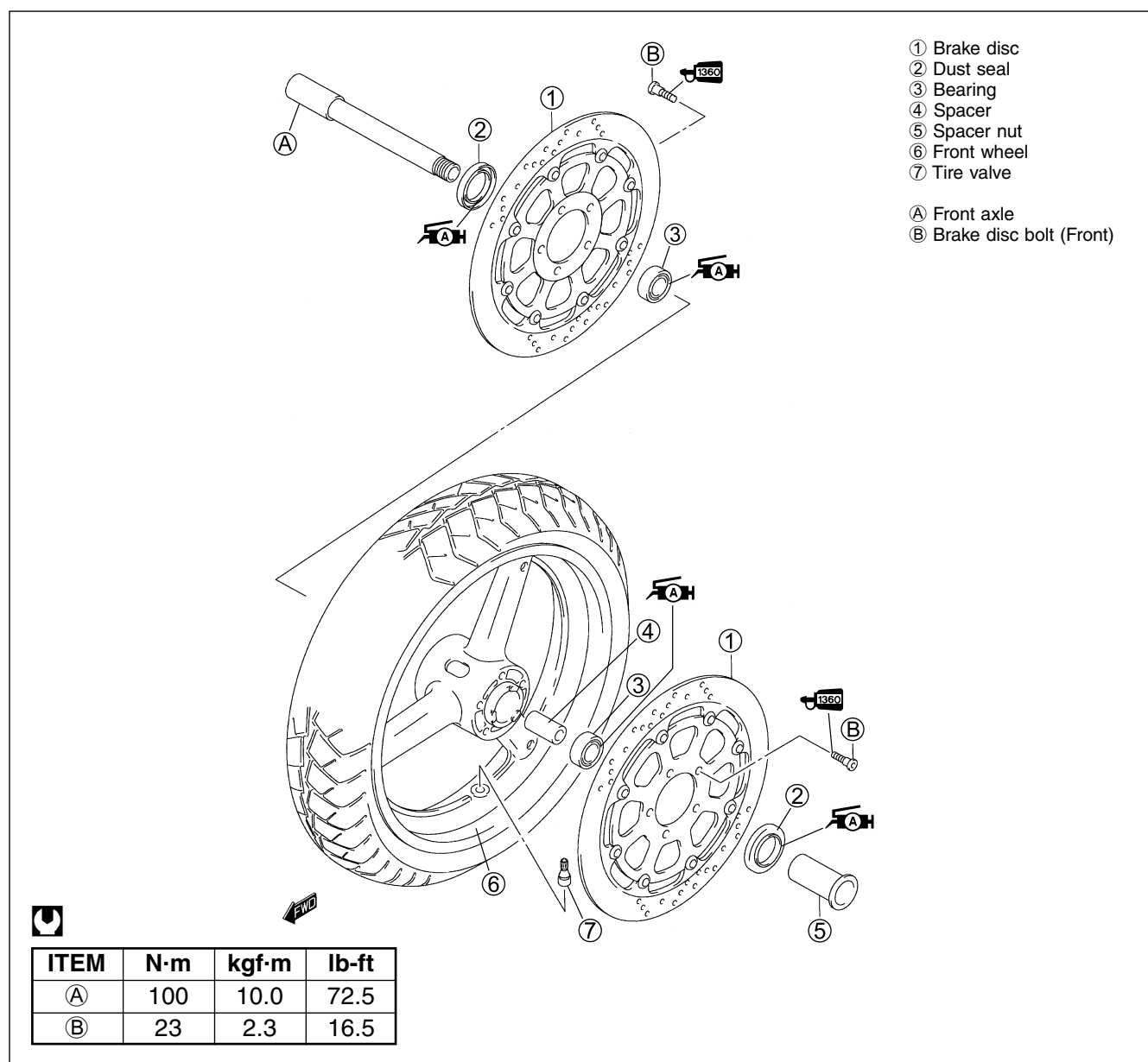
1. The text of this manual is divided into sections.
2. The section titles are listed in the GROUP INDEX.
3. Holding the manual as shown at the right will allow you to find the first page of the section easily.
4. The contents are listed on the first page of each section to help find the item and page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



COMPONENT PARTS AND WORK TO BE DONE













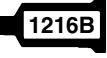






Under the name of each system or unit, is its exploded view. Work instructions and other service information such as the tightening torque, lubricating points and locking agent points, are provided.

Example: Front wheel



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 fork oil. 99000-99044-L01 |
|  | Apply molybdenum oil solution. (Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1:1) |  | Apply or use brake fluid. |
|  | Apply SUZUKI SUPER GREASE "A". 99000-25010 |  | Measure in voltage range. |
|  | Apply SUZUKI MOLY PASTE. 99000-25140 |  | Measure in current range. |
|  | Apply SUZUKI BOND "1207B". 99000-31140 |  | Measure in diode test range. |
|  | Apply SUZUKI BOND "1216B". 99000-31230 |  | Measure in continuity test range. |
|  | Apply THREAD LOCK SUPER "1303". 99000-32030 |  | Use special tool. |
|  | Apply THREAD LOCK SUPER "1322". 99000-32110 |  | Indication of service data. |
|  | Apply THREAD LOCK "1342". 99000-32050 | | |

ABBREVIATIONS MAY BE USED IN THIS MANUAL

A

| | |
|--------------|---|
| ABDC | : After Bottom Dead Center |
| AC | : Alternating Current |
| ACL | : Air Cleaner, Air Cleaner Box |
| API | : American Petroleum Institute |
| ATDC | : After Top Dead Center |
| ATM Pressure | : Atmospheric Pressure Atmospheric Pressure Sensor (APS, 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) |
| EOT Sensor | : Engine Oil Temperature Sensor (EOTS), Oil Temp. Sensor (OTS) |
| EVAP | : Evaporative Emission |
| EVAP Canister | : Evaporative Emission Canister (Canister) |

F

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

G

| | |
|-----------|------------------------|
| GEN | : Generator |
| GND | : 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) |

GENERAL INFORMATION

CONTENTS

| | |
|--|-------------|
| WARNING/CAUTION/NOTE | 1- 2 |
| GENERAL PRECAUTIONS | 1- 2 |
| SUZUKI GSX1400K2 (2002-MODEL) | 1- 4 |
| SERIAL NUMBER LOCATION | 1- 4 |
| FUEL AND OIL RECOMMENDATION | 1- 5 |
| FUEL | 1- 5 |
| ENGINE OIL | 1- 5 |
| BRAKE FLUID | 1- 5 |
| FRONT FORK OIL | 1- 5 |
| BREAK-IN PROCEDURES | 1- 6 |
| CYLINDER IDENTIFICATION | 1- 6 |
| INFORMATION LABELS | 1- 7 |
| SPECIFICATIONS | 1- 8 |
| COUNTRY AND AREA CODES | 1-10 |

WARNING/CAUTION/NOTE

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

WARNING

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

CAUTION

Indicates a potential hazard that could result in motorcycle damage.

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

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

GENERAL PRECAUTIONS

WARNING

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

CAUTION

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

SUZUKI GSX1400K2 (2002-MODEL)



RIGHT SIDE

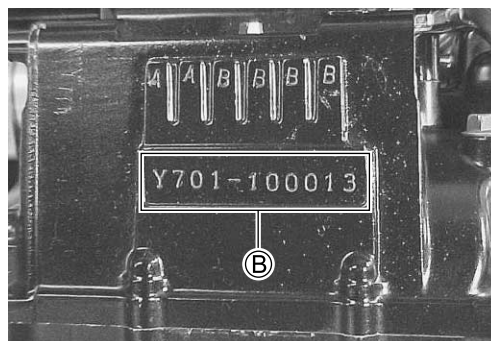
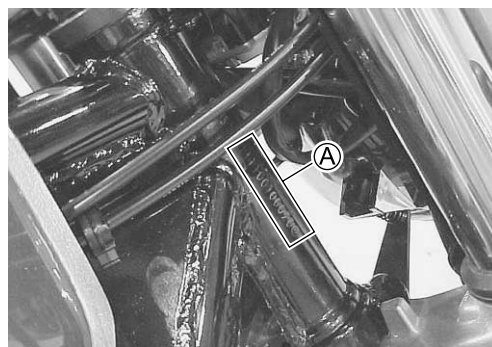


LEFT SIDE

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

SERIAL NUMBER LOCATION

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



FUEL AND OIL RECOMMENDATION

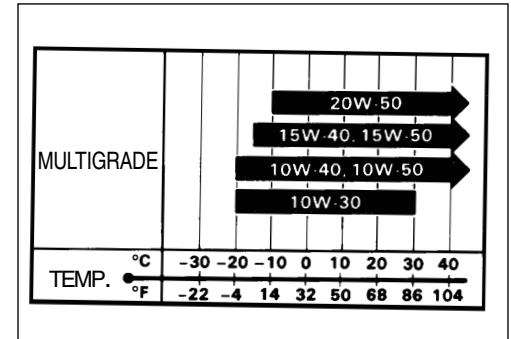
FUEL

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

ENGINE OIL

Use a premium quality 4-stroke motor oil to ensure longer service life of your motorcycle. Use only oils which are rated SF or SG under the API service classification.

The recommended viscosity is SAE 10W-40. If an SAE 10W-40 motor oil is not available, select an alternative according to the following chart.



BRAKE FLUID

Use DOT4 brake fluid.

⚠ WARNING

Since the brake system of this motorcycle is filled with a glycol-based brake fluid by the manufacturer, do not use or mix different types of fluid such as silicone-based and petroleum-based fluid for refilling the system, otherwise serious damage will result.

Do not use any brake fluid taken from old or used or unsealed containers.

Never re-use brake fluid left over from a previous servicing, which has been stored for a long period.

FRONT FORK OIL

Use fork oil L01 or an equivalent fork oil.

BREAK-IN PROCEDURES

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

- Keep to these break-in procedures:

Initial 800 km (500 miles): Below 4 500 r/min

Up to 1 600 km (1 000 miles): Below 6 700 r/min

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

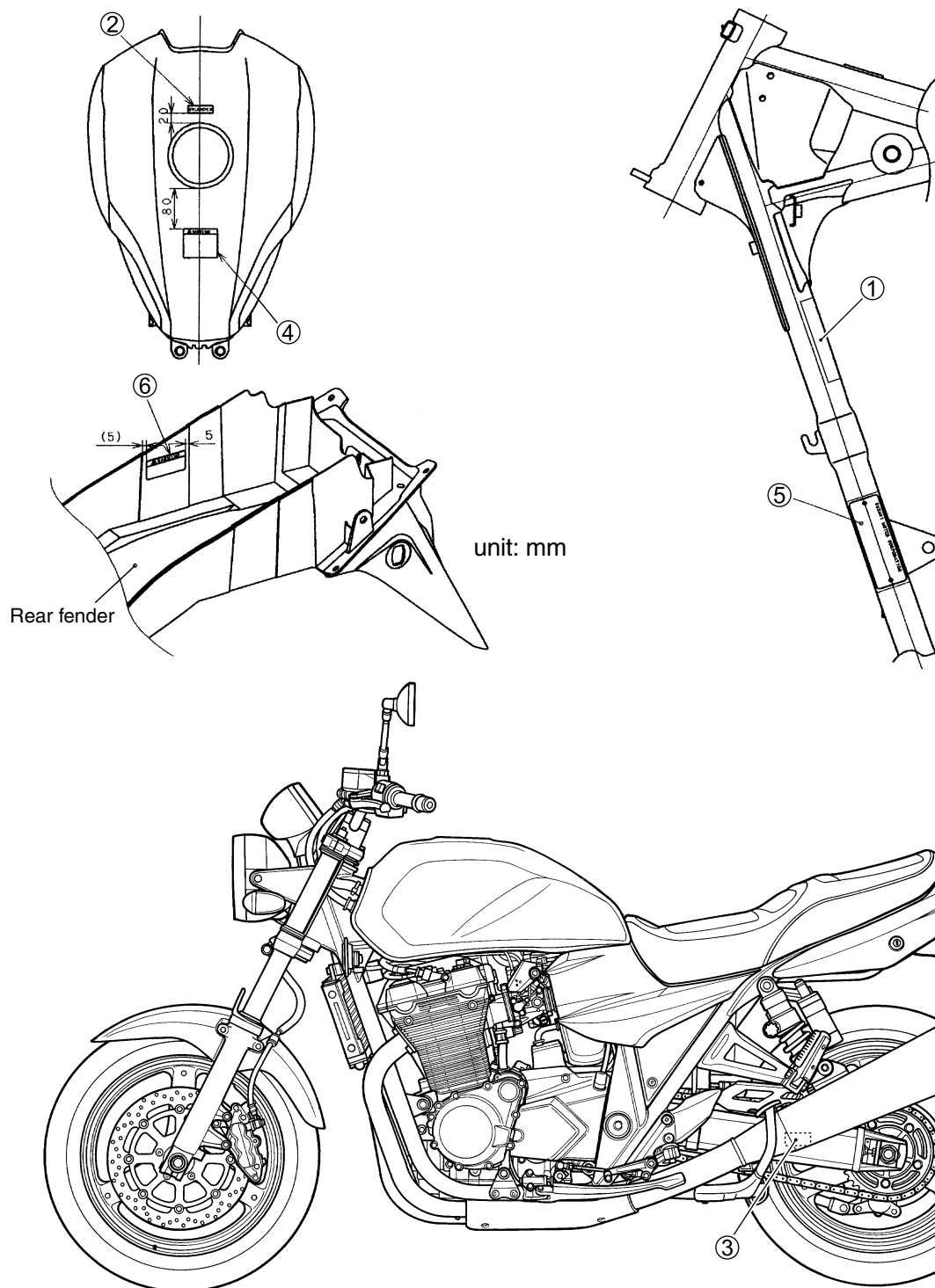
- Upon reaching an odometer reading of 1 600 km (1 000 miles) you can subject the motorcycle to full throttle operation. However, do not exceed 9 000 r/min at any time.

CYLINDER IDENTIFICATION

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

INFORMATION LABELS

| | GSX1400 | GSX1400UD |
|------------------------|--------------------|-----------|
| ① Noise label | ○ For E-24 | |
| ② Fuel caution label | ○ For E-02, 24 | |
| ③ Tire pressure label | ○ | ○ |
| ④ Warning safety label | ○ | ○ |
| ⑤ ID plate | ○ For E-02, 19, 24 | ○ |
| ⑥ Loading capacity | ○ | ○ |



SPECIFICATIONS

DIMENSIONS AND DRY MASS

| | |
|------------------------|--------------------|
| Overall length | 2 160 mm (85.0 in) |
| Overall width | 810 mm (31.9 in) |
| Overall height | 1 140 mm (44.9 in) |
| Wheelbase | 1 520 mm (59.8 in) |
| Ground clearance | 130 mm (5.1 in) |
| Seat height | 790 mm (31.1 in) |
| Dry mass | 228 kg (502 lbs) |

ENGINE

| | |
|---------------------------|---|
| Type | Four-stroke, air-cooled with SACS, DOHC |
| Number of cylinders | 4 |
| Bore | 81.0 mm (3.189 in) |
| Stroke | 68.0 mm (2.677 in) |
| Piston displacement | 1 402 cm ³ (85.5 cu. in) |
| Compression ratio | 9.5 : 1 |
| Fuel system | Fuel injection system |
| Air cleaner | Non-woven fabric element |
| Starter system | Electric |
| Lubrication system | Wet sump |
| Idle speed | 1 100 ± 100 r/min |

TRANSMISSION

| | |
|-------------------------------|-------------------------|
| Clutch | Wet multi-plate type |
| Transmission | 6-speed constant mesh |
| Gearshift pattern | 1-down, 5-up |
| Primary reduction ratio | 1.509 (83/55) |
| Gear ratios, Low | 2.916 (35/12) |
| 2nd | 1.937 (31/16) |
| 3rd | 1.526 (29/19) |
| 4th | 1.285 (27/21) |
| 5th | 1.136 (25/22) |
| Top | 1.000 (24/24) |
| Final reduction ratio | 2.277 (41/18) |
| Drive chain | RK GB50GSVZ3, 116 links |

CHASSIS

| | |
|-------------------------------|-------------------------------------|
| Front suspension | Telescopic, coil spring, oil damped |
| Rear suspension | Swingarm, coil spring, oil damped |
| Front suspension stroke | 130 mm (5.1 in) |
| Rear wheel travel | 123 mm (4.7 in) |
| Caster | 26° |
| Trail | 105 mm (4.1 in) |
| Steering angle | 37° (right and left) |
| Turning radius | 2.8 m (9.2 ft) |
| Front brake | Disc brake, twin |
| Rear brake | Disc brake |
| Front tire size | 120/70 ZR17 (58 W), tubeless |
| Rear tire size | 190/50 ZR17 (73 W), tubeless |

ELECTRICAL

| | |
|------------------------------------|--------------------------------------|
| Ignition type | Electronic ignition (Transistorized) |
| Ignition timing | 7° B.T.D.C. at 1 100 r/min |
| Spark plug | NGK CR8EK DENSO U24ETR |
| Battery | 12 V 43.2 kC (12 Ah)/10 HR |
| Generator | Three-phase A.C. generator |
| Main fuse | 30 A |
| Fuse | 10/10/15/15/10/10 A |
| Headlight | 12 V 60/55 W (H4) |
| Position light | 12 V 5 W Except E-24 |
| Turn signal light | 12 V 21 W |
| Brake light/Taillight | 12 V 21/5 W × 2 |
| Speedometer light | LED |
| Tachometer light | LED |
| Turn signal indicator light | LED |
| Neutral indicator light | LED |
| High beam indicator light | LED |
| Oil pressure indicator light | LED |
| Fuel injection warning light | LED |

CAPACITIES

| | |
|------------------------------------|------------------------------|
| Fuel tank, including reserve | 22 L (5.8/4.8 US/Imp gal) |
| Engine oil, oil change | 4 200 ml (4.4/3.7 US/Imp qt) |
| with filter change | 4 800 ml (5.1/4.2 US/Imp qt) |
| overhaul | 5 700 ml (6.0/5.0 US/Imp qt) |
| Front fork oil (each leg) | 648 ml (21.9/22.8 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 |
|-----------|------|-----------------|
| GSX1400 | E-02 | U.K. |
| | E-19 | EU |
| | E-24 | Australia |
| GSX1400UD | E-19 | EU |

PERIODIC MAINTENANCE

2

CONTENTS

| | |
|---|-------------|
| PERIODIC MAINTENANCE SCHEDULE | 2- 2 |
| PERIODIC MAINTENANCE CHART | 2- 2 |
| LUBRICATION POINTS..... | 2- 3 |
| MAINTENANCE AND TUNE-UP PROCEDURES | 2- 4 |
| AIR CLEANER | 2- 4 |
| SPARK PLUG | 2- 5 |
| VALVE CLEARANCE..... | 2- 6 |
| ENGINE OIL AND OIL FILTER | 2-13 |
| FUEL HOSE | 2-14 |
| ENGINE IDLE SPEED | 2-14 |
| THROTTLE VALVE SYNCHRONIZATION..... | 2-15 |
| THROTTLE CABLE PLAY | 2-15 |
| CLUTCH..... | 2-16 |
| DRIVE CHAIN | 2-17 |
| BRAKE | 2-19 |
| TIRE | 2-22 |
| STEERING | 2-23 |
| FRONT FORK | 2-24 |
| REAR SUSPENSION..... | 2-24 |
| EXHAUST PIPE BOLT AND NUT | 2-24 |
| CHASSIS BOLT AND NUT..... | 2-25 |
| COMPRESSION PRESSURE CHECK | 2-27 |
| OIL PRESSURE CHECK | 2-28 |

PERIODIC MAINTENANCE SCHEDULE

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

NOTES:

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

PERIODIC MAINTENANCE CHART

| Item | Interval | km | 1 000 | 6 000 | 12 000 | 18 000 | 24 000 |
|---|----------|---|-------|-------|--------|--------|--------|
| | miles | 600 | 4 000 | 7 500 | 11 000 | 15 000 | |
| | months | 1 | 6 | 12 | 18 | 24 | |
| Air cleaner element | | - | I | I | R | I | |
| Spark plugs | | - | I | R | I | R | |
| Valve clearance | | - | - | - | - | I | |
| Engine oil | | R | R | R | R | R | |
| Engine oil filter | | R | - | - | R | - | |
| Fuel line | | - | I | I | I | I | |
| | | Replace fuel hose every 4 years. | | | | | |
| Idle speed | | I | I | I | I | I | |
| Throttle valve synchronization | | - | - | I | - | I | |
| PAIR (air supply) system | | - | - | I | - | I | |
| Throttle cable play | | I | I | I | I | I | |
| Clutch hose | | - | I | I | I | I | |
| | | Replace every 4 years. | | | | | |
| Clutch fluid | | - | I | I | I | I | |
| | | Replace every 2 years. | | | | | |
| Drive chain | | I | I | I | I | I | |
| | | Clean and lubricate every 1 000 km (600 miles). | | | | | |
| Brakes | | I | I | I | I | I | |
| Brake hoses | | - | I | I | I | I | |
| | | Replace every 4 years. | | | | | |
| Brake fluid | | - | I | I | I | I | |
| | | Replace every 2 years. | | | | | |
| Tires | | - | I | I | I | I | |
| Steering | | I | - | I | - | I | |
| Front forks | | - | - | I | - | I | |
| Rear suspension | | - | - | I | - | I | |
| Exhaust pipe bolts and muffler bolt and nut | | T | - | T | - | T | |
| Chassis bolts and nuts | | T | T | T | T | T | |

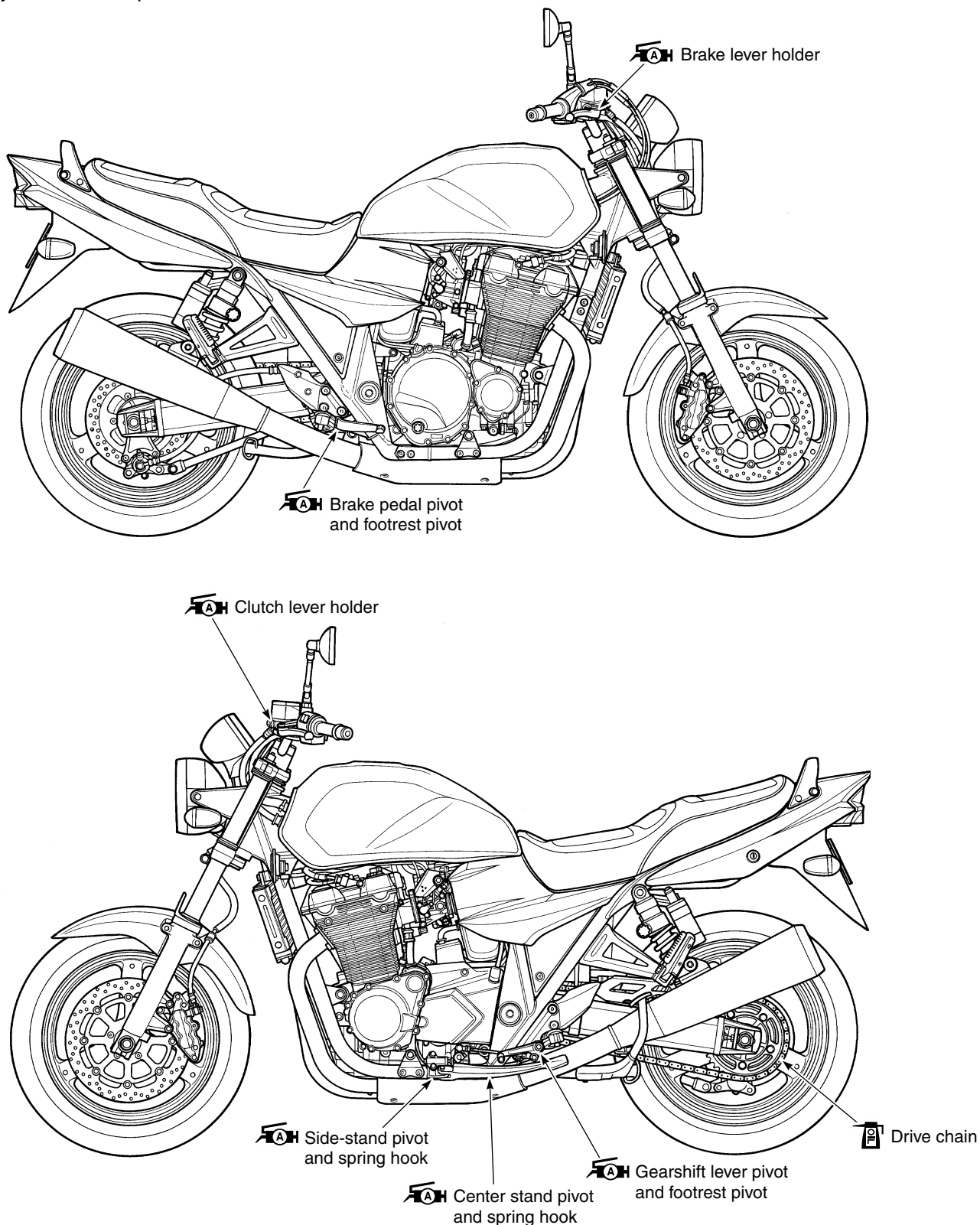
I = Inspect and adjust, clean, lubricate or replace as necessary.

R = Replace

T = Tighten

LUBRICATION POINTS

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



NOTE:

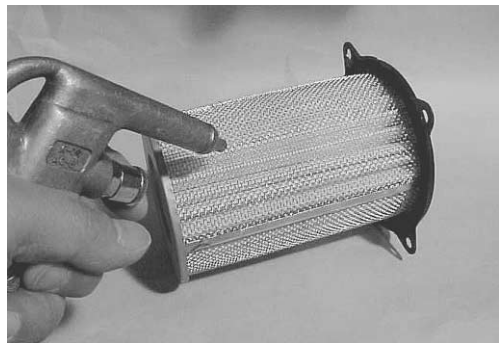
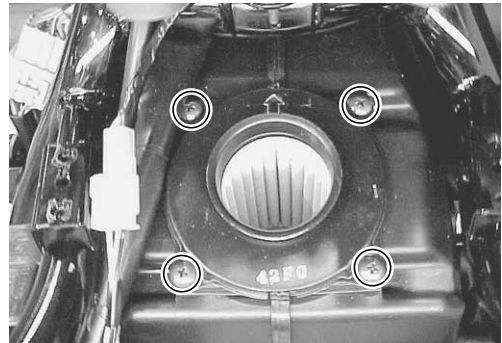
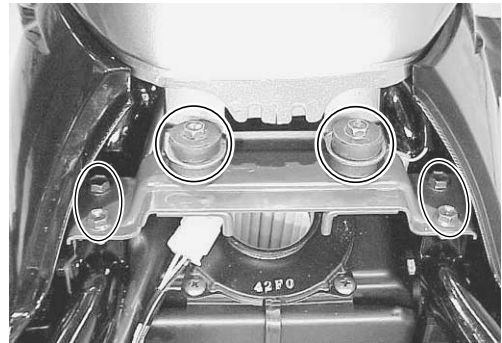
- * Before lubricating each part, clean off any rusty spots and wipe off any grease, oil, dirt or grime.
- * Lubricate exposed parts which are subject to rust, with a rust preventative spray, especially whenever the motorcycle has been operated under wet or rainy conditions.

MAINTENANCE AND TUNE-UP PROCEDURES

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

AIR CLEANER

- Remove the fuel tank.
- Remove the fuel tank bracket.
- Remove the air cleaner element by removing the screws.
- Carefully use air hose to blow the dust from the cleaner element.



CAUTION

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

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

CAUTION

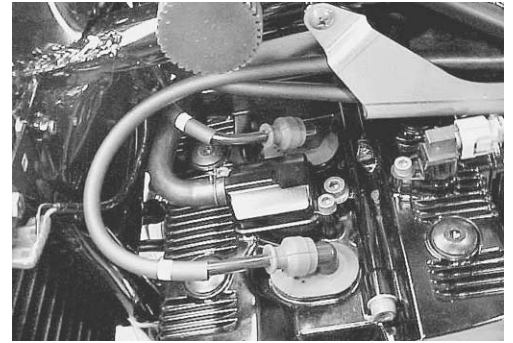
If driving under dusty conditions, clean the air cleaner element more frequently. The surest way to accelerate engine wear is to operate the engine without the element or to use a torn element. Make sure that the air cleaner is in good condition at all times. The life of the engine depends largely on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

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

SPARK PLUG

SPARK PLUG AND SPARK PLUG CAP REMOVAL

- Remove the seat.
- Remove the fuel tank. (🔧 4-48)



- Remove all spark plug caps.
- Remove the spark plugs with a spark plug wrench.



HEAT RANGE

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

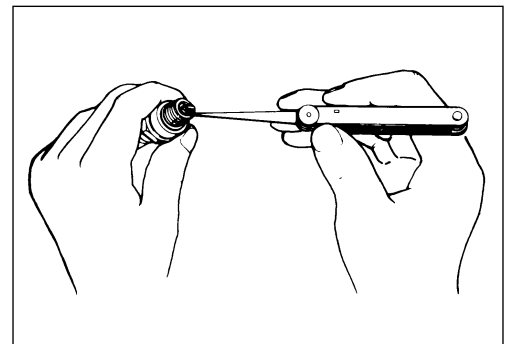
| | NGK | DENSO |
|-------------|-------|--------|
| Standard | CR8EK | U24ETR |
| Colder type | CR9EK | U27ETR |

NOTE:

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

CARBON DEPOSITS

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

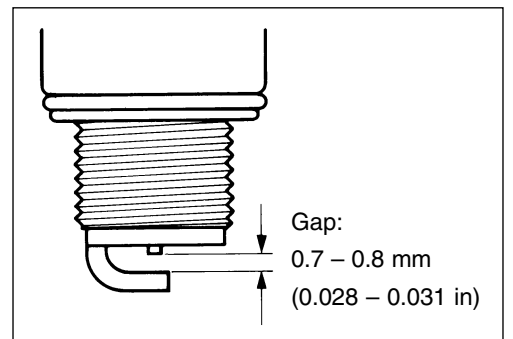


SPARK PLUG GAP

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

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

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

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

SPARK PLUG AND SPARK PLUG CAP INSTALLATION

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

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

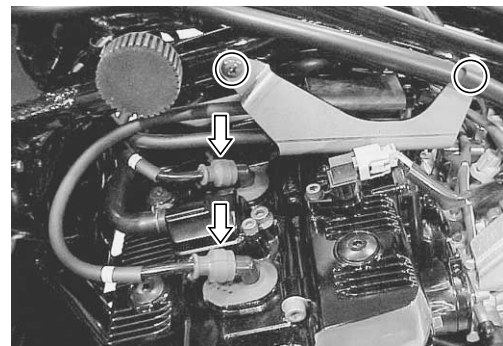
CAUTION

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



VALVE CLEARANCE

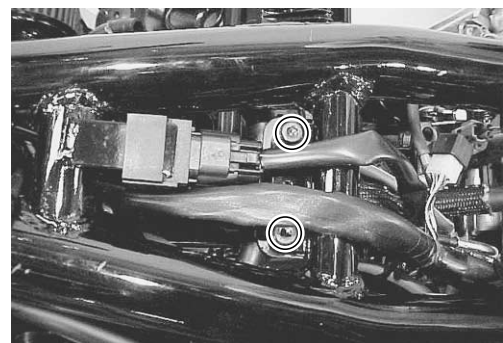
- Remove the fuel tank. (4-48)
- Remove the spark plug caps.
- Remove the ignition coil brackets. Remove the ignition coils.



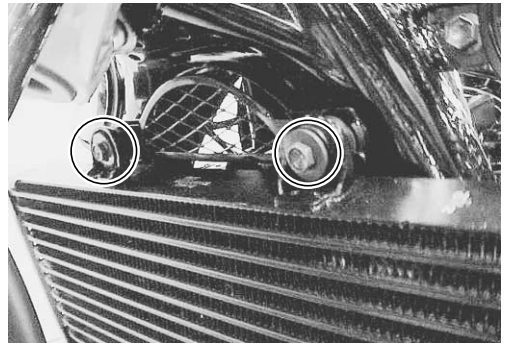
- Disconnect the cam position sensor coupler.



- Disconnect the PAIR hoses.
- Remove the PAIR valve.



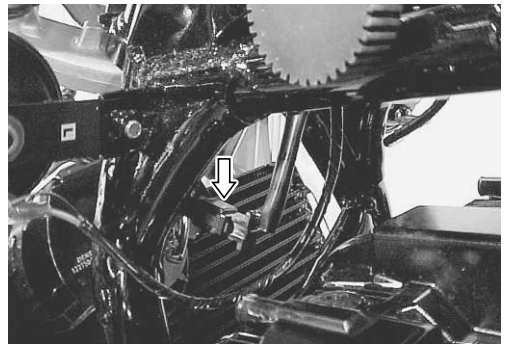
- Remove the engine oil cooler bolts.



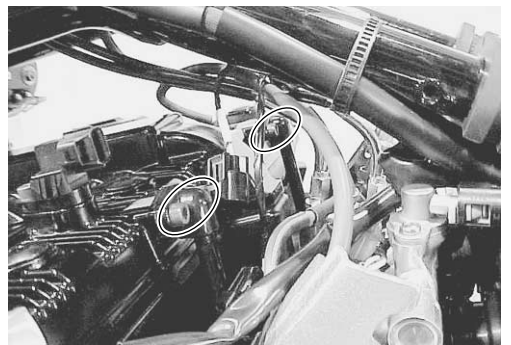
- Remove the engine oil cooler hose clamp.
- Move the engine oil cooler forward.



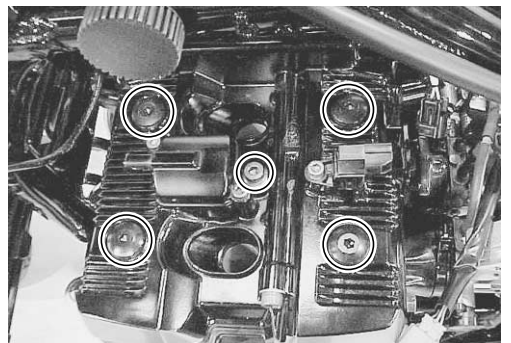
- Disconnect the cooling fan lead wire coupler.



- Remove the oil hose clamp bolts.



- Remove the cylinder head cover bolts.
- Remove the cylinder head cover.



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 disturbed by removing them for servicing.

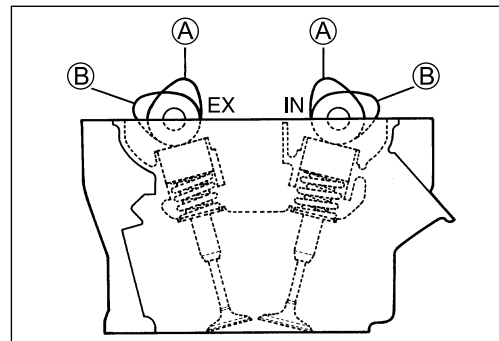
DATA Valve clearance (when cold):

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

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

NOTE:

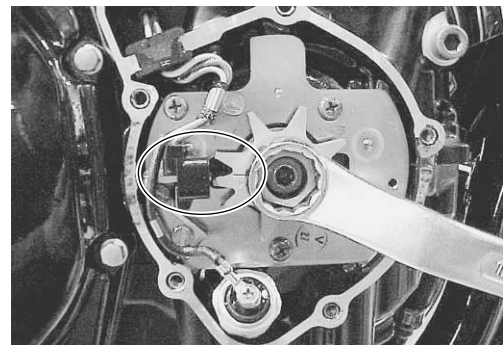
- * The cam must be at positions, ① or ②, in order to check the valve clearance, or to adjust tappet clearance. Clearance readings should not be taken with the cam in any other position than these two positions.
- * The clearance specification is for COLD state.
- * To turn the crankshaft for clearance checking, be sure to use a wrench, and rotate in the normal running direction. All spark plugs should be removed.



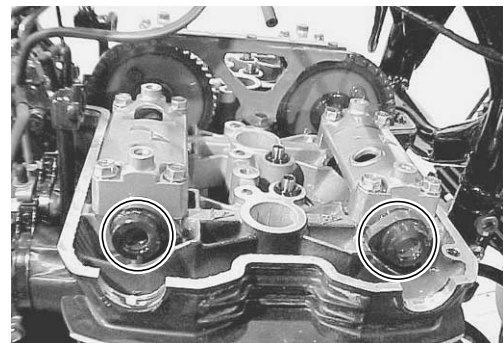
- Remove the signal generator cover.



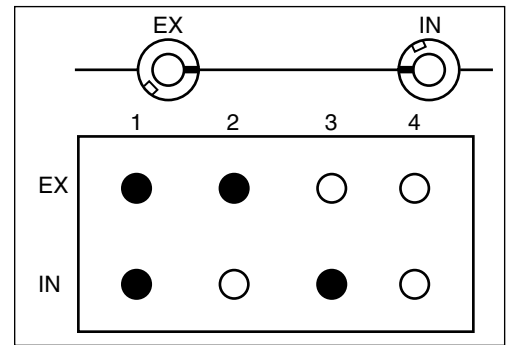
- Turn the crankshaft clockwise until the signal generator rotor line aligns on the signal generator sensor tip.



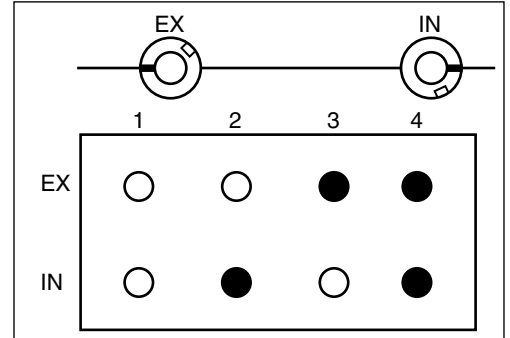
- Check the exhaust and intake camshaft line positions.



- When the lines face each other, measure • marked valve clearances.



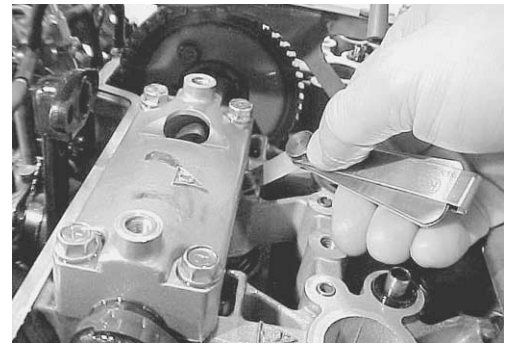
- Turn the crankshaft 360° and measure • marked valve clearances.



- Measure the valve clearances with a thickness gauge.



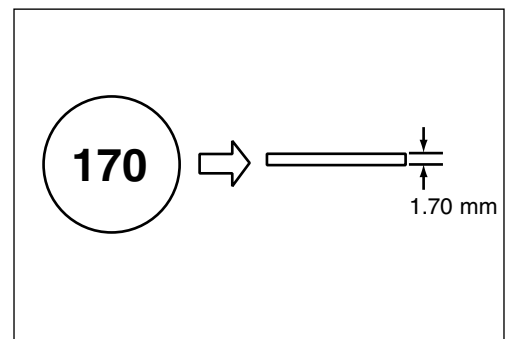
09900-20803: Thickness gauge



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. (☞ 3-12)
- 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.

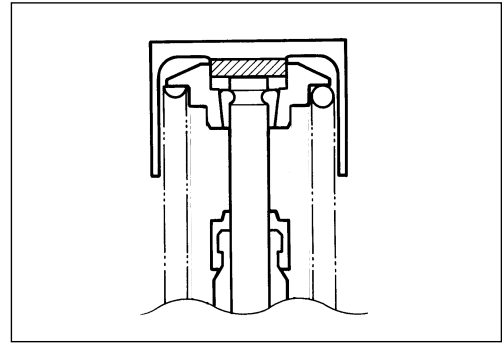


NOTE:




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

CAUTION

Reinstall the camshafts as the specified manner.
 3-74)



- 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 parts.
 - * Camshafts  3-74
 - * Signal generator cover  3-77
 - * Cylinder head cover  3-78

(INTAKE SIDE)

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

TAPPET SHIM SET (12800-05820)

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

HOW TO USE THIS CHART:

I. Measure valve clearance. “ENGINE IS COLD”

II. Measure present shim size.

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

HOW TO USE THIS CHART:

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

EXAMPLE

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

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

TAPPET SHIM SET (12800-05820)

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

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 row.

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

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

ENGINE OIL REPLACEMENT


- Keep the motorcycle upright.
- Place an oil pan below the engine, and drain oil by removing the oil drain plug ① and filler cap ②.
- Tighten the drain plug ① to the specified torque, and pour fresh oil through the oil filler. The engine will hold about 4.2 L (4.4/3.7 US/Imp qt) of oil. Use an API classification of SF or SG oil with SAE 10W/40 viscosity.

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

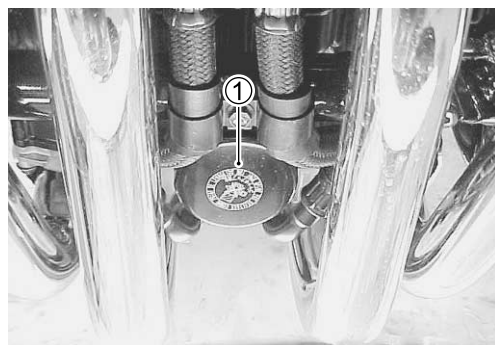
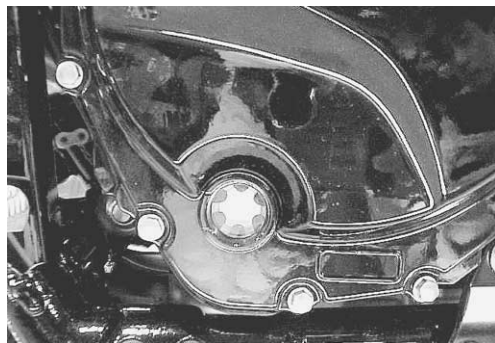
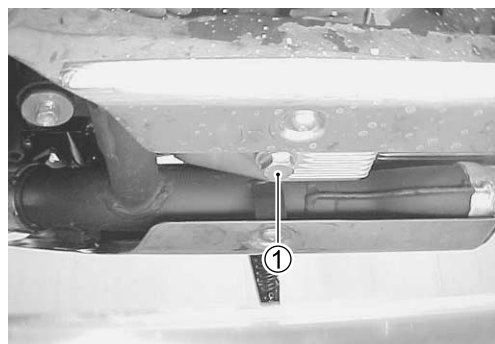
- Start up the engine and allow it to run for several minutes at idling speed.
- Turn off the engine and wait about three minutes, then check the oil level through the inspection window. If the level is below mark “L”, add oil to “F” level. If the level is above mark “F”, drain oil to “F” level.

OIL FILTER REPLACEMENT

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

 **09915-40610: Oil filter wrench**

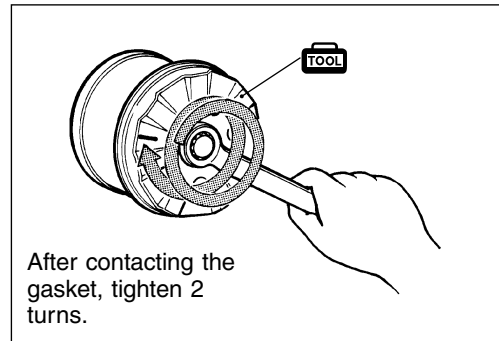
- Apply engine oil lightly to the gasket of the new oil filter before installation.



- Install the new oil filter. Turn it by hand until you feel that the oil filter gasket has contacted the oil filter mounting surface. Then, tighten the oil filter two full turns using 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: 4.2L (4.4/3.7 US/Imp qt)

Oil and filter change: 4.8L (5.1/4.2 US/Imp qt)

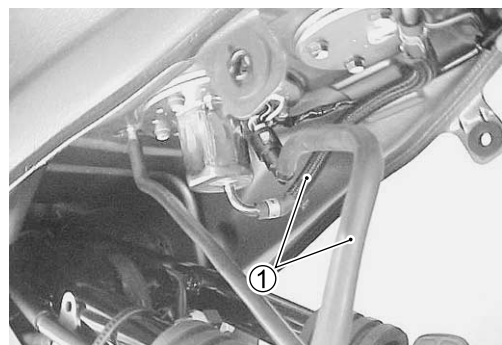
Engine overhaul: 5.7L (6.0/5.0 US/Imp qt)

CAUTION

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

FUEL HOSE

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



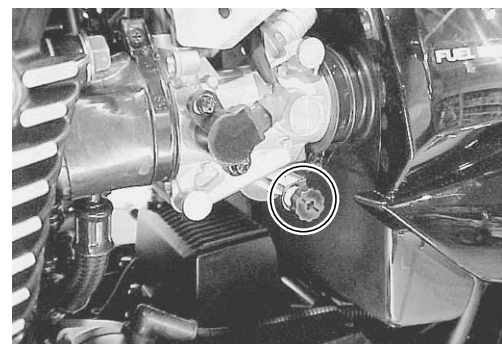
ENGINE IDLE SPEED

NOTE:

Make this adjustment when the engine is hot.

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

DATA Engine idle speed: 1 100 ± 100 rpm

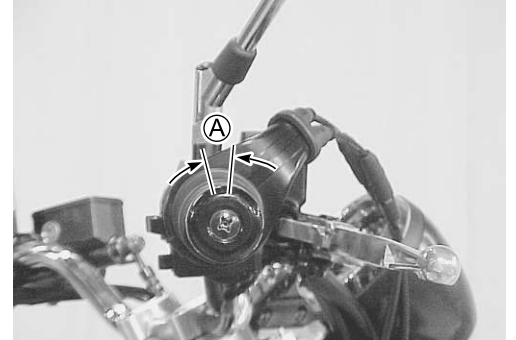


THROTTLE VALVE SYNCHRONIZATION

Inspect throttle valve synchronization periodically. (👉 4-66)

THROTTLE CABLE PLAY

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



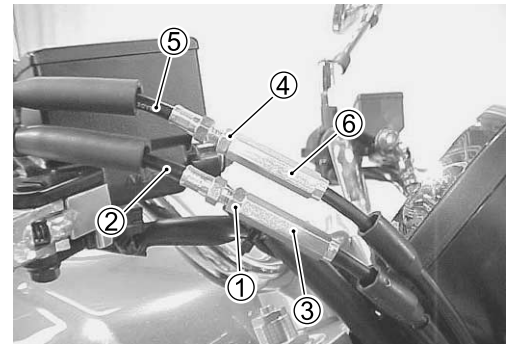
MINOR ADJUSTMENT

1st step:

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

2nd step:

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



DATA Throttle cable play \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 $\textcircled{3}$ of the throttle returning cable $\textcircled{2}$ until resistance is felt.
- Tighten the locknut $\textcircled{1}$ while holding the adjuster $\textcircled{3}$.

⚠ 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

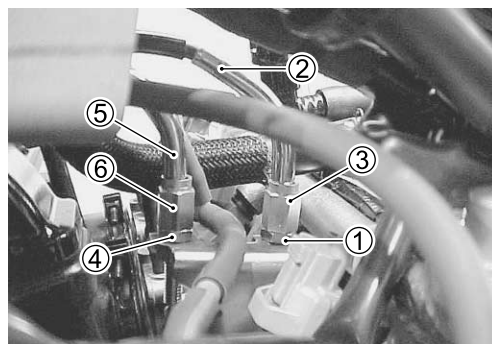
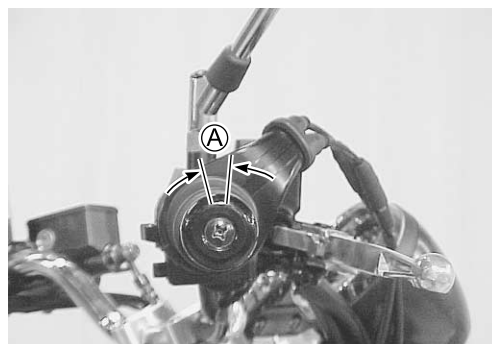
- Lift and support the fuel tank with its prop stay. (🔧 4-48)
- Loosen the lock nuts ① of the throttle returning cable ②.
- Turn the returning cable adjuster ③ to obtain proper cable play.
- Loosen the lock nuts ④ of the throttle pulling cable ⑤.
- Turn the pulling cable adjuster ⑥ in or out until the throttle cable play ⑦ 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 ⑦: 2.0 – 4.0 mm (0.08 – 0.16 in)

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

CLUTCH FLUID LEVEL

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

BF Specification and Classification: DOT 4



⚠ WARNING

The clutch system of this motorcycle is filled with a glycol-based brake fluid. Do not use or mix different types of fluid such as silicone-based or petroleum-based. Do not use any brake fluid taken from old, used or unsealed containers. Never re-use brake fluid left over from the last servicing or stored for a long periods. Check the clutch hose and hose joints for cracks and fluid leakage.

BLEEDING AIR FROM THE CLUTCH FLUID CIRCUIT

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

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

 **Air bleeder valve: 8 N·m (0.8 kgf·m, 6.0 lb·ft)**

DRIVE CHAIN

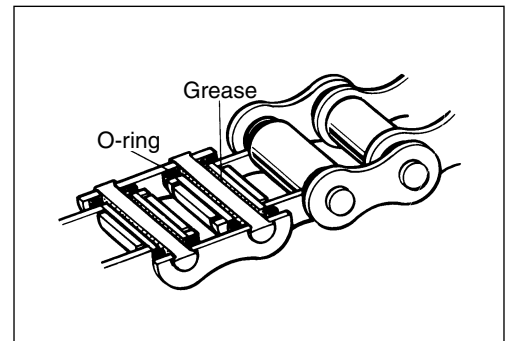
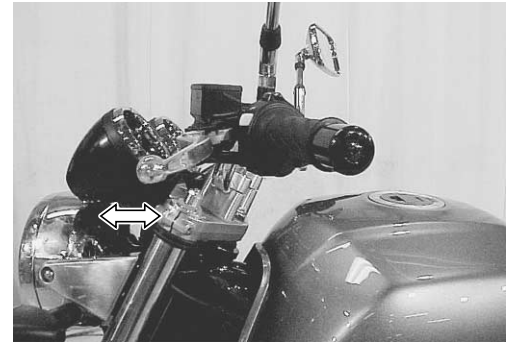
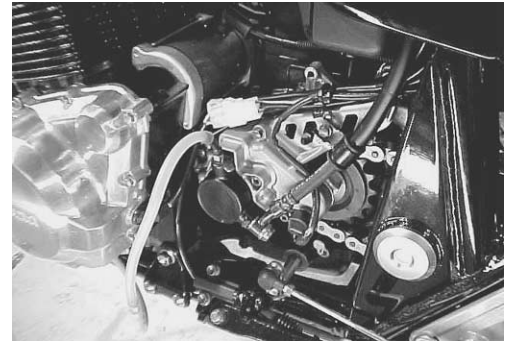
Visually check the drive chain for the possible defects listed below. (Support the motorcycle by a jack and a wooden block, turn the rear wheel slowly by hand with the transmission shifted to Neutral.)

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

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

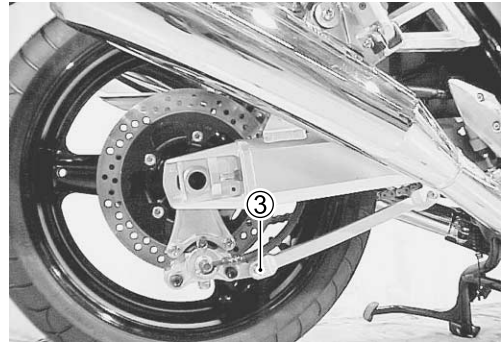
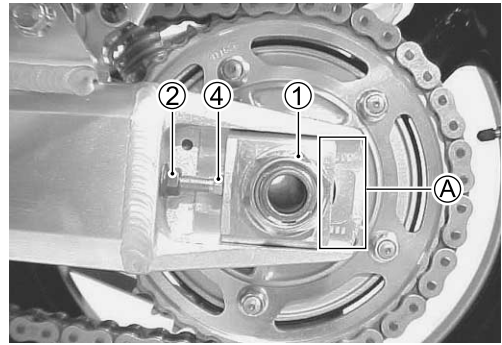
NOTE:

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



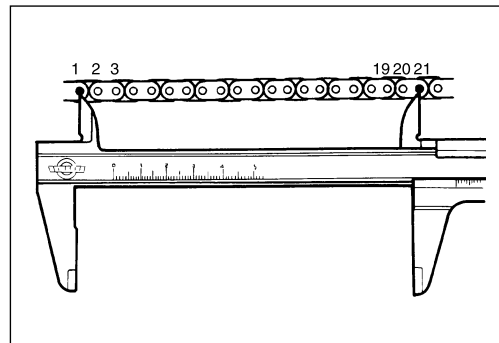
CHECKING

- Loosen the axle nut ①.
- Loosen the chain adjuster lock nuts ②.
- Loosen the torque link nut (Rear) ③.
- Tense the drive chain fully by turning both chain adjusters ④.



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

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

**ADJUSTING**

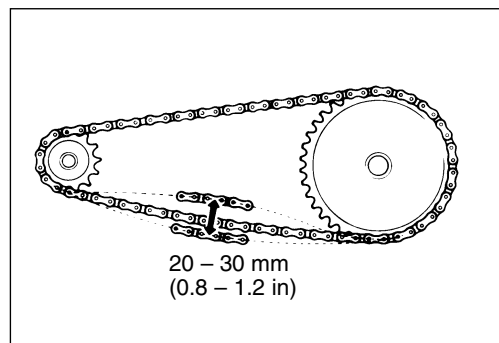
- Loosen or tighten both chain adjuster nuts ① until there is 20 – 30 mm (0.8 – 1.2 in) of slack at the middle of the chain between the engine and rear sprockets as shown. The reference marks A on both sides of the swingarm and the edge of each chain adjuster must be aligned to ensure that the front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

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

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

Wrench icon Rear axle nut: 110 N·m (11.0 kgf·m, 79.6 lb-ft)
Torque link nut (Rear): 34 N·m (3.4 kgf·m, 24.6 lb-ft)

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



CLEANING AND LUBRICATING

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

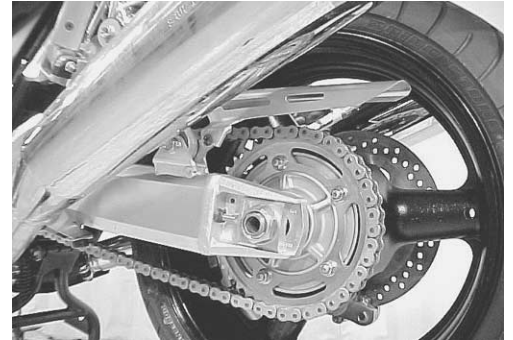
CAUTION

Do not use trichloroethylene, gasoline or any similar solvent. These fluids have too great a dissolving power for this chain and they can damage the O-rings. Use only kerosine to clean the drive chain.

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

CAUTION

- * **Do not use any oil sold commercially as “drive chain oil”. Such oil can damage the O-rings.**
- * **The standard drive chain is a RK GB50GSVZ3 Suzuki recommends to use this standard drive chain as a replacement.**



BRAKE

BRAKE FLUID LEVEL CHECK

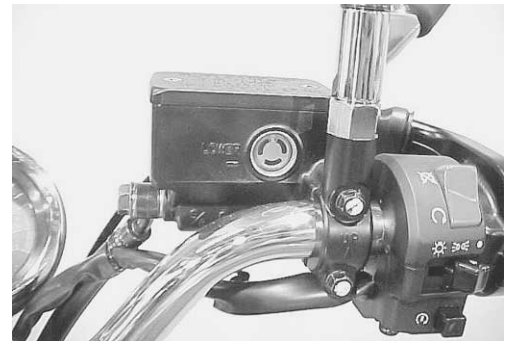
- Keep the motorcycle upright and place the handlebars straight.
- Check the brake fluid level by observing the lower limit lines on the front and rear brake fluid reservoirs.
- When the level is below the lower limit line, replenish with brake fluid that meets the following specification.



Specification and Classification: DOT 4

⚠ WARNING

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

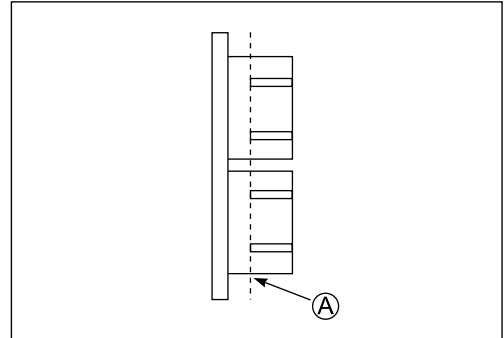
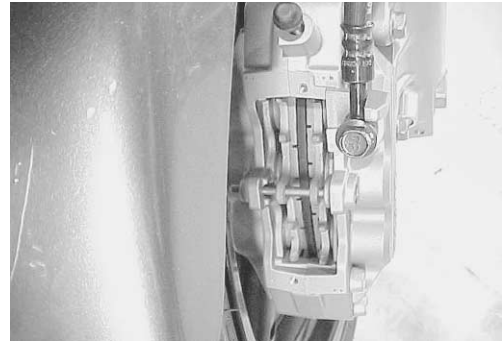


BRAKE PADS**FRONT BRAKE**

- 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. (👉 6-50)

CAUTION

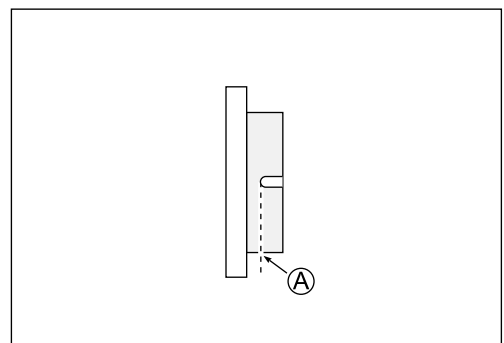
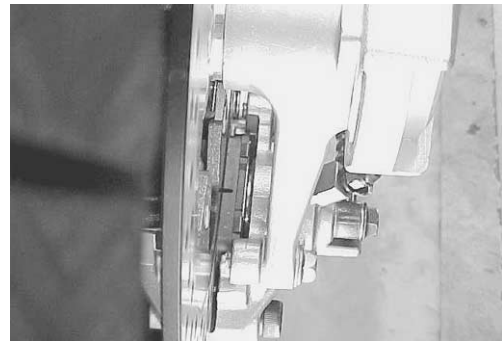
Replace the brake pads as a set, otherwise braking performance will be adversely affected.

**REAR BRAKE**

- The extent of brake pad wear can be checked by observing the grooved limit line (A) on the pad. When the wear exceeds the grooved limit line, replace the pads with new ones. (👉 6-58)


CAUTION

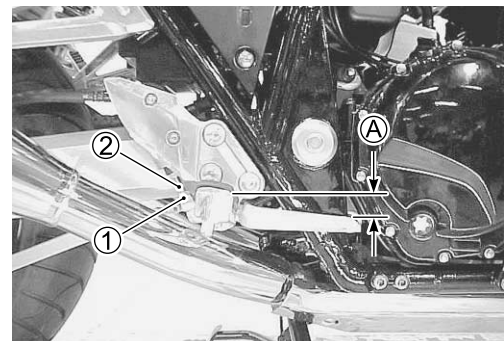
Replace the brake pads as a set, otherwise braking performance will be adversely affected.

**BRAKE PEDAL HEIGHT**

- Loosen the locknut (1).
- Turn the push rod (2) until the brake pedal is 35 – 45 mm (1.4 – 1.8 in) (A) below the top of the footrest.
- Tighten the locknut (1) securely.

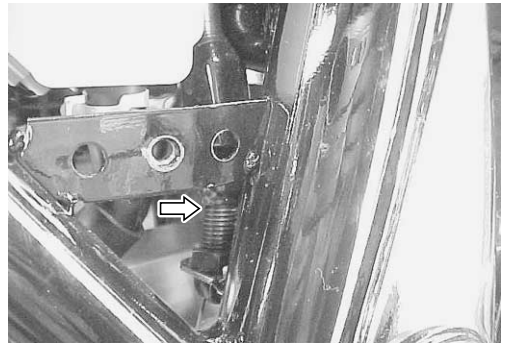
 **Rear brake master cylinder rod locknut:**
18 N·m (1.8 kgf·m, 13.0 lb-ft)

 **Brake pedal height (A):**
Standard: 35 – 45 mm (1.4 – 1.8 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.

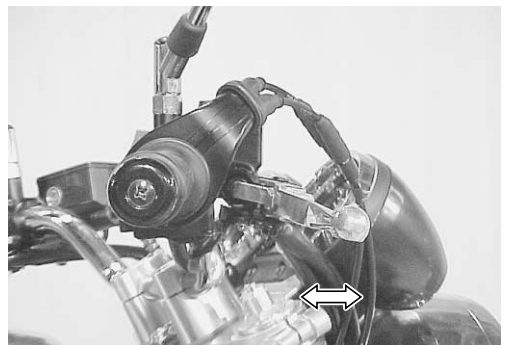


AIR BLEEDING THE BRAKE FLUID CIRCUIT

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

FRONT BRAKE

- Fill the master cylinder reservoir to the top of the inspection window. Replace the reservoir cap to prevent dirt from entering.
- Attach a hose to the air bleeder valve and insert the free end of the hose into a receptacle.
- Squeeze and release the brake lever several times in rapid succession and squeeze the lever fully without releasing it. Loosen the air bleeder valve by turning it a quarter of a turn so that the brake fluid runs into the receptacle, this will remove the tension of the brake lever causing it to touch the handlebar grip. Then, close the air bleeder valve, pump and squeeze the lever, and open the valve. Repeat this process until fluid flowing into the receptacle no longer contains air bubbles.



NOTE:

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

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

 **Air bleeder valve: 8 N·m (0.8 kgf·m, 6.0 lb-ft)**

CAUTION

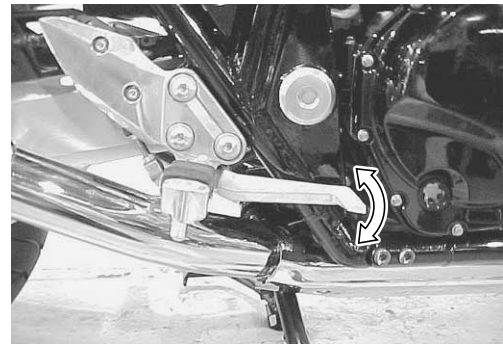
Handle brake fluid with care: the fluid reacts chemically with paint, plastics, rubber materials, etc.

REAR BRAKE

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

NOTE:


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



TIRES

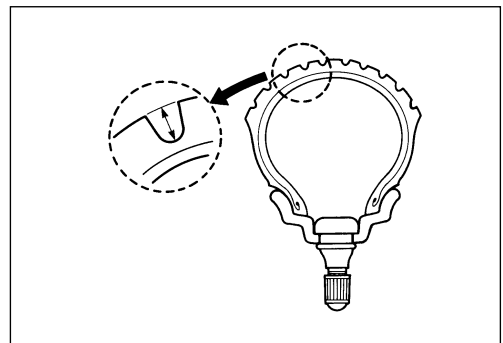
TIRE TREAD CONDITION

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

 **09900-20805: Tire depth gauge**

 **Tire tread depth:**

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

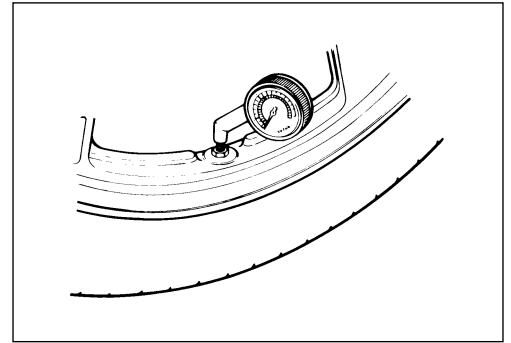


TIRE PRESSURE

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/cm², 36 psi)
 Rear: 250 kPa (2.50 kgf/cm², 36 psi)
Dual riding: Front: 250 kPa (2.50 kgf/cm², 36 psi)
 Rear: 290 kPa (2.90 kgf/cm², 42 psi)



CAUTION

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

DATA TIRE TYPE

BRIDGESTONE (BT020F F.....Front, BT020R.....Rear)

STEERING

The steering should be adjusted properly for smooth turning of the handlebars and safe operation. Overtight steering prevents smooth turning of the handlebars and too loose steering will cause poor stability. Check that there is no play in the front fork. Support the motorcycle so that the front wheel is off the ground. With the wheel facing straight ahead, grasp the lower fork tubes near the axle and pull forward. If play is found, readjust the steering. (6-31)



FRONT FORK

Inspect the front forks for oil leakage, scoring or scratches on the outer surface of the inner tubes. Replace any defective parts, if necessary. (👉 6-13)



REAR SUSPENSION

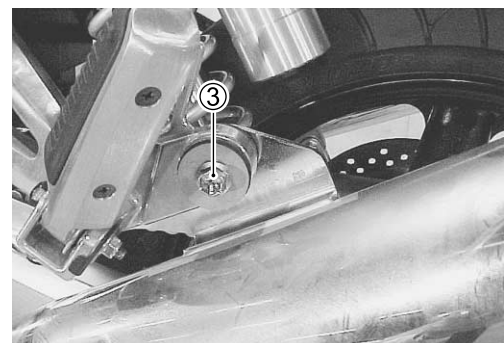
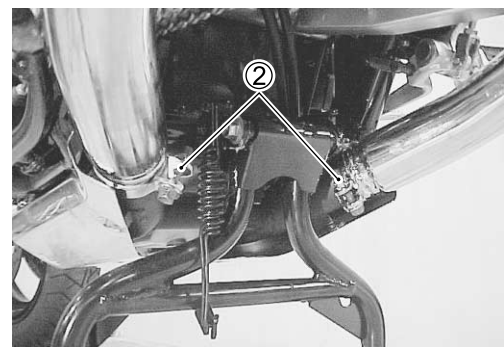
Inspect the rear shock absorbers for oil leakage and check that there is no play in the swingarm. Replace any defective parts if necessary. (👉 6-41)




EXHAUST PIPE BOLT AND NUT

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

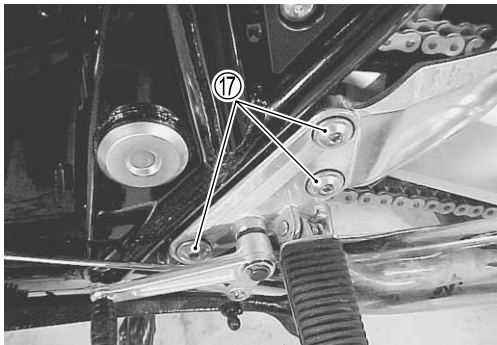
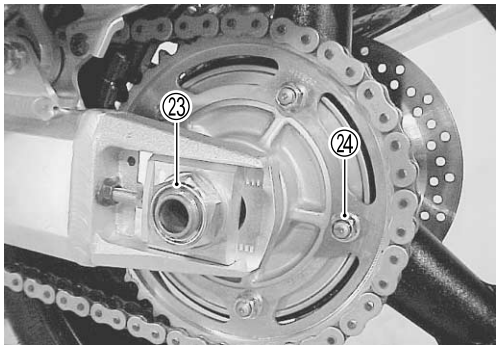
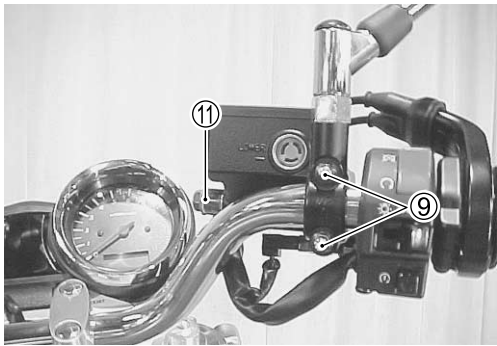
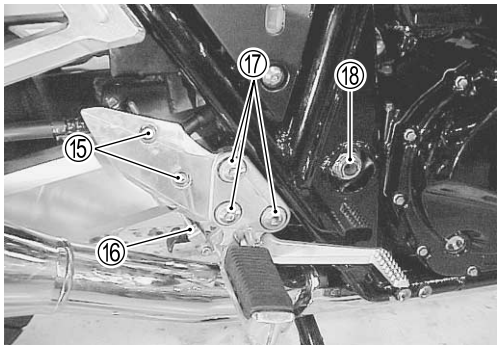
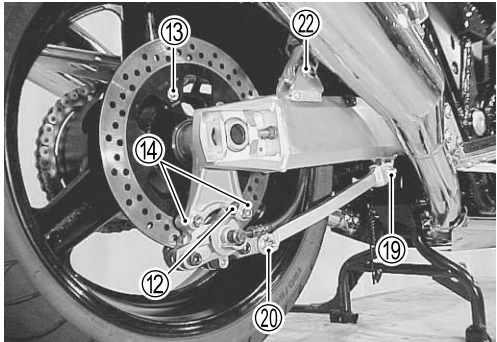
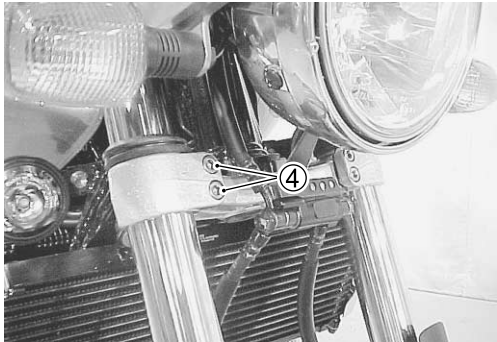
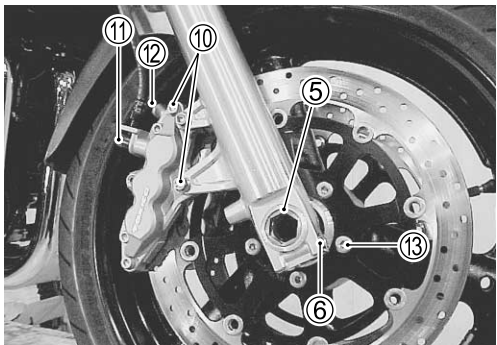
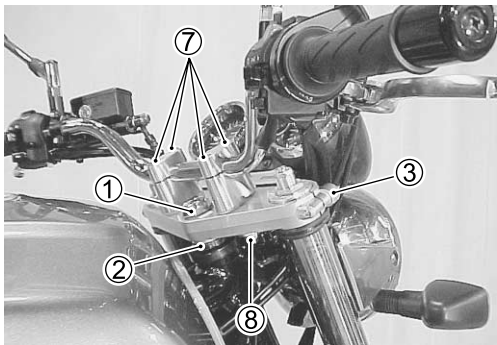
- 🔧 Exhaust pipe bolt ①: 23 N·m (2.3 kgf·m, 16.5 lb-ft)
Muffler connecting bolt ②: 24 N·m (2.4 kgf·m, 17.5 lb-ft)
Muffler mounting bolt ③: 23 N·m (2.3 kgf·m, 16.5 lb-ft)
Exhaust pipe connecting bolt: 20 N·m
(2.0 kgf·m, 14.4 lb-ft)



CHASSIS BOLTS AND NUTS

Check that all chassis bolts and nuts are tightened to their specified torque. The locations of the following nuts and bolts on the motorcycle.:  2-26

| Item | N·m | kgf·m | lb·ft |
|---|-----|-------|-------|
| ① Steering stem head nut | 65 | 6.5 | 47.0 |
| ② Steering stem lock nut | 80 | 8.0 | 58.0 |
| ③ Front fork upper clamp bolt | 23 | 2.3 | 16.5 |
| ④ Front fork lower clamp bolt | 23 | 2.3 | 16.5 |
| ⑤ Front axle | 100 | 10.0 | 72.5 |
| ⑥ Front axle pinch bolt | 23 | 2.3 | 16.5 |
| ⑦ Handlebar set bolt | 23 | 2.3 | 16.5 |
| ⑧ Handlebar clamp bolt | 95 | 9.5 | 68.5 |
| ⑨ Front brake master cylinder mounting bolt | 10 | 1.0 | 7.0 |
| ⑩ Front brake caliper mounting bolt | 26 | 2.6 | 19.0 |
| ⑪ Brake hose union bolt (Front & Rear) | 23 | 2.3 | 16.5 |
| ⑫ Caliper air bleeder valve (Front & Rear) | 8 | 0.8 | 6.0 |
| ⑬ Brake disc bolt | 23 | 2.3 | 16.5 |
| ⑭ Rear brake caliper mounting bolt | 26 | 2.6 | 20.0 |
| ⑮ Rear brake master cylinder mounting bolt | 10 | 1.0 | 7.3 |
| ⑯ Rear brake master cylinder rod lock nut | 18 | 1.8 | 13.0 |
| ⑰ Front footrest bracket mounting bolt | 26 | 2.6 | 19.0 |
| ⑱ Swingarm pivot nut | 100 | 10.0 | 72.5 |
| ⑲ Torque link bolt and nut (Front) | 28 | 2.8 | 20.0 |
| ⑳ Torque link bolt and nut (Rear) | 34 | 3.4 | 24.6 |
| ㉑ Rear shock absorber (Upper) | 23 | 2.3 | 16.5 |
| ㉒ Rear shock absorber (Lower) | 34 | 3.4 | 24.5 |
| ㉓ Rear axle nut | 100 | 10.0 | 72.5 |
| ㉔ Rear sprocket nut | 60 | 6.0 | 43.5 |



COMPRESSION PRESSURE CHECK

The compression pressure reading of a cylinder is a good indicator of its internal condition.

