

**SERVICE MANUALS
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SUZUKI

GSF650/S

SERVICE MANUAL



FOREWORD

This manual contains an introductory description on the SUZUKI GSF650/S and procedures for its inspection/service and overhaul of its main components.

Other information considered as generally known is not included.

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

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

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

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

▲ WARNING

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

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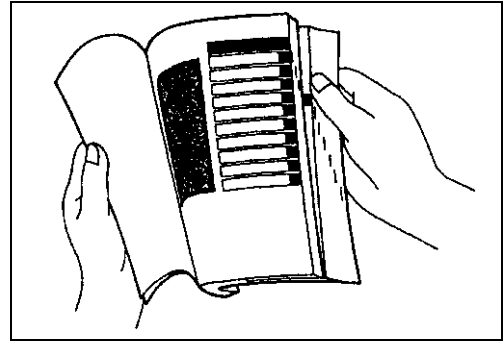
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SUZUKI MOTOR CORPORATION

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.



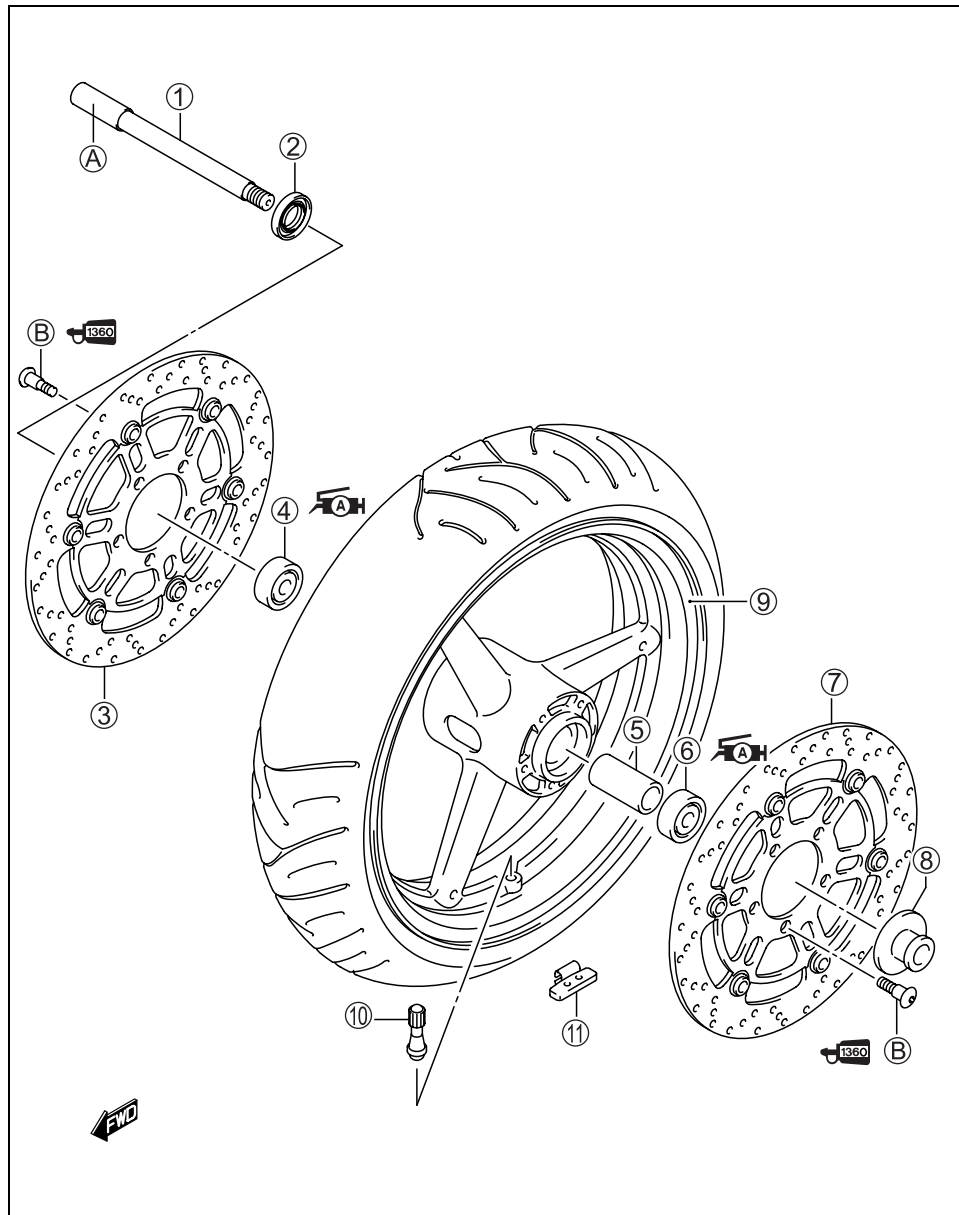
COMPONENT PARTS AND WORK TO BE DONE

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










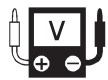

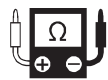

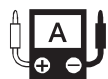

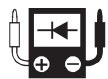







①	Front axle
②	Dust seal
③	Brake disc (RH)
④	Bearing (RH)
⑤	Spacer
⑥	Bearing (LH)
⑦	Brake disc (LH)
⑧	Collar
⑨	Front wheel
⑩	Air bleeder valve
⑪	Balancer
A	Front axle
B	Brake disc bolt

ITEM	N·m	kgf·m
A	65	6.5
B	23	2.3



SYMBOL

Listed in the table below are the symbols indicating instructions and other information necessary for servicing. The meaning of each symbol is also included in the table.

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Torque control required. Data beside it indicates specified torque.		Apply THREAD LOCK "1342". 99000-32050
	Apply oil. Use engine oil unless otherwise specified.		Apply THREAD LOCK SUPER "1360". 99000-32130
	Apply molybdenum oil solution (mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1:1).		Use fork oil. 99000-99044-10G
	Apply SUZUKI SUPER GREASE "A". 99000-25010		Apply or use brake fluid.
	Apply SUZUKI MOLY PASTE. 99000-25140		Measure in voltage range.
	Apply SUZUKI SILICONE GREASE. 99000-25100		Measure in resistance range.
	Apply PBC GREASE. 99000-25110		Measure in current range.
	Apply THERMO-GREASE. 99000-59029		Measure in diode test range.
	Apply SUZUKI BOND "1207B". 99000-31140		Measure in continuity test range.
	Apply SUZUKI BOND "1215". 99000-31110		Use special tool.
	Apply THREAD LOCK SUPER "1303". 99000-32030		Indication of service data.
	Apply THREAD LOCK SUPER "1322". 99000-32110		

GENERAL INFORMATION

1

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COUNTRY AND AREA CODES

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

CODE	COUNTRY OR AREA
E-02	England (UK)
E-19	European markets
E-28	Canada

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, oil cooler and exhaust system until they have cooled.
- * After servicing the fuel, oil, exhaust or brake systems, check all lines and fittings related to the system for leaks.

CAUTION

- * If parts replacement is necessary, replace the parts with Suzuki Genuine Parts or their equivalent.
 - * When removing parts that are to be reused, keep them arranged in an orderly manner so that they may be reinstalled in the proper order and orientation.
 - * Be sure to use special tools when instructed.
 - * Make sure that all parts used in reassembly are clean. Lubricate them when specified.
 - * Use the specified lubricant, bond or sealant.
 - * When removing the battery, disconnect the negative cable first and then the positive cable. When reconnecting the battery, connect the positive cable first and then the negative cable, and replace the terminal cover on the positive terminal.
 - * When performing service to electrical parts, if the service procedures not require use of battery power, disconnect the negative cable the battery.
 - * When tightening the cylinder head and case bolts and nuts, tighten the larger sizes first. Always tighten the bolts and nuts diagonally from the inside 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 Earth's natural resources, properly dispose of used motorcycle and parts.

SUZUKI GSF650 (2005-MODEL)



* Difference between photographs and actual motorcycles may exist depending on the markets.

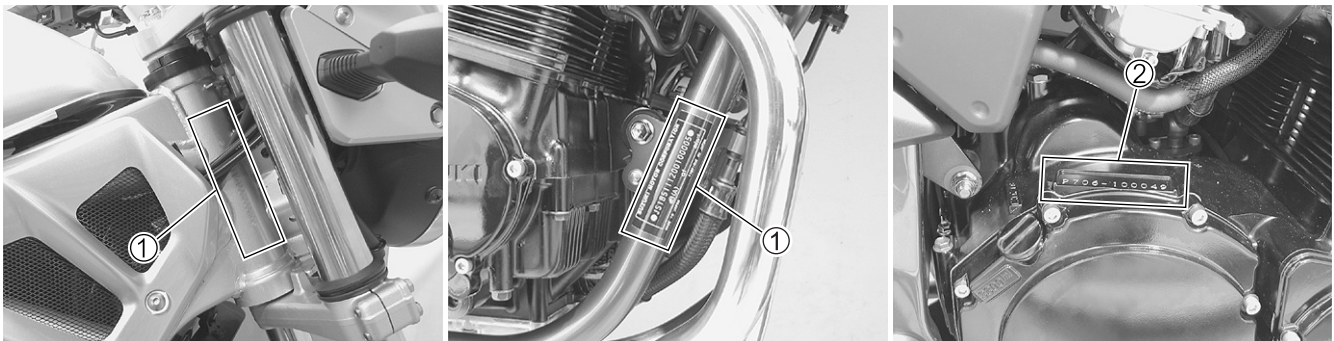
SUZUKI GSF650S (2005-MODEL)



* Difference between photographs and actual motorcycles may exist depending on the markets.

SERIAL NUMBER LOCATION

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



FUEL AND OIL RECOMMENDATION

FUEL (For Canada)

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

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

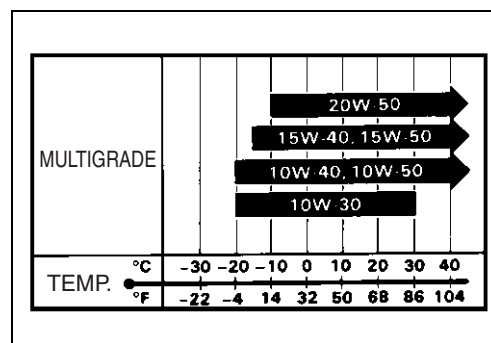
FUEL (For other countries)

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

ENGINE OIL

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

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



BRAKE FLUID

Specification and classification: DOT 4

⚠ WARNING

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

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

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

FRONT FORK OIL

Use fork oil #10 or 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 engine speed limits:

Initial 800 km : Below 6 000 r/min

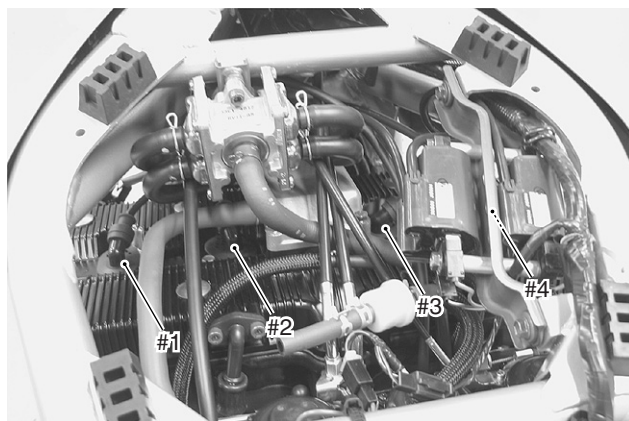
Up to 1 600 km : Below 9 000 r/min

Over 1 600 km : Below 12 000 r/min

- Upon reaching an odometer reading of 1 600 km you can subject the motorcycle to full throttle operation. However, do not exceed 12 000 r/min at any time.

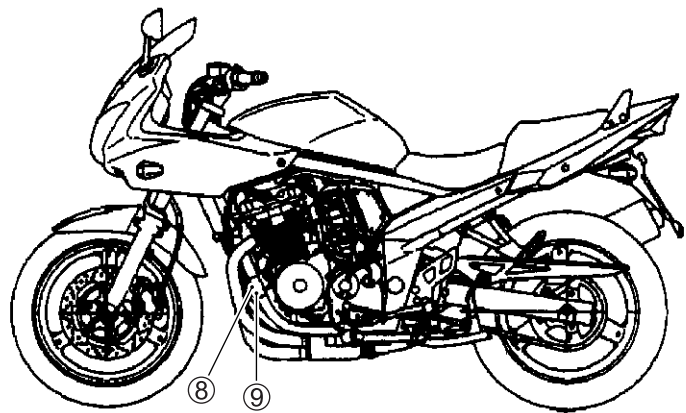
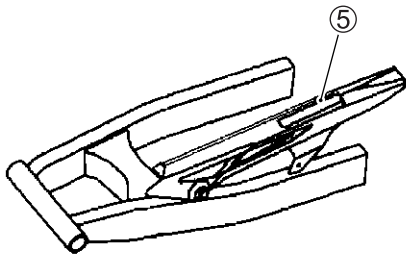
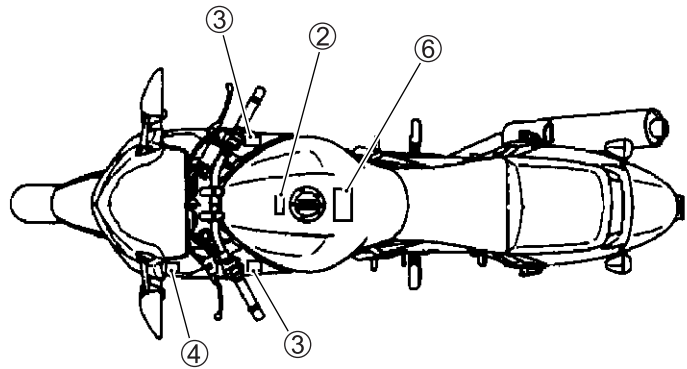
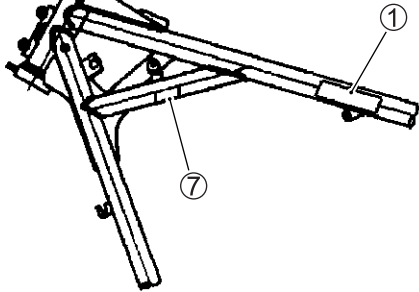
CYLINDER IDENTIFICATION

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



INFORMATION LABELS

No.	Label name	GSF650	GSF650A	GSF650U	GSF650UA	GSF650S	GSF600SA	GSF650SU	GSF650SUA
①	Information label	<input type="radio"/> E-28				<input type="radio"/> E-28			
②	Fuel caution label	<input type="radio"/> E-02	<input type="radio"/> E-02			<input type="radio"/> E-02	<input type="radio"/> E-02		
③	Screen label					<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
④	Warning steering label					<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
⑤	Tire information label	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
⑥	General warning label	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
⑦	ICES Canada label	<input type="radio"/> E-28				<input type="radio"/> E-28			
⑧	I.D. plate	<input type="radio"/> Except E-28	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/> Except E-28	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
⑨	Safety plate	<input type="radio"/> E-28				<input type="radio"/> E-28			



SPECIFICATIONS

DIMENSIONS AND DRY MASS

Overall length.....	2 110 mm
Overall width	770 mm
Overall height.....	1 085/1 095 mmLow/HighGSF650
	1 225 mmGSF650S
Wheelbase.....	1 440 mm
Ground clearance	130 mm
Seat height.....	770/790 mmLow/High
Dry mass.....	201 kg.....GSF650
	204 kg.....GSF650S

ENGINE

Type.....	Four-stroke, air-cooled, DOHC
Number of cylinders	4
Bore	65.5 mm
Stroke.....	48.7 mm
Displacement.....	656 cm ³
Compression ratio.....	10.5 : 1
Carburetor.....	KEIHIN CVR32
Air cleaner.....	Non-woven fabric element
Starter system.....	Electric
Lubrication system	Wet sump
Idle speed	1 200 ± 100 r/min

DRIVE TRAIN

Clutch.....	Wet multi-plate type
Transmission.....	6-speed constant mesh
Gearshift pattern	1-down, 5-up
Primary reduction ratio.....	1.744 (75/43)
Gear ratios, Low	3.083 (37/12)
2nd.....	2.062 (33/16)
3rd	1.647 (28/17)
4th.....	1.400 (28/20)
5th.....	1.227 (27/22)
Top	1.095 (23/21)
Final reduction ratio	3.133 (47/15)
Drive chain.....	RKFS50SMOZ1, 112 links

CHASSIS

Front suspension.....	Telescopic, coil spring, oil damped
Rear suspension	Link type, coil spring, oil damped
Front suspension stroke.....	130 mm
Rear wheel travel	126 mm
Caster.....	26°
Trail	108 mm
Steering angle	35° (right & left)
Turning radius	2.8 m
Front brake	Disc brake, twin
Rear brake	Disc brake
Front tire size	120/70ZR17M/C (58W), tubeless
Rear tire size	160/60ZR17M/C (69W), tubeless

ELECTRICAL

Ignition type.....	Electronic ignition (Transistorized)
Ignition timing.....	10° B.T.D.C. at 1 200 r/min
Spark plug	NGK CR8EK or DENSO U24ETR
Battery.....	12 V 28.8 kC (8 Ah)/10 HR
Generator	Three-phase A.C. generator
Main fuse.....	30 A
Fuse	10/15/15/10/10 A
Headlight.....	12 V 60/55 W H4 GSF650
	12 V 55 W H7: Upper and Lower beam..... GSF650S
Parking or city light.....	12 V 5 W..... GSF650
	12 V 5 W × 2..... GSF650S
Turn signal light.....	12 V 21 W
Brake light/Taillight.....	12 V 21/5 W
Speedometer light	LED
Tachometer light	LED
Neutral indicator light	LED
High beam indicator light.....	LED
Turn signal indicator light	LED
Oil pressure indicator light.....	LED

CAPACITIES

Fuel tank, including reserve.....	20.0 L
reserve	4.5 L
Engine oil, oil change	3 300 ml
with filter change.....	3 500 ml
overhaul	4 600 ml

These specifications are subject to change without notice.

PERIODIC MAINTENANCE

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PERIODIC MAINTENANCE SCHEDULE

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

NOTE:

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

PERIODIC MAINTENANCE CHART

Item	Interval	1 000	6 000	12 000	18 000	24 000
	km months	2	12	24	36	48
Air cleaner element		–	I	I	R	I
Exhaust pipe bolts and muffler bolts		T	–	T	–	T
Valve clearance		I	–	I	–	I
Spark plugs		–	I	R	I	R
Fuel line		–	I	I	I	I
Fuel filter		–	I	R	I	R
Engine oil		R	R	R	R	R
Engine oil filter		R	–	–	R	–
Idle speed		I	I	I	I	I
Throttle cable play		I	I	I	I	I
Throttle valve synchronization		–	–	I	–	I
PAIR (air supply) system		–	–	I	–	I
Clutch cable play		–	I	I	I	I
Drive chain		I	I	I	I	I
		Clean and lubricate every 1 000 km.				
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
Chassis bolts and nuts		T	T	T	T	T

NOTE:

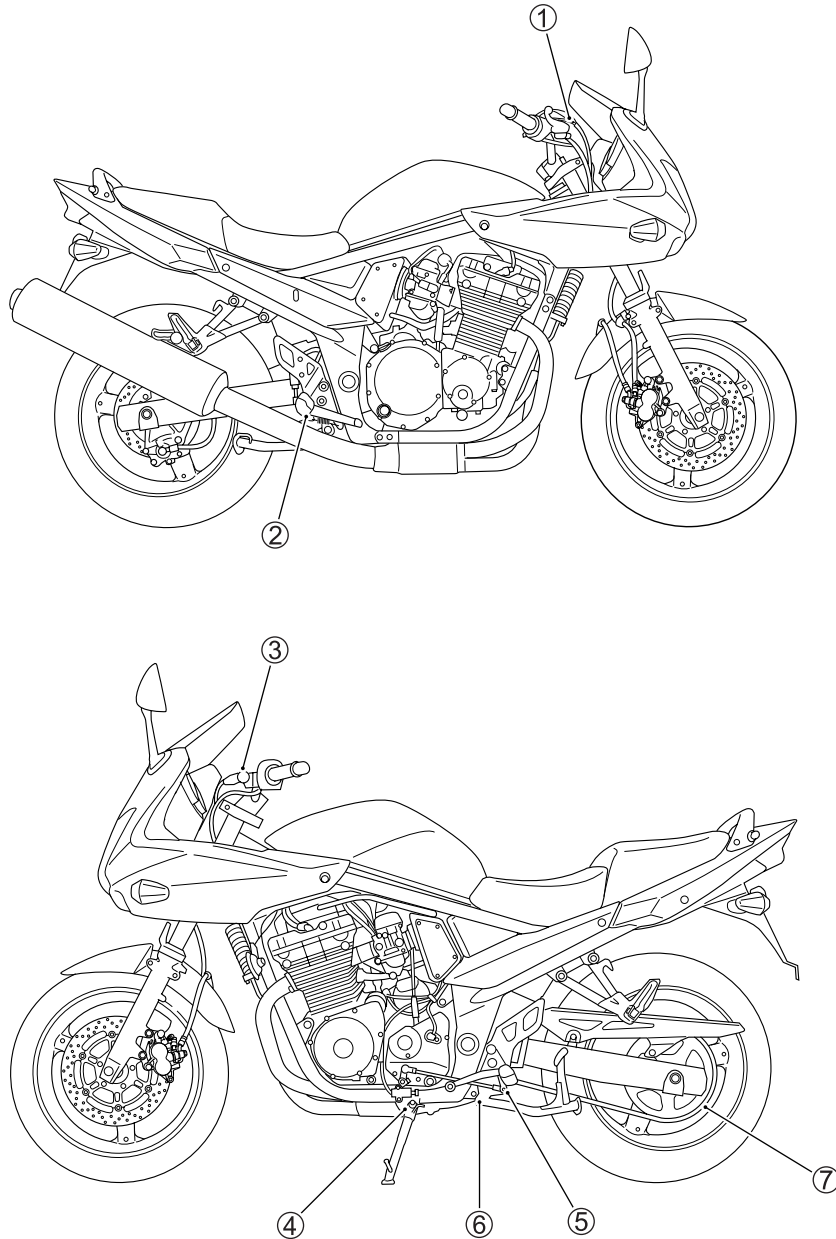
I = Inspect and clean, adjust, replace or lubricate as necessary

R = Replace

T = Tighten

LUBRICATION POINTS

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



- | | |
|--|---|
| ① Brake lever holder and throttle cables | ⑤ Gearshift pivot and left footrest pivot |
| ② Brake pedal pivot and right footrest pivot | ⑥ Center stand pivot and spring hook |
| ③ Clutch lever holder and clutch cable | ⑦ Drive chain |
| ④ Side-stand pivot and spring hook | |

NOTE:

* Before lubricating each part, clean off any rusty spots and wipe off any grease, oil, dirt or grime.

* Lubricate exposed parts which are subject to rust, with a rust preventative spray whenever the motorcycle has been operated under wet or rainy conditions.

MAINTENANCE AND TUNE-UP PROCEDURES

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

VALVE CLEARANCE

Inspect initially at 1 000 km (1 month) and every 12 000 km (24 months).

- Remove the fuel tank. (☞ 4-3)
- Remove the frame head covers. (GSF650 ☞ 5-5)
- Remove the cowling. (GSF650S ☞ 5-5)
- Remove the PAIR valve. (☞ 3-97)
- Remove all the spark plugs.
- Remove the cylinder head cover and signal generator cover. (☞ 3-12 and -13)

The valve clearance specification is different for both intake and exhaust valves.

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

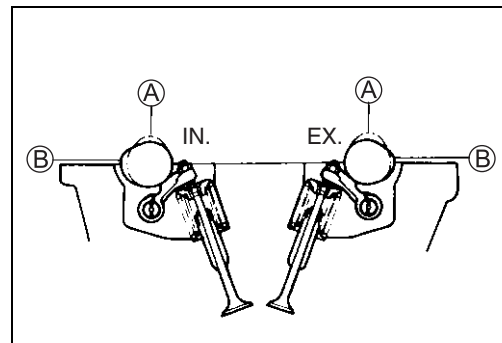
DATA Valve clearance (when cold):

IN.: 0.10 – 0.15 mm

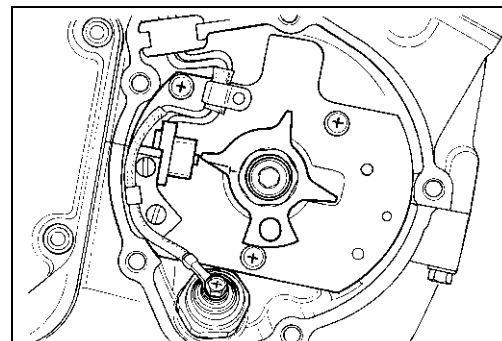
EX.: 0.18 – 0.23 mm

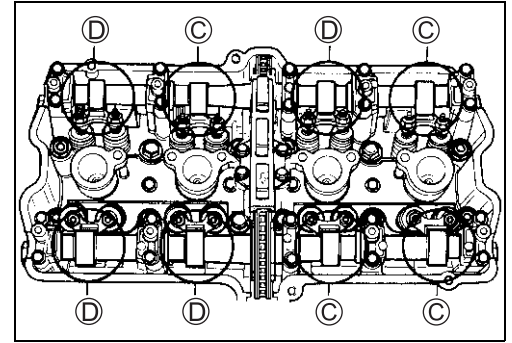
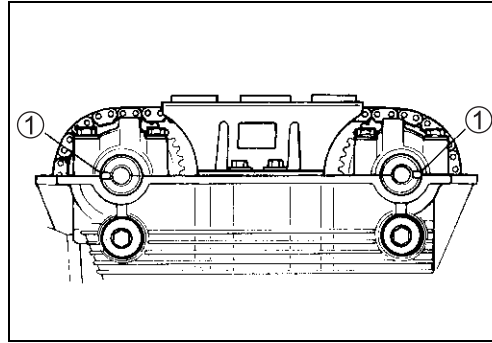
NOTE:

- * The camshafts must be at positions **(A)** or **(B)**, in order to check or adjust the valve clearance. Clearance readings should not be taken with the camshafts in any other position than the ones shown.
- * The valve clearance should only be checked when the engine is cold.
- * Turn the crankshaft clockwise using a 19-mm wrench. Make sure that all of the spark plugs have been removed.



- Turn the crankshaft clockwise and align the “T” mark on the signal generator rotor with the center of the pickup coil. Also, position the notches ① on the right end of each camshaft as shown. Then, measure the following valve clearance **(C)**:
 - Cylinder #1: Intake and exhaust valve clearance
 - Cylinder #2: Exhaust valve clearance
 - Cylinder #3: Intake valve clearance



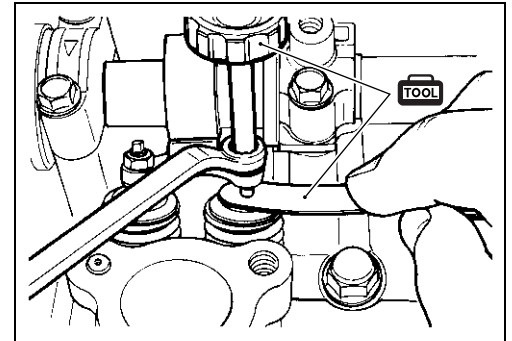


- Insert the thickness gauge between the valve stem end and adjusting screw on the rocker arm. If the clearance is out of specification, hold the locknut with a wrench and use the special tool to adjust the clearance.

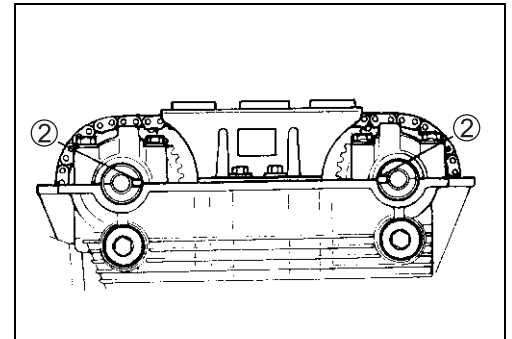
TOOL 09900-20803: Thickness gauge
09917-14910: Valve adjuster driver

CAUTION

Both the right and left valve clearances should be as closely as possible.



- Turn the crankshaft clockwise 360° (one full rotation) and align the “T” mark on the signal generator rotor with the center of the pickup coil. Also, position the notches ② on the right end of each camshaft as shown.



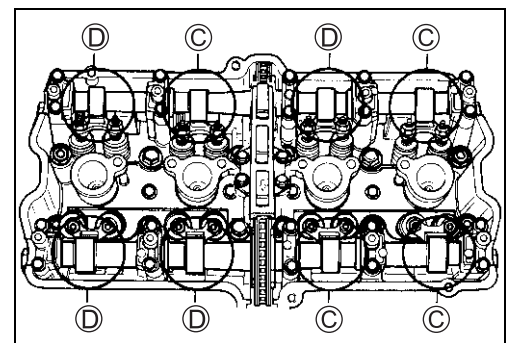
- Measure the valve clearances of the remaining valves ① and adjust them if necessary.

Camshaft position	Notch ① position	
	Intake camshaft	Exhaust camshaft
Ⓒ	Ⓔ	Ⓒ
Ⓓ	Ⓒ	Ⓔ

- When installing the cylinder head cover, apply the recommended bond to the cylinder head cover groove and camshaft end caps. (⚙️ 3-83)

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

- Tighten the cylinder head cover bolts to the specified torque. (⚙️ 3-84, 7-33)
- Install the signal generator cover.



SPARK PLUGS

Inspect every 6 000 km (6 months) and replace every 12 000 km (24 months).

- Remove all of the spark plugs.

NOTE:

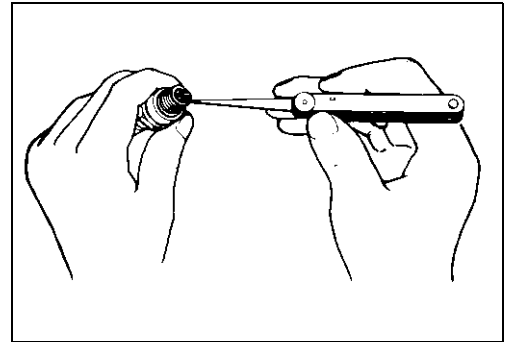
If it is difficult to remove any of the spark plug caps, pry them up using a screwdriver.

TOOL 09930-10121: Spark plug wrench set
09900-20803: Thickness gauge

	Standard	Cold type
NGK	CR8EK	CR9EK
DENSO	U24ETR	U27ETR

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.

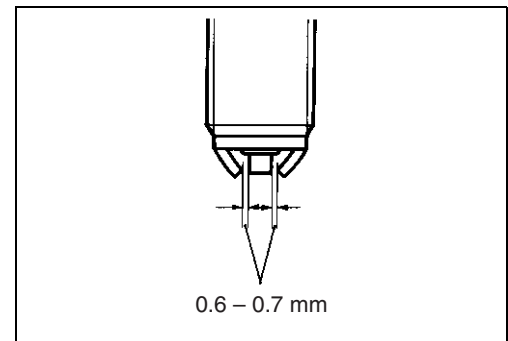


SPARK PLUG GAP

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

DATA Spark plug gap: 0.6 – 0.7 mm

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 threads, 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 INSTALLATION

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.

- Insert 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)**

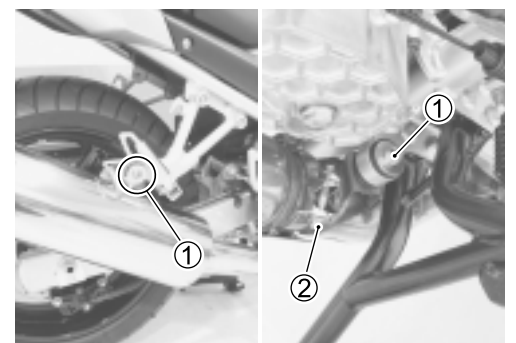
EXHAUST PIPE BOLTS AND MUFFLER BOLTS

Tighten initially at 1 000 km (1 month) and every 12 000 km (24 months) thereafter.

- Tighten the exhaust pipe bolts and muffler bolts to the specified torque.

 **Exhaust pipe bolt: 23 N·m (2.3 kgf·m)**

 **Muffler mounting bolt ①: 23 N·m (2.3 kgf·m)**
Muffler connecting bolt ②: 23 N·m (2.3 kgf·m)



AIR CLEANER

Inspect every 6 000 km (12 months) and replace every 18 000 km (36 months).

- Remove the fuel tank. (☞ 4-3)
- Remove the screws.
- Remove the air cleaner element ①.
- Carefully use compressed air to clean the air cleaner element.

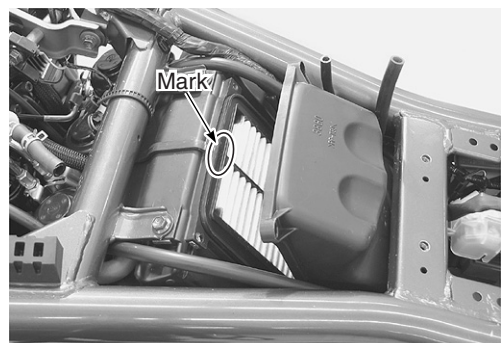
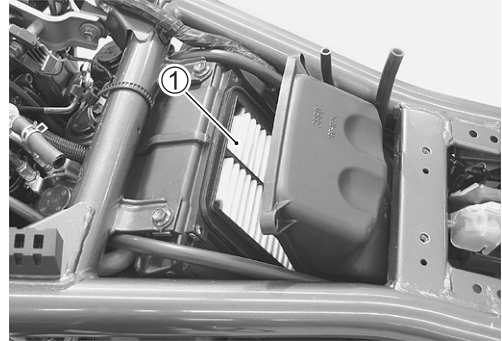
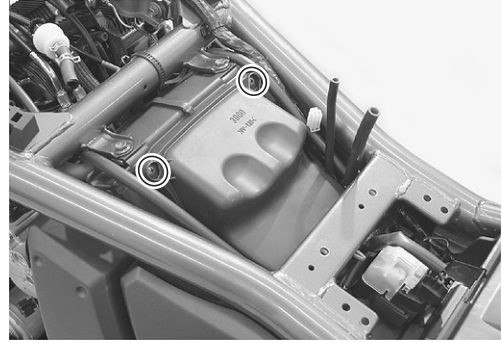
CAUTION

Always apply compressed air to the inside of the air cleaner element. If compressed air is applied to the outside, dirt will be forced into the pores of the air cleaner element, restricting air flow through the air cleaner element.

- Reinstall the cleaned or new air cleaner element in the reverse order of removal.
- When installing the air cleaner element into the air cleaner box, make sure that the mark points up.

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. Life of the engine depends largely on this component.



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



ENGINE OIL AND OIL FILTER

(ENGINE OIL)

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

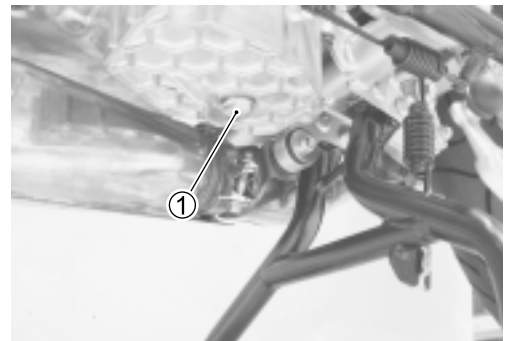
(OIL FILTER)

Replace initially at 1 000 km (2 month) and every 12 000 km (24 months) thereafter.


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

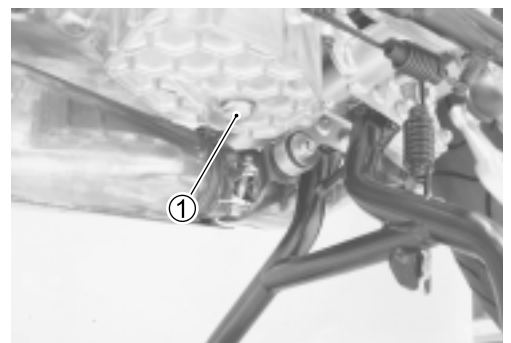
ENGINE OIL REPLACEMENT

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

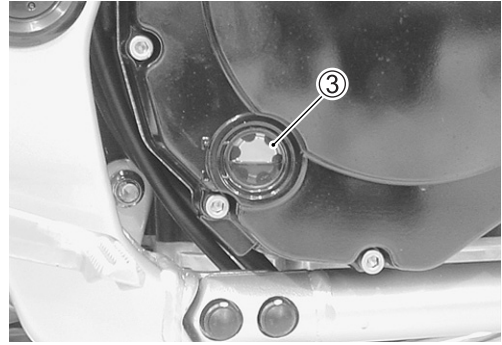


- Tighten the oil drain plug ① to the specified torque, and pour new oil through the oil filler. When performing an oil change (without oil filter replacement), the engine will hold about 3.3 L of oil. Use SF/SG or SH/SJ with JASO MA in API (American Petroleum Institute) classification.

 Oil drain plug: 23 N·m (2.3 kgf·m)

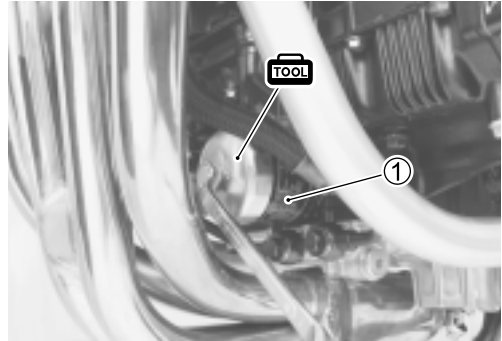


- Start up the engine and allow it to run for several minutes at idling speed.
- Turn off the engine and wait about three minutes, then check the oil level through the inspection window ③. If the level is below the “L” mark, add oil to the “F” mark. If the level is above the “F” mark, drain the oil until the level reaches the “F” mark.



OIL FILTER REPLACEMENT

- Drain engine oil as described in the engine oil replacement procedure.
- Remove the oil filter ① using the special tool.
- Apply engine oil lightly to the O-ring of new oil filter, before installation.

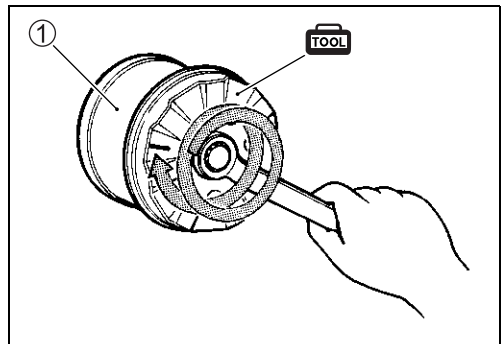


TOOL 09915-40610: Oil filter wrench

- Install the new oil filter. Turn it by hand until you feel that the oil filter O-ring has contacted the oil filter mounting surface. Then, tighten the oil filter two full turns using the special tool.

NOTE:

- * Before installing the oil filter, apply a light coat of engine oil onto its O-ring.
- * To properly tighten the oil filter, use the special tool. Never tighten the oil filter by hand only.
- Add new engine oil and check the oil level as described in the engine oil replacement procedure.



DATA NECESSARY AMOUNT OF ENGINE OIL

Oil change: 3.3 L

Oil and filter change: 3.5 L

Engine overhaul: 4.6 L

CAUTION

ONLY USE A GENUINE SUZUKI MOTORCYCLE OIL FILTER.

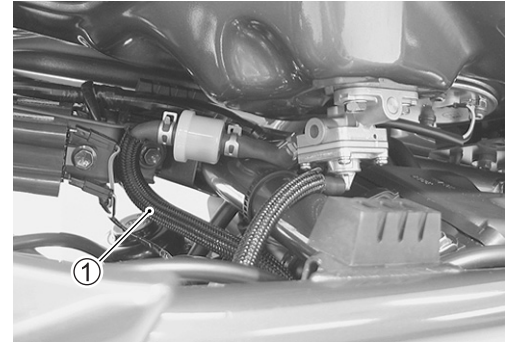
Other manufacturer's oil filters may differ in thread specifications (thread diameter and pitch), filtering performance and durability which may lead to engine damage or oil leaks. Also, do not use a genuine Suzuki automobile oil filter on this motorcycle.

FUEL LINE

Inspect every 6 000 km (12 months).

- Remove the seat.
- Remove the fuel tank mounting bolts. (☞ 4-3)
- Lift up the fuel tank.

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



ENGINE IDLE SPEED

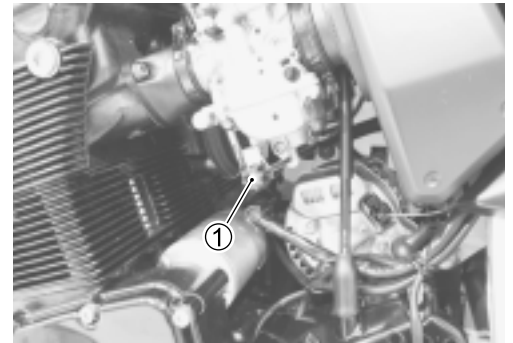
Inspect initially at 1 000 km (2 month) and every 6 000 km (12 months) thereafter.

NOTE:

Make this adjustment when the engine is hot.

- Start the engine, turn the throttle stop screw ① and set the engine idle speed between 1 100 and 1 300 r/min.

DATA Engine idle speed: 1 200 ± 100 r/min



THROTTLE CABLE PLAY

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

Adjust the throttle cable play ① as follows.

- Loosen the locknut ① of the throttle pulling cable ②.
- Turn the adjuster ③ in or out until the throttle cable play (at the throttle grip) ① is between 2 – 4 mm.
- Tighten the locknut ① while holding the adjuster ③.

DATA Throttle cable play ①: 2 – 4 mm

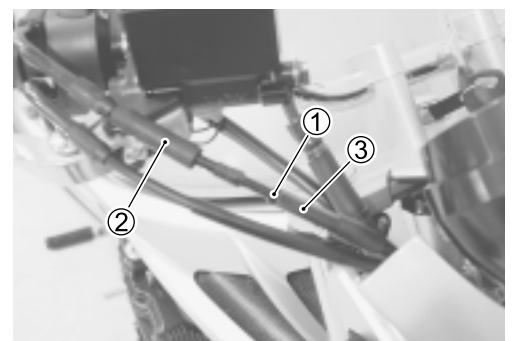
⚠ WARNING

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

NOTE:

Major adjustment can be made at the carburetor side adjusters.

(☞ 4-24)



CARBURETOR SYNCHRONIZATION

Inspect initially at 1 000 km (2 month) and every 12 000 km (24 months).

(☞ 4-25)

PAIR (AIR SUPPLY) SYSTEM

Inspect every 12 000 km (24 months).

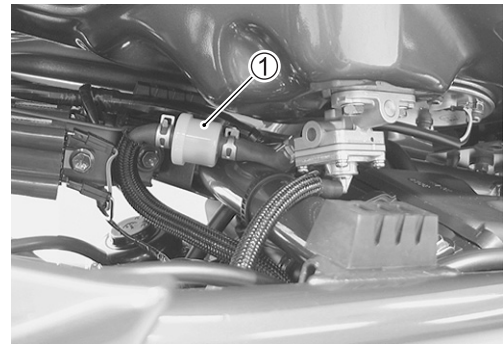
(☞ 3-97)

FUEL FILTER

Inspect every 6 000 km (12 months) and replace every 12 000 km (24 months).

- Lift up the fuel tank. (☞ 2-10)

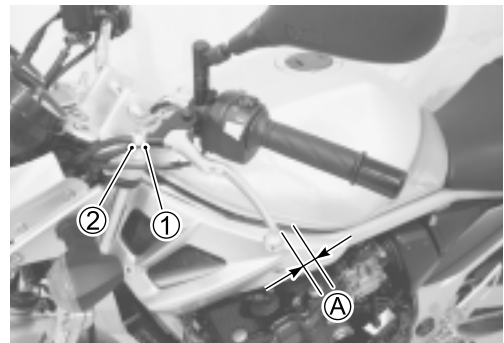
Check the fuel filter ① for evidence of dirt and contamination. If present, replace the fuel filter with a new one. (☞ 4-6)



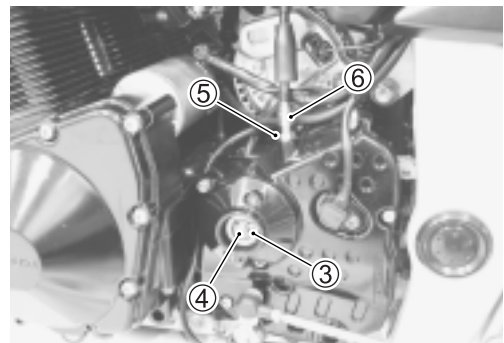
CLUTCH CABLE PLAY

Inspect every 6 000 km (12 months).

- Loosen the locknut ① and turn the adjuster ② all the way into the clutch lever assembly.



- Remove the clutch release cover.
- Loosen the locknut ③, and turn out the adjusting screw ④ two or three rotations.
- Then, slowly turn in the adjusting screw ④ until resistance is felt.
- Then, turn out the adjusting screw ④ 1/4 of a turn, and tighten the locknut ③.
- Loosen the locknut ⑤, and turn the cable adjuster ⑥ to obtain 10 – 15 mm of free play A at the clutch lever end.
- Tighten the locknut ⑤.



DATA Clutch cable play A: 10 – 15 mm

DRIVE CHAIN

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

With the transmission in neutral, support the motorcycle using the center-stand and turn the rear wheel slowly by hand. Visually check the drive chain for the possible defects listed below.

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

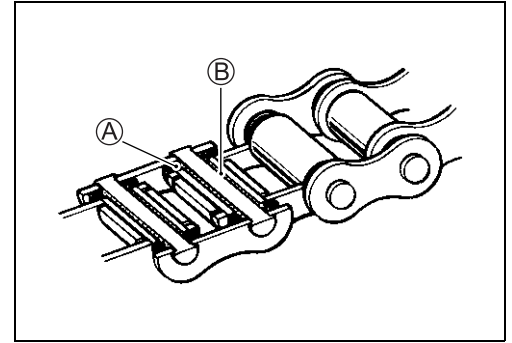
Ⓐ O-ring

Ⓑ Grease

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

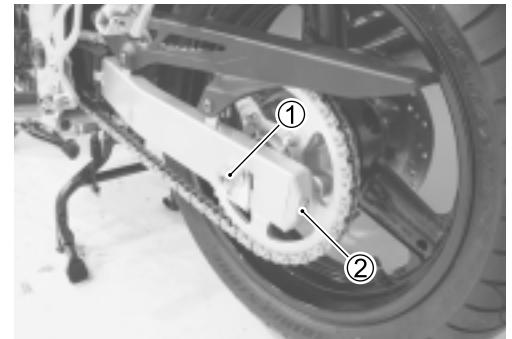
NOTE:

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



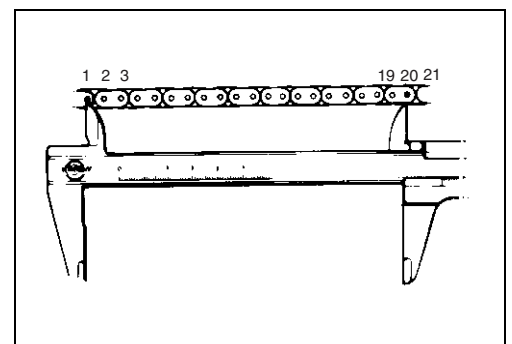
CHECKING

- Remove the cotter pin. (E-28)
- Loosen the axle nut ①.
- Tense the drive chain fully by turning both chain adjuster bolts ②.



- 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 mm

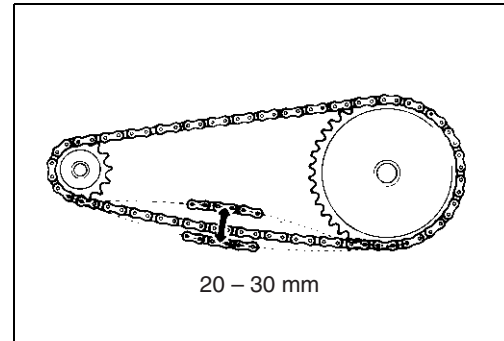
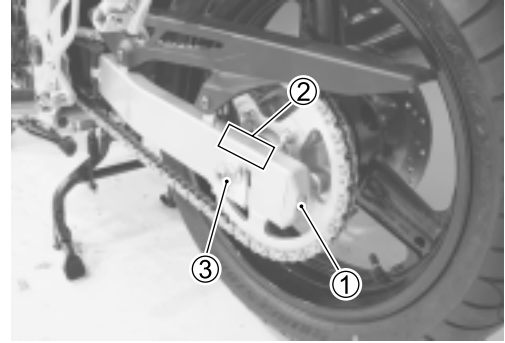


ADJUSTING

- Loosen or tighten both chain adjuster bolts ① until there is 20 – 30 mm of slack at the middle of the chain between the engine and rear sprockets as shown. The reference marks ② 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.
- Place the motorcycle on its side-stand for accurate adjustment.
- After adjusting the drive chain, tighten the axle nut ③ to the specified torque.
- Tighten both chain adjuster bolts ① securely.

🔧 Rear axle nut: 100 N·m (10.0 kgf·m)

- Replace the cotter pin with a new one. (E-28)

**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.

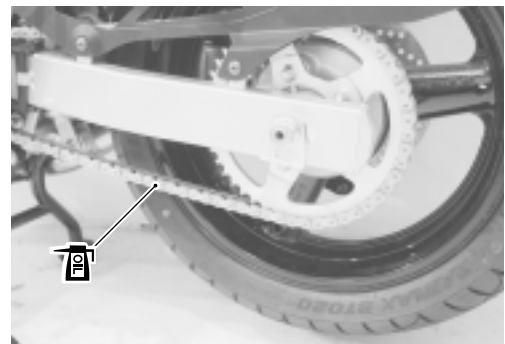
These fluids have too great a dissolving power for this chain and they can damage the O-rings. Use only kerosine to clean the drive chain.

- After cleaning 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 RKFS50SMOZ1. SUZUKI recommends to use this standard drive chain as a replacement.**

**DRIVE CHAIN CUTTING AND RECONNECTING (👉 5-70)**

BRAKES

(BRAKE)

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

(BRAKE HOSE AND BRAKE FLUID)

Inspect every 6 000 km (12 months).

Replace hoses every 4 years. Replace fluid every 2 years.

BRAKE FLUID LEVEL

- Keep the motorcycle upright and place the handlebar straight.
- Check the brake fluid level by observing the lower limit line on the front and rear brake fluid reservoirs.
- When the brake fluid 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 oil leakage before riding.

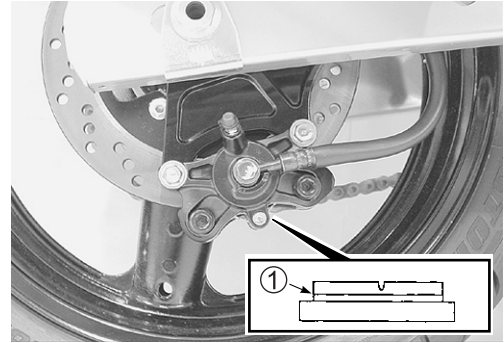
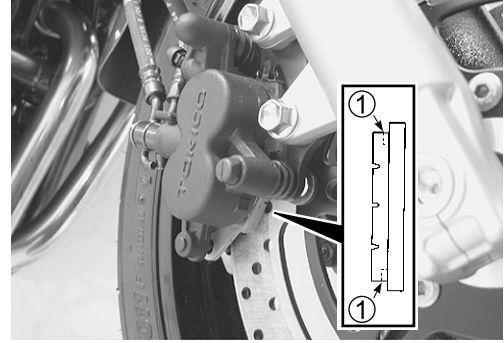


BRAKE PADS

The extent of brake pad wear can be checked by observing the grooved limit line ① on the pad. When the wear exceeds the grooved limit line, replace the pads with new ones. (👉 5-47)

CAUTION

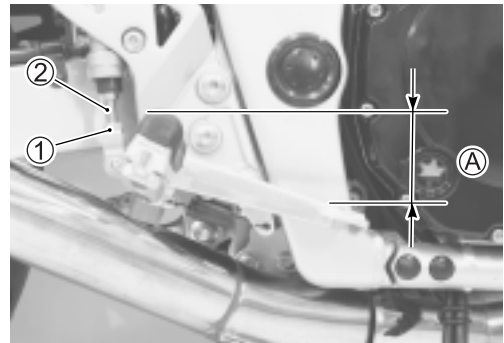
Replace the brake pads as a set, otherwise braking performance will be adversely affected.

**BRAKE PEDAL HEIGHT**

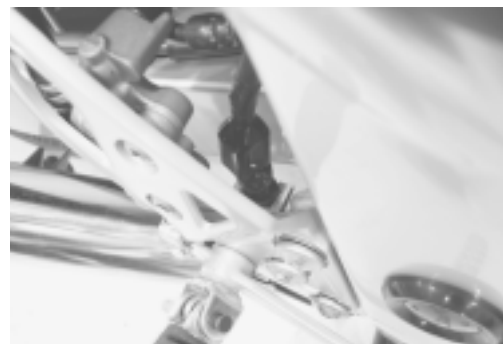
- Loosen the locknut ①.
- Turn the push rod ② until the brake pedal is 60 mm ④ below the top of the footrest.
- Tighten the locknut ① securely.

DATA Brake pedal height ④
Standard: 60 mm

🔧 Master cylinder push rod locknut: 18 N·m (1.8 kgf·m)

**BRAKE LIGHT SWITCH**

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



AIR BLEEDING 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. Place the reservoir cap to prevent dirt from entering.
- Attach a hose to the air bleeder valve, and insert the free end of the hose into a receptacle.
- Squeeze and release the brake lever several times in rapid succession and squeeze the lever fully without releasing it. Loosen the air bleeder valve by turning it a quarter of a turn so that the brake fluid runs into the receptacle, this will remove the tension of the brake lever causing it to touch the handle-bar grip. Then, close the air bleeder 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.

NOTE:

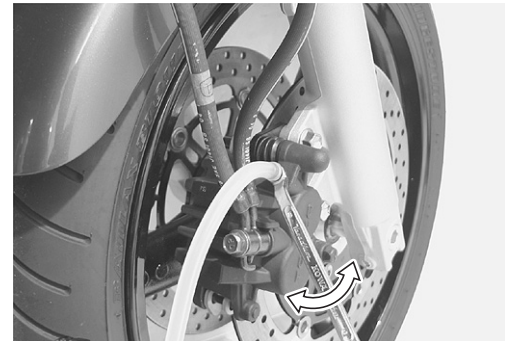
While bleeding the brake system, replenish the brake fluid in the reservoir as necessary. Make sure that there is always some fluid visible in the reservoir.

- 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)**

CAUTION

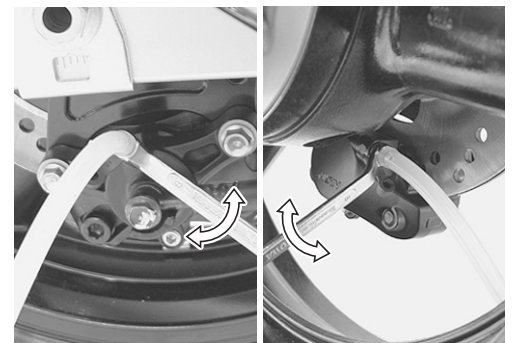
Handle brake fluid with care: the fluid reacts chemically with paint, plastics, rubber materials, etc.



Rear brake

NOTE:

Rear brake caliper has two bleeder valves.



TIRES

Inspect every 6 000 km (12 months).

TIRE TREAD CONDITION

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

TOOL 09900-20805: Tire depth gauge

DATA Tire tread depth

Service limit: **FRONT** 1.6 mm
REAR 2.0 mm

TIRE PRESSURE

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

COLD INFLATION TIRE PRESSURE	SOLD RIDING		DUAL RIDING	
	kPa	kgf/cm ²	kPa	kgf/cm ²
FRONT	250	2.50	250	2.50
REAR	250	2.50	250	2.50

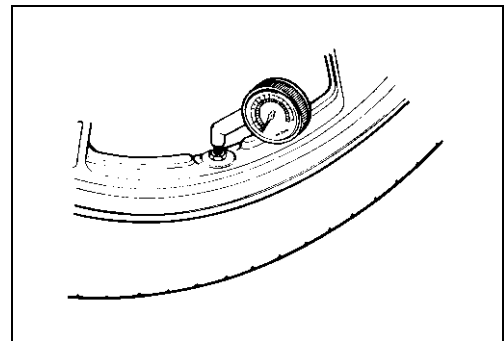
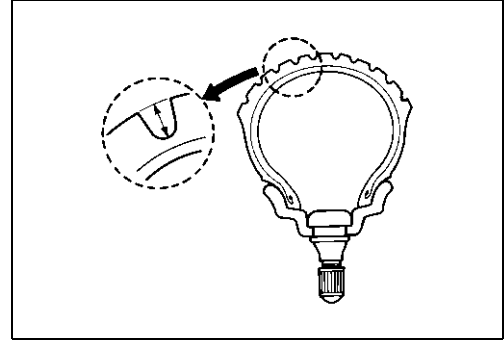
CAUTION

The standard tire fitted on this motorcycle is a 120/70ZR17 M/C (58W) for the front (GSF650: BRIDGESTONE BT011F L, GSF650S: BRIDGESTONE BT011F J) and a 160/60ZR17 M/C (69W) for the rear (GSF650, GSF650S: BRIDGESTONE BT020R L). The use of tires other than those specified may cause instability. It is highly recommended to use the specified tires.

STEERING

Inspect initially at 1 000 km (2 month) and every 12 000 km (24 months) thereafter.

The steering should be adjusted properly for smooth turning of the handlebars and safe operation. Overtighten steering prevents smooth turning of the handlebars and too loose steering will cause poor stability. Check that there is no play in the front fork. Support the motorcycle so that the front wheel is off the ground. With the wheel facing straight ahead, grasp the lower fork tubes near the axle and pull forward. If play is found, readjust the steering. (5-28)



FRONT FORKS

Inspect every 12 000 km (24 months).

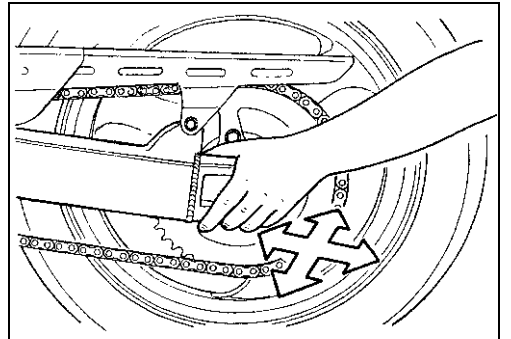
Inspect the front fork for oil leakage, scoring or scratches on the outer surface of the inner tubes. Replace any defective parts, if necessary. (🔧 5-15)



REAR SUSPENSION

Inspect every 12 000 km (24 months).

Inspect the rear shock absorbers for oil leakage and check that there is no play in the swingarm. (🔧 5-38)

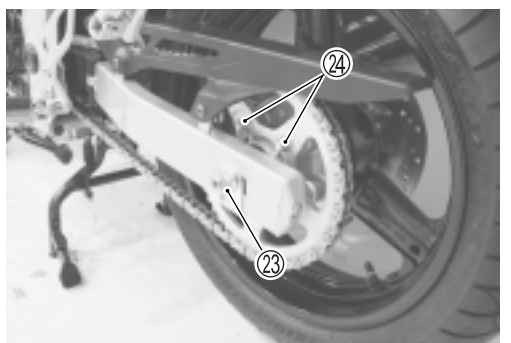
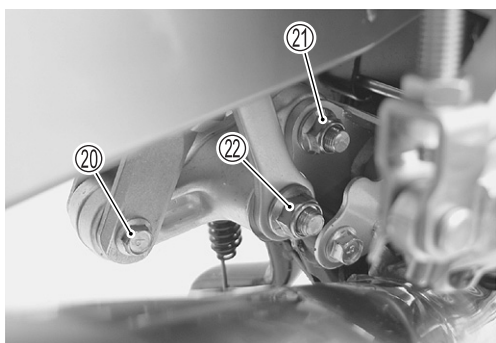
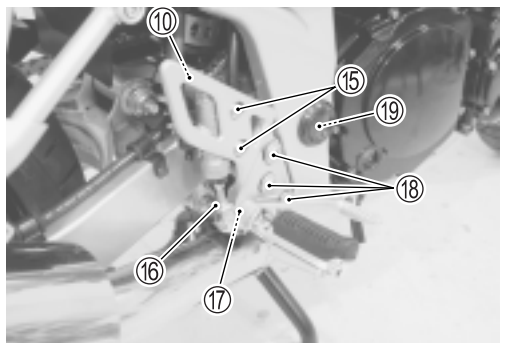
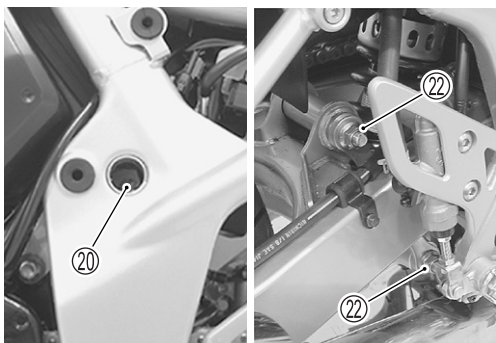
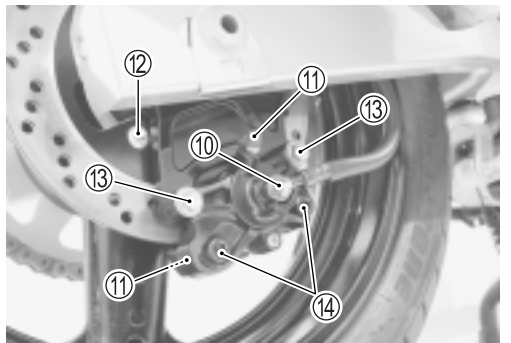
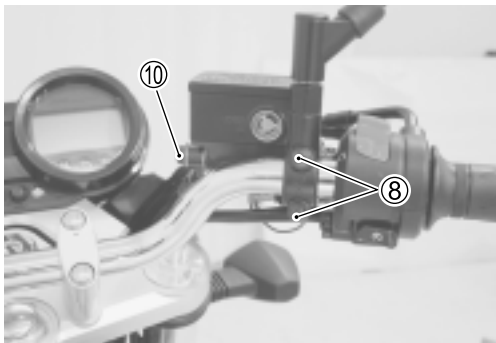
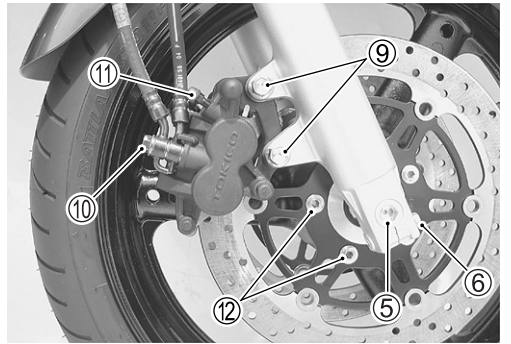
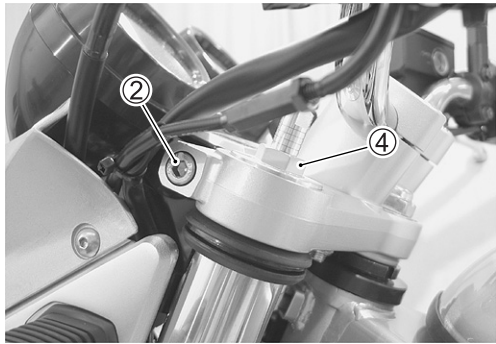
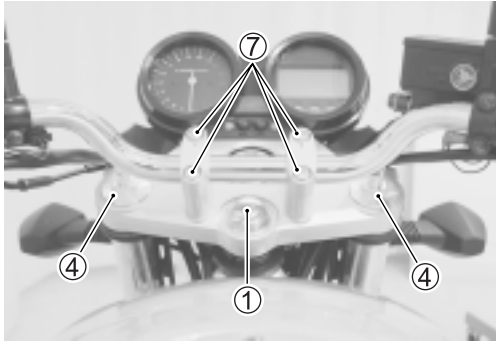


CHASSIS BOLTS AND NUTS

Tighten initially at 1 000 km (2 month) and every 6 000 km (24 months) thereafter.

Check that all chassis bolts and nuts are tightened to their specified torque. (Refer to page 2-21 for the locations of the following nuts and bolts.)

ITEM	N·m	kgf-m
① Steering stem head nut	65	6.5
② Front fork upper clamp bolt	23	2.3
③ Front fork lower clamp bolt	23	2.3
④ Front fork cap bolt	23	2.3
⑤ Front axle	65	6.5
⑥ Front axle pinch bolt	23	2.3
⑦ Handlebar holder bolt	23	2.3
⑧ Front brake master cylinder mounting bolt	10	1.0
⑨ Front brake caliper mounting bolt	39	3.9
⑩ Brake hose union bolt (front & rear)	23	2.3
⑪ Air bleeder valve (front & rear)	8	0.8
⑫ Brake disc bolt (front & rear)	23	2.3
⑬ Rear brake caliper mounting bolt	26	2.6
⑭ Rear brake caliper housing bolt	37	3.7
⑮ Rear brake master cylinder mounting bolt	25	2.5
⑯ Rear brake master cylinder push rod locknut	18	1.8
⑰ Front footrest bolt	35	3.5
⑱ Front footrest bracket bolt	23	2.3
⑲ Swingarm pivot nut	100	10.0
⑳ Rear shock absorber mounting nut (upper & lower)	50	5.0
㉑ Cushion lever mounting nut	78	7.8
㉒ Cushion lever rod mounting nut	78	7.8
㉓ Rear axle nut	100	10.0
㉔ Rear sprocket nut	50	5.0



COMPRESSION PRESSURE CHECK

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

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

COMPRESSION PRESSURE SPECIFICATION

Standard	Limit	Difference
1 000 – 1 500 kPa (10 – 15 kgf/cm ²)	800 kPa (8 kgf/cm ²)	200 kPa (2 kgf/cm ²)

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 800 kPa (8 kgf/cm²).
- * The difference in compression pressure between any two cylinders is more than 200 kPa (2 kgf/cm²).
- * All compression pressure readings are below 1 000 kPa (10 kgf/cm²) even when they measure more than 800 kPa (8 kgf/cm²).

COMPRESSION TEST PROCEDURE

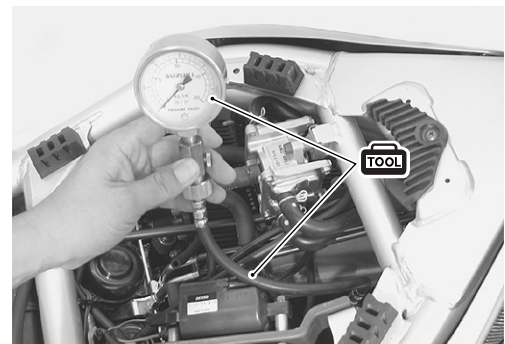
NOTE:

- * 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.

- Remove the fuel tank. (☞ 4-3)
- Remove all of the spark plugs.
- 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**
09915-63310: 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

Above 300 kPa (3 kgf/cm²)
Below 600 kPa (6 kgf/cm²) at 3 000 r/min, oil temp. at 60 °C

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

LOW OIL PRESSURE

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

HIGH OIL PRESSURE


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

OIL PRESSURE TEST PROCEDURE

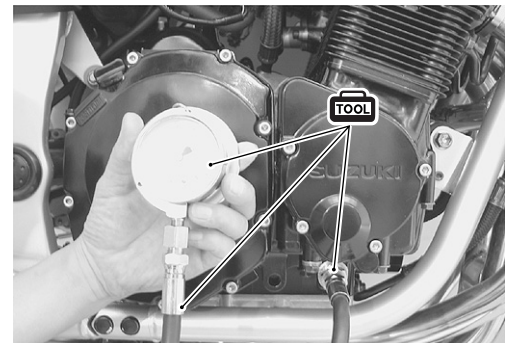
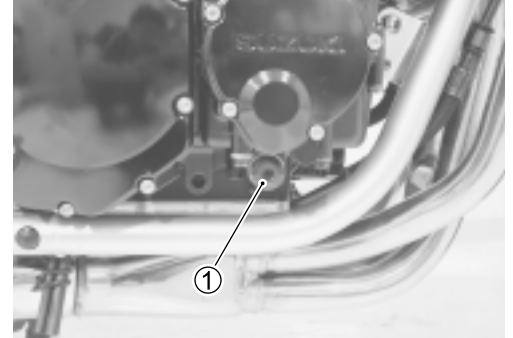
Start the engine and check if the oil pressure indicator light is turned on. If the light stays on, check the oil pressure indicator light circuit. If the circuit is OK, check the oil pressure in the following manner.

- Remove the main oil gallery plug ①.
- Install the oil pressure gauge and adaptor into the main oil gallery.

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

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

 **Main oil gallery plug: 40 N·m (4.0 kgf·m)**



ENGINE

















































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












ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE

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

























ENGINE CENTER

ITEM	REMOVAL	INSPECTION	INSTALLATION
Exhaust pipe/muffler	 3-5	—	 3-8
Oil hoses	 3-12	—	 3-84
Oil filter	 3-12	—	 3-84
Oil cooler	 3-6	 3-90	 3-8
Oil pan	 3-21	 3-87	 3-69
Engine oil pressure regulator	 3-87	 3-87	 3-88
Oil sump filter	 3-87	 3-87	 3-88
Carburetors	 4-15	 4-20	 3-10
Cam chain tensioner adjuster	 3-13	 3-28	 3-82
Cylinder head cover	 3-12	 3-30	 3-83
Camshafts	 3-13	 3-26	 3-79
Cylinder head	 3-14	 3-29	 3-78
Cylinder	 3-14	 3-39	 3-77
Pistons	 3-15	 3-40	 3-76
Starter motor	 3-16	 6-24	 3-75
Generator	 3-16	 6-15	 3-75
PAIR system	 3-12, 97	 3-97	 3-85, 98

ENGINE LEFT SIDE

ITEM	REMOVAL	INSPECTION	INSTALLATION
Gearshift lever	 3-4	—	 3-10
Engine sprocket cover	 3-4	—	 3-9
Engine sprocket/drive chain	 3-4	 2-13	 3-9
Gear position switch	 3-20	 6-27	 3-69
Starter clutch cover	 3-17	—	 3-74
Starter idle gear	 3-19	—	 3-70
Starter clutch	 3-20	 3-45	 3-70

ENGINE RIGHT SIDE

ITEM	REMOVAL	INSPECTION	INSTALLATION
Clutch cover	 3-16	—	 3-73
Signal generator	 3-16	 6-33	 3-74
Oil pressure switch	 3-16, 89	 6-40	 3-74
Clutch plates	 3-17	 3-43	 3-72
Clutch sleeve hub	 3-18	—	 3-72
Oil pump driven gear	 3-19	—	 3-71
Generator/oil pump drive gears	 3-18	—	 3-71
Primary driven gear	 3-18	—	 3-72
Gearshift shaft	 3-19	 3-45	 3-71
Gearshift pawl/cam driven gear	 3-19	—	 3-70

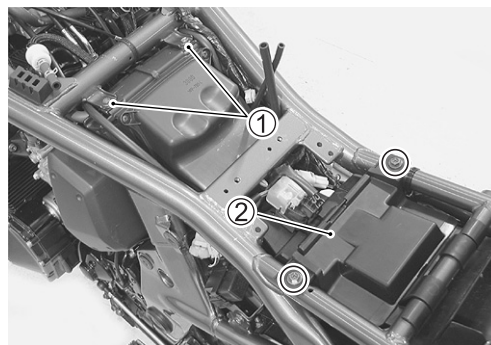
ENGINE REMOVAL AND INSTALLATION

REMOVAL

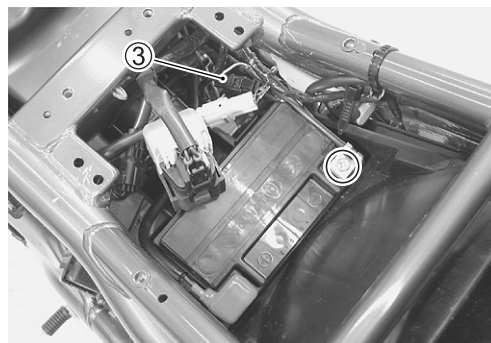
Before taking the engine out of the frame, wash the engine using a steam cleaner. Engine removal is sequentially explained in the following steps.

- Drain engine oil. (☞ 2-9)
- Remove the seat and frame covers. (☞ 5-4)
- Remove the frame head covers. (GSF650: ☞ 5-5)
- Remove the cowling. (GSF650S: ☞ 5-5)
- Remove the fuel tank. (☞ 4-3)

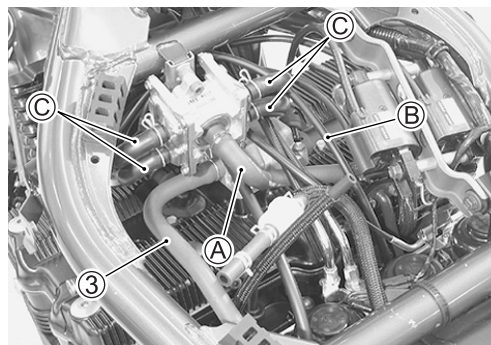
- Remove the air cleaner box mounting bolts ①.
- Remove the luggage box ②. (☞ 5-4)



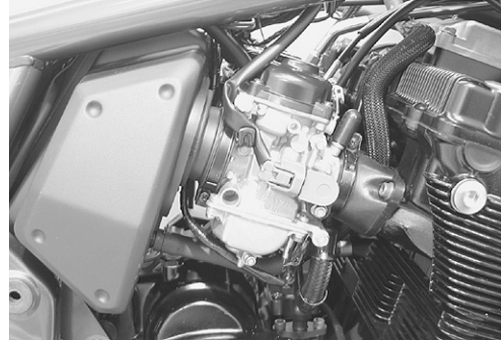
- Disconnect the battery \ominus lead wire.
- Disconnect the engine ground wire coupler ③.



- Disconnect all of the spark plug caps.
- Disconnect the PAIR valve hoses ① to ③.
 - ① Air cleaner hose
 - ② Vacuum hose
 - ③ PAIR hoses
- Disconnect the breather hose ④.

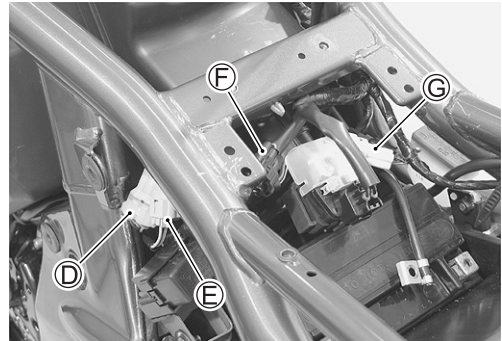


- Remove the carburetor assembly. (➡ 4-15)

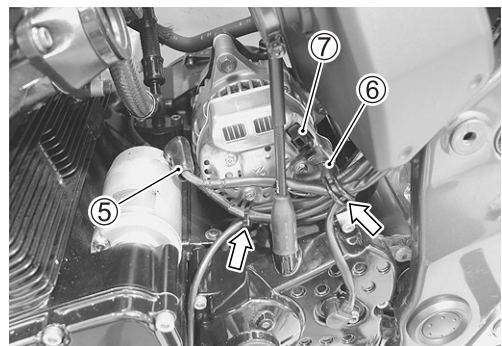


- Disconnect the lead wire couplers ④ to ③.

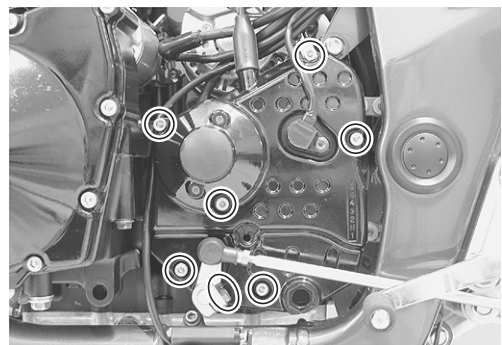
- ④ Signal generator
- ⑤ Side-stand switch
- ⑥ Speed sensor
- ③ Gear position switch



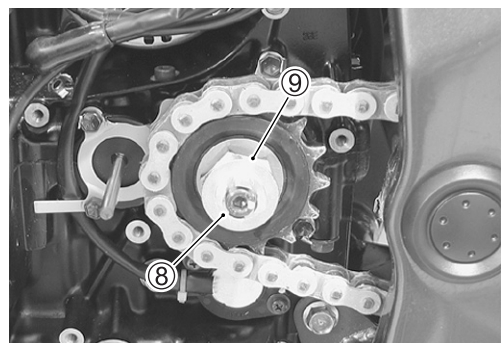
- Open the clamps.
- Disconnect the starter motor lead wire ⑤.
- Disconnect the generator lead wire ⑥ and coupler ⑦.



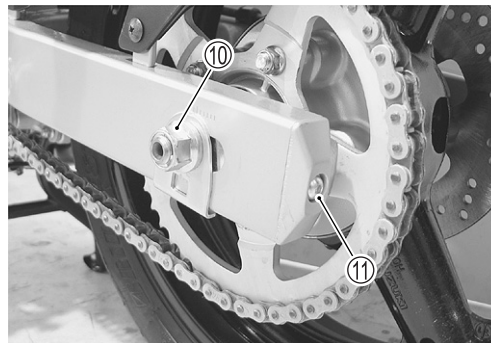
- Disengage the gearshift lever link by removing the bolt.
- Remove the engine sprocket cover along with the clutch cable and speed sensor.



- Remove the speed sensor rotor ⑧ and engine sprocket nut ⑨ while depressing the rear brake pedal.



- Loosen the rear axle nut ⑩ and chain adjusters ⑪ to provide additional chain slack.



- Remove the engine sprocket ⑫.



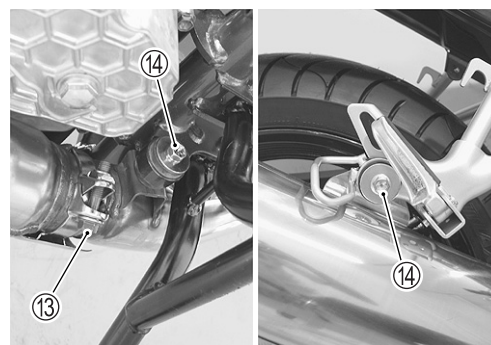
- Remove the exhaust pipe bolts.



- Loosen the muffler connecting bolt ⑬.
- Remove the muffler mounting bolts ⑭.
- Remove the muffler assembly.

NOTE:

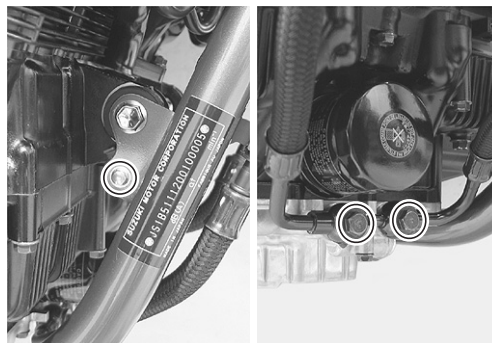
Support the muffler assembly to prevent it from falling.



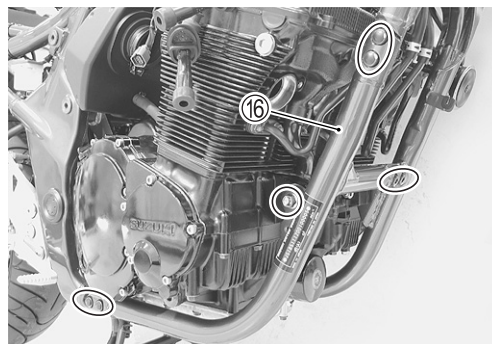
- Remove the exhaust pipe gaskets ⑮.



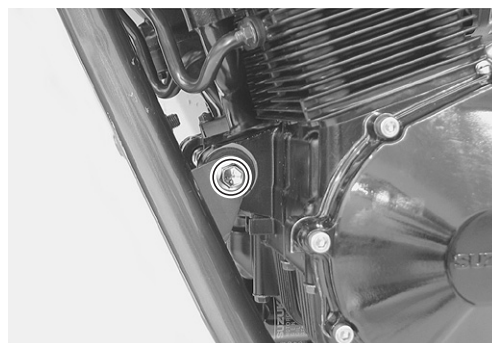
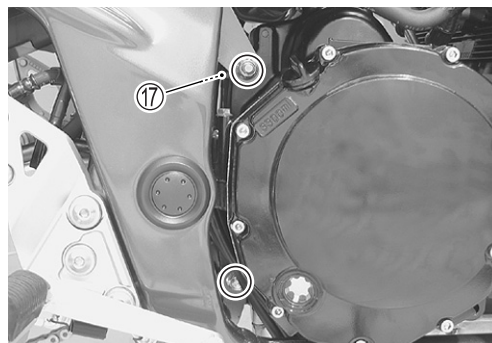
- Remove the oil cooler.



- Support the engine with a proper jack.
- Remove the frame down tube ⑯.



- Remove the engine mounting bolts, nuts and spacer ⑰.
- Gradually lower the engine.



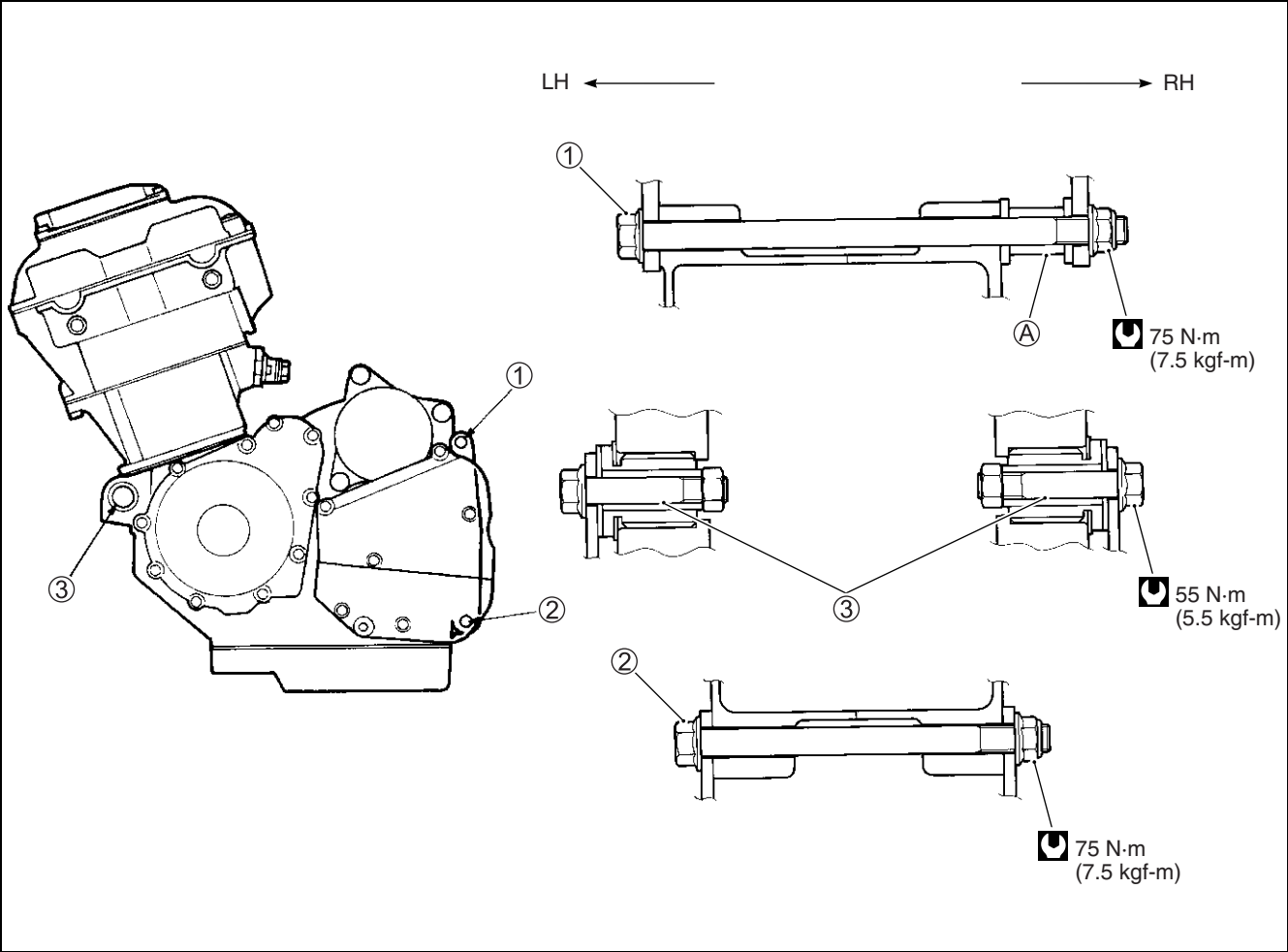
INSTALLATION

Install the engine in the reverse order of engine removal.

- Insert the two long bolts from left side. Install the brackets, spacer, bolts and nuts properly, as shown in the following illustration.

NOTE:

The engine mounting nuts are self-locking. Once the nuts have been removed, they are no longer of any use. Be sure to use new nuts and tighten them to the specified torque.



NOTE:

When reusing the removed engine mounting bolts (1 and 2), apply a small quantity of the **THREAD LOCK** to their threads.

99000-32110: **THREAD LOCK SUPER "1322"**

Frame down tube mounting bolt: 50 N·m (5.0 kgf-m)

LENGTH

Bolt ①	180 mm
Bolt ②	130 mm
Bolt ③	55 mm
Spacer RH ④	27 mm

ITEM	N·m	kgf·m
①, ②	75	7.5
③	55	5.5

- Tighten the oil cooler mounting bolts ① to the specified torque.

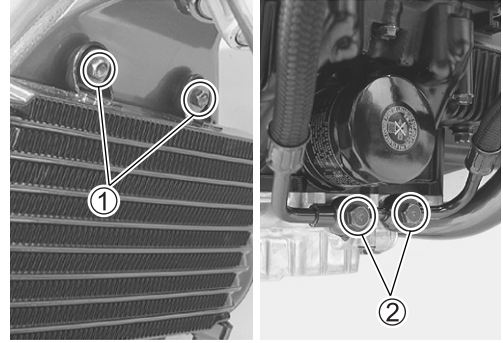
Oil cooler mounting bolt: 10 N·m (1.0 kgf-m)

- Tighten the oil cooler hose union bolts ② to the specified torque.

Oil cooler hose union bolt: 28 N·m (2.8 kgf-m)

CAUTION

Use new gasket washers to prevent oil leakage.



NOTE:

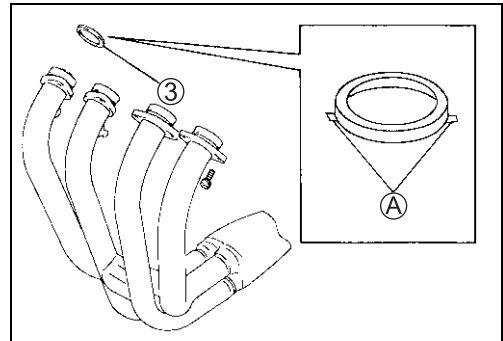
When installing new exhaust pipe/muffler assembly connectors, remove all of the old sealer from the exhaust pipes and from inside the muffler. Apply the exhaust gas sealer to both the inside and outside of the new exhaust pipe/muffler assembly connectors.

EXHAUST GAS SEALER: PREMATEX 1372

- Install the exhaust pipe gaskets ③.

CAUTION

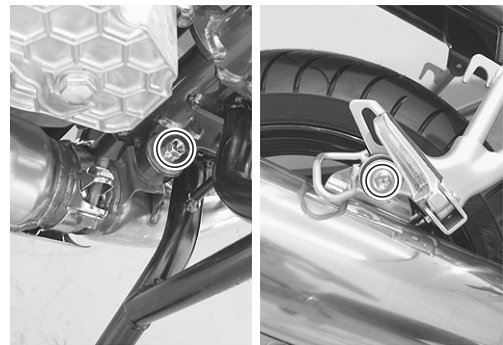
Be sure to face the tabs **A** on the exhaust pipe gaskets ③ to the engine side when installing them.



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

Exhaust pipe bolt: 23 N·m (2.3 kgf-m)

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



- Apply THREAD LOCK SUPER to the driveshaft.

 **99000-32030: THREAD LOCK SUPER “1303”**

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

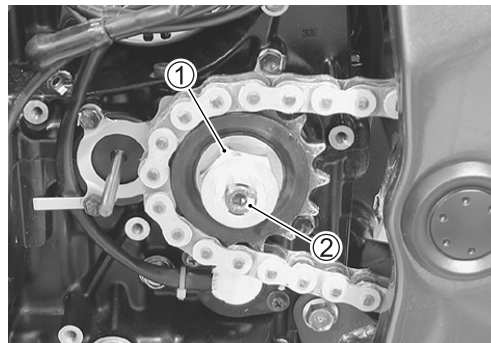
 **Engine sprocket nut ①: 115 N·m (11.5 kgf-m)**

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

 **99000-32050: THREAD LOCK “1342”**

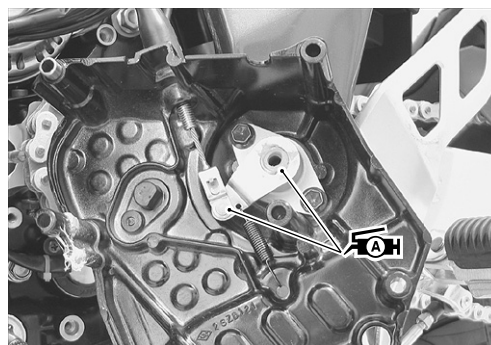
- Tighten the speed sensor rotor bolt ② to the specified torque.

 **Speed sensor rotor bolt ②: 20 N·m (2.0 kgf-m)**

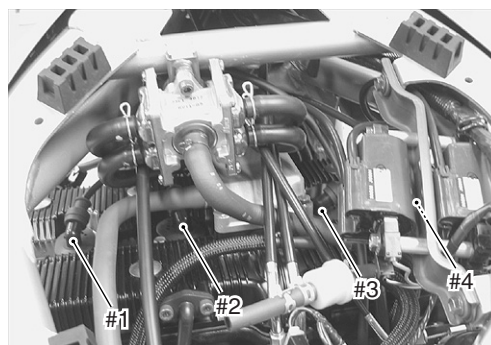


- Before installing the engine sprocket cover, apply a small quantity of SUZUKI SUPER GREASE “A” to the clutch release mechanism.

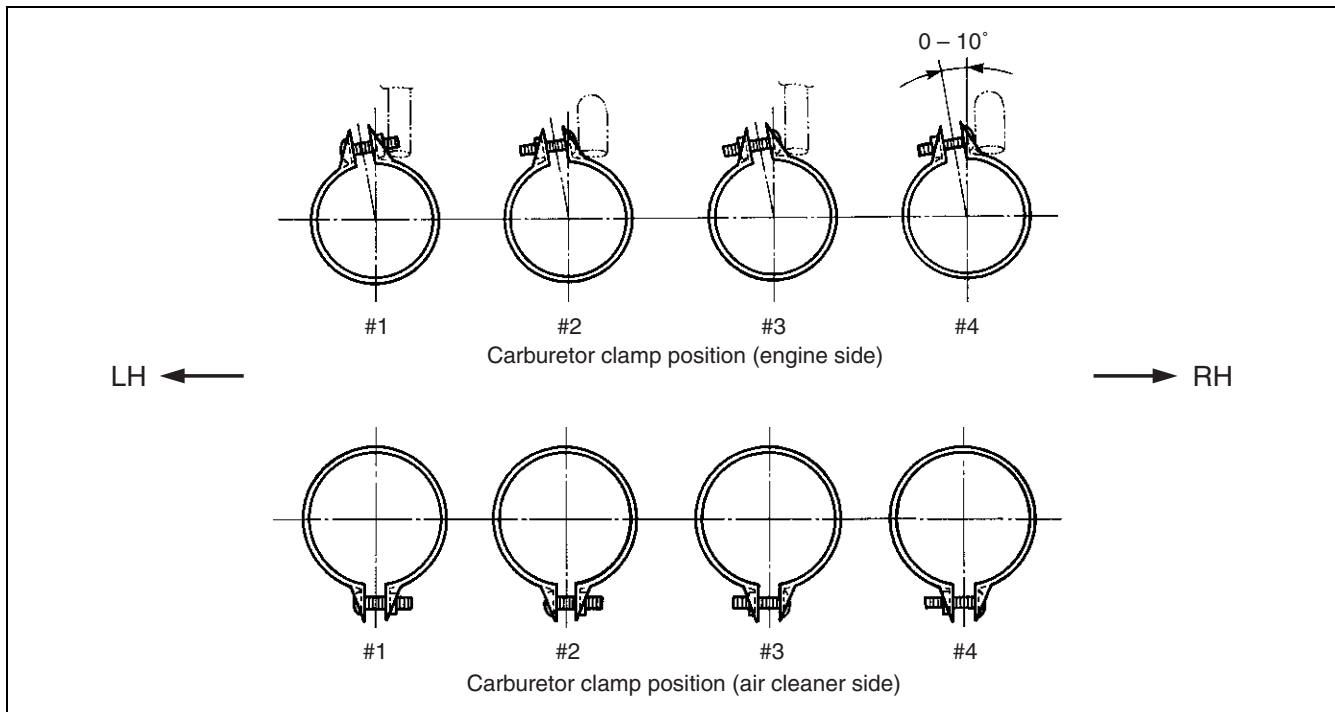
 **99000-25010: SUZUKI SUPER GREASE “A”**



- Install the spark plug caps onto the spark plugs. Make sure that each spark plug cap is installed in the correct location. The number on each spark plug cord refers to the appropriate cylinder.

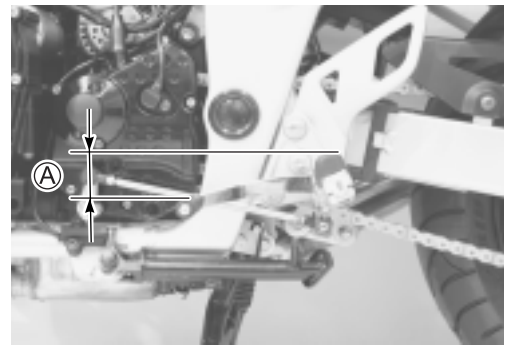


- Position the carburetor clamps as shown.



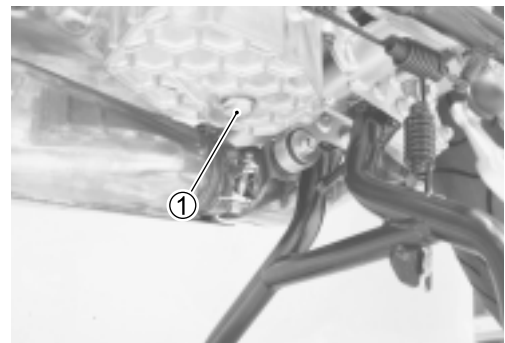
- After remounting the engine, route the wire harness, cables and hoses properly. (☞ 7-12 to -19)
- Install the gearshift lever to the gearshift shaft in the correct position.

DATA Gearshift lever height $\text{\textcircled{A}}$
Standard: 55 mm



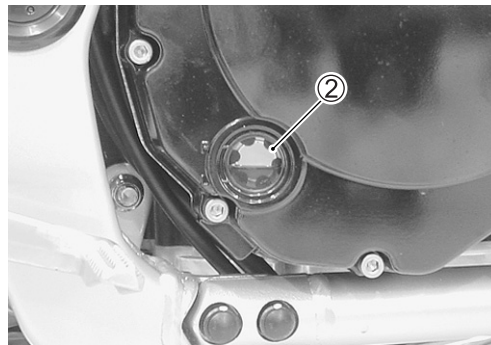
- Tighten the oil drain plug $\text{\textcircled{1}}$ to the specified torque.






🔧 Oil drain plug: 23 N·m (2.3 kgf·m)



- Pour 3.3 L of SF/SG or SH/SJ with JASO MA (API) engine oil, with a viscosity rating of 10W-40 (SAE), into the engine after overhauling it.
- Start up the engine and allow it run for several minutes at idle speed and then stop the engine. Wait three minutes and then check that the oil level remains between the marks on the oil level inspection window ②.

Oil change	3 300 ml
Oil and filter change	3 500 ml
Engine overhaul	4 600 ml



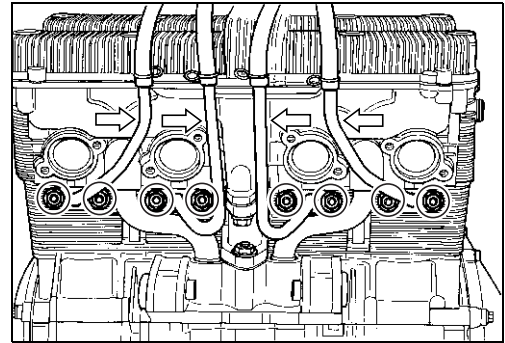
- Adjust the following items to specification.
 - * Throttle cable play.....  2-11
 - * Engine idle speed  2-11
 - * Carburetor synchronization.....  4-25
 - * Drive chain slack.....  2-14
 - * Clutch cable play.....  2-12

ENGINE DISASSEMBLY

CAUTION

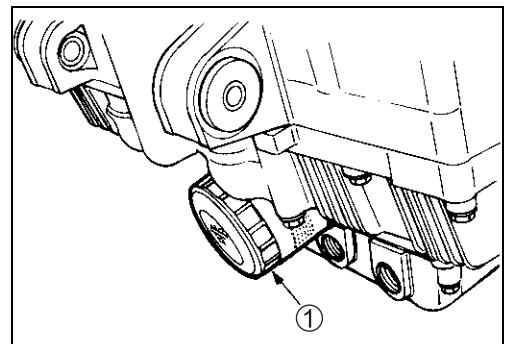
Identify the position of each removed part. Organize the parts in their respective groups (e.g., intake, exhaust) so that they can be reinstalled in their original positions.

- Remove each PAIR valve pipe and hose.

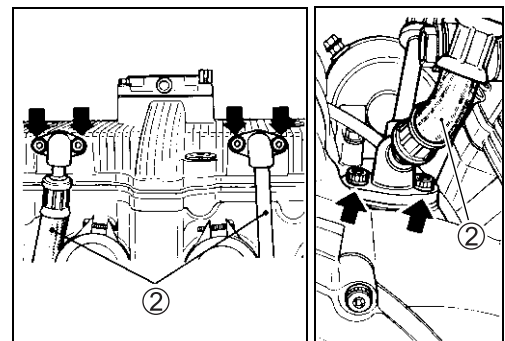


- Remove the oil filter ① using the special tool.

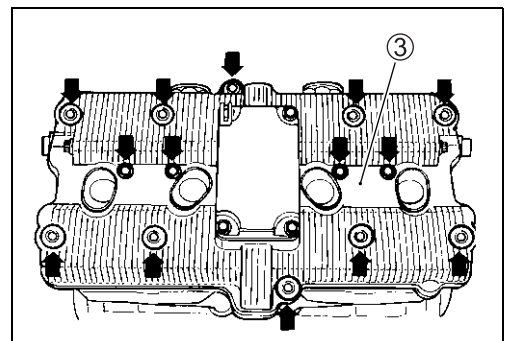
TOOL 09915-40610: Oil filter wrench



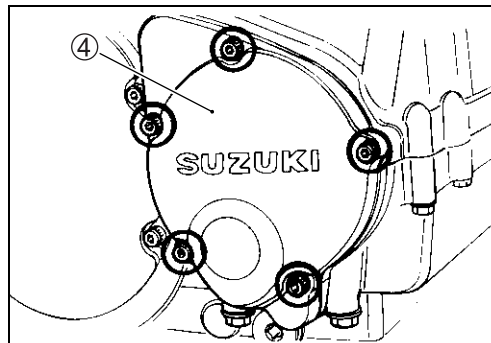
- Remove the oil hoses ②.



- Remove the cylinder head cover ③.



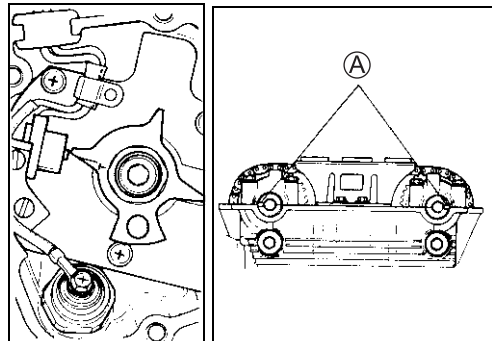
- Remove the signal generator cover ④.



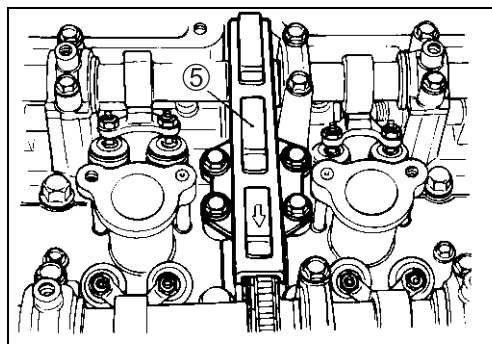
- Remove all of the spark plugs.

TOOL 09930-10121: Spark plug wrench set

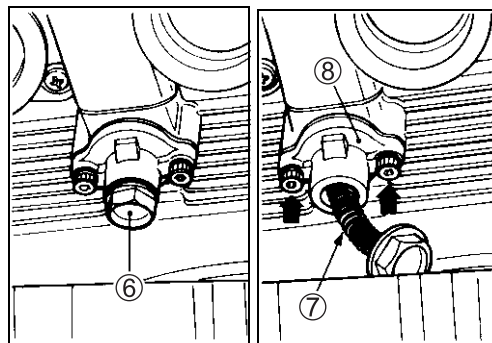
- Turn the crankshaft clockwise and align the "T" mark on the signal generator rotor with the center of the pickup coil. Also, position the notches (A) on the right end of each camshaft as shown.



- Remove the cam chain guide ⑤.



- After removing the spring holder bolt ⑥ and spring ⑦, remove the cam chain tensioner adjuster ⑧.

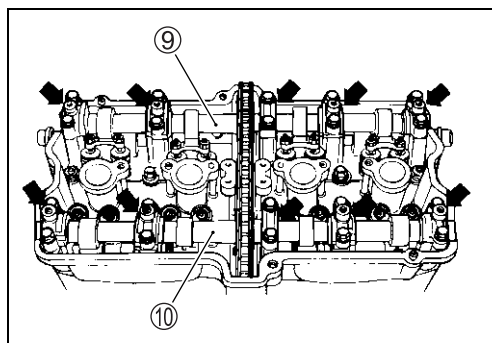


- Remove the camshaft journal holders.

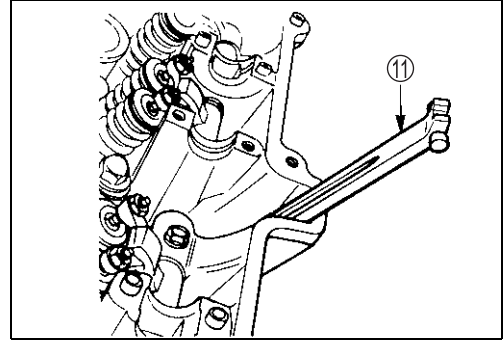
NOTE:

Be sure to loosen the camshaft journal holder bolts evenly and in a crisscross pattern.

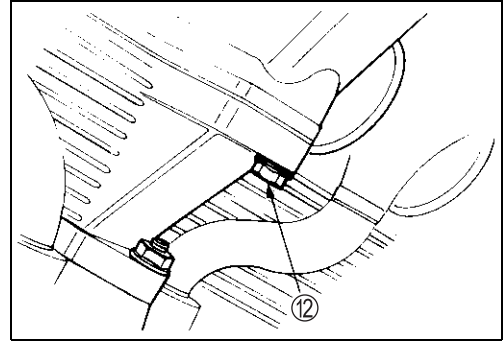
- Remove the intake ⑨ and exhaust camshafts ⑩.



- Remove the cam chain guide ⑪.



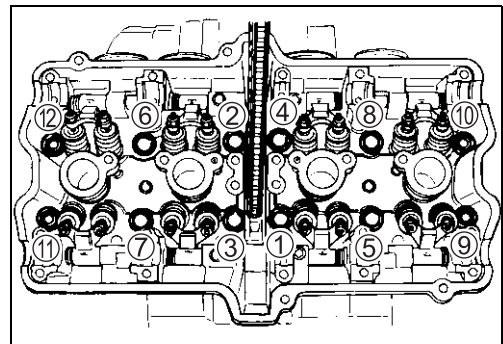
- Remove the cylinder head bolt ⑫.



- The cylinder head can be removed after its twelve 14-mm nuts are removed.

NOTE:

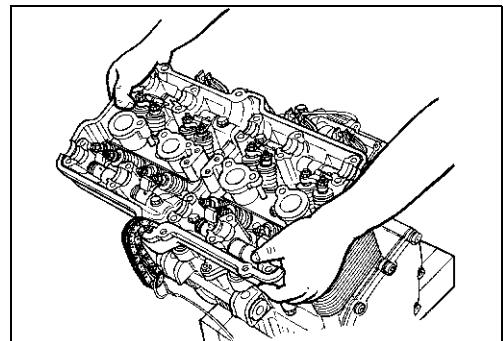
When loosening the cylinder head nuts, loosen each nut little by little, in descending order, according to the numbers cast on the cylinder head.



- Firmly grip the cylinder head at both ends and lift it straight up. If the cylinder head does not come off, lightly tap on the finless portions of it using a plastic mallet.

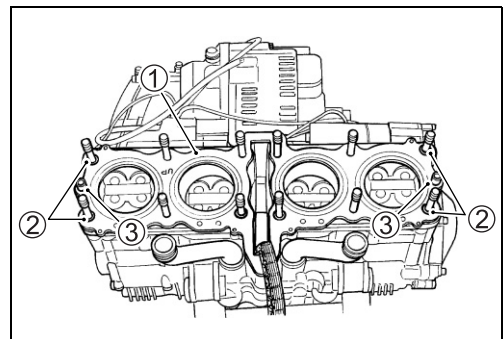
CAUTION

Be careful not to damage the fins when removing or handling the cylinder head.

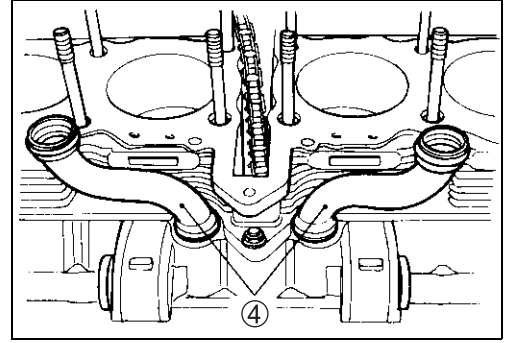


CYLINDER

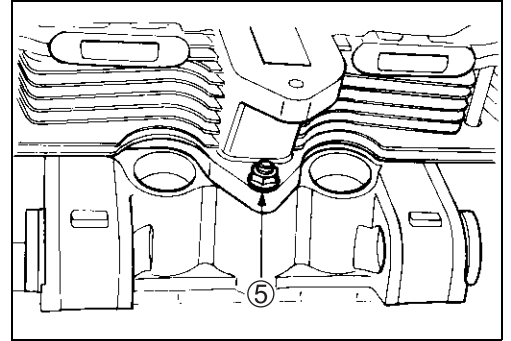
- Remove the cylinder head gasket ①, O-rings ② and dowel pins ③.



- Remove the left and right oil pipes ④.



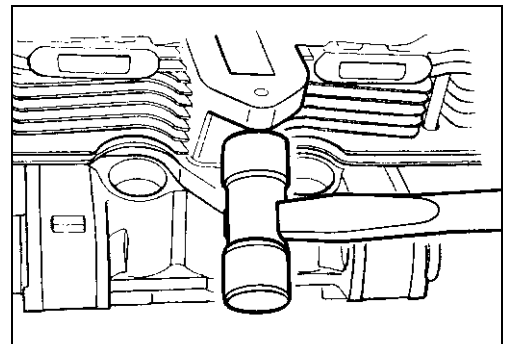
- Remove the cylinder base nut ⑤.



- Firmly grip the cylinder block at both ends and lift it straight up. If the cylinder block does not come off, lightly tap on the finless portions of it using a plastic mallet.

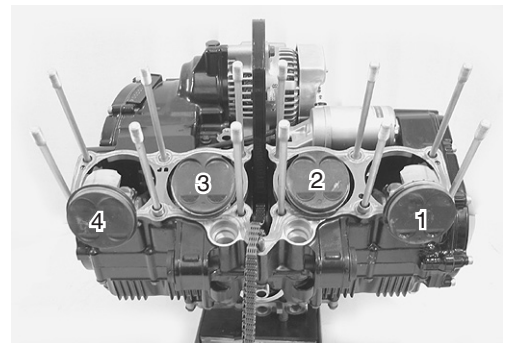
CAUTION

Be careful not to damage the fins when removing or handling the cylinder block.



PISTONS

- Scribe the cylinder number on the head of the respective pistons.

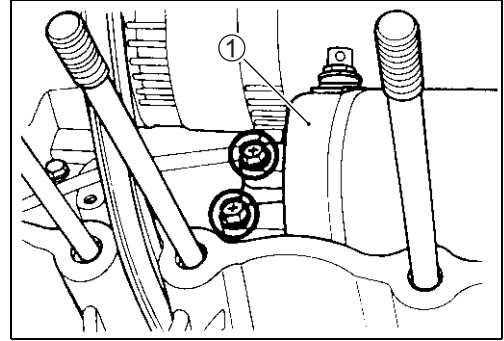


- Place a clean rag over the cylinder to prevent any parts from falling into the crankcase.
- Remove the piston pin circlip ①.
- Draw out each piston pin and remove the pistons.
- Remove the cylinder gasket and dowel pins.



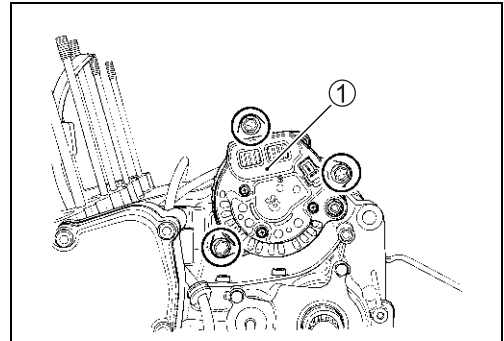
STARTER MOTOR

- Remove the starter motor ①.

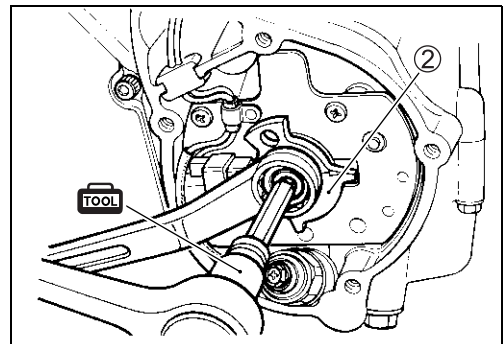


GENERATOR

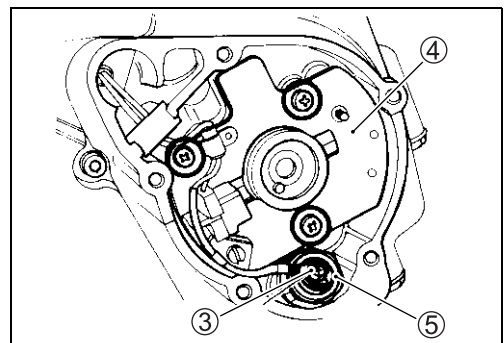
- Remove the generator ①.



- Remove the signal generator rotor ② using the special tool.

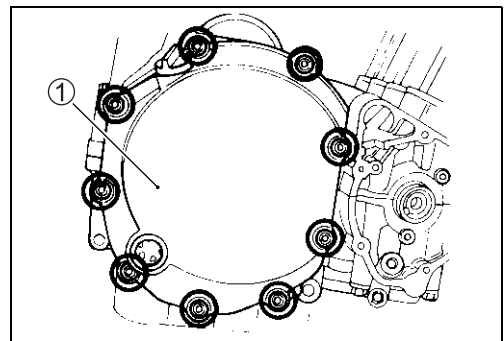


- Disconnect the oil pressure switch lead wire ③.
- Remove the signal generator stator (along with the pickup coil) ④ and oil pressure switch ⑤.

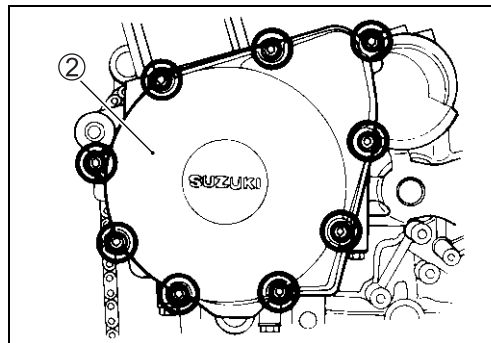


CLUTCH

- Remove the clutch cover ①.

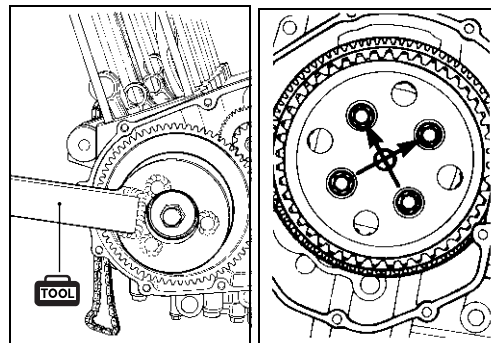


- Remove the starter clutch cover ②.

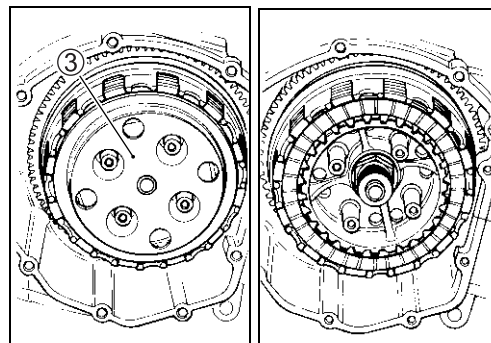


- Hold the starter clutch using the special tool and loosen the clutch spring set bolts in a crisscross pattern. Then, remove the bolts.

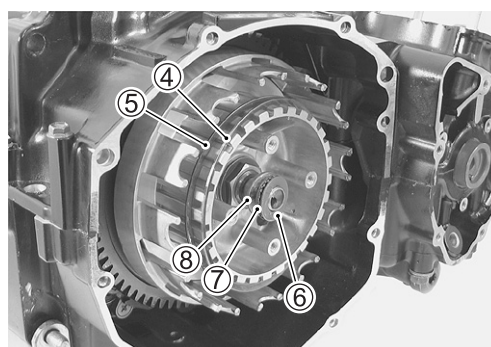
TOOL 09920-34810: Starter clutch holder



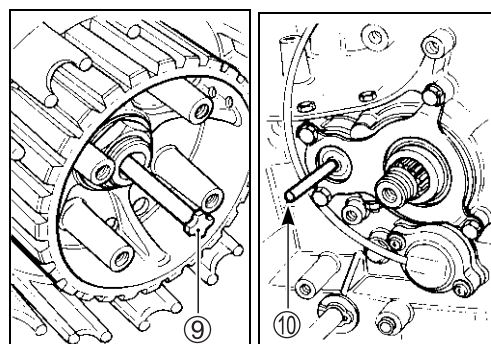
- Remove the clutch pressure plate ③, clutch drive plates and clutch driven plates.



- Remove the spring washer ④ and spring washer seat ⑤.
- Remove the thrust washer ⑥, clutch release bearing ⑦ and clutch push piece ⑧.

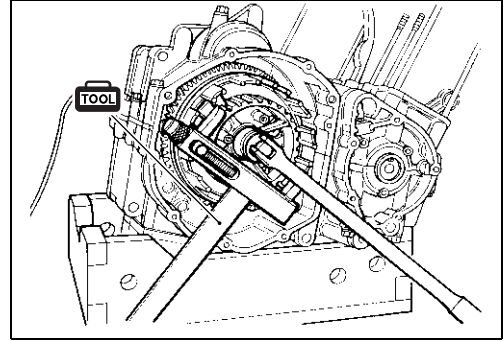


- Draw out the clutch push rods (⑨ and ⑩).

