SUZUKI

VS600GL

SERVICE MANUAL

99500-35052-01E

FOREWORD

This manual contains an introductory description on SUZUKI VS600GL and procedures for its inspection/service and overhaul of its main components.
Other information considered as generally known is not included.
Read GENERAL INFORMATION section to familiarize yourself with outline of the vehicle and MAINTENANCE and other sections to use as a guide for proper inspection and service.
This manual will help you know the vehicle better so that you can assure your customers of your optimum and quick service.

* *This manual has been prepared on the basis of the latest specification at the time of publication.*
  If modification has been made since then, difference may exist between the content of this manual and the actual vehicle.
* *Illustrations in this manual are used to show the basic principles of operation and work procedures.*
  They may not represent the actual vehicle exactly in detail.
* *This manual is intended for those who have enough knowledge and skills for servicing SUZUKI vehicles. Without such knowledge and skills, you should not attempt servicing by relying on this manual only.*
  Instead, please contact your nearby authorized SUZUKI motorcycle dealer.

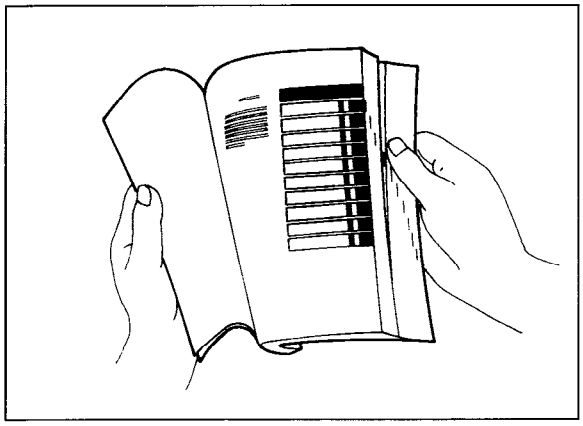
SUZUKI MOTOR CORPORATION
Motorcycle Service Department

GROUP INDEX

HOW TO USE THIS MANUAL

TO LOCATE WHAT YOU ARE LOOKING FOR:

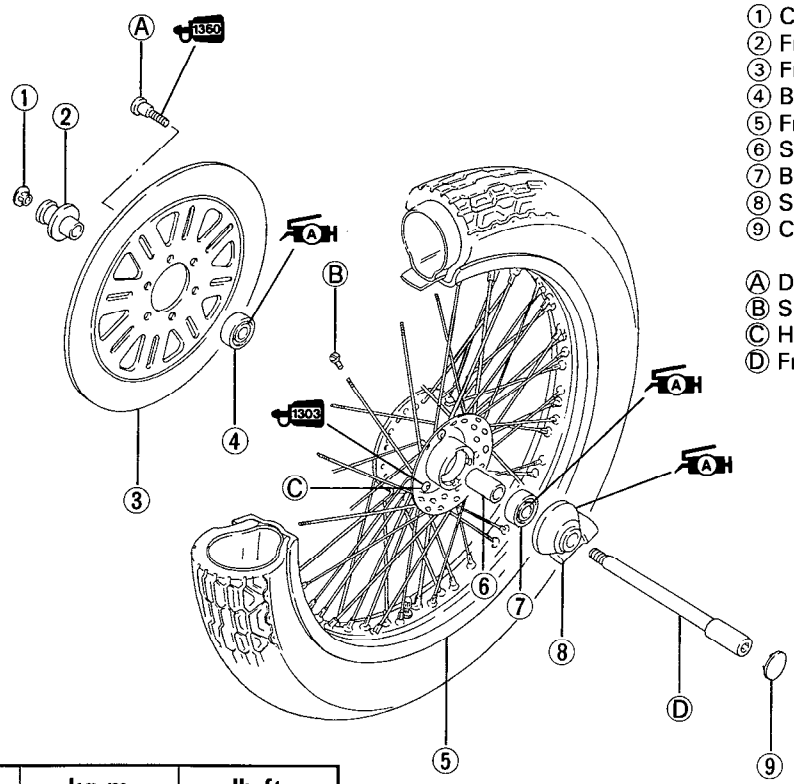
1. The text of this manual is divided into sections.
2. As the title of these sections are listed on the previous page as GROUP INDEX, select the section where what you are looking for belong.
3. Holding the manual as shown at the right will allow you to find the first page of the section easily.
4. On the first page of each section, its contents are listed. Find the item and page you need.



COMPONENT PARTS AND WORK TO BE DONE

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

Example: Front wheel



① Cap
② Front axle spacer
③ Front brake disc
④ Bearing
⑤ Front wheel
⑥ Speacer
⑦ Bearing
⑧ Speedometer gearbox
⑨ Cap

Ⓐ Disc plate bolt
Ⓑ Spork nipple
Ⓒ Hub flange bolt
Ⓓ Front axle

ITEM	N·m	kg-m	lb-ft
Ⓐ	23	2.3	16.5
Ⓑ	5	0.5	3.5
Ⓒ	25	2.5	18.0
Ⓓ	44	4.4	32.0

SYMBOL

Listed in the table below are the symbols indicating instructions and other information necessary for servicing and meaning associated with them respectively.

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Torque control required. Data beside it indicates specified torque.	1324	Apply THREAD LOCK SUPER "1324". 99000-32120
OIL	Apply oil. Use engine oil unless otherwise specified.	1360	Apply THREAD LOCK SUPER "1360". 99000-32130
A	Apply SUZUKI SUPER GREASE "A". 99000-25010	BF	Apply or use brake fluid.
M	Apply SUZUKI MOLY PASTE. 99000-25140	V	Measure in voltage range.
1215	Apply SUZUKI BOND "1215". 99000-31110	Ω	Measure in resistance range.
1216	Apply SUZUKI BOND "1216". 99000-31160	A	Measure in current range.
1342	Apply THREAD LOCK "1342". 99000-32050	TOOL	Use special tool.
1303	Apply THREAD LOCK SUPER "1303". 99000-32030	LLC	Use engine coolant. 99000-99032-10X
1305	Apply THREAD LOCK SUPER "1305". 99000-32100	FORK	Use fork oil. 99000-99044-10G
1322	Apply THREAD LOCK SUPER "1322" 99000-32110		

GENERAL INFORMATION

1

CONTENTS

WARNING/CAUTION/NOTE

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

⚠ WARNING

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

⚠ CAUTION

Indicates a potential hazard that could result in vehicle 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 vehicle.**
- **When 2 or more persons work together, pay attention to the safety of each other.**
- **When it is necessary to run the engine indoors, make sure that exhaust gas is forced outdoors.**
- **When working with toxic or flammable materials, make sure that the area you work in is well-ventilated and that you follow all of the material manufacturer's instructions.**
- **Never use gasoline as a cleaning solvent.**
- **To avoid getting burned, do not touch the engine, engine oil, radiator or exhaust system during or for a while after engine operation.**
- **After servicing fuel, oil, water, exhaust or brake systems, check all lines and fittings related to the system for leaks.**

⚠ CAUTION

* If parts replacement is necessary, replace the parts with Suzuki Genuine Parts or their equivalent.
* When removing parts that are to be reused, keep them arranged in an orderly manner so that they may be reinstalled in the proper order and orientation.
* Be sure to use special tools when instructed.
* Make sure that all parts used in reassembly are clean, and also lubricated when specified.
* When use of a certain type of lubricant, bond, or sealant is specified, be sure to use the specified type.
* 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.
* Tighten cylinder head and case bolts and nuts, beginning with larger diameter and ending with smaller diameter, from inside to outside diagonally, to the specified tightening torque.
* Whenever you remove oil seals, gaskets, packing, O-rings, locking washers, 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.
* Do not use self-locking nuts a few times over.
* Use a torque wrench to tighten fasteners to the torque values when specified. Wipe off grease or oil if a thread is smeared with them.
* After reassembly, check parts for tightness and operation.

* To protect 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 vehicles and parts.

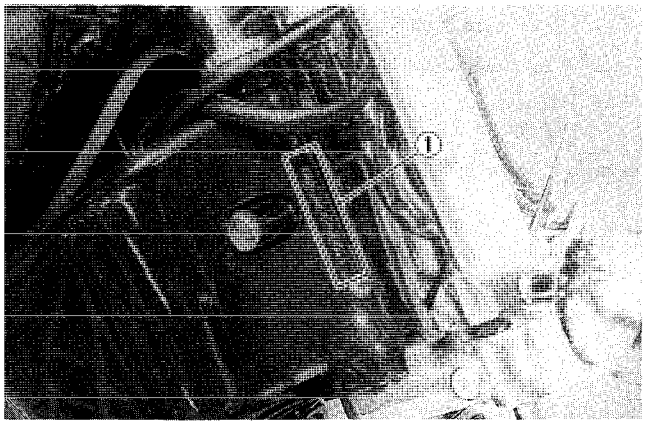
SUZUKI VS600GLS ('95-MODEL)

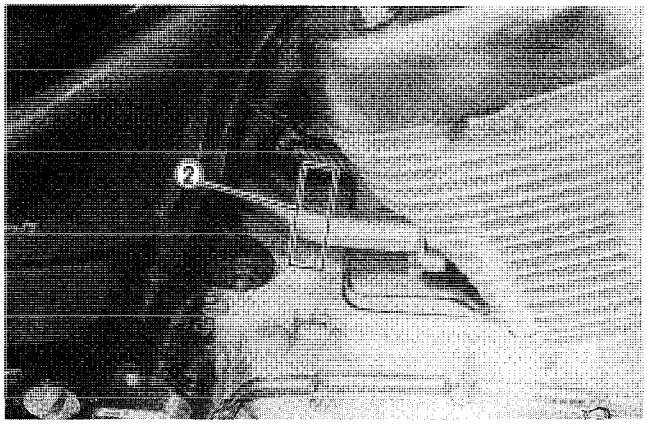
RIGHT SIDE **LEFT SIDE**

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

SERIAL NUMBER LOCATION

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





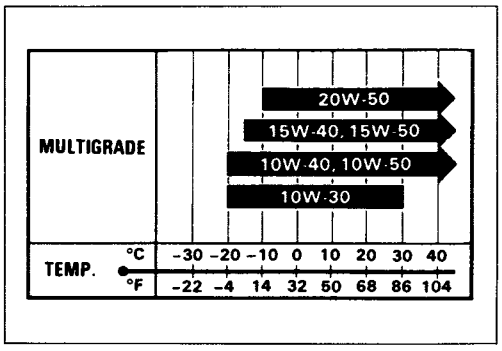
FUEL, OIL AND ENGINE COOLANT RECOMMENDATION

FUEL

Gasoline used should be graded 85—95 octane (Research Method) or higher. An unleaded gasoline is recommended.

ENGINE OIL

Make sure that the engine oil you use comes under API classification of SE or SF and that its viscosity rating is SAE 10W/40. If an SAE 10W/40 motor oil is not available, select an alternate according to the right chart.



GEAR OIL (FINAL DRIVE GEAR BOX)

Use SAE 90 hypoid gear oil which is rated GL-5 under API classification system. If you operate the motorcycle where ambient temperature is below 0°C (32°F), use SAE 80 hypoid gear oil.

BRAKE FLUID

Specification and classification: DOT4

⚠ 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

ENGINE COOLANT

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

WATER FOR MIXING

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

ANTI-FREEZE/ENGINE COOLANT

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

Suzuki recommends the use of SUZUKI GOLDEN CRUISER 1200NA anti-freeze/engine coolant. If this is not available, use an equivalent which is compatible with an aluminum radiator.

LIQUID AMOUNT OF WATER/ENGINE COOLANT

Solution capacity (total): 1 700 ml (1.8/1.5 US/Imp qt)

For engine coolant mixture information, refer to cooling system section, page 6-4.

⚠ CAUTION

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

BREAK-IN PROCEDURES

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

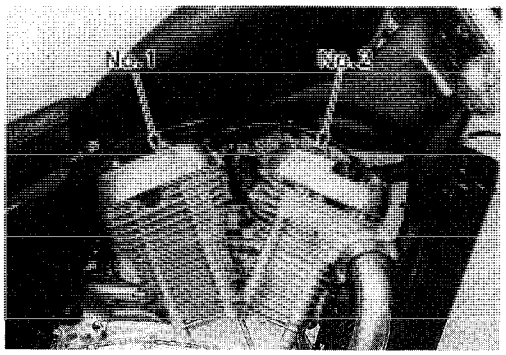
- Keep to these break-in throttle opening limits:

Initial 800 km (500 miles): Less than 1/2 throttle
Up to 1 600 km (1 000 miles): Less than 3/4 throttle

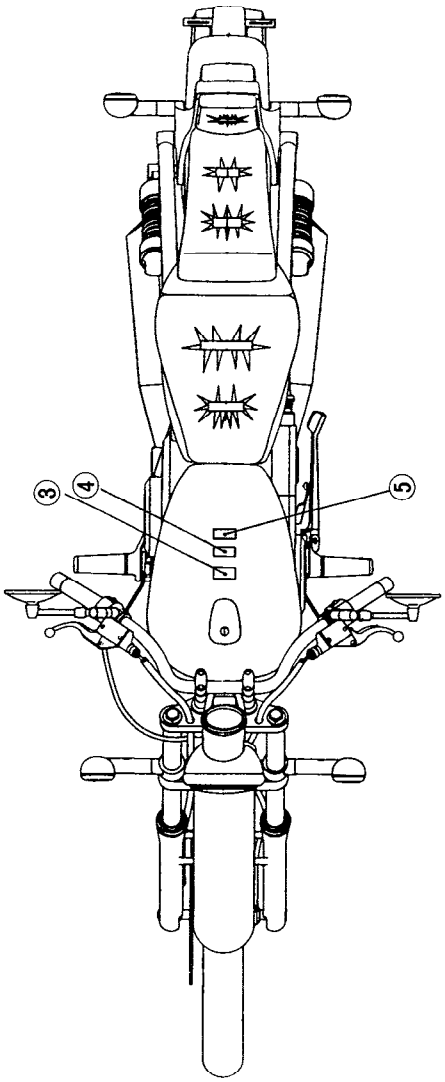
- Upon reaching an odometer reading of 1 600 km (1 000 miles) you can subject the motorcycle to full throttle operation.

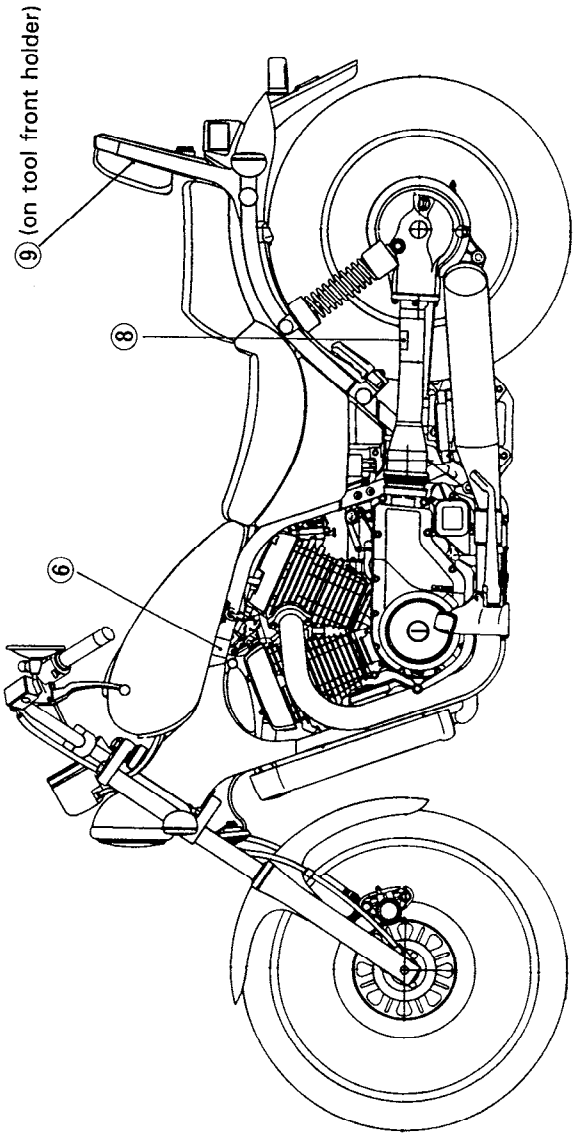
CYLINDER IDENTIFICATION

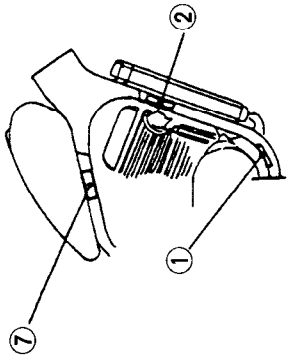
The two cylinders of this engine are identified as No.1 and No.2 cylinder, as counted from rear to front (as viewed by the rider on the seat).



INFORMATION LABELS







Right side

①	Noise label	Only for E-34
②	Information label	All models
③	Fuel caution label	Only for E-02
③	Warning safety label	Except for E-02
④	Warning safety label	All models
⑤	Warning safety label	Only for E-34
⑥	ID label	Only for E-18
⑦	ID plate	All models
⑧	Tire pressure label	Only for E-22
⑨	Tire pressure label	Except for E-22

SPECIFICATIONS

DIMENSIONS AND DRY MASS

Overall length	2 280 mm (89.8 in) E-18
	2 255 mm (88.8 in) ..... Others
Overall width	770 mm (30.3 in)
Overall height	1 215 mm (47.8 in)
Wheelbase	1 560 mm (61.4 in)
Ground clearance	125 mm (4.9 in)
Seat height	685 mm (27.0 in)
Dry mass	200 kg (440 lbs)

ENGINE

Type	Four-stroke, Water-cooled, TSCC, OHC, 45-degree V-twin
Number of cylinders	2
Bore	80.0 mm (3.150 in)
Stroke	59.5 mm (2.343 in)
Piston displacement	598 cm^3 (36.5 cu. in)
Carburetor	MIKUNI BDS34SS ..... front
	MIKUNI BS34SS ..... rear
Air cleaner	Non-woven fabric element
Starter system	Electric starter
Lubrication system	Wet sump

TRANSMISSION

Clutch	Wet multi-plate type
Transmission	5-speed constant mesh
Gearshift pattern	1-down, 4-up
Primary reduction ratio	1.690 (71/42)
Secondary reduction ratio	1.133 (30/30 × 17/15)
Final reduction ratio	3.090 (34/11)
Gear ratios, Low	2.285 (32/14)
2nd	1.631 (31/19)
3rd	1.227 (27/22)
4th	1.000 (25/25)
Top	0.851 (23/27)
Drive system	Shaft drive

CHASSIS

Front suspension	Telescopic, coil spring, oil damped
Rear suspension	Swingarm, coil spring, oil damped, spring pre-load 5-way adjustable
Steering angle	40° (right & left)
Caster	56° 45′
Trail	145 mm (5.7 in)
Turning radius	2.9 m (9.5 ft)
Front brake	Disc brake
Rear brake	Internal expanding
Front tire size	80/90-21 48H
Rear tire size	140/90-15 M/C 70H
Front fork stroke	130 mm (5.1 in)
Rear wheel travel	90 mm (3.5 in)

ELECTRICAL

Ignition type	Electronic Ignition (Transistorized)
Ignition timing	5° B.T.D.C. below 1 650 r/min and 30° B.T.D.C. above 3 500 r/min
Spark plug	DPR8EA or X24EPR-U9
Battery	12V 57.6 kC (16 Ah)/10 HR
Generator	Three-phase A.C. Generator
Fuse	25/10/10/10/10A
Headlight	12V 60/55W
Position light	12V 4W
Turn signal light	12V 21W
Tail/Brake light	12V 5/21W
License plate light	12V 5W
Speedometer light	12V 3.4W
Neutral indicator light	12V 3W
High beam indicator light	12V 1.7W
Turn signal indicator light	12V 3W
Oil pressure indicator light	12V 3W
Engine coolant temp. indicator light	12V 3W

CAPACITIES

Fuel tank, including reserve	12.0 L (3.2/2.6 US/Imp gal)
reserve	3.0 L (0.8/0.7 US/Imp gal)
Engine oil, oil change	2 400 ml (2.5/2.1 US/Imp qt)
with filter change	2 800 ml (3.0/2.5 US/Imp qt)
overhaul	3 300 ml (3.5/2.9 US/Imp qt)
Final gear oil	200—220 ml (6.8/7.0—7.4/7.7 US/Imp oz)
Engine coolant, including reserve	1 700 ml (1.8/1.5 US/Imp qt)
Front fork oil (each leg)	418 ml (14.1/14.7 US/Imp oz)

These specifications are subject to change without notice.

COUNTRY OR AREA

The series of symbols on the left stand for the countries and areas on the right.

SYMBOL	COUNTRY or AREA
E-02	England
E-04	France
E-15	Finland
E-16	Norway
E-17	Sweden
E-18	Switzerland
E-21	Belgium
E-22	Germany
E-34	Italy
E-39	Austria
E-53	Spain

(E-15,16 and 17 countries are included in E-22.
E-21 and 53 countries are included in E-34.
E-39 country is included in E-18.)

PERIODIC MAINTENANCE

2

CONTENTS

PERIODIC MAINTENANCE SCHEDULE

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

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

PERIODIC MAINTENANCE CHART

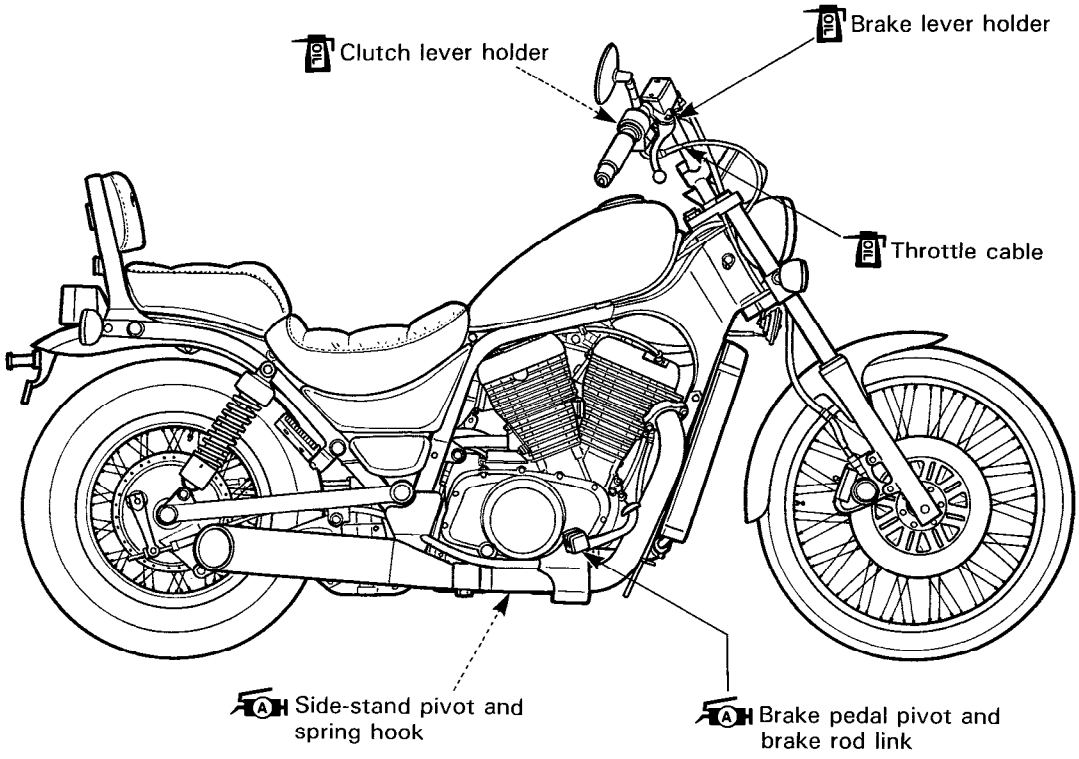
Item \ Interval						
	km	1 000	6 000	12 000	18 000	24 000
	miles	600	4 000	7 500	11 000	15 000
	months	2	12	24	36	48
Battery (Specific gravity of electrolyte)		I	I	I	I	I
Air cleaner		—	I	R	I	R
Valve clearance		—	I	I	I	I
Spark plug		—	I	R	I	R
Engine oil		R	R	R	R	R
Engine oil filter		R	—	R	—	R
Fuel hose		—	I	I	I	I
		Replace every 4 years				
Fuel valve strainer		—	—	C	—	C
Engine idle rpm		I	I	I	I	I
Throttle cable play		I	I	I	I	I
Radiator hose		I	—	I	—	I
		Replace every 4 years				
Engine coolant		Change every 2 years				
Final gear oil		R	—	I	—	I
Clutch fluid		—	—	I	—	I
		Replace every 2 years				
Clutch hose		—	I	I	I	I
		Replace every 4 years				
Brake		I	I	I	I	I
Brake fluid		—	I	I	I	I
		Replace every 2 years				
Brake hose		—	I	I	I	I
		Replace every 4 years				
Tire		—	I	I	I	I
Steering		I	I	I	I	I
Front fork		—	—	I	—	I
Rear suspension		—	—	I	—	I
Exhaust pipe bolts		—	T	T	T	T
Chassis bolts and nuts		T	T	T	T	T

I = Inspection and adjust, clean, lubricate or replace as necessary
C = Clean R = Replace T = Tighten

LUBRICATION POINTS

Proper lubrication is important for smooth operation and long life of each working part of the motorcycle.

Major lubrication points are indicated below.



NOTE:

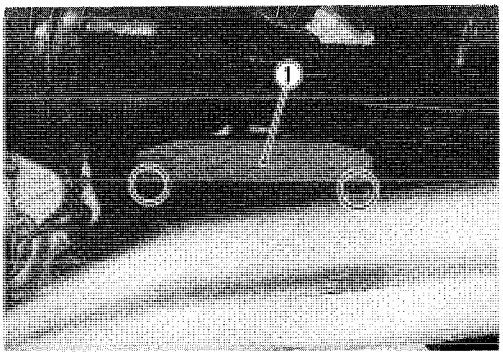
* *Before lubricating each part, clean off any rusty spots and wipe off any grease, oil, dirt or grime.*
* *Lubricate exposed parts which are subject to rust, with a rust preventative spray whenever the motorcycle has been operated under wet or rainy conditions.*

MAINTENANCE AND TUNE-UP PROCEDURES

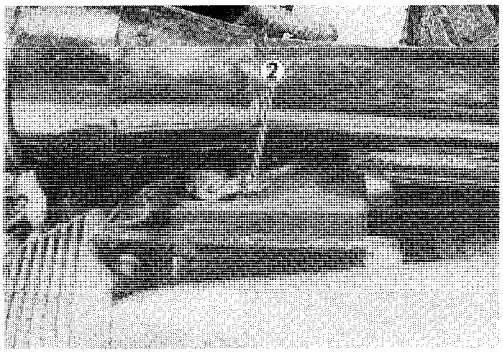
This section describes the servicing procedures for each item of the Periodic Maintenance requirement.

BATTERY

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



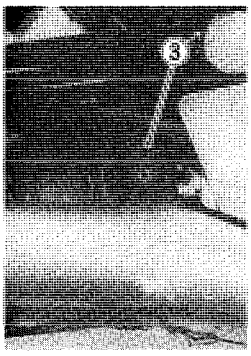
- Remove the regulator/rectifier ①.
- Disconnect the ⊖ lead wire ② from the battery terminal.

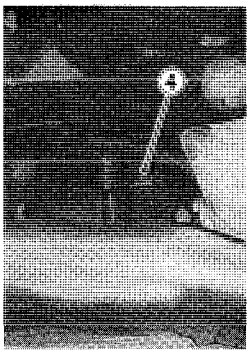


⚠ CAUTION

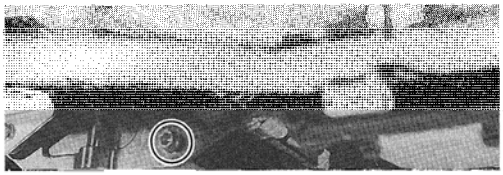
After disconnecting the battery ⊖ lead wire, make sure to remove the battery ⊖ terminal bolt or tighten the bolt fully to the battery ⊖ terminal to prevent the contact of the ⊖ terminal bolt to the other parts, when removing and reinstalling the ⊕ terminal bolt.

- Remove the battery ⊕ terminal cover ③ to right side.
- Disconnect the ⊕ lead wire ④ from the battery terminal.

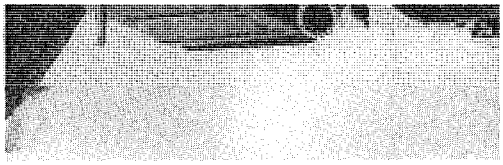




- Remove the battery case bottom plate right and left bolts and open the case bottom plate.
- Remove the battery.

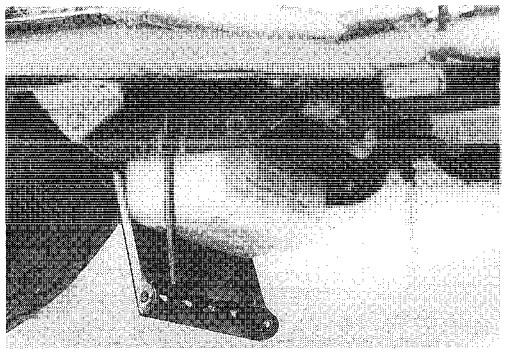


NOTE:

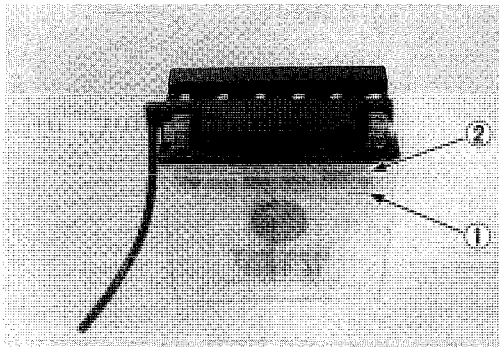


⚠ CAUTION

Make sure to support the battery case bottom plate and battery to prevent the fall of the battery, when removing the case bottom plate bolts and opening the case bottom plate.



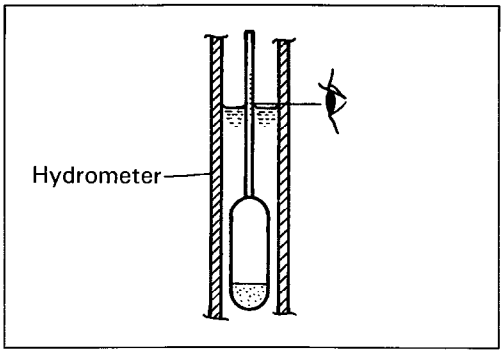
- Check the electrolyte level and specific gravity. Add distilled water, as necessary, to keep the surface of the electrolyte above the LOWER LEVEL line ① but not above the UPPER LEVEL line ②.
- For checking specific gravity, use a hydrometer to determine the charged condition.



TOOL 09900-28403: Hydrometer

Standard specific gravity: 1.28 at 20°C (68°F)

An S.G. reading of 1.22 (at 20°C) or under means that the battery needs recharging. Remove the battery from the machine and charge it with a battery charger.



⚠ CAUTION

*** Never charge a battery while still in the machine as damage may result to the battery or regulator/rectifier.**
*** Be careful not to bend, obstruct, or change the routing of the breather hose from the battery, make certine that the breather hose is attached to the battery vent fitting and that the opposite end is always open.**

- Charge at a maximum of 1.6 amps.
- To install the battery, reverse the procedure described above.

⚠ WARNING

When installing the battery lead wires, fix the ⊕ lead first and ⊖ lead last.

- Make sure that the breather hose is tightly secured and undamaged, and is routed correctly.

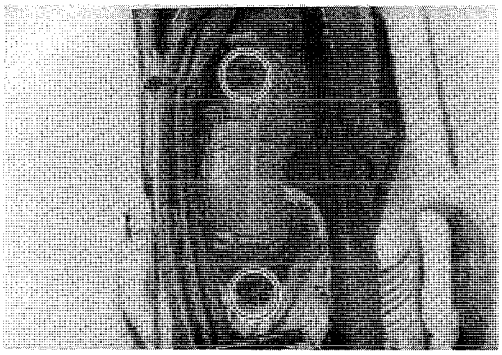
AIR CLEANER

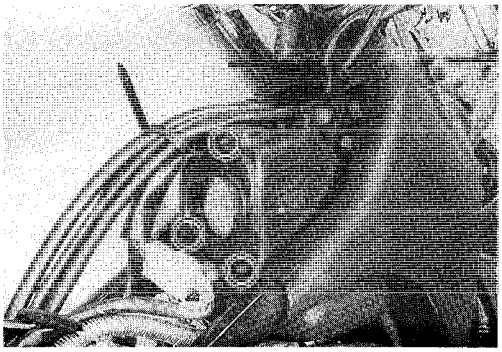
Inspect Every 6 000 km (4 000 miles, 12 months) and Replace Every 12 000 km (7 500 miles, 24 months).

- Remove the frame cover, seat and fuel tank (Refer to pages 7-1 and 5-4.)

FRONT SIDE AIR CLEANER

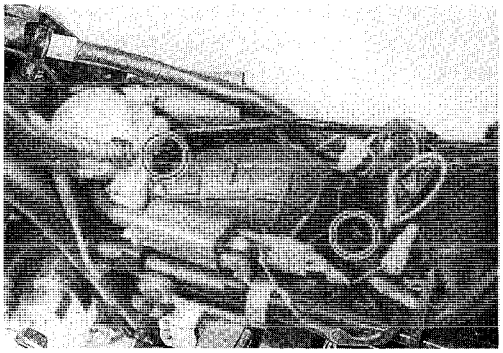
- Loosen the two clamp screws and disconnect the joint hose from the No.2 carburetor.
- Remove the three screws and pull out the front side air cleaner element.





REAR SIDE AIR CLEANER

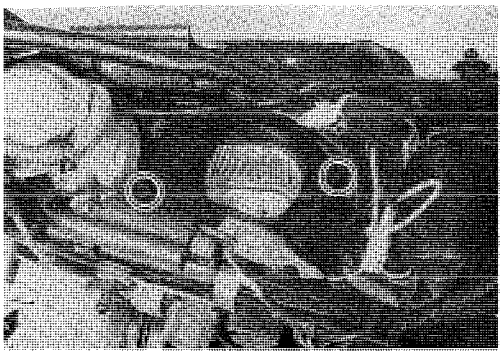
- Loosen the two clamp screws and disconnect the joint hose from the No.1 carburetor.
- Remove the two screws and pull out the rear side air cleaner element.
- Carefully use an air hose to blow the dust from the air cleaner elements inside.



⚠ CAUTION

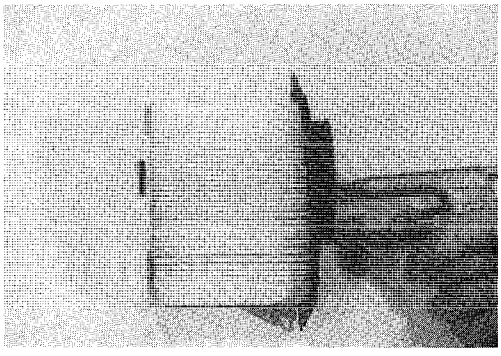
Always use air pressure on the inside of the air cleaner elements. If air pressure is used on the outside, dirt will be forced into the pores of the cleaner element thus restricting air flow through the cleaner element.

- Reinstall the cleaned elements or new ones in reverse order of removal.



⚠ CAUTION

If driving under dusty conditions, clean the air cleaner elements more frequently. The surest way to accelerate engine wear is to use the engine without the elements or to use ruptured elements. Make sure that the air cleaners are in good condition at all times. Life of the engine depends largely on these components!



VALVE CLEARANCE

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

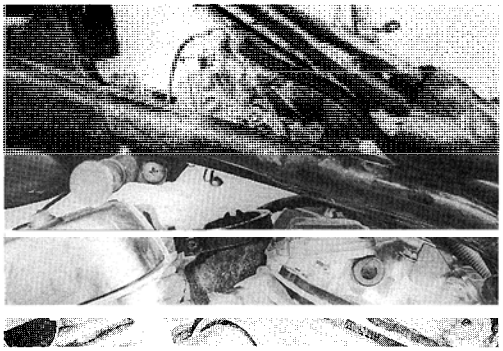
Valve clearance also must be checked and adjusted when:
(1) the valve mechanism is serviced, and
(2) the camshaft are disturbed by removing them for servicing.

Excessive valve clearance results in valve noise and insufficient valve clearance results in valve damage and reduced power. Check and adjust the clearance to the specification.