The decision to overhaul the cylinder is often based on the results of a compression test. Periodic maintenance records kept at your dealership should include compression readings for each maintenance service.

COMPRESSION PRESSURE SPECIFICATION

| Standard | Limit | Difference |
|---|--|--|
| 1 180 kPa (11.8 kgf/cm ²) 168 psi | 880 kPa (8.8 kgf/cm ²) 125 psi | 200kPa (2 kgf/cm ²) 28 psi |

Low compression pressure can indicate any of the following conditions:

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

Overhaul the engine in the following cases:

- * Compression pressure in one of the cylinders is less than 900 kPa (9 kg/cm², 128 psi).
- * The difference in compression pressure between any two cylinders is more than 200 kPa (2 kgf/cm², 28 psi).
- * All compression pressure readings are below 1 100 kPa (11 kgf/cm², 156 psi) even when they measure more than 900 kPa (9 kgf/cm², 128 psi).

COMPRESSION TEST PROCEDURE

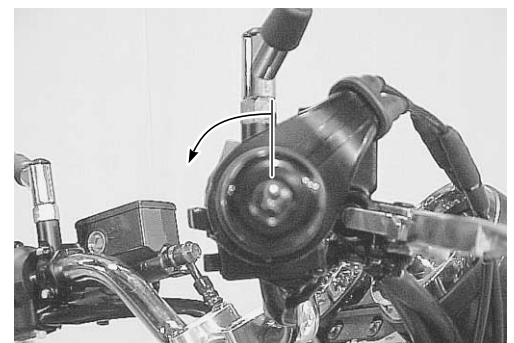
NOTE:

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

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

- Lift and support the fuel tank. (👉 4-48)
- Remove all the spark plugs. (👉 2-5)
- Install the compression gauge and adaptor in the spark plug hole. Make sure that the connection is tight.
- Keep the throttle grip in the fully opened position.
- Press the starter button and crank the engine for a few seconds. Record the maximum gauge reading as the cylinder compression.
- Repeat this procedure with the other cylinders.

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

300 – 600 kPa (3.0 – 6.0 kgf/cm², 43 – 85 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

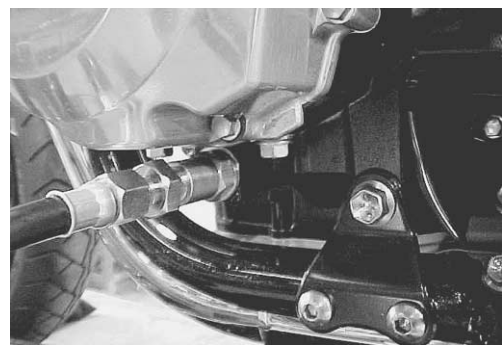
OIL PRESSURE TEST PROCEDURE

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

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

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



ENGINE










































CONTENTS

| | |
|---|-------------|
| ENGINE COMPONENTS REMOVABLE WITH THE ENGINE IN PLACE | 3- 2 |
| ENGINE REMOVAL AND INSTALLATION | 3- 3 |
| ENGINE REMOVAL | 3- 3 |
| ENGINE INSTALLATION | 3- 8 |
| ENGINE DISASSEMBLY | 3-11 |
| ENGINE COMPONENTS INSPECTION AND SERVICE | 3-22 |
| PAIR VALVE | 3-22 |
| CYLINDER HEAD COVER | 3-23 |
| CAMSHAFT | 3-23 |
| CAM CHAIN TENSION ADJUSTER..... | 3-25 |
| CAM CHAIN TENSIONER/CAM CHAIN GUIDE | 3-25 |
| CYLINDER HEAD AND VALVE | 3-26 |
| CYLINDER | 3-34 |
| PISTON AND PISTON RING | 3-35 |
| CLUTCH | 3-37 |
| GEARSHIFT SYSTEM..... | 3-39 |
| GENERATOR | 3-40 |
| OIL PUMP | 3-40 |
| OIL PRESSURE REGULATOR/OIL STRAINER | 3-41 |
| CRANK BALANCER | 3-41 |
| TRANSMISSION | 3-42 |
| CRANKSHAFT AND CONROD..... | 3-45 |
| CRANKCASE/OIL PAN | 3-53 |
| ENGINE REASSEMBLY | 3-56 |





















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 |
|----------------------------|--|--|--|
| Oil cooler |  3-4 | — |  3-10 |
| Exhaust pipe and muffler |  3-4 | — |  3-9 |
| PAIR valve |  3-11 |  3-22 |  3-78 |
| Cylinder head cover |  3-11 |  3-23 |  3-78 |
| Cam chain tension adjuster |  3-12 |  3-25 |  3-76 |
| Camshaft |  3-12 |  3-23 |  3-74 |
| Cylinder head |  3-12 |  3-26 |  3-72 |
| Cylinder |  3-13 |  3-34 |  3-72 |
| Piston |  3-14 |  3-35 |  3-71 |
| Breather cover |  3-14 | — |  3-70 |
| Oil temperature sensor |  3-14 |  5-11 |  3-70 |
| Oil filter |  3-15 | — |  3-69 |
| Oil pan |  3-19 |  3-53 |  3-62 |
| Oil strainer |  3-19 |  3-41 |  3-62 |
| Crank balancer |  3-19 |  3-40 |  3-60 |

ENGINE RIGHT SIDE

| | | | |
|------------------------------|--|--|--|
| Signal generator cover |  3-11 | — |  3-77 |
| Signal generator rotor |  3-15 | — |  3-69 |
| Signal generator(CKP sensor) |  3-15 |  7-21 |  3-69 |
| Cooling fan switch |  3-15 |  5-10 |  3-70 |
| Clutch cover |  3-16 | — |  3-65 |
| Clutch (plates) |  3-16 |  3-37 |  3-65 |
| Gearshift shaft |  3-17 |  3-39 |  3-65 |
| Oil pump driven gear |  3-17 | — |  3-65 |

ENGINE LEFT SIDE

| | | | |
|--------------------------------|--|--|--|
| Gearshift arm |  3-5 | — |  3-9 |
| Engine sprocket |  3-7 | — |  3-9 |
| Starter motor |  3-14 |  7-13 |  3-70 |
| Generator(Cover) |  3-18 |  3-40 |  3-64 |
| Starter idle gear |  3-18 | — |  3-63 |
| Generator rotor/Starter clutch |  3-18 |  4-40 |  3-63 |
| Gear position sensor |  3-18 |  7-15 |  3-63 |
| Clutch release cylinder |  6-65 |  6-65 |  6-65 |

ENGINE REMOVAL AND INSTALLATION

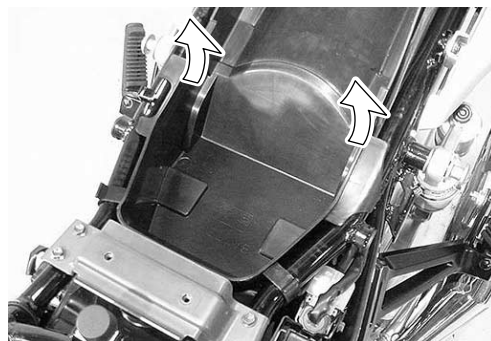
ENGINE REMOVAL

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 seat. (👉 6-3)
- Remove the frame side cover. (👉 6-3)
- Remove the fuel tank. (👉 4-48)



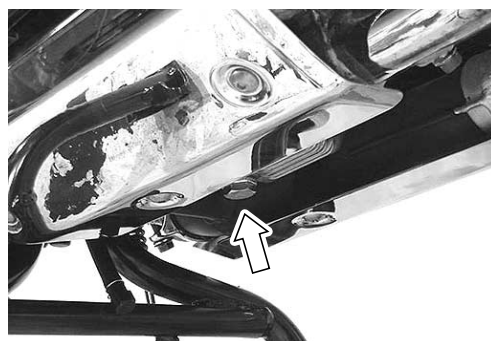
- Remove the tray.



- Remove the battery .

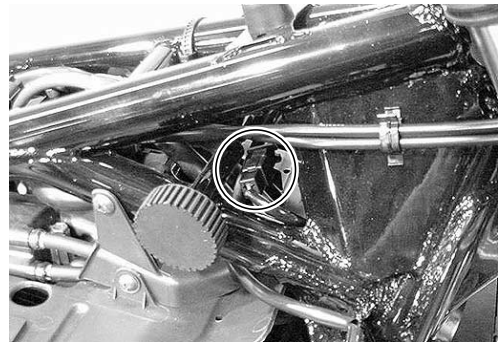


- Drain engine oil.



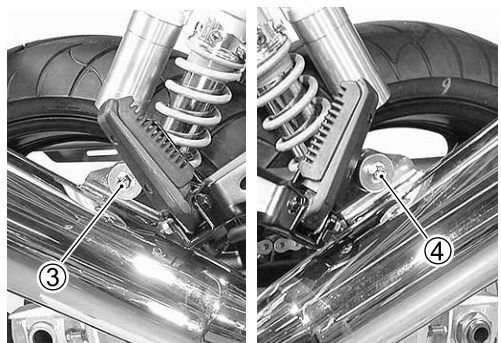
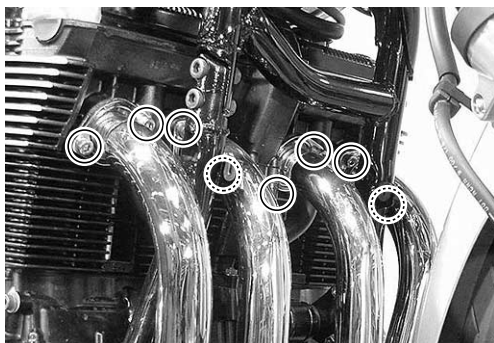
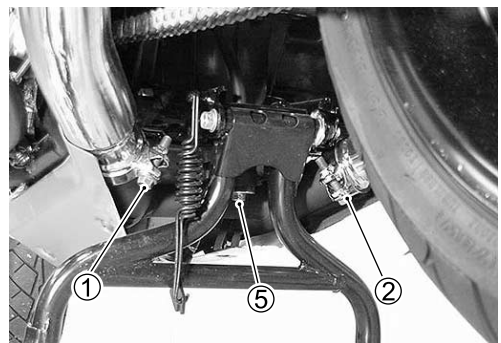
OIL COOLER

- Remove the cooling fan coupler (2P).
- Remove the oil hose union and oil hose guide.
- With the oil cooler bolts removed, detach the oil cooler and cooling fan.



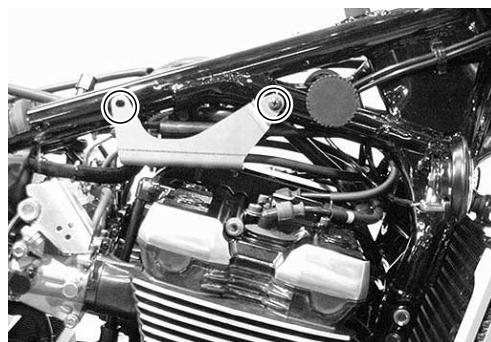
EXHAUST PIPE AND MUFFLER

- Loosen the muffler connecting bolts, ① and ②.
- With the muffler mounting nuts (③ and ④) removed, remove the mufflers (R, L).
- With the exhaust pipe bolts and exhaust pipe mounting bolt ⑤ removed, remove the exhaust pipe assembly.

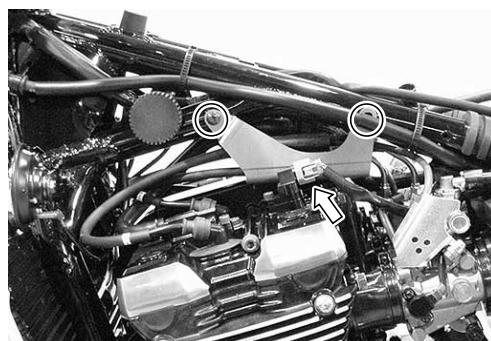


IGNITION COIL

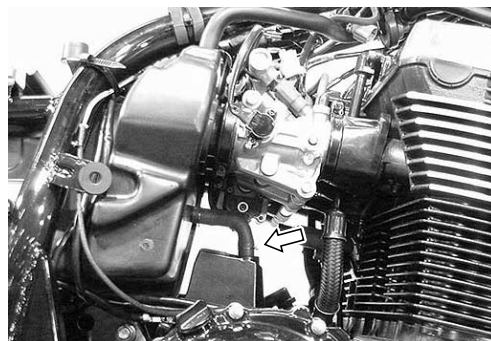
- With the ignition coil couplers and plug caps disconnected, remove the ignition coil brackets (R, L).



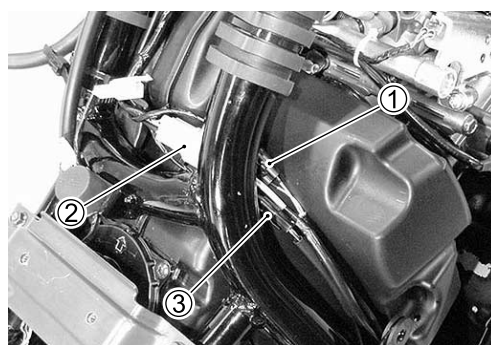
- Disconnect the CMP sensor.



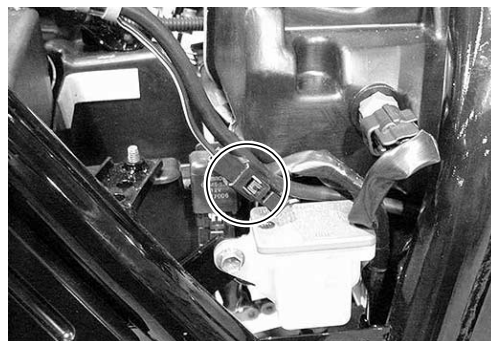
- Disconnect the breather hose.
- Remove the throttle body assembly. (📖 4-55)

**ELECTRIC PARTS**

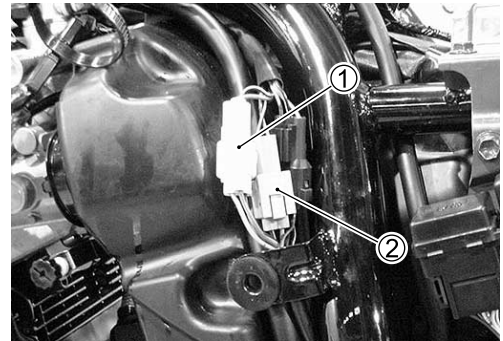
- Disconnect the oil temperature sensor coupler (2P)①.
- Disconnect the signal generator (CKP sensor)/oil pressure switch coupler (3P) ②.
- Disconnect the cooling fan switch coupler (2P)③.



- Disconnect the ground lead wire coupler.



- Disconnect the gear position switch coupler (3P) ① and side-stand switch coupler (2P) ②.

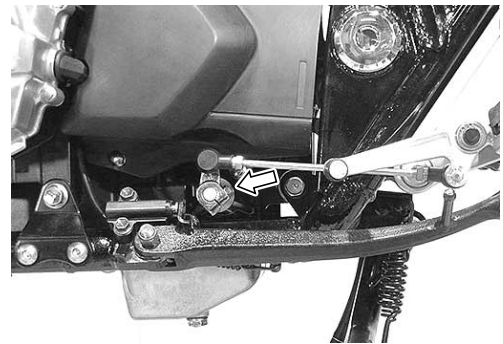


- Remove the starter motor lead wire.



GEARSHIFT LEVER

- Disconnect the gearshift lever linkage.



ENGINE SPROCKET

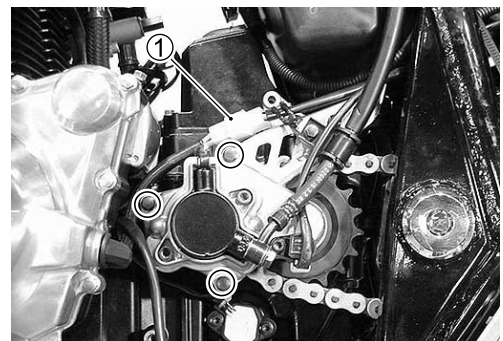
- Remove the engine sprocket cover.



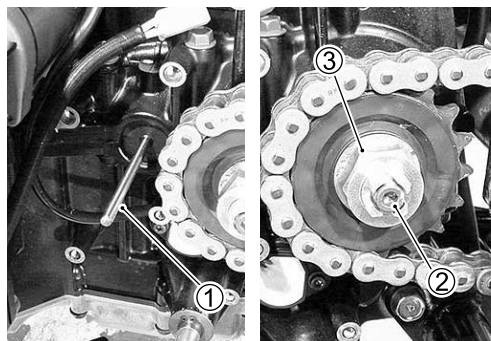
- Disconnect the generator coupler (3P) ①.
- Remove the clutch release cylinder housing.

CAUTION

Do not operate the clutch lever after removing the clutch release housing.



- Remove the clutch push rod ①.
- Remove the speed sensor rotor ②.
- Remove the engine sprocket nut ③ and the washer.

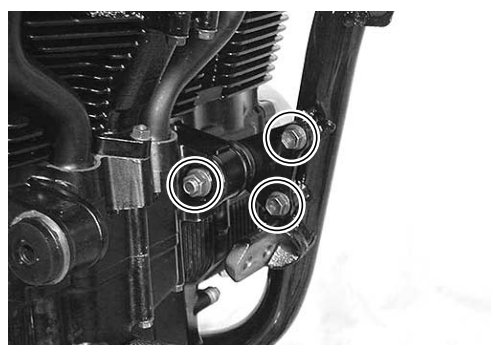
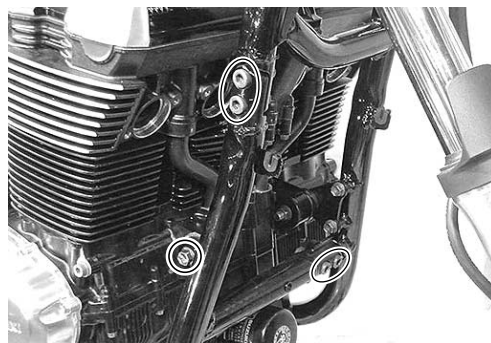
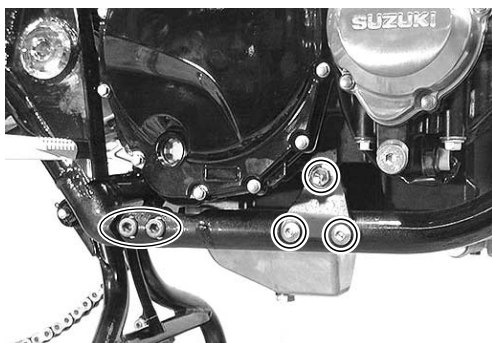


- Remove the cotter pin. (For E-03, 28, 33)
- Loosen the rear axle nut and the rear torque link nut.
- Loosen the left and right chain adjusters.
- Push the rear wheel forward and make sure that the drive chain has enough slack.
- Disengage the drive chain from the rear sprocket.
- Remove the engine sprocket.

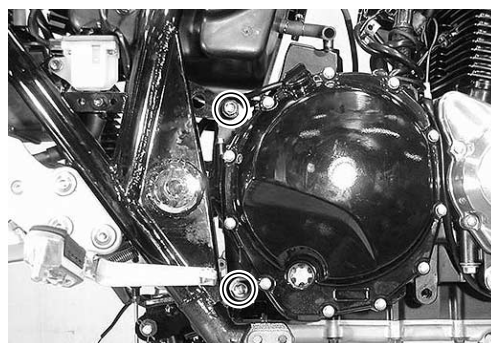


ENGINE MOUNTING

- Support the engine using an engine jack.
- With each engine mounting bolts and nuts removed, detach the frame down tube .



- Draw out the engine mounting shafts and remove the engine assembly from frame.



ENGINE INSTALLATION

Install the engine in the reverse order of engine removal.

Pay attention to the following points:

NOTE:

Hang the drive chain on the driveshaft when installing the engine.

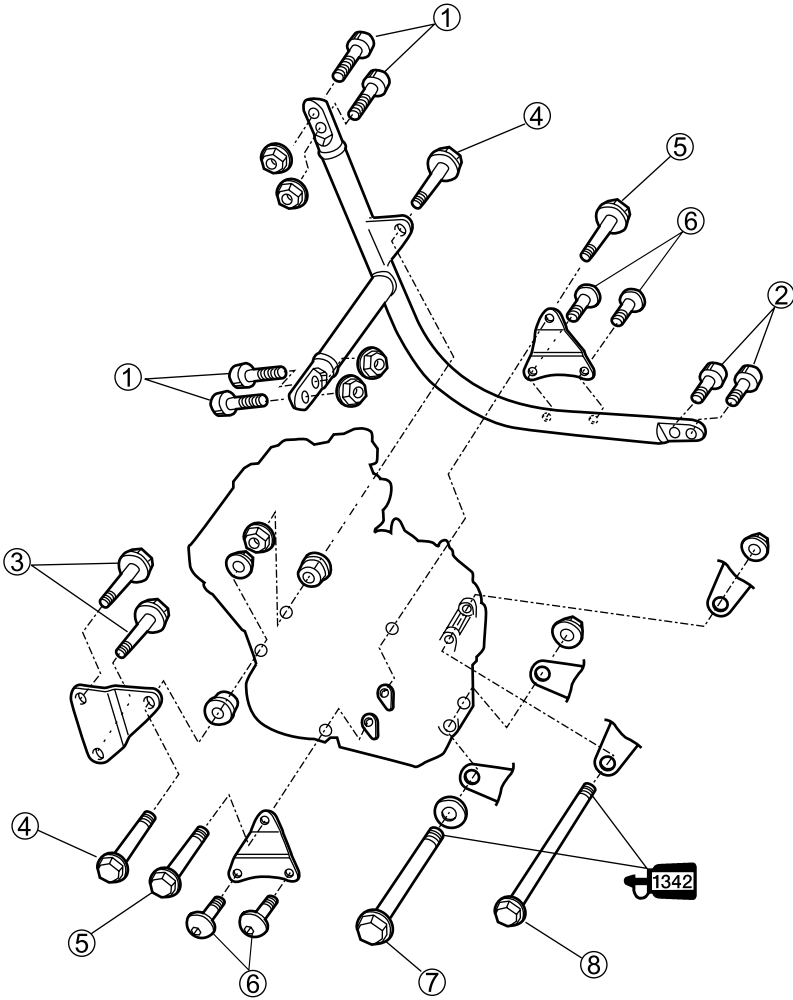
ENGINE MOUNT

- Install the engine and tighten the engine mounting bolts and nuts.

 99000-32050: THREAD LOCK “1342”

BOLT LENGTH


| ITEM | mm | in |
|------|-----|------|
| ① | 35 | 1.4 |
| ② | 25 | 0.98 |
| ③ | 14 | 0.55 |
| ④ | 60 | 2.4 |
| ⑤ | 50 | 2.0 |
| ⑥ | 14 | 0.55 |
| ⑦ | 140 | 5.5 |
| ⑧ | 155 | 6.1 |



| ITEM | N·m | kgf·m | lb·ft |
|------|-----|-------|-------|
| ①②③ | 50 | 5.0 | 37 |
| ④⑤ | 55 | 5.5 | 41 |
| ⑥ | 23 | 2.3 | 17 |
| ⑦ | 88 | 8.8 | 65 |
| ⑧ | 85 | 8.5 | 63 |

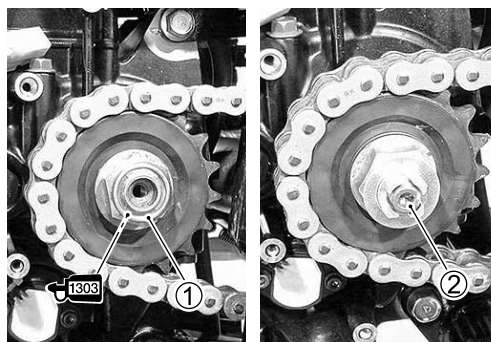
- Apply a small quantity of **THREAD LOCK** to the drive shaft thread portion and tighten the engine sprocket nut ① to the specified torque.

 **99000-32050: THREAD LOCK “1342”**

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

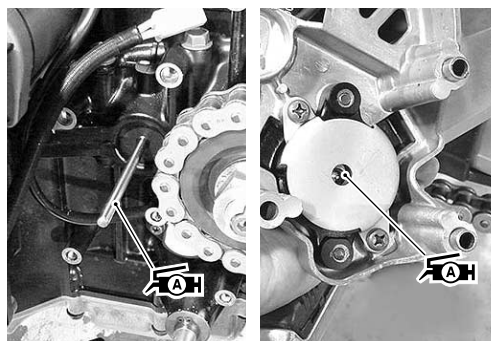
- Tighten the speed sensor rotor bolt ② to the specified torque.

 **Speed sensor rotor bolt: 20 N·m (2.0 kgf·m, 14.8 lb-ft)**



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

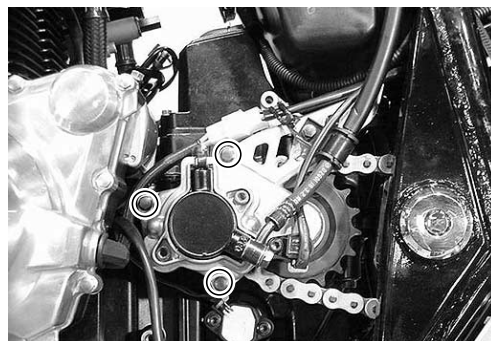
 **99000-25010: SUZUKI SUPER GREASE “A”**



CLUTCH RELEASE CYLINDER

- Install the clutch release cylinder housing.

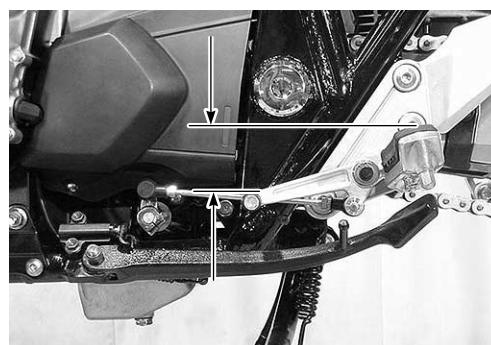
 **Clutch release cylinder housing bolt:**
10 N·m (1.0 kgf·m, 7.4 lb-ft)



GEARSHIFT LEVER

- Install the engine sprocket cover and the gearshift lever.

 **Gearshift lever height: 40 – 50 mm (1.6 – 2.0 in)**

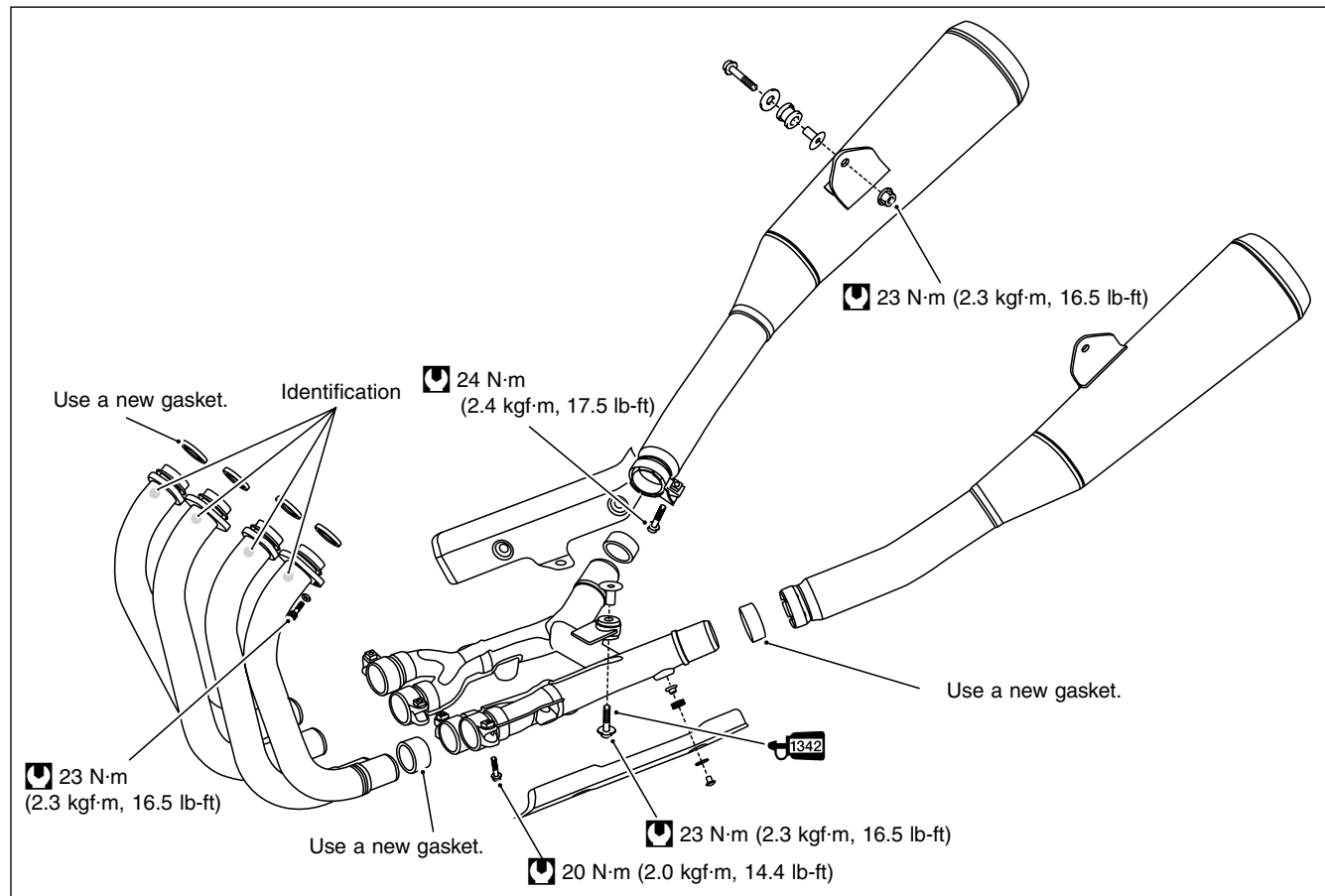


EXHAUST PIPE/ MUFFLER

- Install the exhaust pipes and mufflers as shown in illustration.

CAUTION







Replace the gaskets with new ones.

**OIL COOLER**

- Fit a new O-ring.
- Install the oil cooler hoses.

 **Oil cooler union bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)**



- Install and adjust the following items.
 - * Engine oil ( 2-13)
 - * Throttle valve synchronization ( 4-66)
 - * Throttle cable play ( 2-15)
 - * Idling adjustment ( 2-14)
 - * Drive chain slack ( 2-17)
 - * Wiring harness, cables and hoses ( 8-16 – 29)

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.

CYLINDER HEAD COVER

- Remove the PAIR reed valve cover and reed valve.

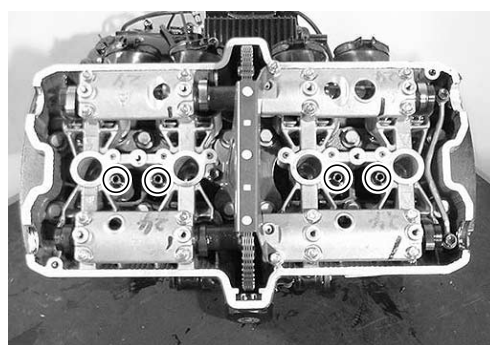
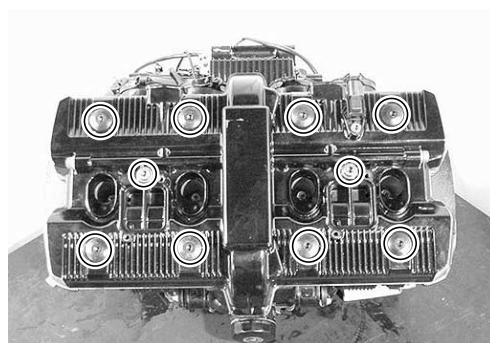
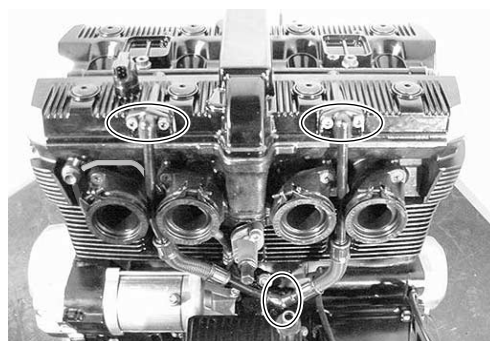
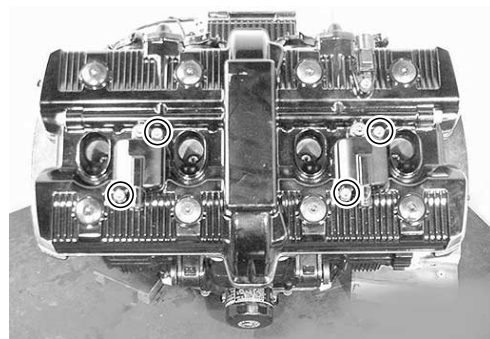
- Remove the oil hoses.

- Remove the spark plugs. (🔧 2-5)
- Remove the cylinder head cover.

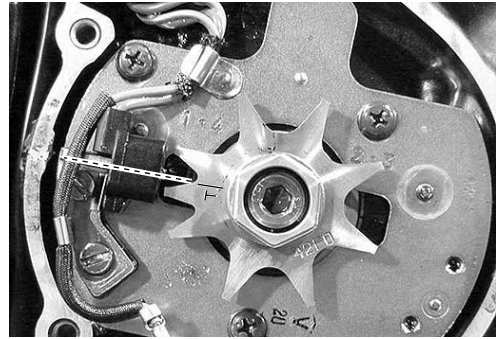
- Remove the dowel pins and O-rings.

SIGNAL GENERATOR COVER

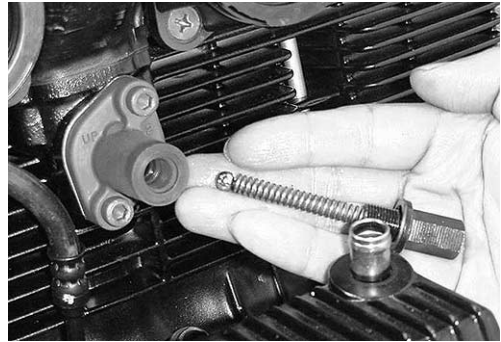
- Remove the signal generator cover and gasket.



- Set the #1 cylinder at TDC.
Turn the crankshaft to bring the “T” line on the rotor to the tip of signal generator, and the lines on camshaft facing outside.



- Remove the cam chain tension adjuster cap, the washer, the spring and the steel ball.
- Remove the cam chain tension adjuster.

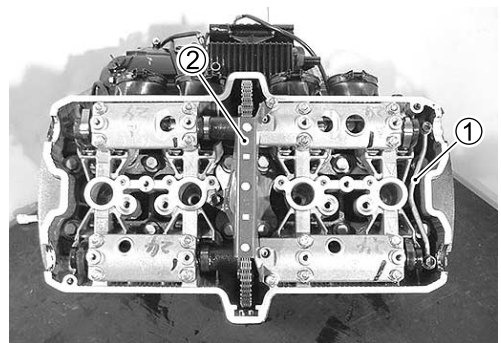


- Remove the oil pipe ①.
- Remove the cam chain guide ② and camshaft journal holders.

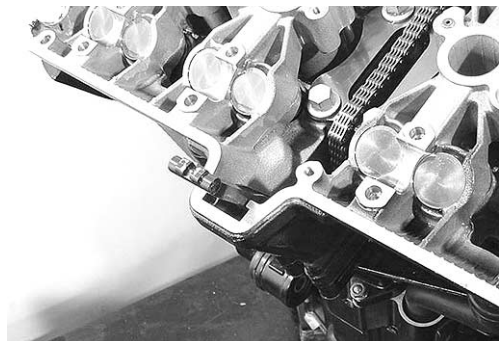
CAUTION

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

- Remove the intake and exhaust camshafts.

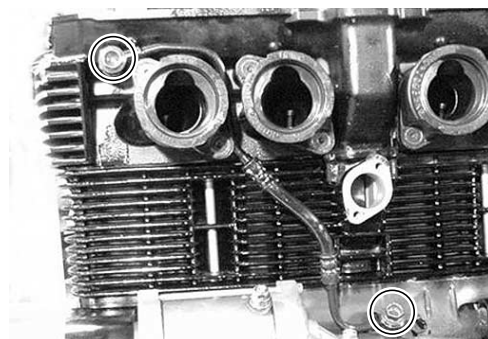


- Remove the cam chain guide.

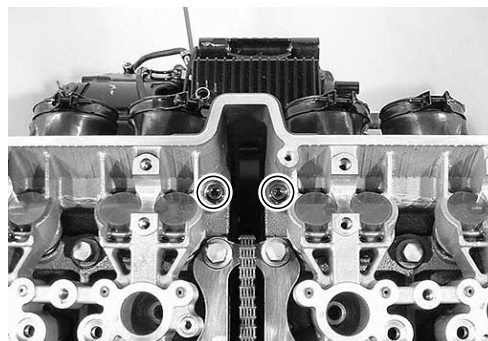
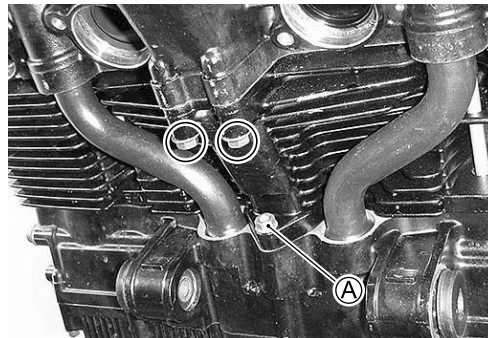


CYLINDER HEAD

- Remove the oil hose.



- Loosen the cylinder nut (A).
- Remove the cylinder head bolts (M6).

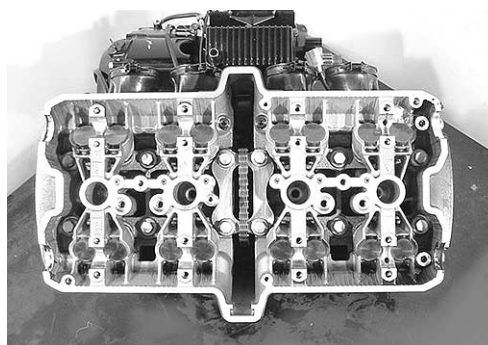


- Remove the cylinder head bolts and nuts.

NOTE:

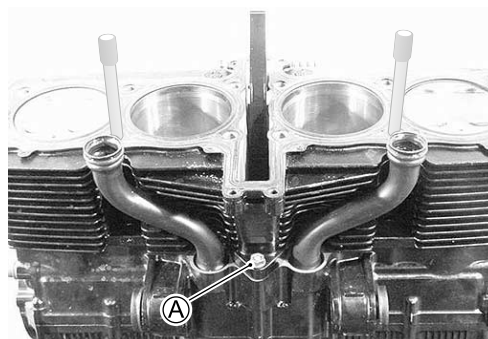
When loosening the cylinder head bolts and nuts, loosen each bolt little by little diagonally.

- Remove the cylinder head.

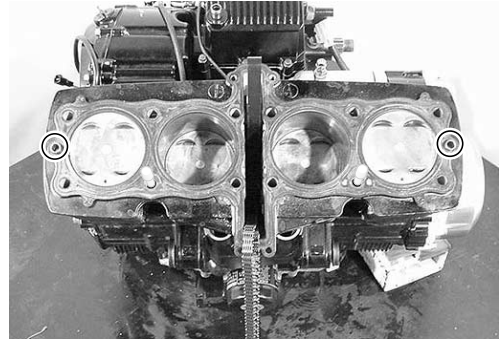


CYLINDER

- Draw out the oil return pipes (R, L).
- Remove the cylinder nut (A).



- Remove the cylinder head gasket and dowel pins.
- With both end of cylinder evenly risen, remove the cylinder.

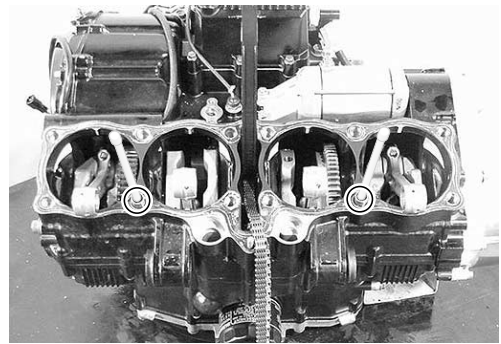


PISTON

- Put the rag under the piston so as not to drop the parts into the crankcase, remove the piston pin circlip.
- Draw out the piston pin, remove the piston.



- Remove the gasket and dowel pins.



OIL TEMPERATURE SENSOR

- Remove the oil temperature sensor ①.

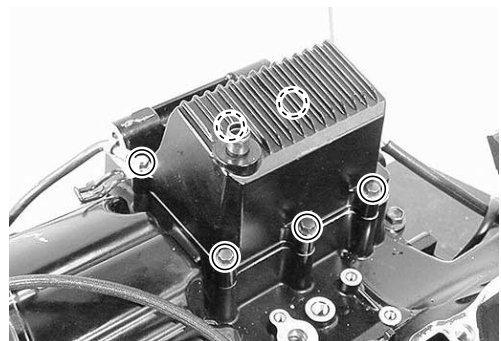
STARTER MOTOR

- Remove the starter motor.



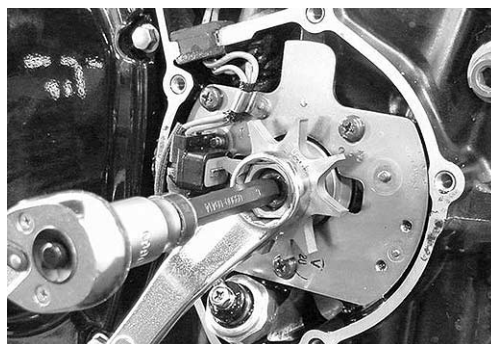
BREATHER COVER

- Remove the breather cover.

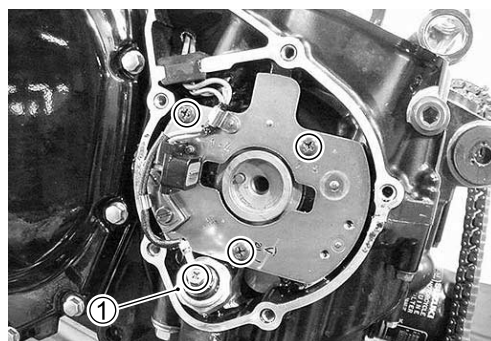


SIGNAL GENERATOR

- With the rotor held, remove the signal generator rotor bolt.



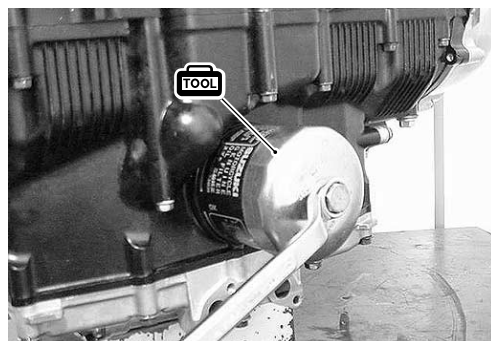
- Remove the signal generator.
- Remove the oil pressure switch ①.



OIL FILTER

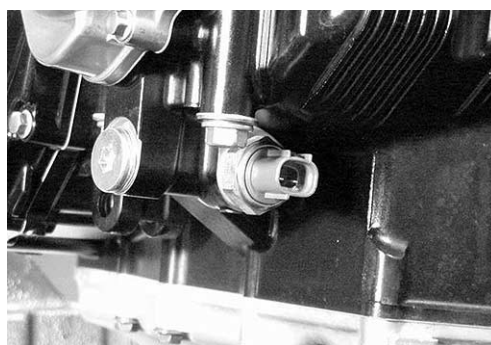
- Remove the oil filter.

 **09915-40610: Oil filter wrench**



COOLING FAN SWITCH

- Remove the cooling fan switch.

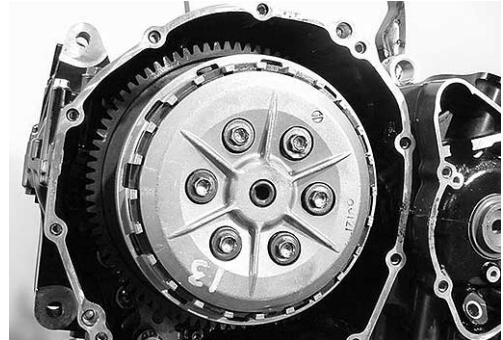


CLUTCH

- Remove the clutch cover.



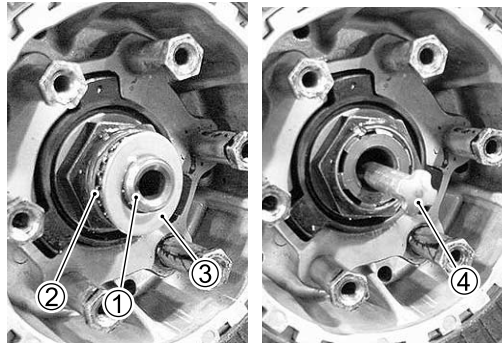
- With the clutch spring bolts removed, detach the clutch springs and clutch pressure plate.



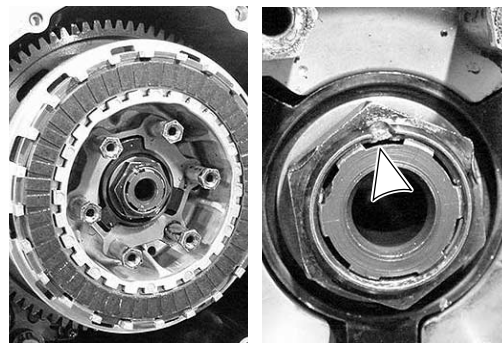
- Remove the clutch push piece ①, the bearing ② and the thrust washer ③.
- Remove the clutch push rod ④.

NOTE:

If it is difficult to pull out the push rod ④, use a magnetic hand or a wire.



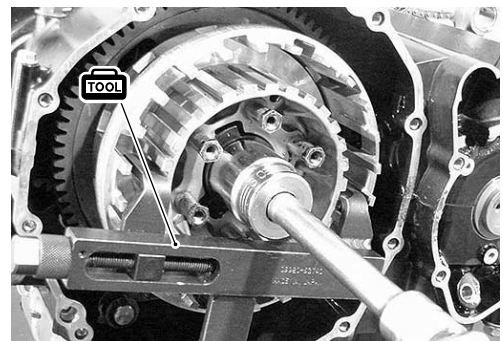
- Remove the clutch drive plates and the driven plates.
- Remove the spring washer and the spring washer seat.
- Unlock the clutch sleeve hub nut.



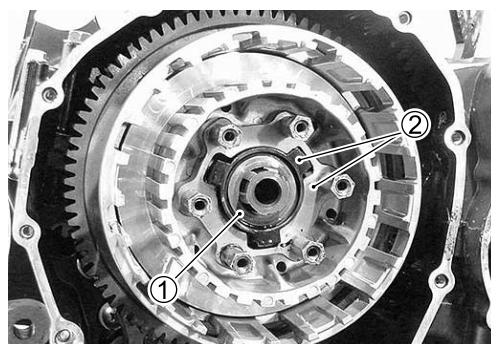
- Hold the clutch sleeve hub with the special tool.

TOOL 09920-53740: Clutch sleeve hub holder

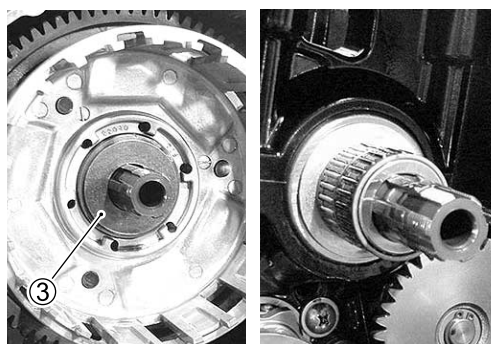
- Remove the clutch sleeve hub nut.



- Remove the wave washer ①, the back torque limiter ② and the clutch sleeve hub.



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



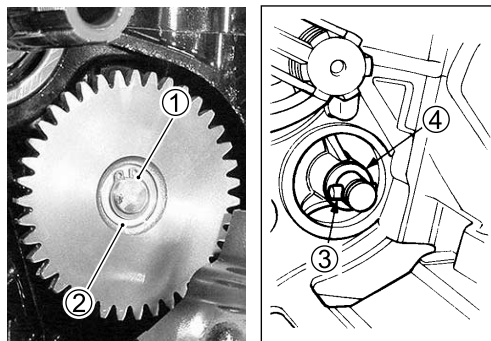
OIL PUMP DRIVEN GEAR

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

NOTE:

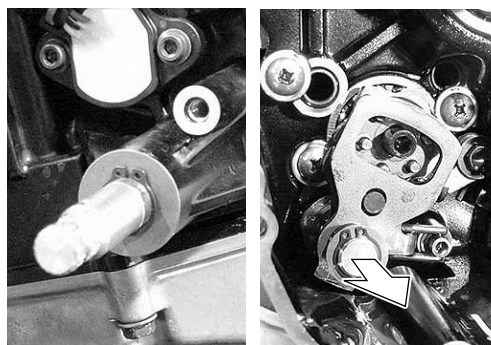
Do not drop the circlip, the pin and the washer into the crankcase.

- Remove the pin ③ and the washer ④.

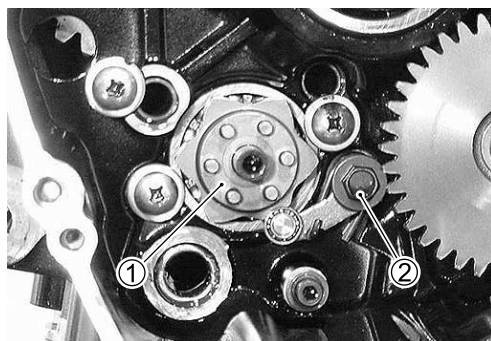


GEARSHIFT SHAFT

- With the circlip removed, remove the gearshift shaft assembly.

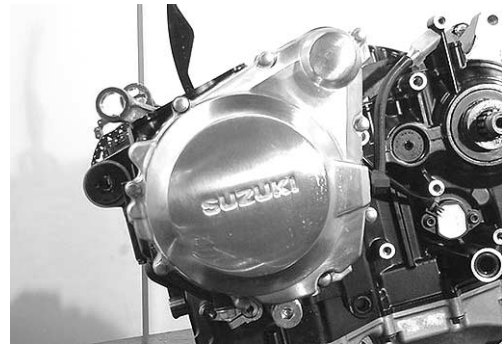


- Remove the gearshift cam plate ① and the gearshift cam stopper ②.

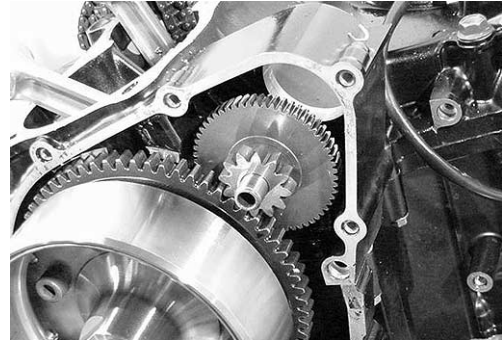


GENERATOR COVER

- Remove the generator cover.




- Remove the starter idle gear and its shaft.




GENERATOR ROTOR/STARTER CLUTCH

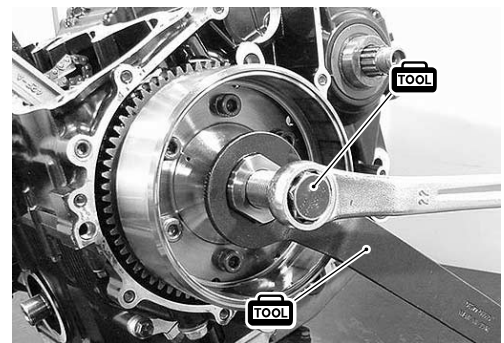
- Hold the generator rotor with the special tool and remove the generator rotor bolt.

 09930-44530: Rotor holder



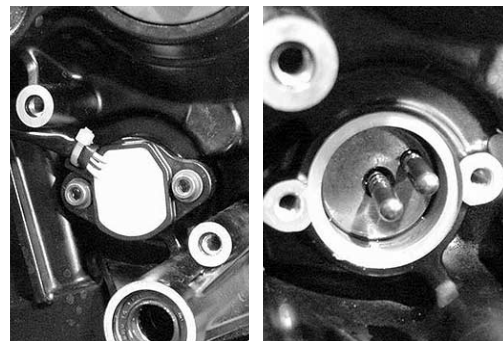
- Remove the generator rotor with the special tool.

 09930-30450: Rotor remover
09930-44530: Rotor holder



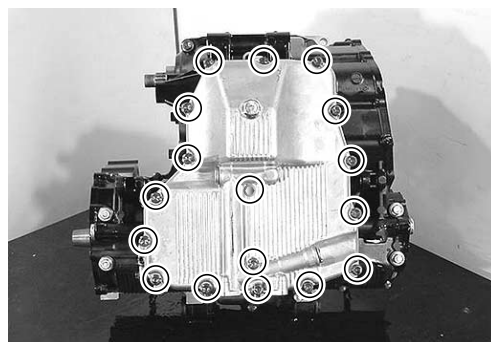
GEAR POSITION SENSOR

- Remove the gear position sensor.
- Remove the switch contacts and the springs.



OIL PAN

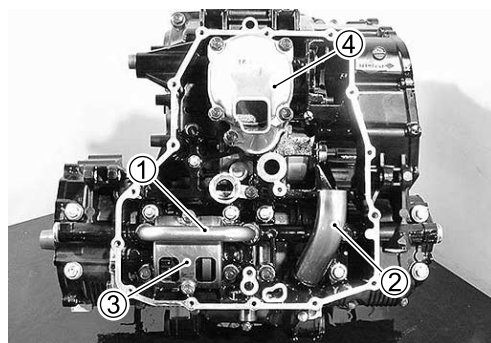
- Remove the oil pan.



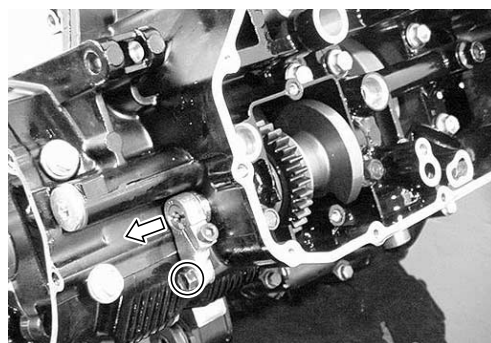
- Remove the oil pressure regulator.



- Remove the oil pipes, ① and ②.
- Remove the crank balancer guard ③.
- Remove the oil strainer ④ and its O-ring.

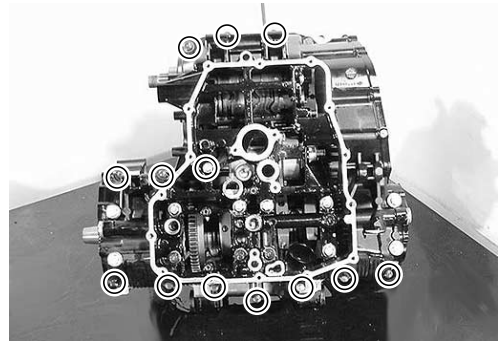
**CRANK BALANCER**

- With the balancer lever bolt removed, draw out the crank balancer shaft and remove the crank balancer.

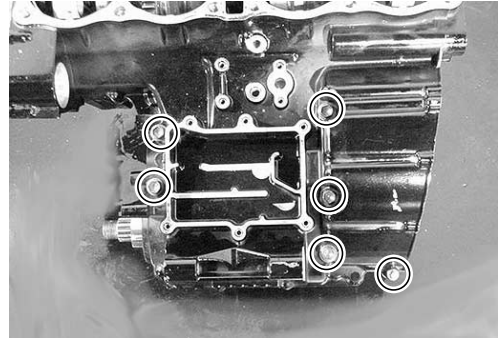


CRANK CASE

- Remove the lower crankcase bolts, (6 mm) and (8 mm).



- Remove the upper crankcase bolts, (6 mm) and (8 mm).

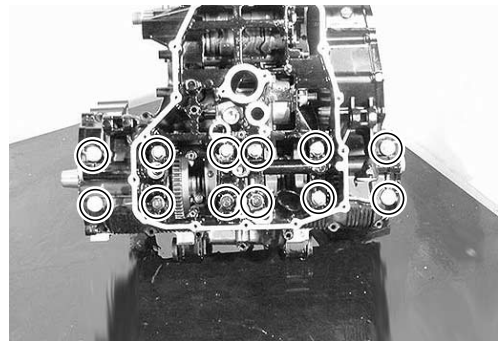


- Remove the crank journal bolts (9 mm).

NOTE:

Loosen the crank journal bolts in the descending order of the number on crankcase.

- Remove the lower crankcase.



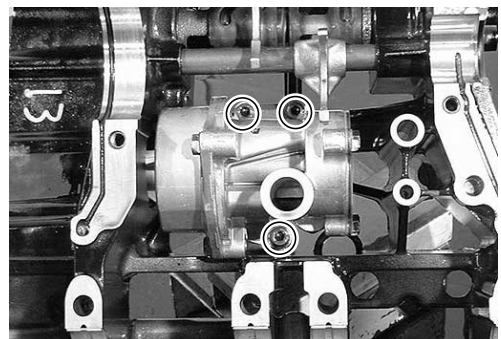
GEARSHIFT CAM AND GEARSHIFT FORK

- With the screws removed, draw out the gearshift fork shaft and remove the gearshift fork.

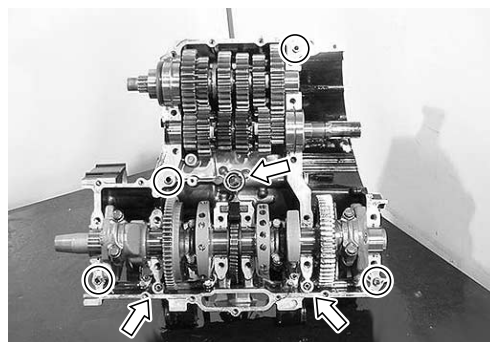


OIL PUMP

- Remove the oil pump.

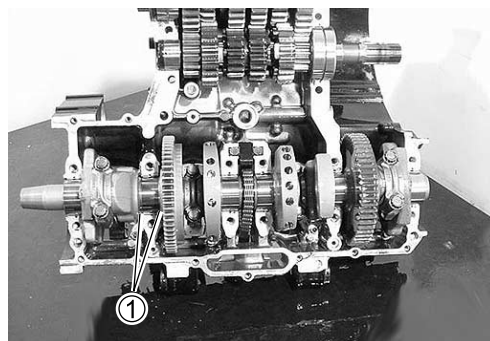


- Remove the O-rings and the dowel pins.



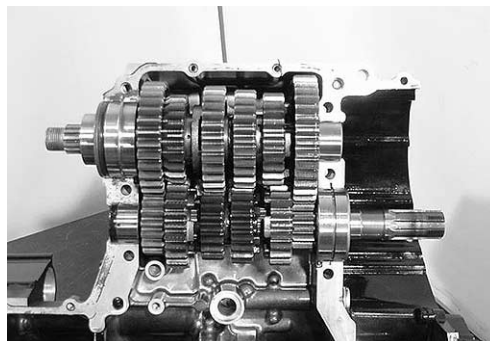
CRANKSHAFT

- Remove the crankshaft thrust bearings ①.
- Remove the crankshaft together with the cam chain.

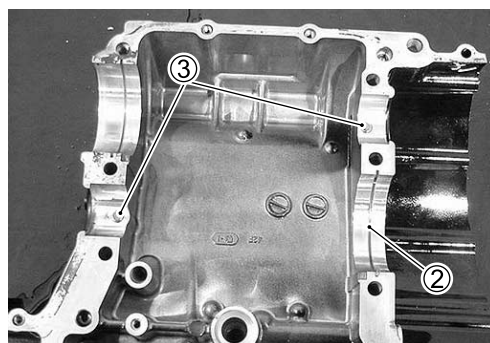


TRANSMISSION

- Remove the countershaft and the driveshaft.



- Remove the C-ring ② and the dowel pins ③.



ENGINE COMPONENTS INSPECTION AND SERVICE

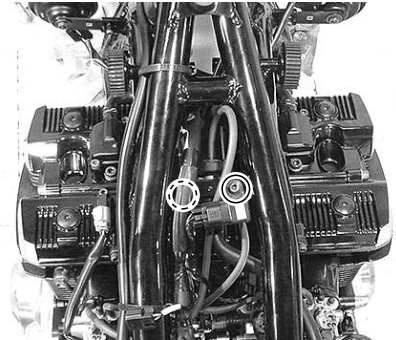
CAUTION

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.

PAIR VALVE

REMOVAL AND INSTALLATION

- Remove the fuel tank. (→ 4-32)
- Disconnect the PAIR valve hoses and remove the PAIR valve.



INSPECTION

PAIR REED VALVE HOSE

- Inspect the PAIR valve hose for damage and connection.

PAIR REED VALVE

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



PAIR CONTROL VALVE

- Inspect that air flows through the PAIR control valve air inlet port to the air outlet 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 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.

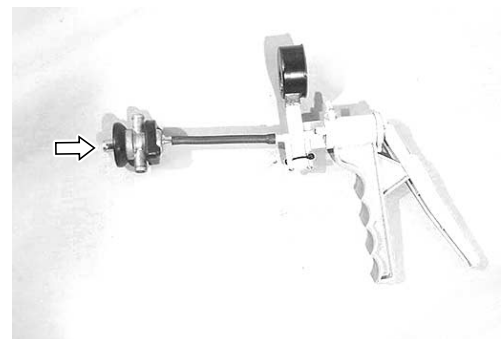
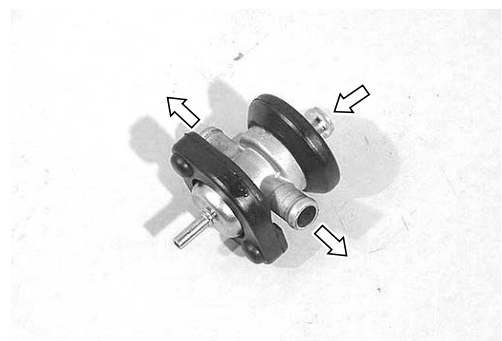
Negative pressure range

(Standard): 38.7 – 53.3 kPa (280 – 390 mmHg)

 09917-47010: Vacuum pump gauge

CAUTION

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



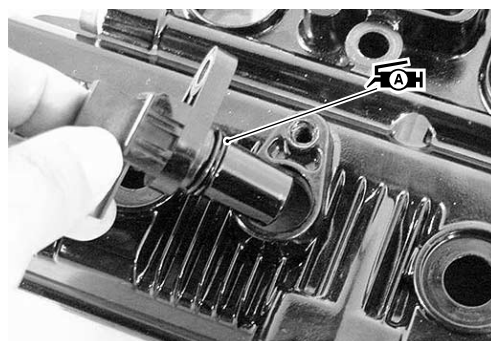
CYLINDER HEAD COVER

CAM POSITION SENSOR

- Inspect the cam position sensor for abnormal condition.
- With the grease applied to the O-ring, install the cam position sensor.

 **Cam position sensor bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)**

 **99000-25010: SUZUKI SUPER GREASE "A"**



OIL GALLERY PLUG

- Install the gasket and the oil gallery plug.