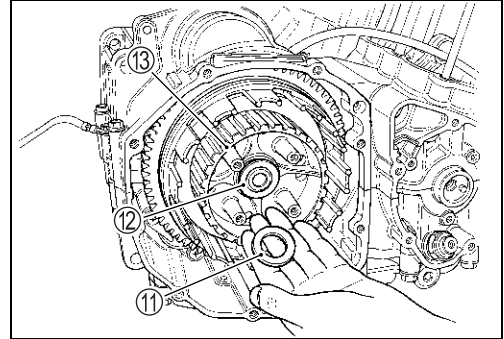


- Hold the clutch sleeve hub using the special tool and then remove the nut.

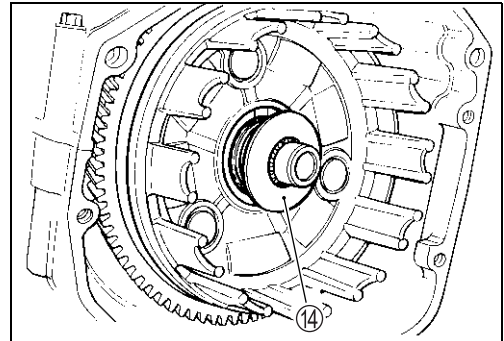
 09920-53740: Clutch sleeve hub holder



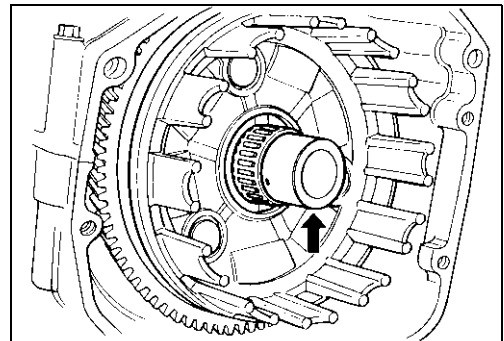
- Remove the washer ⑪, washer seat ⑫ and clutch sleeve hub ⑬.



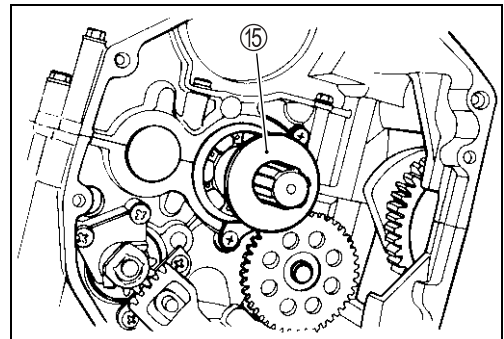
- Remove the thrust washer ⑭.



- With the spacer and bearing removed, the primary driven gear assembly is free to disengage from the primary drive gear.
- Remove the primary driven gear assembly along with the generator/oil pump drive gears.




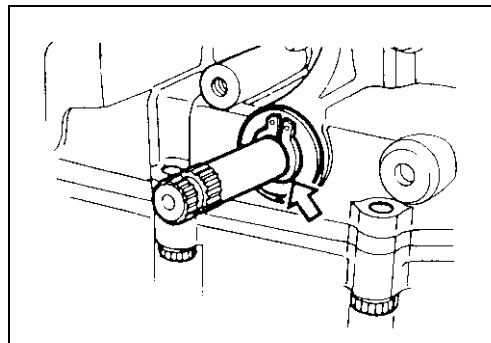
- Remove the thrust washer ⑮.



GEARSHIFT

- Remove the circlip and washer from the gearshift shaft.

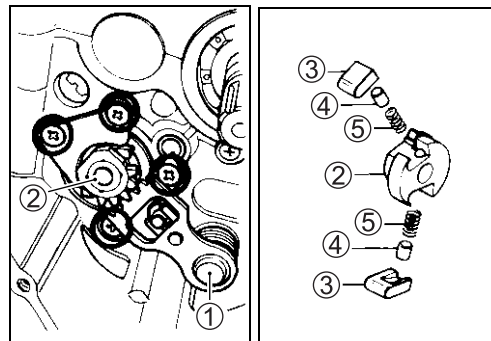
 **09900-06107: Snap ring pliers**




- Draw out the gearshift shaft ①, and then remove the gearshift cam driven gear ②.

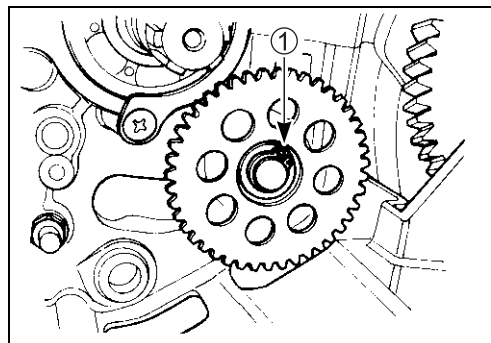
NOTE:

When removing the gearshift cam driven gear, do not lose the gearshifting pawl ③, pin ④ and spring ⑤.

**OIL PUMP DRIVEN GEAR**

- Remove the circlip ①.

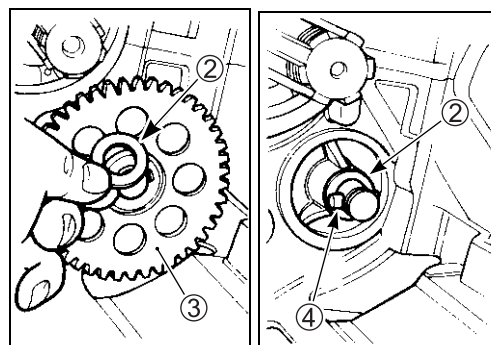
 **09900-06107: Snap ring pliers**



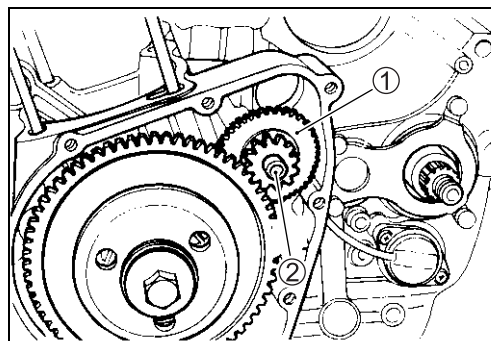
- Remove the washers ②, oil pump driven gear ③ and pin ④.

NOTE:

Be careful not to drop the circlip, pin and washers into the oil pan.

**STARTER CLUTCH**

- Remove the starter idle gear ① and its shaft ②.

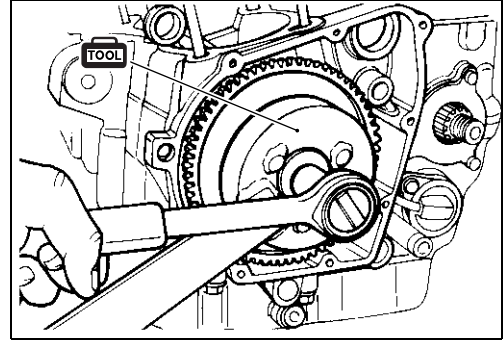


- Hold the starter clutch assembly using the special tool and then loosen the starter clutch mounting bolt.


 **09920-34810: Starter clutch holder**

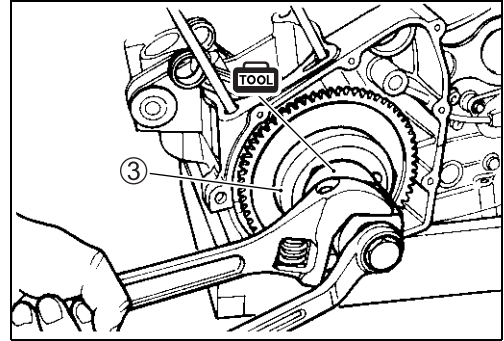
NOTE:

Do not remove the starter clutch mounting bolt at this stage, only loosen it. You will need to use it in conjunction with the special tool when removing the starter clutch assembly.



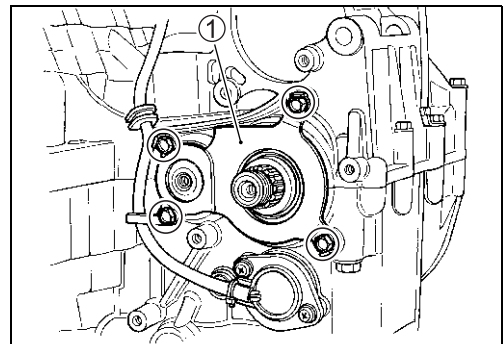
- Remove the starter clutch assembly ③ from the crankshaft using the special tool.

 **09930-33720: Rotor remover**

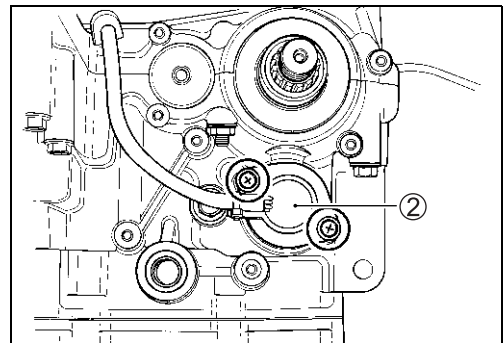


GEAR POSITION SWITCH

- Flatten the tab on the oil seal retainer and remove the bolt.
- Remove the oil seal retainer ①.



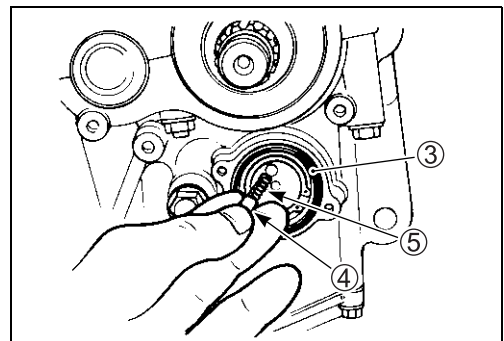
- Remove the gear position switch ②.



- Remove the O-ring ③, switch contact ④ and spring ⑤.

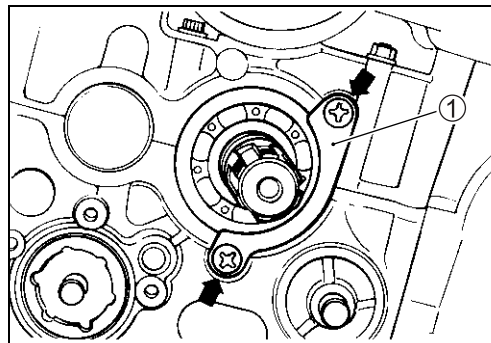
NOTE:

Do not lose the O-ring, switch contact and spring.

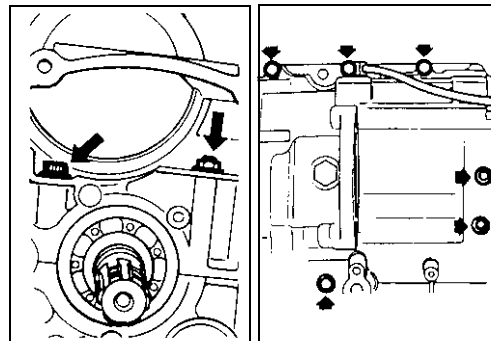


CRANKCASE

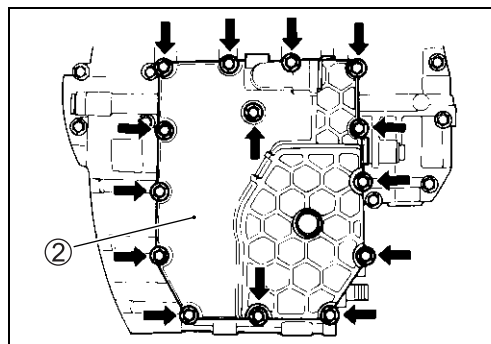
- Remove the countershaft bearing retainer ①.



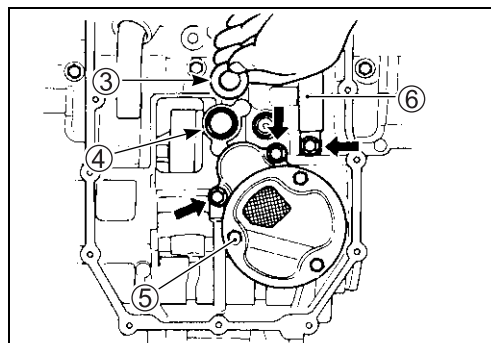
- Remove the upper crankcase bolts and nut.



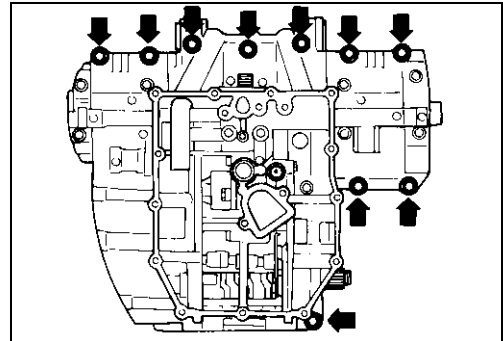
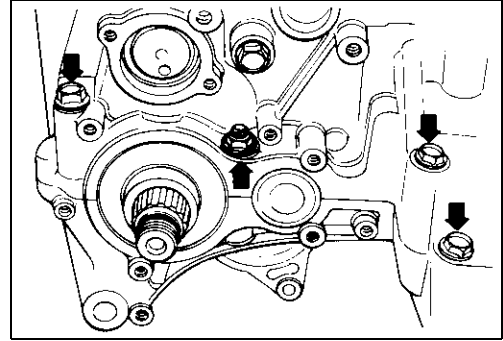
- Remove the oil pan ②.



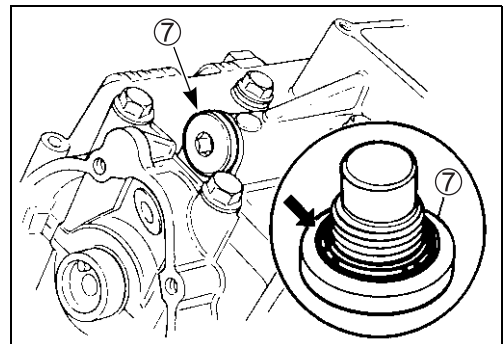
- Remove the shim ③ and O-ring ④.
- Remove the oil sump filter ⑤.
- Remove the oil return pipe ⑥.



- Remove the lower crankcase bolts and nut.



- Remove the main oil gallery plug ⑦ and O-ring.

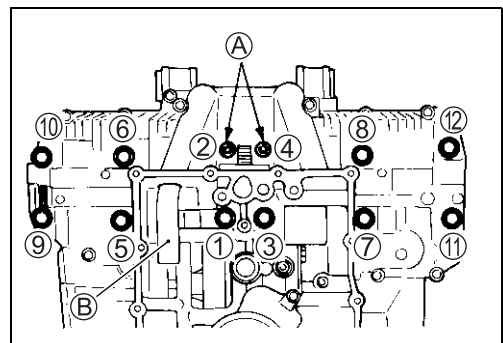


- Loosen the crankcase bolts in descending numerical order and then remove them.

NOTE:

Two allen bolts are located at position ① to tighten the crankshaft.

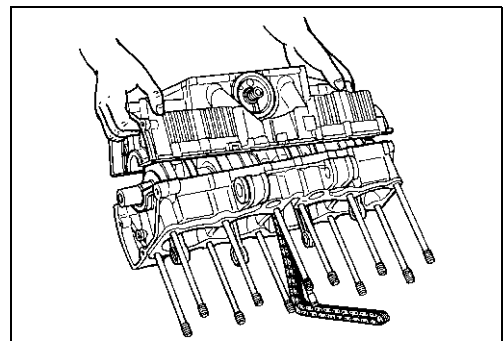
- Remove the oil return pipe ②.



- Make sure that all of the bolts are removed. Then, tap the sides of the lower crankcase using a plastic mallet to separate the upper and lower crankcase halves and then lift the lower crankcase off of the upper crankcase.

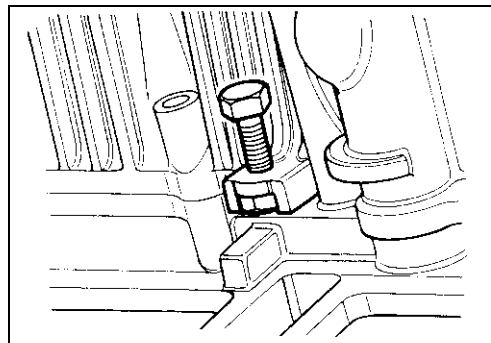
CAUTION

Do not allow the crankshaft journal bearings to drop out of the lower crankcase.



NOTE:

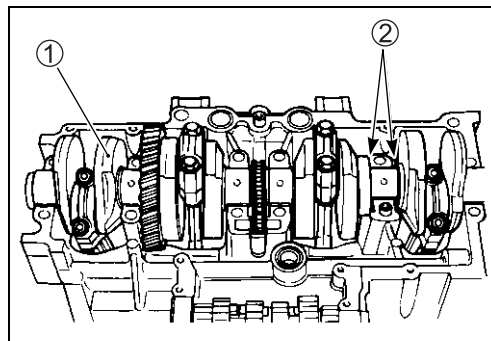
If it is difficult to separate the crankcase halves, set the proper bolt and nut to the crankcase by separating the upper and lower crankcase halves, as shown in the illustration.

**TRANSMISSION**

- Remove the crankshaft assembly ① from the upper crankcase.

NOTE:

The crankshaft thrust bearings ② are located between the crankshaft assembly and upper crankcase.

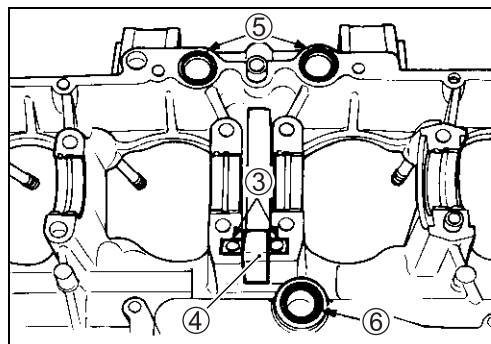


- Remove the dampers ③ and cam chain tensioner ④.
- Remove the O-rings (⑤ and ⑥).

NOTE:

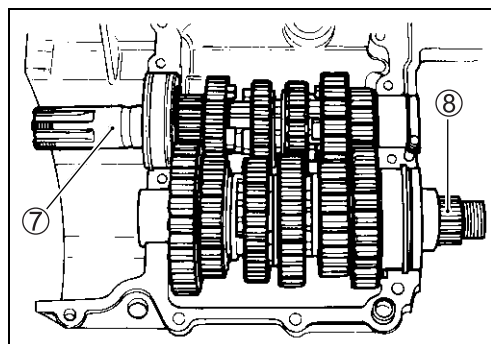
* Do not remove the crankshaft journal bearings unless absolutely necessary.

* Make a note of where the crankshaft journal bearings are removed from so that they can be reinstalled in their original positions.

**CAUTION**

When removing the crankshaft journal bearings, be careful not to scratch the crankcase and the crankshaft journal bearings.

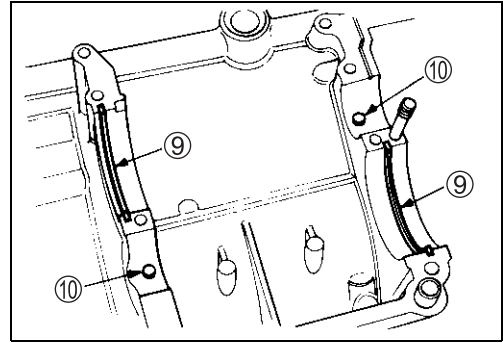
- Remove the countershaft assembly ⑦ and driveshaft assembly ⑧.



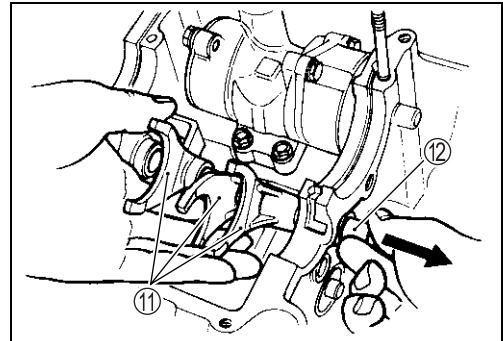
- Remove the C-rings ⑨ and bearing pins ⑩.

NOTE:

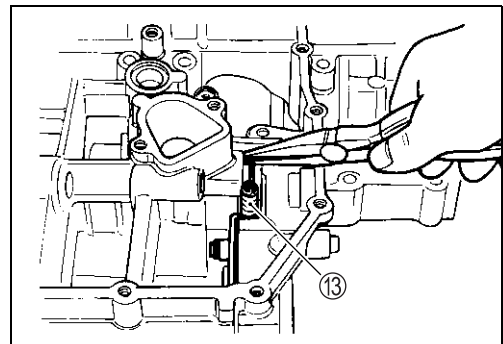
Do not lose the C-rings and bearing pins.



- Hold the gearshift forks ⑪ and draw out the gearshift fork shaft ⑫ from the lower crankcase.

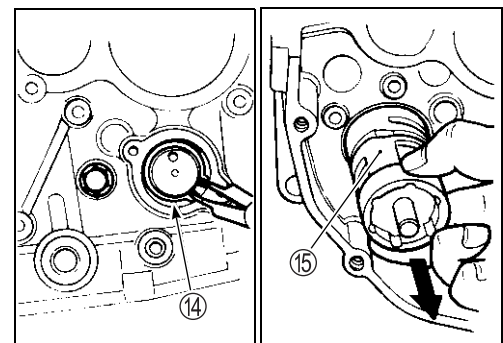


- Unhook the gearshift cam stopper spring ⑬ from the lower crankcase.



- Remove the circlip ⑭ from the gearshift cam, then draw out the gearshift cam ⑮ from the opposite side.

TOOL 09900-06107: Snap ring pliers



- Remove the circlip ⑯ and gearshift cam stopper ⑰.

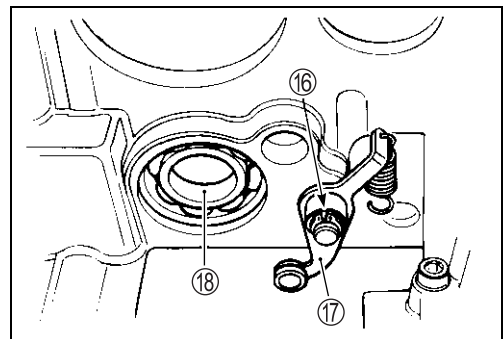
TOOL 09900-06107: Snap ring pliers

NOTE:

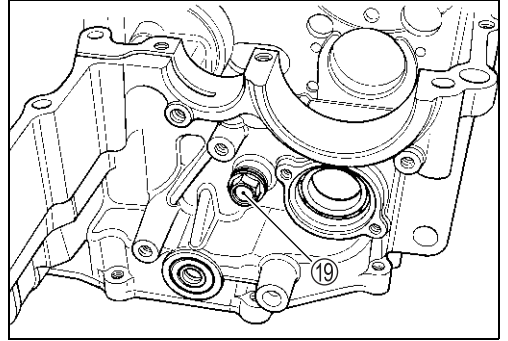
Rotate the bearing ⑱ in the crankcase by hand to inspect for abnormal noise and smooth rotation.

Replace the bearing if there is anything unusual.

TOOL 09900-06106: Snap ring pliers

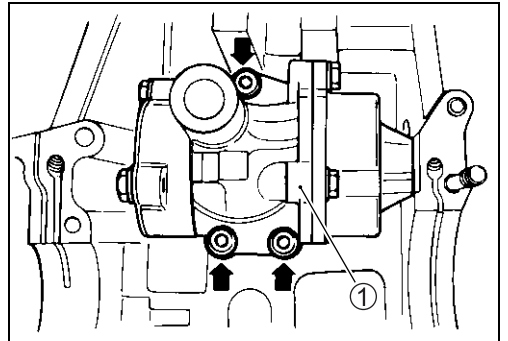


- Remove the gearshift cam stopper bolt ⑱.



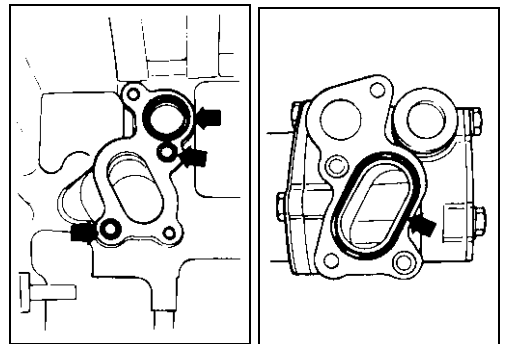
OIL PUMP

- Remove the oil pump ①.



- Remove the O-rings and dowel pins.

Oil pump inspection.....  3-86



ENGINE COMPONENTS INSPECTION AND SERVICE

CAMSHAFT/CYLINDER HEAD INSPECTION AND SERVICE

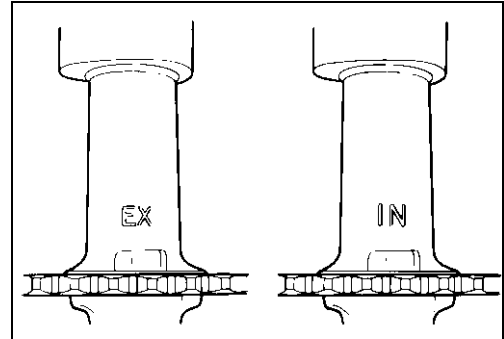
CAUTION

Identify the position of each removed part. Organize the parts in their respective groups (i.e., intake, exhaust, #1 or #2) so that they can be installed in their original locations.

CAMSHAFTS

If the engine produces abnormal noises, vibration or lacks power, a camshaft may be distorted or worn to the service limit. The camshaft runout should be checked. Also, check the cams and journals for wear or damage.

The exhaust camshaft has the embossed letters "EX" and the intake camshaft has the embossed letters "IN".



CAM WEAR

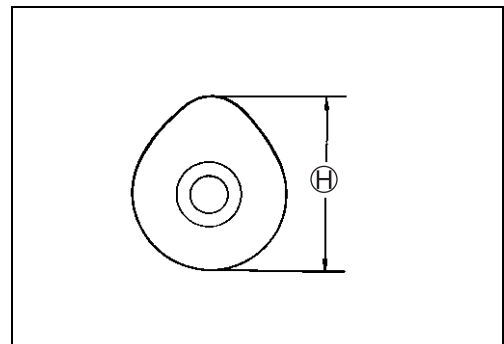
Worn-down cams are often the cause of mistimed valve operation resulting in reduced power output.

Measure the cam height H using the micrometer. Replace a camshaft if the cams are worn to the service limit.

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

DATA Cam height H

Service Limit: (IN) 32.30 mm
(EX) 32.35 mm

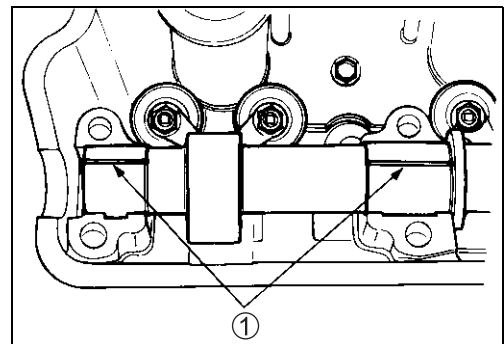


CAMSHAFT JOURNAL WEAR


Determine whether or not each journal is worn down to the limit by measuring the oil clearance with the camshaft installed in place. Measure the clearance using the plastigauge ①.

TOOL 09900-22301: Plastigauge
09900-22302: Plastigauge

DATA Camshaft journal oil clearance (IN & EX)
Service Limit: 0.15 mm

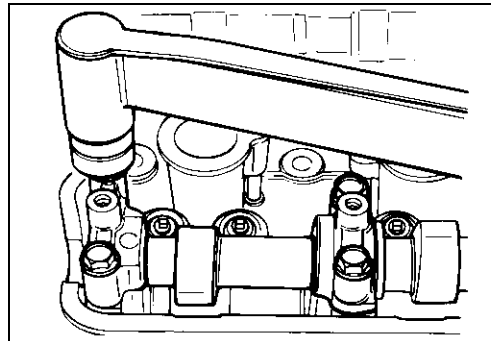


NOTE:

Install each camshaft journal holder to its original position.
( 3-81)

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

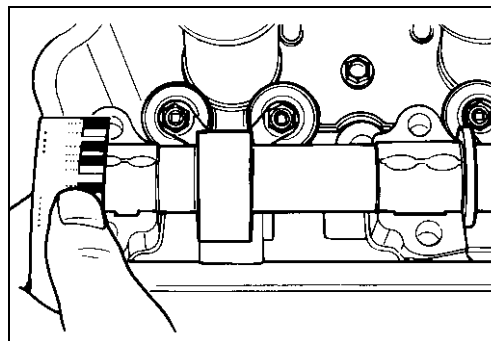
 **Camshaft journal holder bolt: 10 N·m (1.0 kgf·m)**




NOTE:


Do not rotate the camshafts with the plastigauge in place.

Remove the camshaft journal holders 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.



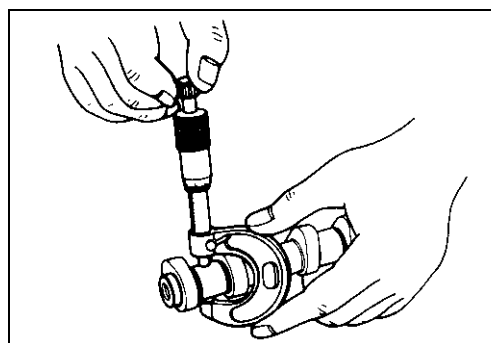
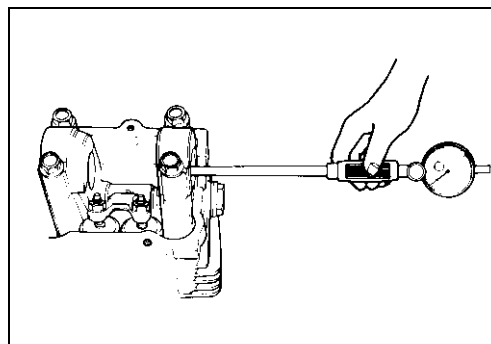
If the camshaft journal oil clearance exceeds the limit, measure the inside diameter of the camshaft journal holder and the outside diameter of the camshaft journal. Replace the camshaft or the cylinder head depending upon which one exceeds the specification.

 **09900-20602: Dial gauge (1/1 000 mm)**
09900-22403: Small bore gauge (18 – 35 mm)

 **Camshaft journal holder I.D. (IN & EX)**
Standard: 22.012 – 22.025 mm


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

 **Camshaft journal O.D. (IN & EX)**
Standard: 21.959 – 21.980 mm

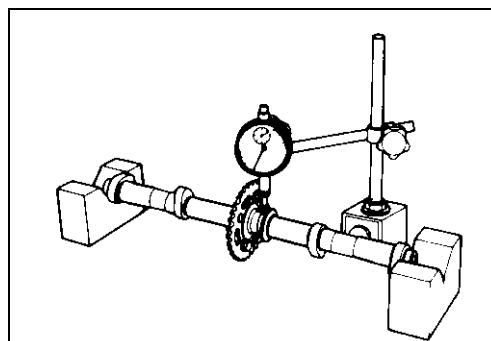


CAMSHAFT RUNOUT

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)

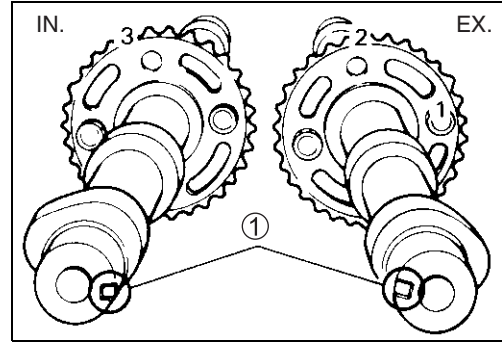
 **Camshaft runout (IN & EX)**
Service Limit: 0.1 mm



CAMSHAFT SPROCKETS

The fixed position of each camshaft sprocket is determined by arrow mark “3” for the intake camshaft, and by arrow marks “1” and “2” for the exhaust camshaft, as located in reference to the notch ① on the right end of each camshaft.

Inspect the teeth of each camshaft sprocket for wear or damage. If they are worn or damaged, replace the sprockets and cam chain as a set.



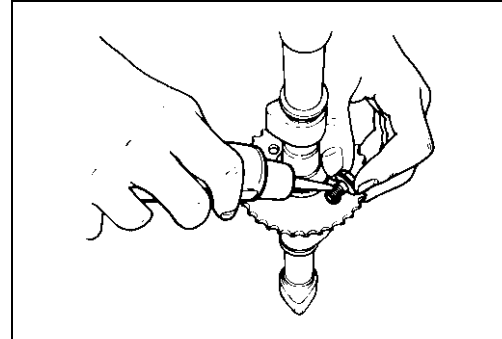
- Apply THREAD LOCK SUPER “1303” to the threads of the camshaft sprocket bolts and then tighten them to the specified torque.

 99000-32030: THREAD LOCK SUPER “1303”

 Camshaft sprocket bolt:

Initial: 16 N·m (1.6 kgf·m)

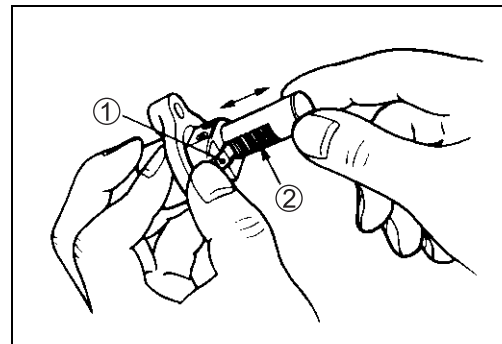
Final: 25 N·m (2.5 kgf·m)



CAM CHAIN TENSIONER ADJUSTER

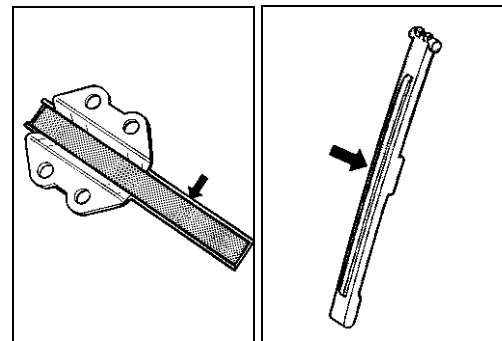
The cam chain tensioner adjuster is maintained at the proper tension by an automatically adjusted tensioner.

Unlock the ratchet mechanism ① and move the push rod ② in place to see if it slides smoothly. If it does not slide smoothly or the ratchet mechanism is worn or damaged, replace the cam chain tensioner adjuster with a new one.



CAM CHAIN GUIDE


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

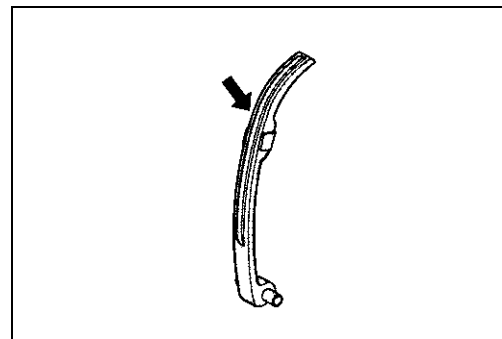


CAM CHAIN TENSIONER

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

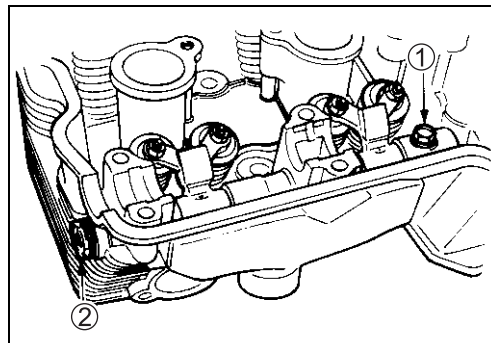
If it is necessary to replace the cam chain tensioner, remove the engine and separate the upper and lower crankcases.

( 3-22)



CYLINDER HEAD DISASSEMBLY

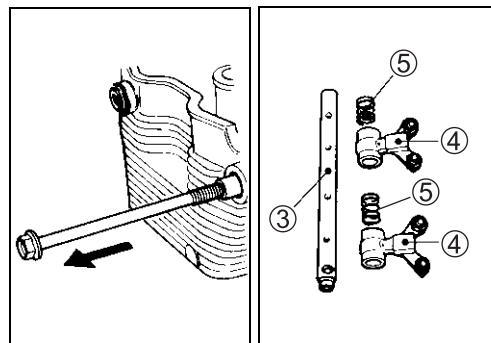
- Remove the rocker arm shaft set bolt ① and cylinder head plug ②.



- Remove the rocker arm shaft ③, rocker arm ④ and spring ⑤.

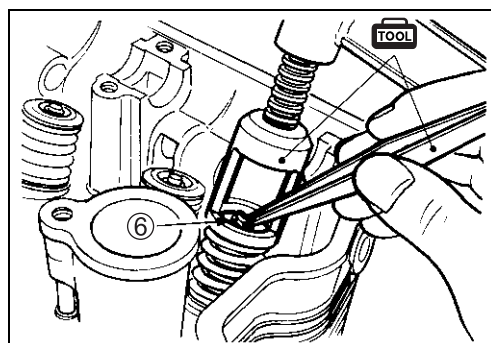
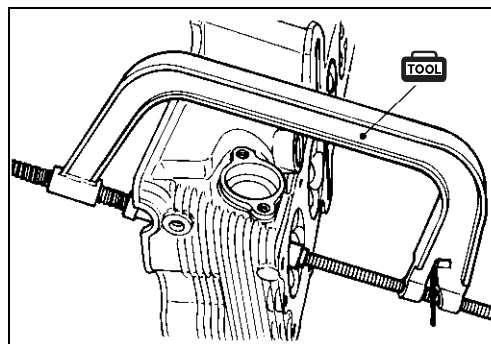
NOTE:

To remove the rocker arm shaft, screw a 8-mm bolt into the rocker arm shaft end and then pull out the shaft.

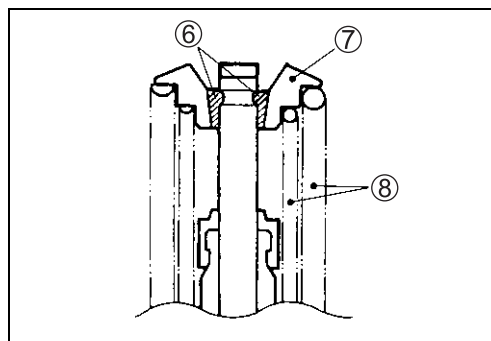


- Using the special tools, compress the valve spring and remove the valve cotters ⑥ from the valve stem.

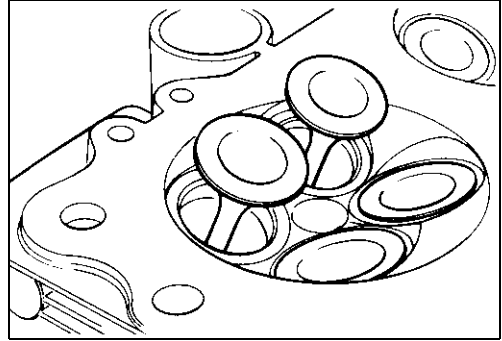
- TOOL** 09916-14510: Valve lifter
- 09916-14910: Valve lifter attachment
- 09916-84511: Tweezers



- Remove the valve spring retainer ⑦ and the inner and outer valve springs ⑧.



- Remove the valve spring seat.
- Remove the valve from the combustion chamber side.
- Remove the oil seal.



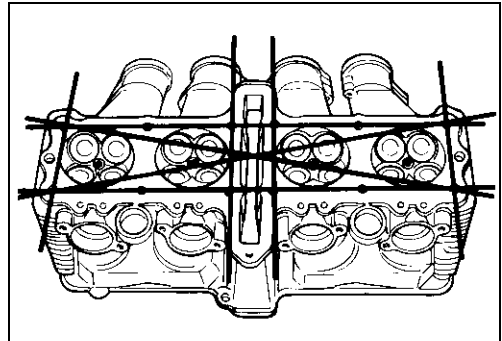
CYLINDER HEAD DISTORTION

Decarbonize the combustion chambers.

Check the gasket surface of the cylinder head for distortion. Use a straightedge and thickness gauge. Take clearance readings at several places. If readings exceed the service limit, replace the cylinder head.

TOOL 09900-20803: Thickness gauge

DATA Cylinder head distortion
Service Limit: 0.2 mm



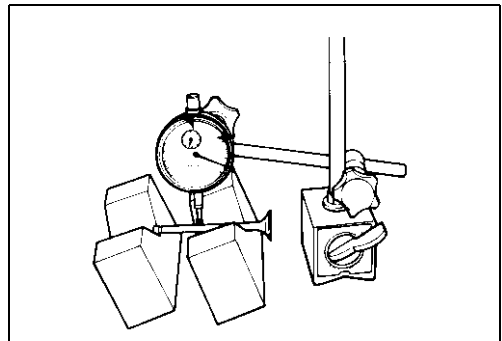
VALVE STEM RUNOUT

Support the valve using V-blocks, as shown, and check its runout using the dial gauge.

If the runout exceeds the service limit, replace the valve.

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

DATA Valve stem runout
Service Limit: 0.05 mm



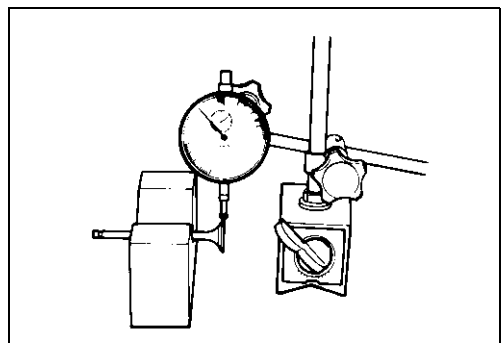
VALVE HEAD RADIAL RUNOUT

Place the dial gauge at a right angle to the valve head face and measure the valve head radial runout.

If it measures more than the service limit, replace the valve.

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

DATA Valve head radial runout
Service Limit: 0.03 mm



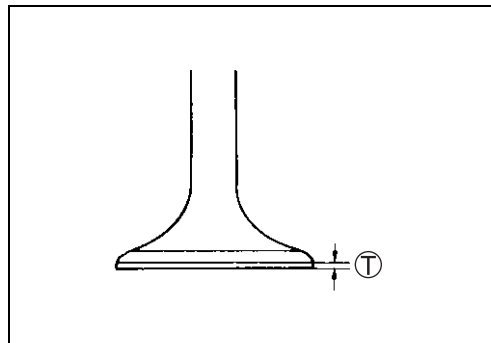
VALVE FACE WEAR

Visually inspect each valve face for wear. Replace any valve with an abnormally worn face. The thickness of the valve face decreases as the face wears. Measure the valve face ①. If it is out of specification replace the valve with a new one.

TOOL 09900-20102: Vernier calipers

DATA Valve face thickness ①

Service Limit: 0.5 mm

**VALVE STEM DEFLECTION**

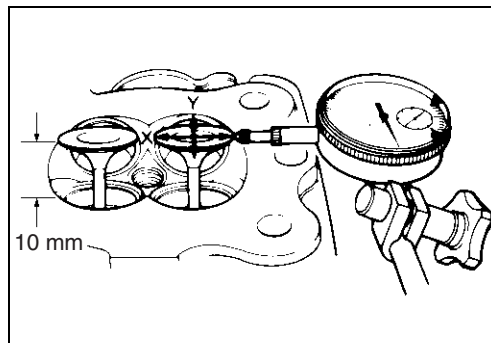
Lift the valve about 10 mm from the valve seat. Measure the valve stem deflection in two directions, “X” and “Y”, perpendicular to each other. Position the dial gauge as shown. If the deflection exceeds the service limit, then determine whether the valve or the guide should be replaced with a new one.

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

09900-20701: Magnetic stand

DATA Valve stem deflection (IN & EX)

Service Limit: 0.35 mm

**VALVE STEM WEAR**

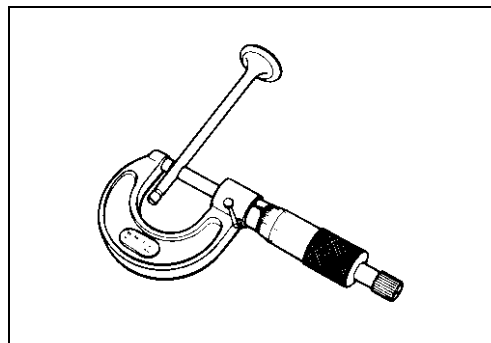
Measure the valve stem O.D. using the micrometer. If it is out of specification, replace the valve with a new one. If the valve stem O.D. is within specification but the valve stem deflection is not, replace the valve guide. After replacing the valve or valve guide, recheck the deflection.

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

DATA Valve stem O.D.

Standard (IN) : 4.965 – 4.980 mm

(EX) : 4.945 – 4.960 mm

**NOTE:**

If valve guides have to be replaced, refer to the valve guide servicing steps below.

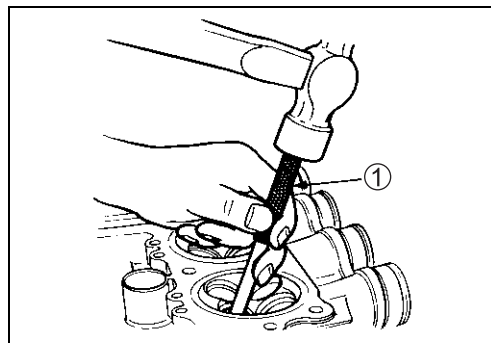
VALVE GUIDE SERVICING

- Using the valve guide remover ①, drive the valve guide out toward the intake or exhaust camshaft side.

TOOL 09916-44310: Valve guide remover/installer

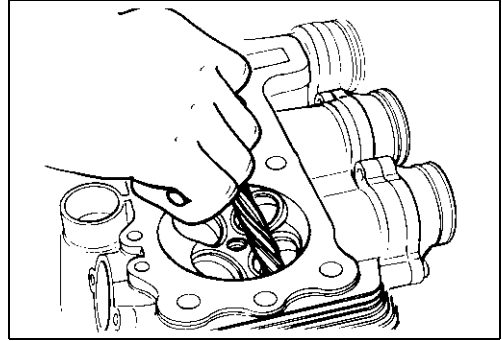
NOTE:

- * Discard the removed valve guide subassemblies.
- * Only oversized valve guides are available as replacement parts. (Part No. 11116-06B70)



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

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



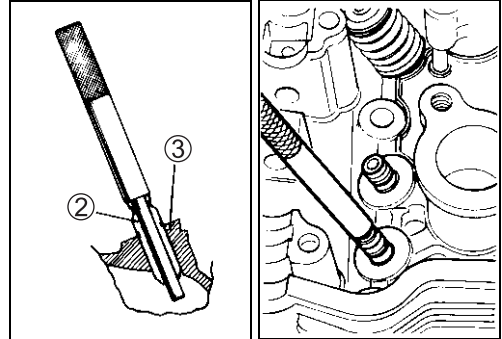
- Install a ring onto each valve guide. Be sure to use new rings.
- Oil the stem hole of each valve guide and drive the guide into the guide hole using the valve guide installer.

- ② Valve guide
- ③ Cylinder head

TOOL 09916-44310: Valve guide remover/installer

CAUTION

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

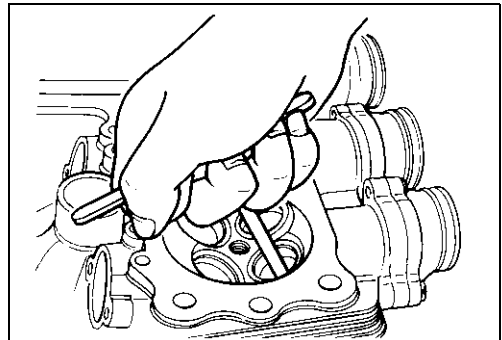


- After installing the valve guides, re-finish their guiding bores using the reamer. Be sure to clean and oil the guides after reaming.

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

NOTE:

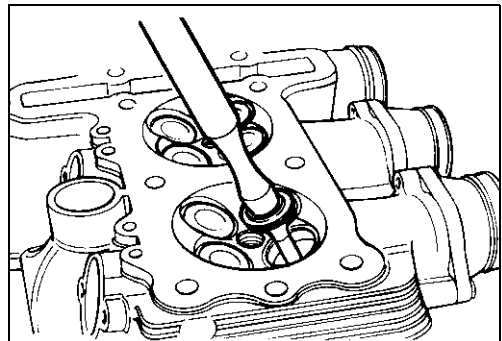
Insert the reamer from the combustion chamber and always turn the reamer handle clockwise.



VALVE SEAT WIDTH

- Coat the valve seat uniformly with Prussian blue. Install the valve and attach a valve lapper onto it. Tap the coated seat with the valve face in a rotating manner, in order to obtain a clear impression of the seating contact.

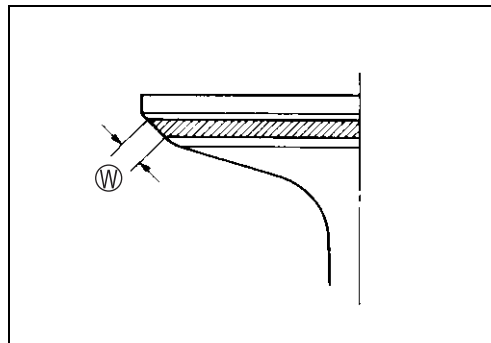
TOOL 09916-10911: Valve lapper set



- The ring-like dye impression left on the valve face must be continuous without any breaks. In addition, the width of the dye ring, which is the valve seat width, must be within the following specification.

DATA Valve seat width $\text{\textcircled{W}}$
Standard: 0.9 – 1.1 mm

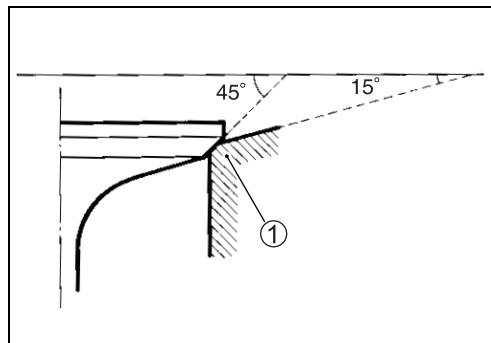
If the valve seat is out of specification, re-cut the seat.



VALVE SEAT SERVICING

The valve seats ① for both the intake and exhaust valves are machined to two different angles. The seat contact surface is cut at 45°.

	INTAKE	EXHAUST
45°	N-122	N-122
15°	N-121	N-121



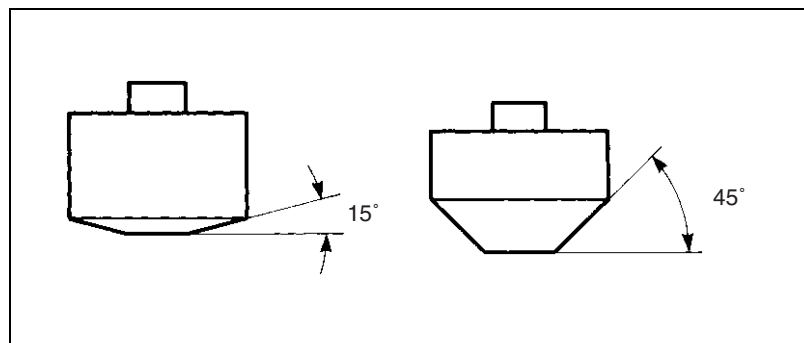
- TOOL** 09916-21111: Valve seat cutter set
- 09916-20610: Valve seat cutter (N-121)
- 09916-20620: Valve seat cutter (N-122)
- 09916-24311: Solid pilot (N-100-5.0)

NOTE:

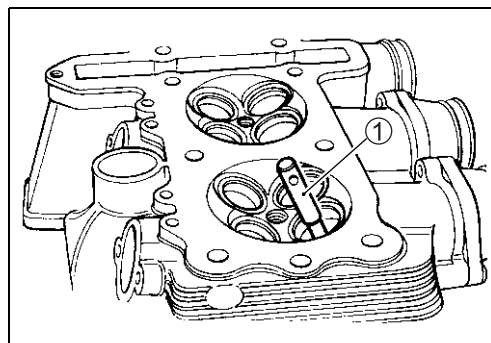
Use the solid pilot (N-100-5.0) along with the valve seat cutter (N-121 and -122).

CAUTION

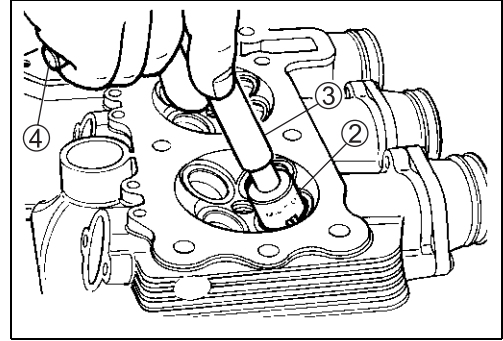
The valve seat contact area must be inspected after each cut.



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

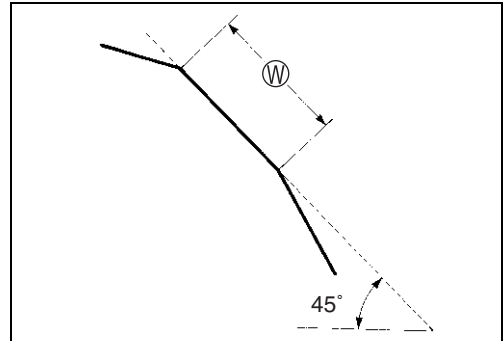


- Seat the pilot snugly. Install the 45° cutter ②, attachment ③ and T-handle ④.



INITIAL SEAT CUT

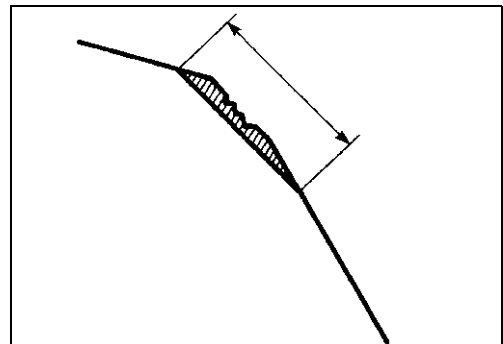
- Using the 45° cutter, descale and clean up the seat. Rotate the cutter one or two turns.
- Measure the valve seat width W after every cut.



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

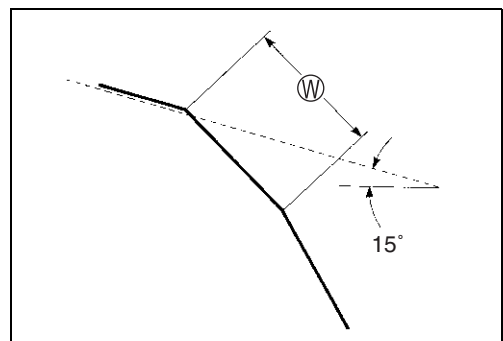
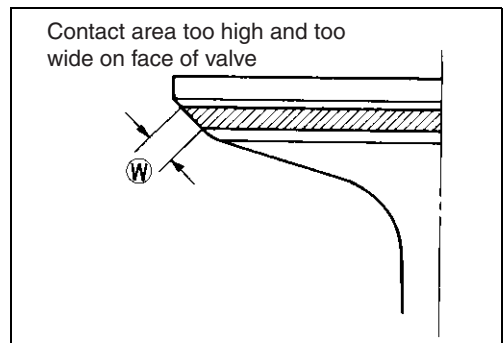
NOTE:

Cut only the minimum amount necessary from the seat to prevent the possibility of the valve stem becoming too close to the rocker arm for correct valve contact angle.



TOP NARROWING CUT

- If the contact area is too high and too wide on the face of valve, use the 15° cutter to lower and narrow the contact area.



FINAL SEAT CUT

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

NOTE:

After cutting the 15° angle, it is possible that the valve seat (45°) is too narrow. If so, re-cut the valve seat to the correct width.

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

CAUTION

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

NOTE:

After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. (☞ 2-4)

VALVE SEAT SEALING CONDITION

Clean and assemble the cylinder 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.

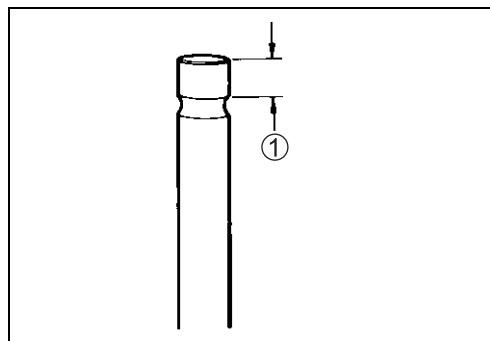
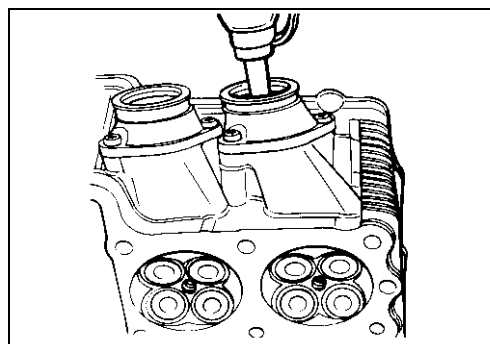
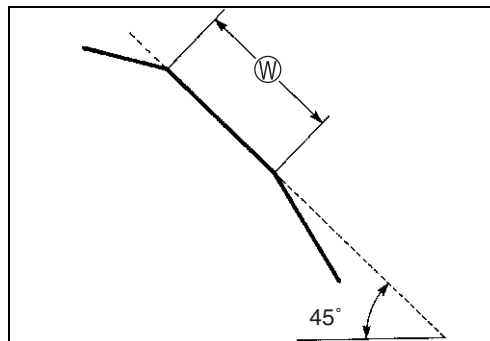
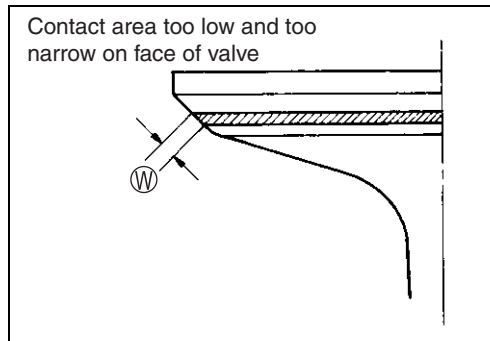
NOTE:

After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. (☞ 2-4)

VALVE STEM END CONDITION

Inspect the valve stem end face for pitting and wear. If pitting or wear is present, resurface the valve stem end. Make sure that the length ① is not less than 2.5 mm. If this length becomes less than 2.5 mm, replace the valve.


DATA Valve stem end length
Service Limit: 2.5 mm



VALVE SPRINGS

The force of the coil spring keeps the valve seat tight. A weakened spring results in reduced engine power output and often accounts 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 specified range, replace both the inner and outer springs as a set.

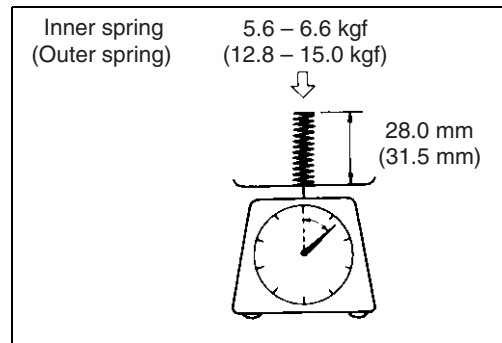
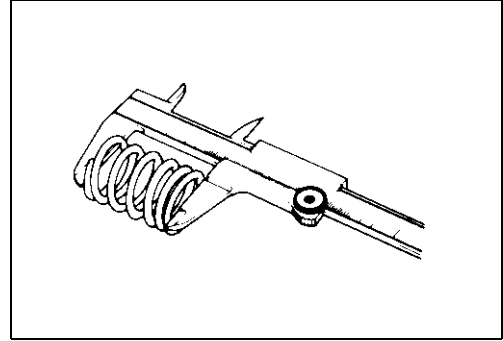
 **09900-20102: Vernier calipers**

 **Valve spring free length (IN & EX)**

Service Limit: INNER : 35.0 mm
OUTER : 38.4 mm

 **Valve spring tension (IN & EX)**

Standard: INNER: 5.6 – 6.6 kgf/28.0 mm
OUTER: 12.8 – 15.0 kgf/31.5 mm

**ROCKER ARM SHAFT OUTSIDE DIAMETER**

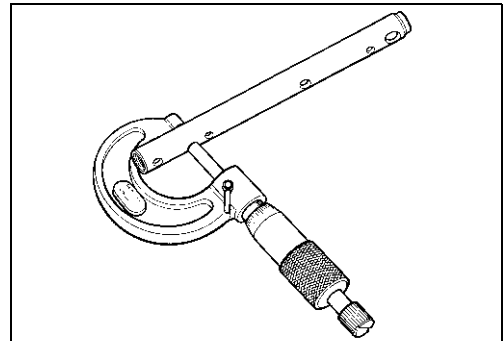
On the sliding surface, take two measurements, at right angle to each other.

If the outside diameter measured is less than the standard value, replace the shaft.

 **Rocker arm shaft O.D.**

Standard: 11.973 – 11.984 mm

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


**ROCKER ARM INSIDE DIAMETER**

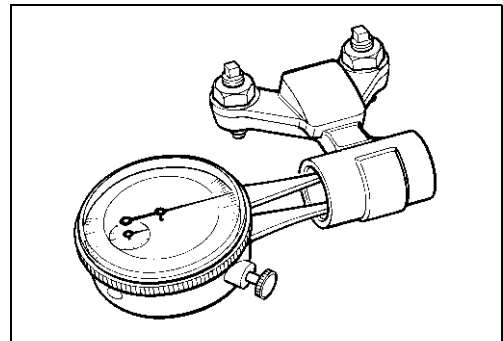
Measure the rocker arm inside diameter in two directions at right angle to each other.

If the inside diameter measured exceeds the standard value, replace the rocker arm.

 **Rocker arm I.D.**

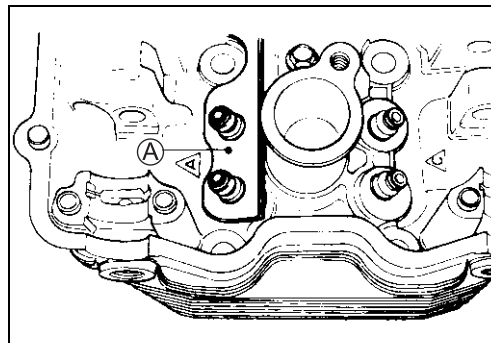
Standard: 12.000 – 12.018 mm

 **09900-20605: Dial calipers**



CYLINDER HEAD REASSEMBLY

- Locate the plate **A** on the cylinder head of exhaust side.

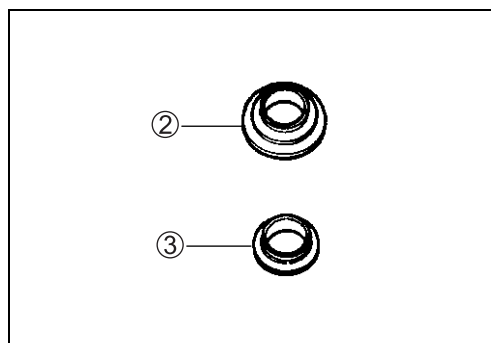
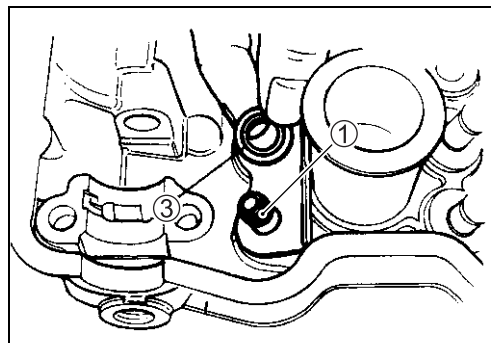
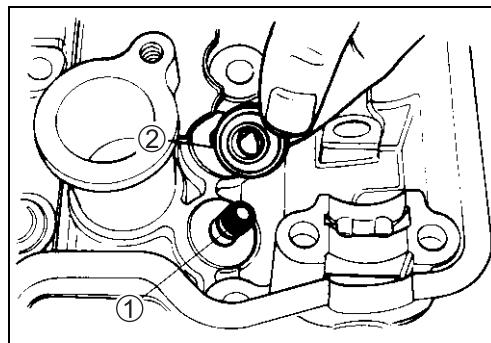


- Oil each oil seal **1** and press-fit them into position using the valve guide installer.
- Install each valve spring seat **2** (for intake side) and **3** (for exhaust side).

TOOL 09916-44310: Valve guide remover/installer

CAUTION

Do not reuse the oil seals.

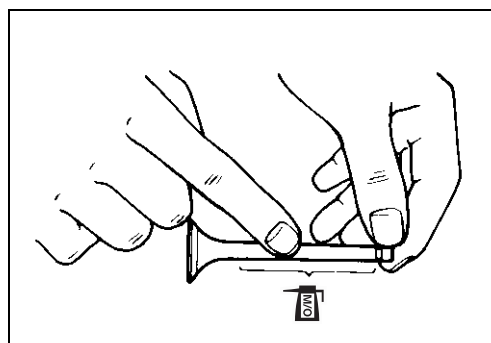


- Insert the valves with their stems coated with molybdenum oil solution (mixed engine oil/moly paste). Coat the entire stem making sure that there are no gaps.

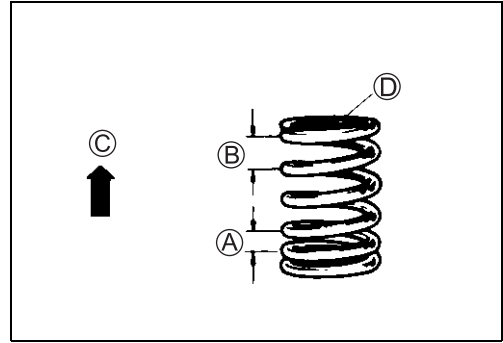
CAUTION

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

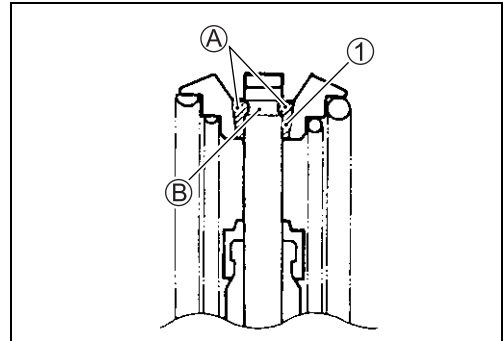
MH 99000-25140: SUZUKI MOLY PASTE



- Install the valve springs with the smaller pitch (A) facing the cylinder head.
- (B) Larger pitch
- (C) Up
- (D) Paint mark



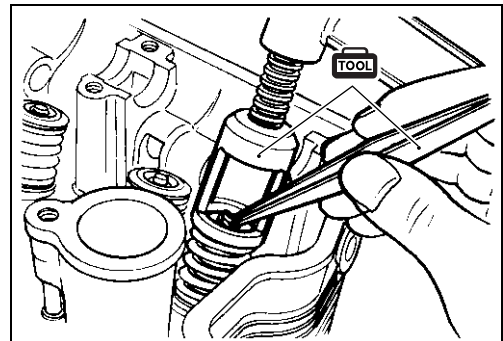
- Install the valve spring retainer, press down the springs using the valve lifter and then install the cotter halves on to the stem end. Then, release the valve lifter to allow the cotter (1) to wedge between the retainer and the valve stem. Be sure that the rounded lip (A) of the cotter fits snugly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



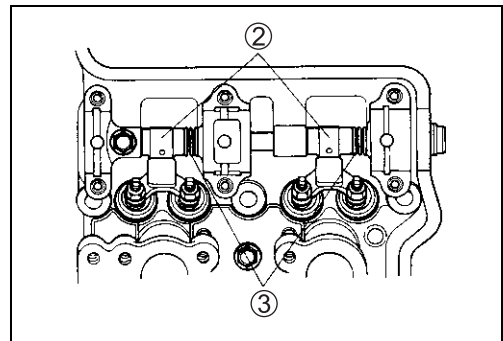
- TOOL** 09916-14510: Valve lifter
 09916-14910: Valve lifter attachment
 09916-84511: Tweezers

CAUTION

Be sure to install all of the parts in their original positions.

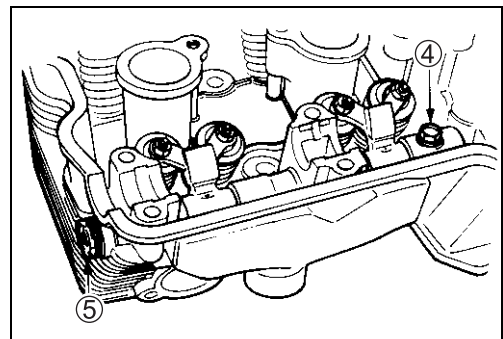


- Apply engine oil to the rocker arm shaft sufficiently.
- Install the rocker arms (2), the springs (3) and the rocker arm shaft.



- Tighten the rocker arm shaft set bolt (4) and cylinder head plug (5) to the specified torque.

- TOOL** 09900-00410: Hexagon wrench set
- U** Rocker arm shaft set bolt (4): 9 N·m (0.9 kgf-m)
 Cylinder head plug (5): 28 N·m (2.8 kgf-m)



INTAKE PIPES

- When installing the intake pipe, apply SUZUKI SUPER GREASE “A” to the O-ring.

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

- When installing the intake pipe bolts, apply a small quantity of THREAD LOCK “1342” to their thread.

 **99000-32050: THREAD LOCK “1342”**

CAUTION

Use new O-rings to prevent the joints from sucking air.

NOTE:

* When replacing the intake pipes, identify the different intake pipes according to each I.D. code ①.

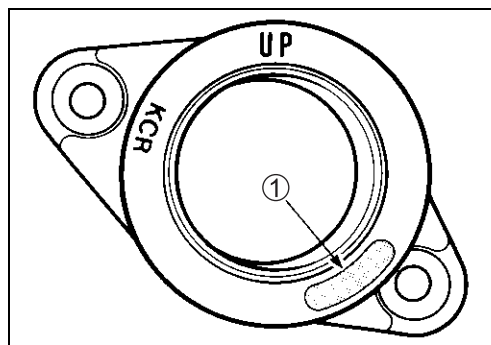
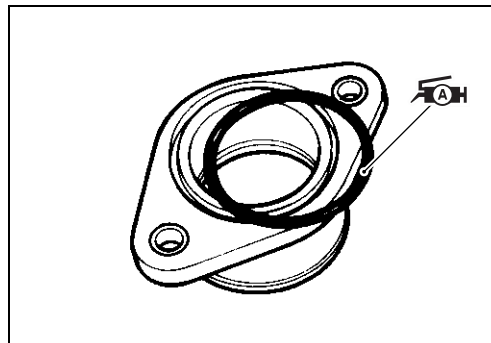
(1-26E0 for cylinder #1)

(1-26E0 for cylinder #2)

(3-26E0 for cylinder #3)

(3-26E0 for cylinder #4)


* Make sure that the “UP” mark faces up.



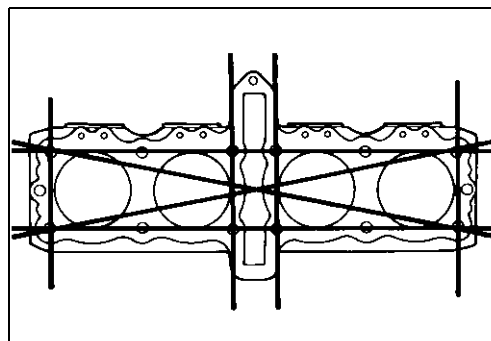
CYLINDER BLOCK/PISTON INSPECTION

CYLINDER BLOCK DISTORTION

Check the gasket surface of the cylinder block for distortion. Use a straightedge and thickness gauge. Take clearance readings at several places. If any reading exceeds the service limit, replace the cylinder block.

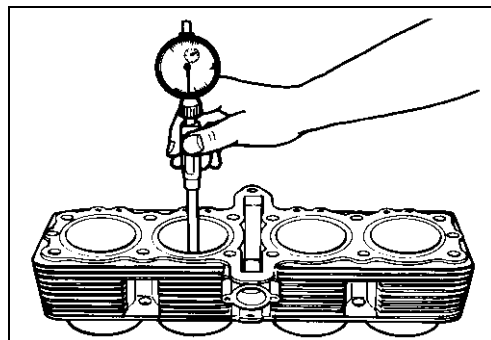
 **09900-20803: Thickness gauge**

 **Cylinder block distortion**
Service Limit: 0.2 mm



CYLINDER BORE

Measure the cylinder bore diameter at six places. If any one of the measurements exceed the limit, overhaul the cylinder and replace the piston with an oversize piston. The remaining cylinders must also be rebored accordingly; otherwise, the imbalance might cause excessive vibration.

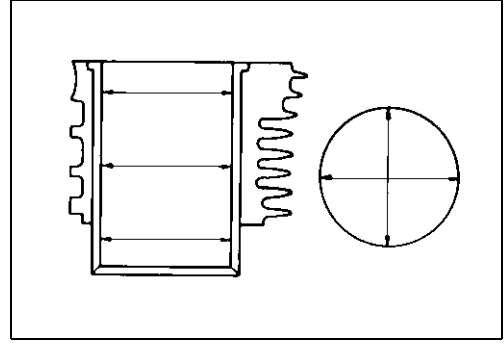


TOOL 09900-20508: Cylinder gauge set

DATA Cylinder bore

Standard: 65.500 – 65.515 mm

Service Limit: 65.615 mm



PISTON DIAMETER

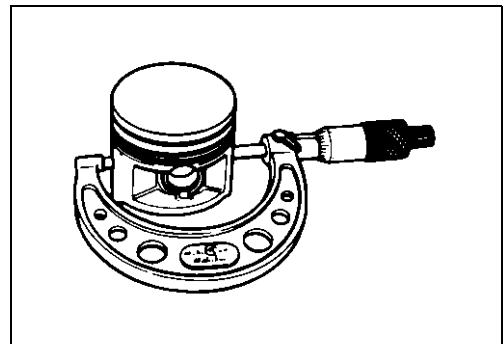
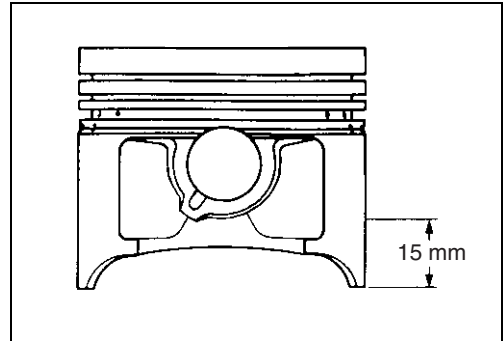
Measure the piston diameter using the micrometer at 15 mm from the skirt end.

If the piston diameter is less than the service limit, replace the piston.

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

DATA Piston diameter

Service Limit: 65.38 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 both the cylinder and piston.

DATA Piston-to-cylinder clearance

Service Limit: 0.12 mm

PISTON-RING-TO-GROOVE CLEARANCE

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

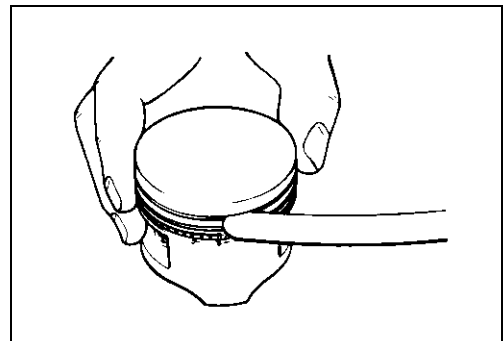
TOOL 09900-20803: Thickness gauge

09900-20205: Micrometer (0 – 25 mm)

DATA Piston-ring-to-groove clearance

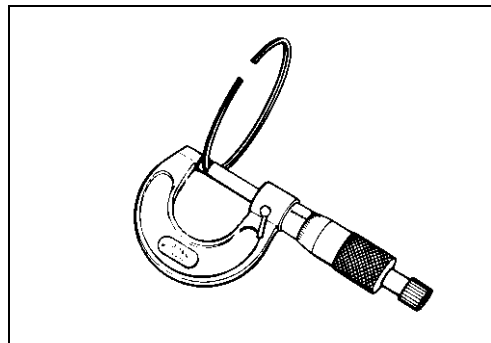
Service Limit: (1st) : 0.18 mm

(2nd) : 0.15 mm



DATA Piston ring groove width
 Standard: (1st) : 1.01 – 1.03 mm
 (2nd) : 0.81 – 0.83 mm
 (Oil) : 1.51 – 1.53 mm

DATA Piston ring thickness
 Standard: (1st) : 0.97 – 0.99 mm
 (2nd) : 0.77 – 0.79 mm



PISTON RING FREE END GAP AND PISTON RING END GAP

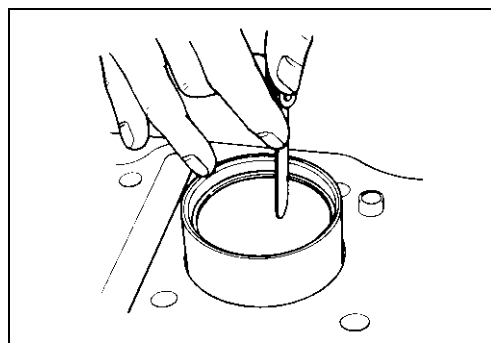
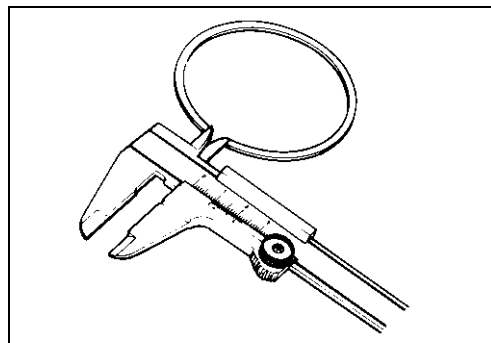
Measure the piston ring free end gap using vernier calipers. Next, fit the piston ring squarely into the cylinder and measure the piston ring end gap using the thickness gauge. If any of the measurements exceed the service limit, replace the piston ring with a new one.

TOOL 09900-20102: Vernier calipers

DATA Piston ring free end gap
 Service Limit: (1st) : 7.3 mm
 (2nd) : 7.3 mm

TOOL 09900-20803: Thickness gauge

DATA Piston ring end gap
 Service Limit: (1st) : 0.5 mm
 (2nd) : 0.5 mm

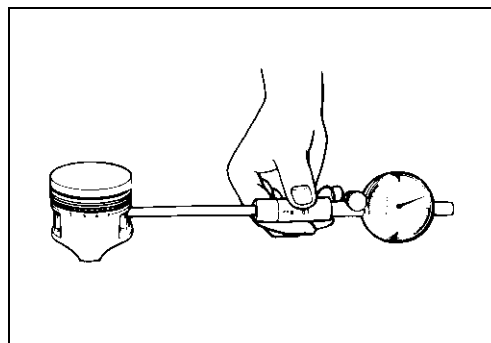


PISTON PINS AND PIN BORE

Measure the piston pin bore inside diameter using the small bore gauge. If either is out of specification or the difference between these measurement is more than the limits, replace the piston.

TOOL 09900-20602: Dial gauge (1/1 000 mm)
 09900-22403: Small bore gauge (18 – 35 mm)

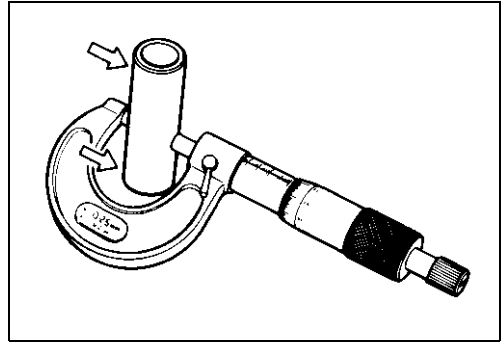
DATA Piston pin bore I.D.
 Service Limit: 18.030 mm



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

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

DATA Piston pin O.D.
Service Limit: 17.980 mm

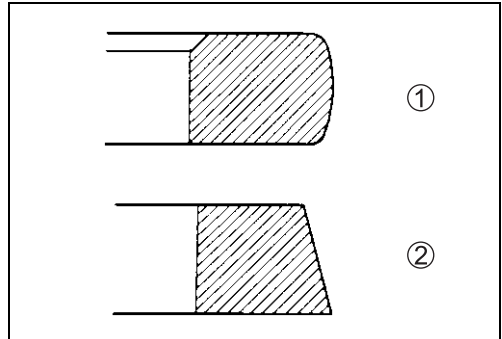


PISTON RING INSTALLATION

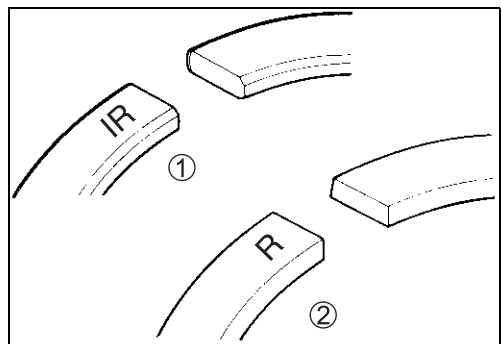
- Install the oil ring first, then the 2nd ring and finally the 1st ring.

NOTE:

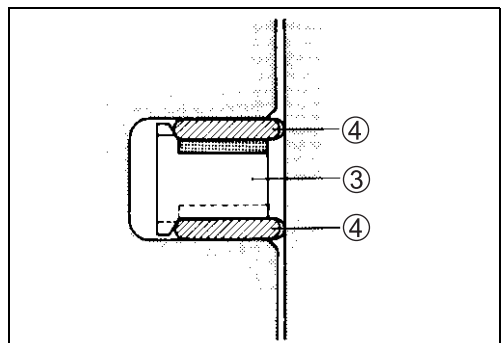
The 1st ① and 2nd piston rings ② differ in shape.



- The 1st ① and 2nd ② piston rings should be installed with the mark facing up.



- First, install a spacer ③ into the oil ring groove and then install the two side rails ④. The spacer and side rails do not have a designated top and bottom. They can be installed in any position.

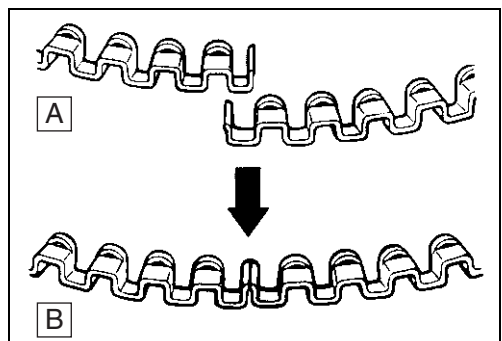


CAUTION

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

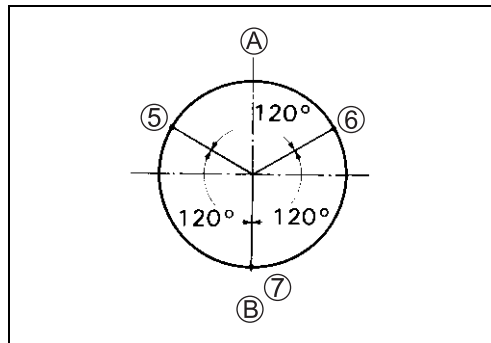
A INCORRECT

B CORRECT



- Position the piston ring gaps as shown. Before inserting each piston into its cylinder, check that the gaps are properly positioned.

- Ⓐ Exhaust side
- Ⓑ Intake side
- ⑤ 2nd ring and lower side rail
- ⑥ Upper side rail
- ⑦ 1st ring and spacer



NOTE:

Install the pistons with the “O” mark facing towards the exhaust side.



CLUTCH/CLUTCH RELEASE ASSEMBLY INSPECTION

CLUTCH DRIVE PLATES

NOTE:

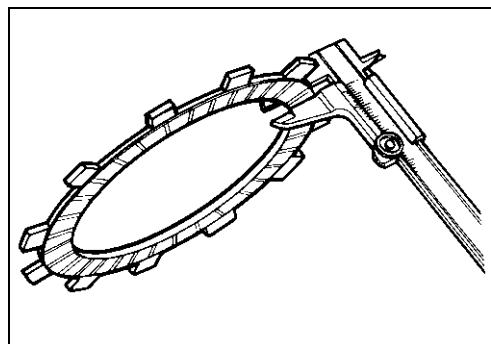
Wipe off any engine oil from the clutch drive plates using a clean rag.

Measure the thickness of the clutch drive plates using vernier calipers.

If a clutch drive plate thickness is thinner than the service limit, replace the clutch plates as a set.

TOOL 09900-20102: Vernier calipers

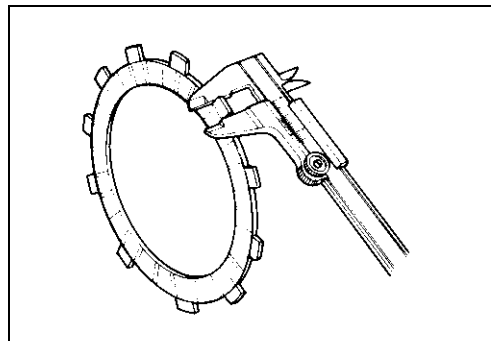
DATA Clutch drive plate thickness
 Standard (No. 1): 2.92 – 3.08 mm
 (No. 2): 3.42 – 3.58 mm
 Service Limit (No. 1): 2.62 mm
 (No. 2): 3.31 mm



Measure the claw width of the clutch drive plates using vernier calipers. If a clutch drive plate claw width is less than the service limit, replace the clutch plates as a set.

TOOL 09900-20102: Vernier calipers

DATA Clutch drive plate claw width (No. 1 and No. 2)
 Service Limit: 15.4 mm




CLUTCH DRIVEN PLATES

NOTE:

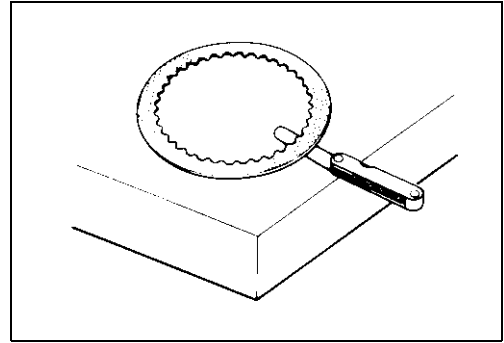
Wipe off any engine oil from the clutch driven plates using a clean rag.

Measure each clutch driven plate for distortion using the thickness gauge and surface plate.

If a clutch driven plate distortion exceeds the service limit, replace the clutch plates as a set.


 **09900-20803: Thickness gauge**

 **Clutch driven plate distortion**
Service Limit: 0.1 mm

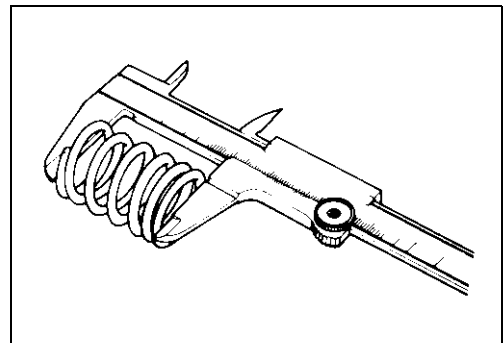


CLUTCH SPRING FREE LENGTH

Measure the free length of each clutch spring using vernier calipers. If any spring is shorter than the service limit, replace all of the springs.

 **09900-20102: Vernier calipers**

 **Clutch spring free length**
Service Limit: 47.5 mm



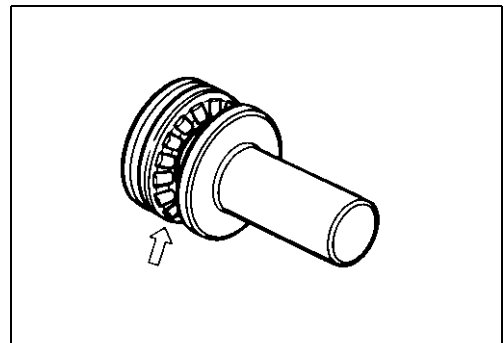
CLUTCH RELEASE BEARING

Inspect the clutch release bearing for any abnormality, especially cracks. When removing the bearing from the clutch, decide whether it can be reused or if it should be replaced.

Smooth engagement and disengagement of the clutch depends on the condition of this bearing.

NOTE:

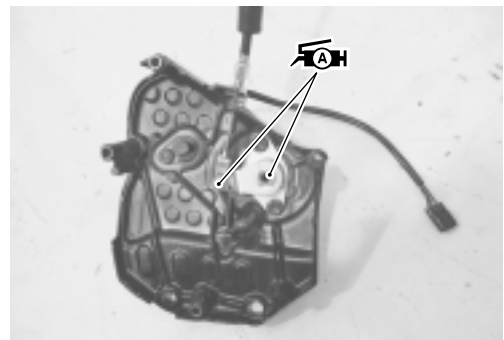
The thrust washer is located between the clutch pressure plate and the clutch release bearing.



CLUTCH RELEASE ASSEMBLY

- Before removing the clutch release assembly, operate the clutch lever by hand to inspect it for a smooth movement and any abnormal noise. If excessive resistance is felt, clean and apply SUZUKI SUPER GREASE "A" to the clutch release mechanism.

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



STARTER CLUTCH INSPECTION

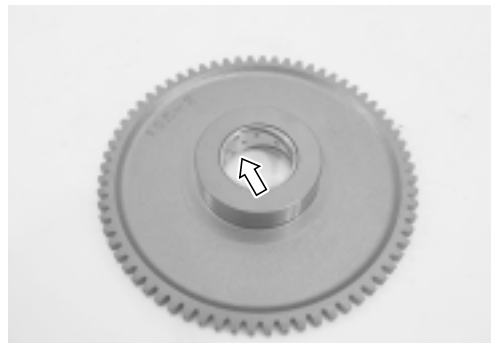
STARTER CLUTCH

Install the starter driven gear onto the starter clutch and turn the starter driven gear by hand (the gear turns in only one direction). The starter driven gear should turn smoothly. If excessive resistance is felt while turning the starter driven gear, inspect the starter clutch. Also, inspect the surface of the starter driven gear which contacts the starter clutch, for wear or damage. If any wear or damage is found, replace the defective part(-s).



STARTER DRIVEN GEAR BEARING

Inspect the starter driven gear bearing for wear or damage.



GEARSHIFT LINKAGE INSPECTION

GEARSHIFT SHAFT/GEARSHIFT ARM

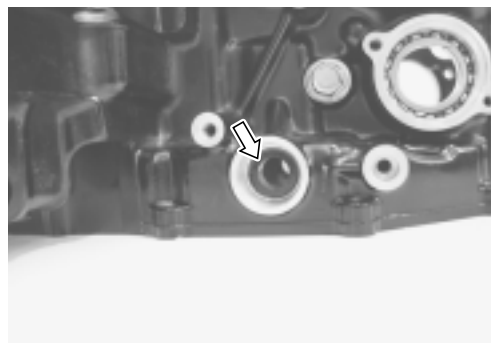
Check the gearshift shaft/gearshift arm for bends or wear. Check the return spring on the gearshift arm for damage or fatigue.

If any defects are found, replace the defective part(-s).



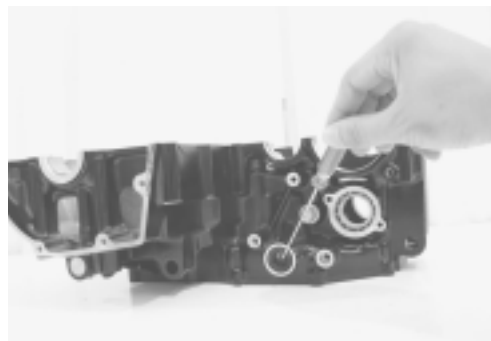
OIL SEAL INSPECTION

Inspect the gearshift shaft oil seal's lip for damage or wear. If any defects are found, replace the oil seal with a new one.



OIL SEAL REPLACEMENT

- Remove the gearshift shaft oil seal from the lower crankcase.



- Install the new oil seal using the special tool.

 09943-88211: Pinion bearing installer

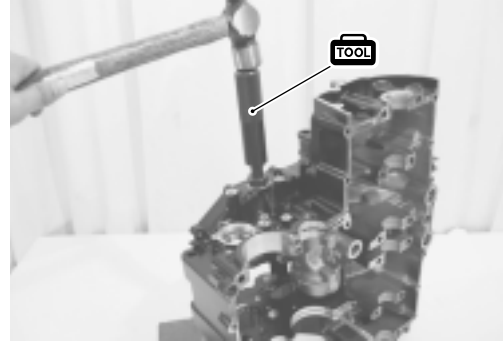
CAUTION

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

NOTE:

Apply *SUZUKI SUPER GREASE "A"* onto the oil seal lip to prevent oil seal damage when installing the lower crankcase.

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



GEARSHIFT SHAFT HOLE

Check the gearshift shaft hole for damage or wear.



GEARSHIFT SHAFT REASSEMBLY

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



TRANSMISSION INSPECTION AND SERVICE

CAUTION

Identify the position of each removed part. Organize the parts in their respective groups (i.e., drive or driven) so that they can be reinstalled in their original positions.

GEARSHIFT FORK-TO-GEARSHIFT FORK GROOVE CLEARANCE

Measure the gearshift fork clearance in the groove of its respective gear using the thickness gauge.

If the clearance exceeds the specification, replace the fork, its respective gear or both.

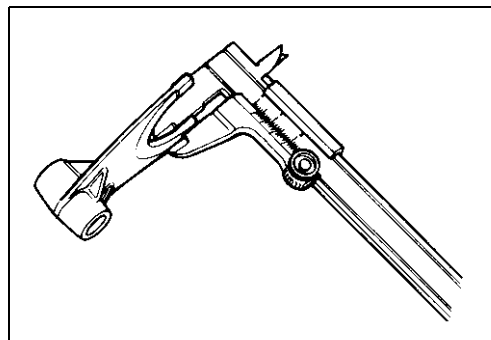
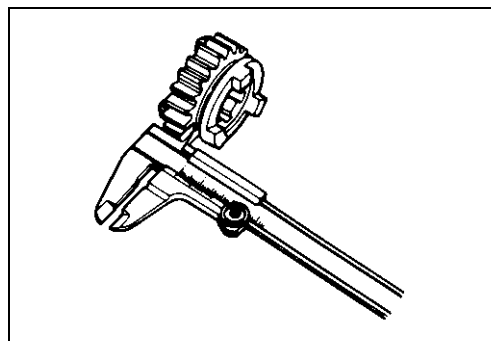
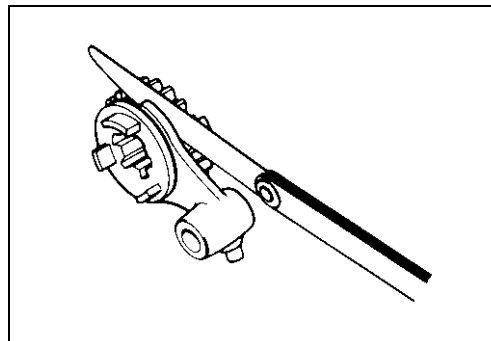
The clearance for each of the three gearshift forks plays an important role in the smoothness and positiveness of the shifting action.

TOOL 09900-20803: Thickness gauge
09900-20102: Vernier calipers

DATA Gearshift fork-to-gearshift fork groove clearance
Standard: 0.10 – 0.30 mm
Service Limit: 0.50 mm

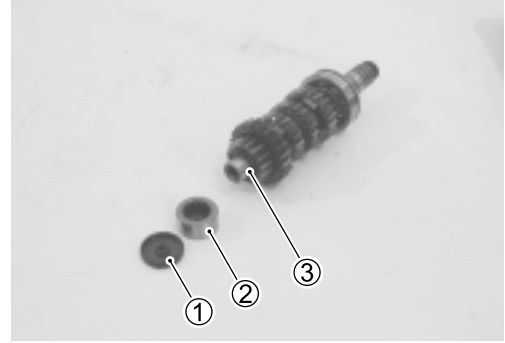
DATA Gearshift fork groove width
Standard (#1 & #3) : 4.80 – 4.90 mm
(#2) : 5.00 – 5.10 mm

DATA Gearshift fork thickness
Standard (#1 & #3) : 4.60 – 4.70 mm
(#2) : 4.80 – 4.90 mm



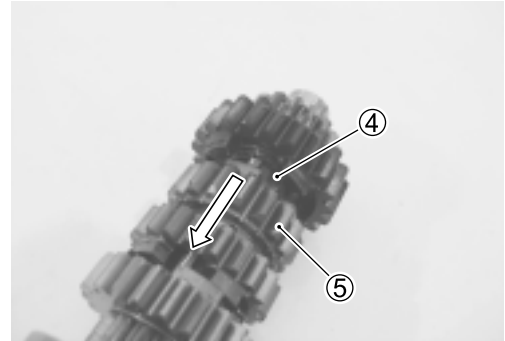
DISASSEMBLY**Countershaft assembly**

- Remove the cap ①, left end bearing ② and oil seal ③.

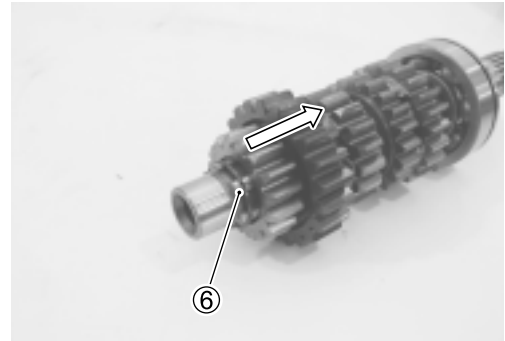


- Remove the 6th (top) drive gear circlip ④ from its groove and slide it towards the 3rd/4th drive gears ⑤.

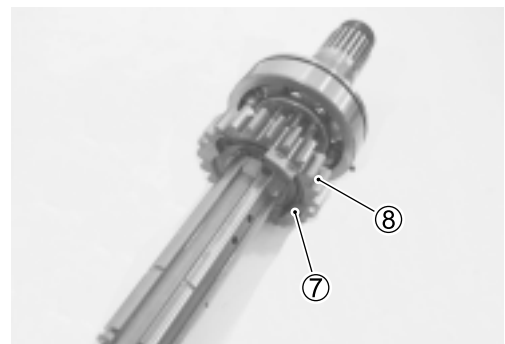
TOOL 09900-06107: Snap ring pliers



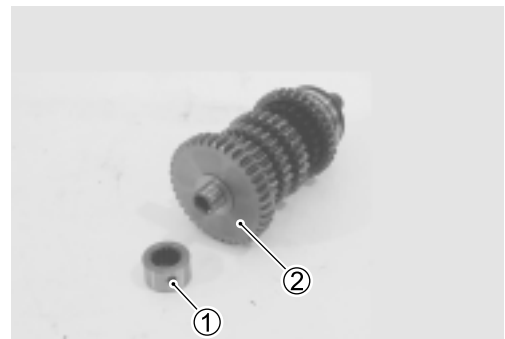
- Slide the 6th (top) and 2nd drive gears toward the 3rd/4th drive gears, then remove the 2nd drive gear circlip ⑥.
- Remove the 2nd, 6th (top), washer, circlip and 3rd/4th drive gears.



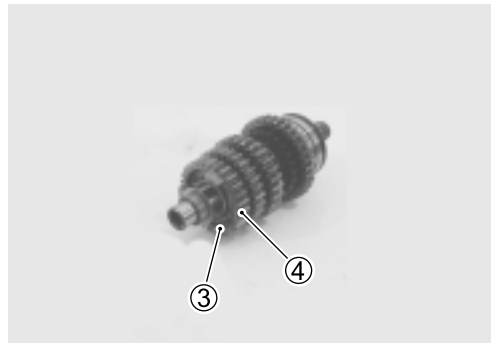
- Remove the circlip, 5th drive gear bushing ⑦ and the 5th drive gear ⑧.

**Driveshaft assembly**

- Remove the right end bearing ①, washer and 1st (low) driven gear ②.



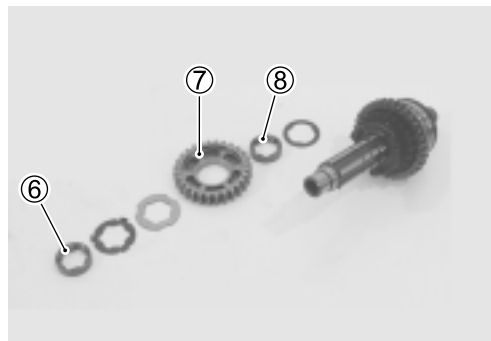
- Remove the 1st (low) driven gear bushing ③, washer and the 5th driven gear ④.



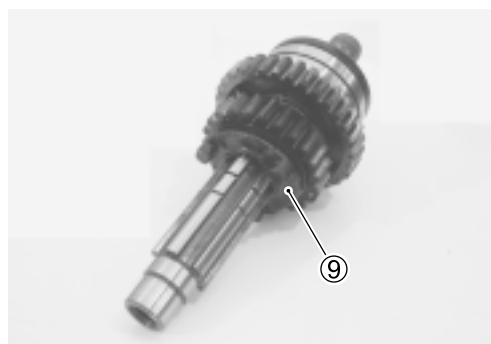
- Remove the circlip, washer and 4th driven gear ⑤.



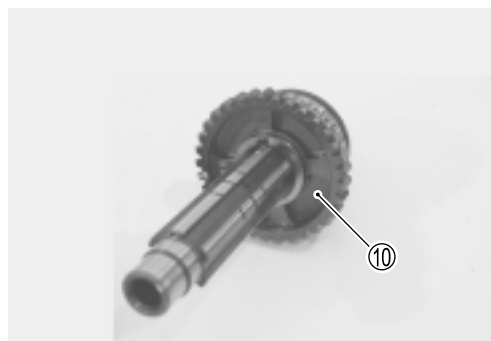
- Remove the 4th driven gear bushing ⑥, lock washers, 3rd driven gear ⑦, 3rd driven gear bushing ⑧ and washer.



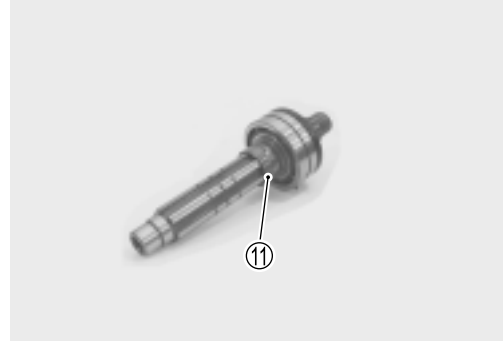
- Remove the circlip and 6th (top) driven gear ⑨.



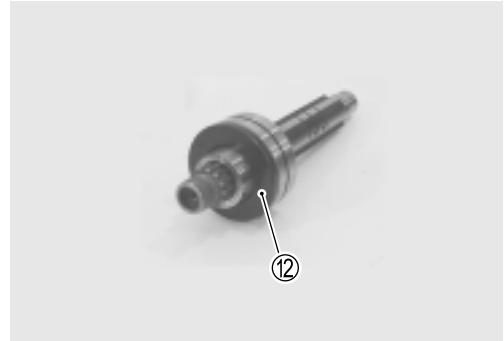
- Remove the circlip, washer and 2nd driven gear ⑩.



- Remove the 2nd driven gear bushing ⑪.



- Remove the oil seal ⑫.



REASSEMBLY

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

NOTE:

- * Before installing the gears, rotate the bearing by hand to inspect for abnormal noises and smooth rotation. Replace the bearing if there is anything unusual.
- * Before installing the gears, lightly coat the driveshaft, countershaft and bushings with molybdenum oil solution.
- * Before installing the oil seal, apply SUZUKI SUPER GREASE "A" to the oil seal lip.

 99000-25140: SUZUKI MOLY PASTE

 99000-25010: SUZUKI SUPER GREASE "A"

CAUTION

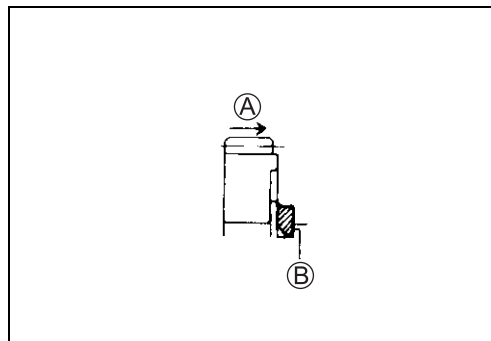
- * Never reuse a circlip. After a circlip has been removed from a shaft, it should be discarded and a new circlip must be installed.
- * When installing a new circlip, do not expand the end gap larger than required to slip the circlip over the shaft.
- * After installing a circlip, make sure that it 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. (☞ 3-53)

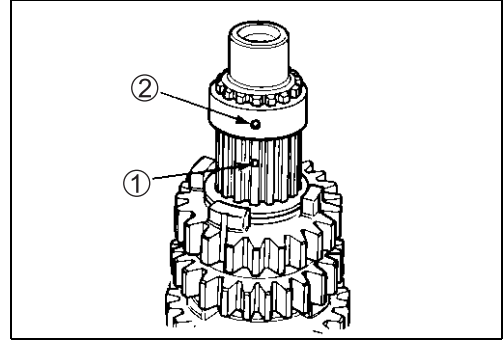
- When installing a new circlip, pay attention to the direction of the circlip. Fit the circlip to the side where the thrust is, as shown. The rounded side should be against the gear surface.

- Ⓐ Thrust
- Ⓑ Sharp edge

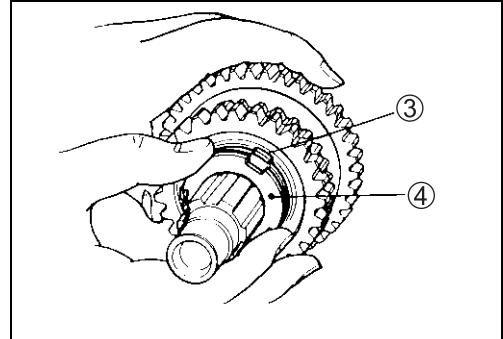


CAUTION

When installing the 3rd and 4th driven gear bushings onto the driveshaft, align the driveshaft oil hole ① with the bushing oil hole ②.

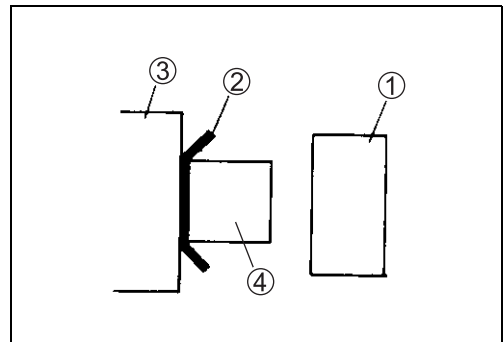


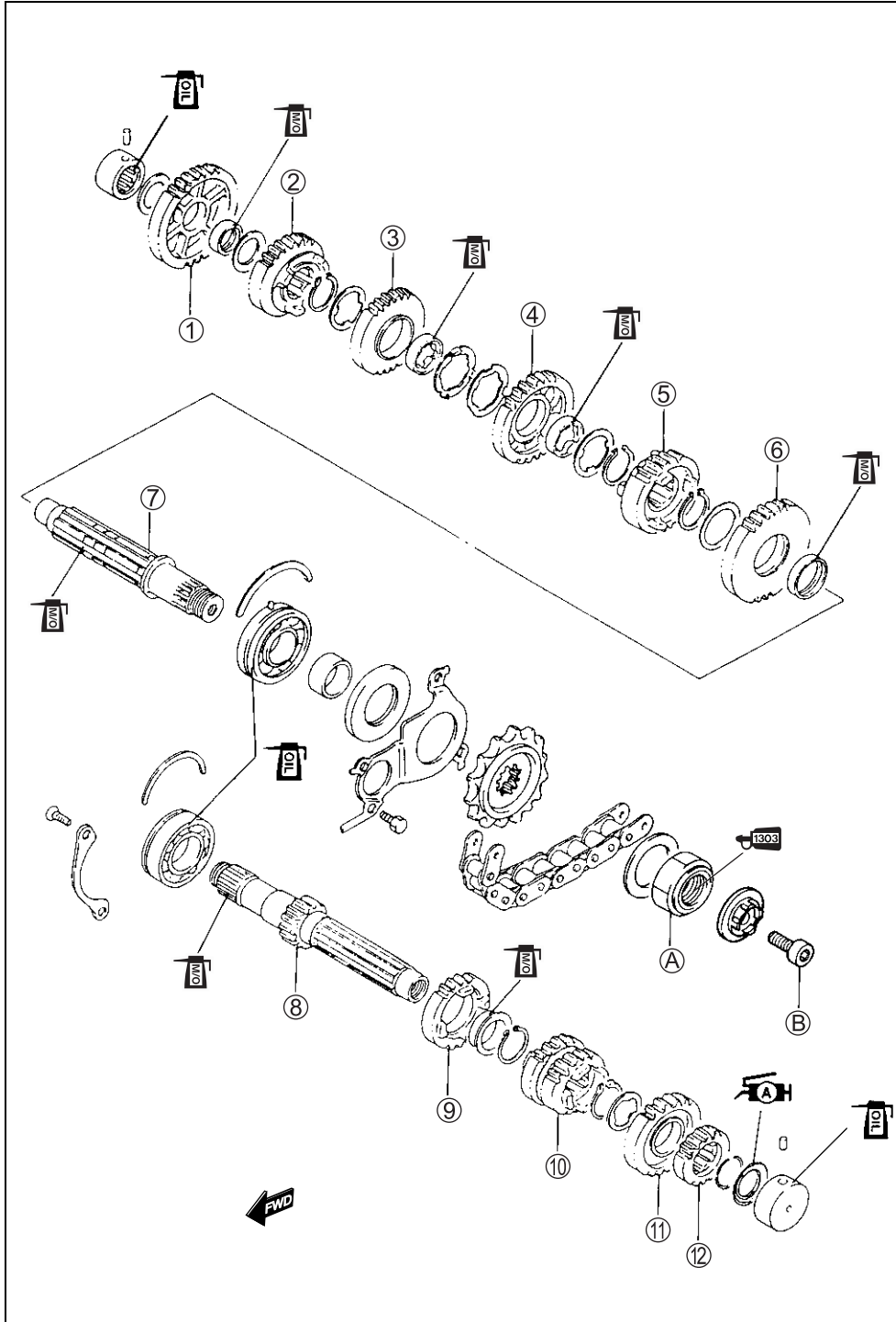
- After installing the 3rd driven gear onto the driveshaft, install lock washer #2 ③ onto the driveshaft, and position it so it fits into the groove.
- Then, fit lock washer #1 ④ into lock washer #2 ③.

**CAUTION**

Install the oil seal as shown in the illustration.

- ① Left end bearing
- ② Oil seal
- ③ 2nd drive gear
- ④ Countershaft

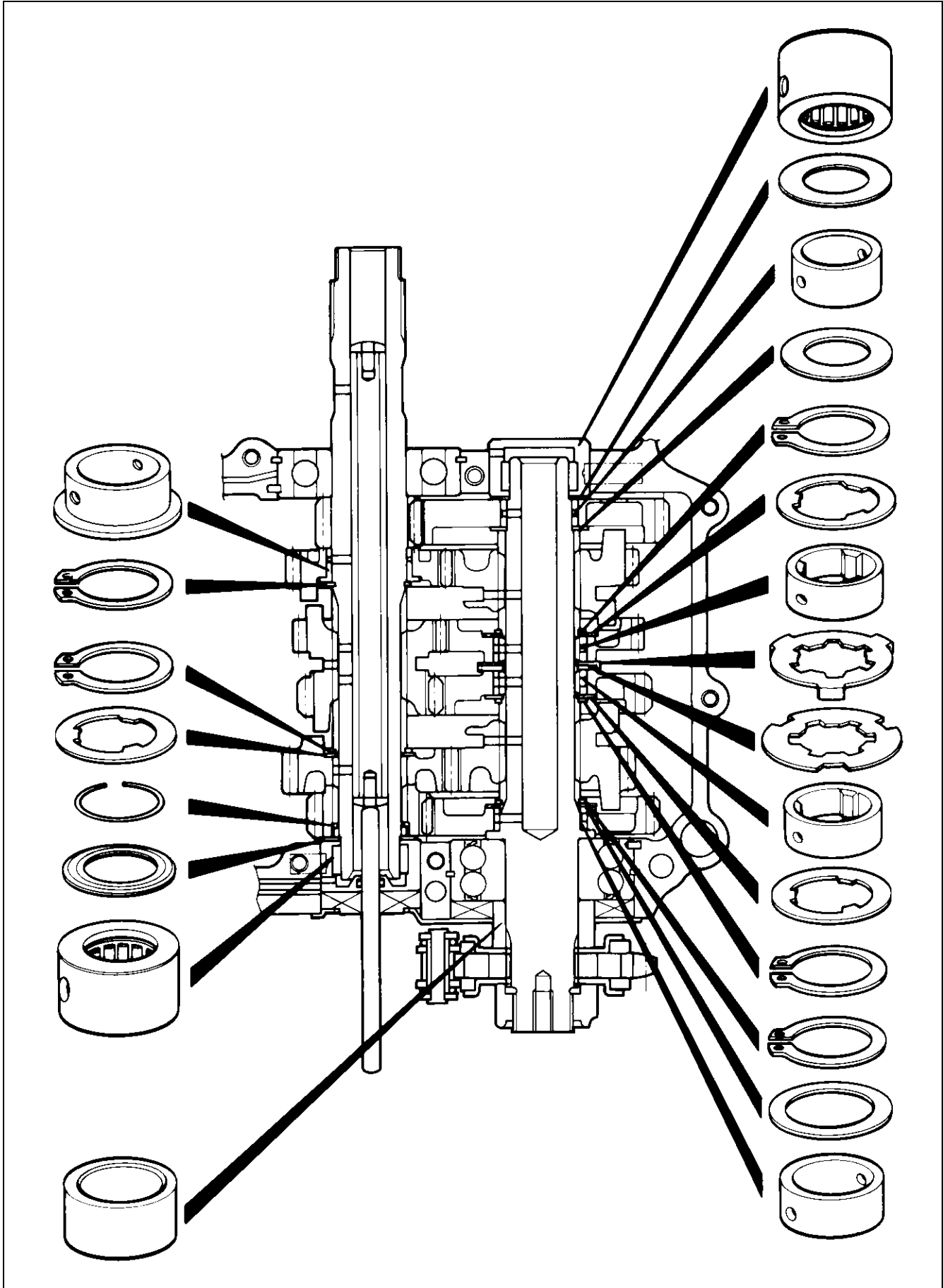




①	1st (low) driven gear
②	5th driven gear
③	4th driven gear
④	3rd driven gear
⑤	6th (top) driven gear
⑥	2nd driven gear
⑦	Driveshaft
⑧	Countershaft/1st (low) drive gear
⑨	5th drive gear
⑩	3rd/4th drive gear
⑪	6th (top) drive gear
⑫	2nd drive gear



ITEM	N·m	kgf·m
Ⓐ	115	11.5
Ⓑ	13	1.3



CONROD/CRANKSHAFT INSPECTION

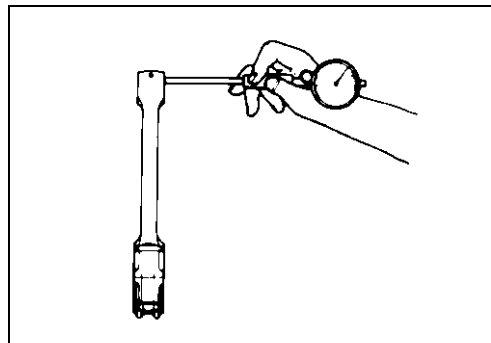
CONROD SMALL END I.D.

Measure the conrod small end inside diameter using the small bore gauge.

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

TOOL 09900-20602: Dial gauge (1/1 000 mm)
09900-22403: Small bore gauge (18 – 35 mm)

DATA Conrod small end I.D.
Service Limit: 18.040 mm



CONROD BIG END SIDE CLEARANCE

Check the conrod big end side clearance using the thickness gauge. If the clearance exceeds the limit, measure the conrod big end width and crank pin width.

If any of the measurements are out of specification, replace the defective part(-s).