(0.003 - 0.005 in)

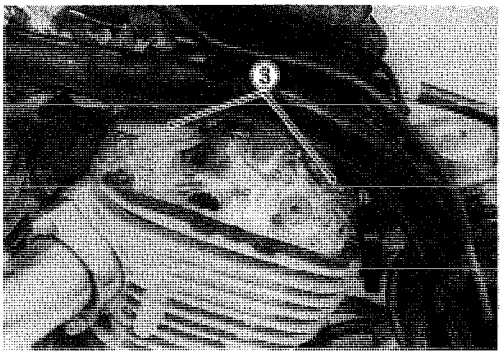
NOTE:
* *The clearance specification is for COLD state.*
* *Both intake and exhaust valves must be checked and adjusted when the piston is at Top Dead Center (TDC) of the compression stroke.*

- Remove the seat and fuel tank. (Refer to pages 7-1 and 5-4.)
- Pull out the fuel pump inlet hose from the frame.
- Disconnect the carburetor fuel hose from the No.2 carburetor and pull out it from the frame.
- Remove the head cover caps ①.
- Remove the No.2 joint hose ② and disconnect the No.2 carburetor.



⚠ CAUTION

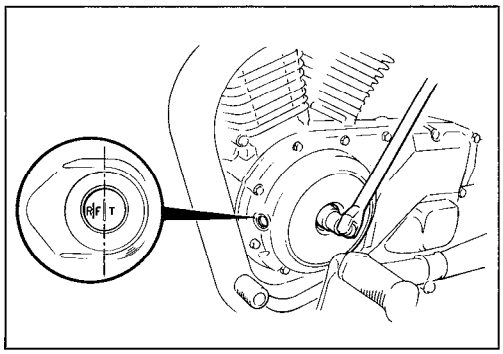
Do not pull strongly at the carburetor cables to keep the balance of two carburetors.



- Remove all the inspection caps ③.
- Remove all the spark plugs. (Refer to page 2-8.)

- Remove the generator cover plug ④ and the timing inspection plug ⑤.

- Rotate the generator rotor to set the No.1 engine's piston at TDC of the compression stroke. (Rotate the rotor until the "RT" line on the rotor is aligned with the center of hole on the generator cover.)



- To inspect the No.1 engine's valve clearance, insert the thickness gauge to the clearance between the valve stem end and the adjusting screw on the rocker arms.

TOOL 09900-20806: Thickness gauge

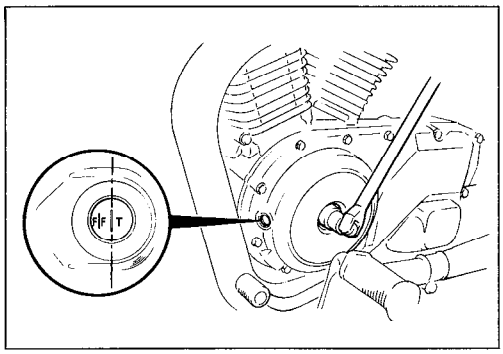
- If the clearance is out of the specification, bring it into the specified range by using the special tool.

TOOL 09917-10410: Valve adjust driver

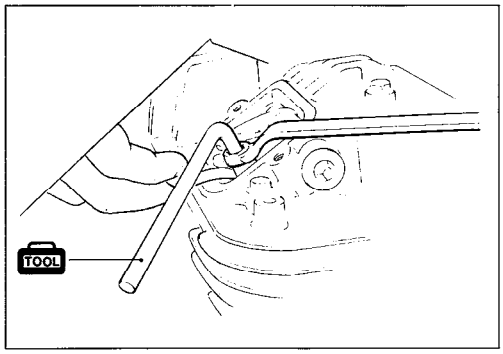
⚠ CAUTION

Both right and left vlave clearances should be as closely set as possible.

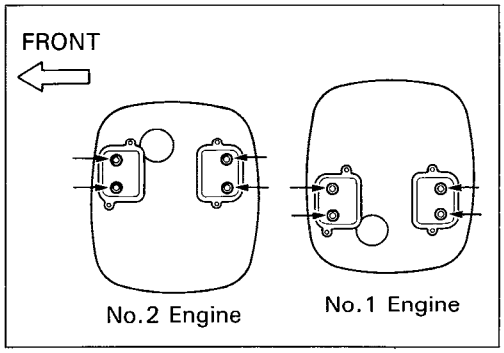
- Rotate the generator rotor 450 degrees (1-¼ turns) and align the "FT" line on the rotor with the center of hole on the generator cover.



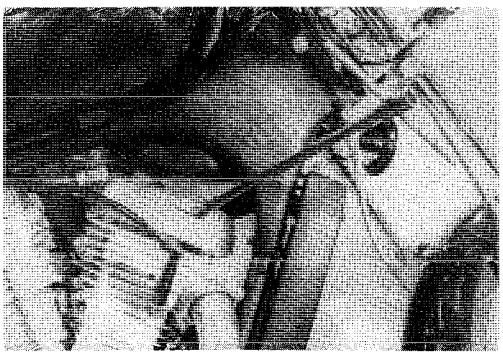
Inspect the No.2 engine's valve clearance as the same manner above.



NOTE:
Use the thickness gauge from the arrow marks as shown in the illustration.



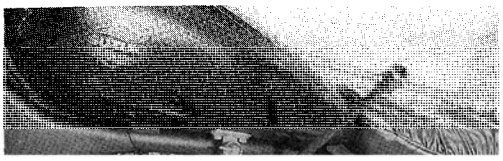
SPARK PLUG



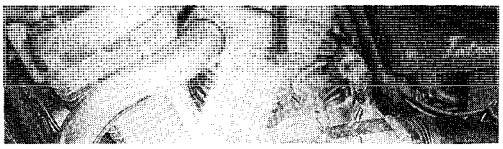
Inspect Every 6 000 km (4 000 miles, 12 months) and Replace Every 12 000 km (7 500 miles, 24 months).

- Remove the spark plugs with spark plug wrench.

TOOL 09930-10141: Socket wrench
09930-14530: Universal joint
09914-24510: T-handle



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



	NGK	NIPPONDENSO
Hotter type	DPR7EA-9	X22EPR-U9
Standard	DPR8EA-9	X24EPR-U9
Colder type	DPR9EA-9	X27EPR-U9

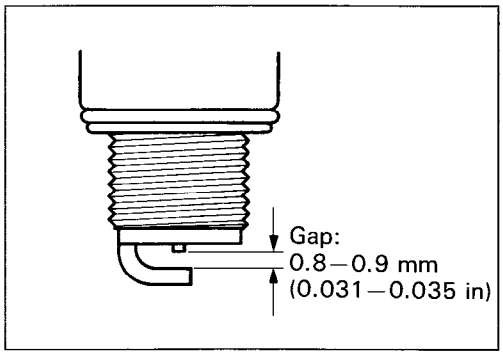
NOTE:
"R" type spark plug has a resistor located at the center electrode to prevent radio noise.

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

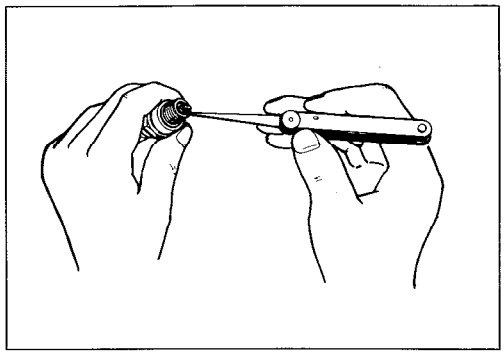
- Measure the plug gap with a thickness gauge if it is correct. If not, adjust it to the following gap.

TOOL 09900-20803: Thickness gauge

Standard
Spark plug gap: 0.8—0.9 mm (0.031—0.035 in)



- Check to see the worn or burnt condition of the electrodes. If it is extremely worn or burnt, replace the plug. And also replace the plug if it has a broken insulator, damaged thread.



⚠ CAUTION

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

ENGINE OIL AND OIL FILTER

(ENGINE OIL)

Every 12 000 km (7 500 miles, 24 months) thereafter.

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

- Keep the motorcycle upright.
- Place an oil pan below the engine, and drain the oil by removing the drain plug ① and filler cap ② .
- Remove the oil filter ③ by using the oil filter wrench Ⓐ.
- Apply engine oil lightly to the gasket of the new filter before installation.
- Install the new filter turning it by hand until you feel that the filter gasket contacts the mounting surface. Then tighten it 2 turns using the oil filter wrench Ⓐ.

TOOL 09915-40610: Oil filter wrench

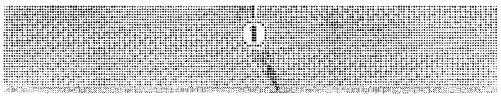
NOTE:
To properly tighten the filter, use the special tool. Never tighten the filter by hand.

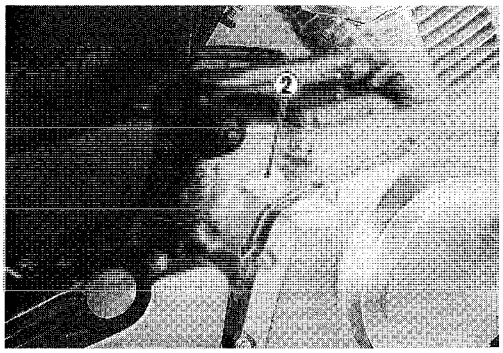
- Fit the drain plug ① securely, and pour fresh oil through the oil filler. The engine will hold about 2.8 L (3.0/2.5 US/Imp qt) of oil. Use an API classification of SE or SF oil with SAE 10W/40 viscosity.
- Start up the engine and allow it to run for several seconds at idling speed.
- Turn off the engine and wait about one minute, then check the oil level through the inspection window ④ . If the level is below the lower line, add oil to that level.

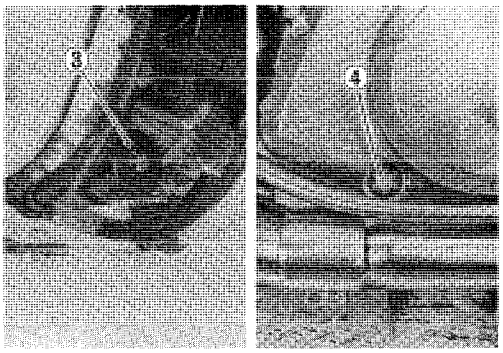
Necessary amount of engine oil
Oil change: 2.4 L (2.5/2.1 US/Imp qt)
Filter change: 2.8 L (3.0/2.5 US/Imp qt)
Overhaul engine: 3.3 L (3.5/2.9 US/Imp qt)

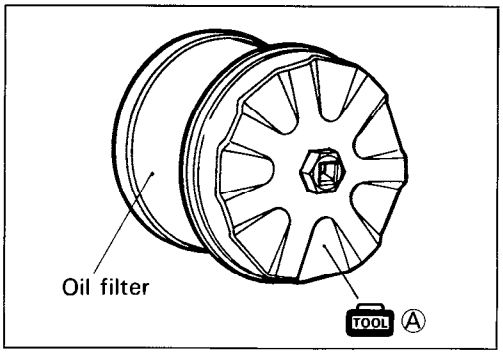
⚠ CAUTION

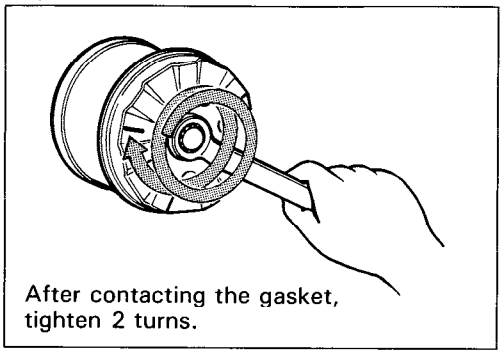
Use SUZUKI MOTORCYCLE GENUINE OIL FILTER only, since the other make's genuine filters and after-market parts may differ in thread specifications (thread diameter and pitch), filtering performance and durability, which could cause engine damage or oil leaks. Suzuki automobile genuine oil filter is also not usable for the motorcycles.



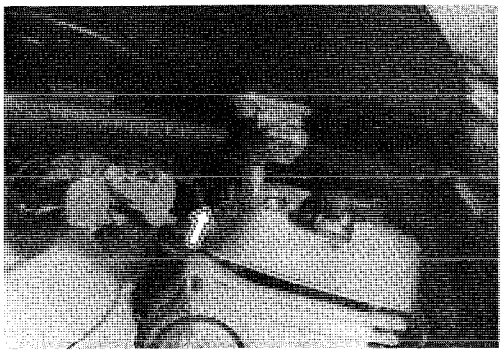








FUEL HOSE



Inspect Every 6 000 km (4 000 miles, 12 months) thereafter. Replace Every 4 years.

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

FUEL VALVE STRAINER

Clean Every 12 000 km (7 500 miles, 24 months).

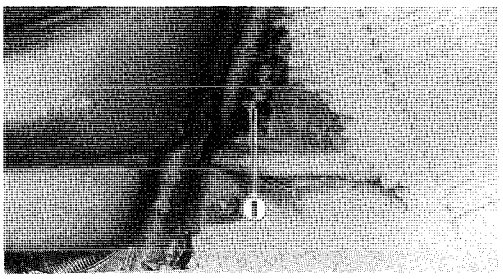
(Refer to page 5-4.)

CARBURETOR

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

ENGINE IDLE RPM (Idle adjustment)

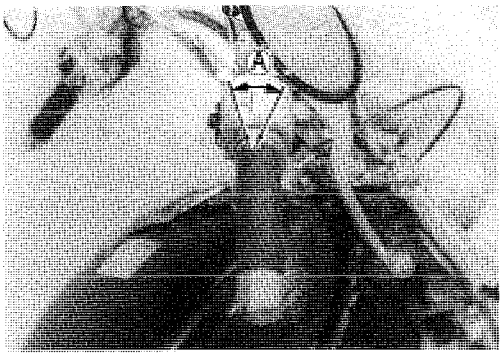
NOTE:
The engine idling speed should be adjusted when the engine is hot.



- Connect a tachometer.
- Start up the engine and set its speed at idle speed by turning throttle stop screw ① .

Engine idle speed: 1 200 $^{+100}_{-50}$ r/min ..... for E-18
1 200 ± 100 r/min ..... for others

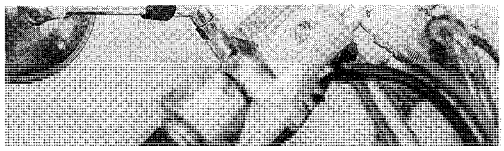
THROTTLE CABLE PLAY



There should be 3.0—6.0 mm (0.12—0.24 in) play Ⓐ on the throttle grip. Adjust the throttle cable play with the following procedures.

- Loosen the lock nut ② and turn the adjuster ③ in or out until the specified play is obtained.
- Tighten the lock nut ② while holding the adjuster.

Throttle cable play Ⓐ: 3.0—6.0 mm (0.12—0.24 in)

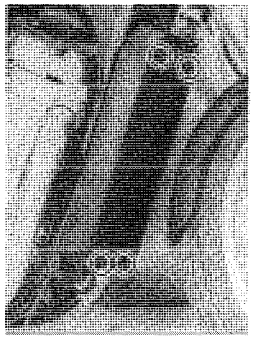
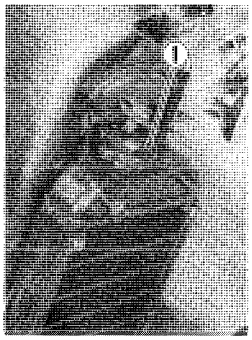


⚠ WARNING

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

COOLING SYSTEM

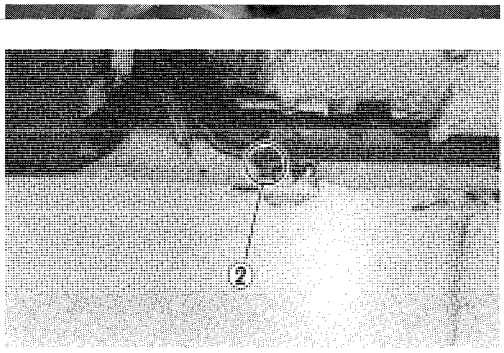
Inspect Initially at 1 000 km (600 miles, 2 months) and Every 12 000 km (7 500 miles, 24 months) thereafter.
Change engine coolant Every 2 years.
Replace radiator hoses Every 4 years.

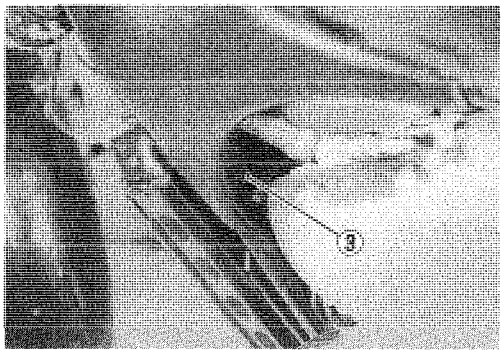
- Remove the radiator cover.
- Remove the radiator cap ① and drain plug ②.

⚠ WARNING

*** Do not open the radiator cap when the engine is hot as you may be injured by escaping hot liquid or vapor.**
*** Coolant may be harmful if swallowed or if it comes in contact with skin or eyes. If coolant gets into the eyes or in contact with the skin, flush thoroughly with plenty of water. If swallowed, induce vomitting and call physician immediately!**



- Flush the radiator with fresh water if necessary.
- Tighten the drain plug ② securely and remove the air bleeder plug ③.
- Pour the specified coolant up to the radiator inlet and tighten the air bleeder plug ③.



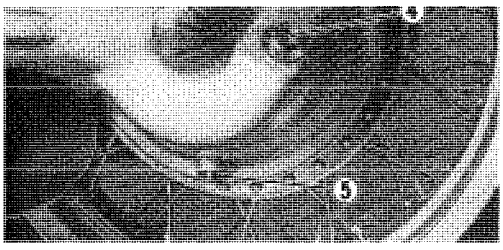
NOTE:
For coolant information, refer to page 6-4.

- Close the radiator cap ① securely.
- After warning up and cooling down the engine, add the specified coolant up to the radiator inlet.

⚠ CAUTION

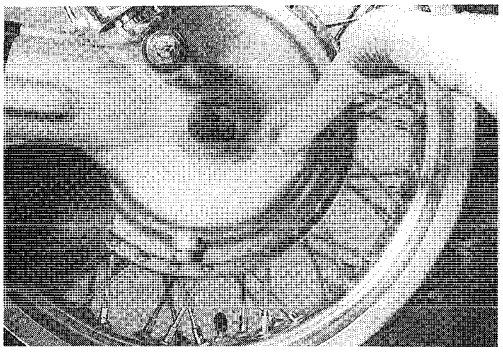
Repeat above procedure several times and make sure that the radiator is filled with coolant up to the inlet hole.

LLC Engine coolant capacity: 1 700 ml (1.8/1.5 US/Imp. qt)



FINAL GEAR OIL

Replace Initially at 1 000 km (600 miles, 2 months) and Inspect Every 12 000 km (7 500 miles, 24 months).



- Keep the motorcycle upright.
- Place an oil pan below the final gear case and drain oil by removing filler cap ④ and drain plug ⑤.
- Refit the drain plug ⑤ and pour the specified oil (SAE 90 hypoid gear oil with GL-5 under API classification) through the filler hole until the oil level reaches the filler hole.
- Refit the filler cap ④.

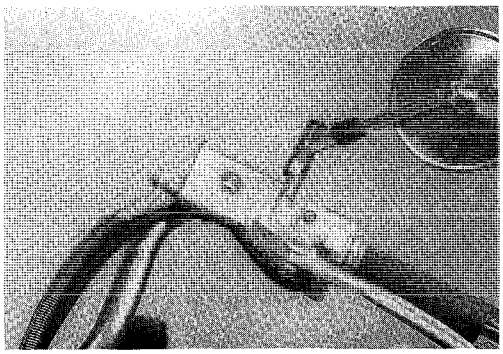
Necessary amount of final gear oil:
200—220 ml (6.8/7.0—7.4/7.7 US/Imp. oz)

CLUTCH

(CLUTCH FLUID)
Inspect Every 12 000 km (7 500 miles, 24 months).
Replace fluid Every 2 years.

(CLUTCH HOSE)
Inspect Every 6 000 km (4 000 miles, 12 months).
Replace hose Every 4 years.

CLUTCH FLUID LEVEL

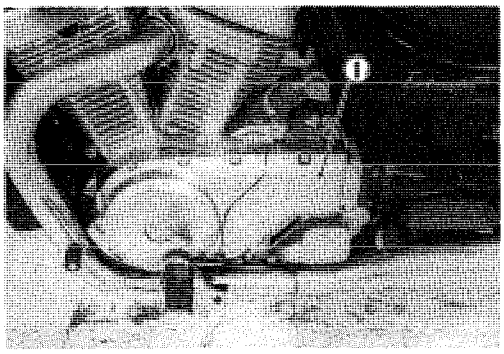


- Keep the motorcycle upright and place the handlebars straight.
- Check the clutch fluid level by observing the lower limit line on the clutch fluid reservoir.
- If the level is found to be lower than the lower mark, replenish with BRAKE FLUID that the following specification.

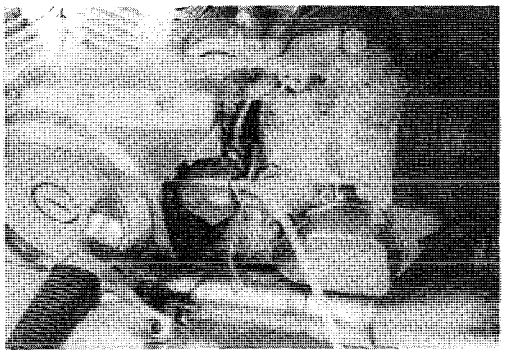
BF Specification and classification: DOT4

⚠ WARNING

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



BLEEDING AIR FROM THE CLUTCH FLUID CIRCUIT



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

- Fill up the master cylinder reservoir to the upper end of the inspection window. Replace the reservoir cap to prevent entry of dirt.
- Remove the secondary bevel gear case cover ①.
- Attach a pipe to the bleeder valve and insert the free end of the pipe into a receptacle.
- Squeeze and release the clutch lever several times in rapid succession, and squeeze the lever fully without releasing it. Loosen the bleeder valve by turning it a quarter of a turn so that the fluid runs into the receptacle; this will remove the tension of the clutch lever causing it to touch the handlebar grip. Then, close the valve, pump and squeeze the lever, and open the valve. Repeat this process until the fluid flowing into the receptacle no longer contains air bubbles.
- Close the bleeder valve, and disconnect the pipe. Fill the reservoir with brake fluid to the upper end of the inspection window.

BRAKE

(BRAKE)
Inspect Initially at 1 000 km (600 miles, 2 months) and Every 6 000 km (4 000 miles, 12 months) thereafter.

(BRAKE FLUID AND BRAKE HOSE)
Inspect Every 6 000 km (4 000 miles, 12 months). Replace fluid Every 2 years. Replace hoses Every 4 years.

FRONT BRAKE

Brake fluid level

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

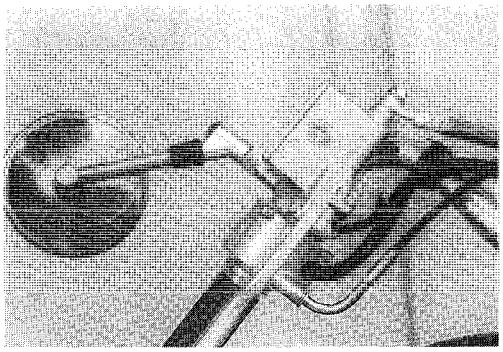
BF Specification and Classification: DOT4

⚠ 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 or petroleum-based. Do not use any brake fluid taken from old, used or unsealed containers. Never re-use brake fluid left over from the last servicing or stored for a long period.

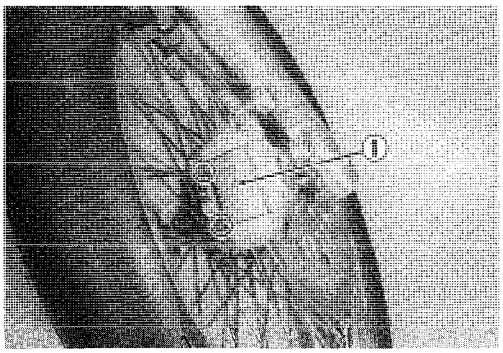
⚠ WARNING

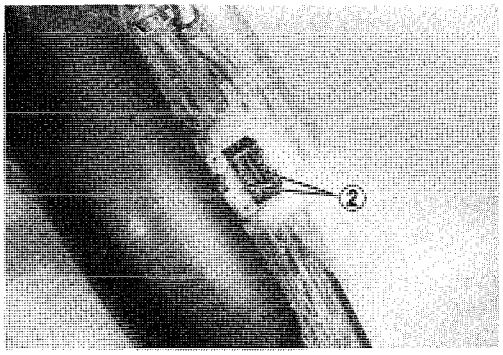
Brake fluid, if it leaks, will interfere with safe running and immediately discolor painted surfaces. Check the brake hoses and hose joints for cracks and oil leakage before riding.



Brake pad

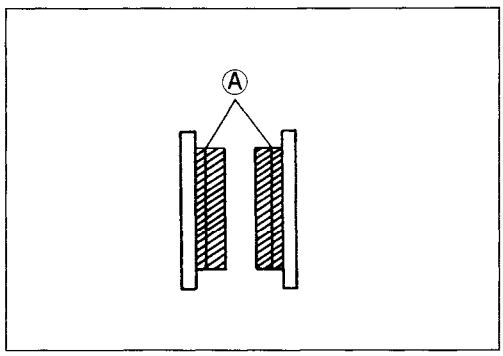
- Remove the cover ①.
- Check the wearing condition of brake pad ② by observing the grooved limit line Ⓐ on the pad.
- When the wear exceeds the grooved limit line, replace the pad with new one. (Refer to page 7-9.)





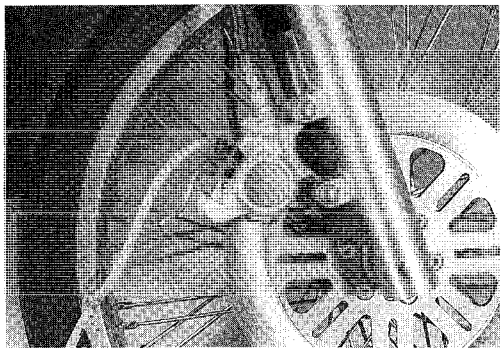
⚠ CAUTION

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



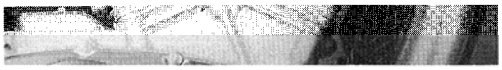
Air bleeding the brake fluid circuit

Air trapped in the 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:

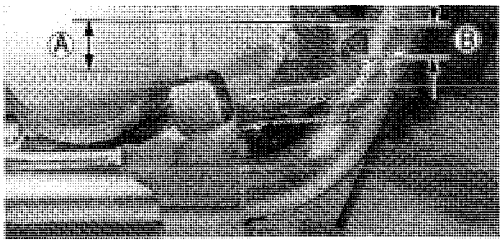


- Fill up the master cylinder reservoir to the upper end of the inspection window. Replace the reservoir cap to prevent entry of dirt.
- Attach a pipe to the caliper air bleeder valve, and insert the free end of the pipe into a receptacle.
- Squeeze and release the brake lever several times in rapid succession and squeeze the lever fully without releasing it. Loosen the bleeder valve by turning it a quarter of a turn so that the brake fluid runs into the receptacle; this will remove the tension of the brake lever causing it to touch the handlebar grip. Then, close the 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:
Replenish the brake fluid in the reservoir as necessary while bleeding the brake system. Make sure that there is always some fluid visible in the reservoir.



- Close the bleeder valve, and disconnect the pipe. Fill the [illegible] tion window.



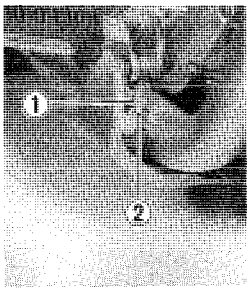
Caliper air bleeder valve: 8 N·m (0.8 kg-m, 6.0 lb-ft)

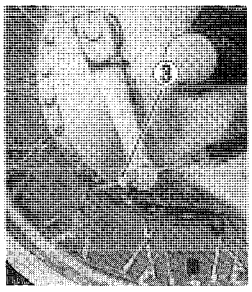
⚠ CAUTION

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

REAR BRAKE


- Loosen the lock nut ① and rotate the adjusting bolt ② to locate the brake pedal height Ⓐ above the footrest as shown in photo. Be sure to tighten the lock nut good and hard after setting the bolt.
- Set the pedal free travel Ⓑ as measured at pedal tip, by repositioning the adjuster nut ③ on the brake cable.

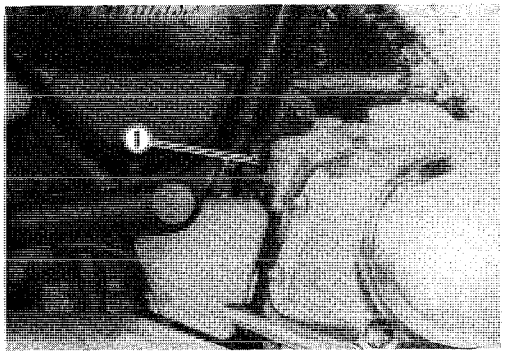




Brake pedal height Ⓐ: 40 mm (1.6 in)
Brake pedal free travel Ⓑ: 20—30 mm (0.8—1.2 in)

Brake light switch

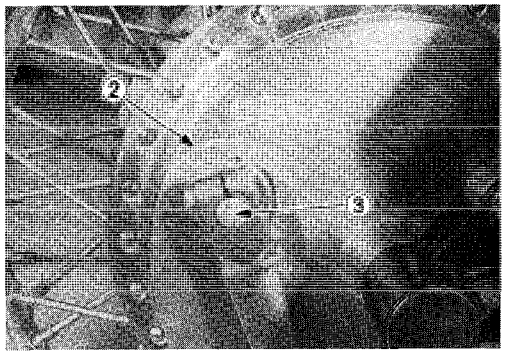
Adjust the rear brake light switch ① so that the brake light will come on just before pressure is felt when the brake pedal is depressed.



Brake shoe wear

This motorcycle is equipped with brake lining wear limit indicator ② on rear brake panel. At the condition of normal lining wear, the extension line of the index mark ③ on brake cam shaft should be within the range embossed on the brake panel with brake on. To check wear of the brake lining, perform the following step.

- First check if the brake system is properly adjusted.
- While operating the brake, check to see that the extension line of the index mark ③ is within the range on the brake panel.
- If the index mark is beyond the range, the brake shoe assembly should be replace with new ones. (Refer to page 7-31.)

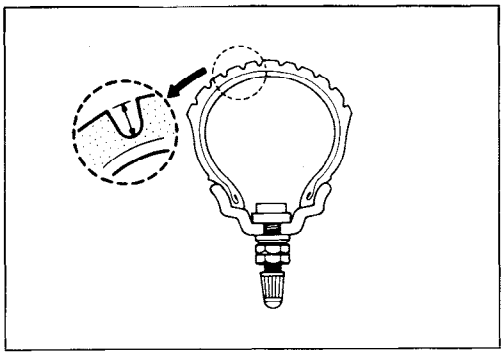


TIRE

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

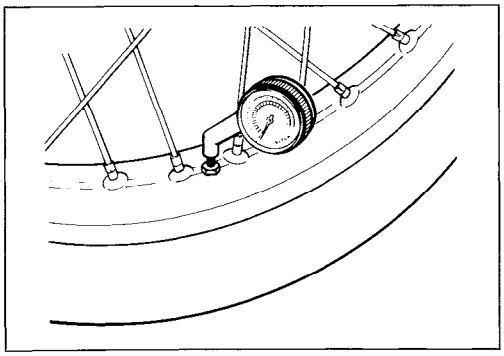
TIRE TREAD CONDITION

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



TOOL 09900-20805: Tire depth gauge

Tire tread depth limit: FRONT 1.6 mm (0.06 in)
REAR 2.0 mm (0.08 in)



TIRE PRESSURE

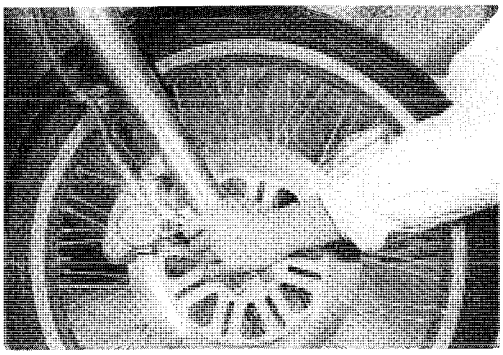
If the tire pressure is too high or too low, steering will be adversely affected and tire wear increased. Therefore, maintain the correct tire pressure for good roadability or shorter tire life will result. Cold inflation tire pressure is as follows.

COLD INFLATION TIRE PRESSURE	SOLO RIDING			DUAL RIDING		
	kPa	kg/cm²	psi	kPa	kg/cm²	psi
FRONT	200	2.00	29	225	2.25	33
REAR	225	2.25	33	250	2.50	36

⚠ CAUTION

The standard tire fitted on this motorcycle is 80/90-21 48H for front and 140/90-15 M/C 70H for rear. The use of tires other than those specified may cause instability. It is highly recommended to use a SUZUKI Genuine Tire.

STEERING



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

Taper roller type bearings are used on the steering system for better handling. Steering should be adjusted properly for smooth turning of handlebars and safe running. Overtight steering prevents smooth turning of the handlebars and too loose steering will cause poor stability. Check that there is no play in the front fork assembly by supporting the motorcycle so that the front wheel is off the ground, with the wheel straight ahead, grasp the lower fork tubes near the axle and pull forward. If play is found, perform steering bearing adjustment as described in page 7-27 of this manual.

FRONT FORK

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

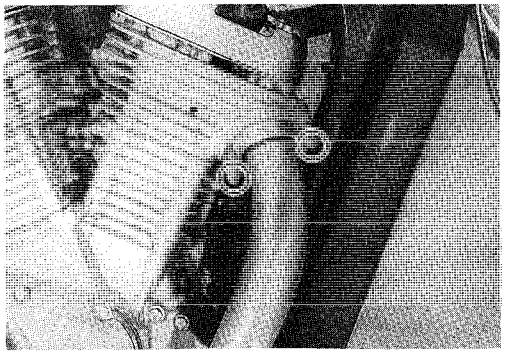
Inspect the front forks for oil leakage, scoring or scratches on the outer surface of the inner tubes. Replace any defective parts, if necessary. (Refer to page 7-16.)

REAR SUSPENSION

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

Inspect the rear shock absorber for oil leakage and check that there is no play in the swingarm assembly.

EXHAUST PIPE BOLTS



Tighten Every 6 000 km (4 000 miles, 12 months).

- Tighten the exhaust pipe clamp bolts to the specified torque with torque wrench.

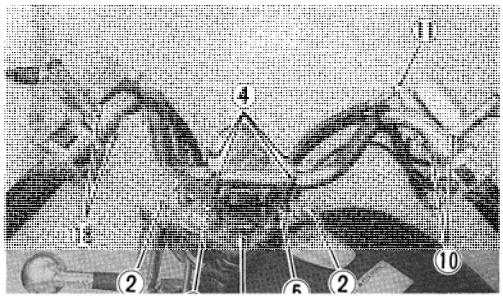
Exhaust pipe clamp bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)

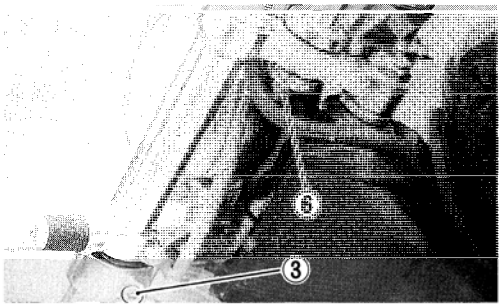
CHASSIS BOLTS AND NUTS

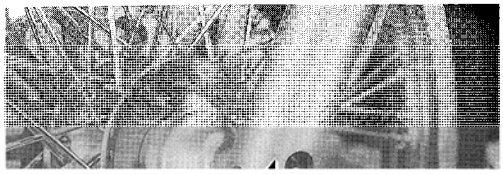
Tighten Initially at 1 000 km (600 miles, 2 months) and Every 6 000 km (4 000 miles, 12 months).