 **Oil gallery plug: 14 N·m (1.4 kgf·m, 10 lb-ft)**



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).

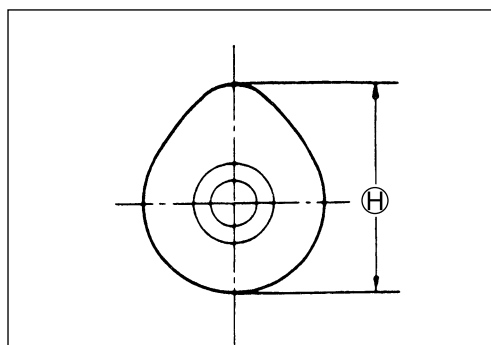


CAM WEAR

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


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

 **Cam height \oplus :**
Service Limit: (IN.) : 34.98 mm (1.378 in)
(EX.) : 33.88 mm (1.339 in)

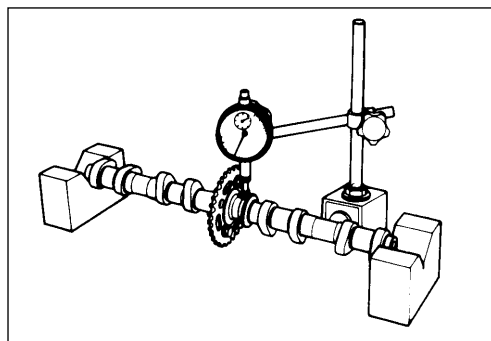


CAMSHAFT RUNOUT

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

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

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



CAMSHAFT JOURNAL WEAR

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

DATA Camshaft journal oil clearance:

Standard: (IN & EX): 0.032 – 0.066 mm
(0.0013 – 0.0026 in)

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

TOOL 09900-22301: Plastigauge
09900-22302: Plastigauge

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

Camshaft journal holder bolt: 10 N·m (1.0 kgf·m, 7.4 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.:

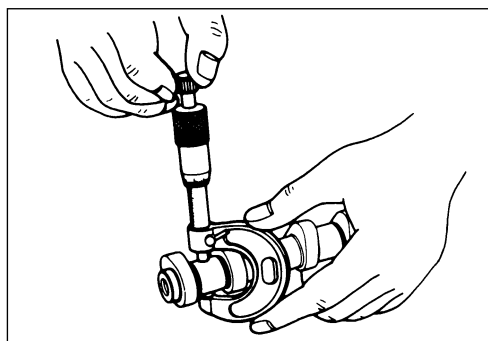
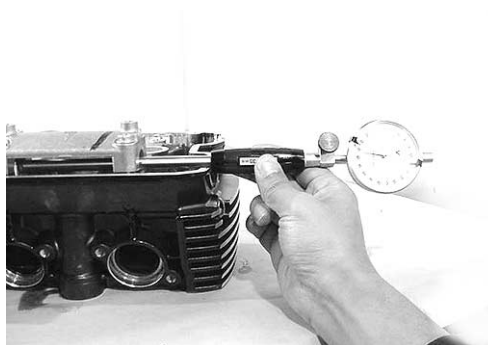
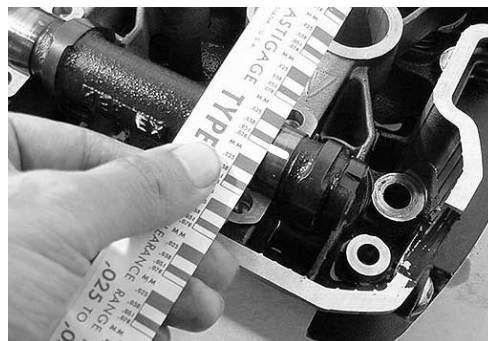
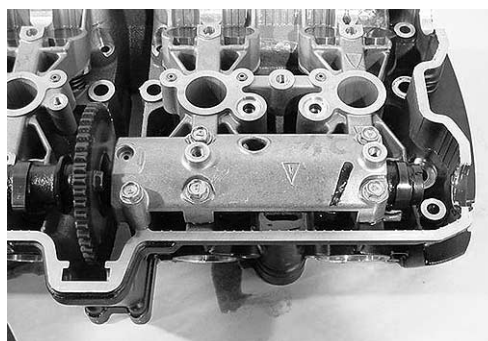
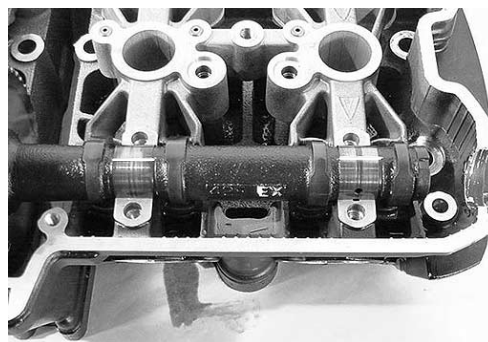
Standard: (IN & EX): 24.012 – 24.025 mm
(0.9454 – 0.9459 in)

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)

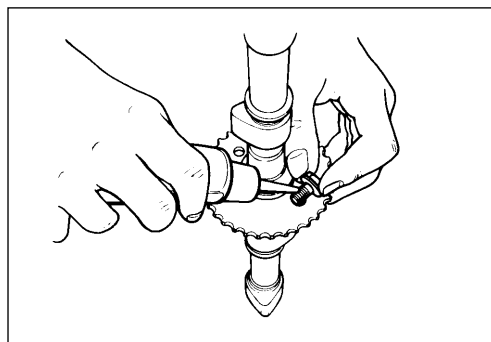


CAM SPROCKET

- Inspect the sprocket teeth for wear.
- If they are worn, replace the sprocket/camshaft assembly and cam chain as a set.
- Install the cam sprocket to the camshaft. (P3-75)
- Apply a small quantity of thread lock to the cam sprocket bolt and tighten it to the specified torque.

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

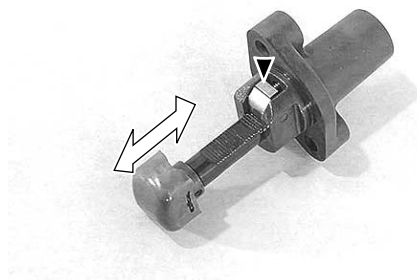
 **Cam sprocket bolt: 25 N·m (2.5 kgf·m, 18 lb-ft)**



CAM CHAIN TENSION ADJUSTER

INSPECTION

- Remove the cam chain tension adjuster cap bolt.
- Check that the push rod slides smoothly when releasing stopper.
- 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.

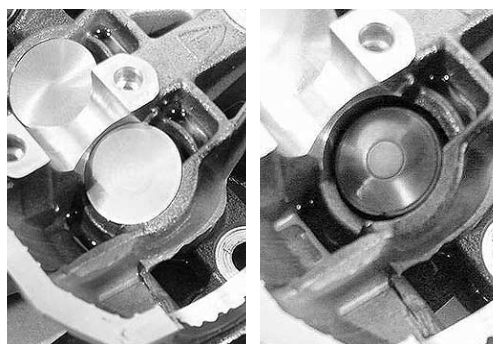
CYLINDER HEAD AND VALVE

VALVE AND VALVE SPRING DISASSEMBLY

- Remove the tappets and shims 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 ① from valve stem.



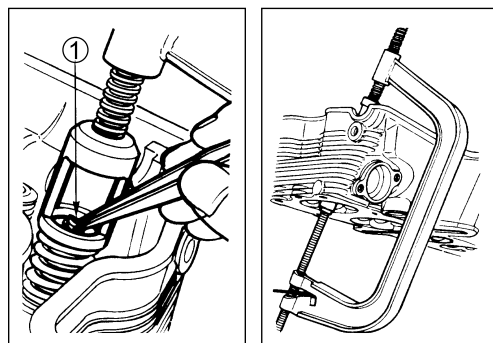
09916-14510: Valve lifter

09916-14521: Valve lifter attachment (24 mm)

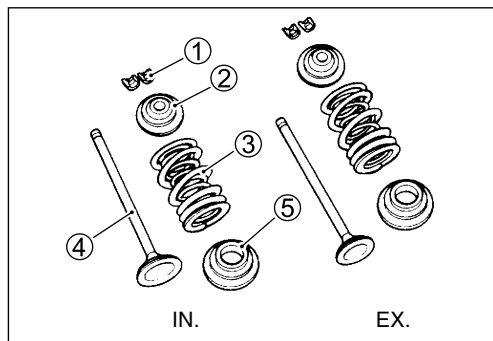
09916-84511: Tweezers

CAUTION

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



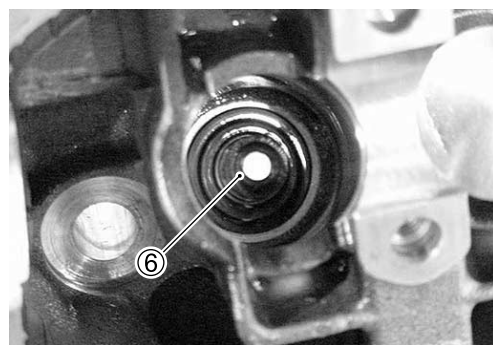
- Remove the valve spring retainer ② and valve springs ③.
- Pull out the valve ④ from the other side.
- Remove the spring seat ⑤.



- Remove the oil seal ⑥.

CAUTION

Do not reuse the removed oil seal.



CYLINDER HEAD DISTORTION

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

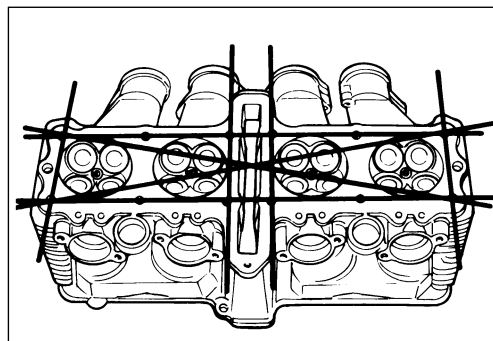


09900-20803: Thickness gauge



Cylinder head distortion:

Service Limit: 0.20 mm (0.008 in)



VALVE STEM 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.

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

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

VALVE STEM WEAR

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

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

DATA Valve stem O.D.:
Standard (IN) : 4.475 – 4.490 mm (0.1762 – 0.1768 in)
(EX): 4.455 – 4.470 mm (0.1754 – 0.1760 in)

NOTE:

If valve guides have to be removed for replacement after inspecting related parts, carry out the steps shown in valve guide servicing. (➡ 3-29)

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.

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

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

VALVE HEAD RADIAL RUNOUT

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

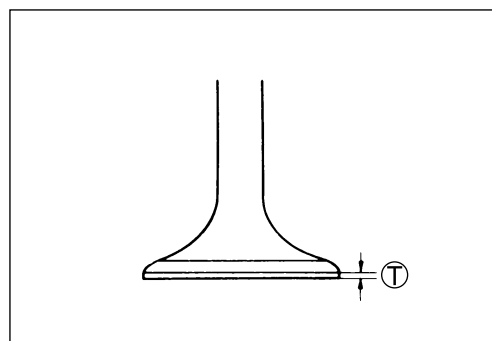
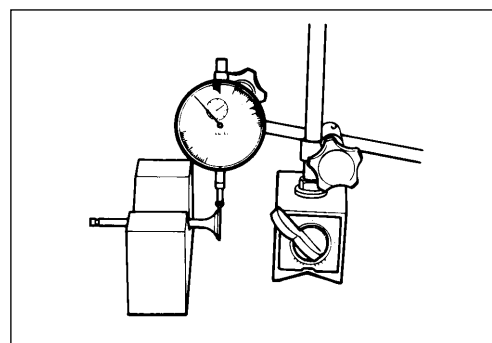
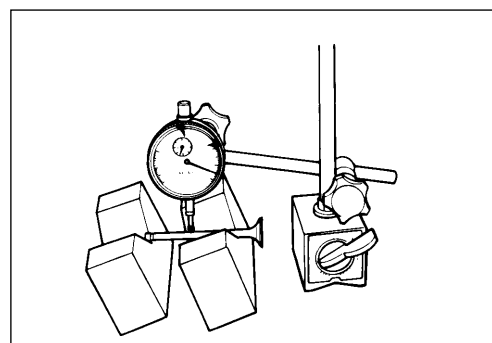
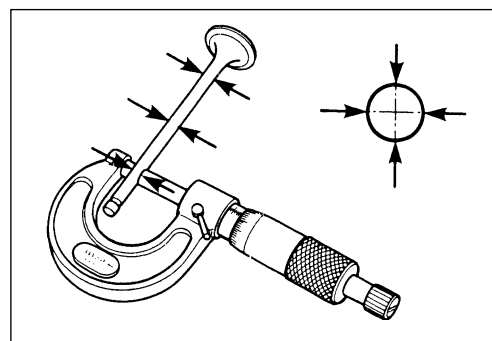
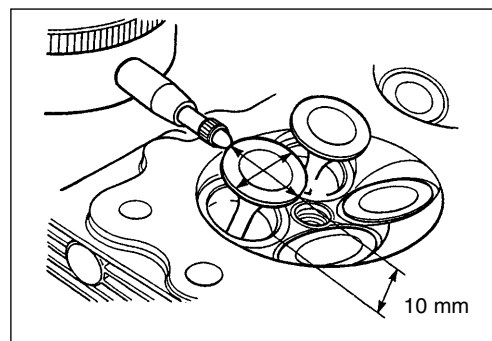
DATA Valve head radial runout:
Service Limit: 0.03 mm (0.001 in)

VALVE FACE WEAR

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

TOOL 09900-20102: Vernier calipers

DATA Valve head thickness \textcircled{T} : Service Limit: 0.5 mm (0.02 in)



VALVE SPRING

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

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



09900-20102: Vernier calipers



Valve spring free length (IN & EX): Service limit:

Inner: 38.6 mm (1.52 in)

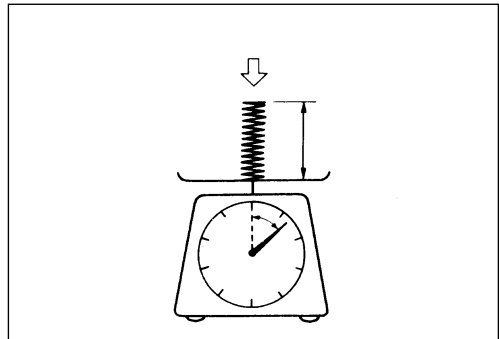
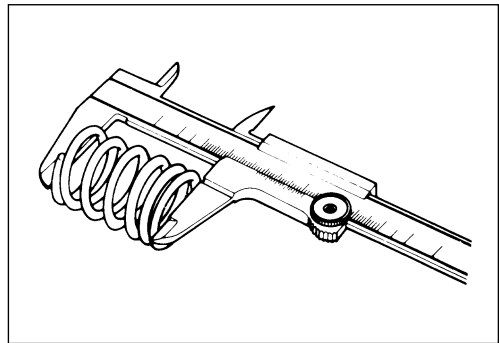
Outer: 40.6 mm (1.60 in)



Valve spring tension (IN & EX): Standard:

Inner: 49 – 59 N, 4.9 – 5.9 kgf/ 29.9 mm
(10.8 – 13.0 lbs/ 1.18 in)

Outer: 136 – 156 N, 13.6 – 15.6 kgf/ 33.4 mm
(30.0 – 34.4 lbs/ 1.31 in)



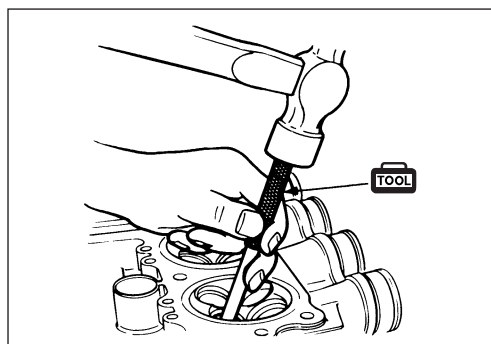
VALVE GUIDE SERVICING

- 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. 11115-18D72)

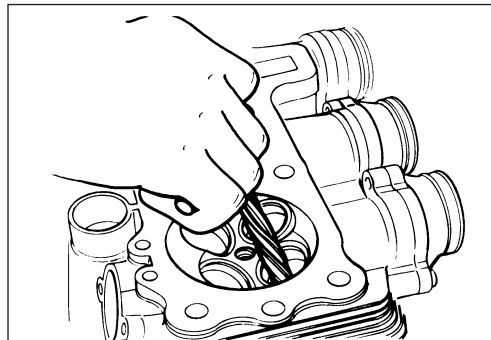


- Refinish the valve guide holes in cylinder head with the reamer and handle.

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

CAUTION

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



- Apply engine oil to the valve guide hole.
- Drive the valve guide into the hole using the special tool.

TOOL 09916-43210: Valve guide installer/remover

NOTE:

Install the valve guide until the ring **A** contacts with the cylinder head.

CAUTION

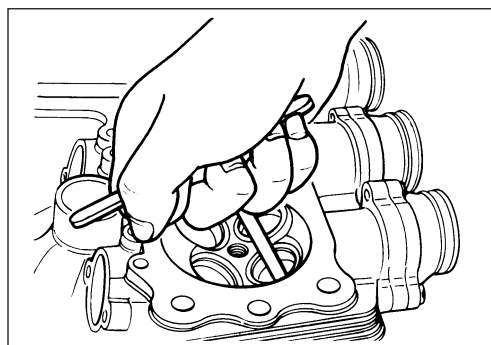
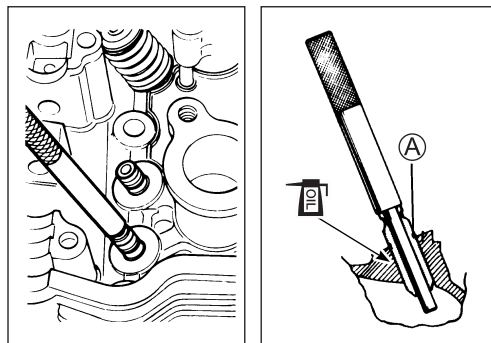
Failure to oil the valve guide hole before driving the new guide into place may result in a damaged guide or head.

- After installing the valve guides, refinish 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.

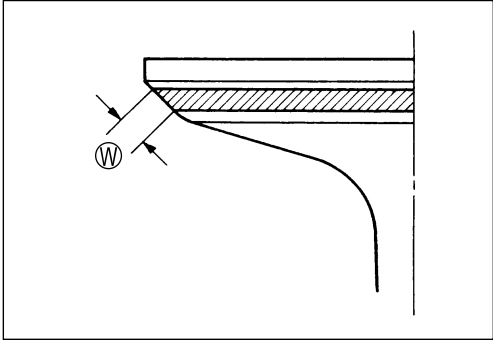
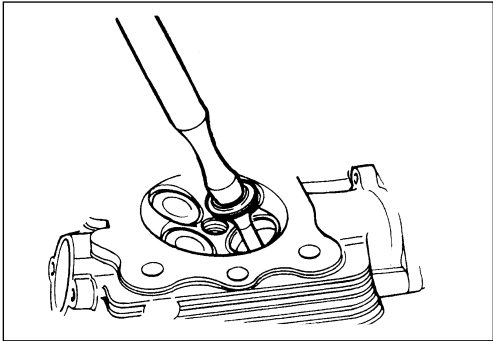
TOOL 09916-10911: Valve rapper set

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

DATA Valve seat width \textcircled{W} :

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

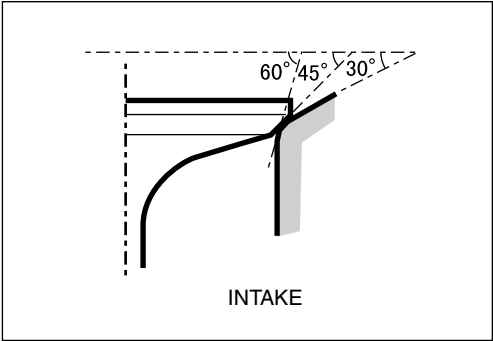
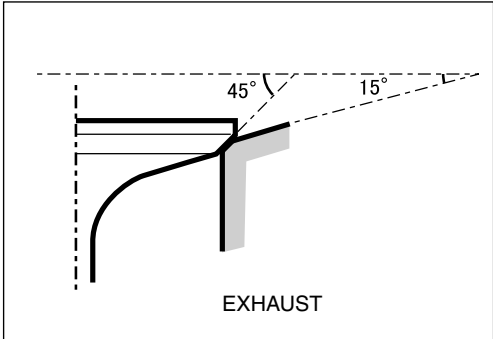
If the valve seat is out of specification, recut the seat.



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 | |



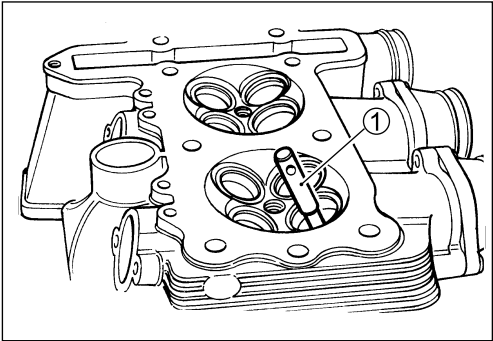
TOOL 09916-21111: Valve seat cutter set
09916-20630: Valve seat cutter (N-126)
09916-20640: Solid pilot (N-100-4.5)

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

CAUTION

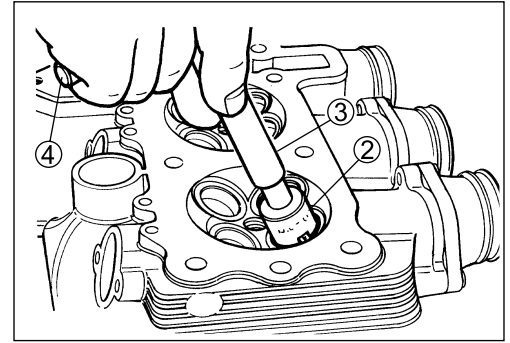
The valve seat contact area must be inspected after each cut.

- When installing the solid pilot ①, rotate it slightly.

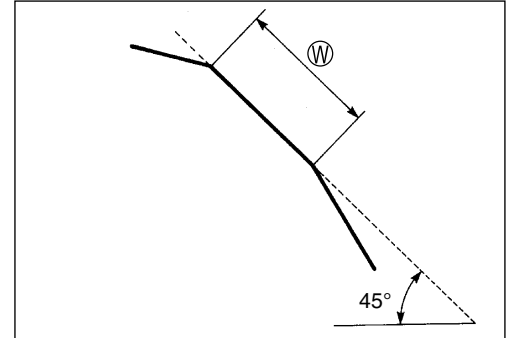


INITIAL SEAT CUT

- Install the 45° cutter ②, attachment ③ and T-handle ④.



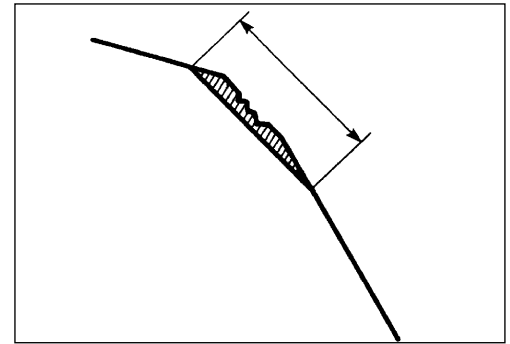
- Using the 45° cutter, descale and clean up the seat. Rotate the cutter one or two turns.
- Measure the valve seat width (W) after every cut.



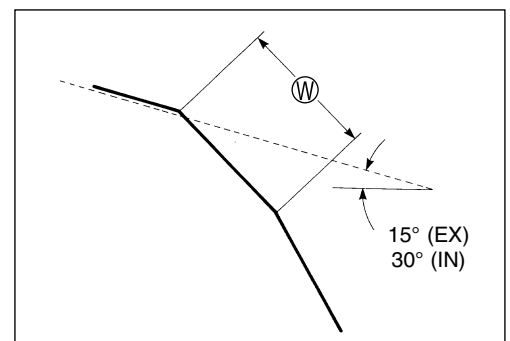
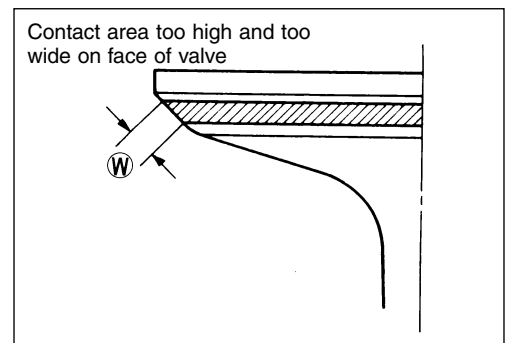
- If the valve seat is pitted or burned, use the 45° cutter to condition the seat some more.

NOTE:

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

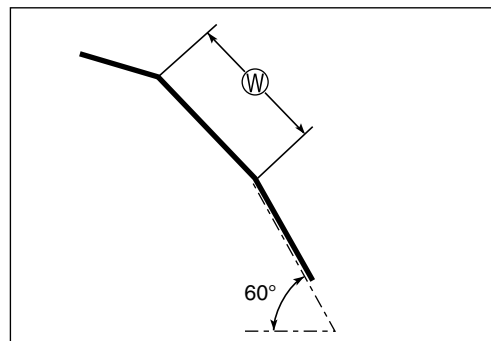
**TOP NARROWING CUT**

- If the contact area (W) 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.

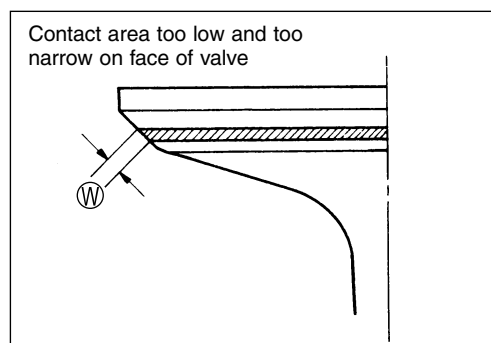


BOTTOM NARROWING CUT (IN.)

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

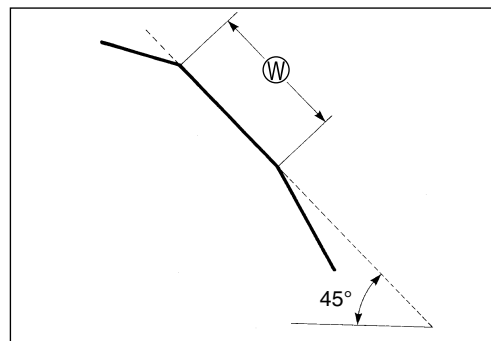
**FINAL SEAT CUT**

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

**NOTE:**

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

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

**CAUTION**

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

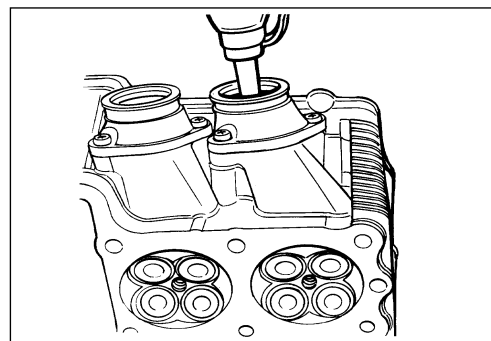
NOTE:

After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. (➡ 2-6)

- 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 AND VALVE SPRING REASSEMBLY

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

TOOL 09916-43210: Valve guide remover/installer

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 facing cylinder head.

Ⓐ: Small-pitch portion

Ⓑ: Large-pitch portion

- Put on the valve spring retainer, 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 ① to wedge in between retainer and stem. Be sure that the rounded lip Ⓐ of the cotter fits snugly into the groove Ⓑ in the stem end.

TOOL 09916-14510: Valve lifter

09916-14521: Valve lifter attachment (24 mm)

09916-84511: Tweezers

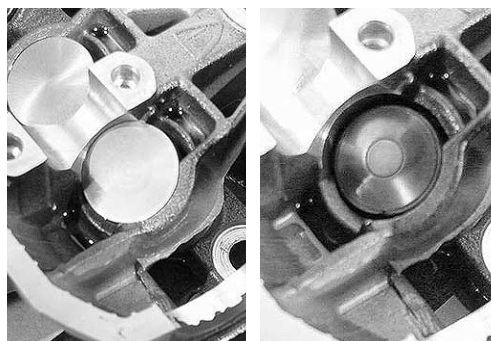
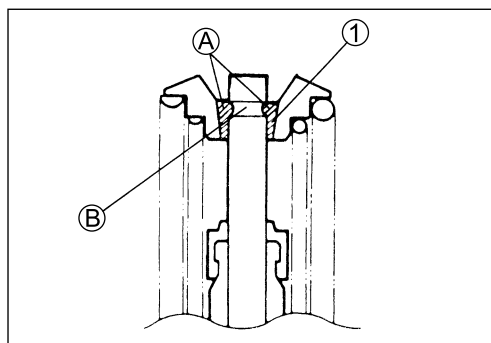
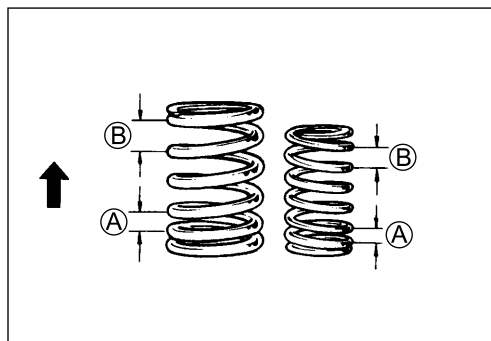
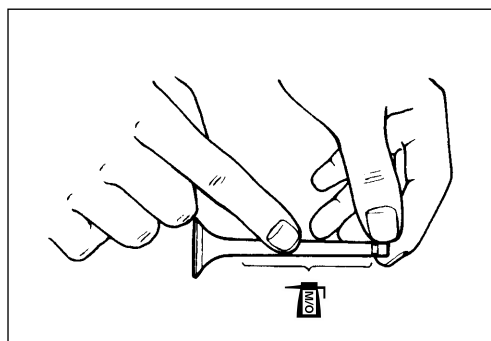
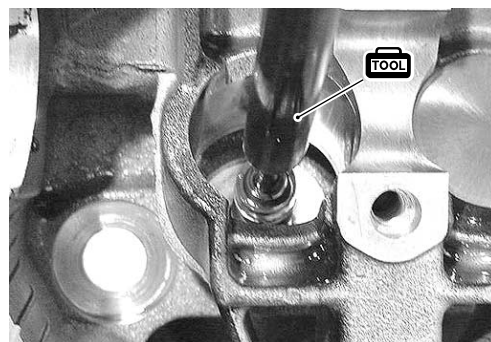
CAUTION

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.



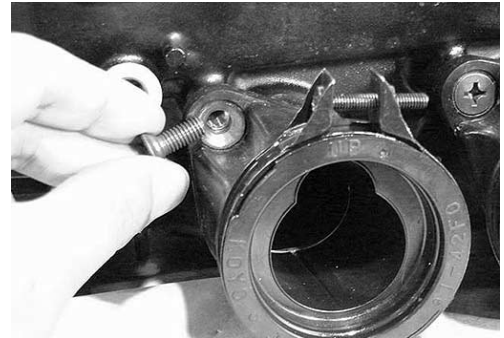
OIL GALLERY

- Install the washer and the oil gallery plug.


 **Oil gallery plug: 20 N·m (2.0 kgf·m, 15 lb·ft)**

**INTAKE PIPE**

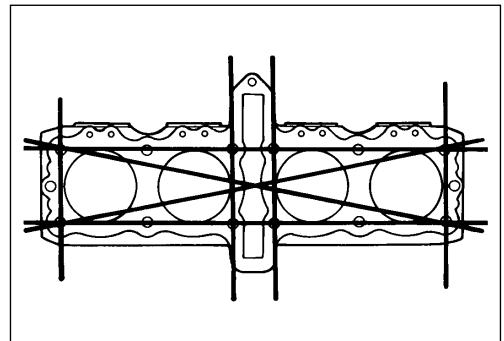
- Install the intake pipes.

**CYLINDER****CYLINDER DISTORTION**


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


 **09900-20803: Thickness gauge**

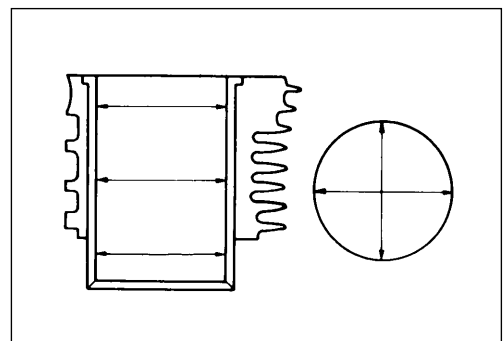
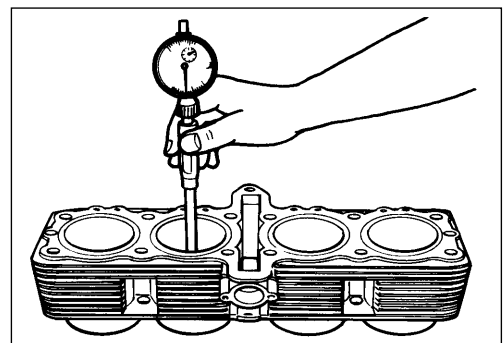
 **Cylinder distortion:**
Service Limit: 0.20 mm (0.008 in)

**CYLINDER BORE**

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

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

 **09900-20508: Cylinder gauge set**



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.



Piston diameter:

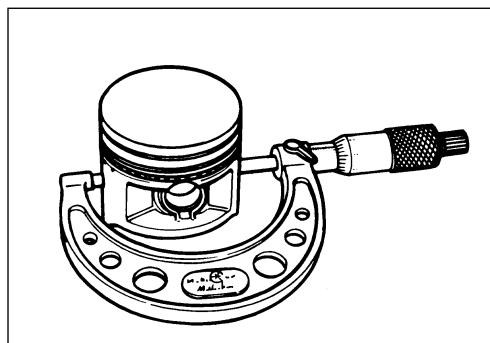
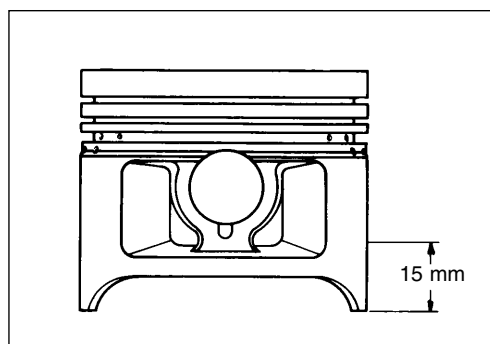
Standard: 80.980 – 80.995 mm (3.1882 – 3.1888 in)

Service Limit: 80.880 mm (3.1843 in)

at 15 mm (0.6 in) from the skirt end



09900-20204: Micrometer (75 – 100 mm)



PISTON TO CYLINDER CLEARANCE

- Subtract the piston diameter from the cylinder bore diameter.
- If the piston to cylinder clearance exceeds the service limit, replace the cylinder and the piston.



Piston to cylinder clearance:

Standard: 0.015 – 0.025 mm (0.00059 – 0.00098 in)

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 specification, replace the piston.



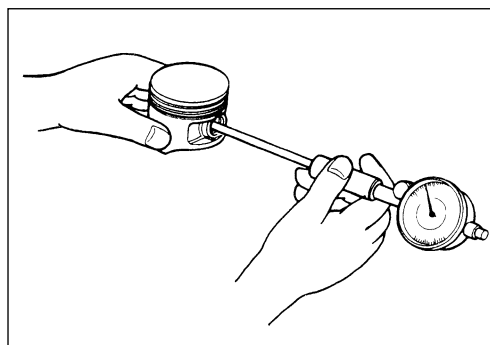
09900-20602: Dial gauge (1/1000 mm)

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



Piston pin bore I.D.:

Service Limit: 18.030 mm (0.7098 in)



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

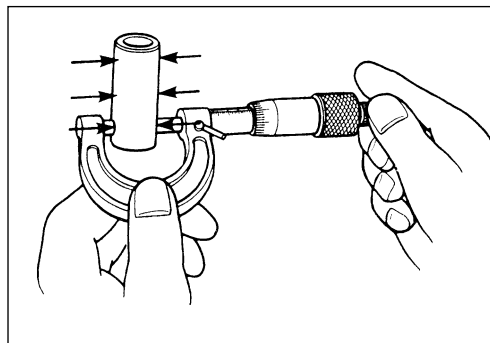


09900-20205: Micrometer (0 – 25 mm)



Piston pin O.D.:

Service Limit: 17.980 mm (0.7079 in)



PISTON RING TO GROOVE CLEARANCE

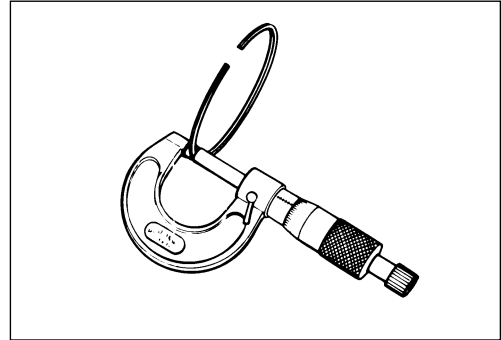
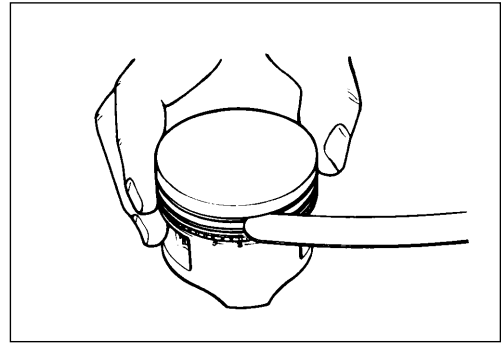
- Measure the side clearances of the 1st and 2nd piston rings using the thickness gauge.
- If any of the clearances exceed the limit, replace both the piston and piston rings.

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): 1.21 – 1.23 mm (0.0476 – 0.0484 in)
(2nd): 1.01 – 1.03 mm (0.0398 – 0.0406 in)
(Oil): 2.01 – 2.03 mm (0.0791 – 0.0799 in)

DATA Piston ring thickness:
Standard (1st): 1.175 – 1.190 mm (0.04626 – 0.04685 in)
(2nd): 0.970 – 0.990 mm (0.03819 – 0.03898 in)

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

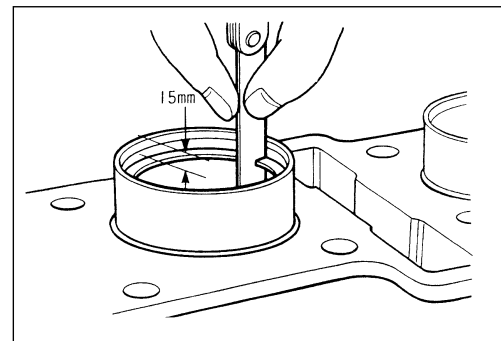
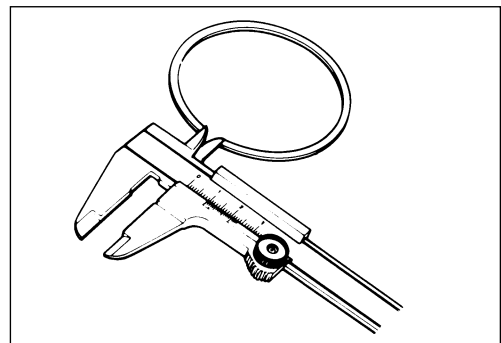
- Measure the piston ring free end gap using vernier calipers.
- Next, fit the piston ring squarely into the cylinder and measure the piston ring end gap using the thickness gauge.
- If any of the measurements exceed the service limit, replace the piston ring with a new one.

TOOL 09900-20102: Vernier calipers

DATA Piston ring free end gap:
Service Limit (1st) : 7.6 mm (0.30 in)
(2nd): 8.8 mm (0.35 in)

TOOL 09900-20803: Thickness gauge

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



CLUTCH

CLUTCH DRIVE PLATES INSPECTION

NOTE:

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

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

DATA Drive plate thickness:

Service Limit (No.1, 2 and 3): 2.42 mm (0.095 in)

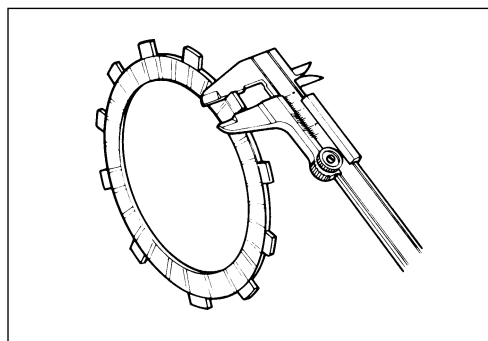
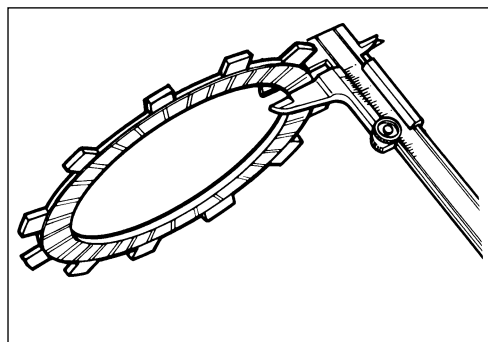
TOOL 09900-20102: Vernier calipers

- 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: (No.1, 2 and 3) 13.05 mm (0.5138 in)

TOOL 09900-20102: Vernier calipers



CLUTCH DRIVEN PLATES INSPECTION

NOTE:

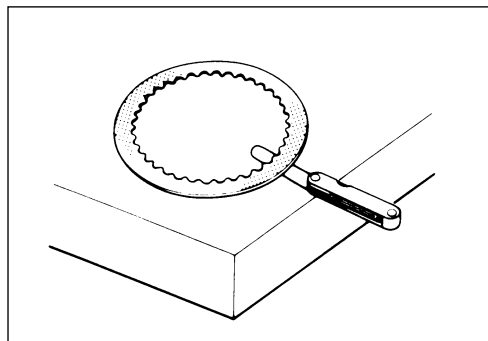
Wipe off engine oil from the clutch driven plates with a clean rag.

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

DATA Driven plate distortion (No.1, 2 and 3):

Service Limit: 0.10 mm (0.004 in)

TOOL 09900-20803: Thickness gauge



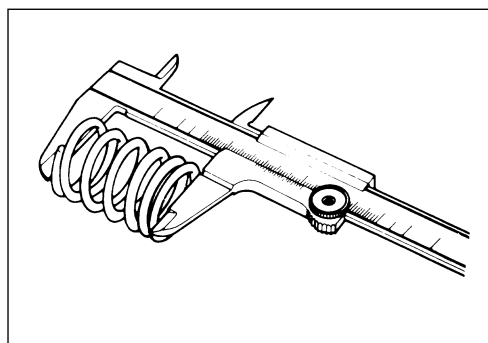
CLUTCH SPRING INSPECTION

- 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:

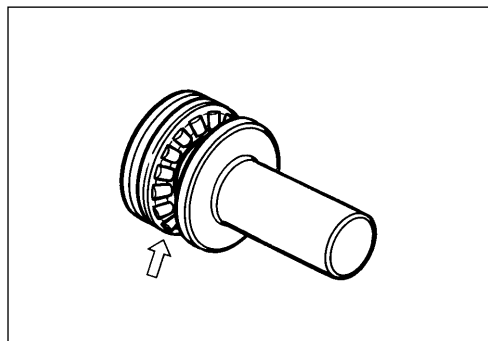
Service Limit: 73.9 mm (2.909 in)

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.




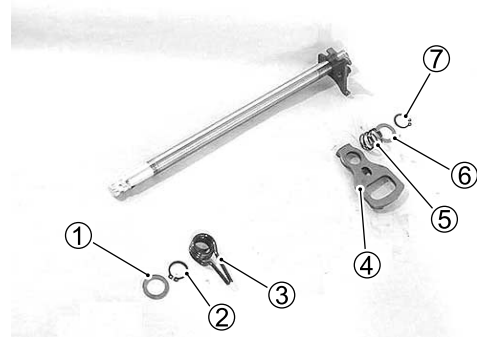
GEARSHIFT SYSTEM

GEARSHIFT SHAFT/GEARSHIFT ARM DISASSEMBLY

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

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

 **09900-06107: Snap ring pliers**




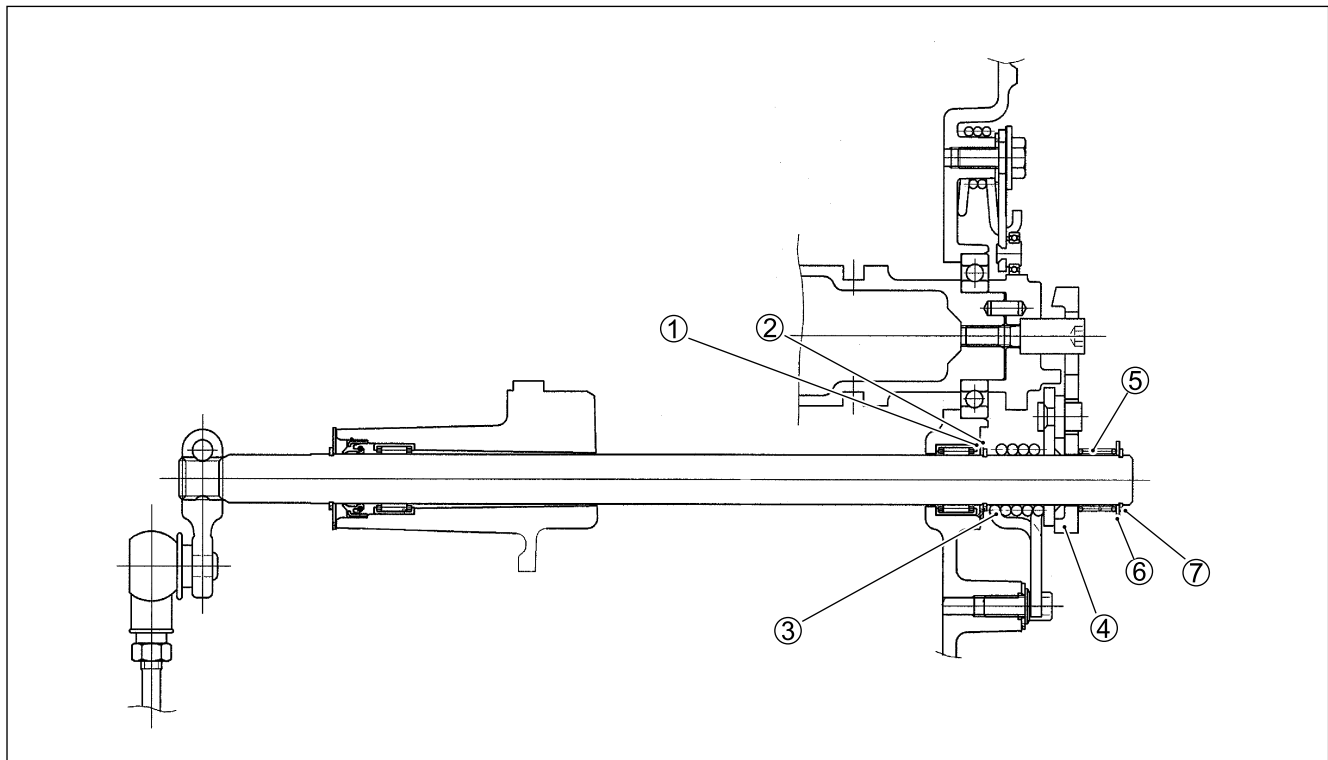
GEARSHIFT SHAFT/GEARSHIFT ARM INSPECTION

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

GEARSHIFT SHAFT/GEARSHIFT ARM REASSEMBLY

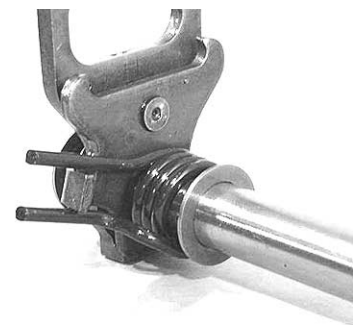
- Install the following parts to the gearshift shaft/gearshift arm as shown in the illustration.

 **09900-06107: Snap ring pliers**



NOTE:

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

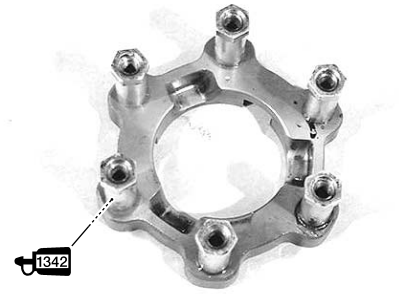


BACK TORQUE LIMITER

- Inspect the back torque limiter for wear or damage. If any defects are found, replace it with a new one.
- Apply a small quantity of thread lock to the clutch spring guide bolt and tighten it.

 **1342 99000-32050: THREAD LOCK “1342”**

 **Clutch spring guide bolt: 23 N·m (2.3 kgf·m, 17 lb-ft)**



GENERATOR

INSPECTION:  7-8

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, 7.4 lb-ft)**

NOTE:

Be sure to install the grommet to the generator cover.

STARTER CLUTCH

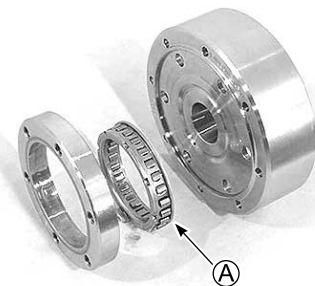
INSPECTION

- Inspect the starter clutch for abnormal wear or damage.
- Turn the starter driven gear and inspect the starter clutch for smooth movement.
- Inspect that the gear turns one direction only.
- If they are found to be damaged, replace them with new ones.

INSTALLATION

- Face the shoulder (A) of starter clutch to generator rotor, install them.

 **Starter clutch bolt: 25 N·m (2.5 kgf·m, 18 lb-ft)**



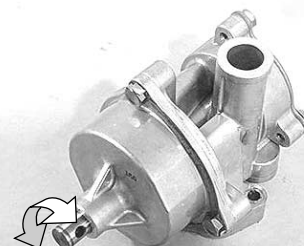
OIL PUMP

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.



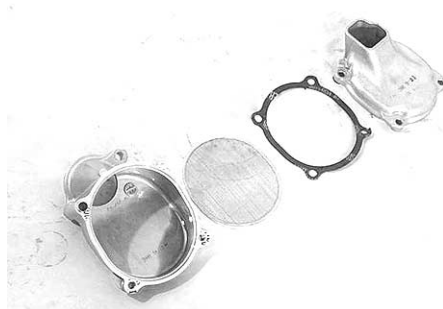
OIL PRESSURE REGULATOR

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



OIL STRAINER

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

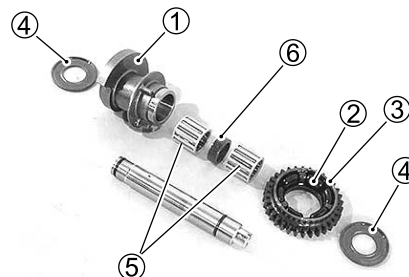


CRANK BALANCER

DISASSEMBLY

- Disassemble the crank balancer assembly.

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

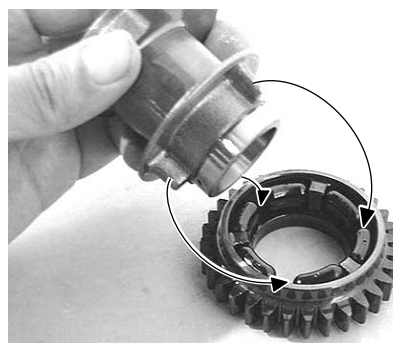


INSPECTION

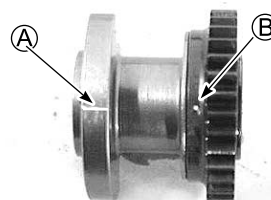
- Inspect the balancer shaft for wear or damage.
- Inspect the bearing, the damper and the gear for wear or damage.
- If there is anything usual, replace them with new ones.

REASSEMBLY

- Apply engine oil to each parts.
- Assemble the crank balancer as follow;
- Install the convex parts on crank balancer between dampers.



- Align the engraved line ① on the crank balancer with the punched mark ② on the balancer gear.



TRANSMISSION

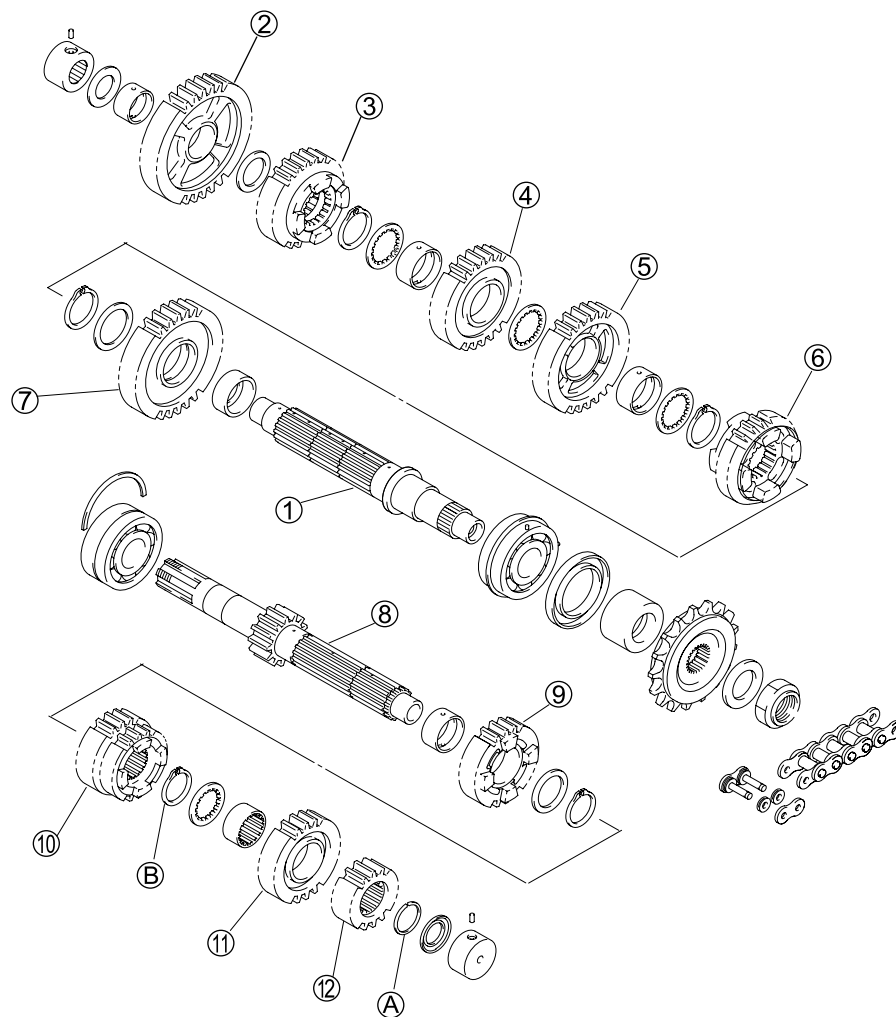
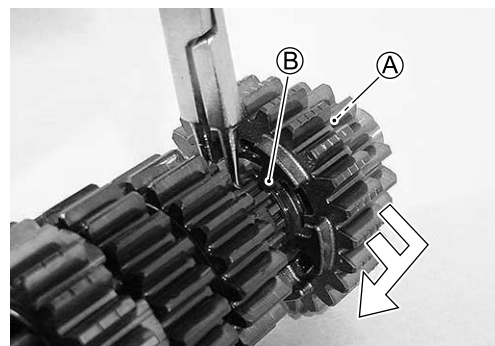
- Disassemble the countershaft and driveshaft.

Pay attention to the following points:



09900-06104: Snap ring pliers

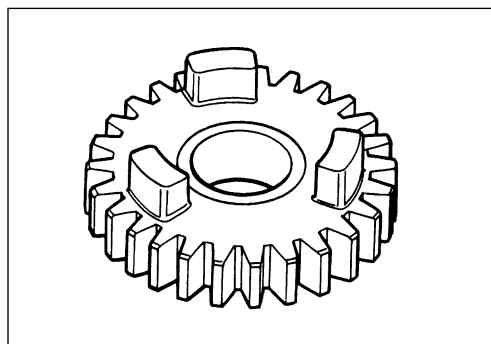
- Slide the 6th (TOP) drive gear circlip **B** from its groove towards the 3rd/4th drive gears.
- Slide the 2nd drive gear towards the 6th (TOP) drive gear, then remove the 2nd drive gear circlip **A**.



- ① Driveshaft
- ② 1st driven gear
- ③ 5th driven gear
- ④ 4th driven gear
- ⑤ 3rd driven gear
- ⑥ 6th driven gear
- ⑦ 2nd driven gear
- ⑧ Countershaft / 1st drive gear
- ⑨ 5th drive gear
- ⑩ 3rd/4th drive gear
- ⑪ 6th drive gear
- ⑫ 2nd drive gear

GEAR

- Inspect the teeth of gear for wear, scratch or damage.
- Inspect the dock of gear for wear or damage.
- If there are anything unusual, replace them with new ones.

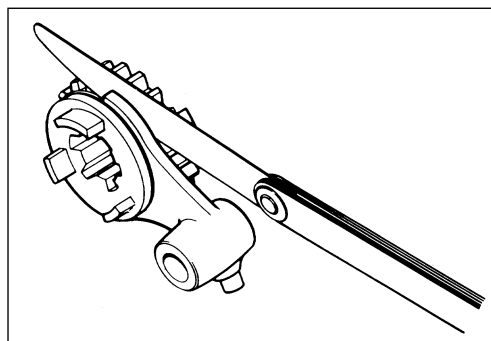
**GEARSHIFT FORK TO GROOVE CLEARANCE**

- 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:
Standard: 0.1 – 0.3 mm (0.004 – 0.012 in)
Service Limit: 0.50 mm (0.020 in)

TOOL 09900-20803: Thickness gauge

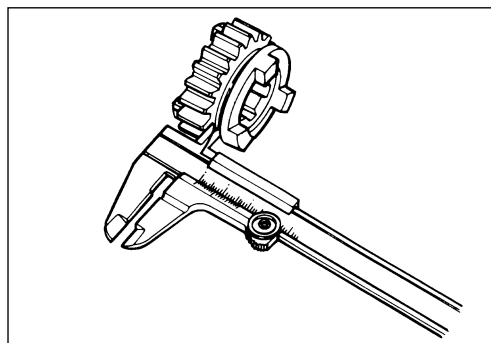
- If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.

**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)

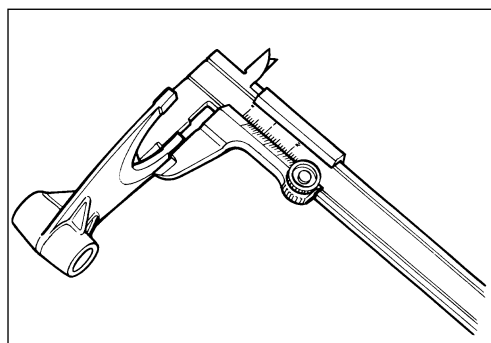
TOOL 09900-20102: Vernier calipers

**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

**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.
- * Before installing the oil seal, apply grease to oil seal.

FA 99000-25010: SUZUKI SUPER GREASE “A”

CAUTION

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

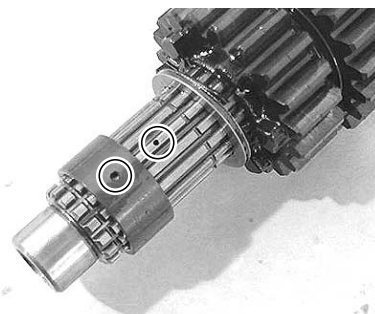
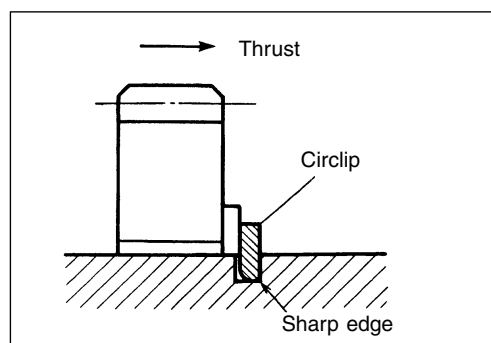
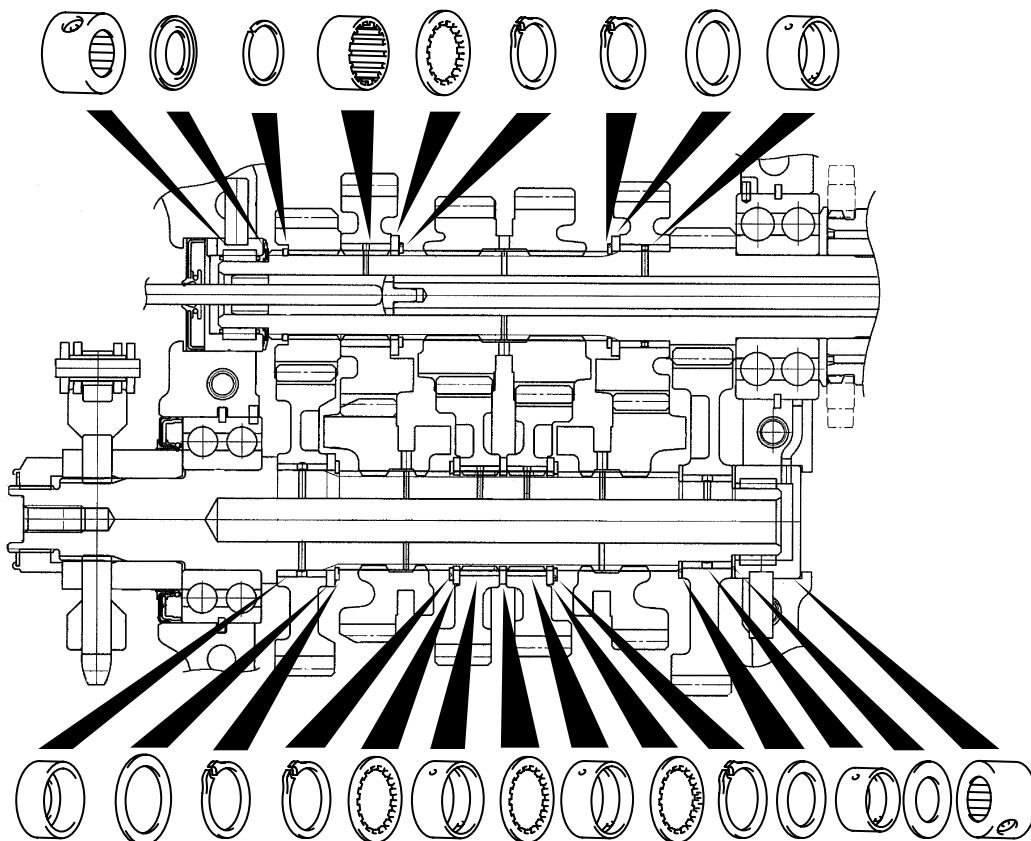
NOTE:

When reassembling the transmission, attention must be given to the locations and positions of washers and circlips. The cross sectional view shows the correct position of the gears, bushings, washers and circlips.

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

CAUTION

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

**TRANSMISSION PARTS LOCATION**

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.



09900-20606: Dial gauge (1/100 mm, 10 mm)

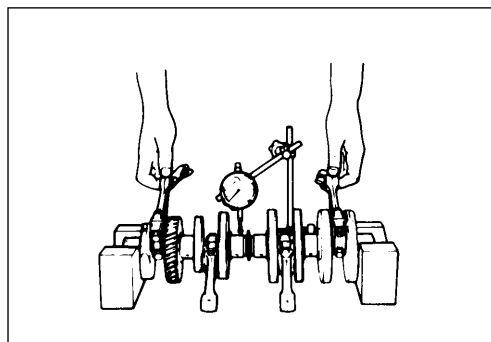
09900-20701: Magnetic stand

09900-21304: V-block (100 mm)



Crankshaft runout:

Service Limit: 0.05 mm (0.002 in)



CONROD SMALL END I.D.

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



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

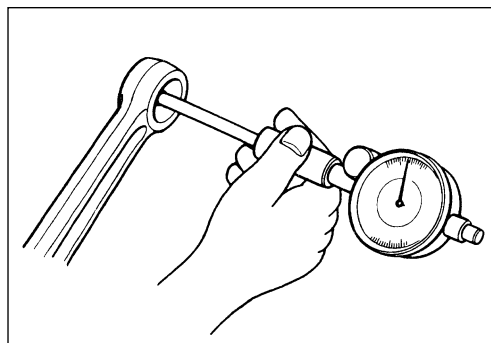
09900-22401: Small bore gauge (10 – 18 mm)



Conrod small end I.D.:

Service Limit: 18.040 mm (0.7102 in)

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



CONROD BIG END SIDE CLEARANCE

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



Conrod big end side clearance:

Service Limit: 0.30 mm (0.012 in)



09900-20803: Thickness gauge



Conrod big end width:

Standard: 20.95 – 21.00 mm (0.8248 – 0.8268 in)



09900-20205: Micrometer (0 – 25 mm)

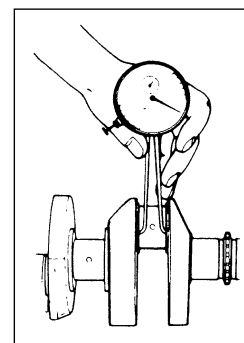
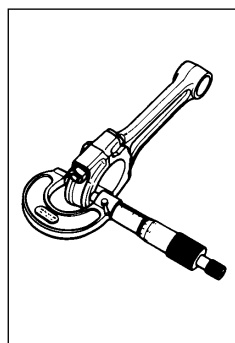
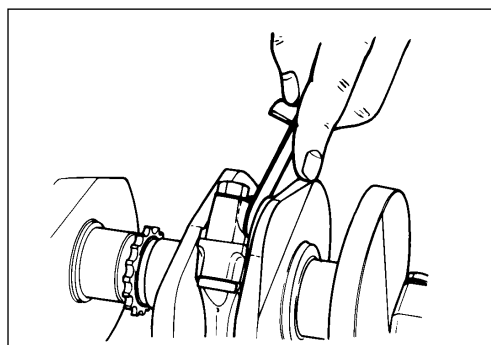


Crank pin width:

Standard: 21.10 – 21.15 mm (0.8307 – 0.8327 in)



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

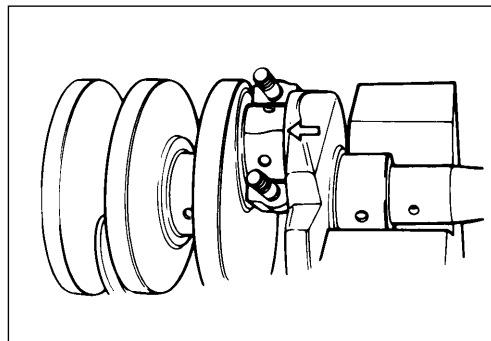


CONROD-CRANK PIN BEARING INSPECTION

- Inspect the bearing surfaces for any sign of fusion, pitting, burn, or flaws. If any, replace them with a specified set of bearings.
- If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

**CONROD-CRANK PIN BEARING SELECTION**

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

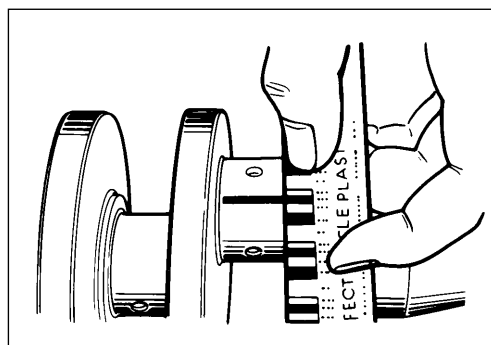
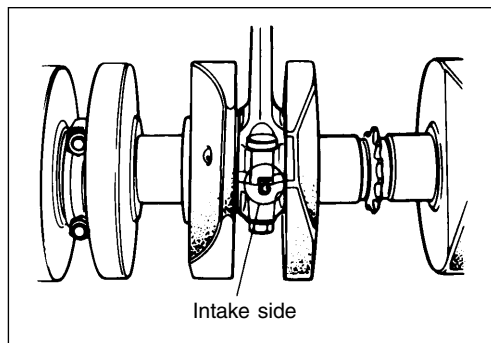
**09900-22301: Plastigauge**

- Tighten the conrod cap bolts to the specified torque, in two stages. (↗ 3-48)

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.