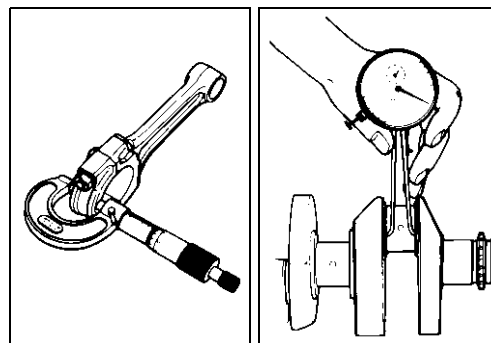
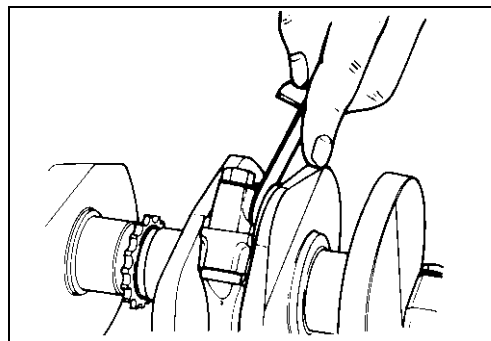
TOOL 09900-20803: Thickness gauge

DATA Conrod big end side clearance
Service Limit: 0.3 mm

TOOL 09900-20205: Micrometer (0 – 25 mm)
09900-20605: Dial calipers (10 – 34 mm)

DATA Conrod big end width
Standard: 20.95 – 21.00 mm

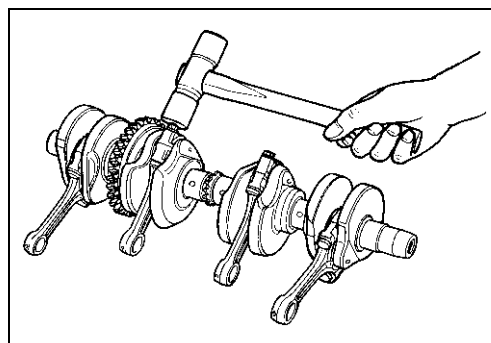
DATA Crank pin width
Standard: 21.10 – 21.15 mm



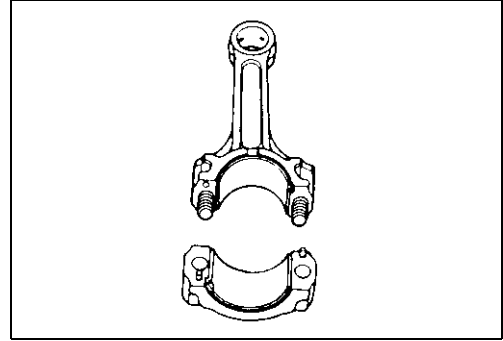
CONROD-CRANK PIN BEARING INSPECTION AND SERVICE

CONROD-CRANK PIN BEARING

- Loosen the bearing cap nuts and tap the bearing cap nut lightly using a plastic hammer to remove the bearing cap.

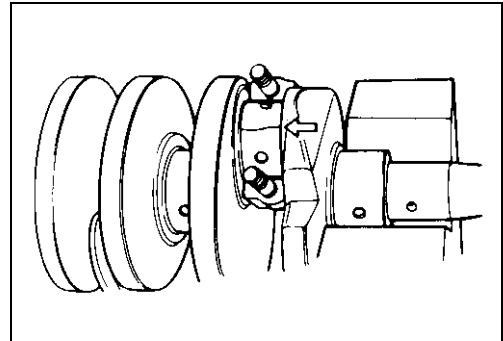


- Remove the conrods and mark them to identify their respective cylinders.
- Inspect the bearing surfaces for any signs of fusion, pitting, burns, or flaws. If there is any damage, replace them with the specified set of bearings.



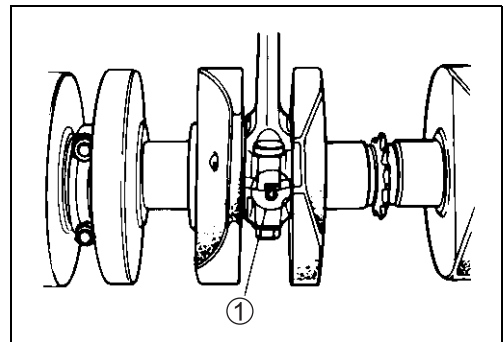
CONROD-CRANK PIN BEARING SELECTION

- Place the plastigauge axially along the crank pin, avoiding the oil hole, as shown.
- Tighten the conrod cap nuts to the specified torque, in two stages.



NOTE:

When installing the bearing cap to the crank pin, make sure that the number ① on the conrod faces towards the intake side.



Conrod cap nut

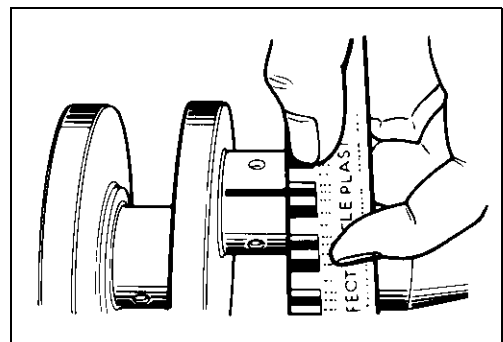
(Initial) : 19 N·m (1.9 kgf·m)

(Final) : 35 N·m (3.5 kgf·m)

TOOL 09900-22301: Plastigauge

NOTE:

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



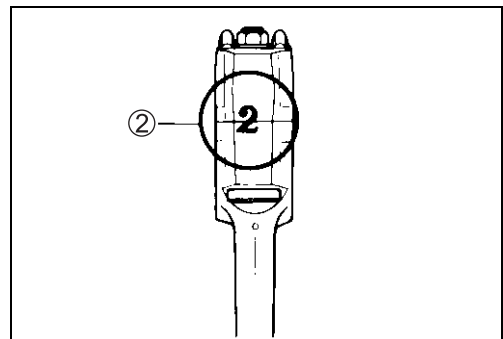
- Remove the bearing caps, and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

DATA Conrod big end oil clearance

Standard: 0.032 – 0.056 mm

DATA Conrod big end oil clearance

Service Limit: 0.080 mm

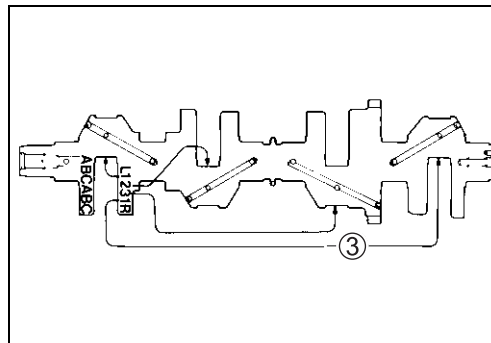


- If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.
- Check the corresponding conrod I.D. code numbers (“1” or “2”) ②.

- Check the corresponding crank pin O.D. code numbers (“1”, “2” or “3”) ③.

Bearing selection table

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



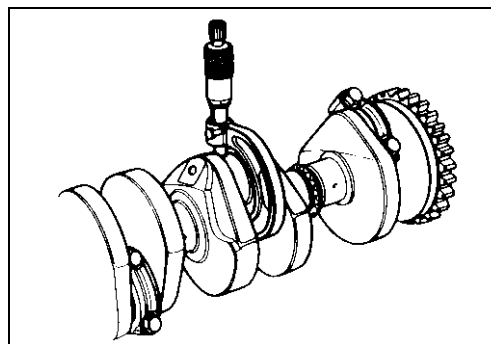
Conrod I.D. specification

Code	I.D. specification
1	37.000 – 37.008 mm
2	37.008 – 37.016 mm

Crank pin O.D. specification

Code	O.D. specification
1	33.992 – 34.000 mm
2	33.984 – 33.992 mm
3	33.976 – 33.984 mm

 09900-20202: Micrometer (25 – 50 mm)



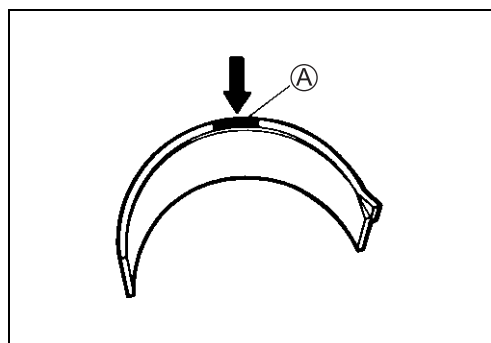
Bearing thickness specification

Color (Part No.)	Thickness
Green (12164-26E00-0A0)	1.480 – 1.484 mm
Black (12164-26E00-0B0)	1.484 – 1.488 mm
Brown (12164-26E00-0C0)	1.488 – 1.492 mm
Yellow (12164-26E00-0D0)	1.492 – 1.496 mm

Ⓐ Color code

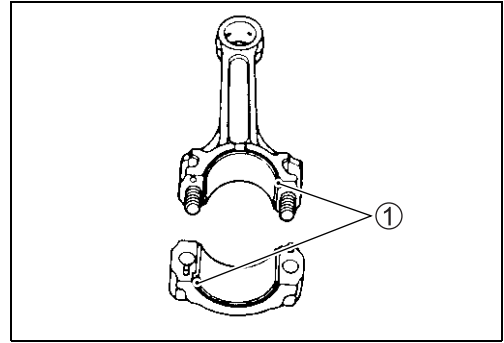
CAUTION

The bearings should be replaced as a set.



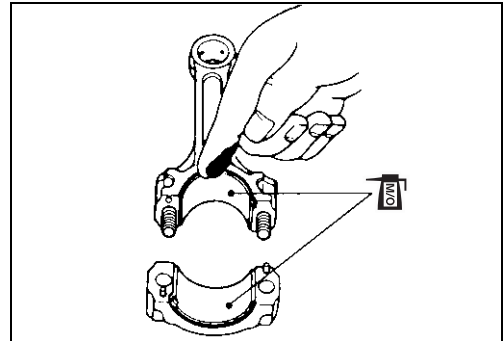
BEARING ASSEMBLY

- When installing the bearings into the bearing cap and conrod, be sure to install the tab ① first, and then press in the opposite side of the bearing.



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

 99000-25140: SUZUKI MOLY PASTE



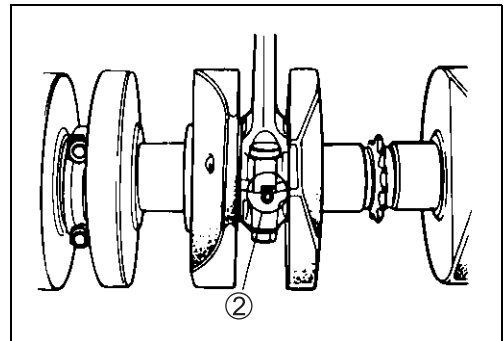
- When mounting the conrod on the crankshaft, make sure that the numbers ② on the conrod faces towards the intake side.
- Tighten the conrod cap nuts to the specified torque.

Conrod cap nut

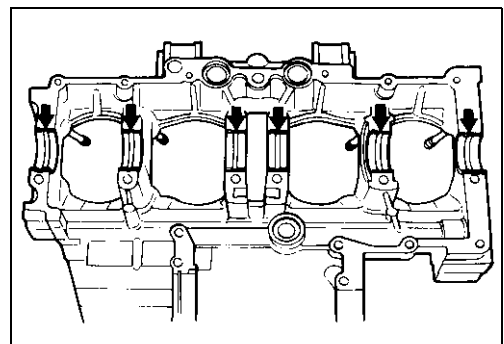
(Initial) : 19 N·m (1.9 kgf-m)

(Final) : 35 N·m (3.5 kgf-m)


- Check that the conrod moves smoothly.

**CRANKCASE-CRANKSHAFT BEARING INSPECTION AND SERVICE****CRANKCASE-CRANKSHAFT BEARING**

- Inspect each upper and lower crankcase bearing for any damage.

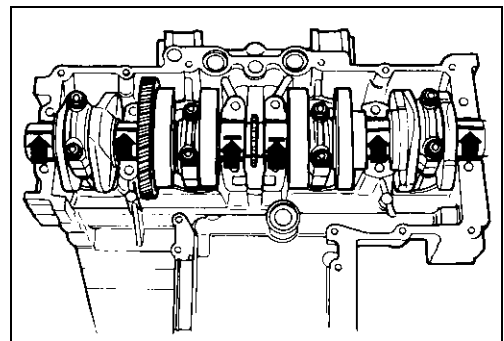
**CRANKCASE-CRANKSHAFT BEARING SELECTION**

- Install the plastigauge onto each crankshaft journal as shown.

 09900-22301: Plastigauge

NOTE:

Do not place the plastigauge on the oil hole and do not rotate the crankshaft when a piece of plastigauge is installed.

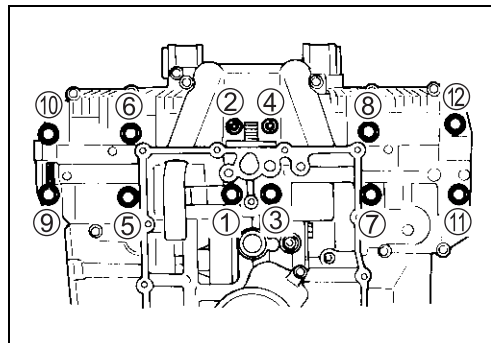


- Mate the lower crankcase with the upper crankcase and tighten the crankshaft bolts to the specified torque and in the proper tightening sequence.

🔧 Crankcase bolt

(Initial) : 13 N·m (1.3 kgf-m)

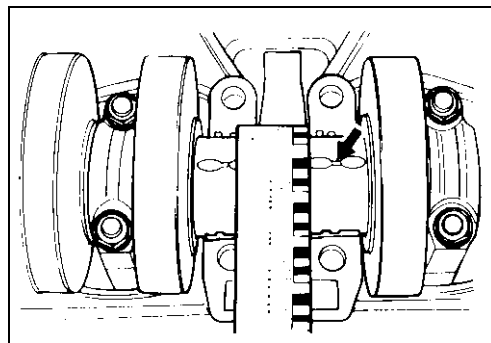
(Final) : 23 N·m (2.3 kgf-m)



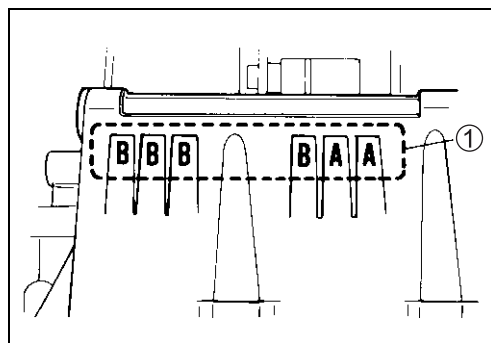
- Remove the lower crankcase and measure the width of compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge.

DATA Crankshaft journal oil clearance
Standard: 0.020 – 0.044 mm

DATA Crankshaft journal oil clearance
Service Limit: 0.08 mm



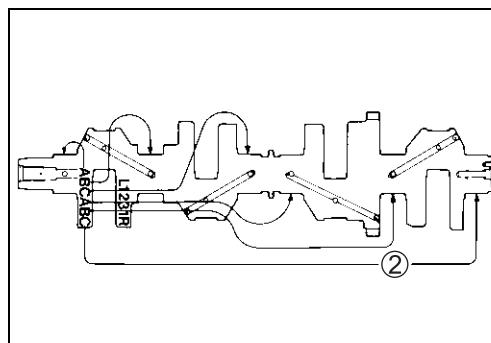
- If the width at the widest part of the compressed plastigauge exceeds the limit, replace the set of bearings with new ones. Refer to the selection table.
- Check the corresponding crankcase journal I.D. codes (“A” or “B”) ①, which are stamped on the rear of the upper crankcase.



- Check the corresponding crankshaft journal O.D. codes (“A”, “B” or “C”) ②, which are stamped on the crankshaft.

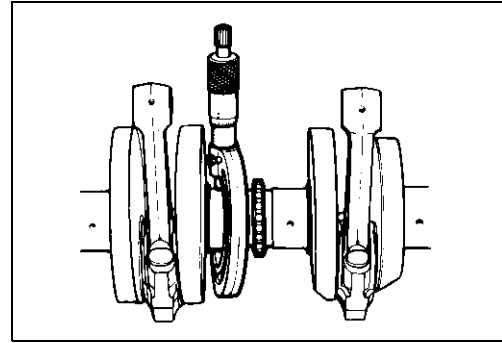
Bearing selection table

		Crankshaft O.D. ②		
Code		A	B	C
Crankcase I.D. ①	A	Green	Black	Brown
	B	Black	Brown	Yellow



Crankcase journal I.D. specification

Code	I.D. specification
A	35.000 – 35.008 mm
B	35.008 – 35.016 mm



Crankshaft journal O.D. specification

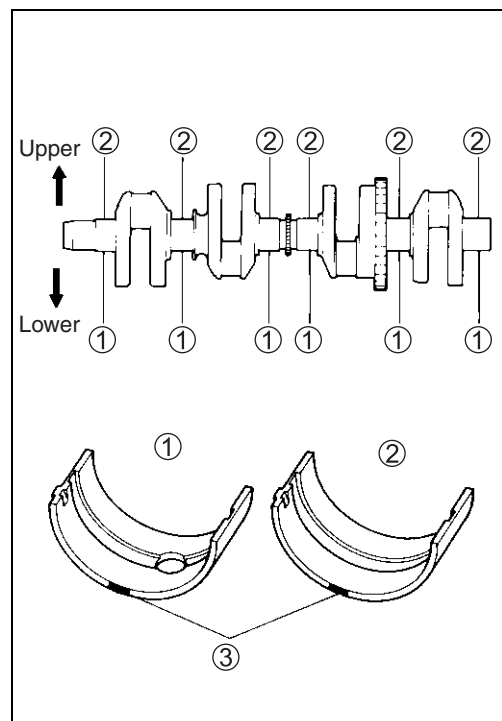
Code	O.D. specification
A	31.992 – 32.000 mm
B	31.984 – 31.992 mm
C	31.976 – 31.984 mm

 09900-20202: Micrometer (25 – 50 mm)

Bearing thickness specification

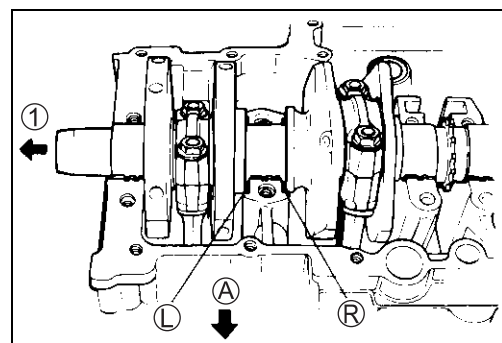
Color (Part No.)	Thickness
Green (12229-27A00-0A0) ... ① (12229-27A10-0A0) ... ②	1.486 – 1.490 mm
Black (12229-27A00-0B0) ... ① (12229-27A10-0B0) ... ②	1.490 – 1.494 mm
Brown (12229-27A00-0C0) ... ① (12229-27A10-0C0) ... ②	1.494 – 1.498 mm
Yellow (12229-27A00-0D0) ... ① (12229-27A10-0D0) ... ②	1.498 – 1.502 mm

- ① Grooved bearing with oil hole (for lower crankcase)
- ② Grooved bearing (for upper crankcase)
- ③ Color code



CRANKSHAFT THRUST CLEARANCE ADJUSTMENT

- With the crankshaft's right-side and left-side thrust bearings inserted into the upper crankcase, measure the thrust clearance between the left-side thrust bearing and the crankshaft using the thickness gauge.
- Ⓡ: Right-side thrust bearing
- Ⓛ: Left-side thrust bearing
- Ⓐ: Front



NOTE:

Pull ① the crankshaft to the left so that there is no clearance on the right-side thrust bearing.

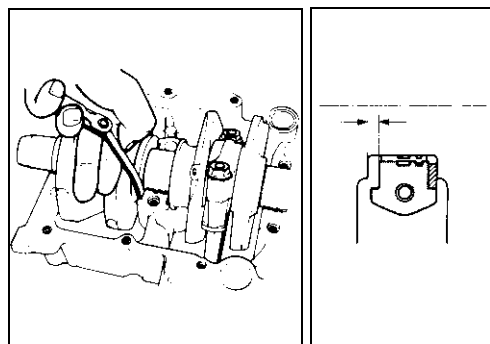
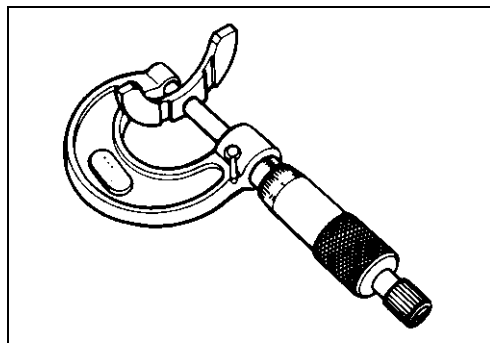
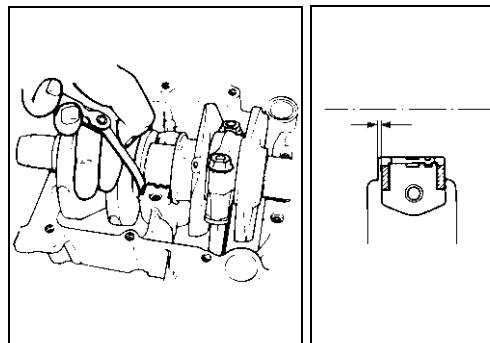
DATA Crankshaft thrust clearance
Standard: 0.04 – 0.09 mm

If the thrust clearance exceeds the standard range, adjust the thrust clearance as follows:

- Remove the right-side thrust bearing and measure its thickness using the micrometer. If the thickness of the right-side thrust bearing is below standard, replace it with a new bearing and measure the thrust clearance again, as described above.

DATA Right-side thrust bearing thickness
Standard: 2.425 – 2.450 mm

- If the right-side thrust bearing is within the standard range, reinsert the right-side thrust bearing and remove the left-side thrust bearing.
- With the left-side thrust bearing removed, measure the clearance using the thickness gauge as shown. Then, select a left-side thrust bearing from the selection table below.



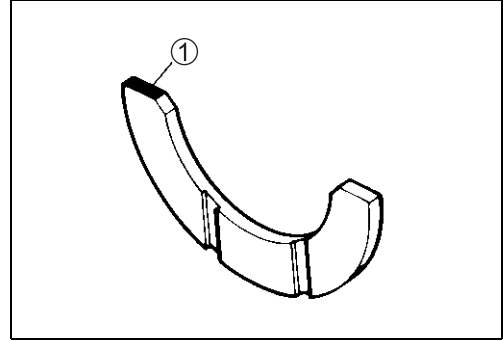
Left-side thrust bearing selection table

Clearance before inserting the left-side thrust bearing	Color ① (Part No.)	Thrust bearing thickness	Thrust clearance
2.415 – 2.440 mm	Red (12228-43411)	2.350 – 2.375 mm	0.04 – 0.09 mm
2.440 – 2.465 mm	Black (12228-43412)	2.375 – 2.400 mm	
2.465 – 2.490 mm	Blue (12228-43413)	2.400 – 2.425 mm	
2.490 – 2.515 mm	Green (12228-43414)	2.425 – 2.450 mm	
2.515 – 2.540 mm	Yellow (12228-43415)	2.450 – 2.475 mm	
2.540 – 2.565 mm	White (12228-43416)	2.475 – 2.500 mm	

- After selecting a left-side thrust bearing, install it and then measure the thrust clearance again.

NOTE:

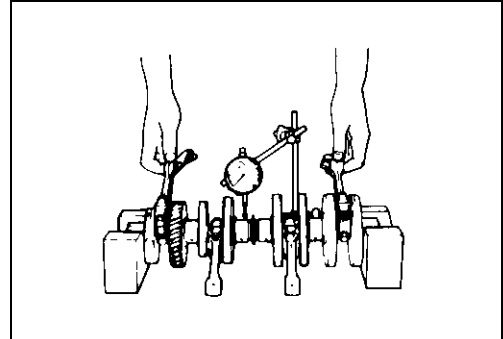
The right-side thrust bearing color code ① and part number are as follows. GREEN (12228-43414).

**CRANKSHAFT RUNOUT**

Support the crankshaft using V-blocks as shown, with the two end journals resting on the blocks. Set up the dial gauge as shown, and rotate the crankshaft slowly to read the runout. Replace the crankshaft if the runout exceeds the service limit.

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

- DATA** Crankshaft runout
- Service Limit: 0.05 mm



ENGINE REASSEMBLY

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

NOTE:

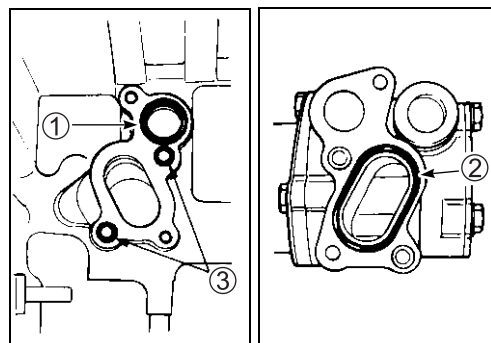
Apply engine oil to each running and sliding part before reassembling.

OIL PUMP

- Install the O-rings (① and ②) and dowel pins (③) in the correct position as shown.

CAUTION

Replace the O-rings with new ones to prevent oil leakage.




- Install the oil pump (④) into the lower crankcase with the three bolts and then tighten them to the specified torque.

NOTE:

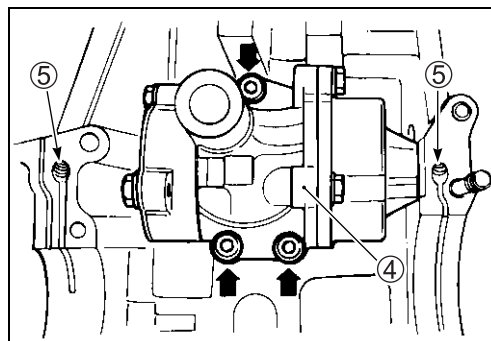
Apply a small quantity of THREAD LOCK "1342" to the bolts.

 99000-32050: THREAD LOCK "1342"

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

NOTE:

Make sure that the oil jets (⑤) in the lower crankcase are not clogged.



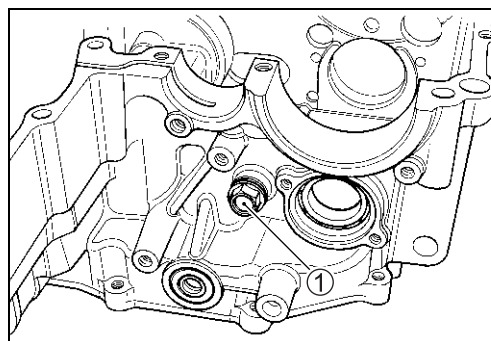
TRANSMISSION

- Install the gearshift cam stopper bolt (①).

NOTE:

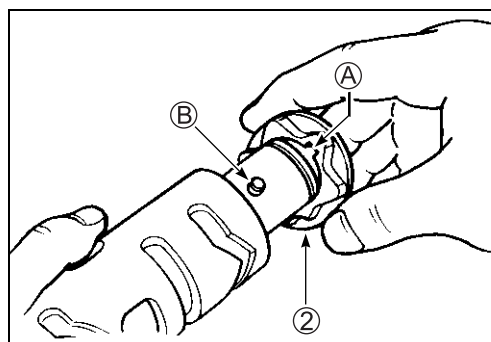
Before installing the gearshift cam stopper bolt (①), apply a small quantity of THREAD LOCK "1342" to it.

 99000-32050: THREAD LOCK "1342"



NOTE:

When installing the gearshift cam stopper plate (②), align the pin groove (A) with the pin (B) as shown.

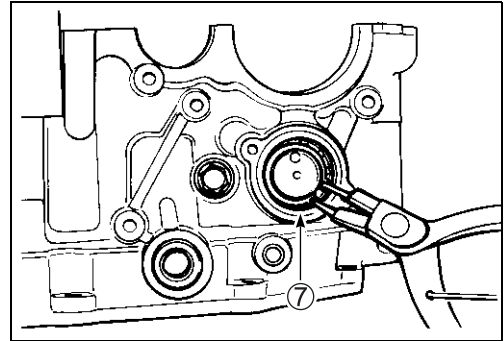
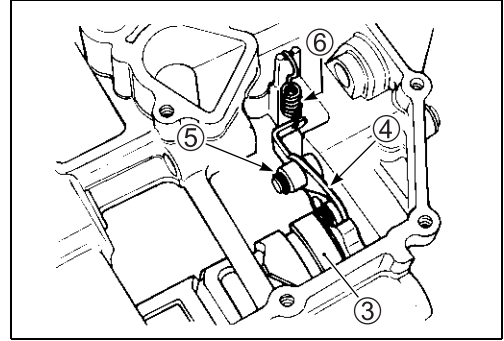


- Install the gearshift cam ③ and its related parts.

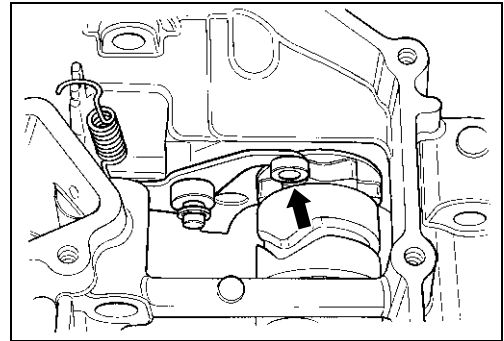
- ④ Gearshift cam stopper
- ⑤ Circlip
- ⑥ Spring
- ⑦ Circlip

CAUTION

Always use new circlips (⑤ and ⑦).

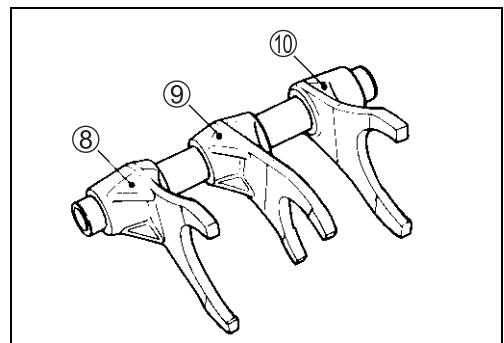


- Position the gearshift cam in the neutral position as shown. This will allow the gearshift forks and transmission gears to be installed easily.

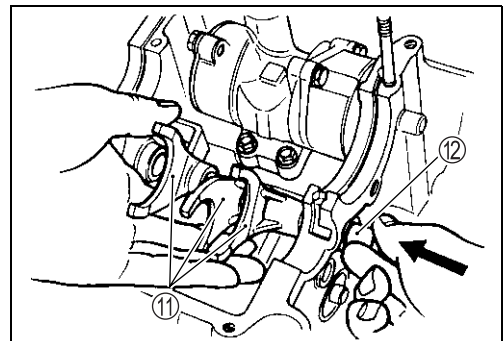


- Install the gearshift forks into the crankcase in the correct position and direction.

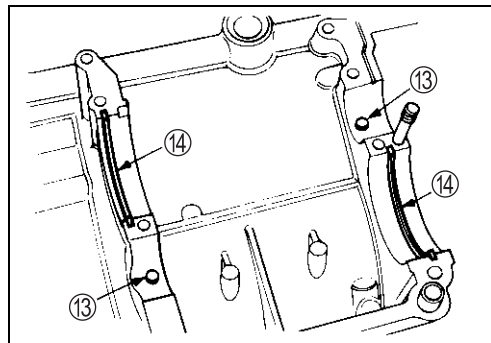
- ⑧ For the 6th (top) driven gear
- ⑨ For the 3rd/4th drive gear
- ⑩ For the 5th driven gear



- Hold the gearshift forks ⑪ by hand when installing the gearshift fork shaft ⑫.



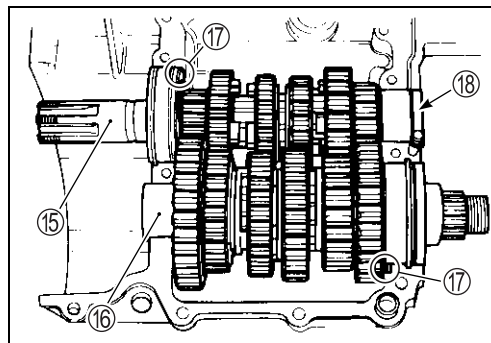
- Install the bearing pins ⑬ and C-rings ⑭ into the upper crankcase.



- Install the countershaft assembly ⑮ and driveshaft assembly ⑯ into the upper crankcase.

NOTE:

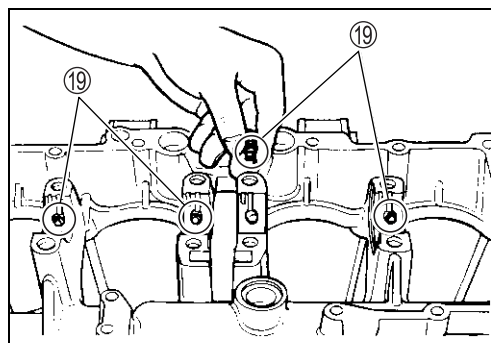
- * Be sure to install the bearing dowel pins ⑰ in their respective positions.
- * Install the countershaft end cap in the proper position ⑱.
- * Make sure that the countershaft assembly turns freely while holding the driveshaft assembly. If it does not turn freely, turn the gearshift cam to the neutral position.



NOTE:

Before installing the crankshaft journal bearings, make sure that the oil jets ⑲ in the upper crankcase are not clogged.

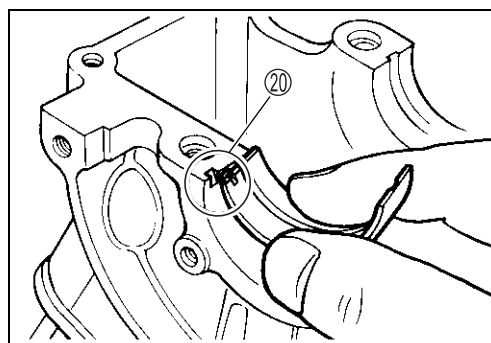
- ⑲ Oil jet (4 pcs)In the upper crankcase



- When installing the crankshaft journal bearings into the upper and lower crankcases, be sure to install the tab ⑳ first, and then press in the opposite side of the bearing.

CAUTION

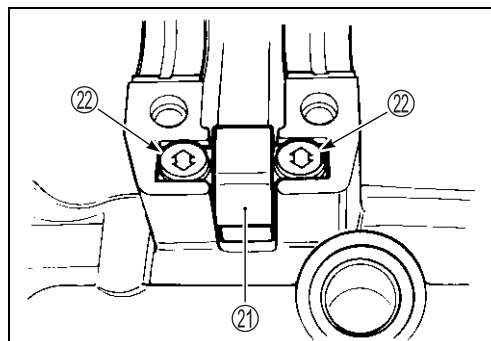
Do not touch the bearing surfaces with your hands. Grasp the bearings by their edges.



- Install the cam chain tensioner ㉑ and the two dampers ㉒ properly.

NOTE:

Be sure to face the arrow mark on the damper towards the front and rear, not towards the left and right.



- Install the O-rings (23 and 24).

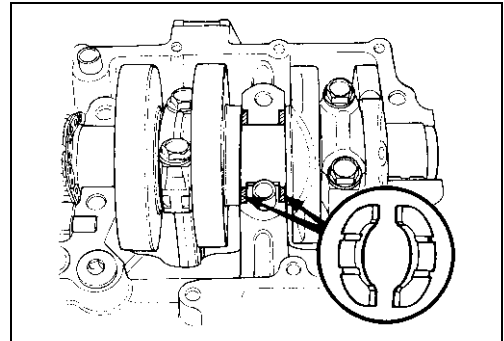
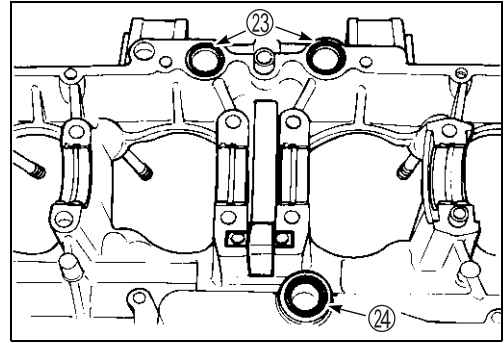
CAUTION

Replace the O-rings with new ones to prevent oil leakage.

- Before installing the crankshaft assembly, apply molybdenum oil solution to each crankshaft journal bearing.

 **99000-25140: SUZUKI MOLY PASTE**

- Install the crankshaft assembly along with the cam chain into the upper crankcase.
- Insert the right-and left-thrust bearings with the oil grooves facing towards the crankshaft web. (↩ 3-60)
- Clean the mating surfaces of the crankcases.
- Install the dowel pins in the upper crankcase.

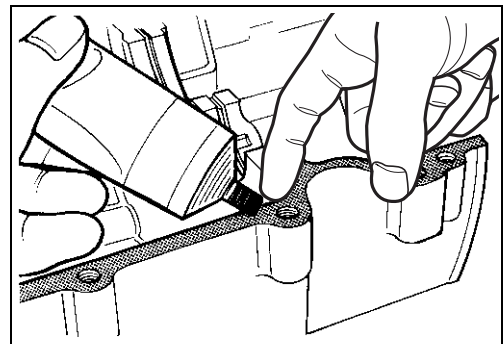
**CRANKCASE**

- Apply the recommended bond to the mating surface of the lower crankcase as follows.

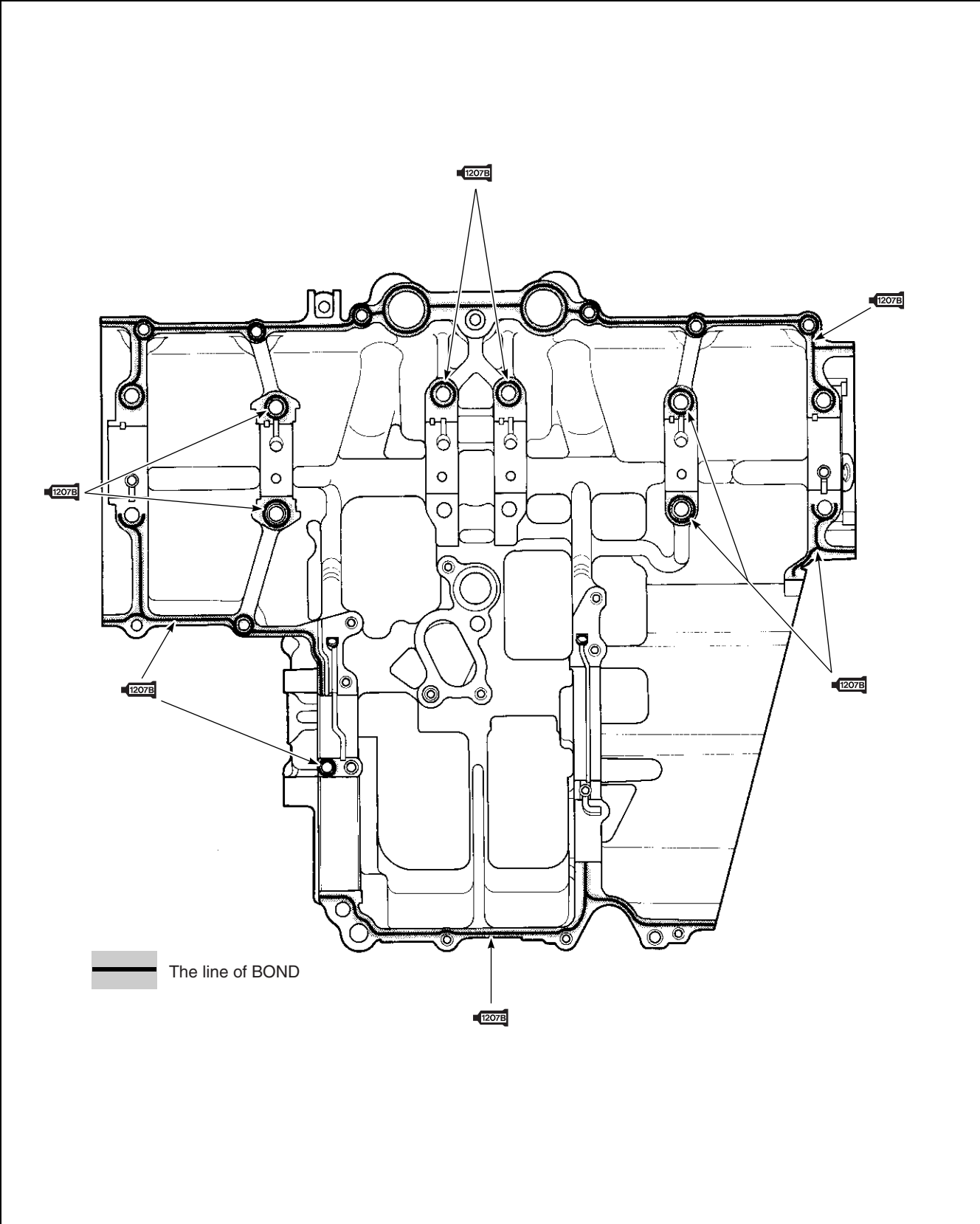
 **99000-31140: SUZUKI BOND "1207B"**

NOTE:

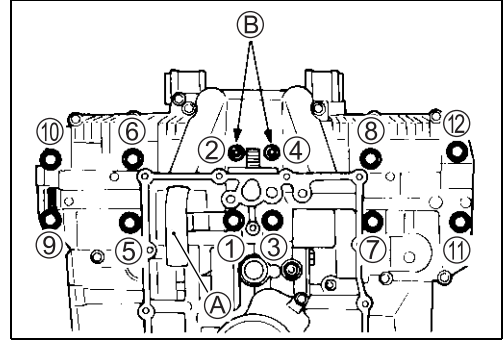
- * *Make sure that the mating surfaces are free from moisture, oil, dust and other foreign materials.*
- * *Apply the bond thinly and evenly and assemble the crankcases within a few minutes of application.*
- * *Take extreme care not to apply any bond to the bearing surfaces.*



BOND "1207B" should be applied to the following locations.



- Install the right oil pipe (A) with the bolt (1).
- Install the copper washers onto bolts (9) and (11).
- Install the two allen bolts at position (B).
- Install the ten crankcase bolts (8 mm).
- Tighten the crankcase bolts (crankshaft tightening bolts) in ascending order. Tighten each bolt a little at a time to equalize the pressure.



🔩 Crankcase bolt (M8)
 (Initial): 13 N·m (1.3 kgf-m)
 (Final): 23 N·m (2.3 kgf-m)

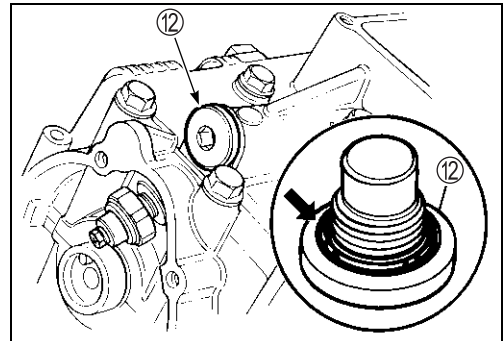
- Tighten the main oil gallery plug (12) to the specified torque.

CAUTION

Replace the O-ring with a new one.

🔩 Main oil gallery plug: 40 N·m (4.0 kgf-m)

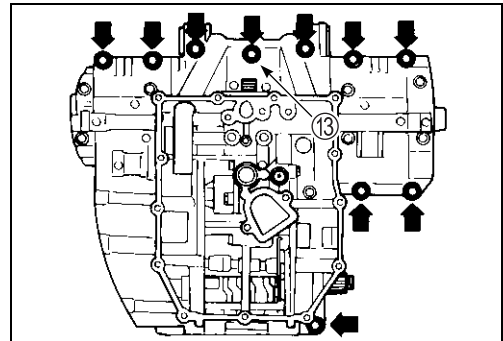
- Tighten the lower and upper crankcase bolts (6 mm) and nuts to the specified torque.



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

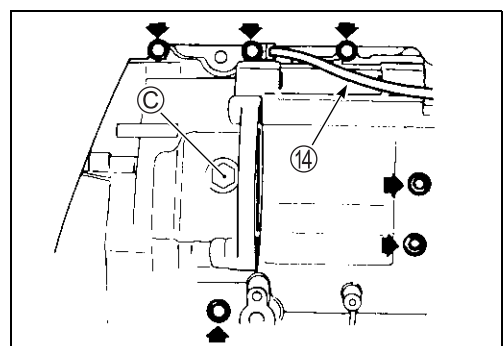
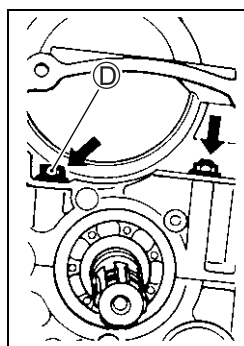
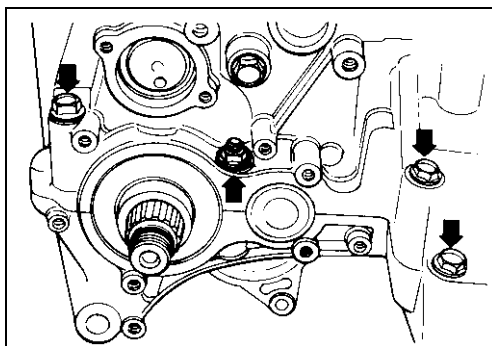
NOTE:

- * Install a new gasket washer at position (13).
- * After tightening the upper crankcase bolt (D), install the plug (C).
- * Install the engine ground wire (14) into the correct position as shown.



CAUTION

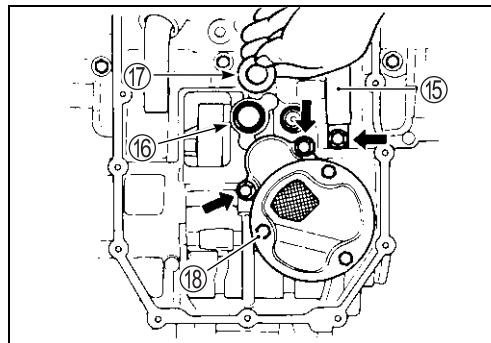
Use a new gasket washer to prevent oil leakage.




- Install the left oil pipe ⑮.
- Install a new O-ring ⑯ and shim ⑰.
- Install a new gasket and the oil sump filter ⑱.

CAUTION

Replace the gasket and O-ring with new ones to prevent oil leakage.

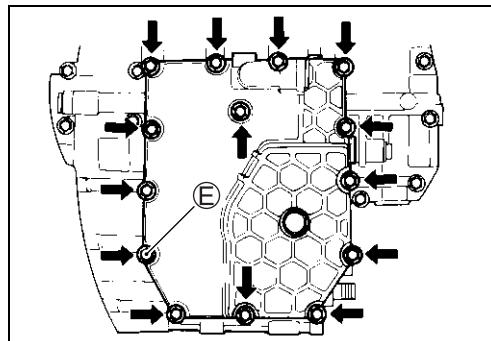


- Install a new gasket and the oil pan. Tighten the oil pan bolts to the specified torque.

 Oil pan bolt: 14 N·m (1.4 kgf·m)

CAUTION

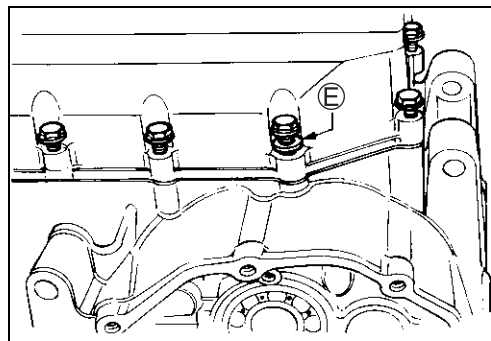
Replace the oil pan gasket with a new one to prevent oil leakage.

**NOTE:**

Install a new gasket washer to the oil pan bolt (E) as shown.

CAUTION

Use a new gasket washer to prevent oil leakage.

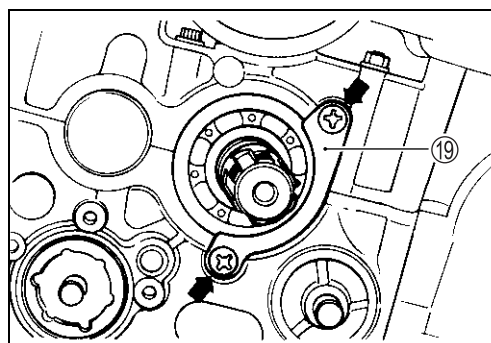


- Install the countershaft bearing retainer ⑲.

NOTE:

Apply a small quantity of **THREAD LOCK "1342"** to the two screws.

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

**GEAR POSITION SWITCH**

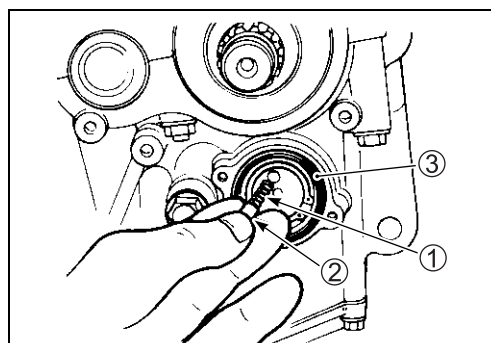
- Install the gear position switch.

NOTE:

When installing the gear position switch, be sure to install the spring ①, switch contact ② and O-ring ③ properly.

CAUTION

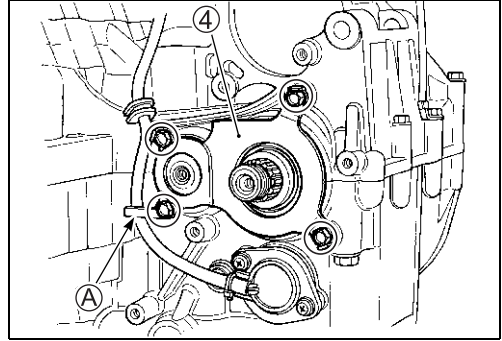
Replace the O-ring with a new one.



- Install the oil seal retainer ④ with the four bolts and then bend the tab on the retainer.

NOTE:

Route the gear position switch lead wire to the inside of the oil seal retainers tab ④ as shown.

**STARTER CLUTCH**

- Remove the grease from the tapered portion of the starter clutch and crankshaft. Use a nonflammable cleaning solvent to wipe off any oil or grease and make sure that the surfaces are completely dry.

NOTE:

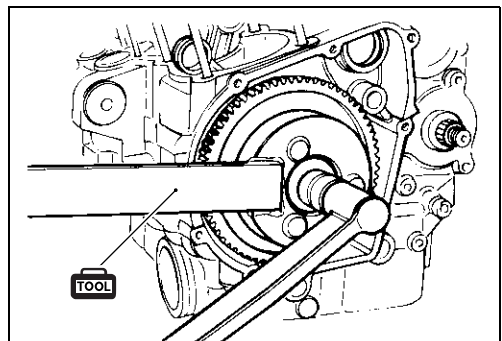
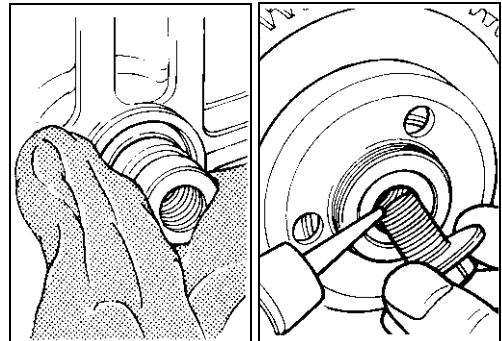
Apply a small quantity of **THREAD LOCK SUPER "1303"** to the threads of the starter clutch mounting bolt.

1303 99000-32030: THREAD LOCK SUPER "1303"

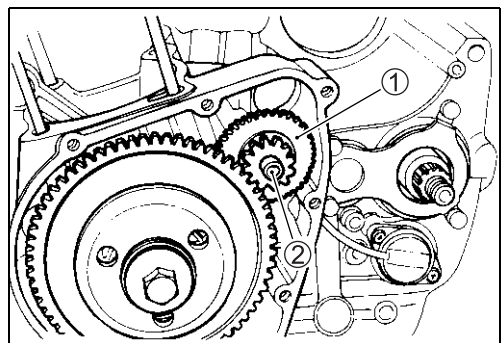
- Hold the starter clutch assembly using the special tool and then tighten the starter clutch mounting bolt to the specified torque.

TOOL 09920-34810: Starter clutch holder

Starter clutch mounting bolt: 150 N·m (15.0 kgf·m)

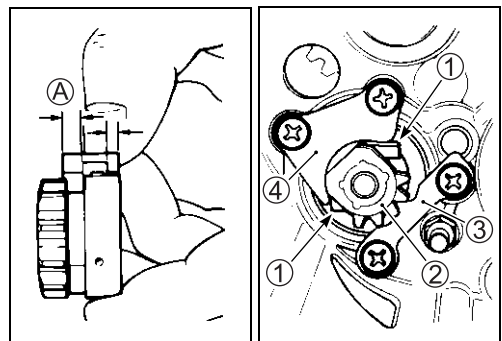


- Install the starter idle gear ① and its shaft ②.

**GEARSHIFT**

- Install each pawl ① into the gearshift cam driven gear ②.
- The large shoulder ④ must face to the outside.
- Install the cam guide ③ and pawl lifter ④.
- Apply a small quantity of **THREAD LOCK "1342"** to the screws.

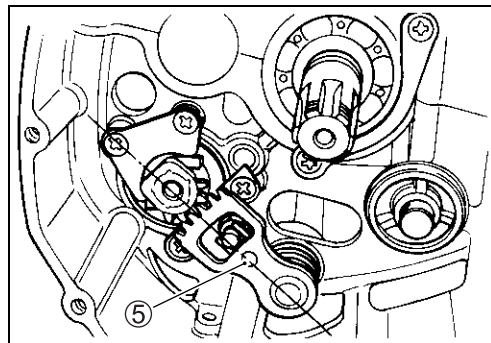
1342 99000-32050: THREAD LOCK "1342"



- Install the gearshift shaft ⑤.

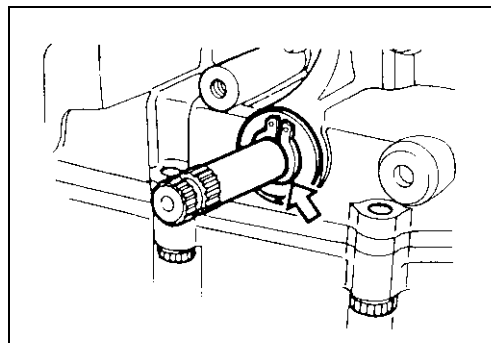
NOTE:

Align the center teeth on the gearshift shaft with the center teeth on the gearshift cam driven gear.



- Install the washer and fix the gearshift shaft with the circlip.

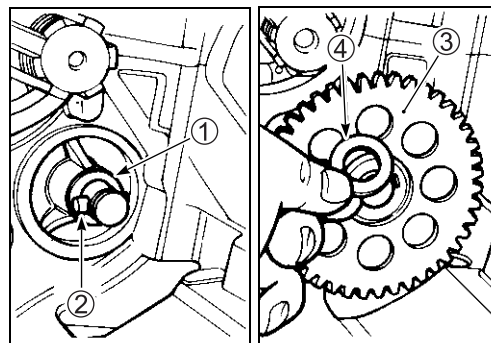
TOOL 09900-06107: Snap ring pliers



OIL PUMP DRIVEN GEAR

- Install the washer ①, pin ②, oil pump driven gear ③ and washer ④.
- Fix the oil pump driven gear with the circlip.

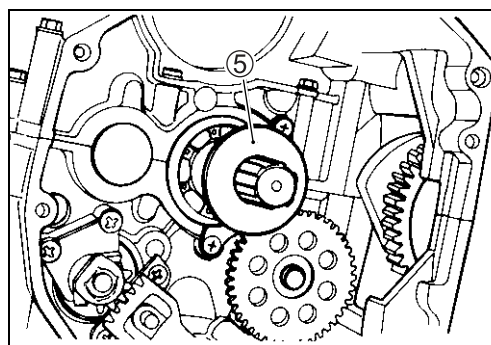
TOOL 09900-06107: Snap ring pliers



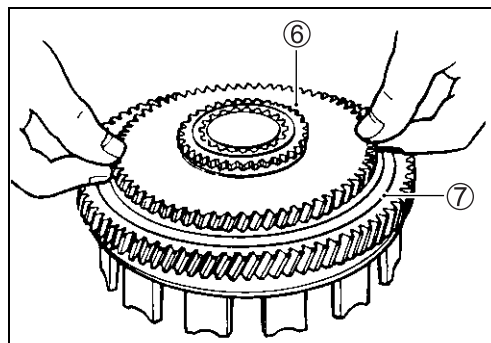
- Install the thrust washer ⑤ onto the countershaft.

NOTE:

The flat surface of the thrust washer should face out.

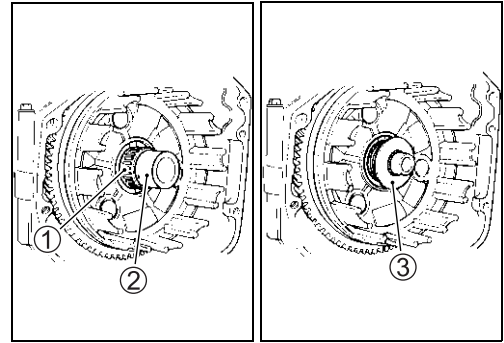


- Install the generator/oil pump drive gears ⑥ onto the primary driven gear assembly ⑦ as shown.

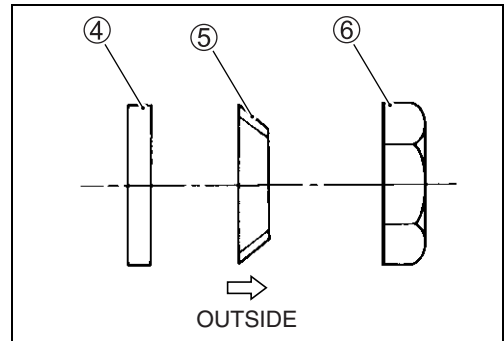


CLUTCH

- Install the primary driven gear assembly onto the countershaft, and apply engine oil onto the needle bearing ① and spacer ②.
- Install the thrust washer ③ onto the countershaft.



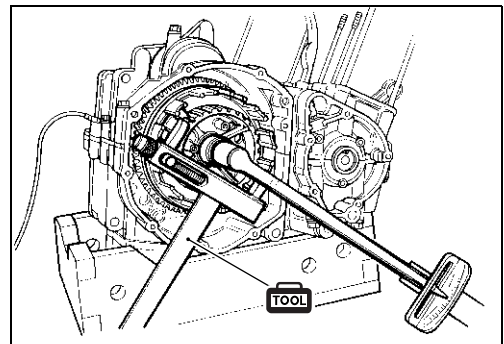
- Install the clutch sleeve hub onto the countershaft.
- Install the washer seat ④, washer ⑤ and clutch sleeve hub nut ⑥ as shown.



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

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

 **Clutch sleeve hub nut: 95 N·m (9.5 kgf·m)**

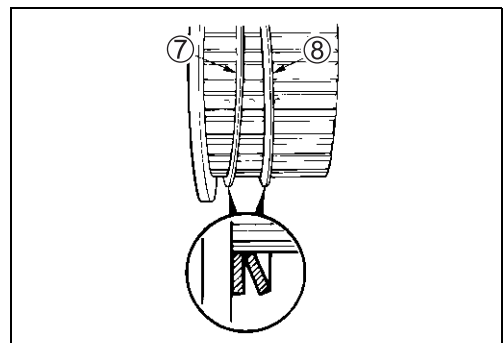


- Install the spring washer seat ⑦ and spring washer ⑧ onto the clutch sleeve hub as shown.
- Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order, No. 2 drive plate first.

NOTE:

Two kinds of the drive plate, No. 1 and No. 2 are equipped in the clutch system, they can be distinguished by the inside diameter.

DRIVE PLATE	I.D.
No. 1	116 mm
No. 2	120 mm

**CAUTION**

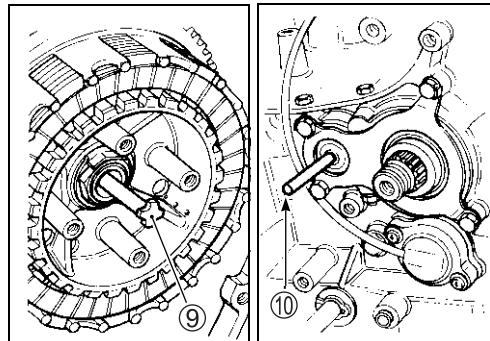
No. 1 and No. 2 drive plates resemble each other very closely in external appearance. Make sure to check their inside diameter before installing them.

- Install the clutch push rods (⑨ and ⑩).

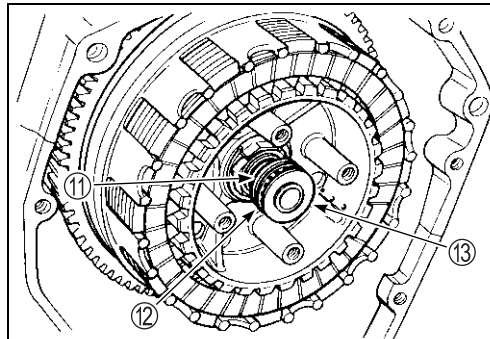
NOTE:

Apply *SUZUKI SUPER GREASE "A"* to the clutch push rod ⑦ when installing it.

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



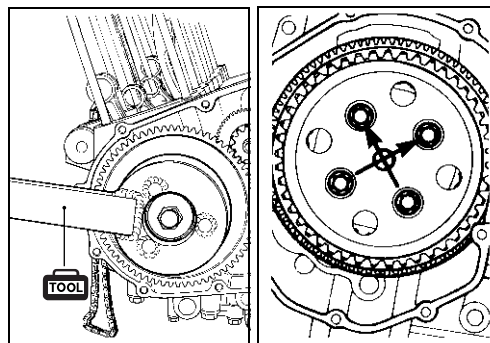
- Install the clutch push piece (⑪), clutch release bearing (⑫) and thrust washer (⑬) onto the countershaft.



- Hold the starter clutch using the special tool, install the clutch pressure plate, and then tighten the clutch spring set bolts in a crisscross pattern to the specified torque.

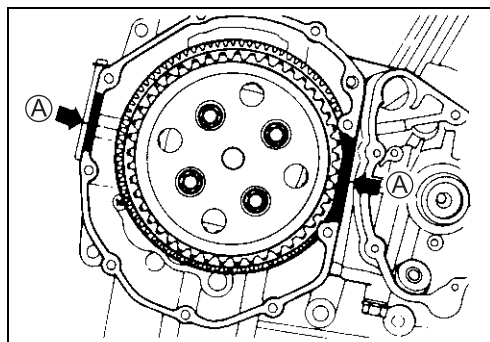
 **09920-34810: Starter clutch holder**

 **Clutch spring set bolt: 12 N·m (1.2 kgf-m)**



- Apply a light coat of the *SUZUKI BOND* to the clutch cover gasket mating surface (A) as shown.

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



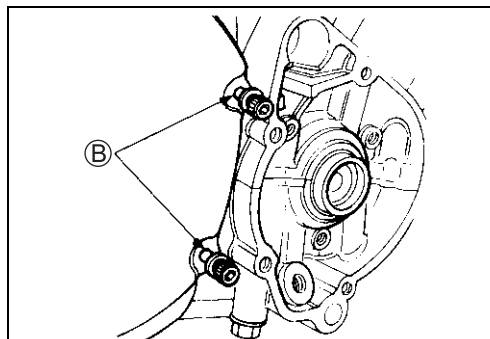
- Install the dowel pins, new gasket and clutch cover.
- Tighten the clutch cover bolts securely.

NOTE:

Install two gasket washers onto the clutch cover bolts (B) as shown.

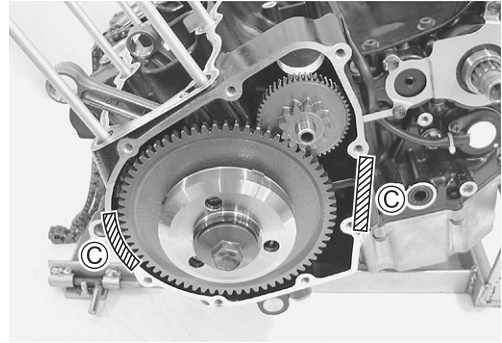
CAUTION

Use only new gasket washers to prevent oil leakage.



- Apply a light coat of SUZUKI BOND to the starter clutch cover gasket mating surface ③ as shown.

 99000-31140: SUZUKI BOND “1207B”



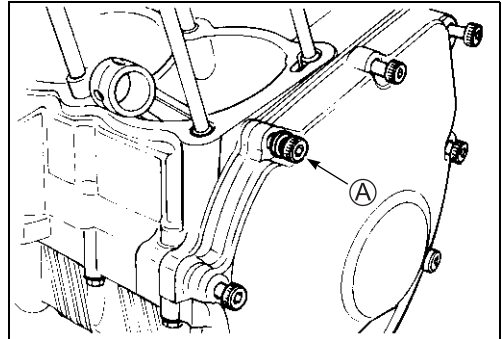
- Install the dowel pin, a new gasket and the starter clutch cover, and tighten the cover bolts securely.

NOTE:

Install the gasket washer to the starter clutch cover bolt ① as shown.

CAUTION

Use a new gasket washer to prevent oil leakage.

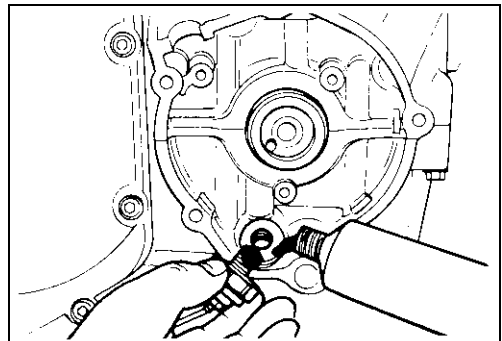


SIGNAL GENERATOR

- Install the oil pressure switch, apply the SUZUKI BOND to its thread and tighten it to the specified torque.

 99000-31140: SUZUKI BOND “1207B”

 Oil pressure switch: 14 N·m (1.4 kgf·m)

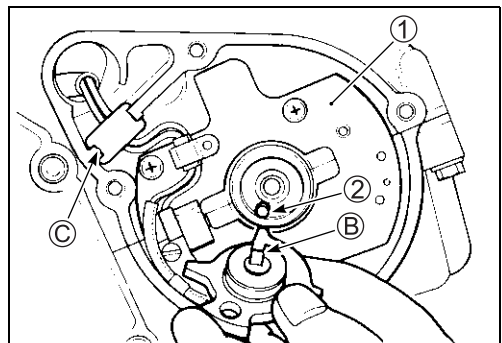


- Install the signal generator stator (along with the pickup coil) ①.
- Be sure to fit the slot ② on the back surface of the signal generator rotor over the locating pin ② on the end of crankshaft.

NOTE:

The SUZUKI BOND should be applied to the groove of the signal generator lead wire grommet ③.

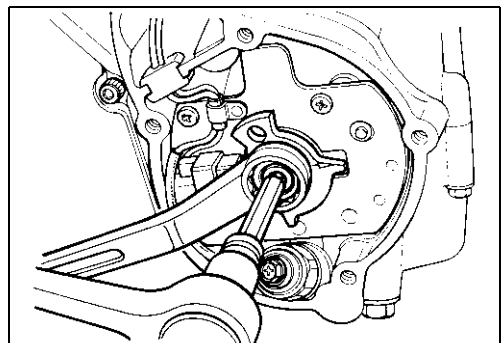
 99000-31140: SUZUKI BOND “1207B”



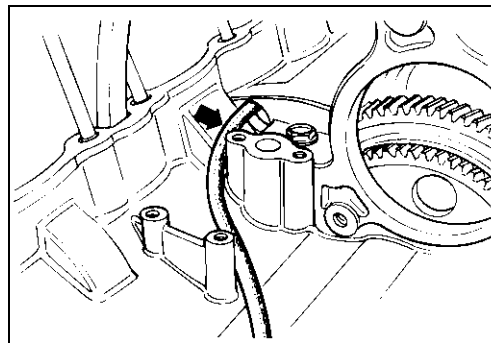
- Hold the nut and tighten the signal generator rotor bolt to the specified torque.

 Signal generator rotor bolt: 26 N·m (2.6 kgf·m)

- Connect the oil pressure switch lead wire.



- Pass the signal generator lead wire through the upper crank-case as shown.



- Install the generator ①.

Generator mounting bolt: 26 N·m (2.6 kgf·m)

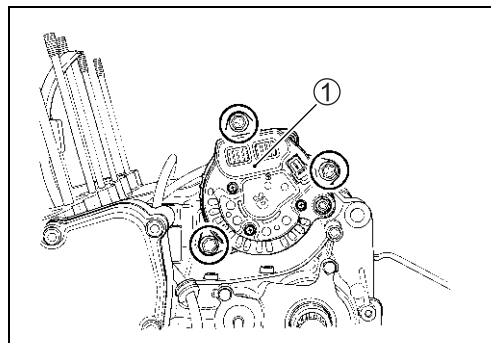
NOTE:

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

99000-25010: SUZUKI SUPER GREASE "A"

CAUTION

Replace the O-ring with a new one.



- Install the starter motor ②.

Starter motor mounting bolt: 6 N·m (0.6 kgf·m)

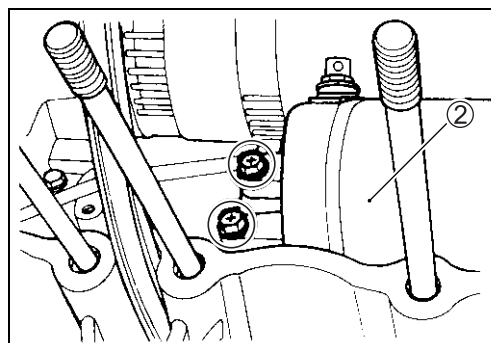
NOTE:

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

* Apply a small quantity of THREAD LOCK "1342" to the two bolts.

99000-32050: THREAD LOCK "1342"

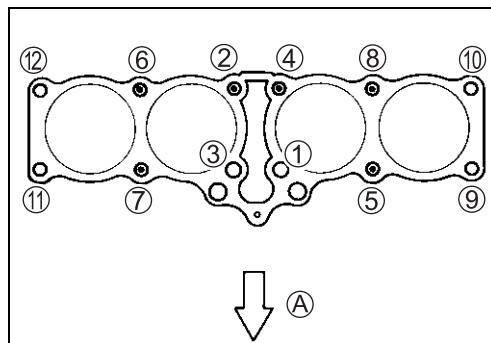
99000-25010: SUZUKI SUPER GREASE "A"



CYLINDER BLOCK STUD BOLT LOCATION

Item No.	Length
① ③ ⑤ ⑦ ⑨ ⑩ ⑪ ⑫	175 mm
② ④ ⑥ ⑧	168 mm

Ⓐ Exhaust side

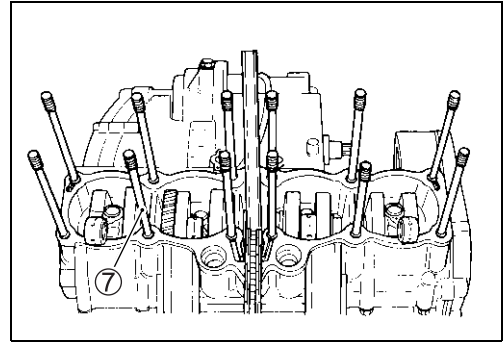


NOTE:

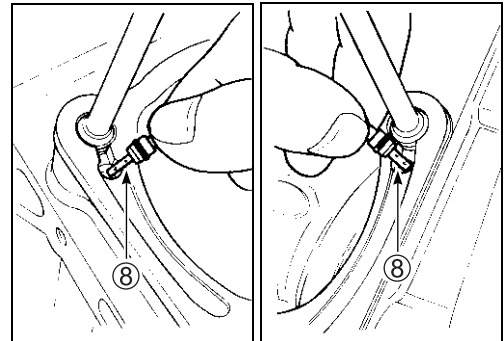
Before installing the cylinder block stud bolt ⑦, apply a light coat of the recommended bond to its threads.

 99000-31140: SUZUKI BOND "1207B"

 Cylinder block stud bolt: 15 N·m (1.5 kgf-m)



- Make sure that the oil jets ⑧ in the upper crankcase are not clogged.

**PISTONS**

- Install the pistons and piston pins in their original cylinders. Refer to the scribe marks on each piston.
- Before installing the piston pins, apply molybdenum oil solution to their surfaces.

 99000-25140: SUZUKI MOLY PASTE

- Place a cloth beneath the piston, and install the circlips ①.

NOTE:

* Install the pistons with the "O" mark ① facing towards the exhaust side.

* Be sure to use new circlips.



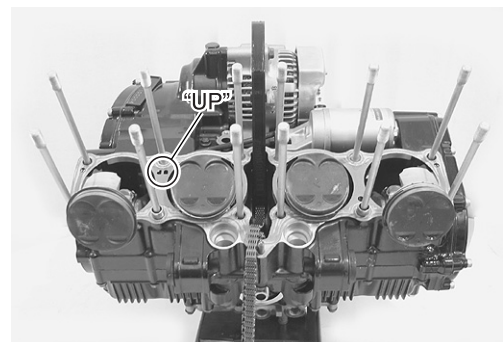
- Install the dowel pins and a new cylinder gasket.
- Before installing the cylinder block, oil the big and small ends of each conrod and also the sliding surface of each piston.

NOTE:

Install the gasket with the "UP" mark facing up as shown.

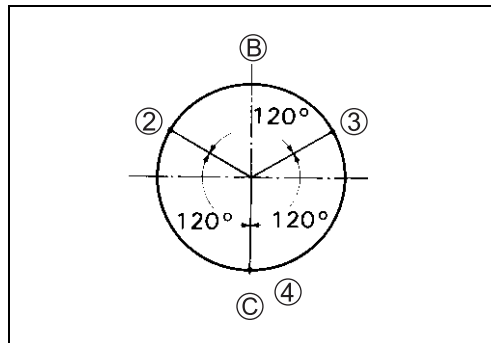
CAUTION

Use a new gasket to prevent oil leakage.



- Position the piston ring gaps as shown. Before inserting each piston into its cylinder, check that the gaps are properly positioned.

- Ⓑ Exhaust side
- Ⓒ Intake side
- ② 2nd ring and lower side rail
- ③ Upper side rail
- ④ 1st ring and spacer

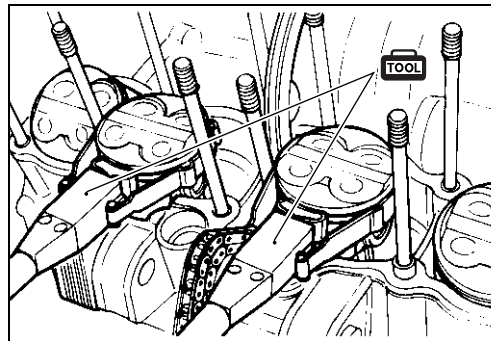


- Install each special tool as shown. Some light resistance must be overcome to lower the cylinder block over the pistons.
- With pistons #2 and #3 in place, install pistons #1 and #4, and then insert them into the respective cylinders.

TOOL 09916-74521: Holder body
09916-74530: Band (bore 55 – 65 mm)

NOTE:

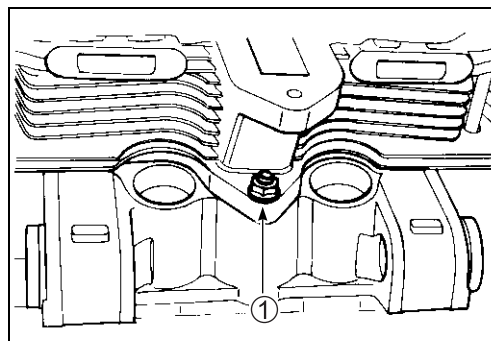
Do not overtighten the bands or piston installation into the cylinders will be difficult.



CYLINDER

- Tighten the cylinder base nut ① to the specified torque.

TOOL Cylinder base nut: 9 N·m (0.9 kgf·m)



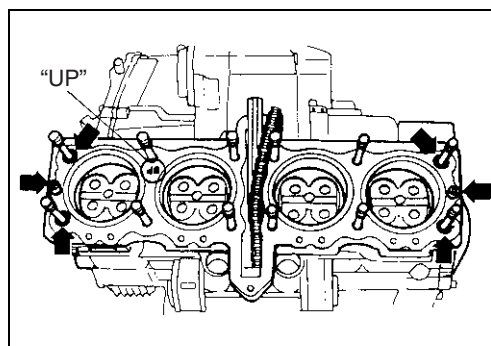
- Install the dowel pins, new O-rings and cylinder head gasket.

NOTE:

Install gasket with the "UP" mark facing up as shown.

CAUTION

Replace the O-rings and gasket with new ones to prevent oil leakage.

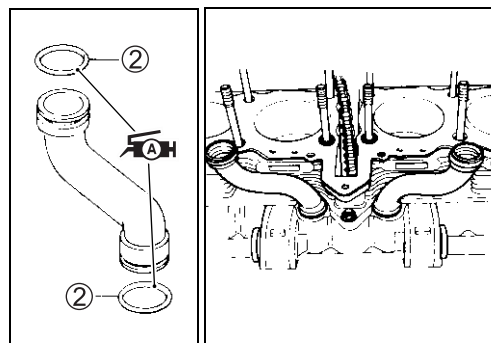


- Install the new O-rings ② onto the oil pipes and apply SUZUKI SUPER GREASE "A" to the O-rings.
- Install the right and left oil pipes.

CAUTION

Replace the O-rings ② with new ones to prevent oil leakage.

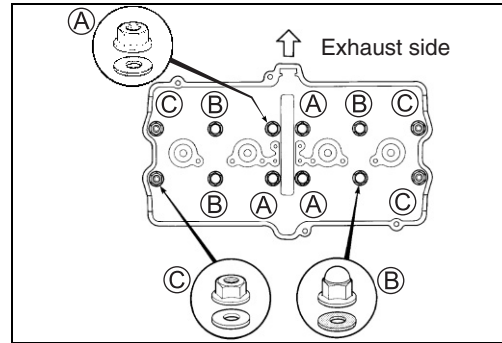
TOOL 99000-25010: SUZUKI SUPER GREASE "A"



CYLINDER HEAD

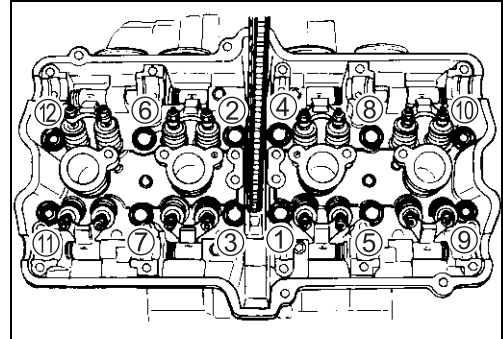
- Place the cylinder head onto the cylinder block.
- Cylinder head nuts and washers must be installed in the correct position as shown.

- Ⓐ Copper washer with normal nut (4 pcs.)
- Ⓑ Copper washer with cap nut (4 pcs.)
- Ⓒ Steel washer with normal nut (4 pcs.)



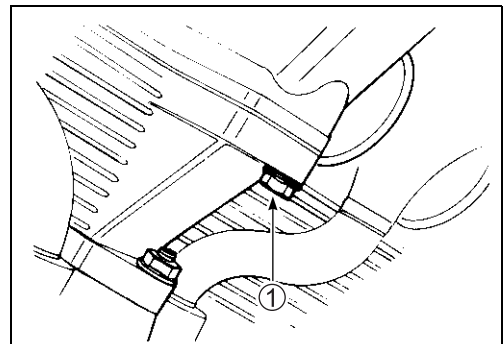
- Tighten the twelve 10-mm nuts in ascending order and to the specified torque.

 **Cylinder head nut: 37 N·m (3.7 kgf·m)**

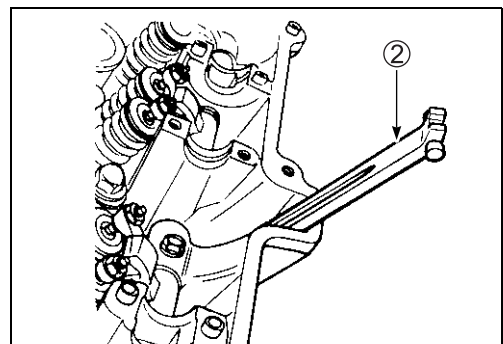


- After firmly tightening the twelve 10-mm nuts, install the cylinder head bolt (6 mm) ① and tighten it to the specified torque.

 **Cylinder head bolt: 10 N·m (1.0 kgf·m)**



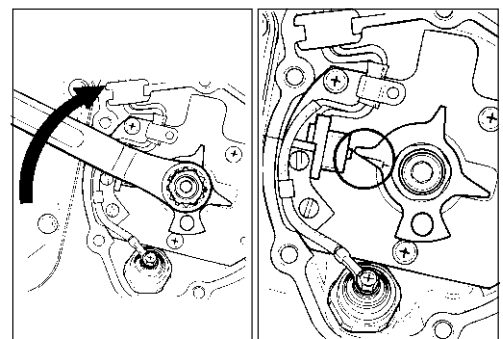
- Install the cam chain guide ② as shown.



- While holding down the cam chain, rotate the crankshaft clockwise and align the “T” mark on the signal generator rotor with the center of the pickup coil.

CAUTION

Turn the crankshaft using a 19 mm wrench. Never rotate the crankshaft using a 6-mm T-type wrench.



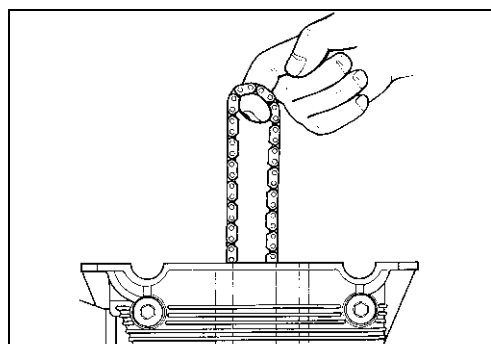
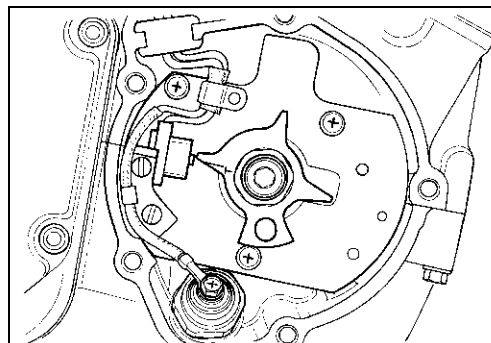
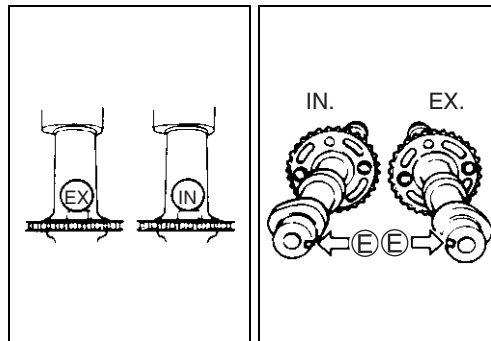
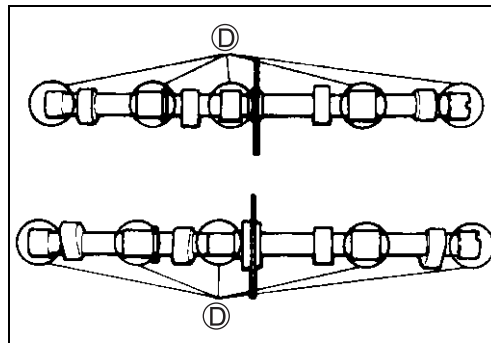
NOTE:

Before installing the camshafts onto the cylinder head, apply **SUZUKI MOLY PASTE** onto the camshaft journals ① and do not leave any dry spots. Also, apply engine oil onto the camshaft journal holders.

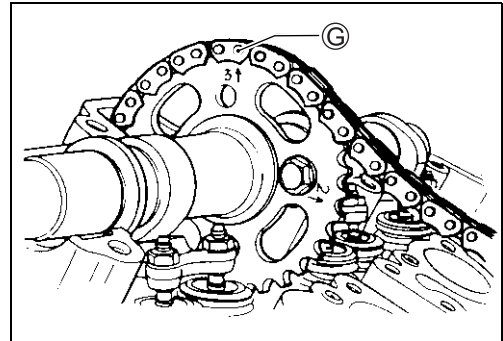
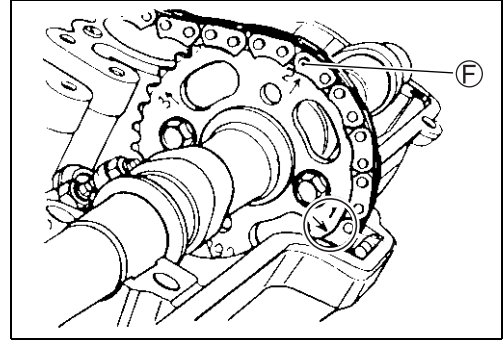
 **99000-25140: SUZUKI MOLY PASTE**

- The exhaust camshaft has the embossed letters “EX” and the intake camshaft has the embossed letters “IN”. Also, the right end of each camshaft has a notch ②.

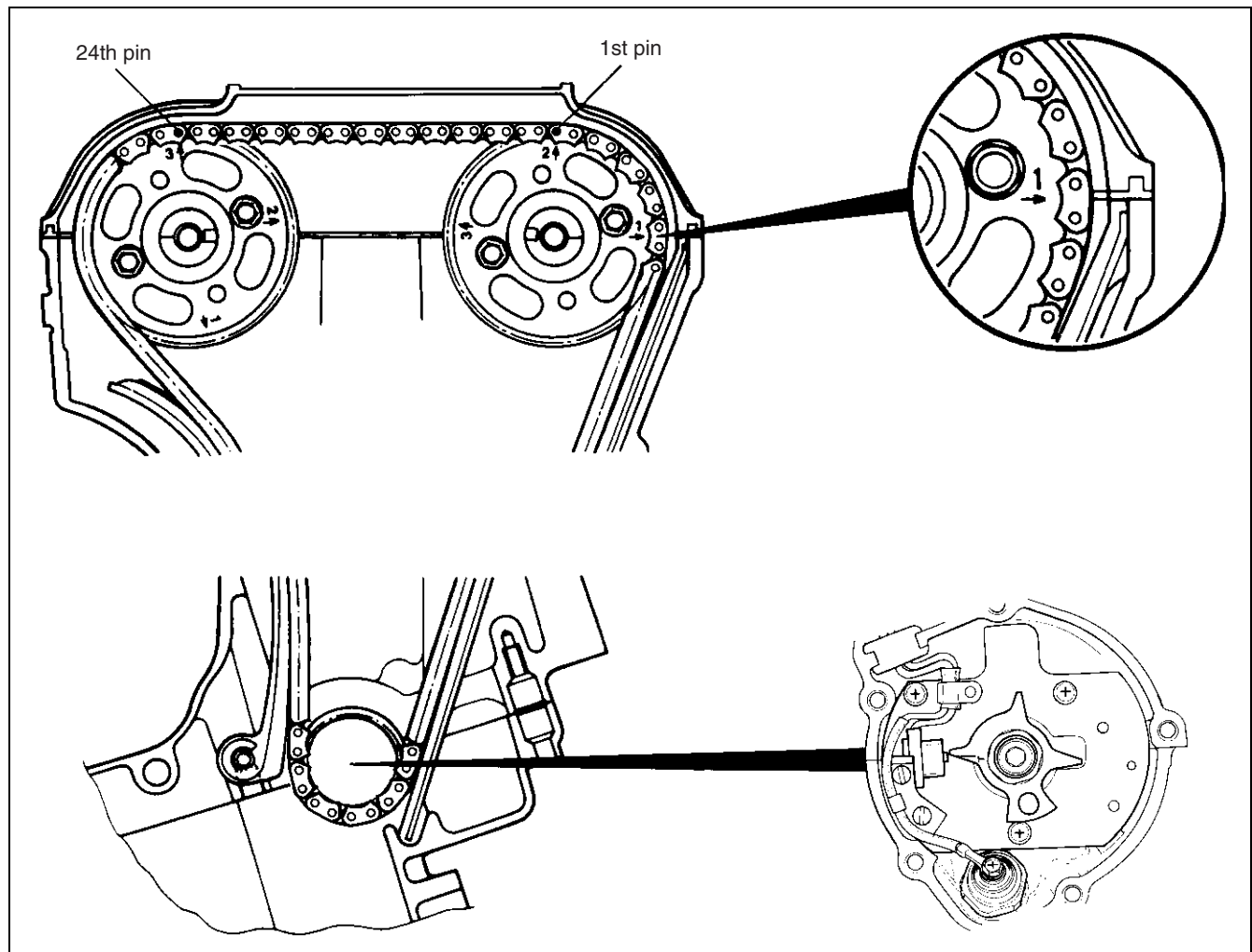
- When the “T” mark on the signal generator rotor is aligned with the center of the pickup coil, hold the camshaft steady and lightly pull up the cam chain to remove any slack between the crankshaft sprocket and the exhaust camshaft sprocket.



- The exhaust camshaft sprocket has an arrow marked "1". Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head.
- Engage the cam chain with the exhaust camshaft sprocket.
- The other arrow marked "2" should now be pointing straight up. Starting from the roller pin ⑥ that is directly above the arrow marked "2", count out 24 roller pins (from the exhaust camshaft side going towards the intake camshaft side). Engage the 24th roller pin ⑦ on the cam chain with the arrow marked "3" on the intake sprocket. Refer to the following illustrations.

**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 tensioner are secured.



- Each camshaft journal holder is identified with an embossed letter. Install the dowel pins into each camshaft journal holder.
- Fasten the camshafts (IN and EX) evenly by tightening the camshaft journal holder bolts sequentially and in a crisscross pattern.

NOTE:

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

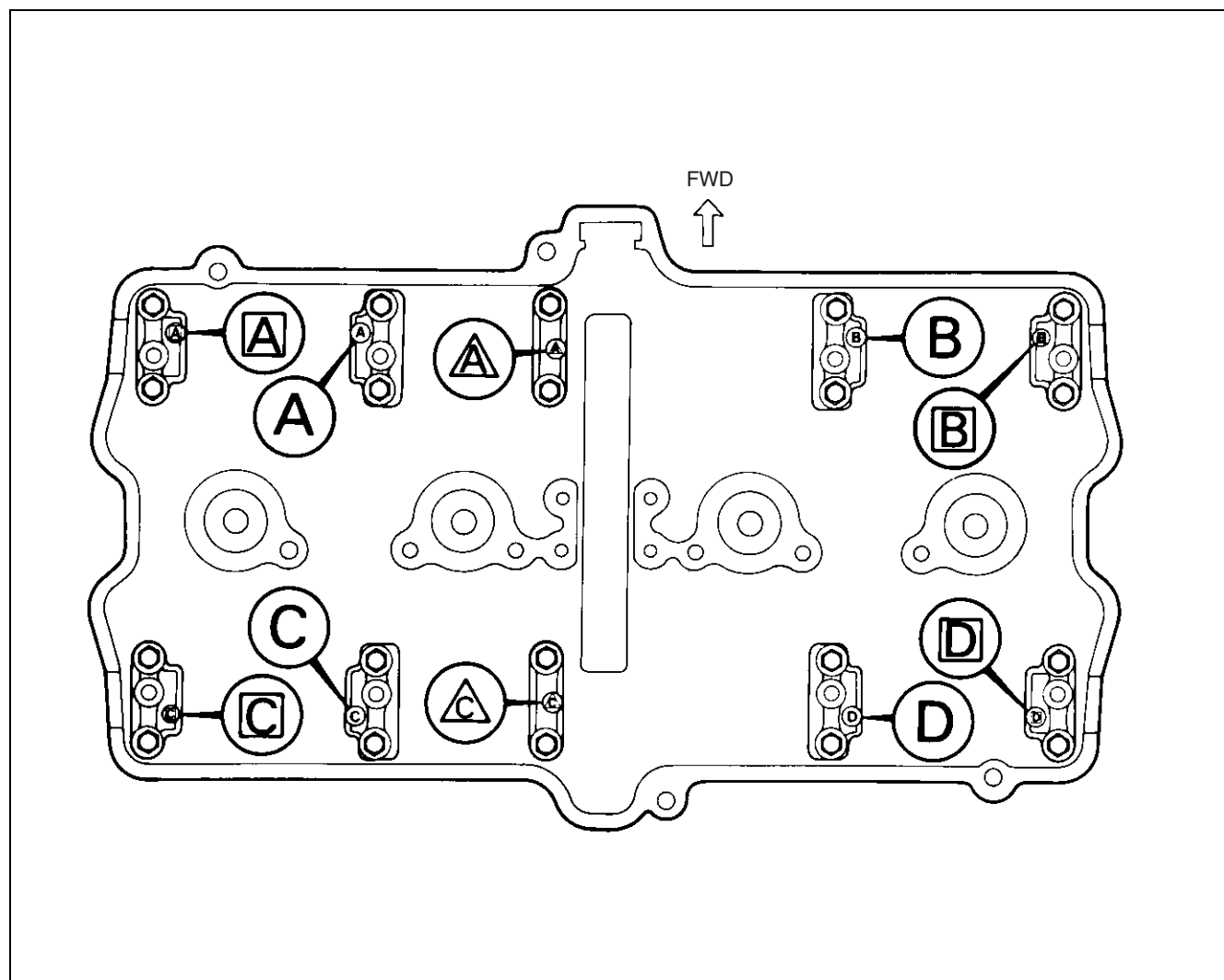
- Tighten the camshaft journal holder bolts to the specified torque.

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

CAUTION

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

Take special care not to use other types of bolts instead of these special bolts. To identify these bolts, each of them has a “9” on its head.

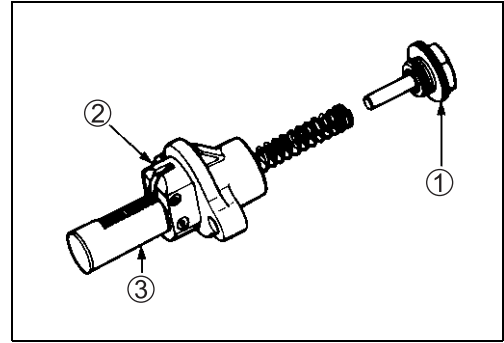


CAM CHAIN TENSIONER ADJUSTER

- After removing the spring holder bolt ① and spring, unlock the ratchet mechanism ② and push the push rod ③ all the way into the cam chain tensioner adjuster.

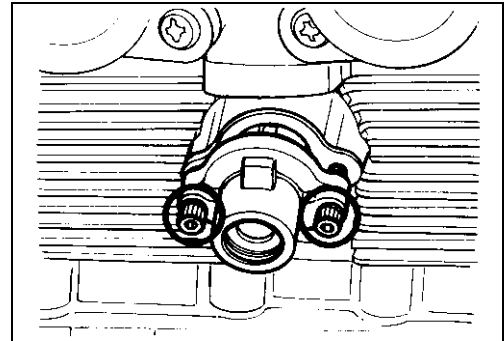
NOTE:

Before installing the cam chain tensioner adjuster, turn the crankshaft clockwise to remove any cam chain slack between the crankshaft sprocket and exhaust camshaft sprocket.



- Install a new gasket and the cam chain tensioner adjuster onto the cylinder block as shown.
- Tighten the cam chain tensioner adjuster mounting bolts to the specified torque.

Cam chain tensioner adjuster mounting bolt: 7 N·m (0.7 kgf·m)

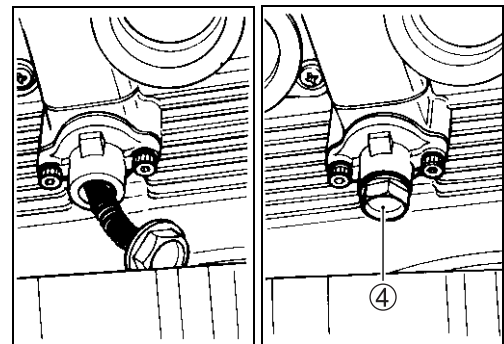


- Insert the spring into the cam chain tensioner adjuster and tighten the spring holder bolt ④ to the specified torque.

Spring holder bolt: 35 N·m (3.5 kgf·m)

CAUTION

After installing the cam chain tensioner adjuster, check the cam chain slack to make sure that the cam chain tensioner adjuster is working properly.

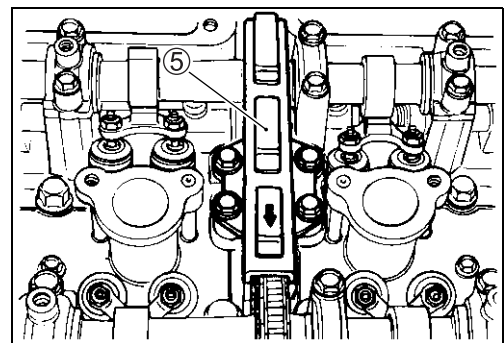


- Recheck the camshaft position (cam timing).
- Install the cam chain guide ⑤ with the four bolts and tighten them to the specified torque.

Cam chain guide mounting bolt: 10 N·m (1.0 kgf·m)

NOTE:

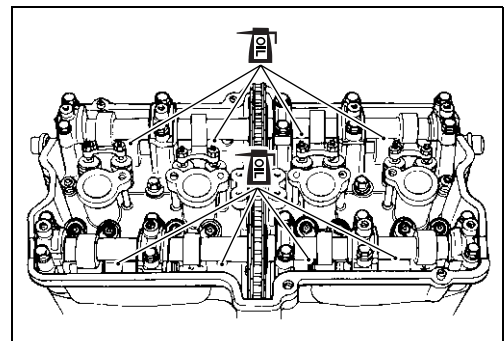
Be sure to face the arrow mark on the cam chain guide towards the exhaust side.

**CYLINDER HEAD**

- Pour about 50 ml of engine oil into each oil pocket in the cylinder head.

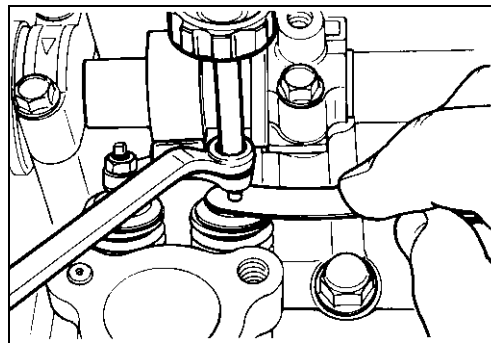
NOTE:

Turn the crankshaft and check that all the moving parts (e.g., cam follower, camshaft) work properly.



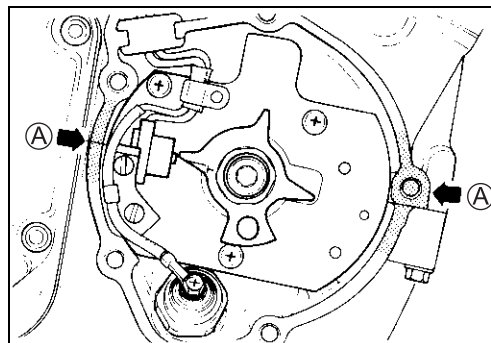
CAUTION

Be sure to check and adjust the valve clearance.
( 2-4)



- Apply a light coat of the recommended bond to the signal generator gasket mating surface (A) as shown.

 99000-31140: SUZUKI BOND "1207B"



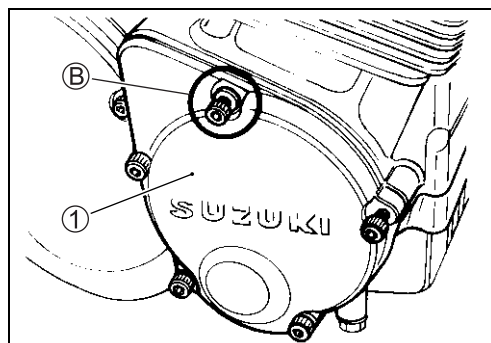
- Install a new gasket and the signal generator cover (1).

NOTE:

* Install the gasket washer onto the signal generator cover bolt (B) as shown.

* Apply a small quantity of THREAD LOCK "1342" to the signal generator cover bolts.

 99000-32050: THREAD LOCK "1342"

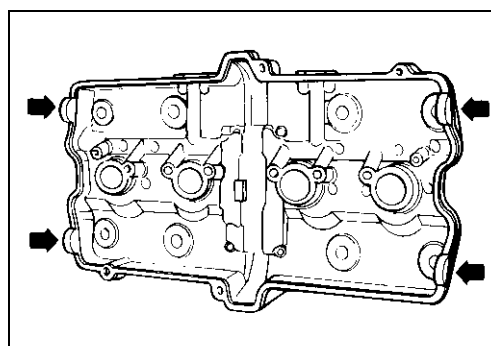
**CAUTION**

Use a new gasket to prevent oil leakage.

CYLINDER HEAD COVER

- Before installing the cylinder head cover gasket onto the cylinder head cover, apply the recommended bond to the groove in the cylinder head cover.
- Apply the recommended bond to the four camshaft end caps of the gasket as shown.

 99000-31140: SUZUKI BOND "1207B"



- Place the cylinder head cover onto the cylinder head.
- Install the four gaskets onto each cylinder head cover union bolt ① and apply oil to thread and gasket before tightening them to the specified torque.

CAUTION

Replace the gaskets with new ones to prevent oil leakage.

🔧 Cylinder head cover union bolt ①: 20 N·m (2.0 kgf-m)

- Install the eight gaskets in the correct locations.
- Tighten the cylinder head cover bolts ② to the specified torque.

CAUTION

Replace the gaskets with new ones to prevent oil leakage.

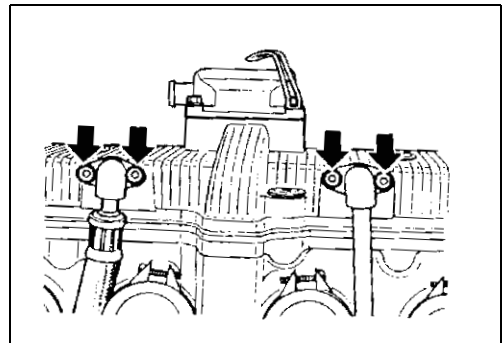
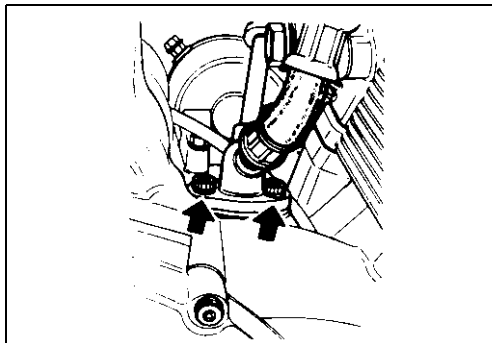
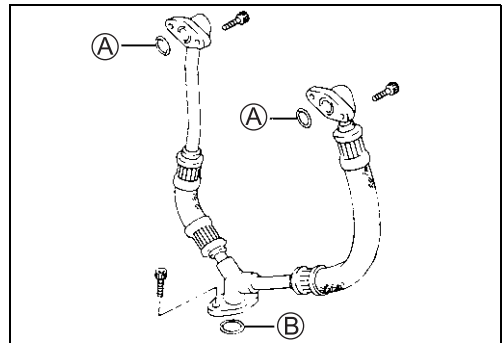
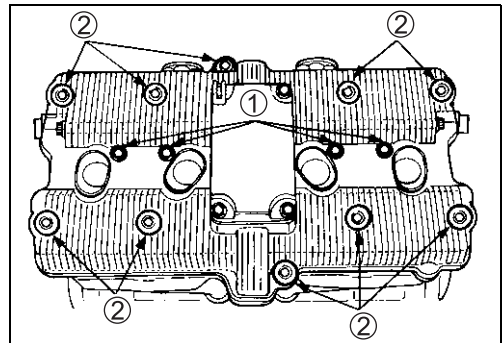
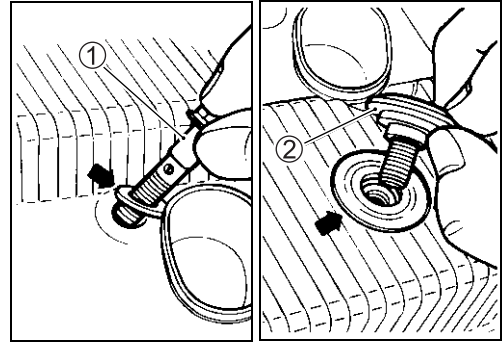
🔧 Cylinder head cover bolt ②: 14 N·m (1.4 kgf-m)

- Install all of the spark plugs.
- Install the left and right oil hoses and tighten their mounting bolts to the specified torque.

CAUTION

Replace the O-rings (A) and (B) with new ones to prevent oil leakage.

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

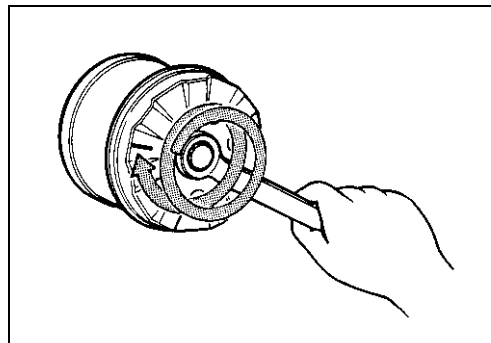


- Turn the oil filter by hand until you feel that the oil filter O-ring has contacted the oil filter mounting surface. Then, tighten the oil filter two full turns using the special tool.

TOOL 09915-40610: Oil filter wrench

NOTE:

- * Before installing the oil filter, apply a light coat of engine oil onto its O-ring.
- * To properly tighten the oil filter, use the special tool. Never tighten the oil filter by hand only.

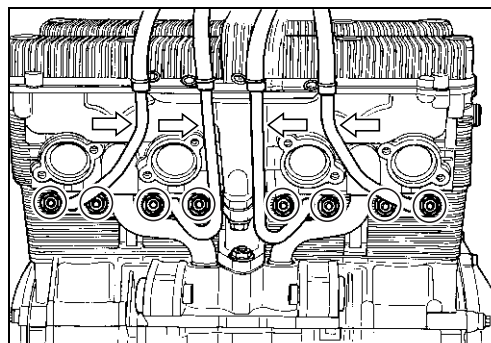


- Install the PAIR valve pipes and hoses and tighten their mounting nuts to the specified torque.

CAUTION

Replace the gaskets with new ones to prevent exhaust gas leakage.

PAIR valve pipe mounting nut: 10 N·m (1.0 kgf-m)



ENGINE LUBRICATION SYSTEM

OIL PUMP

REMOVAL

The crankcase must be separated to service the oil pump.

The oil pump service requires engine removal and disassembly.

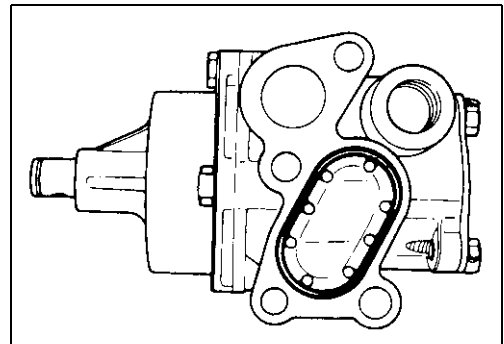
Refer to the engine removal and engine disassembly sections for oil pump removal. (☞ 3-25)

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.**



INSTALLATION

- Refer to the engine reassembly and the engine installation sections to install the oil pump. (☞ 3-63)

OIL SUMP FILTER/OIL PRESSURE REGULATOR

REMOVAL

After draining engine oil, the following components must be removed in the described order before removing the oil sump filter and the oil pressure regulator.

NOTE:

Refer to the following pages for the details of each step.

Drain:

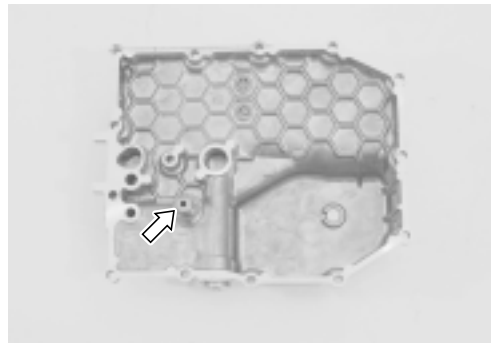
- Engine oil (☞ 2-9)

Remove:

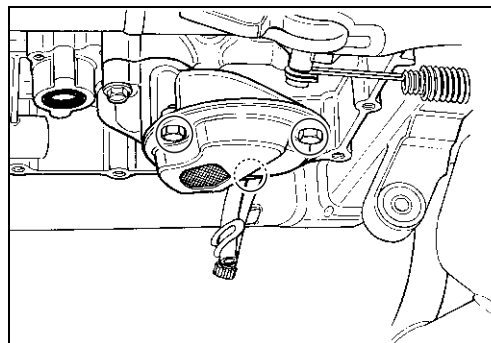
- Exhaust pipe/muffler assembly (☞ 3-5)
- Oil cooler hose union bolts
- Oil pan (☞ 3-86)



- Oil pressure regulator



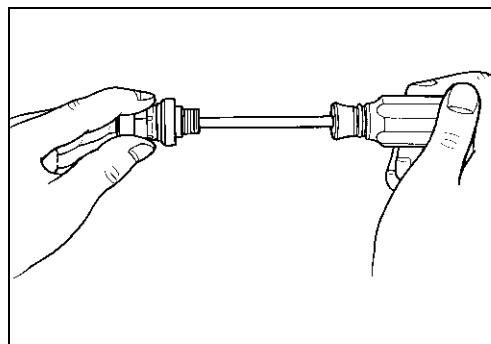
- Oil sump filter



INSPECTION

Oil pressure regulator

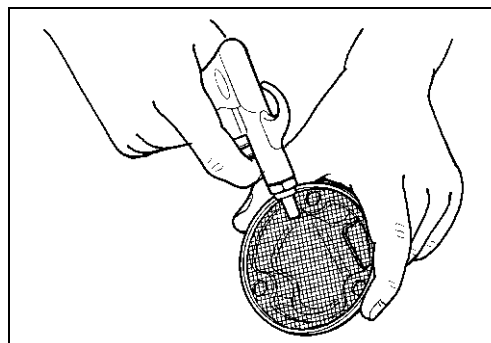
Check the operation of the oil pressure regulator by pushing on the piston with an appropriately shaped tool. If the piston does not operate, replace the oil pressure regulator with a new one.



CLEANING

Oil sump filter

Clean the oil sump filter using compressed air.



Oil pan

Wash the oil pan with kerosine.



INSTALLATION

Installation is in the reverse order of removal.

NOTE:

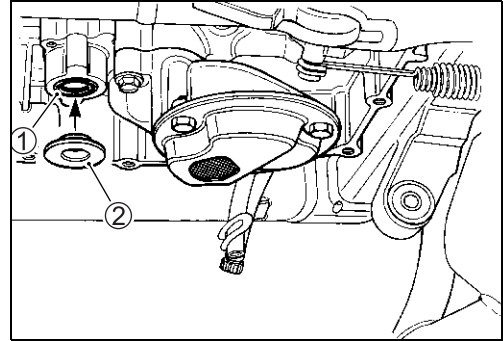
Refer to the following pages for the details of each step.

Install:

- Oil sump filter


NOTE:

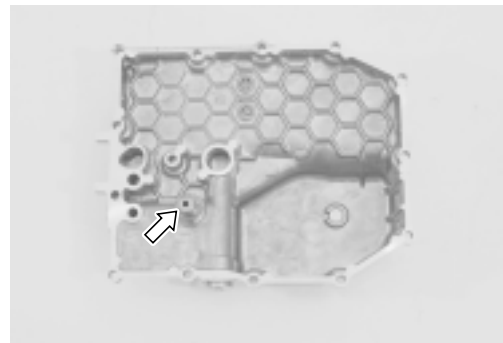
Do not loose the O-ring ① and shim ②.





- Oil pressure regulator

 **Oil pressure regulator: 28 N·m (2.8 kgf·m)**


- Oil pan ( 3-69)



- Oil cooler hose union bolts ( 3-8)
- Exhaust pipe/muffler assembly ( 3-8)



- Adjust the following item to specification.

* Engine oil.....  2-9

OIL PRESSURE SWITCH

REMOVAL

After draining engine oil, remove the oil pressure switch.

NOTE:

Refer to the following pages for the details of each step.

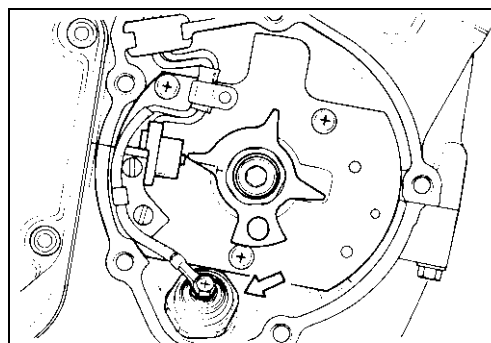
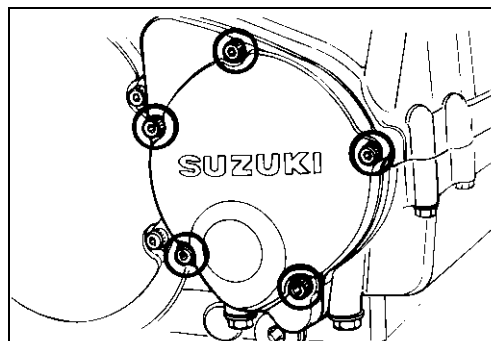
Drain:

- Engine oil (☞ 2-9)

Remove:

- Signal generator cover

- Oil pressure switch



INSPECTION

☞ 6-40

INSTALLATION

Installation is in the reverse order of removal.

- Oil pressure switch (☞ 3-74)
- Signal generator cover (☞ 3-83)

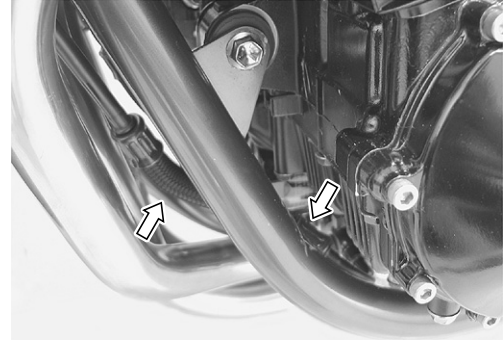
Adjust the following item to specification.

* Engine oil ☞ 2-9

OIL COOLER

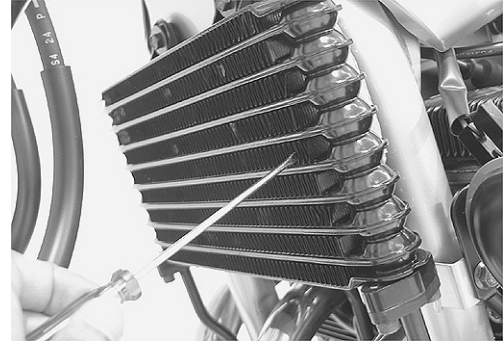
INSPECTION AND CLEANING

Inspect the oil cooler hoses for damage and oil leaks. If any defects are found, replace the oil cooler hose(-s) with a new one.



Inspect the oil cooler for oil leaks. If any defects are found, replace the oil cooler with a new one.

If the fins are bent or dented, repair them by carefully straightening them with the blade of a small screwdriver.



Blow out any foreign matter that is stuck in the oil cooler fins using compressed air.

CAUTION

- * Make sure not to bend the fins when using compressed air.
- * Always apply compressed air from the engine side of oil cooler. If compressed air is applied from the front side, dirt will be forced into the pores of oil cooler.



REMOVAL AND INSTALLATION

- Oil cooler (👉 3-6 and -8)

OIL FILTER

👉 2-10

OIL PRESSURE

👉 2-23

OIL JET

OIL JET (for the cylinder head) REMOVAL

- The oil jet (for the cylinder head) can be removed after removing the cylinder block.

NOTE:

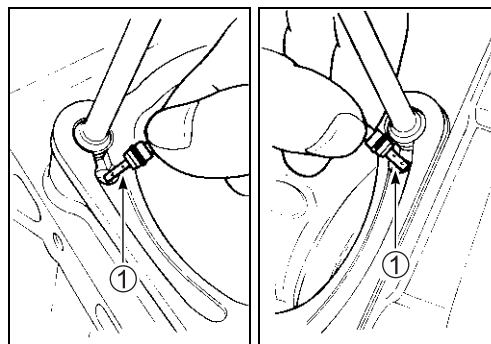
Refer to the following pages for the details of each step.

Drain:

- Engine oil (☞ 2-9)

Remove:

- Cylinder block (☞ 3-14)
- Oil jet (for the cylinder head) ①

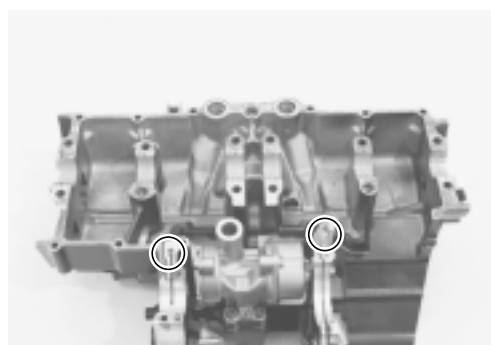
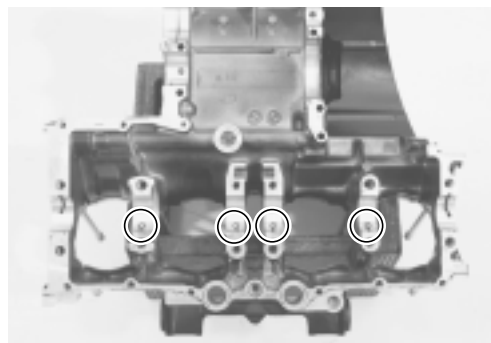


OIL JET (for piston cooling and the transmission) REMOVAL

- The oil jet (for piston cooling and the transmission) can be removed after separating the crankcase.