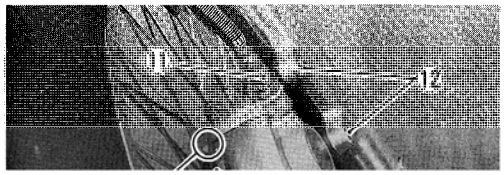
The nuts and bolts listed below are important safety parts. They must be retightened when necessary to the specified torque with a torque wrench. (Refer to page 2-18 for the locations of the following nuts and bolts on the motorcycle.)

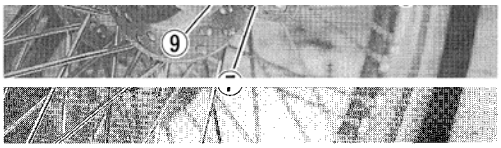
ITEM	N·m	kg-m	lb-ft
① Steering stem head nut	90	9.0	65.0
② Front fork cap bolt	90	9.0	65.0
③ Front fork lower clamp bolt	33	3.3	24.0
④ Handlebars clamp bolt	23	2.3	16.5
⑤ Handlebars holder bolt	45	4.5	32.5
⑥ Handlebars holder nut	45	4.5	32.5
⑦ Front fork damper rod bolt	20	2.0	14.5
⑧ Front axle	44	4.4	32.0
⑨ Front axle pinch bolt	23	2.3	16.5
⑩ Front master cylinder mounting bolt	10	1.0	7.0
⑪ Brake hose union bolt	23	2.3	16.5
⑫ Caliper mounting bolt	35	3.5	25.5
⑬ Caliper housing bolt	33	3.3	24.0
⑭ Caliper air bleeder valve	8	0.8	6.0
⑮ Brake disc plate bolt	23	2.3	16.5
⑯ Hub flange bolt	25	2.5	18.0
⑰ Spoke nipple	5	0.5	3.5
⑱ Clutch master cylinder mounting bolt	10	1.0	7.0
⑲ Rear shock absorber fitting nut (upper)	32	3.2	23.0
⑳ Rear shock absorber fitting nut (lower)	29	2.9	21.0
㉑ Rear axle nut	78	7.8	56.5
㉒ Rear brake cam lever bolt	10	1.0	7.0
㉓ Rear torque link nut (front & rear)	29	2.9	21.0
㉔ Final gear case joint nut	40	4.0	29.0
㉕ Rear swingarm pivot nut	96	9.6	69.5
㉖ Front footrest bolt	26	2.6	19.0

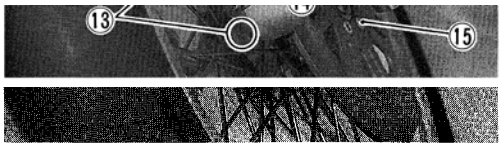


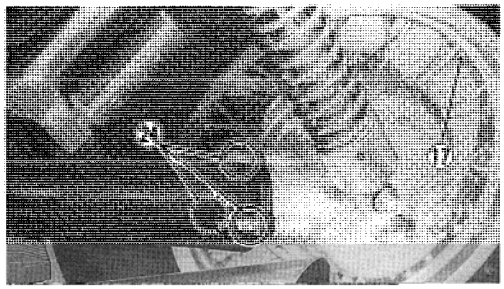


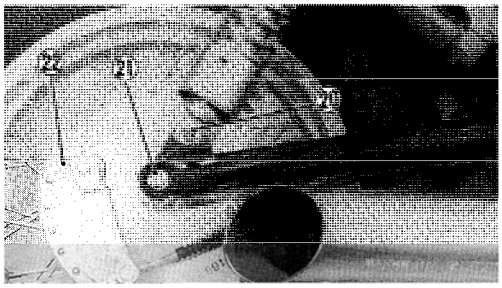


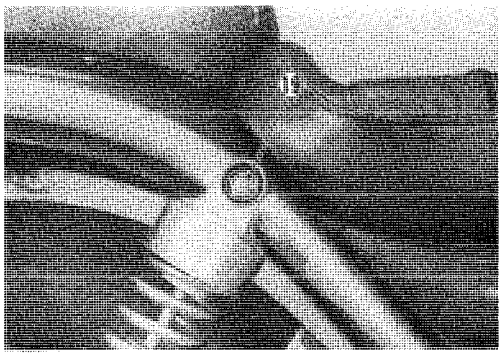


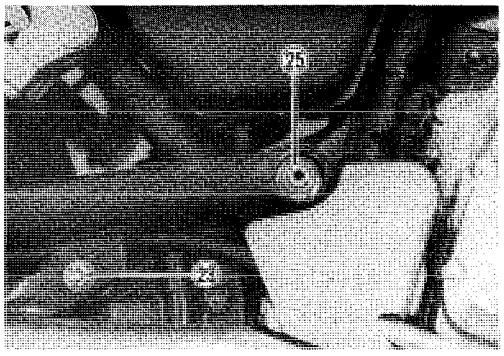


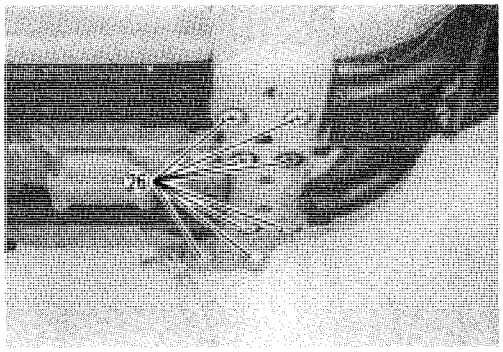












COMPRESSION PRESSURE CHECK

The compression 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.

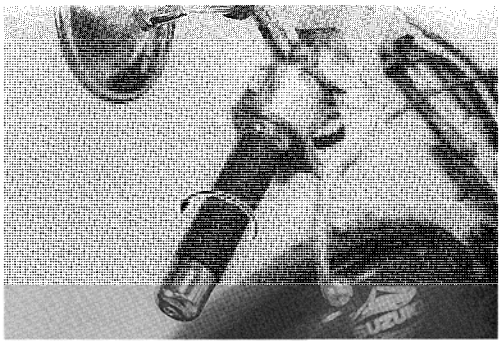
COMPRESSION PRESSURE SPECIFICATION

Standard	Limit	Difference
1 450 kPa (14.5 kg/cm²) (206 psi)	1 000 kPa (10 kg/cm²) (142 psi)	200 kPa (2 kg/cm²) (28 psi)

Low compression pressure can indicate any of the following conditions:
* Excessively worn cylinder wall
* Worn-down piston or piston rings
* Piston rings stuck in grooves
* Poor seating of valves
* Ruptured or otherwise defective cylinder head gasket
* Valve clearance out of adjustment
* Starter motor cranks too slowly

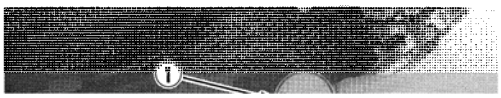
Overhaul the engine in the following cases:
* Compression pressure in one of the cylinders is less than 1 000 kPa (10 kg/cm², 142 psi).
* Difference in compression pressure between any two cylinders is more than 200 kPa (2 kg/cm², 28 psi).

COMPRESSION TEST PROCEDURE

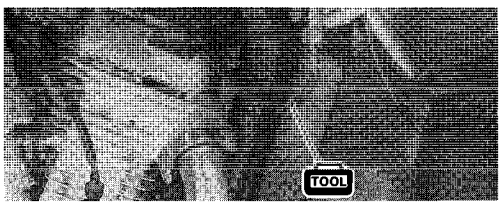


NOTE:
* *Before testing the engine for compression pressure, make sure that the cylinder head bolts are tightened to the specified torque values and valves are properly adjusted.*
* *Have the engine warmed up by idling before testing.*
* *Be sure that the battery used is in fully-charged condition.*

Test the compression pressure in the following manner.
- Remove all the spark plugs.
- Fit the compression gauge ① in one of the plug holes, while taking care that the connection tight.



er, and record the maximum gauge reading as the compression of that cylinder.
- Repeat this procedure with the other cylinder.



TOOL **09915-64510: Compression gauge**
09918-03810: Compression gauge adaptor

OIL PRESSURE CHECK

Check periodically the oil pressure in the engine to judge roughly the condition of the moving parts.

OIL PRESSURE SPECIFICATION

Above 350 kPa (3.5 kg/cm², 50 psi) **Below 650 kPa (6.5 kg/cm², 92 psi)**	**at 3 000 r/min., Oil temp. at 60°C (140°F)**

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

LOW OIL PRESSURE

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

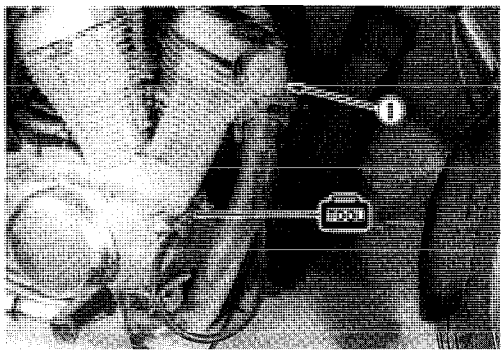
HIGH OIL PRESSURE

* Used a engine oil which is too high viscosity
* Clogged oil passage way
* Improper installation of the oil filter
* Combination of above items

OIL PRESSURE TEST PROCEDURE

Start the engine and check if the oil pressure indicator light is turned on. If it keeps on lighting, check the oil pressure indicator light circuit. If it is in good condition, check the oil pressure in the following manner.

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



TOOL **09915-74510: Oil pressure gauge**
09915-74531: Oil pressure gauge adaptor
09915-77330: Meter (for high pressure)

ENGINE

CONTENTS

3

ENGINE COMPONENTS REMOVABLE WITH THE ENGINE IN PLACE

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

ENGINE CENTER

ENGINE RIGHT SIDE

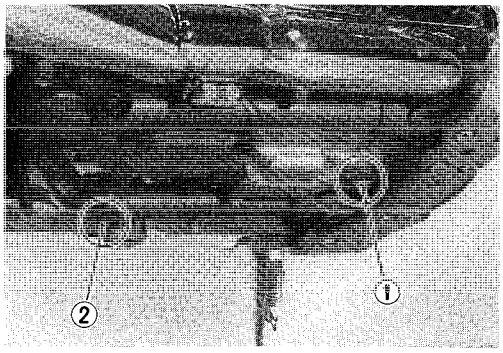
ENGINE LEFT SIDE

ENGINE REMOVAL AND REINSTALLATION

ENGINE REMOVAL

Before taking the engine out of the frame, thoroughly clean the engine with a suitable cleaner. The procedure of engine removal is sequentially explained in the following steps.

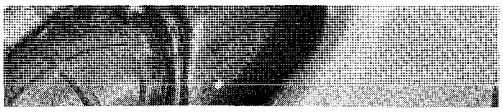
- Remove the seat.
- Remove all the frame covers.
- Turn the fuel cock ''OFF'' position and remove the fuel tank mounting bolts, remove the fuel tank by disconnecting the fuel hose.
- Disconnect the battery ⊖ and ⊕ lead wires from the battery terminals, remove the battery.



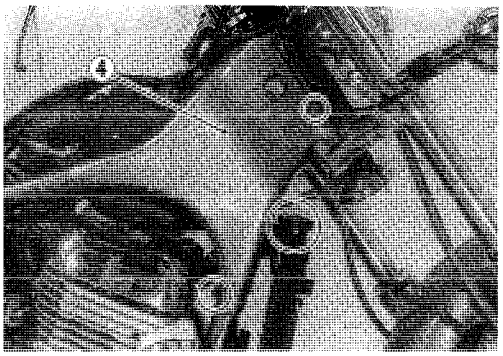
⚠ CAUTION

Be sure to disconnect the ⊖ lead wire first.

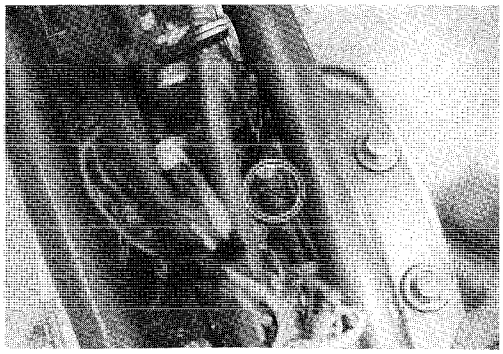
- Remove the oil drain plug ① to drain out engine oil.
- Remove the water drain plug ② to drain out coolant.



- Remove the frame head covers ④ and radiator cap.

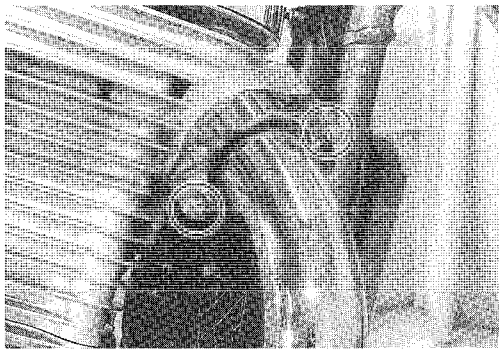


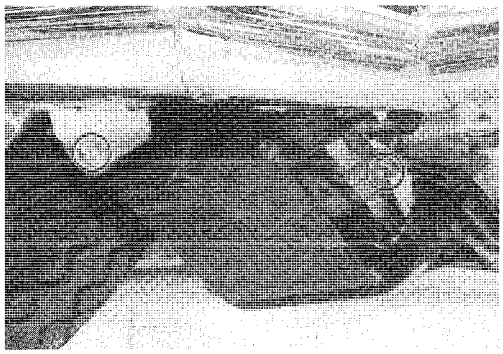
- Disconnect the breather hose from the rear cylinder head.

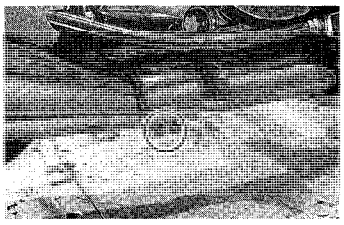


- Remove the radiator by removing the radiator cover and radiator hose clamps.
- Remove the coolant reservoir tank.

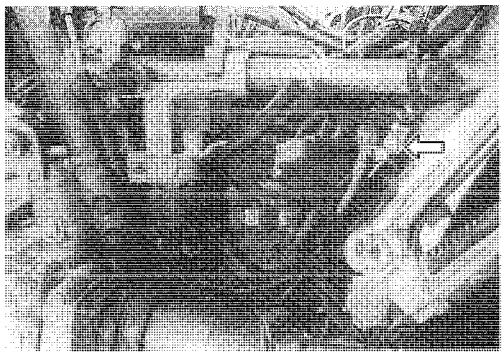
- Remove the left and right mufflers.

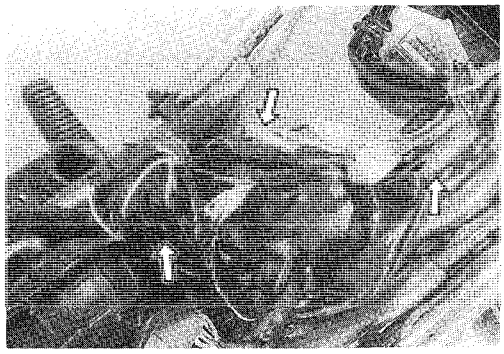




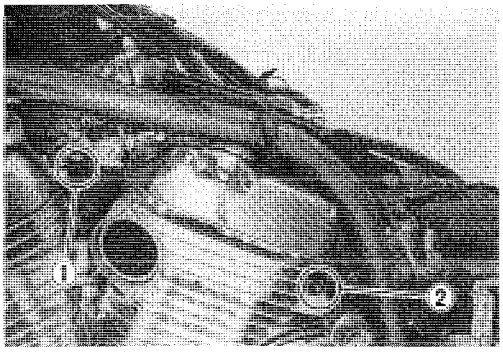


- Remove all the spark plug caps.
- Disconnect the following lead wires.
  - * Generator
  - * Signal coil
  - * Starter motor
  - * Starter relay
  - * Engine coolant temperature gauge
  - * Cooling fan motor lead
  - * Neutral indicator
  - * Ground lead
  - * Oil pressure indicator

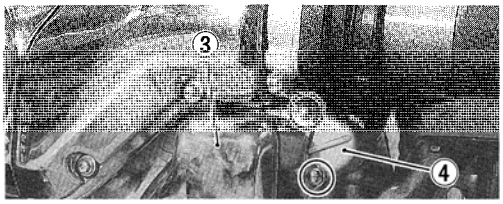


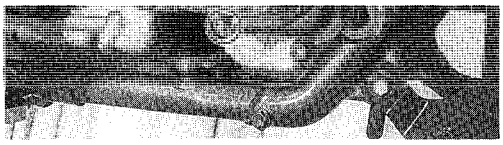


- Loosen the front and rear carburetor clamps ①, ②.
- Remove the carburetor joint hose from the rear air cleaner.
- Remove the rear air cleaner mounting bolts and slide the air cleaner rightward.
- Disconnect the front and rear carburetors from the engine.

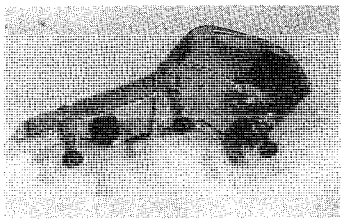


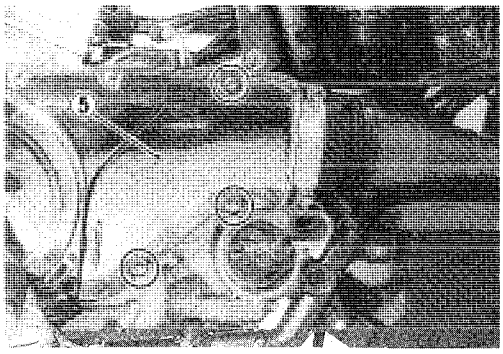
- Remove the water pump cover ③ and the water pump case ④.



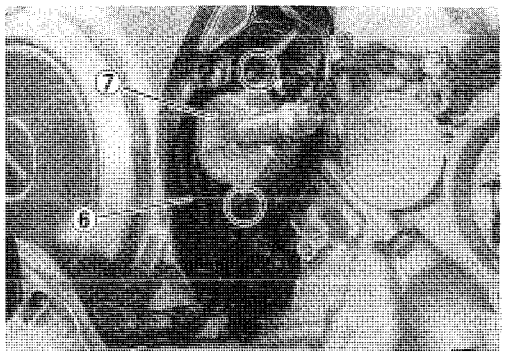


- Remove the secondary bevel gear case cover ⑤.

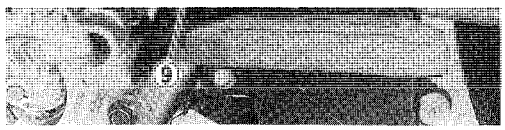




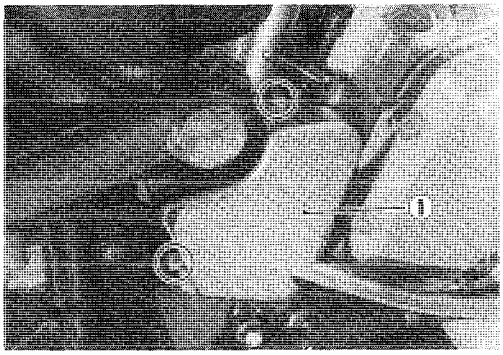
- Disconnect the side-stand switch lead wires ⑥.
- Remove the clutch release cylinder ⑦.



- Loosen the shaft drive boot clamp ⑧ and remove the cover ⑨.



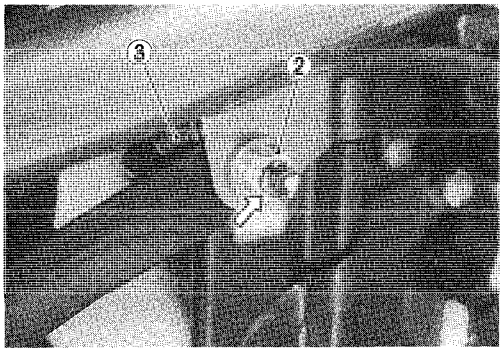
- Hold the motorcycle securely in an upright position by jacking up the frame with a jack or jacks.
- Remove the rear brake adjuster nut from the rear brake cable.
- Remove the brake cover ①.



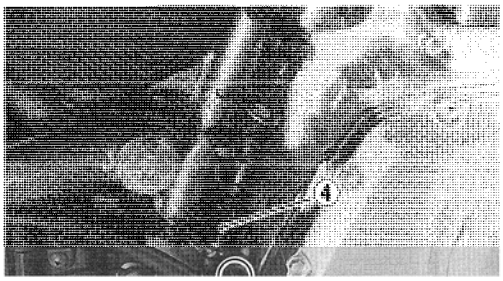
- Loosen the nut ② after removing the cotter pin to remove the rear brake cable from the cable guide ③.

⚠ CAUTION

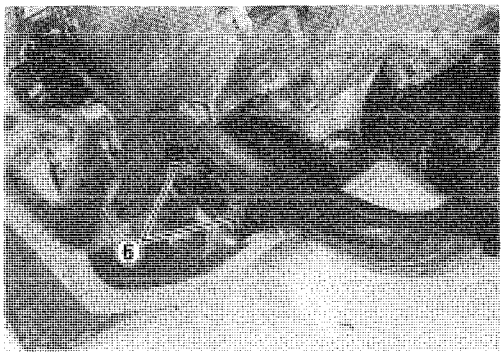
Replace the cotter pin with the new one, when assembling.



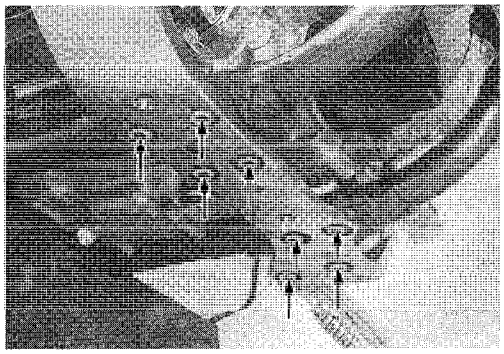
- Remove the stop lamp switch cable ④.
- Remove the bolt ⑤.



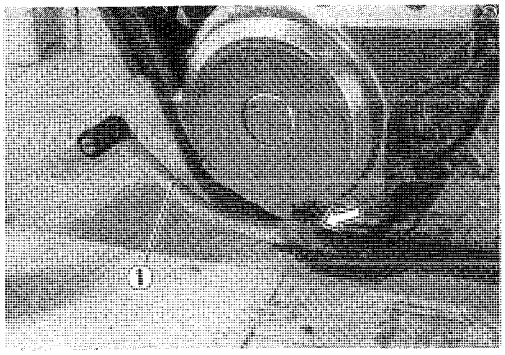
- Remove the footrest bolt pins ⑥.



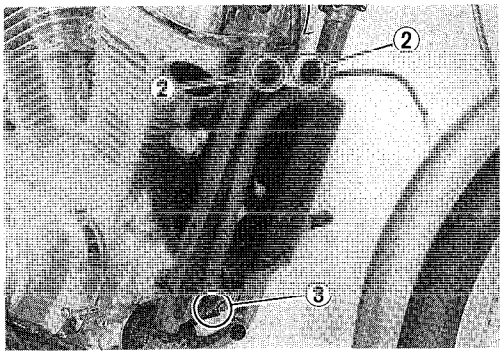
- Remove the front footrest.



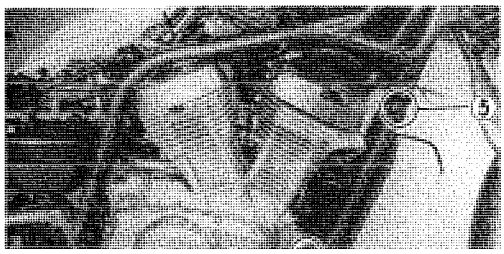
- Remove the gearshift lever ①.



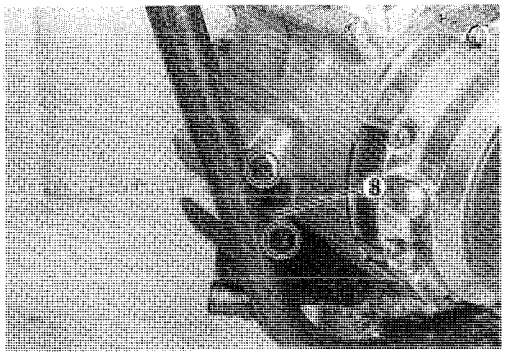
- Remove the cooling fan mounting bolts ②.
- Remove the frame connecting bolt ③.



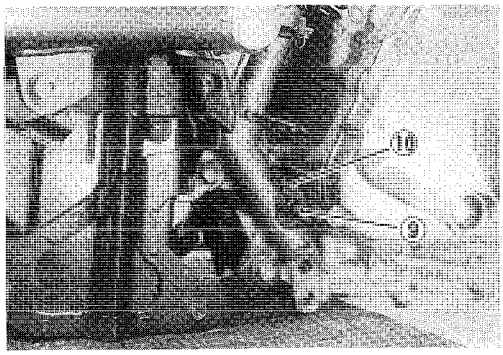
- Remove the engine mounting nut ④.
- Remove the right frame down tube ⑦ with the cooling fan by removing bolts ⑤ and ⑥.



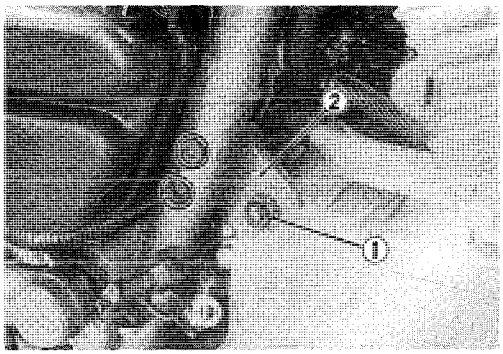
- Remove the engine mounting bracket ⑧.



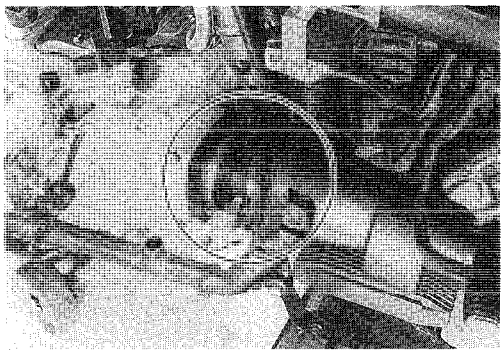
- Remove the engine mounting bolt ⑨ and the bracket ⑩.



- Remove the engine mounting bolt ① and bracket ②.

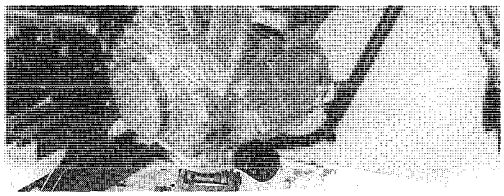


- Support the engine with a proper jack.
- Extract the engine output shaft splines from the universal joint coupling by pulling the engine slightly forward.
- Dismount the engine by pulling slightly forward and to right-side.



⚠ CAUTION

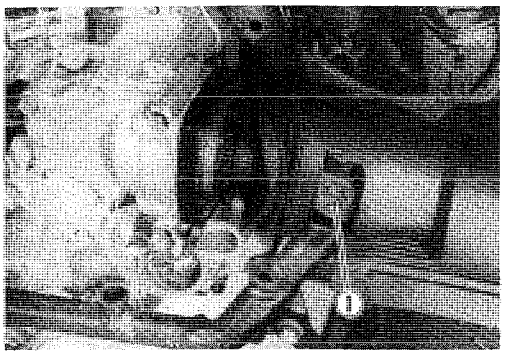
When holding the engine with a jack,
- **avoid applying a jack to the oil filter, or the oil filter may be damaged.**
- **place a wooden piece on a jack, or the oil pan may be damaged.**



ENGINE REINSTALLATION

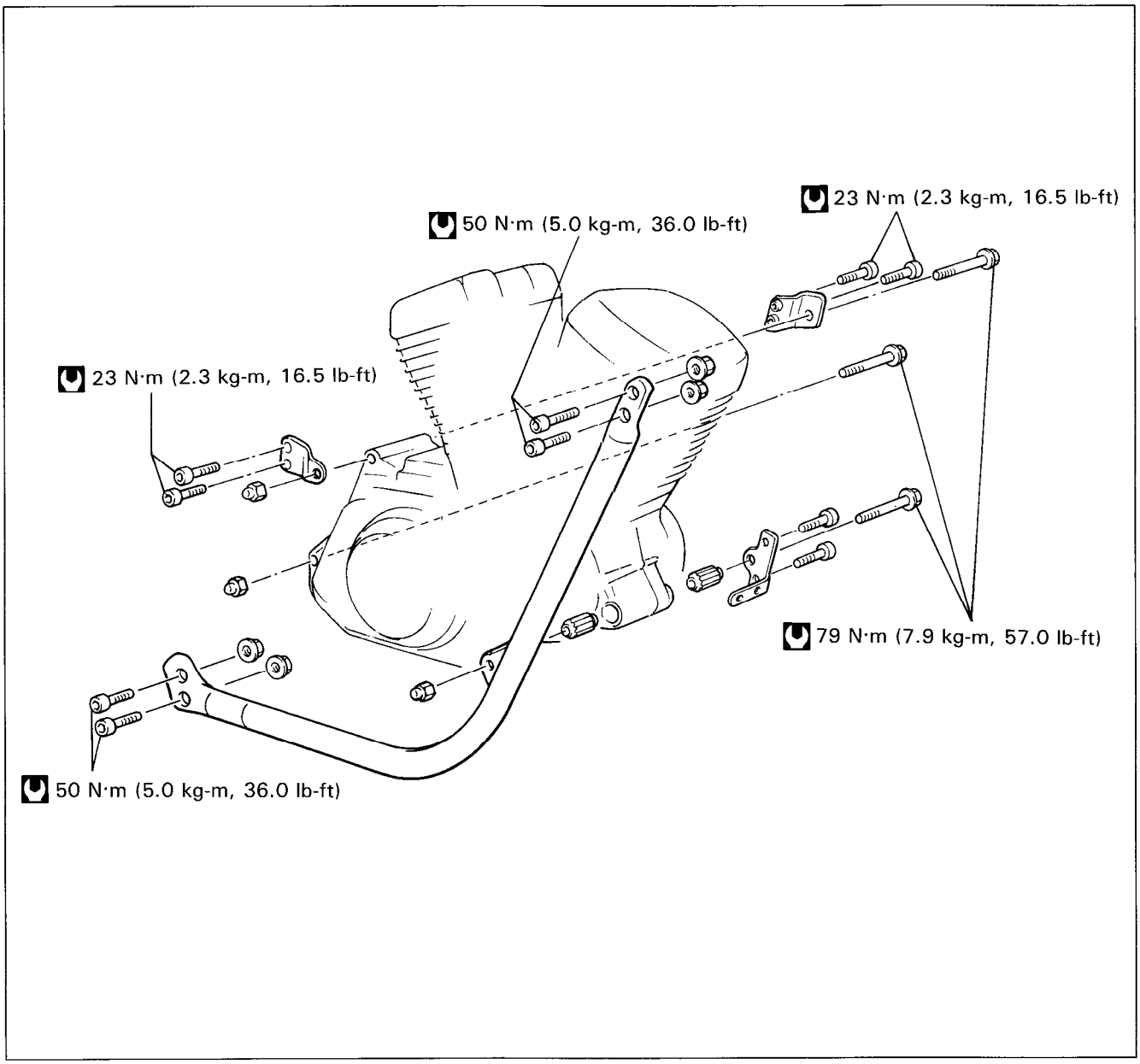
Reinstall the engine in the reverse order of engine removal.

- Install the brackets, spacer, bolts and nuts properly, as shown in the following illustration.
- Fit the universal joint coupling ① to the propeller shaft before inserting the engine output shaft to the universal joint coupling.

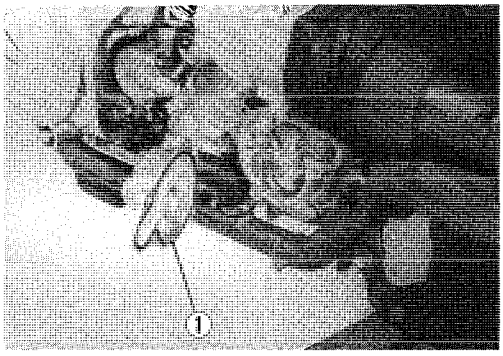


NOTE:
The engine mounting nuts are self-locking. Once the nut has been removed, it is no longer of any use. Be sure to use new nuts and tighten them to the specified torque.

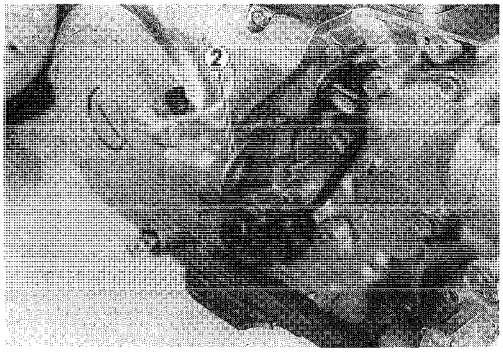
- After remounting the engine, route wiring harness, cables and hoses properly by referring to the sections, for wire routing, cable routing and hose routing. (Refer to pages 9-10 through 18.)



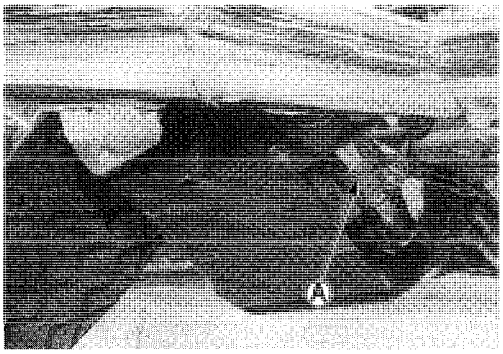
- Fit the "O-ring" ① to the water pump case.



- Fit the retainer ② to the clutch release cylinder.



- Paste the muffler seal to the muffler connecting pipe Ⓐ.



- Adjust the following items to the specification.

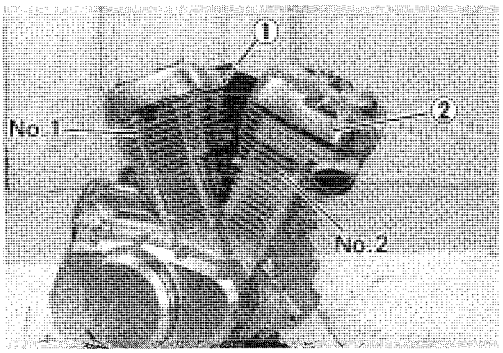
- Pour 3.3 L (3.5/2.9 US/Imp qt) of engine oil SAE 10W/40 graded SE or SF into the engine after overhauling engine.
- Start up the engine and allow it run for several minutes at idle speed. About several minutes after stopping engine, check that the oil level remains between the marks of oil level inspection window.

Change	2 400 ml (2.5/2.1 US/Imp qt)
Filter change	2 800 ml (3.0/2.5 US/Imp qt)
Overhaul	3 300 ml (3.5/2.9 US/Imp qt)

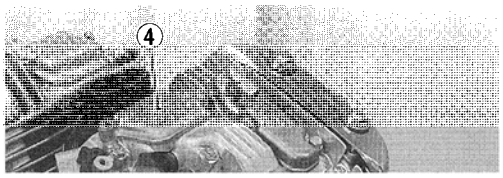
ENGINE DISASSEMBLY

⚠ CAUTION

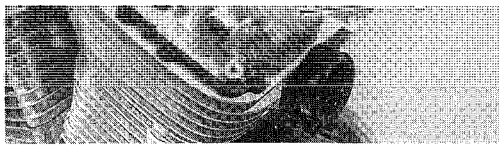
Be sure to identify each removed part such as intake pipe, camshaft, piston, conrod etc. as to its location and lay the parts out in groups so that each will be restored to the original location during assembly.

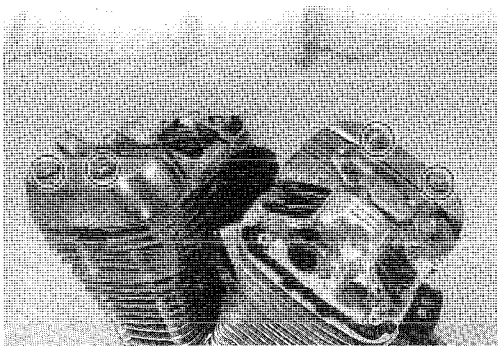


- Remove the head cover caps ① and ②.