**Conrod big end oil clearance:****Standard: 0.032 – 0.056 mm (0.0013 – 0.0022 in)****Service Limit: 0.080 mm (0.0031 in)**

- Check the corresponding conrod I.D. code number ① stamped on the conrod.
- Check the corresponding crank pin O.D. code number ② stamped on the crankshaft.

DATA Bearing selection table

| | Code | Crank pin O.D. ② | | |
|---------------|------|------------------|-------|--------|
| | | 1 | 2 | 3 |
| Conrod | 1 | Green | Black | Brown |
| I.D. ① | 2 | Black | Brown | Yellow |

DATA Conrod I.D.

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

DATA Crank pin O.D.

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

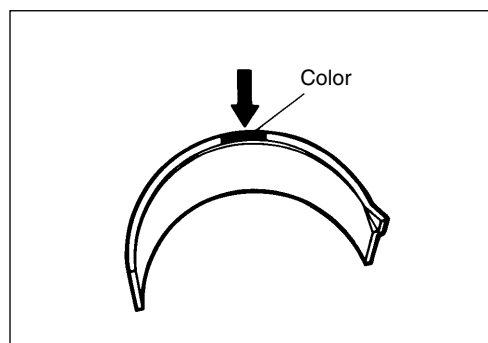
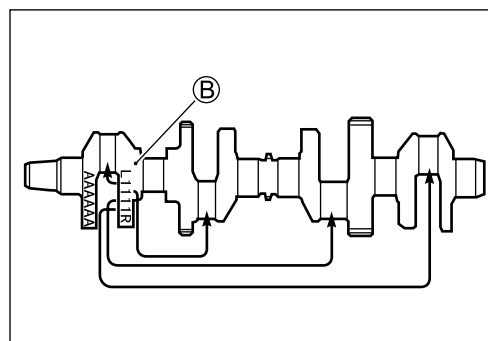
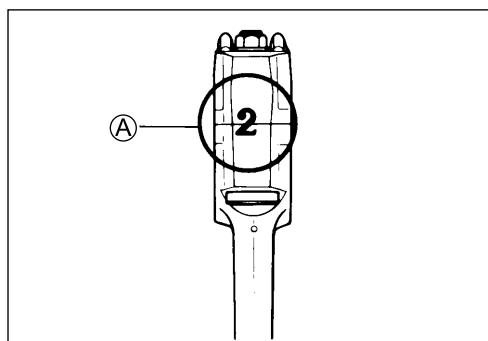
TOOL 09900-20202: Micrometer (25 – 50 mm)

DATA Bearing thickness

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

CAUTION

The bearings must be replaced as a set.



INSTALLATION

- When fitting the bearing to the bearing cap and conrod, be sure to fix the stopper part ① first and press in the other end.

CAUTION

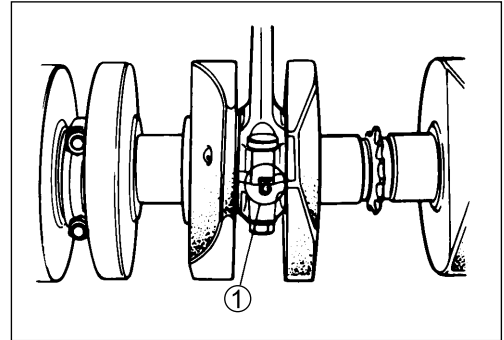
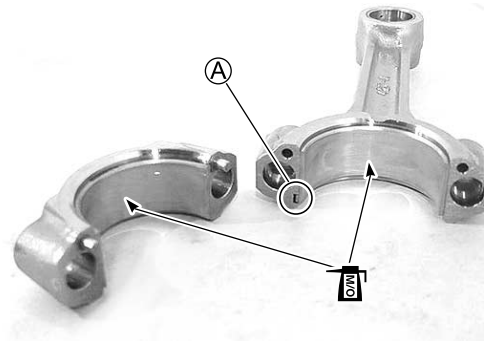
Be sure to clean the conrod big end.

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



Molybdenum oil

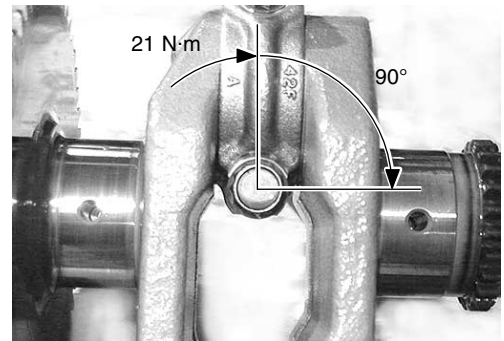
- When fitting the conrods on the crankshaft, make sure that I.D.code ① on each conrod faces toward intake valve side.



- Tighten the conrod cap bolt as following two steps.



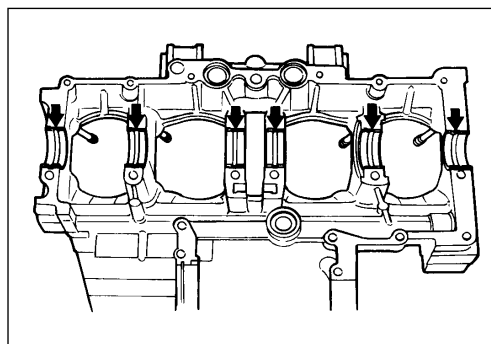
**Conrod cap bolt: Initial: 21 N·m (2.1 kgf·m, 15 lb-ft)
Final: 90°**



CRANKSHAFT JOURNAL BEARING

INSPECTION

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



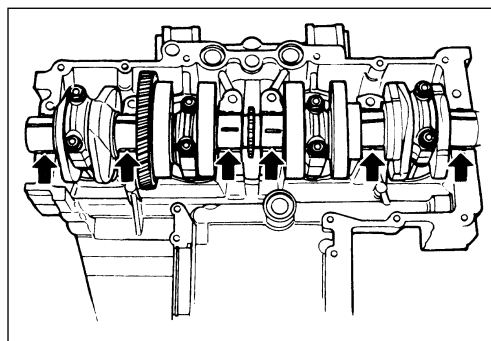
SELECTION

- 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.

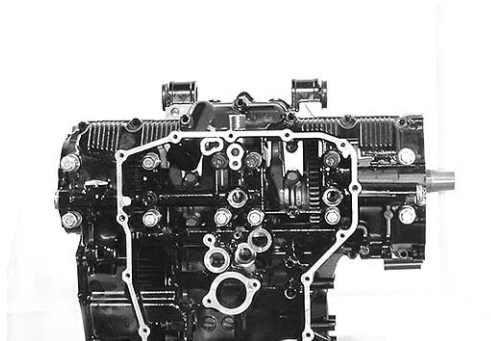


- Mate the lower crankcase with the upper crankcase, and tighten the crank journal bolts (M9) as following two steps in the indicated order.

U Crank journal bolt (9 mm)

Initial : 18 N·m (1.8 kgf·m, 13 lb-ft)

Initial : 32 N·m (3.2 kgf·m, 24 lb-ft)



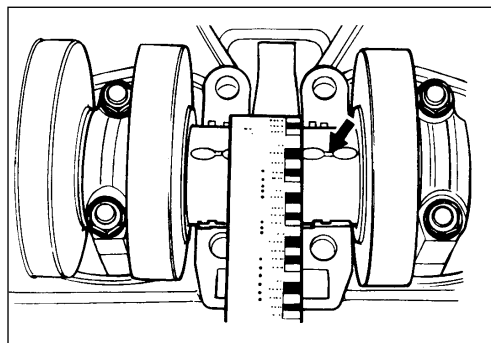
- Remove the lower crankcase and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

DATA Crankshaft journal bearing oil clearance:

Standard: 0.016 – 0.040 mm (0.00063 – 0.00157 in)

Service Limit: 0.080 mm (0.0031 in)

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



- Check the corresponding crankcase journal I.D.code number
Ⓐ stamped on the upper crankcase.
- Check the corresponding crankshaft journal O.D.code number
Ⓑ stamped on the crankshaft.

DATA Bearing selection table

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

DATA Crankcase I.D. specification

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

DATA Crankshaft journal O.D. specification

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

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

DATA Bearing thickness specification

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

NOTE:

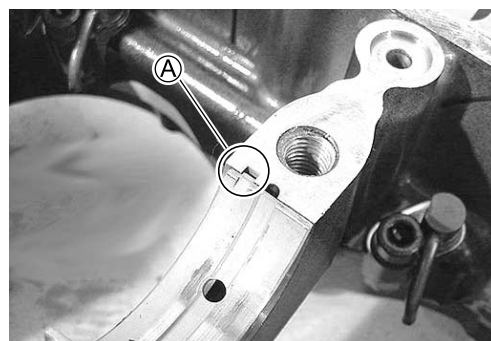
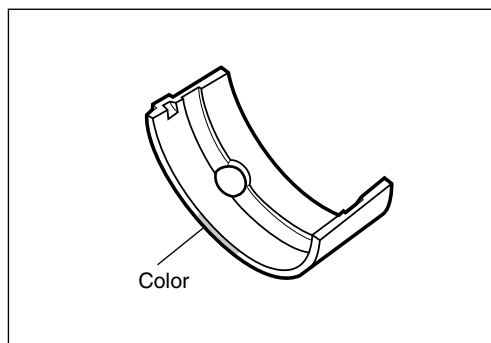
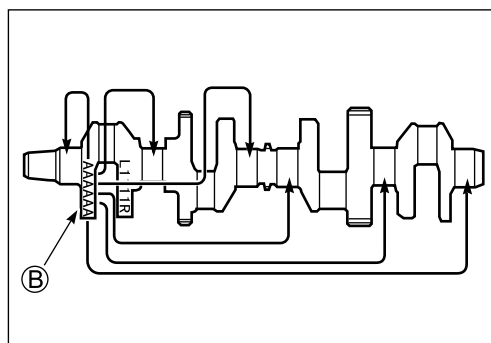
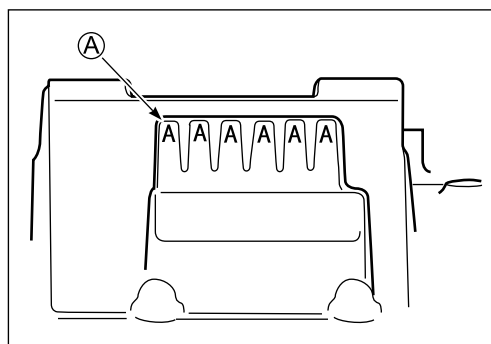
Upper and lower crankshaft journal bearings are the same.

INSTALLATION

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

CAUTION

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



CRANKSHAFT THRUST BEARING

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

- ①: Right-side thrust bearing
- ②: Left-side thrust bearing

NOTE:

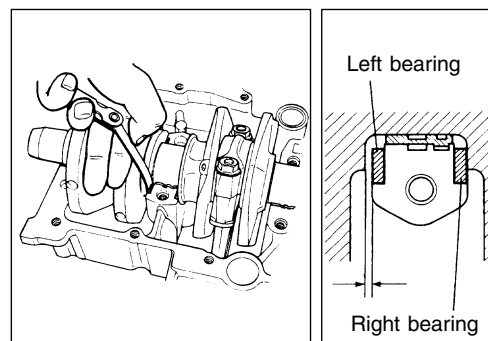
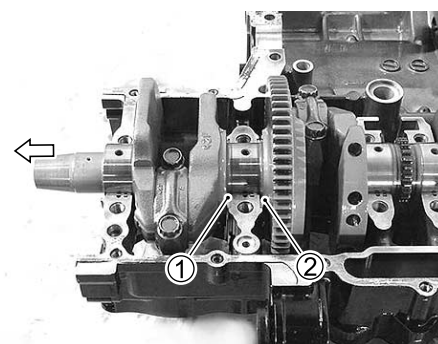
Pull the crankshaft to the left-side, so that there is no clearance on the right-side thrust bearing.

TOOL 09900-20803: Thickness gauge

DATA Thrust clearance:

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

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



CRANKSHAFT THRUST CLEARANCE ADJUSTMENT

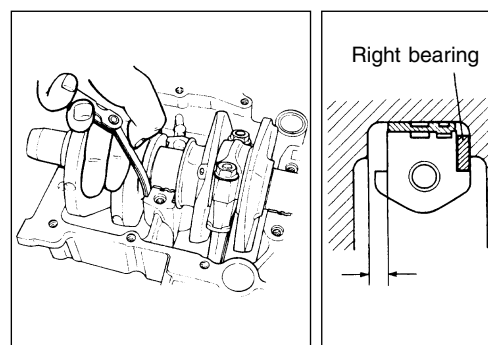
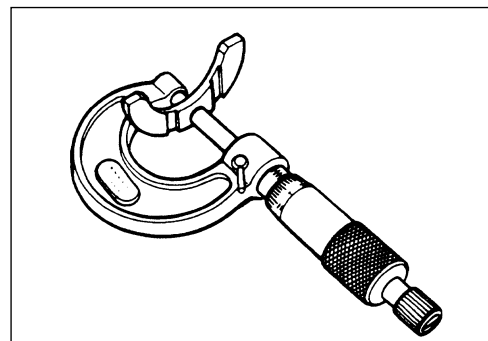
- Remove the right-side thrust bearing and measure its thickness with a micrometer.
- If the thickness of the right-side thrust bearing is below standard, replace it with a new one and once again perform the thrust clearance measurement listed above, checking to make sure it is within standard.

TOOL 09900-20205: Micrometer

DATA Right-side thrust bearing thickness:

Standard: 2.425 – 2.450 mm (0.0955 – 0.0965 in)

- If the right-side thrust bearing is within the standard range, reinsert the right-side thrust bearing and remove the left-side thrust bearing.
- As shown in the illustration, measure the clearance by using a thickness gauge before inserting of the left-side thrust bearing.
- Select a left-side thrust bearing from the selection table. (➡ 3-52)



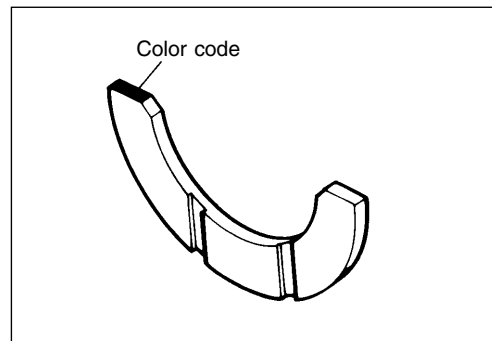
DATA Thrust bearing selection table

| Clearance before inserting left-side thrust bearing | Color (Part No.) | Thrust bearing thickness | Thrust clearance |
|---|-----------------------------|--|--|
| 2.560 – 2.585 mm (0.1008 – 0.1018 in) | White (12228-24F00-0F0) | 2.475 – 2.500 mm (0.0974 – 0.0984 in) | 0.060 – 0.110 mm (0.0024 – 0.0043 in) |
| 2.535 – 2.560 mm (0.0998 – 0.1008 in) | Yellow (12228-24F00-0E0) | 2.450 – 2.475 mm (0.0965 – 0.0974 in) | 0.060 – 0.110 mm (0.0024 – 0.0043 in) |
| 2.510 – 2.535 mm (0.0982 – 0.0998 in) | Green (12228-24F00-0D0) | 2.425 – 2.450 mm (0.0954 – 0.0965 in) | 0.060 – 0.110 mm (0.0024 – 0.0043 in) |
| 2.485 – 2.510 mm (0.0978 – 0.0982 in) | Blue (12228-24F00-0C0) | 2.400 – 2.425 mm (0.0944 – 0.0954 in) | 0.060 – 0.110 mm (0.0024 – 0.0043 in) |
| 2.460 – 2.485 mm (0.0969 – 0.0978 in) | Black (12228-24F00-0B0) | 2.375 – 2.400 mm (0.0935 – 0.0944 in) | 0.060 – 0.110 mm (0.0024 – 0.0043 in) |
| 2.430 – 2.460 mm (0.0957 – 0.0969 in) | Red (12228-24F00-0A0) | 2.350 – 2.375 mm (0.0925 – 0.0935 in) | 0.055 – 0.110 mm (0.0022 – 0.0043 in) |

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

NOTE:

Right-side thrust bearing has the same specification as the GREEN of left-side thrust bearing.

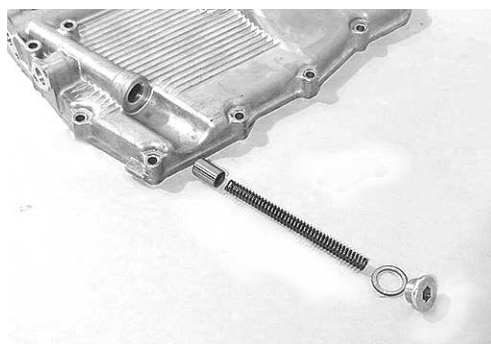


CRANKCASE/OIL PAN

OIL CHECK VALVE

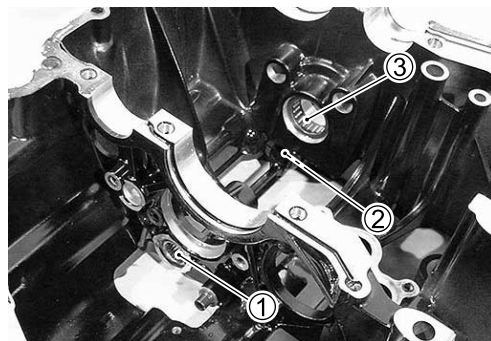
- Install the oil check valve.

 Oil check valve: 35 N·m (3.5 kgf·m, 26 lb-ft)



LOWER CRANKCASE

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




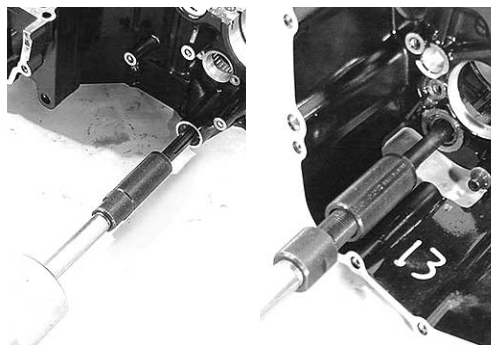
Bearing replacement

- Remove the oil seal.



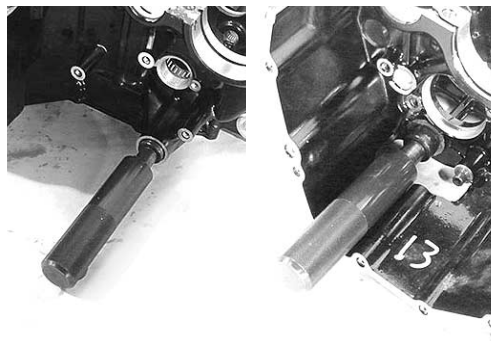
- Remove the gearshift shaft bearing using the special tool.

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



- Install the bearings using the special tool.

 **09913-70210: Bearing installer set (20mm)**

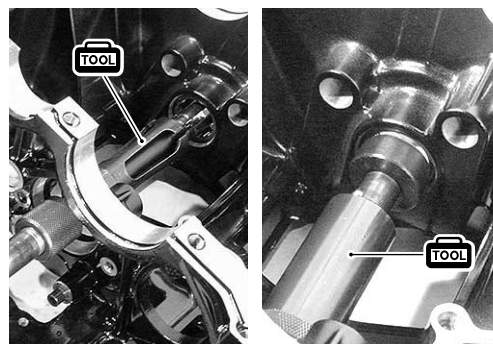


- Remove the gearshift cam bearing using the special tools.

TOOL 09923-74510: Bearing remover
09930-30102: Sliding shaft

- Install the bearing using the special tool.

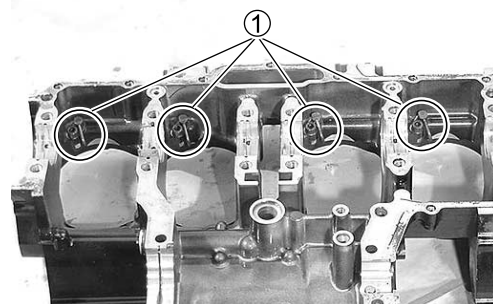
TOOL 09913-70210: Bearing installer set (30 mm)



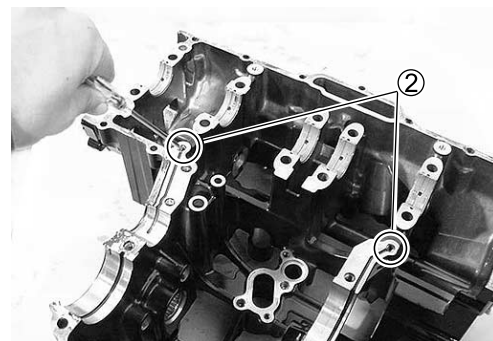
OIL JET

Removal

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



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



Inspection

- 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 (#12) (For transmission)

Installation

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



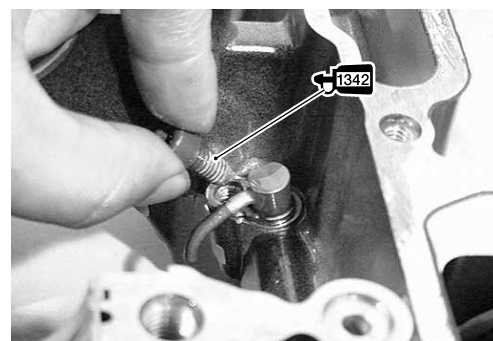
CAUTION

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

- With the thread lock applied to the bolts, install each piston cooling oil jet with the bolts.


1342 99000-32050: THREAD LOCK “1342”

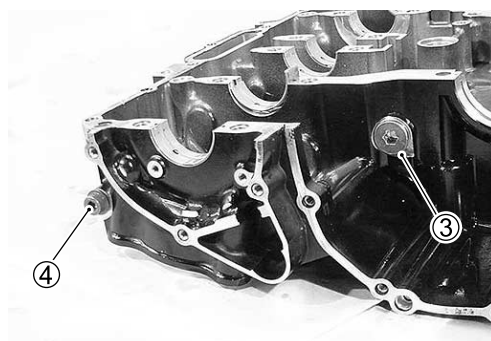
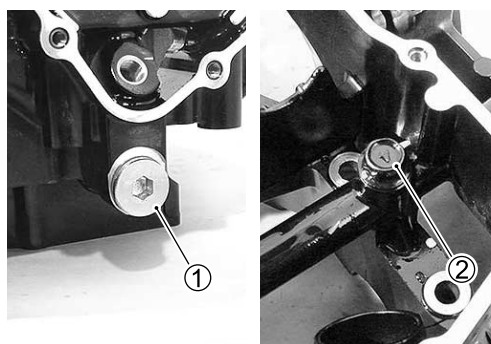
U Piston cooling oil jet bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)



OIL GALLERY PLUG

- Install each plug.

-  ① Main gallery plug: 35 N·m (3.5 kgf·m, 26 lb-ft)
② Main gallery plug: 21 N·m (2.1 kgf·m, 15 lb-ft)
③ Sub gallery plug: 35 N·m (3.5 kgf·m, 26 lb-ft)
④ Sub gallery plug: 10 N·m (1.0 kgf·m, 7.4 lb-ft)



ENGINE REASSEMBLY

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

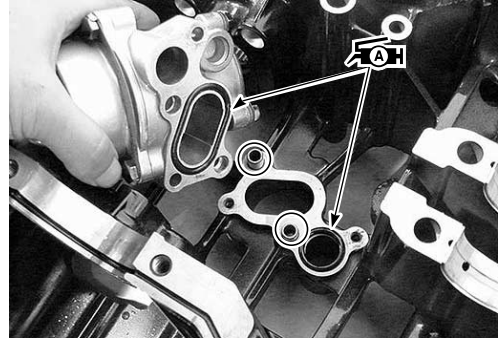
NOTE:

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

OIL PUMP

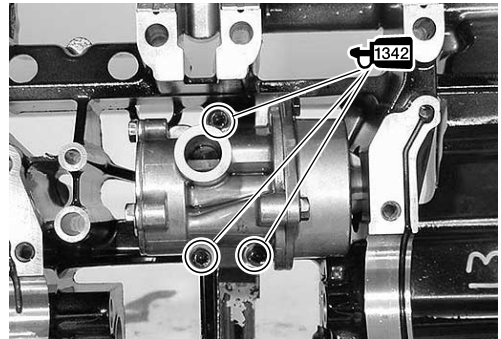
- Install the dowel pins.
- Apply grease to the O-ring, install the oil pump assembly.

 99000-25010: SUZUKI SUPER GREASE "A"



- Apply a small quantity of thread lock to the bolts and tighten them.

 99000-32050: THREAD LOCK "1342"



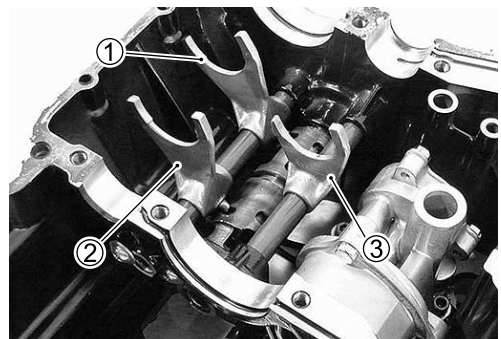
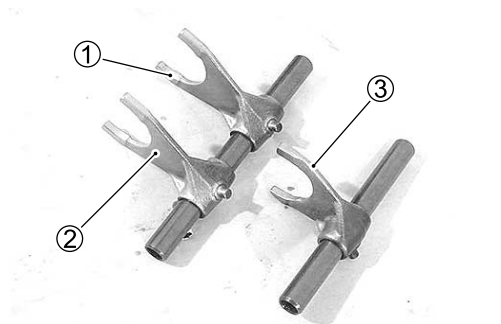
GEARSHIFT CAM/GEARSHIFT FORK

- Install the gearshift cam with the bearing.
- Install the gearshift forks and their shafts as shown.

- ① Gearshift fork No.1 (For 6th driven gear)
- ② Gearshift fork No.1 (For 5th driven gear)
- ③ Gearshift fork No.3 (For 3rd/4th drive gear)

NOTE:

The gearshift forks No.1 (① and ②) are the same.



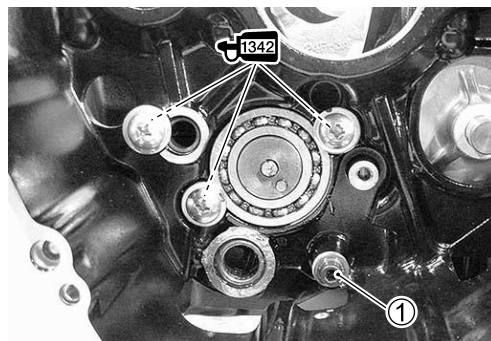
- Apply a small quantity of **THREAD LOCK** to the bearing retainer screws and the shift fork shaft retainer screw and tighten them.

 **99000-32050: THREAD LOCK “1342”**

- Tighten the gearshift shaft spring stopper.

 **Gearshift shaft spring stopper:**

10 N·m (1.0 kgf·m, 7.4 lb-ft)



CRANKSHAFT

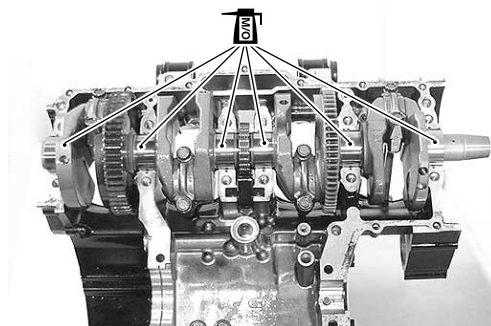
- Install the cam chain tensioner.
- Install the cam chain tensioner cushion so that its arrow is directed to front and rear.



- Apply molybdenum oil solution to each crankshaft journal bearing lightly.

 **MOLYBDENUM OIL SOLUTION**

- Set the crankshaft to the crankcase with the cam chain.

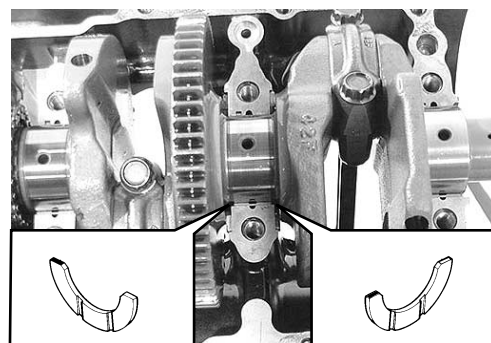


- Apply molybdenum oil solution to the thrust bearings and insert the right and left-thrust bearings with oil groove facing the crank web.

 **MOLYBDENUM OIL SOLUTION**

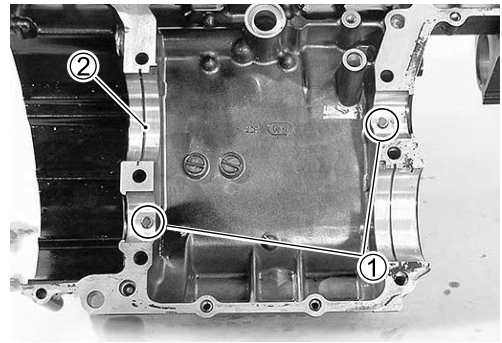
NOTE:

Right-thrust bearing has green painting.



TRANSMISSION

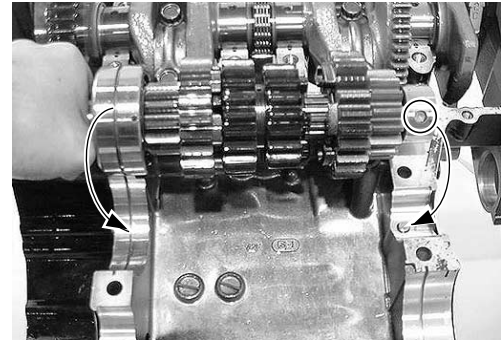
- Install the bearing pins ① and the C-ring ② on the upper crankcase.



- Install the countershaft assembly on the upper crankcase.

NOTE:

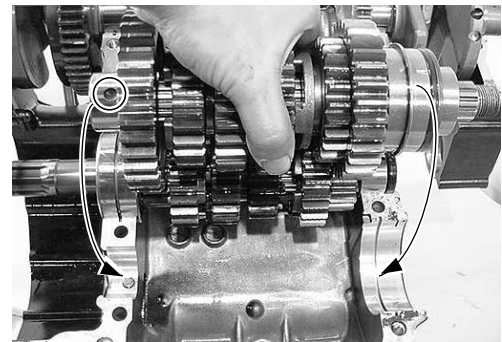
Align the C-ring with the groove on the bearing and the bearing pin with the indent on the bearing.



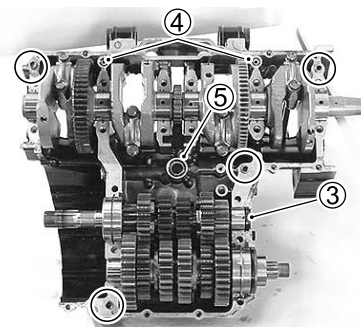
- Install the driveshaft assembly on the upper crankcase.

NOTE:

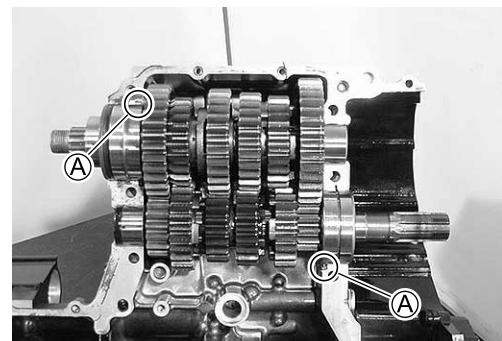
Align the bearing ring with the groove on the crankcase and the bearing pin with the indent on the bearing.



- Install the oil seal ③.
- Install the O-rings ④ and ⑤.
- Install the dowel pins.



- Turn the bearings to install the bearing dowel pins ① in the respective positions.



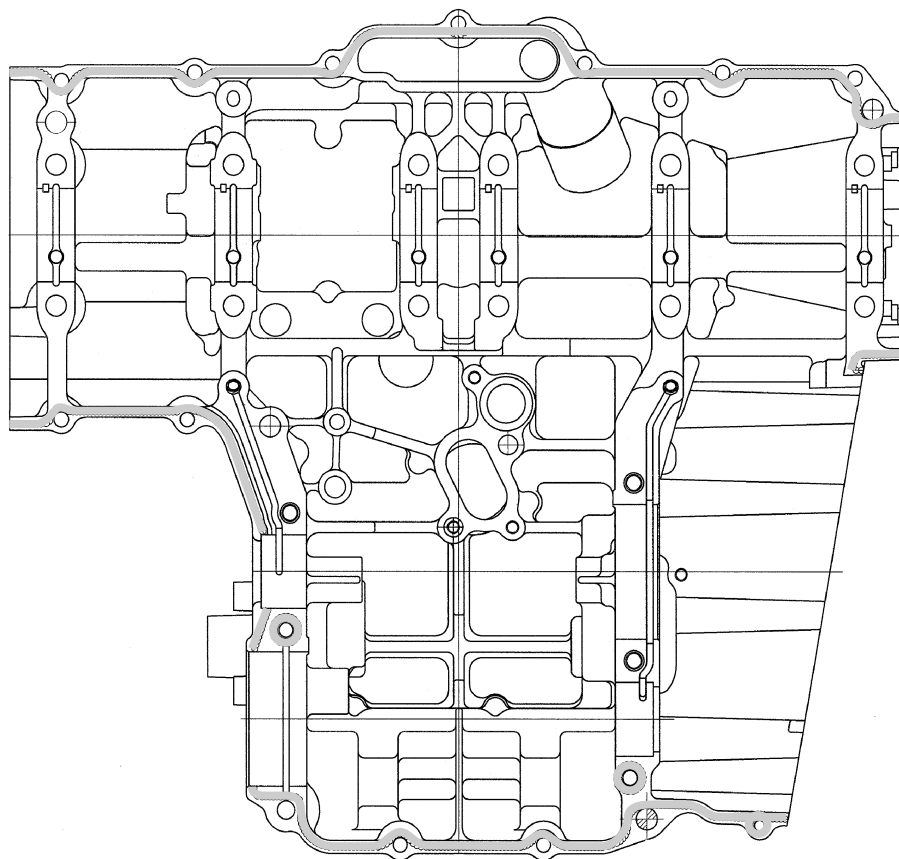
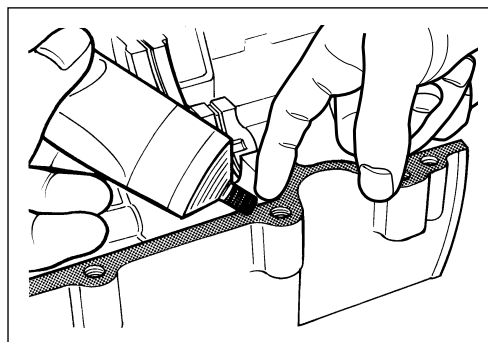
- Apply SUZUKI BOND to the mating surface of the lower crankcase.

1207B 99000-31140: SUZUKI BOND “1207B”

NOTE:

Use of SUZUKI BOND is as follows:

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



1207B

- Match the upper and lower crankcases.
- Tighten the crank journal bolt (9 mm) in ascending order of numbers assigned to these bolts. Tighten each bolt a little at a time to equalize the pressure as following two steps.

Crank journal bolt: (M9)

initial: 18 N·m (1.8 kgf·m, 13 lb-ft)

Final: 32 N·m (3.2 kgf·m, 24 lb-ft)

NOTE:

Fit the copper washer to the bolt (A).

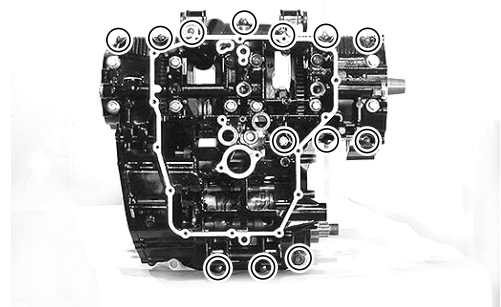
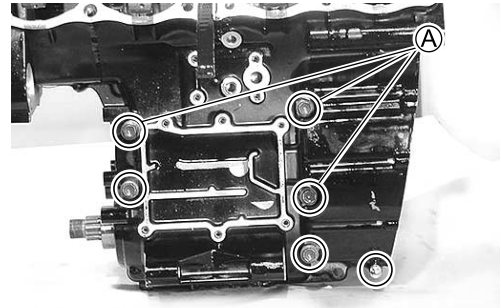
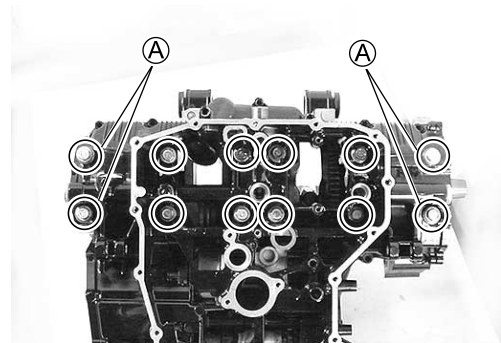
- Tighten the other crankcase bolts a little at a time to equalize the pressure.

Crankcase bolt: (M8): 26 N·m (2.6 kgf·m, 19 lb-ft)

Crankcase bolt: (M6): 11 N·m (1.1 kgf·m, 8.1 lb-ft)

NOTE:

Fit the copper washer to the crankcase bolt (A).



NOTE:

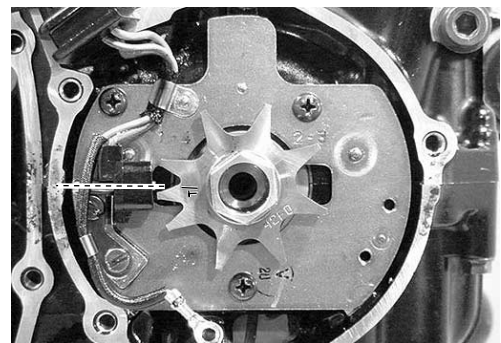
After the crankcase bolts have been tightened, check if the crankshaft and transmission rotate smoothly.

CRANK BALANCER

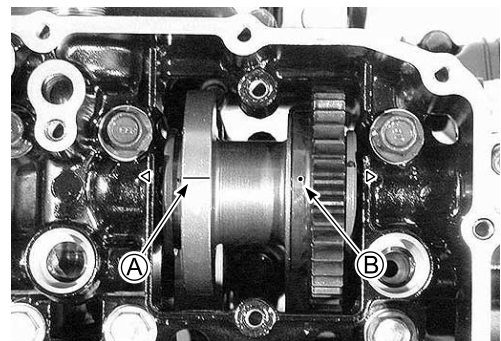
- Install the signal generator and the rotor temporarily.
- Rotate the crankshaft so as to align the "T" line on the rotor with the tip of signal generator sensor.

NOTE:

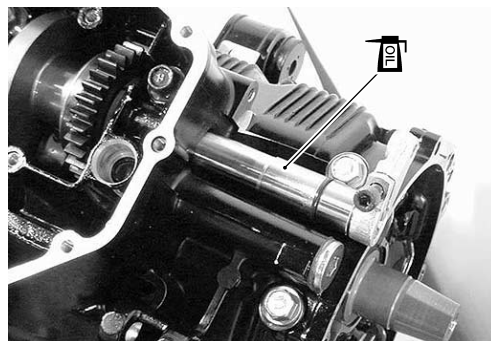
Hold the crankshaft so as not to rotate during the crank balancer installing.



- Align the line (A) and the punched mark (B) on the crank balancer with the index (Δ) on the crankcase.



- Apply engine oil to the balancer shaft and insert it.



- Apply a small quantity of thread lock to the balancer lever bolt and tighten it to the specified torque.

 **99000-32050: THREAD LOCK “1342”**

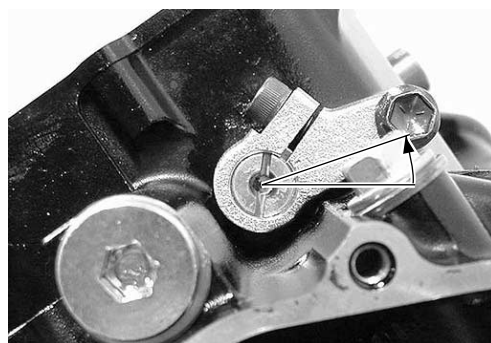
 **Balancer lever bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)**

- Slowly turn the balancer shaft clockwise until it is stop.



- From this position, turn the balancer shaft counterclockwise by 1.5 – 2 graduations and tighten the lock bolt.

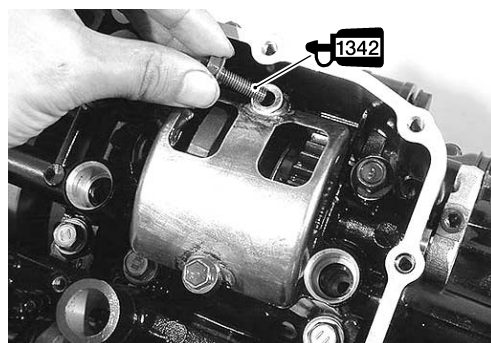
 **Balancer lever lock bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)**



- Apply a small quantity of thread lock to the bolt and install the balancer cover.

 **99000-32050: THREAD LOCK “1342”**

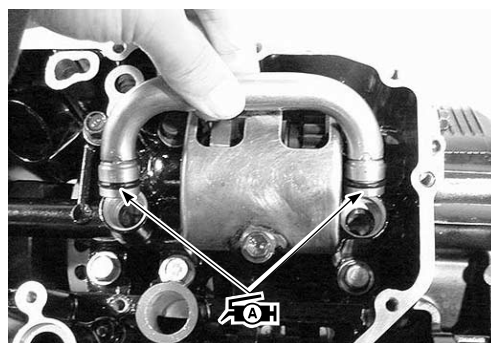
 **Balancer cover bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)**



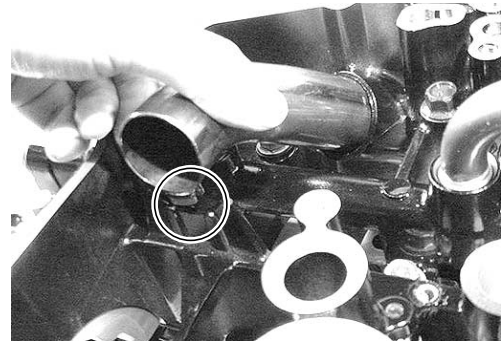
OIL PIPE

- Apply grease to the O-rings and install the main gallery oil pipe.

 **99000-25010: SUZUKI SUPER GREASE “A”**



- Set the stopper of oil return pipe in the convex on crankcase.

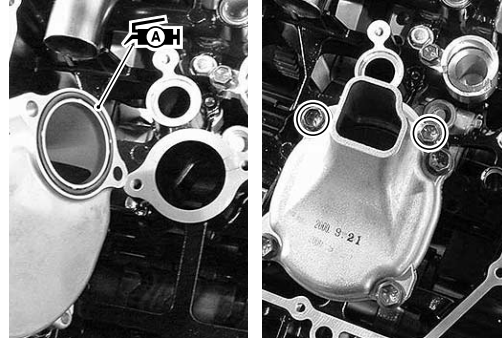


OIL STRAINER

- With grease applied to the O-ring, install the oil strainer.

 99000-25010: SUZUKI SUPER GREASE "A"

 Oil strainer bolt: 10 N·m (1.0 kgf·m, 7.4 lb·ft)



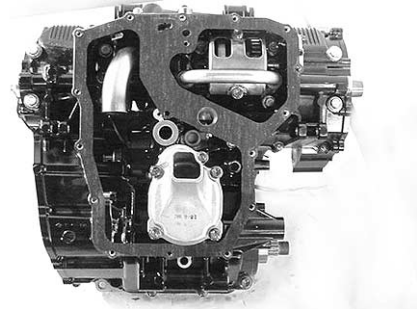
- Apply grease to the O-ring and install it with the shim.

 99000-25010: SUZUKI SUPER GREASE "A"



OIL PAN

- Install the gasket.



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

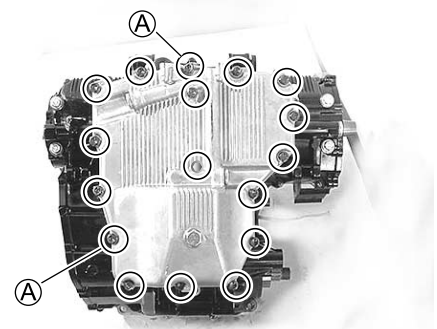
NOTE:

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

 Oil pan bolt: 11 N·m (1.1 kgf·m, 8.1 lb·ft)

- Tighten the oil drain plug to the specified torque.

 Oil drain plug: 23 N·m (2.3 kgf·m, 17 lb·ft)



GEAR POSITION SWITCH

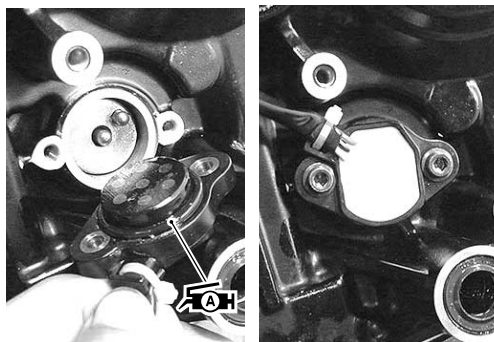
- Install the gear position switch contacts and the springs.



- Apply grease to the O-ring.

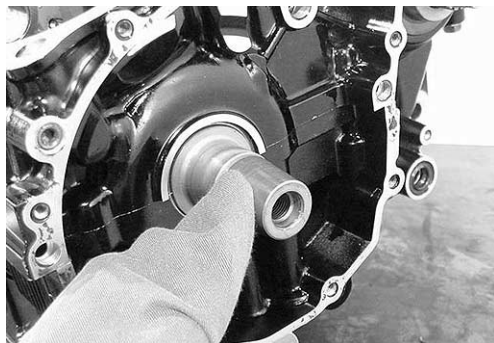
 **99000-25010: SUZUKI SUPER GREASE "A"**

- Install the gear position switch as shown.



GENERATOR

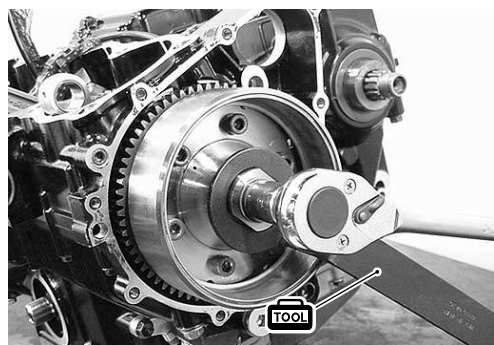
- Degrease the tapered portion of the generator rotor and also the crankshaft. Use nonflammable cleaning solvent to wipe off oily or greasy matter and make these surfaces completely dry.



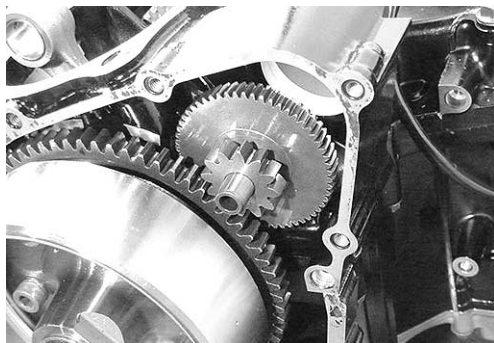
- Install the generator rotor and starter driven gear onto the crankshaft.
- Holding the generator rotor with the special tool and tighten its bolt to the specified torque.

 **09930-44530: Rotor holder**

 **Generator rotor bolt: 160 N·m (16.0 kgf·m, 118 lb-ft)**



- Install the starter idle gear and its shaft.




GENERATOR COVER

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

 99000-31140: SUZUKI BOND “1207B”

- Install the dowel pins and new gasket.

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

 **Generator cover bolt: 11 N·m (1.1 kgf·m, 8.1 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 .

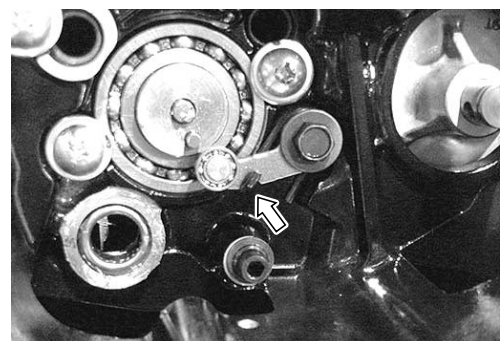
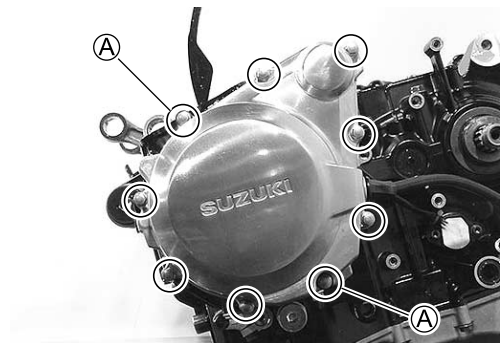
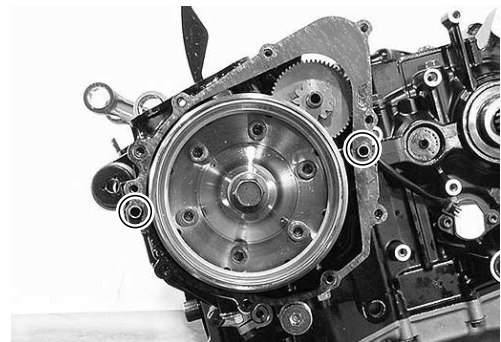
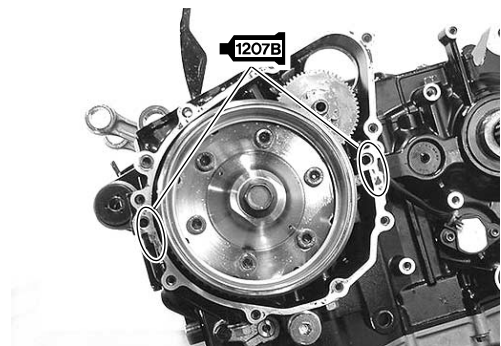
GEARSHIFT SYSTEM

- Install the gearshift cam stopper, its bolt, the washer and the return spring.

 99000-32050: THREAD LOCK “1342”

 **Gearshift cam stopper bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)**

- Hook the return spring end to the stopper.



- Confirm the gearshift cam stopper movement.
- Check the neutral position.
- Install the gearshift cam stopper plate after aligning the gearshift cam pin with the gearshift cam stopper plate hole.
- Apply a small quantity of THREAD LOCK to the gearshift cam stopper plate bolt and tighten it to the specified torque.

 **99000-32050: THREAD LOCK “1342”**

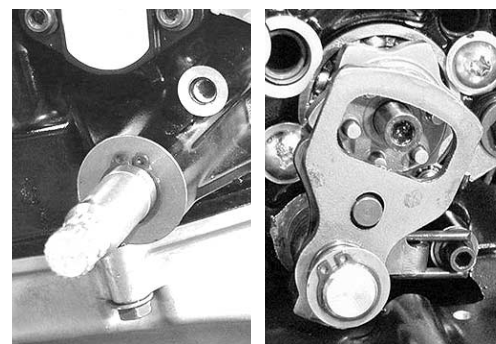
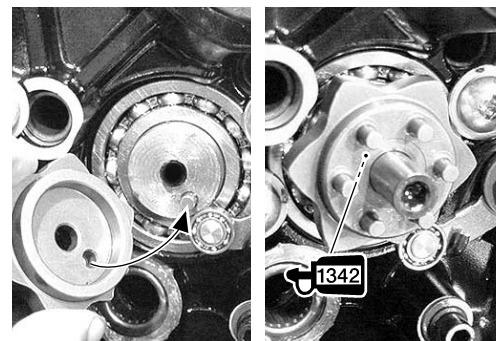
 **Gearshift cam stopper plate bolt: 10 N·m
(1.0 kgf-m, 7.4 lb-ft)**

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

NOTE:

Pinch the gearshift arm stopper with return spring ends.

- Install the washer and circlip.




OIL PUMP DRIVEN GEAR

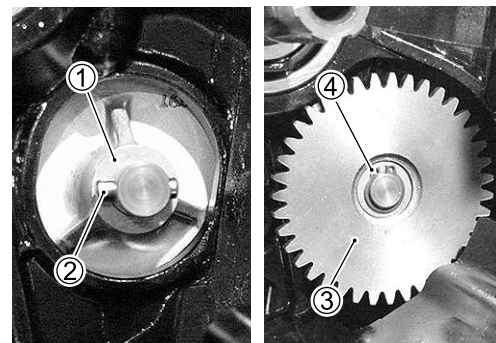
- Install the washer ① and the pin ②.

NOTE:

Be careful not to drop the washer and the pin into the crankcase.

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

 **09900-06107: Snap ring pliers**



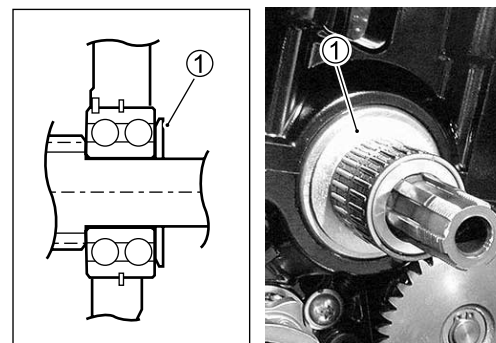
CLUTCH

- Install the thrust washer ① onto the countershaft.

NOTE:

The chamfer side of the thrust washer faces inner side.

- Install the needle bearing and spacer.



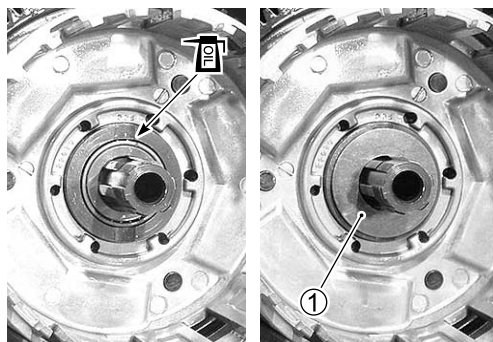
- Install the oil pump drive gear ② to the primary driven gear assembly.



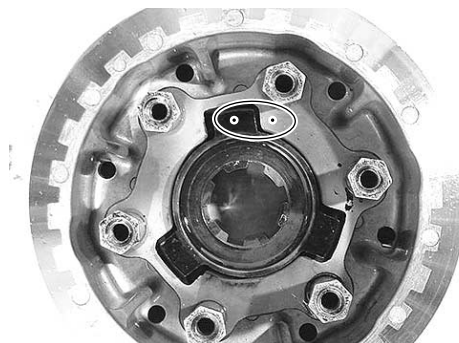
- Install the primary driven gear assembly and apply engine oil to the needle bearing.
- Install the thrust washer ①.

NOTE:

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



- Align the punched mark on back torque limiter driven with punched mark on drive.

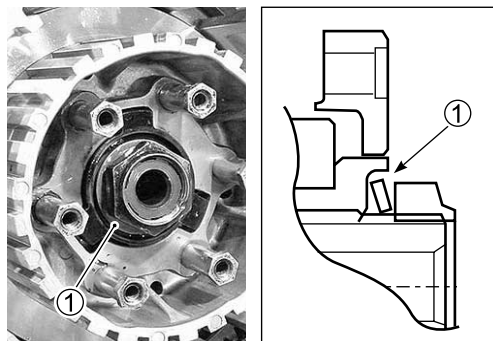


- Install the clutch sleeve hub onto the countershaft.
- Install the spring washer ①.

NOTE:

The convex side of the washer ① faces outside.

- Install the clutch sleeve hub nut.

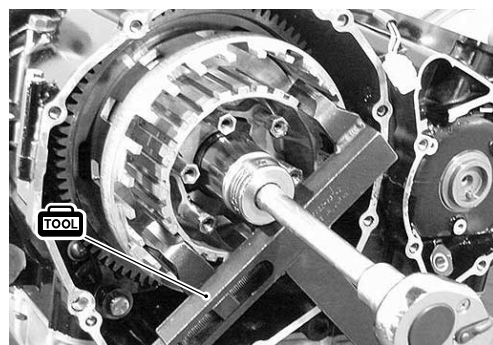


- Hold the clutch sleeve hub using the special tool.

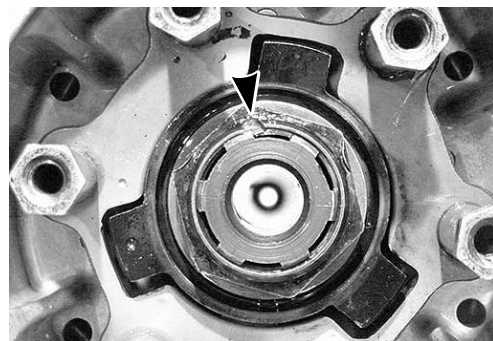
TOOL 09920-53740: Clutch sleeve hub holder

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

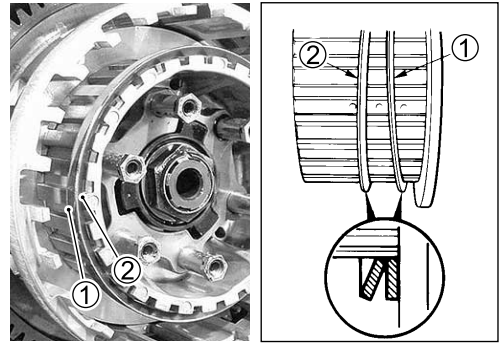
Clutch sleeve hub nut: 90 N·m (9.0 kgf·m, 66 lb-ft)



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



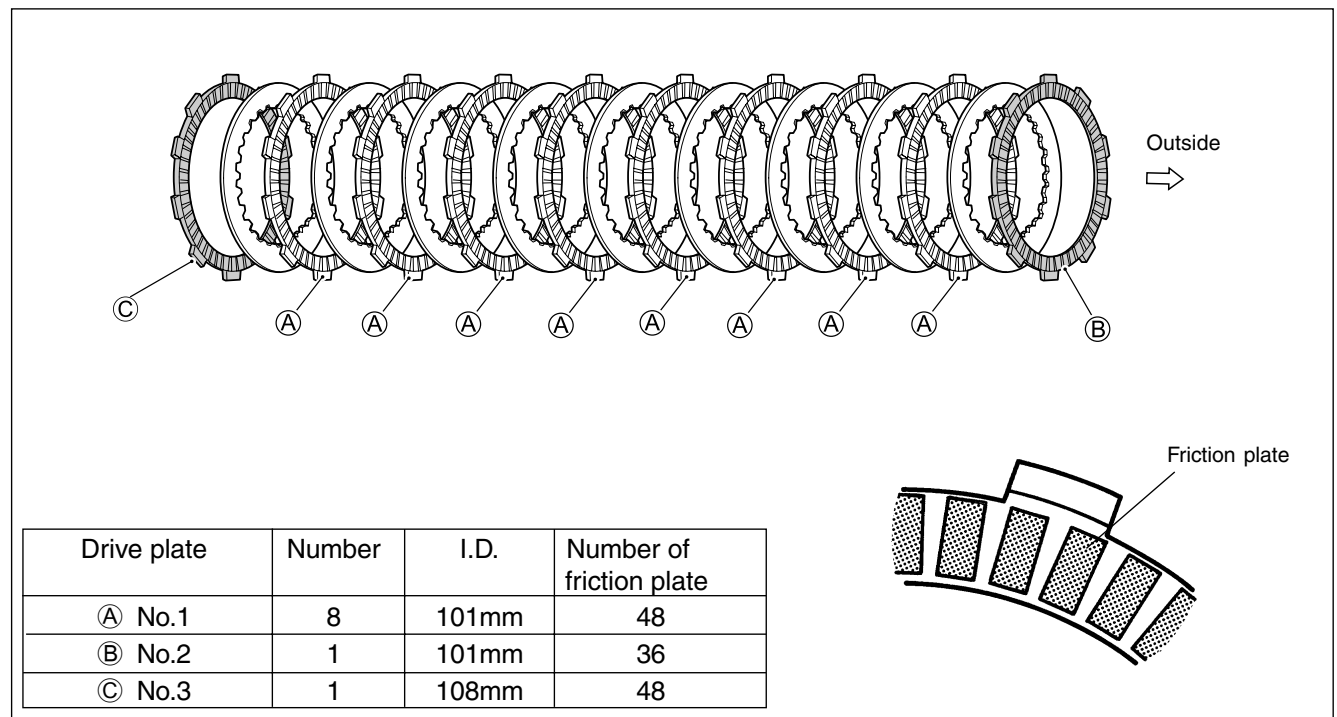
- Insert the spring washer seat ① and the spring washer ②.



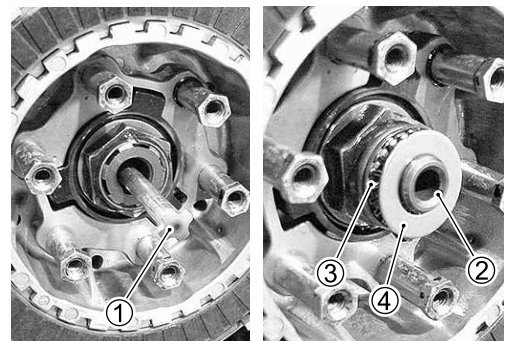
- Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order as shown in the illustration.

NOTE:

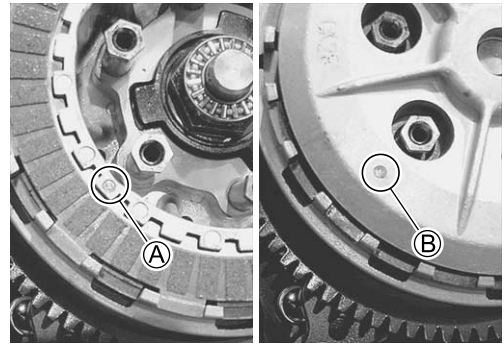
Insert the outermost No.2 drive plate claws to the other slits of clutch housing as shown.



- Install the clutch push rod ① into the countershaft.
- Install the clutch push piece ②, the bearing ③ and the thrust washer ④ to the countershaft.



- Align the indent ⑥ on the clutch pressure plate with the indent ⑤ (either of two) on the clutch sleeve hub.



- Install the clutch springs.
- Hold the clutch housing using 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, 7.4 lb-ft)

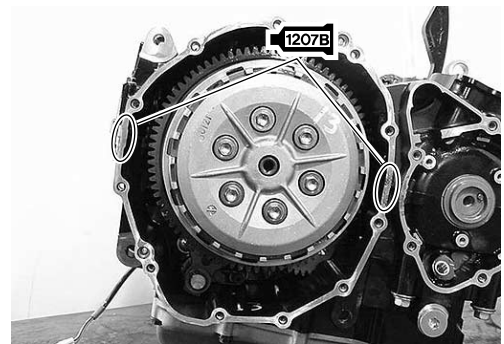
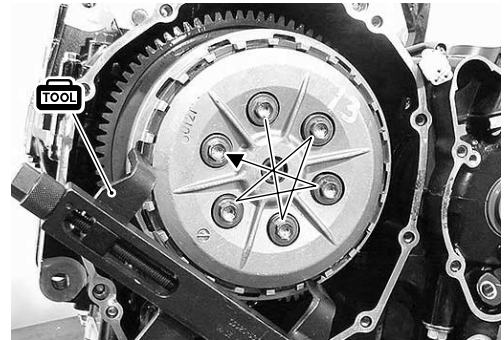
NOTE:

Tighten the clutch spring set bolts diagonally.

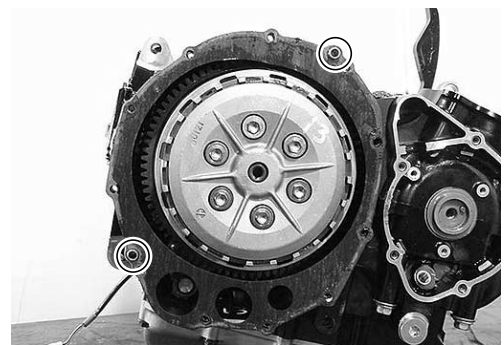
CLUTCH COVER

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

1207B 99000-31140: SUZUKI BOND “1207B”

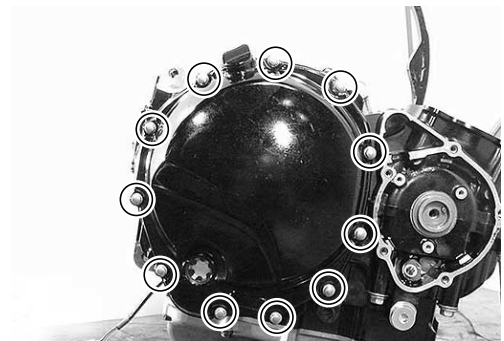


- Install the gasket and the dowel pins.



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

Clutch cover bolt: 11 N·m (1.1 kgf·m, 8.1 lb-ft)




COOLING FAN SWITCH

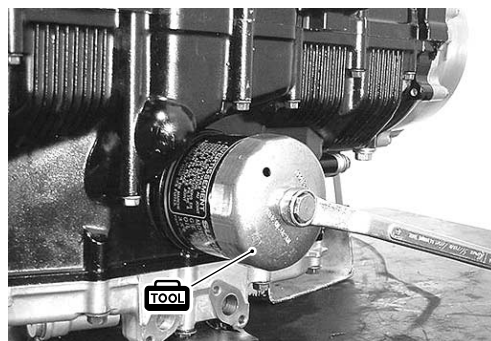
- Install the gasket and the cooling fan switch.

 **Cooling fan switch: 17 N·m (1.7 kgf·m, 13 lb-ft)**


**OIL FILTER**

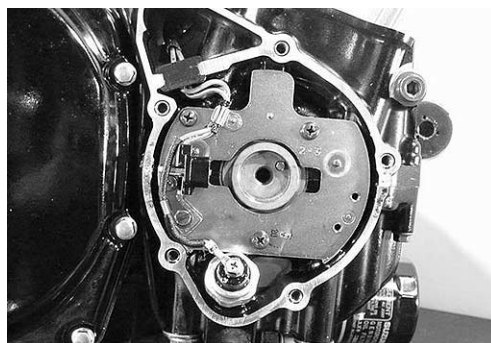
- Install the oil filter using the special tool. (👉 2-13)

 **09915-40610: Oil filter wrench**

**OIL PRESSURE SWITCH**

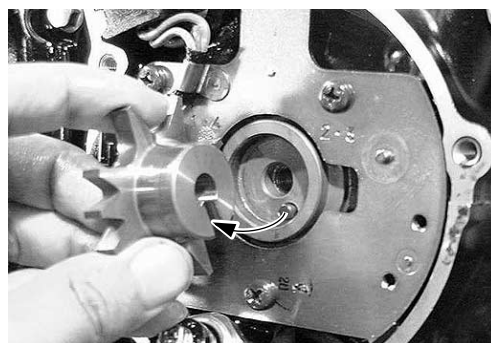
- Install the oil pressure switch and tighten it to the specified torque.

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

**SIGNAL GENERATOR**

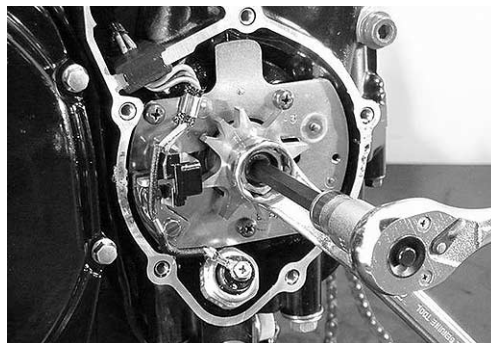
- Install the signal generator.

- Align the pin of crankshaft with the slit of the rotor.

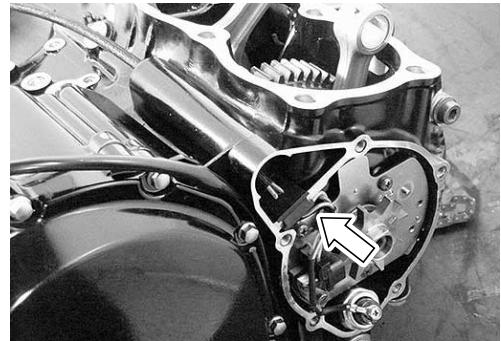


- Hold the rotor and tighten the signal generator rotor bolt to the specified torque.