Remove:

- Oil jet (for piston cooling)
- Oil jet (for the transmission)



INSPECTION

Make sure that the oil jets are not clogged. If they are clogged, clean their oil passage using a wire of the proper size and compressed air.



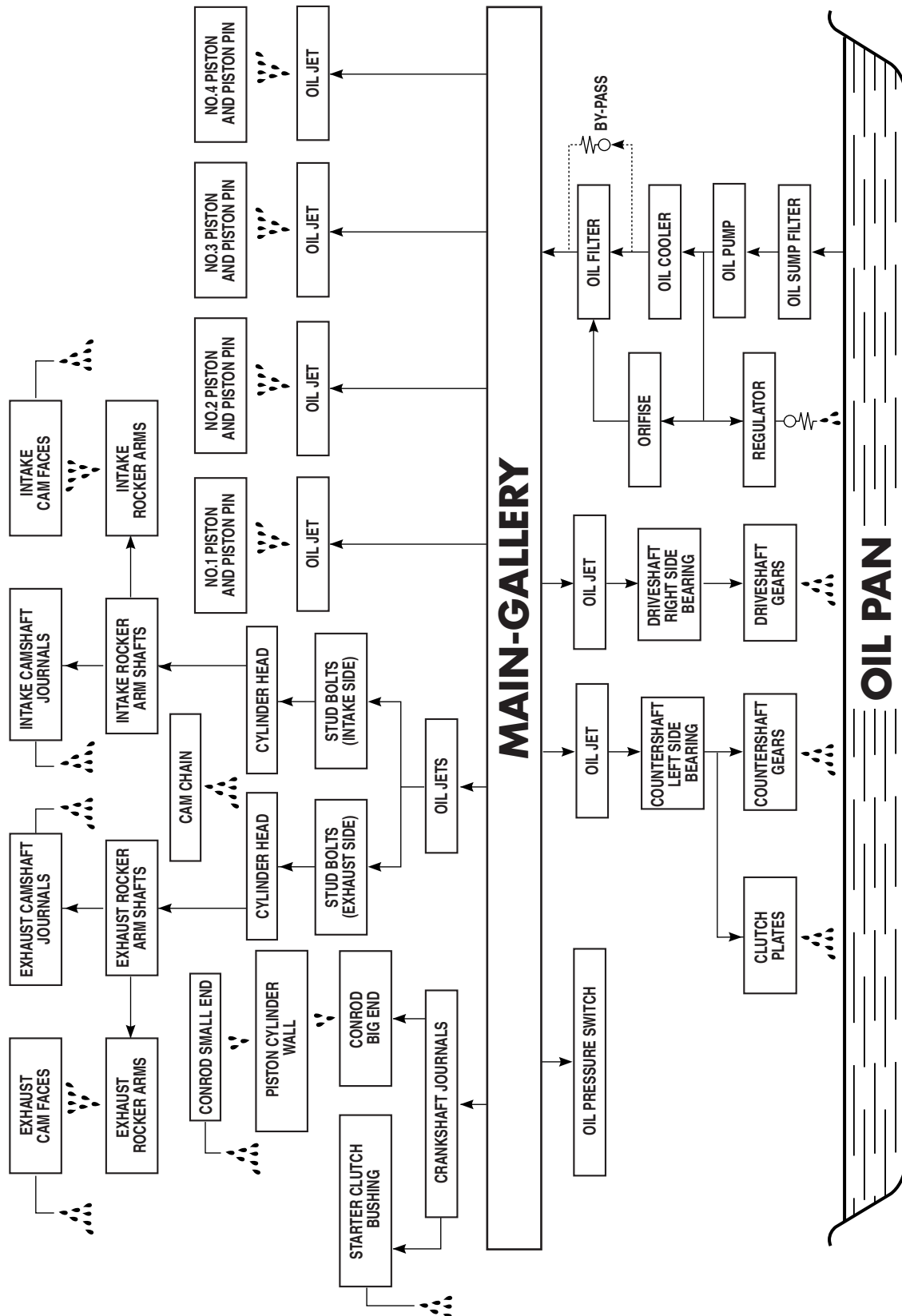
INSTALLATION

Refer to the cylinder block installation, engine reassembly and engine installation sections.

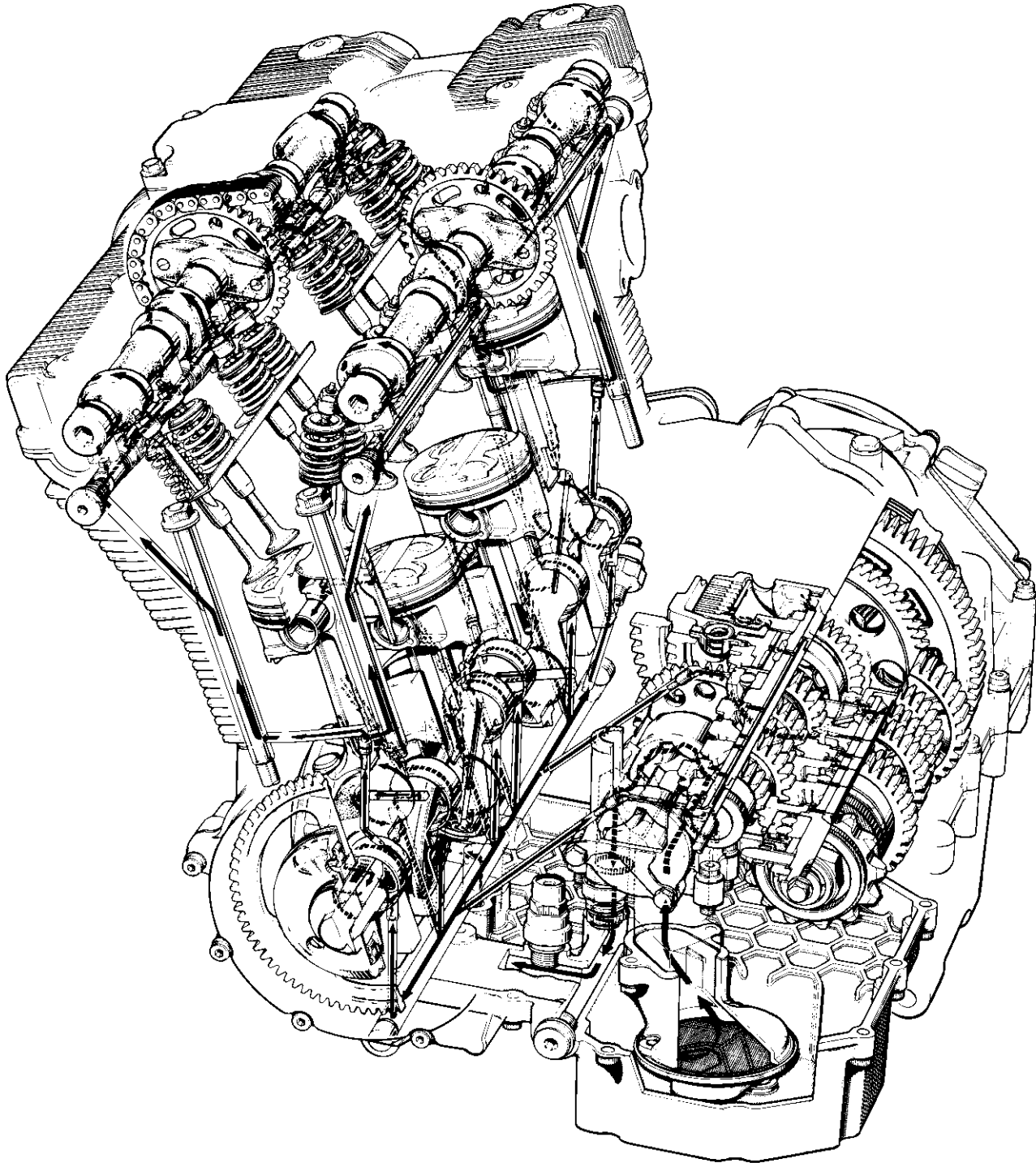
NOTE:

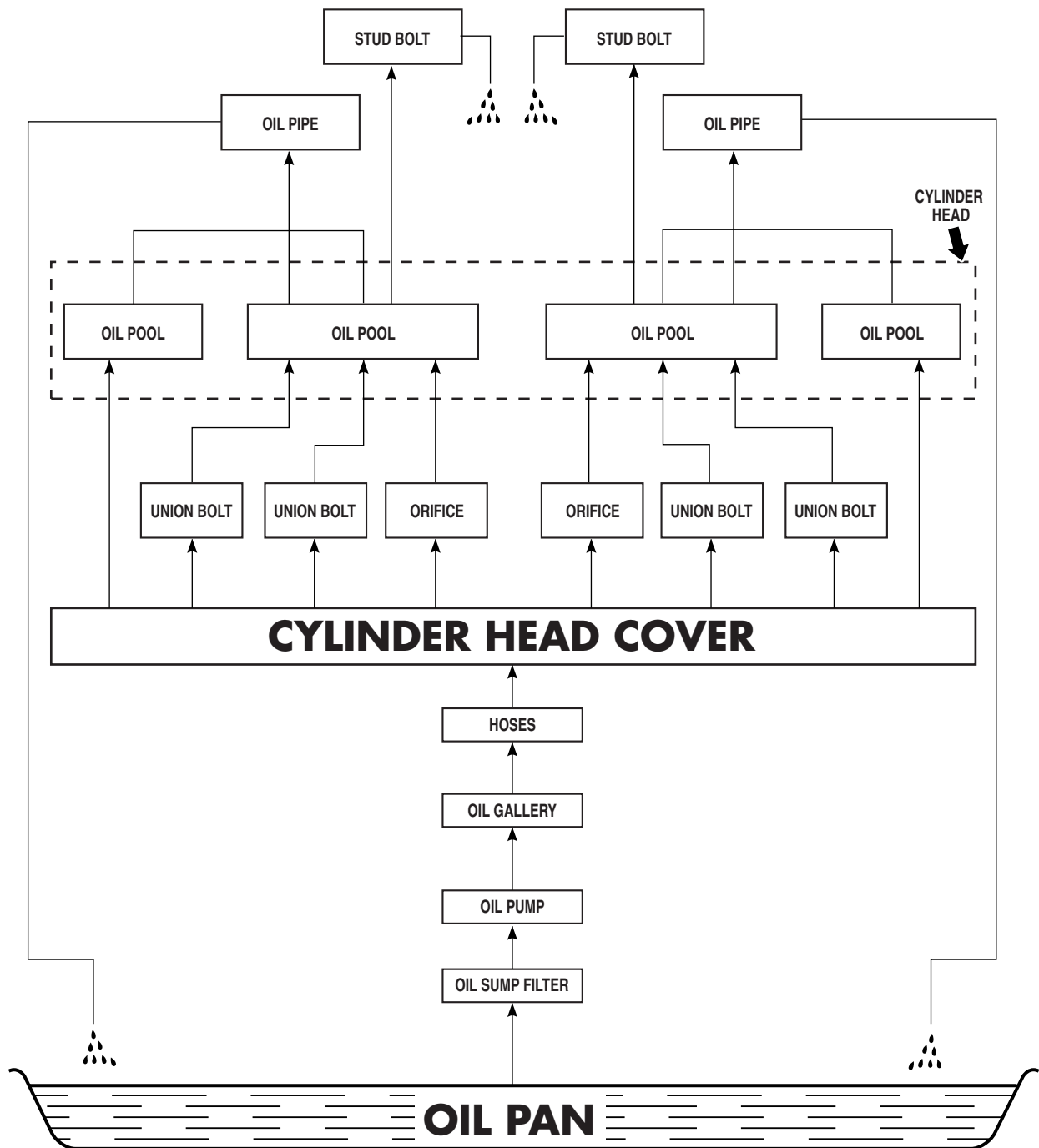
Before installing the oil jets, apply a light coat of engine oil to the O-rings.

ENGINE LUBRICATION SYSTEM CHART

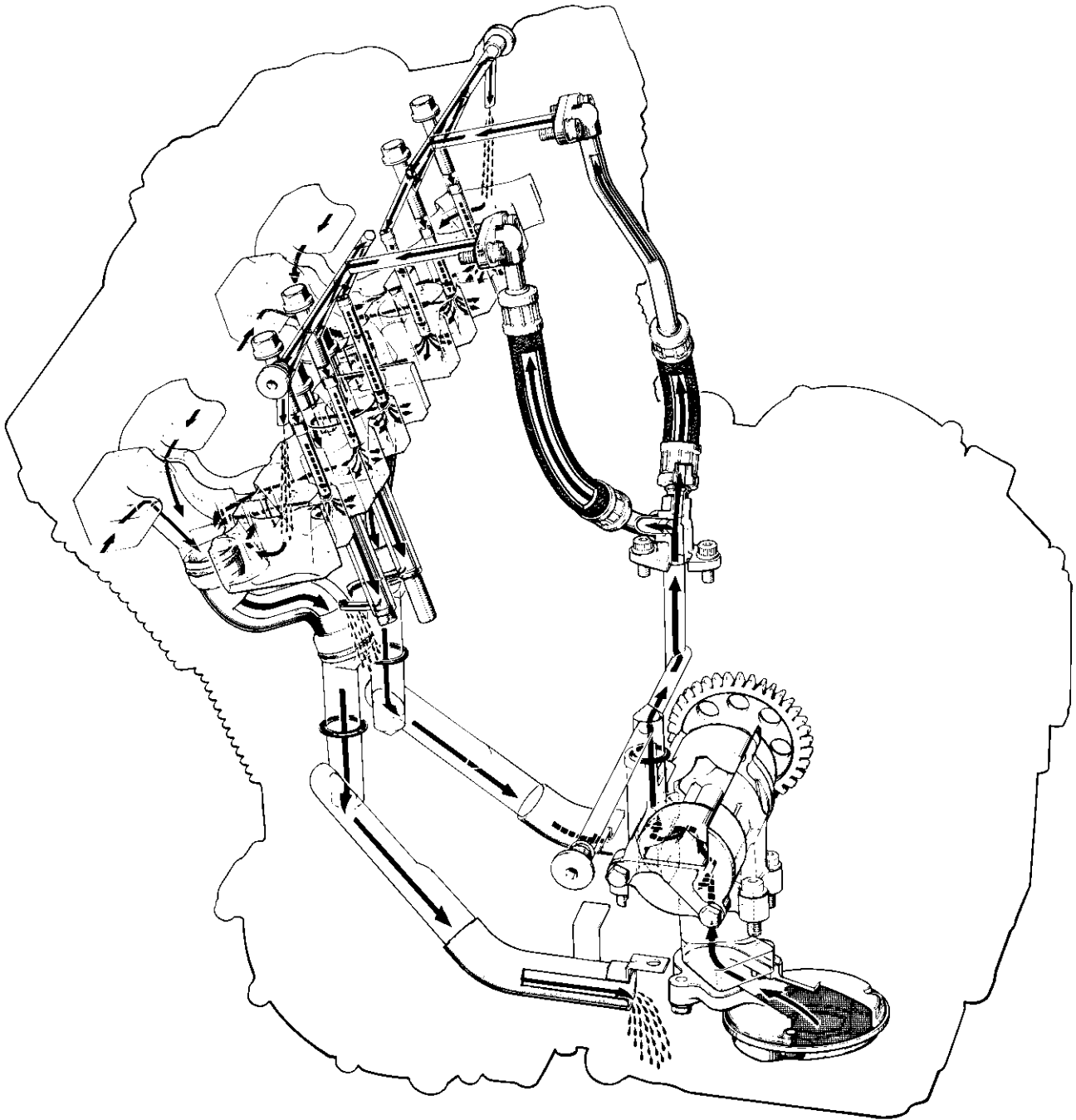


ENGINE LUBRICATION SYSTEM



CYLINDER HEAD COOLING SYSTEM CHART

CYLINDER HEAD COOLING SYSTEM

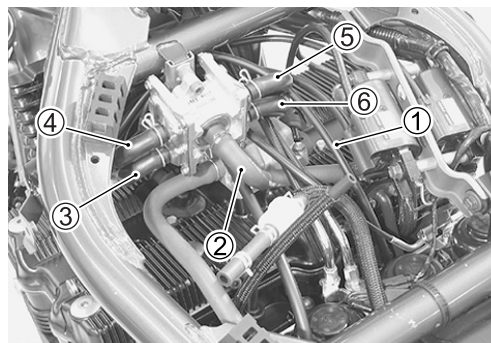


PAIR (AIR SUPPLY) SYSTEM

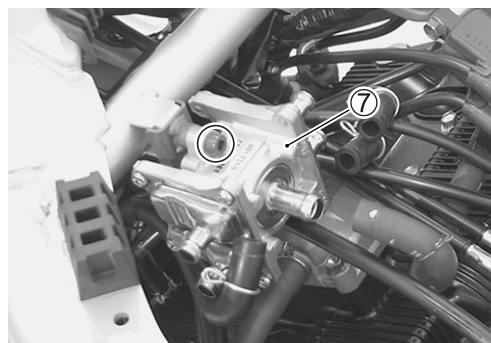
REMOVAL

- Remove the fuel tank. (☞ 4-3)
- Disconnect all of the PAIR valve hoses.

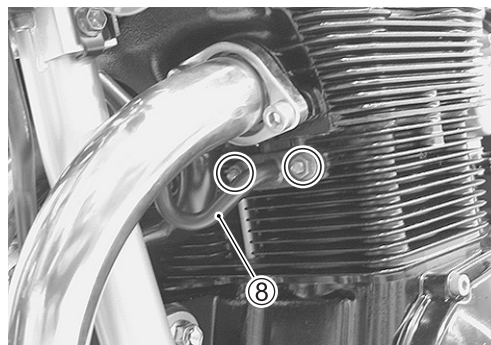
- ① Vacuum hose
- ② Air cleaner hose
- ③ PAIR hose No. 1
- ④ PAIR hose No. 2
- ⑤ PAIR hose No. 4
- ⑥ PAIR hose No. 3



- Remove the PAIR valve ⑦.



- Remove the PAIR pipes ⑧ from each cylinder.



INSPECTION

HOSES AND PIPES

- Inspect the hoses and pipes for wear or damage.
- Inspect that the hoses and pipes are securely connected.

PAIR VALVE

- Remove the PAIR valve. (☞ Above)
- Inspect the PAIR valve body for damage.

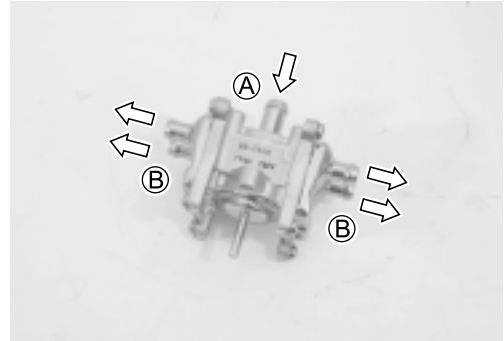


REED VALVE

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

**PAIR VALVE**

- Inspect that air flows through the PAIR valve air inlet port (A) to the air outlet parts (B).
- 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 PAIR valve as shown in the photograph.
- Apply negative pressure slowly to the PAIR valve and inspect the air flow.
- If air does not flow out within the specification, the PAIR valve is in normal condition.
- If the PAIR valve does not function within the specification, replace the PAIR valve with a new one.

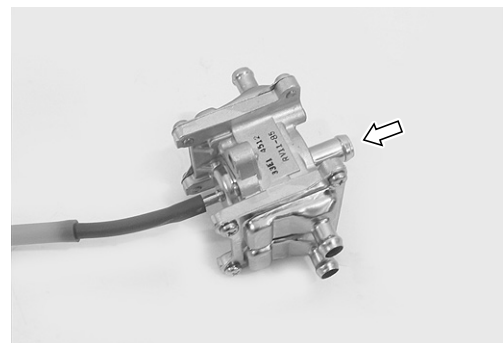


DATA Negative pressure range: 65.3 kPa (490 mmHg)

TOOL 09917-47010: Vacuum pump gauge

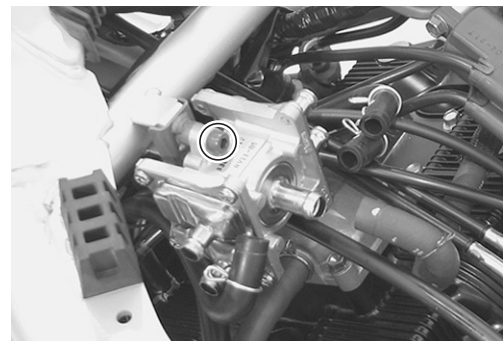
CAUTION

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


**INSTALLATION**

- Rout the hoses properly. (7-19)
- Tighten the PAIR valve mounting bolt to the specified torque.

PAIR valve mounting bolt: 10 N·m (1.0 kgf·m)



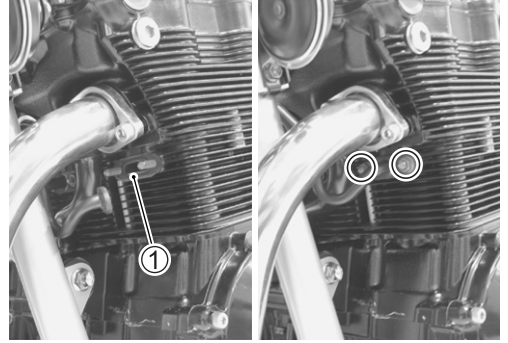
- Tighten the PAIR pipe mounting nuts to the specified torque.

 PAIR pipe mounting nut: 10 N·m (1.0 kgf·m)

CAUTION

Use a new gasket ① to prevent exhaust gas leakage.

- Rout the hoses properly. (📄 7-19)



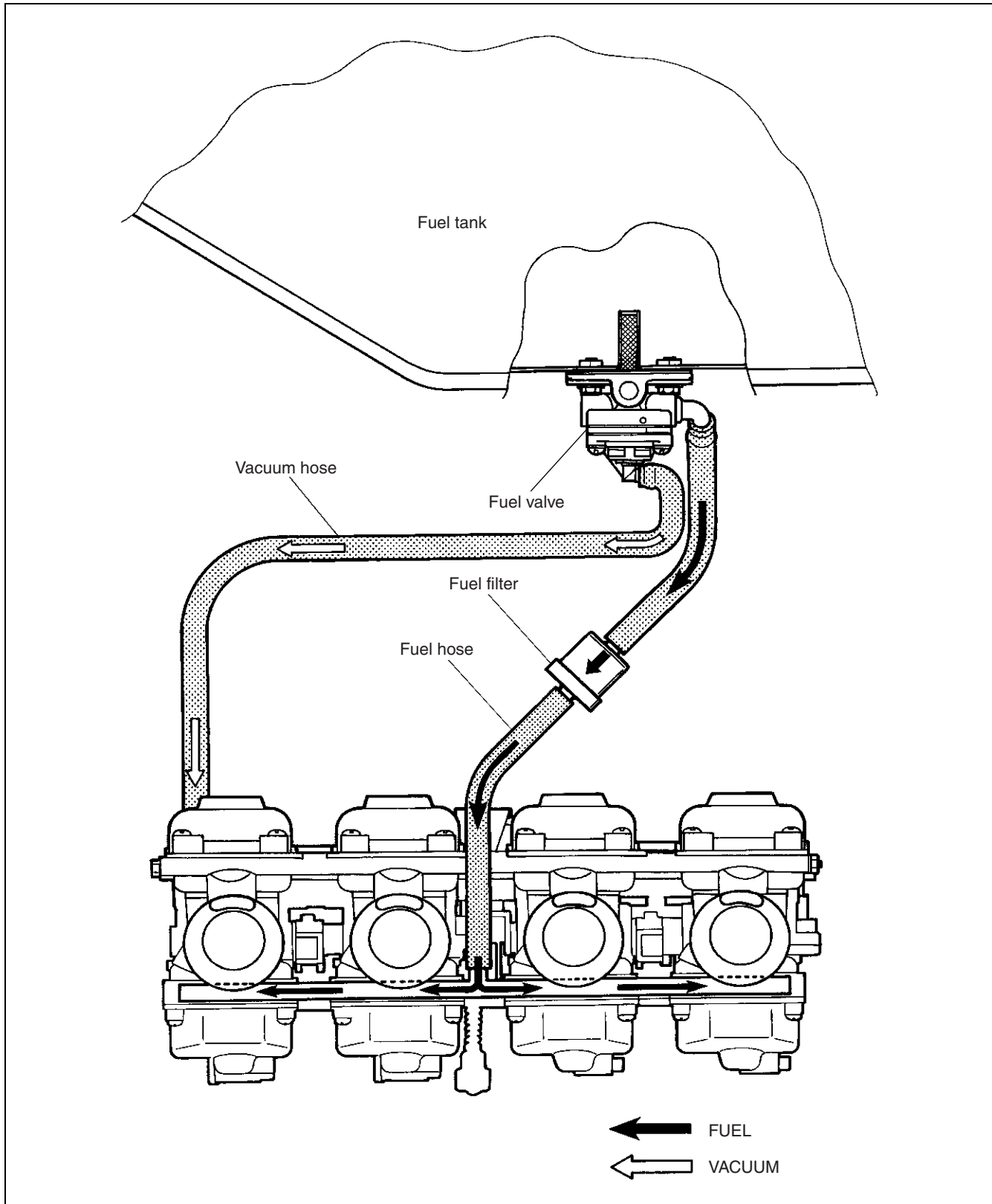
FUEL SYSTEM

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FUEL SYSTEM

The fuel system consists of a fuel tank, fuel valve, vacuum hose, fuel filter, fuel hose and carburetor assembly. When there is negative pressure (vacuum) in the combustion chamber, the fuel is able to flow from the fuel tank, through the fuel valve and then to the carburetor assembly.



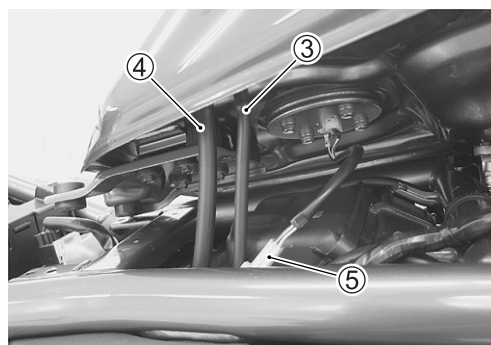
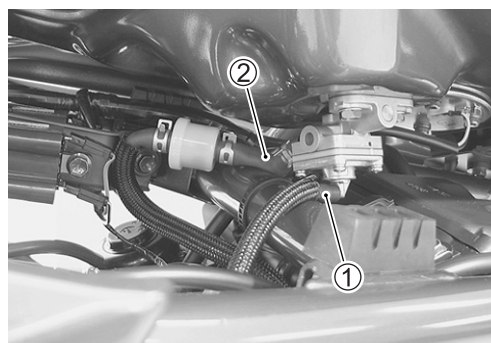
FUEL TANK

REMOVAL

⚠ WARNING

Gasoline is highly flammable and explosive.
Keep heat, sparks and flames away from gasoline.

- Remove the seat. (☞ 5-4)
- Remove the fuel tank mounting bolts.
- Disconnect the vacuum hose ①, fuel hose ②.
- Disconnect the fuel tank air breather hose ③ and water drain hose ④.
- Disconnect the fuel level gauge lead wire coupler ⑤.
- Remove the fuel tank.



REMOUNTING

Remount the fuel tank in the reverse order of removal.

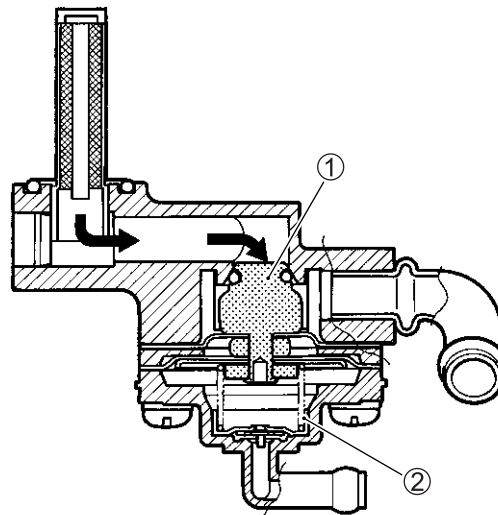
CAUTION

Be careful not to bend the hoses when remounting.

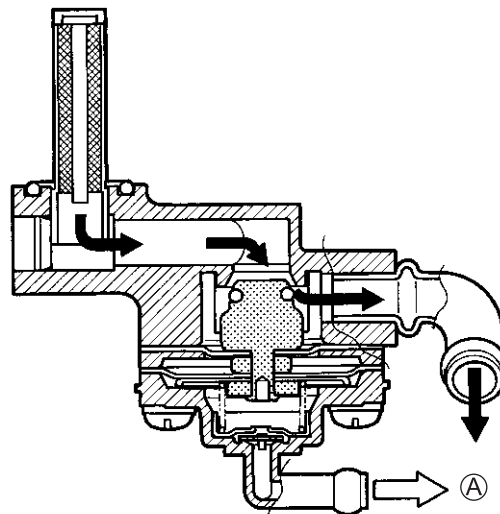
FUEL VALVE

When the engine is not operating, the fuel valve ① is kept closed by the tension of the spring ②, which closes the fuel passageway and stops the flow of fuel to the carburetors.

When the engine has started, negative pressure (vacuum) Ⓐ is generated in the combustion chamber and reaches the diaphragm through a passage in the carburetor's main bore and the vacuum hose. This negative pressure (vacuum) Ⓐ is higher than the spring pressure which causes the diaphragm to force open the fuel valve ① and allow fuel to flow to the carburetor assembly.



"Fuel stop" condition



"Fuel flow" condition

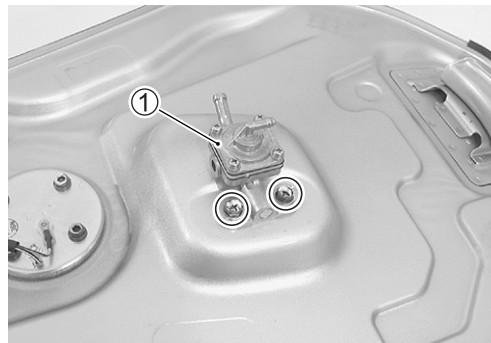


REMOVAL

⚠ WARNING

Gasoline is very explosive. Extreme care must be taken.

- Remove the fuel tank. (➡ 4-3)
- Remove the fuel valve ①.



INSPECTION AND CLEANING

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

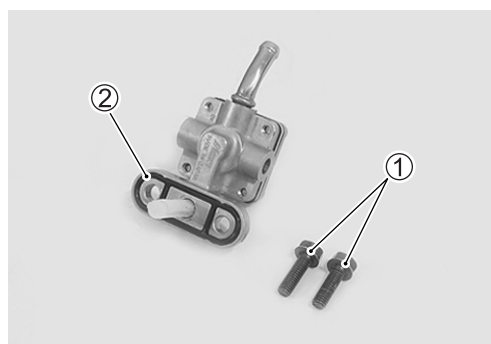


INSTALLATION

Install the fuel valve in the reverse order of removal.

⚠ WARNING

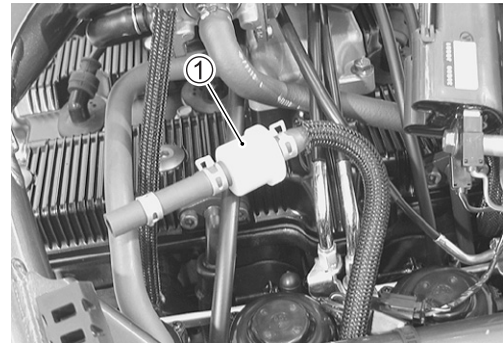
Replace the gaskets ① and O-ring ② with new ones to prevent fuel leakage.



FUEL FILTER

REMOVAL

- Remove the fuel tank. (☞ 4-3)
- Remove the fuel filter ①.



INSPECTION

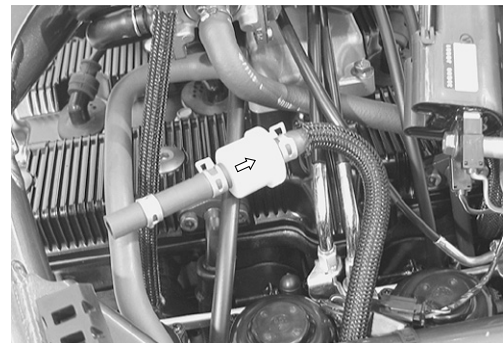
- If the fuel filter is dirty with sediment or rust, fuel will not flow smoothly and loss in engine power may result. Replace the fuel filter if necessary.



INSTALLATION

Install the fuel filter in the reverse order of removal. Pay attention to the following point:

- Be sure to face the arrow mark on the fuel filter to the carburetor side.



FUEL LEVEL GAUGE REMOVAL AND INSTALLATION

⚠ WARNING

Gasoline is very explosive. Extreme care must be taken.

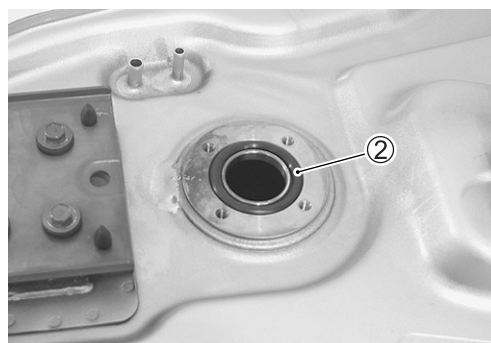
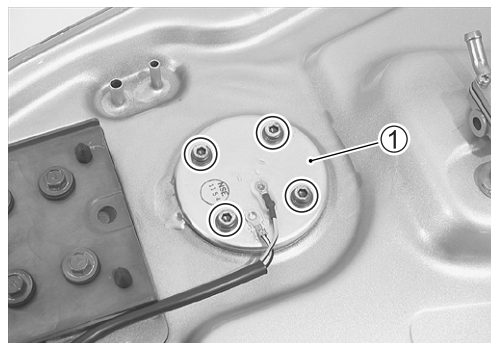
- Remove the fuel tank. (☞ 4-3)
- Remove the fuel level gauge ①.

Install the fuel level gauge in the reverse order of removal. Pay attention to the following points.

⚠ WARNING

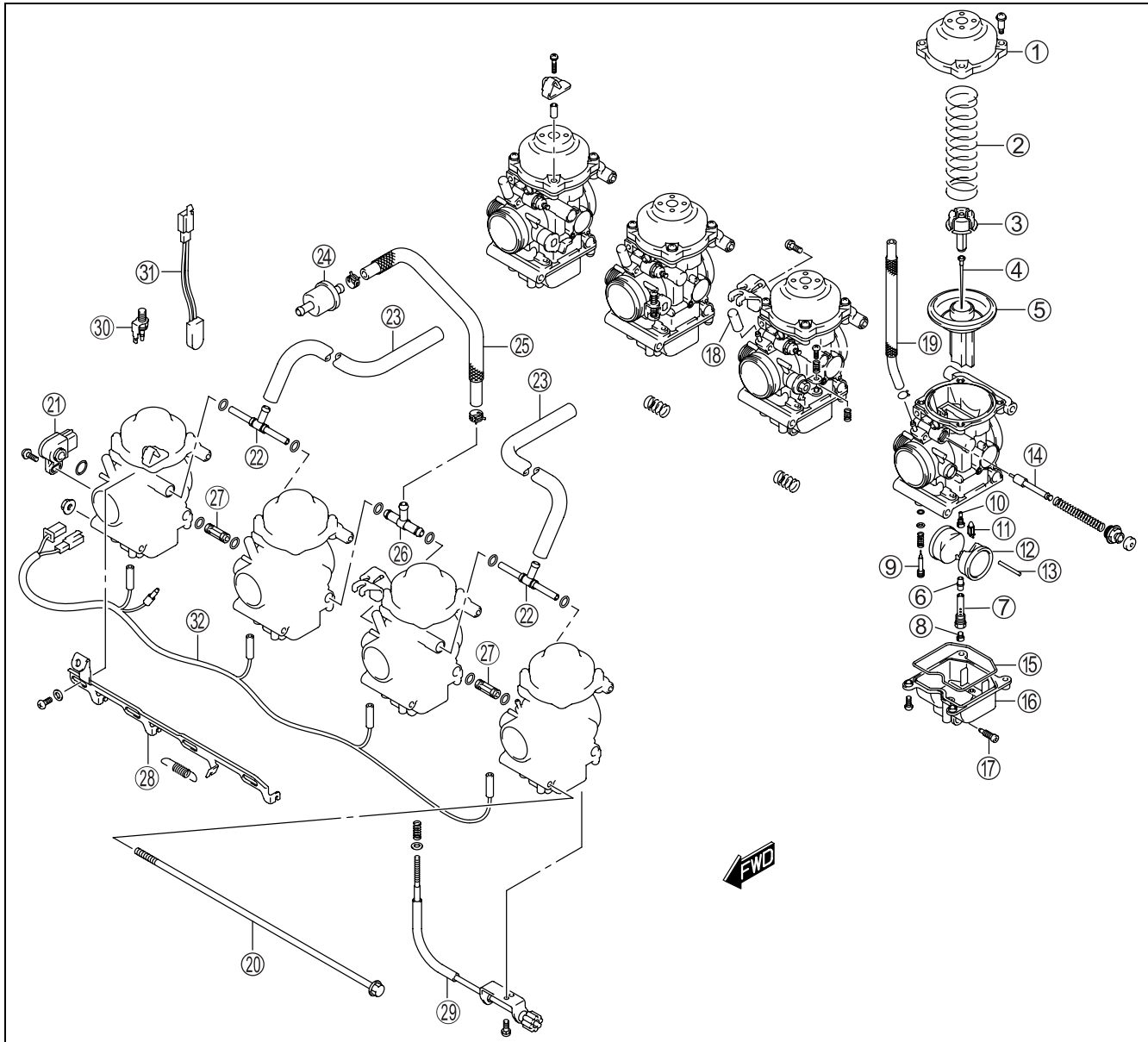
Replace the O-ring ② with a new one to prevent fuel leakage.

- Set the triangle mark forward.



FUEL LEVEL GAUGE INSPECTION (☞ 6-39)

CARBURETOR CONSTRUCTION



①	Top cap	⑬	Float pin	⑳	Air vent hose
②	Spring	⑭	Starter (enricher) plunger	㉑	Fuel filter
③	Jet needle stopper	⑮	Gasket (O-ring)	㉒	Fuel hose
④	Jet needle	⑯	Float chamber	㉓	Fuel joint pipe No. 1
⑤	Diaphragm/Piston valve	⑰	Drain screw	㉔	Fuel joint pipe No. 2
⑥	Needle jet	⑱	Vacuum inlet cap	㉕	Starter (enricher) plate
⑦	Needle jet holder	㉒	Vacuum hose (for fuel valve)	㉖	Throttle stop screw
⑧	Main jet	㉓	Carburetor set shaft (Upper and Lower)	㉗	Carburetor heater (For E-02, 19)
⑨	Pilot screw	㉔	TPS (Throttle position sensor)	㉘	Thermo-switch (For E-02, 19)
⑩	Slow jet	㉕			
⑪	Needle valve assy	㉖			
⑫	Float	㉗			
		㉘			

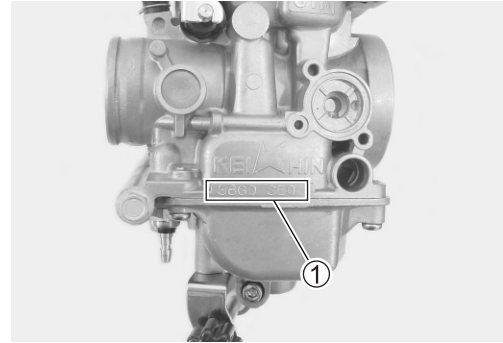
SPECIFICATIONS

ITEM	SPECIFICATION	
	E-02, 19	E-19 U-type
Carburetor type	KEIHIN CVR32	←
Bore size	32.5	←
I.D. No.	38G0	38G2
Idle r/min	1 200 ± 100 r/min	←
Float height	17.0 mm	←
Main jet (M.J.)	#105 (For carburetor #1, 4) #102 (For carburetor #2, 3)	←
Main air jet (M.A.J.)	#50	←
Jet needle (J.N.)	NFKP	←
Needle jet (N.J.)	φ3.4	←
Throttle valve (Th.V.)	11°	←
Slow jet (S.J.)	#35	←
Slow air jet (S.A.J.)	#160	←
Pilot screw (P.S.)	PRE-SET (2 turns back)	←
Throttle cable play (pulling cable)	2.0 – 4.0 mm	←
Starter (enricher) plunger cable play	0.5 – 1.0 mm	←

ITEM	SPECIFICATION	
	E-28	P-37
Carburetor type	KEIHIN CVR32	←
Bore size	32.5	←
I.D. No.	38G1	38G0
Idle r/min	1 200 ± 100 r/min	←
Float height	17.0 mm	←
Main jet (M.J.)	#105 (For carburetor #1, 4) #102 (For carburetor #2, 3)	#110 (For carburetor #1, 4) #108 (For carburetor #2, 3)
Main air jet (M.A.J.)	#50	←
Jet needle (J.N.)	NFKP	NFKR
Needle jet (N.J.)	φ3.4	←
Throttle valve (Th.V.)	11°	←
Slow jet (S.J.)	#35	#38
Slow air jet (S.A.J.)	#160	←
Pilot screw (P.S.)	PRE-SET (2 turns back)	←
Throttle cable play (pulling cable)	2.0 – 4.0 mm	←
Starter (enricher) plunger cable play	0.5 – 1.0 mm	←

I.D. NO. LOCATION

Each carburetor has an I.D. number ① printed on its body.

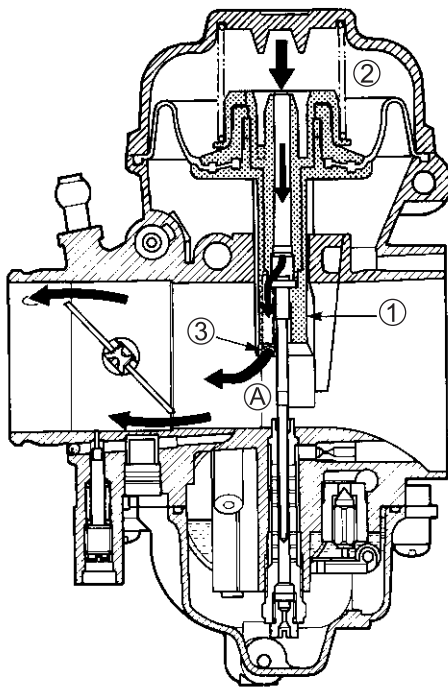


DIAPHRAGM AND PISTON OPERATION

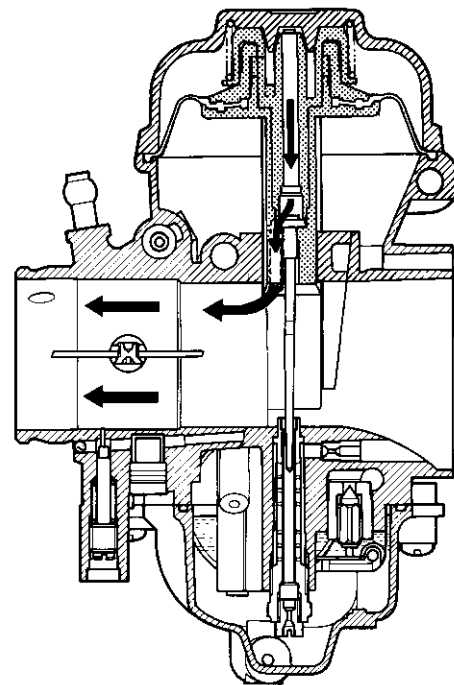
The carburetor is a variable-venturi type, whose venturi cross sectional area is increased or decreased automatically by the piston valve ①. The piston valve moves according to the negative pressure present on the downstream side of the venturi (A). Negative pressure is admitted into the diaphragm chamber ② through an orifice ③ provided in the piston valve ①.

Rising negative pressure overcomes the spring ④ force, causing the piston valve ① to rise into the diaphragm chamber and prevent the air velocity from increasing. Thus, air velocity in the venturi passage is kept relatively constant for improved fuel atomization and the precise air/fuel mixture.

LOWER POSITION OF PISTON VALVE



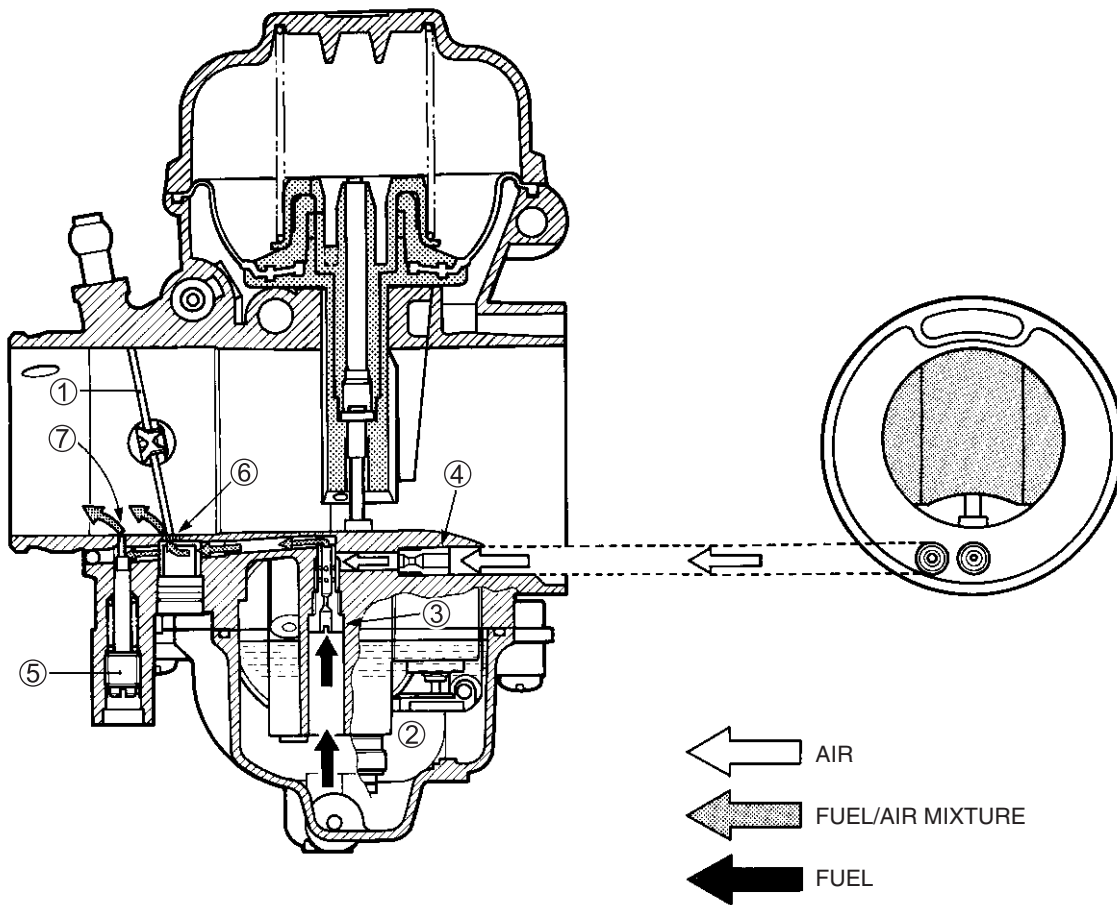
UPPER POSITION OF PISTON VALVE



← NEGATIVE PRESSURE

SLOW SYSTEM

This system supplies fuel during engine operation when the throttle valve ① is closed or slightly opened. The fuel from the float chamber ② is metered by the slow jet ③ where it mixes with air coming in through the slow air jet ④. This mixture, rich with fuel, then goes up through the pilot passage to the pilot screw ⑤. Part of the mixture is discharged into the main bore through bypass ports ⑥. The mixture is metered by the pilot screw ⑤ and sprayed into the main bore through the pilot outlet port ⑦.



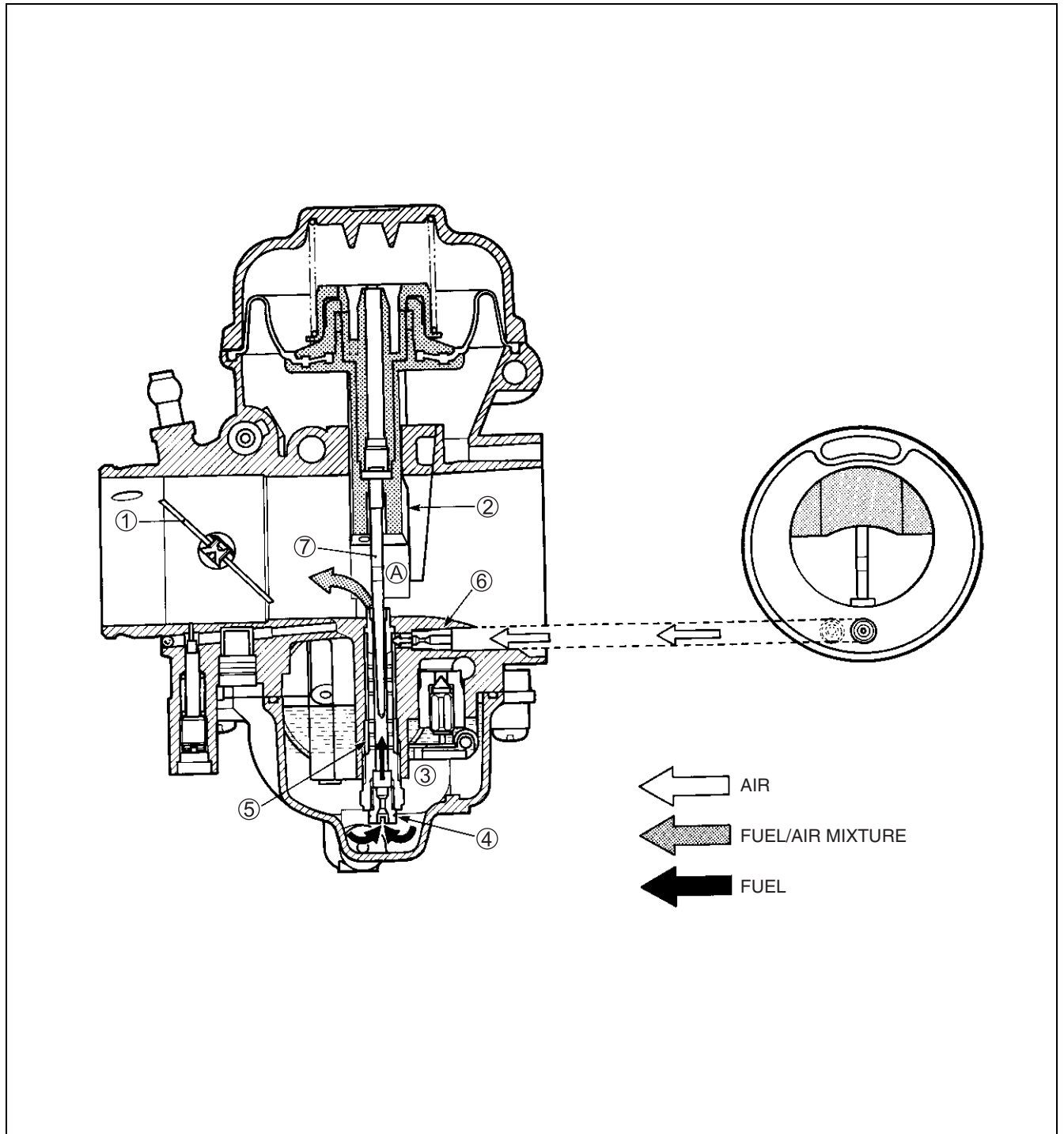
MAIN SYSTEM

As the throttle valve ① is opened, engine speed rises and negative pressure in the venturi ① increases. This causes the piston valve ② to move upward.

The fuel in the float chamber ③ is metered by the main jet ④. The metered fuel enters the needle jet ⑤, mixes with the air admitted through the main air jet ⑥ and forms an emulsion.

The emulsified fuel then passes through the clearance between the needle jet ⑤ and jet needle ⑦ and is discharged into the venturi ①, where it meets the main air stream being drawn by the engine.

Mixture proportioning is accomplished in the needle jet ⑤. The clearance through which the emulsified fuel must flow ultimately depends on throttle position.



STARTER (ENRICHER) SYSTEM

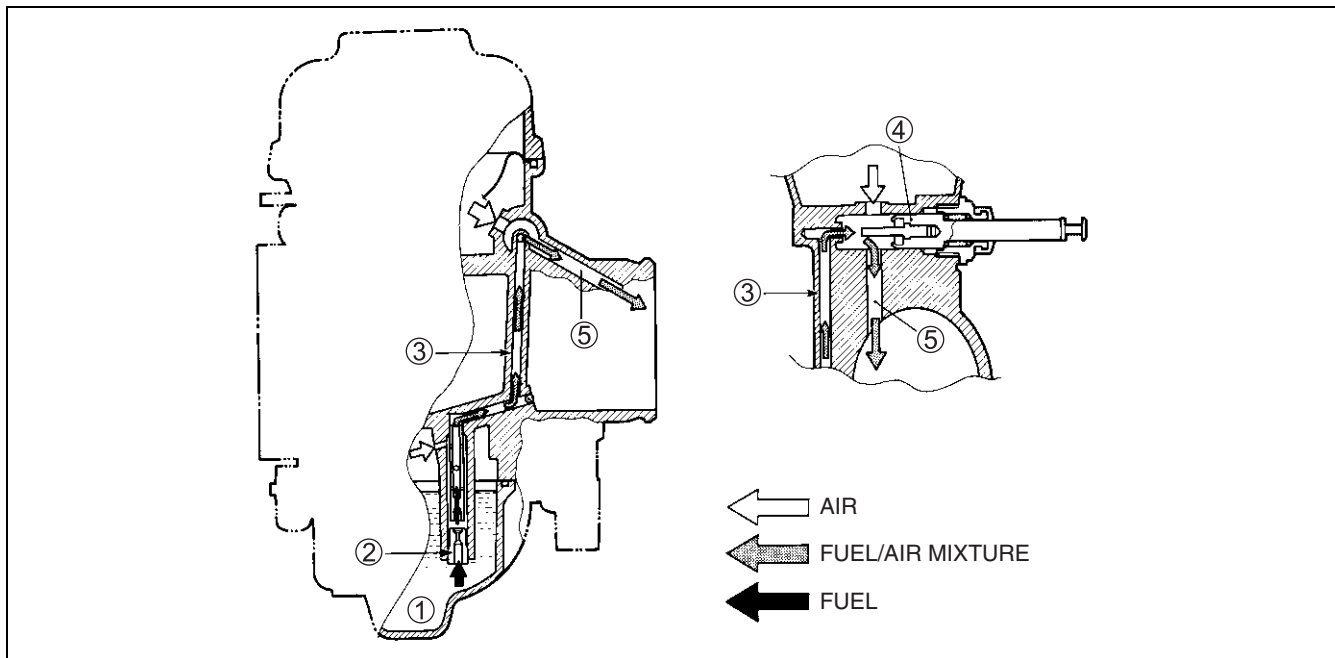
Pulling the starter (enricher) plunger causes fuel to be drawn into the starter circuit from the float chamber ①.

The starter jet ② meters this fuel. The fuel then flows into the fuel pipe ③ and mixes with the air coming from the float chamber ①. The mixture, rich in fuel, reaches the starter plunger ④ and mixes again with the air coming through a passage extending from behind the diaphragm.

The two successive mixtures of the fuel with the air provide the proper air/fuel mixture for starting. This occurs when the mixture is sprayed through the starter outlet port ⑤ into the main bore.

NOTE:

A starter (enricher) system is operated almost the same way as a choke.



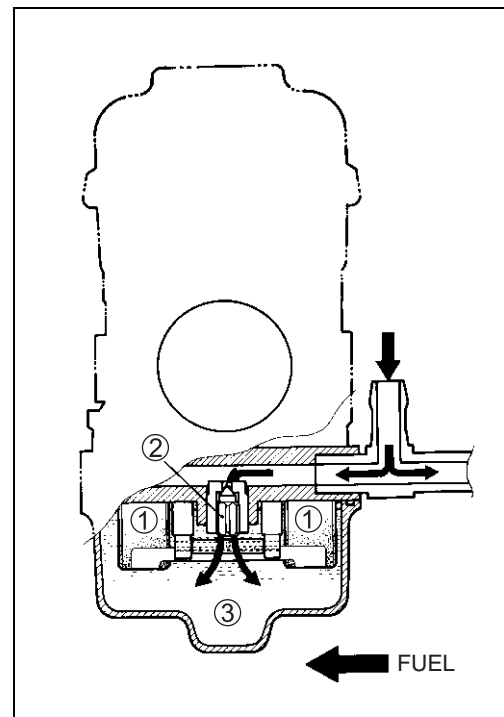
FLOAT SYSTEM

The float ① and needle valve ② work in conjunction with one another. As the float ① moves up and down, so does the needle valve ②.

When there is a high fuel level in the float chamber ③, the float ① rises and the needle valve ② pushes up against the valve seat. When this occurs, no fuel enters the float chamber ③.

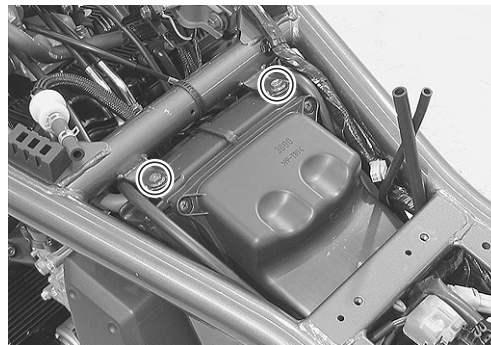
As the fuel level falls, the float ① lowers and the needle valve ② unseats itself; admitting fuel into the float chamber ③.

In this manner, the needle valve ② admits and shuts off fuel to maintain the appropriate fuel level inside the float chamber ③.

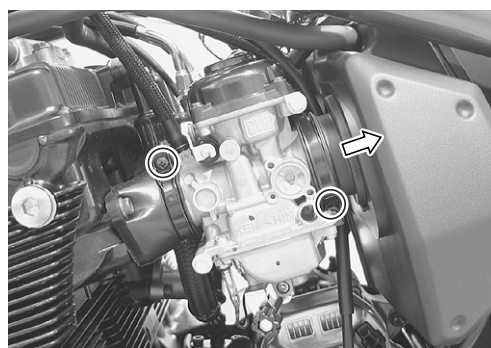
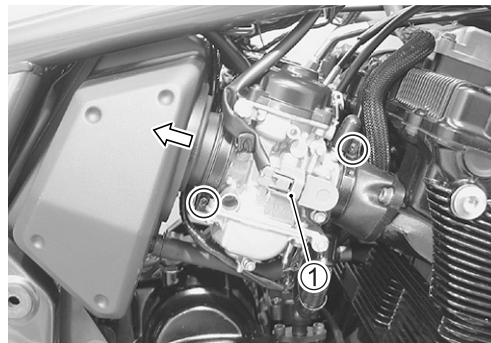


REMOVAL

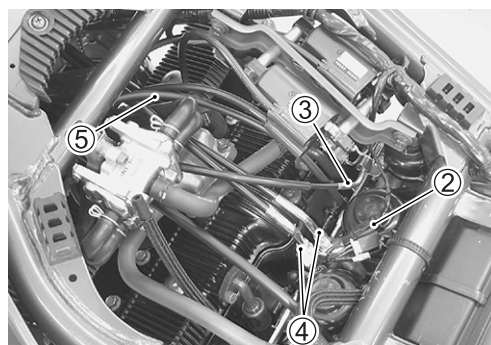
- Remove the seat and frame covers. (☞ 5-4)
- Remove the fuel tank. (☞ 4-3)
- Remove the air cleaner box mounting bolts.



- Disconnect the throttle position sensor coupler ①.
- Loosen the respective carburetor clamp screws.
- Move the air cleaner box backward.



- Disconnect the carburetor heater lead wire coupler ②.
- Unhook the starter cable ③ and throttle cables ④.
- Disconnect the vacuum hose ⑤ from behind the PAIR valve.
- Remove the carburetor assembly



DISASSEMBLY

Before disassembly, prepare a clean and well lit work place where carburetor components can be laid out neatly and will not get lost. Study the service manual carburetor diagram and familiarize yourself with component locations and the different fuel circuits and their routing through the carburetor.

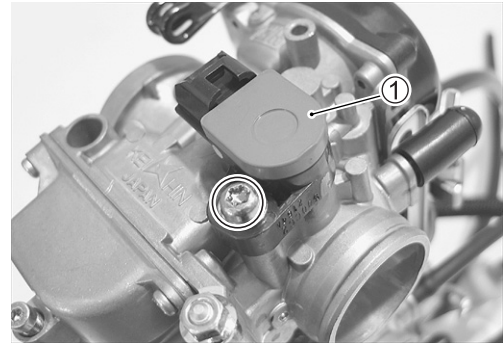
- Remove the throttle position sensor ①.

TOOL 09930-11950: Torx wrench, T25

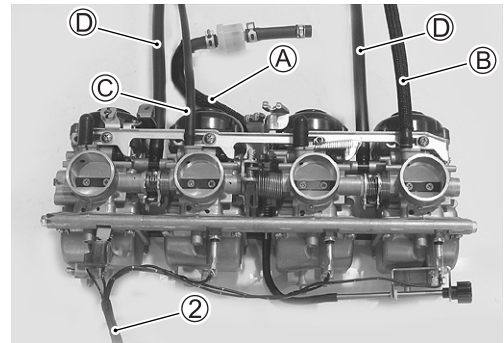
CAUTION

The throttle position sensor is preset at the factory. Prior to disassembly, mark the throttle position sensor's original position with paint or a scribe for accurate reinstallation.

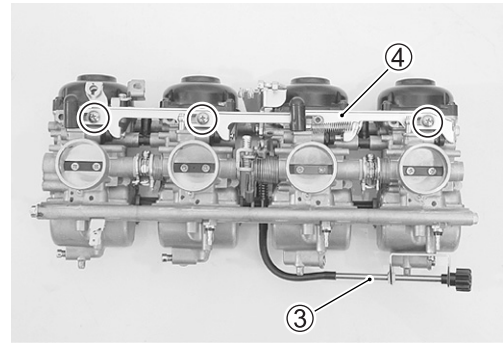
Avoid removing the throttle position sensor from the carburetor body unless absolutely necessary.



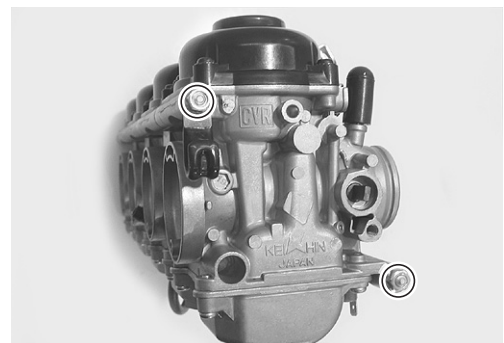
- Disconnect the hoses.
 - Ⓐ Fuel hose
 - Ⓑ Vacuum hose (for fuel valve)
 - Ⓒ Vacuum hose (for PAIR valve)
 - Ⓓ Air vent hose
- Disconnect the carburetor heater terminal lead wires ②.



- Remove the throttle stop screw ③.
- Remove the starter (enricher) plate ④ and spring.



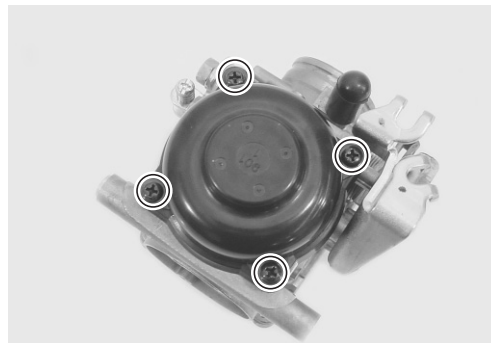
- Remove the upper and lower carburetor set shafts.
- Separate the carburetor assembly.



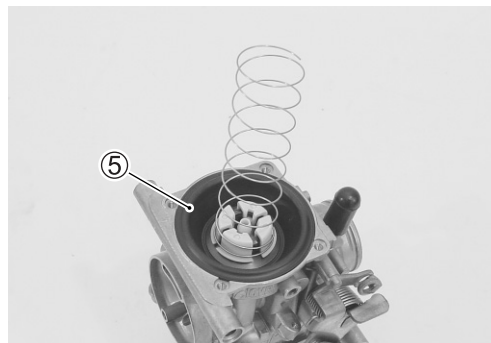
- Remove the top cap.

CAUTION

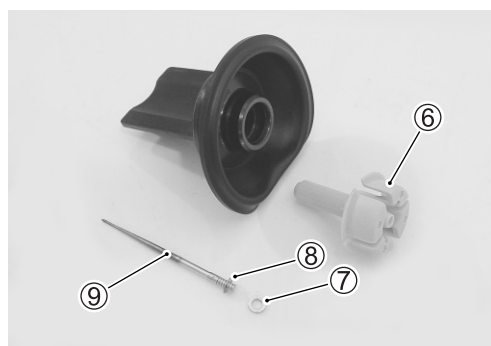
Do not use compressed air on the carburetor body, before removing the diaphragm; this may damage the diaphragm.



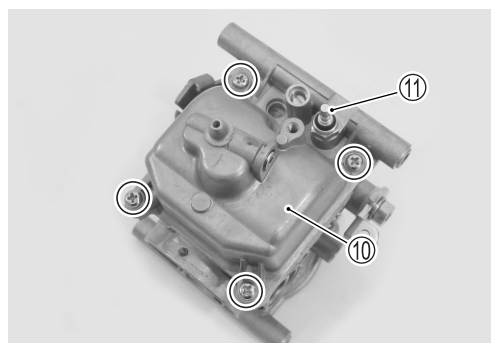
- Remove the spring and piston valve assembly ⑤.



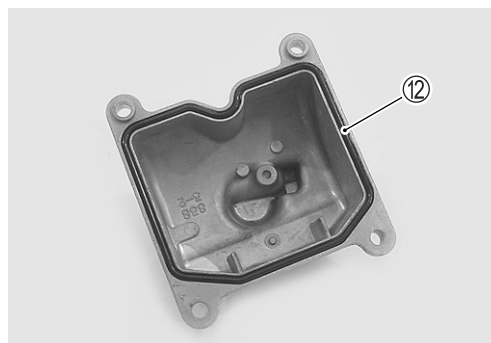
- Remove the jet needle stopper ⑥, washer ⑦, E-ring ⑧ and jet needle ⑨ from the piston valve.



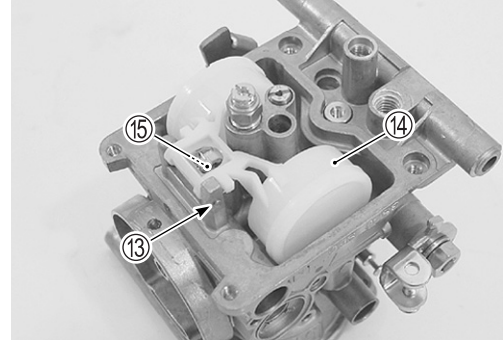
- Remove the float chamber ⑩.
- Remove the carburetor heater ⑪.



- Remove the O-ring ⑫.

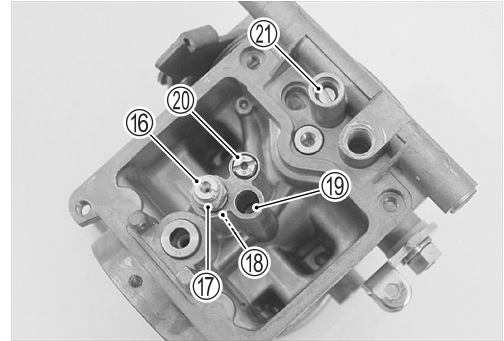


- Remove the float pin ⑬, float ⑭ and needle valve ⑮.



- Remove the following parts.

- ⑯ Main jet
- ⑰ Needle jet holder
- ⑱ Needle jet
- ⑲ Slow jet
- ⑳ Starter (enricher) jet
- ㉑ Pilot screw



NOTE:

Before removing the pilot screw ㉑, its setting must be determined. Slowly turn the pilot screw clockwise and count the number of turns until it lightly seats. Make a note of how many turns were made.

When reassembling the pilot screw, you will want to set it to its original position.

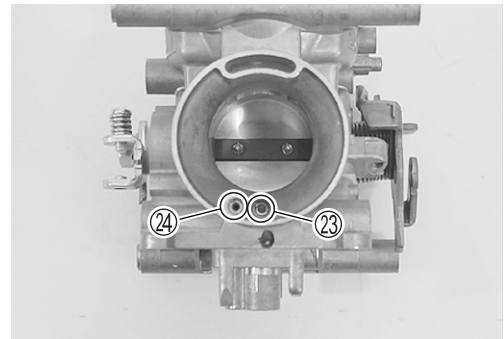
CAUTION

Do not use a wire to clean the passages, valve seat and jets.

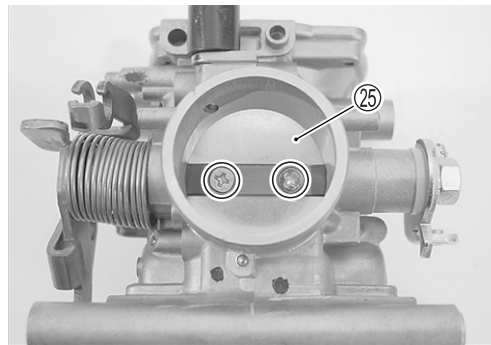
- Remove the starter (enricher) plunger assembly ㉒.



- Remove the main air jet ㉓.
- Remove the slow air jet ㉔.



- Remove the throttle valve ②⑤.



CLEANING

⚠ WARNING

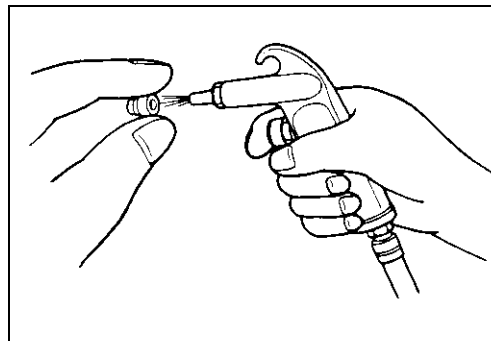
Some carburetor cleaning chemicals, especially dip-type soaking solutions, are very corrosive and must be handled carefully. Always follow the chemical manufacturer's instructions on proper use, handling and storage.

- Clean all jets with a spray-type carburetor cleaner and dry them using compressed air.
- Clean all circuits of the carburetor thoroughly – not just the perceived problem area. Clean the circuits in the carburetor body with a spray-type cleaner and allow each circuit to soak, if necessary, to loosen dirt and varnish. Blow the body dry using compressed air.

CAUTION

Do not use a wire to clean the jets or passageways. A wire can damage the jets and 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 carburetor components.

- After cleaning, reassemble the carburetor with new seals and gaskets.



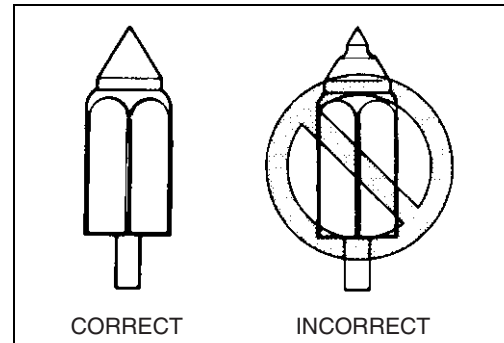
INSPECTION

Check the following items for any damage or clogging.

- * Slow jet
- * Main jet
- * Main air jet
- * Slow air jet
- * Needle jet air bleeding hole
- * Float
- * Needle valve
- * Jet needle
- * Valve seat
- * Piston valve
- * Starter (enricher) jet
- * Gasket and O-ring
- * Throttle shaft oil seal
- * Diaphragm
- * Pilot outlet and by-pass ports

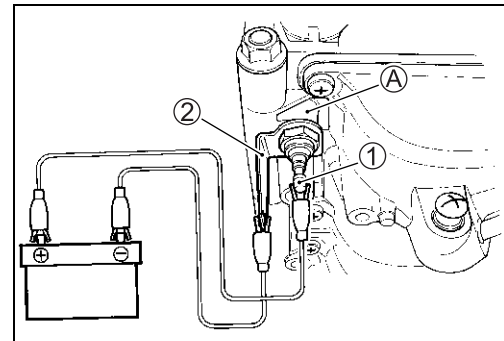
NEEDLE VALVE

If foreign matter is caught between the valve seat and the needle valve, the gasoline will continue flowing and overflow. If the valve seat and needle valve are worn beyond the permissible limits, similar trouble will occur. Conversely, if the needle valve sticks, the gasoline will not flow into the float chamber. Clean the float chamber and float parts with gasoline. If the needle valve is worn, as shown in the illustration, replace it along with a new valve seat. Clean the fuel passage of the mixing chamber using compressed air.



CARBURETOR HEATER (E-02, 19)

- Remove the carburetor assembly. (☞ 4-15)
- Disconnect the carburetor heater terminal lead wires.
- Connect the ⊕ terminal of a 12V battery to the terminal ① of the carburetor heater and the battery ⊖ terminal to the terminal ②.
- Check that the heater section ④ is heated in 5 minutes after the battery has been connected. If the carburetor heater is not heated up, replace the carburetor heater with a new one.



⚠ WARNING

Do not touch the carburetor heater directly to prevent burn.

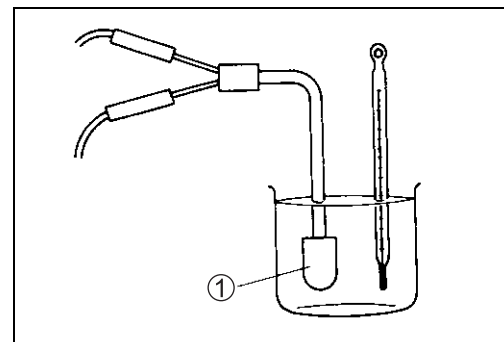
THERMO-SWITCH (E-02, 19)

- Cool the thermo-switch ① with ice water and check for continuity.

TOOL 09900-25008: Multi-circuit tester

DATA

Thermo-switch continuity	Below 8 – 14 °C	Yes
	Above 15 – 21 °C	No

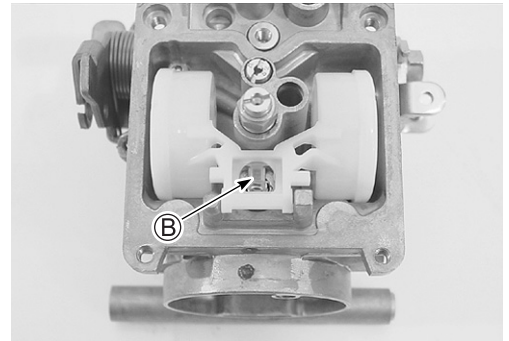
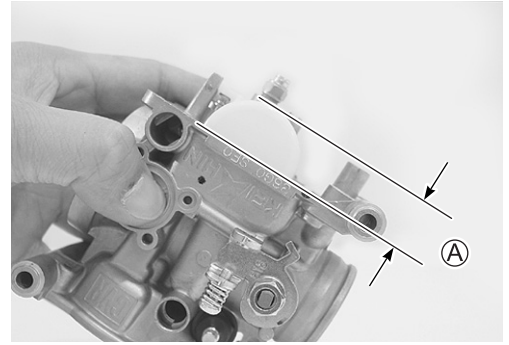


FLOAT HEIGHT

To check the float height, turn the carburetor upside down. Measure the float height (A) while the float arm is just contacting the needle valve using vernier calipers. Bend the tongue (B) as necessary to bring the float height (A) to the specified level.

TOOL 09900-20102: Vernier calipers

DATA Float height (A): 17.0 mm



THROTTLE POSITION SENSOR

Measure the resistance between the terminals as shown.

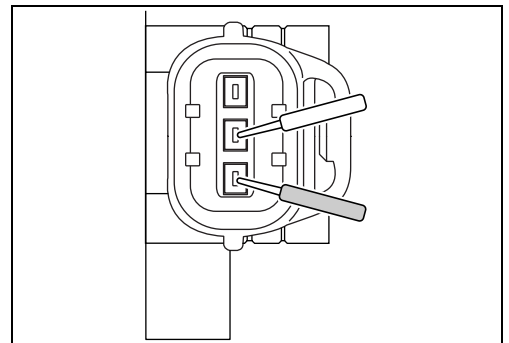
DATA Throttle position sensor resistance: Approx. 5 kΩ

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Resistance (Ω)

NOTE:

When performing this test, it is not necessary to remove the throttle position sensor.



REASSEMBLY

Reassemble the carburetors in the reverse order of disassembly. Pay attention to the following points.

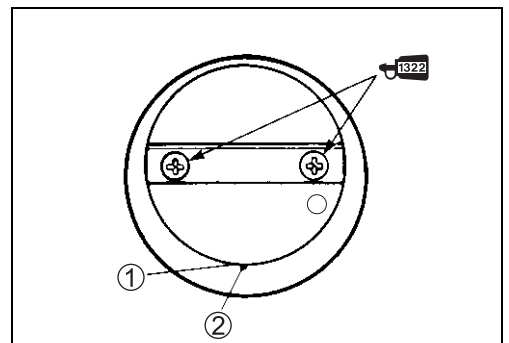
THROTTLE VALVE

- Turn the throttle stop screw and throttle valve synchronizing screw until the throttle valve's bottom end (1) is aligned with the foremost by-pass port (2) as shown.
- Apply a small quantity of THREAD LOCK "1322" to the throttle valve screws and tighten them.

1322 99000-32110: THREAD LOCK SUPER "1322"

CAUTION

Face the stamped side of the throttle valve out.

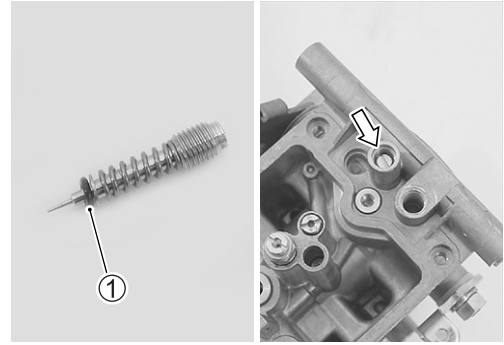


PILOT SCREW

- After cleaning, reinstall the pilot screw to the original setting by turning the screw in until it lightly seats, and then turn it out the same number of turns counted during disassembly.

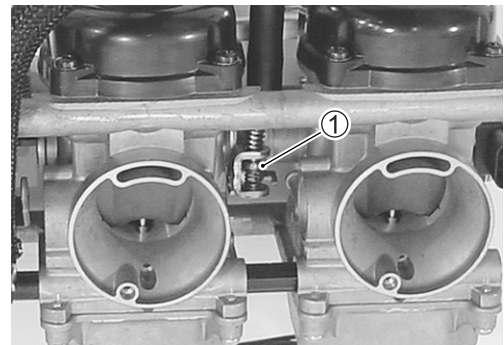
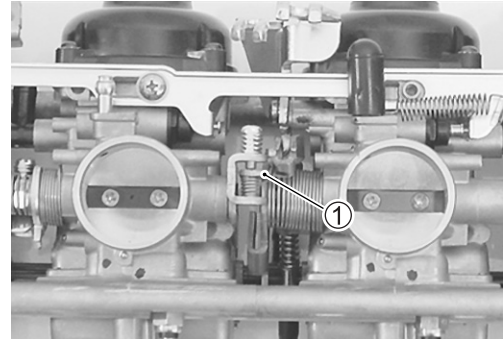
CAUTION

Replace the O-ring ① with a new one.




CARBURETOR ENGAGEMENT

- Position the throttle valve control lever ① between the throttle valve synchronizing screw and spring as shown.



CARBURETOR HEATER (E-02, 19)

- Apply thermo-grease to the threads and tighten the carburetor heater.

 99000-59029: THERMO-GREASE

 Carburetor heater: 3 N·m (0.3 kgf·m)



THROTTLE POSITION SENSOR POSITIONING

Install the throttle position sensor as described below.

- Measure the resistance (Ω_1) between the throttle position sensor terminals. (☞ 4-21)

TOOL 09900-25008: Multi circuit tester set

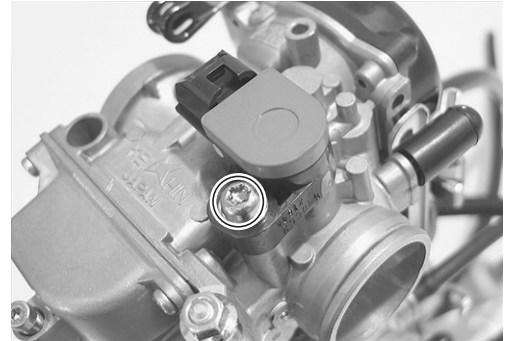
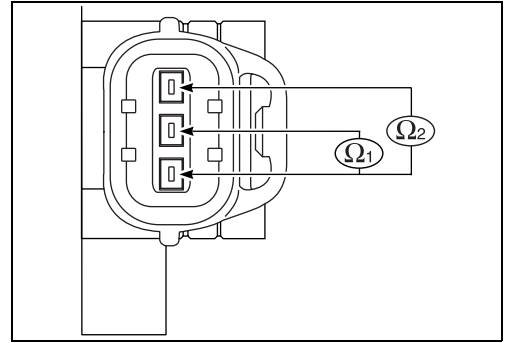
Tester knob indication: Resistance (Ω)

- Measure the resistance (Ω_2) between the throttle position sensor terminals as shown.
- Fully open the throttle valve with the throttle lever.
- Position the throttle position sensor until resistance (Ω_2) reaches between 3.09 – 4.63 k Ω .
- When the resistance (Ω_2) is within specification, tighten the throttle position sensor mounting screws.

DATA Throttle position sensor resistance (Ω_2) :
3.09 – 4.63 k Ω

TOOL 09930-11950: Torx wrench, T25

Throttle position sensor screw: 3.5 N·m (0.35 kgf·m)

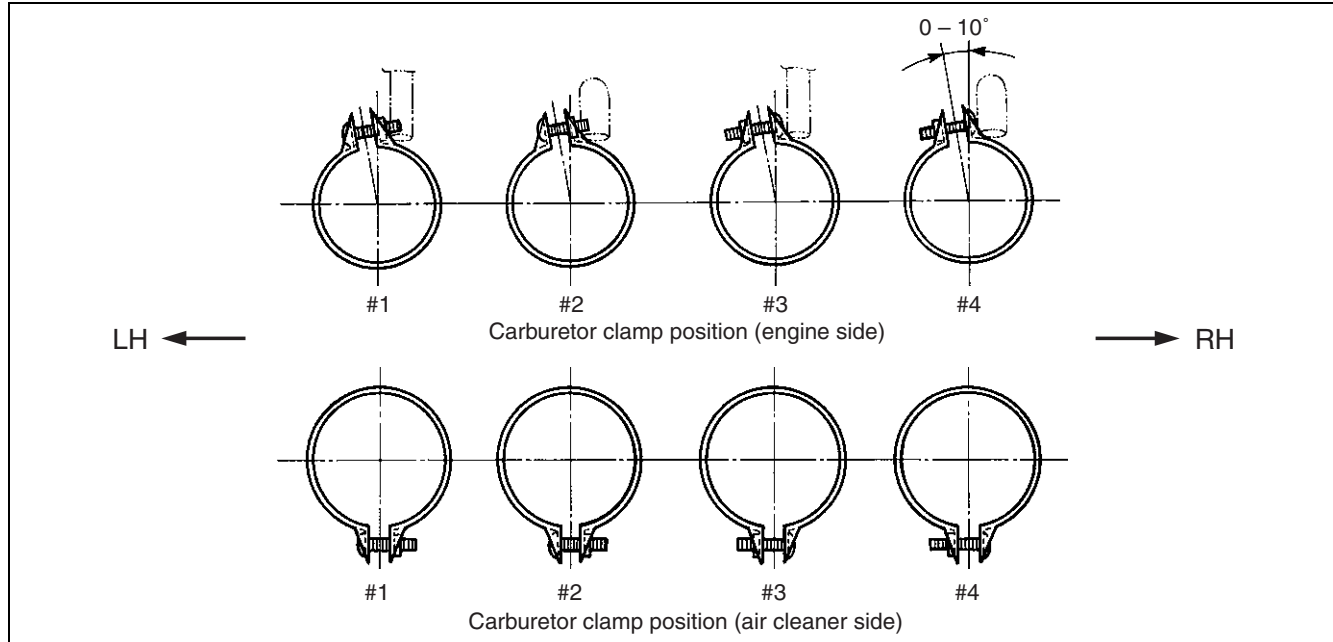


REMountING

Remount the carburetor assembly in the reverse order of removal. Pay attention to the following points.

CARBURETOR CLAMPS

Position the carburetor clamps as shown.



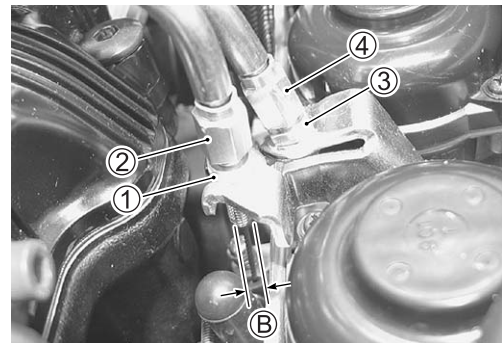
THROTTLE CABLE ADJUSTMENT (MAJOR ADJUSTMENT)

NOTE:

Minor adjustment can be made by the throttle grip side adjuster.

(2-11)

- Remove the fuel tank. (4-3)
- Loosen the locknut ① of the throttle returning cable.
- Turn the returning cable adjuster ② to obtain proper cable play.
- Loosen the locknut ③ of the throttle pulling cable.
- Turn the pulling cable adjuster ④ in or out until the throttle cable play ⑤ of 2.0 – 4.0 mm at the throttle grip is obtained.
- Tighten the locknut ③ securely while holding the adjuster ④.
- While holding the throttle grip at the fully closed position, slowly turn the returning cable adjuster ② to obtain a cable slack ⑥ of 1.0 mm.
- Tighten the locknut ① securely.



- After all of the work has been completed, install the carburetor assembly onto the engine and perform the following adjustments.
 - * Engine idle speed 2-11
 - * Throttle cable play 2-11
 - * Carburetor synchronization 4-25

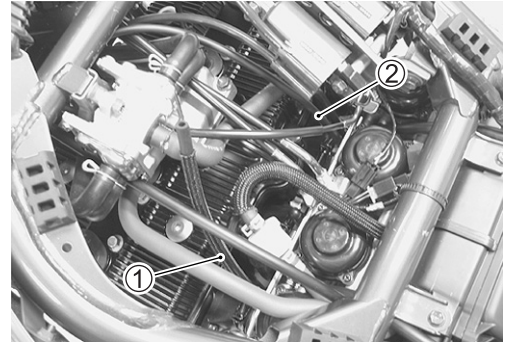
CARBURETOR SYNCHRONIZATION

Check and adjust the carburetor synchronization among the four carburetors as follows.

USE OF VACUUM BALANCER GAUGE

Calibrating each vacuum gauge

- Start up the engine and run it in idling condition for warming up.
- Stop the warmed-up engine.
- Disconnect the vacuum hoses ① (for fuel valve) and ② (for PAIR valve) from carburetor #1 and #3, and install a cap of the proper size to each carburetor's vacuum inlet.
- Remove the vacuum inlet cap ③ from the carburetor (for cylinders #2 or #4).

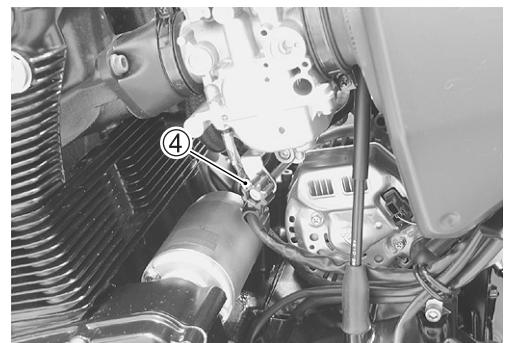


- Connect one of the carburetor balancer's rubber hoses to this inlet.

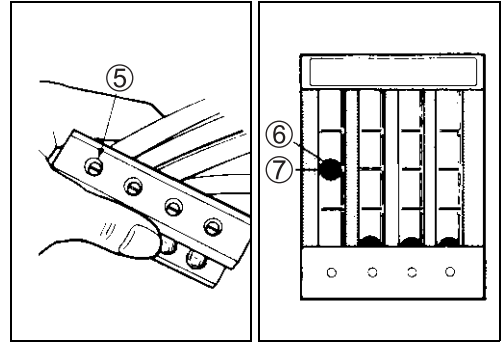
 **09913-13121: Vacuum balancer gauge**



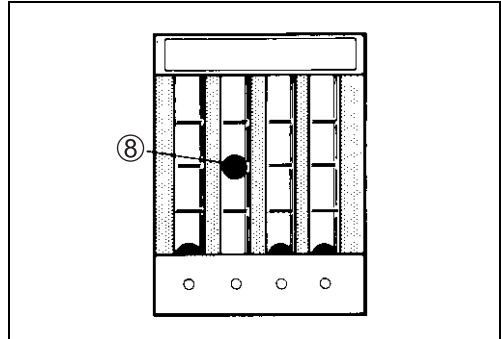
- Connect a tachometer and start up the engine.
- Bring the engine rpm to 1 750 r/min by the throttle stop screw ④.



- Turn the air screw ⑤ of the carburetor balancer gauge so that the vacuum pressure causes the steel ball ⑥ to rise to the center line ⑦ of the tube.



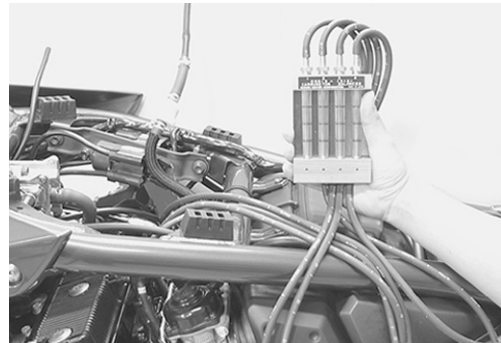
- After making sure that the steel ball remains at the center line, disconnect the hose from the vacuum inlet and connect the next hose to the vacuum inlet.
 - Turn the air screw for this tube until the steel ball ⑧ is at the center line of its respective tube.
 - Repeat the above procedure on the third and fourth hoses.
- The carburetor balancer is now ready to be used to synchronize the carburetors.



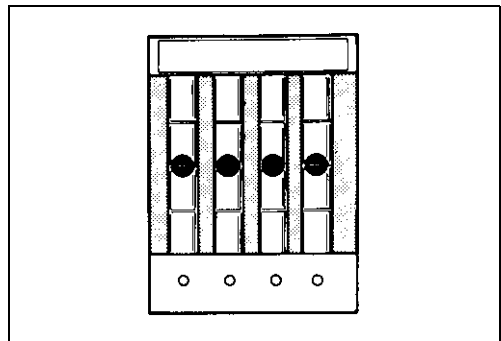
CARBURETOR SYNCHRONIZATION

Remove all of the vacuum inlet caps, before synchronizing the carburetors. Connect the carburetor balancer hoses to these vacuum inlets and then adjust the carburetors as follows.

- Start the engine and keep it running at 1 750 r/min.
Observe the tachometer reading.



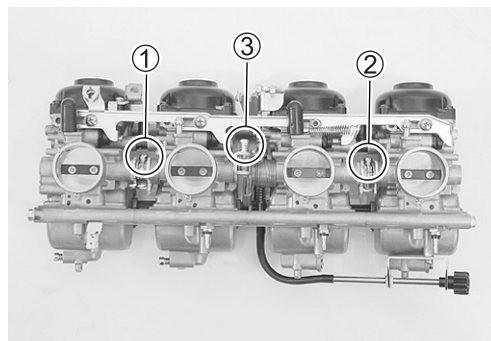
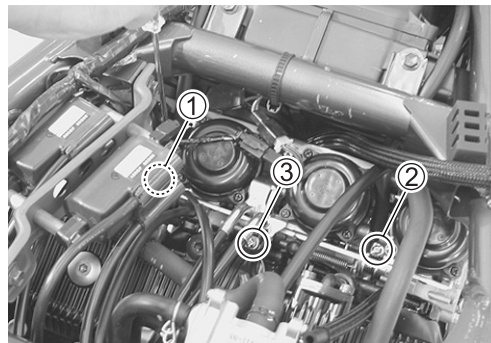
- When the steel balls in tubes #1, #2, #3 and #4 are at the same level, the carburetor is correctly adjusted.



- If the steel balls are not at the same level, adjust the throttle valve synchronizing screws ①, ② and ③.

Adjusting order is as follows.

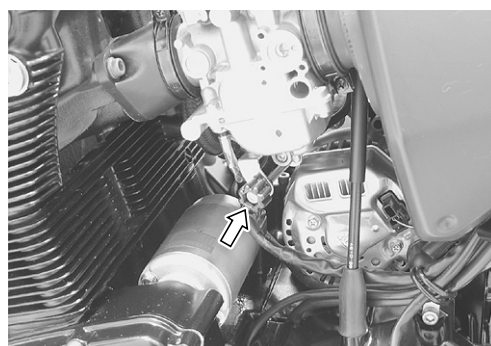
① → ② → ③



- After balancing the carburetor, set the engine speed by turning the throttle stop screw.

Observe the tachometer reading.

DATA Engine speed: $1\ 200 \pm 100$ r/min



CHASSIS

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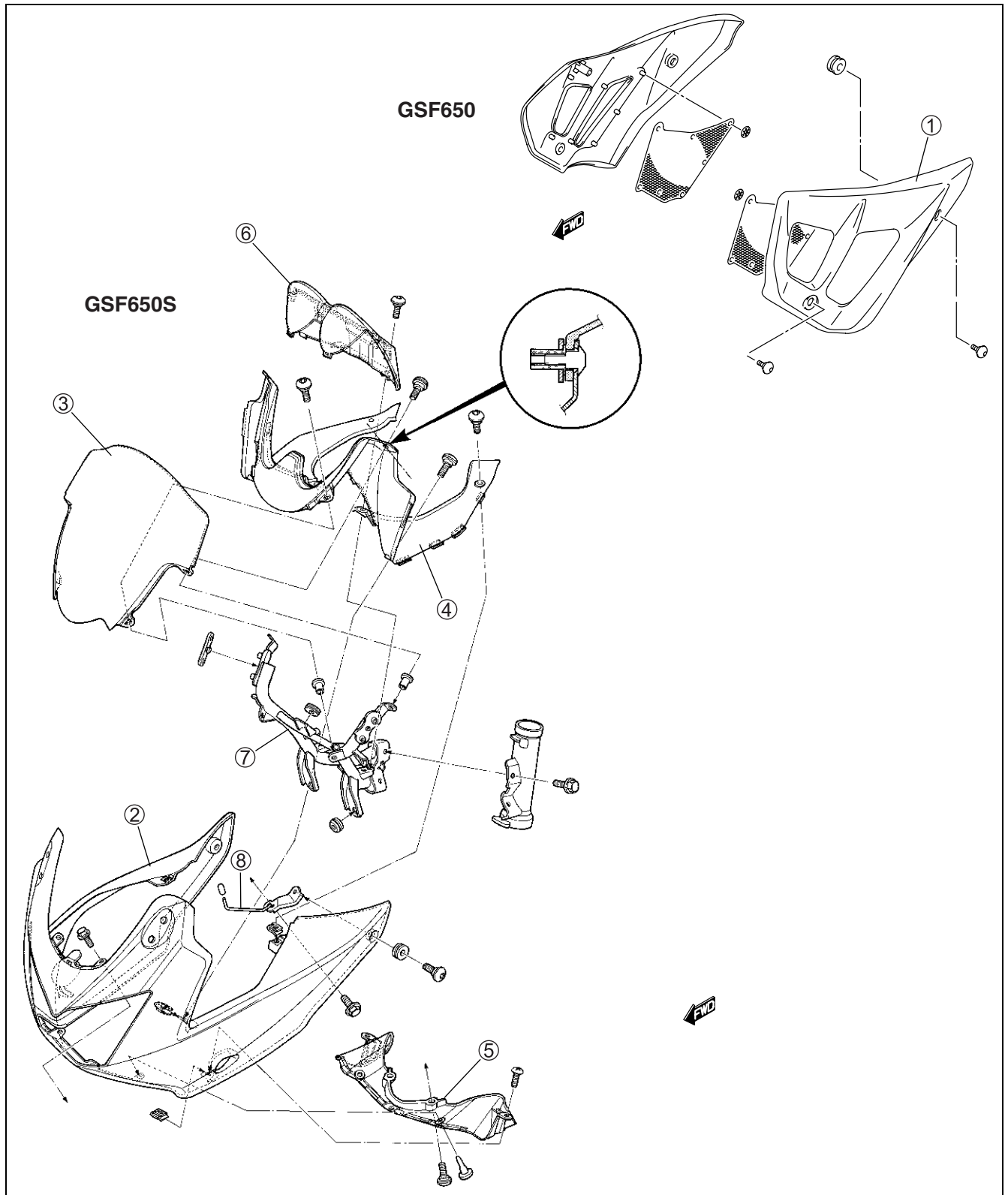
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EXTERIOR PARTS CONSTRUCTION



①	Frame head cover	④	Upper panel	⑦	Cowling brace
②	Cowling body	⑤	Lower panel	⑧	Cowling side bracket
③	Wind screen	⑥	Combination meter		

REMOVAL

SEAT

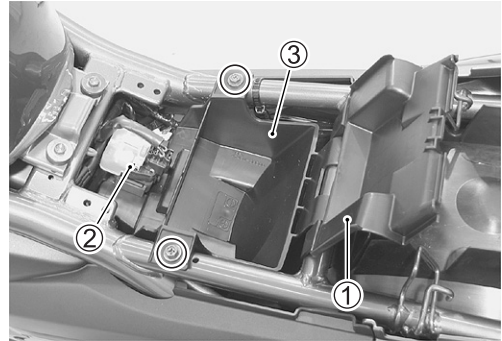
- Unlock the seat with the ignition key.
- Remove the front and rear seats as an assembly.

SEAT HEIGHT ADJUSTMENT (☞ 5-74)



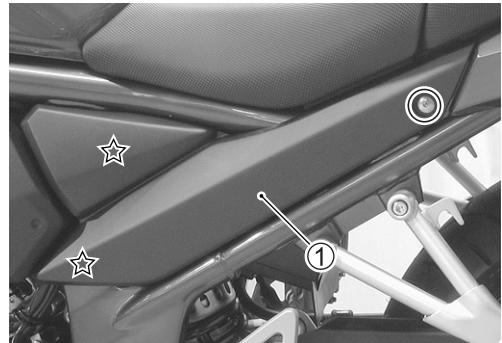
LUGGAGE BOX

- Remove the seat. (☞ Above)
- Remove the luggage box lid ①.
- Pull out the starter relay ②.
- Remove the bolts and luggage box ③.



FRAME COVER

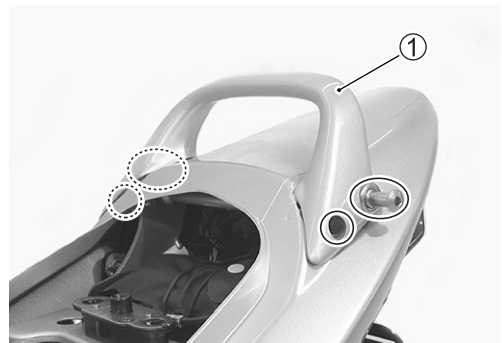
- Remove the frame cover ① (LH and RH).



: Hooked points

SEAT TAIL COVER

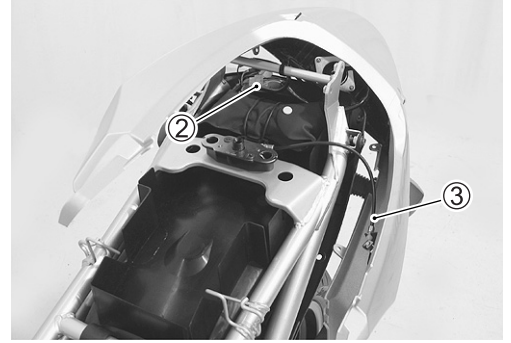
- Remove the seat. (☞ Above)
- Remove the frame covers. (☞ Above)
- Remove the pillion rider handle ①.



- Remove the fasteners.

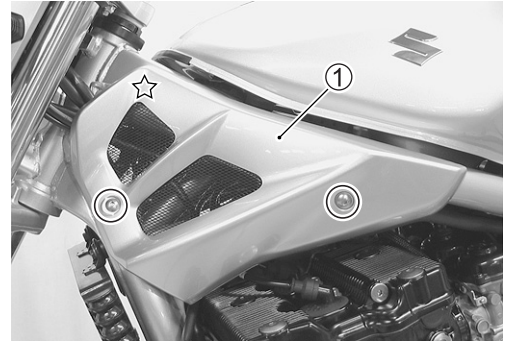


- Disconnect the brake light/taillight lead wire coupler ②.
- Unhook the seat lock cable ③.
- Remove the seat tail cover.



FRAME HEAD COVER (GSF650)

- Remove the frame head cover ① (LH and RH).



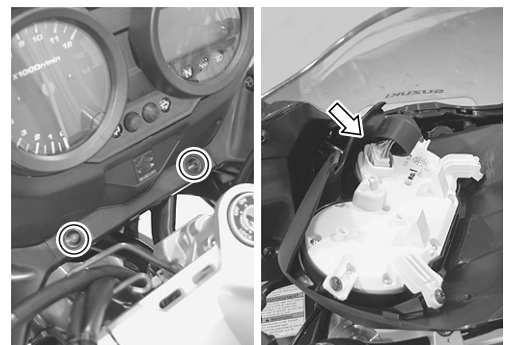
: Hooked point

COWLING AND COWLING BRACE (GSF650S)

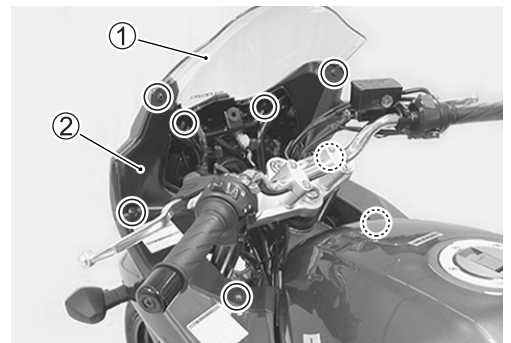
- Remove the caps.
- Remove the rear view mirrors (LH and RH).



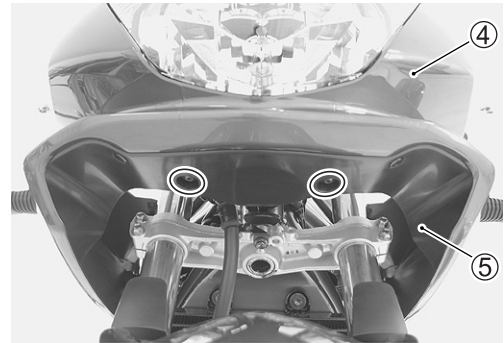
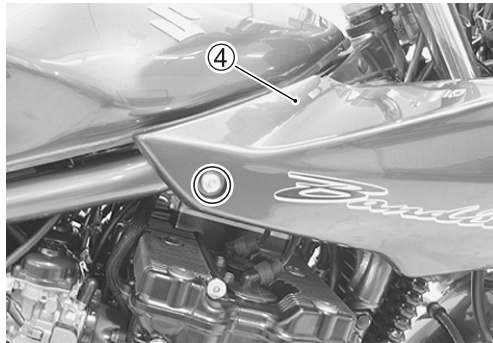
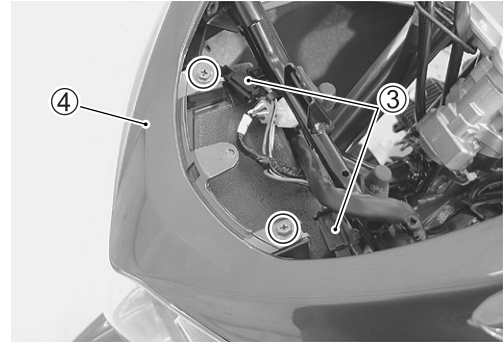
- Remove the combination meter unit.



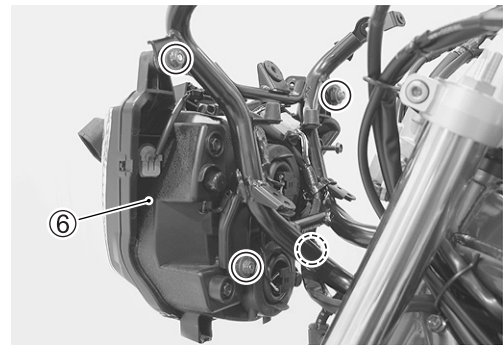
- Remove the wind screen ① and upper panel ②.



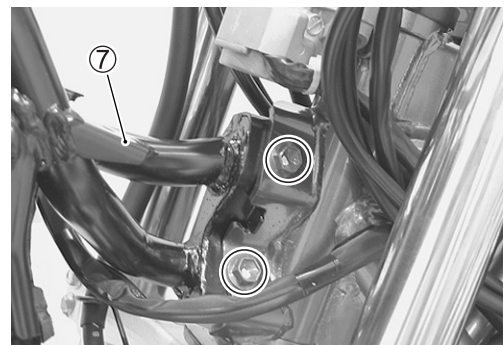
- Disconnect the turn signal lead wire couplers ③.
- Remove the cowling ④ along with the lower panel ⑤ and turn signal assemblies.



- Disconnect the headlight and position light couplers.
- Remove the headlight assembly ⑥.



- Remove the cowling brace ⑦.

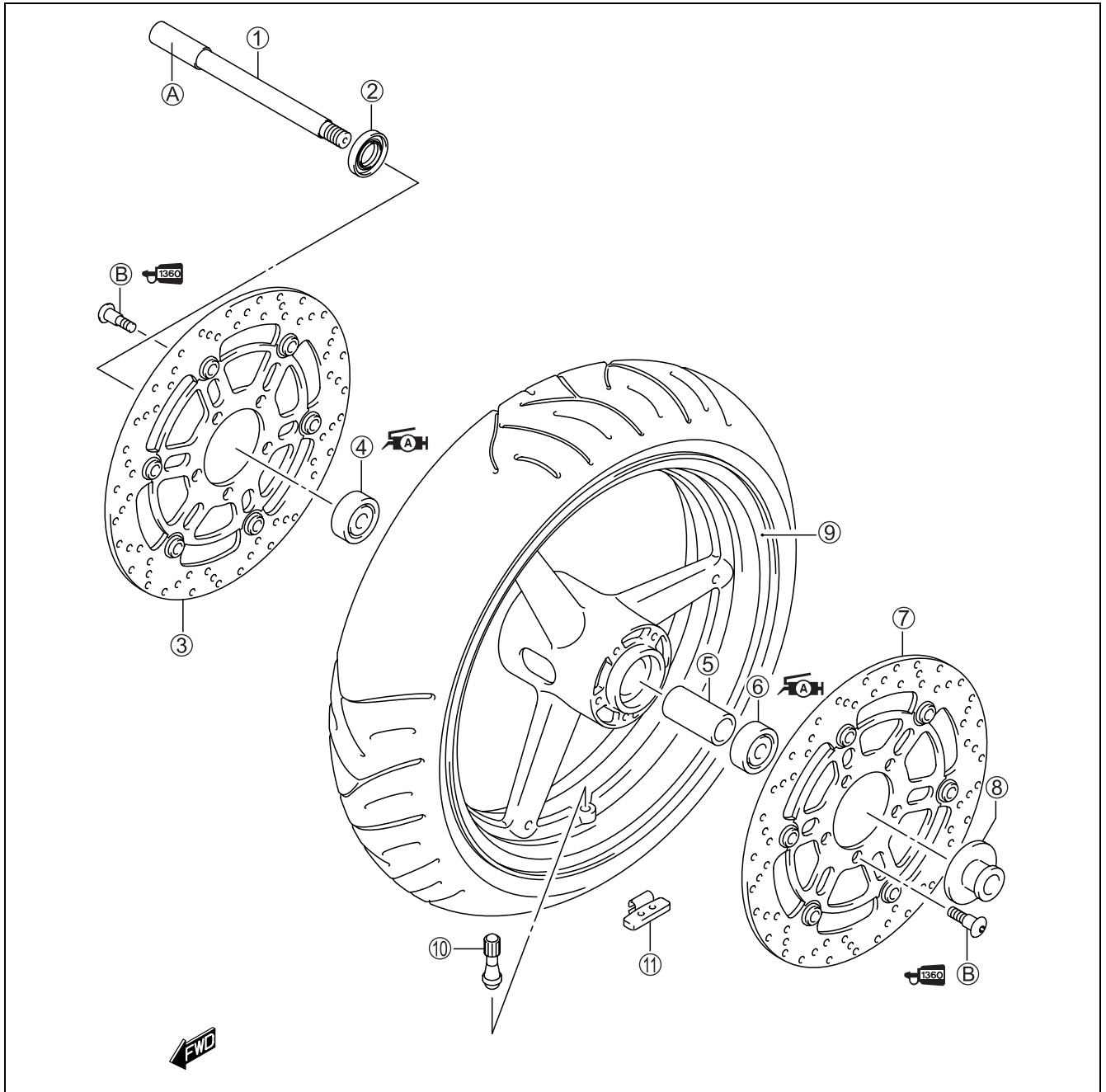


FRONT FENDER..... (👉 5-14)

INSTALLATION

Install the exterior parts in the reverse order of removal.

FRONT WHEEL CONSTRUCTION



①	Front axle	⑥	Bearing (LH)	⑪	Balancer
②	Dust seal	⑦	Brake disc (LH)	Ⓐ	Front axle
③	Brake disc (RH)	⑧	Collar	Ⓑ	Brake disc bolt
④	Bearing (RH)	⑨	Front wheel		
⑤	Spacer	⑩	Air bleeder valve		



ITEM	N·m
Ⓐ	65
Ⓑ	23

REMOVAL

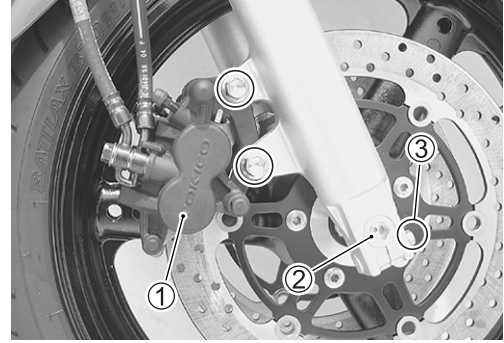
- Remove the brake calipers ① (LH and RH).
- Loosen the front axle pinch bolt ②.
- Loosen the front axle ③.
- Raise the front wheel off the ground using a jack or wooden block.
- Draw out the front axle ③ and remove the front wheel.

CAUTION

- * **Make sure that the motorcycle is supported securely.**
- * **Do not operate the front brake lever with the front wheel removed.**

NOTE:

After removing the front wheel, fit the calipers temporarily on their original positions.



INSPECTION AND DISASSEMBLY

TIRE..... (➡ 2-18, 5-66)


BRAKE DISC..... (➡ 5-52)

DUST SEAL

Inspect the dust seal lip for wear or damage. If any damages are found, replace the dust seal with a new one.

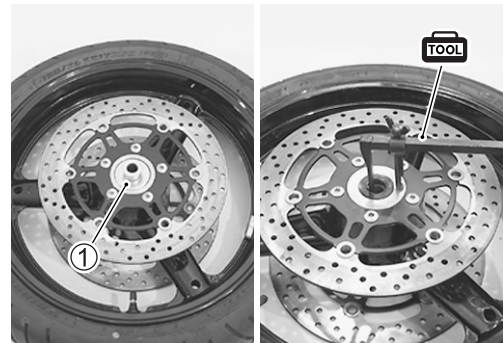


- Remove the spacer ① (LH) and dust seal (RH).

 09913-50121: Oil seal remover

CAUTION

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



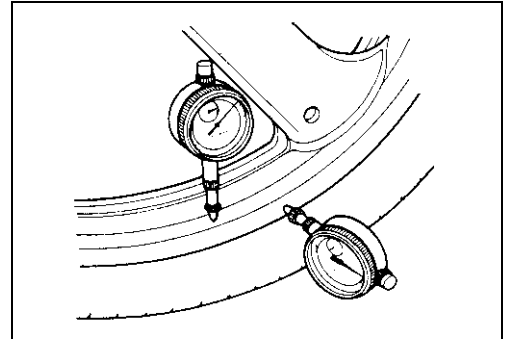
- Remove the brake discs.



WHEEL

Make sure that the wheel runout (axial and radial) checked as shown do not exceed the service limit. An excessive runout is usually due to worn or loosened wheel bearings and can be reduced by replacing the bearings. If bearing replacement fails to reduce the runout, replace the wheel.

DATA Wheel rim runout (axial and radial)
Service Limit: 2.0 mm

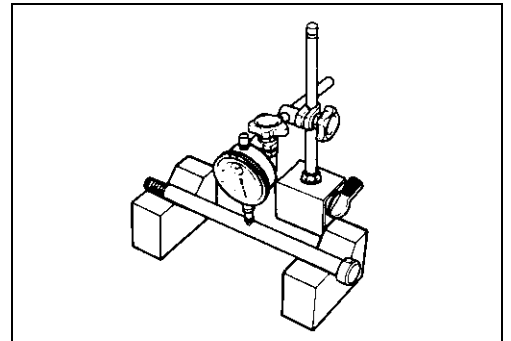


FRONT AXLE

Measure the front axle runout using the dial gauge.
Replace the front axle if the runout exceeds the service limit.

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

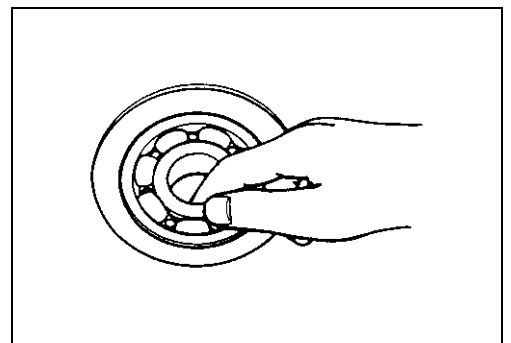
DATA Wheel axle runout
Service Limit: 0.25 mm



WHEEL BEARINGS

Inspect the play of the wheel bearings by finger while they are in the wheel. Rotate the inner race by finger to inspect for abnormal noise and smooth rotation.

Replace the bearing in the following procedure if there is anything unusual.



- Remove the bearing using the special tool.