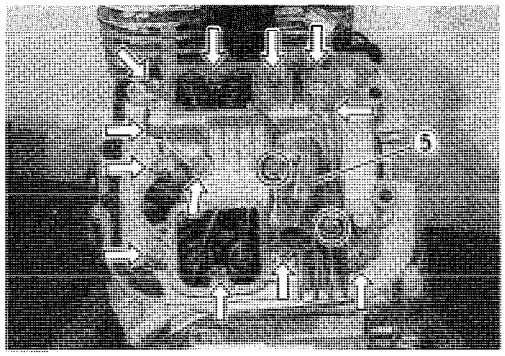


- Remove the valve inspection caps ③ and ④.





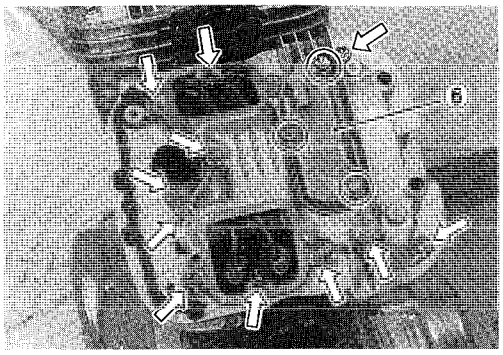
- Remove the head cover caps.



- Remove the water outlet union ⑤ and the cylinder head cover.

NOTE:
When removing the cylinder head covers, the piston must be at top dead center on the compression stroke.

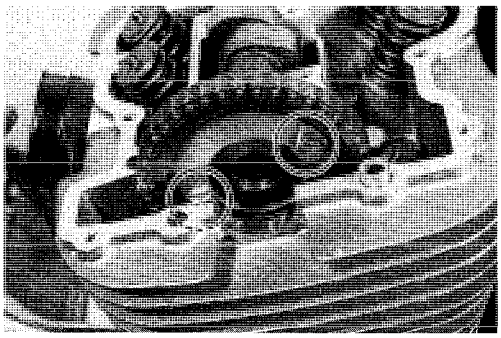
No.2 (FRONT)



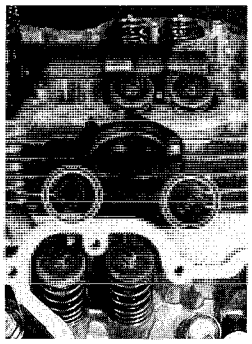
- Remove the cylinder head cover and the breather cover ⑥.

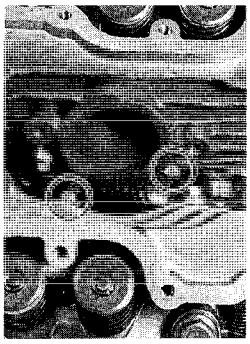
No.1 (REAR)

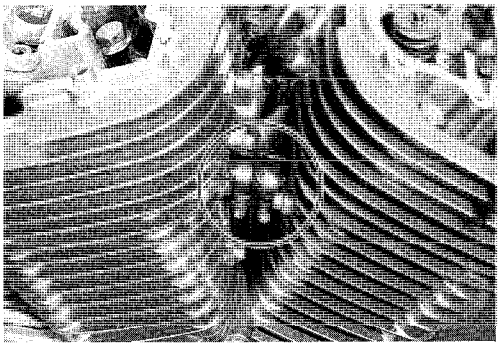
- Flatten the lock washers and remove the camshaft sprocket bolts.
- Remove the camshafts and sprockets.



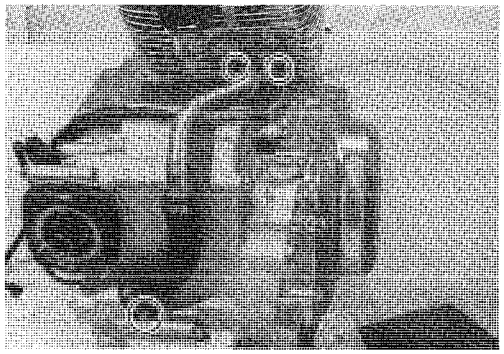
- Remove the front intake pipe.
- Loosen the water hose clamp screws.



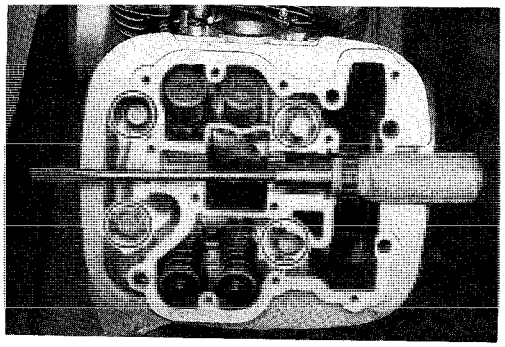




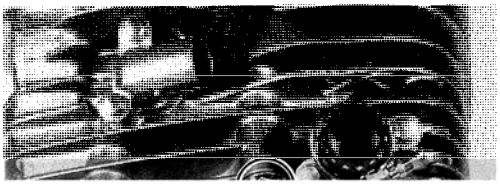
- Remove the water pipe/water hose by removing the water pipe bolts and loosening the water hose clamp screw.

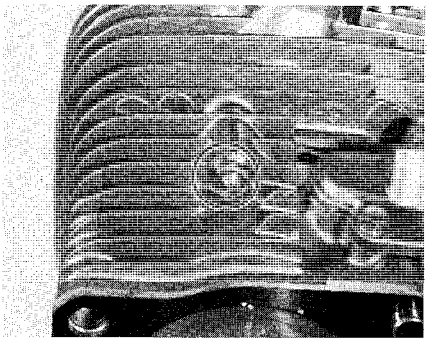


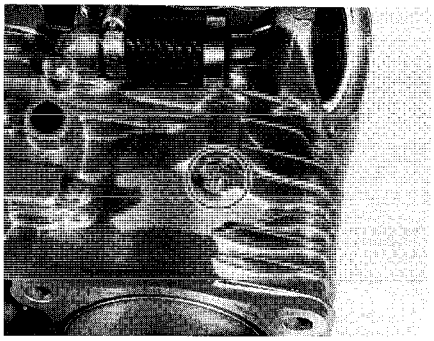
- Remove the cylinder head bolts.
- Remove the front and rear cylinder heads along with the respective cylinders.

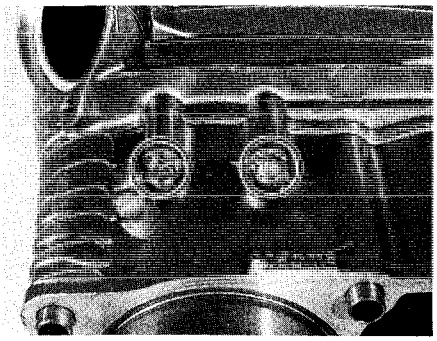


- Remove the cylinder head nuts and bolts.



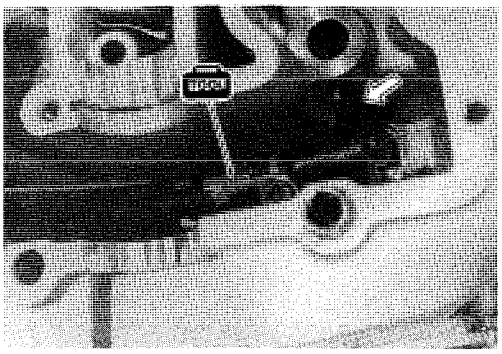




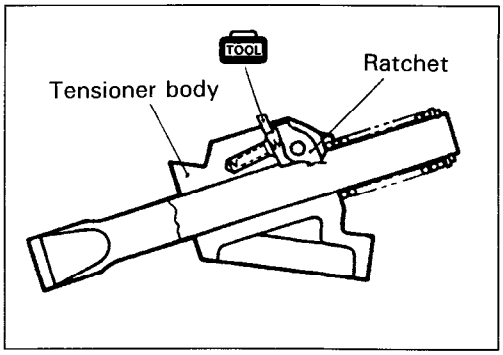


- After releasing the ratchet, push the chain tensioner rod fully to compress the spring and insert a special tool between ratchet and chain tensioner body.

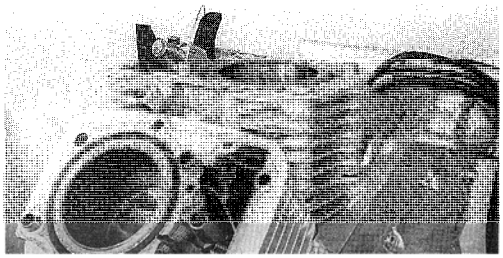
TOOL 09918-53810: Chain tensioner locking tool



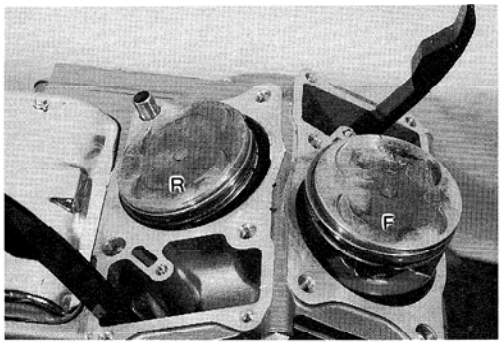
- Separate the respective cylinder heads and cylinders.



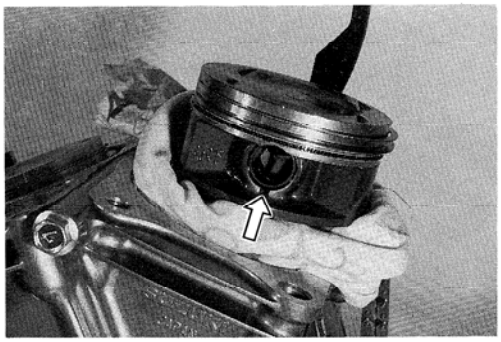
- Remove the chain tensioner and the chain tensioner guide.
- Remove cylinders.



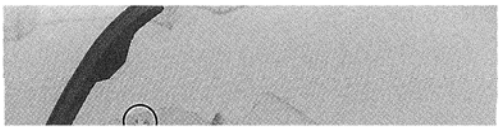
- Check the ''F'' and ''R'' piston marks.

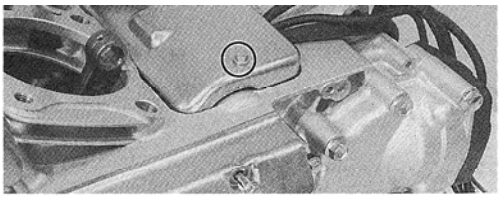


- Place a clean rag over the cylinder base to prevent piston pin circlips from dropping into crankcase. Remove the piston pin circlips with long-nose pliers.
- Drive out the piston pins by using proper drift.

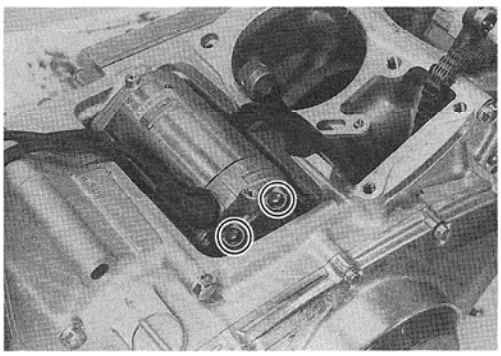


- Remove the starter motor cover.



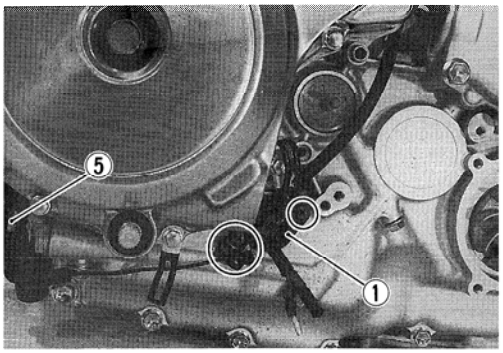


- Remove the starter motor.

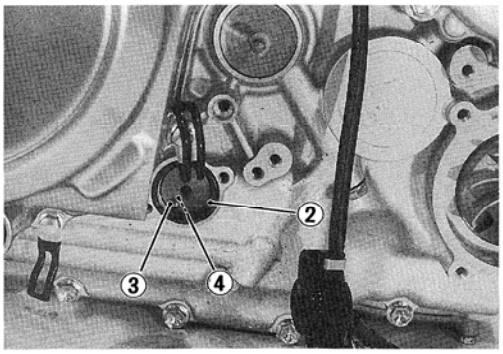


- Remove the neutral switch assembly ①.

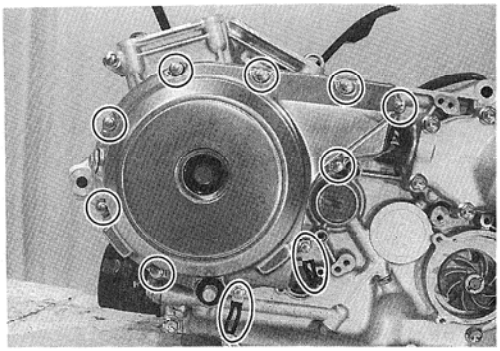
NOTE:
Do not lose the "O-ring" ②, the neutral switch contact ③ and its spring ④.



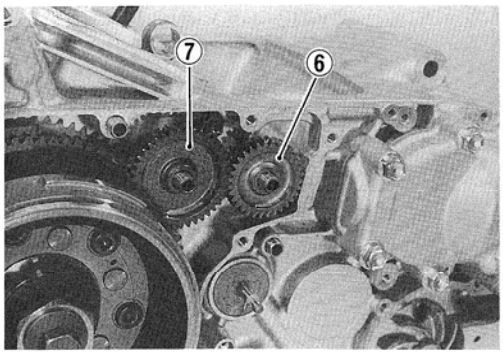
- Disconnect the oil pressure switch lead wire ⑤.



- Remove the generator cover.

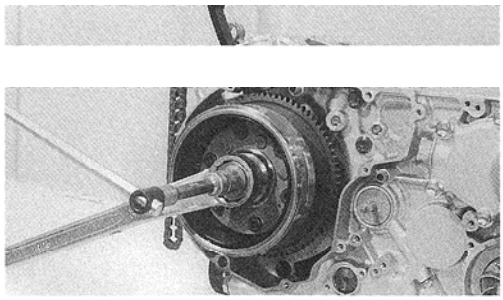


- Remove the starter driven gear ⑥ and its idle gear ⑦.



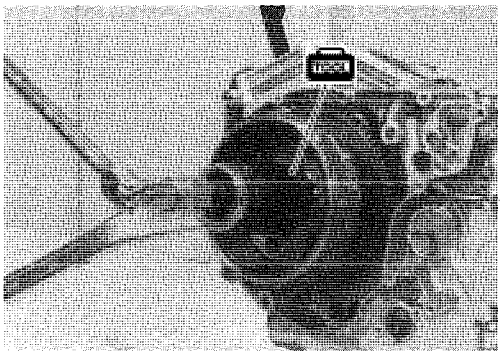
NOTE:

ter loosening the bolt. The rotor bolt is used in conjunction with the rotor remover.

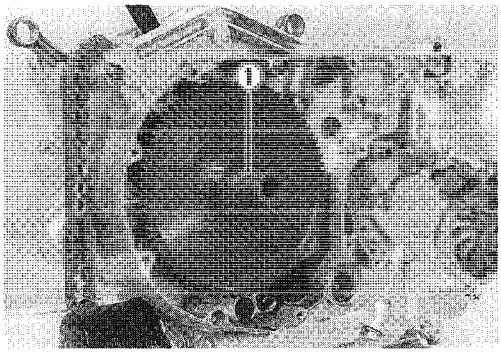


- Remove the rotor by using the special tool.

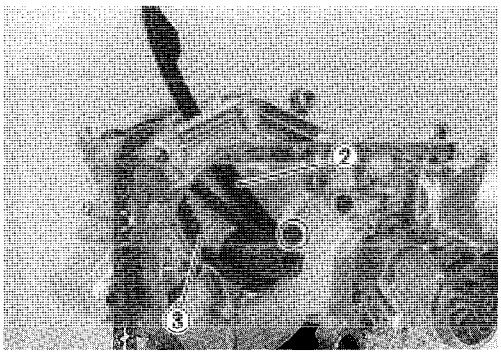
TOOL **09930-30720: Rotor remover**



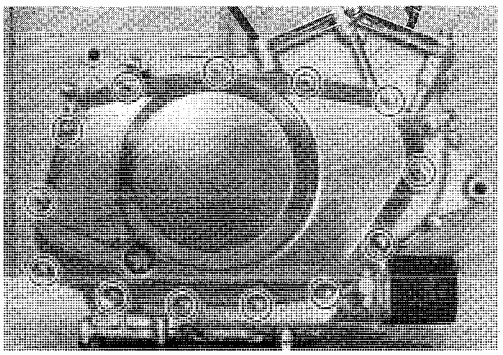
- Remove the key ①.
- Remove the starter driven gear.



- Remove the cam chain guide ② and cam chain ③.

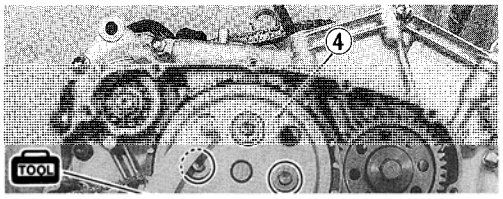


- After removing the clutch cover bolts, remove the clutch cover by tapping with a plastic hammer.

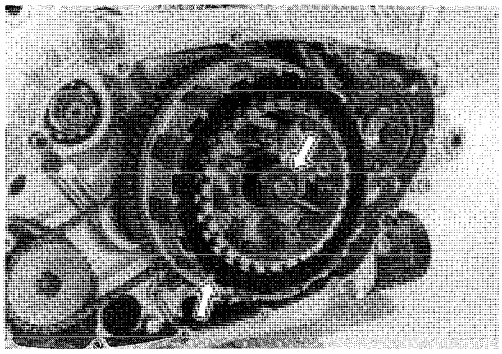


- Remove the clutch spring mounting bolts diagonally.
- Remove the pressure plate ④.

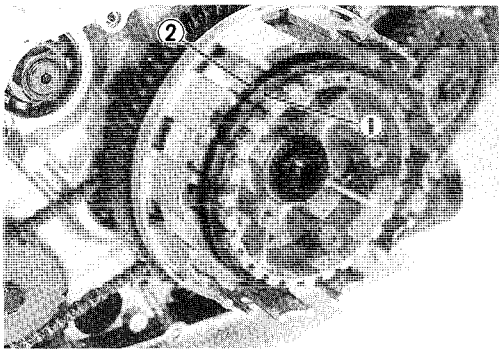
TOOL **09930-40113: Roter holder**



- Remove the clutch push piece, thrust washer, bearing and push rod.
- Remove the clutch drive and driven plates.

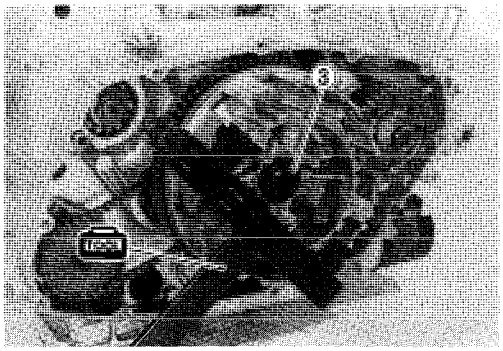


- Remove the wave washer ① and the wave washer seat ②.

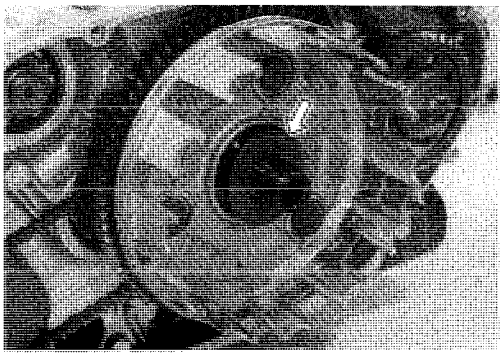


- Remove the clutch sleeve hub nut ③ by using the special tool.

TOOL 09920-53740: Clutch sleeve hub holder (or 09920-50710)

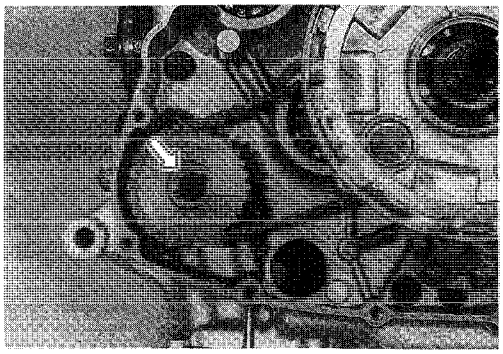


- Remove the thrust washer.

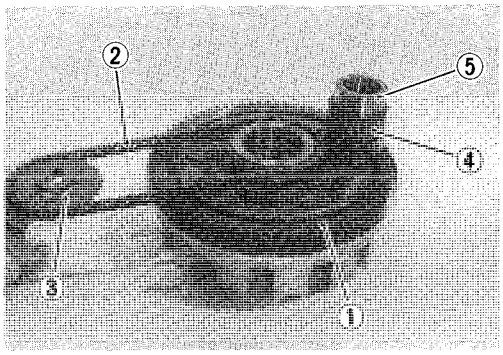


- Remove the oil pump driven gear circlip.

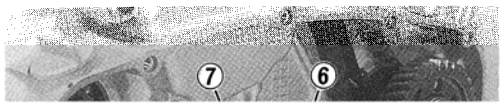
TOOL 09900-06107: Snap ring pliers

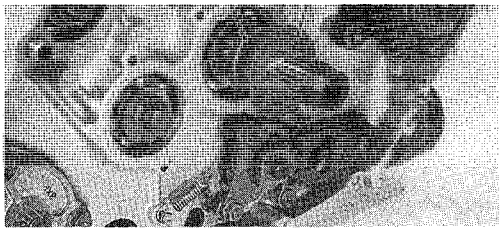


- Remove the primary driven gear assembly ①, oil pump drive chain ② and oil pump driven gear ③.
- Remove the needle roller bearing ④ and spacer ⑤.



- Remove the thrust washer ⑥ and spacer ⑦.



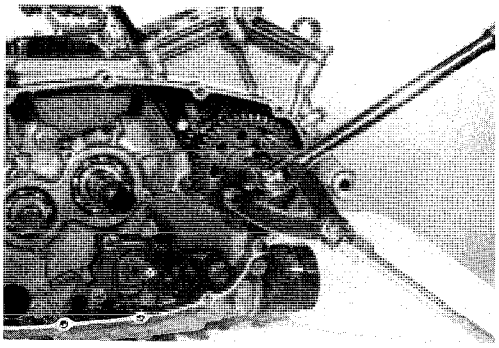


- Remove the primary drive gear bolt while holding the primary drive gear with the special tool and remove the primary drive gear.

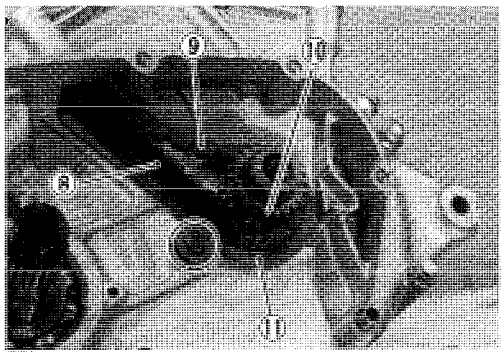
TOOL **09930-40113: Rotor holder**

⚠ CAUTION

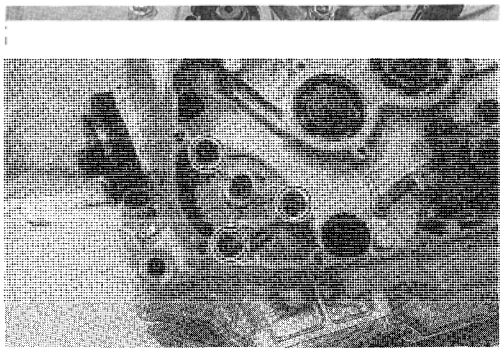
This bolt has left-hand thread. Turning it counter-clockwise it may cause damage.



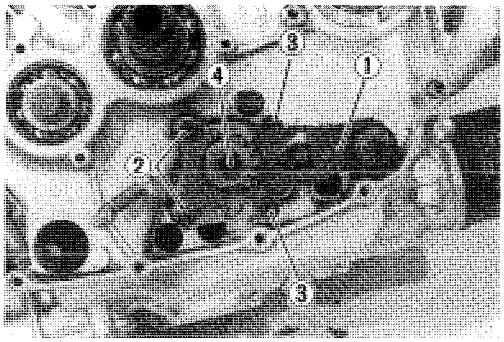
- Remove the cam chain guide ⑧ and cam chain ⑨.
- Remove the camshaft drive sprocket ⑩ and thrust washer ⑪.



Remove the oil pump by removing the bolts.



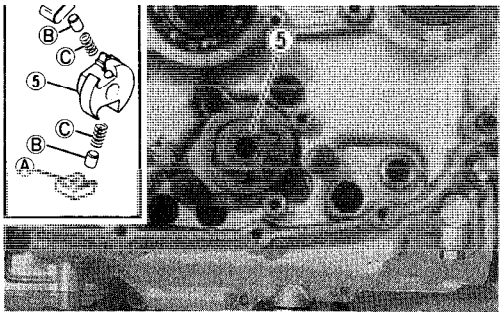
- Remove the gearshift shaft ①.
- Remove the pawl lifter and cam guide by removing the nuts ② and screws ③.



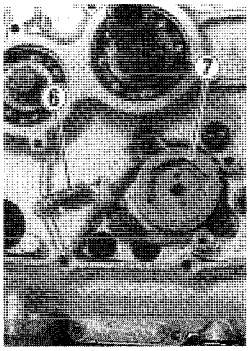
TOOL 09900-09003: Impact driver set

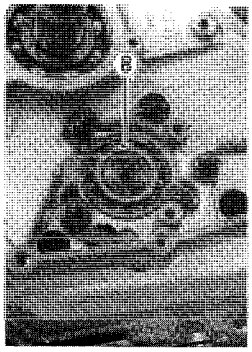
- Remove the gearshift cam driven gear retaining bolt ④.

NOTE:
When removing the gearshift cam driven gear, do not lose gearshift pawl Ⓐ, pin Ⓑ and spring Ⓒ.



- Unhook the gearshift cam stopper spring ⑥, gearshift cam stopper plate ⑦ and washer ⑧.

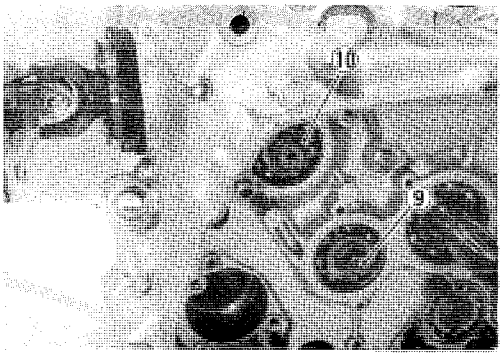




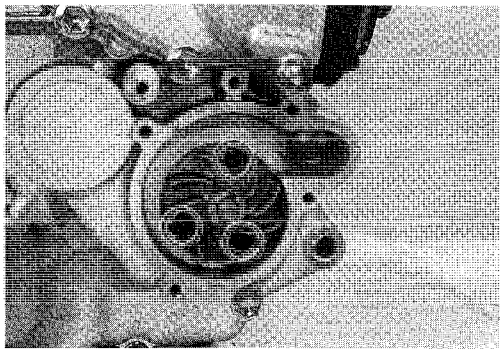
- Install the universal joint into the secondary driven bevel gear.
- Remove the driveshaft bolt ⑨ and secondary drive bevel gear shaft nut ⑩ while holding the universal joint.

⚠ CAUTION

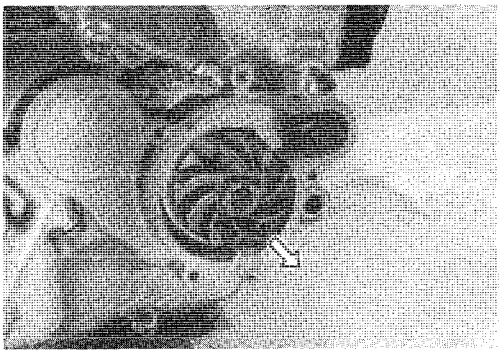
Driveshaft bolt ⑨ has left-hand thread.



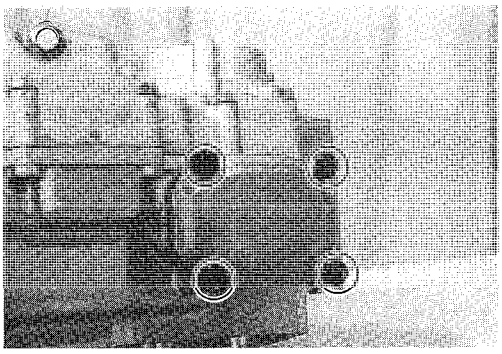
- Set the three openings of the impeller to the three screws by rotating the impeller.
- Remove the three screws securing water pump assembly.

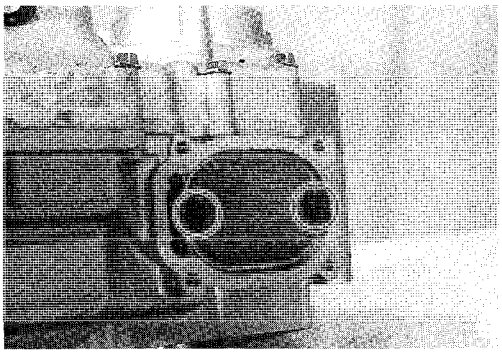


- Set one of the openings to an unused female screw at the six o'clock position by rotating the impeller.
- Extract the water pump assembly by driving a removed screw into the female screw.



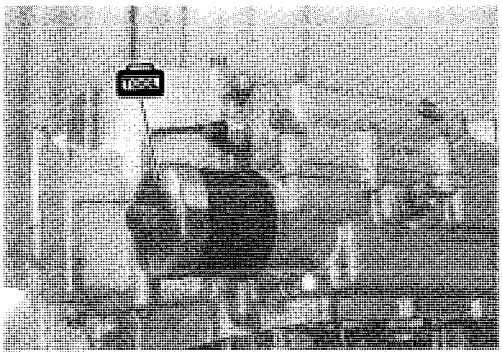
- Remove the oil sump filter cap and oil sump filter.



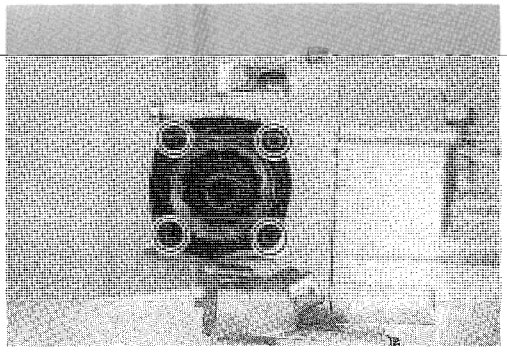


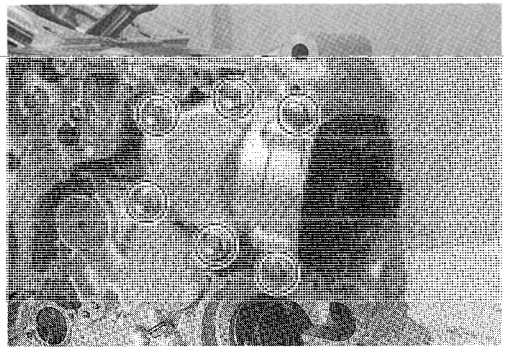
- Remove the oil filter by using the special tool.

TOOL 09915-40610: Oil filter wrench

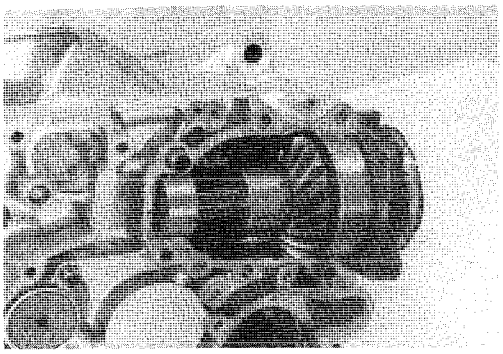


- Remove the secondary driven bevel gear housing bolts and secondary bevel gear case bolts.

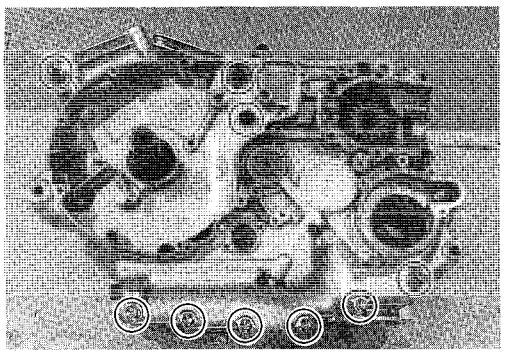


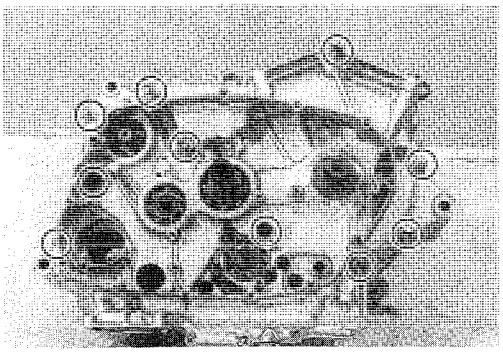


- Remove the secondary driven bevel gear assembly and bearing.



- Remove the crankcase securing bolts.

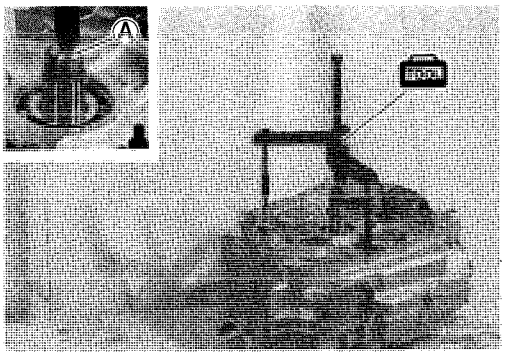




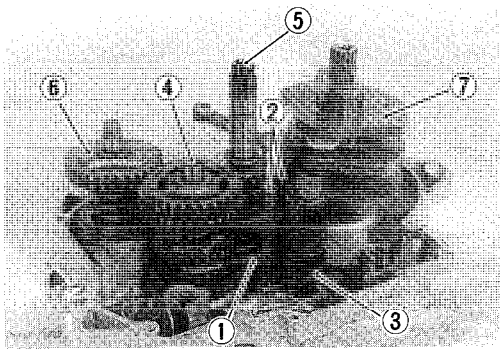
- Separate the crankcase into 2 parts, right and left with a crankcase separating tool.

TOOL 09920-13120: Crankcase separating tool

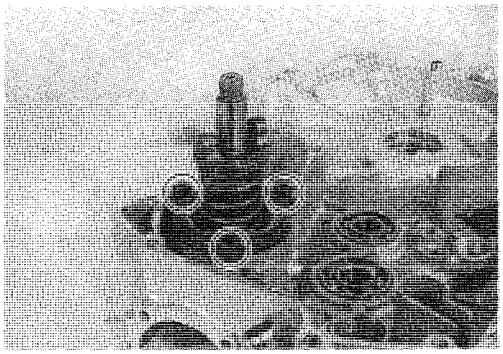
NOTE:
Fit the crankcase separating tool, so that the tool arms parallel the side of the crankcase. The crankshaft and transmission components must remain in the left crankcase half. Put a metal piece Ⓐ or socket tool to protect the end face of the countershaft.



- Remove the gearshift fork shafts ② and gearshift forks ①.
- Remove the gearshift cam ③.
- Remove the driveshaft assembly ④, countershaft assembly ⑤ and secondary reduction gear ⑥.
- Remove the crankshaft ⑦.