 **Signal generator rotor bolt: 25 N·m (2.5 kgf·m, 18 lb-ft)**




- Pass the signal generator lead wire through the crankcase hole.



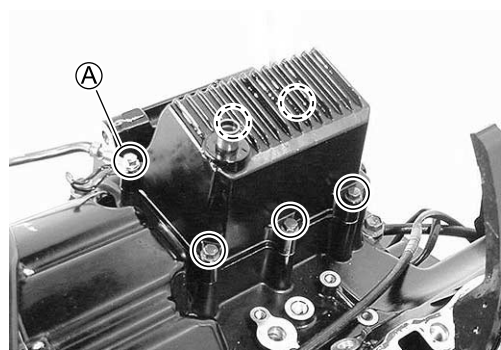
BREATHER COVER

- Install the gasket.
- Install the breather cover.

 **Breather cover bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)**

NOTE:

Install the engine ground lead wire and clamp to the bolt ①.

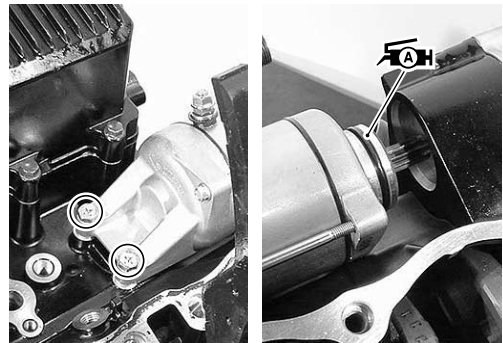


STARTER MOTOR

- Apply grease to the O-ring and install the starter motor.

 **99000-25010: SUZUKI SUPER GREASE "A"**

 **Starter motor mounting bolt: 6 N·m (0.6 kgf·m, 4.4 lb-ft)**



OIL TEMPERATURE SENSOR

- Apply grease to the O-ring and install the oil temperature sensor.

 **Oil temperature sensor bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)**



PISTON

- 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

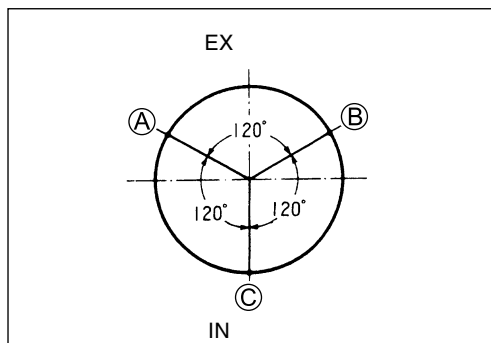
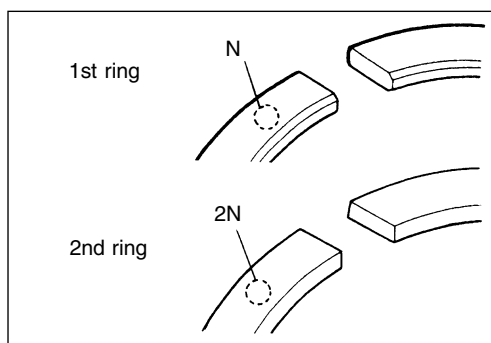
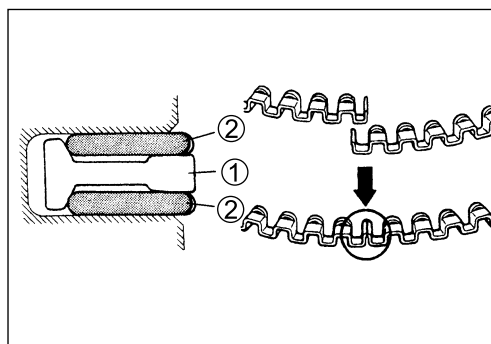
When installing the spacer, be careful not to allow its two ends to overlap in the groove.

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

NOTE:

1st ring and 2nd ring differ in shape.

- 1st ring and 2nd ring have letters “N” and “2N” 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.
 - Ⓐ :2nd ring/Lower side rail
 - Ⓑ :Upper side rail
 - Ⓒ :Top ring/Spacer

**PISTON AND CONROD**

- When installing the pistons, the indent on the piston head must be faced to exhaust side.
- Rub a small quantity of molybdenum oil solution onto each piston pin.

**MOLYBDENUM OIL**

- Install the pistons.

NOTE:

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

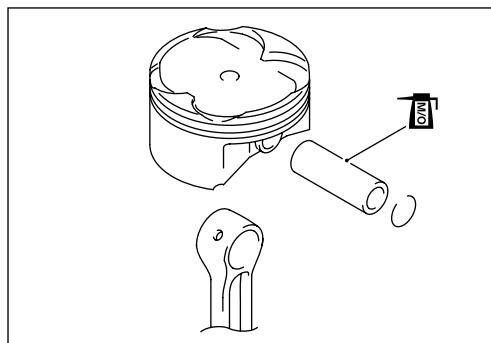
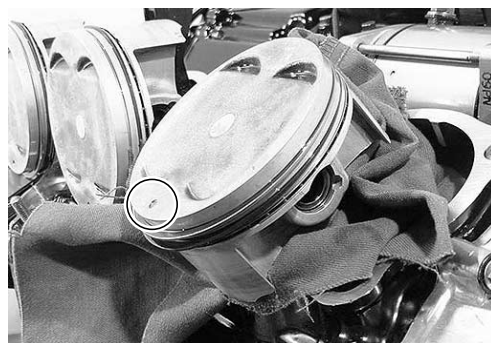
- Install the piston pin circlips.

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.



CYLINDER

- Install the dowel pins and gasket.
- Apply engine oil to the sliding surface of the pistons and cylinder walls.



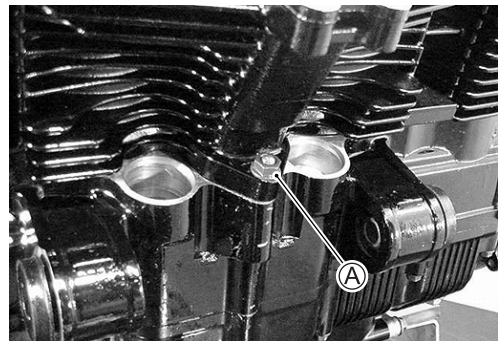
- Set the special tools to the No.2 and No.3 pistons, and insert them into the cylinder block.

TOOL 09916-74521: Holder body
09916-54550: Band

NOTE:

Do not over tighten the special tool bands or the pistons entry into the cylinders will be difficult.

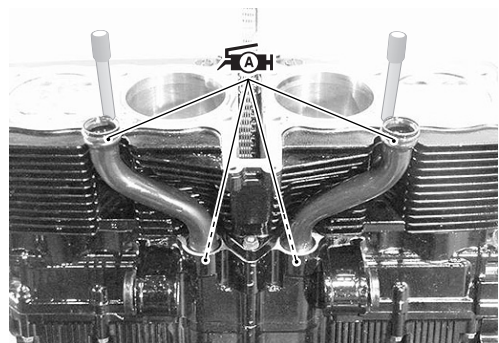
- After inserting the No.2 and No.3 pistons in place, insert the No.1 and No.4 pistons.
- Tighten cylinder nut (A) temporarily.



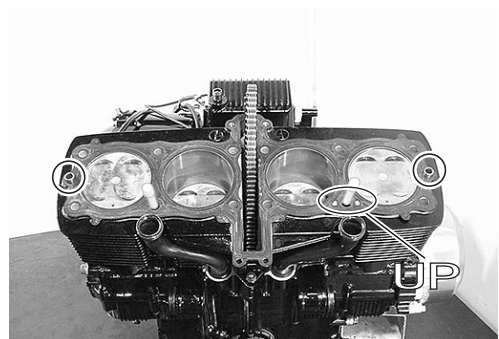
CYLINDER HEAD

- Apply grease to the O-rings and insert the oil return pipes to the crankcase.

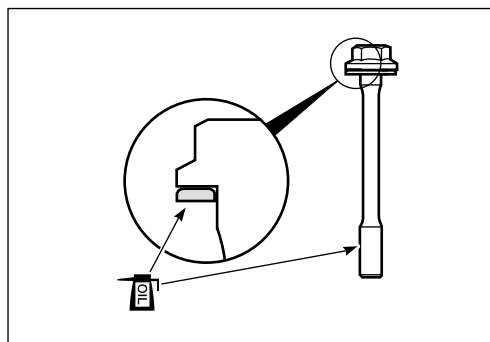
TOOL 99000-25010: SUZUKI SUPER GREASE "A"



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



- Place the cylinder head on the cylinder.
- Apply engine oil to the threads of cylinder head bolt and the copper washers.



- Install the cylinder head plate ① and tighten the cylinder head bolts and nuts (M10) to the specified two-step torque with a torque wrench sequentially and diagonally.

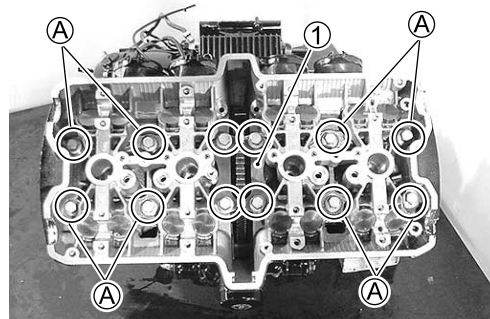
🔧 Cylinder head bolt/nut (M10):

Initial: 25 N·m (2.5 kgf·m, 18 lb-ft)

Final: 37 N·m (3.7 kgf·m, 27 lb-ft)

NOTE:

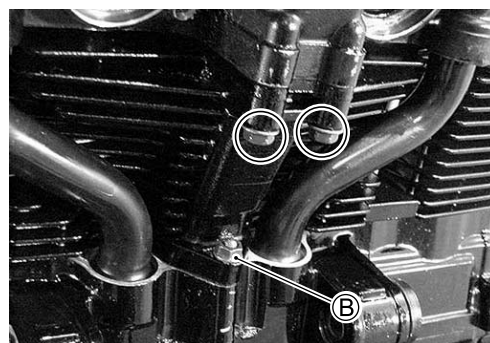
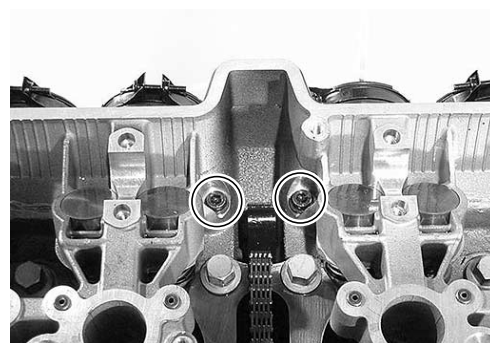
Fit the copper washer to the bolt/nut ①.



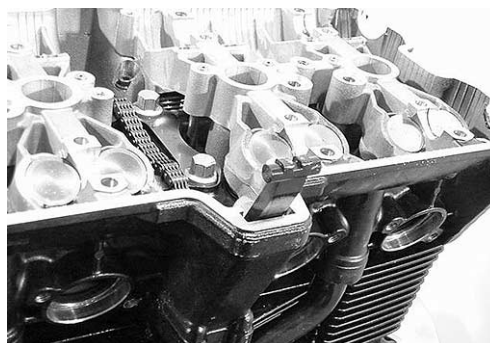
- Tighten the cylinder head bolts (M6) and the cylinder nut ②.

🔧 Cylinder head bolt (M6): 10 N·m (1.0 kgf·m, 7.4 lb-ft)

Cylinder nut: 10 N·m (1.0 kgf·m, 7.4 lb-ft)

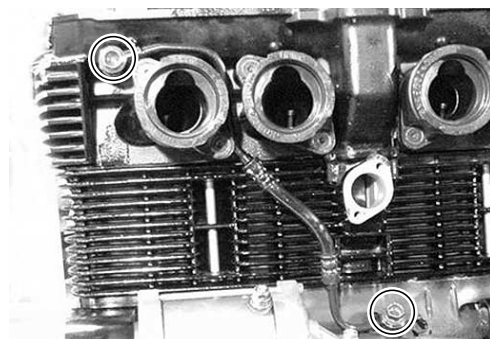


- Install the cam chain guide.



- Install the cylinder head oil hose.

Cylinder head oil hose union bolt:
20 N·m (2.0 kgf·m, 15 lb-ft)



- Install the oil pipe with the white paint facing exhaust side.
- Install and tighten the oil pipe bolts with the washers.

Oil pipe bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)

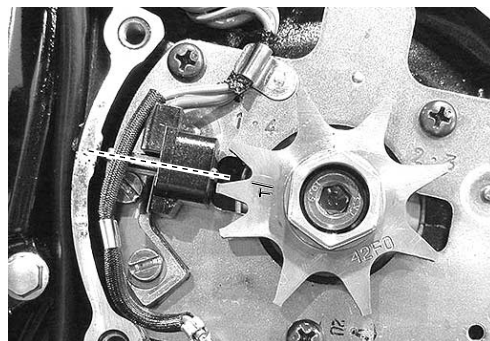


CAMSHAFT

- Turn the crankshaft clockwise with the box wrench and align the “T” line on the signal generator rotor with the tip of the signal generator rotor sensor 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.

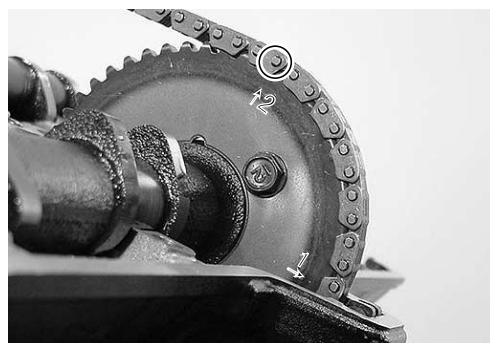


- The camshafts are identified by the embossed letters.

NOTE:

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

- Pull the cam chain lightly.
- Set the exhaust camshaft so that the arrow marked “1” is aligned with the surface of the cylinder head.



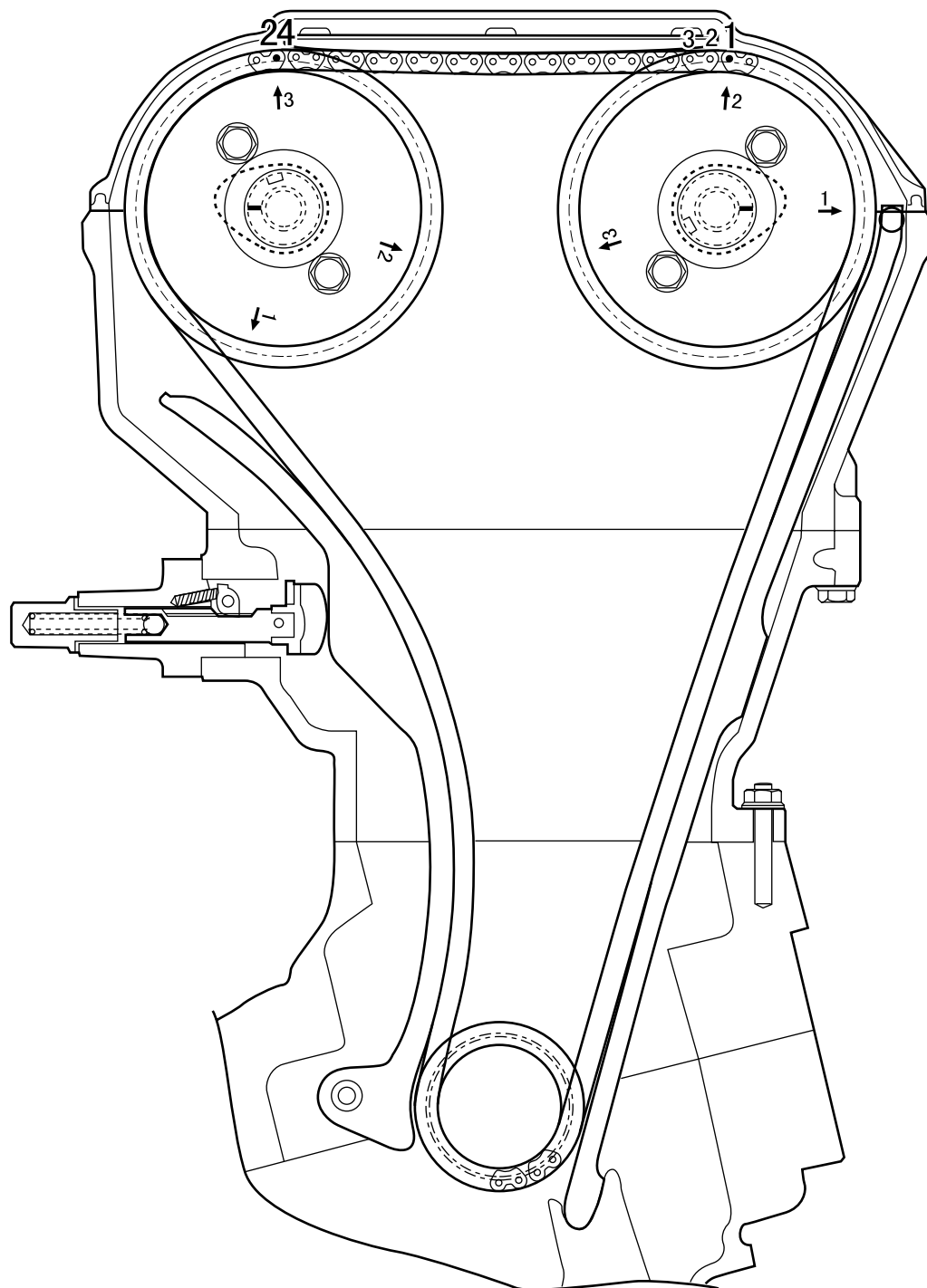
- The other arrow marked “2” should now be pointing straight up. Starting from the roller pin that is directly above the arrow marked “2”, count out 24 roller pins.
- Engage the 24 roller pin on the cam chain with the arrow marked “3” on the intake sprocket.

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.



POSITION OF CAMSHAFTS AND CAM SPROCKETS



- Apply molybdenum oil solution to journals and cam faces.

MOLYBDENUM OIL SOLUTION

- Install each dowel pin.

- Install the camshaft journal holders by aligning the embossed letters on the camshaft journal holders with the embossed letters on the cylinder head.
- Fasten the camshaft journal holders evenly by tightening the camshaft journal holder bolts sequentially and diagonally.

 **Camshaft journal holder bolt: 10 N·m**
(1.0 kgf·m, 7.4 lb-ft)

NOTE:

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

Cam chain tension adjuster

- Retract the push rod by pushing the stopper.
- Install the cam chain tension adjuster with new gasket.

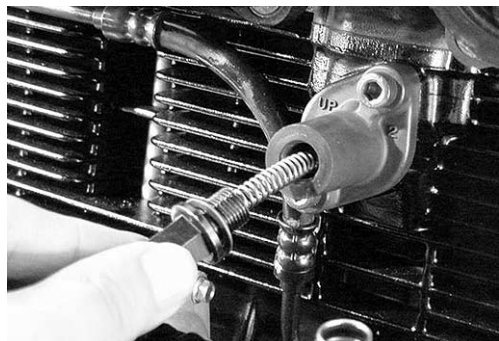
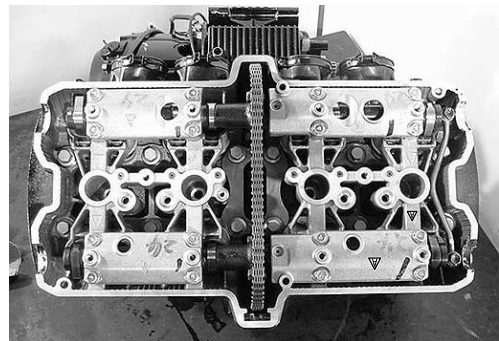
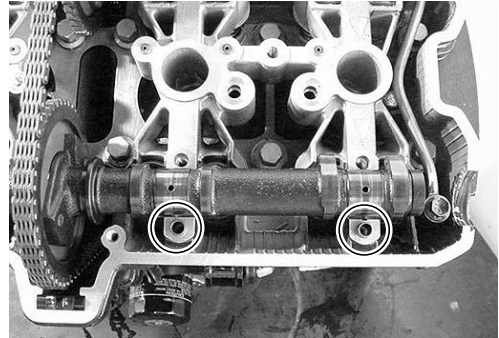
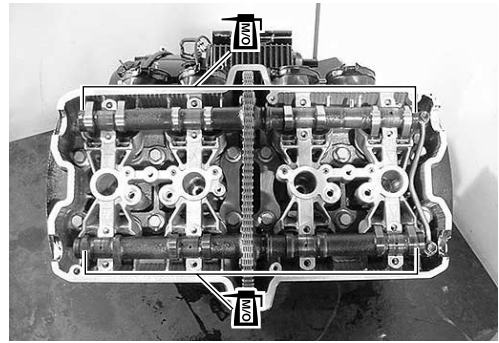
 **Cam chain tension adjuster mounting bolt: 10 N·m**
(1.0 kgf·m, 7.4 lb-ft)

- Install the steel ball, the spring, the gasket washer and cam chain tension adjuster cap to the cam chain tension adjuster.


 **Cam chain tension adjuster cap:**
35 N·m (3.5 kgf·m, 26 lb-ft)

NOTE:

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



- After installing the cam chain tension adjuster, check to be sure that the adjuster work properly by checking the slack of cam chain.
- After installing the cam chain tension adjuster, rotate the crankshaft (some turns), and recheck the positions of the camshafts. (👉 3-75)
- Install the cam chain guide.

 **Cam chain guide bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)**

SIGNAL GENERATOR COVER

- Apply SUZUKI BOND to the grommet and the crankcase mating surface.

 **99000-31140: SUZUKI BOND “1207B”**

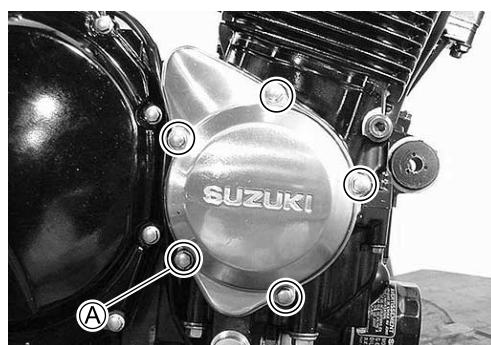
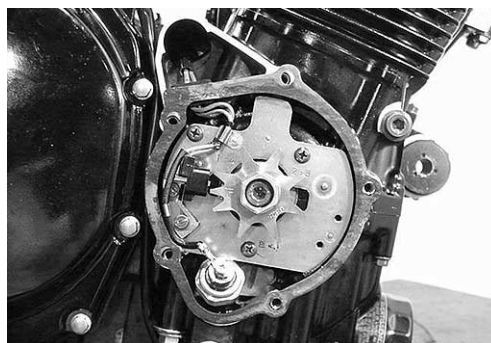
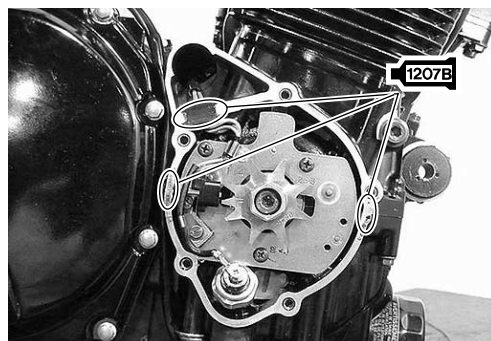
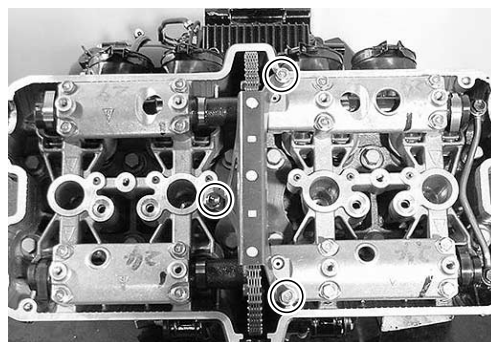
- Install the gasket.

- Install the signal generator cover.

 **Signal generator cover bolt: 11 N·m (1.1 kgf·m, 8.0 lb-ft)**

NOTE:

Fit the gasket washer to the starter clutch cover bolt (A) as shown.



CYLINDER HEAD COVER

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

NOTE:

Be sure to check the valve clearance. (👉 2-6)

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

99000-31230: SUZUKI BOND “1216B”

- Place the cylinder head cover on the cylinder head.
- Fit the new gaskets to head cover bolts (8 mm).
- Tighten the head cover bolts to the specified torque.

Head cover bolt (8 mm): 20 N·m (2.0 kgf·m, 15 lb-ft)

- Apply a small quantity of engine oil to the gasket.
- Tighten the head cover bolts (7 mm) to the specified torque.

Head cover bolt (7 mm): 14 N·m (1.4 kgf·m, 10.0 lb-ft)

- Apply grease to the O-ring and install the oil hose.

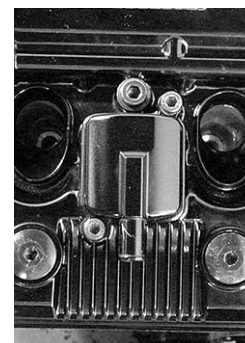
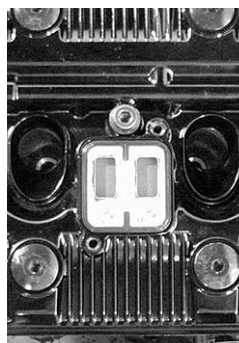
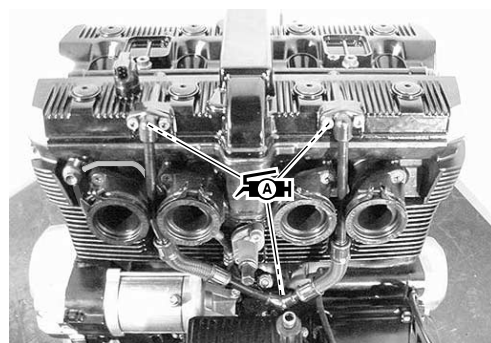
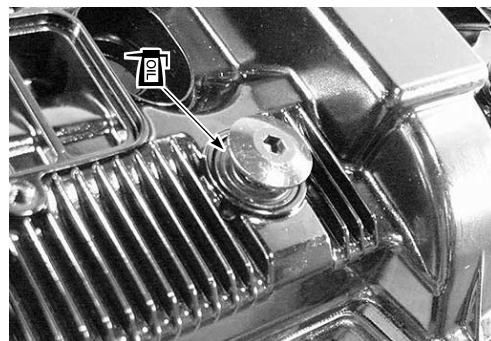
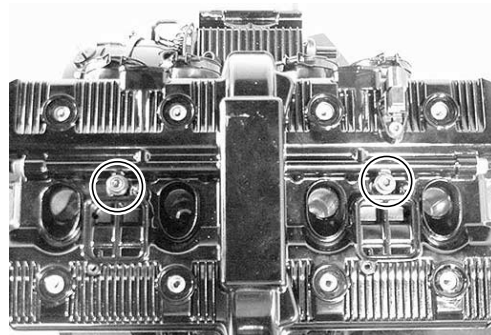
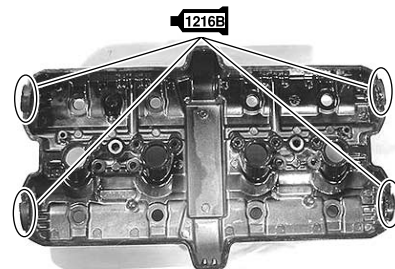
Oil hose union bolt: 10 N·m (10 kgf·m, 7.4 lb-ft)

99000-25010: SUZUKI SUPER GREASE “A”

PAIR REED VALVE

- Install the PAIR reed valve and its cover.

PAIR reed valve cover bolt: 10 N·m (1.0 kgf·m, 7.4 lb-ft)



FI SYSTEM

CONTENTS

| | |
|--|-------------|
| PRECAUTIONS IN SERVICING | 4- 2 |
| FI SYSTEM TECHNICAL FEATURES | 4- 8 |
| INJECTION TIME | 4- 8 |
| COMPENSATION OF INJECTION TIME | 4- 9 |
| INJECTION STOP CONTROL | 4- 9 |
| FUEL DELIVERY SYSTEM | 4-10 |
| FUEL PUMP | 4-11 |
| FUEL PRESSURE REGULATOR | 4-12 |
| FUEL INJECTOR | 4-12 |
| FUEL PUMP CONTROL SYSTEM | 4-13 |
| ECM (FI CONTROL UNIT) | 4-14 |
| INJECTION TIMING | 4-14 |
| SENSORS | 4-15 |
| FI SYSTEM PARTS LOCATION | 4-19 |
| FI SYSTEM DIAGRAM | 4-21 |
| FI SYSTEM WIRING DIAGRAM | 4-22 |
| SELF-DIAGNOSIS FUNCTION | 4-23 |
| USER MODE | 4-23 |
| DEALER MODE | 4-24 |
| FAIL-SAFE FUNCTION | 4-26 |
| FI SYSTEM TROUBLESHOOTING | 4-27 |
| CUSTOMER COMPLAINT ANALYSIS | 4-27 |
| SELF-DIAGNOSTIC PROCEDURES | 4-28 |
| SELF-DIAGNOSIS RESET PROCEDURE | 4-28 |
| MALFUNCTION CODE AND DEFECTIVE CONDITION | 4-29 |
| “C11” CMP SENSOR CIRCUIT MALFUNCTION | 4-31 |
| “C12” CKP SENSOR CIRCUIT MALFUNCTION | 4-32 |
| “C13” IAP SENSOR CIRCUIT MALFUNCTION | 4-33 |
| “C14” TP SENSOR CIRCUIT MALFUNCTION | 4-35 |
| “C15” EOT SENSOR CIRCUIT MALFUNCTION | 4-37 |
| “C21” IAT SENSOR CIRCUIT MALFUNCTION | 4-38 |
| “C22” AP SENSOR CIRCUIT MALFUNCTION | 4-39 |
| “C23” TO SENSOR CIRCUIT MALFUNCTION | 4-41 |
| “C24” or “C25” IGNITION SYSTEM MALFUNCTION | 4-42 |
| “C28” STV ACTUATOR CIRCUIT MALFUNCTION | 4-42 |
| “C29” STP SENSOR CIRCUIT MALFUNCTION | 4-43 |
| “C31” GEAR POSITION SWITCH CIRCUIT MALFUNCTION | 4-45 |
| “C32”, “C33”, “C34” or “C35” FUEL INJECTION MALFUNCTION | 4-46 |
| “C41” FP RELAY CIRCUIT MALFUNCTION | 4-47 |
| “C42” IG SWITCH CIRCUIT MALFUNCTION | 4-47 |

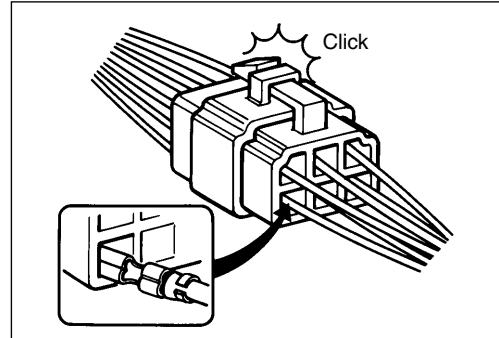
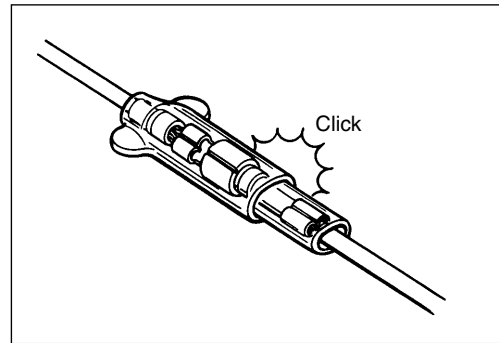
| | |
|--|-------------|
| FUEL SYSTEM | 4-48 |
| FUEL TANK REMOVAL | 4-48 |
| FUEL TANK INSTALLATION | 4-48 |
| FUEL PRESSURE INSPECTION | 4-49 |
| FUEL PUMP INSPECTION | 4-50 |
| FUEL PUMP RELAY INSPECTION | 4-51 |
| FUEL PUMP AND FUEL FILTER REMOVAL | 4-51 |
| FUEL MESH FILTER INSPECTION AND CLEANING | 4-52 |
| FUEL PUMP AND FUEL MESH FILTER INSTALLATION | 4-53 |
| THROTTLE BODY AND STV ACTUATOR | 4-54 |
| CONSTRUCTION | 4-54 |
| THROTTLE BODY REMOVAL | 4-55 |
| THROTTLE BODY DISASSEMBLY | 4-56 |
| THROTTLE BODY CLEANING | 4-59 |
| INSPECTION | 4-59 |
| THROTTLE BODY REASSEMBLY | 4-59 |
| STP SENSOR ADJUSTMENT | 4-62 |
| TP SENSOR ADJUSTMENT | 4-64 |
| THROTTLE BODY INSTALLATION | 4-64 |
| FUEL INJECTOR INSPECTION | 4-64 |
| FUEL INJECTOR REMOVAL | 4-64 |
| FUEL INJECTOR INSTALLATION | 4-64 |
| FAST IDLE INSPECTION | 4-65 |
| FAST IDLE ADJUSTMENT | 4-65 |
| THROTTLE VALVE SYNCHRONIZATION | 4-66 |
| THROTTLE CABLE ADJUSTMENT | 4-66 |
| SENSORS | 4-67 |
| IAP SENSOR INSPECTION | 4-67 |
| IAP SENSOR REMOVAL/INSTALLATION | 4-67 |
| TP SENSOR INSPECTION | 4-67 |
| TP SENSOR REMOVAL/INSTALLATION | 4-67 |
| STP SENSOR INSPECTION | 4-67 |
| STP SENSOR REMOVAL/INSTALLATION | 4-67 |
| CKP SENSOR INSPECTION | 4-67 |
| CKP SENSOR REMOVAL/INSTALLATION | 4-67 |
| CMP SENSOR INSPECTION | 4-68 |
| CMP SENSOR REMOVAL/INSTALLATION | 4-68 |
| IAT SENSOR INSPECTION | 4-68 |
| IAT SENSOR REMOVAL/INSTALLATION | 4-68 |
| EOT SENSOR INSPECTION | 4-68 |
| EOT SENSOR REMOVAL/INSTALLATION | 4-68 |
| AP SENSOR INSPECTION | 4-68 |
| AP SENSOR REMOVAL/INSTALLATION | 4-68 |
| TO SENSOR INSPECTION | 4-68 |
| TO SENSOR REMOVAL/INSTALLATION | 4-68 |

PRECAUTIONS IN SERVICING

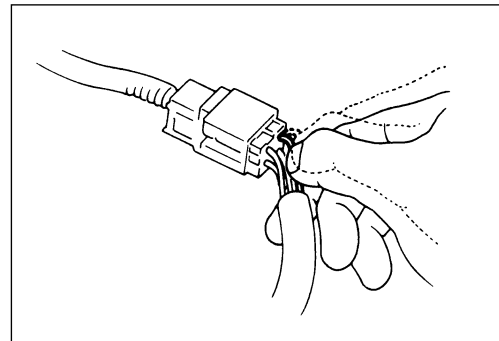
When handling the FI component parts or servicing the FI system, observe the following points for the safety of the system.

CONNECTOR/COUPLER

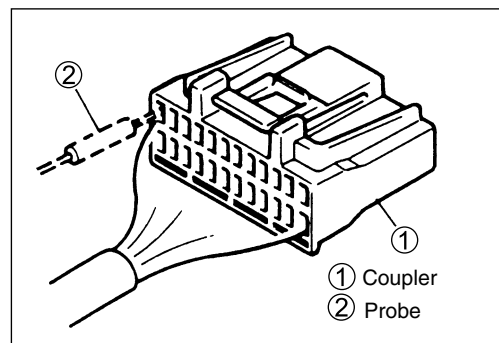
- When connecting a connector, be sure to push it in until a click is felt.
- With a lock type coupler, be sure to release the lock when disconnecting, and push it in fully till the lock works when connecting it.
- When disconnecting the coupler, be sure to hold the coupler body and do not pull the lead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



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



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

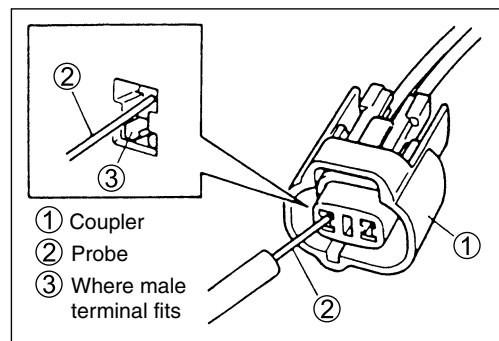


- When connecting meter probe from the terminal side of the coupler (connection from harness side not being possible), use extra care not to force and cause the male terminal to bend or the female terminal to open.

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

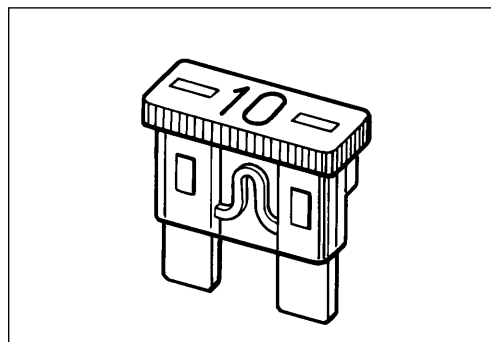
Never push in the probe where male terminal is supposed to fit.

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



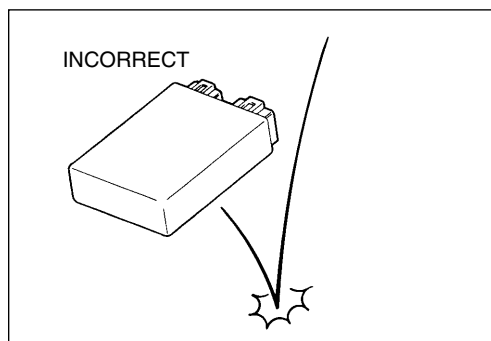
FUSE

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

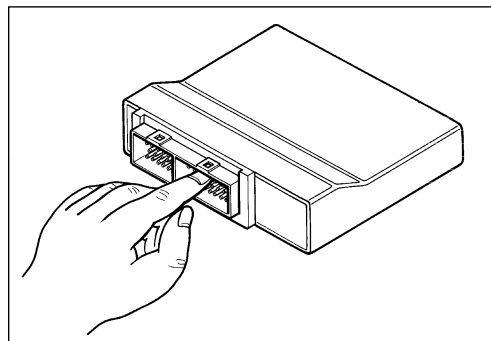


ECM/VARIOUS SENSORS

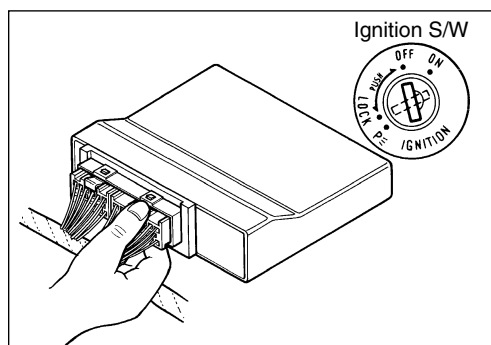
- Since each component is a high-precision part, great care should be taken not to apply any sharp impacts during removal and installation.



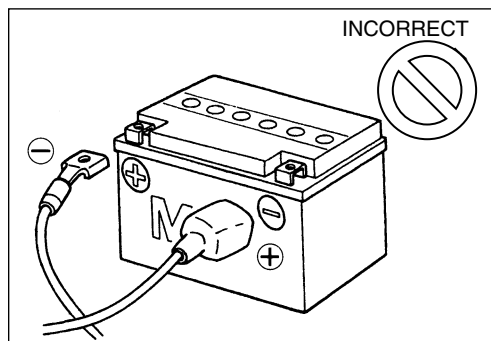
- Be careful not to touch the electrical terminals of the ECM. The static electricity from your body may damage this part.



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

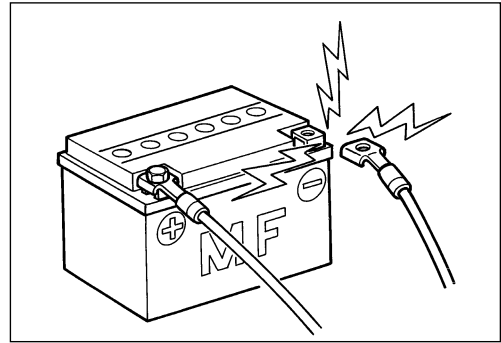


- Battery connection in reverse polarity is strictly prohibited. Such a wrong connection will damage the components of the FI system instantly when reverse power is applied.

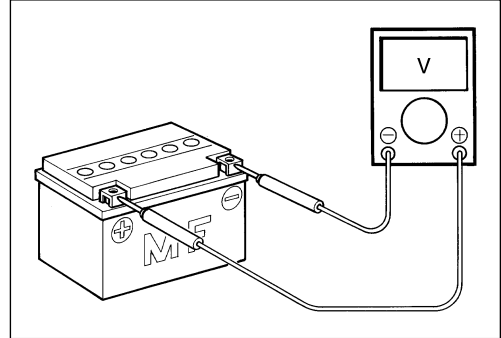


- Removing any battery terminal of a running engine is strictly prohibited.

The moment such removal is made, damaging counter electromotive force will be applied to the ECM which may result in serious damage.



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



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

ELECTRICAL CIRCUIT INSPECTION PROCEDURE

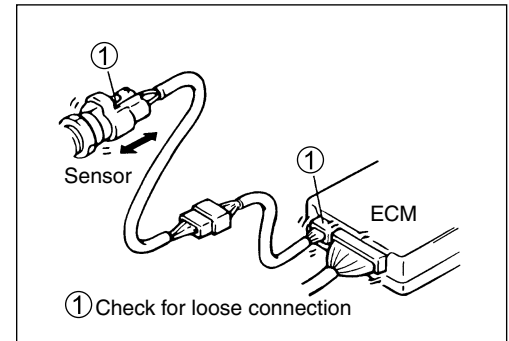
While there are various methods for electrical circuit inspection, described here is a general method to check for open and short circuit using an ohmmeter and a voltmeter.

OPEN CIRCUIT CHECK

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

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

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

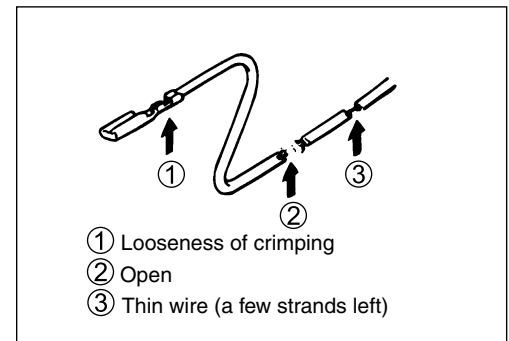
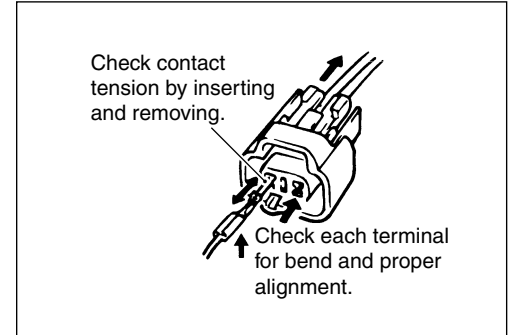


- Using a test male terminal, check the female terminals of the circuit being checked for contact tension. Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted in the coupler and locked.

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

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

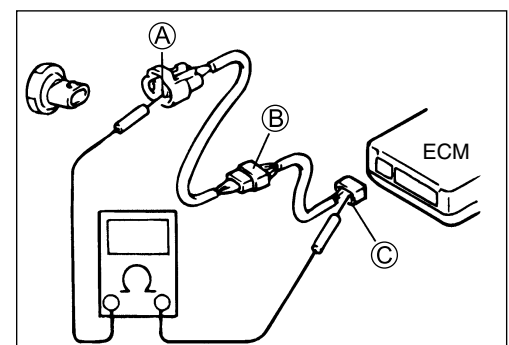
- Using continuity inspect or voltage check procedure as described below, inspect the wire harness terminals for open circuit and poor connection. Locate abnormality, if any.



Continuity check

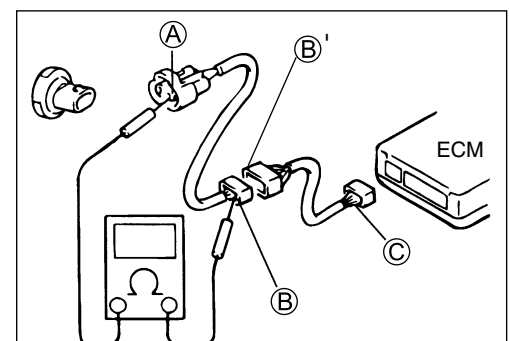
- Measure resistance across coupler ② (between ① and ③ in the figure).

If no continuity is indicated (infinity or over limit), the circuit is open between terminals ① and ③.



- Disconnect the coupler ② and measure resistance between couplers ① and ②.

If no continuity is indicated, the circuit is open between couplers ① and ②. If continuity is indicated, there is an open circuit between couplers ②' and ③ or an abnormality in coupler ②' or coupler ③.



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. 5V

(B) and body ground: Approx. 5V

(A) and body ground: 0V

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

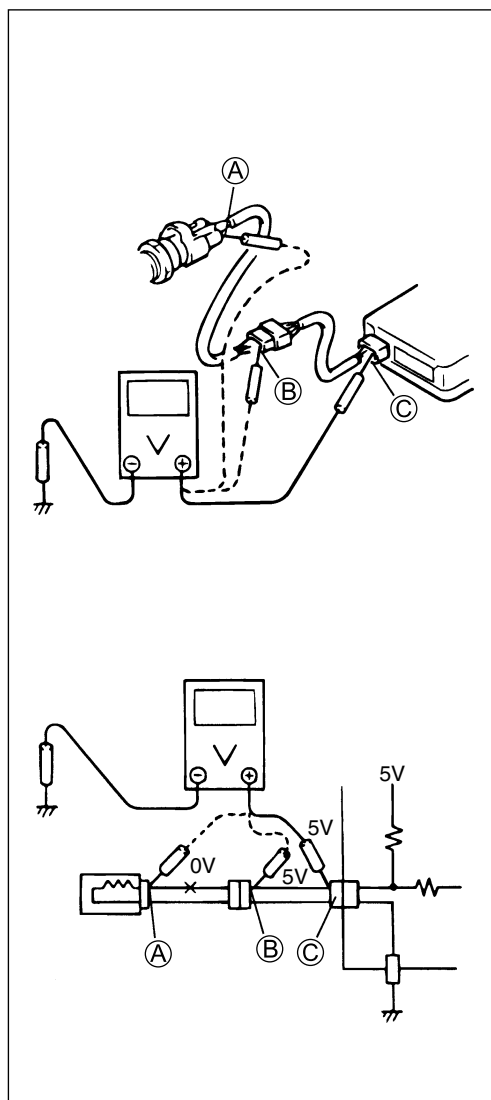
Voltage Between:

(C) and body ground: Approx. 5V

(B) and body ground: Approx. 5V

(A) and body ground: Approx. 3V

2V voltage drop



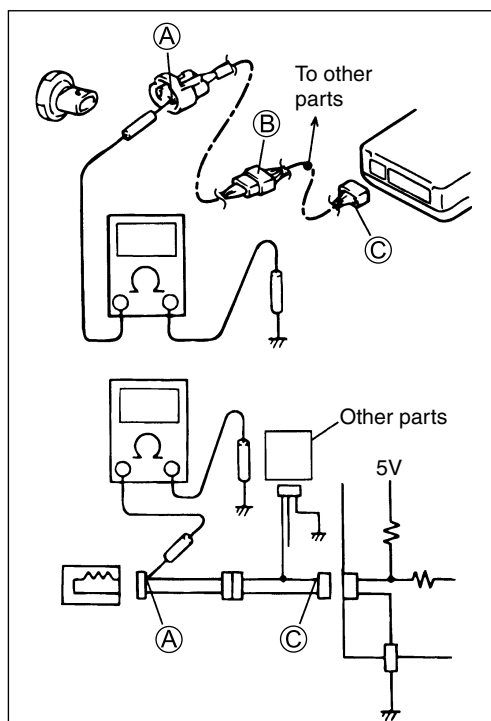
SHORT CIRCUIT CHECK (WIRE HARNESS TO GROUND)

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

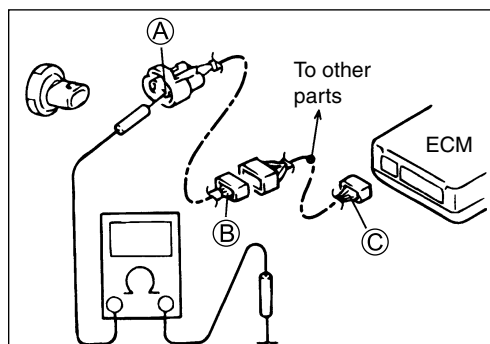
NOTE:

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 ②) and measure resistance between terminal ① and body ground.
If continuity is indicated, the circuit is shorted to the ground between terminals ① and ②.



USING TESTERS

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

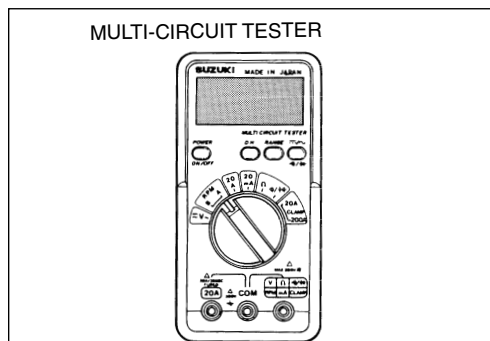
Using the tester

- Incorrectly connecting the \oplus and \ominus 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 10.00M Ω and "1" flashes in the display.
- Check that no voltage is applied before making the measurement. If voltage is applied, the tester may be damaged.
- After using the tester, turn the power off.

09900-25008: Multi-circuit tester

NOTE:

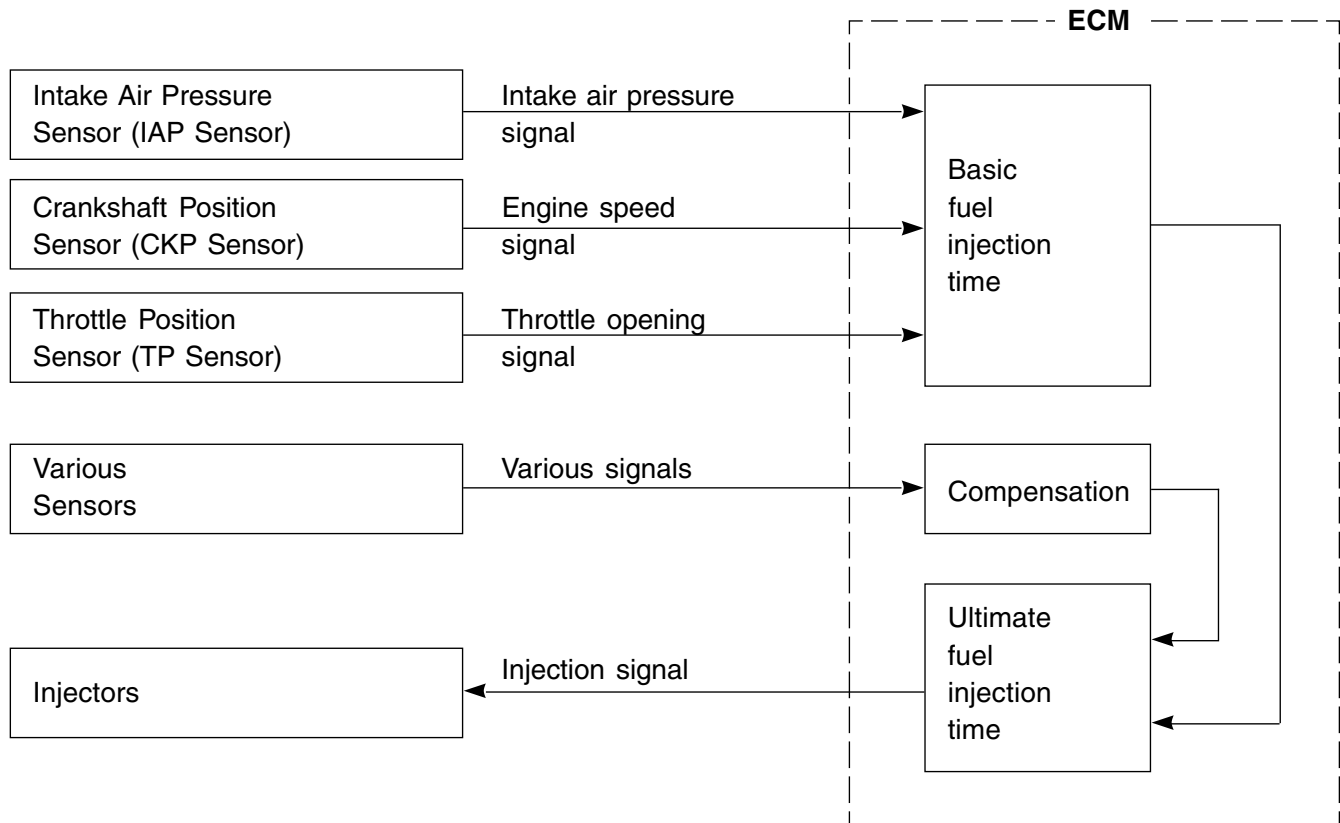
- * When connecting the multi circuit tester, install fine copper wires (O.D is below 0.5 mm) to the back side of the lead wire coupler and connect the probes of tester to them.
- * Use a fine copper wire, the outer diameter being below 0.5 mm, to prevent the rubber of the water proof coupler from damage.



FI SYSTEM TECHNICAL FEATURES

INJECTION TIME (INJECTION VOLUME)

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



COMPENSATION OF INJECTION TIME (VOLUME)

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

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

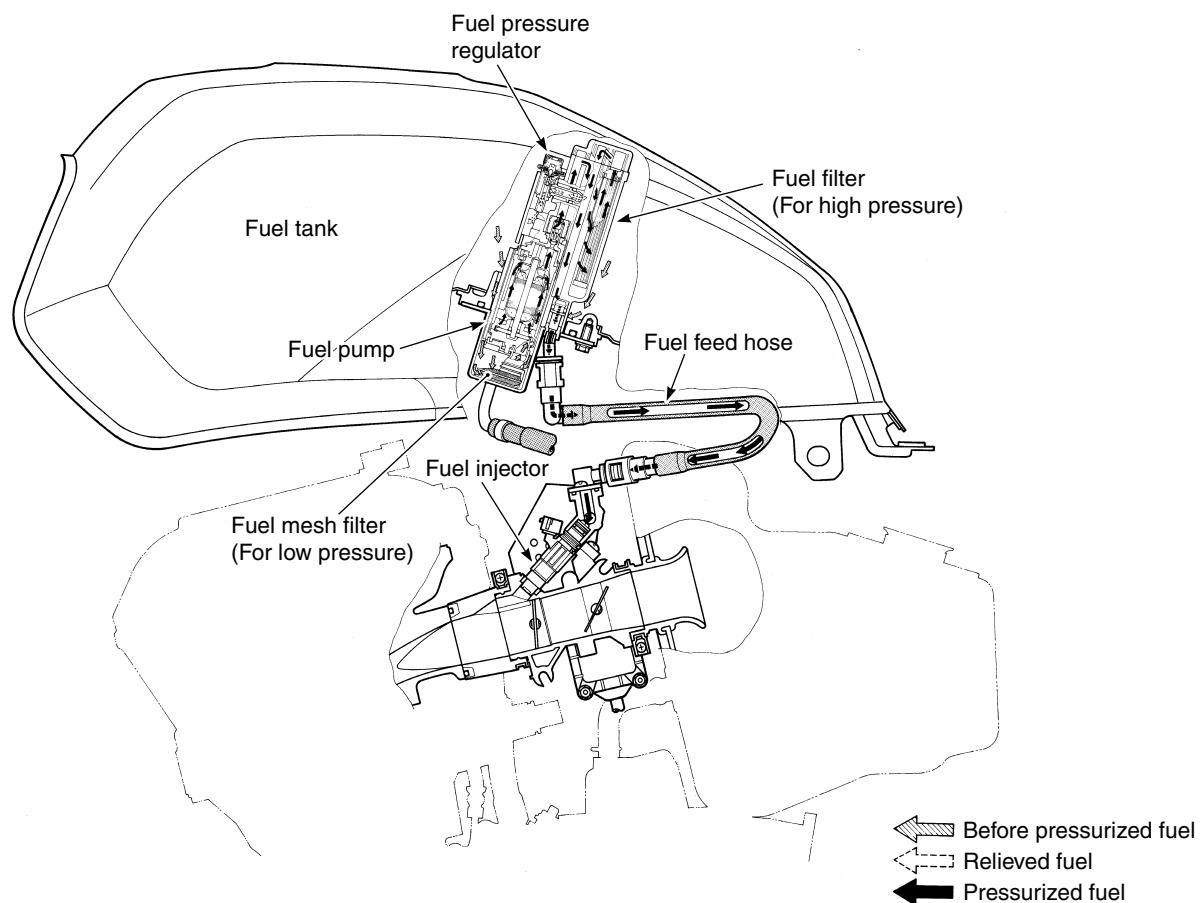
INJECTION STOP CONTROL

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

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 to flow 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 absolute fuel pressure of 300 kPa (3.0 kgf/cm², 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.

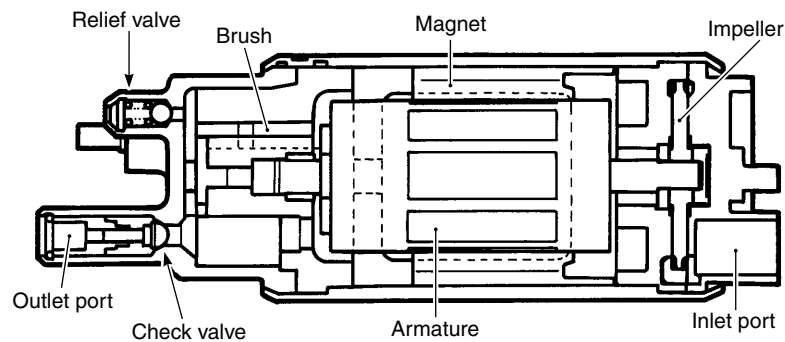
The fuel relieved by the fuel pressure regulator flows out to the fuel tank.



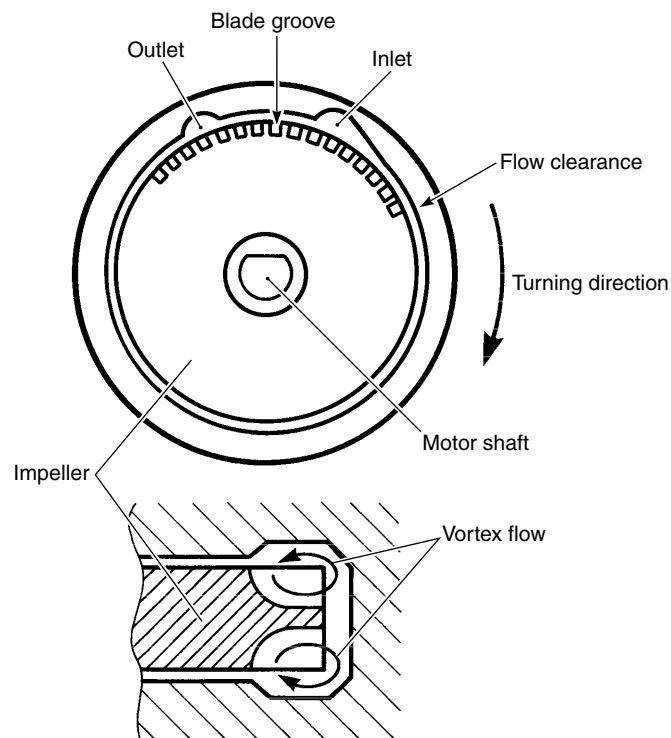
FUEL PUMP

The electric fuel pump is mounted at the bottom of the fuel tank, which consists of the armature, magnet, impeller, brush, check valve and relief valve. The ECM controls its ON/OFF operation as controlled under the FUEL PUMP CONTROL SYSTEM.

When electrical energy is supplied to the fuel pump, the motor in the pump runs and so does the impeller. This causes a pressure difference to occur between both sides of the impeller as there are many grooves around it. Then the fuel is drawn through the inlet port, and with its pressure increased, it is discharged through the outlet port. The fuel pump has a check valve to keep some pressure in the fuel feed hose even when the fuel pump is stopped. Also, the relief valve is equipped in the fuel pump, which releases pressurized fuel to the fuel tank when the outlet of the fuel pressure has increased up to 450 – 600 kPa (4.5 – 6.0 kgf/cm², 64 – 85 psi).



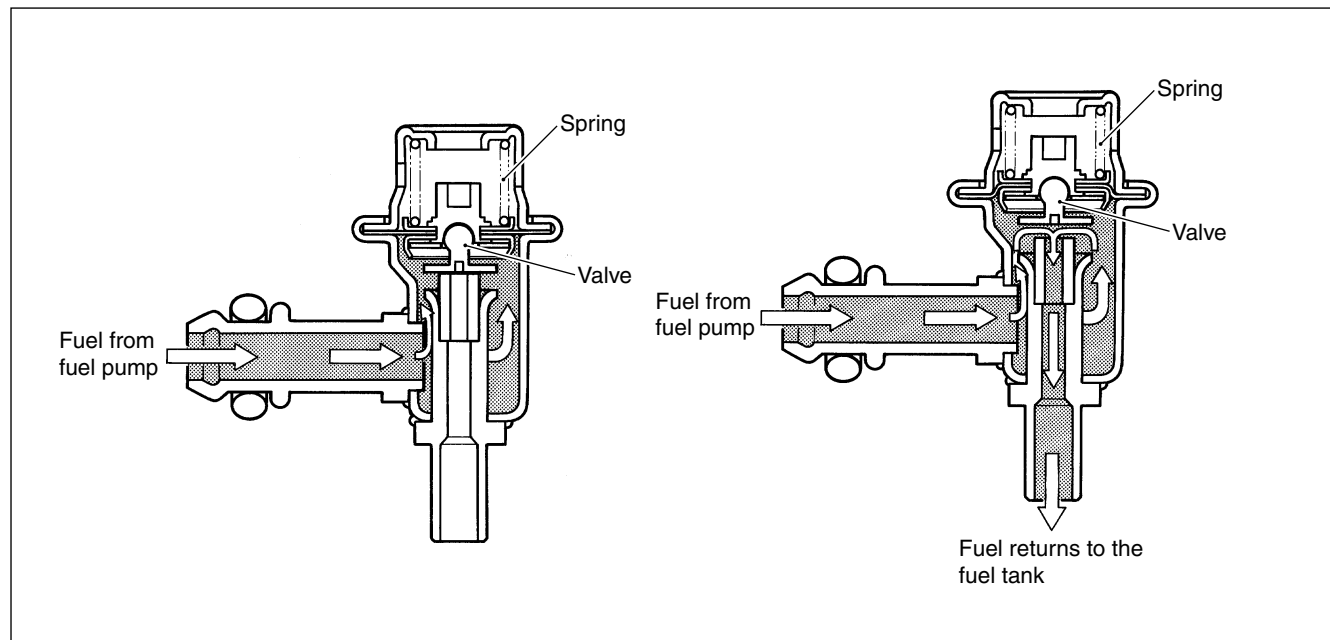
When the impeller is driven by the motor, pressure differential occurs between the front part and the rear part of the blade groove as viewed in angular direction due to fluid friction. This process continuously takes place causing fuel pressure to be built up. The pressurized fuel is then let out from the pump chamber and discharged through the motor section and the check valve.



FUEL PRESSURE REGULATOR

The fuel pressure regulator consists of the spring and valve. It keeps absolute fuel pressure of 300 kPa (3.0 kgf/cm², 43 psi) applied to the injector at all times.

When the fuel pressure rises more than 300 kPa (3.0 kgf/cm², 43 psi), the fuel pushes the valve in the regulator open and excess fuel returns to the fuel tank.

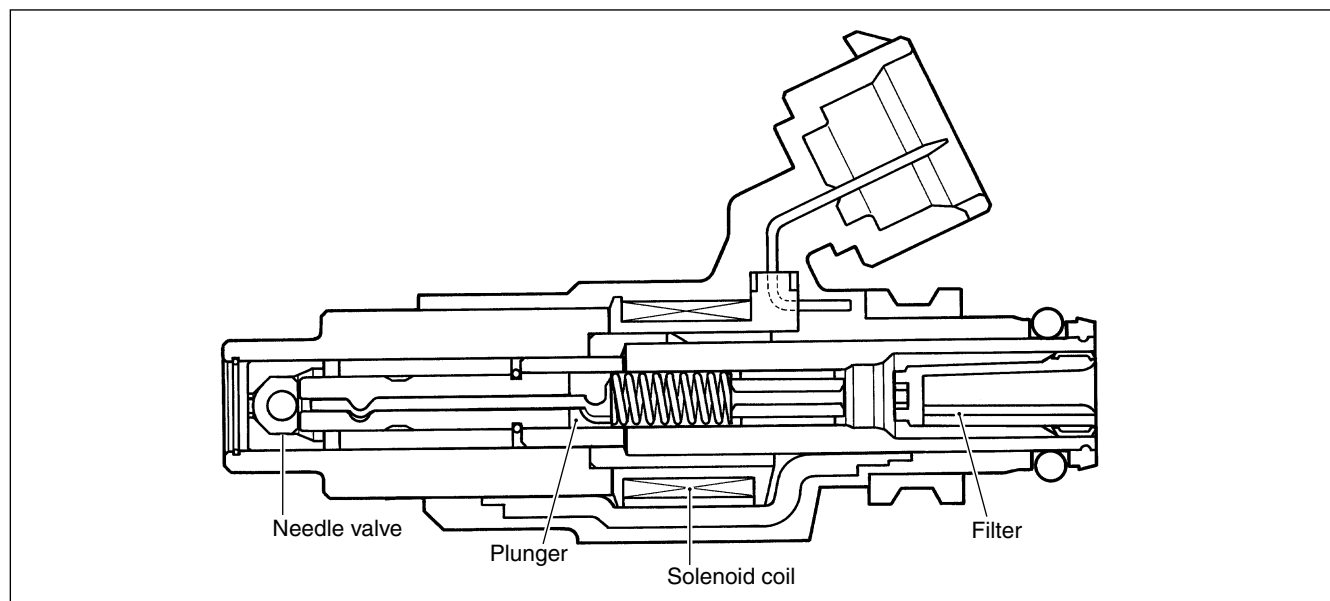


FUEL INJECTOR

The fuel injector consists of the solenoid coil, plunger, needle valve and filter.

It is an electromagnetic type injection nozzle which injects fuel in the throttle body according to the signal from the ECM.

When the solenoid coil of the injector is energized by the ECM, it becomes an electromagnet and attracts the plunger. At the same time, the needle valve incorporated with the plunger opens and the injector which is under the fuel pressure injects fuel in conic dispersion. As the lift stroke of the needle valve of the injector is set constant, the volume of the fuel injected at one time is determined by the length of time during which the solenoid coil is energized (injection time).