TOOL 09921-20240: Bearing remover set

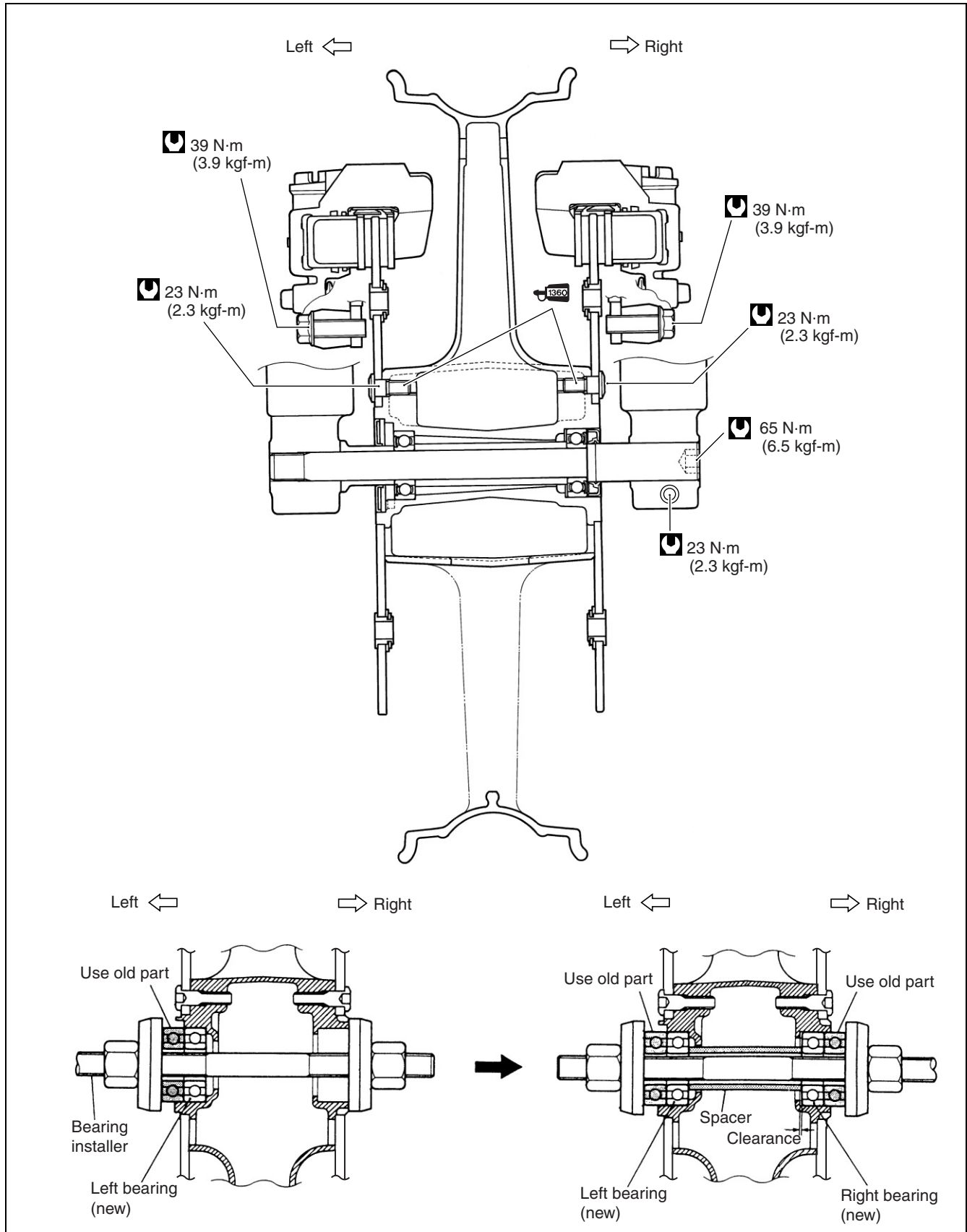
CAUTION

- * The removed bearing should be replaced with a new one.
- * Make sure not to damage the brake discs when removing the bearing.



REASSEMBLY AND INSTALLATION

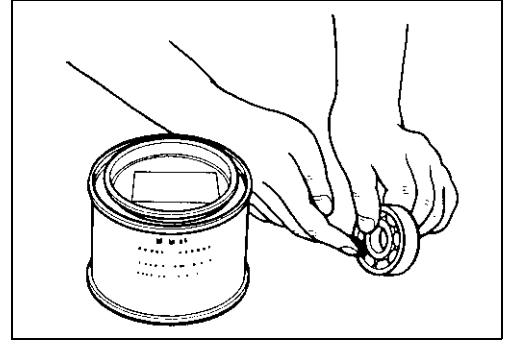
Reassembly and installation is in the reverse order of removal and disassembly. Pay attention to the following points:



WHEEL BEARINGS

- Apply grease to the bearing before installing.

 99000-25010: SUZUKI SUPER GREASE "A"

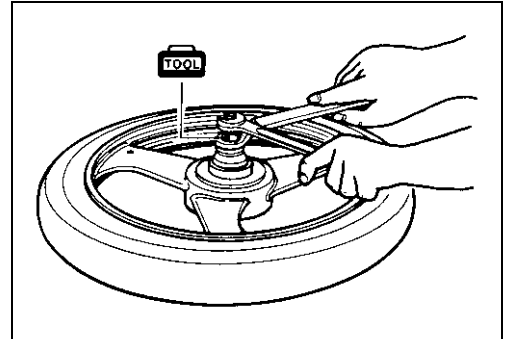


- Install the wheel bearing using the used bearing and special tool.

 09924-84521: Bearing installer set

CAUTION

- * First install the left bearing, then install the spacer and right wheel bearing.
- * The sealed cover of the bearing must face outside.



- Make sure that the brake discs are clean and free of any grease. Apply THREAD LOCK SUPER "1360" to the brake disc bolts and tighten them to the specified torque.

 99000-32130: THREAD LOCK SUPER "1360"

 Brake disc bolts: 23 N·m (2.3 kgf·m)



WHEEL

- Install the front wheel and tighten the front axle temporarily.

⚠ WARNING

The directional arrow on the wheel and tire must point to the wheel rotation, when remounting the wheel.



FRONT AXLE

- Tighten the front axle ① to the specified torque.

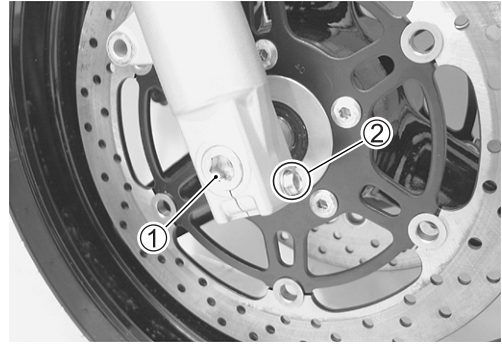
 **Front axle: 65 N·m (6.5 kgf·m)**

NOTE:

Before tightening the front axle pinch bolt ②, move the front fork up and down four or five times.

- Tighten the front axle pinch bolt ② to the specified torque.

 **Front axle pinch bolt: 23 N·m (2.3 kgf·m)**

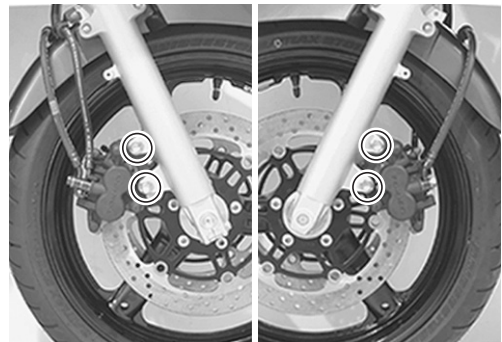
**BRAKE CALIPERS**

- Tighten the brake caliper mounting bolts to the specified torque.

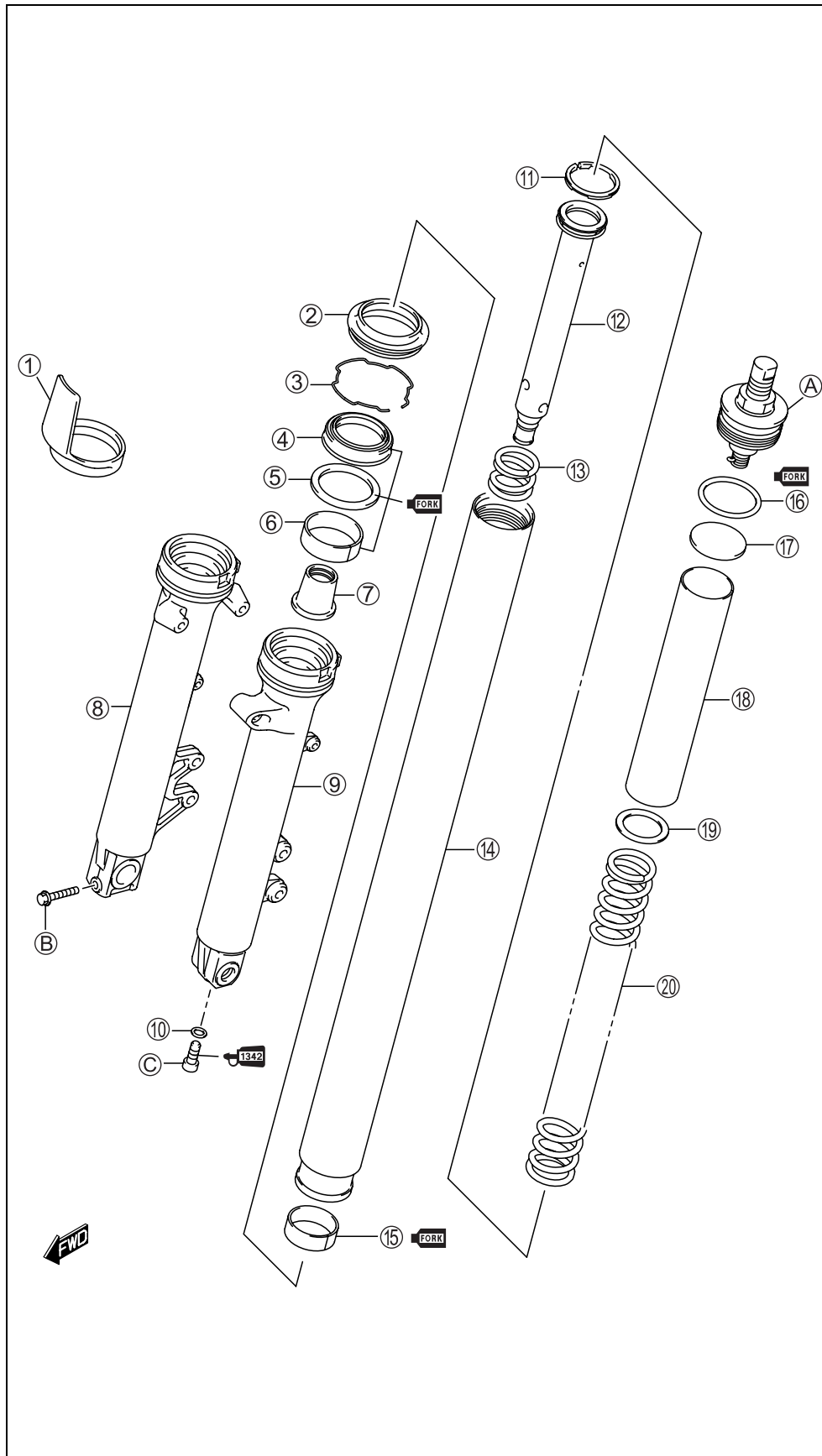
 **Brake caliper mounting bolt: 39 N·m (3.9 kgf·m)**

⚠ WARNING

After remounting the brake calipers, pump the brake lever until the pistons push the pads correctly.



FRONT FORK CONSTRUCTION



①	Front fork protector
②	Dust seal
③	Oil seal stopper ring
④	Oil seal
⑤	Oil seal retainer
⑥	Outer tube slide metal
⑦	Oil lock piece
⑧	Outer tube (R)
⑨	Outer tube (L)
⑩	Gasket
⑪	Ring
⑫	Cylinder
⑬	Spring
⑭	Inner tube
⑮	Inner tube slide metal
⑯	O-ring
⑰	Spring seat
⑱	Spacer
⑲	Washer
⑳	Spring
A	Front fork cap bolt
B	Front axle pinch bolt
C	Cylinder bolt

ITEM	N-m	kgf-m
A	23	2.3
B	23	2.3
C	30	3.0

REMOVAL AND DISASSEMBLY

- Raise the front wheel off the ground using a jack or wooden block.
- Remove the brake calipers and front wheel. (👉 5-8)

CAUTION

- * **Make sure that the motorcycle is supported securely.**
- * **Do not operate the front brake lever with the front wheel removed.**

FRONT FENDER

- Remove the brake hose clamp bolt ① (RH).
- Remove the front fender mounting bolts and plates behind (LH and RH).
- Disconnect the brake hose clamp ② from the front fender.

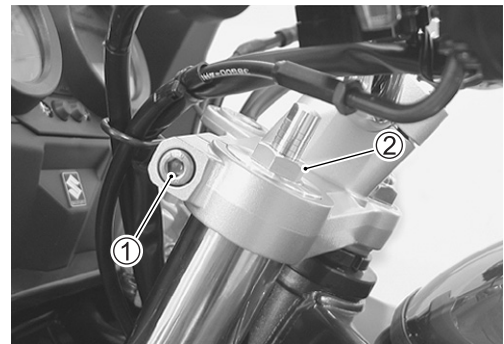


FRONT FORK

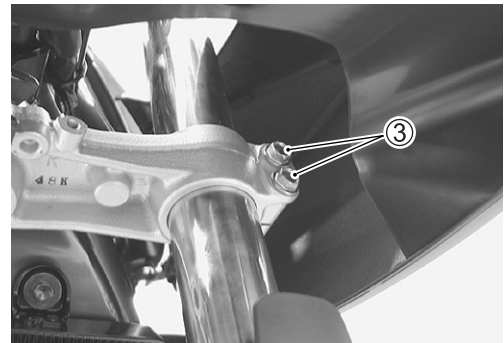
- Loosen the front fork upper clamp bolt ①.

NOTE:

Slightly loosen the front fork cap bolt ② to facilitate later disassembly.



- Loosen the front fork lower clamp bolts ③.
- Remove the front fork.



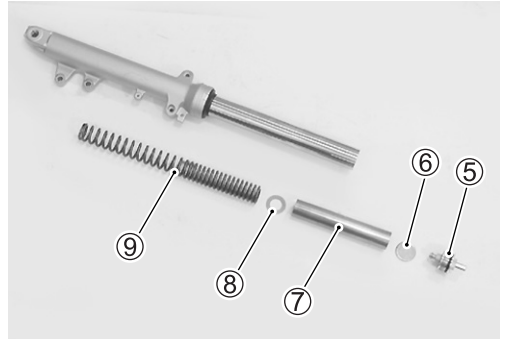
- Remove the protector ④.



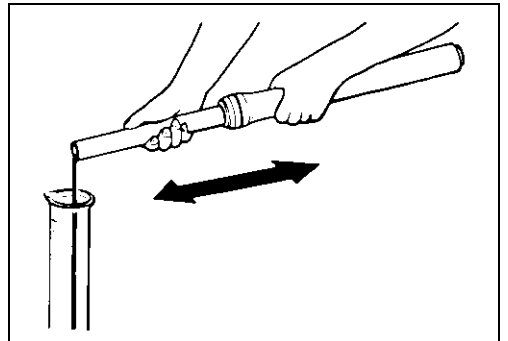
- Remove the front fork cap bolt ⑤, spring seat ⑥, spacer ⑦, washer ⑧ and fork spring ⑨.

⚠ WARNING

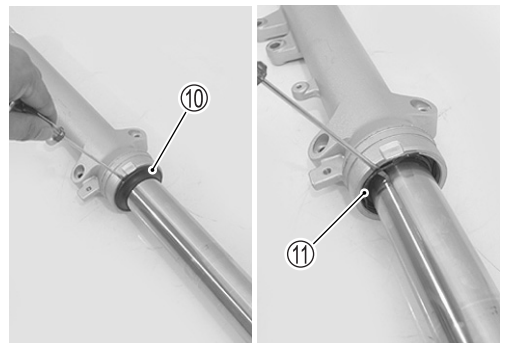
Hold the front fork cap bolt when removing it, or it will jump out due to the spring pressure.



- Invert the front fork and stroke it several times to drain out fork oil.
- Hold the front fork in the inverted position for a few minutes to allow the fork oil to fully drain.

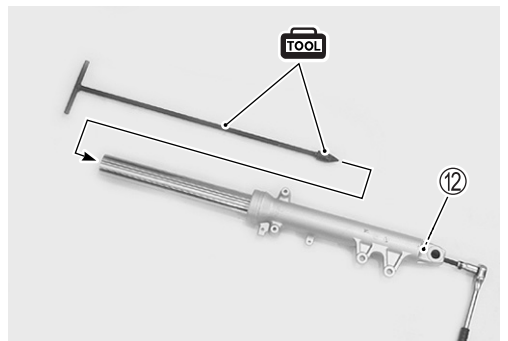


- Remove the dust seal ⑩ and oil seal stopper ring ⑪.

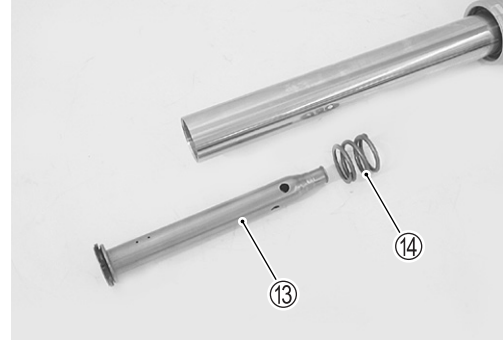


- Remove the cylinder bolt ⑫ using the special tools.

TOOL 09940-34520: T-Handle
09940-34531: Attachment (A)



- Remove the cylinder ⑬ and rebound spring ⑭.



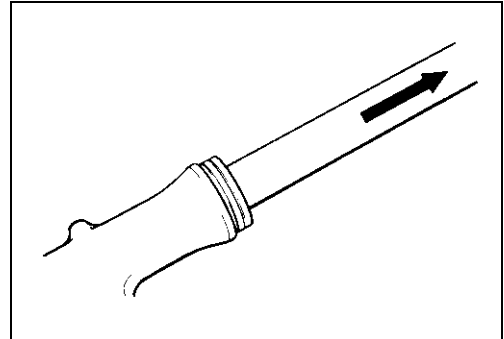
- Remove the oil seal by slowly pulling out the inner tube.

NOTE:

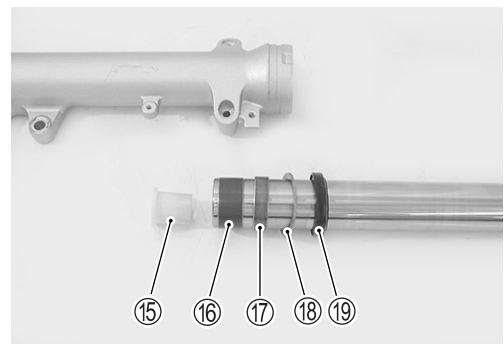
Be careful not to damage the inner tube.

CAUTION

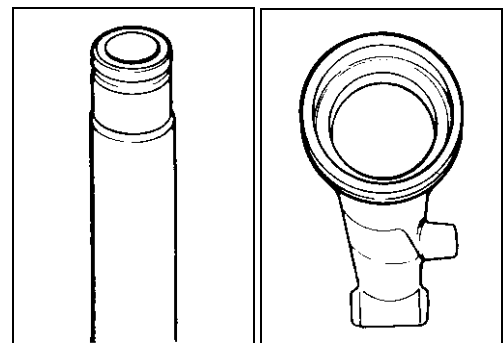
The outer and inner tube's slide metals must be replaced along with the oil seal and dust seal when assembling the front fork.



- Remove the following parts from the inner tube.
 - ⑮ Oil lock piece
 - ⑯ Inner tube slide metal
 - ⑰ Outer tube slide metal
 - ⑱ Oil seal retainer
 - ⑲ Oil seal

**INSPECTION****INNER AND OUTER TUBES**

Inspect the inner tube sliding surface and outer tube sliding surface for scuffing. If any defects are found, replace them with new ones.

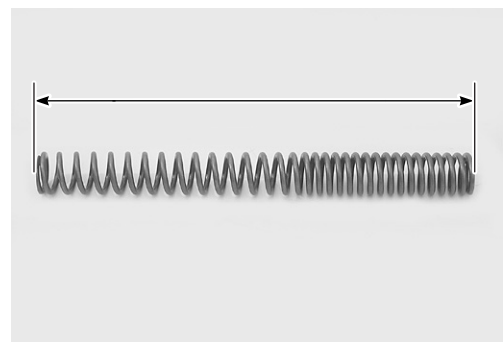
**FORK SPRING**

Measure the fork spring free length. If it is shorter than the service limit, replace it with a new one.

DATA Front fork spring free length

Service Limit: 337 mm (GSF650)

332 mm (GSF650S)



CYLINDER RING

Inspect the cylinder ring for wear or damage. If it is worn or damaged, replace it with a new one.

NOTE:

The ring should be installed onto the cylinder with its oil passage notches ① facing downward.



REASSEMBLY AND INSTALLATION

Reassemble and install the front fork in the reverse order of removal and disassembly. Pay attention to the following points:

INNER TUBE

- Install the following parts onto the inner tube.
 - ① Dust seal
 - ② Oil seal stopper ring
 - ③ Oil seal
 - ④ Oil seal retainer

CAUTION

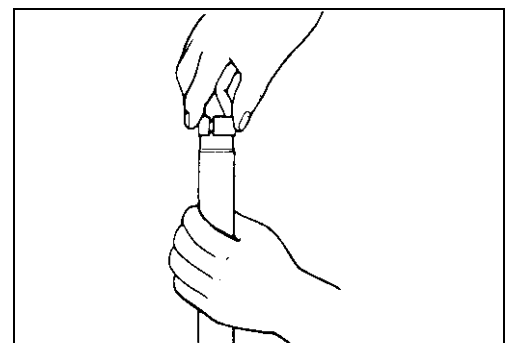
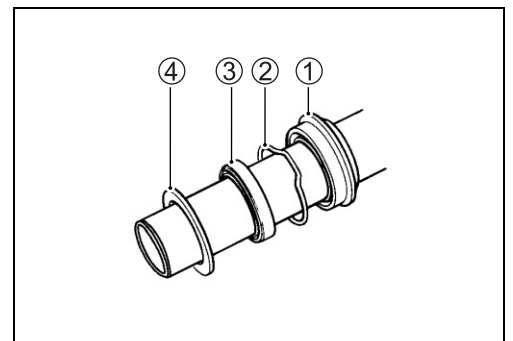
- * When installing the oil seal to inner tube, be careful not to damage the oil seal lip.
- * Apply fork oil to the slide metals and oil seal lip.

FORK 99000-99044-10G: SUZUKI FORK OIL #10

- Hold the inner tube vertically, clean the metal groove and install the inner tube slide metal by hand.

CAUTION

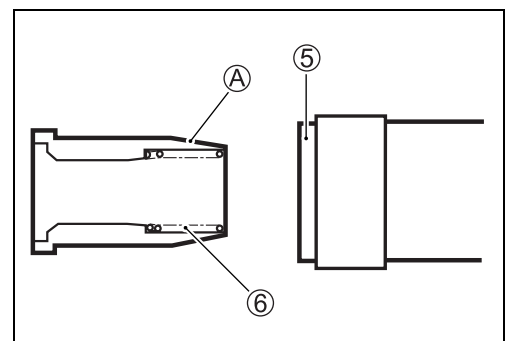
- Do not damage the Teflon coated surface of the inner tube's slide metal when installing it.



NOTE:

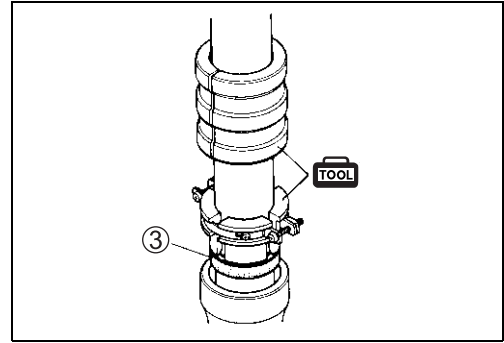
When installing the oil lock piece, insert the tapered end ⑤ of the oil lock piece into the inner tube ⑥.

Check the installation of the spring ⑥ when reassemble the oil lock piece.



- Insert the inner tube into the outer tube and install the oil seal ③ using the special tool.

TOOL 09940-52861: Front fork oil seal installer

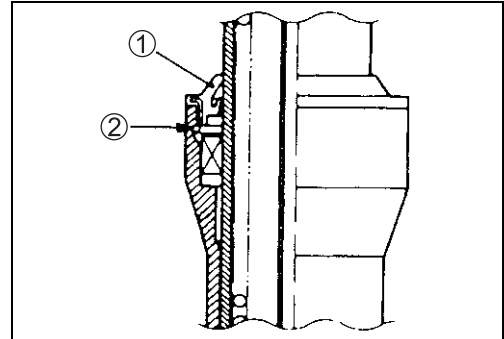


- Install the oil seal stopper ring ②.

CAUTION

Make sure that the oil seal stopper ring is fitted securely.

- Install the dust seal ①.



CYLINDER BOLT

- Apply THREAD LOCK “1342” to the cylinder bolt and tighten it to the specified torque using a 6-mm hexagon wrench and the special tools.

1342 99000-32050: THREAD LOCK “1342”

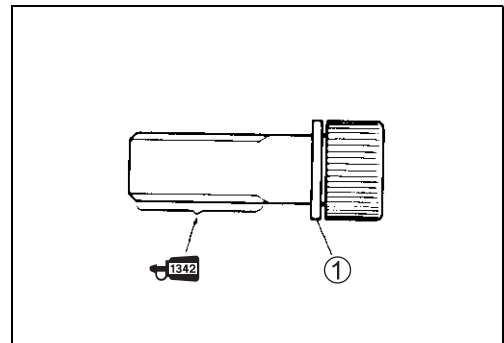
TOOL 09940-34520: T-Handle

09940-34531: Attachment (A)

W Cylinder bolt: 30 N·m (3.0 kgf·m)

CAUTION

Use a new gasket ① to prevent oil leakage.

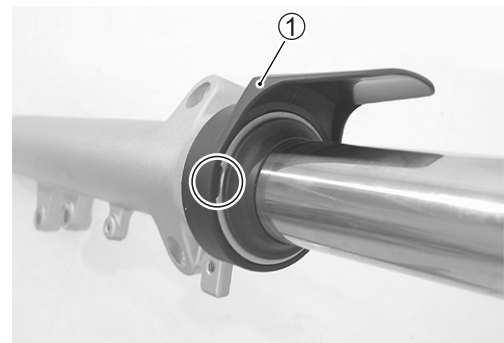


FRONT FORK PROTECTOR

- Install the front fork protector ①.

NOTE:

Fit the projection of the front fork protector to the depression of the front fork outer tube.

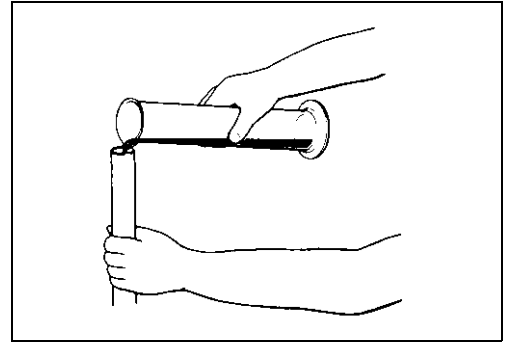


FORK OIL

- Pour the specified fork oil into the inner tube.

FORK 99000-99044-10G: SUZUKI FORK OIL #10

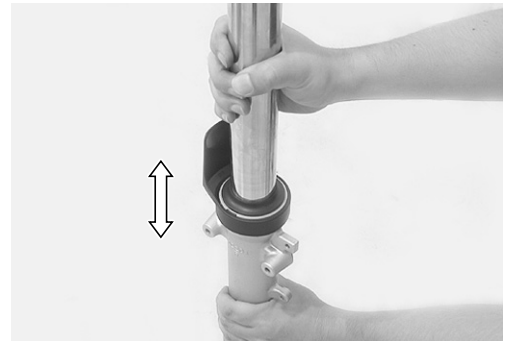
DATA Capacity (each leg): 502 mL (GSF650)
507 ml (GSF650S)



- Move the inner tube up and down several strokes until no more bubbles come out from the oil.
- Keep the front fork vertically and leave it during 5 – 6 minutes.

NOTE:

Take extreme attention to pump out air completely.



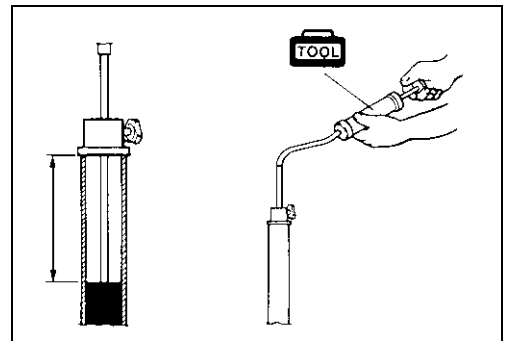
- Hold the front fork in a vertical position and adjust the fork oil level using the special tool.

TOOL 09943-74111: Fork oil level gauge

DATA Oil level: 108 mm (GSF650)
104 mm (GSF650S)

NOTE:

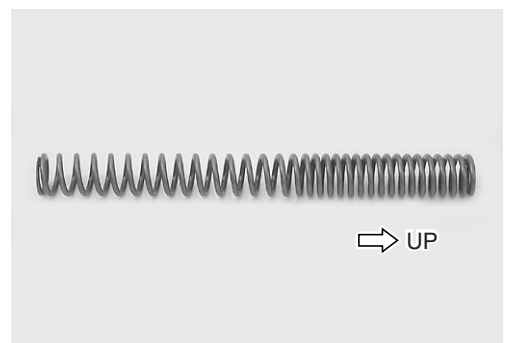
When adjusting the fork oil level, compress the outer tube fully without the fork spring.

**FORK SPRING**

- Insert the fork spring as shown.

NOTE:

The end of the spring with the smaller pitch should be turned up in the front fork.

**FRONT FORK CAP BOLT**

- Apply fork oil lightly to the O-ring.

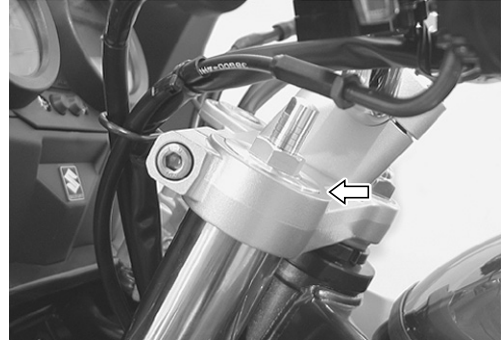
CAUTION

Use a new O-ring to prevent oil leakage.



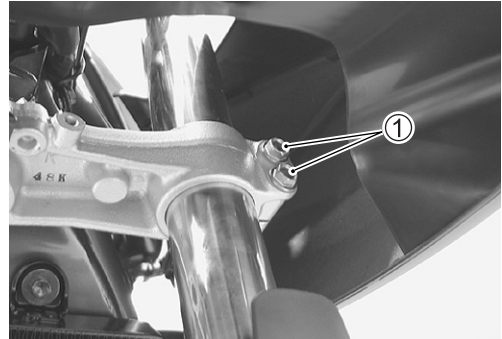
INSTALLATION

- Align the edge of the inner tube with the upper surface of the steering stem upper bracket.



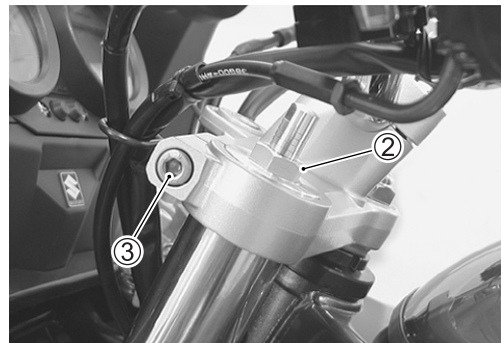
- Tighten the front fork lower clamp bolts ①.

 **Front fork lower clamp bolt ①: 23 N·m (2.3 kgf-m)**



- Tighten the front fork cap bolt ② and front fork upper clamp bolt ③.

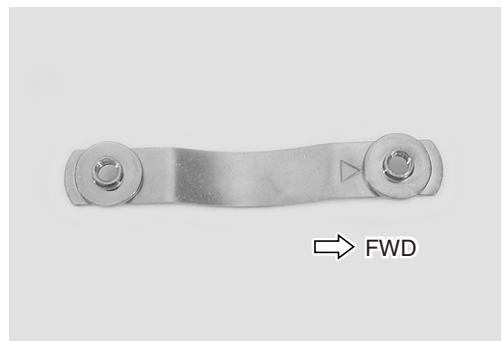
 **Front fork cap bolt ②: 23 N·m (2.3 kgf-m)**
Front fork upper clamp bolt ③: 23 N·m (2.3 kgf-m)

**FRONT FENDER**

- Install the front fender.

NOTE:

Face the triangle mark on the front fender plate to the front side.



- Remount the front fender.
- Install the front wheel. (👉 5-11)

NOTE:

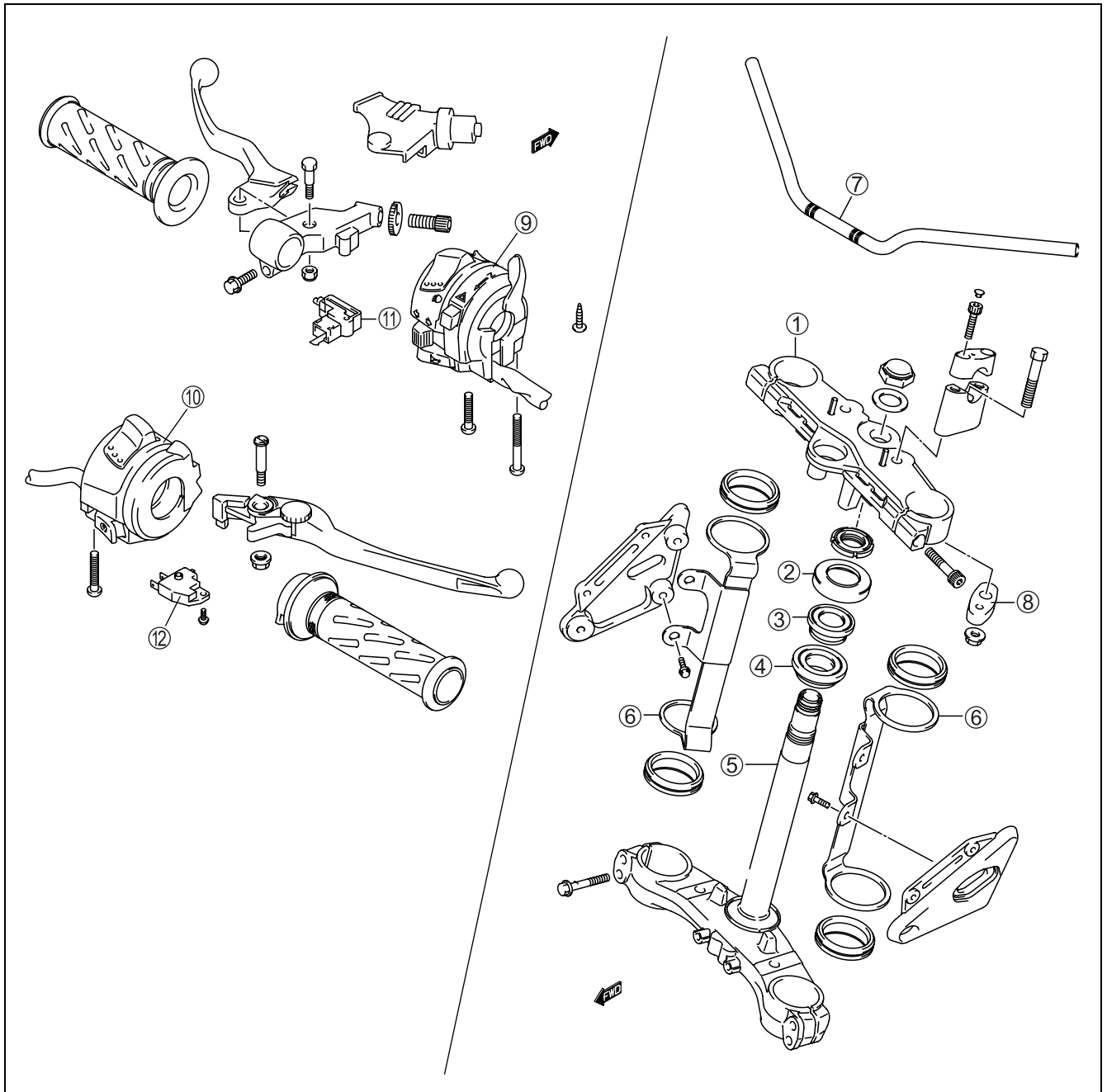
Before tightening the front axle and front axle pinch bolt, move the front fork up and down four or five times.

⚠ WARNING

After remounting the brake calipers, pump the brake lever until the pistons push the pads correctly.



HANDLEBARS AND STEERING CONSTRUCTION



①	Steering stem upper bracket	⑦	Handlebar	Ⓐ	Steering stem head nut
②	Dust seal	⑧	Handlebar spacer	Ⓑ	Handlebar holder bolt
③	Steering stem upper bearing	⑨	Handlebar switch assembly (LH)	Ⓒ	Front fork upper pinch bolt
④	Steering stem lower bearing	⑩	Handlebar switch assembly (RH)	Ⓓ	Steering stem nut
⑤	Steering stem	⑪	Clutch switch	Ⓔ	Front fork lower pinch bolt
⑥	Head light housing bracket (GSF650)	⑫	Brake light switch		



ITEM	N-m	kgf-m
Ⓐ	65	6.5
Ⓑ	23	2.3

ITEM	N-m	kgf-m
Ⓒ	23	2.3
Ⓓ	45	4.5

ITEM	N-m	kgf-m
Ⓔ	23	2.3

HANDLEBARS

REMOVAL

- Remove the following items from the handlebars.

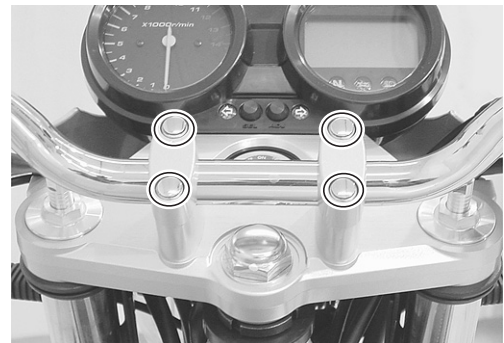
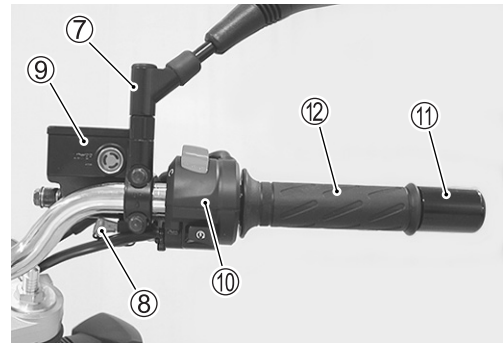
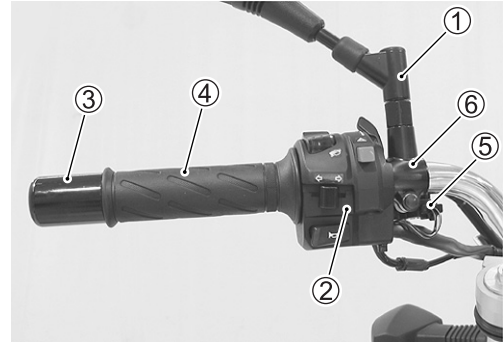
- ① Rear view mirror
- ② Left handlebar switch box
- ③ Handlebar balancer
- ④ Grip rubber
- ⑤ Clutch switch lead wires
- ⑥ Clutch lever holder/Clutch lever

- ⑦ Rear view mirror
- ⑧ Brake light switch lead wires
- ⑨ Front brake master cylinder/Front brake lever
- ⑩ Right handlebar switch box
- ⑪ Handlebar balancer
- ⑫ Throttle grip

CAUTION

Do not turn the front brake master cylinder upside down.

- Remove the caps and handlebar clamp bolts.

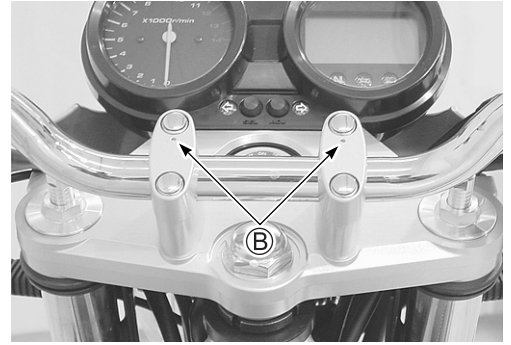


INSTALLATION

- Set the handlebars so that its punch mark **A** aligns with the mating surface of the left handlebar holder.



- Set the handlebar clamps with their punch marks **ⓑ** forward.

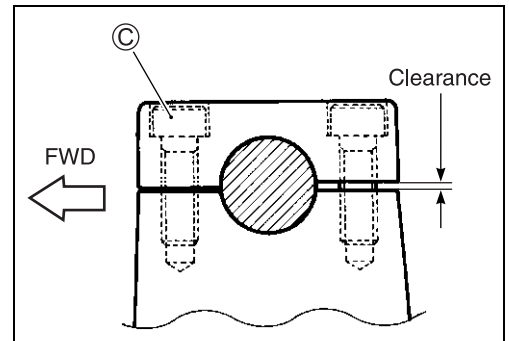


- Tighten the handlebar clamp bolts.

NOTE:

First tighten the handlebar clamp bolts **ⓒ** (front ones) to the specified torque.

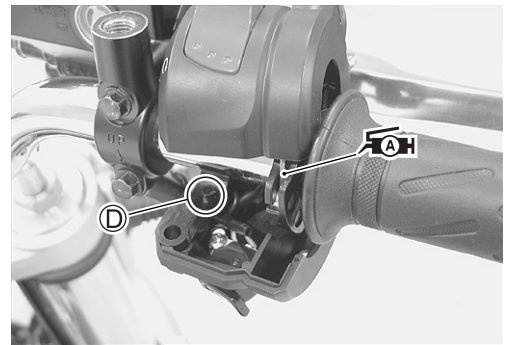
 **Handlebar clamp bolt: 23 N·m (2.3 kgf·m)**



- Install the front brake master cylinder. (☞ 5-56)
- Apply SUZUKI SUPER GREASE to the throttle cables and cable pulley.

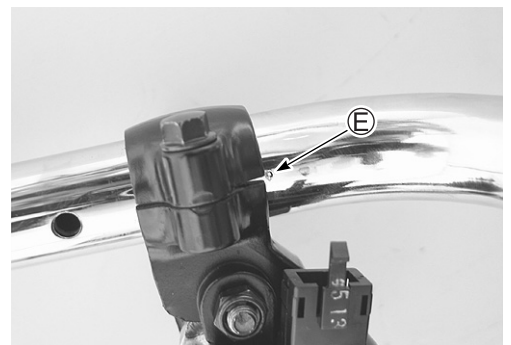
 **99000-25010: SUZUKI SUPER GREASE "A"**

- Insert the projection **ⓓ** of the right handlebar switch into hole of the handlebar.
- Adjust the throttle cable play. (☞ 2-11)



- Align the clutch lever holder's matching surface with the punch mark **ⓔ** on the handlebar.
- Tighten the clutch holder mounting bolt to the specified torque.

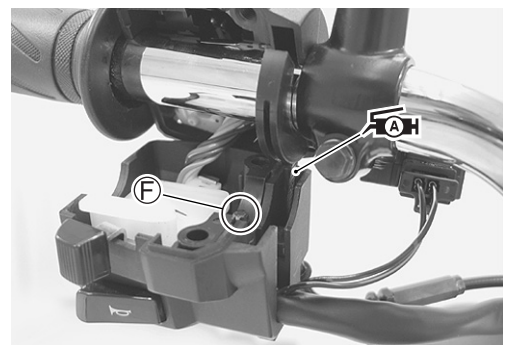
 **Clutch holder mounting bolt: 10 N·m (1.0 kgf·m)**



- Apply SUZUKI SUPER GREASE to the starter cable and cable pulley.

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

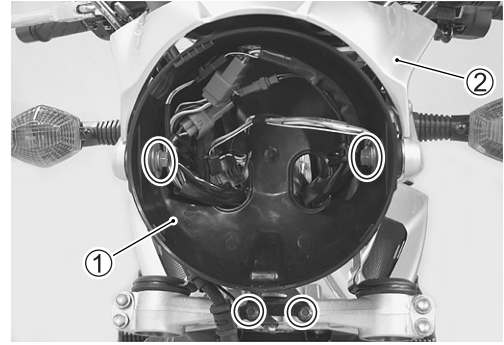
- Adhere the left grip rubber.
- Insert the projection **ⓕ** of the left handlebar switch box into the hole of the handlebar.



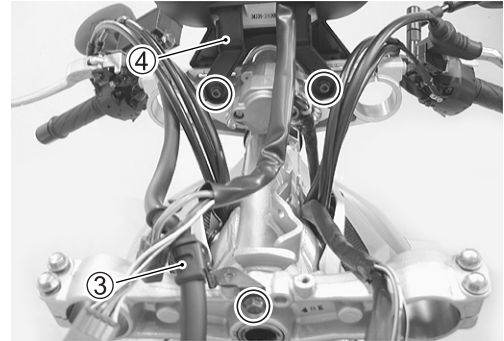
STEERING

REMOVAL (GSF650)

- Remove the front wheel. (👉 5-8)
- Remove the front forks. (👉 5-14)
- Remove the headlight. (👉 6-41)
- Disconnect the couplers.
- Remove the headlight housing ① and bracket ②.



- Remove the brake hose clamp ③.
- Remove the combination meter unit ④.

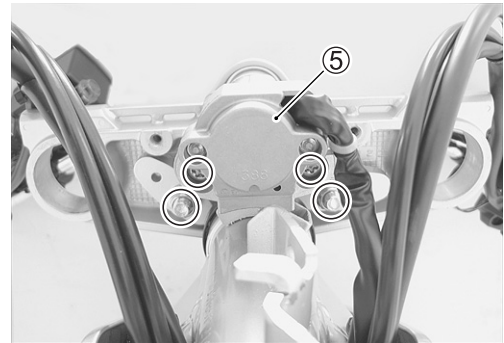


- Remove the ignition switch ⑤ using the special tools.

TOOL 09930-11920: Torx bit (JT40H)

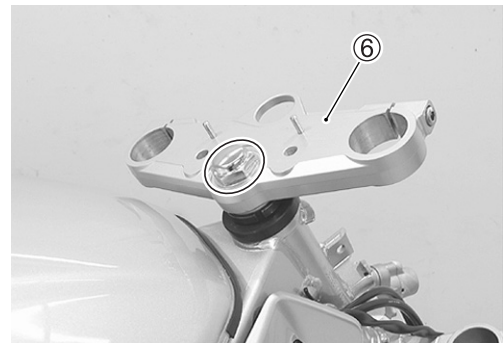
09930-11940: Bit holder

- Dismount the handlebars by removing the handlebar holder nuts.



HANDLEBAR HEIGHT ADJUSTMENT (👉 5-75)

- Remove the steering stem head nut and washer.
- Remove the steering stem upper bracket ⑥.



- Remove the steering stem nut using the special tool.

TOOL 09940-14911: Steering stem nut wrench

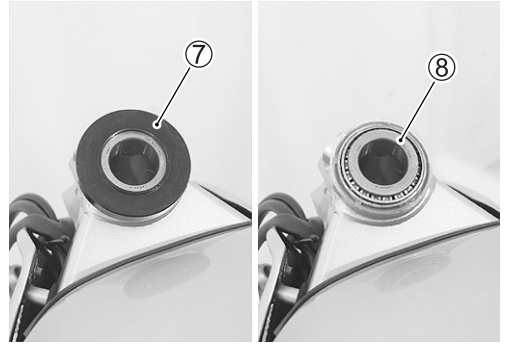
NOTE:

When loosening the stem nuts, hold the steering stem lower bracket to prevent it from falling.

- Remove the steering stem lower bracket.

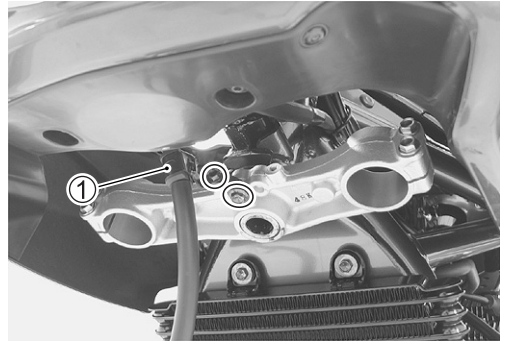


- Remove the dust seal ⑦ and steering stem upper bearing ⑧.

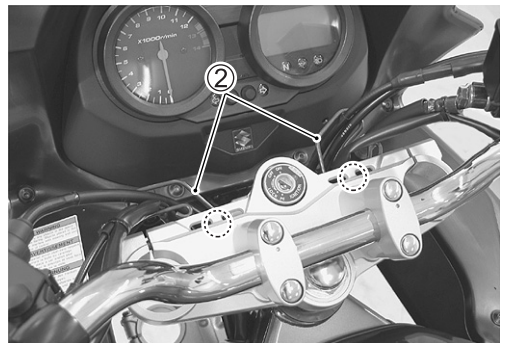


REMOVAL (GSF650S)

- Remove the front wheel. (☞ 5-8)
- Remove the front forks. (☞ 5-14)
- Remove the brake hose clamp ①.



- Remove the cable guides ②.



- Remove the ignition switch using the special tools.

TOOL 09930-11920: Torx bit (JT40H)
09930-11940: Bit holder

- Dismount the handlebars by removing the handlebar holder nuts.

NOTE:

Place a rag on the fuel tank to prevent the fuel tank scratched.

HANDLEBAR HEIGHT ADJUSTMENT (☞ 5-75)



The removal procedure of the steering stem is the same as GSF650.

INSPECTION AND DISASSEMBLY

Inspect the removed parts for the following abnormalities.

- * Handlebar distortion
- * Distortion of the steering stem
- * Bearing wear or damage
- * Abnormal bearing noise
- * Race wear or damage

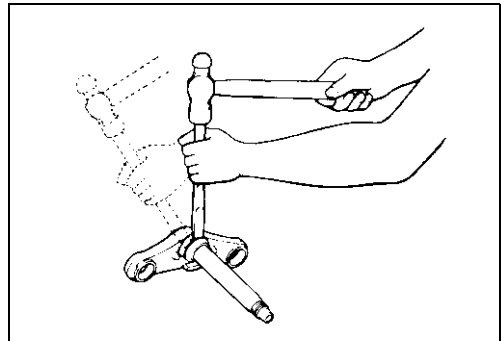
If any abnormal points are found, replace defective parts with new ones



- Remove the steering stem lower bearing and inner race using a chisel.

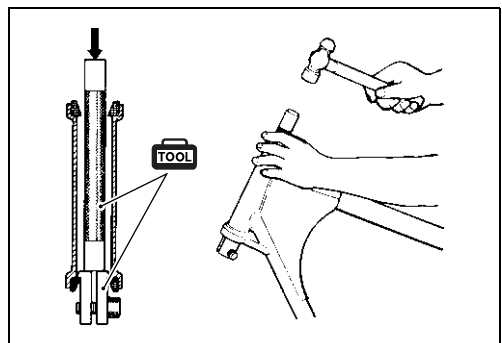
CAUTION

The removed lower bearing and inner race should be replaced with new ones.



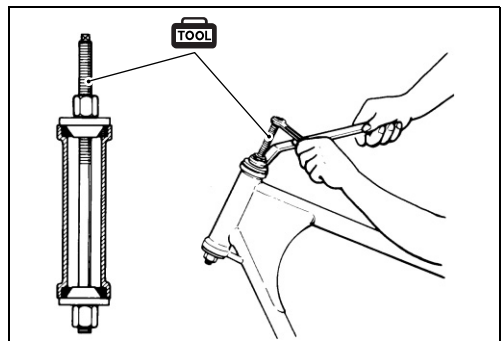
- Remove the steering stem upper and lower bearing races using the special tools.

TOOL 09941-54911: Bearing outer race remover
09941-74911: Steering bearing installer

**REASSEMBLY AND INSTALLATION****Outer race**

- Press in the upper and lower outer races using the special tool.

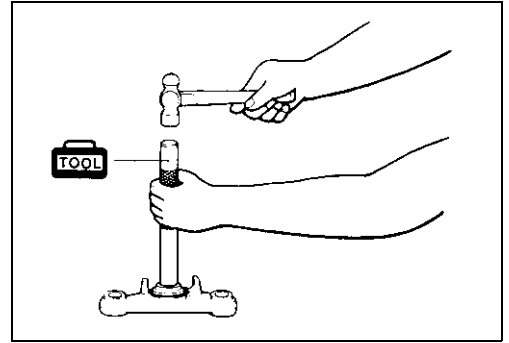
TOOL 09941-34513: Steering outer race installer



Inner race

- Press in the lower inner race using the special tool.

 **09941-74911: Steering bearing installer**

**Bearing**

- Apply SUZUKI SUPER GREASE to the bearings, races and dust seals before remounting the steering stem.

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

**Steering stem**

- Tighten the steering stem nut to the specified torque using the special tool.

 **09940-14911: Steering stem nut wrench**

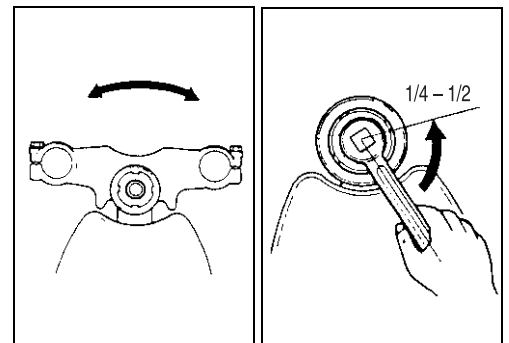
 **Steering stem nut: 45 N·m (4.5 kgf·m)**



- Turn the steering stem lower bracket about five or six times to the left and right so that the angular ball bearings seat properly.
- Loosen the steering stem nut 1/4 – 1/2 turn.

NOTE:

This adjustment will vary from motorcycle to motorcycle.



- Install the headlight bracket.
- Temporarily install the front forks. (☞ 5-20)
- Tighten the steering stem head nut to the specified torque.

 **Steering stem head nut: 65 N·m (6.5 kgf·m)**

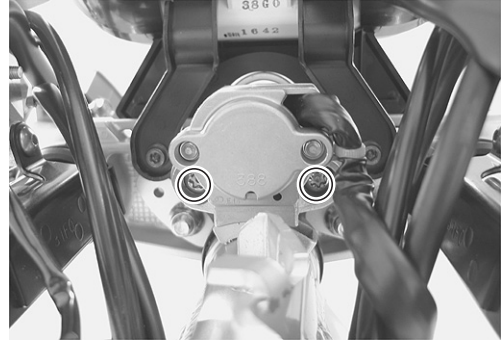


- Install the ignition switch.

TOOL 09930-11920: Torx bit JT40H

09930-11940: Bit holder

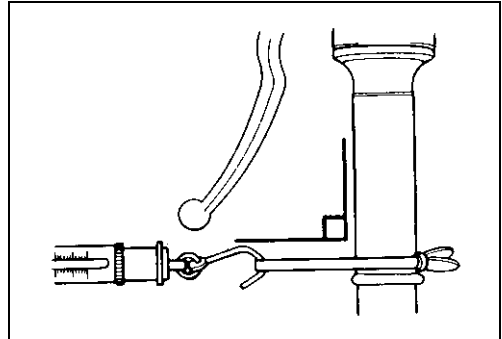
1322 99000-32050: THREAD LOCK SUPER “1322”



STEERING TENSION ADJUSTMENT

Check the steering tension as follows

- Support the motorcycle using a jack and raise the front wheel off the floor 20 – 30 mm.
- Make sure that the cables and wire harness are properly routed.
- With the front wheel pointing straight ahead, attach the spring scale onto the end of the handlebar as shown.
- When the handlebar starts moving, record the reading on the spring scale. This reading is referred to as the “initial force”.
- Repeat the same procedure on the end of the other handlebar.



DATA Initial force: 200 – 500 grams

TOOL 09940-92720: Spring scale

- If the initial force reading is out of specification, adjust the steering tension as follows.

- 1) First, loosen the front fork upper clamp bolts and the steering stem head nut. Then, adjust the steering stem nut by either loosening or tightening it.

TOOL 09910-60611: Universal clamp wrench

- 2) Tighten the steering stem head nut and front fork upper clamp bolts to the specified torque (⚙️ 5-20) and recheck the initial force as described above.
- 3) Continue adjusting the steering stem nut until the initial force is within specification.

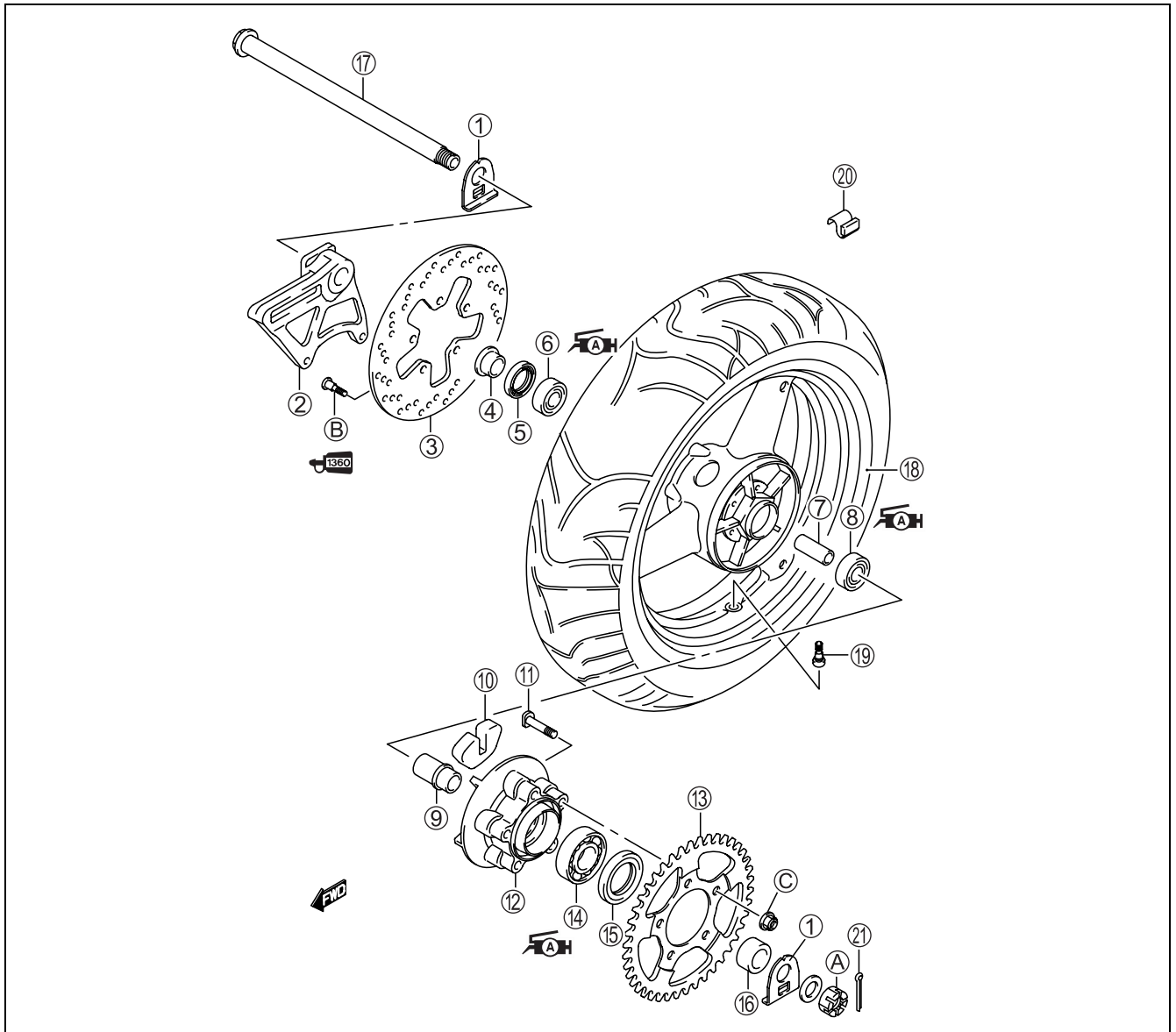


NOTE:

Hold the front fork legs, move them back and forward. Make sure that the steering is not loose.



REAR WHEEL CONSTRUCTION



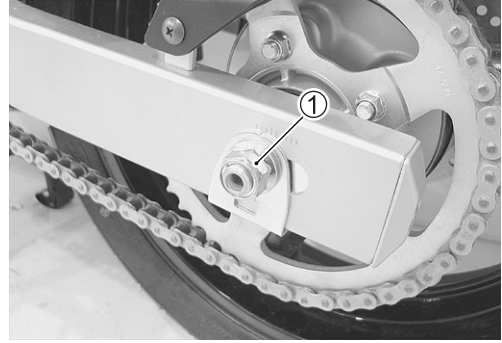
①	Chain adjuster plate	⑨	Retainer	⑰	Rear axle
②	Brake caliper bracket	⑩	Wheel damper	⑱	Rear wheel
③	Brake disc	⑪	Rear sprocket bolt	⑲	Air valve
④	Collar	⑫	Rear sprocket mounting drum	⑳	Balancer
⑤	Dust seal	⑬	Rear sprocket	㉑	Cotter pin (For E-28)
⑥	Bearing (RH)	⑭	Bearing	A	Rear axle nut
⑦	Spacer	⑮	Dust seal	B	Brake disc bolt
⑧	Bearing (LH)	⑯	Spacer	C	Rear sprocket nut



ITEM	N·m	kgf·m
A	100	10.0
B	23	2.3
C	50	5.0

REMOVAL

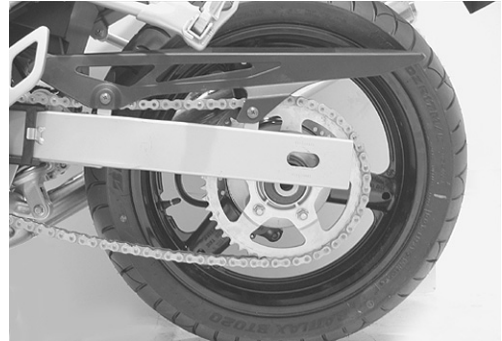
- Support the motorcycle with the center stand.
- Remove the cotter pin. (E-28)
- Remove the rear axle nut ①.



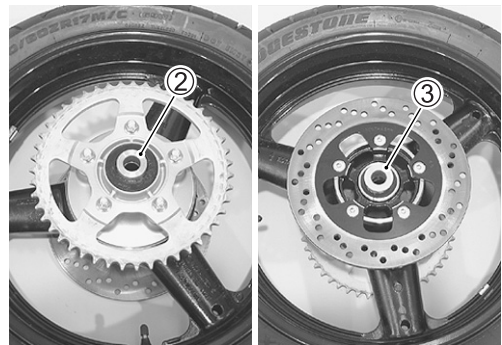
- Remove the rear axle and disengage the drive chain from the rear sprocket.
- Remove the rear wheel.

CAUTION

Do not operate the rear brake pedal with the rear wheel removed.



- Remove the spacer ② (LH) and collar ③ (RH).



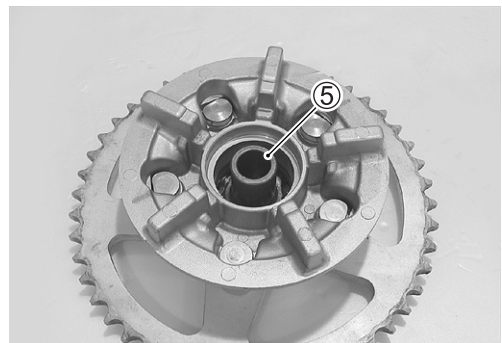
- Remove the rear sprocket mounting drum assembly ④ from the rear wheel.

NOTE:

Before removing the rear sprocket mounting drum, slightly loosen the rear sprocket nuts to facilitate later disassembly.



- Remove the retainer ⑤.
- Remove the rear sprocket from sprocket mounting drum.



INSPECTION AND DISASSEMBLY

TIRE (☞ 2-18, 5-66)

WHEEL (☞ 5-9)

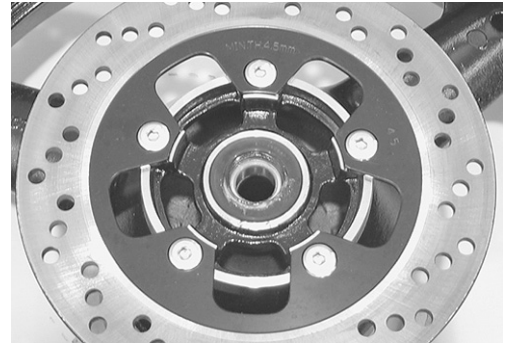
AXLE SHAFT (☞ 5-9)

BRAKE DISC (☞ 5-52)

(Use the front wheel specifications and procedure.)

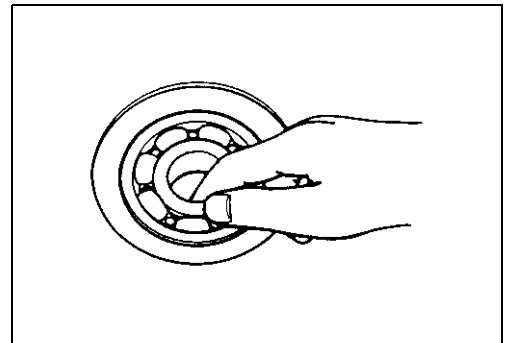
DUST SEAL

- Inspect the wheel and sprocket mounting drum dust seal for wear or damage. If any damage is found, replace the dust seal with a new one.




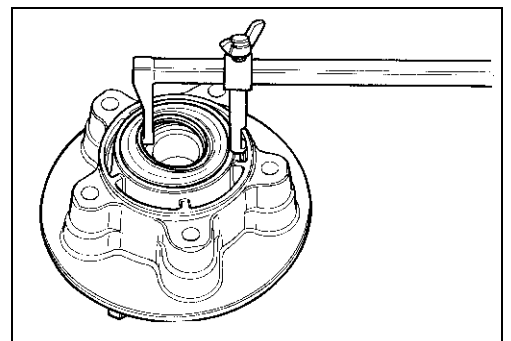
BEARING

Inspect the play of the wheel and sprocket mounting drum bearings by hand while they are in the wheel and drum. Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



- Remove the wheel and sprocket mounting drum dust seal using the special tool.

 **09913-50121: Oil seal remover**

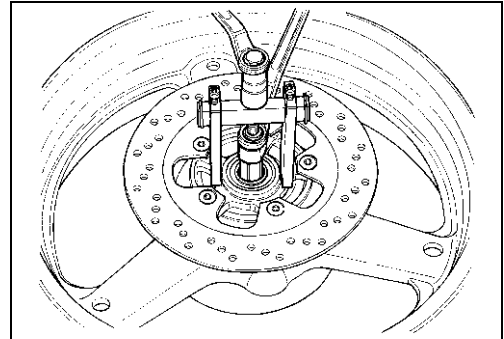
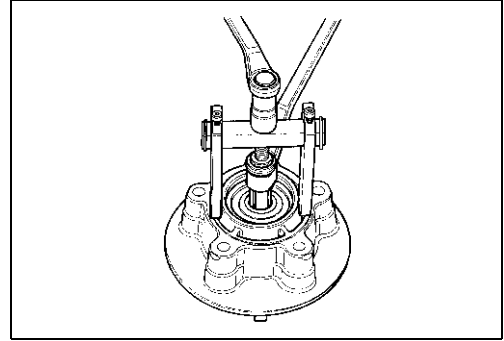


- Remove the sprocket mounting drum bearing and wheel bearings using the special tool.

TOOL 09921-20240: Bearing remover set

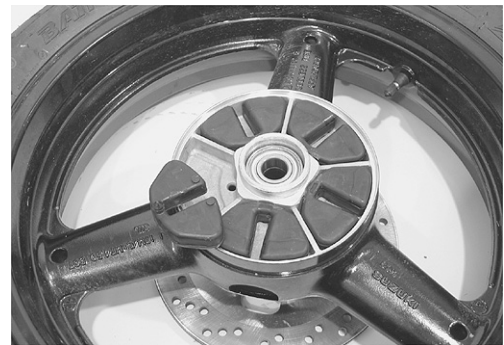
CAUTION

The removed dust seal and bearing must be replaced with new ones.

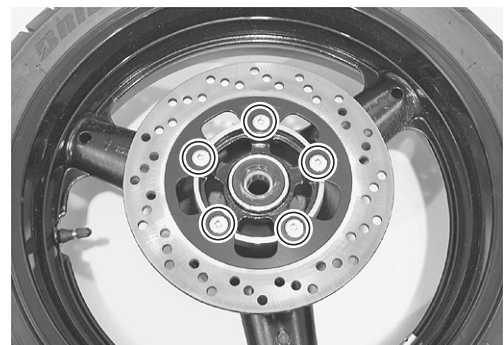


WHEEL DAMPERS

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

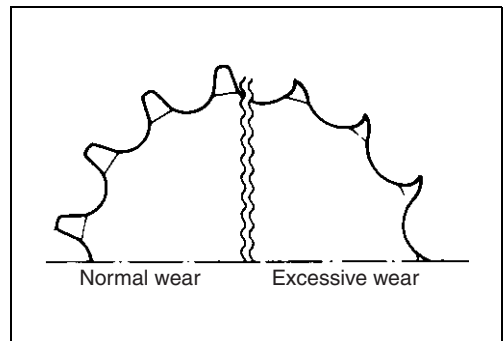


- Remove the brake disc.



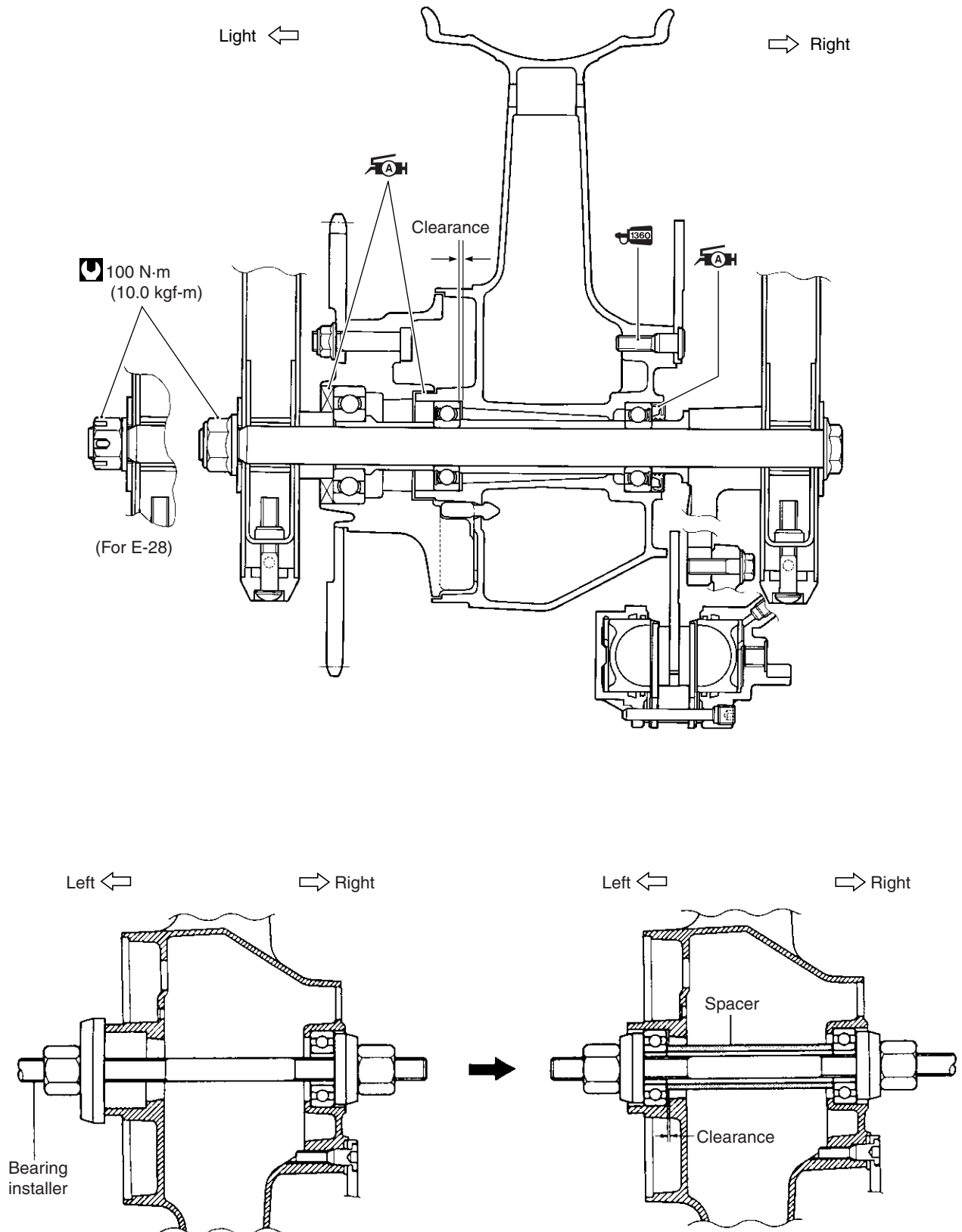
REAR SPROCKET

Inspect the rear sprocket teeth for wear. If they are worn as shown, replace the engine sprocket, rear sprocket and drive chain as a set.



REASSEMBLY AND INSTALLATION

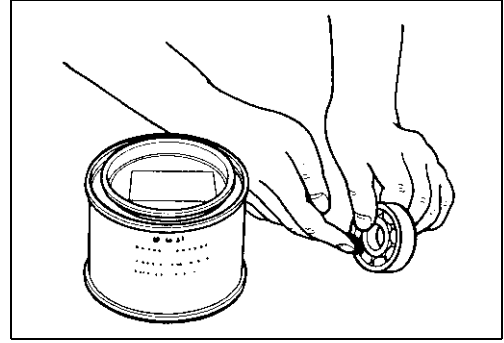
Reassembly and installation is in the reverse order of removal and disassembly. Pay attention to the following points:



BEARINGS

- Apply grease to the bearings before installing.

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

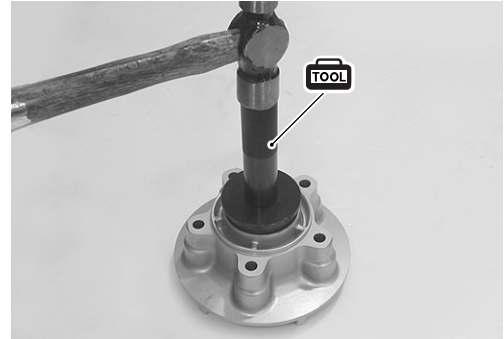


- Install new bearing and dust seal to the sprocket mounting drum using the special tool.

 **09913-70210: Bearing installer set**

- Apply grease to the bearing and dust seal lip.

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

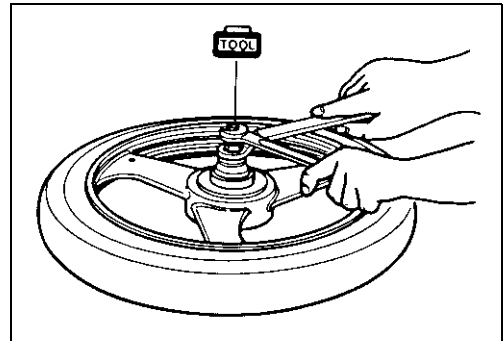


- Install new wheel bearings using the special tool.

 **09941-34513: Bearing installer set**

CAUTION

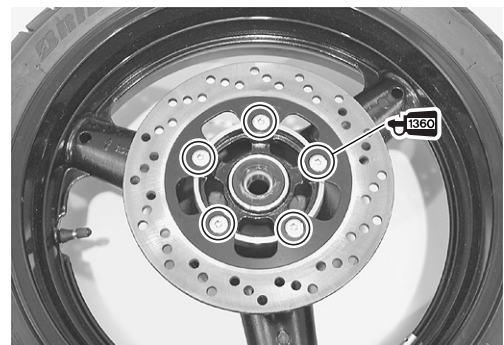
First, install the right wheel bearing, then install the spacer and left wheel bearing.
The sealed cover of the bearing must face outside.



- Make sure that the brake disc is clean and free of any grease. Apply THREAD LOCK SUPER "1360" to the brake disc bolts and tighten them to the specified torque.

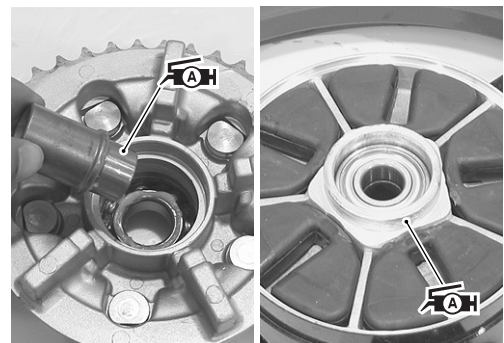
 **99000-32130: THREAD LOCK SUPER "1360"**

 **Brake disc bolt: 23 N·m (2.3 kgf·m)**



- Apply SUZUKI SUPER GREASE to the rear sprocket mounting retainer.
- Apply SUZUKI SUPER GREASE to the contacting surface between the rear wheel and the sprocket drum.

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

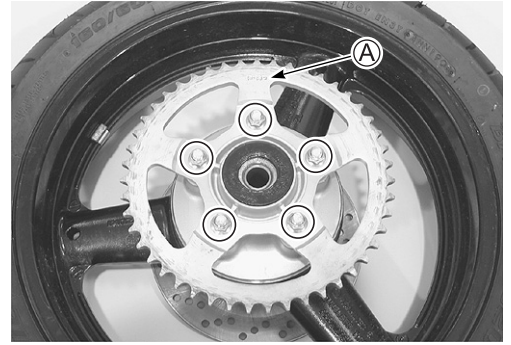


- Tighten the rear sprocket nuts to the specified torque.

🔧 Rear sprocket nut: 50 N·m (5.0 kgf-m)

NOTE:

The stamped mark **A** on the rear sprocket should face outside.



WHEEL

- Install the rear wheel.

⚠ WARNING

The directional arrow on the wheel and tire must point to the wheel rotation, when remounting the wheel.

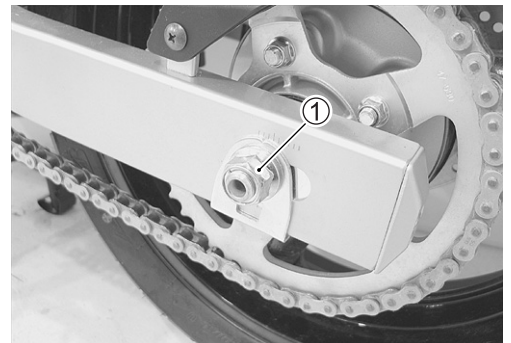


- Adjust the drive chain slack after installing the rear wheel. (👉 2-14)
- Tighten the rear axle nut **①** to the specified torque.

🔧 Rear axle nut: 100 N·m (10.0 kgf-m)

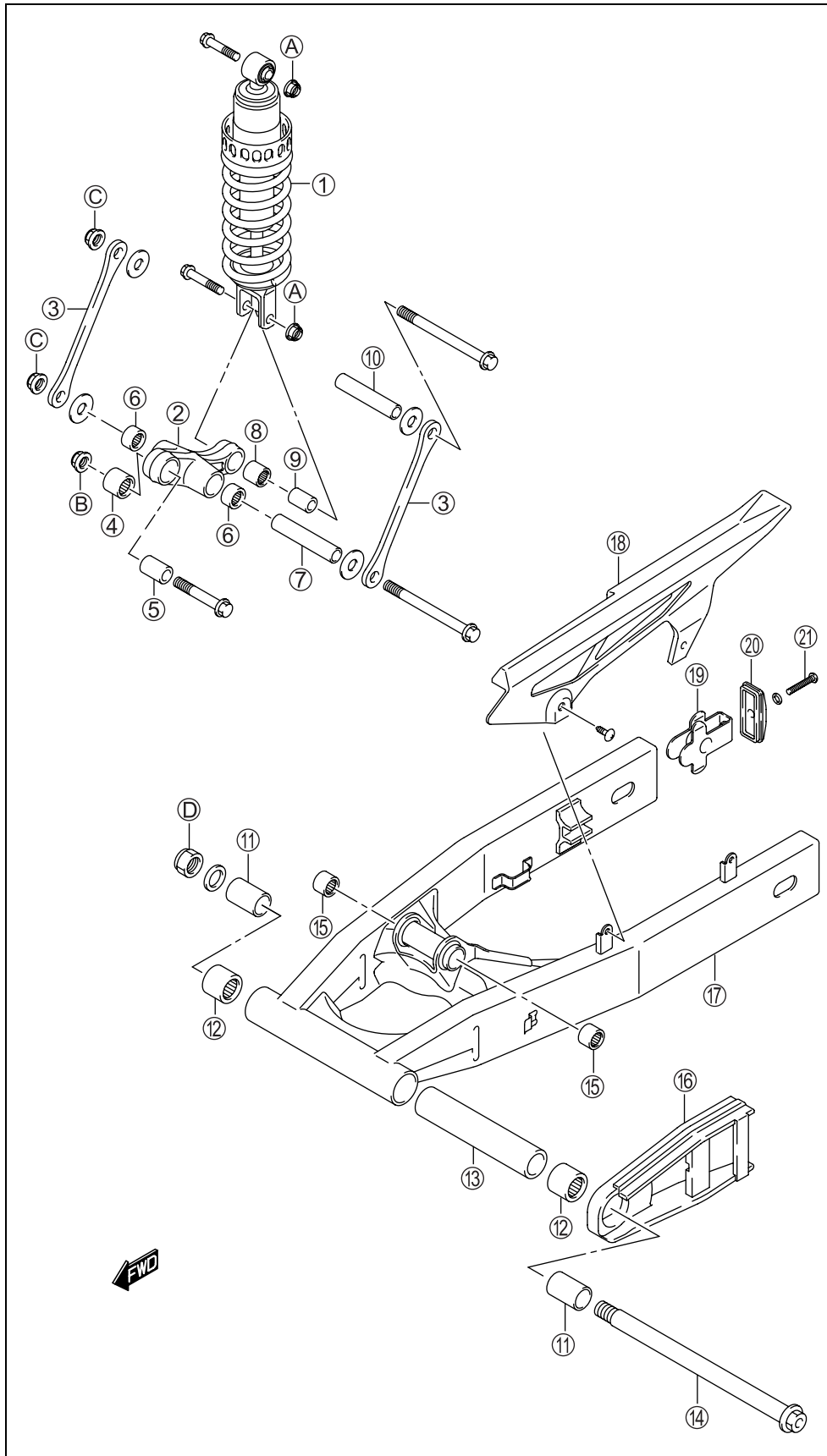
⚠ WARNING

After remounting the rear wheel, pump the brake pedal a few times to check for proper brake operation.



- Install a new cotter pin. (E-28)

REAR SUSPENSION CONSTRUCTION



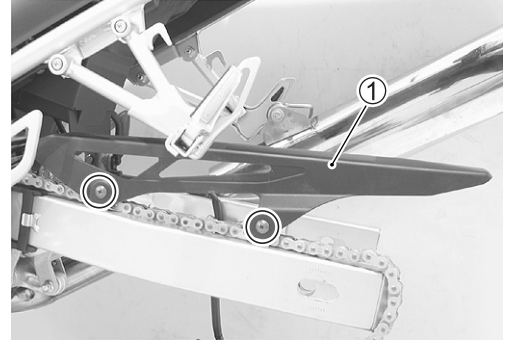
①	Rear shock absorber
②	Rear cushion lever
③	Rear cushion lever rod
④	Bearing
⑤	Spacer
⑥	Bearing
⑦	Spacer
⑧	Bearing
⑨	Spacer
⑩	Spacer
⑪	Spacer
⑫	Bearing
⑬	Spacer
⑭	Pivot shaft
⑮	Bearing
⑯	Chain buffer
⑰	Swingarm
⑱	Chain cover
⑲	Chain adjuster
⑳	Chain adjuster guide
㉑	Chain adjuster bolt
A	Rear shock absorber mounting nut
B	Cushion lever mounting nut
C	Cushion lever rod mounting nut
D	Swingarm pivot nut



ITEM	N·m	kgf-m
A	50	5.0
B	78	7.8
C	78	7.8
D	100	10.0

REMOVAL

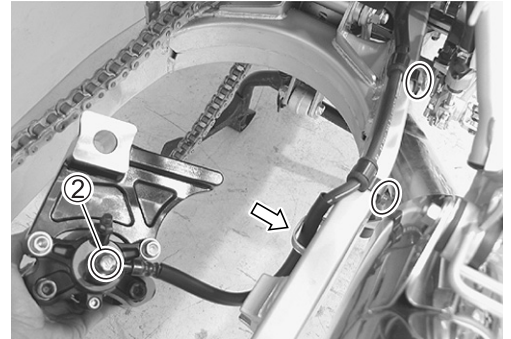
- Remove the rear wheel. (☞ 5-30)
- Remove the drive chain cover ①.



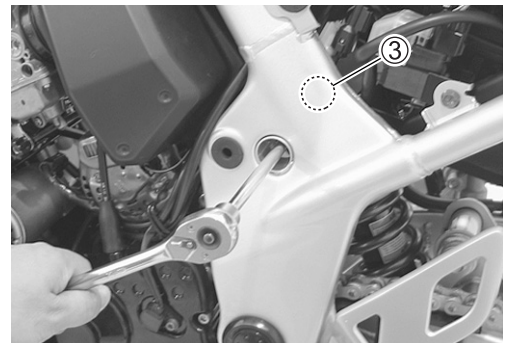
- Remove the brake hose union bolt ②.
- Remove the brake hose from the brake hose guide and clamps.

CAUTION

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



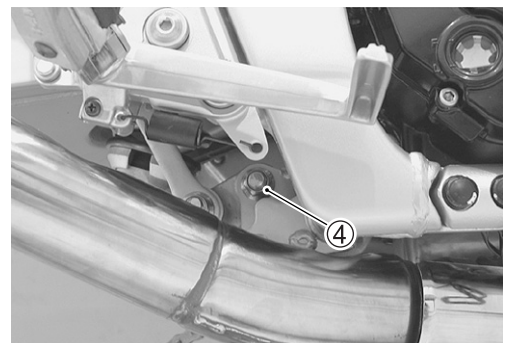
- Remove frame cover (LH). (☞ 5-4)
- Remove the rear shock absorber upper mounting bolt/nut ③.



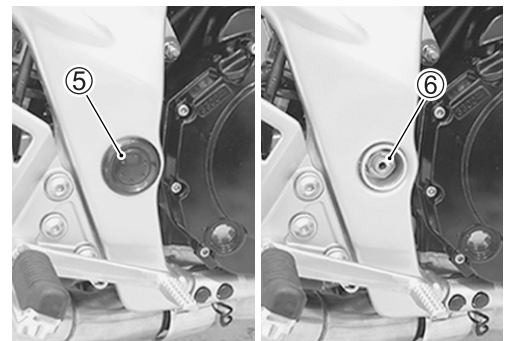
- Remove the cushion lever mounting bolt/nut ④.

NOTE:

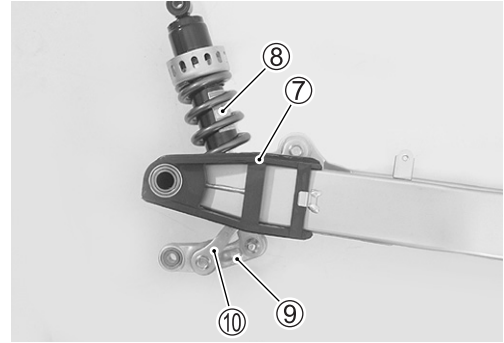
Slightly loosen the cushion lever rod mounting nuts and rear shock absorber lower mounting nut to facilitate later disassembly.



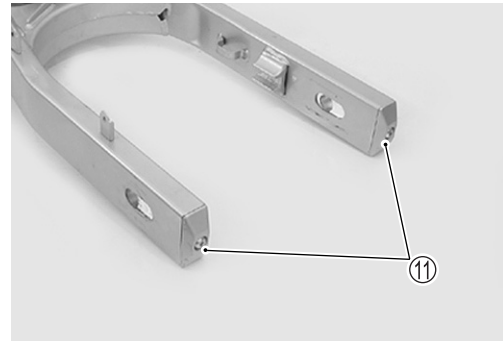
- Remove the pivot shaft end caps ⑤. (LH and RH).
- Remove the swingarm by removing the pivot shaft/nut ⑥.



- Remove the chain buffer ⑦, rear shock absorber ⑧, cushion lever ⑨ and cushion rods ⑩.

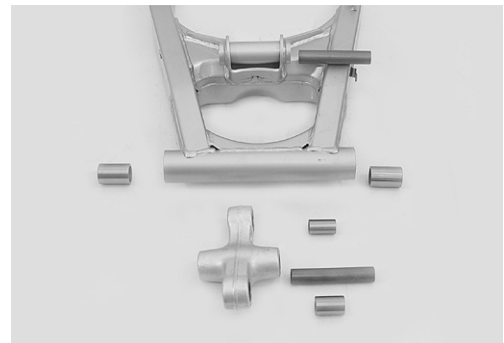


- Remove the chain adjusters ⑪.



INSPECTION AND DISASSEMBLY SPACERS

- Remove the spacers from the swingarm and cushion lever.
- Inspect the spacers for any flaws or other damage. If any defects are found, replace the spacer with a new one.



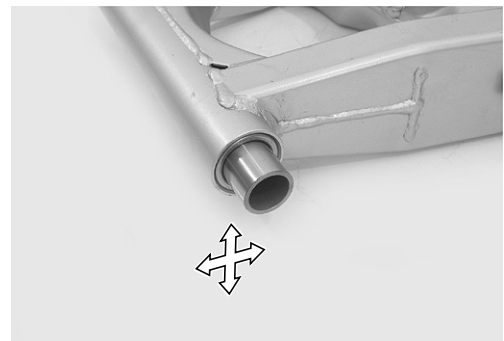
CHAIN BUFFER

- Inspect the chain buffer for wear and damage. If any defects are found, replace the chain buffer with a new one.



SWINGARM BEARINGS

- Insert the spacers into bearings, check the play by moving the spacers up and down.
- If excessive play is noted, replace the bearing with a new one.

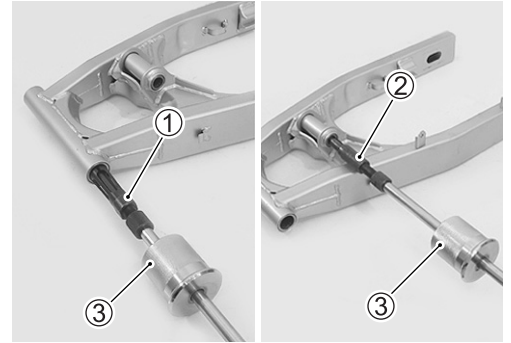


- Remove the swingarm bearings using the special tools.

- TOOL**
- ① 09923-74510: Bearing remover
 - ② 09923-73210: Bearing remover
 - ③ 09930-30102: Sliding shaft

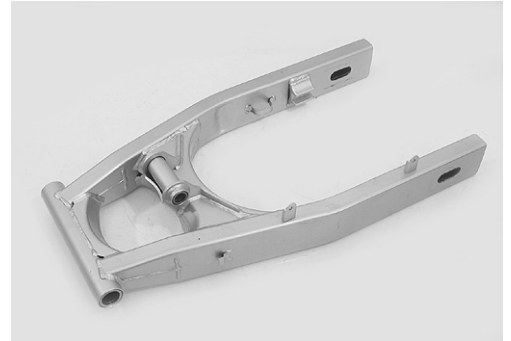
CAUTION

The removed needle bearings should be replaced with new ones.



SWINGARM

Inspect the swingarm for damage.



CUSHION LEVER BEARINGS

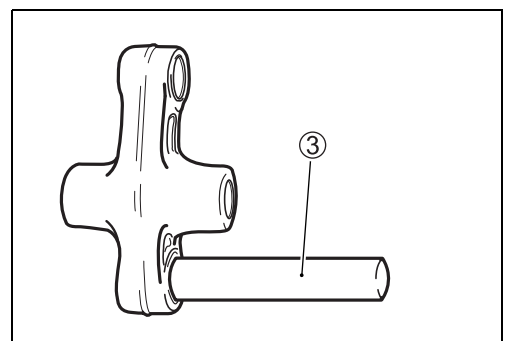
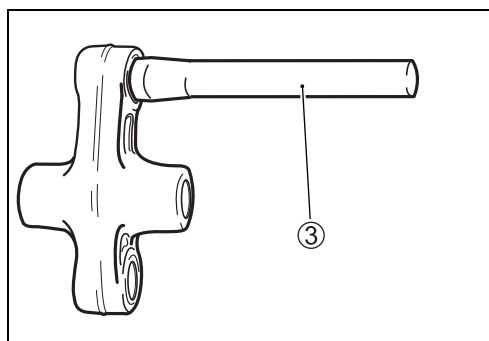
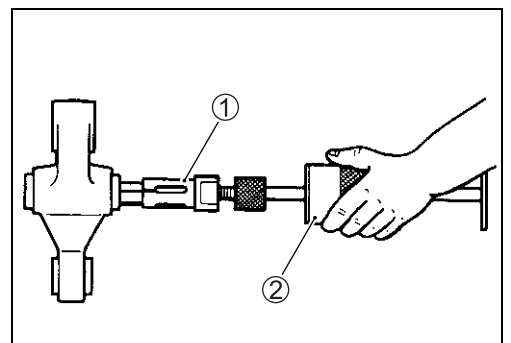
Insert the spacers into bearings, check the play by moving the spacers up and down.

If excessive play is noted, replace the bearing with a new one.



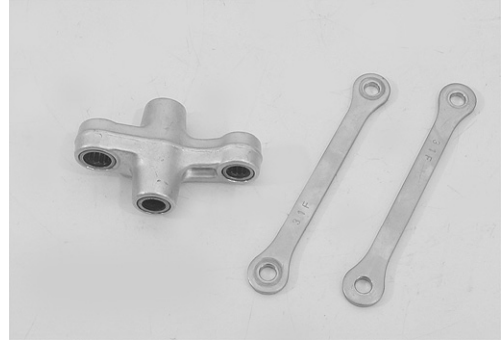
- Remove the cushion lever bearings using the special tools.

- TOOL**
- ① 09923-73210: Bearing remover
 - ② 09930-30102: Sliding shaft
 - ③ 09913-70210: Bearing installer set



CUSHION LEVER AND CUSHION RODS

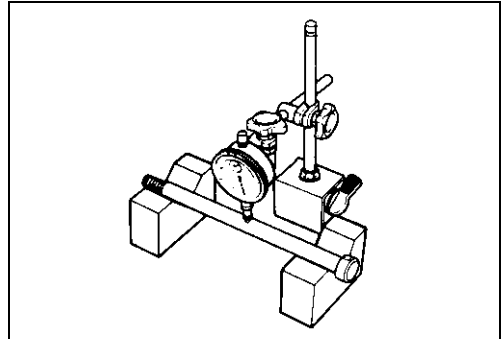
Inspect the cushion lever and cushion rods for damage.

**SWINGARM PIVOT SHAFT**

Measure the swingarm pivot shaft runout using the dial gauge. If the runout exceeds the service limit, replace the pivot shaft.

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

DATA Swingarm pivot shaft runout
Service Limit: 0.3 mm

**REAR SHOCK ABSORBER**

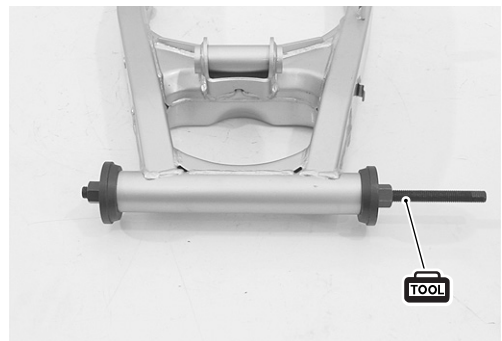
Inspect the rear shock absorber for damage and oil leakage. If any defects are found, replace the rear shock absorber with a new one.

CAUTION

Do not attempt to disassemble the rear shock absorber. It is unserviceable.

**REASSEMBLY****SWINGARM BEARINGS**

- Before installing the swingarm pivot bearings, make sure to insert the spacer between them.
- Press needle bearings into the swingarm pivot using the special tool.

**NOTE:**

Install the needle bearings with the stamped mark facing out.

- TOOL** 09941-34513: Steering outer race installer

- Apply grease to the spacers, dust seals and needle bearings.

FAH 99000-25010: SUZUKI SUPER GREASE "A"

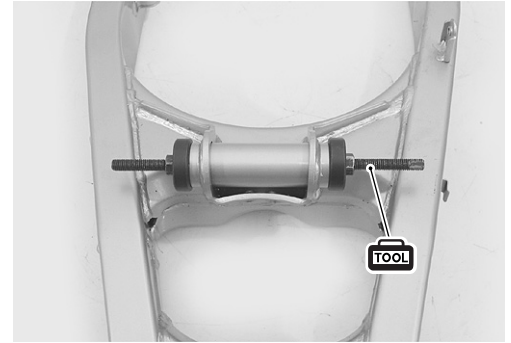


- Press needle bearings into the cushion rod pivot using the special tool.

 **09924-84521: Steering outer race installer**

- Apply grease to the needle bearings.

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



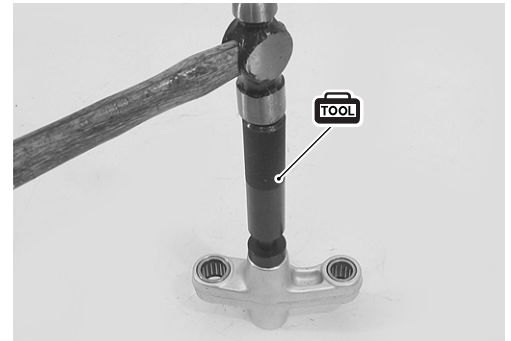
CUSHION LEVER BEARINGS

- Press needle bearings into the cushion lever using the special tool.

 **09913-70210: Bearing installer set**

- Apply grease to the spacers and needle bearings.

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



REAR SHOCK ABSORBER DISPOSAL

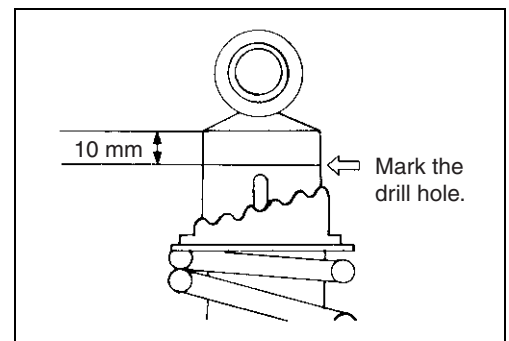
WARNING

The rear shock unit contains high-pressure nitrogen gas. Mishandling can cause explosion.

- * Keep away from fire and heat. High gas pressure caused by heat can cause an explosion.
- * Release gas pressure before disposing.

GAS PRESSURE RELEASE

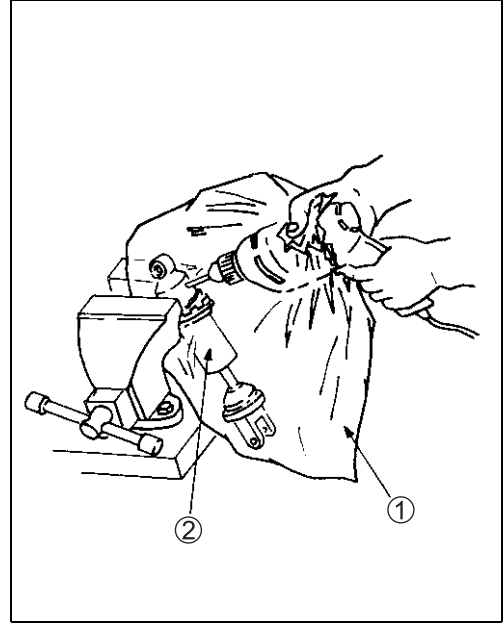
- Mark the drill hole with a center punch.



- Cover the rear shock absorber with a transparent plastic bag ①.
- Hold the rear shock absorber ② with a vice.
- Mark a hole with a 3 mm drill.

⚠ WARNING

Wear eye protection to protect your eyes from released gas and metal chips.



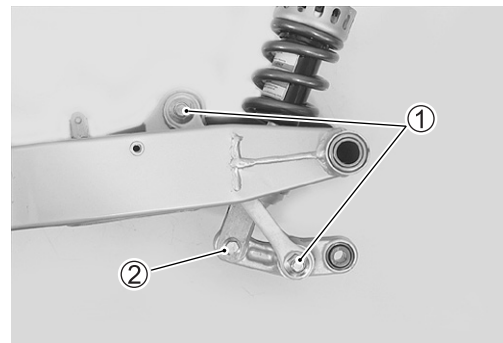
INSTALLATION

Install the swingarm and rear shock absorber in the reverse order of removal. Pay attention to the following points:

- When remount the rear shock absorber and cushion lever, set the index line rearward.

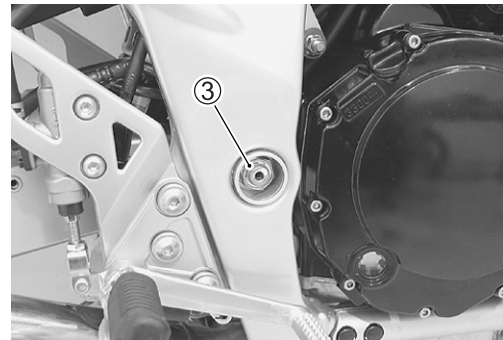
- Tighten the cushion lever rod mounting nuts ① and rear shock absorber lower mounting nut ② to the specified torque.

- **⚙ Cushion lever rod mounting nut ①: 78 N·m (7.8 kgf·m)**
Rear shock absorber lower mounting nut ②:
50 N·m (5.0 kgf·m)



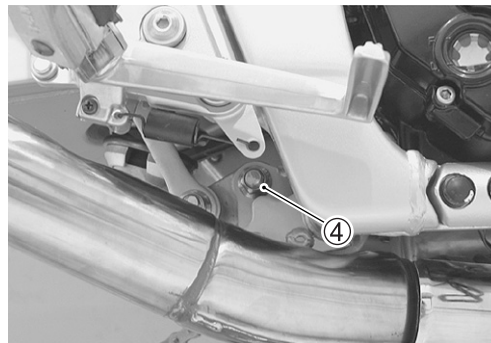
- Tighten the swingarm pivot nut ③ to the specified torque.

- **⚙ Swingarm pivot nut: 100 N·m (10.0 kgf·m)**



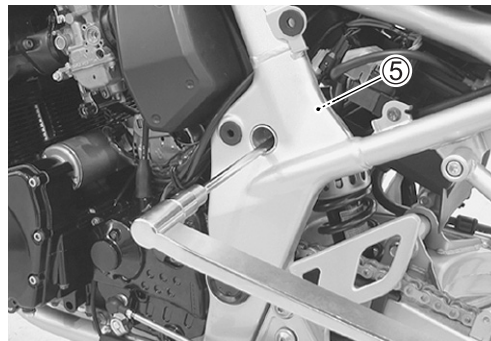
- Tighten the cushion lever mounting nut ④ to the specified torque.

 **Cushion lever mounting nut: 78 N·m (7.8 kgf-m)**



- Tighten the rear shock absorber upper mounting nut ⑤ to the specified torque.

 **Rear shock absorber upper mounting nut:
50 N·m (5.0 kgf-m)**



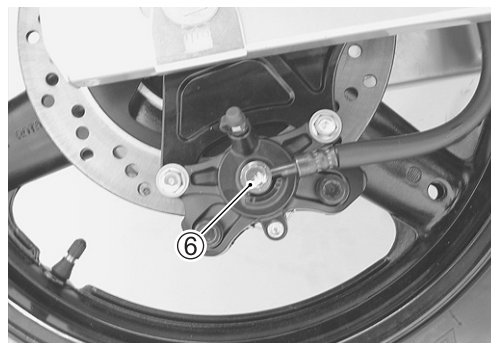
REAR BRAKE

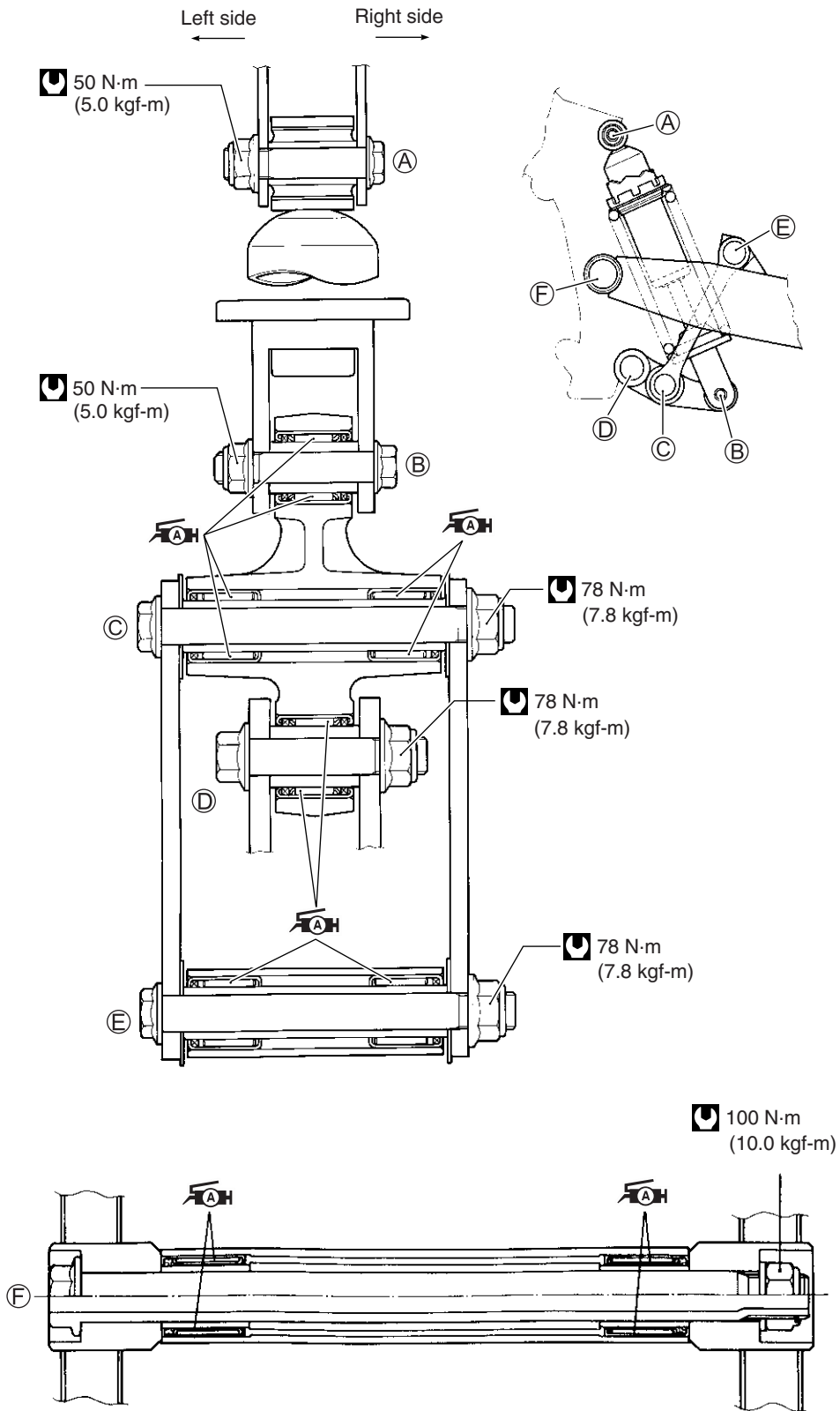
- Remount the rear wheel. (🔧 5-35)
- Tighten the brake hose union bolt ⑥ to the specified torque.

 **Brake hose union bolt: 23 N·m (2.3 kgf-m)**

CAUTION

Bleed air from the brake system. (🔧 2-17)





FINAL INSPECTION AND ADJUSTMENT

After installing the rear suspension and rear wheel, adjust the following before riding.

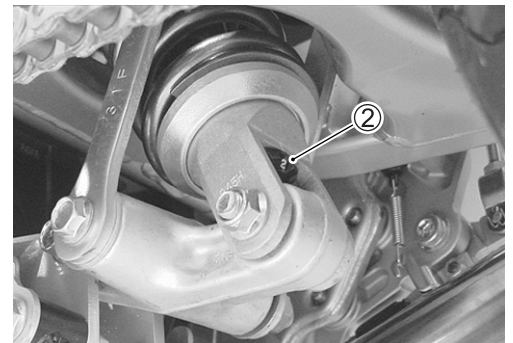
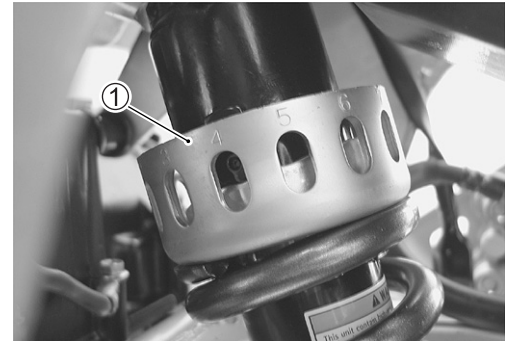
* Drive chain slack.....(☞ 2-14)

* Tire pressure.....(☞ 2-18)

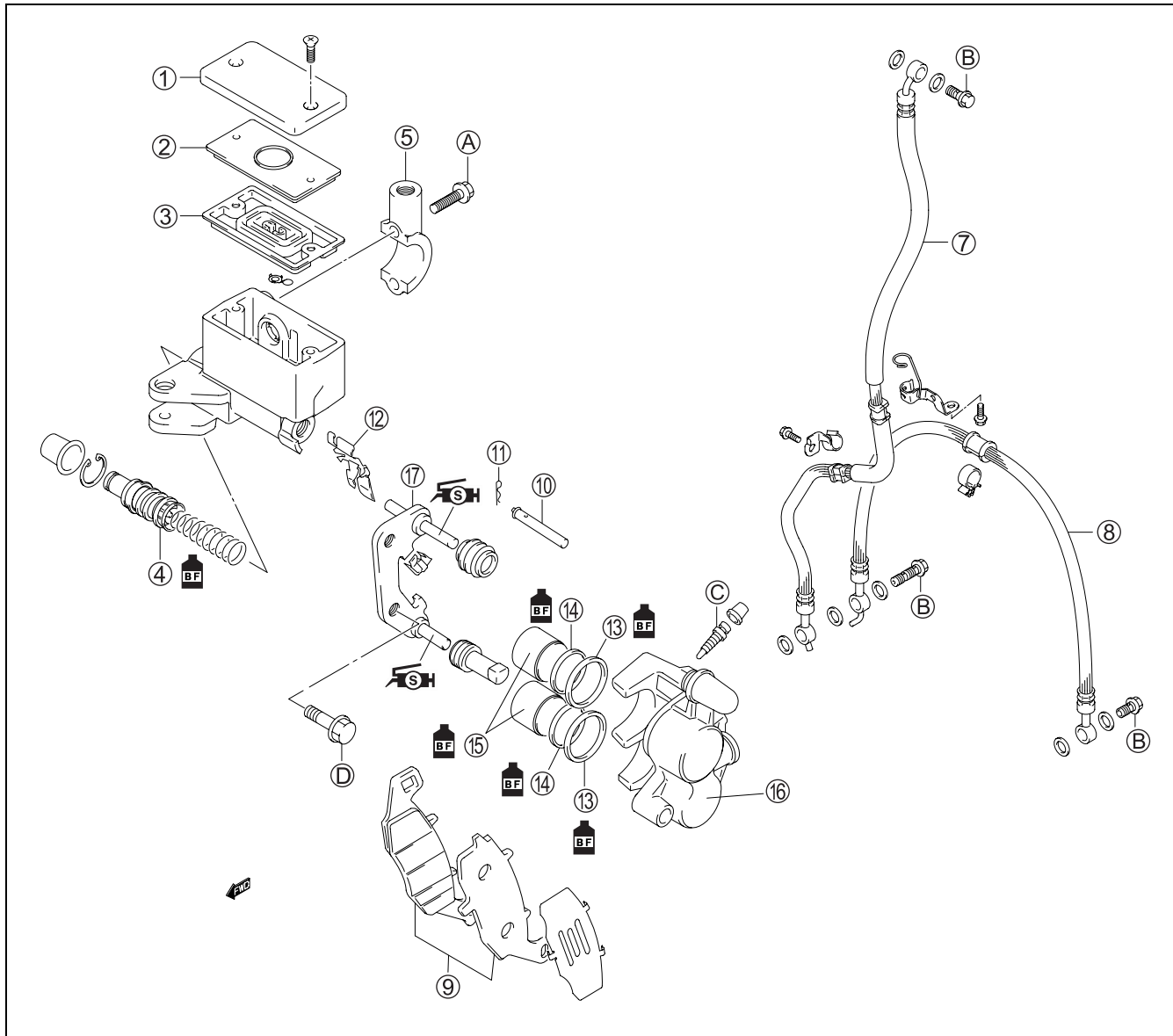
SUSPENSION SETTING

After installing the rear suspension, adjust the spring pre-load and damping force as follows.

	Spring pre-load adjuster ①	Rebound damping force adjuster ②
GSF650	3rd	2nd
GSF650S	4th	2nd



FRONT BRAKE CONSTRUCTION



①	Master cylinder reservoir cap	⑧	Brake hose #2	⑮	Brake caliper pistons
②	Reservoir cap plate	⑨	Brake pads	⑯	Brake caliper
③	Diaphragm	⑩	Brake pad mounting pin	⑰	Brake caliper holder
④	Piston/cup set	⑪	Clip	A	Master cylinder holder bolt
⑤	Master cylinder holder	⑫	Spring	B	Brake hose union bolt
⑥	Master cylinder	⑬	Piston seal	C	Air bleeder valve
⑦	Brake hose #1	⑭	Dust seal	D	Brake caliper mounting bolt



ITEM	N-m	kgf-m
A	10	1.0
B	23	2.3
C	8	0.8
D	39	3.9

⚠ WARNING

- * This brake system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid, such as silicone-based or petroleum-based.
- * Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or which has been stored for long periods of time.
- * When storing brake fluid, seal the container completely and keep it away from children.
- * When replenishing brake fluid, take care not to get dust into the fluid.
- * When washing brake components, use new brake fluid. Never use cleaning solvent.
- * A contaminated brake disc or brake pad reduces braking performance. Discard contaminated pads and clean the disc with high quality brake cleaner or neutral detergent.

CAUTION

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

BRAKE PAD REPLACEMENT

- Remove the brake caliper.

CAUTION

Do not operate the brake lever with the front brake caliper removed.

- Remove the brake pads by removing the clip ① and brake pad mounting pin ②.

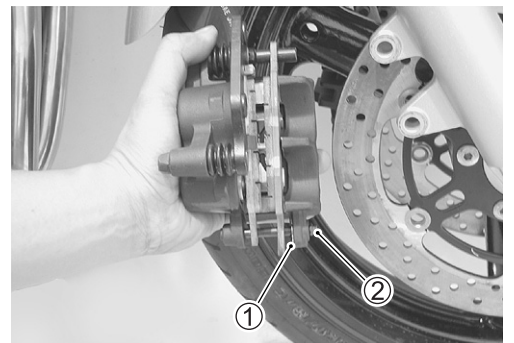
CAUTION

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

- Install new brake pads.

⚠ WARNING

Make sure that the brake pad is properly engaged with the guide plate as shown in the photograph.

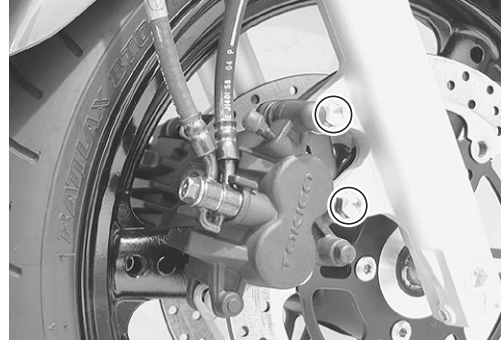


- Tighten the brake caliper mounting bolts to the specified torque.

 **Brake caliper mounting bolt: 39 N·m (3.9 kgf·m)**

⚠ WARNING

After remounting the brake calipers, pump the brake lever until the pistons push the pads correctly.



BRAKE FLUID REPLACEMENT

- Place the motorcycle on a level surface and keep the handlebars straight.
- Remove the brake fluid reservoir cap and diaphragm.
- Suck up the old brake fluid as much as possible.
- Fill the reservoir with new brake fluid.

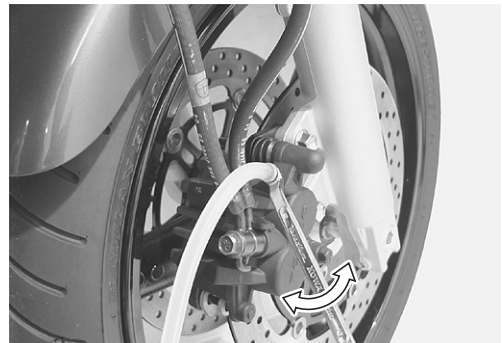
 **Specification and classification: DOT 4**

- Connect a clear hose to the air bleeder valve and insert the other end of the hose into a receptacle.
- Loosen the air bleeder valve and pump the brake lever until the old brake fluid flows out of the brake system.
- Close the air bleeder valve and disconnect the clear hose. Fill the reservoir with new brake fluid to the upper line of the reservoir.