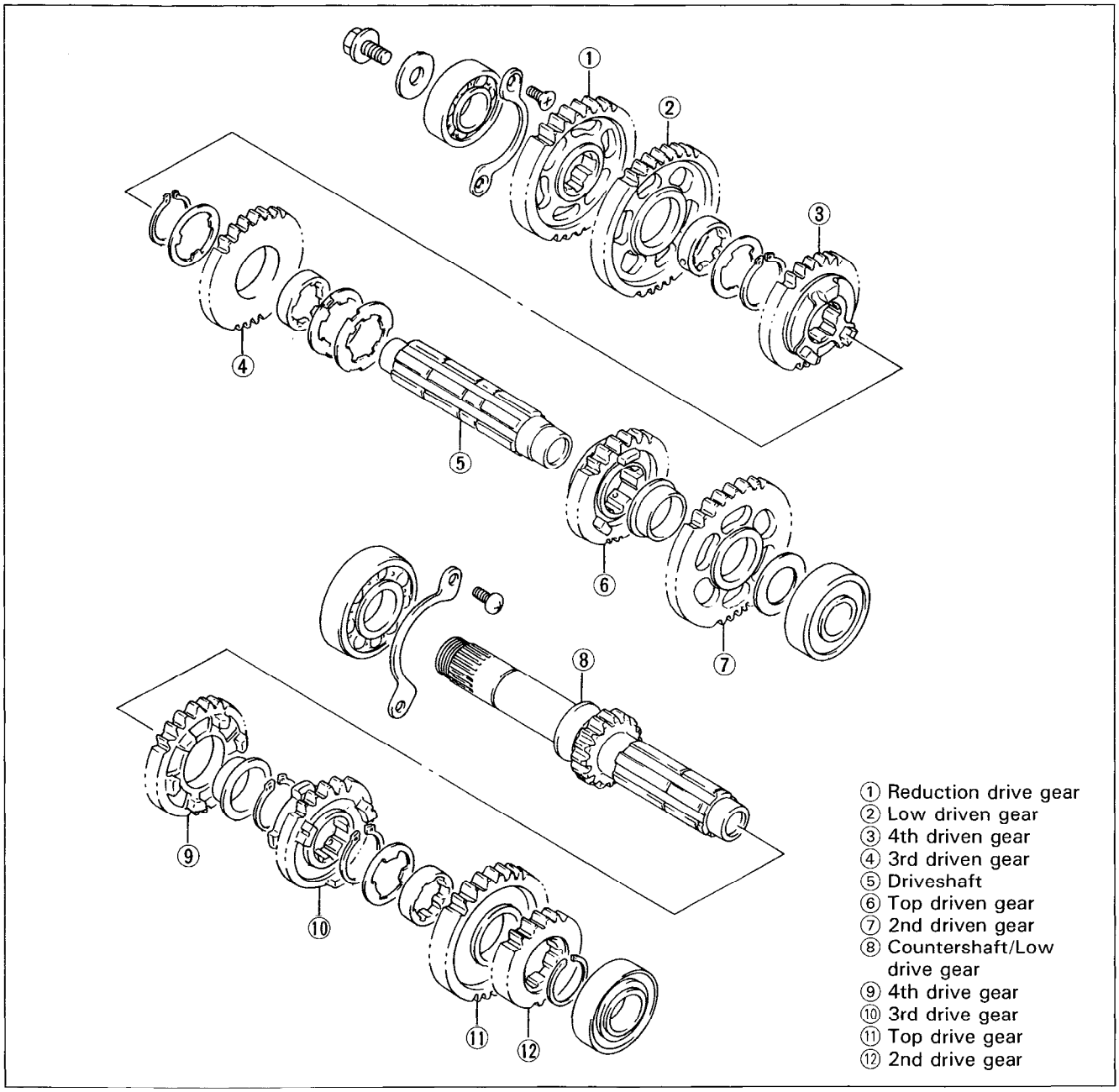
- Loosen the secondary drive bevel gear housing bolts and remove the secondary drive bevel gear assembly.



TRANSMISSION

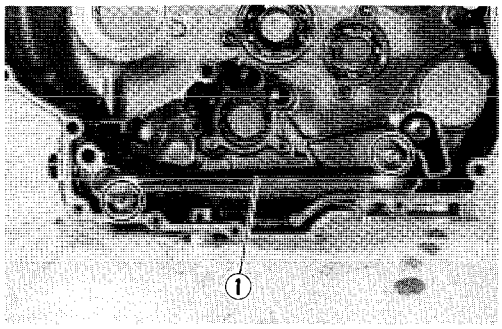
DISASSEMBLY

- Disassemble the transmission gears as shown in the illustration.



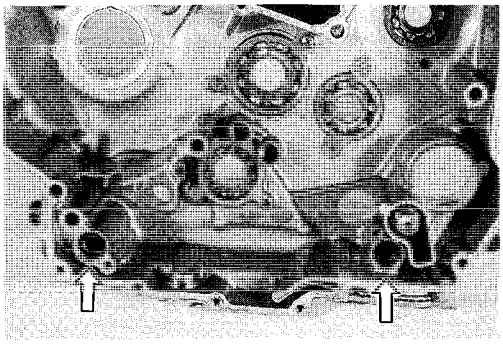
LUBRICATION RELATED PARTS

- Remove the oil pipe ① and O-rings.



⚠ CAUTION

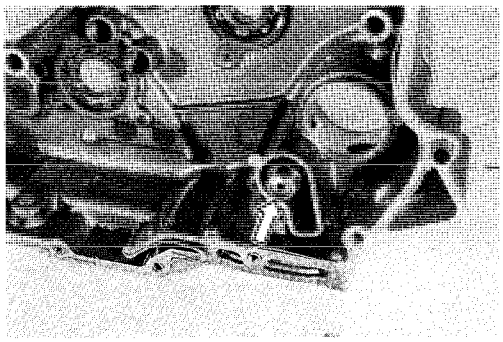
The removed O-ring should be replaced with a new one.



- Remove the oil pressure regulator.

NOTE:
When reinstalling the oil pressure regulator. Tighten it to the specified torque.

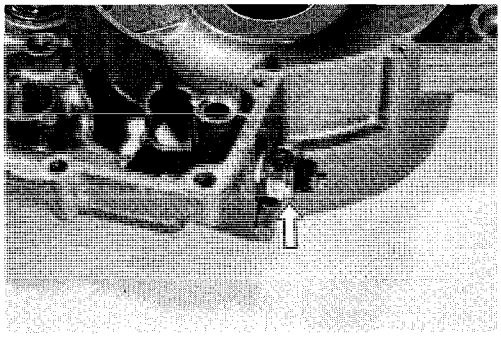
Oil pressure regulator: 28 N·m (2.8 kg-m, 20.0 lb-ft)



- Remove the oil pressure switch.

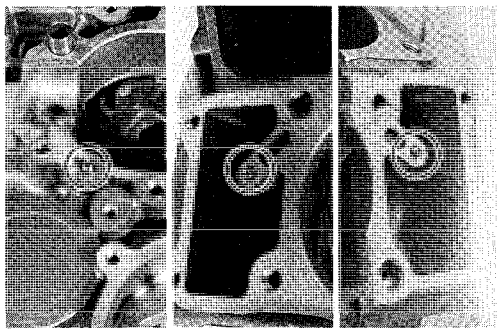
NOTE:
When reinstalling the oil pressure switch, apply the SUZUKI BOND "1215" to thread part.

1215 99000-31110: SUZUKI BOND "1215"

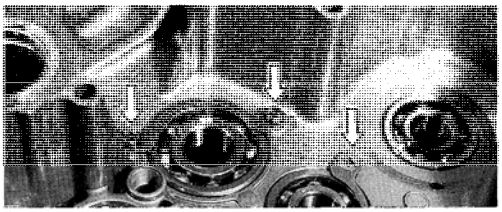


- Check the oil jet fitted on the crankcase for clogging.

NOTE:
When installing the oil jet, apply the motor oil to the oil jet O-ring.



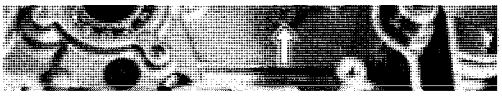
CRANKCASE BEARING AND OIL SEAL

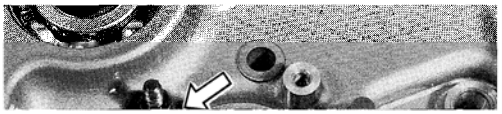


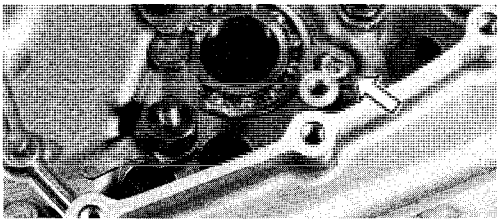
- Remove the bearing retainer screws.

NOTE:
When reinstalling the bearing retainers, apply THREAD LOCK SUPER "1324" to bearing retainer bolts or screws.

1324 99000-32120: THREAD LOCK SUPER "1324"

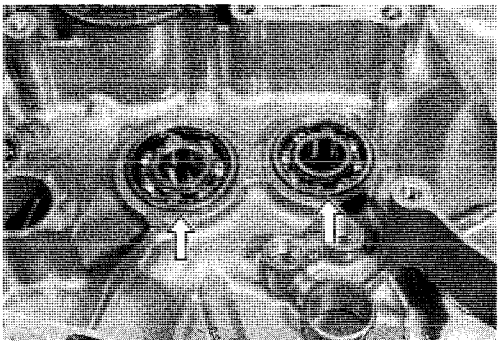


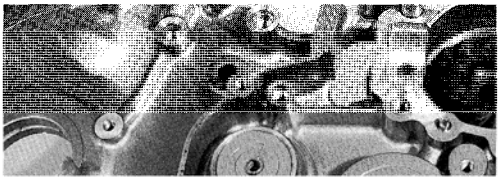




- Remove the bearings and oil seal by using the special tools.

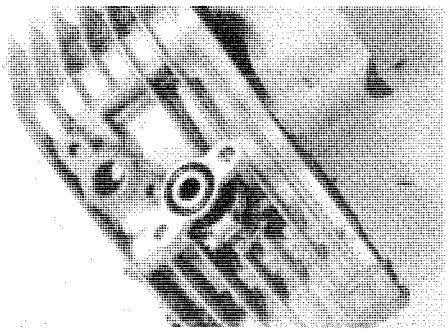
TOOL 09914-79610: Bearing remover/installer
09923-73210: Bearing remover
09930-30102: Sliding shaft

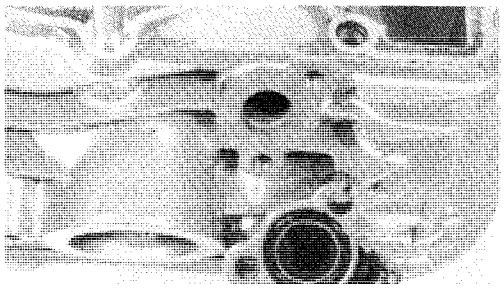


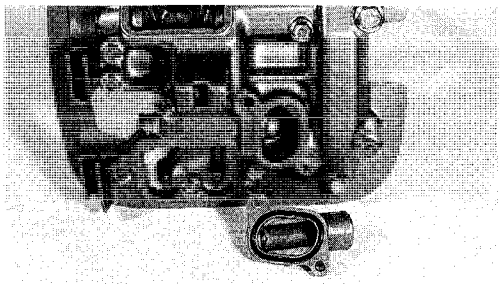


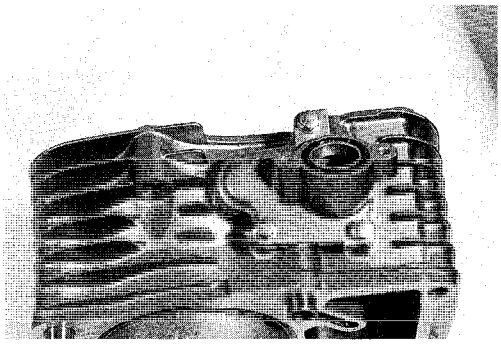
COOLING SYSTEM RELATED PARTS

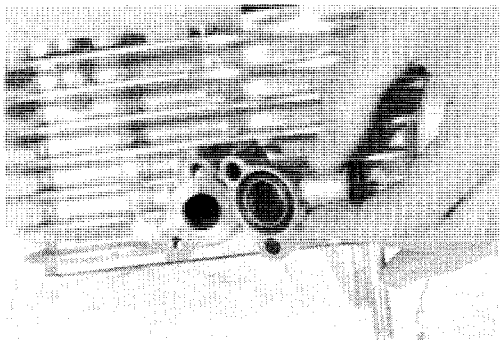
NOTE:
When reinstalling each cover, check that the O-ring is installed.

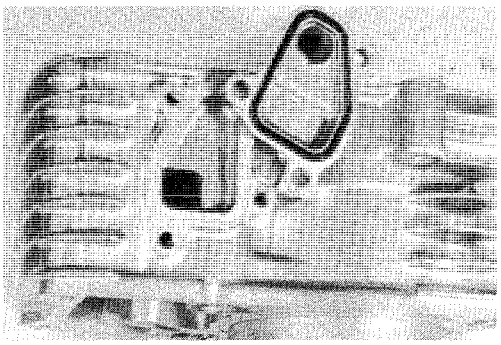


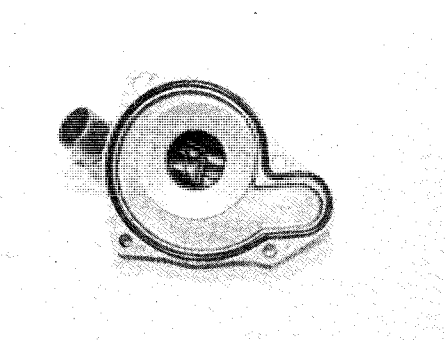












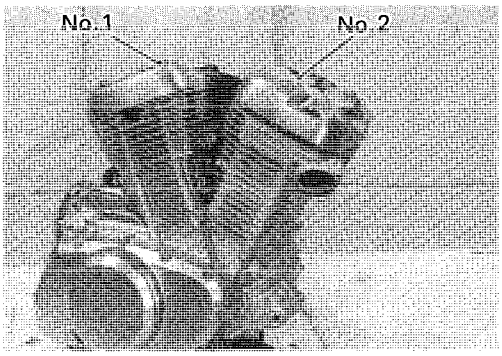
ENGINE COMPONENTS INSPECTION AND SERVICING

CYLINDER HEAD COVER

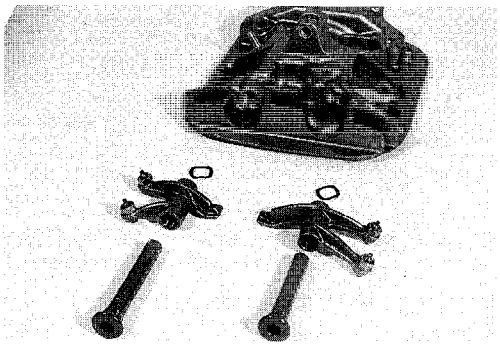
DISASSEMBLY

⚠ CAUTION

Be sure to identify each removed part as to its location, and lay the parts out in groups designated as "No.1 cylinder", "No.2 cylinder", "Exhaust", "Inlet", so that each will be restored to the original location during assembly.



- Loosen the rocker arm shafts and pull out the rocker arm shafts. (Refer to page 3-67 for reassembly)



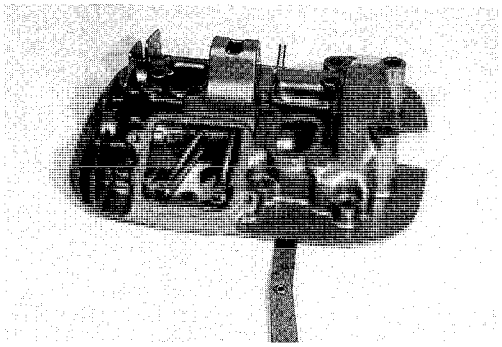
CYLINDER HEAD COVER DISTORTION

After removing sealant (SUZUKI BOND "1216") from the fitting surface of the cylinder head cover, place the cylinder head cover on a surface plate and check for distortion with a thickness gauge. Check points are shown in Fig.

Service Limit: 0.05 mm (0.002 in)

TOOL 09900-20803: Thickness gauge

If the distortion exceeds the limit, replace the cylinder head cover.

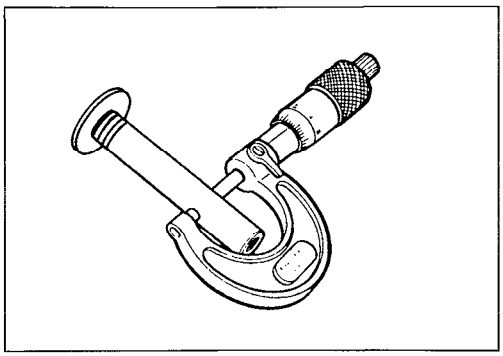


ROCKER ARM SHAFT O.D.

Measure diameter of rocker arm shaft.

Standard: 11.966—11.984 mm
(0.4711—0.4718 in)

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

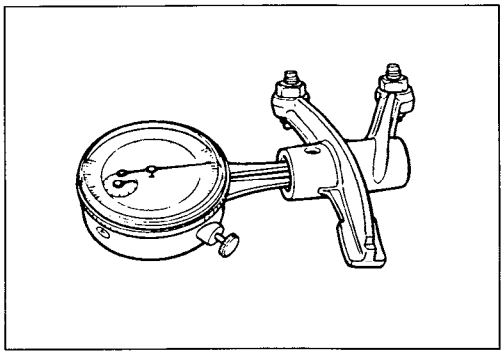


ROCKER ARM I.D.

When checking the valve rocker arm, the inside diameter of the valve rocker arm and wear of the camshaft contacting surface should be checked.

Standard: 12.000—12.018 mm (0.4724—0.4731 in)

TOOL 09900-20605: Dial calipers



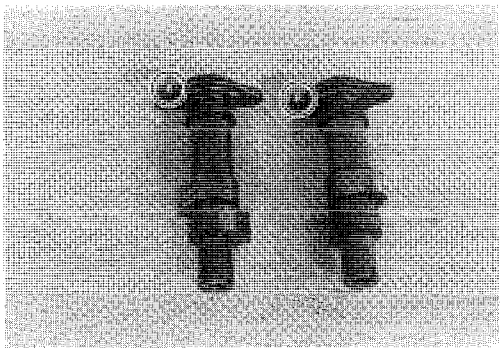
CAMSHAFT

The camshafts should be checked for wear and also for runout of cams and journals if the engine has been noted to produce abnormal noise or vibration or to lack output power. Any of these malconditions could be caused by a worn camshafts.

The camshaft can be distinguished by the embossed-letters, "F" and "R", on the camshaft.

"F" : Front (No. 2) camshaft

"R" : Rear (No. 1) camshaft



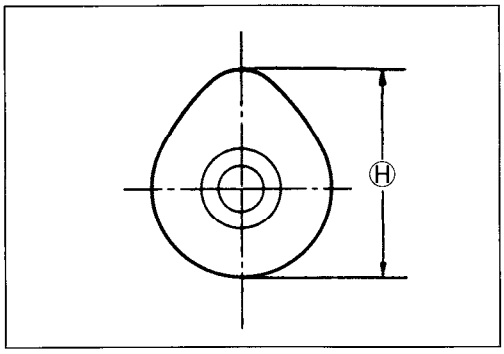
CAMSHAFT CAM WEAR

Worn-down cams are often the cause of mistimed valve operation resulting in reduced output power. The limit of cam wear is specified for both intake and exhaust cams in terms of cam height Ⓗ, which is to be measured with a micrometer. Replace camshafts if found worn down to the limit.

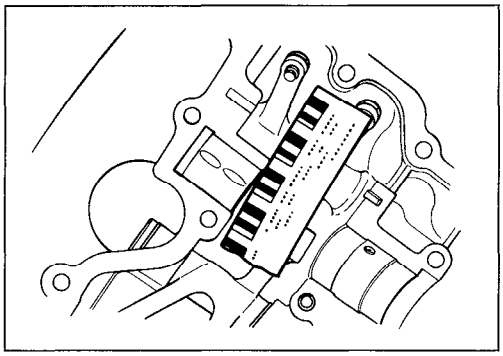
Cam height Ⓗ

Service Limit **Intake cam : 35.660 mm (1.4039 in)**
Exhaust cam: 36.630 mm (1.4421 in)

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



CAMSHAFT JOURNAL WEAR



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

Camshaft journal oil clearance
Service Limit: 0.15 mm (0.006 in)

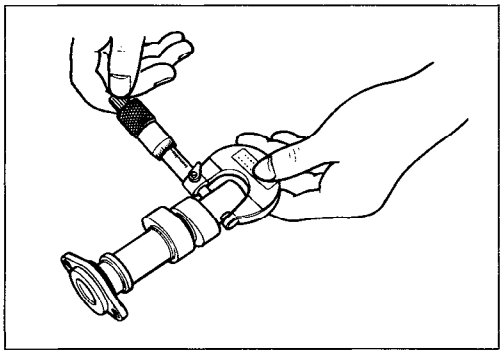
- Tighten the cylinder head cover bolts evenly and diagonally to the specified torque.

Cylinder head cover bolts tightening torque

Length	N·m	kg-m	lb-ft
140 mm 235 mm	21—25	2.1—2.5	15.0—18.0
The others	9—11	0.9—1.1	6.5—8.0

09900-22301: Plastigauge

NOTE:
To properly measure the oil clearance with plastigauge, all gasket material must be removed from fitting surfaces of cylinder head and cover. Do not apply SUZUKI BOND "1216" until after the oil clearance has been determined.



If the camshaft journal oil clearance measured exceeds the limit, measure the outside diameter of camshaft.
Replace either the cylinder head set or the camshaft if the clearance is incorrect.

09900-20205: Micrometer (0—25 mm)

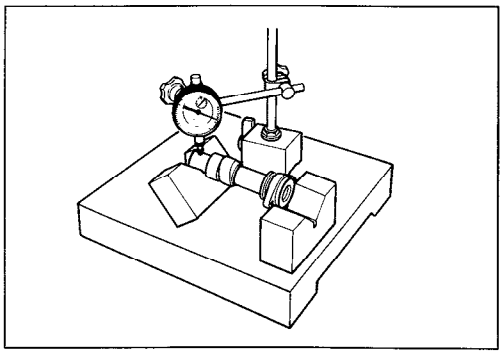
Camshaft journal O.D.	24.959—24.980 mm (0.9826—0.9835 in)
	19.959—19.980 mm (0.7858—0.7866 in)

CAMSHAFT RUNOUT

Measure the runout with a dial gauge. Replace the camshaft if the runout exceeds the limit.

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

Service Limit: 0.1 mm (0.004 in)

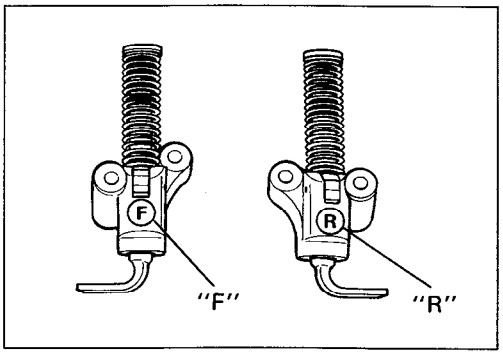


CAM CHAIN TENSIONER

For driving the camshafts, two cam chain tensioners are used on the respective cam drive chains. Unlock the ratchet mechanism, and move the push rod in place to see if it slides smoothly. If any stickiness is noted or ratchet mechanism is faulty, replace the cam chain tensioner assembly with a new one.

The cam chain tensioner can be distinguished by the embossed-letters, "F" and "R", on the cam chain tensioners.

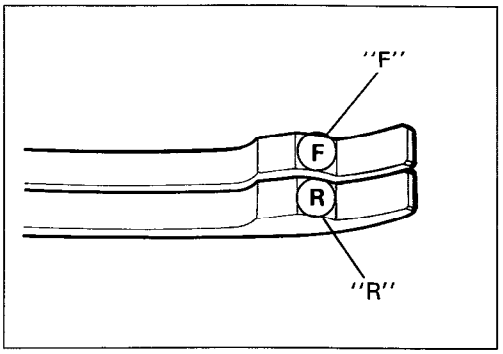
"F" : Front (No. 2) cam chain tensioner
"R" : Rear (No. 1) cam chain tensioner



CAM CHAIN GUIDE

Two kinds of cam chain guide are used on the respective cam drive chains.

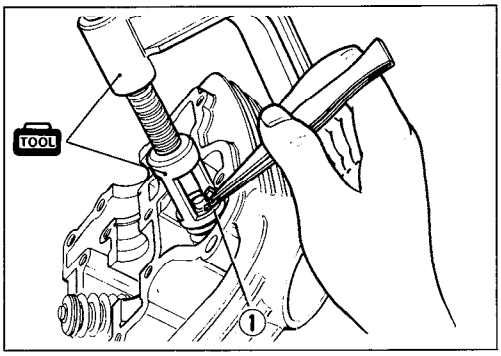
"F" : Front (No. 2) cam chain guide
"R" : Rear (No.1) cam chain guide



VALVE AND VALVE SPRING DISASSEMBLY

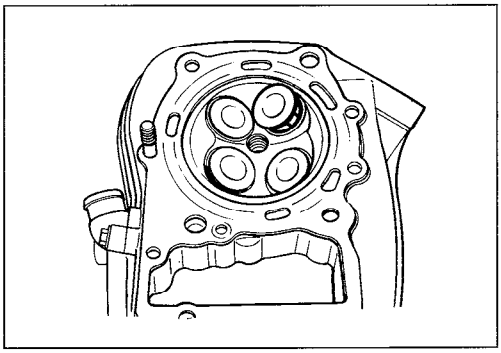
- Using special tools, compress the valve springs and remove the two cotter halves ① from valve stem.

TOOL 09916-14510: Valve spring compressor
09916-14910: Valve spring compressor attachment
09916-84510: Tweezers



- Remove the valve spring retainer, inner spring and outer spring.
- Pull out the valve from the other side.

NOTE:
Removal of valves completes ordinary disassembling work. If valve guides have to be removed for replacement after inspecting related parts, carry out the steps shown in valve guide servicing. (Refer to page 3-35 for reassembly.)



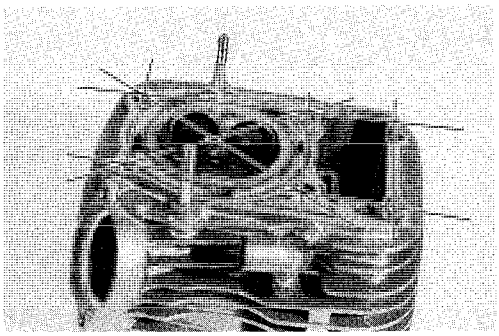
CYLINDER HEAD DISTORTION

- Decarbonize the combustion chambers.

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

TOOL 09900-20803: Thickness gauge

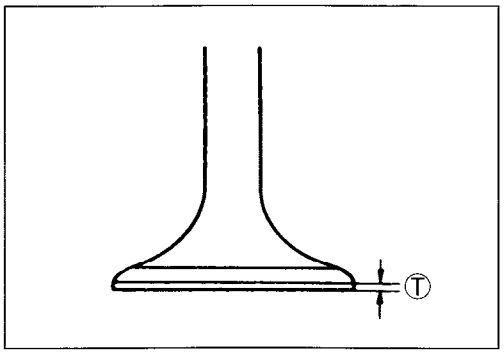
Service Limit: 0.05 mm (0.002 in)



VALVE FACE WEAR

Visually inspect each valve for wear of its seating face. Replace any valve with an abnormally worn face.
The thickness Ⓣ decreases as the wear of the face advances. Measure the thickness and, if the thickness is found to have been reduced to the limit, replace it.

Service Limit Ⓣ: 0.5 mm (0.02 in)

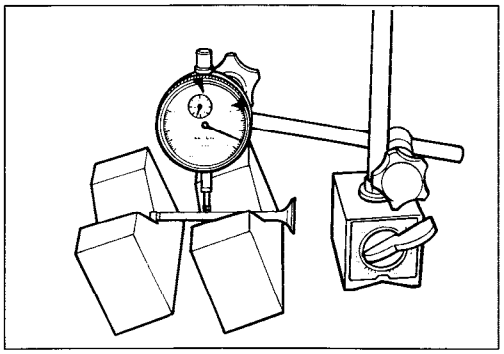


VALVE STEM RUNOUT

Support the valve with "V" blocks, as shown, and check its runout with a dial gauge.
The valve must be replaced if the runout exceeds the limit.

Service Limit: 0.05 mm (0.002 in)

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

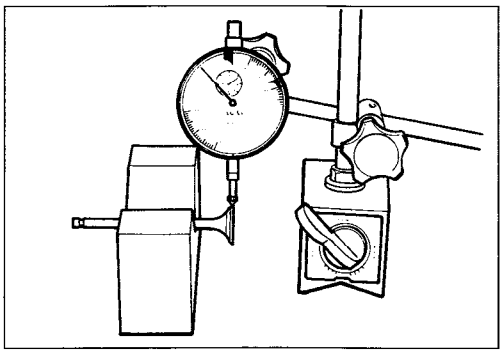


VALVE HEAD RADIAL RUNOUT

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

Service Limit: 0.03 mm (0.001 in)

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

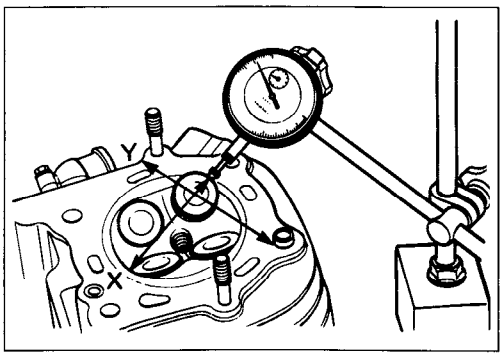


VALVE STEM DEFLECTION

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

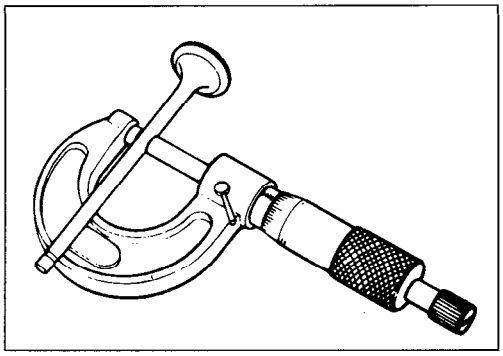
Service Limit **IN. : 0.35 mm (0.014 in)**
EX.: 0.35 mm (0.014 in)

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



VALVE STEM WEAR

If the valve stem is worn down to the limit, as measured with a micrometer, where the clearance is found to be in excess of the limit indicated replace the valve, if the stem is within the limit, then replace the guide. After replacing valve or guide, be sure to re-check the clearance.



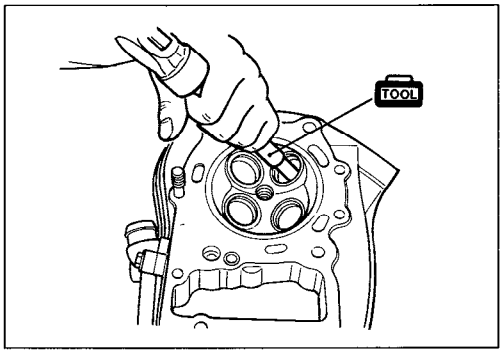
TOOL **09900-20205: Micrometer (0—25 mm)**

Valve stem O.D.

Standard **IN. : 5.465—5.480 mm (0.2152—0.2157 in)**
EX.: 5.450—5.465 mm (0.2146—0.2152 in)

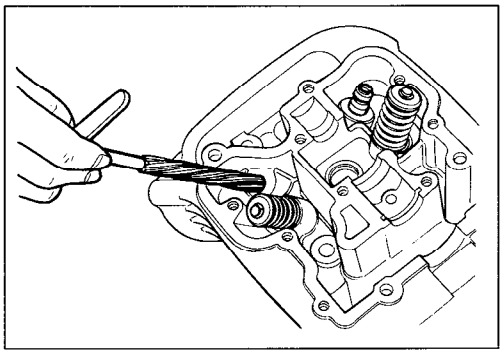
VALVE GUIDE SERVICING

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



TOOL **09916-44910: Valve guide remover/installer**

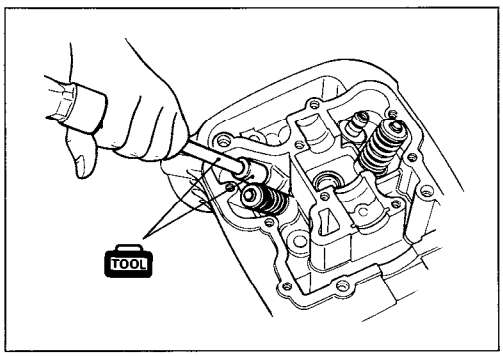
- Re-finish the valve guide holes in cylinder head with a 10.8 mm reamer and handle.



TOOL **09916-34580: Valve guide hole reamer**
09916-34541: Reamer handle

NOTE:
* *Discard the removed valve guide subassemblies.*
* *Only oversized valve guide is available.*

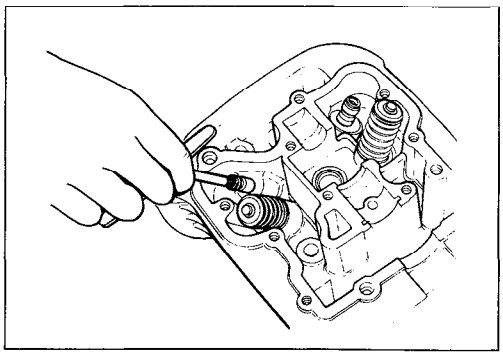
- Lubricate each valve guide with engine oil and drive the guide into the guide hole using the valve guide installer and attachment.



TOOL **09916-44910: Valve guide remover/installer**
09916-44920: Valve guide installer attachment

- After fitting all valve guides, re-finish their guiding bores with a 5.5 mm reamer. Be sure to clean and oil the guide after reaming.

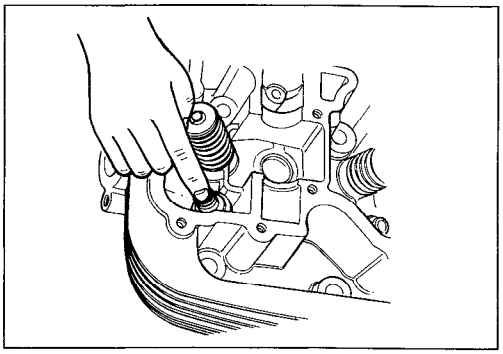
TOOL 09916-34550: Valve guide reamer
09916-34541: Reamer handle



- Fit the valve spring lower seats.
- Lubricate each oil seal with engine oil, and press-fit the oil seal into position with the finger tip.

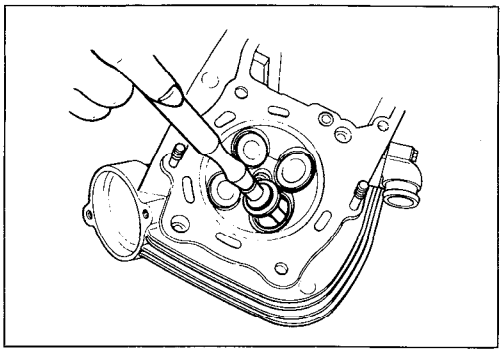
⚠ CAUTION

Do not reuse the oil seal.

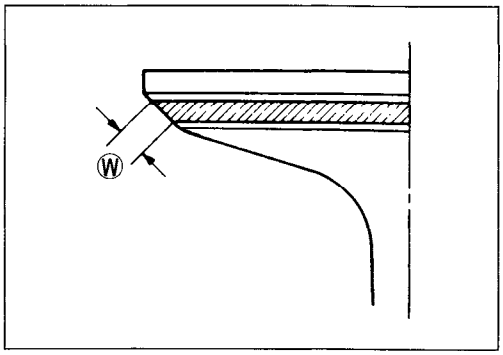


VALVE SEAT WIDTH

Coat the valve seat with prussian blue uniformly. Fit the valve and tap the coated seat with the valve face in a rotating manner, in order to obtain a clear impression of the seating contact. In this operation, use the valve lapper to hold the valve head.
The ring-like dye impression left on the valve face must be continuous — without any break. In addition, the width of the dye ring, which is the visualized seat ''width'', must be within the following specification:



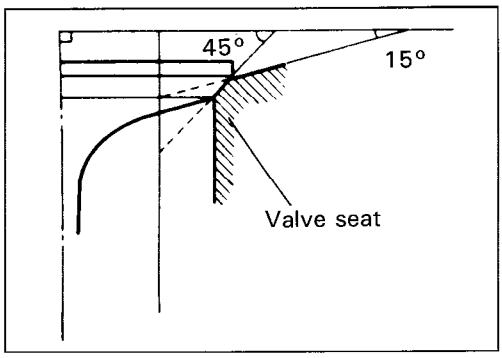
Valve seat width
STD. Ⓦ: 0.9—1.1 mm (0.035—0.043 in)



If either requirement is not met, correct the seat by servicing it as follows:

VALVE SEAT SERVICING

The valve seats for both intake and exhaust valves are machined to two different angles. The seat contact surface is cut 45° and the area above the contact surface (closest to the combustion chamber) is cut to 15°.