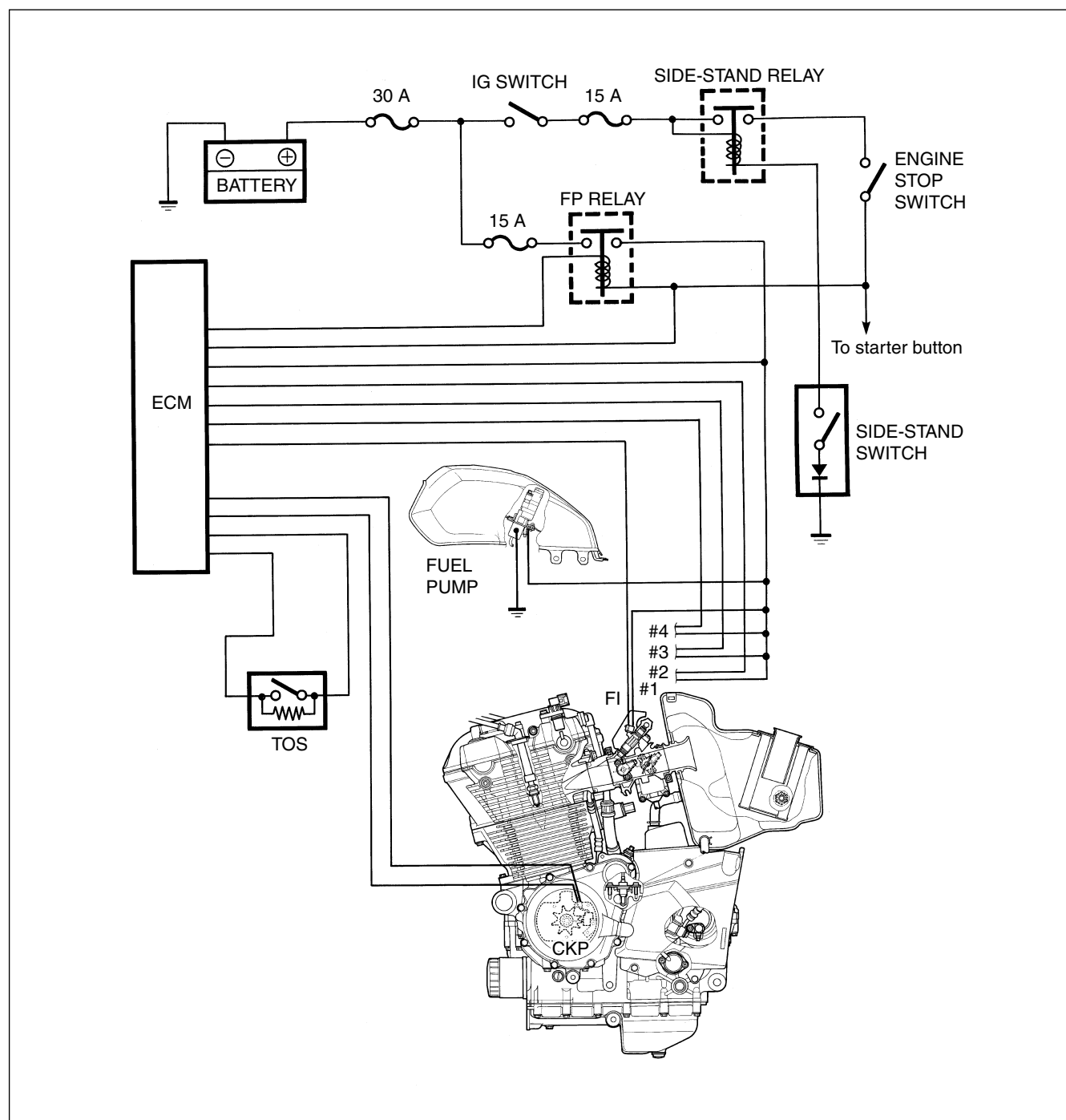
FUEL PUMP CONTROL SYSTEM

When the ignition switch is turned on, current from the battery flows to the fuel pump motor through the side-stand relay and the fuel pump relay causing the motor to turn.

Since the ECM has a timer function, the fuel pump motor stops turning in three seconds after the switch has been turned on.

Thereafter, when the crankshaft is turned by the starter motor or the engine has been started, the engine revolving signal is input to the ECM. Then, current flows to the fuel pump motor from the battery through the side-stand relay and the fuel pump relay so that the pump continues to function.

A tip over sensor is provided in the fuel pump control circuit. By this provision, anytime the motorcycle tips over, the tip over sensor sends a signal to the ECM to turn off power to the fuel pump relay, causing the fuel pump motor to stop. At the same time, current to the fuel injectors as well as the ignition coil is interrupted, which then stops the engine.



ECM (FI CONTROL UNIT)

The ECM is located under the seat.

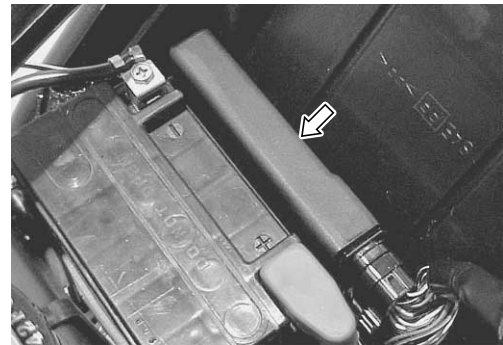
The ECM consists of CPU (Central Processing Unit), memory (ROM) and I/O (Input/Output) sections. The signal from each sensor is sent to the input section and then sent to CPU. On the basis of signal information received, CPU calculates the volume of fuel necessary for injection using maps programmed for varying engine conditions. Then, the operation signal of the fuel injection is sent from the output section to the fuel injector.

The eight kinds of independent program maps are programmed in the ROM.

These eight kinds of maps are designed to compensate for differences of the intake/exhaust systems and cooling performance.

LIGHT LOAD: When the engine is running in a light load, the fuel injected volume (time) is determined the basis of the intake air pressure and engine speed.

HEAVY LOAD: When the engine is running in a heavy load, the fuel injected volume (time) is determined the basis of the throttle valve opening and engine speed.



INJECTION TIMING

The system employs a sequential, four-cylinder independent injection type, using the crankshaft position sensor (signal generator) to determine the piston position (injection timing and ignition timing) and the camshaft position sensor to identify the cylinder during operation, and these information are sent to the ECM. This makes it possible to inject the optimum volume of fuel in the best timing for the engine operating conditions. When the crankshaft begins to turn at the time of starting, the ECM sends the signals to the four injectors, #1, #2, #3 and #4 to have them inject fuel simultaneously. From the second turn onward, the sequential four-cylinder independent injection occurs as explained above.

SENSORS

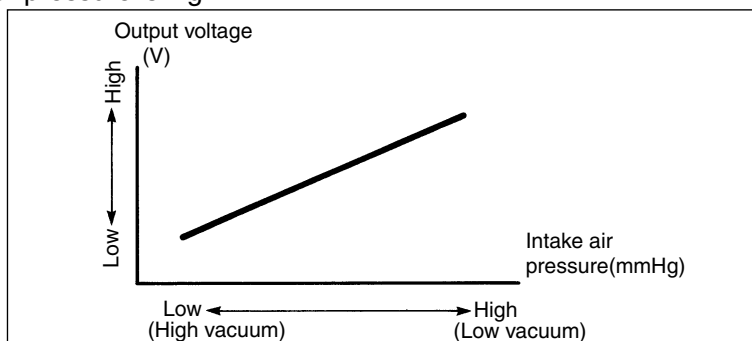
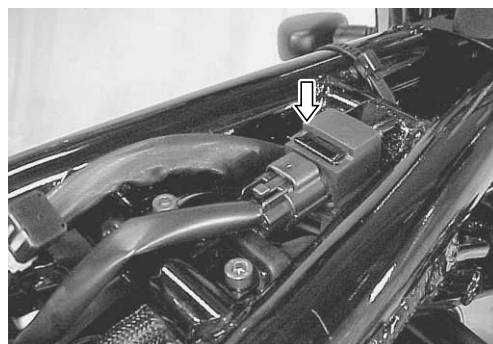
INTAKE AIR PRESSURE SENSOR (IAP SENSOR)

The intake air pressure sensor is located at the upper frame between the tubes and its vacuum hose is connected to the throttle body.

The sensor detects the intake air pressure, which is then converted into voltage signal and sent to the ECM.

The basic fuel injection time (volume) is determined according to the voltage signal (output voltage).

The voltage signal increases when the intake air pressure is high.



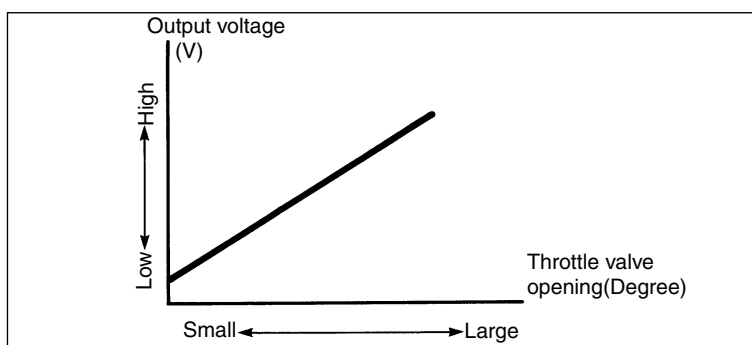
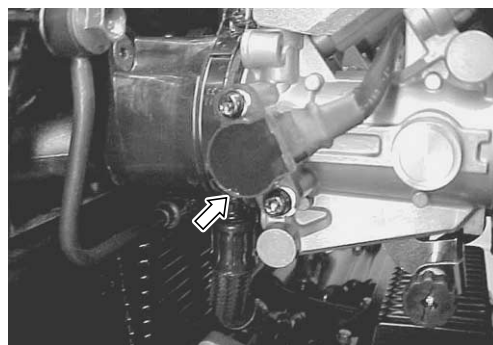
THROTTLE POSITION SENSOR (TP SENSOR)

The throttle position sensor is installed on the No.1 throttle body. The throttle position sensor is a kind of variable resistor which detects the throttle opening angle.

The battery voltage in the sensor is changed to the throttle position voltage which is then sent to the ECM.

The basic fuel injection time (volume) is determined according to the voltage signal (output voltage).

The voltage signal increases as the throttle is opened wider.



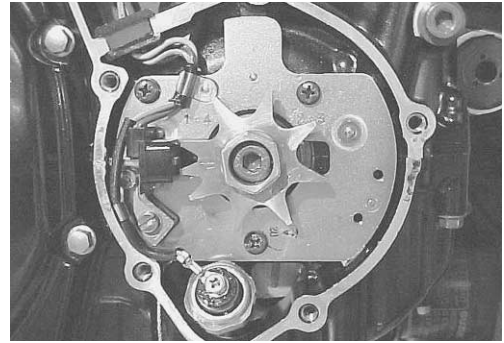
CRANKSHAFT POSITION SENSOR (CKP SENSOR)

The signal rotor is mounted on the right end of the crankshaft, and the crankshaft position sensor (Pick-up coil) is installed on the right side of the crankcase.

The sensor generates the pick-up signal to be supplied to the ECM.

The ECM calculates and decides both the fuel injection timing and ignition timing.

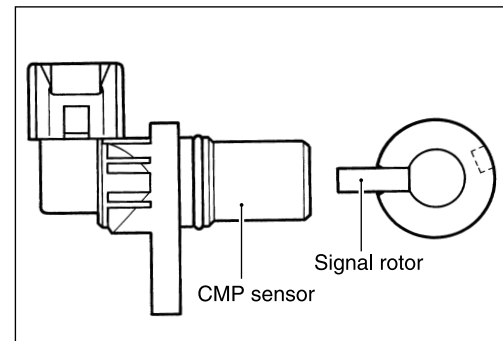
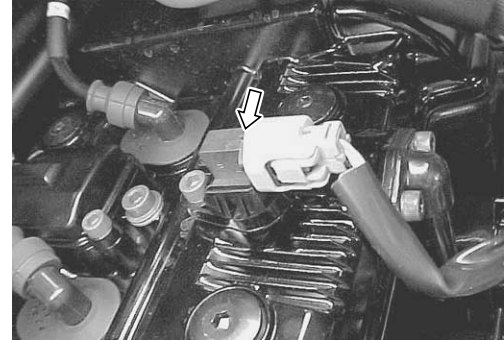
The injection volume increases when the engine rpm is high.

**CAMSHAFT POSITION SENSOR (CMP SENSOR)**

The signal rotor is installed on the intake camshaft, and the camshaft position sensor (Pick-up coil) is installed on the cylinder head cover.

The sensor generates the pick-up signal to be supplied to the ECM.

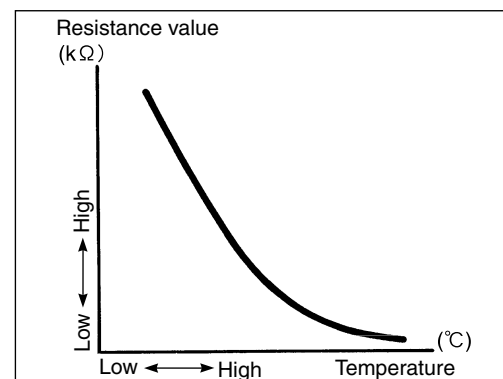
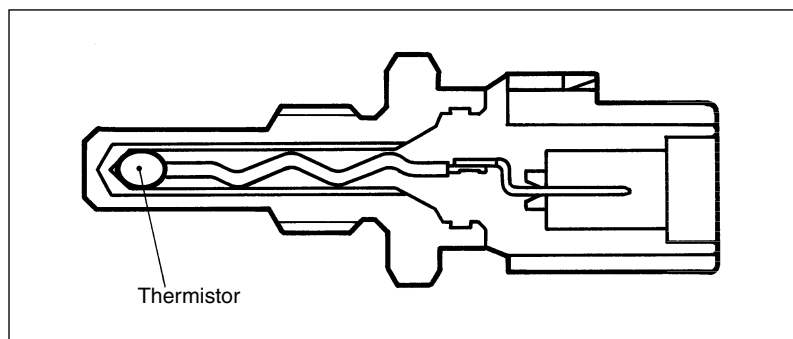
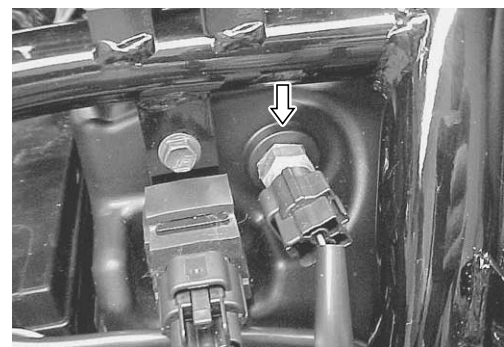
The ECM calculates and decides the cylinder identity and sequential injection timing.

**INTAKE AIR TEMPERATURE SENSOR (IAT SENSOR)**

The intake air temperature sensor is installed at the right side of the air cleaner box.

The sensor detects the intake air temperature in thermistor resistance value. With this resistance value converted to voltage signal, the signal is sent to the ECM. The injection volume increases as intake air temperature decreases.

The thermistor resistance value increases when the intake air temperature is low, and decreases when the intake air temperature is high.

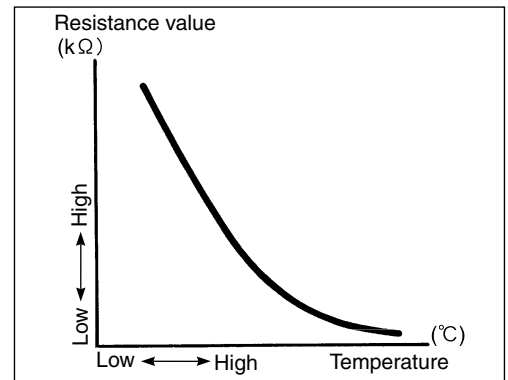
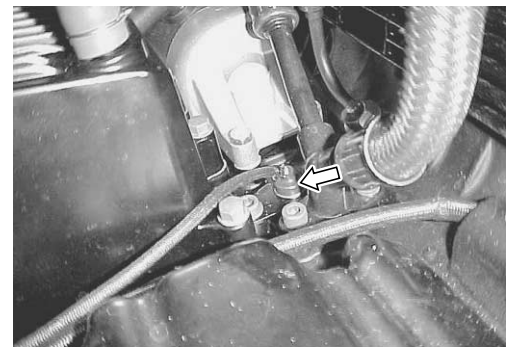
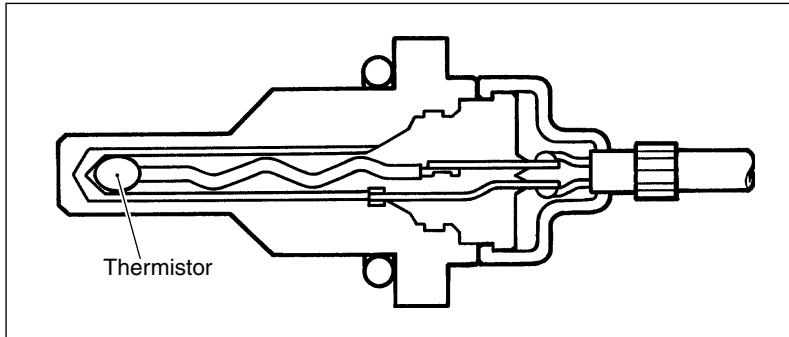


ENGINE OIL TEMPERATURE SENSOR (EOT SENSOR)

The engine oil temperature sensor is installed at the upper crankcase.

The sensor detects the engine oil temperature in thermistor resistance value, which is then converted to voltage signal and sent to the ECM. The injection volume increases as oil temperature decreases.

The thermistor resistance value increases when the engine oil temperature is low, and decreases when the engine oil temperature is high.



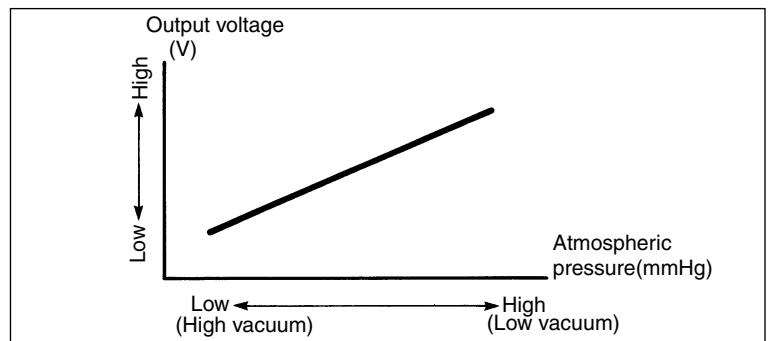
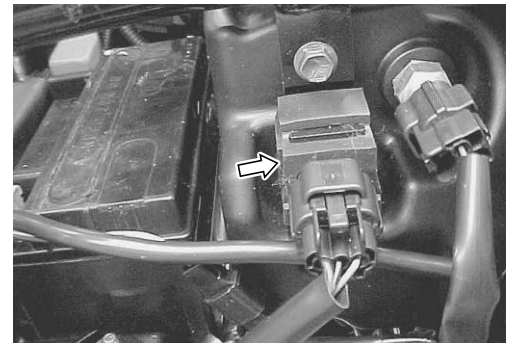
ATMOSPHERIC PRESSURE SENSOR (AP SENSOR)

The atmospheric pressure sensor is located at the right side of the air cleaner box.

The sensor detects the atmospheric pressure. The detected pressure is converted into voltage signal and sent to the ECM.

The injection time (volume) is controlled according to the voltage signal (output voltage).

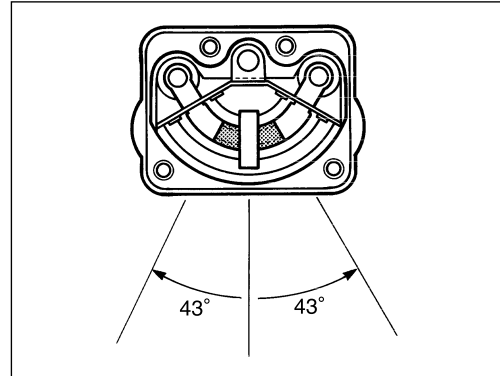
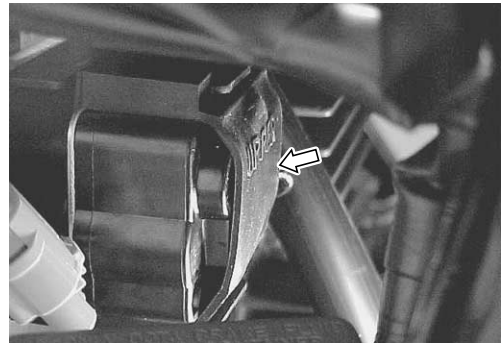
The voltage signal increases as the atmospheric pressure rises.



TIP OVER SENSOR (TO SENSOR)

The tip over sensor is located in ahead of the battery holder.

The sensor detects the leaning of the motorcycle. When it leans more than 43° , the mechanical switch turns ON and a signal is sent to the ECM. At the same time, this signal cuts OFF current supply to the fuel pump, fuel injectors and ignition coils.

**SECONDARY THROTTLE POSITION SENSOR (STP SENSOR)**

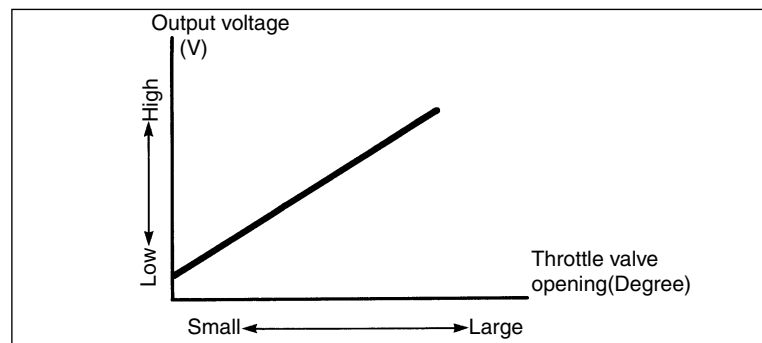
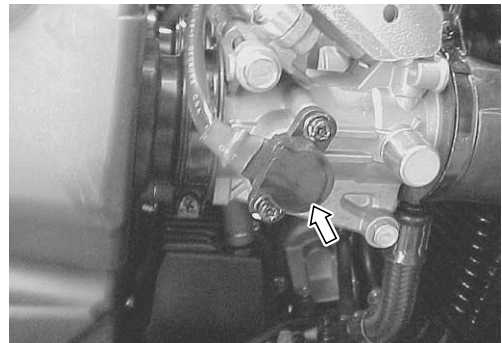
The secondary throttle position sensor is installed on the No.4 throttle body.

The secondary throttle position sensor is a kind of variable resistor which detects the secondary throttle opening angle.

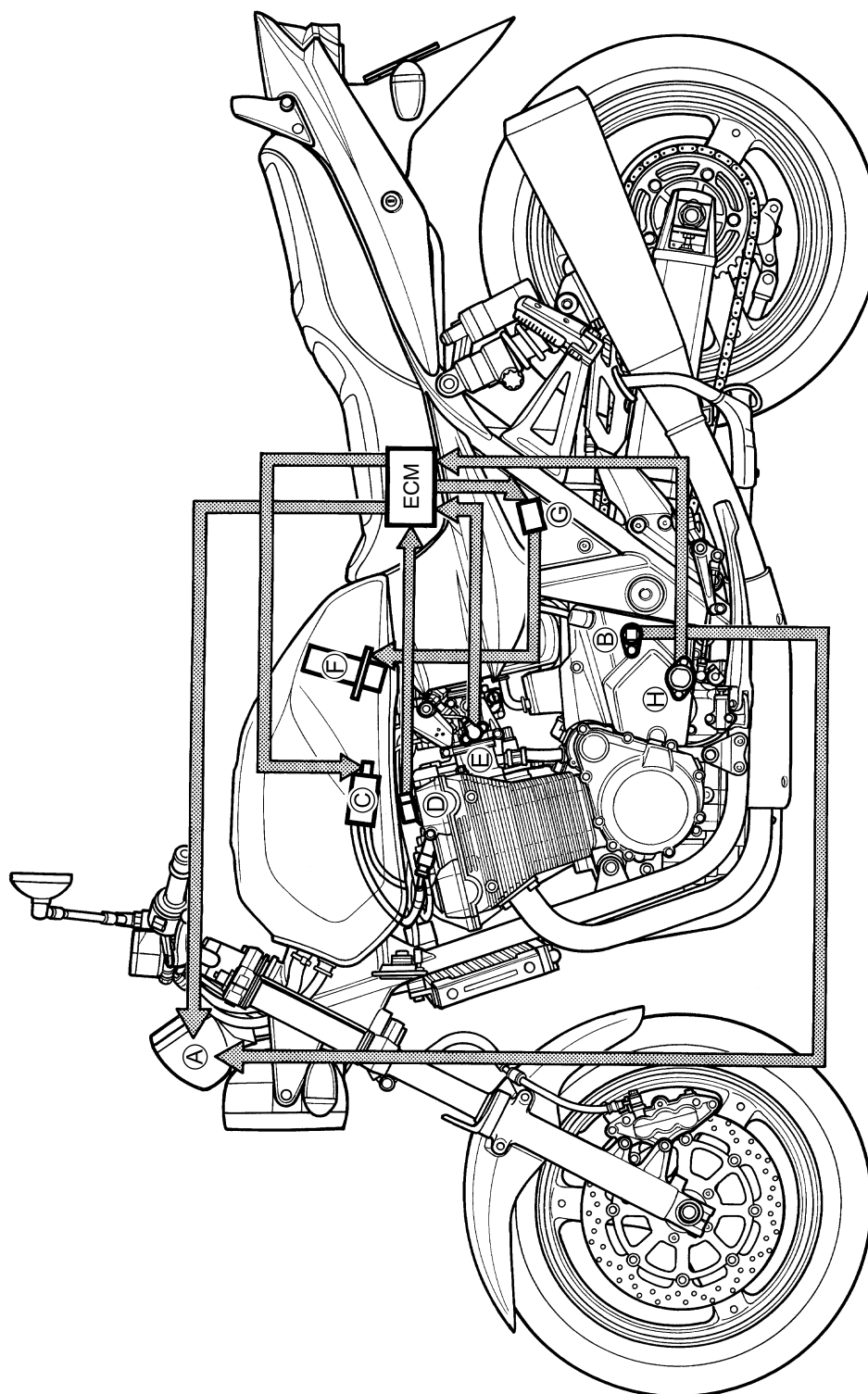
The STP sensor detects the STV actuator movement by the voltage signal which is then sent to the ECM.

The ECM determines the ST valve angle based on the operation map.

The voltage signal increases as the secondary throttle is opened wider.

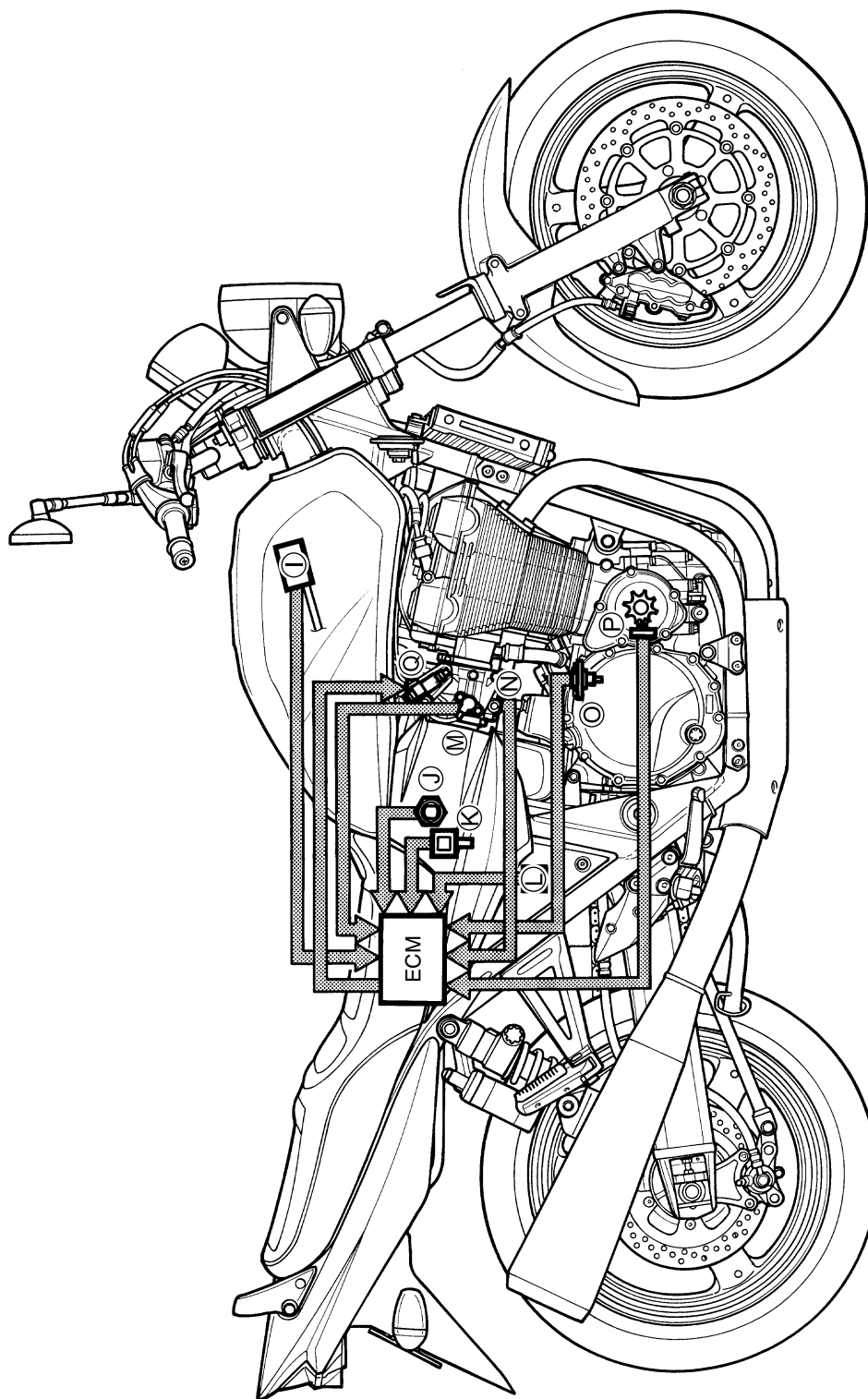


FI SYSTEM PARTS LOCATION



A Speedometer
B Speed sensor
C Ignition coil (IG COIL)
D Camshaft position sensor (CMPS)

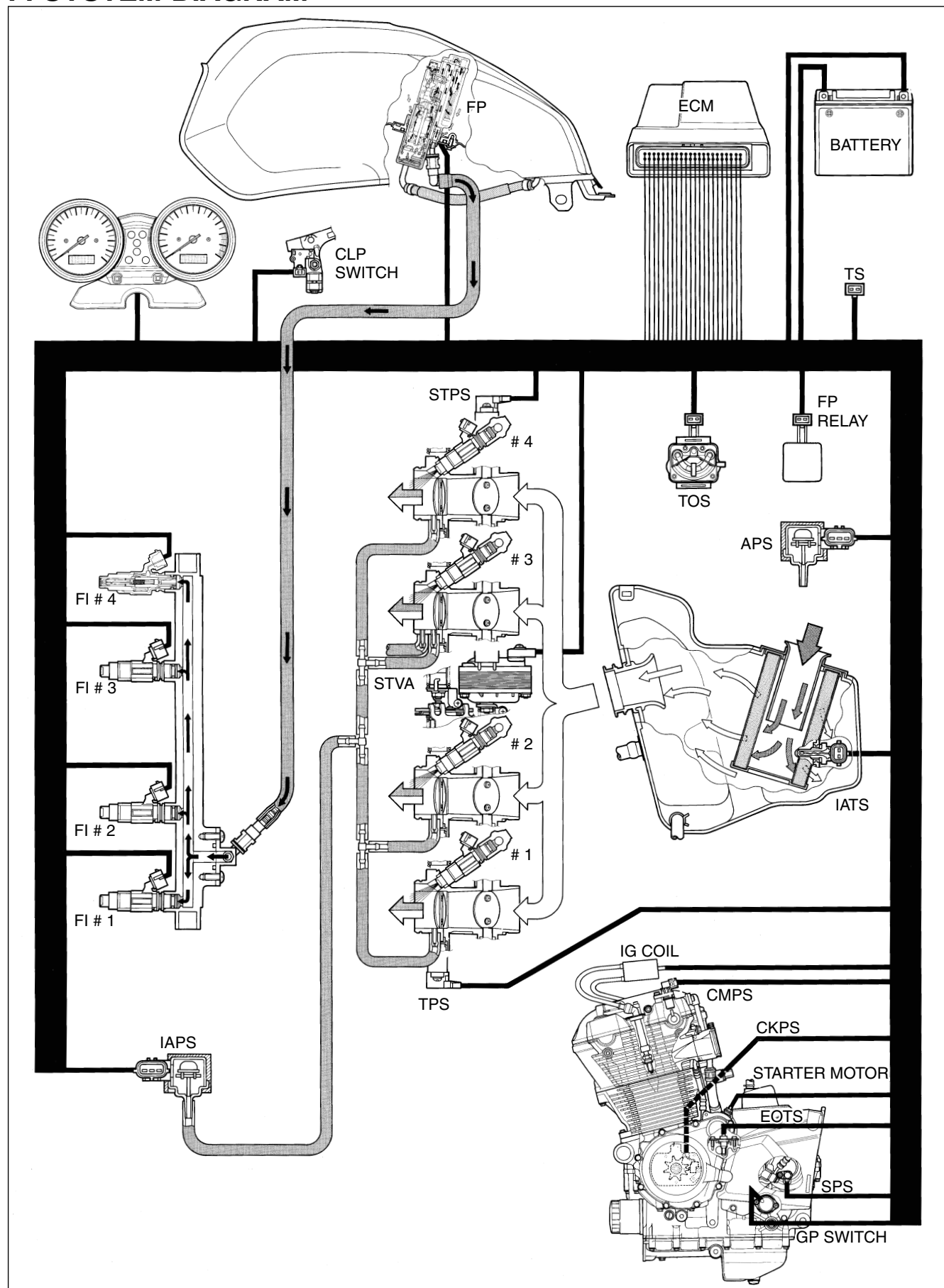
E Throttle position sensor (TPS)
F Fuel pump (FP)
G Fuel pump relay (FP RELAY)
H Gear position switch (GP SWITCH)



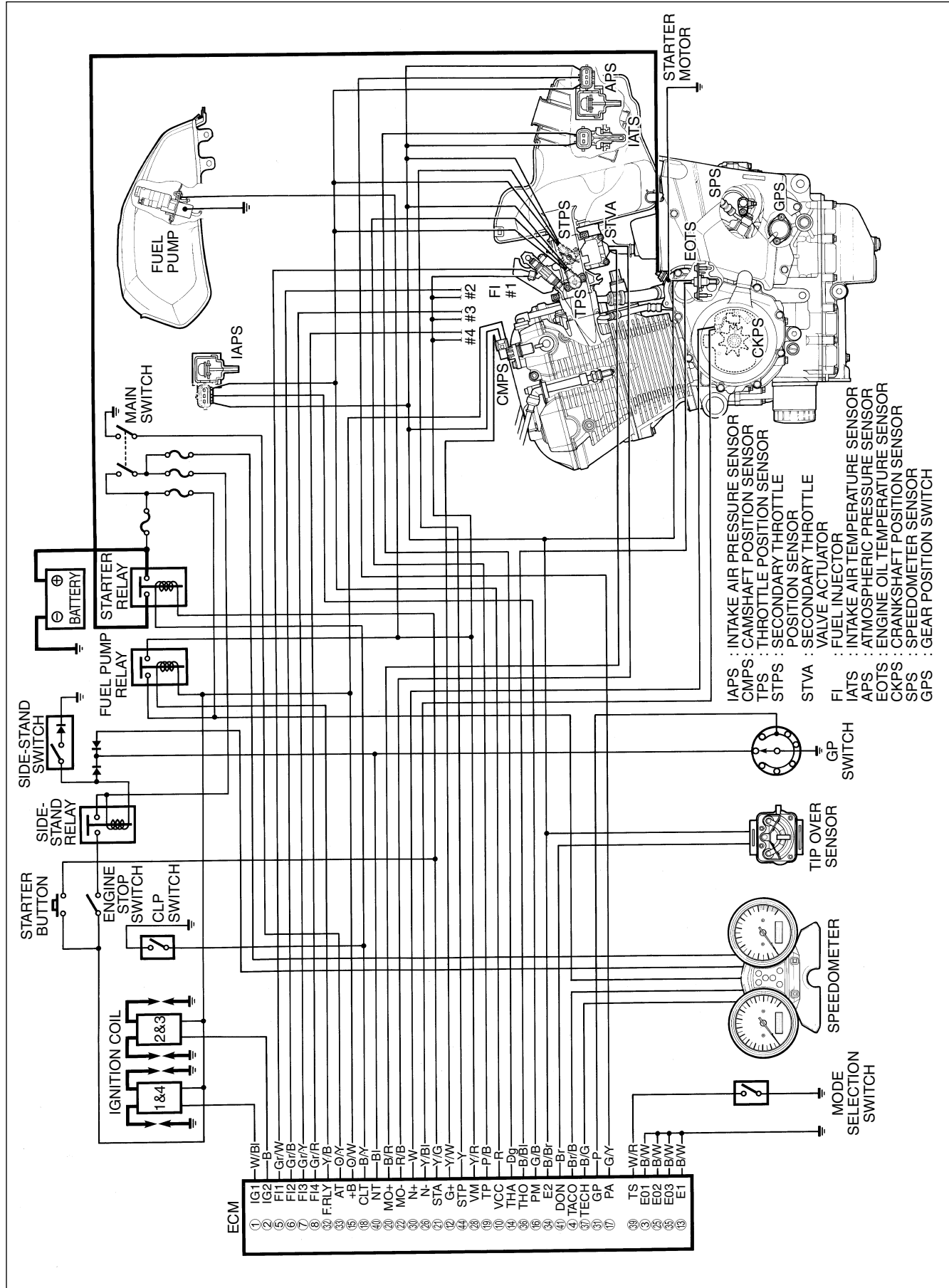
- ① Intake air pressure sensor (IAPS)
- ② Intake air temperature sensor (IATS)
- ③ Atmospheric pressure sensor (APS)
- ④ Tip over sensor (TOS)

- ⑤ Secondary throttle position sensor (STPS)
- ⑥ Secondary throttle valve actuator (STVA)
- ⑦ Engine oil temperature sensor (EOTS)
- ⑧ Crankshaft position sensor (CKPS)
- ⑨ Fuel injector (FI)

FI SYSTEM DIAGRAM



FI SYSTEM WIRING DIAGRAM



SELF-DIAGNOSIS FUNCTION

The self-diagnosis function is incorporated in the ECM. The function has two modes, "User mode" and "Dealer mode". The user can only be notified by the LCD (DISPLAY) panel and LED (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" | Odometer | — | — |
| "YES" | Odometer and "FI" letters *1 | FI light turns ON. | Each 2 sec. Odometer 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 odometer are indicated in the LCD panel and motorcycle can run.

*2

The injection signal is stopped, when the crankshaft position sensor signal, tip over sensor signal, #1/#4 and #2/#3 ignition signals, #1/#2, #1/#3, #1/#4, #2/#3, #2/#4 and #3/#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 3 seconds.

For Example:

The ignition switch is turned ON, and the engine stop switch is turned OFF. In this case, the speedometer does not receive any signal from the ECM, and the panel indicates "CHEC".

If CHEC is indicated, the LCD does not indicate the trouble code. It is necessary to check the wiring harness between ECM and speedometer couplers.

The possible cause of this indication is as follows;

Engine stop switch is in OFF position. Side-stand/ignition inter-lock system is not working. Ignition fuse is burnt.

DEALER MODE

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

 09930-82710: Mode select switch



CAUTION

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

| MALFUNCTION | LCD (DISPLAY) INDICATION | FI 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) | Pick-up coil signal, signal generator |
| c12 | Crankshaft position sensor (CKPS) | |
| c13 | Intake air pressure sensor (IAPS) | |
| c14 | Throttle position sensor (TPS) | |
| c15 | Engine oil temp. sensor (EOTS) | |
| c21 | Intake air temp. sensor (IATS) | |
| c22 | Atmospheric pressure sensor (APS) | |
| c23 | Tip over sensor (TOS) | |
| c24 | Ignition signal #1, #4 (IG coil #1, #4) | |
| c25 | Ignition signal #2, #3 (IG coil #2, #3) | |
| c28 | Secondary throttle valve actuator (STVA) | For #1 & 4 cylinders |
| c29 | Secondary throttle position sensor (STPS) | For #2 & 3 cylinders |
| c31 | Gear position signal (GP switch) | *3 |
| 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 |

In the LCD (DISPLAY) panel, the malfunction code is indicated from small code to large code.

*3

When the secondary throttle valve actuator and secondary throttle position sensor signals are not sent to ECM. In this case, c29 is indicated.

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 | ECM determines cylinder as number before occurrence of such a failure. | "YES" | "YES" |
| 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 oil temperature sensor | Engine oil temperature value is fixed to 80°C. | "YES" | "YES" |
| Intake air temperature sensor | Intake air temperature value is fixed to 40°C. | "YES" | "YES" |
| Atmospheric pressure sensor | Atmospheric pressure is fixed to 760 mmHg. | "YES" | "YES" |
| Ignition signal | #1, #4 #1/#4 Ignition-off | "YES" | "YES" |
| | | #2 & #3 cylinders can run. | |
| | #2, #3 #2/#3 Ignition-off | "YES" | "YES" |
| | | #1 & #4 cylinders can run. | |
| Injection signal | #1 #1 Fuel-cut | "YES" | "YES" |
| | | #2, #3 & #4 cylinders can run. | |
| | #2 #2 Fuel-cut | "YES" | "YES" |
| | | #1, #3 & #4 cylinders can run. | |
| | #3 #3 Fuel-cut | "YES" | "YES" |
| | | #1, #2 & #4 cylinders can run. | |
| | #4 #4 Fuel-cut | "YES" | "YES" |
| | | #1, #2 & #3 cylinders can run. | |
| Secondary throttle valve actuator | Secondary throttle valve is fixed to half open position. | "YES" | "YES" |
| Secondary throttle position sensor | Secondary throttle valve is fixed to half open position. | "YES" | "YES" |
| Gear position signal | Gear position signal is fixed to 6th gear. | "YES" | "YES" |

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

Only for injector signal:

Two injector signals are not received by ECM ("FI" is indicated in the LCD panel), but the fail-safe circuit works and injection is not 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"/> Difficult Starting <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"/> Poor Driveability <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"/> Other _____ | |
| <input type="checkbox"/> Poor Idling <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"/> Engine Stall when <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: | | | |
| MOTORCYCLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS | | | |
| Environmental condition | | | |
| 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 | | |
| Motorcycle condition | | | |
| 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"/> When shifting (Gear position) <input type="checkbox"/> At stop <input type="checkbox"/> Motorcycle speed when problem occurs (km/h, Mile/h) <input type="checkbox"/> Other _____ | | |

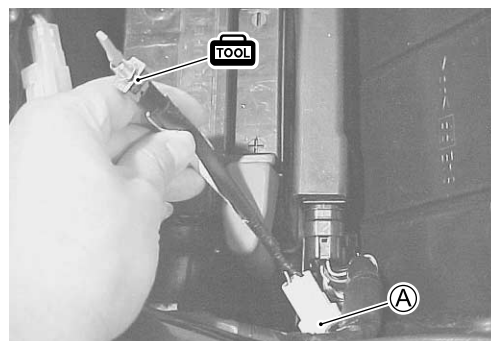
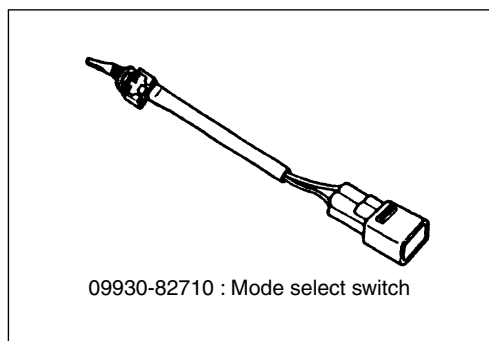
NOTE:

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" (☞ 4-23 and -24) carefully to have good understanding as to what functions are available and how to use it.
- Be sure to read "PRECAUTIONS for Electrical Circuit Service" (☞ 4-4) before inspection and observe what is written there.
- Remove the seat and tray.
- Connect the special tool to the dealer mode coupler ① at the wiring harness, and start the engine or crank the engine for more than 4 seconds.
- Turn the special tool's switch ON and check the malfunction code to determine the malfunction part.

 **09930-82710: Mode select switch**



SELF-DIAGNOSIS RESET PROCEDURE

- After repairing the trouble, turn OFF the ignition switch and turn ON again.
If the malfunction code indicates (c00), the malfunction is cleared.
- Disconnect the special tool from the dealer mode coupler.



MALFUNCTION CODE AND DEFECTIVE CONDITION

| MALFUNCTION CODE | DETECTED ITEM | DETECTED FAILURE CONDITION |
|------------------|-------------------------------|--|
| | | CHECK FOR |
| c00 | NO FAULT | ————— |
| c11 | Camshaft position sensor | The signal does not reach ECM for more than 4 sec. after receiving the starter signal. |
| | | The camshaft position sensor wiring and mechanical parts. (Camshaft position sensor, intake cam pin, wiring/coupler connection) |
| c12 | Crankshaft position sensor | The signal does not reach ECM for more than 3 sec. after receiving the starter signal. |
| | | The crankshaft position sensor wiring and mechanical parts. (Crankshaft position sensor, wiring/coupler connection) |
| c13 | Intake air pressure sensor | The sensor should produce following voltage. ($0.20\text{ V} \leq \text{sensor voltage} < 4.80\text{ V}$) Without the above range, c13 is indicated. |
| | | Intake air pressure sensor, wiring/coupler connection. |
| c14 | Throttle position sensor | The sensor should produce following voltage. ($0.20\text{ V} \leq \text{sensor voltage} < 4.80\text{ V}$) Without the above range, c14 is indicated. |
| | | Throttle position sensor, wiring/coupler connection. |
| c15 | Engine oil temperature sensor | The sensor voltage should be the following. ($0.26\text{ V} \leq \text{sensor voltage} < 4.77\text{ V}$) Without the above range, c15 is indicated. |
| | | Engine oil temperature sensor, wiring/coupler connection. |
| c21 | Intake air temperature sensor | The sensor voltage should be the following. ($0.17\text{ V} \leq \text{sensor voltage} < 4.60\text{ V}$) Without the above range, c21 is indicated. |
| | | Intake air temperature sensor, wiring/coupler connection. |
| c22 | Atmospheric pressure sensor | The sensor voltage should be the following. ($0.20\text{ V} \leq \text{sensor voltage} < 4.80\text{ V}$) Without the above range, c22 is indicated. |
| | | Atm. pressure sensor, wiring/coupler connection. |
| c23 | Tip over sensor | The sensor voltage should be less than the following for more than 4 sec. after ignition switch turns ON. (sensor voltage $< 3.90\text{ V}$) Without the above value, c23 is indicated. |
| | | Tip over sensor, wiring/coupler connection. |
| c24 or c25 | Ignition signal | Crankshaft position sensor (pick-up coil) signal is produced but signal from ignition coil is interrupted continuous by two times or more. In this case, the code c24 or c25 is indicated. |
| | | Ignition coil, wiring/coupler connection, power supply from the battery. |

| | | |
|----------------------|------------------------------------|--|
| 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. ($0.20\text{ V} \leq \text{sensor voltage} < 4.80\text{ V}$) Without the above range, c29 is indicated. |
| | | Secondary throttle position sensor, wiring/coupler connection. |
| c31 | Gear position signal | Gear position signal voltage should be higher than the following for more than 4 seconds. (Gear position sensor voltage $> 0.60\text{ V}$) Without the above value, c31 is indicated. |
| | | Gear position sensor, wiring/coupler connection. Gearshift cam etc. |
| c32, c33, c34 or c35 | Fuel injector signal | When fuel injection signal stops, the c32, c33, c34 or c35 is indicated. |
| | | Injector, wiring/coupler connection, power supply to the injector. |
| c41 | Fuel pump relay signal | When no signal is supplied from fuel pump relay, c41 is indicated. |
| | | Fuel pump relay, connecting lead, power source to fuel pump relay. |
| c42 | Ignition switch signal | Ignition switch signal is not input in the ECM. |
| | | Ignition switch, lead wire/coupler. |

“C11” CMP SENSOR CIRCUIT MALFUNCTION

| DETECTED CONDITION | POSSIBLE CAUSE |
|--|---|
| No CMP sensor signal for 4 seconds at engine cranking. | <ul style="list-style-type: none"> • Metal particles or foreign material being attached on the CMP sensor and rotor tip. • CMP sensor circuit open or short. • CMP sensor malfunction. • ECM malfunction. |

INSPECTION

- Lift and support the fuel tank with a proper stay. (☞ 4-48)

1 Turn the ignition switch OFF.
Check the CMP sensor coupler for loose or poor contacts.
If OK, then measure the CMP sensor peak voltage.
Insert the copper wires to the CMP sensor coupler and crank the engine a few seconds or start the engine, and measure the peak voltage.

DATA CMP sensor peak voltage: More than 3.7 V
(+Y/W – – B/Br)

TOOL 09900-25008: Multi circuit tester
Tester knob indication: Voltage (---)

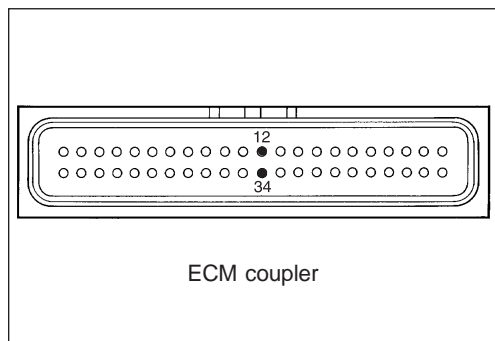
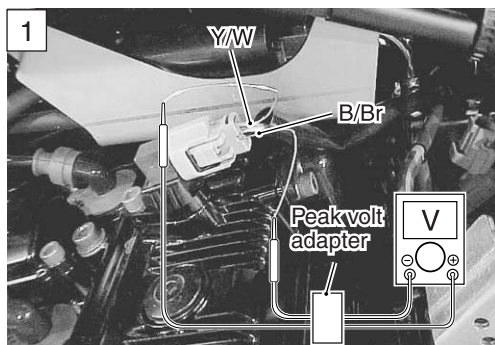
No → Replace the CMP sensor with a new one.
Yes ↓

2 Remove the CMP sensor.
If the metal particles or foreign material is attached on the CMP sensor and rotor tip, signal not flow correctly to the ECM. Clean the CMP sensor and rotor tip with a spray-type carburetor cleaner and blow dry with compressed air and also change the engine oil if necessary.

No → Loose or poor contacts on the CMP sensor coupler or ECM coupler.
Replace the CMP sensor with a new one.
Yes ↓

O/W, Y/W or B/Br wire open or shorted to ground, or poor ⑫ or ③④ connection. (☞ 4-22)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-4)

→ Replace the ECM with a new one, and inspect it again.



“C12” CKP SENSOR CIRCUIT MALFUNCTION

| DETECTED CONDITION | POSSIBLE CAUSE |
|--|---|
| No CKP sensor signal for 3 seconds at engine cranking. | <ul style="list-style-type: none">• Metal particles or foreign material being attached on the CKP sensor and rotor tips.• CKP sensor circuit open or short.• CKP sensor malfunction.• ECM malfunction. |

INSPECTION

- Remove the frame side covers, left and right. (🔧 6-3)
- Lift the fuel tank little. (🔧 4-48)

1

Turn the ignition switch OFF.

Check the CKP sensor coupler for loose or poor contacts. If OK, then measure the CKP sensor resistance. Disconnect the CKP sensor coupler and measure the resistance.

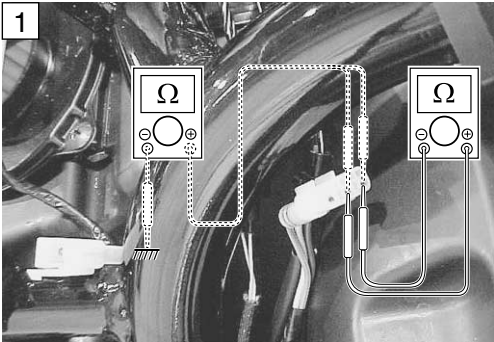
DATA CKP sensor resistance: 134 – 202 Ω
(Blue – Yellow)

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

DATA CKP sensor continuity: ∞Ω (Infinity)
(Blue – Ground)
(Yellow – Ground)

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Resistance (Ω)



No

Replace the CKP sensor with a new one.

Yes

2

Disconnect the CKP sensor coupler.

Crank the engine a few seconds with the starter motor, and measure the CKP sensor peak voltage at the coupler.

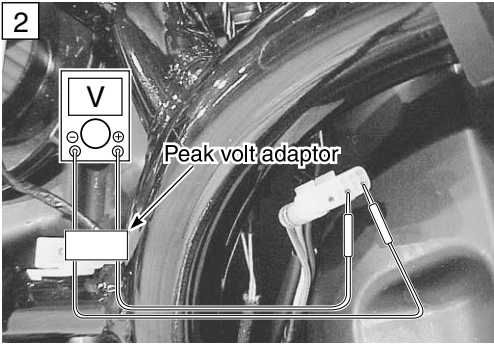
DATA CKP sensor peak voltage: More than 2.7 V
(Blue – Yellow)

Repeat the above test procedure a few times and measure the highest peak voltage.

If OK, then measure the CKP sensor peak voltage at the ECM terminals. (N+/N– or 26/30)

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Voltage (V)



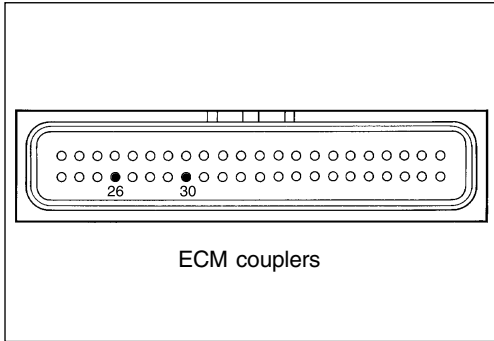
No

Loose or poor contacts on the CKP sensor coupler or ECM coupler. Clean the CKP sensor and rotor tips or replace the CKP sensor with a new one.

Yes

Blue or Yellow wire open or shorted to ground, or poor 26 or 30 connection. (🔧 4-22)

If wire and connection are OK, intermittent trouble or faulty ECM. Recheck each terminal and wire harness for open circuit and poor connection. (🔧 4-4)



Replace the ECM with a new one, and inspect it again.

“C13” IAP SENSOR CIRCUIT MALFUNCTION

| DETECTED CONDITION | POSSIBLE CAUSE |
|---|--|
| Low pressure and low voltage. High pressure and high voltage. ($0.20\text{ V} \leq \text{Sensor voltage} < 4.80\text{ V}$) without the above range. NOTE: <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"> • Clogged vacuum passage between throttle body and IAP sensor. • Air being drawn from vacuum passage between throttle body and IAP sensor. • Red wire circuit open or shorted to ground. • B/Br or G/B wire circuit shorted to ground. • IAP sensor malfunction. • ECM malfunction. |

INSPECTION

- Lift and support the fuel tank with a proper stay. (☞ 4-48)

- Turn the ignition switch OFF.
Check the IAP sensor coupler for loose or poor contacts.
If OK, then measure the IAP sensor input voltage.
Disconnect the IAP sensor coupler.
Turn the ignition switch ON.
Measure the voltage at the Red wire and ground.
If OK, then measure the voltage at the Red wire and B/Br wire.

DATA IAP sensor input voltage: $4.5 - 5.5\text{ V}$
 ($\oplus\text{Red} - \ominus\text{Ground}$)
 ($\oplus\text{Red} - \ominus\text{B/Br}$)

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Voltage (V)

No → Loose or poor contacts on the ECM coupler.
Open or short circuit in the Red wire or B/Br wire.

Yes

- Connect the IAP sensor coupler.
Insert the copper wires to the lead wire coupler.
Start the engine at idling speed.
Measure the IAP sensor output voltage at the wire side coupler (between G/B and B/Br wires).

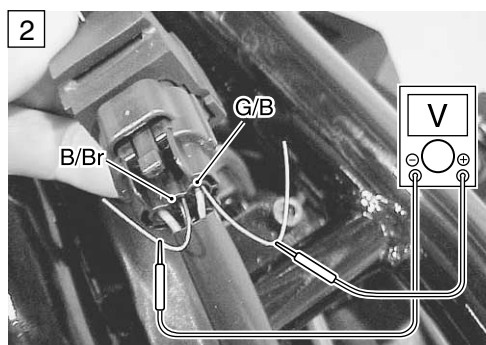
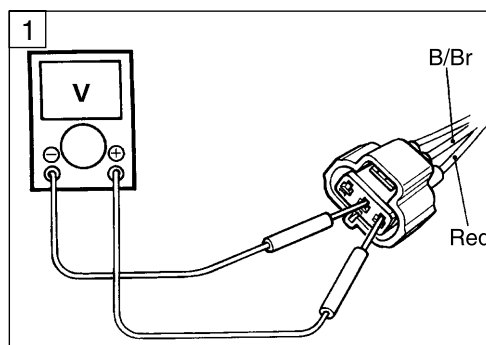
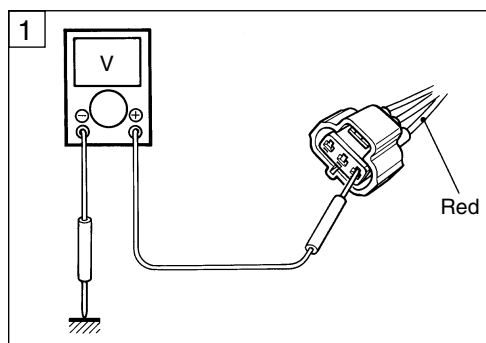
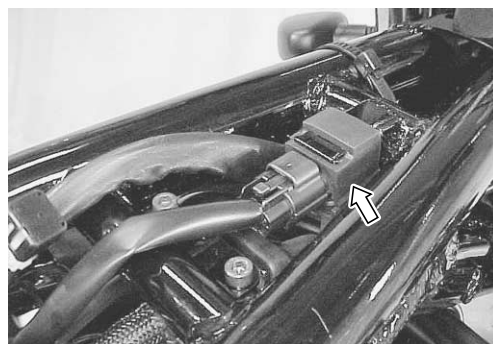
DATA IAP sensor output voltage: **Approx. 2.5 V at idle speed** ($\oplus\text{G/B} - \ominus\text{B/Br}$)

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Voltage (V)

No → Check the vacuum hose for crack or damage.
Open or short circuit in the G/B wire.
Replace the IAP sensor with a new one.

Yes



- 3 Remove the IAP sensor.
Connect the vacuum pump gauge to the vacuum port of the IAP sensor.
Arrange 3 new 1.5 V batteries in series (check that total voltage is 4.5 – 5.0 V) and connect \ominus terminal to the ground terminal and \oplus terminal to the Vcc terminal.
Check the voltage between Vout and ground. Also, check if voltage reduces when vacuum is applied up to 40 cmHg by using vacuum pump gauge. (See table below.)



09917-47010: Vacuum pump gauge

09900-25008: Multi circuit tester



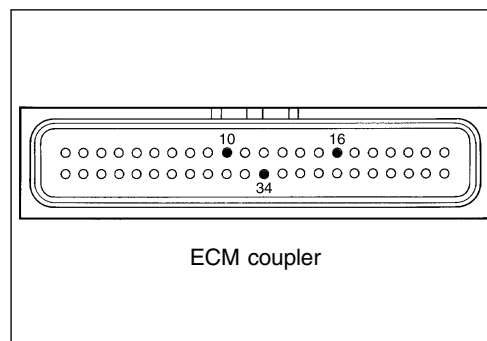
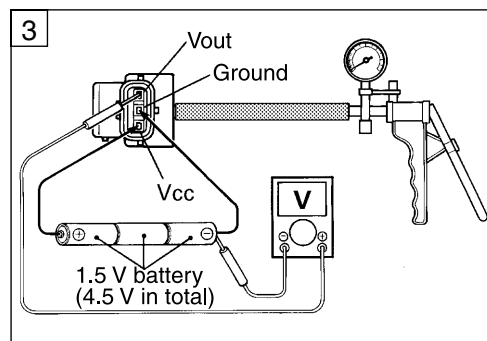
Tester knob indication: Voltage (---)

No → If check result is not satisfactory, replace IAP sensor with a new one.
Yes

Red, G/B or B/Br wire open or shorted to ground, or poor ⑩, ⑯ or ③④ connection. (→ 4-22)

If wire and connection are OK, intermittent trouble or faulty ECM. Recheck each terminal and wire harness for open circuit and poor connection. (→ 4-4)

→ Replace the ECM with a new one, and inspect it again.



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 | 0 | 760 | 100 | 3.4 – 4.0 |
| 2 000 | 610 | 707 | 94 | |
| 2 001 | 611 | 707 | 94 | 2.8 – 3.7 |
| 5 000 | 1 524 | 634 | 85 | |
| 5 001 | 1 525 | 634 | 85 | 2.6 – 3.4 |
| 8 000 | 2 438 | 567 | 76 | |
| 8 001 | 2 439 | 567 | 76 | 2.4 – 3.1 |
| 10 000 | 3 048 | 526 | 70 | |

“C14” TP 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. ($0.20\text{ V} \leq \text{Sensor Voltage} < 4.80\text{ V}$) without the above range. | <ul style="list-style-type: none"> TP sensor maladjusted. TP sensor circuit open or short. TP sensor malfunction. ECM malfunction. |

INSPECTION

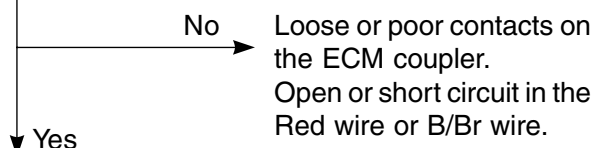
- Lift and support the fuel tank with a proper stay. (☞ 4-48)

- Turn the ignition switch OFF.
Check the TP sensor coupler for loose or poor contacts.
If OK, then measure the TP sensor input voltage.
Disconnect the TP sensor coupler (Black color).
Turn the ignition switch ON.
Measure the voltage at the Red wire and ground.
If OK, then measure the voltage at the Red wire and B/Br wire.

DATA TPS sensor input voltage: $4.5 - 5.5\text{ V}$
($\oplus\text{Red} - \ominus\text{Ground}$)
($\oplus\text{Red} - \ominus\text{B/Br}$)

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Voltage (V)



- Turn the ignition switch OFF.
Disconnect the TP sensor coupler (Black color).
Check the continuity between Yellow wire and ground.

DATA TP sensor continuity: $\infty\Omega$ (Infinity)
(Yellow wire – Ground)

If OK, then measure the TP sensor resistance at the coupler (between Yellow and Black wires).
Turn the throttle grip and measure the resistance.

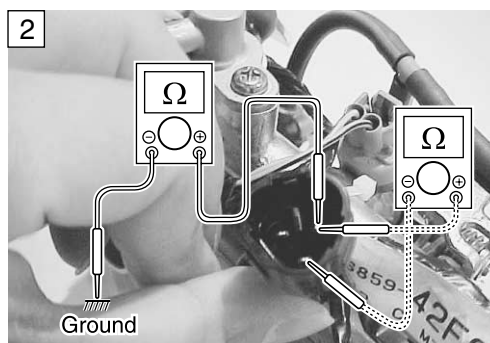
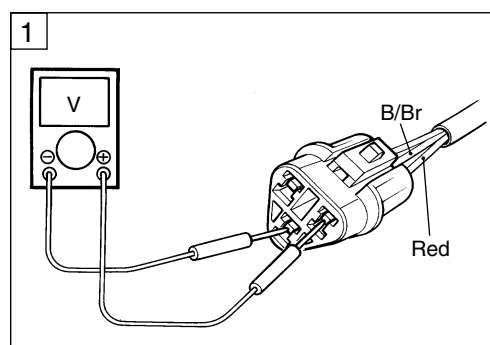
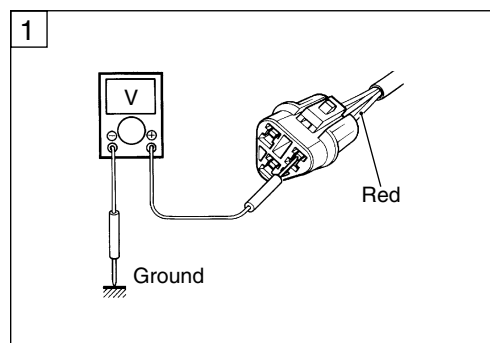
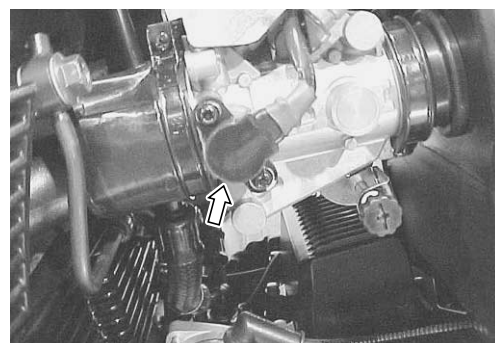
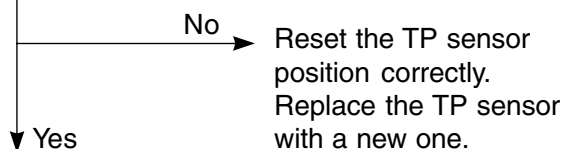
DATA TP sensor resistance

Throttle valve is closed: Approx. $1.1\text{ k}\Omega$

Throttle valve is opened: Approx. $4.3\text{ k}\Omega$

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Resistance (Ω)



- 3 Connect the TP sensor coupler.
Insert the copper wires to the lead wire coupler.
Turn the ignition switch ON.
Measure the TP sensor output voltage at the coupler (between Yellow and Black wires) by turning the throttle grip.

**TP sensor output voltage**Throttle valve is closed: **Approx. 1.1 V**Throttle valve is opened: **Approx. 4.3 V****09900-25008: Multi circuit tester****Tester knob indication: Voltage (---)**

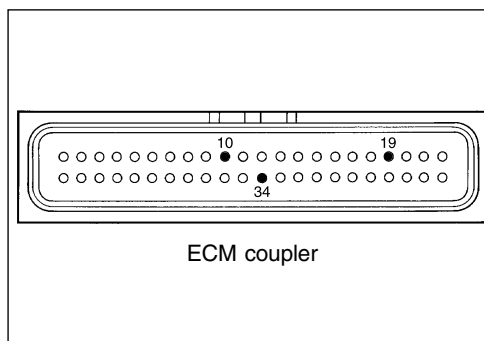
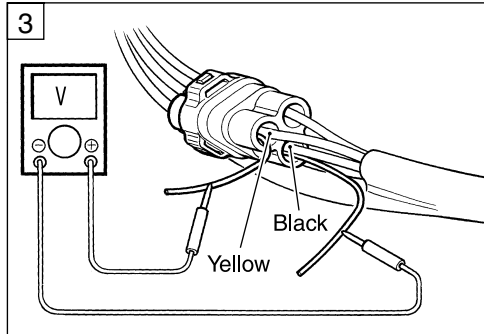
No → If check result is not satisfactory,
replace TP sensor with a new one.

Yes

Red, P/B or B/Br wire open or shorted to ground, or poor ⑩, ⑲ or ③④ connection. (→ 4-22)

If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (→ 4-4)

→ Replace the ECM with a new one,
and inspect it again.



“C15” EOT SENSOR CIRCUIT MALFUNCTION

| DETECTED CONDITION | POSSIBLE CAUSE |
|---|-----------------------------------|
| High engine oil temp. (Low voltage – Low resistance) | • B/BI circuit shorted to ground. |
| Low engine oil temp. (High voltage – High resistance) | • B/Br circuit open. |
| | • EOT sensor malfunction. |
| | • ECM malfunction. |

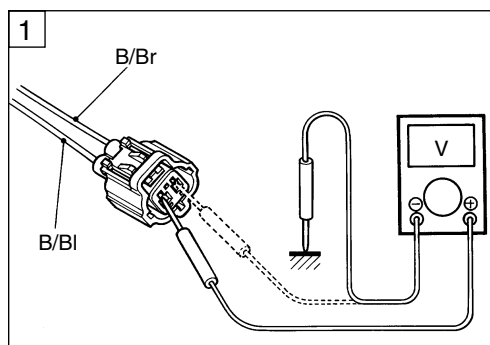
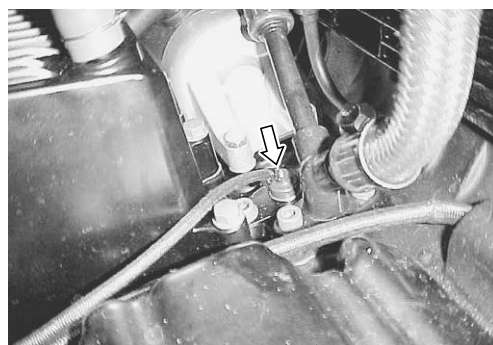
INSPECTION

- Remove the right frame side cover. (🔧6-3)

1 Turn the ignition switch OFF.
Check the EOT sensor coupler for loose or poor contacts.
If OK, then measure the EOT 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 EOT sensor voltage: 4.5 – 5.5 V
(\oplus B/BI – \ominus Ground)
(\oplus B/BI – \ominus B/Br)

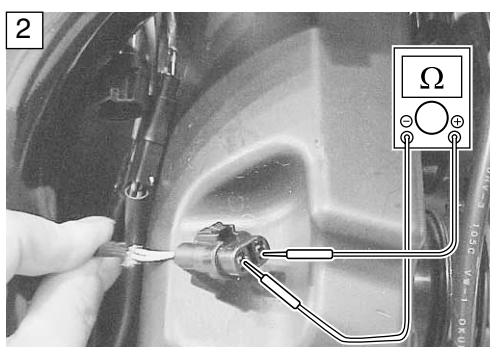
TOOL 09900-25008: Multi circuit tester
Tester knob indication: Voltage (V)



2 Turn the ignition switch OFF.
Measure the EOT sensor resistance.

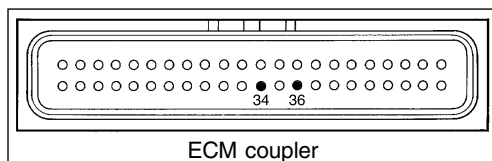
DATA EOT sensor resistance: Approx. 61.3 k Ω at 20°C (68°F)
(White lead wire – White lead wire)

TOOL 09900-25008: Multi circuit tester
Tester knob indication: Resistance (Ω)
Refer to page 5-11 for details.