CAUTION

Bleed air from the brake system. ( 2-17)

 **Brake air bleeder valve: 8 N·m (0.8 kgf·m)**



BRAKE CALIPER REMOVAL AND DISASSEMBLY

- Drain brake fluid. (☞ 5-48)
- Disconnect the brake hose from the brake caliper by removing the brake hose union bolt ①.

NOTE:

Place a rag underneath the union bolt to catch any spilt of brake fluid.

- Remove the brake caliper by removing the brake caliper mounting bolts ②.

⚠ WARNING

Brake fluid, if it leaks, will interfere with safe running and discolor painted surfaces. Check the brake hose and hose joints for cracks and fluid leakage.

- Remove the brake pads. (☞ 5-47)
- Remove the brake caliper holder ① and rubber parts ②.
- Remove the pad spring ③.

- Place a rag over the pistons to prevent them from popping out and then force out the pistons using compressed air.

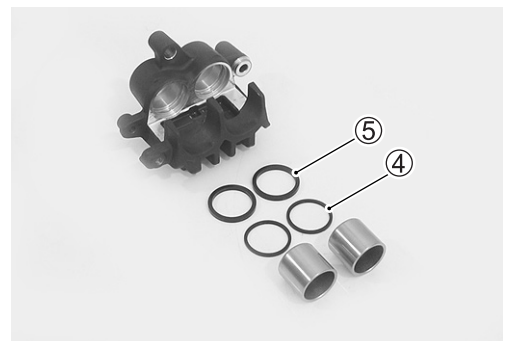
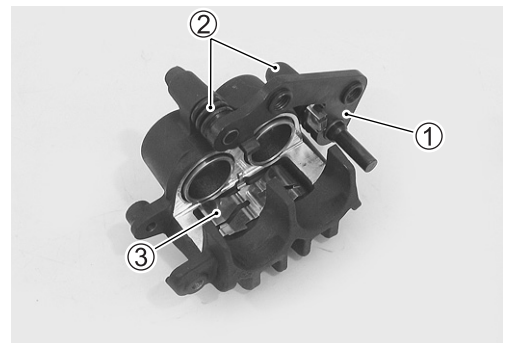
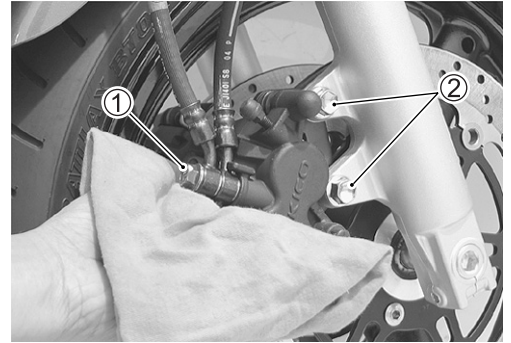
CAUTION

Do not use high pressure air to prevent piston damage.

- Remove the dust seals ④ and piston seals ⑤.

CAUTION

Do not reuse the removed dust seals and piston seals to prevent fluid leakage.



BRAKE CALIPER INSPECTION

BRAKE CALIPER

Inspect the brake caliper cylinder wall for nicks, scratches and other damage. If any damage is found, replace the caliper with a new one.



CALIPER PISTONS

Inspect the caliper pistons for scratches and other damage. If any damage is found, replace the caliper pistons with new ones.



CALIPER HOLDER

Inspect the caliper holder for damage. If any damage is found, replace the caliper holder with a new one.



RUBBER PARTS

Inspect the rubber parts for damage. If any damages are found, replace them with the new ones.

The removed rubber parts should be replaced with new ones.



BRAKE CALIPER REASSEMBLY AND INSTALLATION

Reassemble and install the brake caliper in the reverse order of removal and disassembly. Pay attention to the following points:

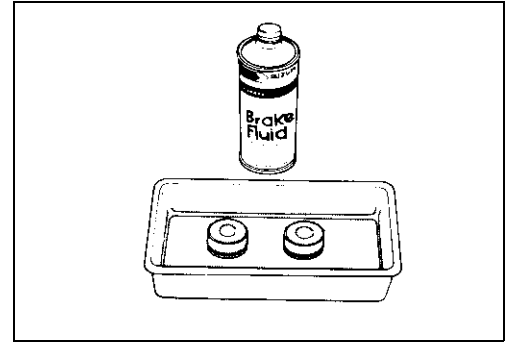
- Wash the caliper bores and pistons with the specified brake fluid. Particularly wash the dust seal grooves and piston seal grooves.



Specification and classification: DOT 4

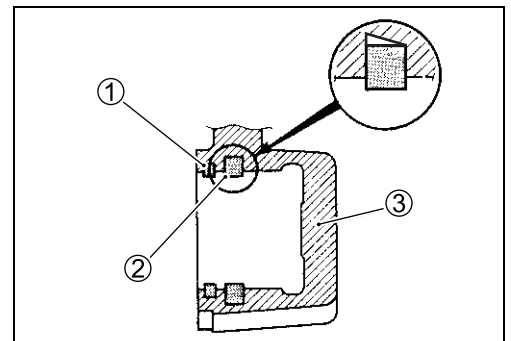
CAUTION

- * Wash the brake caliper components with new brake fluid before reassembly.
- * Do not wipe the brake fluid off after washing the components.
- * When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.
- * Replace the piston seals and dust seals with new ones.
- * Apply brake fluid to all of the seals, brake caliper bores and pistons before reassembly.



PISTON SEAL

- Install the piston seals as shown in the illustration.
- Install the piston to the caliper.
 - ① Dust seal
 - ② Piston seal
 - ③ Caliper

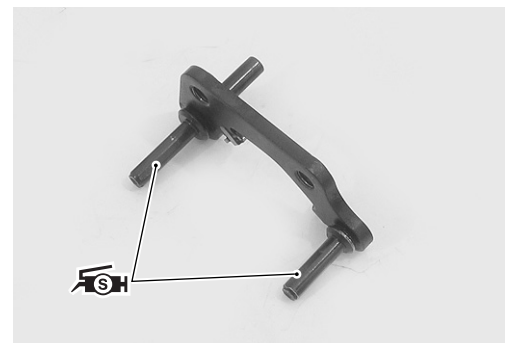


BRAKE CALIPER HOLDER

- Apply SUZUKI SILICONE GREASE to the caliper holder pins.



99000-25100: SUZUKI SILICONE GREASE



- Tighten the brake caliper mounting bolts ① to the specified torque.

🔧 Brake caliper mounting bolt: 39 N·m (3.9 kgf·m)

NOTE:

Before remounting the brake caliper, push the brake caliper pistons all the way into the caliper.

- After setting the brake hose union between the stopper, tighten the union bolt ② to the specified torque.

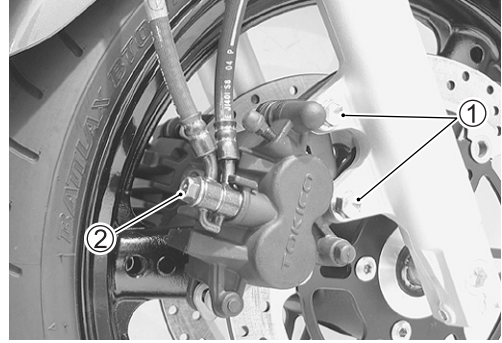
🔧 Brake hose union bolt: 23 N·m (2.3 kgf·m)

CAUTION

- * The seal washers should be replaced with the new ones to prevent fluid leakage.
- * Bleed air from the system after reassembling the caliper. (👉 2-17)

⚠️ WARNING

After remounting the brake calipers, pump the brake lever until the pistons push the pads correctly.



BRAKE DISC INSPECTION

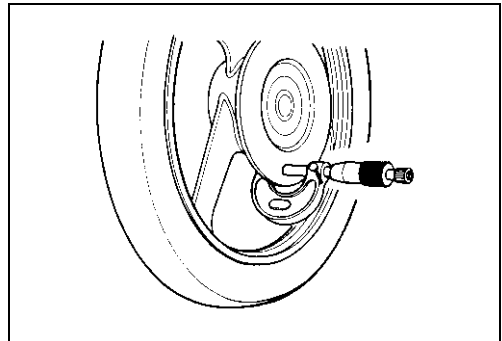
Visually check the brake discs for damage or cracks. Measure the thickness using the micrometer.

Replace the brake disc if the thickness is less than the service limit or if damage is found.

🔧 09900-20205: Micrometer (0 – 25 mm)

📊 Brake disc thickness

Service Limit (front) : 4.0 mm
(rear) : 4.5 mm



Measure the brake disc runout using the dial gauge.

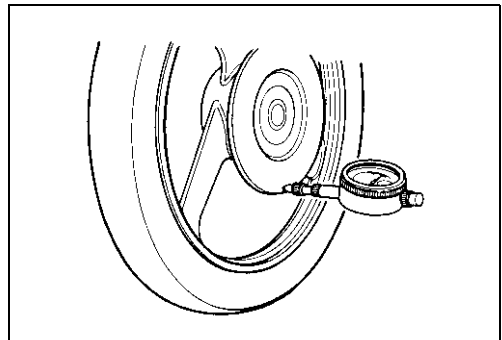
Replace the disc if the runout exceeds the service limit.

🔧 09900-20606: Dial gauge (1/100 mm)

09900-20701: Magnetic stand

📊 Brake disc runout

Service Limit (front and rear): 0.3 mm



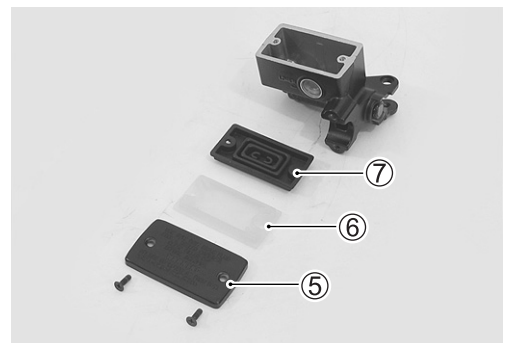
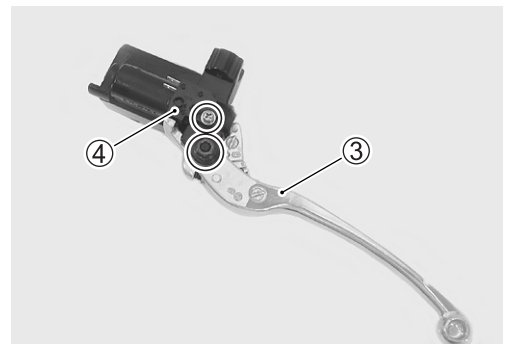
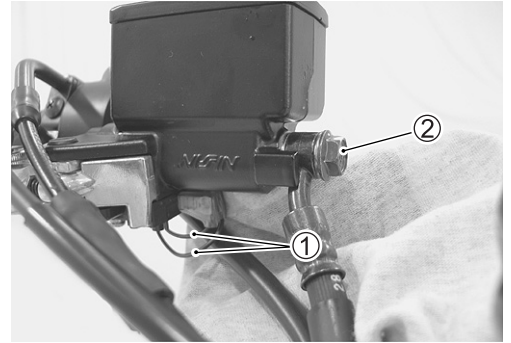
MASTER CYLINDER REMOVAL AND DISASSEMBLY

- Drain brake fluid. (☞ 5-48)
- Disconnect the front brake light switch lead wires ①.
- Place a rag underneath the brake hose union bolt ② on the master cylinder to catch any spilt brake fluid. Remove the brake hose union bolt ② and disconnect the brake hose.


CAUTION

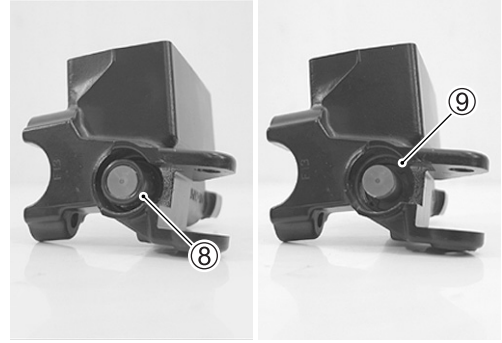
Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The fluid reacts chemically with paint, plastics and rubber materials, etc. and will damage them severely.

- Remove the right rear view mirror.
- Remove the master cylinder assembly.
- Remove the brake lever ③ and brake light switch ④.
- Remove the reservoir cap ⑤, plate ⑥ and diaphragm ⑦.
- Drain the brake fluid.



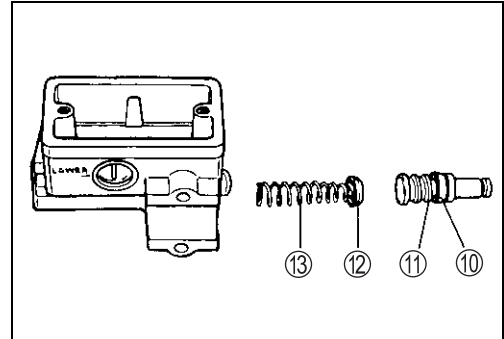
- Pull out the dust boot ⑧ and remove the snap ring ⑨.

 09900-06108: Snap ring pliers



- Remove the piston/secondary cup, primary cup and spring.

- ⑩ Secondary cup
- ⑪ Piston
- ⑫ Primary cup
- ⑬ Spring



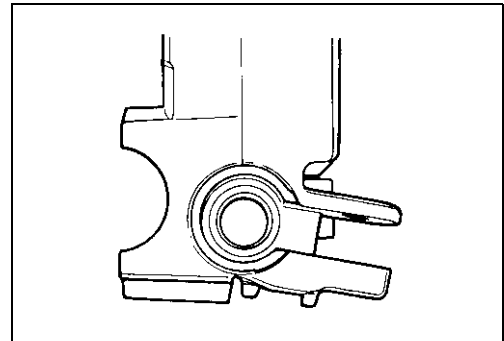
MASTER CYLINDER INSPECTION

MASTER CYLINDER

Inspect the master cylinder bore for any scratches or other damage.

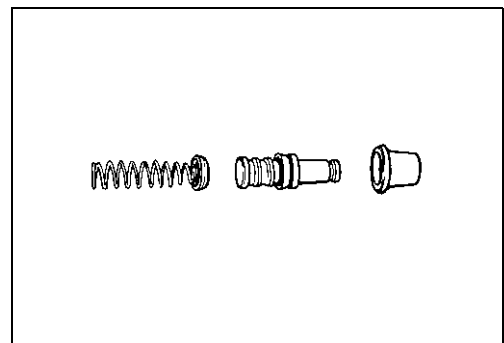
PISTON

Inspect the piston surface for any scratches or other damage.



RUBBER PARTS

Inspect the primary cup, secondary cup and dust boot for wear or damage.

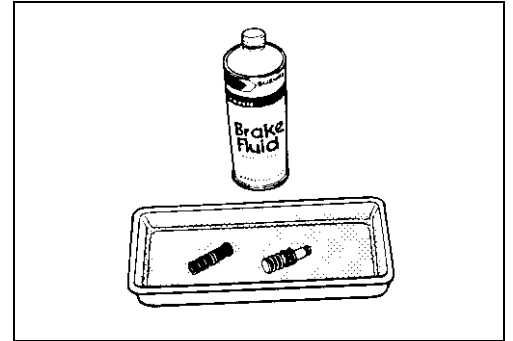


MASTER CYLINDER REASSEMBLY AND INSTALLATION

Reassemble and install the master cylinder in the reverse order of removal and disassembly. Pay attention to the following points:

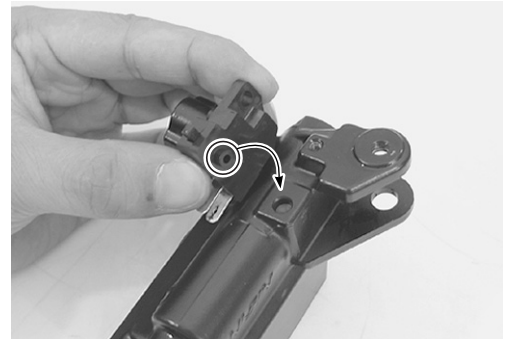
CAUTION

- * Wash the master cylinder components with new brake fluid before reassembly.
- * Do not wipe the brake fluid off after washing the components.
- * When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.
- * Apply brake fluid to the master cylinder bore and all of the master cylinder components before reassembly.



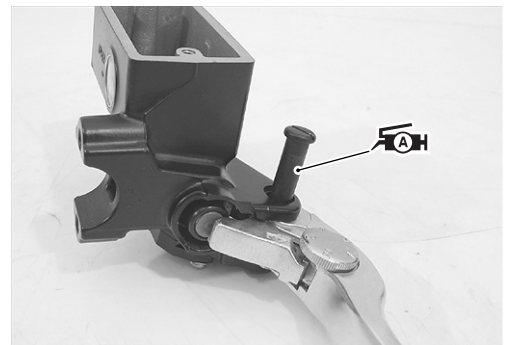
 **Specification and classification: DOT 4**

- When installing the brake light switch, align the projection on the switch with the hole in the master cylinder.

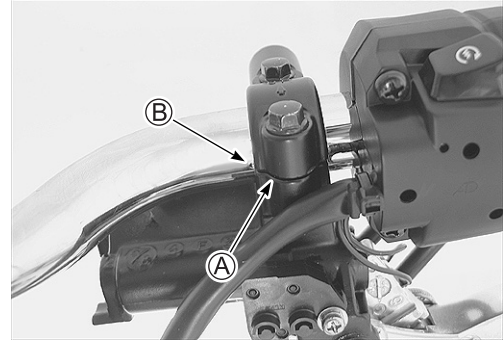


- Apply SUZUKI SUPER GREASE to the brake lever pivot bolt when installing.

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

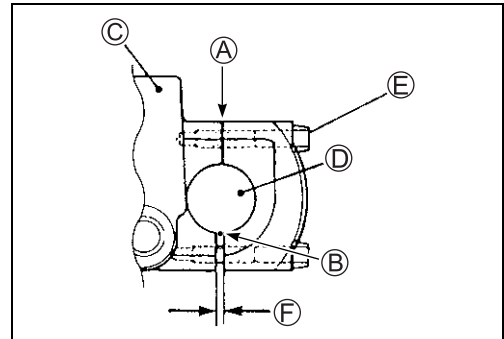


- When installing the master cylinder onto the handlebar, align the master cylinder holder's mating surface (A) with the punch mark (B) on the handlebar and tighten the upper holder bolt first.



- (A) Mating surface
- (B) Punch mark
- (C) Master cylinder
- (D) Handlebar
- (E) Upper holder bolt
- (F) Clearance

🔩 Master cylinder holder bolt (upper and lower):
10 N·m (1.0 kgf·m)

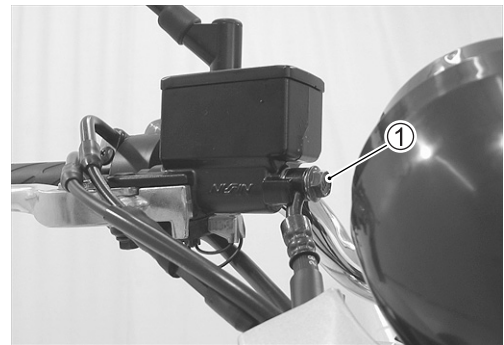


- After setting the brake hose union to the stopper, tighten the union bolt (1) to the specified torque.

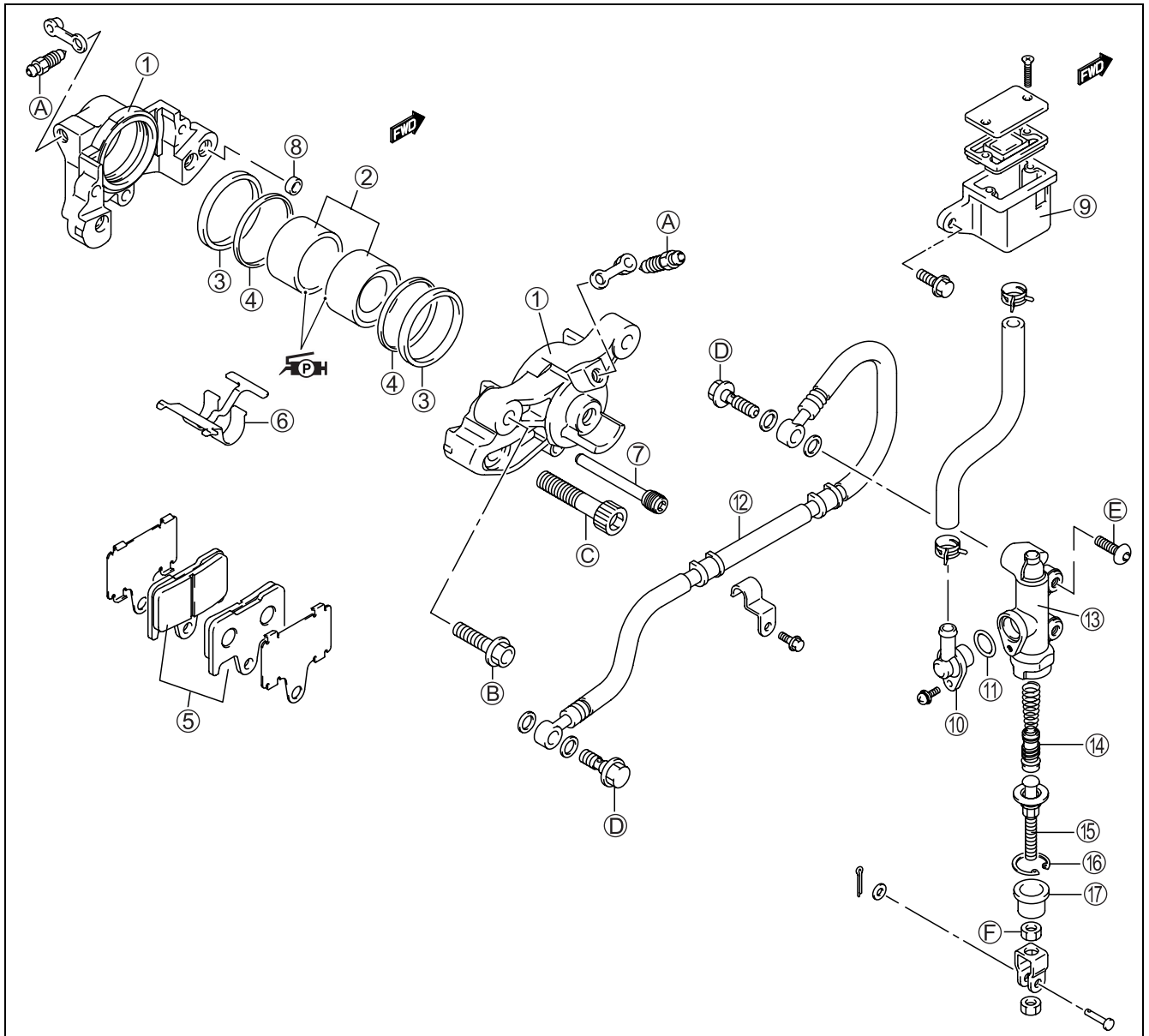
🔩 Brake hose union bolt: 23 N·m (2.3 kgf·m)

CAUTION

- * The seal washers should be replaced with the new ones to prevent fluid leakage.
- * Bleed air from the brake system after reassembling the master cylinder. (👉 2-17)



REAR BRAKE CONSTRUCTION



①	Brake caliper	⑨	Reservoir	⑰	Dust boot
②	Brake caliper pistons	⑩	Brake hose connector	Ⓐ	Air bleeder valve
③	Piston seals	⑪	O-ring	Ⓑ	Brake caliper mounting bolt
④	Dust seals	⑫	Brake hose	Ⓒ	Brake caliper housing bolt
⑤	Brake pads	⑬	Master cylinder	Ⓓ	Brake hose union bolt
⑥	Springs	⑭	Piston/cup set	Ⓔ	Master cylinder mounting bolt
⑦	Brake pad mounting pins	⑮	Push rod	Ⓕ	Master cylinder rod locknut
⑧	O-ring	⑯	Snap ring	Ⓖ	



ITEM	N·m	kgf·m
Ⓐ	8	0.8
Ⓑ	25	2.5

ITEM	N·m	kgf·m
Ⓒ	30	3.0
Ⓓ	23	2.3

ITEM	N·m	kgf·m
Ⓔ	23	2.3
Ⓕ	18	1.8

⚠ WARNING

- * This brake system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid, such as silicone-based or petroleum-based.
- * Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or which has been stored for long periods of time.
- * When storing brake fluid, seal the container completely and keep it away from children.
- * When replenishing brake fluid, take care not to get dust into the fluid.
- * When washing brake components, use new brake fluid. Never use cleaning solvent.
- * A contaminated brake disc or brake pad reduces braking performance. Discard contaminated pads and clean the disc with high quality brake cleaner or neutral detergent.

CAUTION

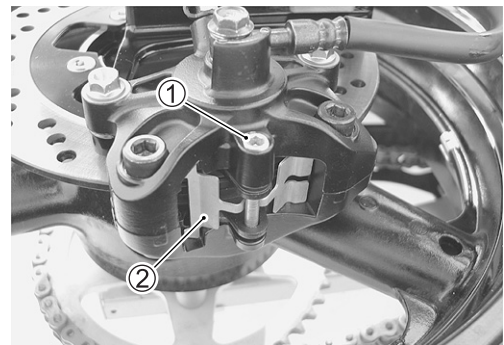
Handle brake fluid with care: the fluid reacts chemically with paint, plastics, rubber materials etc.

BRAKE PAD REPLACEMENT

- Remove the brake pads by removing the brake pad mounting pin ① and spring ②.

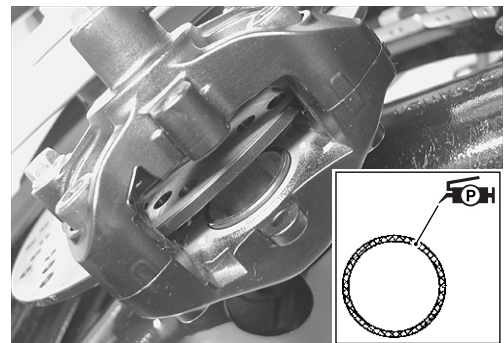
CAUTION

Do not operate the brake pedal with the brake pads removed.

**NOTE:**

Before installing pads, apply SUZUKI PBC GREASE or equivalent grease to the shim contact surface of caliper pistons.

 99000-25110: SUZUKI PBC GREASE



- Install new brake pads with shims.
- Tighten the brake pad mounting pin to the specified torque.

 Brake pad mounting pin: 18 N·m (1.8 kgf·m)

CAUTION

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

⚠ WARNING

After remounting the brake calipers, pump the brake pedal until the pistons push the pads correctly.



BRAKE FLUID REPLACEMENT

- Place the motorcycle on a level surface.
- Remove the frame cover (RH). (☞ 5-4)
- Remove the brake fluid reservoir cap and diaphragm.
- Suck up the old brake fluid as much as possible.
- Fill the reservoir with new brake fluid.

 **Specification and classification: DOT 4**

- Connect a clear hose to the air bleeder valve and insert the other end of the hose into a receptacle.

NOTE:

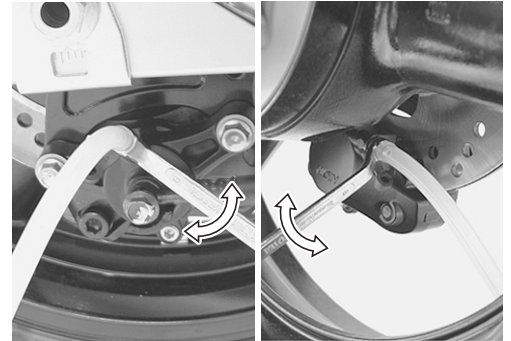
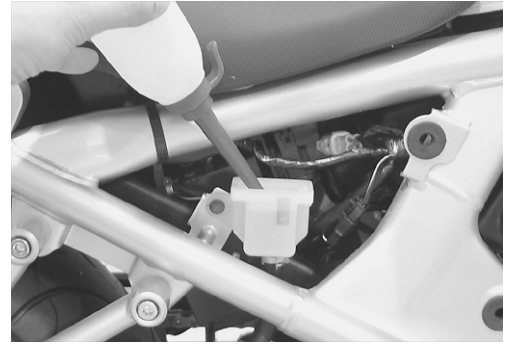
Rear brake caliper has two bleeder valves.

- Loosen the air bleeder valve and pump the brake pedal until the old brake fluid flows out of the brake system.
- Close the air bleeder valve and disconnect the clear hose. Fill the reservoir with new brake fluid to the upper line of the reservoir.

CAUTION

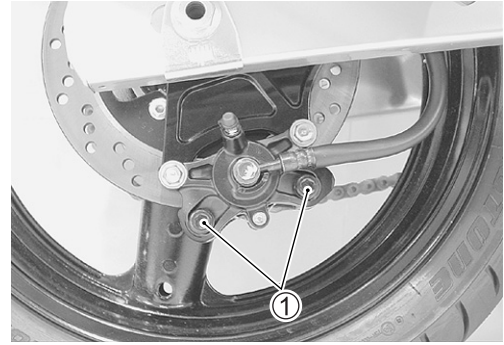
Bleed air from the brake system. (☞ 2-17)

 **Brake air bleeder valve: 8 N·m (0.8 kgf-m)**



BRAKE CALIPER REMOVAL AND DISASSEMBLY

- Drain brake fluid. (☞ 5-59)
- Slightly loosen the brake caliper housing bolts ① to facilitate later disassembly before removing the brake caliper.

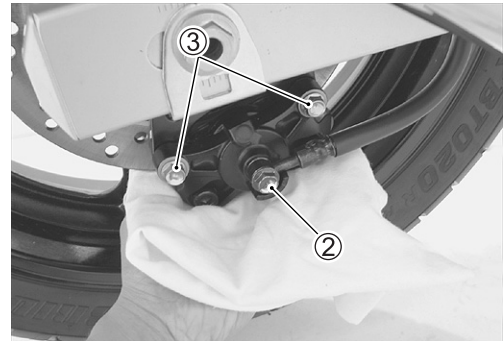


- Disconnect the brake hose from the brake caliper by removing the brake hose union bolt ②.

NOTE:

Place a rag underneath the union bolt to catch any spilt of brake fluid.

- Remove the brake caliper mounting bolts ③.



⚠ WARNING

Brake fluid, if it leaks, will interfere with safe running and discolor painted surfaces. Check the brake hose and hose joints for cracks and fluid leakage.

- Remove the brake pads. (☞ 5-58)
- Remove the brake caliper housing bolts ④.



- Separate the brake caliper halves.
- Remove the O-ring ⑤.

CAUTION

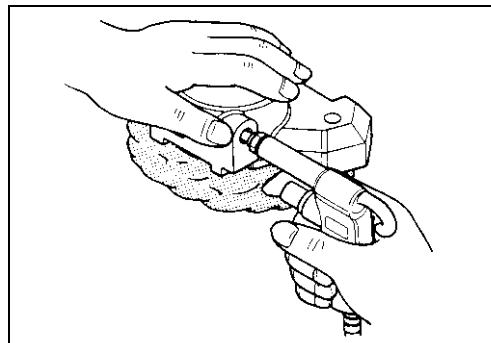
Replace the O-ring ⑤ with a new one.



- Place a rag over the brake caliper piston to prevent it from popping out and then force out the piston using compressed air.

CAUTION

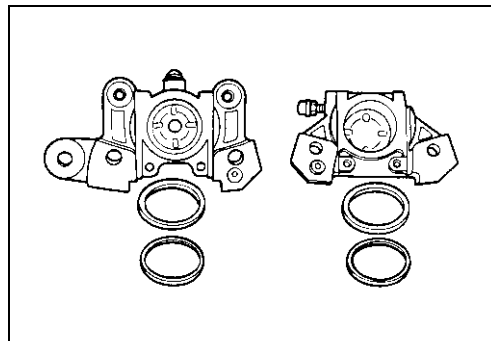
Do not use high pressure air to prevent brake caliper piston damage.



- Remove the dust seals and piston seals.

CAUTION

Do not reuse the dust seals and piston seals to prevent fluid leakage.

**BRAKE CALIPER INSPECTION**

BRAKE CALIPER.....(☞ 5-50)

BRAKE CALIPER PISTONS.....(☞ 5-50)

BRAKE DISC.....(☞ 5-52)

(Use the front wheel specifications and procedure.)

DATA Brake disc thickness (rear)
Service Limit: 4.5 mm

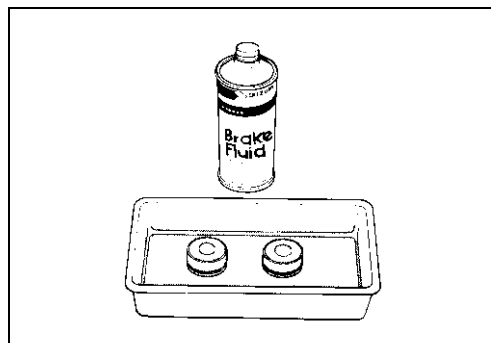
DATA Brake disc runout (rear)
Service Limit: 0.30 mm

BRAKE CALIPER REASSEMBLY AND INSTALLATION

Reassemble and install the brake caliper in the reverse order of removal and disassembly. Pay attention to the following points:

CAUTION

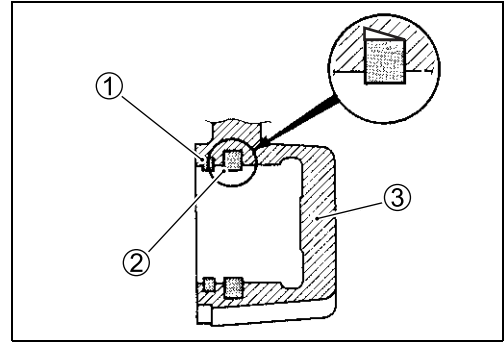
- * Wash the brake caliper components with new brake fluid before reassembly.
- * Do not wipe the brake fluid off after washing the components.
- * When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.
- * Replace the piston seals and dust seals with new ones.
- * Apply brake fluid to all of the seals, brake caliper bores and pistons before reassembly.



BF Specification and classification: DOT 4

PISTON SEAL

- Install the piston seals as shown in the illustration.
- Install the pistons to the caliper.
 - ① Dust seal
 - ② Piston seal
 - ③ Caliper

**NOTE:**

Before installing pads, apply SUZUKI PBC GREASE or equivalent grease to the shim contact surface of caliper pistons.

 99000-25110: SUZUKI PBC GREASE

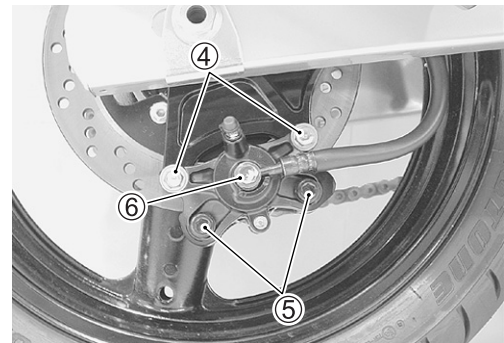


- Tighten the brake caliper mounting bolts ④ and housing bolts ⑤ to the specified torque.
- After setting the brake hose union to the stopper, tighten the union bolt ⑥ to the specified torque.

 **Brake caliper mounting bolt ④: 26 N·m (2.6 kgf·m)**
Brake caliper housing bolt ⑤: 37 N·m (3.7 kgf·m)
Brake hose union bolt ⑥: 23 N·m (2.3 kgf·m)

NOTE:

Before remounting the brake caliper, push the brake caliper pistons all the way into the caliper.

**CAUTION**

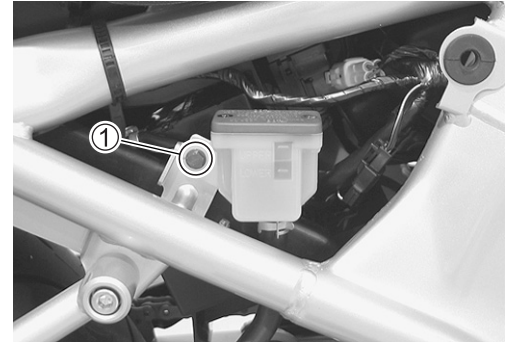
- * The seal washers should be replaced with the new ones to prevent fluid leakage.
- * Bleed air from the system after reassembling the caliper. (🔧 2-17)

⚠ WARNING

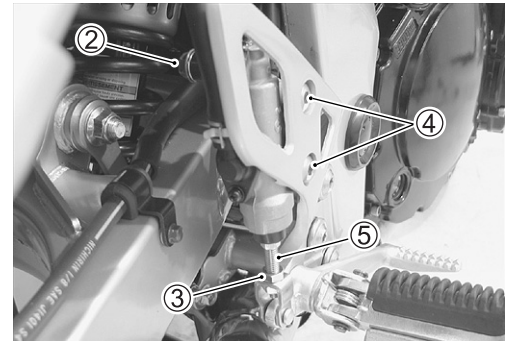
After remounting the brake calipers, pump the brake pedal until the pistons push the pads correctly.

MASTER CYLINDER REMOVAL AND DISASSEMBLY

- Remove the frame cover (RH). (☞ 5-4)
- Drain brake fluid. (☞ 5-59)
- Remove the reservoir mounting bolt ①.



- Place a rag underneath the brake hose union bolt ② on the master cylinder to catch any spilt brake fluid. Remove the brake hose union bolt ② and disconnect the brake hose.
- Loosen the locknut ③.
- Remove the master cylinder mounting bolts ④.
- Remove the master cylinder along with the reservoir by turning the push rod ⑤.



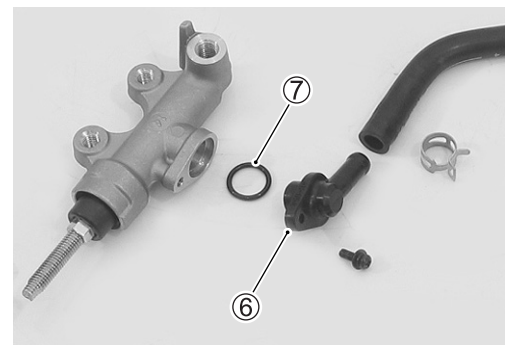
CAUTION

Immediately wipe off any brake fluid contacting any part of the motorcycle. The brake fluid reacts chemically with paint, plastics and rubber materials, etc., and will damage them severely.


- Disconnect the reservoir hose.
- Remove the brake hose connector ⑥.
- Remove the O-ring ⑦.

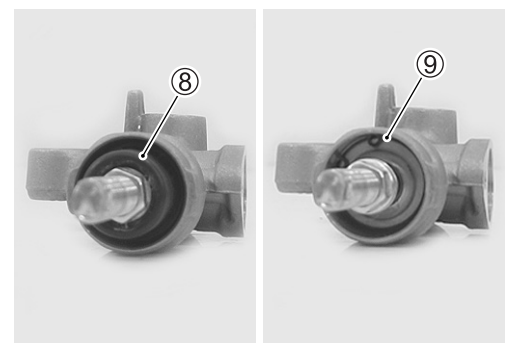
CAUTION

Replace the O-ring with a new one.

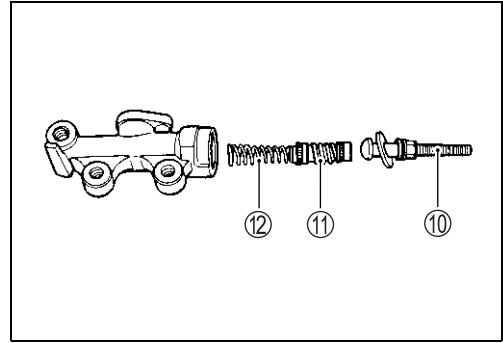


- Pull out the dust boot ⑧ and remove the snap ring ⑨.

 **09900-06108: Snap ring pliers**



- Remove the push rod ⑩, piston/primary cup ⑪ and spring ⑫.



MASTER CYLINDER INSPECTION

MASTER CYLINDER

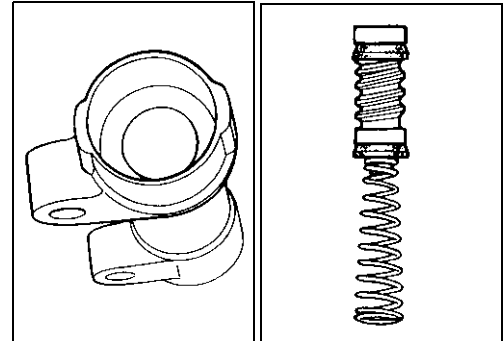
Inspect the master cylinder bore for any scratches or other damage.

PISTON

Inspect the piston surface for any scratches or other damage.

RUBBER PARTS

Inspect the primary/secondary cup and all of the rubber parts for damage.

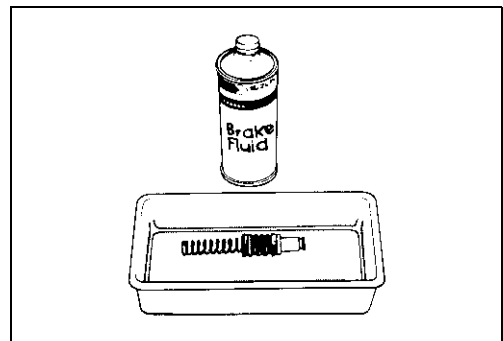


MASTER CYLINDER REASSEMBLY AND INSTALLATION

Reassemble and install the master cylinder in the reverse order of removal and disassembly. Pay attention to the following points:

CAUTION

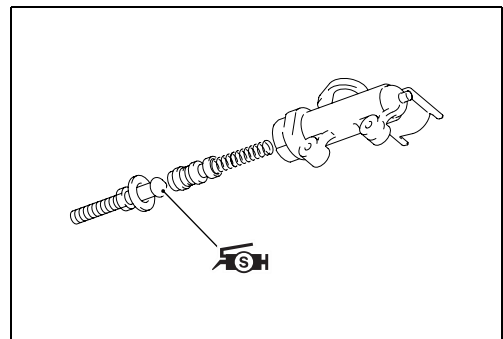
- * Wash the master cylinder components with new brake fluid before reassembly.
- * Do not wipe the brake fluid off after washing the components.
- * When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.
- * Apply brake fluid to the master cylinder bore and all of the master cylinder components before reassembly.



BP Specification and classification: DOT 4

- Apply SUZUKI SILICONE GREASE to the push rod end.

SH 99000-25100: SUZUKI SILICONE GREASE

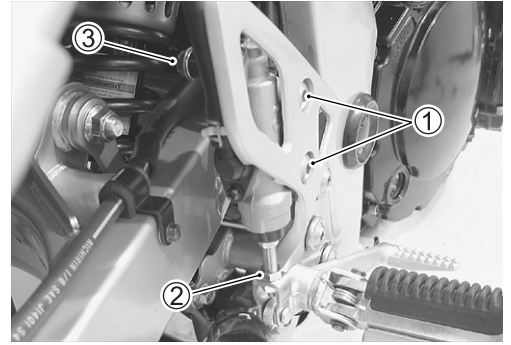


- Tighten the master cylinder mounting bolts ① to the specified torque.
- Tighten the locknut ② to the specified torque.
- After setting the brake hose union to the stopper, tighten the union bolt ③ to the specified torque.

🔧 Master cylinder mounting bolt ①: 25 N·m (2.5 kgf-m)
Master cylinder push rod locknut ②: 18 N·m (1.8 kgf-m)
Brake hose union bolt ③: 23 N·m (2.3 kgf-m)

CAUTION

- * The seal washers should be replaced with the new ones to prevent fluid leakage.
- * Bleed air from the system after reassembling the caliper. (👉 2-17)



TIRE AND WHEEL

TIRE REMOVAL

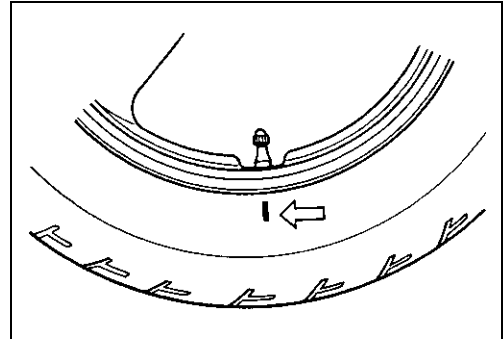
The most critical factor of a tubeless tire is the seal between the wheel rim and the tire bead. For this reason, it is recommended to use a tire changer that can satisfy this sealing requirement and can make the operation efficient as well as functional.

For operating procedures, refer to the instructions supplied by the tire changer manufacturer.

NOTE:

When removing the tire in case of repair or inspection, mark the tire with a chalk to indicate the tire position relative to the valve position.

Even though the tire is refitted to the original position after repairing puncture, the tire may have to be balanced again since such a repair can cause imbalance.

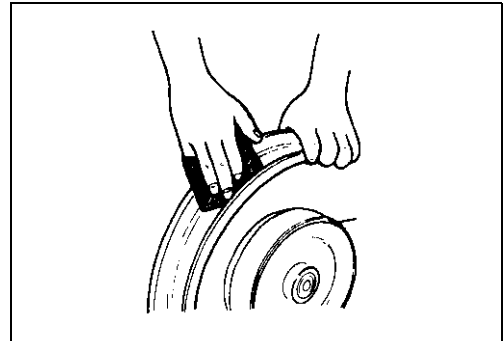


INSPECTION

WHEEL

Wipe the wheel clean and check for the following points:

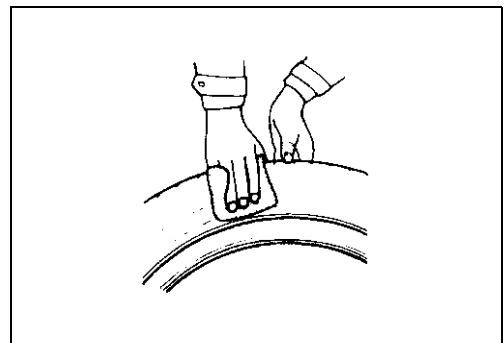
- Distortion and crack
- Any flaws and scratches at the bead seating area.
- Wheel rim runout (☞ 5-9)



TIRE

Tire must be checked for the following points:

- Nick and rupture on side wall
- Tire tread depth (☞ 2-18)
- Tread separation
- Abnormal, uneven wear on tread
- Surface damage on bead
- Localized tread wear due to skidding (Flat spot)
- Abnormal condition of inner liner



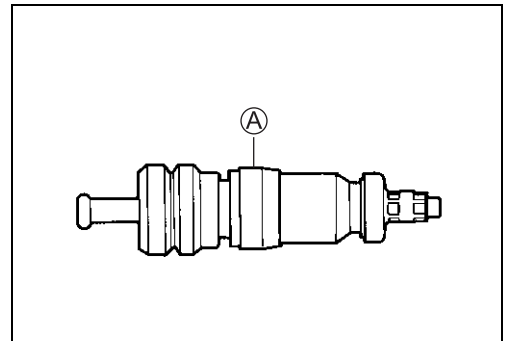
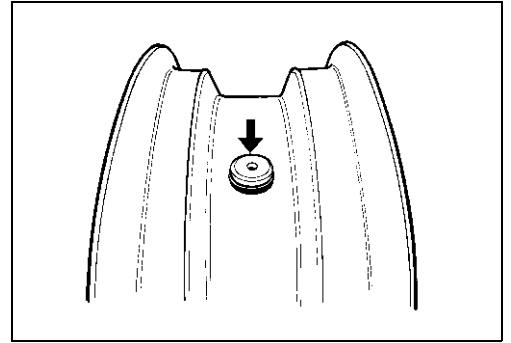
VALVE

Inspect the valve after the tire is removed from the rim. Replace the valve with a new one if the seal (A) rubber is peeling or has damage.

NOTE:

If the external appearance of the valve shows no abnormal condition, removing of the valve is not necessary.

If the seal has abnormal deformation, replace the valve with a new one.



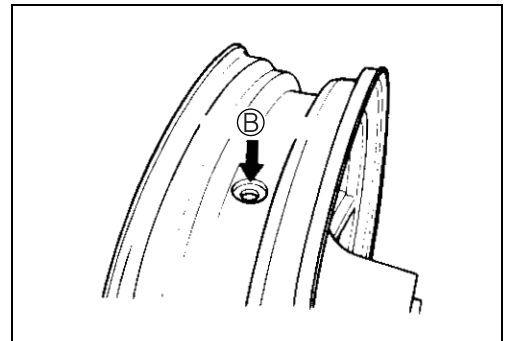
INSTALLATION

VALVE

Any dust or rust around the valve hole (B) must be cleaned off. Then install the valve in the rim.

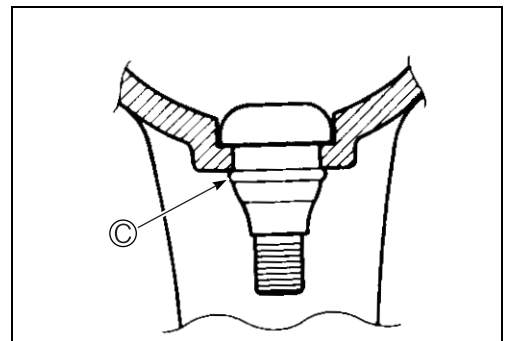
NOTE:

To properly install the valve into the valve hole, apply a special tire lubricant or neutral soapy liquid to the valve.



CAUTION

Be careful not to damage the lip (C) of valve.



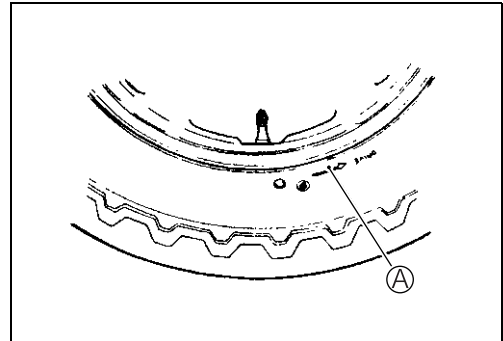
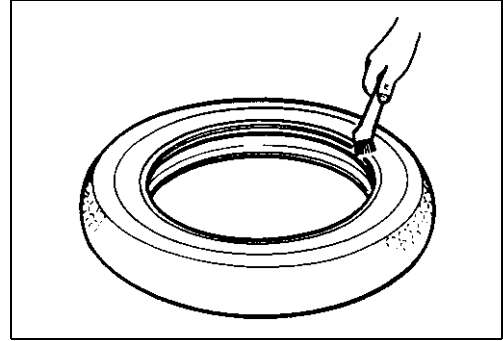
TIRE

- Apply tire lubricant to the tire bead.
- When installing the tire onto the wheel, observe the following points.

CAUTION

- * Do not reuse the valve which has been once removed.
- * Never use oil, grease or gasoline on the tire bead in place of tire lubricant.

- When installing the tire, the arrow (A) on the side wall should point to the direction of wheel rotation.
- Align the chalk mark put on the tire at the time of removal with the valve position.

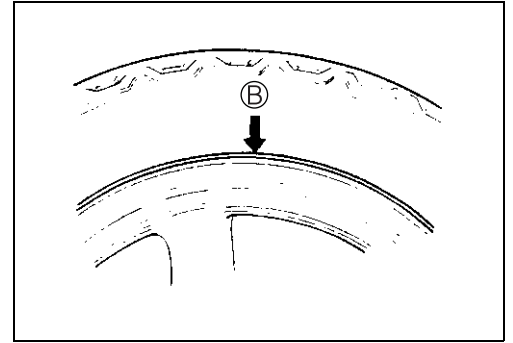


- For installation procedure of tire onto the wheel, follow the instructions given by the tire changer manufacturer.
- Bounce the tire several times while rotating. This makes the tire bead expand outward to contact the wheel, thereby facilitating air inflation.
- Inflate the tire.

⚠ WARNING

- * Do not inflate the tire to more than 400 kPa (4.0 kgf/cm²). If inflated beyond this limit, the tire can burst and possibly cause injury. Do not stand directly over the tire while inflating.
- * In the case of preset pressure air inflator, pay special care for the set pressure adjustment.

- In this condition, check the “rim line” ② cast on the tire side walls. The line must be equidistant from the wheel rim all around. If the distance between the rim line and wheel rim varies, this indicates that the bead is not properly seated. If this is the case, deflate the tire completely and unseat the bead for both sides. Coat the bead with lubricant and fit the tire again.
- When the bead has been fitted properly, adjust the pressure to specification.
- As necessary, adjust the tire balance.

**CAUTION**

Do not run with a repaired tire at a high speed.

DATA Cold inflation tire pressure

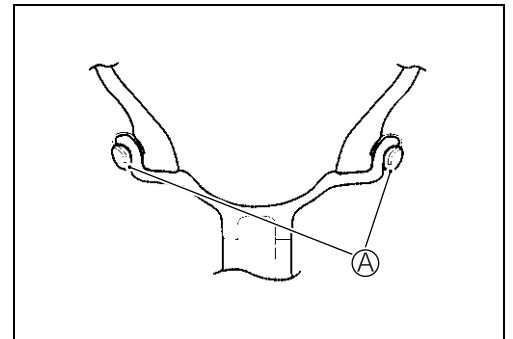
	Front	Rear
Solo riding	250 kPa (2.50 kgf/cm ²)	250 kPa (2.50 kgf/cm ²)
Dual riding	250 kPa (2.50 kgf/cm ²)	250 kPa (2.50 kgf/cm ²)

BALANCER WEIGHT

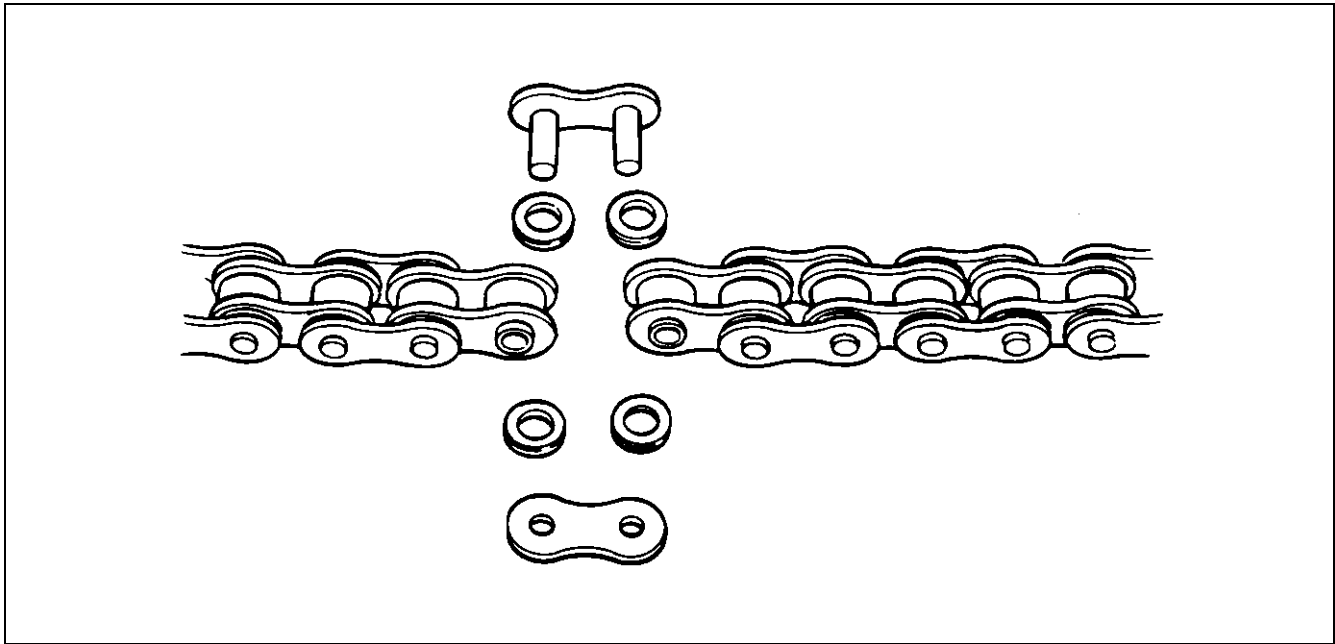
- When installing the balancer weights to the wheel, set the two balancer weights ① on both sides of wheel rim.

CAUTION

Weight difference between the two balancer weights must be 10 g and less.



DRIVE CHAIN

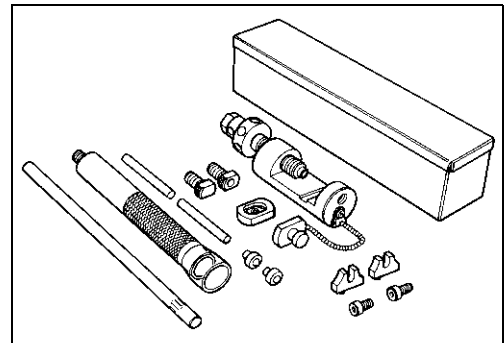


Use the special tool in the following procedures, to cut and rejoin the drive chain.

TOOL 09922-22711: Drive chain cutting and joining tool set

NOTE:

When using the special tool, apply a small quantity of grease to the threaded parts of the special tool.



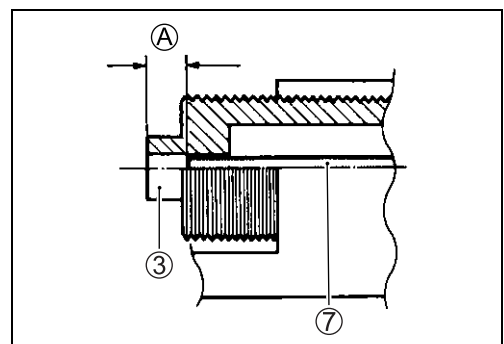
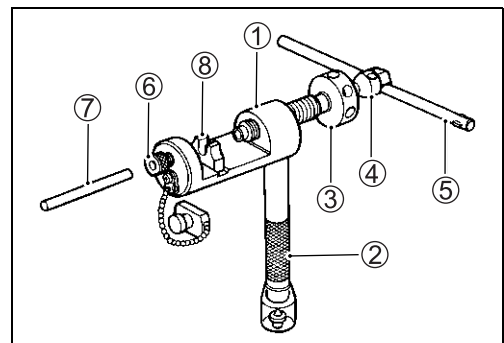
CUTTING

- Set up the special tool as shown in the illustration.

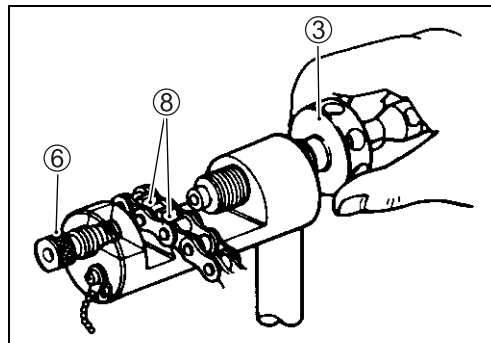
- ① Tool body
- ② Grip handle
- ③ Pressure bolt "A"
- ④ Pressure bolt "B"
- ⑤ Bar
- ⑥ Adjuster bolt (with through hole)
- ⑦ Pin remover
- ⑧ Chain holder (engraved mark 500)
with reamer bolt M5 × 10

NOTE:

The tip of pin remover ⑦ should be positioned inside ① approximately 5 mm (0.2 in) from the end face of pressure bolt "A" ③ as shown in the illustration.



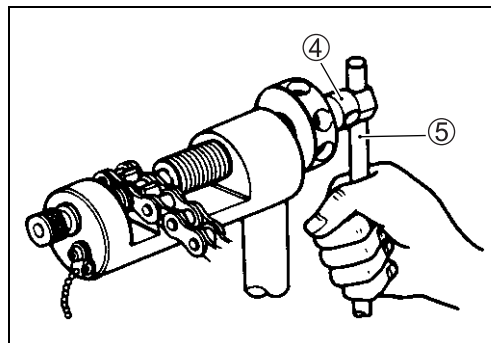
- Place the drive chain link being disjoined on the holder part ⑧ of the tool.
- Turn in both the adjuster bolt ⑥ and pressure bolt "A" ③ so that each of their end hole fits over the chain joint pin properly.
- Tighten the pressure bolt "A" ③ with the bar.



- Turn in the pressure bolt "B" ④ with the bar ⑤ and force out the drive chain joint pin ⑨.

CAUTION

Continue turning in the pressure bolt "B" ④ until the joint pin has been completely pushed out of the chain.



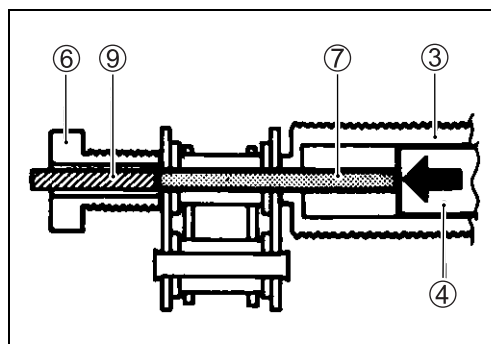
NOTE:

After the joint pin ⑨ is removed, loosen the pressure bolt "B" ④ and then pressure bolt "A" ③.

- Remove the joint pin ⑨ of the other side of joint plate.

CAUTION

Never reuse joint pins, O-rings and plates. After joint pins, O-rings and plates have been removed from the drive chain, the removed joint pins, O-rings and plates should be discarded and new joint plate, O-rings and plate must be installed.

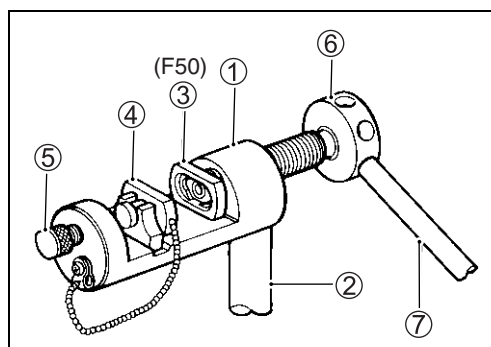


CONNECTING

JOINT PLATE INSTALLATION

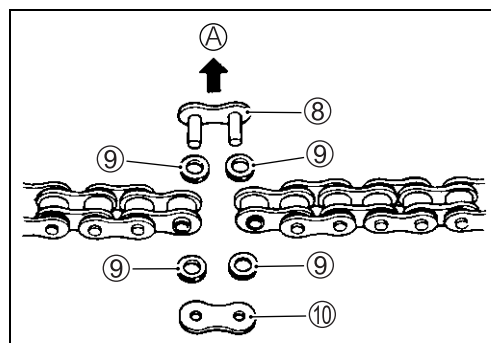
- Set up the special tool as shown in the illustration.

① Tool body	⑤ Adjuster bolt
② Grip handle	(without hole)
③ Joint plate holder	⑥ Pressure bolt "A"
(engraved mark "F50")	⑦ Bar
④ Wedge holder & wedge pin	
 - Connect both ends of the drive chain with the joint pin ⑧ inserted from the wheel side (A) as installed on the motorcycle.
 - ⑨ O-ring ... 4 pcs.
 - ⑩ Joint plate
- Joint set part number
RK: 27620-16G20



WARNING

Do not use joint clip type of drive chain. The joint clip may have a chance to drop which may cause severe damage to motorcycle and severe injury.

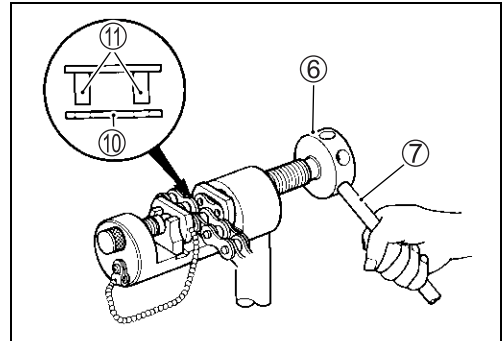
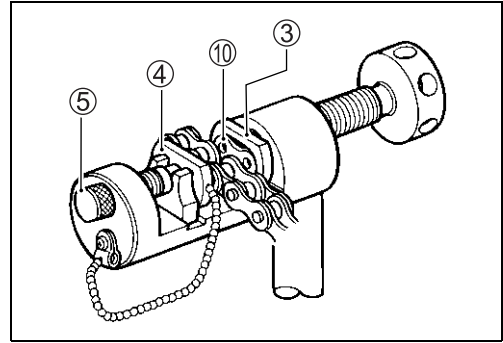


- Apply grease on the recessed portion of the joint plate holder ③ and set the joint plate ⑩.

NOTE:

When positioning the joint plate ⑩ on the tool, its stamp mark must face the joint plate holder ③ side.

- Set the drive chain on the tool as illustrated and turn in the adjuster bolt ⑤ to secure the wedge holder & wedge pin ④.
- Turn in the pressure bolt "A" ⑥ and align two joint pins ⑪ properly with the respective holes of the joint plate ⑩.
- Turn in the pressure bolt "A" ⑥ further using the bar ⑦ to press the joint plate over the joint pins.



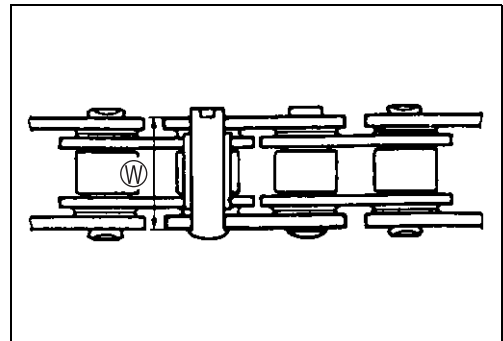
- Continue pressing the joint plate until the distance between the two joint plates come to the specification.

DATA Joint plate distance specification (W)

RK	20.45 – 20.75 mm
----	------------------

CAUTION

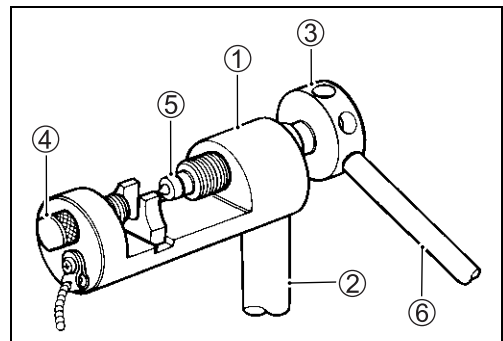
Should pressing of the joint plate be made excessively beyond the specified dimension, the work should be redone using the new joint parts.

**JOINT PIN STAKING**

- Set up the special tool as shown in the illustration.
 - ① Tool body
 - ② Grip handle
 - ③ Pressure bolt "A"
 - ④ Adjuster bolt (without hole)
 - ⑤ Staking pin (stowed inside grip handle behind rubber cap)
 - ⑥ Bar

NOTE:

Before staking the joint pin, apply a small quantity of grease to the staking pin ⑤.



- Stake the joint pin by turning (approximately 7/8 turn) the pressure bolt "A" ③ with the bar until the pin end diameter becomes the specified dimension.

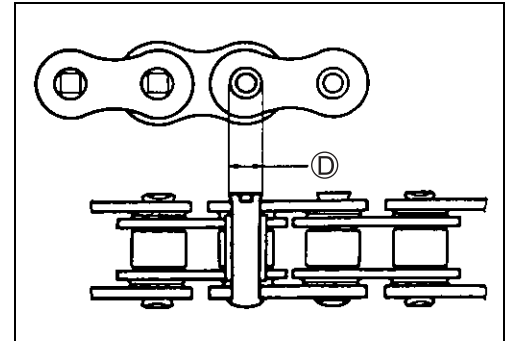
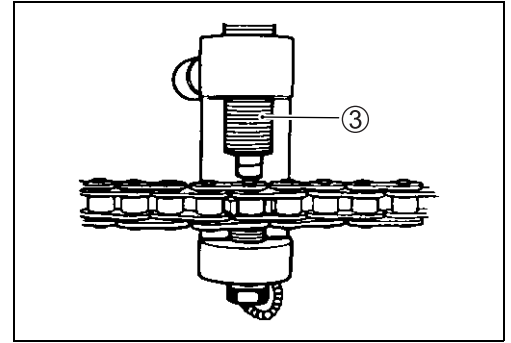
DATA Pin end diameter specification ④

RK	5.45 – 5.85 mm
----	----------------

CAUTION

- * After joining of the chain has been completed, check to make sure that the link is smooth and no abnormal condition is found.
- * Should any abnormal condition be found, reassemble the chain link using the new joint parts.

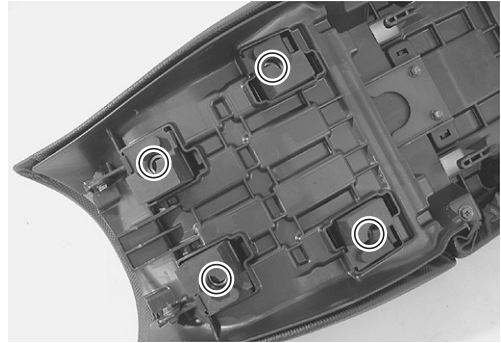
- Adjust the drive chain, after connecting it. (↖ 2-14)



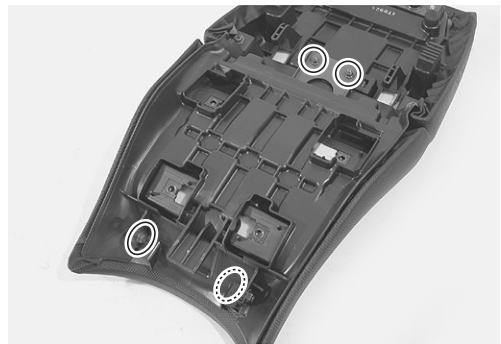
RIDING POSITION ADJUSTMENT

SEAT HEIGHT ADJUSTMENT

- Remove the seat assembly. (➡ 5-4)
- Remove the dampers.

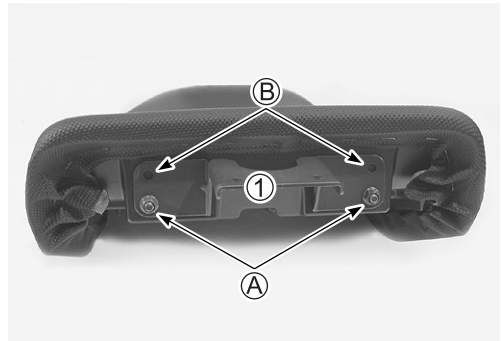


- Remove the front seat.



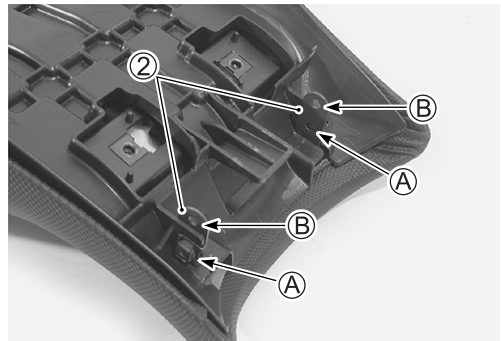
- Adjust the position of bracket ①.

- Ⓐ: For low (normal) position
- Ⓑ: For high position



- Reinstall the front seat and set the position of bracket ②.

- Ⓐ: For low (normal) position
- Ⓑ: For high position



- Install the dampers.

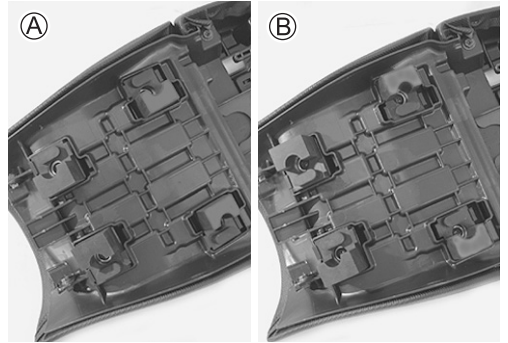
NOTE:

Dampers are used in two ways. Pay attention to the direction of dampers when installing them.

- Ⓐ: For low (normal) position
- Ⓑ: For high position

CAUTION

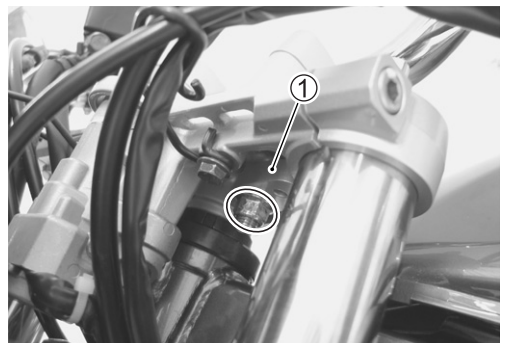
Position of bracket ①, ② and direction of dampers must be unified either Ⓐ or Ⓑ.

**HANDLEBAR HEIGHT ADJUSTMENT**

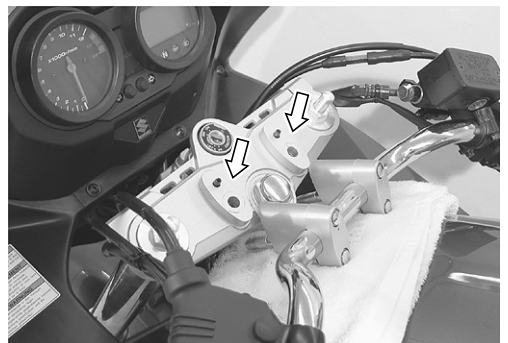
- Remove the cable guides. (GSF650S)
- Remove the handlebar holder nuts and handlebar spacers ①.
- Dismount the handlebars.

NOTE:

Place a rag on the fuel tank to prevent the fuel tank scratched.



- Insert the spacers between the steering upper bracket and handlebar holders.



- Tighten the handlebar holder nuts to the specified torque.

🔧 Handlebar holder nut: 45 N·m (4.5 kgf·m)

- Install the cable guides. (GSF650S)

⚠️ WARNING

Operation with an improperly adjusted handlebars or incorrectly routed cables could result in an unsafe riding condition.



ELECTRICAL SYSTEM

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ELECTRICAL SYSTEM

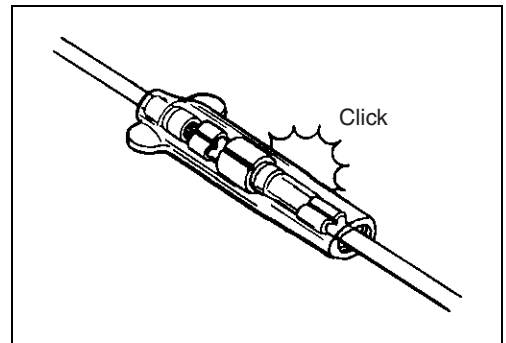
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CAUTIONS IN SERVICING

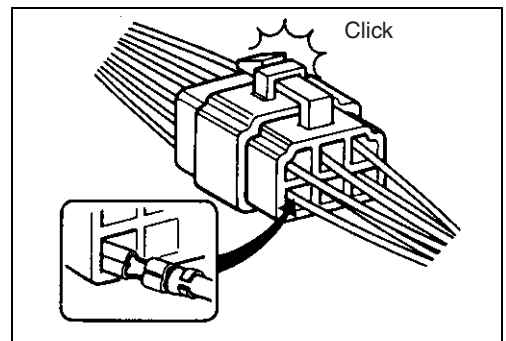
CONNECTOR

- When disconnecting a connector, be sure to hold the terminals; do not pull the lead wires.
- When connecting a connector, be sure to push it in until a click is felt.
- Inspect the connector for corrosion, contamination and breakage in its cover.



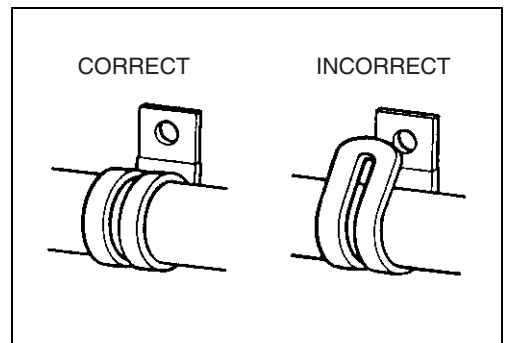
COUPLER

- With a lock type coupler, be sure to release the lock before disconnecting and push it in fully till the lock works when connecting.
- When disconnecting the coupler, be sure to hold the coupler itself and do not pull the lead wires.
- Inspect each terminal on the coupler for being loose or bent.
- Inspect each terminal for corrosion and contamination.



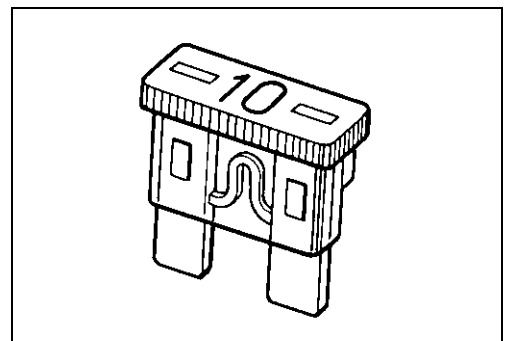
CLAMP

- Clamp the wire harness at such positions as indicated in "WIRE HARNESS, CABLE AND HOSE ROUTING".
(☞ 7-12)
- Bend the clamp properly so that the wire harness is clamped securely.
- In clamping the wire harness, use care not to allow it to hang down.
- Do not use wire or any other substitute for the band type clamp.



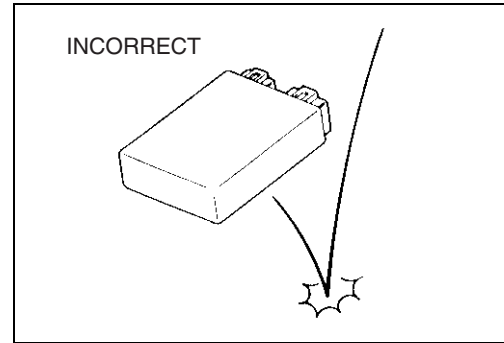
FUSE

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



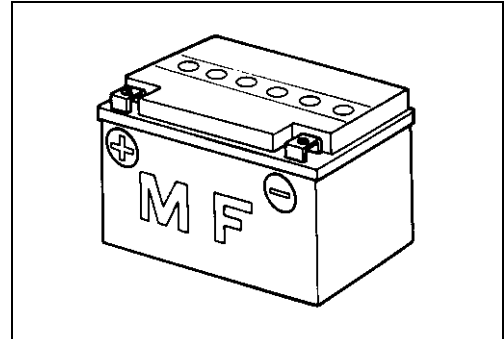
SEMI-CONDUCTOR EQUIPPED PART

- Be careful not to drop the part with a semi-conductor built in such as ignitor.
- When inspecting this part, follow inspection instruction strictly. Neglecting proper procedure may cause damage to this part.



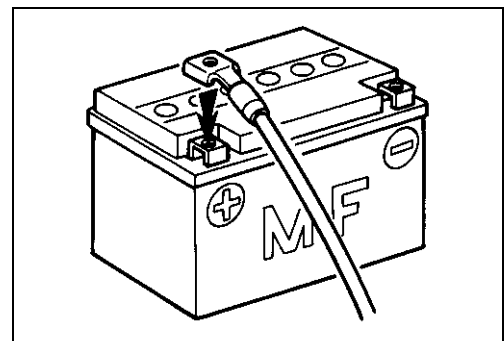
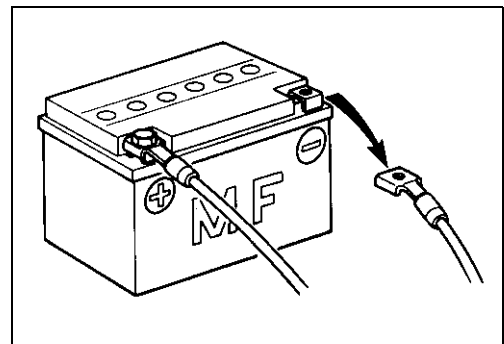
BATTERY

- The MF battery used in this motorcycle does not require maintenance (e.g., electrolyte level inspection, distilled water replenishment).
- During normal charging, no hydrogen gas is produced. However, if the battery is overcharged, hydrogen gas may be produced. Therefore, be sure there are no fire or spark sources (e.g., short circuit) nearby when charging the battery.
- Be sure to recharge the battery in a well-ventilated and open area.
- Note that the charging system for the MF battery is different from that of a conventional battery. Do not replace the MF battery with a conventional battery.



CONNECTING THE BATTERY

- When disconnecting terminals from the battery for disassembly or servicing, be sure to disconnect the \ominus battery lead wire, first.
- When connecting the battery lead wires, be sure to connect the \oplus battery lead wire, first.
- If the terminal is corroded, remove the battery, pour warm water over it and clean it with a wire brush.
- After connecting the battery, apply a light coat of grease to the battery terminals.
- Install the cover over the \oplus battery terminal.



WIRING PROCEDURE

- Properly route the wire harness according to "WIRE HARNESS, CABLE AND HOSE ROUTING". (➡ 7-12)

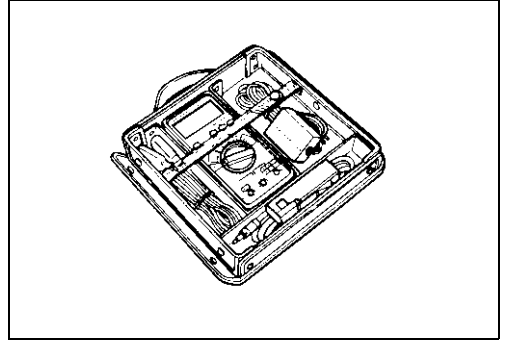
USING THE MULTI-CIRCUIT TESTER

- Properly use the multi-circuit tester \oplus and \ominus probes. Improper use can cause damage to the motorcycle and tester.
- If the voltage and current values are not known, begin measuring in the highest range.
- When measuring the resistance, make sure that no voltage is applied. If voltage is applied, the tester will be damaged.
- After using the tester, be sure to turn the switch to the OFF position.

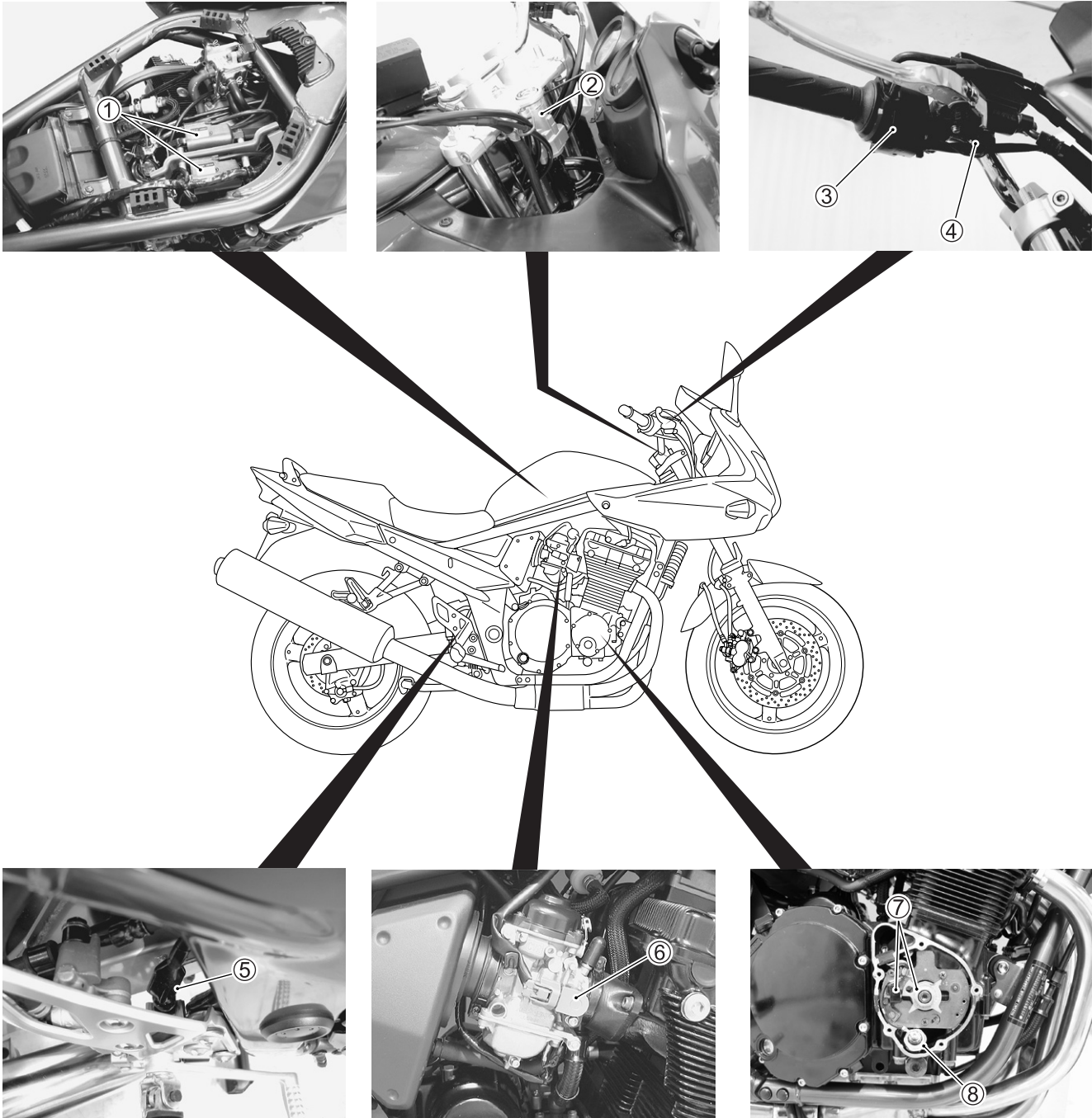
 **09900-25008: Multi-circuit tester set**

CAUTION

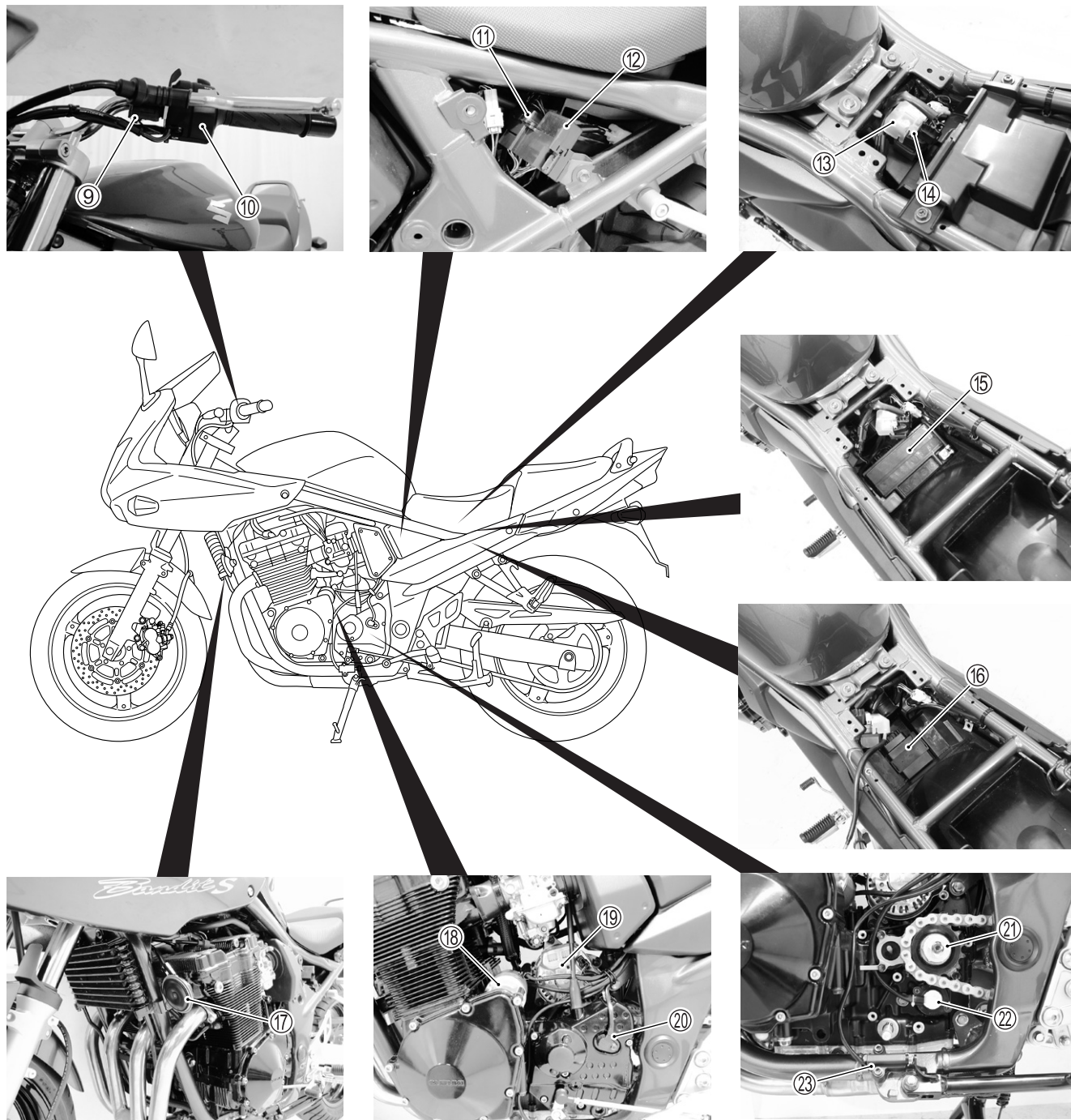
Before using the multi-circuit tester, read its instruction manual.



LOCATION OF ELECTRICAL COMPONENTS



①	Ignition coil	⑤	Rear brake light switch
②	Ignition switch	⑥	Throttle position sensor
③	Handlebar switch (RH)	⑦	Signal generator
④	Front brake light switch	⑧	Oil pressure switch



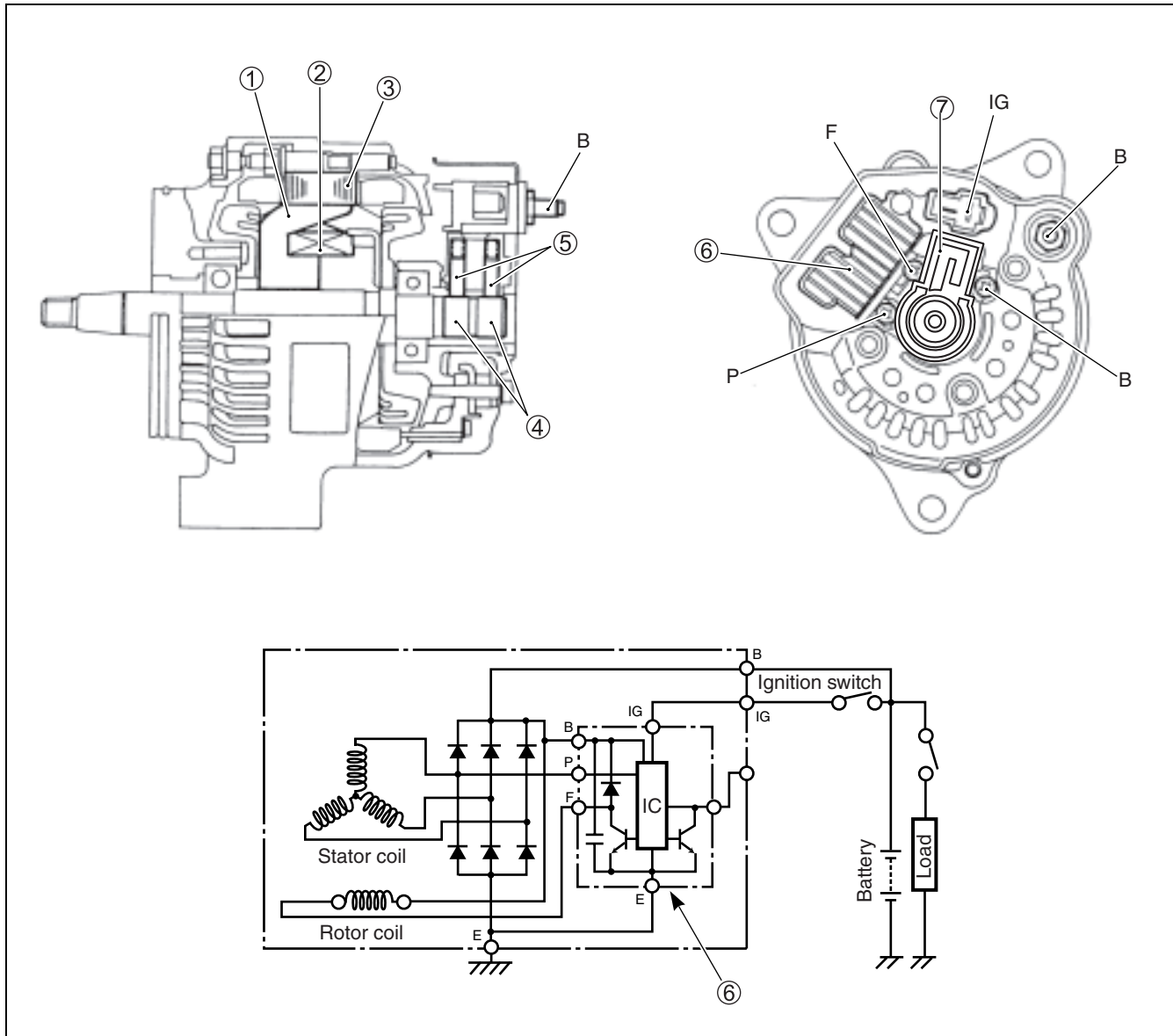
⑨	Clutch lever position switch	⑭	Main fuse	⑲	Generator
⑩	Handlebar switch (LH)	⑮	Battery	⑳	Speed sensor
⑪	Fuse box	⑯	Ignitor	㉑	Speed sensor rotor
⑫	Turn signal/side-stand relay	⑰	Horn	㉒	Gear position switch
⑬	Starter relay	⑱	Starter motor	㉓	Side-stand switch

CHARGING SYSTEM

DESCRIPTION (GENERATOR WITH IC REGULATOR)

The generator features a solid-state regulator that is mounted inside the generator. All regulator components are enclosed into a solid mold, and this unit is attached to the brush holder frame. The regulator voltage setting cannot be adjusted.

Two brushes carry current through the two slip rings to the rotor coil which is mounted on the rotor. The stator windings are assembled on the inside of a laminated core that forms part of the generator housing. A rectifier bridge, which is connected to the stator windings, contains eight diodes, and electrically changes the stator A.C. voltage to D.C. voltage which appears at the generator output terminal.



①	Rotor	⑤	Brushes
②	Rotor coil	⑥	IC regulator
③	Stator coil	⑦	Brush holder
④	Slip rings		

B : Battery terminal

IG : Ignition terminal

F : Rotor coil terminal

P : Stator coil terminal

E : Ground

TROUBLESHOOTING

Battery runs down quickly

Step 1

- 1) Check accessories which use excessive amounts of electricity.
Are accessories being installed?

YES	Remove accessories.
NO	Go to Step 2.

Step 2

- 1) Check the battery for current leakage. (☞ 6-11)
Is the battery for current leakage OK?

YES	Go to Step 3.
NO	<ul style="list-style-type: none"> • Short circuit of wire harness • Loose or disconnected wires • Faulty battery

Step 3

- 1) Measure the charging voltage between the battery terminals. (☞ 6-11)
Is the charging voltage OK?

YES	<ul style="list-style-type: none"> • Faulty battery • Abnormal driving condition
NO	Go to Step 4.

Step 4

- 1) Measure the continuity of the stator coil and rotor coil. (☞ 6-16)
Is the continuity of the stator coil and rotor coil OK?

YES	Go to Step 5.
NO	<ul style="list-style-type: none"> • Faulty stator coil • Disconnected lead wires

Step 5

- 1) Inspect the slip rings and brushes. (☞ 6-16, -17)
Is the slip rings and brushes OK?

YES	Go to Step 6.
NO	Faulty slip ring(-s) and/or brush(-es)

Step 6

- 1) Inspect the rectifier and IC regulator. (☞ 6-17)
Is the rectifier and IC regulator OK?

YES	Go to Step 7.
NO	Faulty rectifier and/or IC regulator

Step 7

1) Inspect wirings.

Is the wirings OK?

YES	Faulty battery
NO	<ul style="list-style-type: none">• Short circuit of wire harness• Poor contact of couplers

Battery overcharges

- Faulty regulator/rectifier
- Faulty battery
- Poor contact of generator lead wire coupler

INSPECTION

BATTERY CURRENT LEAKAGE

- Turn the ignition switch to the OFF position.
- Remove the seat. (☞ 5-4)
- Remove the luggage box. (☞ 5-4)
- Disconnect the battery \ominus lead wire.
- Measure the current between \ominus battery terminal and the \ominus battery lead wire using the multi-circuit tester. If the reading exceeds the specified value, leakage is evident.

DATA Battery current (leak): Under 1 mA

TOOL 09900-25008: Multi-circuit tester set

TESTER Tester knob indication: Current (---, 20 mA)

CAUTION

- * Because the current leak might be large, turn the tester to high range first to avoid tester damage.
- * Do not turn the ignition switch to the ON position when measuring current.

When checking for excessive current leakage, remove the couplers and connectors, one by one, so as to locate the position of trouble.

CHARGING OUTPUT

- Remove the seat. (☞ 5-4)
- Remove the luggage box. (☞ 5-4)
- Start the engine and keep it running at 5 000 r/min with the dimmer switch turned HI position.
- Measure the DC voltage between the \oplus and \ominus battery terminals using the multi-circuit tester. If the voltage is not within the specified value, inspect the stator coil, rectifier and IC regulator mounted in the generator. (☞ 6-16 and -17)

NOTE:

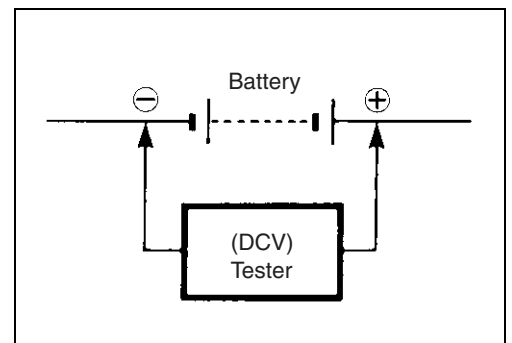
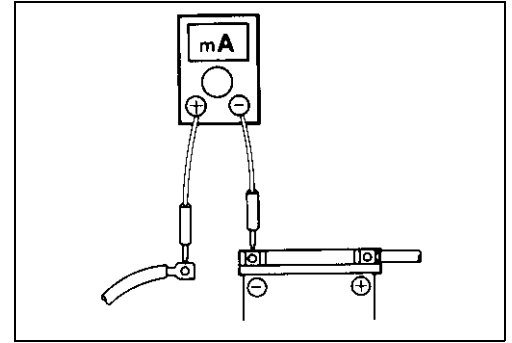
When making this test, be sure that the battery is in fully-charged condition.

DATA Charging output (regulated voltage)

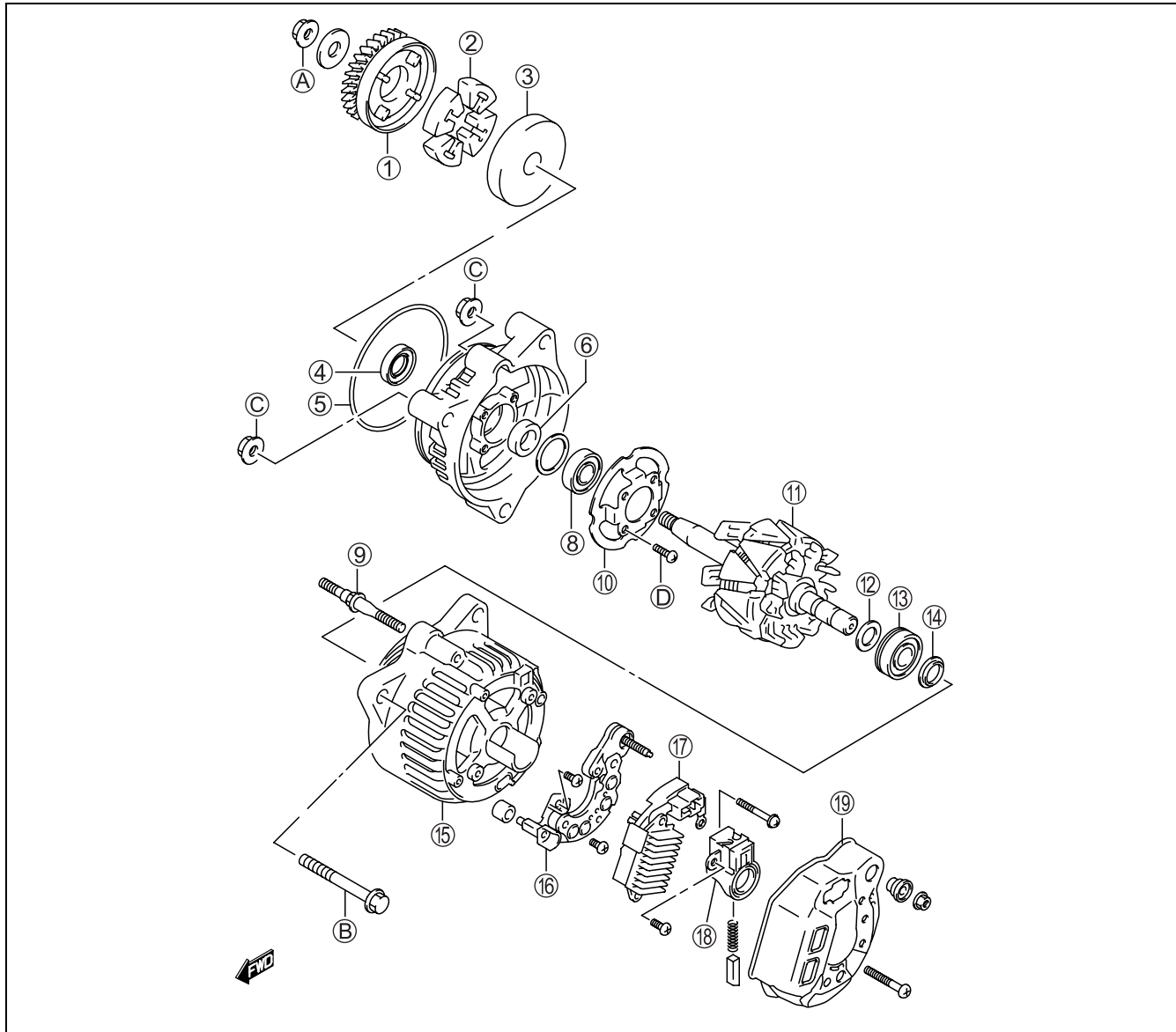
Standard: 13.6 – 14.4 V at 5 000 r/min

TOOL 09900-25008: Multi circuit tester set

TESTER Tester knob indication: Voltage (---)



GENERATOR



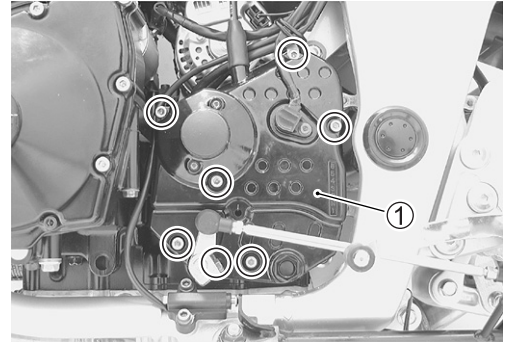
①	Generator driven gear	⑨	Stud bolt	⑰	IC regulator
②	Damper (4 pcs.)	⑩	Retainer	⑱	Brush holder
③	Damper housing	⑪	Rotor	Ⓐ	Generator driven gear nut
④	Oil seal	⑫	Bearing cover #2	Ⓑ	Generator mounting bolt
⑤	O-ring	⑬	Slip ring side bearing	Ⓒ	Generator housing nut
⑥	Spacer	⑭	Bearing cover #1	Ⓓ	Bearing retainer screw
⑦	Generator end housing	⑮	Generator housing		
⑧	Bearing	⑯	Rectifier		



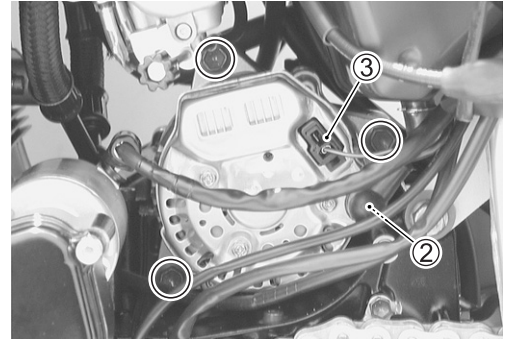
ITEM	N·m	kgf·m
Ⓐ	55	5.5
Ⓑ	25	2.5
Ⓒ	4.5	0.45
Ⓓ	2.5	0.25

REMOVAL AND DISASSEMBLY

- Disconnect the battery \ominus lead wire. (➡ 6-11)
- Remove the engine sprocket cover ①.



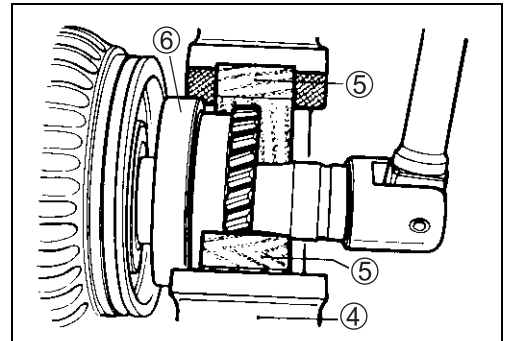
- Disconnect the generator lead wire ② and coupler ③.
- Remove the generator.



- Hold the generator driven gear using a vise ④ and two pieces of wood ⑤ as shown. Then, remove the generator driven gear nut.

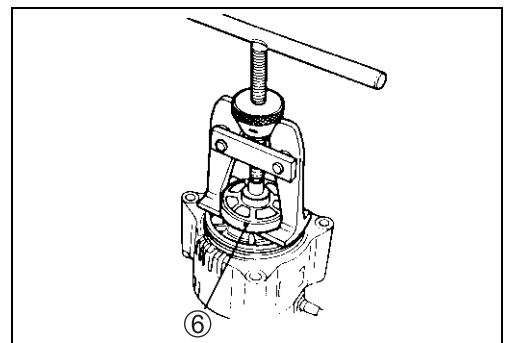
CAUTION

Do not hold the damper housing ⑥ using the vise or the damper housing will be damaged.

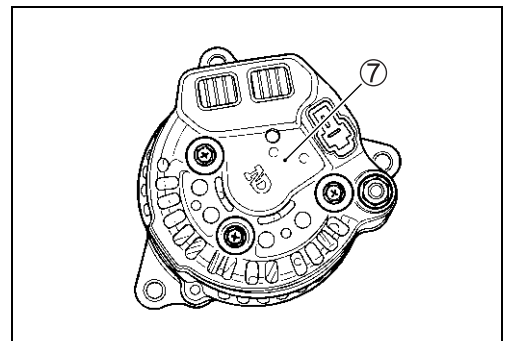


- Remove the damper housing ⑥ using the special tool.

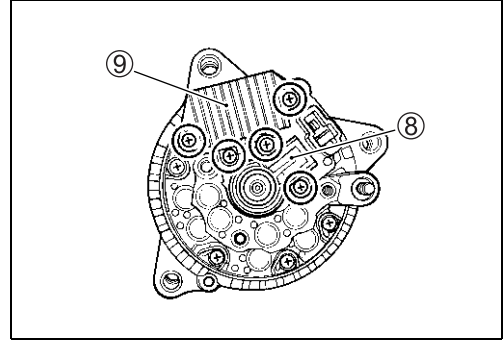
TOOL 09913-61510: Bearing remover



- Remove the generator end cover ⑦.



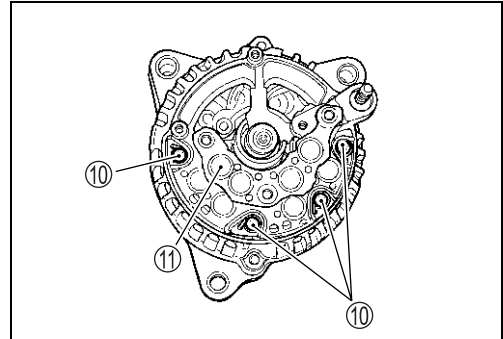
- Remove the brush holder ⑧ and IC regulator ⑨.



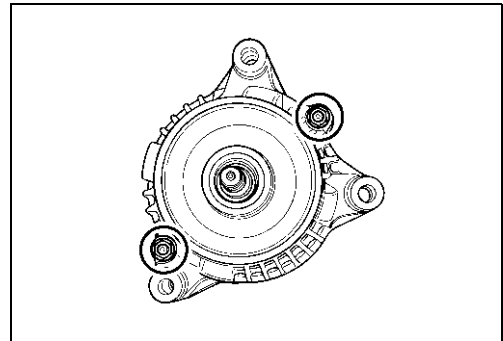
- Remove the stator coil lead wires mounting screws ⑩.
- Remove the rectifier ⑪.

NOTE:

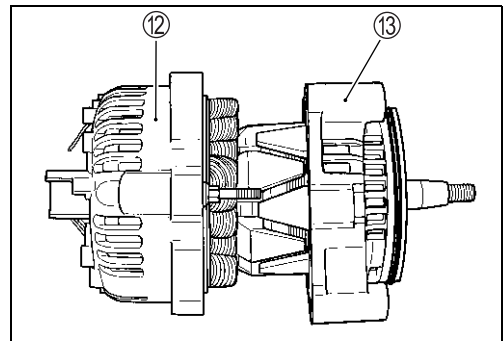
Straighten the stator coil lead wires using long-nose pliers, then remove the rectifier.



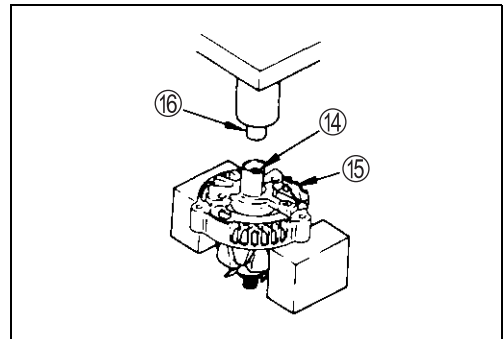
- Remove the generator housing nuts.



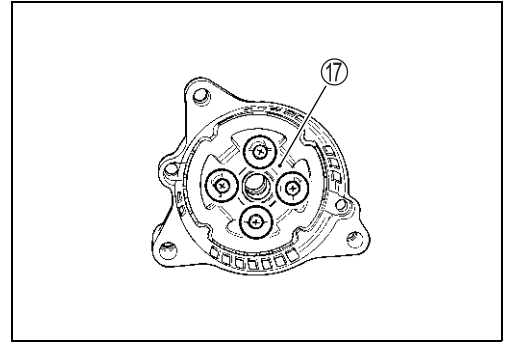
- Separate the generator housing ⑫ from the generator end housing ⑬.



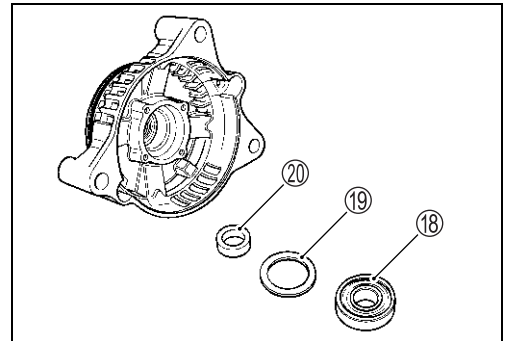
- Remove the rotor ⑭ from the generator end housing ⑮ using a hand press ⑯ as shown.



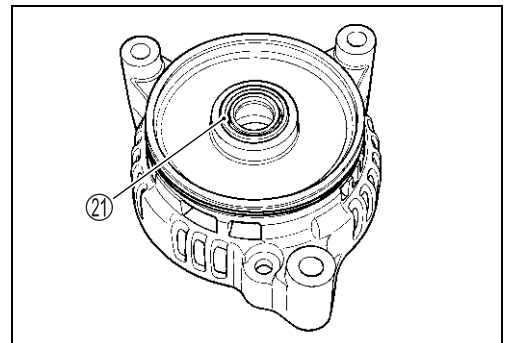
- Remove the bearing retainer ⑰.



- Remove the bearing ⑱, washer ⑲ and spacer ⑳.

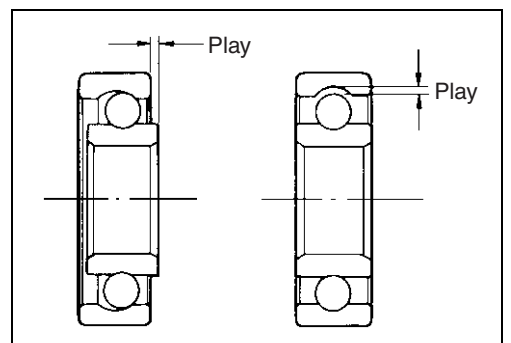


- Remove the oil seal ㉑.



INSPECTION ROTOR BEARINGS

Inspect the rotor bearings for abnormal noise. Also, rotate the rotor bearings by hand and make sure that they rotate smoothly.

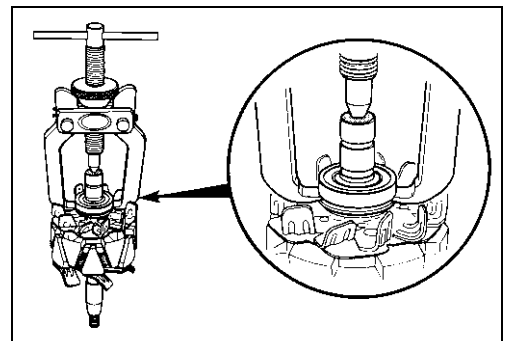


If there is anything unusual, remove the bearing(-s) using the special tool.

TOOL 09913-60910: Bearing remover

CAUTION

The removed bearing(-s) should be replaced with new one(-s).



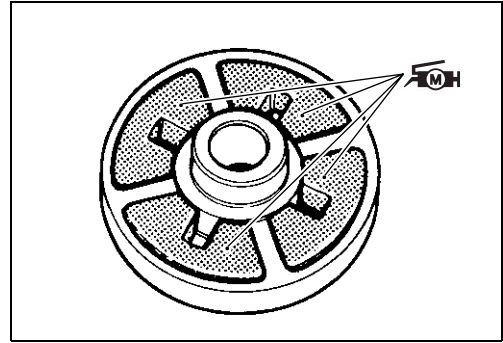
GENERATOR DRIVEN GEAR DAMPERS

Inspect the generator driven gear dampers for wear and damage. If any defects are found, replace the generator driven gear dampers as a set.

NOTE:

When installing the generator driven gear dampers, apply **SUZUKI MOLY PASTE** to the damper surface.

 **99000-25140: SUZUKI MOLY PASTE**

**STATOR COIL CONTINUITY CHECK**

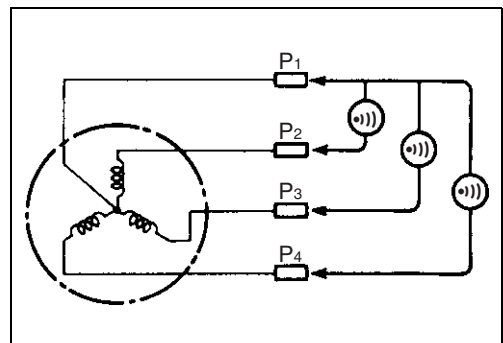
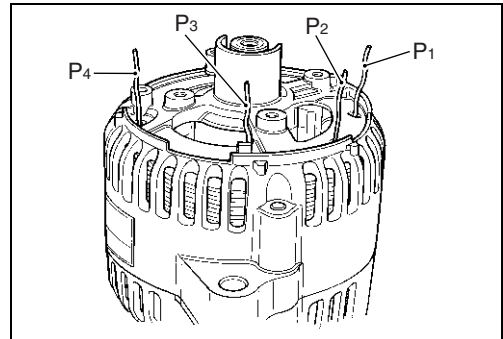
Measure the continuity between the lead wires of the stator coil using a tester.

If there is no continuity, replace the stator.

Also, check that the stator is properly insulated.

 **09900-25008: Multi circuit tester set**

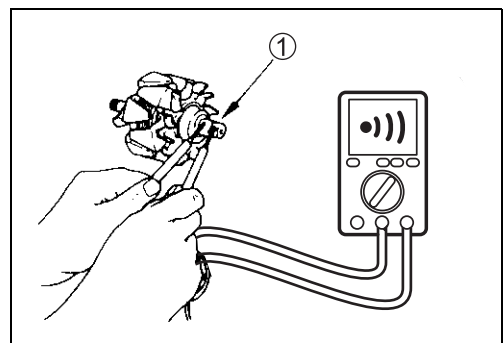
 **Tester knob indication: Continuity test (•||)**

**ROTOR COIL CONTINUITY CHECK**

Measure the continuity between the two slip rings ① on the rotor coil using a tester.