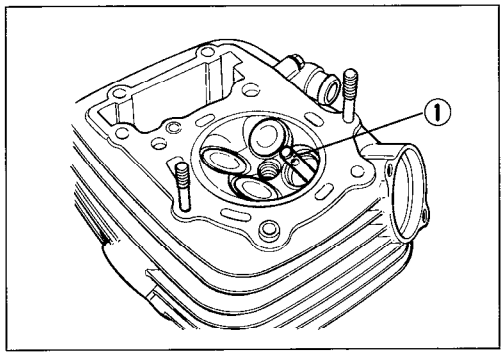


Parts list of valve seat servicing tools

Valve seat cutter head	N-229 (15° & 45° cutter) for IN. (15° & 45°)
	N-116 (15° & 45° cutter) for EX. (15° & 45°) or N-121 (15°) and N-122 (45°)
Solid pilot	N-140-5.5 for N-229
	N-100-5.52 for N-116
Adapter	N-503-1
T-handle	N-503

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

- Insert the solid pilot ① with a slight rotation. Seat the pilot snugly. Install the 45° cutter, attachment and T-handle.
- Using the 45° cutter, descale and cleanup the seat with one or two turns.
- Inspect the seat by the previous seat width measurement procedure. If the seat is pitted or burned, additional seat conditioning with the 45° cutter is required.

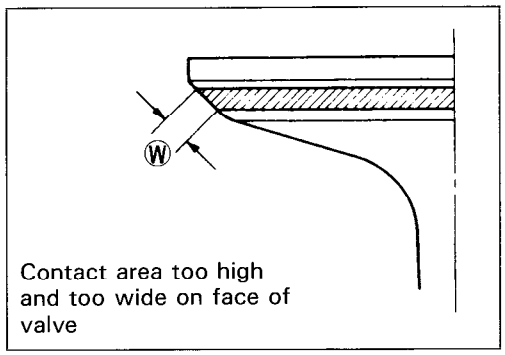


⚠ CAUTION

Cut only the minimum amount necessary from the seat to prevent the possibility of the valve stem becoming too close to the cam for correct valve clearance adjustment.

Parts list of valve seat servicing tools:

TOOL 09916-21110: Valve seat cutter set
09916-27720: Valve seat cutter (N-229)
09916-24480: Solid pilot (N-140-5.5)

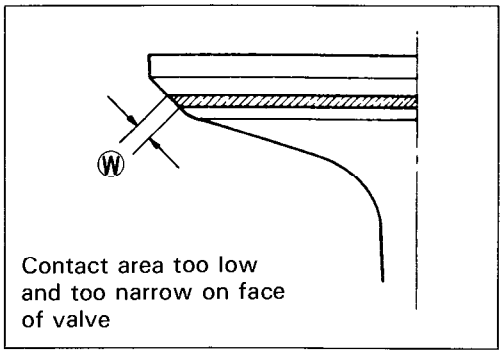


If the contact area is too high on the valve, or if it is too wide, use a 15° cutter to lower and narrow the contact area.

- 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. DO NOT use lapping compound after the final cut is made. The finished valve seat should have a velvety smooth finish and 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.
- Clean and assemble the head and valve components. Fill the intake and exhaust ports with gasoline to check for leaks. If any leaks occur, inspect the valve seat and face for burrs or other things that could prevent the valve from sealing.

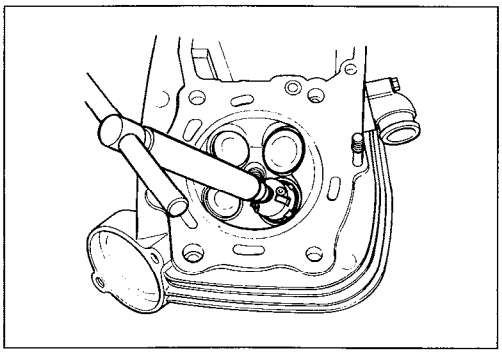
⚠ WARNING

Always use extreme caution when handling gasoline.



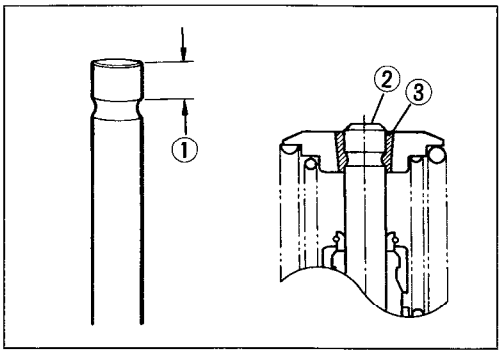
Contact area too low and too narrow on face of valve

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



VALVE STEM END CONDITION

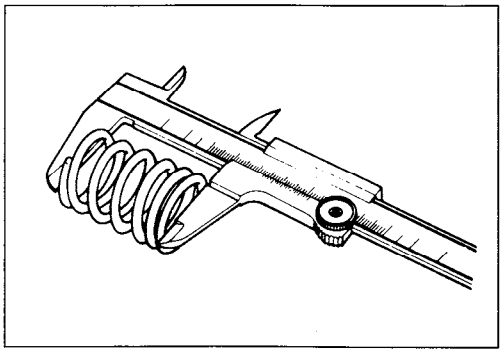
Inspect the valve stem end face for pitting and wear. If pitting or wear of the stem end face are present, the valve stem end may be resurfaced, providing that the length ① will not be reduced to less than 4.0 mm (0.15 in). If this length becomes less than 4.0 mm (0.15 in), the valve must be replaced. After installing a valve whose stem end has been ground off as above, check to ensure that the face ② of the valve stem end is above the cotters ③.



VALVE SPRING

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

Check the springs for strength by measuring their free lengths and also the force required to compress them. If the limit indicated is exceeded by the free length reading or if the measure force does not fall within the range specified, replace both inner and outer springs as a set.

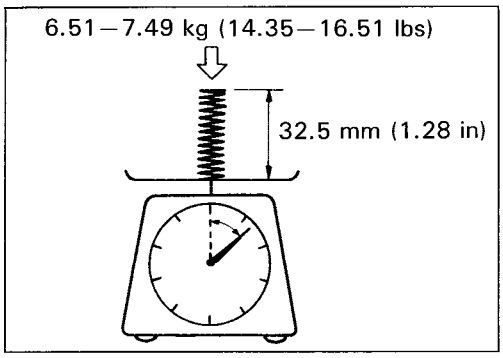


Valve spring free length limit **Unit: mm (in)**

INNER	OUTER
38.3 (1.51)	40.1 (1.58)

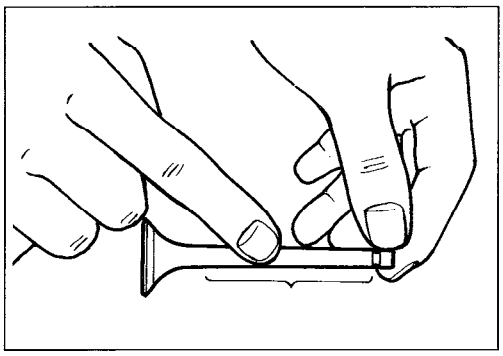
Valve spring tension

Spring	Standard
INNER	6.51—7.49 kg/32.5 mm (14.35—16.51 lbs/1.28 in)
OUTER	12.09—13.91 kg/36.0 mm (26.65—30.67 lbs/1.42 in)



VALVE AND VALVE SPRING REASSEMBLY

- Insert the valves, with their stems coated with high quality molybdenum disulfide lubricant (SUZUKI MOLY PASTE) all around and along the full stem length without any break.

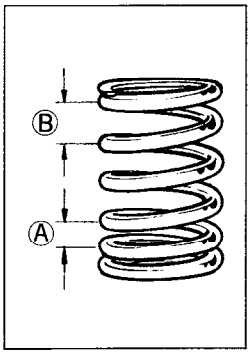


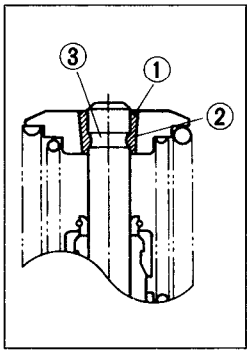
⚠ CAUTION

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

99000-25140: SUZUKI MOLY PASTE

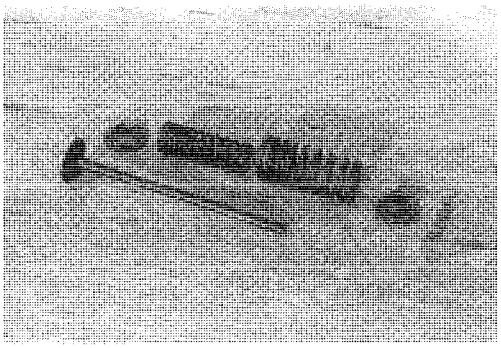
- Install the valve springs with the small-pitch portion Ⓐ facing cylinder head.
  Ⓑ: Large-pitch portion.
- Put on the valve spring retainer and, using the valve spring compressor, press down the spring, fit the two cotter halves to the stem end, and release the compressor to allow the cotter ① to wedge in between seat and stem. Be sure that the rounded lip ② of the cotter fits snugly into the groove ③ in the stem end.





⚠ CAUTION

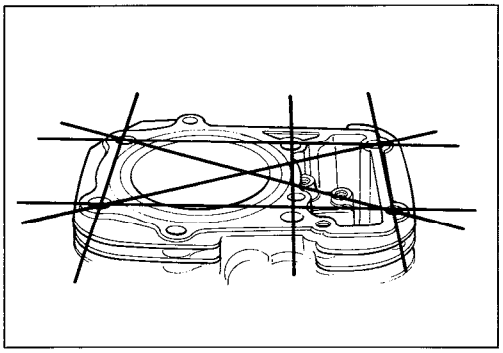
Be sure to restore each spring, valve and spring retainer to their original positions.



CYLINDER DISTORTION

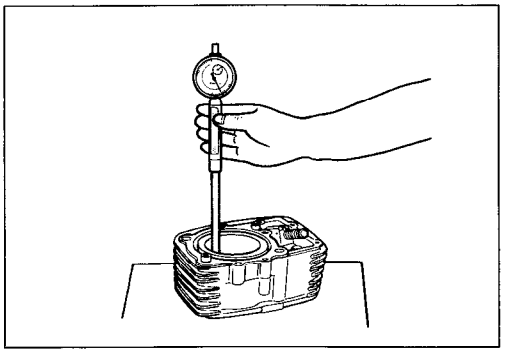
Check the gasketed surface of the cylinder for distortion with a straightedge and thickness gauge, taking a clearance reading at several places as indicated. If the largest reading at any position of the straightedge exceeds the limit, replace the cylinder.

Cylinder distortion
Service Limit: 0.5 mm (0.002 in)



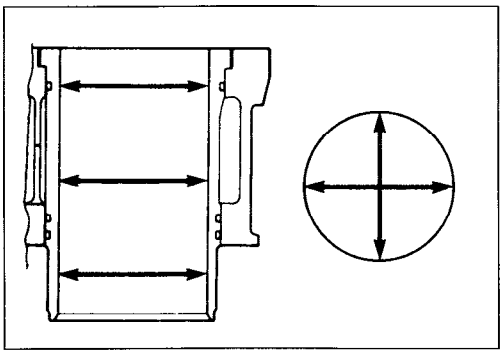
CYLINDER BORE

Measure the cylinder bore diameter at six places. If any one of the measurements exceeds the limit, overhaul the cylinder and replace the piston with an oversize, or replace the cylinder. Once the reboring is done on any one cylinder which measurements is beyond the limit, the remaining cylinders must be also rebored accordingly. Otherwise the imbalance might cause excess vibration.



Cylinder bore
Service Limit: 80.085 mm (3.1529 in)

TOOL 09900-20508: Cylinder gauge set



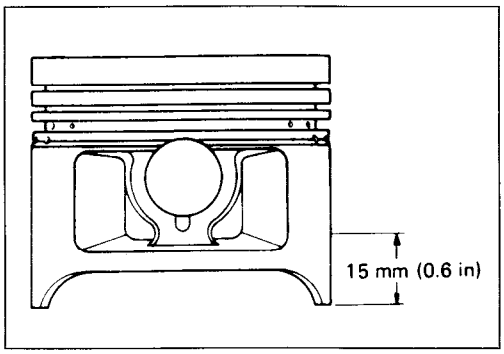
PISTON DIAMETER

Using a micrometer, measure the piston outside diameter at the place shown in Fig. If the measurement is less than the limit, replace the piston.

Piston oversize: 0.5, 1.0 mm

Service Limit: 79.880 mm (3.1449 in)

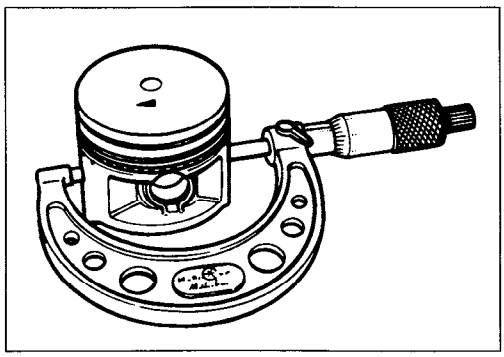
TOOL 09900-20204: Micrometer (75—100 mm)



PISTON TO CYLINDER CLEARANCE

As a result of the above measurement, if the piston to cylinder clearance exceeds the following limit, overhaul the cylinder and use an oversize piston, or replace both cylinder and piston.

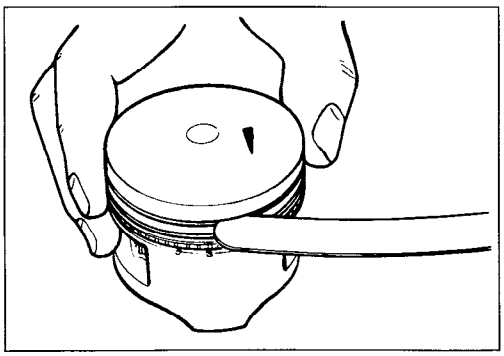
Service Limit: 0.120 mm (0.0047 in)



PISTON RING TO GROOVE CLEARANCE

Using a thickness gauge, measure the side clearances of the 1st and 2nd rings. If any of the clearances exceeds the limit, replace both piston and piston rings.

TOOL 09900-20803: Thickness gauge

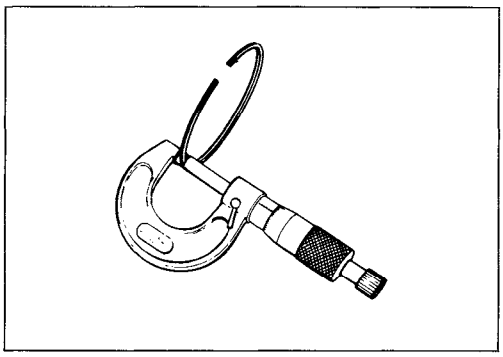


Piston ring to groove clearance

Piston ring	Service Limit
1st	0.18 mm (0.007 in)
2nd	0.15 mm (0.006 in)

Piston ring groove width

Piston ring	Standard
1st	1.01—1.03 mm (0.0398—0.0406 in)
2nd	1.21—1.23 mm (0.0476—0.0484 in)
Oil	2.51—2.53 mm (0.0988—0.0996 in)



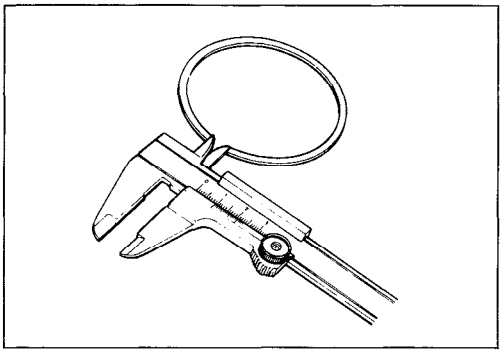
Piston ring thickness

Piston ring	Standard
1st	0.970—0.990 mm (0.0382—0.0390 in)
2nd	1.170—1.190 mm (0.0461—0.0469 in)

PISTON RING FREE END GAP AND END GAP

Before installing piston rings, measure the free end gap of each ring using vernier calipers. Next, fit the ring in the cylinder, and measure each ring end gap using a thickness gauge.

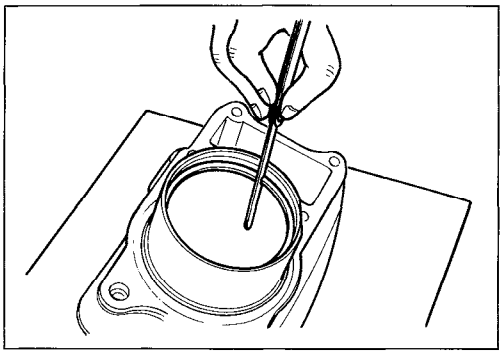
If any ring has an excess end gap, replace the ring.



Piston ring free end gap

Piston ring		Service Limit
1st	R	8.4 mm (0.33 in)
2nd	R	8.4 mm (0.32 in)

TOOL 09900-20101: Vernier calipers



Piston ring end gap

Piston ring	Service Limit
1st & 2nd	0.70 mm (0.028 in)

TOOL 09900-20803: Thickness gauge

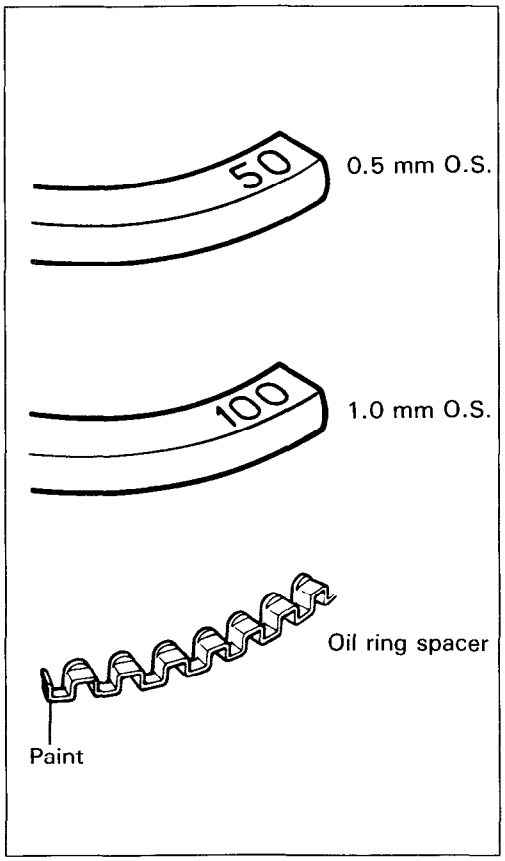
- **Oversize piston ring**
  The following two types of oversize piston rings are used. They bear the following identification numbers.

SIZE	1st	2nd
0.5 mm O.S.	50	50
1.0 mm O.S.	100	100

- **Oversize oil ring**
  The following two types of oversize oil rings are available as optional parts. They bear the following identification marks.

SIZE	COLOR
STD	NIL
0.5 mm O.S.	Painted Red
1.0 mm O.S.	Painted Yellow

- **Oversize side rail**
  Just measure outside diameter to identify the side rail as there is no mark or numbers on it.

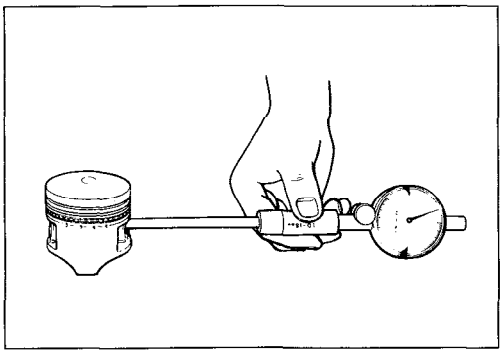


PISTON PIN AND PIN BORE

Using a small bore gauge, measure the piston pin bore inside diameter, and using a micrometer, measure the piston pin outside diameter. If the reading exceeds following limit, replace both piston and piston pin.

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

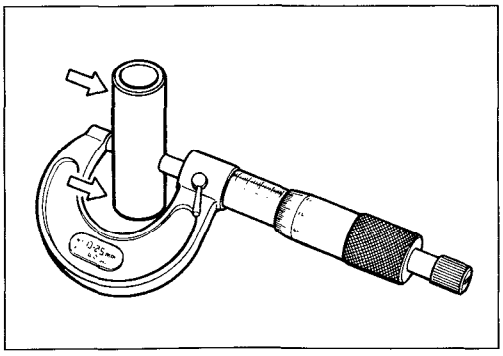
TOOL 09900-20602: Dial gauge (1/1000 mm, 1 mm)
09900-22403: Small bore gauge (18—35 mm)



Using a micrometer, measure the piston pin outside diameter at three positions.

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

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

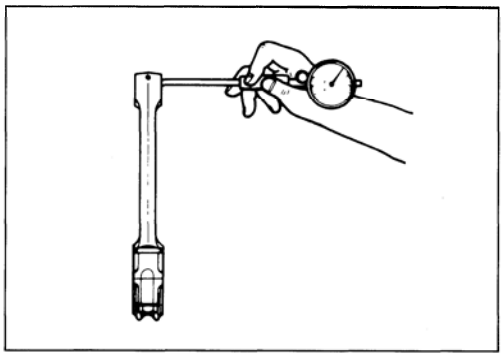


CONROD SMALL END I.D.

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

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

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

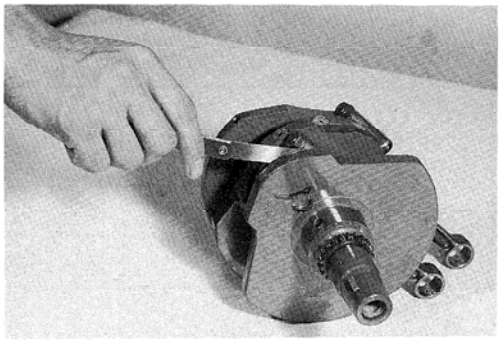


CONROD BIG END THRUST CLEARANCE

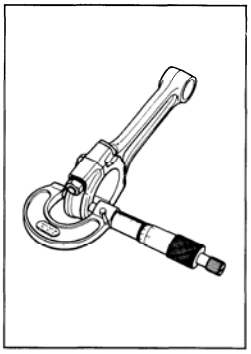
Check the conrod thrust clearance by using a thickness gauge. If the clearance exceeds the limit, replace conrod or crankshaft.

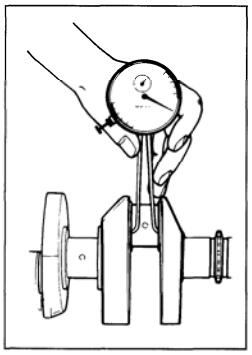
Service Limit: 0.30 mm (0.021 in)

TOOL 09900-20803: Thickness gauge



	Standard
Big end width	21.95—22.00 mm (0.864—0.866 in)
Crank pin width	22.10—22.15 mm (0.870—0.872 in)

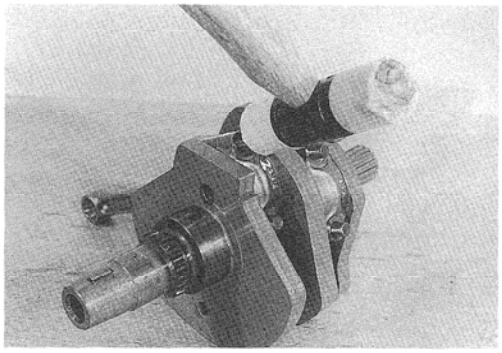




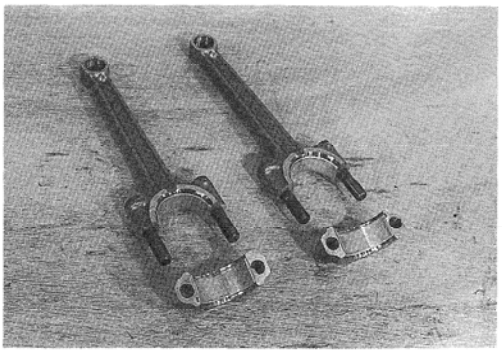
TOOL 09900-20205: Micrometer (0—25 mm)
09900-20605: Dial calipers (10—34 mm)

CONROD-CRANK PIN BEARING SELECTION

- Loosen the bearing cap nuts and tap the bolt end lightly with plastic hammer to remove the bearing cap.

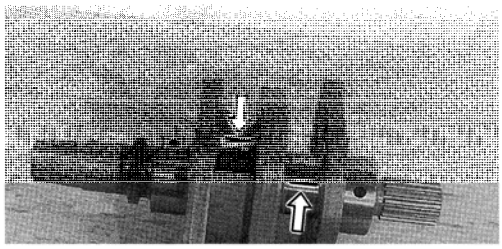


- Remove the rods and mark them to identify the cylinder position.
- Inspect the bearing surfaces for any sign of fusion, pitting, burn, or flaws. If any, replace them with a specified set of bearings.



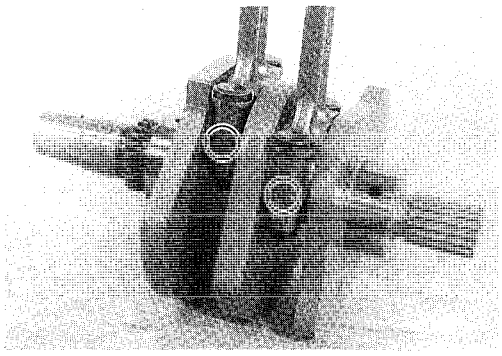
NOTE:
Never try to remove or loosen the conrod cap bolts due to their possible loosening in the rod. Once displaced, the bearing cap will not be fitted properly.

- Place plastigauge axially on the crank pin avoiding the oil hole, at TDC or BDC side as shown.
- Tighten the bearing cap with two-step torque values.



NOTE:
When fitting the bearing cap to crank pin, be sure to discriminate between its two ends, I.D. code side and the other. I.D. code always faces intake valve side.

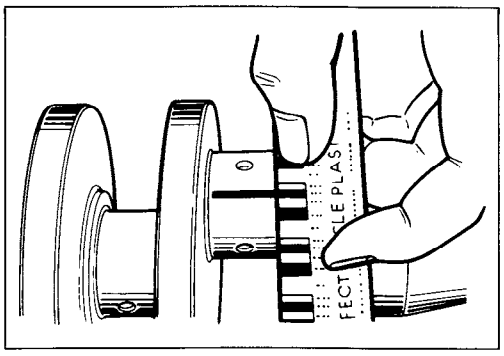
Conrod nut
Initial tightening torque: 25 N·m
(2.5 kg-m, 18.0 lb-ft)
Final tightening torque: 51 N·m
(5.1 kg-m, 37.0 lb-ft)



09900-22302: Plastigauge

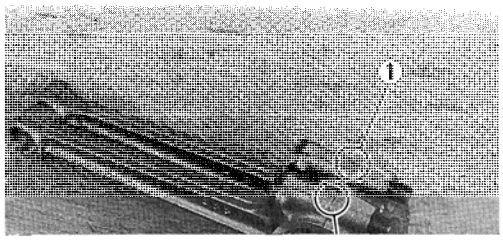
NOTE:
Never rotate the crankshaft or conrod when a piece of plastigauge is in the clearance.

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



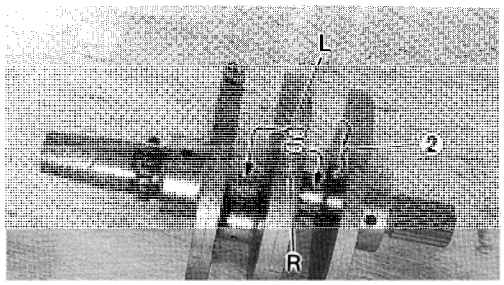
Crank pin bearing oil clearance
Service Limit: 0.080 mm (0.0031 in)

- If oil clearance exceeds the service limit, select the specified bearings from the following table.
- Check the corresponding conrod I.D. code number ① , "1", "2" or "3".
- Check the corresponding crank pin O.D. code number ② , "1", "2" or "3".
- The crank pin O.D. code number ②, "1", "2" or "3" which are stamped on the left crank web.



Bearing selection table

	Code	1	2	3
Conrod I.D. code ①	1	Green	Black	Brown
	2	Black	Brown	Yellow
	3	Brown	Yellow	Blue



Oil clearance
Standard: 0.024—0.042 mm (0.0009—0.0017 in)

Conrod I.D. specification

Code ①	I.D. specification
1	44.000—44.006 mm (1.7323—1.7325 in)
2	44.006—44.012 mm (1.7325—1.7328 in)
3	44.012—44.018 mm (1.7328—1.7330 in)

Crank pin O.D. specification

Code ②	O.D. specification
1	40.994—41.000 mm (1.6139—1.6142 in)
2	40.988—40.994 mm (1.6137—1.6139 in)
3	40.982—40.988 mm (1.6135—1.6137 in)

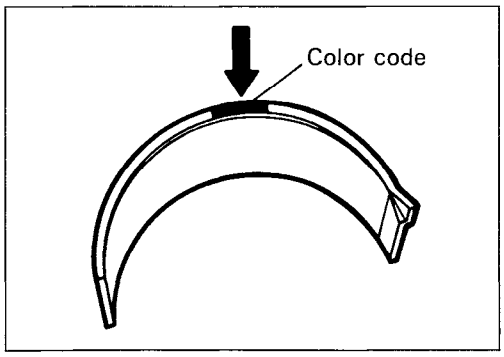
TOOL **09900-20202: Micrometer (25—50 mm)**

⚠ CAUTION

Bearing should be replaced as a set.

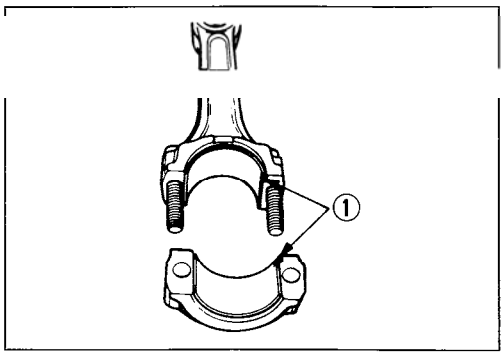
Bearing thickness

Color (Part No.)	Thickness
Green (12164-45C00-0A0)	1.485—1.488 mm (0.0585—0.0586 in)
Black (12164-45C00-0B0)	1.488—1.491 mm (0.0586—0.0587 in)
Brown (12164-45C00-0C0)	1.491—1.494 mm (0.0587—0.0588 in)
Yellow (12164-45C00-0D0)	1.494—1.497 mm (0.0588—0.0589 in)
Blue (12164-45C00-0E0)	1.497—1.500 mm (0.0589—0.0590 in)



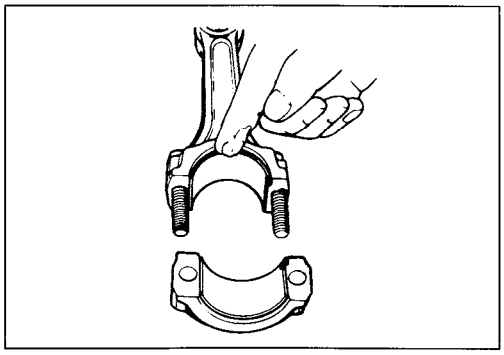
CONROD-CRANK PIN BEARING ASSEMBLY

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



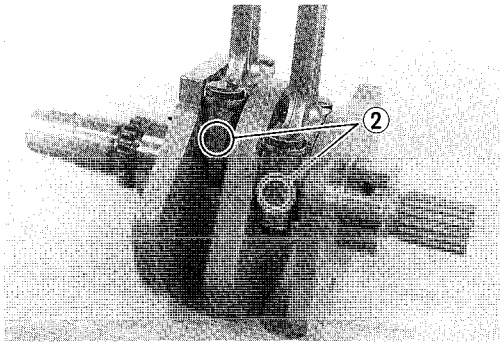
- Apply engine oil or SUZUKI MOLY PASTE to the crank pin and bearing surface.

99000-25140: SUZUKI MOLY PASTE



- When mounting the conrod on the crankshaft, make sure that I.D. code ② of the conrod faces rearward.
- Tighten the conrod fitting nuts with specified torque after applying engine oil to the nut thread.

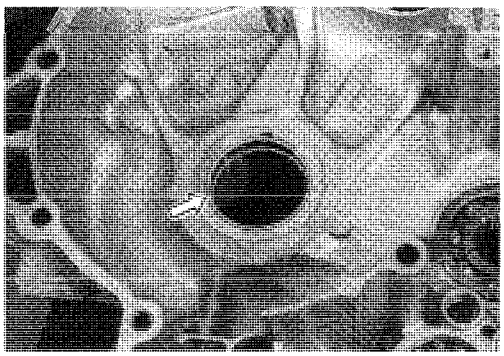
Conrod nut
Initial tightening torque: 25 N·m (2.5 kg-m, 18.0 lb-ft)
Final tightening torque: 51 N·m (5.1 kg-m, 37.0 lb-ft)



- Check the conrod movement for smooth turning.

CRANKCASE-CRANKSHAFT BEARING SELECTION

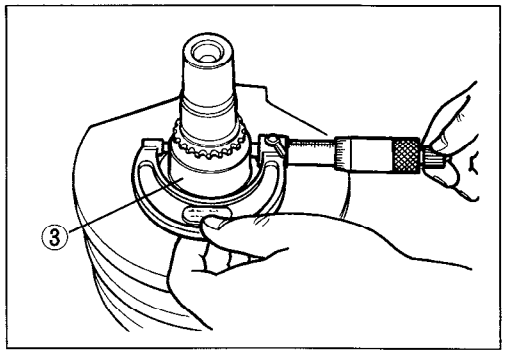
- Inspect the crankshaft and crankshaft journal bearings for any damage.



- Measure the crankshaft journal O.D. ③ by using the special tool.

09900-20202: Micrometer (25—50 mm)

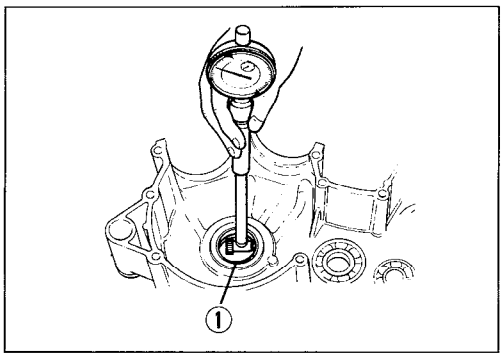
Crankshaft journal O.D. ③
Standard: 47.965—47.980 mm (1.8884—1.8890 in)



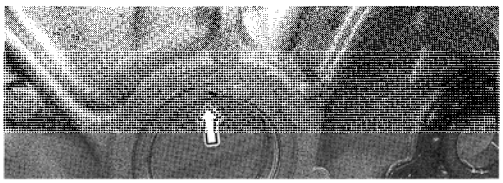
- Measure the crankshaft journal bearing I.D. ① by using the special tool

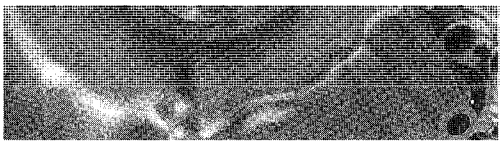
TOOL 09900-20508: Cylinder gauge set

Crankshaft journal bearing I.D. ①
Standard: 48.000—48.015 mm (1.8898—1.8904 in)



If each crankshaft journal bearing I.D. is not within the standard range, replace them with new ones.





- Remove the crankshaft bearing with taking care not to damage the crankcase journal bearing hole.
- Inspect the journal bearing hole of crankcase for any sign of pitting or flaw.
  If any, repair it with emery paper.
- Install the new journal bearings into the crankcases by hydraulic press.
- Hone the new journal bearings with the specified value by honing machine.

⚠ CAUTION

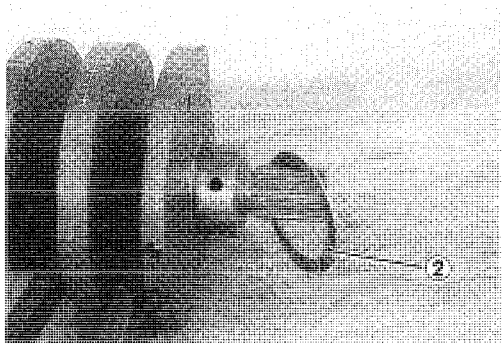
When honing the new journal bearings, be sure to mate the left and right crankcases.