B/BI or B/Br wire open or shorted to ground, or poor ③④ or ③⑥ connection. (🔧4-22)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (🔧4-4)

Replace the ECM with a new one,
and inspect it again.



| Engine Oil Temp. | Resistance |
|------------------|-------------------------|
| 20°C (68 °F) | Approx. 61.3 k Ω |
| 50°C (122 °F) | Approx. 17.8 k Ω |
| 80°C (176 °F) | Approx. 6.2 k Ω |
| 110°C (230 °F) | Approx. 2.5 k Ω |

“C21” IAT SENSOR CIRCUIT MALFUNCTION

| DETECTED CONDITION | POSSIBLE CAUSE |
|---|--|
| High intake air temp. (Low voltage – Low resistance) Low intake air temp. (High voltage – High resistance) | <ul style="list-style-type: none"> • Dg circuit shorted to ground. • B/Br circuit open. • IAT sensor malfunction. • ECM malfunction. |

INSPECTION

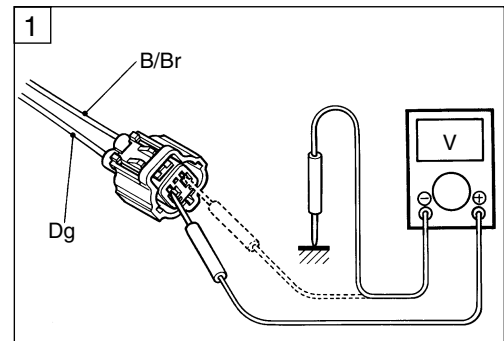
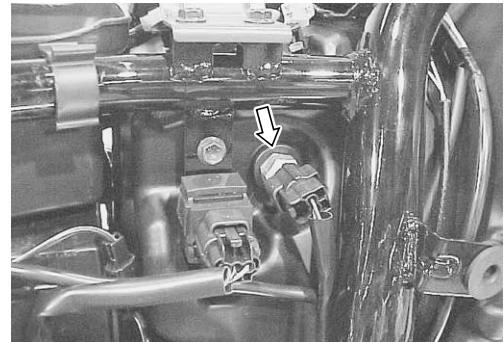
- Remove the right frame side cover. (🔧 6-3)

1 Turn the ignition switch OFF.
Check the IAT sensor coupler for loose or poor contacts.
If OK, then measure the IAT sensor voltage at the wire side coupler.
Disconnect the coupler and turn the ignition switch ON.
Measure the voltage between Dg wire terminal and ground.
If OK, then measure the voltage between Dg wire terminal and B/Br wire terminal.

DATA IAT sensor voltage: 4.5 – 5.5 V

$$\begin{pmatrix} \oplus \text{Dg} - \ominus \text{Ground} \\ \oplus \text{Dg} - \ominus \text{B/Br} \end{pmatrix}$$

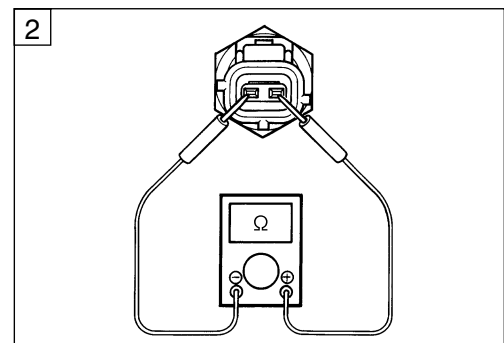
TOOL 09900-25008: Multi circuit tester
Tester knob indication: Voltage (V)



2 Turn the ignition switch OFF.
Measure the IAT sensor resistance.

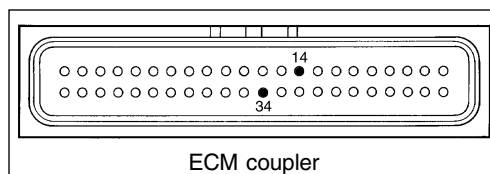
DATA IAT sensor resistance: Approx. 2.6 kΩ at 20°C (68°F)
(Terminal – Terminal)

TOOL 09900-25008: Multi circuit tester
Tester knob indication: Resistance (Ω)



Dg or B/Br wire open or shorted to ground, or poor ⑭ or ⑳ connection. (🔧 4-22)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (🔧 4-4)

Replace the ECM with a new one, and inspect it again.



| Intake Air Temp. | Resistance |
|------------------|----------------|
| 20°C (68 °F) | Approx. 2.6 kΩ |
| 50°C (122 °F) | Approx. 0.8 kΩ |
| 80°C (176 °F) | Approx. 0.3 kΩ |
| 110°C (230 °F) | Approx. 0.2 kΩ |

NOTE:

IAT sensor resistance measurement method is the same way as that of the EOT sensor. Refer to page 5-11 for details.

“C22” AP SENSOR CIRCUIT MALFUNCTION

| DETECTED CONDITION | POSSIBLE CAUSE |
|---|--|
| Low pressure and low voltage. High pressure and high voltage. ($0.20\text{ V} \leq \text{Sensor Voltage} < 4.80\text{ V}$) without the above range. NOTE: <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"> • Clogged air passage with dust. • Red wire circuit open or shorted to ground. • B/Br or G/Y wire circuit shorted to ground. • AP sensor malfunction. • ECM malfunction. |

INSPECTION

- Remove the right frame side cover. (➡ 6-3)

- Turn the ignition switch OFF.
Check the AP sensor coupler for loose or poor contacts.
If OK, then measure the AP sensor input voltage.
Turn the ignition switch ON.
Disconnect the AP sensor coupler.
Measure the voltage between Red wire and ground.
If OK, then measure the voltage between Red wire and B/Br wire.

DATA AP sensor input voltage: $4.5 - 5.5\text{ V}$
 ($\oplus \text{Red} - \ominus \text{Ground}$)
 ($\oplus \text{Red} - \ominus \text{B/Br}$)

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Voltage (V)

No → Loose or poor contacts on the ECM coupler.
Open or short circuit in the Red wire or B/Br wire.

Yes

- Connect the AP sensor coupler.
Insert the copper wires to the lead wire coupler.
Turn the ignition switch ON.
Measure the AP sensor output voltage at the wire side coupler between G/Y and B/Br wires.

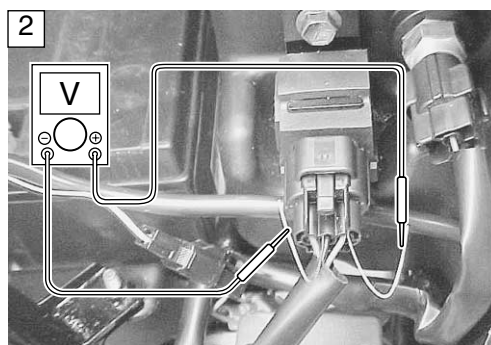
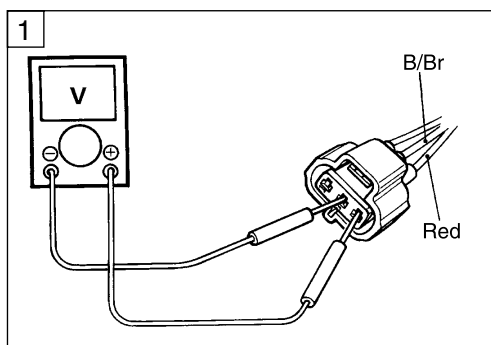
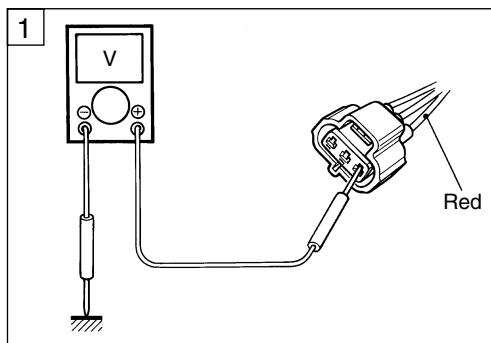
DATA AP sensor output voltage: **Approx. 4.0 V**
at 760 mmHg (100 kPa)
 ($\oplus \text{G/Y} - \ominus \text{B/Br}$)

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Voltage (V)

No → Check the air passage for clogging.
Open or short circuit in the G/Y wire.
Replace the AP sensor with a new one.

Yes




3

Remove the AP sensor.


Connect the vacuum pump gauge to the air passage port of the AP sensor.

Arrange 3 new 1.5 V batteries in series (check that total voltage is 4.5 – 5.0 V) and connect ⊖ terminal to the ground terminal and ⊕ terminal to the Vcc terminal.

Check the voltage between Vout and ground. Also, check if voltage reduces when vacuum is applied up to 40 cmHg by using vacuum pump gauge. (See table below)

 **09917-47010: Vacuum pump gauge**

09900-25008: Multi circuit tester

 **Tester knob indication: Voltage (---)**

No

If check result is not satisfactory, replace AP sensor with a new one.

Yes

Red, G/Y or B/Br wire open or shorted to ground, or poor ⑩, ⑰ or ③④ connection. (👉 4-22)

If wire and connection are OK, intermittent trouble or faulty ECM. Recheck each terminal and wire harness for open circuit and poor connection. (👉 4-4)

Replace the ECM with a new one, and inspect it again.

3

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 | 0 | 760 | 100 | 3.4 – 4.0 |
| 2 000 | 610 | 707 | 94 | |
| 2 001 | 611 | 707 | 94 | 2.8 – 3.7 |
| 5 000 | 1 524 | 634 | 85 | |
| 5 001 | 1 525 | 634 | 85 | 2.6 – 3.4 |
| 8 000 | 2 438 | 567 | 76 | |
| 8 001 | 2 439 | 567 | 76 | 2.4 – 3.1 |
| 10 000 | 3 048 | 526 | 70 | |

“C23” TO SENSOR CIRCUIT MALFUNCTION

| DETECTED CONDITION | POSSIBLE CAUSE |
|---|--|
| No TO sensor signal for more than 2 seconds, after ignition switch turns ON. Sensor voltage high. (Sensor Voltage < 3.90 V) (without the above value.) | <ul style="list-style-type: none"> • TO sensor circuit open or short. • TO sensor malfunction. • ECM malfunction. |

INSPECTION

- Remove the right frame side cover. (6-3)

1 Turn the ignition switch OFF.
Check the TO sensor coupler for loose or poor contacts.
If OK, then measure the TO sensor resistance.
Disconnect the TO sensor coupler.
Measure the resistance between Black and B/W wire terminals.

DATA TO sensor resistance: 60 – 64 kΩ
(Black – B/W)

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Resistance (Ω)



No → Replace the TO sensor with a new one.

Yes →

2 Connect the TO sensor coupler.
Insert the copper wires to the wire lead coupler.
Turn the ignition switch ON.
Measure the voltage at the wire side coupler between Brown and B/Br wires.

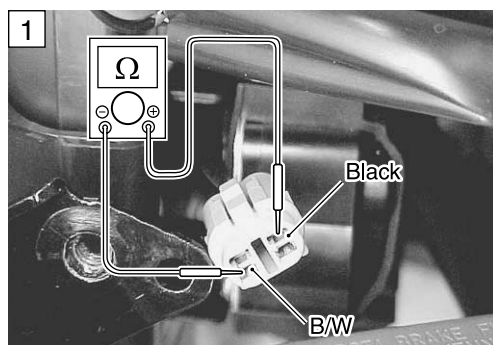
DATA TO sensor voltage: Approx. 3.8 V (Brown – B/Br)

Also, measure the voltage when leaning of the motorcycle.
Dismount the TO sensor from its bracket and measure the voltage when it is leaned more than 43°, left and right, from the horizontal level.

DATA TO sensor voltage: 0 V (Brown – B/Br)

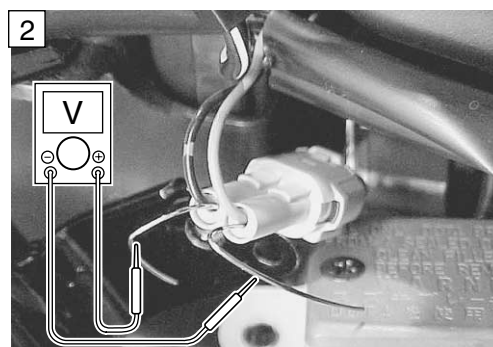
TOOL 09900-25008: Multi circuit tester

Tester knob indication: Voltage (V)



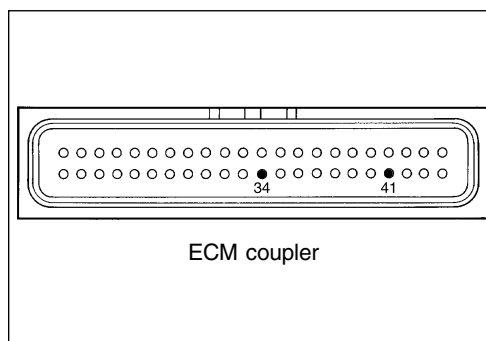
No → Loose or poor contacts on the ECM coupler.
Open or short circuit in the Brown wire or B/Br wire.
Replace the TO sensor with a new one.

Yes →



Brown or B/Br wire open or shorted to ground, or poor ④1 or ③4 connection. (4-22)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (4-4)

→ Replace the ECM with a new one, and inspect it again.



“C24” or “C25” IGNITION SYSTEM MALFUNCTION

*REFER TO THE IGNITION SYSTEM FOR DETAILS. (👉7-20)

“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">• STVA malfunction.• STVA circuit open or short.• STVA motor malfunction. |

INSPECTION

- Lift and support the fuel tank with a proper stay. (👉4-48)

1

Turn the ignition switch OFF.
Check the STVA lead wire coupler for loose or poor contacts.
Disconnect the STVA lead wire coupler.
Check the continuity between Red wire and ground.

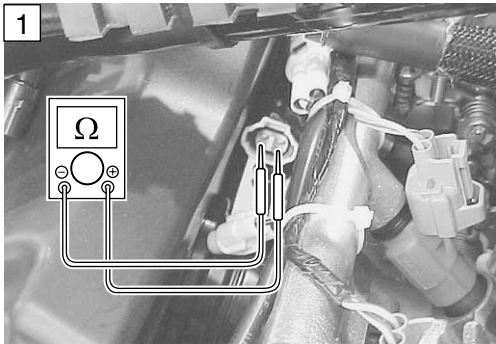
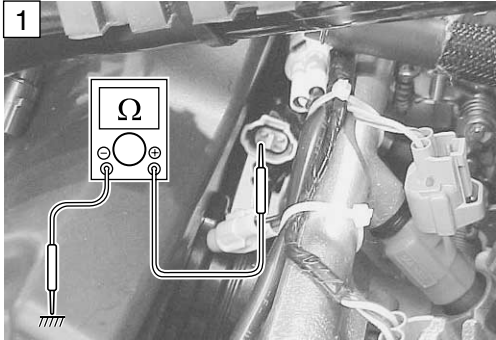
DATA STVA continuity: $\infty\Omega$ (Infinity)

If OK, then measure the STVA resistance. (between Red and Black wires)

DATA STVA resistance: Approx. $4.8 - 7.2 \Omega$
(+ Red – Black)

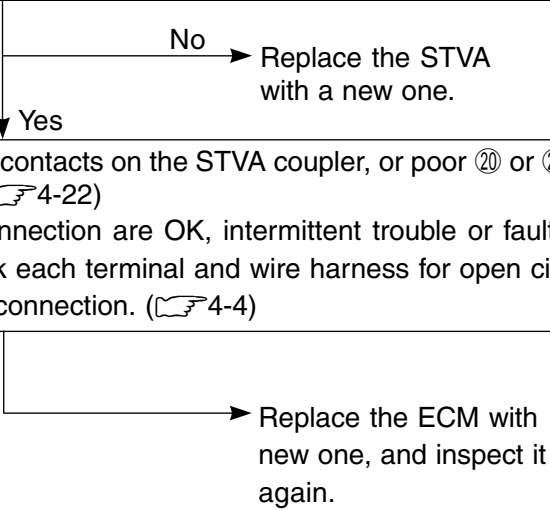
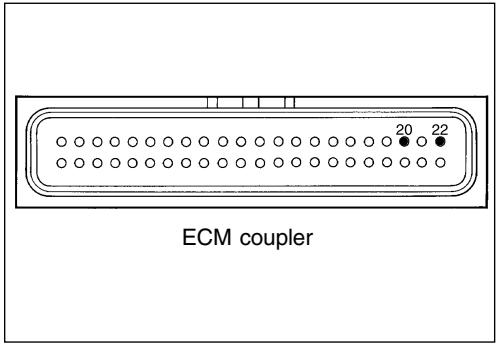
TOOL 09900-25008: Multi circuit tester

Tester knob indication: Resistance (Ω)



Loose or poor contacts on the STVA coupler, or poor ⑳ or ㉓ connection. (👉4-22)

If wire and connection are OK, intermittent trouble or faulty ECM. Recheck each terminal and wire harness for open circuit and poor connection. (👉4-4)



“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. $(0.20\text{ V} \leq \text{Sensor Voltage} < 4.80\text{ V})$ without the above range. | <ul style="list-style-type: none"> • STP sensor maladjusted. • STP sensor circuit open or short. • STP sensor malfunction. • ECM malfunction. |

INSPECTION

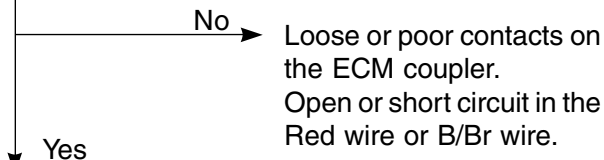
- Remove the fuel tank. (☞ 4-48)

- Turn the ignition switch OFF.
Check the STP sensor coupler for loose or poor contacts.
If OK, then measure the STP sensor input voltage.
Disconnect the STP sensor coupler (White color).
Turn the ignition switch ON.
Measure the voltage at the Red wire and ground.
If OK, then measure the voltage at the Red wire and B/Br wire.

DATA STP sensor input voltage: 4.5 – 5.5 V
 $(\oplus \text{Red} - \ominus \text{Ground})$
 $(\oplus \text{Red} - \ominus \text{B/Br})$

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Voltage (V)



- Turn the ignition switch OFF.
Remove the air cleaner element. (☞ 2-4)
Disconnect the STP sensor coupler (White color).
Check the continuity between Yellow wire and ground.

DATA STP sensor continuity: $\infty\Omega$ (Infinity)
 (Yellow wire – Ground)

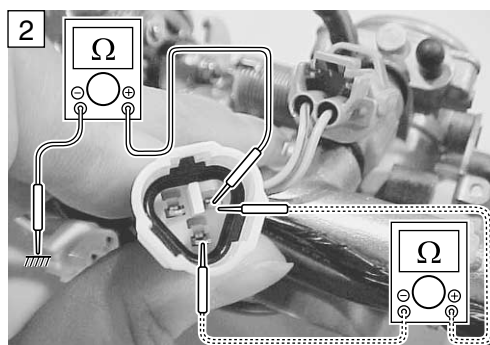
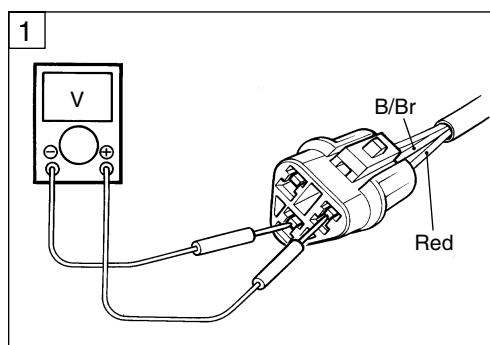
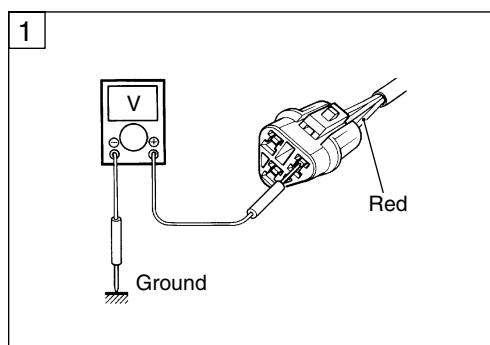
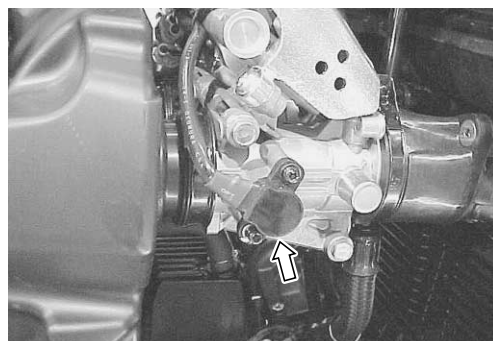
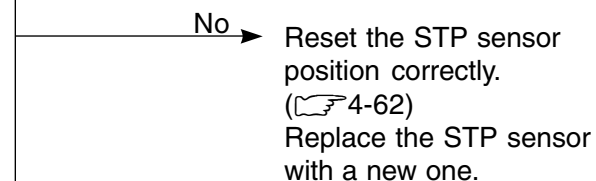
If OK, then measure the STP sensor resistance at the coupler (between Yellow and Black wires).
Close and open the secondary throttle valve by finger through the air cleaner box, and measure the valve closing and opening resistance.

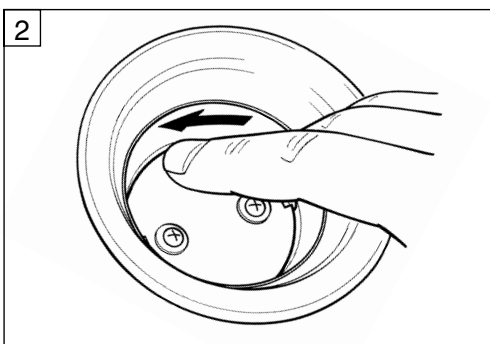
DATA STP sensor resistance

Secondary throttle valve is closed: Approx. 0.8 k Ω
 Secondary throttle valve is opened: Approx. 3.9 k Ω

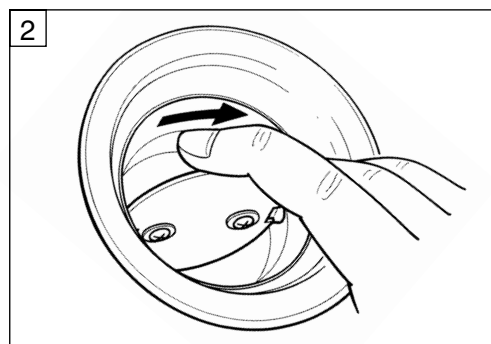
TOOL 09900-25008: Multi circuit tester

Tester knob indication: Resistance (Ω)





Yes

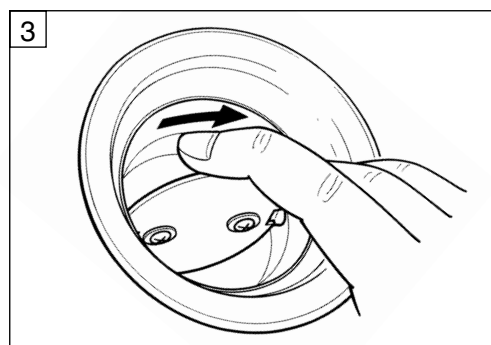
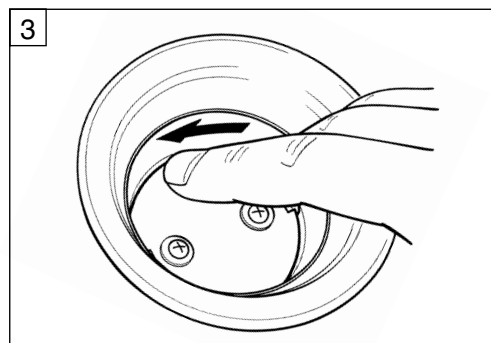
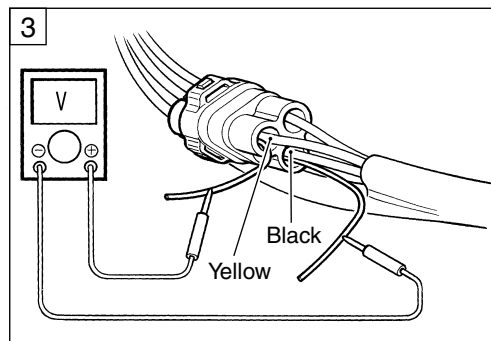


- 3 Turn the ignition switch OFF.
Connect the STP sensor coupler.
Insert the copper wires to the lead wire coupler.
Disconnect the STVA lead wire coupler.
Turn the ignition switch ON.
Measure the STP sensor output voltage at the coupler (between Yellow and Black wires) by turning the secondary throttle valve (close and open) with a finger.

DATA STP sensor output voltage

Throttle valve is closed: Approx. 0.8 V

Throttle valve is opened: Approx. 4.0 V

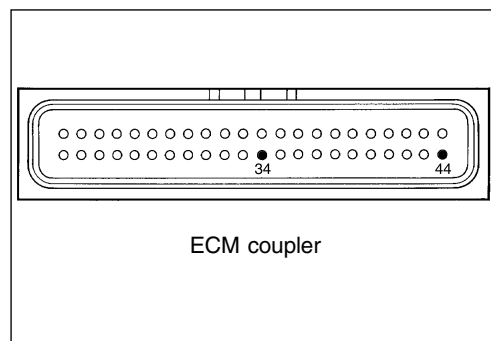
TOOL 09900-25008: Multi circuit tester**Tester knob indication: Voltage (---)**

No

If check result is not satisfactory,
replace STP sensor with a new one.

Yes

Yellow or Black wire open or shorted to ground, or poor ④④ or ③④ connection. (→ 4-22)

If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (→ 4-4)Replace the ECM with a new one,
and inspect it again.

ECM coupler

“C31” GEAR POSITION (GP) SWITCH CIRCUIT MALFUNCTION

| DETECTED CONDITION | POSSIBLE CAUSE |
|--|--|
| No Gear Position switch voltage Switch voltage low. (Switch Voltage > 0.6 V without the above value.) | <ul style="list-style-type: none"> • Gear Position switch circuit open or short. • Gear Position switch malfunction. • ECM malfunction. |

INSPECTION

- Remove the left frame side cover. (☞ 6-3)

- 1 Turn the ignition switch OFF.
Check the GP switch coupler for loose or poor contacts.
If OK, then measure the GP switch voltage.
Support the motorcycle with the center stand.
Turn the side-stand to up-right position.
Turn the engine stop switch ON.
Insert the copper wire to the lead wire coupler.
Turn the ignition switch ON.
Measure the voltage at the wire side coupler between Pink wire and ground, when shifting the gearshift lever from 1st to Top.

DATA GP switch voltage: More than 0.6 V
(Pink – Ground)

TOOL 09900-25008: Multi circuit tester

TESTER Tester knob indication: Voltage (---)

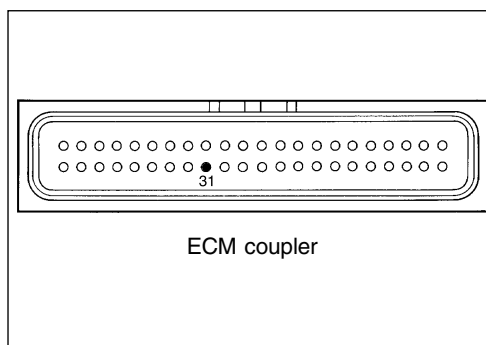
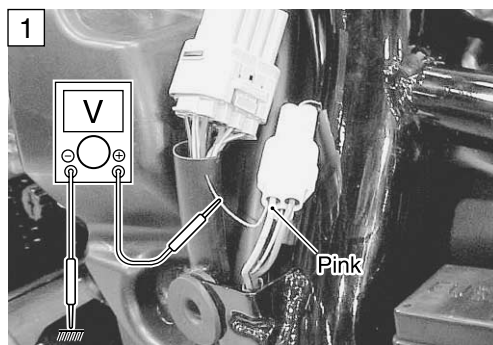
No

Open or short circuit in the Pink wire.
Replace the GP switch with a new one.

Yes

Pink wire open or shorted to ground, or poor ③① connection.
(☞ 4-22)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (☞ 4-4)

Replace the ECM with a new one,
and inspect it again.



“C32”, “C33”, “C34” or “C35” FUEL INJECTION MALFUNCTION

| DETECTED CONDITION | POSSIBLE CAUSE |
|----------------------|--|
| No injector current. | <ul style="list-style-type: none"> • Injector circuit open or short. • Injector malfunction. • ECM malfunction. |

INSPECTION

- Lift and support the fuel tank with a proper stay. (📖 4-48)

1 Turn the ignition switch OFF.
Check the injector coupler for loose or poor contacts.
If OK, then measure the injector resistance.
Disconnect the coupler and measure the resistance between terminals.

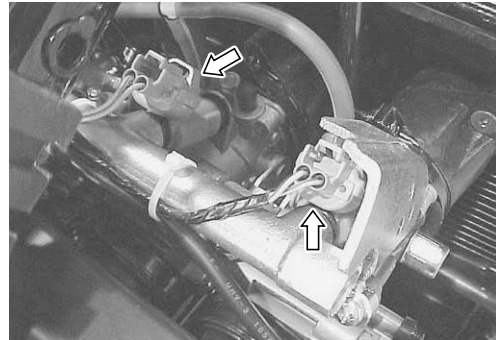
DATA **Injector resistance:** 12 – 18 Ω at 20°C (68°F)
(Terminal – Terminal)

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

DATA **Injector continuity:** $\infty\Omega$ (Infinity)
(Terminal – Ground)

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

Tester knob indication: Resistance (Ω)



No → Replace the injector with a new one. (📖 4-64)

Yes

2 Turn the ignition switch ON.
Measure the injector voltage between Y/R wire and ground.

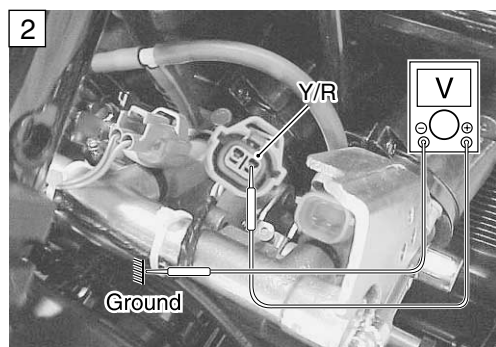
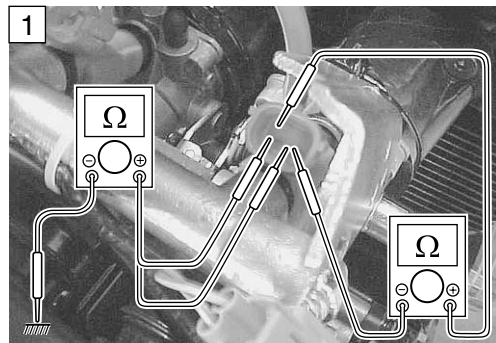
DATA **Injector voltage:** Battery voltage
(Y/R – Ground)

NOTE:

Injector voltage can be detected only 3 seconds after ignition switch is turned ON.

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

Tester knob indication: Voltage (V)



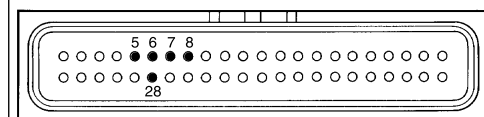
No → Open circuit in the Yellow/Red wire.

Yes

Gr/W, Gr/B, Gr/Y, Gr/R or Y/R wire open or shorted to ground, or poor ⑤, ⑥, ⑦, ⑧ or ⑳ connection. (📖 4-22)

If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (📖 4-4)

→ Replace the ECM with a new one, and inspect it again.



ECM coupler

“C41” FP RELAY CIRCUIT MALFUNCTION

| DETECTED CONDITION | POSSIBLE CAUSE |
|---------------------------------|--|
| No signal from fuel pump relay. | <ul style="list-style-type: none"> Fuel pump relay circuit open or short. Fuel pump relay malfunction. ECM malfunction. |

INSPECTION

- Remove the left frame side cover. (🔧 6-3)

1 Turn the ignition switch OFF.
Check the FP relay coupler for loose or poor contacts.
If OK, then check the insulation and continuity. Refer to page 4-51 for details.

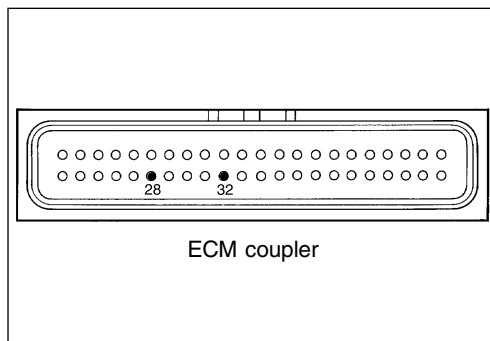
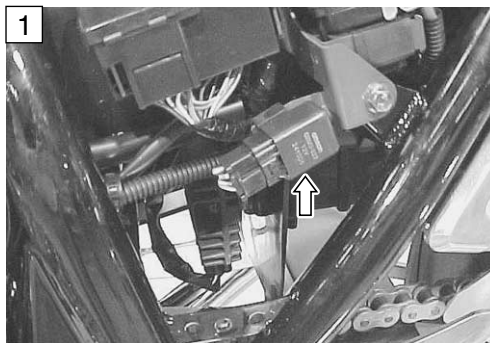
No

Replace the FP relay with a new one.

Yes

Y/B or O/W wire open or shorted to ground, or poor ③② or ②⑧ connection. (🔧 4-22)
If wire and connection are OK, intermittent trouble or faulty ECM.
Recheck each terminal and wire harness for open circuit and poor connection. (🔧 4-4)

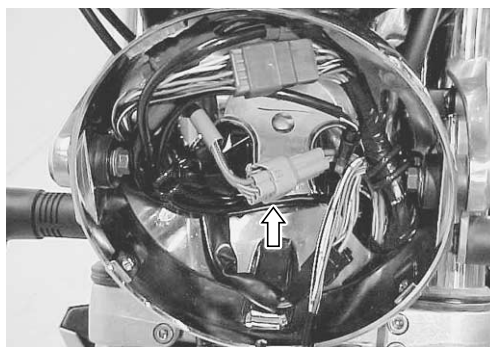
Replace the ECM with a new one, and inspect it again.



“C42” IG SWITCH CIRCUIT MALFUNCTION

* Refer to the IGNITION SWITCH INSPECTION for details.

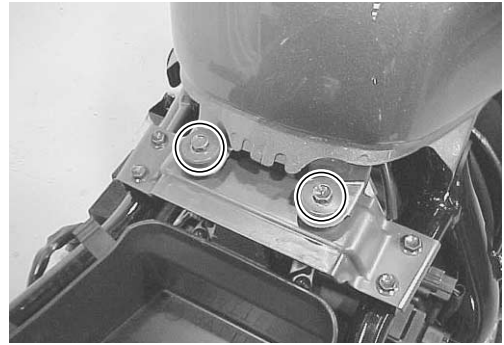
- Remove the headlight. (🔧 6-24)
- Inspect the ignition switch. (🔧 7-29)



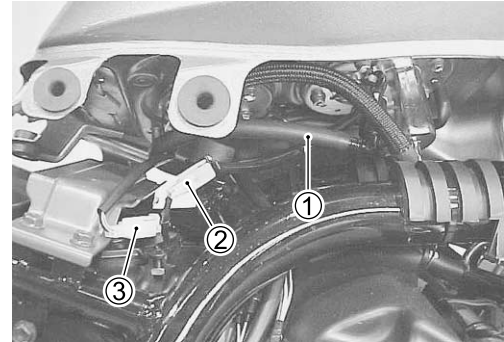
FUEL SYSTEM

FUEL TANK REMOVAL

- Remove the seat and frame side covers, left and right. (👉 6-3)
- Remove the fuel tank mounting bolts.
- Lift and support the fuel tank with a proper stay.



- Place a rag under the fuel feed hose and remove the fuel feed hose ①.
- Disconnect the fuel pump lead wire coupler ② and fuel level gauge lead wire coupler ③.



CAUTION

When removing the fuel feed hose ①, disconnect the fuel delivery pipe side first and fuel tank side last. Do not remain the fuel feed hose ① at the fuel tank side.

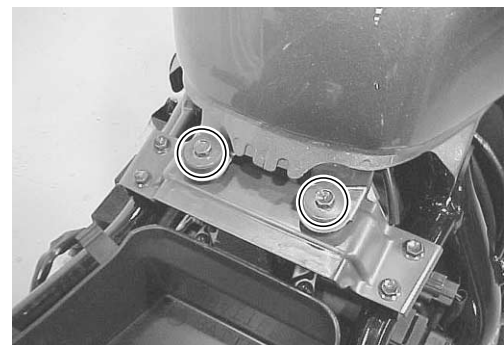
⚠ WARNING

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

- Remove the fuel tank.

FUEL TANK INSTALLATION

- Installation is in the reverse order of removal.



FUEL PRESSURE INSPECTION

- Remove the seat and frame side covers, left and right. (☞ 6-3)
- Lift and support the fuel tank with a proper stay. (☞ 4-48)
- Place a rag under the fuel feed hose. (☞ 4-48)
- Remove the fuel feed hose and install the special tools between the fuel tank and fuel delivery pipe.



09940-40211: Fuel pressure gauge adaptor

09940-40220: Fuel pressure gauge hose attachment

09915-77330: Oil pressure gauge

09915-74520: Oil pressure gauge hose

Turn the ignition switch ON and check the fuel pressure.

DATA Fuel pressure: Approx. 300 kPa (3.0 kgf/cm², 43 psi)

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

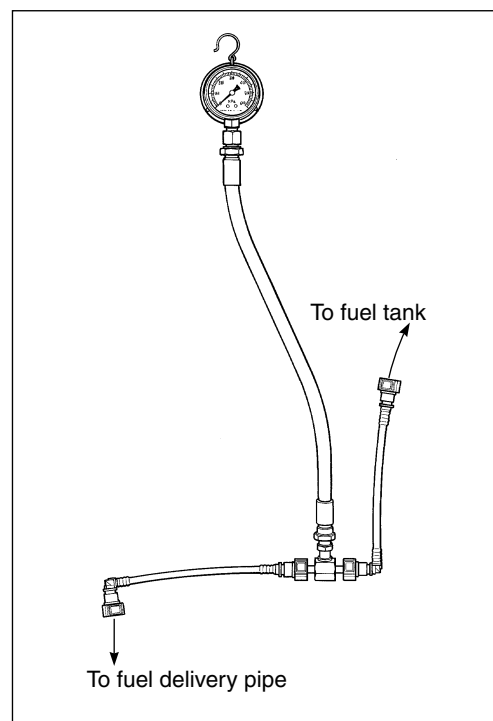
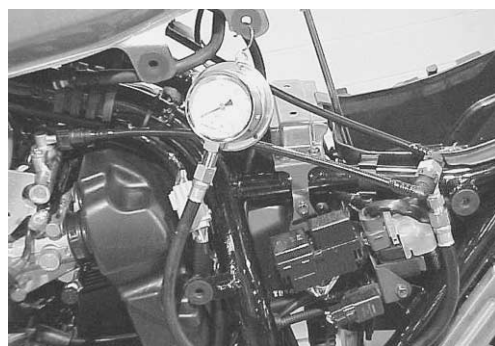
- * Fuel hose leakage
- * Clogged fuel filter
- * Pressure regulator
- * Fuel pump

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

- * Fuel pump check valve
- * Pressure regulator

⚠ WARNING

- * Before removing the special tools, turn the ignition switch OFF position and release the fuel pressure slowly.
- * Gasoline is highly flammable and explosive. Keep heat, sparks and flame away.



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.**

- Remove the seat and frame side covers, left and right. (🔧 6-3)
- Lift and support the fuel tank with a proper stay. (🔧 4-48)
- Disconnect the fuel feed hose from the fuel delivery pipe.
- Place the measuring cylinder and insert the fuel feed hose end into the measuring cylinder.
- Disconnect the ECM lead wire coupler.
- Push the lock ① to pull out the power source lead wire (Yellow with red tracer).

- Apply 12 volts to the fuel pump for 30 seconds and measure the amount of fuel discharged.

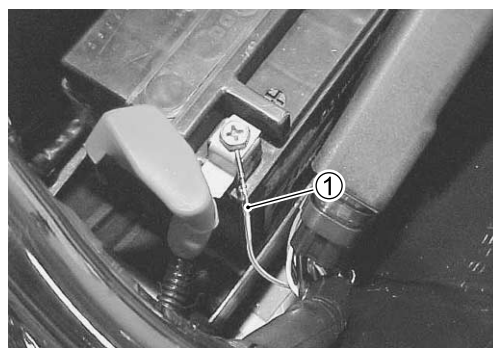
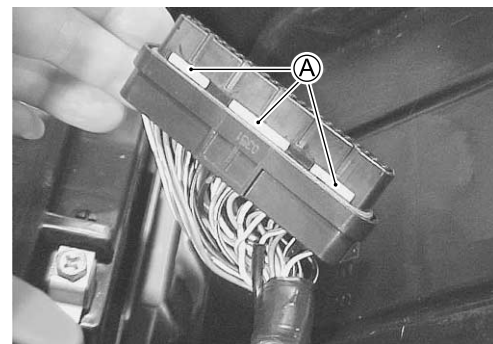
Battery (+) terminal — Power source lead wire ①
(Yellow with red tracer)

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

DATA Fuel discharge amount: **Approx. 1 200 ml/30 sec.**
(1.3/1.1 US/lmp oz)/30 sec.

NOTE:

The battery must be in fully charged condition.



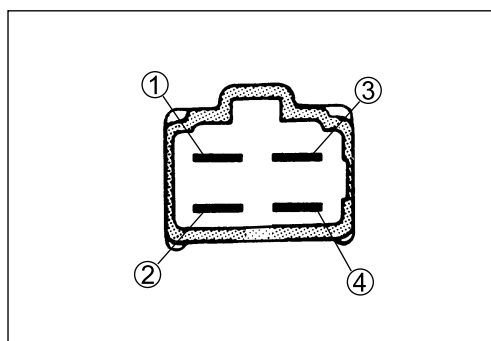
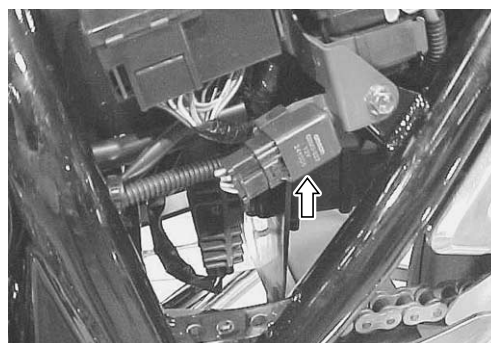
FUEL PUMP RELAY INSPECTION

Fuel pump relay is located behind the left frame side cover.

- Remove the seat and left frame side cover. (➡ 6-3)
- 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.

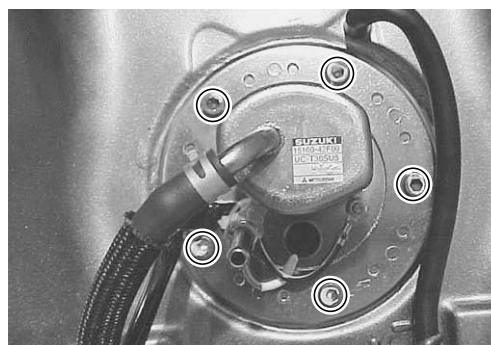


FUEL PUMP AND FUEL FILTER REMOVAL

- Remove the fuel tank. (➡ 4-48)
- Remove the fuel pump assembly by removing its mounting bolts diagonally.

⚠ WARNING

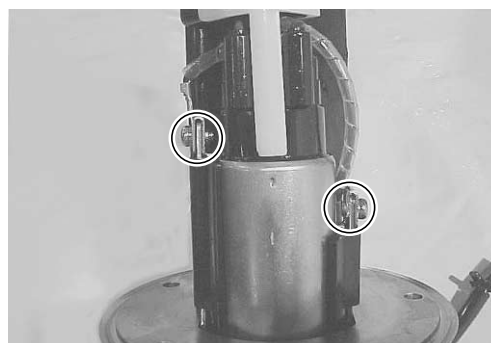
**Gasoline is highly flammable and explosive.
Keep heat, spark and flame away.**



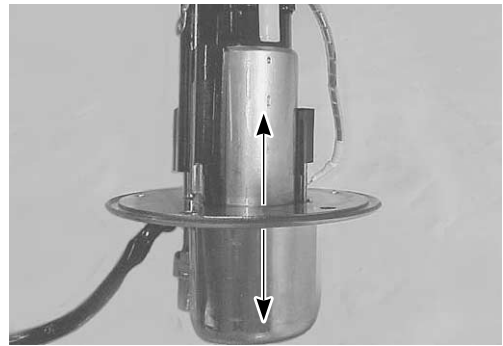
- Remove the nut.



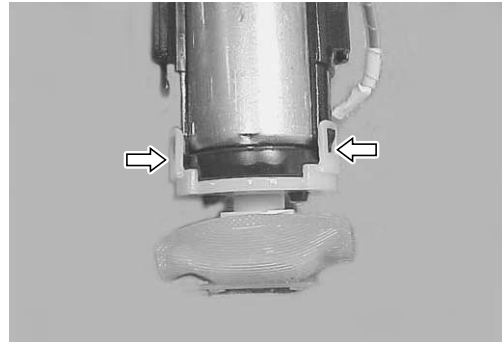
- Remove the screws.



- Remove the fuel pump assy from the fuel pump plate.



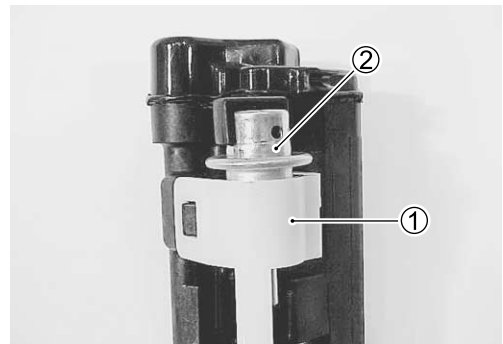
- Remove the fuel pump holder.



- 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.



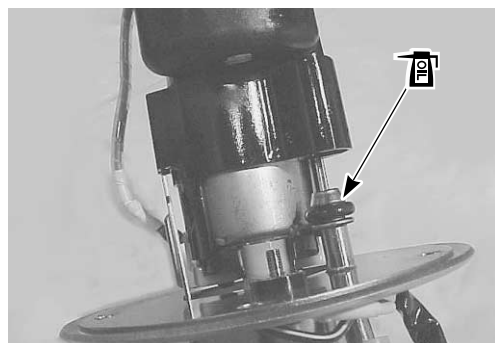
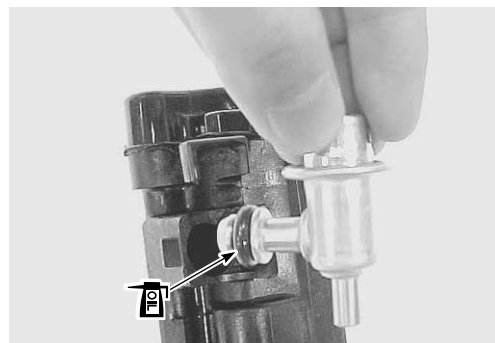
FUEL PUMP AND FUEL MESH FILTER INSTALLATION

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

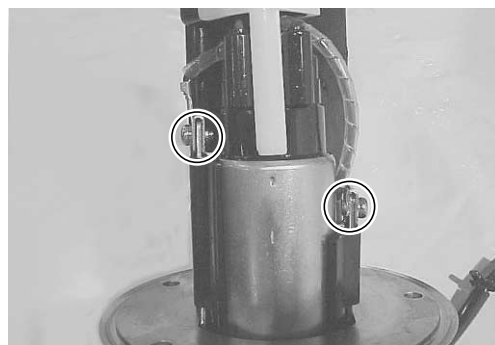
- Install the new O-rings to the fuel pressure regulator and fuel pipe.
- Apply thin coat of the engine oil to the O-rings.

CAUTION

Use the new O-rings to prevent fuel leakage.



- Tighten the screws together with the lead wire terminals.



- Tighten the nut together with the lead wire terminal.

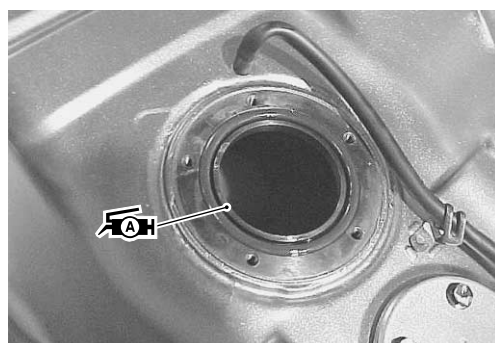


- Install the new O-ring and apply grease to it.

⚠ WARNING

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

 99000-25010: SUZUKI SUPER GREASE "A"



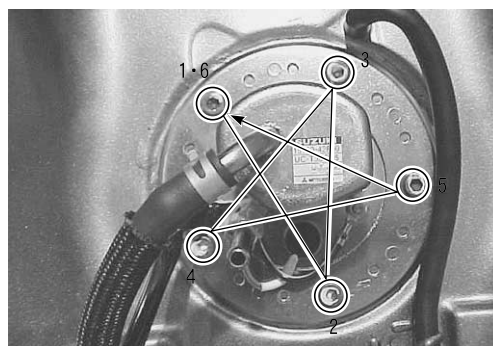
- When installing the fuel pump assembly, lightly tighten all the fuel pump assembly mounting bolts in the ascending order of numbers, and then tighten them to the specified torque in the above manner.

 **Fuel pump mounting bolt: 10 N·m (1.0 kgf·m, 7.3 lb·ft)**

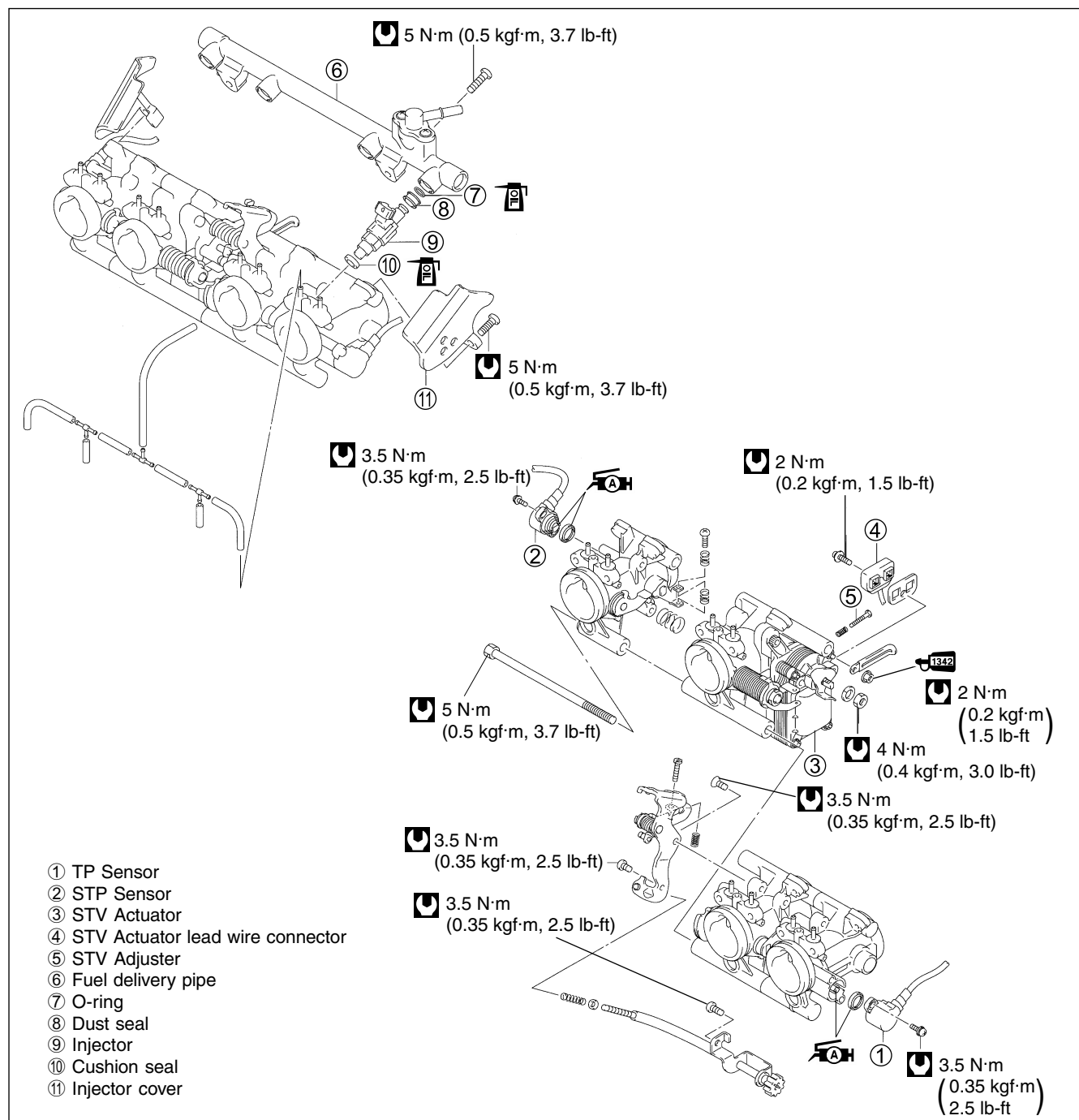
NOTE:

Apply a small quantity of the THREAD LOCK “1342” to the thread portion of the fuel pump mounting bolt.

📞1342 99000-32050: THREAD LOCK “1342”

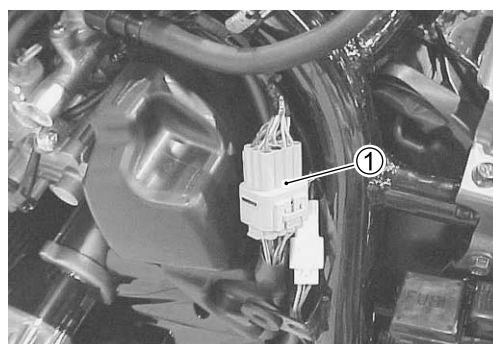


THROTTLE BODY AND STV ACTUATOR CONSTRUCTION

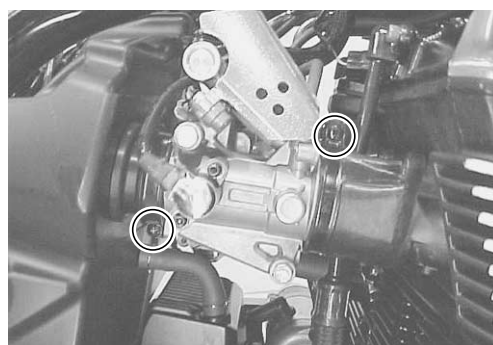


THROTTLE BODY REMOVAL

- Remove the fuel tank. (☞ 4-48)
- Disconnect the fuel injector/sensor lead wire coupler ①.



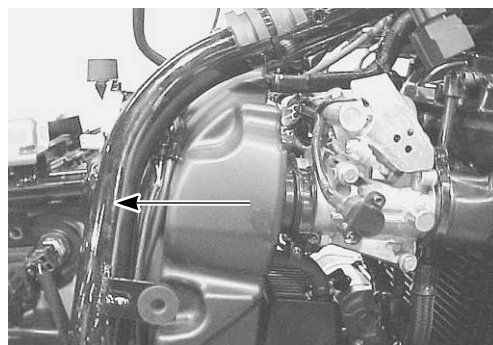
- Loosen the respective throttle body clamp screws.



- Remove the air cleaner box mounting bolts, left and right.



- Slightly move the air cleaner box backward.



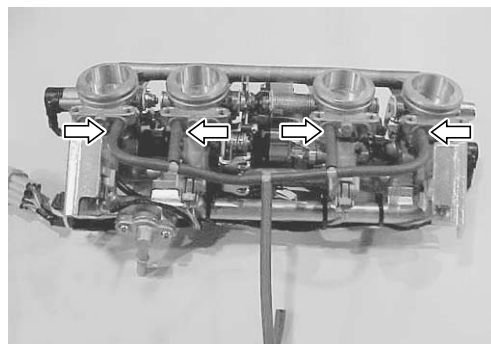
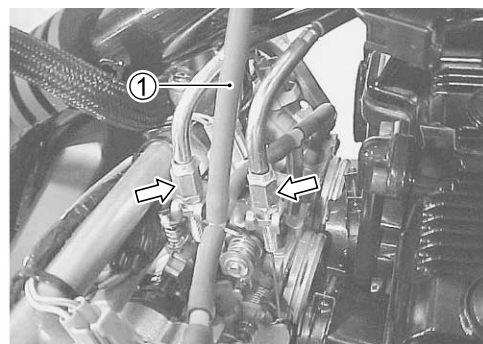
- Disconnect the throttle cables from their drum.
- Disconnect the vacuum hose ① from the IAP sensor.
- Dismount the throttle body assembly.

CAUTION

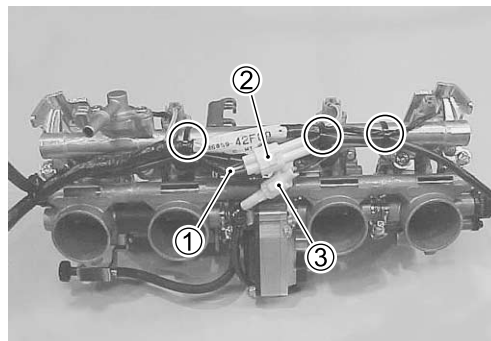
- * Be careful not to damage the throttle cable bracket and fast idle lever when dismounting or remounting the throttle body assembly.
- * After disconnecting the throttle cables, do not snap the throttle valve from full open to full close. It may cause damage to the throttle valve and throttle body.

THROTTLE BODY DISASSEMBLY

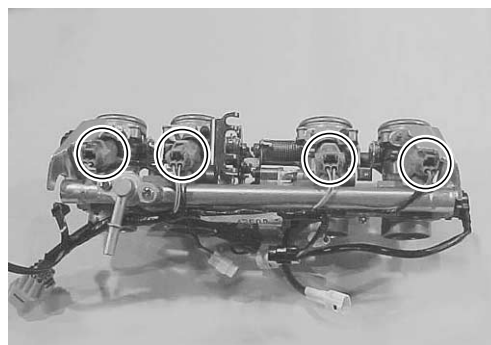
- Disconnect the respective vacuum hoses from each throttle body.



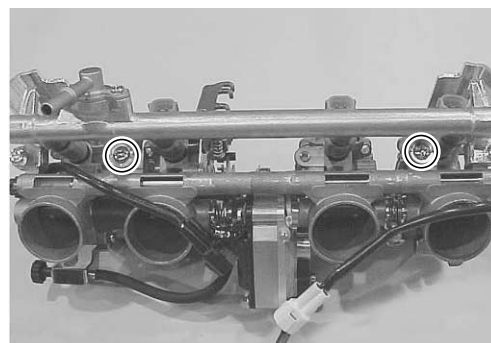
- Remove the lead wire clamps.
- Disconnect the TP sensor lead wire coupler ①, STP sensor lead wire coupler ②, STVA motor lead wire coupler ③.



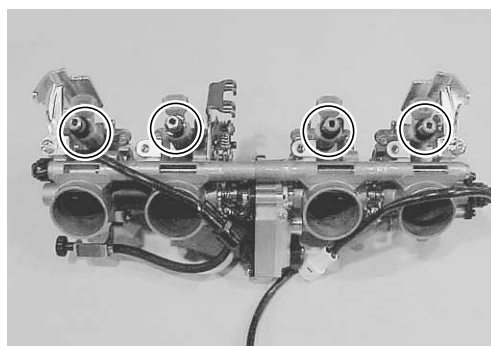
- Disconnect the fuel injector lead wire couplers.



- Remove the fuel delivery pipe assembly by removing its mounting screws.



- Remove the fuel injectors.



- Separate the throttle body assembly to a pair of two bodies (NO.1/NO.2 and NO.3/NO.4) by removing their connecting bolts.



- Remove the TP sensor with the special tool.

TOOL 09930-11960: Torx wrench

NOTE:

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

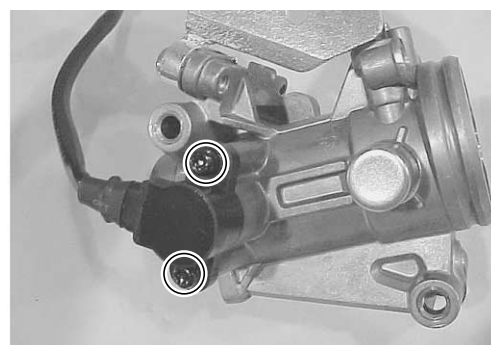


- Remove the STP sensor with the special tool.

TOOL 09930-11960: Torx wrench

NOTE:

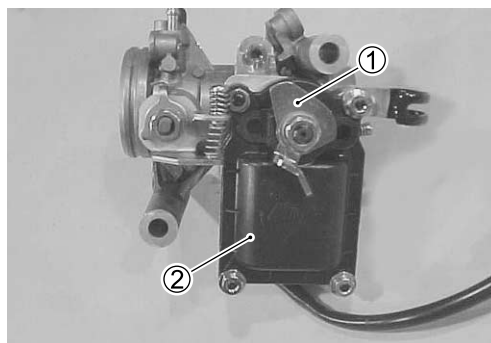
Prior to disassembly, mark the STP sensor's original position with a paint or scribe for accurate reinstallation.



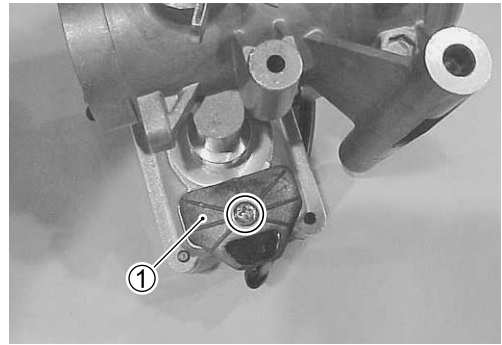
- Remove the fast idle cam ① by removing its mounting nut.

CAUTION

**Do not attempt to disassemble the secondary throttle valve actuator assembly. (Except for the cover ②)
Actuator is available only as an assembly.**

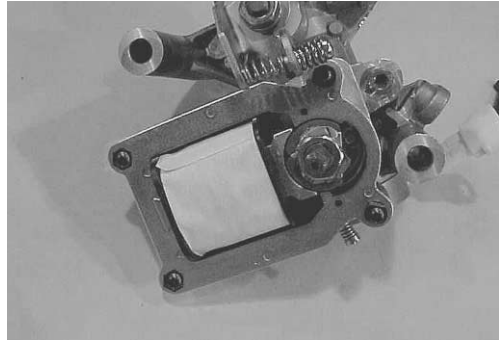


- Remove the STVA motor lead wire connector ① by removing the screw.



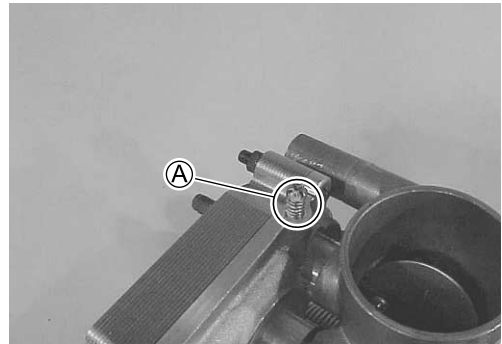
CAUTION

Never remove the STVA motor yoke and motor.



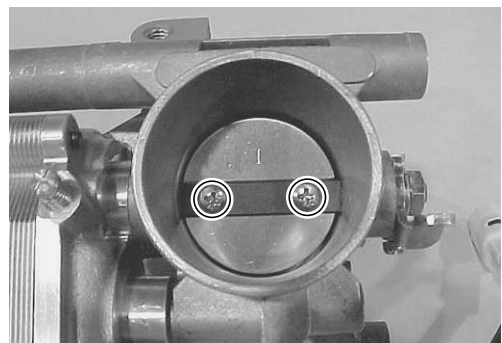
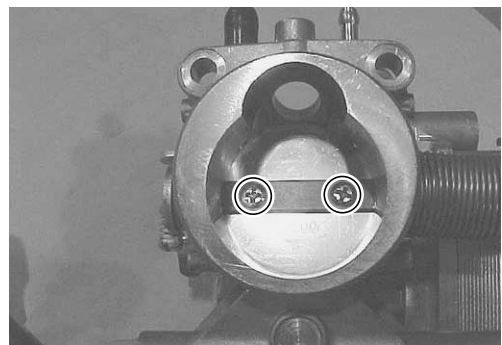
CAUTION

Avoid removing the STV adjuster ① unless absolutely necessary.



CAUTION

Never remove the throttle valve and secondary 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 | * Fuel injector filter |
| * Throttle shaft bushing and seal | * Injector cushion seal |
| * Throttle valve | * Injector dust seal |
| * Secondary throttle valve | * Vacuum hose |

THROTTLE BODY REASSEMBLY

Reassemble the throttle body in the reverse order of disassembly.

Pay attention to the following points:

- Be careful not to apply grease to the other parts when applying the grease to the shaft.

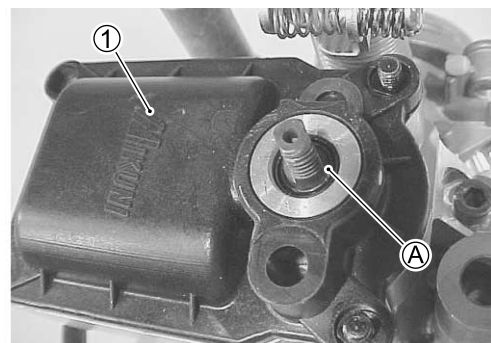
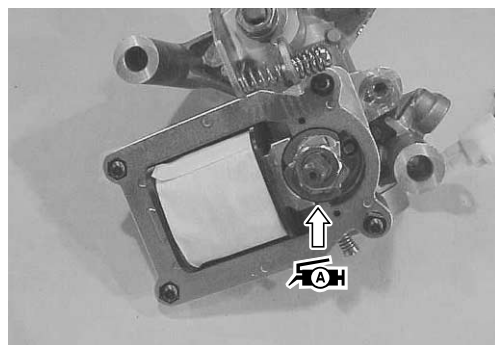
 99000-25010: SUZUKI SUPER GREASE "A"

- Install the actuator cover ①.

NOTE:

Before installing the cover ①, apply grease lightly to the dust seal ②.

 99000-25010: SUZUKI SUPER GREASE "A"



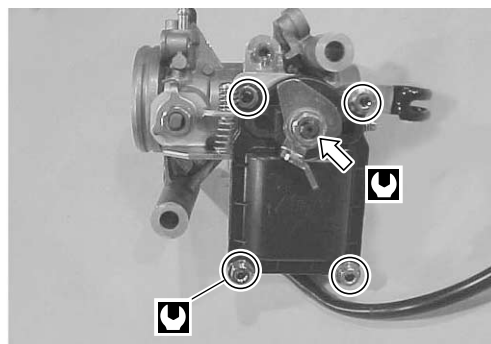
- Apply thread lock “1342” to the actuator cover nuts and tighten them.