If there is no continuity, replace the rotor.

Also check that the rotor is properly insulated.

**SLIP RINGS**

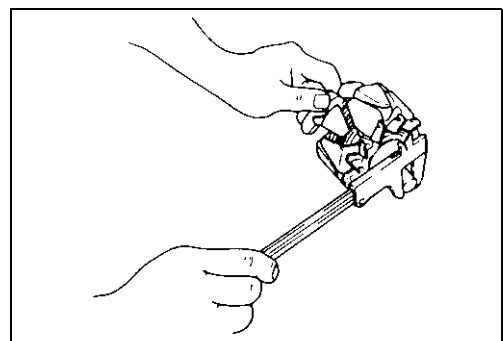
If the slip rings are dirty, polish them with #400 sandpaper and wipe them using a clean, dry cloth.

Then, measure the slip ring O.D. using vernier calipers. If it is less than the service limit, replace the slip rings with new ones.

 **09900-20102: Vernier calipers (200 mm)**

 **Slip ring O.D.**

Service Limit: 14.0 mm

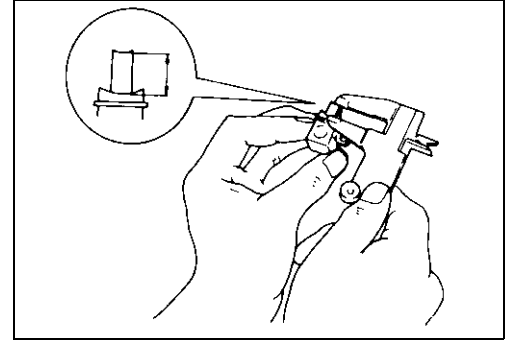


CARBON BRUSHES

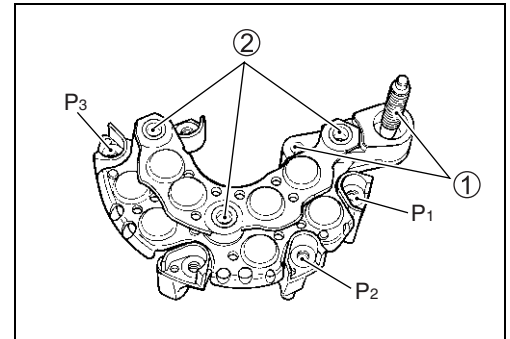
Measure the length of the carbon brushes as shown. If the measurement is less than the service limit, replace the carbon brushes with new ones.

DATA Brush length

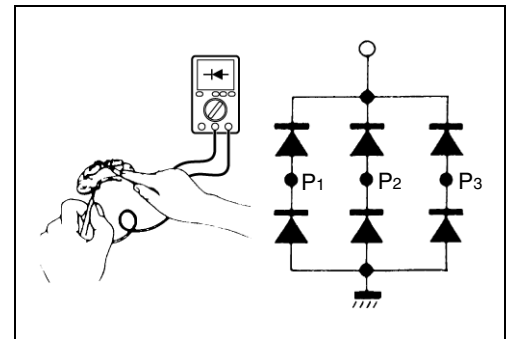
Service Limit: 4.5 mm

TOOL 09900-20102: Vernier calipers (200 mm)**RECTIFIER**

Measure the voltage among the terminal ① and the other terminals (P₁, P₂, P₃ and P₄). Put the tester lead on the terminal ① and the other lead to P₁, P₂, P₃ and P₄ terminals. Observe the reading and then switch the leads. Perform other side tests among the terminal ② and the other terminals (P₁, P₂, P₃ and P₄), as described below. If the voltage measured is excessively out of specification, replace the rectifier.

TOOL 09900-25008: Multi circuit tester set**Tester knob indication: Diode test (+↔)**

Terminal – Terminal	Voltage
① (+) – (–) P ₁ , P ₂ , P ₃	1.4 – 1.5 V
① (–) – (+) P ₁ , P ₂ , P ₃	0.4 – 0.5 V
② (+) – (–) P ₁ , P ₂ , P ₃	0.4 – 0.5 V
② (–) – (+) P ₁ , P ₂ , P ₃	1.4 – 1.5 V

**IC REGULATOR**

Measure the voltage between terminal “F” and terminal “B”. Refer to the following table.

If the voltage measured is excessively out of specification, replace the IC regulator.

F : Rotor coil terminal

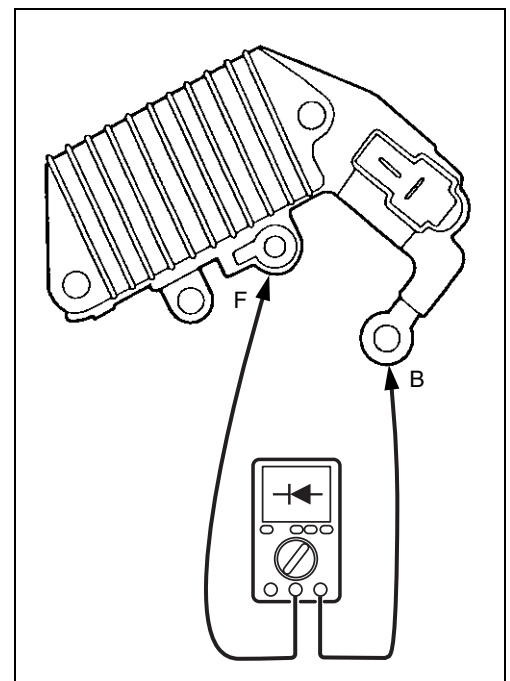
B : Battery terminal

TOOL 09900-25008: Multi circuit tester set**Tester knob indication: Diode test (+↔)**

Terminal – Terminal	Voltage
B (+) – (–) F	Approx. 1.4 V
B (–) – (+) F	Approx. 0.5 V

NOTE:

If the tester reads under 1.4 V, replace its battery when the tester probes are not connected.



GENERATOR REASSEMBLY AND REMOUNTING

Reassemble and remount the generator in the reverse order of removal and disassembly. Pay attention to the following points:

CAUTION

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

- Apply SUZUKI SUPER GREASE “A” to the lip of the oil seal.

99000-25010: SUZUKI SUPER GREASE “A”

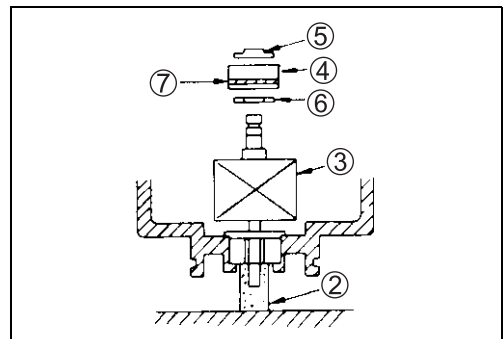
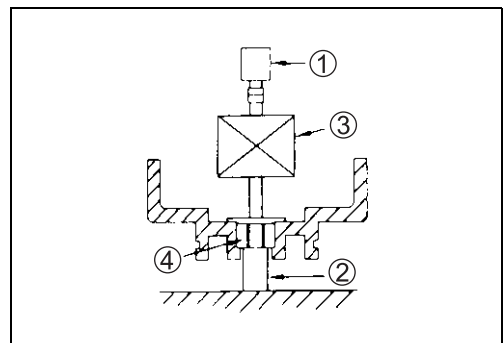
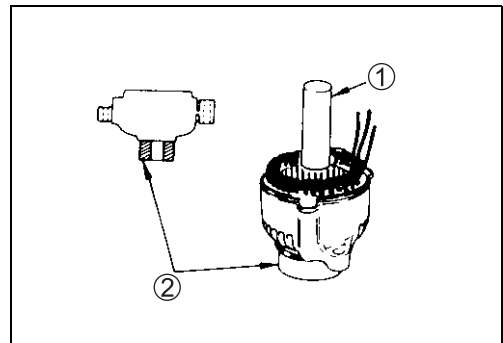
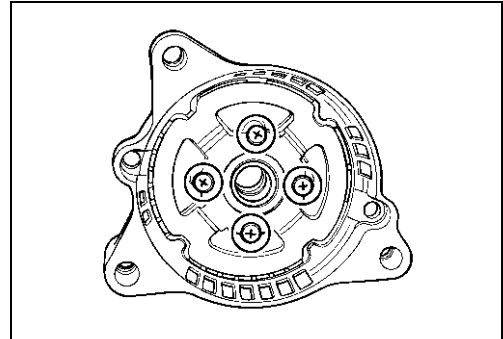
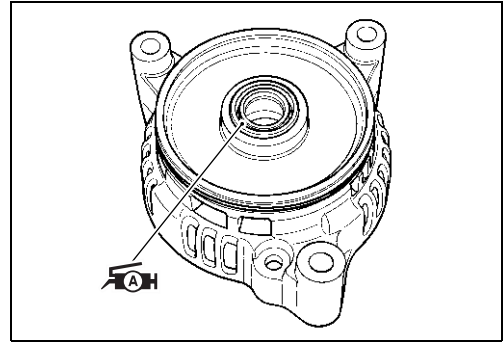
- Apply a small quantity of THREAD LOCK “1342” to the bearing retainer screws and tighten them to the specified torque.

99000-32050: THREAD LOCK “1342”

Bearing retainer screw: 2.5 N·m (0.25 kgf·m)

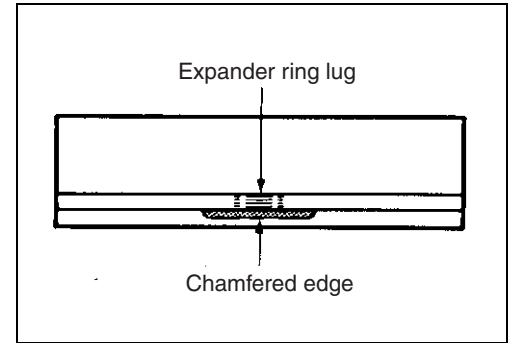
- Install the bearing and rotor using a hand-press.

- ① Hand-press
- ② Jig
- ③ Rotor
- ④ Bearing
- ⑤ Bearing cover #1
- ⑥ Bearing cover #2
- ⑦ Expander ring



NOTE:

Before reinstalling the slip ring side bearing onto the generator end housing, turn the expander ring and align the expander ring lug with the center of the chamfered edge of the bearing outer race.



- Tighten the generator housing nuts ① to the specified torque.

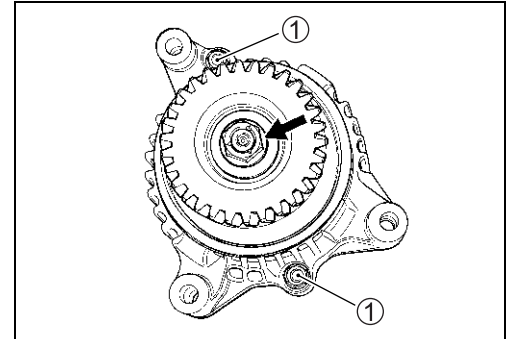
🔧 Generator housing nut: 4.5 N·m (0.45 kgf-m)

- Tighten the generator driven gear nut to the specified torque.

🔧 Generator driven gear nut: 55 N·m (5.5 kgf-m)

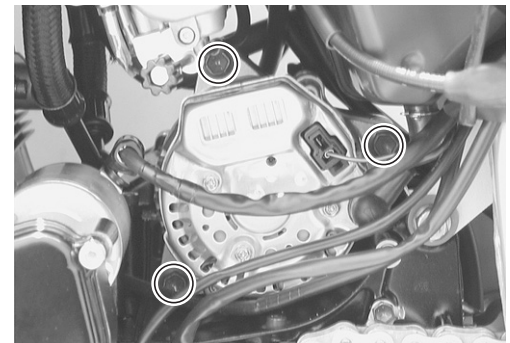
NOTE:

After tightening the generator driven gear nut to the specified torque, stake the nut using a punch.



- Tighten the generator mounting bolts to the specified torque.

🔧 Generator mounting bolt: 26 N·m (2.6 kgf-m)

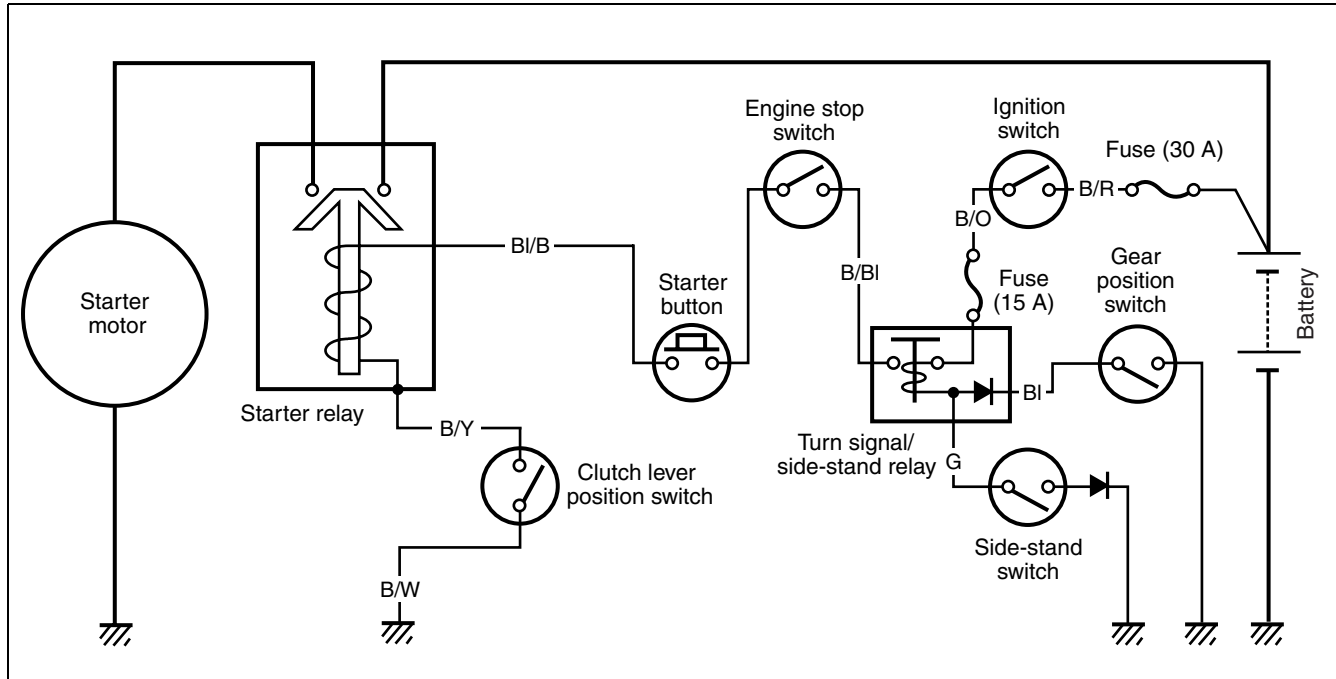


- Route the wire harness properly. (🔧7-14)
- Remount the engine sprocket cover. (🔧3-9)

STARTER SYSTEM AND SIDE-STAND IGNITION INTERLOCK SYSTEM

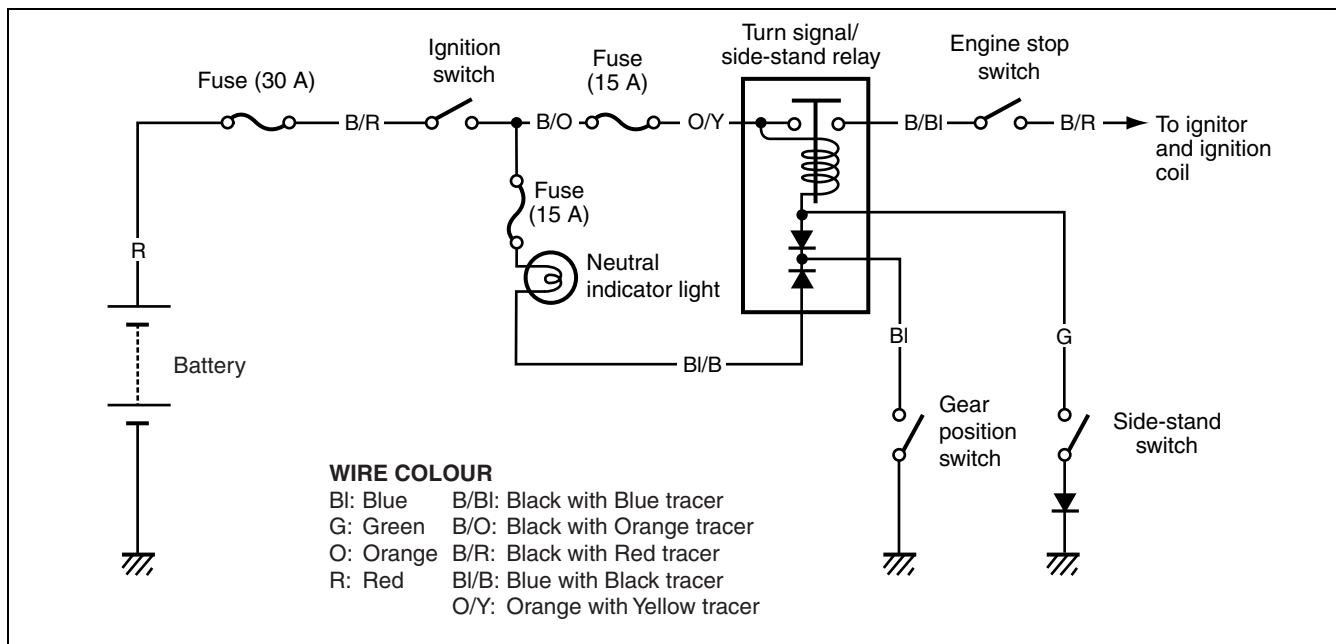
STARTER SYSTEM DESCRIPTION

The starter system consists of the following components: the starter motor, starter relay, clutch lever position switch, turn signal/side-stand relay, side-stand switch, gear position switch, starter button, engine stop switch, ignition switch and battery. Pressing the starter button (on the right handlebar switch) energizes the starter relay, causing the contact points to close, thus completing the circuit from the starter motor to the battery. The starter motor draws about 80 amperes to start the engine.



SIDE-STAND/IGNITION INTERLOCK SYSTEM DESCRIPTION

This side-stand/ignition interlock system prevents the motorcycle from being started with the side-stand down. The system is operated by an electric circuit provided between the battery and ignition coil.

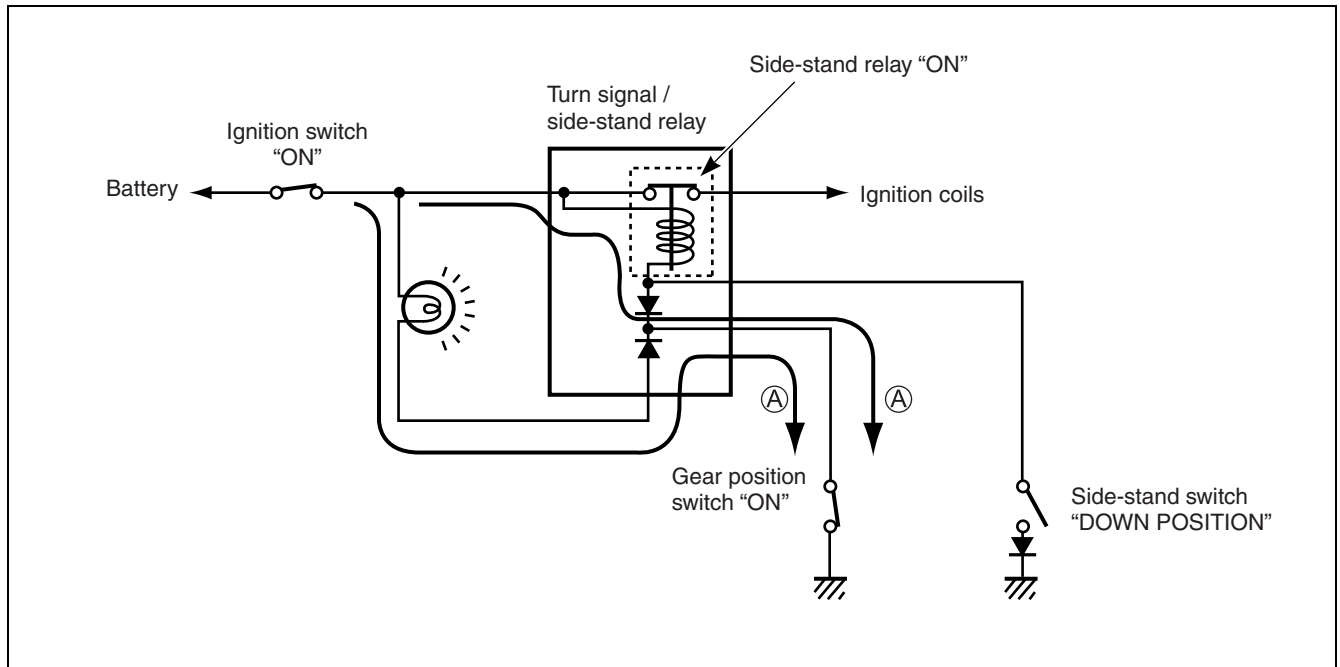


The circuit consists of the turn signal/side-stand relay, neutral indicator light and switches. The ignition coils will send voltage to the spark plugs dependant on what gear the transmission is in and whether the side-stand is either up or down. The gear position and side-stand switches work together in this system.

The ignition coils work only in two situations as follows.

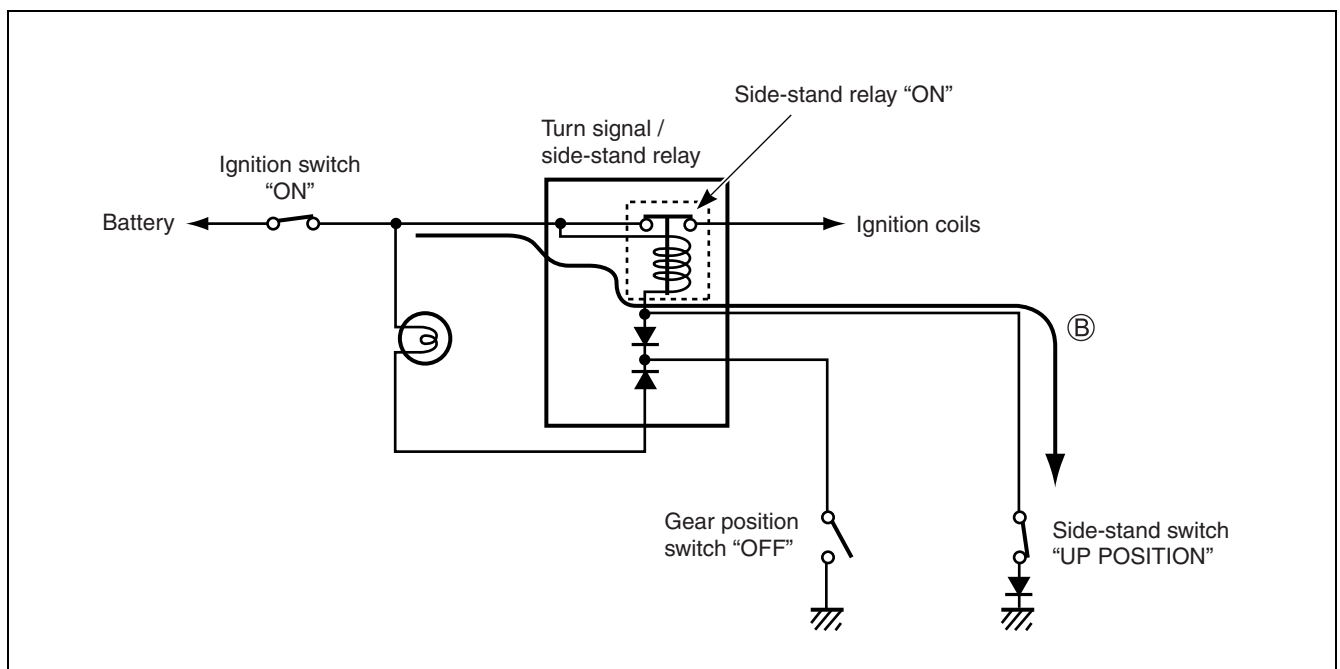
1. Transmission: Neutral (ON) Side-stand: Down (OFF)

The current flow (A) switches "on" the side-stand relay and the ignition coils send voltage to the spark plugs even when the side-stand is kept down.



2. Side-stand: Up (ON)

The current flow (B) switches "on" the side-stand relay and the ignition coils send voltage to the spark plugs. The engine can be started in any gear.



TROUBLESHOOTING

Starter motor will not run

Step 1

- 1) Shift the transmission into neutral. Grasp the clutch lever, turn on the ignition switch with the engine stop switch in the "RUN" position and listen for a click from the starter relay when the starter button is pushed.
Is a click sound heard?

YES	Go to Step 2.
NO	Go to Step 3.

Step 2

- 1) Check if the starter motor runs when its terminal is connected to the battery ⊕ terminal. (Do not use thin "wire" because a large amount of current flows.)
Does the starter motor run?

YES	<ul style="list-style-type: none"> Faulty starter relay Loose or disconnected starter motor lead wire
NO	Faulty starter motor

Step 3

- 1) Measure the starter relay voltage at the starter relay connectors (between B/BI ⊕ and B/Y ⊖) when the starter button is pushed.
Is a voltage OK?

YES	Go to Step 4.
NO	<ul style="list-style-type: none"> Faulty ignition switch Faulty engine stop switch Faulty clutch lever position switch Faulty gear position switch Faulty turn signal/side-stand relay Faulty starter button Poor contact of connector Open circuit in wire harness

Step 4

- 1) Check the starter relay. (🔧 6-26)
Is the starter relay OK?

YES	Poor contact of the starter relay.
NO	Faulty starter relay

Starter motor runs but does not crank the engine

- 1) The starter motor runs when the transmission is in neutral, but does not run when the transmission is in any position other than neutral, with the side-stand up. Check the side-stand switch. (🔧 6-27)
Is the side-stand switch OK?

YES	<ul style="list-style-type: none"> Open circuit in wire harness Poor contact of connector
NO	Faulty side-stand switch

Engine does not turn though the starter motor runs.

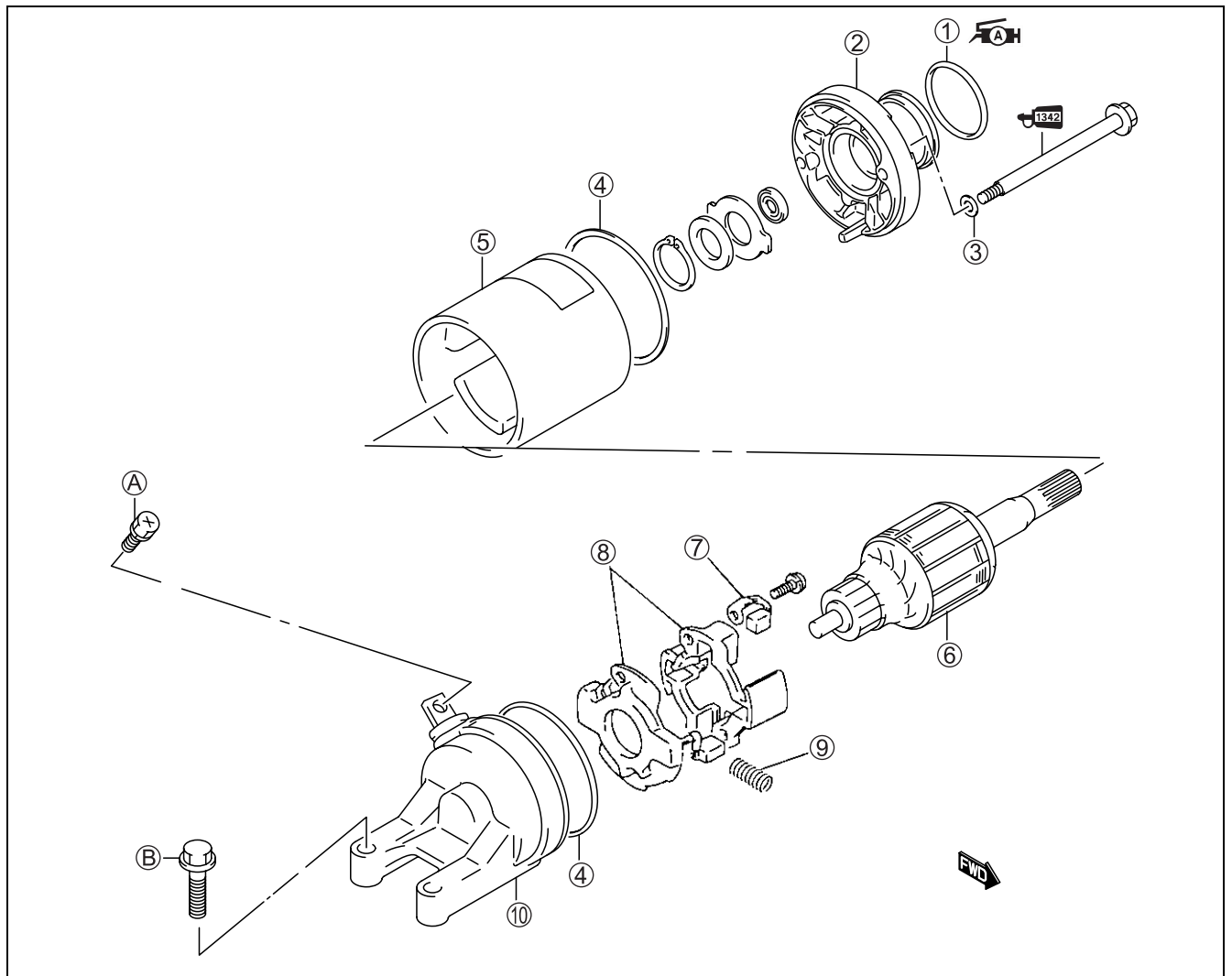
- Faulty side-stand switch

STARTER MOTOR REMOVAL AND DISASSEMBLY

- Remove the starter motor.



- Disassemble the starter motor as shown.



①	O-ring	⑤	Starter motor case	⑨	Brush spring
②	Housing end (inside)	⑥	Armature	⑩	Housing end (outside)
③	O-ring	⑦	Brush		
④	O-ring	⑧	Brush holder		



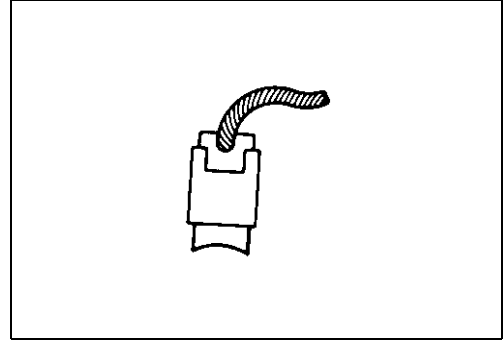
ITEM	N·m	kgf·m
Ⓐ	3	0.3
Ⓑ	6	0.6

STARTER MOTOR INSPECTION

CARBON BRUSHES

Inspect the brushes for abnormal wear, cracks, or smoothness in the brush holder.

If any damages are found, replace the brush assembly with a new one.



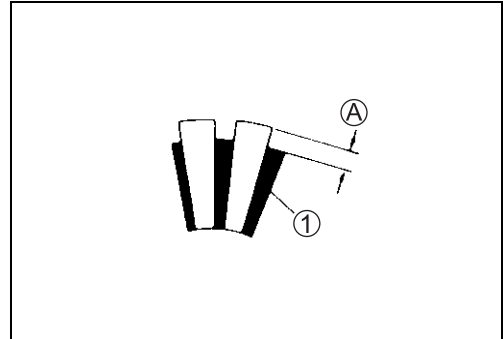
COMMUTATOR

Inspect the commutator for discoloration, abnormal wear or undercut (A).

If abnormal wear is found, replace the armature with a new one.

If the commutator surface is discolored, polish it with #400 sand paper and wipe it using a clean dry cloth.

If there is no undercut, scrape out the insulator ① with a saw blade.



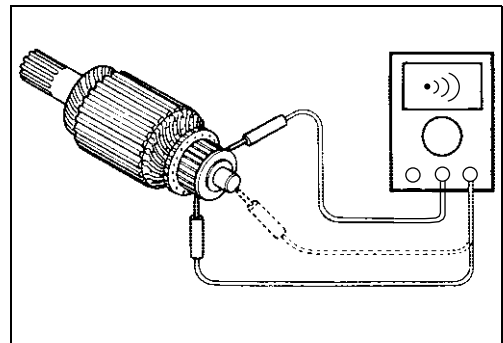
ARMATURE COIL

Check for continuity between each segment and between each segment and the armature shaft using the multi-circuit tester.

If there is no continuity between the segments or there is continuity between the segments and shaft, replace the armature with a new one.

 **09900-25008: Multi-circuit tester set**

 **Tester knob indication: Continuity test (•••••)**



OIL SEAL INSPECTION

Check the seal lip for damage or leakage.

If any damage is found, replace the housing end (inside).



STARTER MOTOR REASSEMBLY AND REMOUNTING

Reassemble and remount the starter motor in the reverse order of removal and disassembly. Pay attention to the following points:

CAUTION

Replace the O-rings with new ones to prevent oil leakage and moisture.

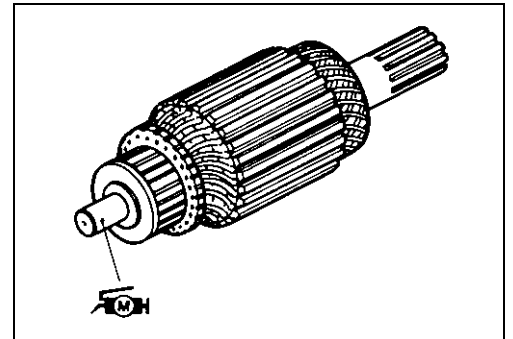
- Apply SUZUKI SUPER GREASE “A” to the oil seal lip.

 99000-25010: SUZUKI SUPER GREASE “A”



- Apply a small quantity of SUZUKI MOLY PASTE to the armature shaft.

 99000-25140: SUZUKI MOLY PASTE

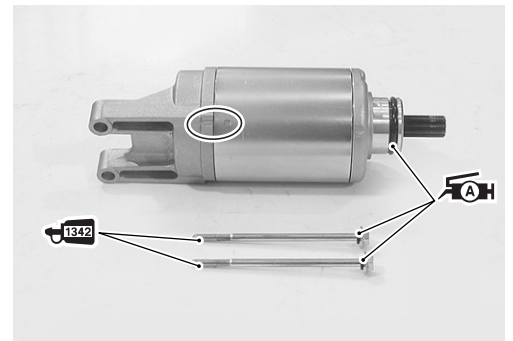


- Align the marks on the housing ends with the marks on the starter motor case.
- Apply a small quantity of THREAD LOCK “1342” to the starter motor housing bolts.


 99000-32050: THREAD LOCK “1342”

- Apply SUZUKI SUPER GREASE “A” to the O-rings.

 99000-25010: SUZUKI SUPER GREASE “A”



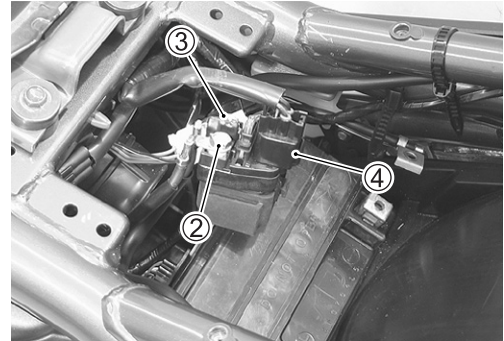
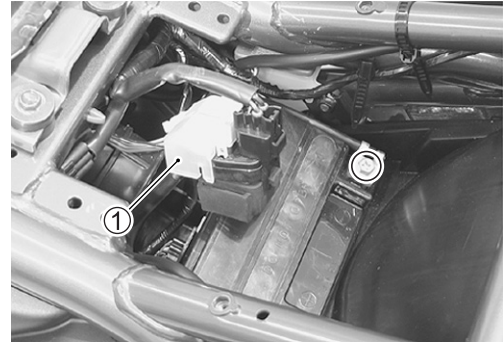
- Install the starter motor. (☞ 3-75)

 **Starter motor mounting bolt: 6 N·m (0.6 kgf·m)**
Lead wire connecting screw: 3 N·m (0.3 kgf·m)



STARTER RELAY INSPECTION

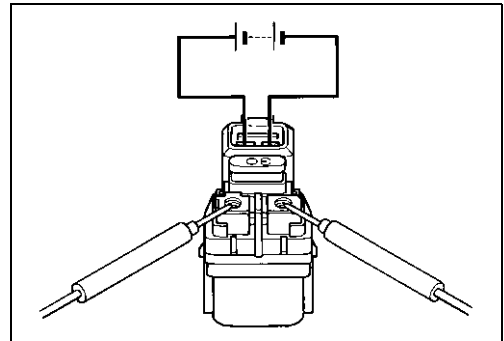
- Remove the seat. (👉 5-4)
- Pull out the starter relay and remove the luggage box. (👉 5-4)
- Disconnect the battery \ominus lead wire from the battery. (👉 6-11)
- Remove the starter relay cover ①.
- Disconnect the starter motor lead wire ②, battery \oplus lead wire ③ and starter relay coupler ④.
- Remove the starter relay.



- Apply 12 V to \textcircled{A} and \textcircled{B} terminals and check for continuity between the positive and negative terminals using the multi-circuit tester. If the starter relay clicks and continuity is found, the relay is ok.

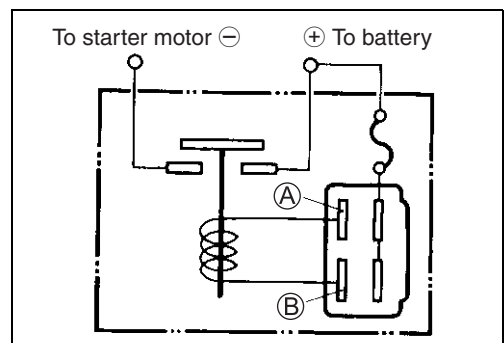
TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Continuity test (•••)



CAUTION

Do not apply battery voltage to the starter relay for five seconds and more, since the relay coil may overheat and get damaged.

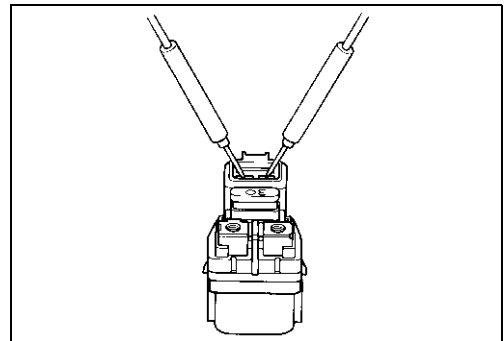


Check the relay coil for opens, grounds and the specified resistance.

DATA Starter relay resistance

Standard: 3 – 6 Ω

Tester knob indication: Resistance (Ω)



SIDE-STAND/IGNITION INTERLOCK SYSTEM PART INSPECTION

Check the interlock system for proper operation. If the interlock system does not operate properly, check each component for damage or abnormalities. If any abnormality is found, replace the component with a new one.

GEAR POSITION SWITCH

- Remove the seat. (☞ 5-4)
- Disconnect the gear position switch coupler ① and measure the continuity between BI and B/W with the transmission in neutral.

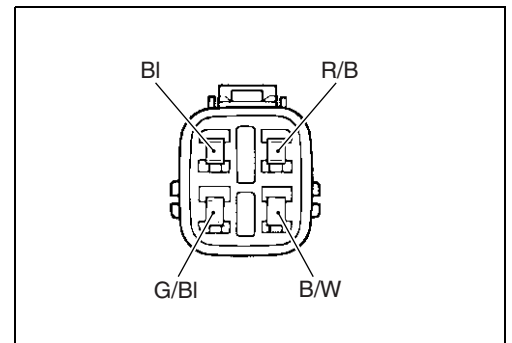
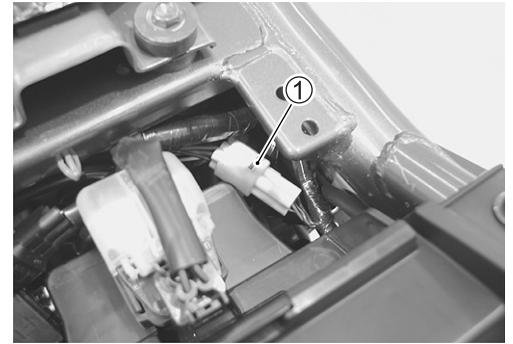
CAUTION

When disconnecting and connecting the gear position switch coupler, make sure to turn off the ignition switch, or electronic parts may get damaged.

	BI	B/W
ON (Neutral)	○ ——— ○	
OFF (Except neutral)		

 **09900-25008: Multi circuit tester set**

 **Tester knob indication: Continuity test (•••)**



SIDE-STAND SWITCH

- Remove the frame cover (LH). (☞ 5-4)
- Disconnect the side-stand switch coupler ① and measure the voltage between Lg and B/W lead wires.

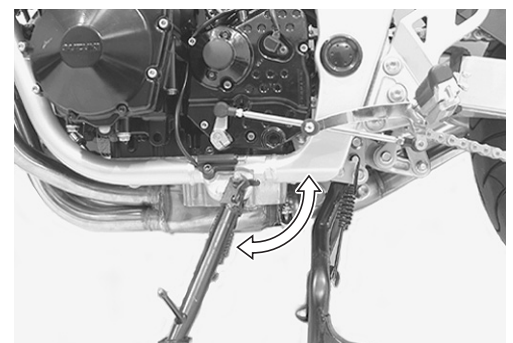
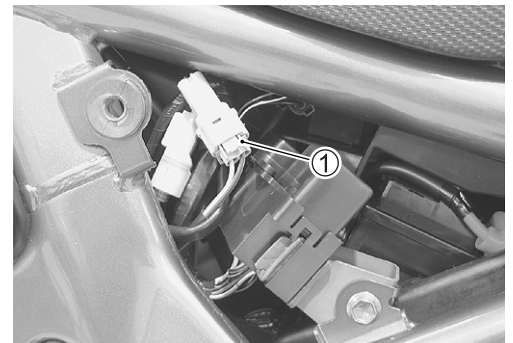
	Lg (+ probe)	B/W (- probe)
ON (side-stand up)	0.4 – 0.6 V	
OFF (side-stand down)	1.4 V and more (Tester's battery voltage)	

 **09900-25008: Multi circuit tester set**

 **Tester knob indication: Diode test (+↔)**

NOTE:

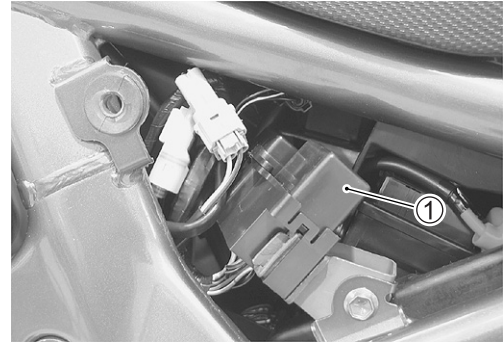
If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.



TURN SIGNAL/SIDE-STAND RELAY

The turn signal/side-stand relay is composed of the turn signal relay, side-stand relay and diode.

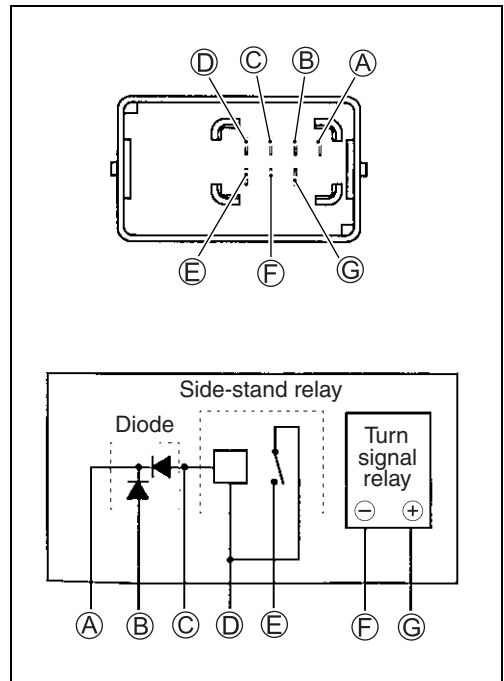
- Remove the frame cover (LH). (➡ 5-4)
- Remove the turn signal/side-stand relay ①.



First check the insulation between ④ and ⑤ terminals with the multi-circuit tester. Then apply 12 V to terminals ④ and ③ (+ to ④ and - to ③) and check the continuity between ④ and ⑤. If there is no continuity, replace the turn signal/side-stand relay with a new one.

TOOL 09900-25008: Multi circuit tester set

Tester knob indication: Continuity test (•••)



DIODE INSPECTION

Measure the voltage between the terminals using the multi circuit tester. Refer to the following table.

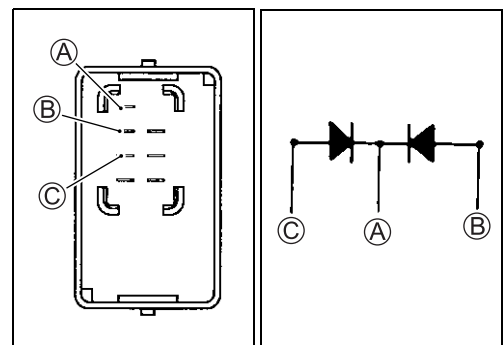
① Probe of tester to:	⊕ Probe of tester to:	
	③, ②	④
③, ②		1.4 V and more (Tester's battery voltage)
④	0.4 – 0.6 V	

TOOL 09900-25008: Multi-circuit tester set

Tester knob indication: Diode test (→←)

NOTE:

If the multi circuit tester reads 1.4 V and below when the tester probes are not connected, replace its battery.



IGNITION SYSTEM (DIGITAL IGNITOR) DESCRIPTION

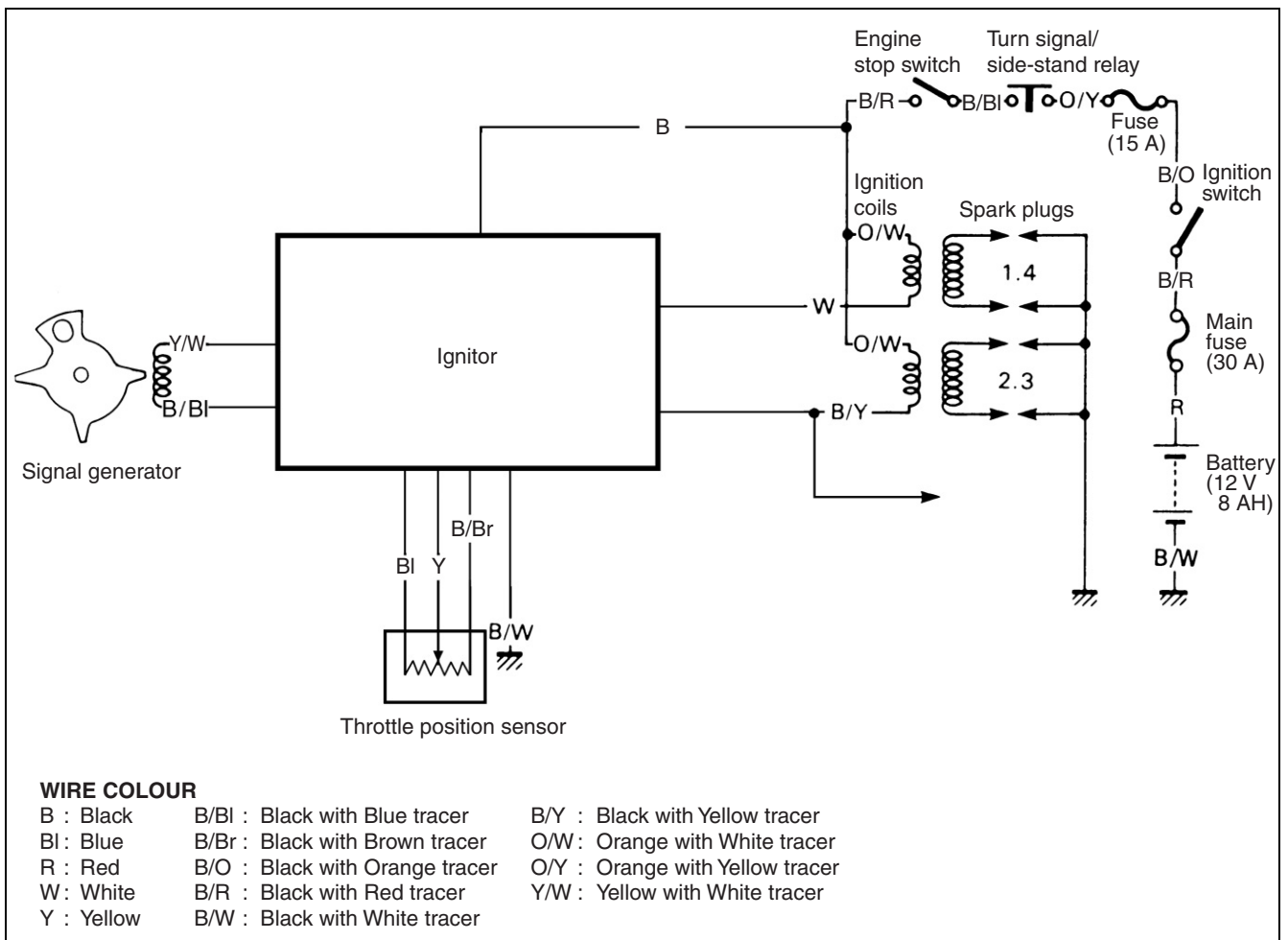
The fully transistorized ignition system consists of the following components: a signal generator (which is made up of the signal generator rotor and pickup coil), ignitor, throttle position sensor, two ignition coils and four spark plugs. The ignition timing is programmed and stored in the ignitor's ROM (Read Only Memory).

The signal generator is mounted on the right end of the crankshaft. The induced signal in the signal generator is sent to the wave-form arrangement circuit and the CPU receives this signal and calculates the best ignition timing, throttle position sensed by throttle position sensor and data stored in the ROM. The CPU outputs the signal to the transistor of the ignition coil output circuit which is connected to the primary windings of the ignition coils which is turned "off" and "on" accordingly. Thus, it induces the secondary current in the ignition coil's secondary windings and produces the spark between the spark plug gaps.

The ignition cutoff circuit is incorporated in the ignitor to prevent the engine from overrevving. If the engine speed reaches 12 000 r/min, this circuit will cutoff the ignition primary current for the #1 and #4 spark plugs.

CAUTION

The engine is capable of running at over 12 000 r/min without a load, even if the ignition cutoff circuit is in effect; however, this may cause engine damage. Therefore, never run the engine over 12 000 r/min without a load.



TROUBLESHOOTING

No spark or poor spark

NOTE:

Check that the transmission is in neutral and the engine stop switch is in the "RUN" position. Grasp the clutch lever. Check that the fuse is not blown and the battery is fully-charged before diagnosing.

Step 1

1) Check the ignition system couplers for poor connections.

Is there connection in the ignition system couplers?

YES	Go to Step 2.
NO	Poor connection of couplers

Step 2

1) Measure the battery voltage between input lead wires (B and B/W) at the ignitor with the ignition switch in the "ON" position.

Is the voltage OK?

YES	Go to Step 3.
NO	<ul style="list-style-type: none"> • Faulty ignition switch • Faulty turn signal/side-stand relay • Faulty engine stop switch • Broken wire harness or poor connection of related circuit couplers

Step 3

1) Measure the ignition coil primary peak voltage. (☞ 6-32)

NOTE:

This ignition coil primary peak voltage inspection method is applicable only with the multi-circuit tester and the peak volt adaptor.

Is the peak voltage OK?

YES	Go to Step 4.
NO	Go to Step 5.

Step 4

1) Inspect the spark plugs. (☞ 2-6)

Is the spark plug OK?

YES	Go to Step 5.
NO	Faulty spark plug(-s)

Step 5

1) Inspect the ignition coil. (☞ 6-33)

Is the ignition coil(-s) OK?

YES	Go to Step 6.
NO	<ul style="list-style-type: none"> • Faulty ignition coil(-s)

Step 6

1) Measure the signal generator peak voltage and its resistance. (☞ 6-33 to -35)

NOTE:

The signal generator peak voltage inspection is applicable only with the multi-circuit tester and peak volt adaptor.

Is the peak voltage and resistance OK?

YES	<ul style="list-style-type: none">• Faulty ignitor• Poor connection of ignition couplers
NO	Faulty signal generator

INSPECTION

IGNITION COIL PRIMARY PEAK VOLTAGE

- Remove the fuel tank. (☞ 4-3)
- Disconnect all the spark plug caps.
- Connect four new spark plugs to each spark plug cap and ground them on the cylinder.

NOTE:

Be sure that all the spark plugs are connected properly and the battery used is in fully-charged condition.

Measure ignition coil primary peak voltage (for #1 and #4 cylinders) in the following procedure.

- Connect the multi circuit tester with the peak voltage adaptor as follows.

Ignition coil (for #1 and #4 cylinders):

W terminal –	Ground
(⊕ Probe)	(⊖ Probe)

NOTE:

Do not disconnect the ignition coil primary lead wire.

 **09900-25008: Multi circuit tester set**

CAUTION

Before using the multi circuit tester and peak voltage adaptor, refer to the appropriate instruction manual.

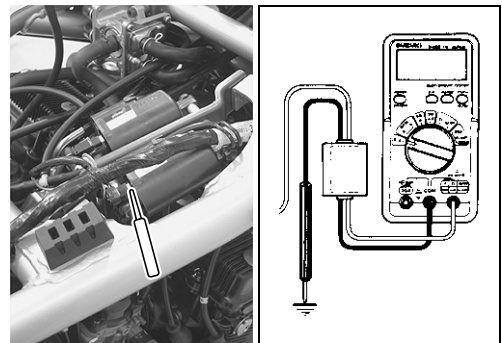
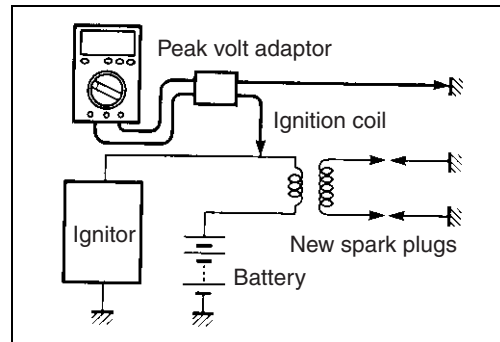
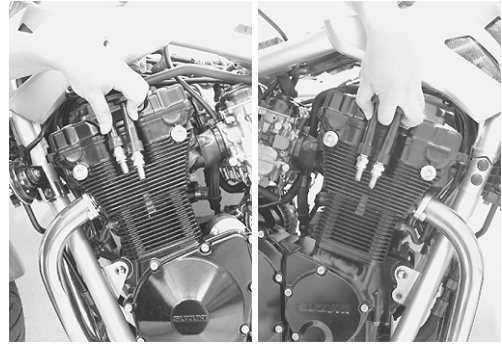
- Shift the transmission into neutral, turn the ignition switch to the “ON” position and grasp the clutch lever.
- Press the starter button and allow the engine to crank for a few seconds, and then measure the ignition coil primary peak voltage.
- Repeat the above procedure a few times and measure the highest ignition coil primary peak voltage.

 **Ignition coil primary peak voltage: 140 V and more**

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

WARNING

Do not touch the tester probes and spark plugs to prevent an electric shock while testing.



Measure ignition coil primary peak voltage (for #2 and #3 cylinders) in the same manner as for cylinders #1 and #4.

Ignition coil (for #2 and #3 cylinders):

B/Y terminal – Ground
(⊕ Probe) (⊖ Probe)

NOTE:

Do not disconnect the ignition coil primary lead wire.

DATA Ignition coil primary peak voltage: 140 V and more

 Tester knob indication: Voltage (---)

⚠ WARNING

Do not touch the tester probes and spark plugs to prevent an electric shock while testing.

If the voltages are lower than the standard values, inspect the ignition coil and the signal generator.

IGNITION COIL RESISTANCE

- Measure the ignition coil resistance in both the primary and secondary windings. If the windings are in sound condition, their resistance should be close to the specified values.

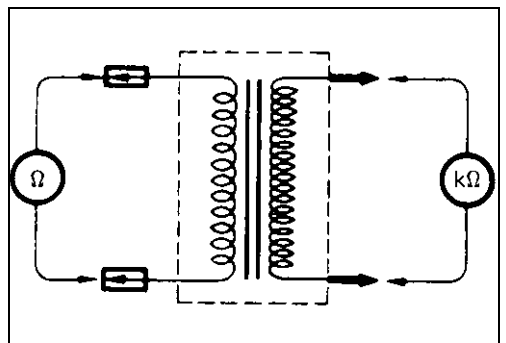
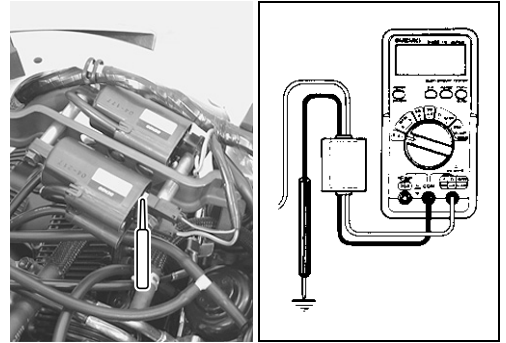
DATA Ignition coil resistance

Primary: Approx. 2 – 4 Ω (⊕ tap – ⊖ tap)

Secondary: Approx. 30 – 40 kΩ

(spark plug cap – spark plug cap)

 Tester knob indication: Resistance (Ω)



SIGNAL GENERATOR PEAK VOLTAGE

- Remove the battery.
- Disconnect the ignitor coupler ①.
- Reconnect the battery.

NOTE:

Make sure that all of the couplers are connected properly and the battery is fully-charged.

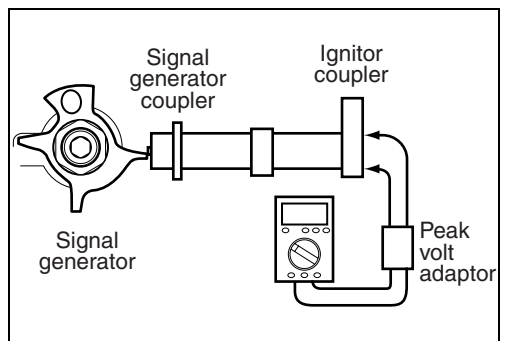
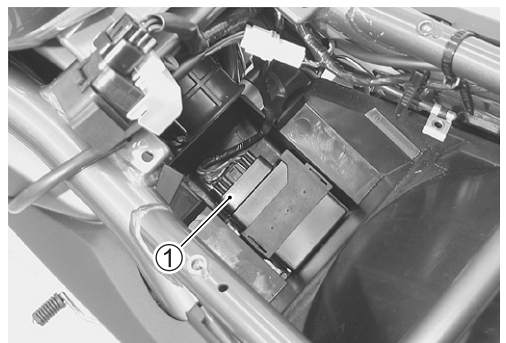
- Connect the multi circuit tester with the peak volt adaptor as follows.

B/BI (⊕ Probe) – Y/W (⊖ Probe)

 **09900-25008: Multi circuit tester set**

CAUTION

Before using the multi circuit tester and peak voltage adaptor, refer to the appropriate instruction manual.




- Shift the transmission into neutral, turn the ignition switch to the “ON” position and grasp the clutch lever.
- Press the starter button and allow the engine to crank for a few seconds, and then measure the signal generator peak voltage.
- Repeat the above procedure a few times and measure the highest signal generator peak voltage.

DATA Signal generator peak voltage:
1.0 V and more (B/BI – Y/W)

 Tester knob indication: Voltage (---)

If the peak voltage measured on the ignitor coupler is lower than the standard value, measure the peak voltage on the signal generator coupler as follows.

- Remove the frame cover (LH). ( 5-4)
- Disconnect the signal generator coupler ②.

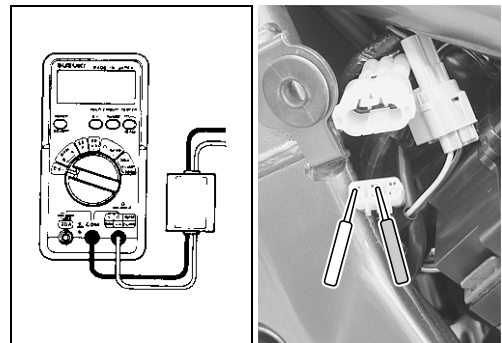
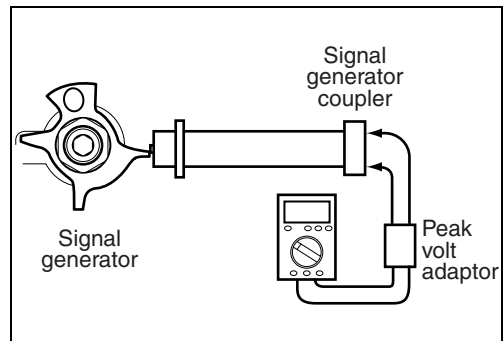
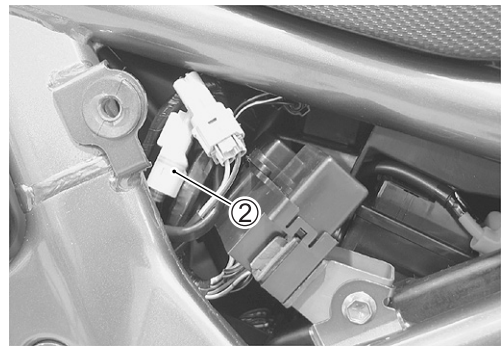
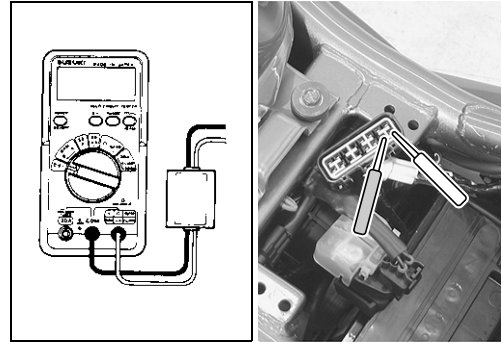
- Connect the multi circuit tester with the peak voltage adaptor. BI terminal – Y terminal
(⊕ Probe) (⊖ Probe)

- Measure the signal generator peak voltage in the same manner as on the ignitor coupler.

DATA Signal generator peak voltage:
1.0 V and more (BI – Y)

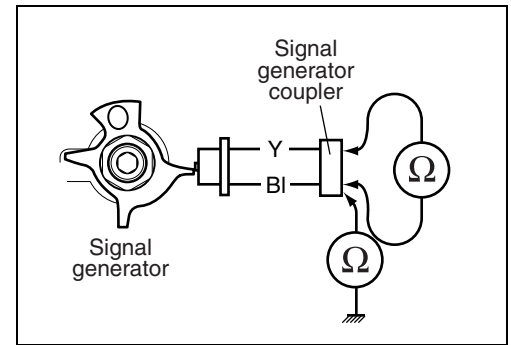
 Tester knob indication: Voltage (---)

If the peak voltage on the signal generator lead wire couplers is within specification, but on the ignitor coupler is out of specification, the wire harness must be replaced. If both peak voltages are out of specification, the signal generator must be replaced and re-checked.



PICKUP COIL RESISTANCE

- Remove the side frame cover and disconnect the signal generator coupler. (☞ 6-34)
- Measure the resistance between the lead wires and ground. If the resistance is not within the specified value, the signal generator stator must be replaced.

DATA Pickup coil resistance:**Approx. 135 – 200 Ω (BI – Y)** **∞ Ω (BI – Ground)****Tester knob indication: Resistance (Ω)****NOTE:***Refer to page 3-16 and -74 for signal generator replacement.*

COMBINATION METER

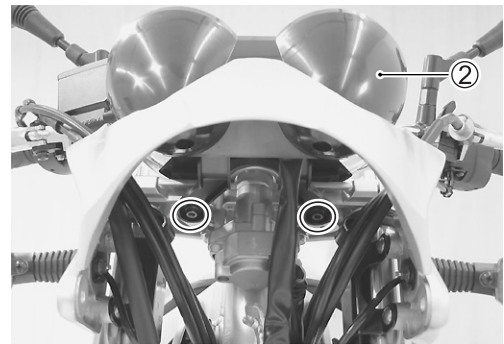
REMOVAL

GSF650

- Remove the headlight. (☞ 6-41)
- Disconnect the couplers and remove the headlight housing ①.



- Remove the combination meter unit ②.

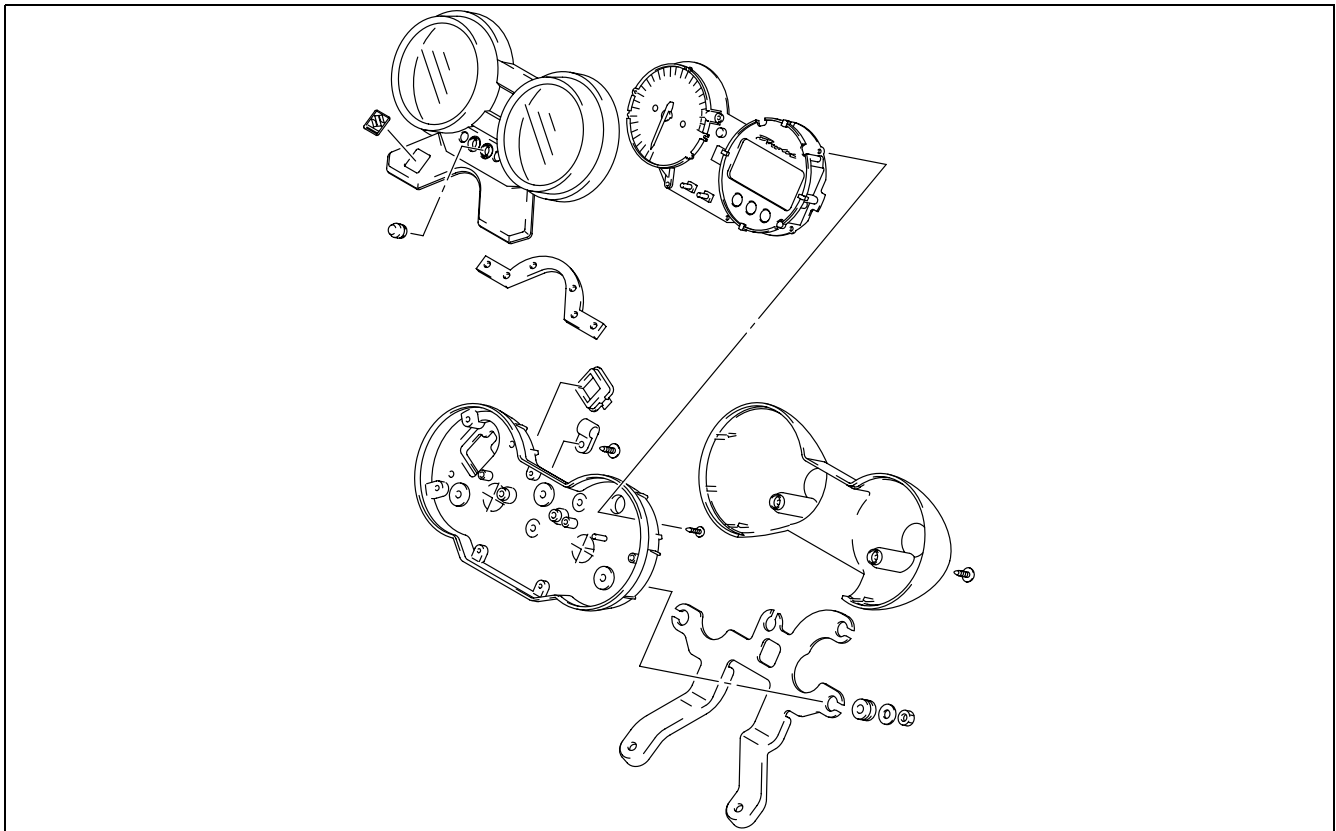


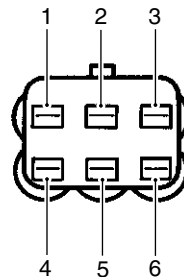
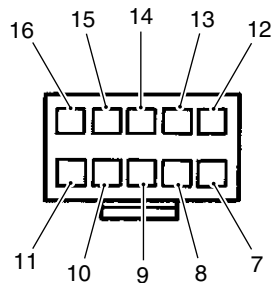
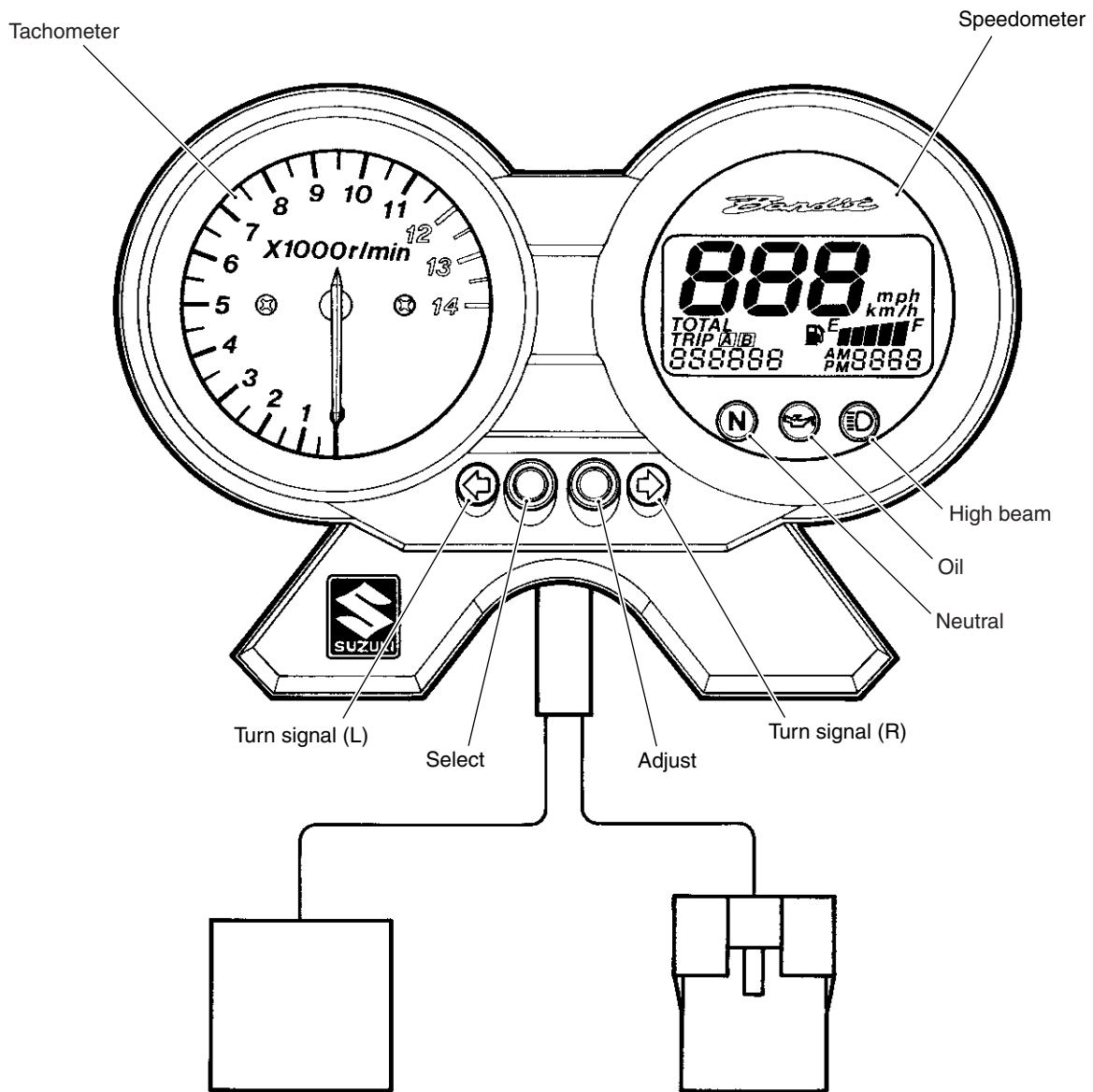
GSF650S

- Remove the combination meter unit. (☞ 5-5)

DISASSEMBLY

- Disassemble the combination meter unit as follows.





- 1: POWER SOURCE OF SPEED SENSOR
- 2: TACHOMETER
- 3: OIL ⊖
- 4: SPEED SENSOR SIGNAL
- 5: BATTERY ⊕
- 6: Blank
- 7: Blank
- 8: Lg : TURN (R)
- 9: Blank
- 10: Blank
- 11: B/B : NEUTRAL
- 12: Y : HIGH BEAM
- 13: B : TURN (L)
- 14: O/G : POWER SOURCE OF METER
- 15: R/B : FUEL LEVEL
- 16: B/W : GROUND

INSPECTION

LED (LIGHT EMITTING DIODE)

- Check that the LEDs (Oil pressure indicator light and meter panel illumination) immediately light up when the ignition switch is turned to ON.
- Check that other LEDs (Neutral indicator light, High-beam indicator light and Turn signal indicator lights) light up/go off by operating each switch.
- If abnormal condition is found, replace the combination meter unit with a new one after checking its wire harness/coupler.



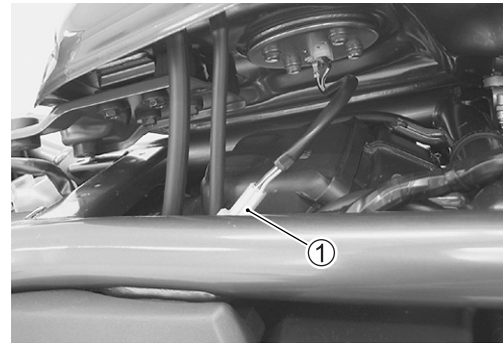
FUEL LEVEL INDICATOR

To test the fuel level indicator, perform the following test.

Test 1

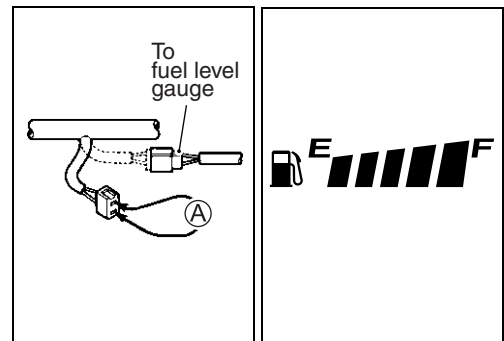
This test will determine if the fuel level indicator is operating.

- Remove the fuel tank mounting bolts.
- Disconnect the fuel level gauge lead wire coupler ①.
- Connect a jumper wire ① between the Y/B and B/W lead wires from the wire harness.
- Turn the ignition switch to ON.
- Check if the fuel level indicator (LCD) indicates full position.



NOTE:

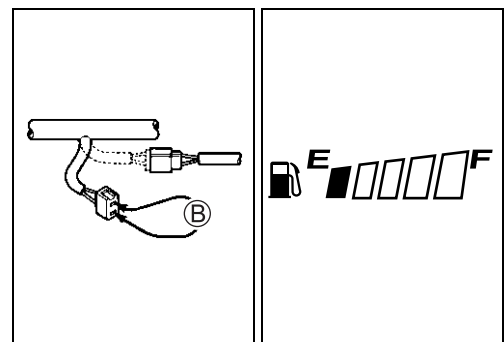
It takes approx. 30 seconds that the fuel level indicator indicates the detected fuel level.



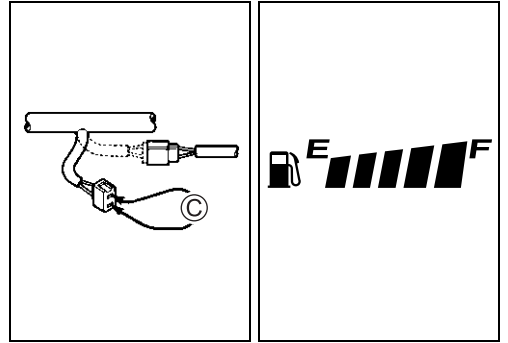
Test 2

This test will determine the accuracy of the fuel level indicator in the empty and full positions.

- Connect a 180 Ω resistor ② between the Y/B and B/W lead wires from the wire harness.
- The fuel level indicator is operating correctly if the LCD bars decrease to empty when the ignition switch is turned to ON.



- Replace the 180 Ω resistor ② with a 5 Ω one ③.
- The fuel level indicator is operating correctly if the LCD bars increase to five (full) when the ignition switch is turned to ON.
- If either test detects a malfunctioning fuel level indicator, replace the combination meter unit with a new one.



FUEL LEVEL GAUGE

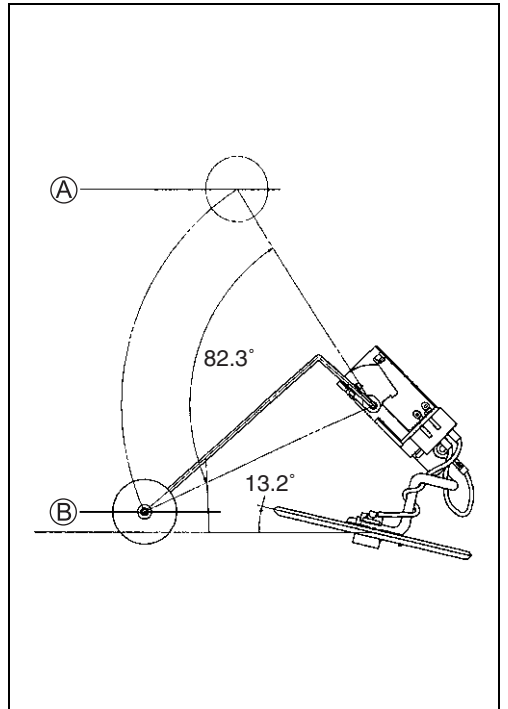
- Remove the fuel gauge. (☞ 4-7)
- Measure the resistance at each fuel level gauge float position. If the resistance is incorrect, replace fuel level gauge with a new one.

The relation between the position of the fuel level gauge float and resistance is below.

Float position	Resistance
① (Full)	3 – 5 Ω
② (Empty)	179 – 185 Ω

 **09900-25008: Multi circuit tester set**

 **Tester knob indication: Resistance (Ω)**

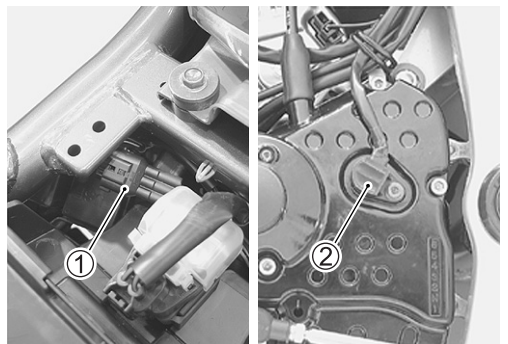


SPEEDOMETER

If the speedometer, odometer or tripmeter does not function properly, inspect the speed sensor and the coupler connections. If the speed sensor and coupler connections are OK, replace the combination meter unit with a new one.

SPEED SENSOR

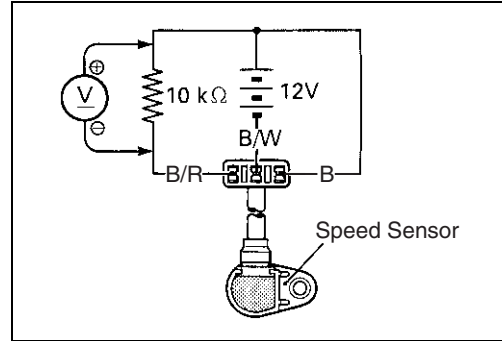
- Remove the seat. (☞ 5-4)
- Disconnect the speed sensor coupler ①.
- Remove the speed sensor ②.



- Connect a 12 V battery (between B and B/W), 10 k Ω resistor (Between B/R and B) and multi-circuit tester (tester \oplus probe to B and tester \ominus probe to B/R) as shown.

TOOL 09900-25008: Multi circuit tester set

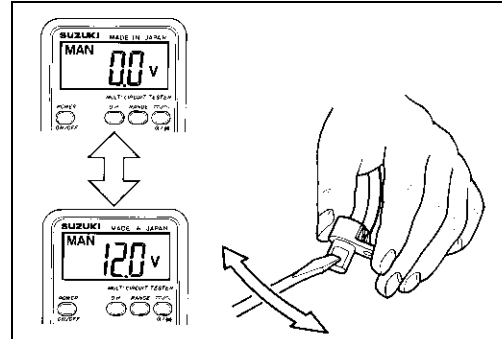
Tester knob indication: Voltage (V)



- Move a screwdriver back and forth across the pick-up surface of the speed sensor. The voltage readings should cycle as follows (0 V \rightarrow 12 V or 12 V \rightarrow 0 V). If the voltage reading does not change, replace the speed sensor with a new one.

NOTE:

While testing, the highest voltage reading should be the same as the battery voltage (12 V).



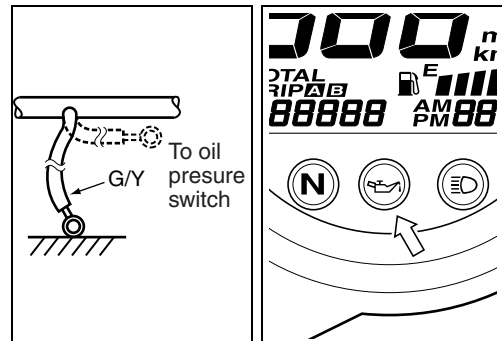
OIL PRESSURE INDICATOR

NOTE:

Before inspecting the oil pressure switch, check if the engine oil level is correct. (2-10)

- Remove the signal generator cover. (3-13)
- Disconnect the oil pressure G/Y lead wire from the oil pressure switch.
- Turn the ignition switch to ON.
- Check if the oil pressure indicator light will light up when grounding the G/Y lead wire.

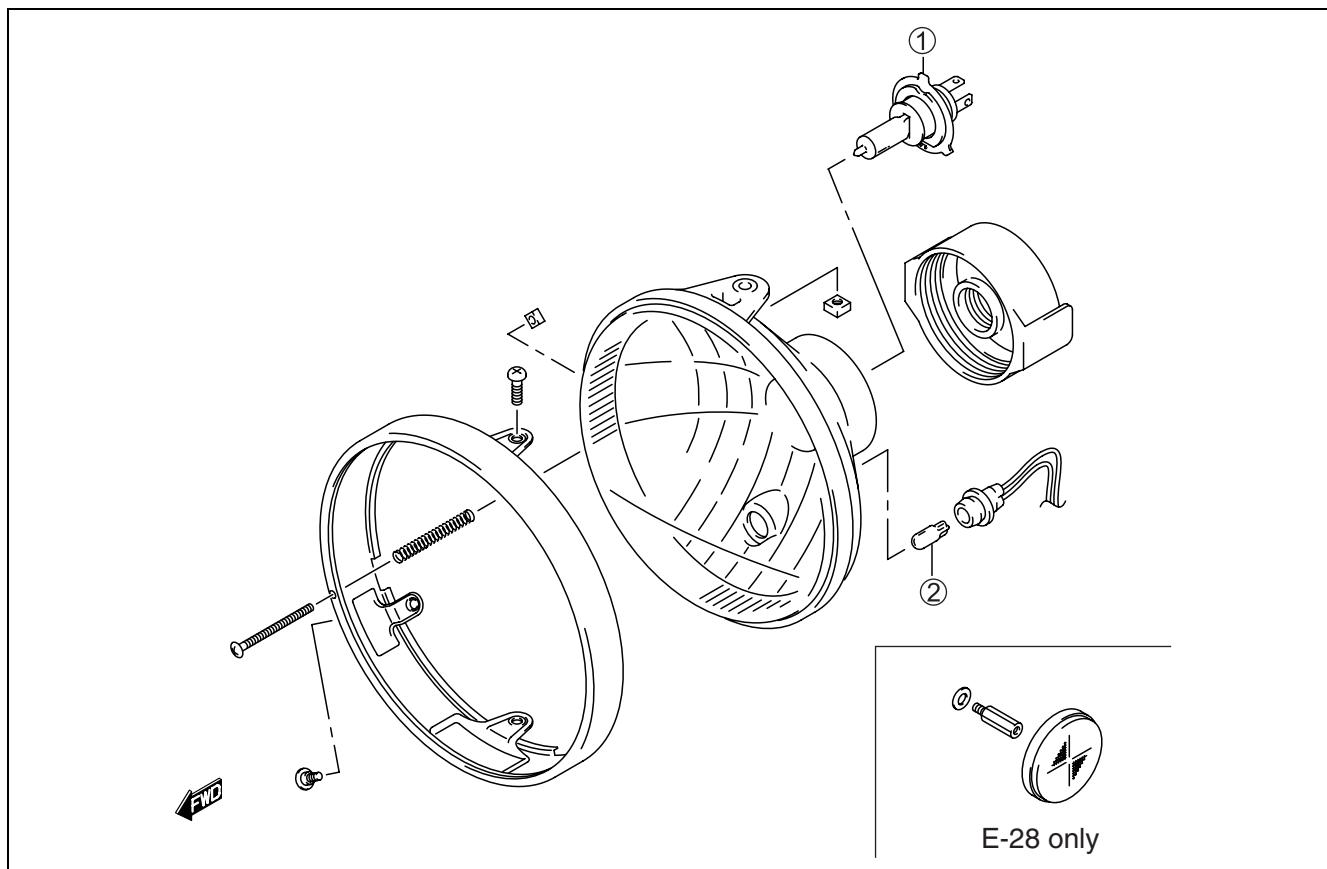
If the oil pressure indicator does not light up, replace the combination meter unit with a new one after checking connection of couplers.



LAMPS

HEADLIGHT

GSF650



Headlight bulb ①: 12 V 60/55 W

Position light bulb ②: 12 V 5 W

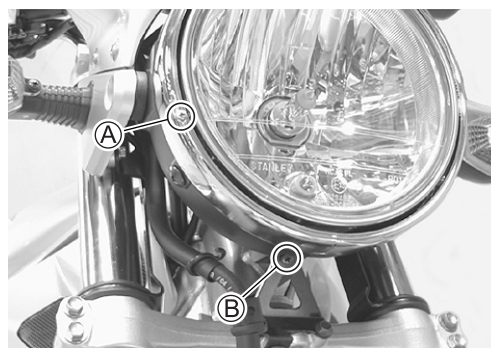
Headlight beam adjustment

- Adjust the headlight beam, both horizontally and vertically.

- Ⓐ: Horizontal adjuster
- Ⓑ: Vertical adjuster

NOTE:

To adjust the headlight beam, adjust the beam horizontally first, then vertically.

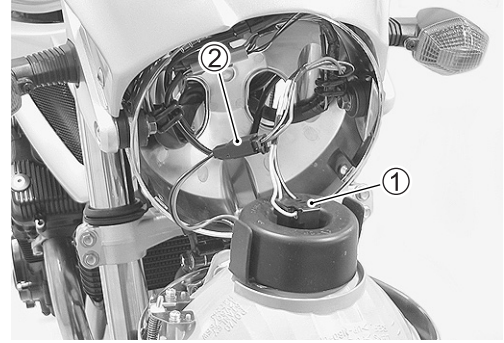


Bulb replacement

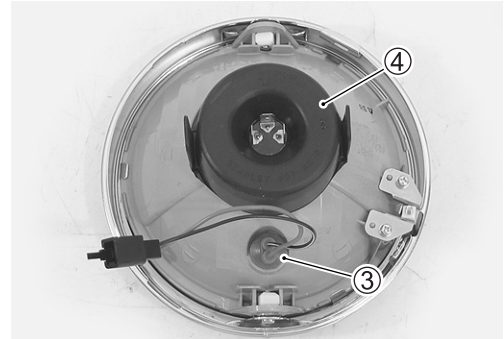
- Remove the headlight mounting screws.



- Disconnect the headlight coupler ① and position light coupler ②.



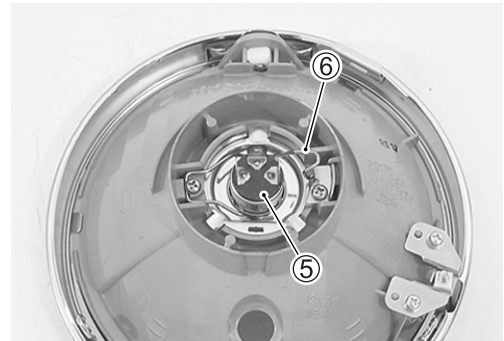
- Remove the position light socket ③.
- Remove the socket cover ④.



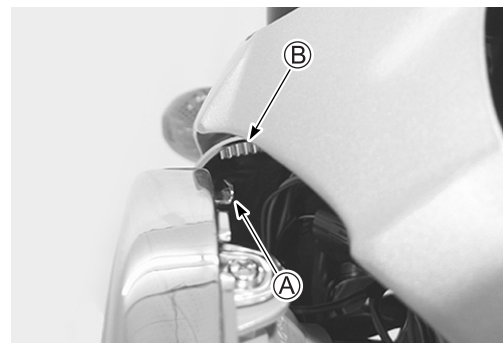
- Remove the headlight bulb ⑤ by unhooking the bulb holder spring ⑥.

CAUTION

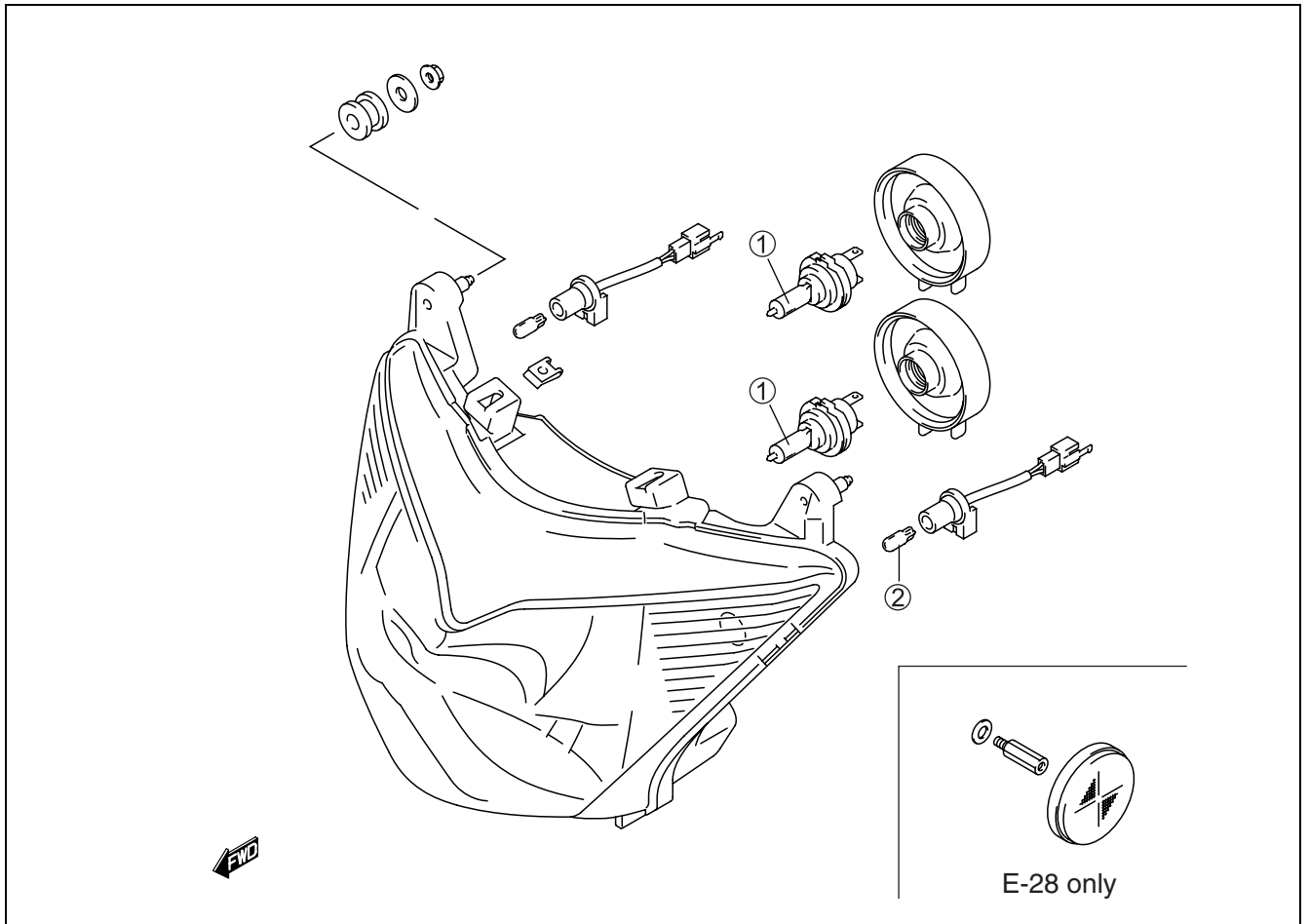
If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.



- Install the headlight assembly so that the hook ① on the headlight bezel engages with ② of the housing.



GSF650S



Headlight bulb ①: 12 V 55 W × 2

Position light bulb ②: 12 V 5 W × 2

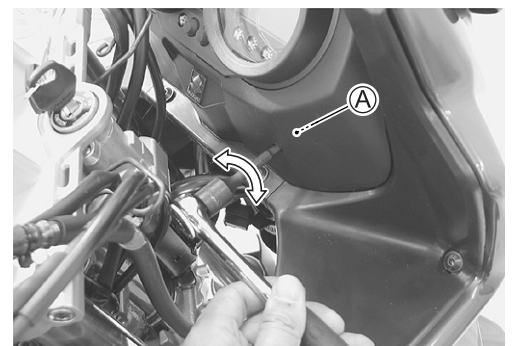
Headlight beam adjustment

- Insert 5 mm hexagon wrench as shown and adjust the Low and Hi headlight beam horizontally.

Ⓐ: Horizontal adjuster (For both Low and Hi beam)

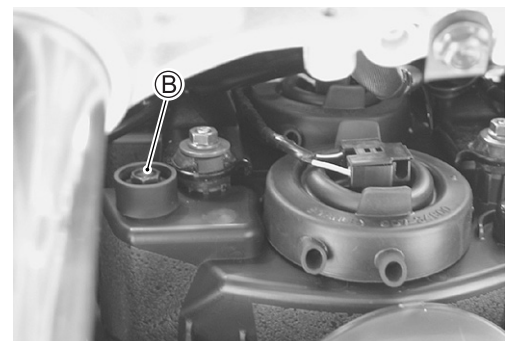
NOTE:

To adjust the headlight beam, adjust the beam horizontally first, then vertically.



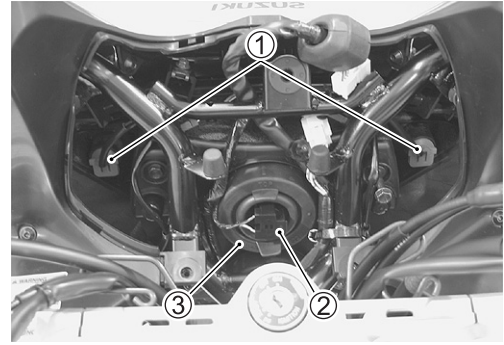
- Adjust the Low and Hi headlight beam vertically from under the cowling.

Ⓑ: Vertical adjuster (For both Low and Hi beam)



Bulb replacement

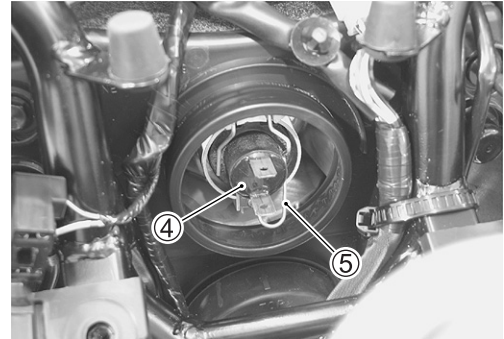
- Remove the combination meter unit. (☞ 5-5)
- Remove the position light sockets ①.
- Disconnect the headlight (Low) coupler ② and remove the rubber boot ③.



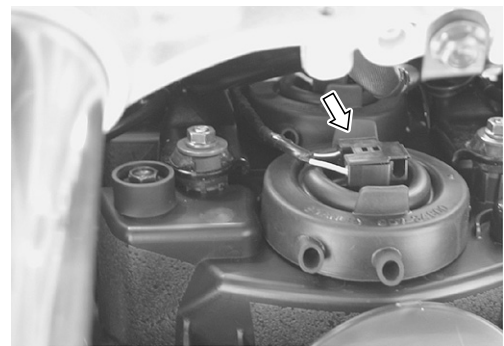
- Remove the headlight bulb (Low) ④ by unhooking the bulb holder spring ⑤.

CAUTION

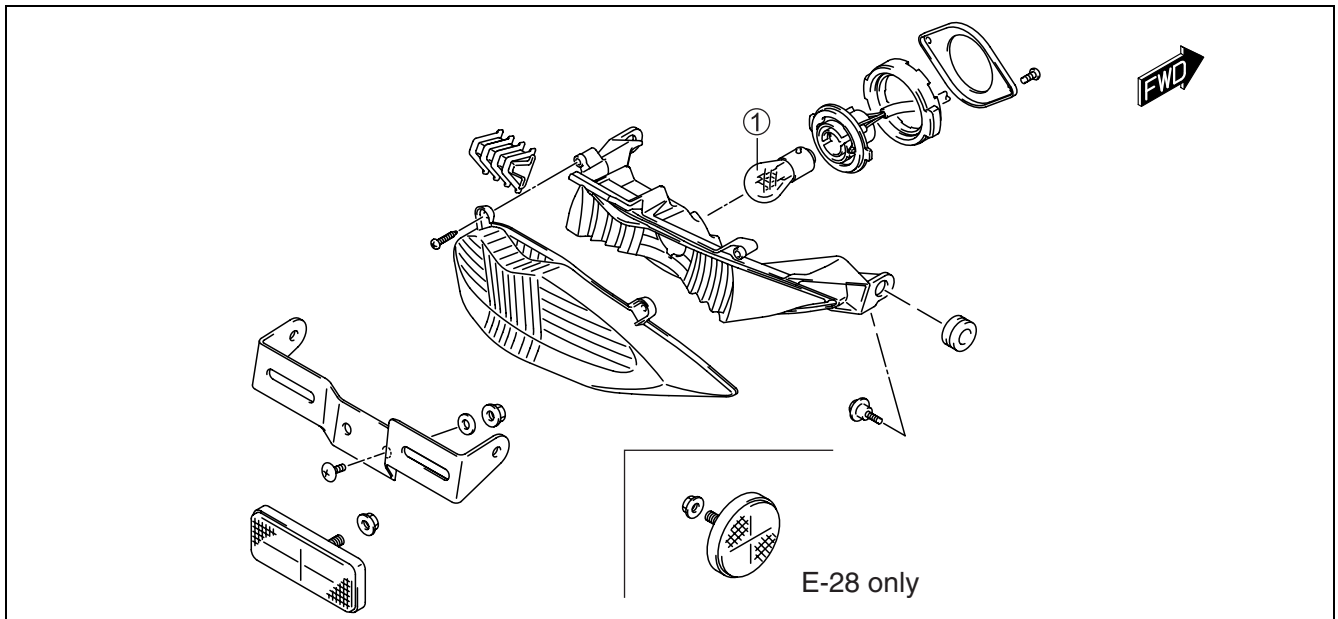
If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.



- Remove the headlight bulb (Hi) in the same way from under the cowling.
- Reassemble the bulbs in the reverse order of removal.



BRAKE LIGHT/TAILLIGHT AND LICENSE PLATE LIGHT

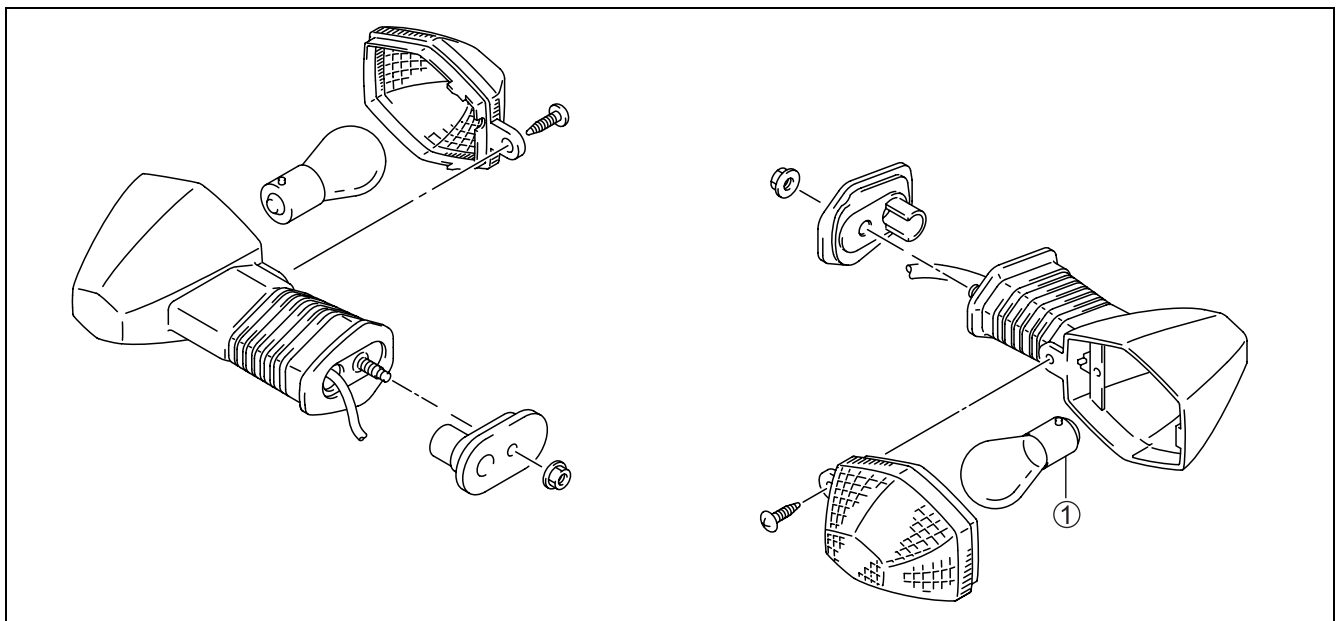


Brake light/taillight bulb ①: 12 V 21/5 W

CAUTION

If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

TURN SIGNAL LIGHTS



Turn signal light bulb: 12 V 21 W × 4

CAUTION

Do not overtighten the lens fitting screws.
If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

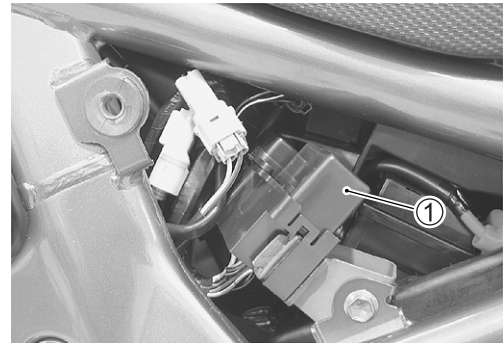
RELAYS

TURN SIGNAL/SIDE-STAND RELAY

The turn signal/side-stand relay, which is located under the seat, is composed of the turn signal relay, and the side-stand relay and diode.

REMOVAL

- Remove the turn signal/side-stand relay ①. (👉 6-28)



INSPECTION

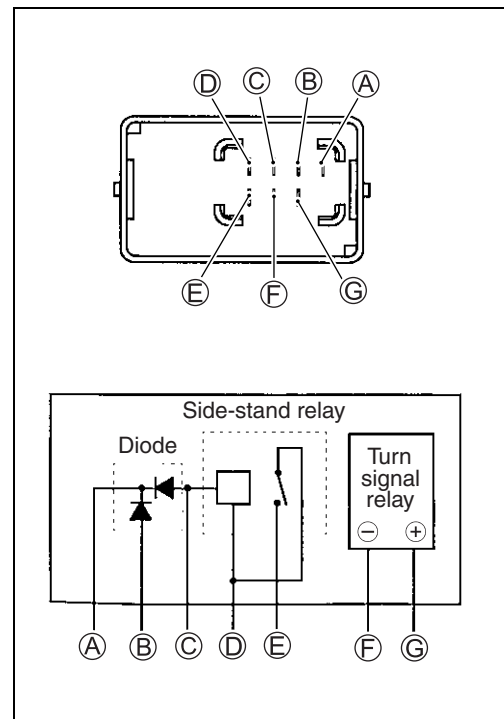
Before removing the turn signal/side-stand relay, check the operation of the turn signal light.

If the turn signal light does not illuminate, inspect the bulb, turn signal switch and circuit connection.

If the bulb, turn signal switch and circuit connection are OK, the turn signal relay may be faulty; therefore, replace the turn signal/side-stand relay with a new one.

NOTE:

Make sure that the battery is fully charged.



STARTER RELAY

👉 6-26

SWITCHES

IGNITION SWITCH REMOVAL AND INSTALLATION

GSF650

- Remove the right frame head cover. (☞ 5-5)
- Disconnect the ignition switch coupler ①.



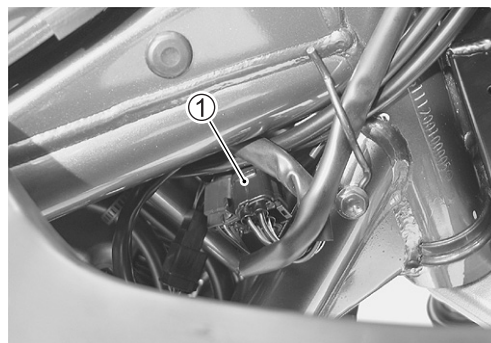
- Remove the headlight housing. (☞ 6-36)
- Remove the ignition switch using the special tools.

TOOL 09930-11920: Torx bit JT40H
09930-11940: Bit holder



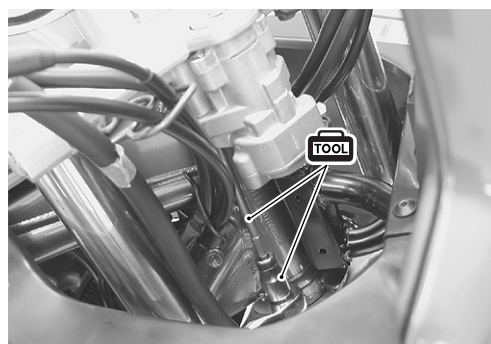
GSF650S

- Disconnect the ignition switch coupler ①.



- Remove the ignition switch using the special tools.

TOOL 09930-11920: Torx bit JT40H
09930-11940: Bit holder



- Install the ignition switch in the reverse order of removal.

CAUTION

When reusing the ignition switch bolt, clean thread and apply the **THREAD LOCK**.

1322 99000-32110: THREAD LOCK SUPER "1322"

INSPECTION

Inspect each switch for continuity with a tester. If any abnormality is found, replace the respective switch assemblies with new ones.

IGNITION SWITCH

Color Position	R	O	O/Y	B/W	Gr	Br
ON	○—○	○—○	○—○	○—○	○—○	○—○
OFF						
LOCK						
P	○—○					○—○

DIMMER SWITCH

Color Position	W	Y	O
HI (≡▷)		○—○	○—○
LO (≡▷)	○—○		○—○

TURN SIGNAL LIGHT SWITCH

Color Position	Lg	Lbl	B
L (⇐)		○—○	○—○
PUSH			
R (⇒)	○—○	○—○	

PASSING LIGHT SWITCH

Color Position	W	Y
•		
PUSH	○—○	○—○

ENGINE STOP SWITCH

Color Position	O/B	O/W
OFF (⊗)		
RUN (⊙)	○—○	○—○

STARTER BUTTON

Color Position	O/R	Y/W
•		
PUSH	○—○	○—○

HORN BUTTON

Color Position	B/Bl	B/W
•		
PUSH	○—○	○—○

FRONT BRAKE LIGHT SWITCH

Color Position	B/R	B/Bl
OFF		
ON	○—○	○—○

REAR BRAKE LIGHT SWITCH

Color Position	O/G	W/B
ON	○—○	○—○
OFF		

CLUTCH LEVER POSITION SWITCH

Color Position	B/Y	B/W
FREE		
•	○—○	○—○

OIL PRESSURE SWITCH

Color Position	G/Y	Ground
ON (engine is stopped)	○—○	○—○
OFF (engine is running)		

NOTE:

Before inspecting the oil pressure switch, check if the engine oil is at the proper level. (📖 2-10)

WIRE COLOR

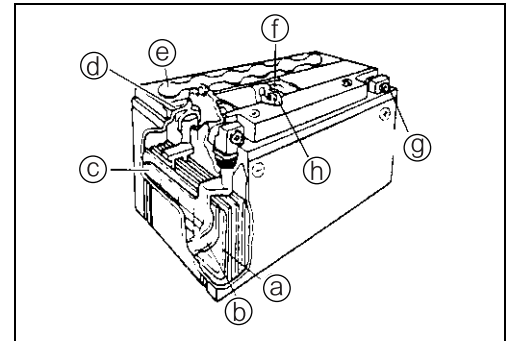
- B : Black
- Br : Brown
- Gr : Gray
- B/Bl : Black with Blue tracer
- B/R : Black with Red tracer
- B/Y : Black with Yellow tracer
- B/W : Black with White tracer
- G/Y : Green with Yellow tracer
- O/B : Orange with Black tracer
- O/Bl : Orange with Blue tracer
- R : Red
- Y : Yellow
- W : White
- O/G : Orange with Green tracer
- O/R : Orange with Red tracer
- O/W : Orange with White tracer
- O/Y : Orange with Yellow tracer
- W/B : White with Black tracer
- Y/G : Yellow with Green tracer
- Y/W : Yellow with White tracer

BATTERY

SPECIFICATIONS

Type designation	YTX9-BS
Capacity	12 V, 28.8 kC (8 Ah)/10 HR
Standard electrolyte S.G.	1.320 at 20 °C

- | | |
|--------------------------------|----------------|
| Ⓐ Anode plates | Ⓔ Stopper |
| Ⓑ Separator (fiberglass plate) | Ⓕ Filter |
| Ⓒ Cathode plates | Ⓖ Terminal |
| Ⓓ Upper cover breather | Ⓗ Safety valve |



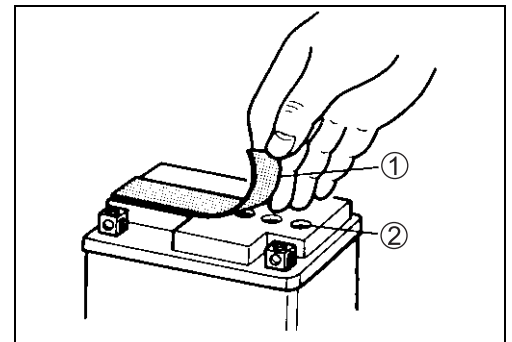
INITIAL CHARGING

FILLING ELECTROLYTE

- Remove the aluminum tape ① which seals the battery filler holes ②.

NOTE:

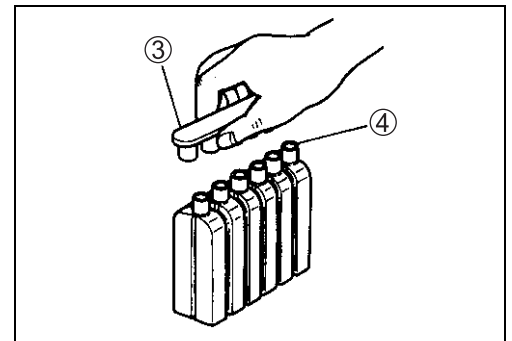
When filling electrolyte, the battery must be removed from the vehicle and must be put on the level ground.



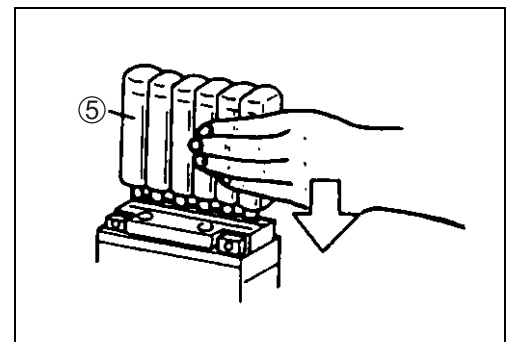
- Remove the caps ③ from the electrolyte container.

NOTE:

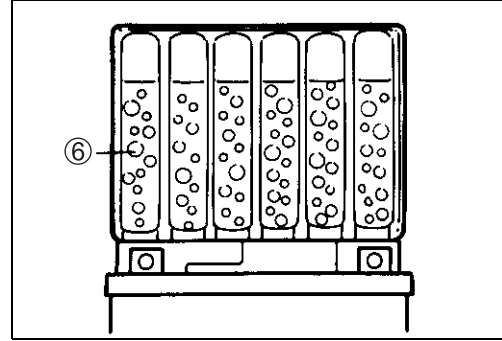
- * After filling the electrolyte completely, use the removed cap ③ as sealing caps of battery-filler holes.
- * Do not remove or pierce the sealed areas ④ of the electrolyte container.



- Insert the nozzles of the electrolyte container ⑤ into the battery's electrolyte filler holes. Hold the electrolyte container firmly so that it does not fall. Do not allow any of the electrolyte to spill.

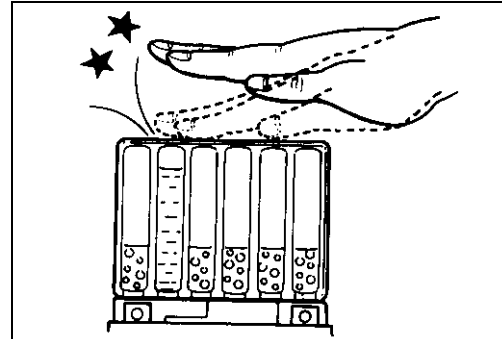


- Make sure that air bubbles ⑥ are coming up each electrolyte container, and leave in this position for about more than 20 minutes.

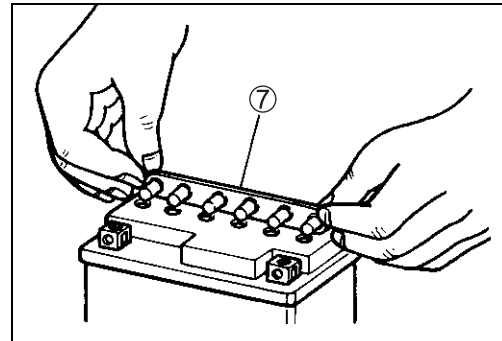
**NOTE:**

If no air bubbles are coming up from a filler port, tap the bottom of the electrolyte container two or three times. Never remove the container from the battery.

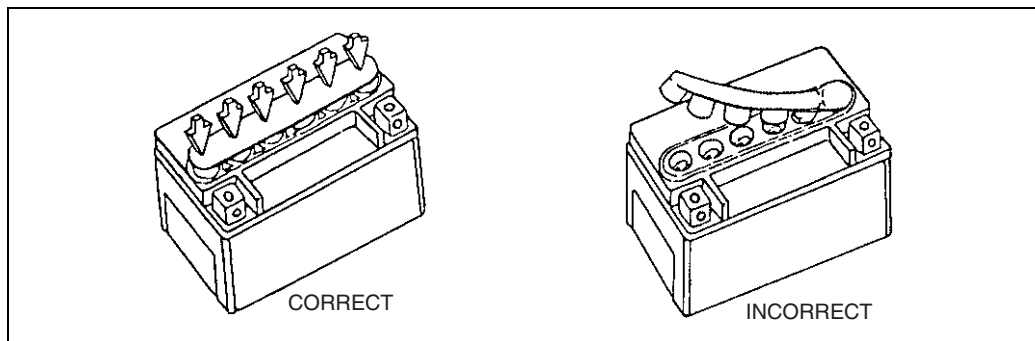
- After confirming that the electrolyte has entered the battery completely, remove the electrolyte containers from the battery. Wait for about 20 minutes.



- Insert the caps ⑦ into the filler holes, pressing in firmly so that the top of the caps do not protrude above the upper surface of the battery's top cover.

**CAUTION**

- * Never use anything except the specified battery.
- * Once the caps have been installed to the battery, do not remove the caps.
- * Do not tap the caps with a tool such as hammer when installing them.



For initial charging, use the charger specially designed for MF battery.

CAUTION

- * For charging the battery, make sure to use the charger specially designed for MF battery. Otherwise, the battery may be overcharged resulting in shortened service life.
- * Do not remove the cap during charging.
- * Position the battery with the cap facing upward during charging.

SERVICING

Visually inspect the surface of the battery container. If any signs of cracking or electrolyte leakage from the sides of the battery have occurred, replace the battery with a new one. If the battery terminals are found to be coated with rust or an acidic white powdery substance, clean the battery terminals with sandpaper.