Crankshaft journal bearing I.D.: 48.000—48.015 mm (1.8898—1.8904 in)

CRANKSHAFT THRUST CLEARANCE

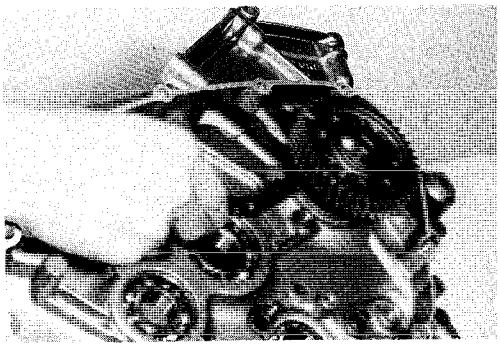
Install the crankshaft in the right crankcase half after installing the thrust shim on the crankshaft.

NOTE:
The oil grooved face of thrust shim ② is faced to crankshaft web side.



Place the thrust washer, camshaft drive sprocket and primary drive gear on the right end of the crankshaft and tighten primary drive gear bolt to the specified torque. Use a thickness gauge to measure the thrust clearance between right crankcase and thrust washer.

Primary drive gear bolt: 95 N·m (9.5 kg-m, 68.5 lb-ft)

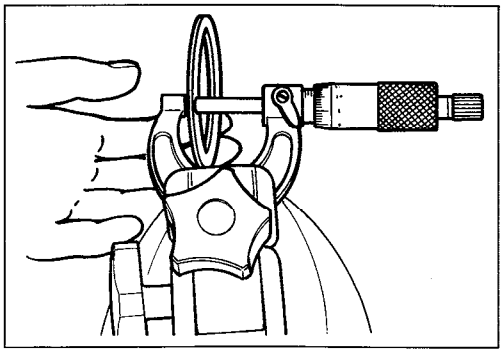


Crankshaft thrust clearance
Standard: 0.05—0.10 mm (0.002—0.004 in)

TOOL 09900-20803: Thickness gauge

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

- Remove the thrust shim, and measure its thickness with a micrometer.
- Change the thrust shim with the other shim if the thrust clearance is incorrect.
- Perform the thrust clearance measurement described above once again.



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

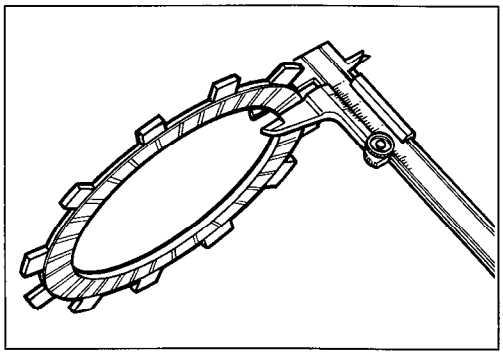
Checking to make sure it is within standard

Unit: mm (in)

Part number	Thrust shim thickness
09160-48001	1.925—1.950 (0.0758—0.0768)
09160-48002	1.950—1.975 (0.0768—0.0778)
09160-48003	1.975—2.000 (0.0778—0.0787)
09160-48004	2.000—2.025 (0.0787—0.0797)
09160-48005	2.025—2.050 (0.0797—0.0807)
09160-48006	2.050—2.075 (0.0807—0,0817)
09160-48007	2.075—2.100 (0.0817—0.0827)
09160-48008	2.100—2.125 (0.0827—0.0837)
09160-48009	2.125—2.150 (0.0837—0.0847)
09160-48010	2.150—2.175 (0.0847—0.0856)

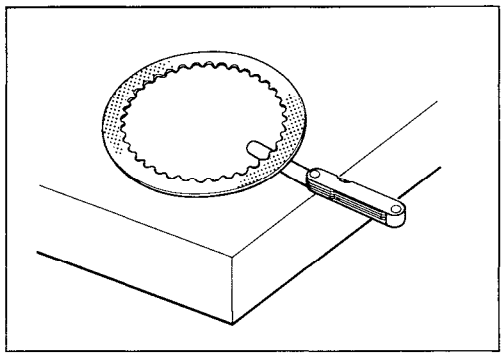
CLUTCH DRIVE PLATE AND DRIVEN PLATE

Clutch plates in service remain in oily condition as they were lubricated with oil. Because of this condition, both drive and driven plates are subject to little wearing action and therefore last much longer. Their life depends largely on the quality of oil used in the clutch and also on the way the clutch is operated.



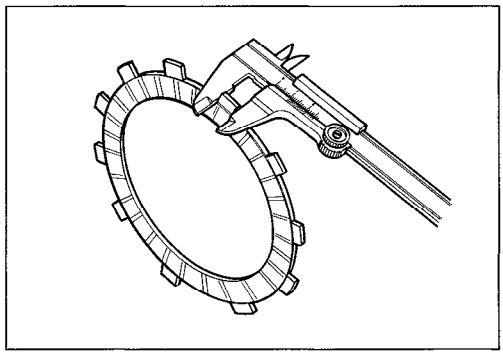
These plates are expendable: they are meant to be replaced when found worn down or distorted to the respective limit: use a caliper to check thickness and a thickness gauge and surface plate to check distortion.

TOOL **09900-20101: Vernier calipers**
09900-20803: Thickness gauge



Unit: mm (in)

Service Limit	Drive plate		Driven plate
	No.1	No.2	
Thickness	2.35 (0.093)	3.15 (0.124)	—
Distortion	—	—	0.1 (0.004)
Claw width	15.0 (0.59)	15.0 (0.59)	—

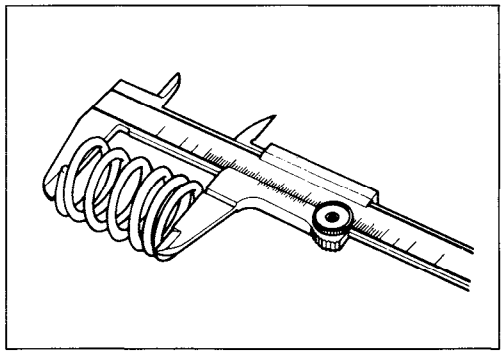


CLUTCH SPRING FREE LENGTH

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

Clutch spring free length

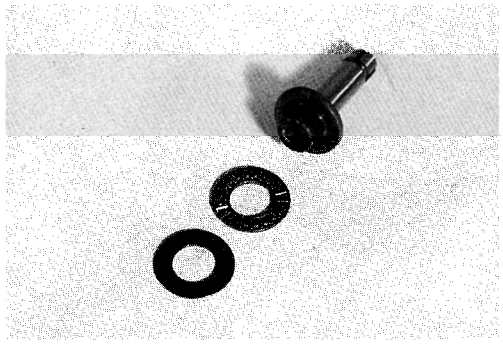
Service Limit: 34.0 mm (1.34 in)



CLUTCH BEARING

Inspect the clutch push piece bearing for any abnormality, particularly cracks, upon removal from the clutch, to decide whether it can be reused or should be replaced.
Smooth engagement and disengagement of the clutch depends much on the condition of this bearing.

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

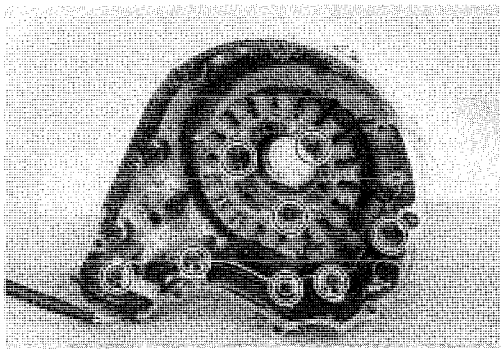


GENERATOR AND SIGNAL GENERATOR SERVICING

- When replacing the generator coil or signal generator coil, apply THREAD LOCK "1342" to the stator set screws and its lead wire guide screws.

NOTE:
Wipe off oil or grease on screw completely and then apply THREAD LOCK "1342".

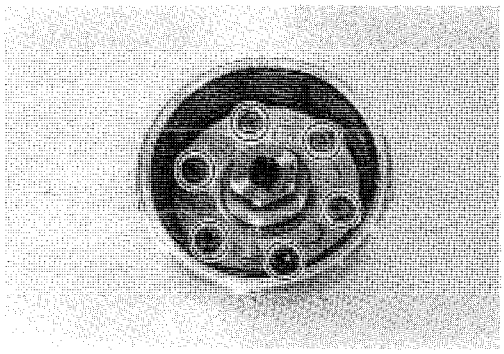
1342 99000-32050: THREAD LOCK "1342"



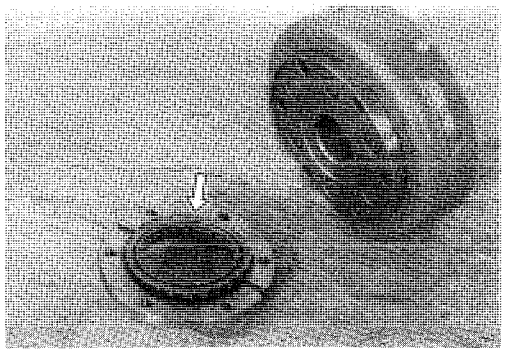
STARTER CLUTCH SERVICING

- Hold the rotor with off-set wrench and remove the starter clutch securing bolts.

TOOL 09914-25811: "T" type hexagon wrench (6 mm)



- When fitting the one way clutch to the guide, position flange side of one way clutch to the rotor side.

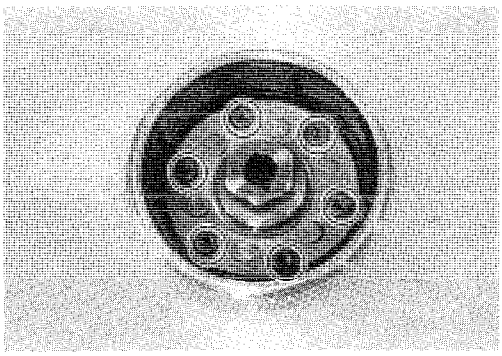


- Apply THREAD LOCK SUPER "1305" to the securing bolts and tighten them to the specified torque while holding the rotor with off-set wrench.

1342 99000-32100: THREAD LOCK SUPER "1305"

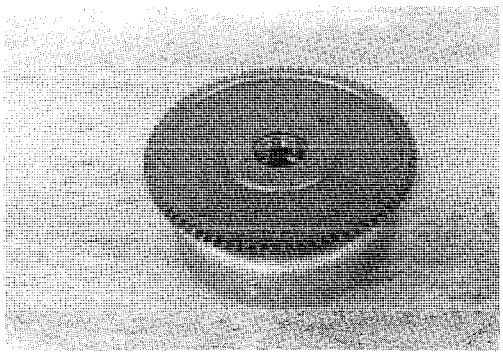
TOOL 09914-25811: "T" type hexagon wrench

Starter clutch securing bolt: 26 N·m (2.6 kg-m, 18.5 lb-ft)

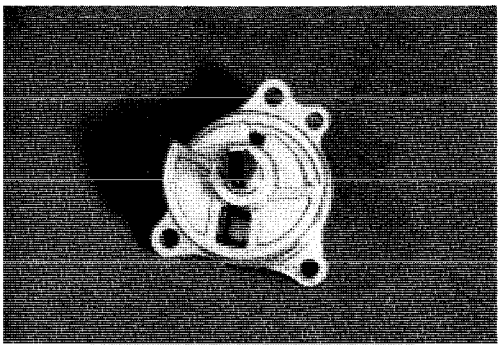


Check the operation of starter clutch by turning the starter driven gear.

NOTE:
The gear turns one direction only.



OIL PUMP

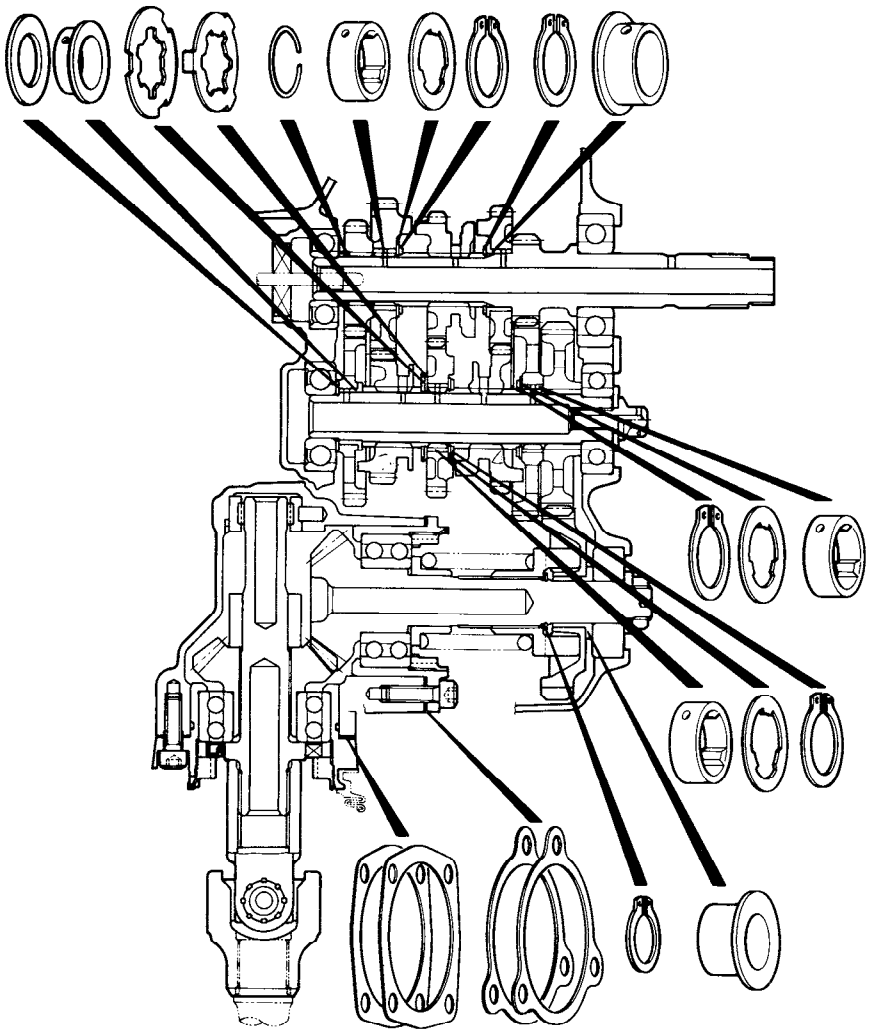


⚠ CAUTION

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

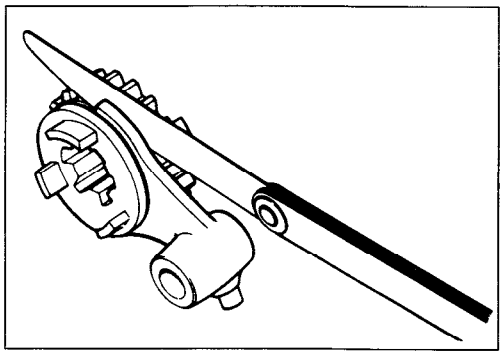
TRANSMISSION

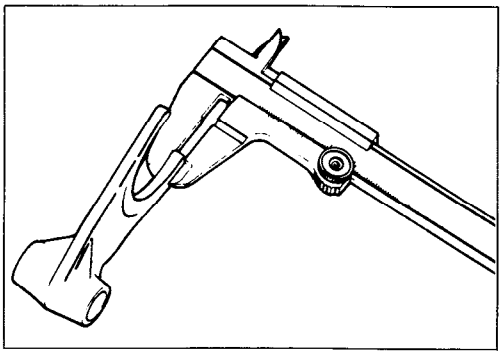
TRANSMISSION GEARS AND RELATED PARTS



GEAR-SHIFTING FORK CLEARANCE

Using a thickness gauge, check the shifting fork clearance in the groove of its gear.
The clearance for each of the three shifting forks plays an important role in the smoothness and positiveness of shifting action.
If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.





TOOL 09900-20803: Thickness gauge
09900-20101: Vernier calipers

Shift fork—Groove clearance
Standard : 0.10—0.30 mm (0.004—0.012 in)
Service Limit: 0.50 mm (0.020 in)

Shift fork groove width
Standard No.1: 5.50—5.60 mm (0.217—0.220 in)
No.2: 4.50—4.60 mm (0.177—0.181 in)

Shift fork thickness
Standard No.1: 5.30—5.40 mm (0.209—0.213 in)
No.2: 4.30—4.40 mm (0.169—0.173 in)

COUNTERSHAFT AND DRIVESHAFT

REASSEMBLY

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

NOTE:
Always use new circlips.

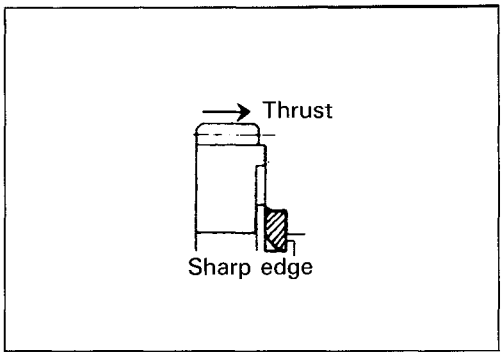
NOTE:
Before installing the gears, coat lightly moly paste or engine oil to the driveshaft and countershaft.

M 99000-25140: SUZUKI MOLY PASTE

⚠ CAUTION

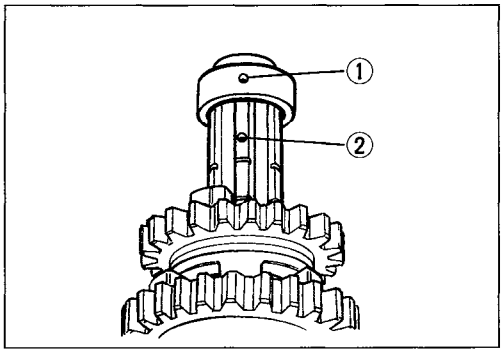
*** Never reuse a circlip. After a circlip has been removed from a shaft, it should be discarded and a new circlip must be installed.**
*** When installing a new circlip, care must be taken not to expand the end gap larger than required to slip the circlip over the shaft.**
*** After installing a circlip,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

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



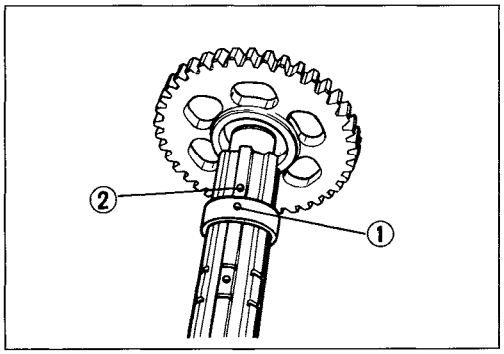
TOP DRIVE GEAR BUSHING

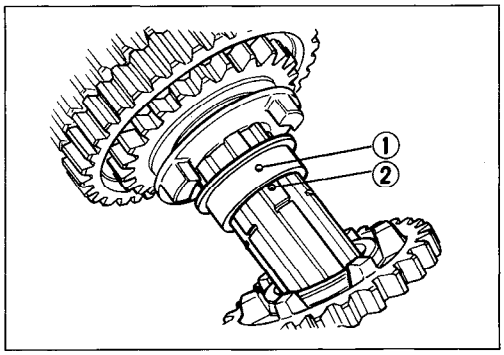
- When installing the top drive gear bushing, align the bushing oil hole ① with the countershaft hole ②.



LOW AND 3RD DRIVEN GEAR BUSHINGS

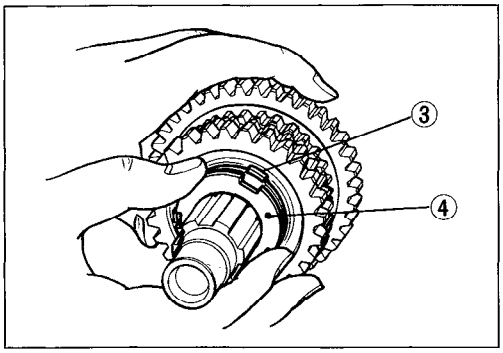
- When installing the low and 3rd driven gear bushings, align the bushing oil hole ① with the driveshaft oil hole ②.





3RD DRIVEN GEAR LOCK WASHERS

- When installing the 3rd driven gear onto the driveshaft, install the lock washer No.2 ③ onto the driveshaft, and turn and fit it into the groove.
- Then, fit the lock washer No.1 ④ in the lock washer No.2 ③.



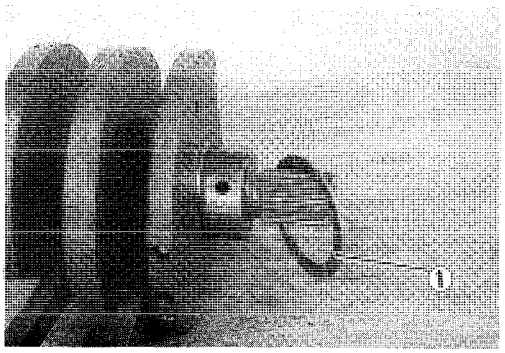
ENGINE REASSEMBLY

This engine is reassembled by carrying out the steps of disassembly in the reverse order, but there are a number of steps which demand special descriptions or precautionary measures.

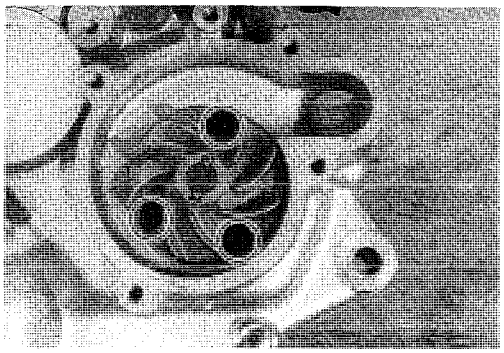
NOTE:
Apply engine oil to each running and sliding part before reassembling.

- Install the thrust shim on the crankshaft.

NOTE:
The oil grooved face of thrust shim ① is faced to crankshaft web side.



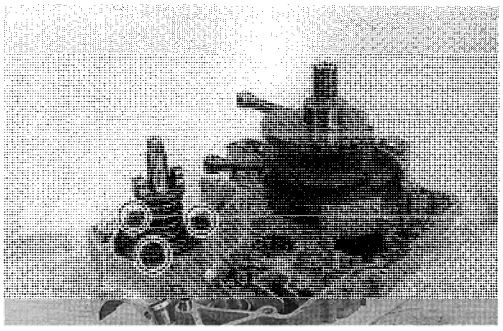
- Fit the new O-ring greased to the water pump.
- Insert the water pump into the crankcase.
- Tighten three screws by aligning cuts of the impeller to three screw holes.



- Install the crankshaft into the left crankcase half.

NOTE:
Coat lightly moly paste to the crankshaft journal bearings.

99000-25140: SUZUKI MOLY PASTE



⚠ CAUTION

Never strike the crankshaft with a plastic hammer when inserting it into the crankcase. It should be easy to install the crankshaft to left crankcase.

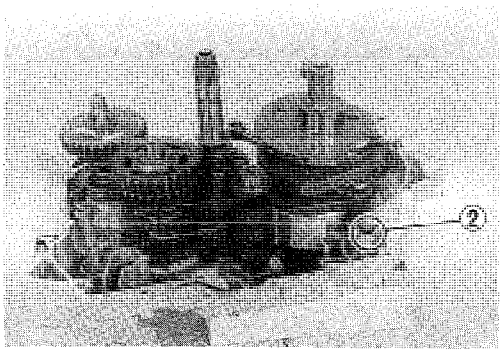
- Install the secondary drive bevel gear assembly,

the specified torque.

⚠ WARNING

Never hit the secondary drive bevel gear. May be, secondary drive bevel gear circlip will be detached.

Secondary drive bevel gear housing bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)

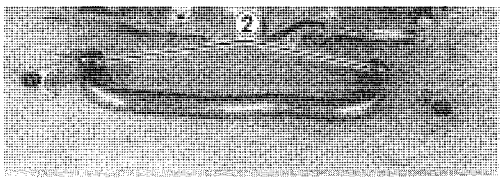


- Install the countershaft assembly, driveshaft assembly and reduction driven gear.
- Install the gearshift forks, gearshift fork shafts and gearshift cam.
- Install a new O-ring ②.

- Install the oil pressure regulator ①.
- Install the new O-rings ②.
- Apply engine oil to the oil pipe end

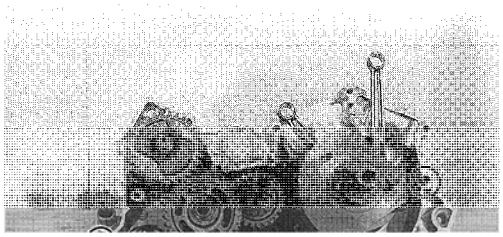
bolts.

Oil pressure regulator: 28 N·m (2.8 kg-m, 20.0 lb-ft)
Oil pipe clamp bolt: 10 N·m (1.0 kg-m, 7.0 lb-ft)



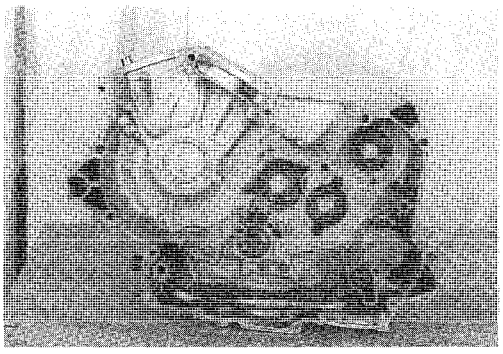
99000-32110: THREAD LOCK SUPER "1322"

- Clean the mating surfaces of the left and right crankcases.
- Fit the dowel pins on the left crankcase.
- Apply SUZUKI BOND "1215" to the mating surface of the right crankcase.

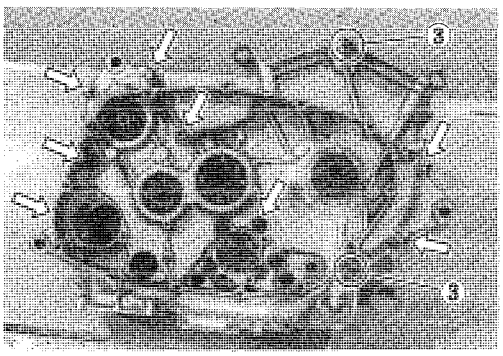


99000-31110: SUZUKI BOND "1215"

** Make surfaces free from moisture, oil, dust and other foreign materials.*
** Spread on surfaces thinly to form an even layer, and assemble the crankcases within few minutes.*
** Take extreme care not to apply any BOND "1215" to the oil hole, oil groove and bearing.*
** Apply to distorted surfaces as it forms a comparatively thick film.*



- Place the gaskets ③ as shown in Fig.
- Fit the engine ground wire to the correct position as shown in Fig.
- Check that shafts turn smoothly.

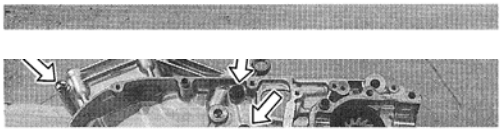


⚠ CAUTION

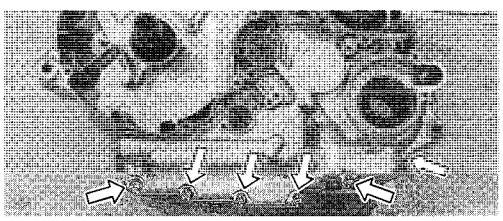
Use new gasket to prevent oil leakage.

- When securing the right and left crankcases, tighten each bolt a little at a time to equalize the pressure. Tighten all the securing bolts to the specified torque values.

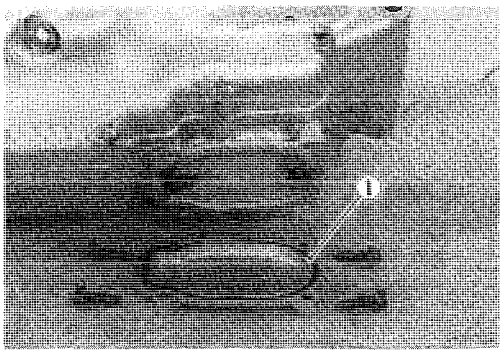
Crankcase bolt



Tightening torque		6 mm bolt	8 mm bolt
Initial	N·m		15
	kg-m		1.5
	lb-ft		11.0
Final	N·m	11	22
	kg-m	1.1	2.2
	lb-ft	8.0	16.0



- Install the oil sump filter.
- Fit the O-ring ① to the oil sump filter cap.

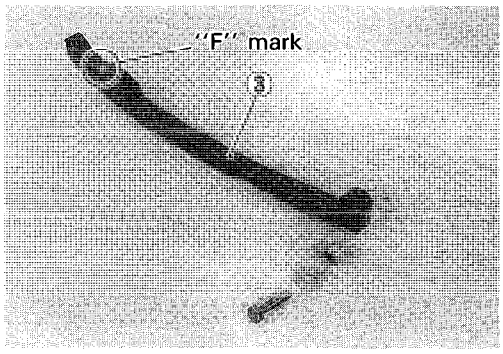


⚠ CAUTION

Use new O-ring to prevent oil leakage.

- Coat grease to the O-ring and install the oil sump filter cap.

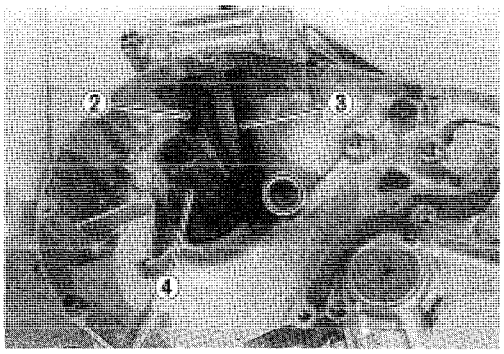
- Install the cam chain ② and cam chain guide ③ with "F" mark. The cam chain guide can be distinguished by the embossed-letters, "F" and "R", on its back side.



- Tighten the cam chain guide set bolt to the specified torque.

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

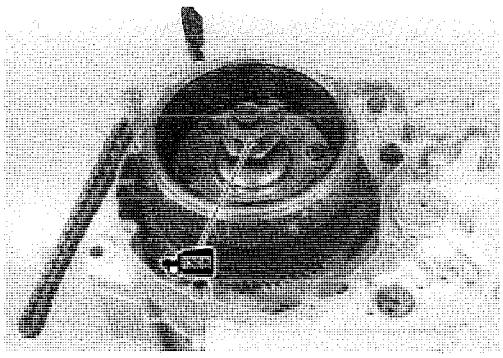
- Fit the key ④ in the key slot on the crankshaft.



- Degrease the tapered portion of the rotor and also the crankshaft. Use nonflammable cleaning solvent to wipe off the oily or greasy matter to make these surfaces completely dry.
- Install the rotor onto the crankshaft.
- Apply THREAD LOCK SUPER "1305" to the rotor bolt and tighten it to the specified torque.

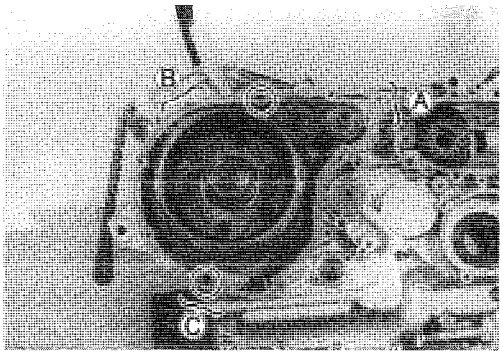
Generator rotor bolt: 160 N·m (16.0 kg-m, 115.5 lb-ft)

1305 99000-32100: THREAD LOCK SUPER "1305"



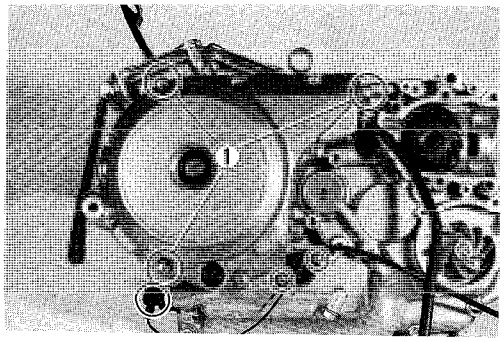
- Install the starter driven gear and its idle gear.
- Fit the dowel pins and attach new gasket.
- Apply SUZUKI BOND "1215" to the groove of generator lead wire grommet.
- Apply SUZUKI BOND "1215" to the area of Ⓐ, Ⓑ and Ⓒ.

1215 99000-31110: SUZUKI BOND "1215"



- Install the generator cover.

NOTE:
Fit the new gaskets ① to the correct positions as shown in Fig.

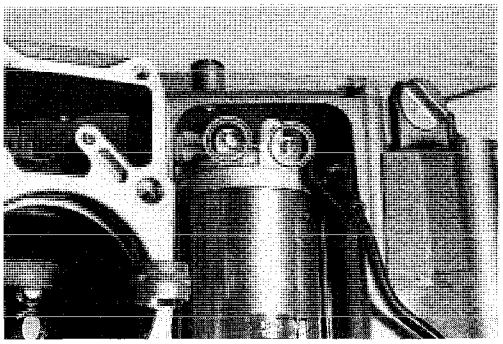


⚠ CAUTION

Use new gasket to prevent oil leakage.

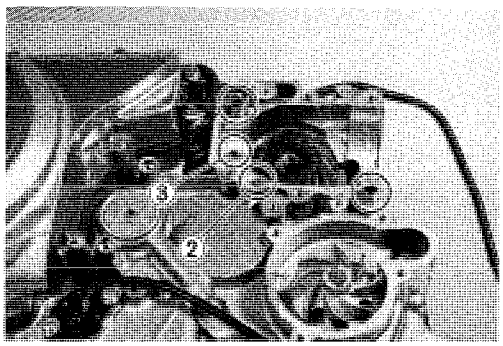
- Fit the spring, the neutral switch contant and O-ring prior to the neutral switch installation.
- Connect the oil pressure switch lead wire and install the neutral switch.
- Mount the starter motor to the crankcase and route the starter motor lead wire properly.

NOTE:
Pass the generator lead wire through the crankcase hole before installing the starter motor.
Grease the O-ring of the starter motor before mounting.



- Install the dowel pins.
- Check the oil jet ② for clogging.
- Install the secondary driven bevel gear assembly, correct shims and new O-ring.
- Apply engine oil to the bearing and gears.

NOTE:
Be sure to align the bearing pin ③ with the bearing pin hole.

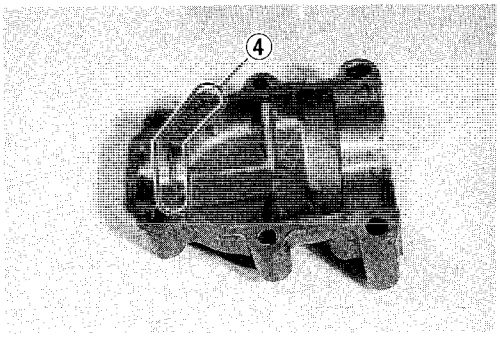


- Apply SUZUKI BOND "1215" to the secondary bevel gear case.

⚠ CAUTION

Be careful not to block the oil passage ④.

1215 99000-31110: SUZUKI BOND "1215"



- Tighten the secondary bevel gear case bolts to the specified torque.

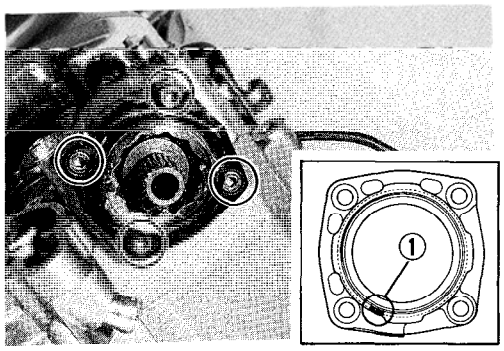
Secondary bevel gear case bolt

	ITEM	Initial	Final
Tightening torque	N·m	15	22
	kg-m	1.5	2.2
	lb-ft	11.0	16.0

- Apply THREAD LOCK SUPER "1303" to the secondary driven bevel gear housing bolts.
- Tighten the bolts to the specified torque.

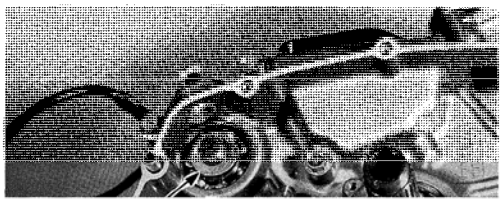
1303 99000-32030: THREAD LOCK SUPER "1303"

Secondary driven bevel gear housing bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)



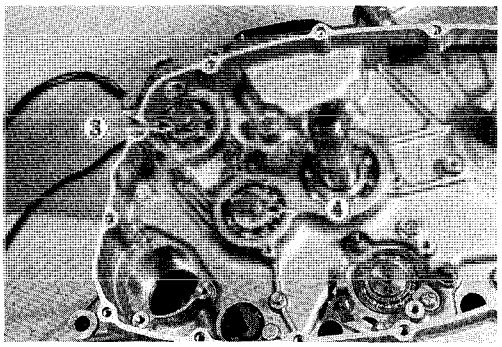
NOTE:
The cutaway portion ① of secondary driven bevel gear housing faces downward.