 99000-32050: THREAD LOCK “1342”

 STVA cover nut: 2.0 N·m (0.2 kgf·m, 1.5 lb-ft)

- Install the fast idle cam and tighten its mounting nut.

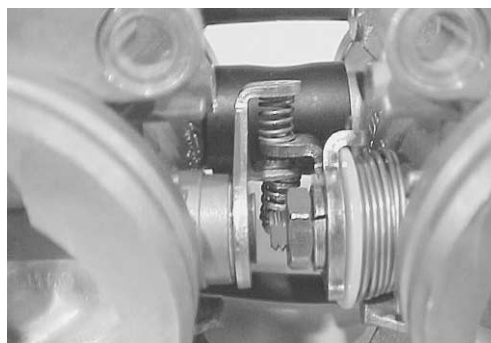
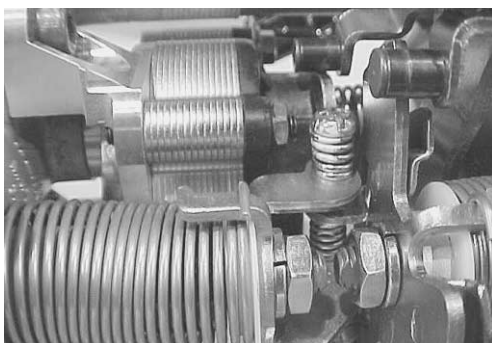
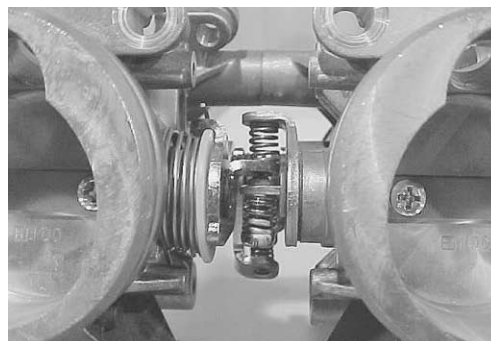
 Fast idle cam mounting nut: 4.0 N·m (0.4 kgf·m, 3.0 lb-ft)



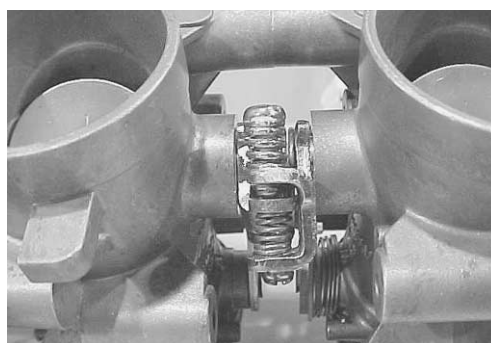
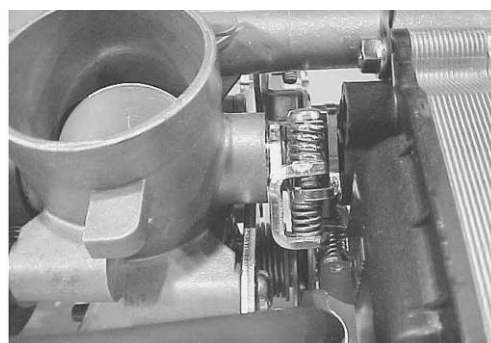
- Position the TV control lever between the TV synchronizing screw and spring as shown.
- Set each TV to the same opening by turning the balance screws.

NOTE:


Apply grease “A” to the screw end and spring if necessary.



- Position the STV control lever between the STV balance screw and spring as shown.



- Place the throttle body assembly on the surface plate and tighten the connecting bolts.

 **Throttle body connecting bolt: 5 N·m
(0.5 kgf·m, 3.7 lb-ft)**

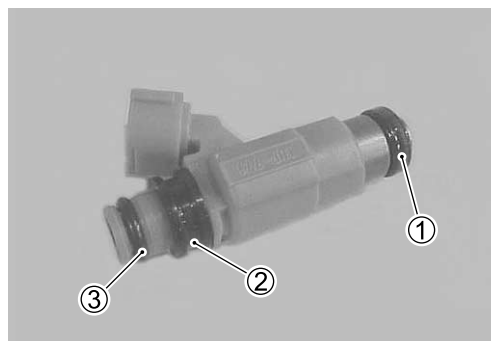


- Apply thin coat of the engine oil to the new fuel injector cushion seals ①, and install them to each fuel injector.

CAUTION

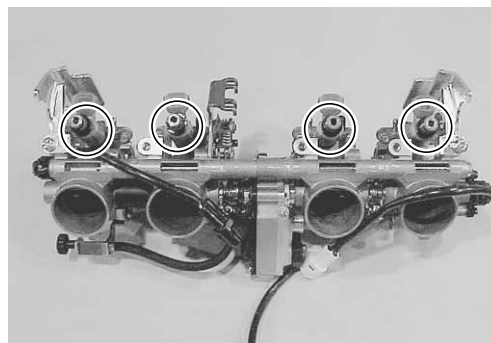
Replace the cushion seal with a new one.

- Install the seals ② and O-rings ③ to each fuel injector.
- Apply thin coat of the engine oil to the new O-rings ③.
- Install the fuel injectors by pushing them straight to each throttle body.



CAUTION

**Replace the dust seal and O-ring with the new ones.
Never turn the injector while pushing it.**



- Install the fuel delivery pipe assembly to the throttle body assembly.

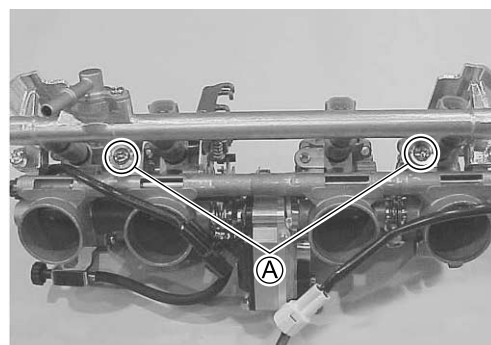
CAUTION

Never turn the fuel injectors while installing them.

- Tighten the fuel delivery pipe mounting screws ①.

 **Fuel delivery pipe mounting screw: 5 N·m
(0.5 kgf·m, 3.7 lb-ft)**

- Connect the fuel injector couplers to each fuel injector.



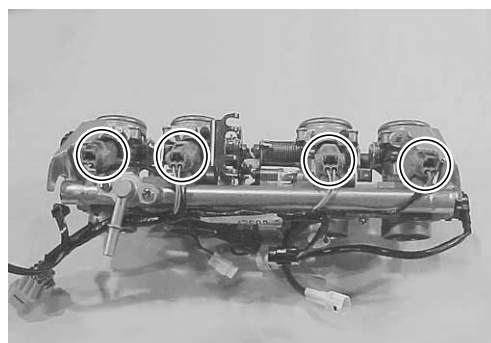
WIRE COLOR

No.1 coupler: Gray/ White

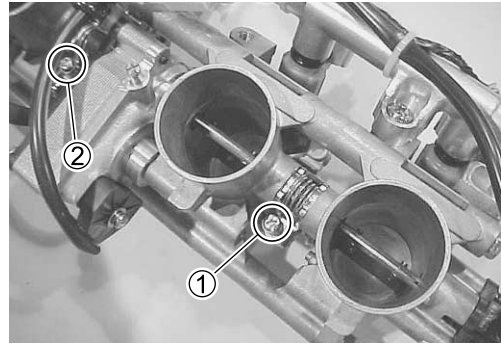
No.2 coupler: Gray/ Black

No.3 coupler: Gray/ Yellow

No.4 coupler: Gray/ Red



- Set the No.3 and No.4 STV's to the same opening by turning the balance screw ①. Then, set the No.1/No.2 valves and No.3/No.4 valves to the same opening by turning the balance screw ②.

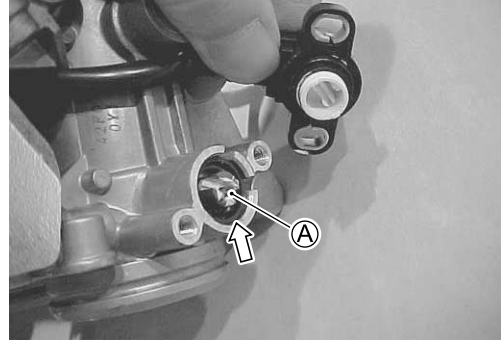


- Install the TP sensor to the No.1 throttle body and STP sensor to the No.4 throttle body respectively.

TOOL 09930-11960: Torx wrench

NOTE:

- * Apply grease "A" to the shaft end ① if necessary.
- * STP sensor and TP sensor resemble each other very closely in external appearance. Make sure to check the color of coupler before connecting.



White coupler: STP sensor, Black coupler: TP sensor

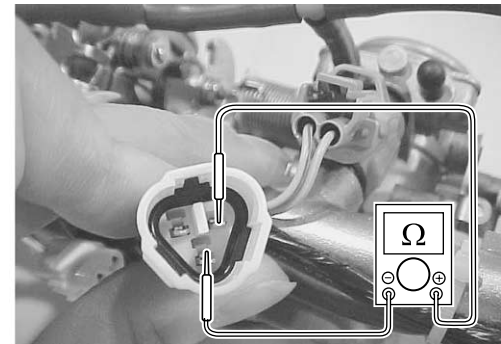
STP SENSOR ADJUSTMENT

If the STP sensor adjustment is necessary, measure the sensor resistance and adjust the STP sensor positioning as follows:

- Disconnect the STP sensor coupler.
- Set the ST valve to fully close position by finger and measure the resistance between yellow and black wires.

DATA STP sensor setting resistance

ST valve is fully closed: Approx. 0.8 kΩ
(⊕ Yellow – ⊖ Black)



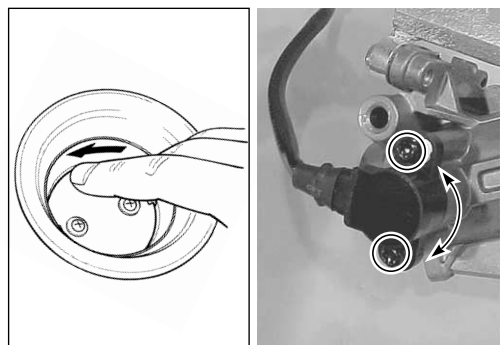
TOOL 09900-25008: Multi circuit tester

Tester knob indication: Resistance (Ω)

- Loosen the STP sensor mounting screws.
- Adjust the STP sensor until resistance is within specification and tighten the STP sensor mounting screws.

TOOL 09930-11960: Torx wrench

STP sensor mounting screw: 3.5 N·m
(0.35 kgf·m, 2.5 lb-ft)



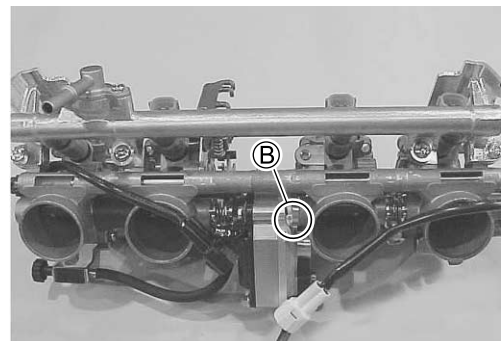
If the measured resistance is not within specification, adjust the STV adjuster ③ as follows:

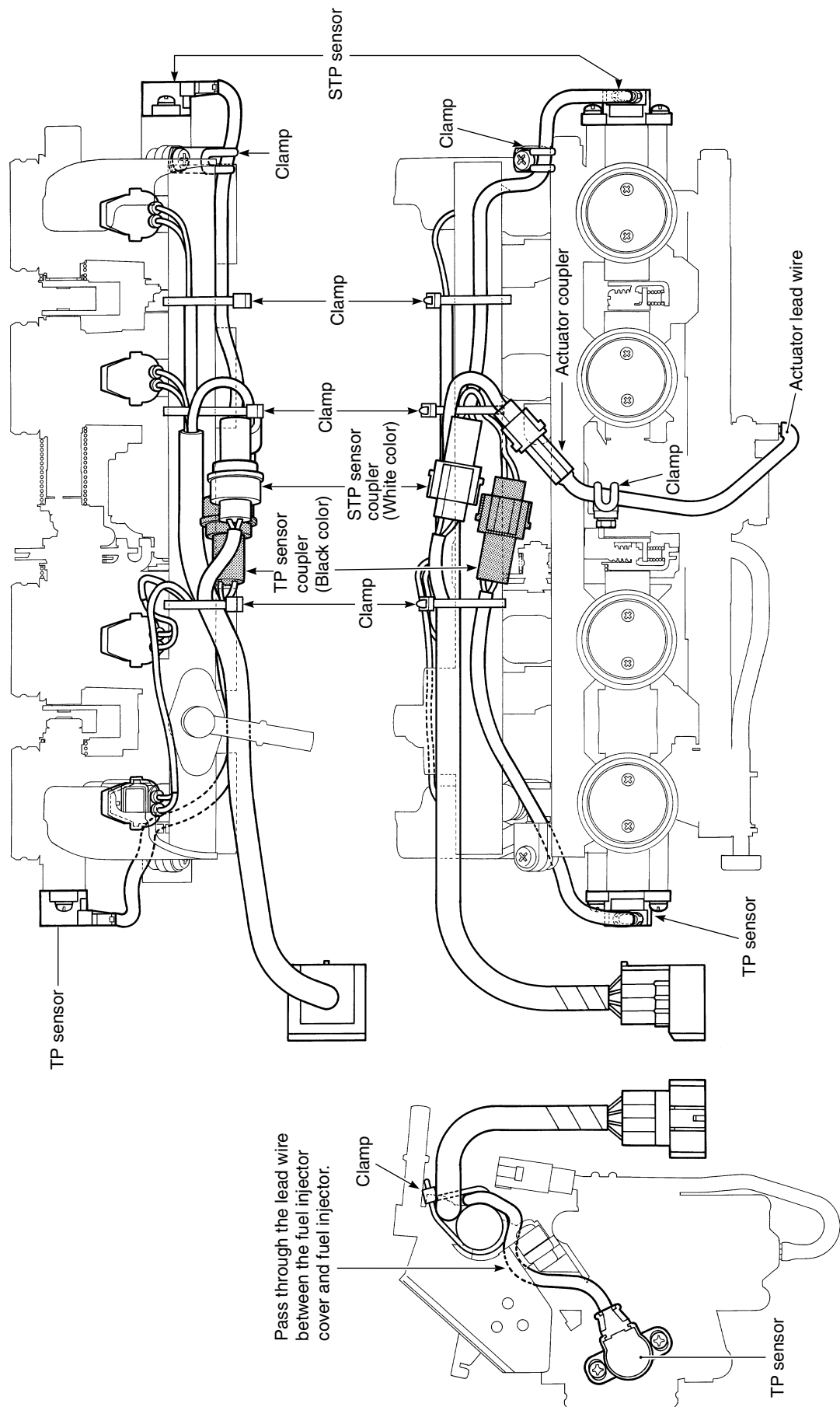
- Under above condition, turn in or out the STV adjuster ③ until the resistance becomes specified value.

If the measured resistance is not obtain, replace the STP sensor with a new one, and adjust the STP sensor positioning again.

NOTE:

To adjust the TP sensor, install the throttle body assembly to the engine and after warming up engine. (ⓘ 4-64)





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 2-15 for details.

TP SENSOR ADJUSTMENT

- After checking or adjusting the throttle valve synchronization, measure the TP sensor resistance and adjust the TP sensor positioning as follows:
- After warming up engine, adjust the idling speed to $1\,100 \pm 100$ rpm.
- Stop the warmed-up engine and disconnect the TP sensor lead wire coupler. (☞ 4-35)
- Measure the resistance between yellow and black wires.

DATA TP sensor setting resistance: Approx. 1.1 k Ω
(⊕ Yellow – ⊖ Black)

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Resistance (Ω)

- Loosen the TP sensor mounting screws.
- Adjust the TP sensor until resistance is within specification and tighten the TP sensor mounting screws.

TOOL 09930-11960: Torx wrench

TP sensor mounting screw: 3.5 N·m
(0.35 kgf·m, 2.5 lb·ft)

FUEL INJECTOR INSPECTION

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

Refer to page 4-46 for details.

FUEL INJECTOR REMOVAL

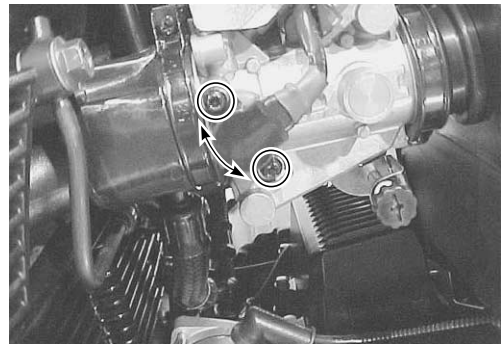
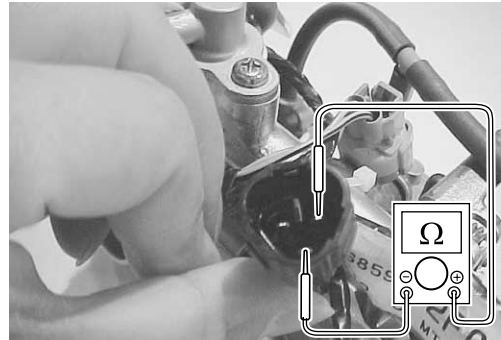
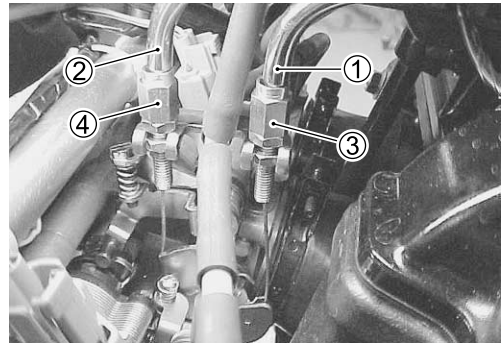
- Lift and support the fuel tank with a proper stay. (☞ 4-48)
- With battery negative cable disconnected, disconnect the injector couplers.
- Remove the fuel delivery pipe assembly. (☞ 4-56)
- Remove the fuel injectors No.1, No.2, No.3 and No.4. (☞ 4-57)

INSPECTION

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

FUEL INJECTOR INSTALLATION

- Apply thin coat of the engine oil to new injector cushion seals and O-rings.
- Install the injector by pushing it straight to the throttle body. Never turn the injector while pushing it. (☞ 4-61)



FAST IDLE INSPECTION

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 oil temperature and lapsed time, the fast idle is cancelled allowing the engine to resume idle speed.

- * Fast idle cancellation occurs in 30 seconds at the ambient temperature of 25°C.
- * Fast idle cancellation occurs in 5 minutes at the ambient temperature of -10°C.

If, under the above conditions, the fast idle cannot be cancelled, the cause may possibly be short-circuit in oil temperature sensor or wiring harness.

DATA Fast idle rpm
 (Standard): 1 500 – 1 700 rpm/Cold engine
 (Maximum) : 2 000 rpm/Cold engine
 Idle rpm: 1 100 ± 100 rpm/Warmed engine

FAST IDLE ADJUSTMENT

- Remove the fuel tank (4-48)
- Open the secondary throttle valve fully by turning its link with the finger. With the secondary throttle valve held at this position, measure the output voltage of TP sensor. (4-36)

DATA TP sensor output voltage: 1.195 V

TOOL 09900-25008: Multi circuit tester

Tester knob indication: Voltage (---)

If the voltage measured is out of specification, loosen the TP sensor screws and adjust the output voltage to specification.

NOTE:

If fast idle fine adjustment is required or the screw [Ⓐ] has been removed, the following adjustment will become necessary.

ADJUSTMENT BY FAST IDLE SCREW

CAUTION

The fast idle screw is factory-adjusted at the time of delivery and therefore avoid removing or turning it unless otherwise necessary. Should the adjustment become necessary, perform the following procedures.

- Measure the voltage when the throttle valve is fully closed.

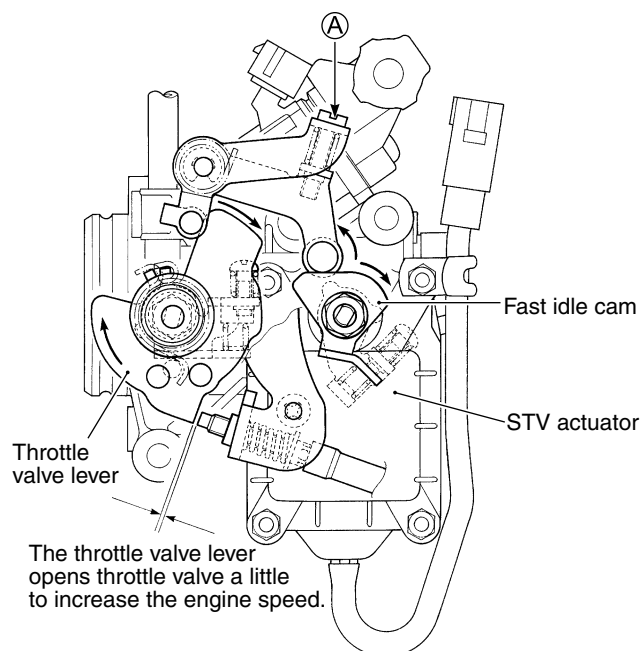
DATA TP sensor output voltage at full closed position: 1.12 V

If the voltage measured is out of specification, move the TP sensor to adjust the voltage to specification.

- Open the secondary throttle valve gradually and just when the STP sensor voltage has become 3.6 V, stop the valve opening and check for variation of the TP sensor output voltage.

DATA TP sensor output voltage variation: 0.035 V at STP sensor output voltage of 3.6 V

If the voltage variation is more than or less than 0.035 V, perform adjustment by the fast idle adjust screw [Ⓐ].



THROTTLE VALVE SYNCHRONIZATION


Check and adjust the throttle valve synchronization among four cylinders. To synchronize throttle valves, disconnect the IAP sensor's vacuum hoses from the vacuum nipples on the respective throttle bodies and connect the vacuum balancer gauge hoses to each vacuum nipple.

 **09913-13121: Vacuum balancer gauge**

NOTE:

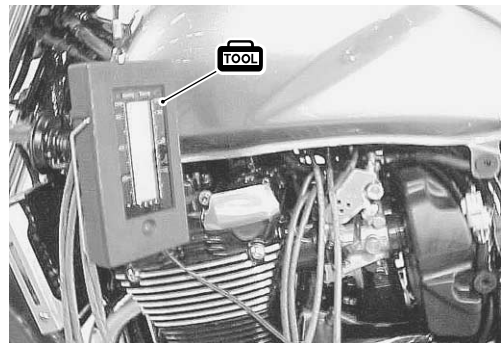
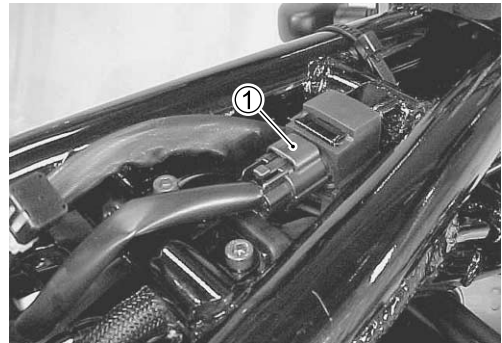
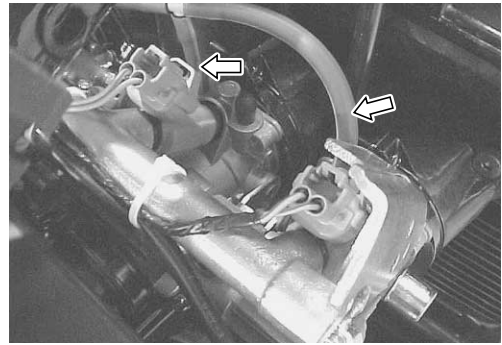
Before balancing the throttle valves, calibrate each vacuum balancer gauge.

THROTTLE VALVE SYNCHRONIZATION

- Lift and support the fuel tank. ( 4-48)
- Start up the engine and run it in idling condition for warming up.
- Stop the warmed-up engine.
- Disconnect the IAP sensor coupler ① and connect the vacuum balancer gauge hoses to the vacuum nipples respectively.
- Connect a tachometer and start up the engine.
- Bring the engine rpm to 1 100 rpm by the throttle stop screw.
- Check the vacuum of the four cylinders and balance the four throttle valves.

NOTE:

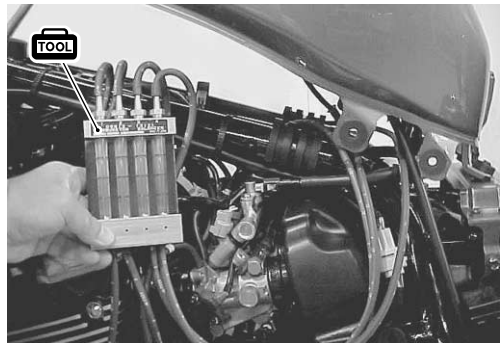
- * *During balancing the throttle valves, always set the engine rpm at 1 100 rpm, using throttle stop screw.*
- * *After balancing the four valves, set the idle rpm to 1 100 rpm.*



For vacuum balancer gauge (09913-13121)


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.



THROTTLE CABLE ADJUSTMENT

NOTE:

Minor adjustment can be made by the throttle grip side adjuster.
( 2-15)

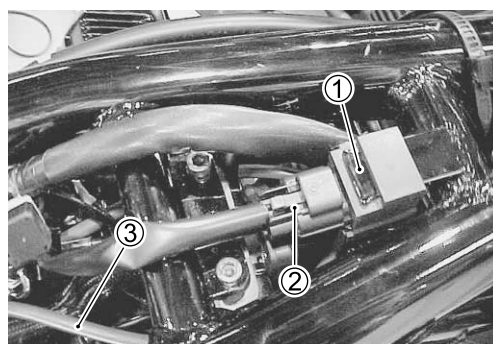
SENSORS

IAP SENSOR INSPECTION

The intake air pressure sensor is located at the upper frame between the tubes. (✎ 4-33)

IAP SENSOR REMOVAL/INSTALLATION

- Lift and support the fuel tank. (✎ 4-48)
- Remove the IAP sensor ① and disconnect the coupler ② and vacuum hose ③.
- Installation is in the reverse order of removal.

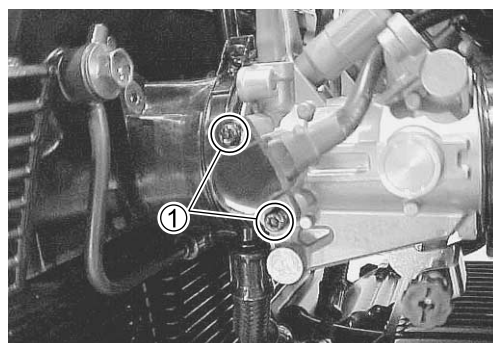


TP SENSOR INSPECTION

The throttle position sensor is installed on the No.1 throttle body. (✎ 4-35)

TP SENSOR REMOVAL/INSTALLATION

- Lift and support the fuel tank. (✎ 4-48)
- Remove the TP sensor setting screws ① and disconnect its coupler.
- Install the TP sensor to the No.1 throttle body. Refer to page 4-64 for TP sensor setting procedure.

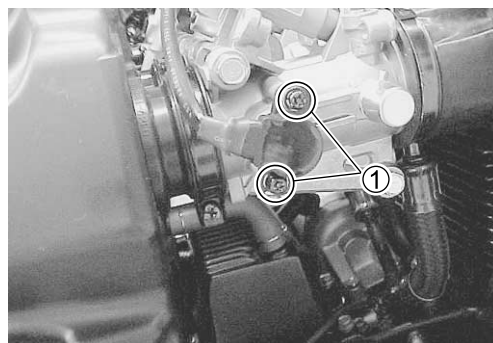


STP SENSOR INSPECTION

The secondary throttle position sensor is installed on the No. 4 throttle body. (✎ 4-43)

STP SENSOR REMOVAL/INSTALLATION

- Lift and support the fuel tank. (✎ 4-48)
- Remove the STP sensor setting screws ① and disconnect its coupler.
- Install the STP sensor to the No. 4 throttle body. Refer to page 4-62 for STP sensor setting procedure.

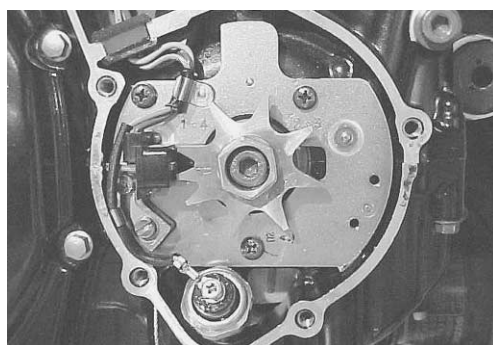


CKP SENSOR INSPECTION

The signal rotor is mounted on the right end of the crankshaft, and the crankshaft position sensor (Pick-up coil) is installed on the right side of the crankcase. (✎ 4-32)

CKP SENSOR REMOVAL/INSTALLATION

(✎ 3-15 and -69)



CMP SENSOR INSPECTION

The signal rotor is installed on the intake camshaft, and the camshaft position sensor (Pick-up coil) is installed on the cylinder head cover. (🔧 4-31)

CMP SENSOR REMOVAL/INSTALLATION

- Lift and support the fuel tank. (🔧 4-48)
- Disconnect the coupler and remove the CMP sensor.
Installation is in the reverse order of removal. (🔧 3-23)



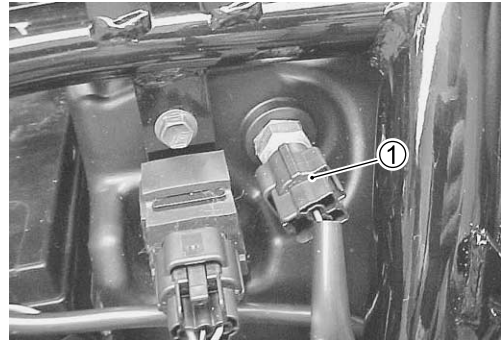
IAT SENSOR INSPECTION

The intake air temperature sensor is installed at the right side of the air cleaner box. (🔧 4-38)

IAT SENSOR REMOVAL/INSTALLATION

- Remove the right frame side cover. (🔧 6-3)
- Disconnect the IAT sensor coupler ① and remove the IAT sensor from the air cleaner box.
- Installation is in the reverse order of removal.

🔧 IAT sensor: 18 N·m (1.8 kgf·m, 13.0 lb-ft)

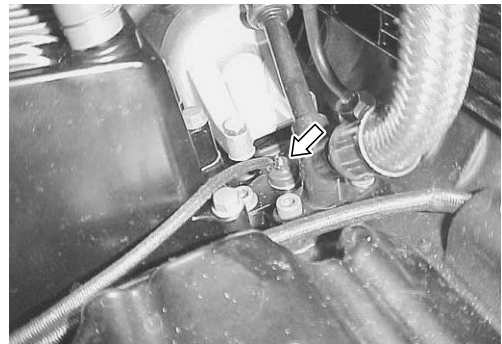


EOT SENSOR INSPECTION

The engine oil temperature sensor is installed on the upper crankcase. (🔧 4-37 and 5-11)

EOT SENSOR REMOVAL/INSTALLATION

(🔧 3-14)

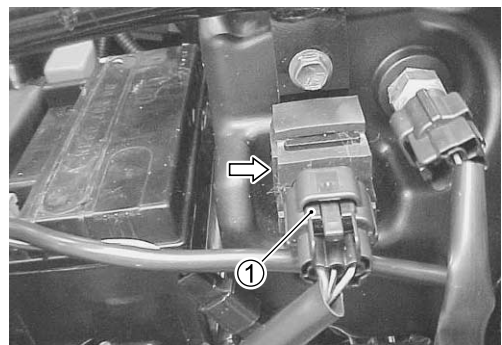


AP SENSOR INSPECTION

The atmospheric pressure sensor is located at the right side of the air cleaner box. (🔧 4-39)

AP SENSOR REMOVAL/INSTALLATION

- Remove the right frame side cover. (🔧 6-3)
- Disconnect the coupler ① and remove the AP sensor.
- Installation is in the reverse order of removal.



TO SENSOR INSPECTION

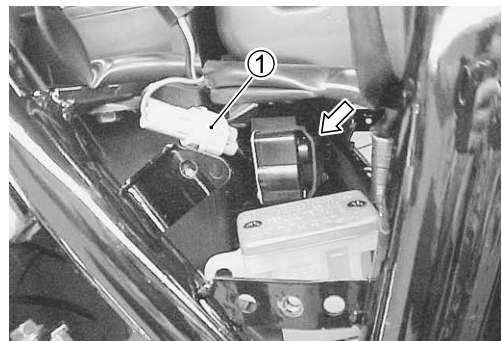
The tip over sensor is located in ahead of the battery holder. (🔧 4-41)

TO SENSOR REMOVAL/INSTALLATION

- Remove the right frame side cover. (🔧 6-3)
- Remove the rear brake fluid reservoir bolt.
- Disconnect the coupler ① and remove the TO sensor.
- Installation is in the reverse order of removal.

NOTE:

When installing the TO sensor, bring the "UPPER" letter on it to the top.



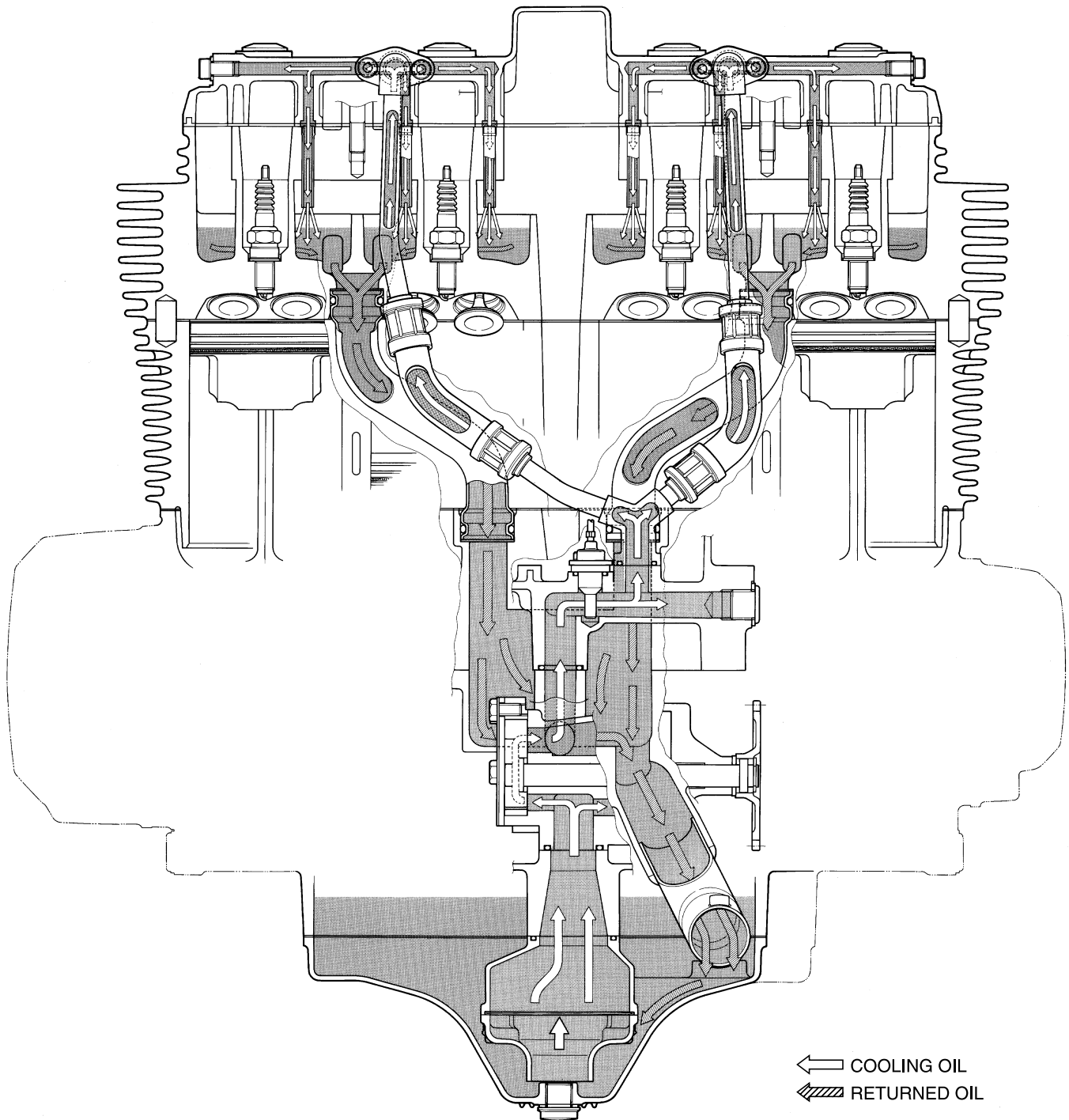
OIL COOLING AND LUBRICATION SYSTEM

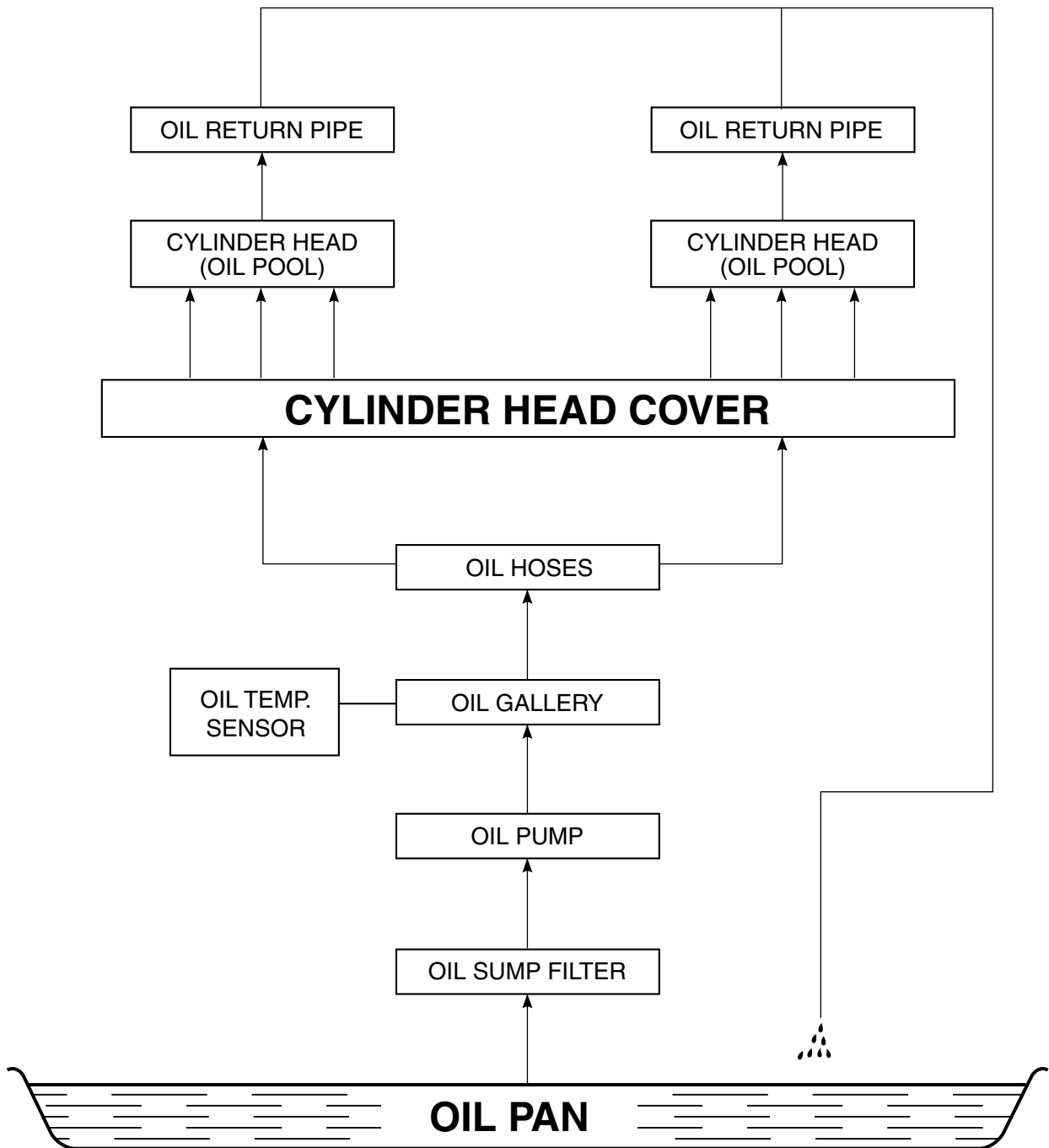
CONTENTS

| | |
|---|-------------|
| OIL COOLING SYSTEM/LUBRICATION SYSTEM | 5- 2 |
| CYLINDER HEAD OIL COOLING CIRCUIT | 5- 2 |
| CYLINDER HEAD COOLING SYSTEM CHART | 5- 3 |
| ENGINE LUBRICATION CIRCUIT | 5- 4 |
| ENGINE LUBRICATION SYSTEM CHART | 5- 6 |
| OIL COOLER AND OIL HOSE | 5- 7 |
| OIL COOLER REMOVAL | 5- 7 |
| OIL COOLER INSPECTION AND CLEANING | 5- 7 |
| OIL HOSE/OIL PIPE INSPECTION..... | 5- 8 |
| OIL COOLER INSTALLATION | 5- 8 |
| COOLING FAN | 5- 8 |
| REMOVAL | 5- 8 |
| INSPECTION | 5- 9 |
| INSTALLATION | 5- 9 |
| COOLING FAN THERMO-SWITCH | 5- 9 |
| REMOVAL | 5- 9 |
| INSPECTION | 5-10 |
| INSTALLATION | 5-10 |
| OIL TEMPERATURE SENSOR | 5-11 |
| REMOVAL | 5-11 |
| INSPECTION | 5-11 |
| INSTALLATION | 5-11 |
| OIL PRESSURE | 5-12 |
| OIL FILTER | 5-12 |
| OIL STRAINER..... | 5-12 |
| OIL JET | 5-12 |
| OIL PUMP | 5-12 |
| OIL PRESSURE SWITCH..... | 5-12 |

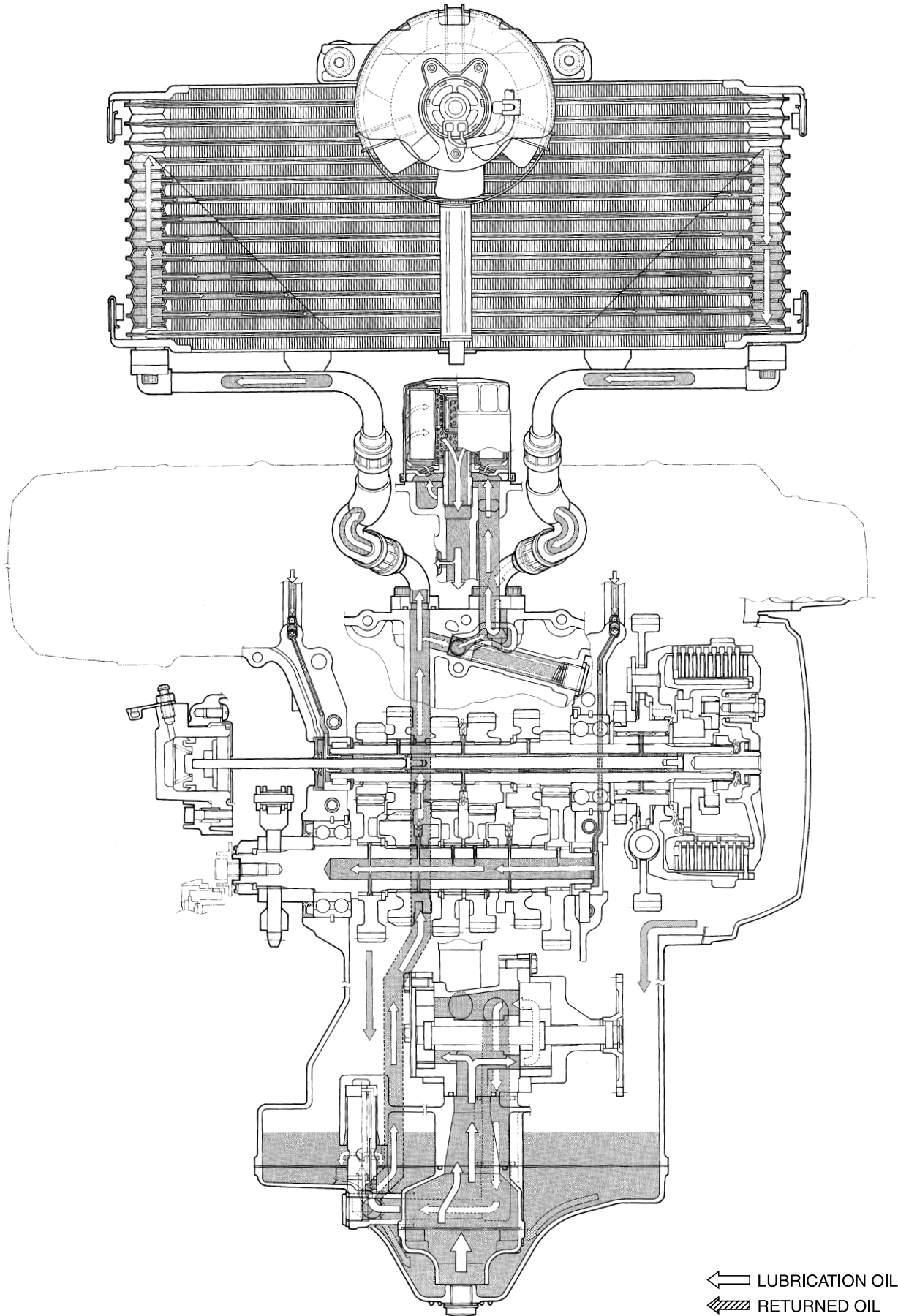
OIL COOLING SYSTEM/LUBRICATION SYSTEM

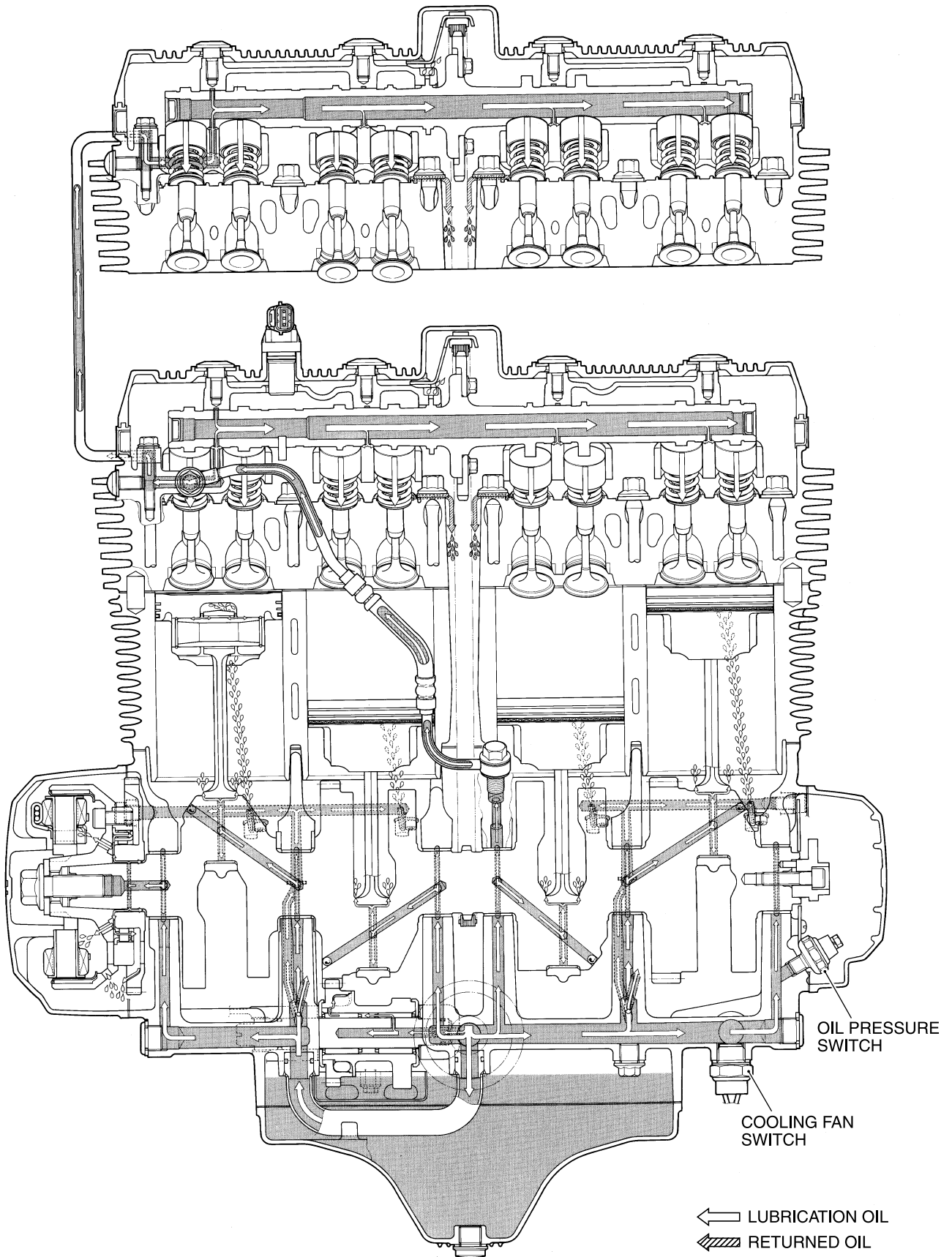
CYLINDER HEAD OIL COOLING CIRCUIT



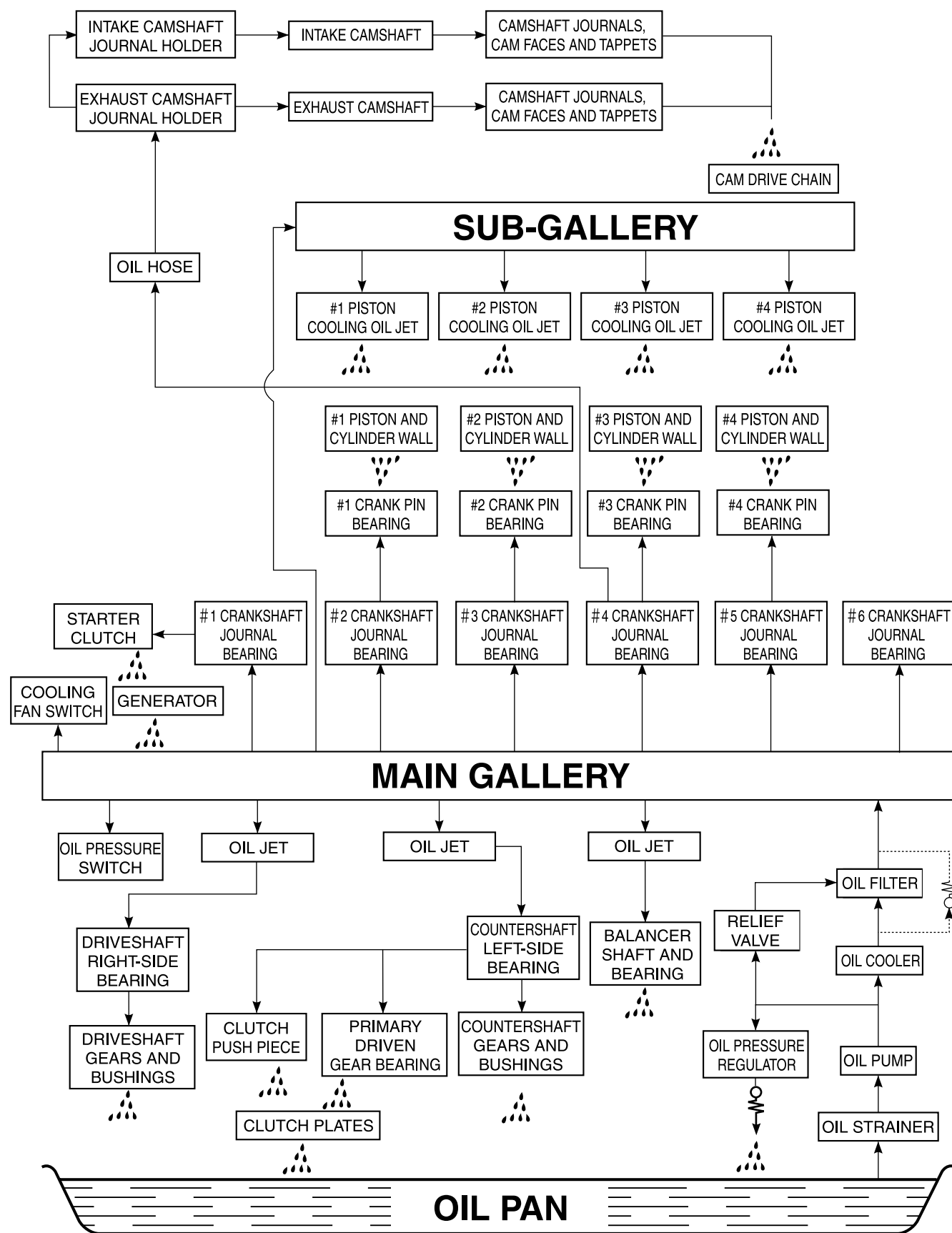
CYLINDER HEAD COOLING SYSTEM CHART

ENGINE LUBRICATION CIRCUIT





ENGINE LUBRICATION SYSTEM CHART



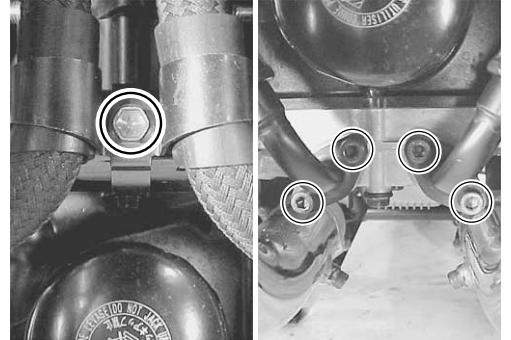
OIL COOLER AND OIL HOSE

OIL COOLER REMOVAL

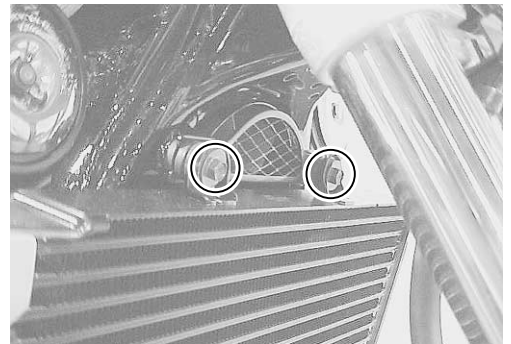
- Drain engine oil. (☞ 2-13)



- Remove the oil cooler hoses.

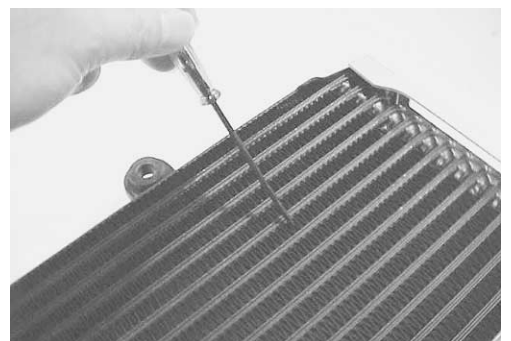
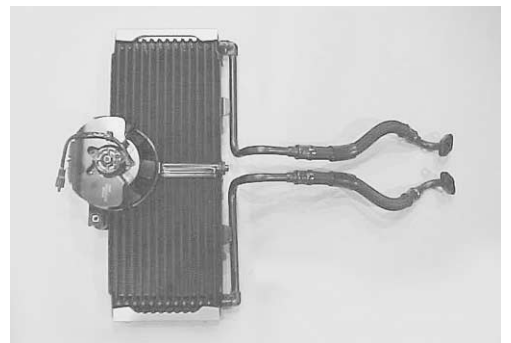


- Disconnect the cooling fan lead wire coupler.
- Remove the oil cooler.



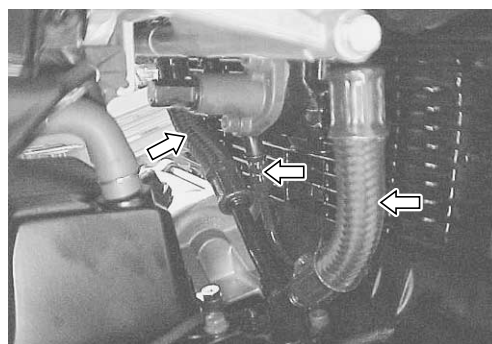
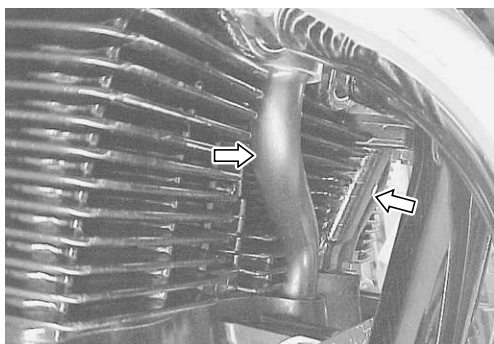
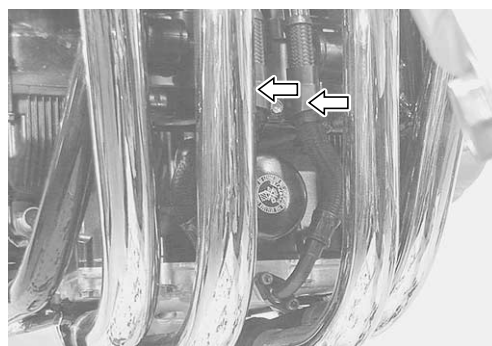
OIL COOLER INSPECTION AND CLEANING

- Inspect the oil cooler and hose joints for oil leakage. If any defects are found, replace the oil cooler and oil hoses with new ones.
- 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.



OIL HOSE/OIL PIPE INSPECTION

- Any oil hose/oil pipe found in a cracked condition or flattened must be replaced.
- Any leakage from the connecting section should be corrected by proper tightening.



OIL COOLER INSTALLATION

- Install the oil cooler.
- Use a new O-ring and install the oil hoses.

CAUTION

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


 99000-25010: SUZUKI SUPER GREASE "A"

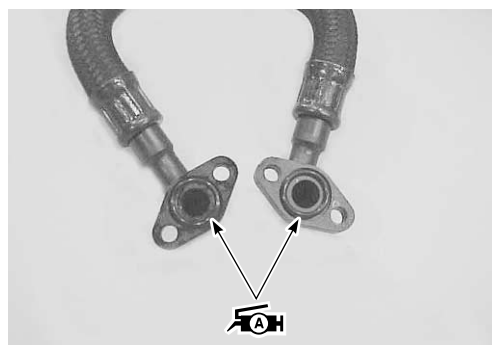
NOTE:

Apply grease "A" to the O-ring.

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



 Oil cooler hose bolt: 10 N·m (1.0 kgf·m, 7.3 lb-ft)

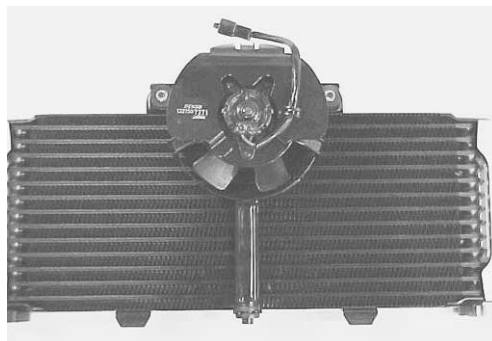
- Pour engine oil. ( 2-13)



COOLING FAN

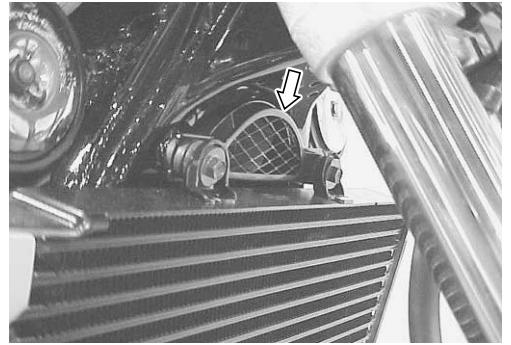
REMOVAL

- Drain engine oil. ( 2-13)
- Remove the oil cooler. ( 5-7)
- Remove the cooling fan.



INSPECTION

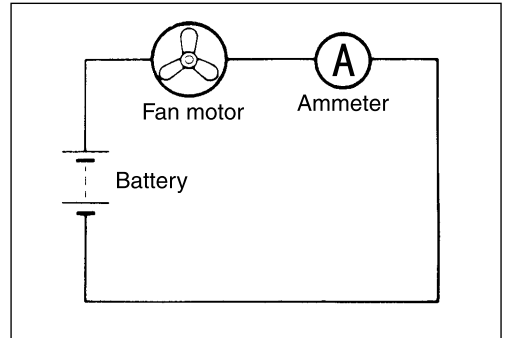
- Disconnect the cooling fan lead wire coupler.
- Test the cooling fan motor for load current with an ammeter connected as shown in the illustration.



- The voltmeter is for making sure that the battery applies 12 volts to the motor. With the motor with electric motor fan running at full speed, the ammeter should be indicating not more than 5 amperes.
- If the fan motor does not turn, replace the motor assembly with a new one.

NOTE:

When making above test, it is not necessary to remove the cooling fan.



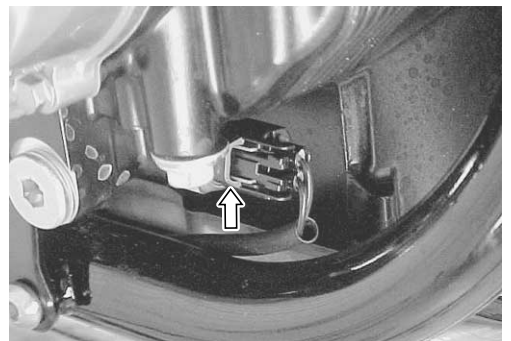
INSTALLATION

- Install the cooling fan.
- Install the oil cooler. (🔧 5-8)
- Route the oil hoses.
- Pour engine oil. (🔧 2-13)

COOLING FAN THERMO-SWITCH

REMOVAL

- Drain engine oil. (🔧 2-13)
- Disconnect the cooling fan thermo-switch lead wire coupler.
- Remove the cooling fan thermo-switch.



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.

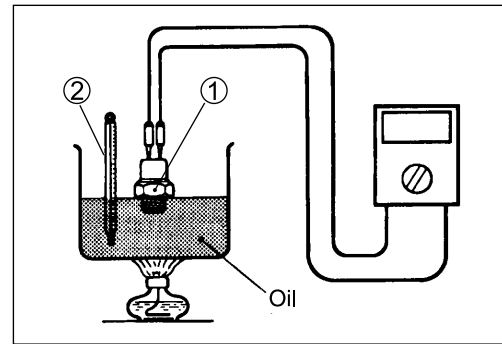
TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Continuity test (•••••)

DATA Cooling fan thermo-switch operating temperature
 Standard (OFF→ON): Approx. 120°C (248°F)
 (ON→OFF): Approx. 108°C (226°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.

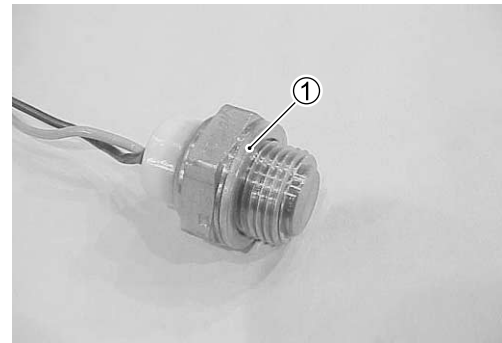


INSTALLATION

- Install the new gasket washer 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)

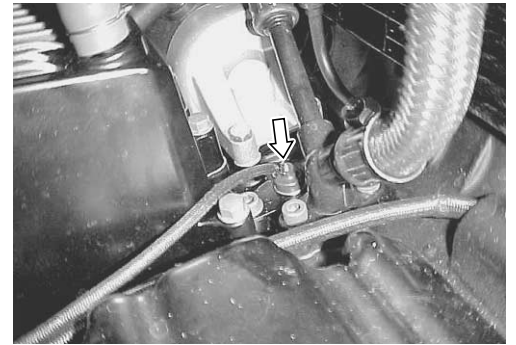
- Pour engine oil. (👉 2-13)



OIL TEMPERATURE SENSOR

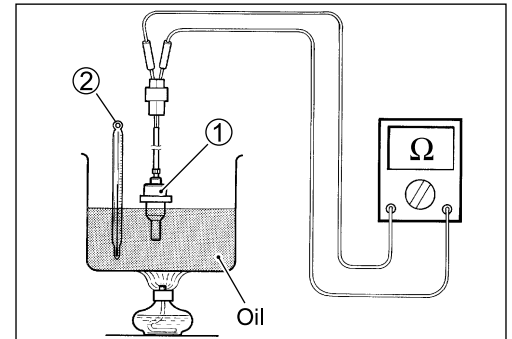
REMOVAL

- Remove the right frame side cover. (🔧6-3)
- Disconnect the oil temperature sensor lead wire coupler.
- Remove the oil temperature sensor.



INSPECTION

- Check the oil 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. 61.3 kΩ |
| 50°C (122°F) | Approx. 17.8 kΩ |
| 80°C (176°F) | Approx. 6.2 kΩ |
| 100°C (212°F) | Approx. 3.4 kΩ |
| 110°C (230°F) | Approx. 2.5 kΩ |

If the resistance noted to show infinity or too much different resistance value, replace the temperature sensor with a new one.

CAUTION

- * Take special care when handling the temperature-sensor. It may cause damage if it gets a sharp impact.
- * Do not contact the oil temperature sensor ① and the column thermometer ② with a pan.

INSTALLATION

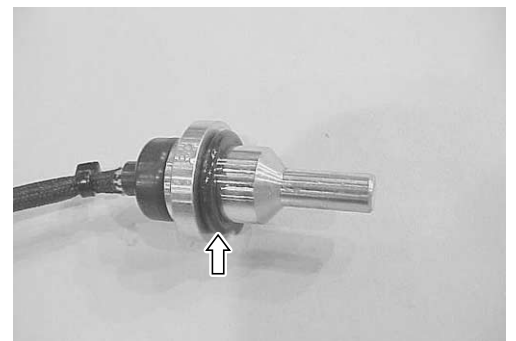
- Install the new O-ring.
- Tighten the oil temperature sensor retainer to the specified torque.

🔧 Oil temperature sensor: 10 N·m (1.0 kgf·m, 7.3 lb-ft)


CAUTION

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


- Install the right frame side cover. (🔧6-3)




OIL PRESSURE

( 2-28)


OIL FILTER

( 2-13, 2-14)

OIL STRAINER


( 3-19, 3-62)

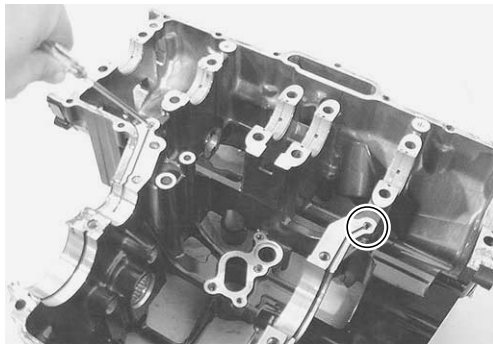
OIL PRESSURE REGULATOR

( 3-19)




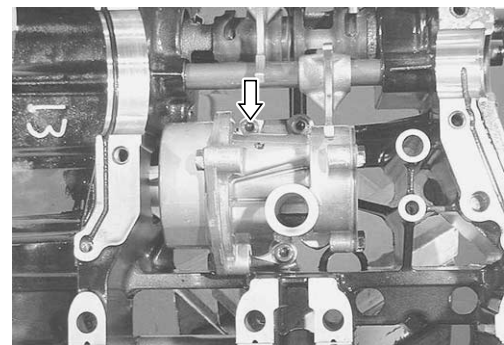
OIL JET

( 3-54)




OIL PUMP

( 3-20, 3-56)



OIL PRESSURE SWITCH

( 3-15, 3-69, 7-25, 7-30)