RECHARGING OPERATION

- Using the multi circuit tester, check the battery voltage. If the voltage reading is the 12.0 V (DC) and less, recharge the battery with a battery charger.

- Ⓐ Charging period
- Ⓑ Stop charging

CAUTION

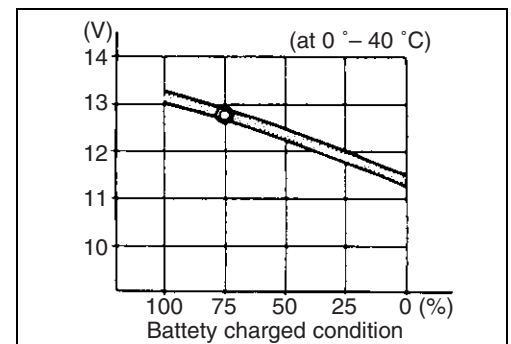
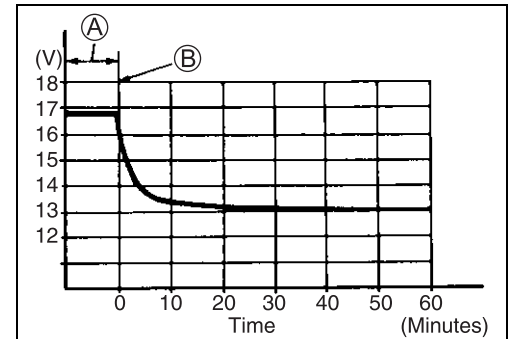
- * When recharging the battery, remove the battery from the motorcycle.
- * Do not remove the caps on the battery top while recharging.

Recharging time: 0.9 A for 5 to 10 hours or 4 A for 1 hour

CAUTION

Be careful not to permit the charging current to exceed 5 A at any time.

- After recharging, wait for 30 minutes and more and check the battery voltage with a multi circuit tester.
- If the battery voltage is the 12.5 V and less, recharge the battery again.
- If battery voltage is still 12.5 V and less, after recharging, replace the battery with a new one.
- When the motorcycle is not used for a long period, check the battery every 1 month to prevent the battery discharge.



SERVICING INFORMATION

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TROUBLESHOOTING ENGINE

Complaint	Symptom and possible causes	Remedy
Engine will not start or is hard to start.	<p>Compression too low</p> <ol style="list-style-type: none"> 1. Worn cylinder. 2. Worn piston ring. 3. Worn valve guide or improper valve seating. 4. Loose spark plug. 5. Broken, cracked or damaged piston. 6. Slow cranking starter motor. 7. Mistimed valves. 8. Valve clearance out of adjustment. <p>Spark plug not sparking</p> <ol style="list-style-type: none"> 1. Damaged spark plug. 2. Damaged spark plug cap. 3. Fouled spark plug. 4. Wet spark plug. 5. Defective ignition coil. 6. Open or short in high-tension cord. 7. Defective signal generator. 8. Defective ignitor. <p>No fuel reaching a carburetor</p> <ol style="list-style-type: none"> 1. Clogged fuel tank vent hose. 2. Clogged or defective fuel valve. 3. Defective needle valve. 4. Clogged fuel hose. 5. Clogged fuel filter. 	<p>Rebore or replace. Replace. Repair or replace. Tighten. Replace. See electrical section. Adjust. Adjust.</p> <p>Replace. Replace. Clean or replace. Clean and dry or replace. Replace. Replace. Replace. Replace.</p> <p>Clean or replace. Clean or replace. Replace with needle valve seat. Clean or replace. Clean or replace.</p>
Engine stalls easily.	<ol style="list-style-type: none"> 1. Fouled spark plug. 2. Defective signal generator. 3. Defective ignitor. 4. Clogged fuel hose. 5. Clogged carburetor jet. 6. Valve clearance out of adjustment. 	<p>Clean or replace. Replace. Replace. Clean. Clean. Adjust.</p>

Complaint	Symptom and possible causes	Remedy
Engine is noisy.	<p>Excessive valve chatter</p> <ol style="list-style-type: none"> 1. Excessive valve clearance. 2. Weak or broken valve spring. 3. Worn rocker arm or rocker arm shaft. 4. Worn or burnt camshaft journal. <p>Noise seems to come from the piston</p> <ol style="list-style-type: none"> 1. Worn piston. 2. Worn cylinder. 3. Carbon build-up in combustion chamber. 4. Worn piston pin or piston pin bore. 5. Worn piston ring or ring groove. <p>Noise seems to come from the cam chain</p> <ol style="list-style-type: none"> 1. Stretched cam chain. 2. Worn cam chain sprocket. 3. Improperly working cam chain tensioner. <p>Noise seems to come from the clutch</p> <ol style="list-style-type: none"> 1. Worn countershaft spline. 2. Worn clutch hub spline. 3. Worn clutch plate teeth. 4. Distorted clutch plate. 5. Worn clutch release bearing. 6. Weak clutch damper. <p>Noise seems to come from the crankshaft</p> <ol style="list-style-type: none"> 1. Worn or burnt crank pin bearing. 2. Worn or burnt journal bearing. 3. Excessive thrust clearance. <p>Noise seems to come from the transmission</p> <ol style="list-style-type: none"> 1. Worn or rubbing gear. 2. Worn countershaft spline. 3. Worn driveshaft spline. 4. Worn or rubbing primary gear. 5. Worn bearing. 	<p>Adjust. Replace. Replace. Replace.</p> <p>Replace. Rebore or replace. Clean. Replace. Replace.</p> <p>Replace cam chain and sprockets. Replace cam chain and sprockets. Repair or replace.</p> <p>Replace countershaft. Replace clutch hub. Replace clutch plate. Replace. Replace. Replace primary driven gear.</p> <p>Replace. Replace. Replace thrust bearing.</p> <p>Replace. Replace countershaft. Replace driveshaft. Replace. Replace.</p>
Clutch slips.	<ol style="list-style-type: none"> 1. Clutch cable out of adjustment. 2. Weak or broken clutch spring. 3. Worn or distorted clutch pressure plate. 4. Distorted clutch plate. 	<p>Adjust. Replace. Replace. Replace.</p>
Clutch drags.	<ol style="list-style-type: none"> 1. Clutch out of adjustment. 2. Some clutch springs are weak, while others are not. 3. Worn or distorted clutch pressure plate. 4. Distorted clutch plate. 	<p>Adjust. Replace. Replace. Replace.</p>
Transmission will not shift.	<ol style="list-style-type: none"> 1. Broken gearshift cam. 2. Distorted gearshift fork. 3. Worn gearshift pawl. 	<p>Replace. Replace. Replace.</p>
Transmission will not shift back.	<ol style="list-style-type: none"> 1. Broken gearshift shaft return spring. 2. Rubbing or stuck gearshift shaft. 3. Worn or distorted gearshift fork. 	<p>Replace. Repair or replace. Replace.</p>

Complaint	Symptom and possible causes	Remedy
Transmission jumps out of gear.	<ol style="list-style-type: none"> 1. Worn gear. 2. Worn or distorted gearshift fork. 3. Weakened gearshift stopper spring. 4. Worn gearshift pawl. 	Replace. Replace. Replace. Replace.
Engine idles poorly.	<ol style="list-style-type: none"> 1. Valve clearance out of adjustment. 2. Improper valve seating. 3. Worn valve guide. 4. Worn rocker arm or rocker arm shaft. 5. Excessive spark plug gap. 6. Defective ignition coil. 7. Defective signal generator. 8. Defective ignitor. 9. Incorrect float chamber fuel level. 10. Clogged carburetor jet. 11. Carburetors not synchronized. 	Adjust. Repair or replace. Replace. Replace. Adjust or replace. Replace. Replace. Replace. Adjust float height. Clean. Synchronize.
Engine runs poorly in high-speed range.	<ol style="list-style-type: none"> 1. Weak valve spring. 2. Worn camshaft. 3. Insufficient spark plug gap. 4. Mistimed valves. 5. Ignition not advanced sufficiently due to poorly working timing advance circuit. 6. Defective ignition coil. 7. Defective signal generator. 8. Defective ignitor. 9. Low float chamber fuel level. 10. Dirty air cleaner element. 11. Clogged fuel hose, resulting in inadequate fuel supply to carburetor. 	Replace. Replace. Regap or replace. Adjust. Replace ignitor. Replace. Replace. Replace. Adjust float height. Clean or replace. Clean and prime.
Exhaust smoke is dirty or thick.	<ol style="list-style-type: none"> 1. Excessive amount of engine oil. 2. Worn cylinder. 3. Worn piston ring. 4. Worn valve guide. 5. Scored or scuffed cylinder wall. 6. Worn valve stem. 7. Defective valve stem oil seal. 8. Worn oil ring side rail. 	Check level and drain. Rebore or replace. Replace. Replace. Rebore or replace. Replace valve. Replace. Replace oil ring.
Engine lacks power.	<ol style="list-style-type: none"> 1. Insufficient valve clearance. 2. Weak valve spring. 3. Mistimed valves. 4. Worn cylinder. 5. Worn piston ring. 6. Improper valve seating. 7. Fouled spark plug. 8. Incorrect spark plug. 9. Clogged carburetor jet. 10. Incorrect float chamber fuel level. 11. Dirty air cleaner element. 12. Loose throttle valve synchronizing screw. 13. Air leakage from intake pipe. 14. Excessive amount of engine oil. 	Adjust. Replace. Adjust. Rebore or replace. Replace. Repair or replace. Clean or replace. Replace. Clean. Adjust float height. Clean or replace. Tighten. Tighten or replace. Check level and drain.

Complaint	Symptom and possible causes	Remedy
Engine overheats.	<ol style="list-style-type: none">1. Carbon build-up on piston crown.2. Insufficient amount of engine oil.3. Defective oil pump.4. Clogged oil circuit.5. Float chamber fuel level too low.6. Air leakage from intake pipe.7. Incorrect engine oil.	Clean. Check level and add. Replace. Clean. Adjust float height. Tighten or replace. Change.

CARBURETOR

Complaint	Symptom and possible causes	Remedy
Starting difficulty.	<ol style="list-style-type: none"> 1. Clogged starter jet. 2. Clogged starter jet passage. 3. Air leaking from joint between starter body and carburetor. 4. Air leaking from carburetor joint or vacuum hose joint. 5. Improperly working starter (enricher) plunger. 	Clean. Clean. Tighten, adjust or replace gasket. Tighten or replace defective part. Adjust.
Idling or low-speed trouble.	<ol style="list-style-type: none"> 1. Clogged or loose pilot jet. 2. Clogged or loose pilot air jet. 3. Air leaking from carburetor joint, vacuum pipe joint, or starter. 4. Clogged pilot outlet port. 5. Clogged bypass port. 6. Starter (enricher) plunger not fully closed. 	Clean or tighten. Clean or tighten. Tighten or replace defective part. Clean. Clean. Adjust.
Medium-or high speed trouble	<ol style="list-style-type: none"> 1. Clogged main jet. 2. Clogged main air jet. 3. Clogged needle jet. 4. Improperly working throttle valve. 5. Clogged fuel filter. 	Clean. Clean. Clean. Adjust. Clean or replace.
Overflow and fuel level fluctuations.	<ol style="list-style-type: none"> 1. Worn or damaged needle valve. 2. Broken needle valve spring. 3. Improperly working float. 4. Foreign matter on the needle valve. 5. Incorrect float chamber fuel level. 	Replace. Replace. Adjust or replace. Clean or replace with needle valve seat. Adjust float height.

CHASSIS

Complaint	Symptom and possible causes	Remedy
Steering is heavy.	<ol style="list-style-type: none"> 1. Overtightened steering stem nut. 2. Broken bearing/race in steering stem. 3. Distorted steering stem. 4. Low tire pressure. 	Adjust. Replace. Replace. Regulate.
Handlebar wobbles.	<ol style="list-style-type: none"> 1. Loss of balance between right and left front forks. 2. Distorted front fork. 3. Distorted front axle. 4. Twisted tire. 	Adjust or replace. Repair or replace. Replace. Replace.
Front wheel wobbles.	<ol style="list-style-type: none"> 1. Distorted wheel rim. 2. Worn front wheel bearing. 3. Defective or incorrect tire. 4. Loose front axle nut. 5. Loose front axle pinch bolt. 6. Incorrect fork oil level. 	Replace. Replace. Replace. Tighten. Tighten. Adjust.
Front suspension too soft.	<ol style="list-style-type: none"> 1. Weak spring. 2. Insufficient fork oil. 	Replace. Check level and add.
Front suspension too stiff.	<ol style="list-style-type: none"> 1. Excessively viscous fork oil. 2. Excessive fork oil. 	Replace. Check level and drain.
Front suspension too noisy.	<ol style="list-style-type: none"> 1. Insufficient fork oil. 2. Loose front suspension fastener. 	Check level and add. Tighten.

Complaint	Symptom and possible causes	Remedy
Rear wheel wobbles.	<ol style="list-style-type: none"> 1. Distorted wheel rim. 2. Worn rear wheel bearing. 3. Defective or incorrect tire. 4. Worn swingarm bearing. 5. Worn rear suspension bush. 6. Loose rear suspension fastener. 	Replace. Replace. Replace. Replace. Replace. Tighten.
Rear suspension too soft	<ol style="list-style-type: none"> 1. Weak rear shock absorber spring. 2. Rear shock absorber leaks oil. 3. Improper suspension setting. 	Replace. Replace. Adjust.
Rear suspension too stiff	<ol style="list-style-type: none"> 1. Improper suspension setting. 2. Bent rear shock absorber shaft. 3. Bent swingarm. 4. Worn swingarm and rear suspension related bearings. 	Adjust. Replace. Replace. Replace.
Rear suspension too noisy.	<ol style="list-style-type: none"> 1. Loose rear suspension fastener. 2. Worn rear suspension bush. 3. Worn swingarm bearing. 	Tighten. Replace. Replace.

BRAKES

Complaint	Symptom and possible causes	Remedy
Brake power insufficient.	<ol style="list-style-type: none"> 1. Leakage of brake fluid. 2. Worn brake pad. 3. Oil on brake pad surface. 4. Worn brake disc. 5. Air in hydraulic system. 	Repair or replace. Replace. Clean brake disc and brake pads. Replace. Bleed.
Brake squeaks.	<ol style="list-style-type: none"> 1. Carbon adhesion on brake pad surface. 2. Tilted brake pad. 3. Damaged wheel bearing. 4. Worn brake pad. 5. Foreign material in brake fluid. 6. Clogged return port of master cylinder. 7. Loose front or rear axle. 	Clean surface with sandpaper. Readjust brake pad position or replace. Replace. Replace. Change brake fluid. Disassemble and clean master cylinder. Tighten.
Brake lever or pedal stroke excessive.	<ol style="list-style-type: none"> 1. Air in hydraulic system. 2. Insufficient brake fluid. 3. Incorrect brake fluid. 	Bleed. Check level and add. Bleed any air. Change.
Brake fluid leaks.	<ol style="list-style-type: none"> 1. Loose connection joint. 2. Cracked hose. 3. Worn piston seal. 4. Worn secondary cup. 	Tighten. Replace. Replace. Replace.
Brake drags.	<ol style="list-style-type: none"> 1. Rusty part. 2. Insufficient brake lever or brake pedal pivot lubrication. 	Clean and lubricate. Lubricate.

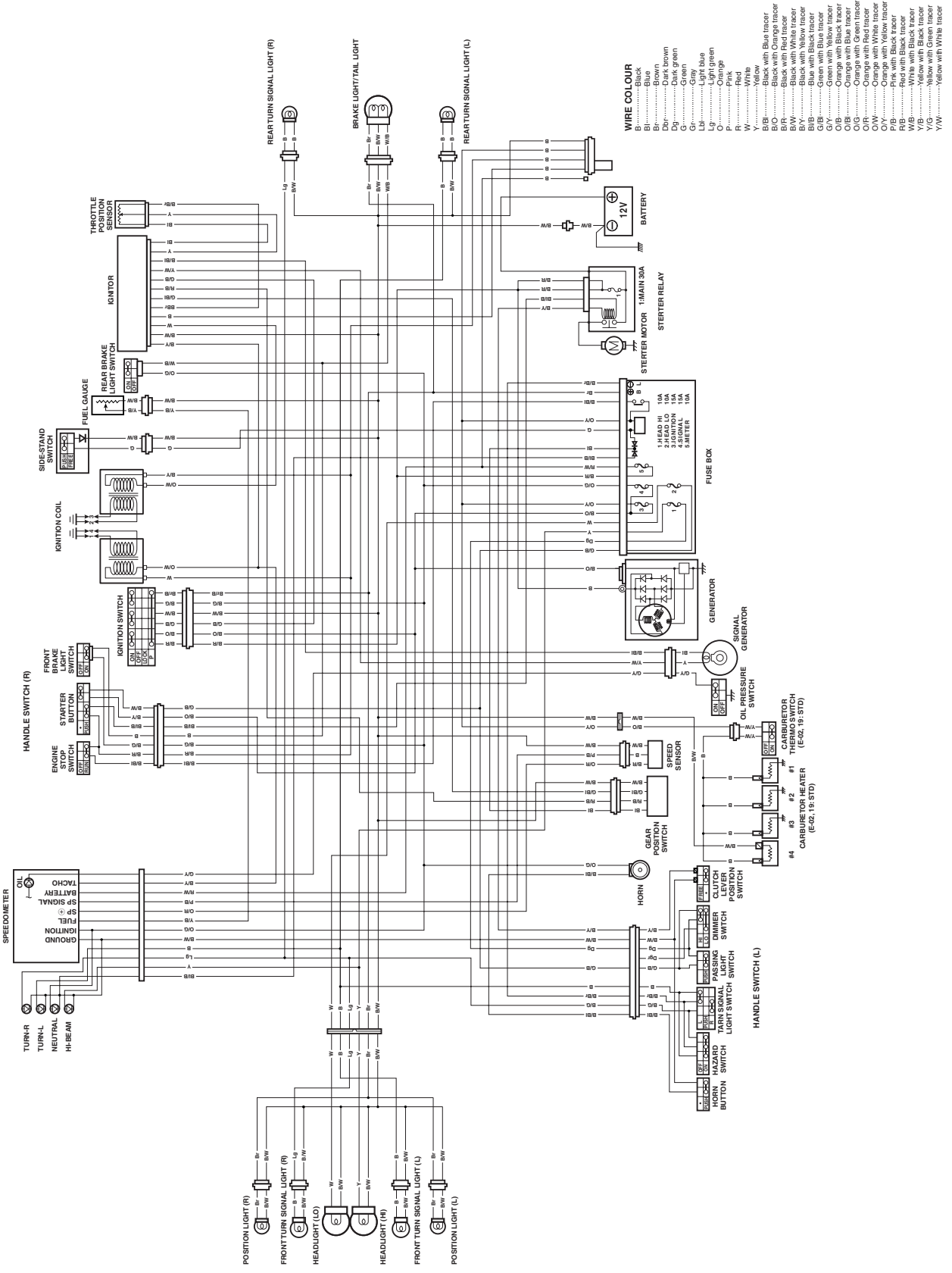
ELECTRICAL

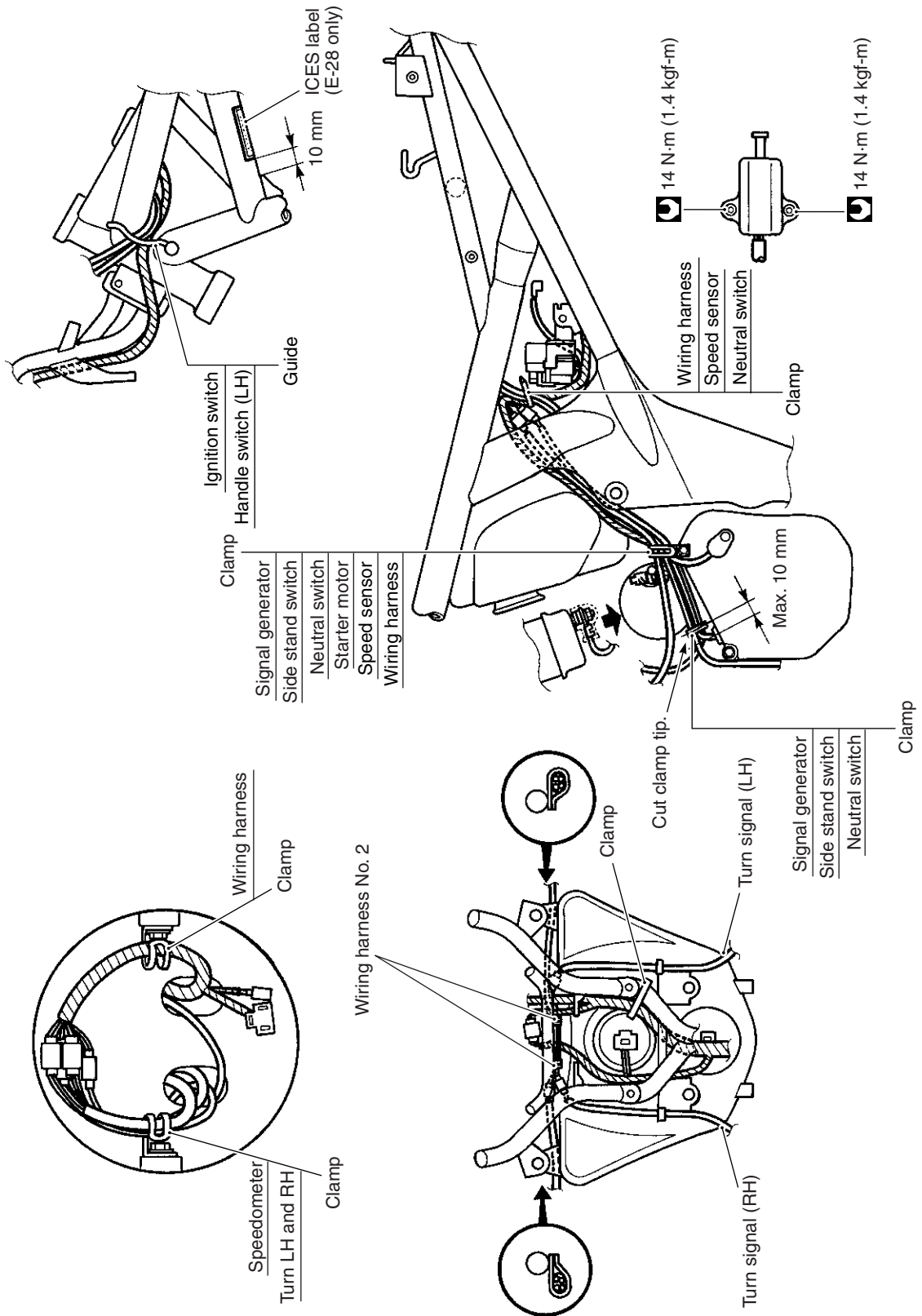
Complaint	Symptom and possible causes	Remedy
No sparking or poor sparking.	<ol style="list-style-type: none"> 1. Defective ignition coil. 2. Defective spark plug. 3. Defective signal generator. 4. Defective ignitor. 	Replace. Replace. Replace. Replace.
Spark plug is wet or quickly becomes fouled with carbon.	<ol style="list-style-type: none"> 1. Excessively rich air/fuel mixture. 2. Excessively high idling speed. 3. Incorrect gasoline. 4. Dirty air cleaner element. 5. Incorrect spark plug (cold type). 	Adjust carburetor. Adjust carburetor. Change. Clean or replace. Change to hot type spark plug.
Spark plug quickly becomes fouled with oil or carbon.	<ol style="list-style-type: none"> 1. Worn piston ring. 2. Worn piston. 3. Worn cylinder. 4. Excessive valve-stem to valve-guide clearance. 5. Worn valve stem oil seal. 	Replace. Replace. Rebore or replace. Replace. Replace.
Spark plug electrodes overheat or burn.	<ol style="list-style-type: none"> 1. Incorrect spark plug (hot type). 2. Overheated engine. 3. Loose spark plug. 4. Excessively lean air/fuel mixture. 	Change to cold type spark plug. Tune-up. Tighten. Adjust carburetor.
Generator does not charge.	<ol style="list-style-type: none"> 1. Open or short in lead wires, or loose lead connections. 2. Shorted, grounded or open generator coil. 3. Shorted or punctured IC regulator or rectifier. 	Repair, replace or connect properly. Replace. Replace.
Generator charges but charging rate is below the specifications.	<ol style="list-style-type: none"> 1. Lead wires tend to get shorted or open-circuited or loosely connected at terminal. 2. Grounded or open-circuited stator coils or generator. 3. Defective IC regulator or rectifier. 4. Defective battery cell plates. 	Repair or tighten. Replace. Replace. Replace battery.
Generator over-charges.	<ol style="list-style-type: none"> 1. Internal short-circuit in the battery. 2. Damaged or defective IC regulator or rectifier. 3. Poorly grounded IC regulator. 	Replace battery. Replace. Clean and tighten ground connection.
Unstable charging.	<ol style="list-style-type: none"> 1. Lead wire insulation frayed due to vibration, resulting in intermittent shorting. 2. Internally shorted generator. 3. Defective IC regulator or rectifier. 	Repair or replace. Replace. Replace.
Starter button does not work.	<ol style="list-style-type: none"> 1. Run down battery. 2. Defective switch contact. 3. Brushes do not seat properly on the commutator in the starter motor. 4. Defective starter relay/starter interlock switch. 	Recharge or replace. Replace. Repair or replace. Replace.

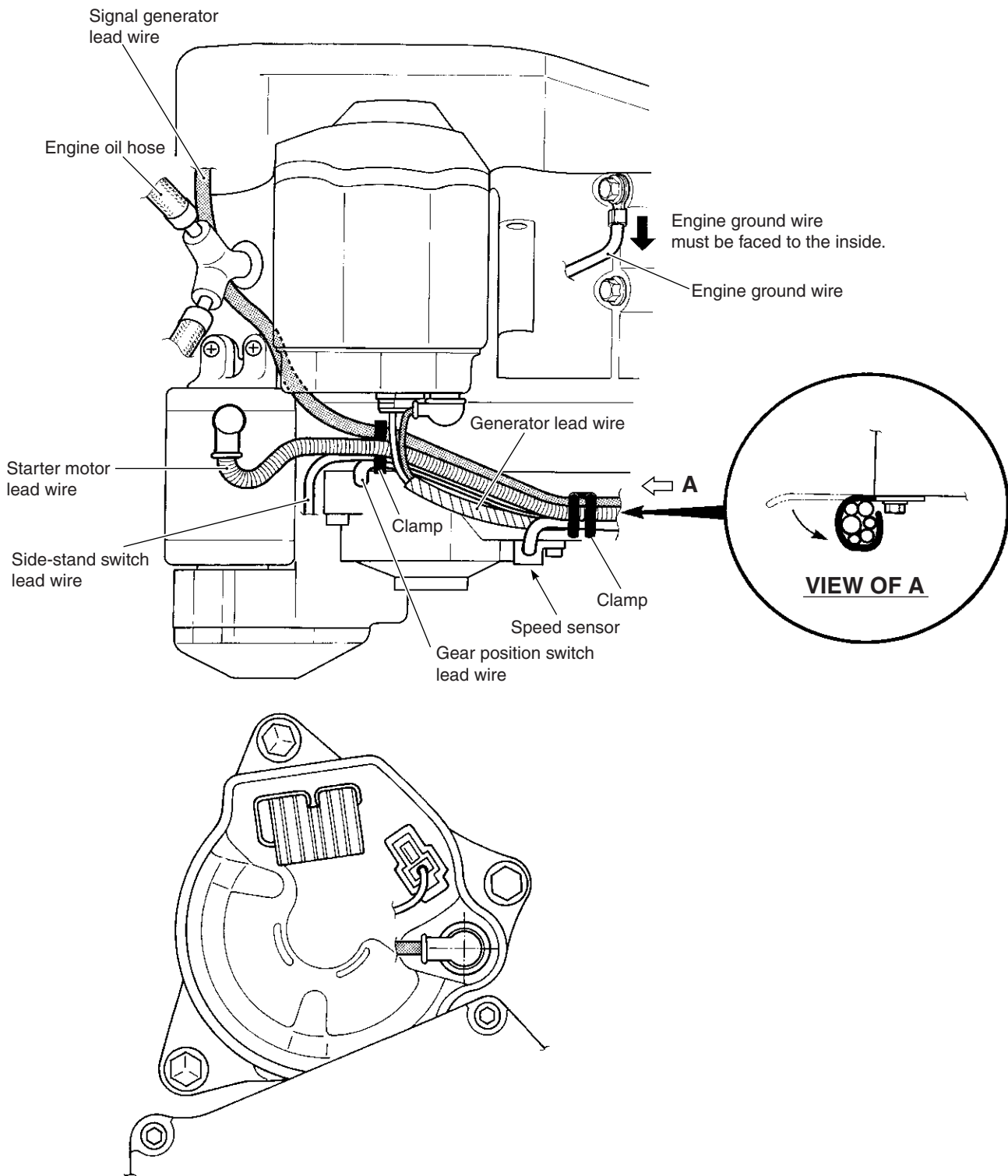
BATTERY (MF BATTERY)

Complaint	Symptom and possible causes	Remedy
Sulfation or spots on surfaces of cell plates.	<ol style="list-style-type: none"> 1. Cracked battery case. 2. Battery has been left in a run-down condition for a long time. 	<p>Replace the battery. Replace.</p>
Battery runs down quickly.	<ol style="list-style-type: none"> 1. Incorrect charging method. 2. Battery cell plates have lost much of their active material as a result of overcharging. 3. Internally shorted battery. 4. Excessively low battery voltage. 5. Battery is too old. 6. Dirty container top and sides. 	<p>Check generator, IC regulator, or rectifier circuit connections, and make necessary adjustment to obtain specified charging operation. Replace battery and correct charging system. Replace. Recharge. Replace. Clean.</p>
Battery sulfation.	<ol style="list-style-type: none"> 1. Incorrect charging rate. (When not in use, the battery should be checked at least once a month and properly charged if necessary, to avoid sulfation.) 2. The battery was left unused in a cold climate for too long. 	<p>Replace battery. Replace the battery if badly sulfated.</p>
Battery discharges too rapidly.	<ol style="list-style-type: none"> 1. Dirty container top and sides. 2. Current leaks. 	<p>Clean. Measure leakage current and replace defective parts.</p>

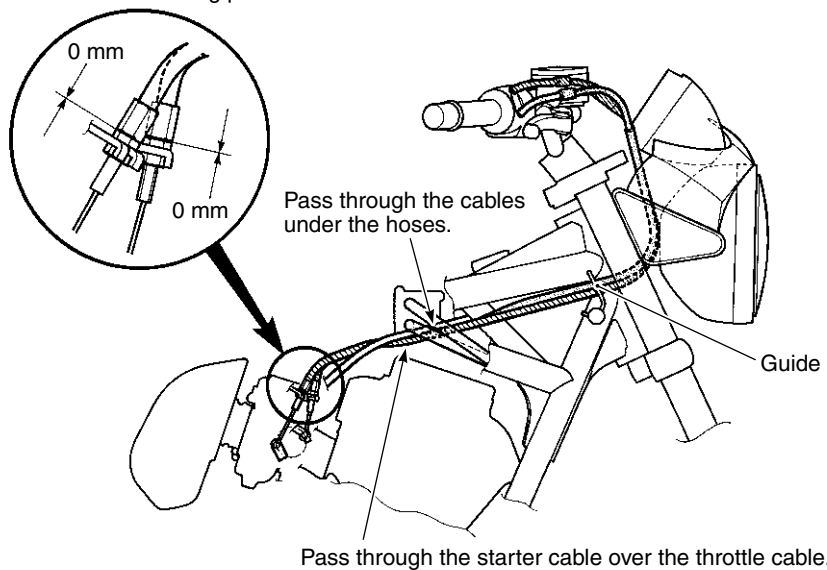
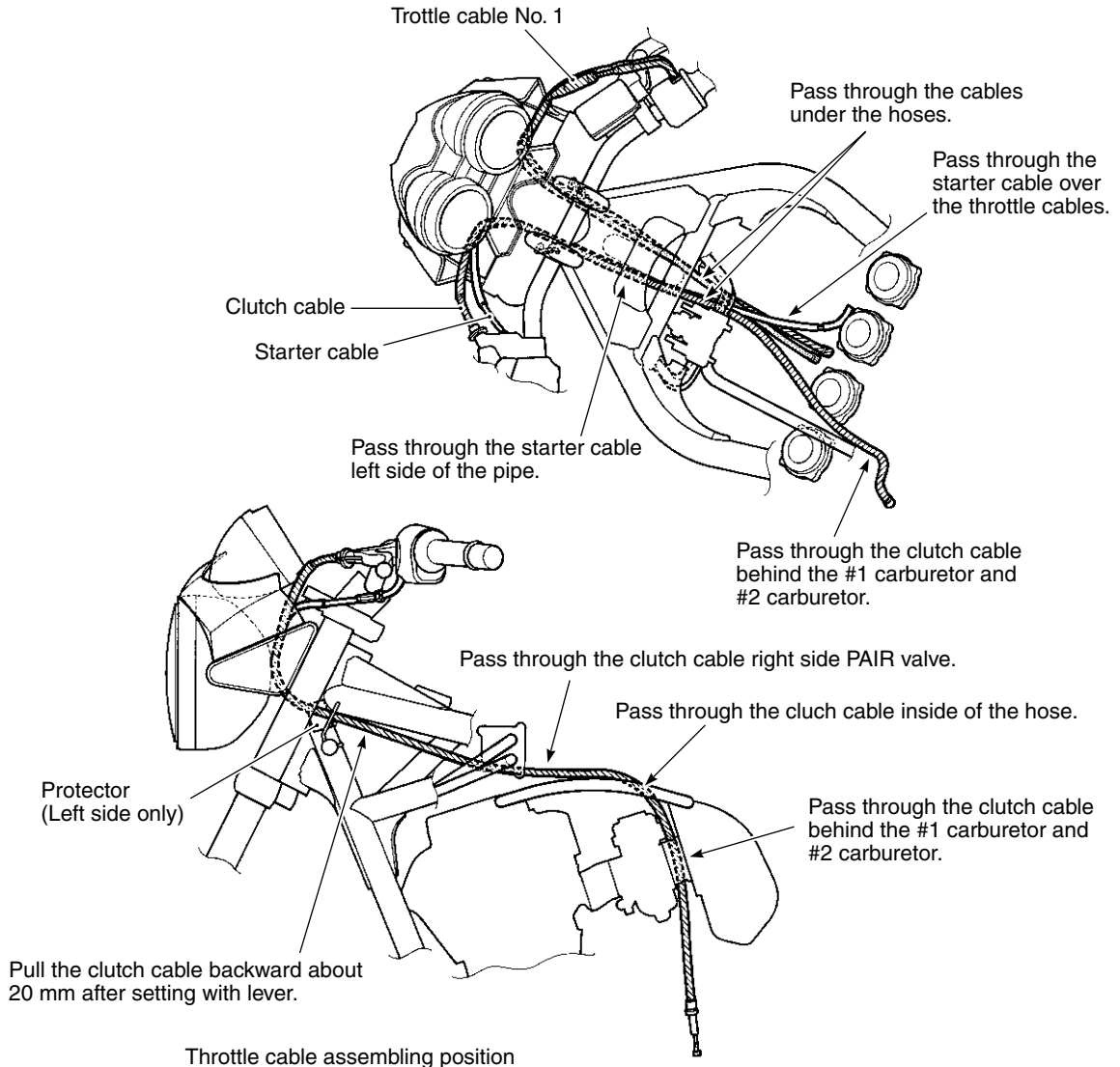
GSF650S



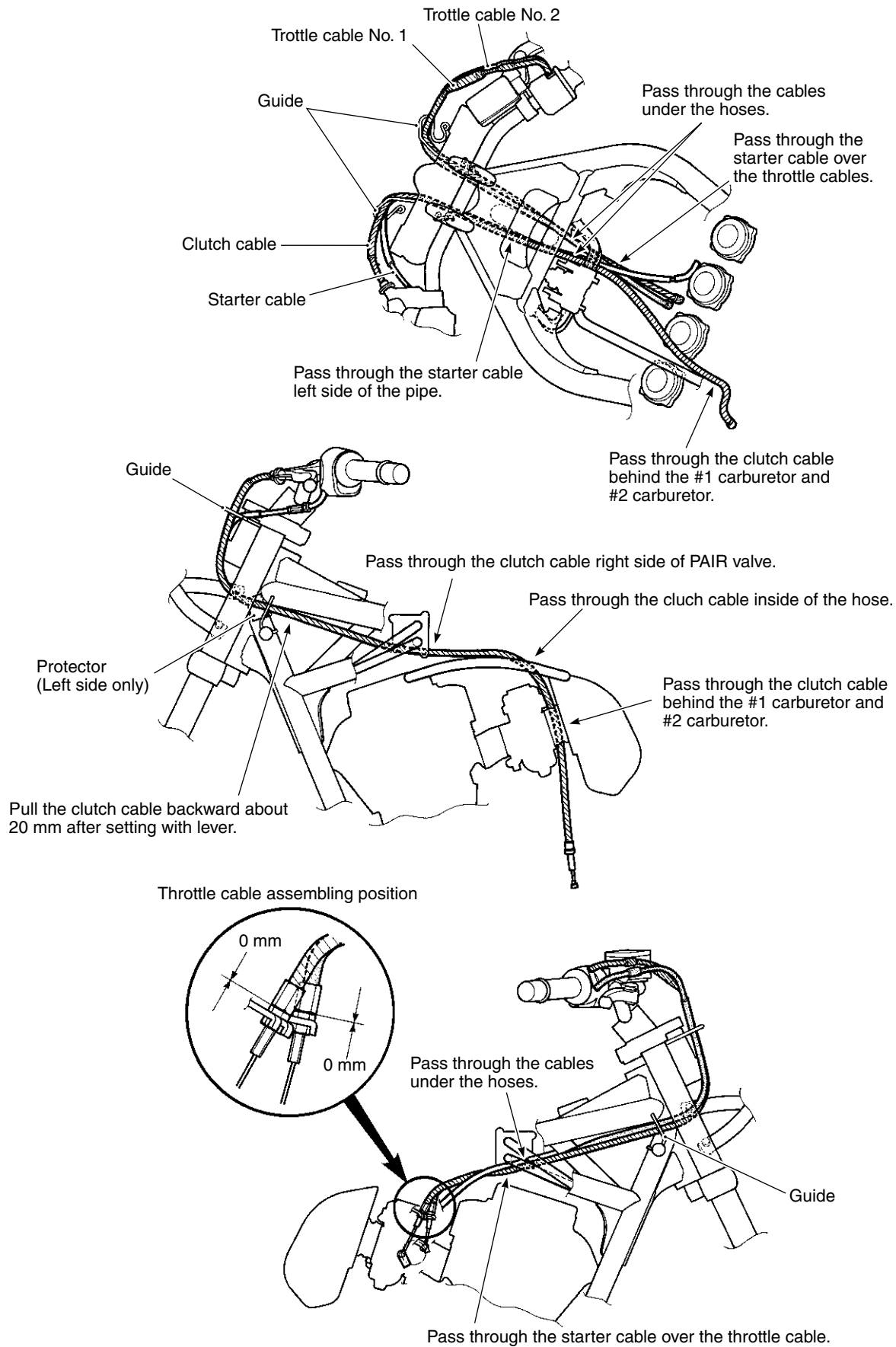




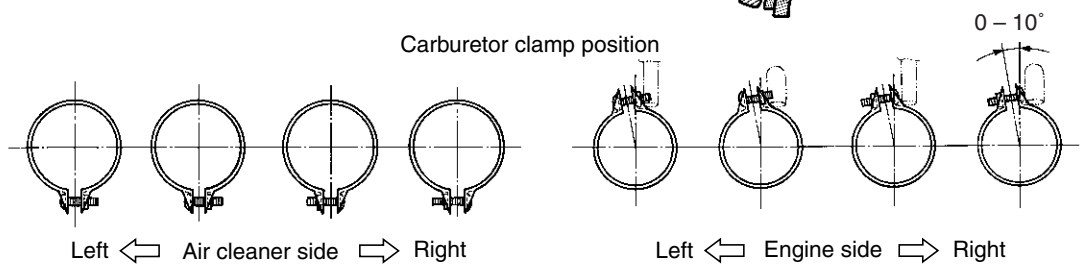
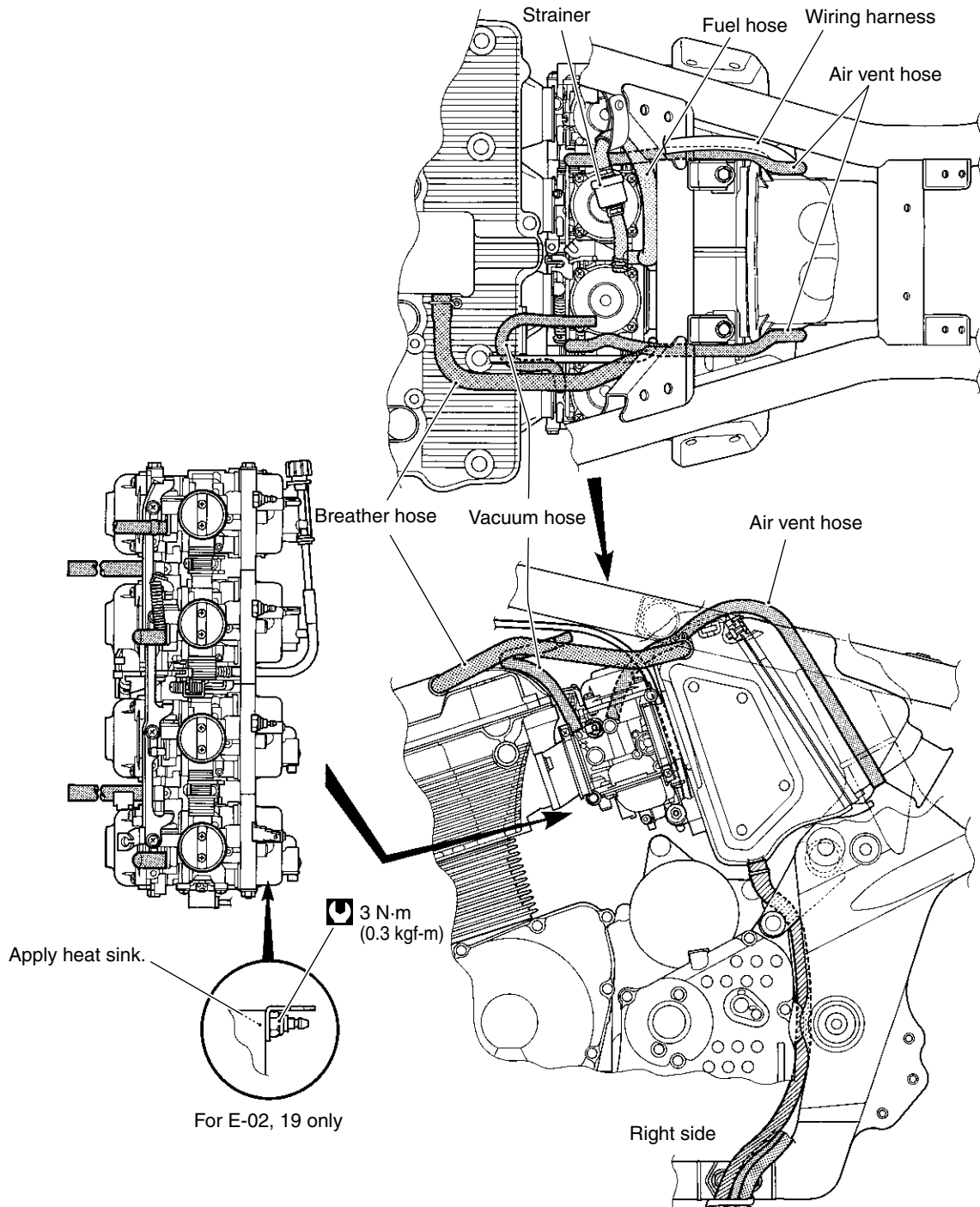
CABLE ROUTING (GSF650)



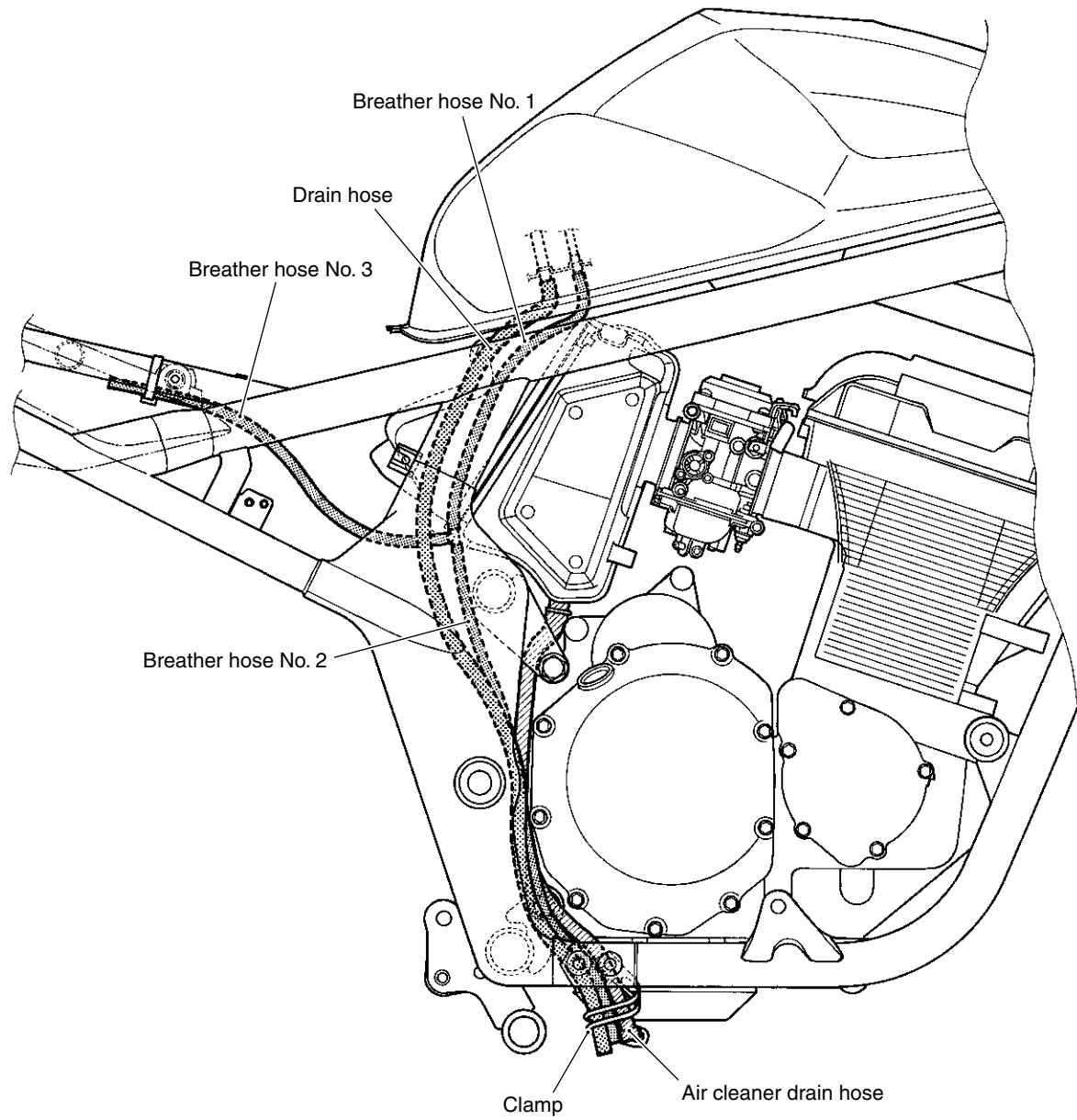
CABLE ROUTING (GSF650S)



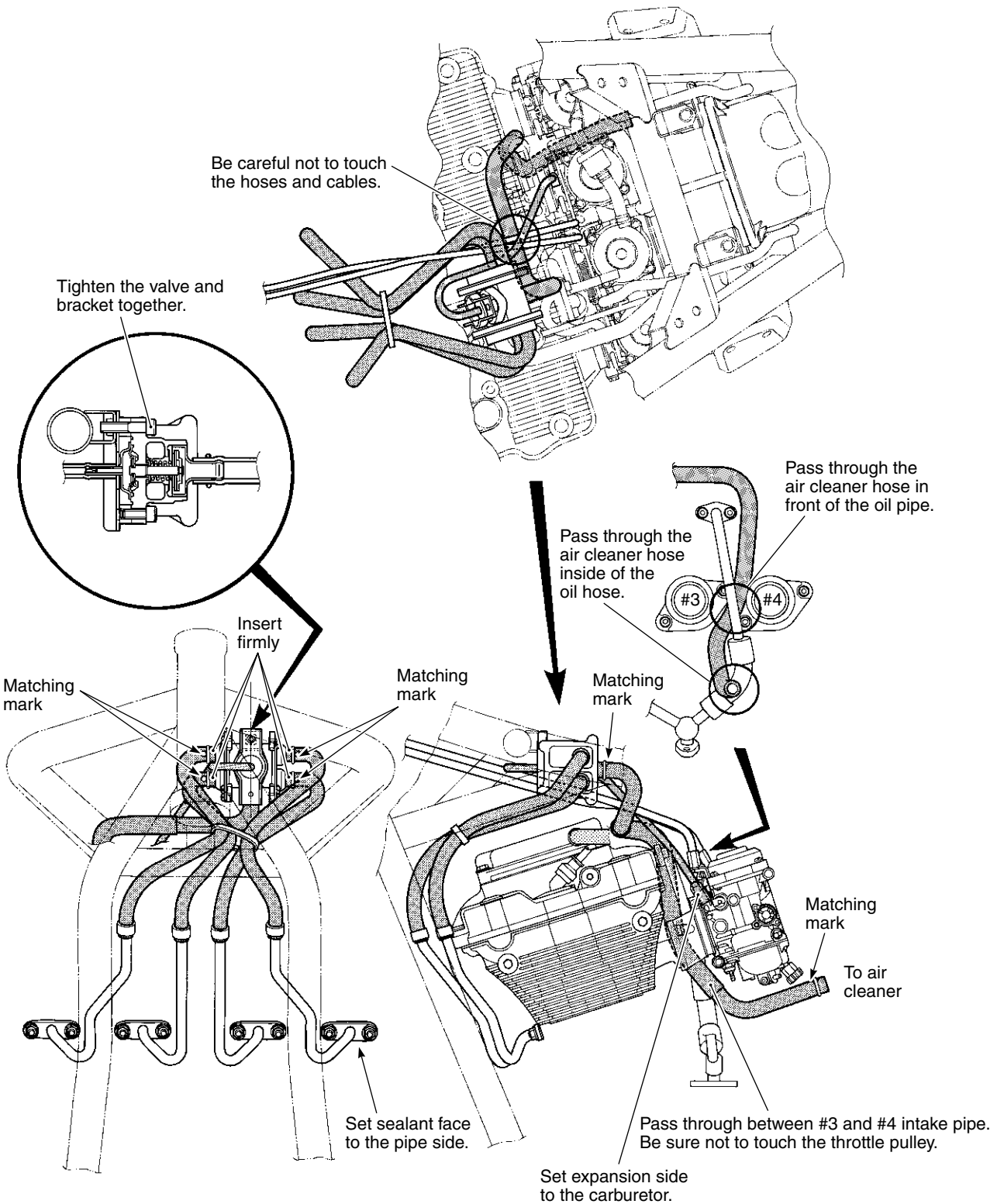
CARBURETOR HOSE ROUTING



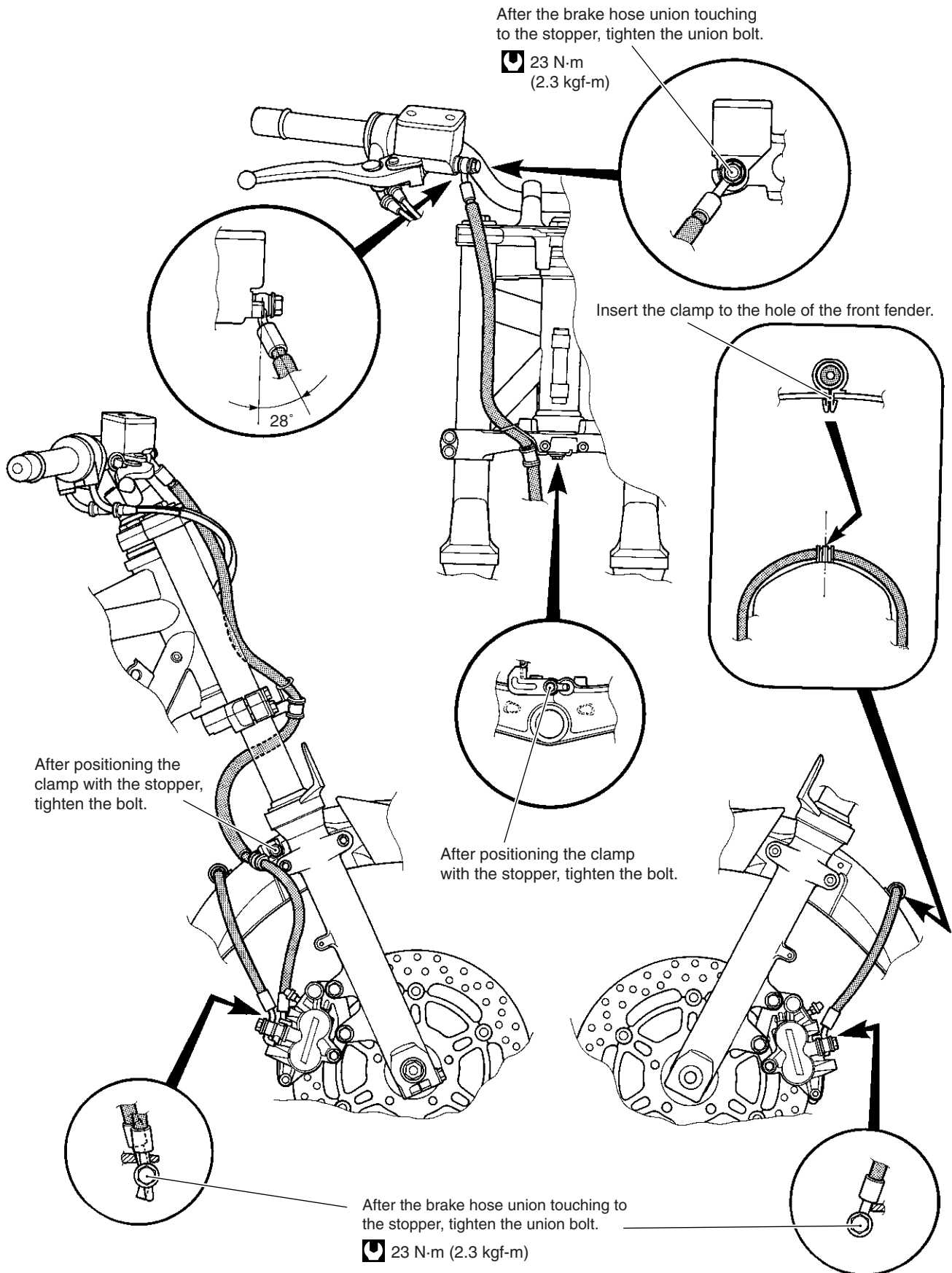
FUEL TANK DRAIN HOSE ROUTING



PAIR (AIR SUPPLY) SYSTEM HOSE ROUTING




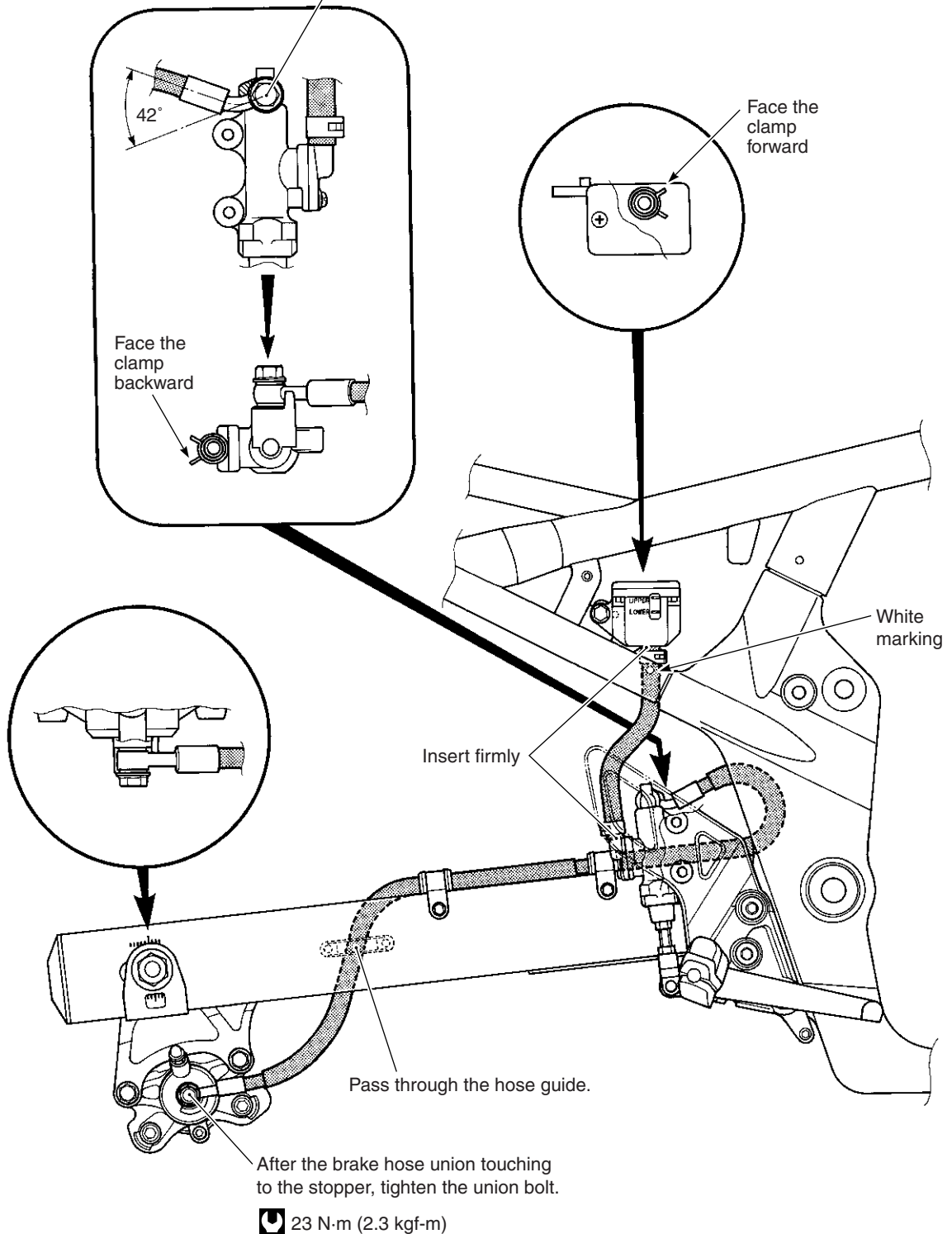
FRONT BRAKE HOSE ROUTING



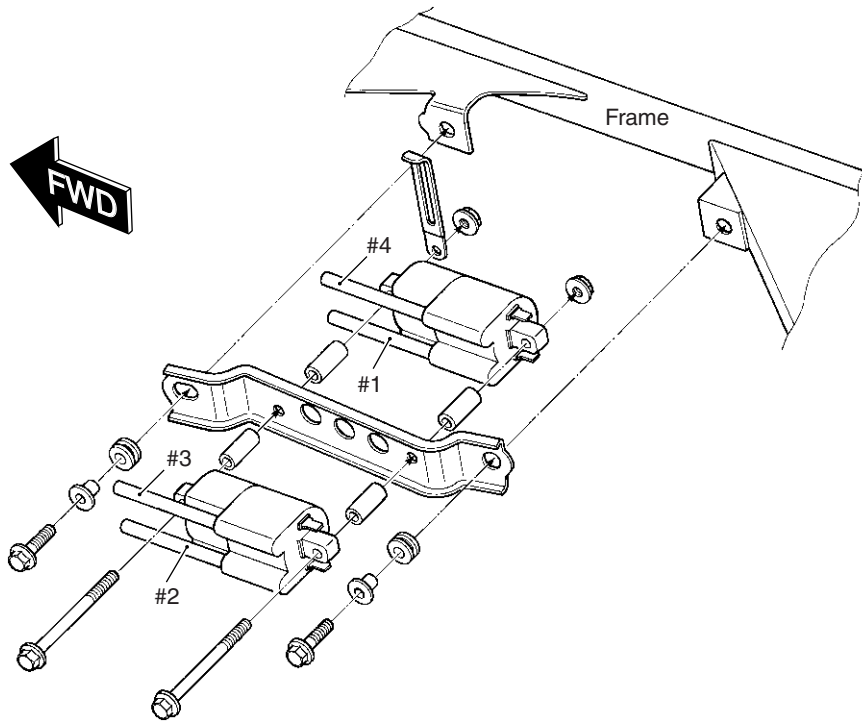
REAR BRAKE HOSE ROUTING

After the brake hose union touching to the stopper, tighten the union bolt.

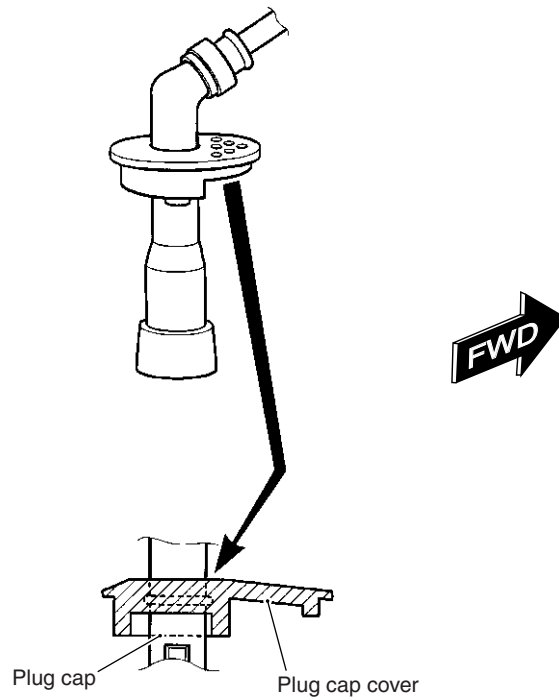
 23 N·m (2.3 kgf-m)



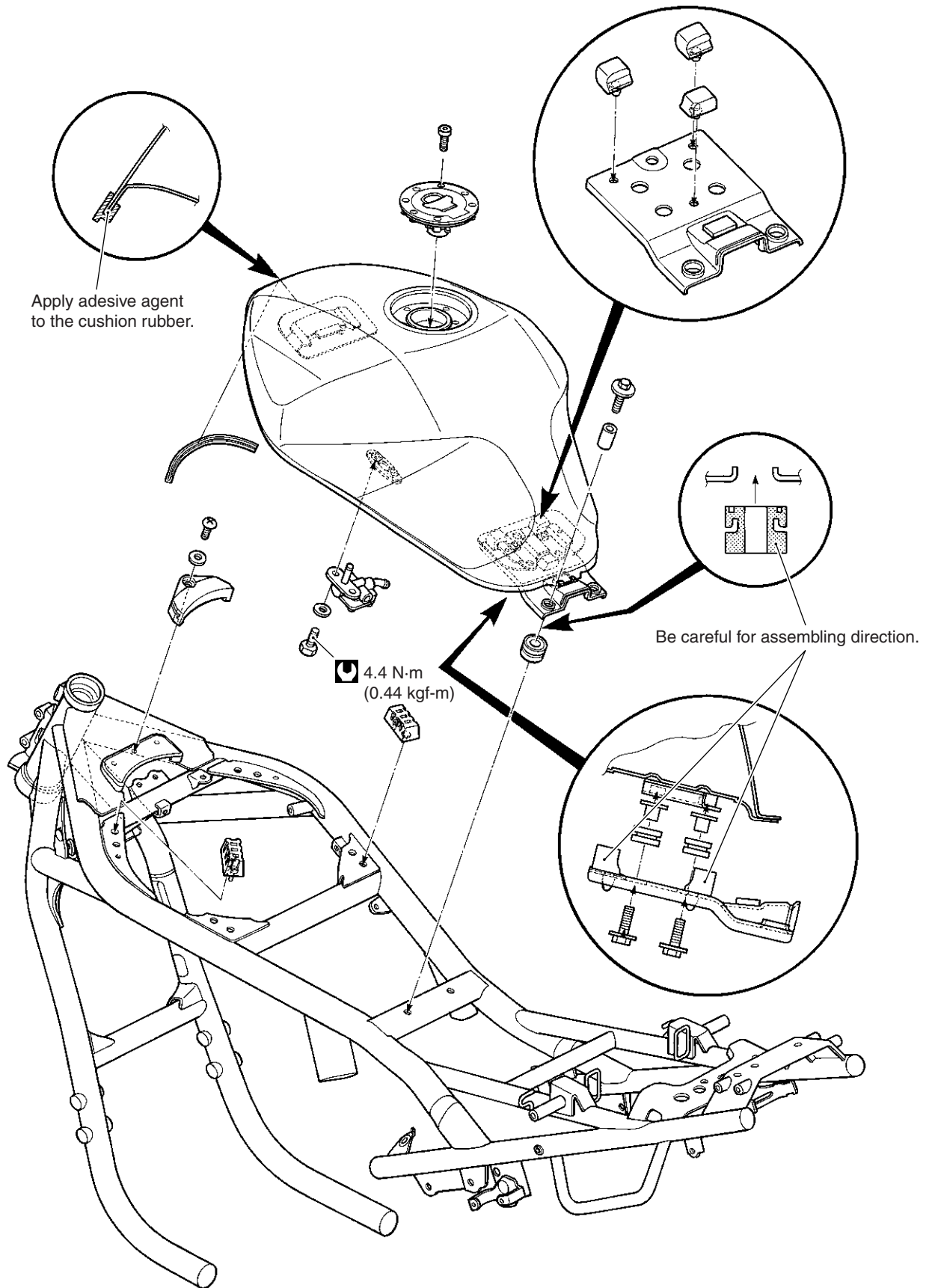
IGNITION COIL INSTALLATION



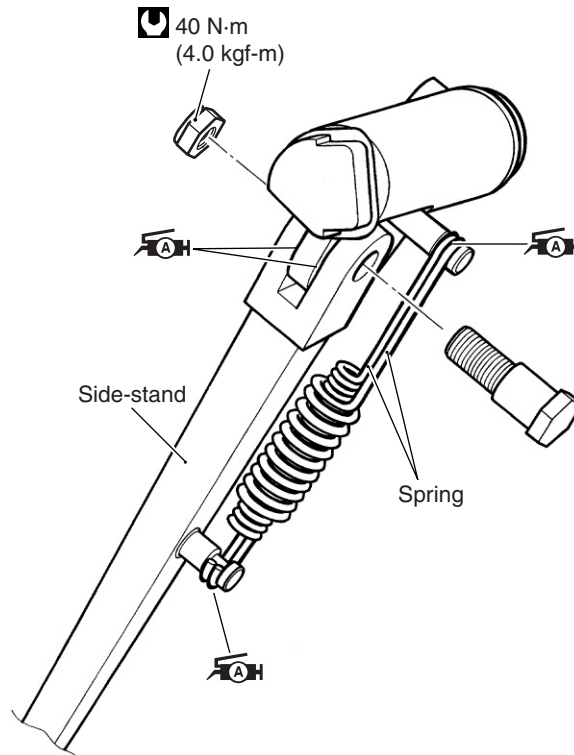
SPARK PLUG CAP INSTALLATION



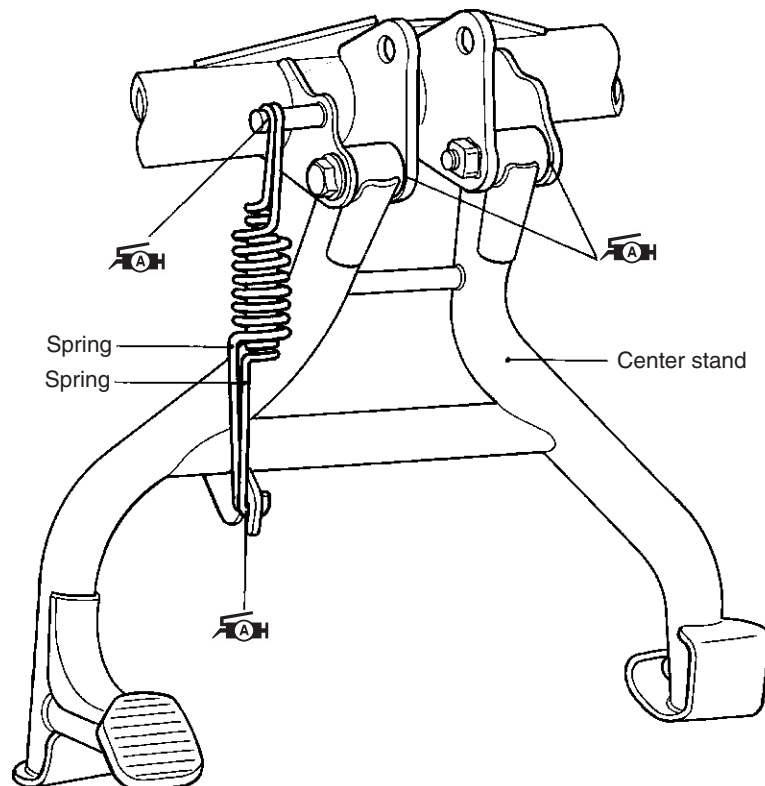
FUEL TANK SET UP



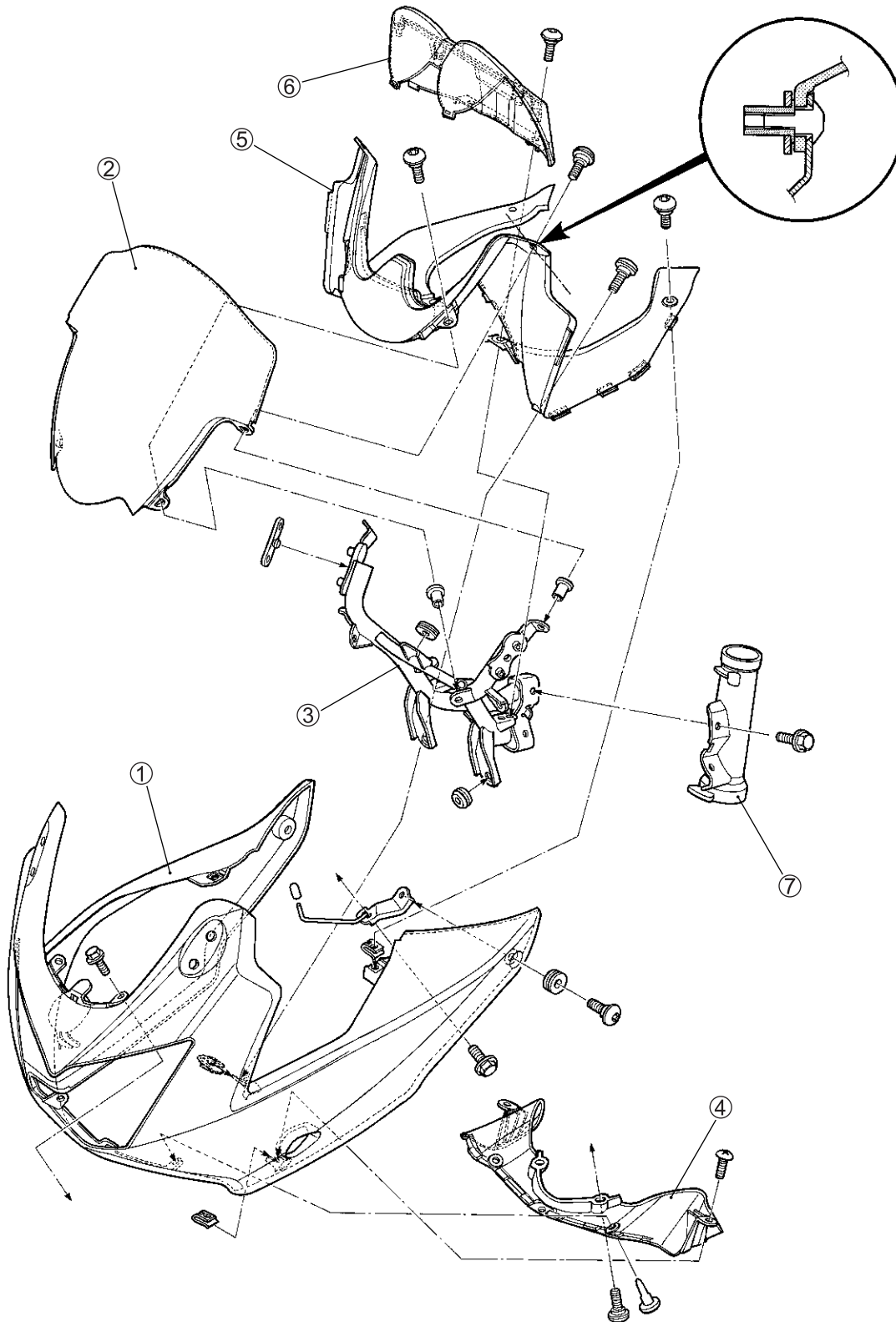
SIDE-STAND SPRINGS



CENTER STAND SPRINGS

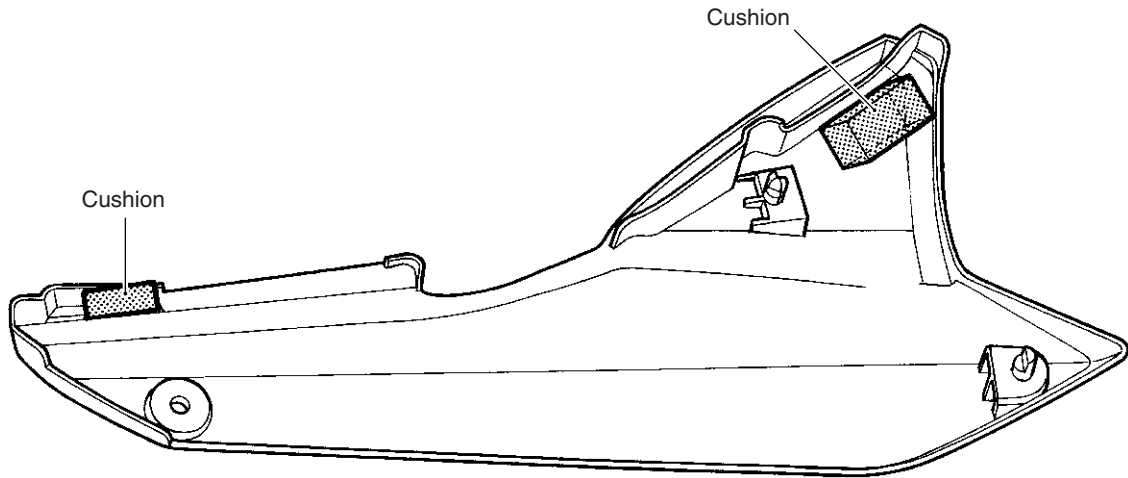


EXTERIOR PARTS CONSTRUCTION

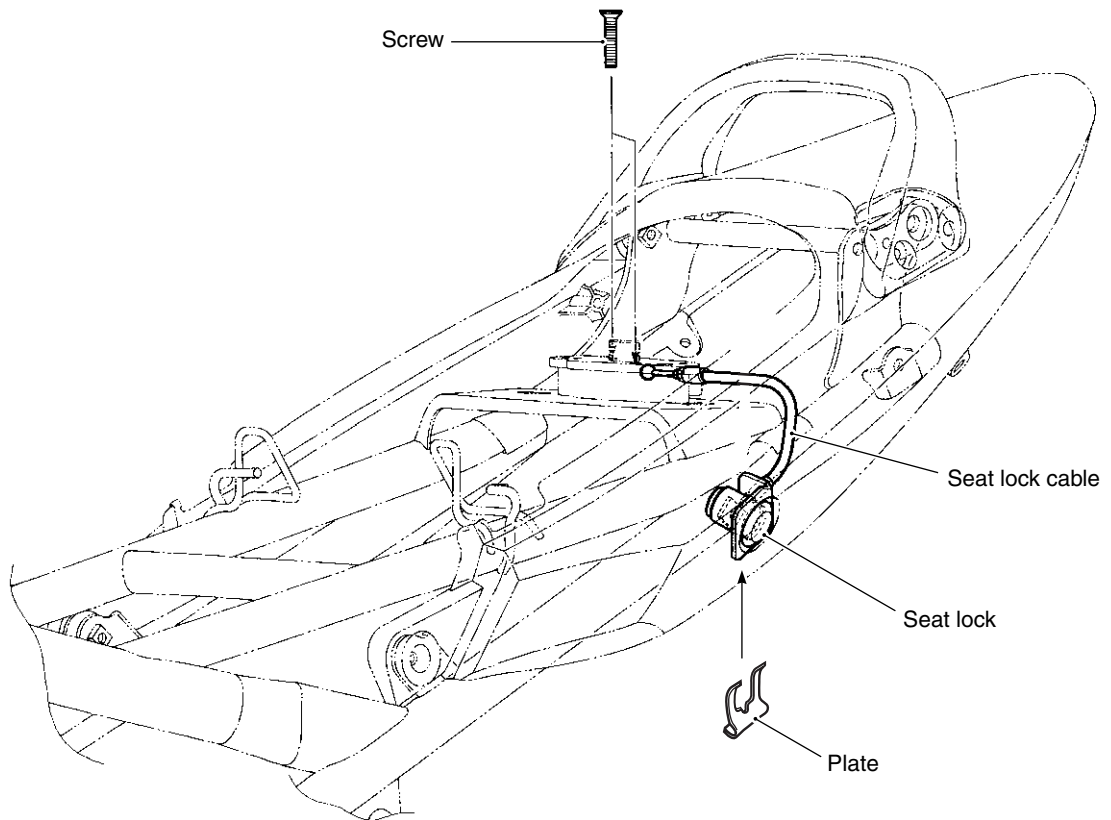


①	Cowling body	④	Lower panel	⑦	Frame
②	Wind screen	⑤	Upper panel		
③	Cowling brace	⑥	Meter panel lid		

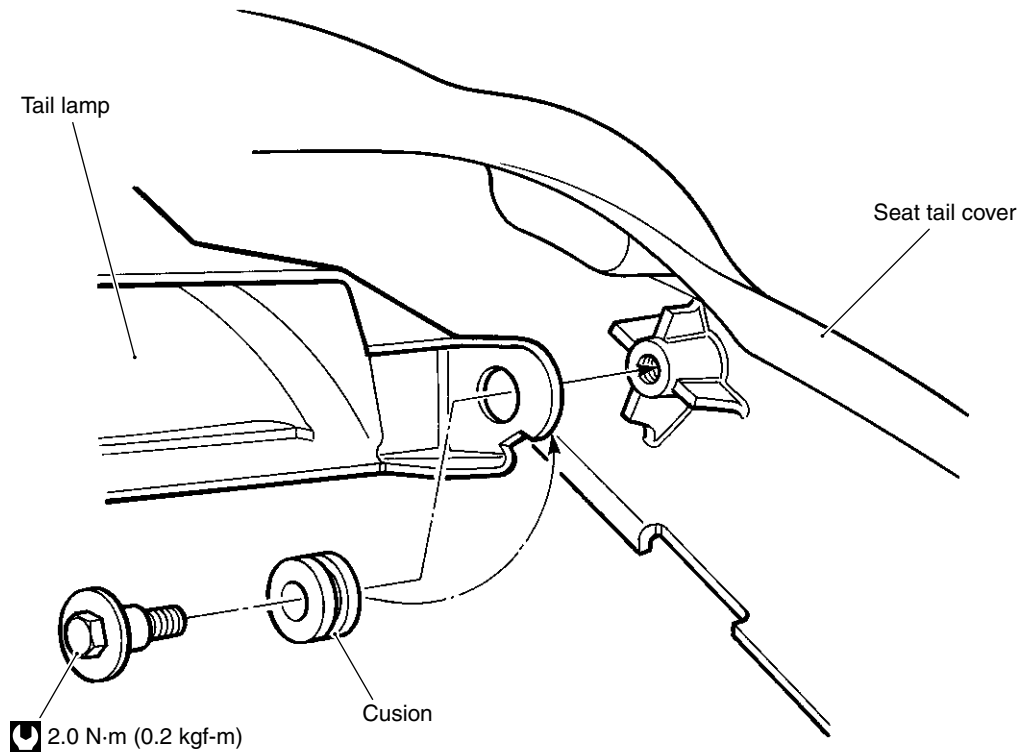
FRAME COVER CUSHION



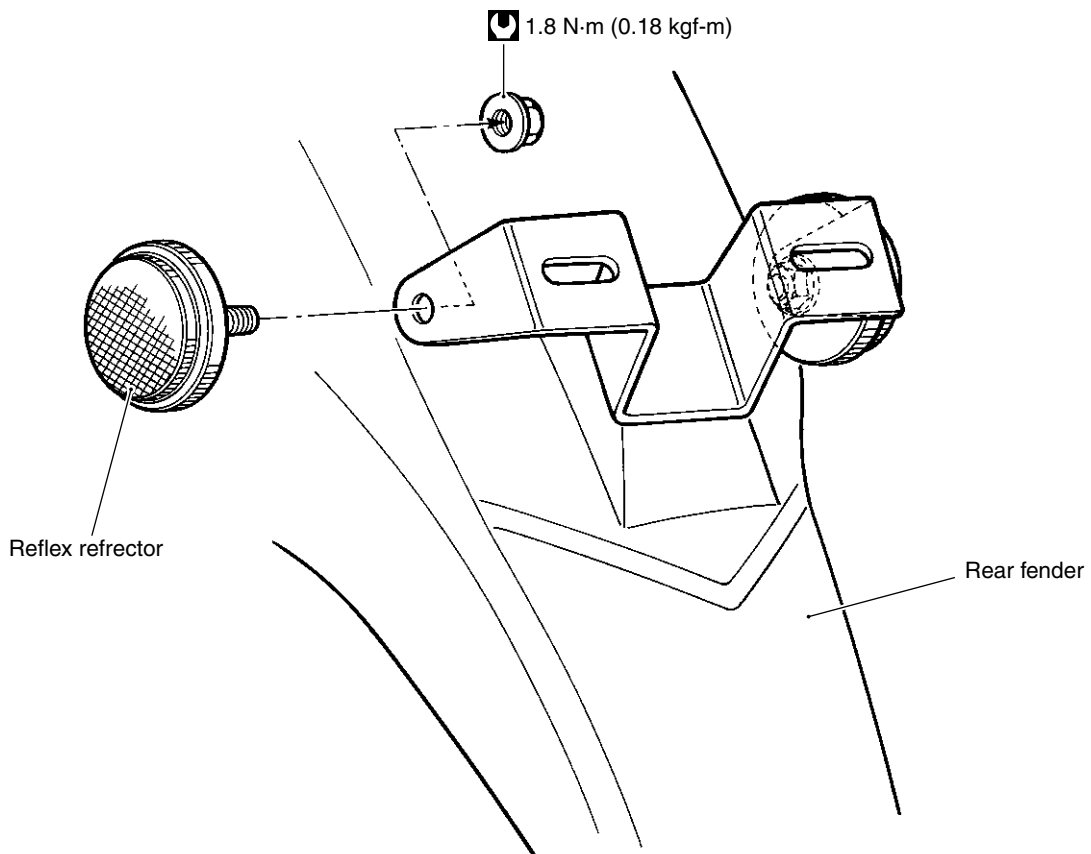
SEAT LOCK CABLE ROUTING



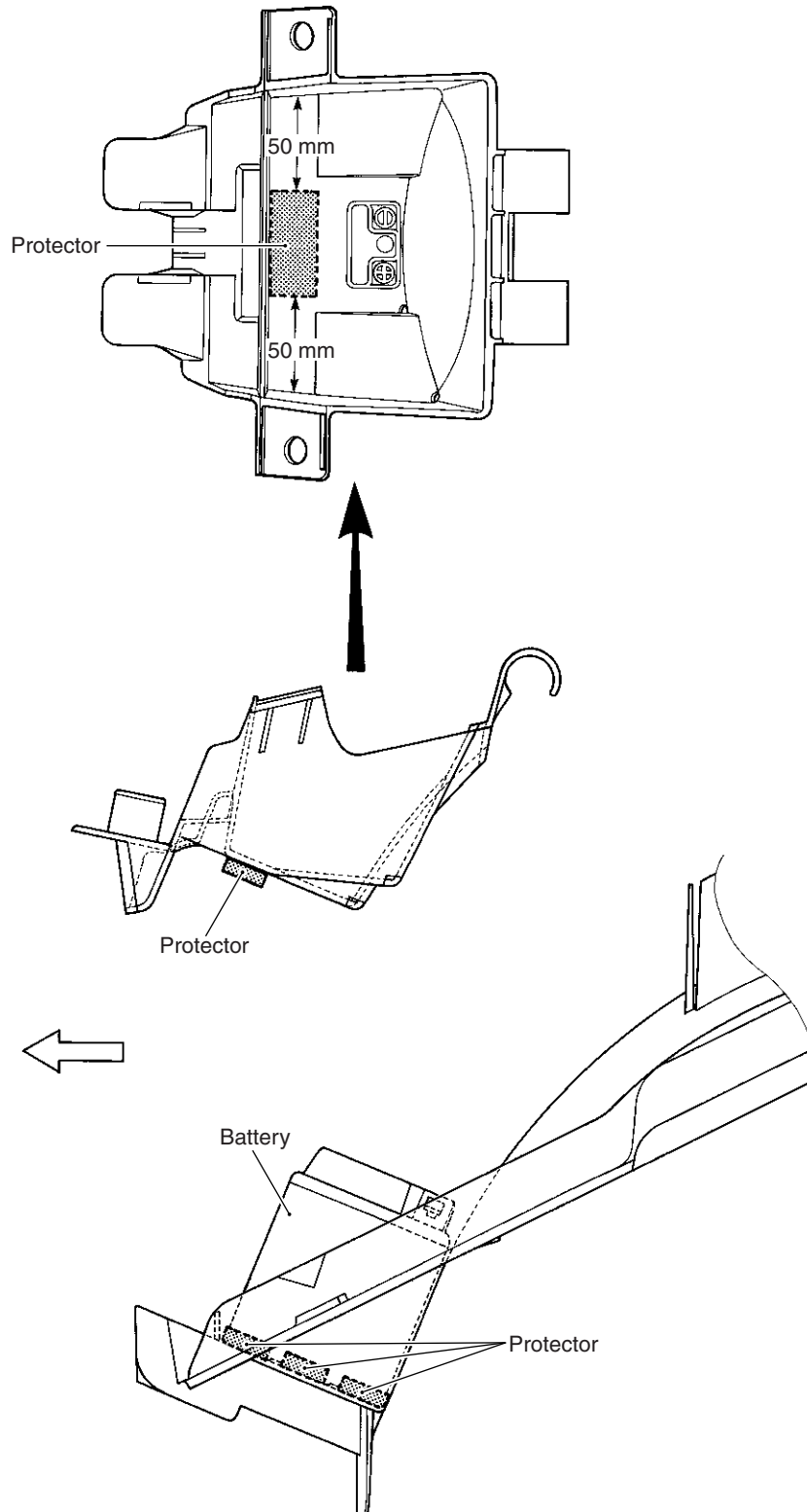
TAILLIGHT INSTALLATION



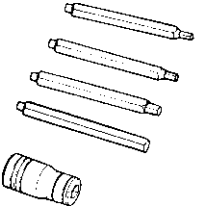
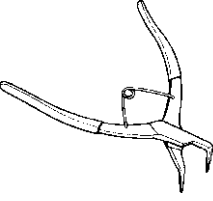
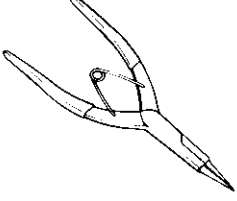
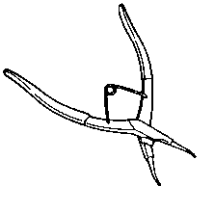
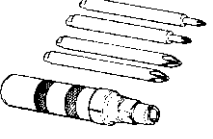
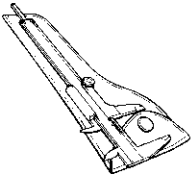
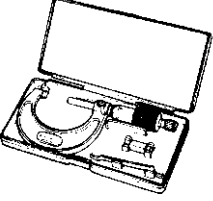


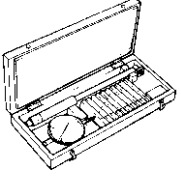
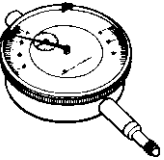
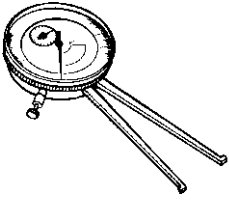
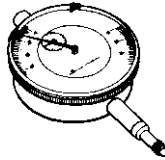
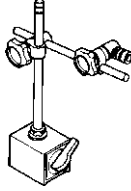
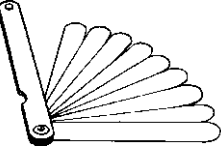
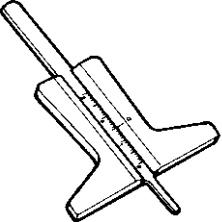
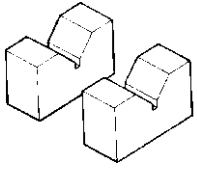

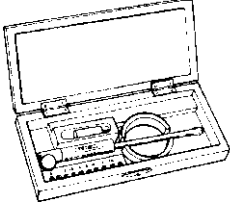
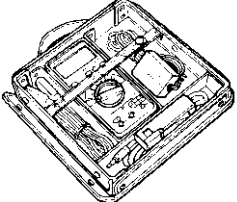
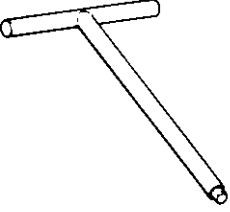
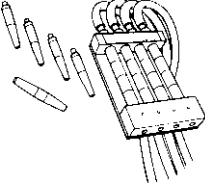
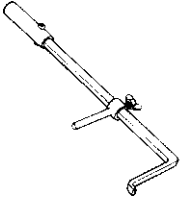
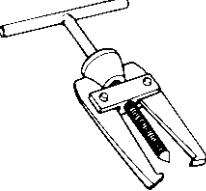
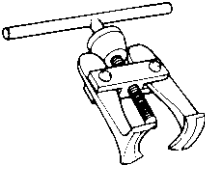
REFLEX REFLECTOR INSTALLATION

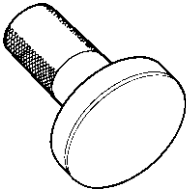
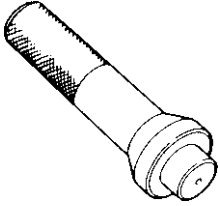
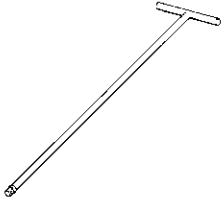
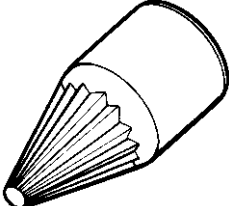
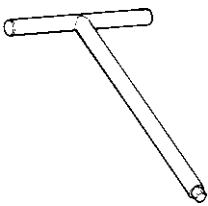
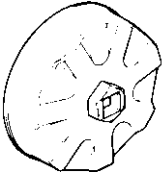
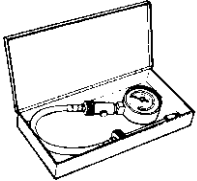


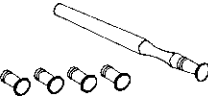
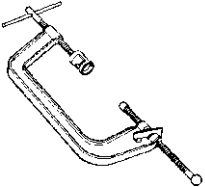
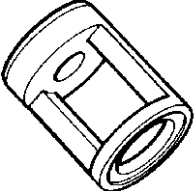
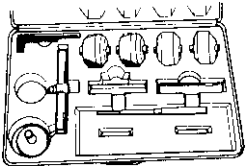
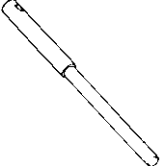
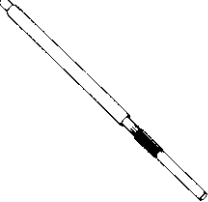
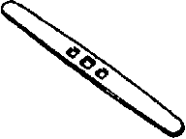

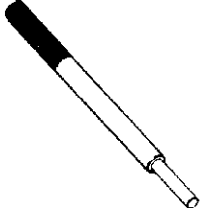
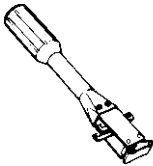

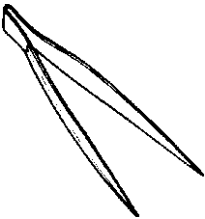
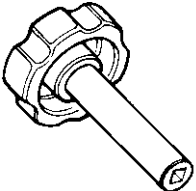
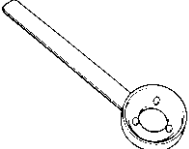
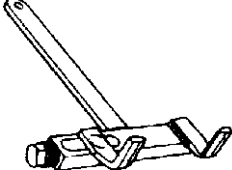
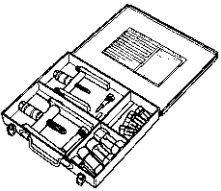


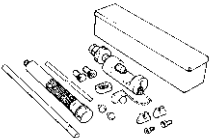
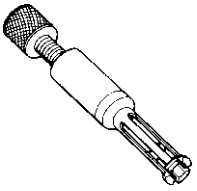
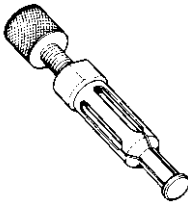
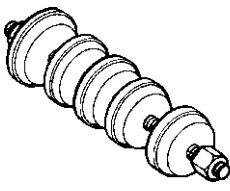
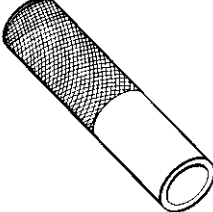
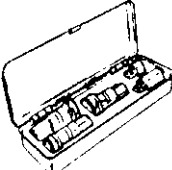
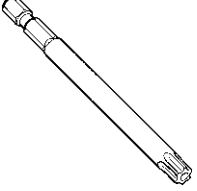
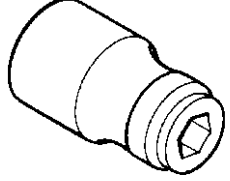
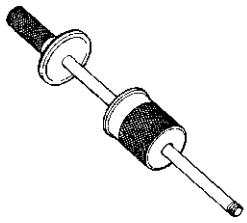
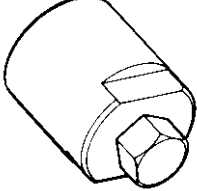
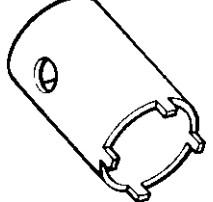
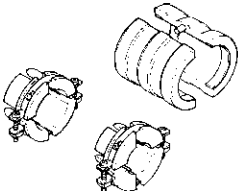
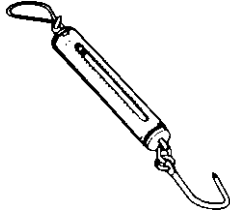
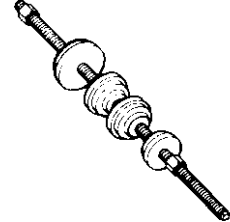
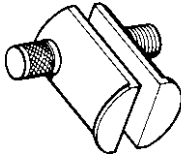
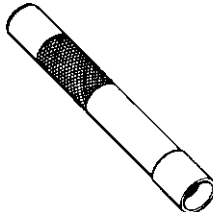
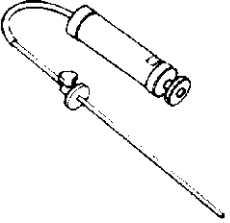
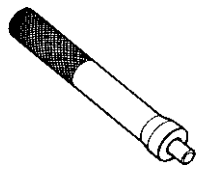
BATTERY PROTECTOR INSTALLATION



SPECIAL TOOLS

 <p>09900-00410 Hexagon wrench set</p>	 <p>09900-06106 Snap ring pliers</p>	 <p>09900-06107 Snap ring pliers</p>	 <p>09900-06108 Snap ring pliers</p>	 <p>09900-09004 Impact driver set</p>
 <p>09900-20102 Vernier calipers (1/20 mm, 200 mm)</p>	 <p>09900-20202 Micrometer (1/100 mm, 25 – 50 mm)</p>	 <p>09900-20203 Micrometer (1/100 mm, 50 – 75 mm)</p>	 <p>09900-20205 Micrometer (1/1000 mm, 0 – 25 mm)</p>	 <p>09900-20508 Cylinder gauge set (1/100 mm, 40 – 80 mm)</p>
 <p>09900-20602 Dial gauge (1/1 000 mm)</p>	 <p>09900-20605 Dial calipers (1/100 mm, 10 – 34 mm)</p>	 <p>09900-20606 Dial gauge (1/100 mm)</p>	 <p>09900-20701 Magnetic stand</p>	 <p>09900-20803 Thickness gauge</p>
 <p>09900-20805 Tire depth gauge</p>	 <p>09900-21304 V-block set (100 mm)</p>	 <p>09900-22301 09900-22302 Plastigauge</p>	 <p>09900-22403 Small bore gauge (18 – 35 mm)</p>	 <p>09900-25008 Multi circuit tester set</p>
 <p>09911-73730 “T” type hexagon wrench (5 mm)</p>	 <p>09913-13121 Carburetor balancer</p>	 <p>09913-50121 Oil seal remover</p>	 <p>09913-60910 Bearing remover</p>	 <p>09913-61510 Bearing remover</p>

 <p>09913-75520 Bearing installer</p>	 <p>09913-75830 Bearing remover</p>	 <p>09940-34520 T-handle</p>	 <p>09940-34531 Attachment (A)</p>	 <p>09914-25811 "T" type hexagon wrench (6 mm)</p>
 <p>09915-40610 Oil filter wrench</p>	 <p>09915-64510 Compression gauge set 09913-10750 (Adaptor)</p>	 <p>09915-74510 Oil pressure gauge 09915-77330 Meter (for high pressure)</p>	 <p>09915-74540 Oil pressure gauge attachment</p>	 <p>09916-10911 Valve lapper set</p>
 <p>09916-14510 Valve lifter</p>	 <p>09916-14910 Valve lifter attachment</p>	 <p>09916-21111 Valve seat cutter set</p>	 <p>09916-24311 Solid pilot (N-100-5.0)</p>	 <p>09916-34570 Valve guide reamer (4.95 mm)</p>
 <p>09916-34542 Valve guide reamer handle</p>	 <p>09916-34580 Valve guide reamer (10.8 mm)</p>	 <p>09916-44310 Valve guide remover/installer</p>	 <p>09916-74521 Holder body</p>	 <p>09916-74530 Band (55 - 65 mm)</p>
 <p>09916-84511 Tweezers</p>	 <p>09917-14910 Valve adjuster driver</p>	 <p>09920-34810 Starter clutch holder</p>	 <p>09920-53740 Clutch sleeve hub holder</p>	 <p>09921-20220 Bearing remover set</p>

 <p>09922-22711 Drive chain cutting and joining tool set</p>	 <p>09923-73210 Bearing remover</p>	 <p>09923-74510 Bearing remover (20 – 35 mm)</p>	 <p>09924-84510 Bearing installer set</p>	 <p>09925-98221 Bearing remover</p>
 <p>09930-10121 Spark plug wrench set</p>	 <p>09930-11920 Torx bit</p>	 <p>09930-11940 Bit holder</p>	 <p>09930-30102 Sliding shaft</p>	 <p>09930-33720 Rotor remover</p>
 <p>09940-14911 Steering stem nut wrench</p>	 <p>09940-52861 Front fork oil seal installer</p>	 <p>09940-92720 Spring scale</p>	 <p>09941-34513 Steering outer race installer</p>	 <p>09941-54911 Bearing outer race remover</p>
 <p>09941-74911 Steering bearing installer</p>	 <p>09943-74111 Fork oil level gauge</p>	 <p>09943-88211 Pinion bearing installer</p>		

NOTE:

When ordering a special tool, please confirm whether it is available or not.

TIGHTENING TORQUE ENGINE

ITEM	N·m	kgf·m
Cylinder head cover bolt (10 pcs.)	14	1.4
Cylinder head cover plug	15	1.5
Cylinder head cover union bolt	20	2.0
Cylinder head nut [M: 10]	37	3.7
Cylinder head bolt [M: 6]	10	1.0
Cylinder head plug	28	2.8
Cylinder base nut	9	0.9
Cylinder stud bolt	15	1.5
Valve clearance adjuster locknut	10	1.0
Rocker arm shaft set bolt	9	0.9
Camshaft journal holder bolt	10	1.0
Cam sprocket bolt	25	2.5
Oil cooler hose union bolt	23	2.3
Oil hose mounting bolt	10	1.0
Cam chain tensioner mounting bolt	7	0.7
Cam chain tensioner spring holder bolt	35	3.5
Conrod cap nut	35	3.5
Starter clutch mounting bolt	150	15.0
Signal generator rotor bolt	25	2.5
Crankcase bolt/nut [M: 6]	11	1.1
[M: 8]	23	2.3
Main oil gallery plug	40	4.0
Oil pump mounting bolt	10	1.0
Oil drain plug	23	2.3
Oil pan bolt	14	1.4
Speed sensor rotor bolt	13	1.3
Clutch sleeve hub nut	95	9.5
Clutch spring set bolt	12	1.2
Exhaust pipe bolt	23	2.3
Muffler mounting bolt	23	2.3
Engine sprocket nut	115	11.5
Engine mounting bolt [L: 50 and 55]	55	5.5
Engine mounting bolt [L: 130 and 175]	75	7.5
Generator driven gear nut	55	5.5
Generator mounting bolt	26	2.6
Oil cooler mounting bolt	10	1.0
Oil pressure regulator	28	2.8
Oil pressure switch	14	1.4
Starter motor mounting bolt	6	0.6
Starter motor terminal bolt	3	0.3
Signal generator stator mounting screw	3	0.3
Starter relay terminal nut	5	0.5

ITEM	N·m	kgf-m
Spark plug	11	1.1
Cam chain guide mounting bolt	10	1.0

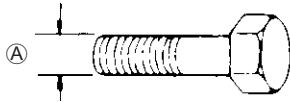
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ITEM	N·m	kgf-m
Steering stem head nut	65	6.5
Front fork upper clamp bolt	23	2.3
Front fork lower clamp bolt	23	2.3
Front fork cap bolt	23	2.3
Front fork cylinder bolt	30	3.0
Front axle	65	6.5
Front axle pinch bolt	23	2.3
Handlebar clamp bolt	23	2.3
Front brake master cylinder mounting bolt	10	1.0
Front brake caliper mounting bolt	39	3.9
Brake hose union bolt (front & rear)	23	2.3
Air bleeder valve (front & rear)	8	0.8
Brake disc bolt (front & rear)	23	2.3
Front footrest bolt	35	3.5
Front footrest bracket bolt	23	2.3
Swingarm pivot nut	100	10.0
Rear shock absorber mounting nut (upper & lower)	50	5.0
Cushion lever mounting nut	78	7.8
Cushion lever rod mounting nut	78	7.8
Rear brake caliper mounting bolt	26	2.6
Rear brake caliper housing bolt	37	3.7
Rear brake master cylinder mounting bolt	25	2.5
Rear brake master cylinder rod locknut	18	1.8
Rear axle nut	100	10.0
Rear sprocket nut	50	5.0

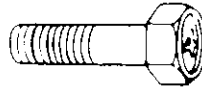
TIGHTENING TORQUE CHART

For other bolts and nuts not listed in the preceding page, refer to this chart:

Bolt Diameter [Ⓐ] (mm)	Conventional or "4" marked bolt		"7" marked bolt	
	N·m	kgf-m	N·m	kgf-m
4	1.5	0.15	2.3	0.23
5	3	0.3	4.5	0.45
6	5.5	0.55	10	1.0
8	13	1.3	23	2.3
10	29	2.9	50	5.0
12	45	4.5	85	8.5
14	65	6.5	135	13.5
16	105	10.5	210	21.0
18	160	16.0	240	24.0



Conventional bolt



"4" marked bolt



"7" marked bolt

SERVICE DATA

VALVE + GUIDE

Unit: mm

ITEM	STANDARD		LIMIT
Valve diameter	IN.	23	—
	EX.	20	—
Valve clearance (when cold)	IN.	0.10 – 0.15	—
	EX.	0.18 – 0.23	—
Valve-guide to valve-stem clearance	IN.	0.020 – 0.047	—
	EX.	0.040 – 0.067	—
Valve stem deflection	IN. & EX.	—	0.35
Valve guide I.D.	IN. & EX.	5.000 – 5.012	—
Valve stem O.D.	IN.	4.965 – 4.980	—
	EX.	4.945 – 4.960	—
Valve stem runout	IN. & EX.	—	0.05
Valve face thickness	IN. & EX.	—	0.5
Valve stem end length	IN. & EX.	—	2.5
Valve seat width	IN. & EX.	0.9 – 1.1	—
Valve head radial runout	IN. & EX.	—	0.03
Valve spring free length (IN. & EX.)	INNER	—	35.0
	OUTER	—	38.4
Valve spring tension (IN. & EX.)	INNER	5.6 – 6.6 kgf at length 28 mm	—
	OUTER	12.8 – 15.0 kgf at length 31.5 mm	—

CAMSHAFT + CYLINDER HEAD

Unit: mm

ITEM	STANDARD		LIMIT
Cam height	IN.	32.60 – 32.64	32.30
	EX.	32.65 – 32.69	32.35
Camshaft journal oil clearance	IN. & EX.	0.032 – 0.066	0.150
Camshaft journal holder I.D.	IN. & EX.	22.012 – 22.025	—
Camshaft journal O.D.	IN. & EX.	21.959 – 21.980	—
Camshaft runout	IN. & EX.	—	0.10
Cam chain pin (at arrow "3")	24th pin		—
Rocker arm I.D.	IN. & EX.	12.000 – 12.018	—
Rocker arm shaft O.D.	IN. & EX.	11.973 – 11.984	—
Cylinder head distortion	—		0.20

CYLINDER + PISTON + PISTON RING

Unit: mm

ITEM	STANDARD			LIMIT
Compression pressure	1 000 – 1 500 kPa (10 – 15 kgf/cm ²)			800 kPa (8 kgf/cm ²)
Compression pressure difference	—			200 kPa (2 kgf/cm ²)
Piston-to-cylinder clearance	0.015 – 0.025			0.120
Cylinder bore	65.500 – 65.515			65.615
Piston diameter	65.480 – 65.495 Measure 15 from the skirt end.			65.380
Cylinder distortion	—			0.20
Piston ring free end gap	1st	R	Approx. 9.1	7.3
	2nd	RN	Approx. 9.1	7.3
Piston ring end gap	1st		0.06 – 0.21	0.5
	2nd		0.06 – 0.21	0.5
Piston-ring to piston-ring-groove clearance	1st		—	0.180
	2nd		—	0.150
Piston ring groove width	1st		1.01 – 1.03	—
	2nd		0.81 – 0.83	—
	Oil		1.51 – 1.53	—
Piston ring thickness	1st		0.97 – 0.99	—
	2nd		0.77 – 0.79	—
Piston pin bore	18.002 – 18.008			18.030
Piston pin O.D.	17.996 – 18.000			17.980

CONROD + CRANKSHAFT

Unit: mm

ITEM	STANDARD		LIMIT
Conrod small end I.D.	18.010 – 18.018		18.040
Conrod big end side clearance	0.10 – 0.20		0.30
Conrod big end width	20.95 – 21.00		—
Crank pin width	21.10 – 21.15		—
Conrod big end oil clearance	0.032 – 0.056		0.080
Crank pin O.D.	33.976 – 34.000		—
Crankshaft journal oil clearance	0.020 – 0.044		0.080
Crankshaft journal O.D.	31.976 – 32.000		—
Crankshaft thrust clearance	0.04 – 0.09		—
Crankshaft thrust bearing thickness	Left side	2.350 – 2.500	—
	Right side	2.425 – 2.450	—
Crankshaft runout	—		0.05

OIL PUMP

ITEM	STANDARD	LIMIT
Oil pump reduction ratio	1.898 (75/43 × 37/34)	—
Oil pressure (at 60 °C, 140 °F)	Above 300 kPa (3.0 kgf/cm ²) Below 600 kPa (6.0 kgf/cm ²) at 3 000 r/min.	—

CLUTCH

Unit: mm

ITEM	STANDARD	LIMIT	
Clutch cable play	10 – 15	—	
Clutch release screw	1/4 turn back	—	
Clutch drive plate thickness	No.1	2.92 – 3.08	2.62
	No.2	3.42 – 3.58	3.12
Clutch drive plate claw width	No.1 & No.2	15.9 – 16.0	15.4
Clutch driven plate distortion	—	0.10	
Clutch spring free length	—	47.5	

TRANSMISSION + DRIVE CHAIN

Unit: mm except ratio

ITEM	STANDARD	LIMIT	
Primary reduction ratio	1.744 (75/43)	—	
Final reduction ratio	3.133 (47/15)	—	
Gear ratios	1st (low)	3.083 (37/12)	—
	2nd	2.062 (33/16)	—
	3rd	1.647 (28/17)	—
	4th	1.400 (28/20)	—
	5th	1.227 (27/22)	—
	6th (top)	1.095 (23/21)	—
Gearshift-fork to gearshift-fork-groove clearance	No.1, No.2 & No.3	0.1 – 0.3	0.50
Gearshift fork groove width	No.1 & No.3	4.8 – 4.9	—
	No.2	5.0 – 5.1	—
Gearshift fork thickness	No.1 & No.3	4.6 – 4.7	—
	No.2	4.8 – 4.9	—
Drive chain	Type	RKFS50SMOZ1	—
	Links	112 links	—
	20-pitch length	—	319
Drive chain slack	20 – 30	—	
Gearshift lever height	55	—	

CARBURETOR

ITEM	SPECIFICATION	
	E-02, 19	E-19 U-type
Carburetor type	KEIHIN CVR32	←
Bore size	32.5	←
I.D. No.	38G0	38G2
Idle r/min	1 200 ± 100 r/min	←
Float height	17.0 mm	←
Main jet (M.J.)	#105 (For carburetor #1, 4) #102 (For carburetor #2, 3)	←
Main air jet (M.A.J.)	#50	←
Jet needle (J.N.)	NFKP	←
Needle jet (N.J.)	φ3.4	←
Throttle valve (Th.V.)	11°	←
Slow jet (S.J.)	#35	←
Slow air jet (S.A.J.)	#160	←
Pilot screw (P.S.)	PRE-SET (2 turns back)	←
Throttle cable play (pulling cable)	2.0 – 4.0 mm	←
Starter (enricher) plunger cable play	0.5 – 1.0 mm	←

ITEM	SPECIFICATION	
	E-28	P-37
Carburetor type	KEIHIN CVR32	←
Bore size	32.5	←
I.D. No.	38G1	38G0
Idle r/min	1 200 ± 100 r/min	←
Float height	17.0 mm	←
Main jet (M.J.)	#105 (For carburetor #1, 4) #102 (For carburetor #2, 3)	#110 (For carburetor #1, 4) #108 (For carburetor #2, 3)
Main air jet (M.A.J.)	#50	←
Jet needle (J.N.)	NFKP	NFKR
Needle jet (N.J.)	φ3.4	←
Throttle valve (Th.V.)	11°	←
Slow jet (S.J.)	#35	#38
Slow air jet (S.A.J.)	#160	←
Pilot screw (P.S.)	PRE-SET (2 turns back)	←
Throttle cable play (pulling cable)	2.0 – 4.0 mm	←
Starter (enricher) plunger cable play	0.5 – 1.0 mm	←

ELECTRICAL

Unit: mm

ITEM		SPECIFICATION		NOTE
Ignition timing		10° B.T.D.C. at 1 200 r/min.		
Firing order		1•2•4•3		
Spark plug		Type	NGK: CR8EK DENSO: U24ETR	
		Gap	0.6 – 0.7	
Spark performance		Over 8 at 1 atm.		
Pickup coil resistance		Approx. 135 – 200 Ω		Tester range: (× 100 Ω)
Signal generator peak voltage		1.0 V and more		
Ignition coil resistance		Primary	⊕ tap – ⊖ tap Approx. 2 – 4 Ω	Tester range: (× 1 Ω)
		Secondary	Spark plug cap – Spark plug cap Approx. 30 – 40 kΩ	Tester range: (× 1 kΩ)
Ignition coil primary peak voltage		140 V and more		
Generator		Slip ring O.D.	Limit: 14.0	DENSO
		Brush length	Limit: 4.5	
Generator maximum output		More than 500 W at 5 000 r/min.		
Regulated voltage		13.6 – 14.4 V at 5 000 r/min.		
Starter relay resistance		3 – 6 Ω		
Battery	Type designation	YTX9-BS		
	Capacity	12V 28.8 kC (8 Ah)/10 HR		
	Standard electrolyte S.G.	1.320 at 20 °C		
Fuse size	Headlight	HI	10 A	
		LO	10 A	
	Turn signal	15 A		
	Ignition	15 A		
	Meter	10 A		
	Main	30 A		

WATTAGE

Unit: W

ITEM		SPECIFICATION	
		GSF650	GSF650S
Headlight	HI	60	55
	LO	55	←
Position light		5	5 × 2
Brake light/Tailight		21/5 × 2	←
Turn signal light		21 × 4	←
Speedometer light		LED	←
Tachometer light		LED	←
Turn signal indicator light		LED × 2	←
High beam indicator light		LED	←
Neutral position indicator light		LED	←
Oil pressure indicator light		LED	←

BRAKE + WHEEL

Unit: mm

ITEM	STANDARD		LIMIT
Rear brake pedal height	60		—
Brake disc thickness	Front	4.5 ± 0.2	4.0
	Rear	5.0 ± 0.2	4.5
Brake disc runout	—		0.30
Master cylinder bore	Front	15.870 – 15.913	—
	Rear	14.000 – 14.043	—
Master cylinder piston diameter	Front	15.827 – 15.854	—
	Rear	13.957 – 13.984	—
Brake caliper cylinder bore	Front	30.230 – 30.306	—
	Rear	38.180 – 38.230	—
Brake caliper piston diameter	Front	30.150 – 30.200	—
	Rear	38.098 – 38.148	—
Wheel rim runout	Axial	—	2.0
	Radial	—	2.0
Wheel axle runout	Front	—	0.25
	Rear	—	0.25
Wheel rim size	Front	J17M/C × MT3.50	—
	Rear	J17M/C × MT4.50	—

SUSPENSION

Unit: mm

ITEM	STANDARD	LIMIT	NOTE
Front fork stroke	130	—	
Front fork inner tube O.D.	41	—	
Front fork spring free length	344.3 (GSF650) 338.9 (GSF650S)	337 (GSF650) 332 (GSF650S)	
Front fork oil level	108 (GSF650) 104 (GSF650S)	—	
Rear wheel travel	126	—	
Swingarm pivot shaft runout	—	0.3	

TIRE

ITEM	STANDARD		LIMIT
Cold inflation tire pressure (Solo/Dual riding)	Front	250 kPa (2.50 kgf/cm ²)	—
	Rear	250 kPa (2.50 kgf/cm ²)	—
Tire size	Front	120/70 ZR17 (58W)	—
	Rear	160/60 ZR17 (69W)	—
Tire type	Front	BRIDGESTONE BT011FL (GSF650) BRIDGESTONE BT011FJ (GSF650S)	—
	Rear	BRIDGESTONE BT020R L	—
Tire tread depth (Recommended depth)	Front	—	1.6 mm
	Rear	—	2.0 mm

FUEL + OIL

ITEM	SPECIFICATION		NOTE
Fuel type	Used only unleaded gasoline of at least 87 pump octane or 91 octane (R/2 + M/2) or higher rated by the Research Method. Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.		E-28
	Gasoline used should be graded 91 octane or higher. An unleaded gasoline type is recommended.		The other countries
Fuel tank capacity	Including reserve	20 L	
	Reserve only	4.5 L	
Engine oil type	SAE 10W-40, API SF/SG or SH/SJ with JASO MA		
Engine oil capacity	Change	3 300 ml	
	Filter change	3 500 ml	
	Overhaul	4 600 ml	
Front fork oil type	#10		
Front fork oil capacity (each leg)	502 ml (GSF650) 507 ml (GSF650S)		
Brake fluid type	DOT 4		

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