- Install the washer ② onto the secondary drive bevel gear shaft.
- Install the universal joint into the secondary driven bevel gear.
- Tighten the secondary drive bevel gear shaft nut ③ and driveshaft bolt ④ to the specified torque while holding the universal joint.



Secondary drive bevel gear shaft nut: 95 N·m (9.5 kg-m, 68.5 lb-ft)

Driveshaft bolt: 65 N·m (6.5 kg-m, 47.0 lb-ft)



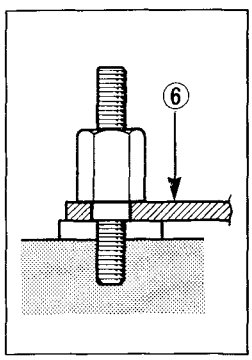
⚠ CAUTION

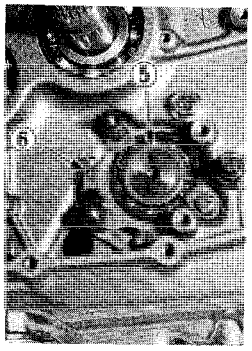
Driveshaft bolt ④ has left-hand thread.

- Install the washer ⑤ on the gearshift cam.

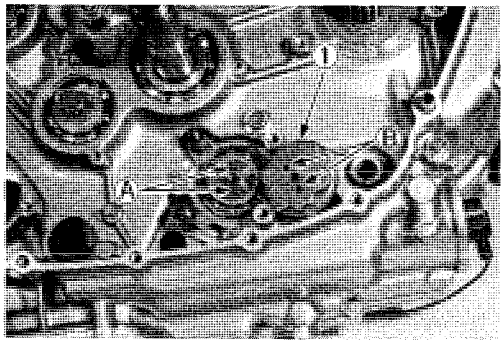
NOTE:
When replacing the gearshift cam stopper ⑥, apply THREAD LOCK SUPER "1322" to the thread of bolt.
After tightening the bolt, make sure that the gearshift cam stopper moves properly.

1322 99000-32110: THREAD LOCK SUPER "1322"





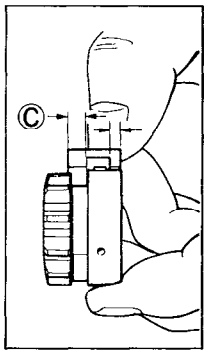
- Check the neutral position.
- Install the gearshift cam stopper plate ① after aligning the gearshift cam pins Ⓐ with the gearshift cam stopper plate holes Ⓑ.

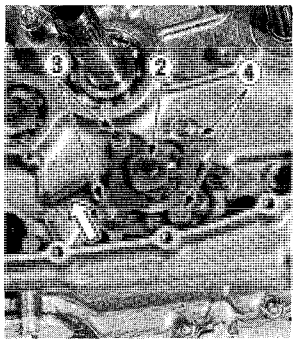


- Install the gearshift pawls into the cam driven gear. The large shoulder Ⓒ must face to the outside as shown in the illustration.
- Apply THREAD LOCK SUPER "1322" to the bolt ②, nuts ③ and screws ④.

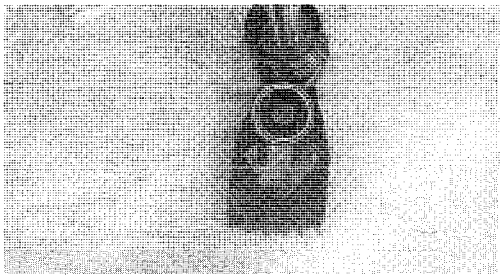
1322 99000-32110: THREAD LOCK SUPER "1322"

- Hook the gearshift cam stopper spring.





- Install the gearshift cam stopper spring properly.

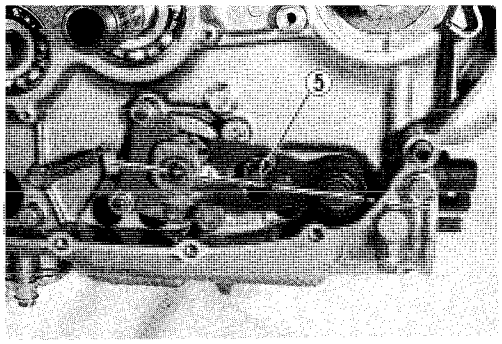


- Install the gearshift shaft. Match the center teeth of the gear on the gearshift shaft with the center teeth on the cam driven gear as shown.

NOTE:
When replacing the gearshift arm stopper ⑤, apply a small quantity of THREAD LOCK SUPER "1303" to its threaded part and tighten it to the specified torque.

1303 99000-32030: THREAD LOCK SUPER "1303"

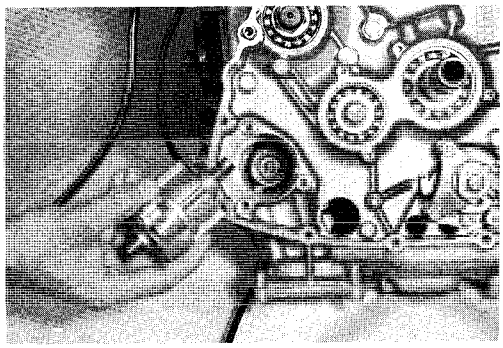
Gearshift arm stopper: 19 N·m (1.9 kg-m, 14.0 lb-ft)



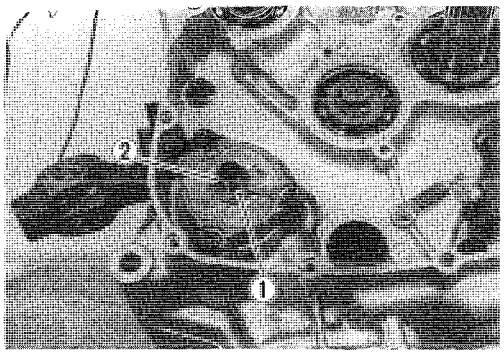
- Install the oil pump to the crankcase.
- Apply THREAD LOCK SUPER "1322" to the oil pump securing bolts.

Oil pump bolt: 11 N·m (1.1 kg-m, 8.0 lb-ft)

1322 99000-32110: THREAD LOCK SUPER "1322"

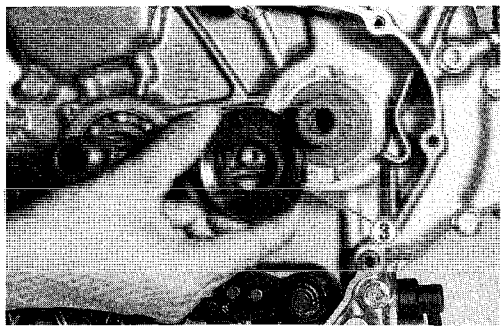


- Install the washer ① and the pin ② to the oil pump.

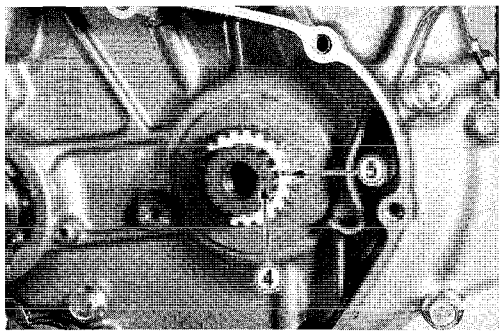


- Install the thrust washer onto the crankshaft.

NOTE:
The chamfer side of thrust washer ③ faces crankcase side.

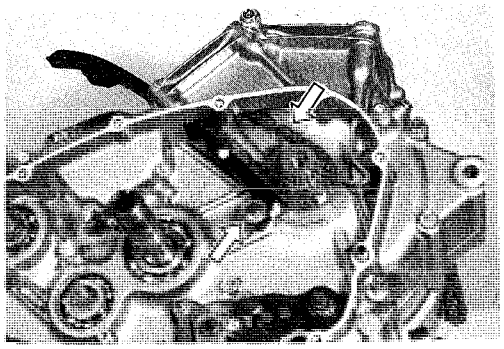


- Align the punch mark ④ on the crankshaft with the punch mark ⑤ on the camshaft drive sprocket.



- Install the cam chain and cam chain guide with ''R'' mark.
- Tighten the cam chain guide set bolt.

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

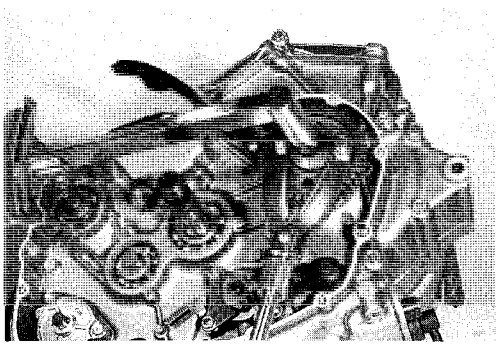


- Tighten the primary drive gear bolt to the specified torque.

TOOL 09930-40113: Rotor holder

Primary drive gear bolt: 95 N·m (9.5 kg-m, 68.5 lb-ft)

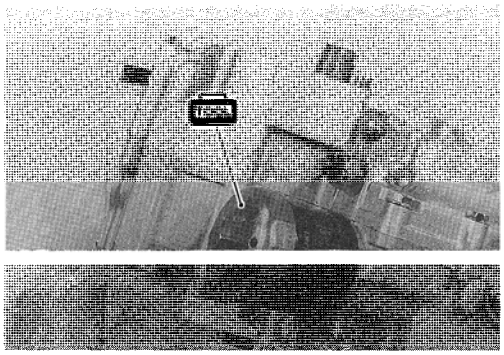
NOTE:
This bolt has left-hand thread.



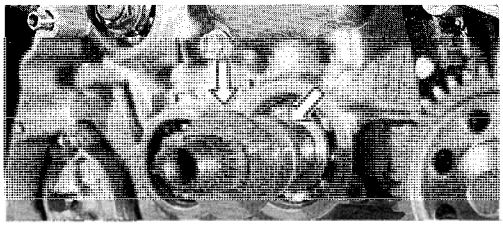
- Apply engine oil lightly to the gasket of the new filter before installation.
- Install the new filter turning it by hand until you feel that the filter gasket contacts the mounting surface. Then tighten it 2 turns using the oil filter wrench.

TOOL 09915-40610: Oil filter wrench

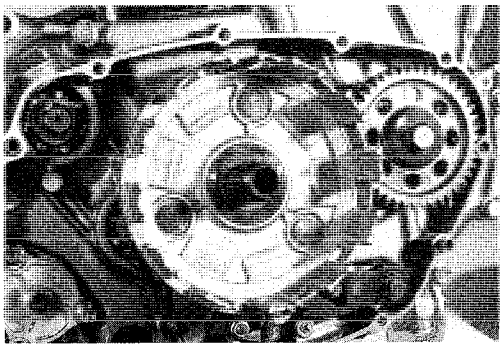
NOTE:
Tighten the filter properly using the special tool.



- Install the spacer and washer onto the countershaft.

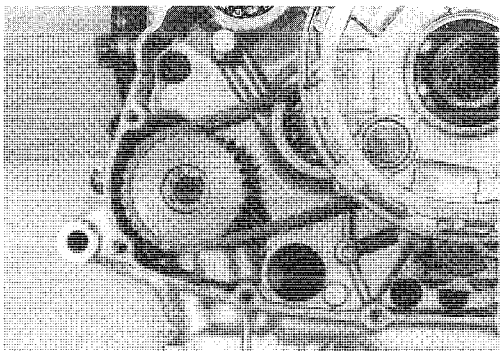


- Apply engine oil to the primary driven gear bearing and spacer.
- Engage the oil pump drive chain onto the oil pump drive gear.
- Install the primary driven gear assembly onto the countershaft.

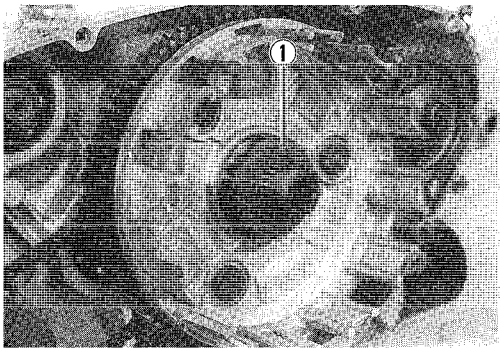


- Engage the oil pump drive chain onto the oil pump driven gear and fix the oil pump driven gear with circlip.

TOOL 09900-06107: Snap ring pliers



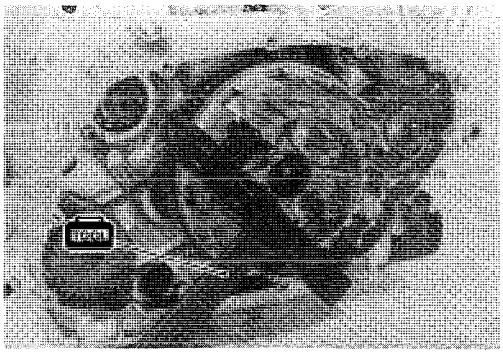
- Install the thrust washer ① onto the countershaft.
- Install the clutch sleeve hub onto the countershaft.
- Install the washer.



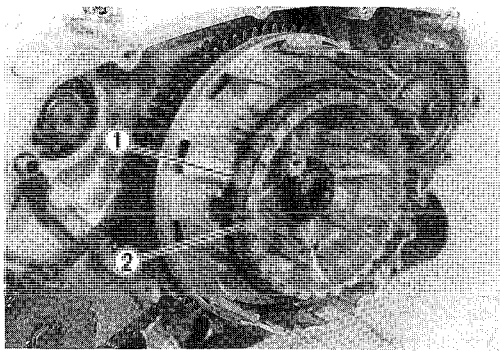
- Tighten the clutch sleeve hub nut to the specified torque by using the special tool.

Clutch sleeve hub nut: 60 N·m (6.0 kg-m, 43.5 lb-ft)

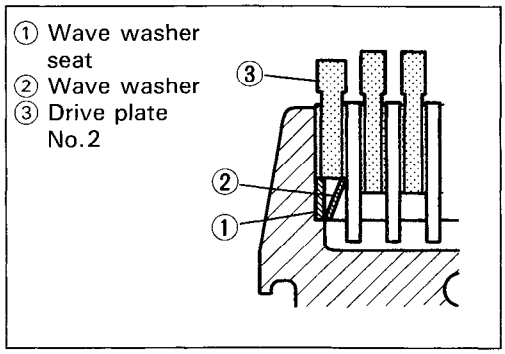
09920-53740: Clutch sleeve hub holder (or 09920-50710)



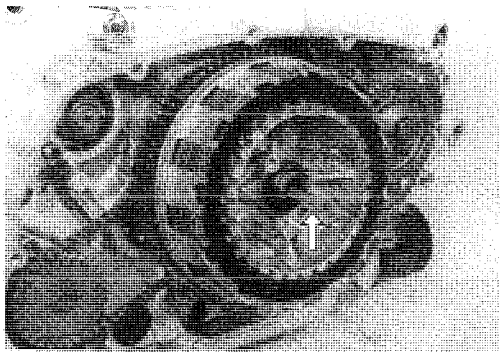
- Install the wave washer seat ①, the wave washer ② and the drive plate No. 2 ③ (thicker plate as shown in the figure) onto the clutch sleeve hub.

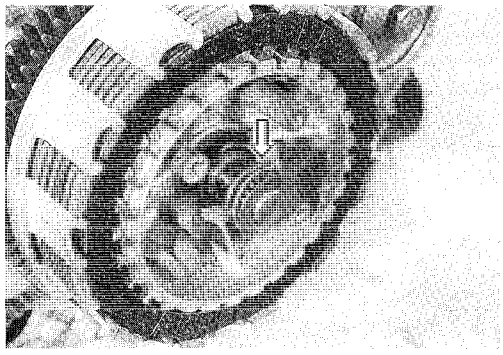


NOTE:
Install the clutch drive plate and driven plate one by one into the clutch sleeve hub in the prescribed order, drive plate No.2 first.

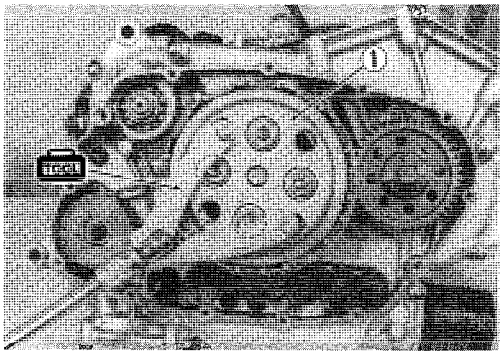


- Install the clutch push rods into the countershaft so that the long push rod touches clutch push piece.
- Install the clutch push piece, bearing and thrust washer in that order.
- Apply engine oil to the bearing.





- Install the pressure plate ① and tighten the clutch spring mounting bolts.

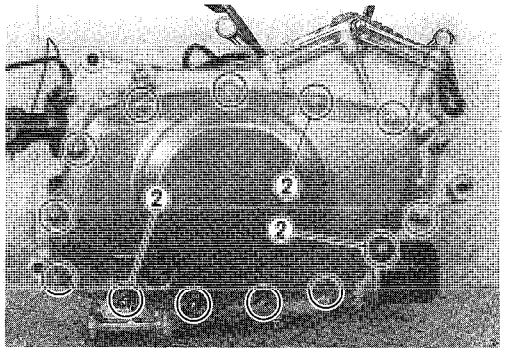


NOTE:
Tighten the clutch spring mounting bolts in the criss-cross manner, tightening them by degrees until they attain a uniform tightness.

Clutch spring mounting bolt: 12 N·m (1.2 kg-m, 8.5 lb-ft)

TOOL 09930-40113: Rotor holder

- Fit the new clutch cover gasket and dowel pins.
- Install the clutch cover.

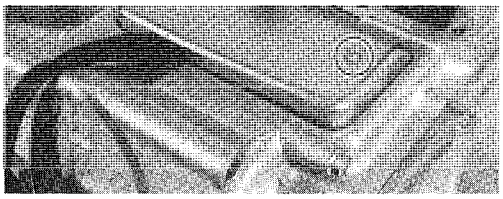


NOTE:
Fit the new gaskets ② to the correct positions as shown in Fig.

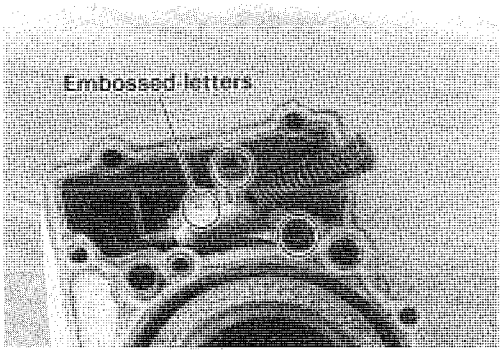
⚠ CAUTION

Use a new gasket to prevent oil leakage.

- Install the cover onto the starter motor.
  Pass the lead wires through the cutaway of the cover.

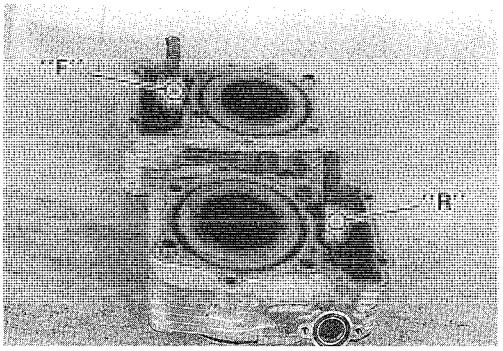


- Install the cam chain tensioners on each cylinder.

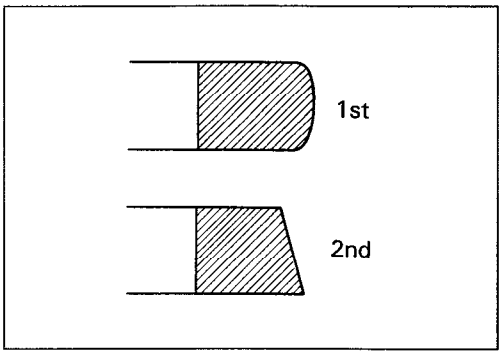


NOTE:
The cam chain tensioner can be distinguished by the embossed-letters, "F" and "R".
"F": Front (No.2 cylinder)
"R": Rear (No.1 cylinder)

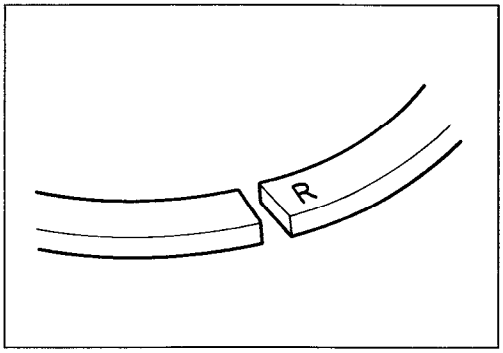
Cam chain tensioner bolt: 10 N·m
(1.0 kg-m, 7.0 lb-ft)



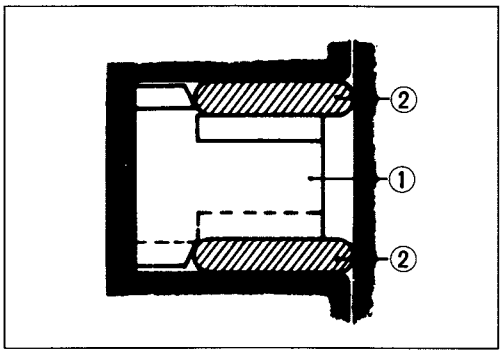
- Install the piston rings in the order of oil ring, 2nd ring and top ring.
- Top ring and 2nd (middle) ring differ in the shape of the ring face, and the face of top ring is chrome-plated whereas that of 2nd ring is not. The color of 2nd ring appears darker than that of the top one.



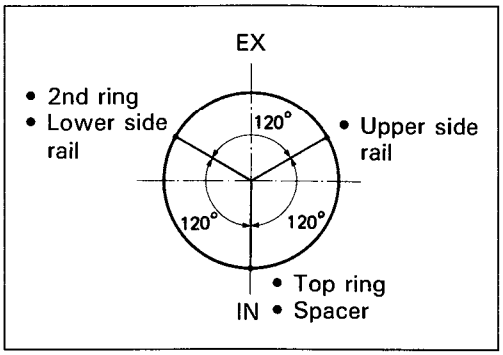
- Top and 2nd (middle) rings have a letter "R" marked on the side. Be sure to bring the marked side to top when fitting them to the piston.



- The first member to go into the ring groove is spacer ①. After placing the spacer, fit the two side rails ②. Side designations, top and bottom, are not applied to the spacer and side rails: you can position each either way.



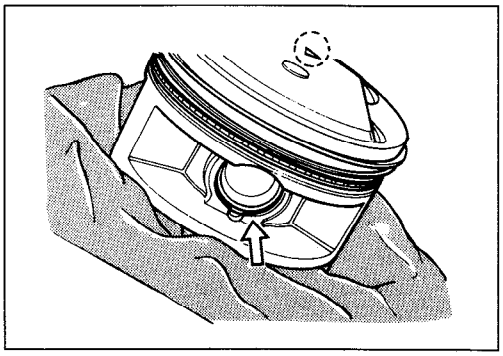
- Position the gaps of the three rings as shown. Before inserting each piston into the cylinder, check that the gaps are so located.



- Rub a small quantity of SUZUKI MOLY PASTE onto the piston pin.

99000-25140: SUZUKI MOLY PASTE

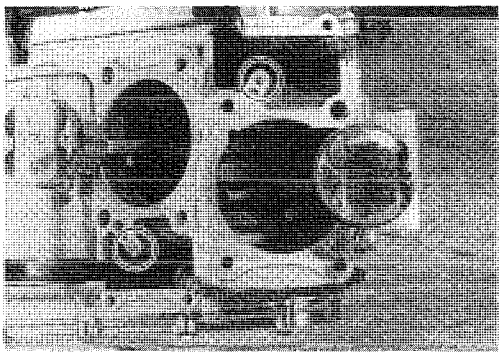
- Place a clean rag over the cylinder base to prevent the piston pin circlips from dropping into the crankcase.
- When fitting the piston, turn the triangle mark on the piston head to exhaust side.
- Fit the piston pin circlips with long-nose pliers.

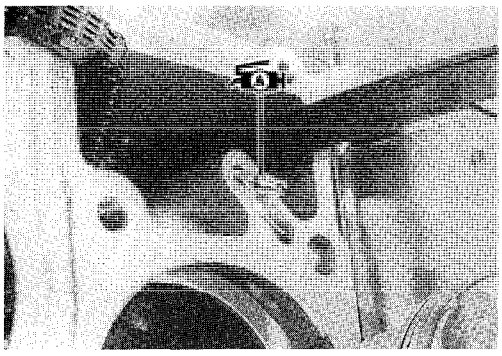


⚠ CAUTION

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

- Fit the oil jets into the crankcase after greasing its O-ring.

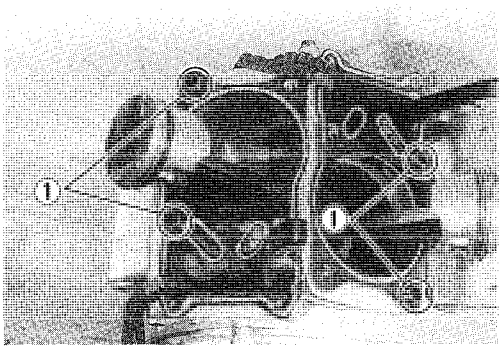




- Apply engine oil to the sliding surface of the piston.
- Fit the dowel pins ① and new gaskets to the crankcase.

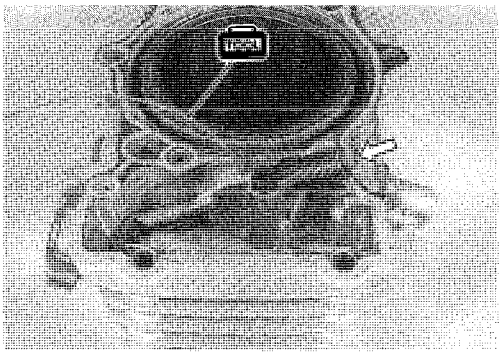
⚠ CAUTION

Use a new gasket to prevent oil leakage.



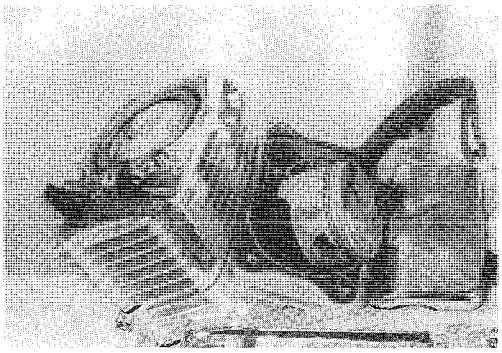
- Compress the chain tensioner spring by releasing ratchet. Insert the special tool between ratchet and chain tensioner body.

TOOL 09918-53810: Tensioner locking tool

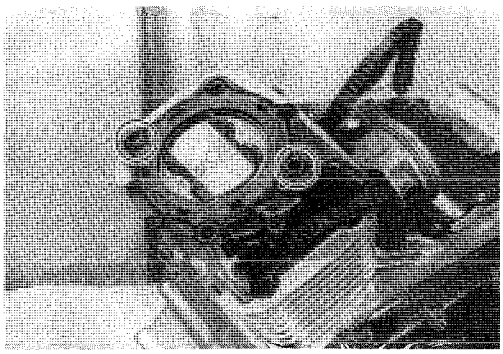


- Hold each piston ring in proper position, and insert piston into the cylinder.
- Pull the cam chain out of cylinder and install the cam chain guide.

NOTE:
When mounting the cylinders, keep the camshaft drive chains taut. The camshaft drive chain must not be caught between cam drive chain sprocket and crankcase when crankshaft is rotated.
There is a holder for the bottom end of the cam chain guide cast in the crankcase. Be sure that the cam chain guide is inserted properly.



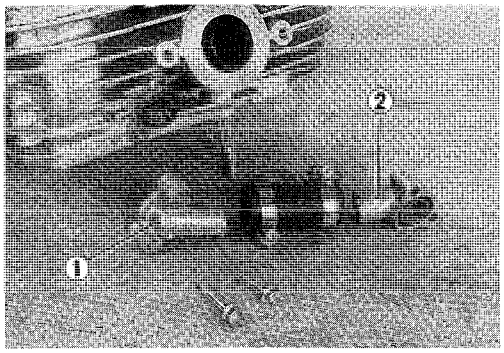
- Fit the dowel pins and the new cylinder head gasket to the cylinder.



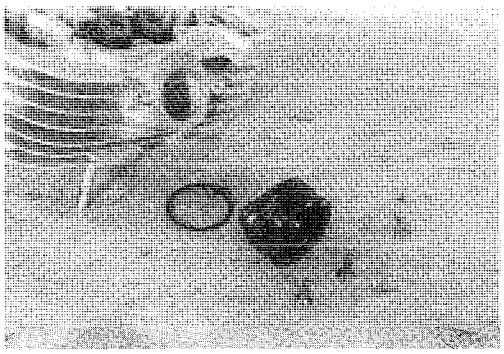
⚠ CAUTION

Use a new gasket to prevent gas leakage.

- Fit O-rings greased to the water unions, ① and ②.
- Install the unions, water hose and water hose clamps to the cylinder head.

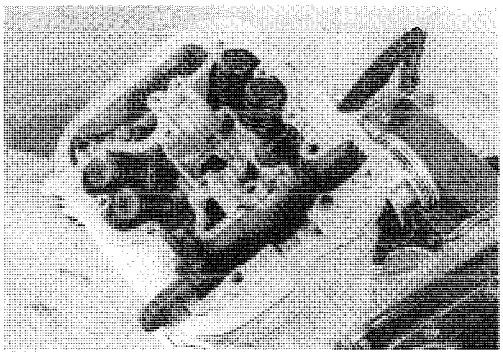


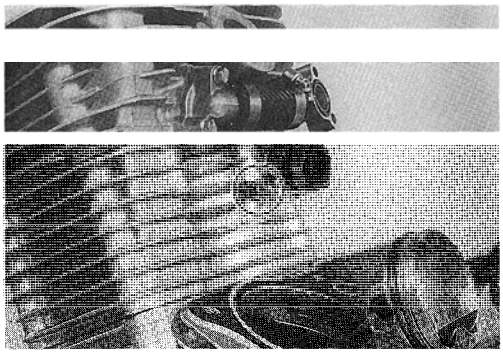
- Fit O-rings greased to the intake pipes and fix them to the respective cylinders.



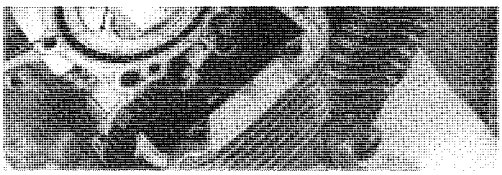
- Tighten the cylinder head bolts (long, 10 mm) diagonally to the specified torque.
- Tighten other cylinder head nuts and bolts to the specified torque.

Cylinder head bolts and nuts:
10 mm: 38 N·m (3.8 kg-m, 27.5 lb-ft)
8 mm: 10 N·m (1.0 kg-m, 7.0 lb-ft)
6 mm: 10 N·m (1.0 kg-m, 7.0 lb-ft)

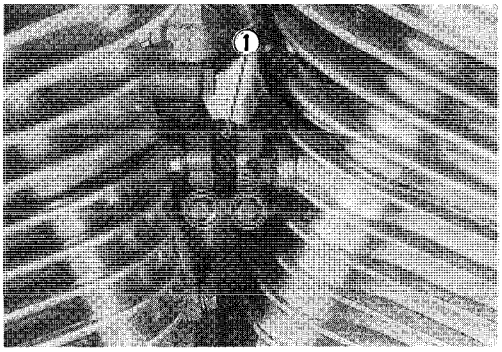




- Mount the No.1 (Rear) cylinder in the same manner of

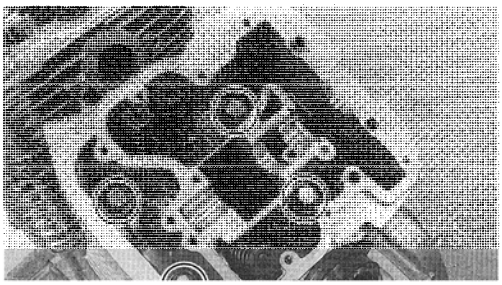


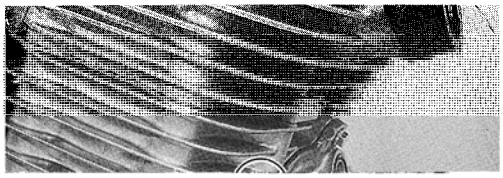
- Fit the water hose ① and clamps when installing the No.1 cylinder.

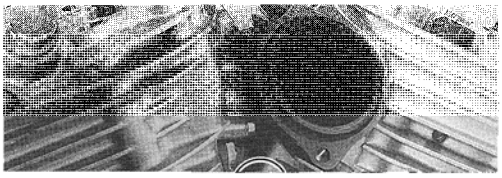


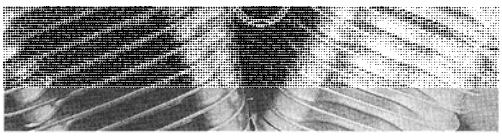
- Tighten the cylinder head bolts and nuts diagonally to the specified torque.

Cylinder head bolts and nuts:
10 mm: 38 N·m (3.8 kg-m, 27.5 lb-ft)
8 mm: 10 N·m (1.0 kg-m, 7.0 lb-ft)
6 mm: 10 N·m (1.0 kg-m, 7.0 lb-ft)



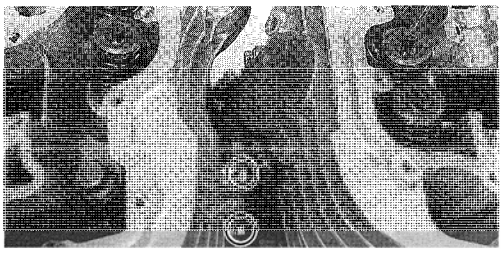






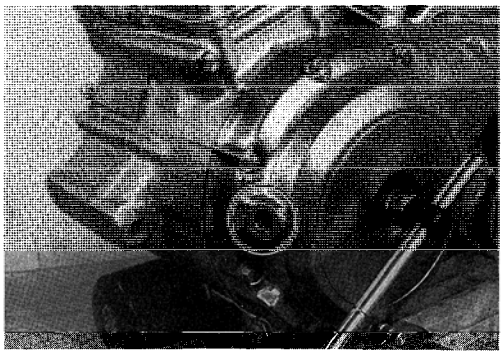
- Tighten the water union bolts.
- Tighten the water hose clamp screws.

Water union bolts: 10 N·m (1.0 kg-m, 7.0 lb-ft)



CAMSHAFT TIMING

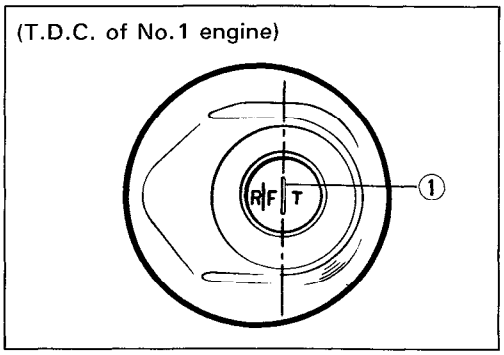
- Turn the crankshaft counterclockwise with the box wrench and align "T" line ① on the magneto rotor with the center of generator cover hole keeping the camshaft drive chain pulled upward.



⚠ CAUTION

If crankshaft is turned without drawing the camshaft drive chain upward, the chain will be caught between crankcase and cam chain drive sprocket.

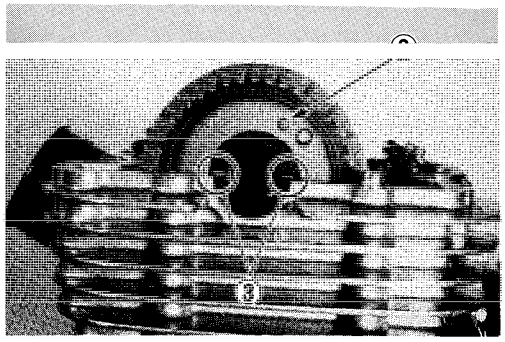
NOTE:
Apply grease on the cam sprocket locating pin and install the pin into the camshaft.



No.1 (REAR) ENGINE

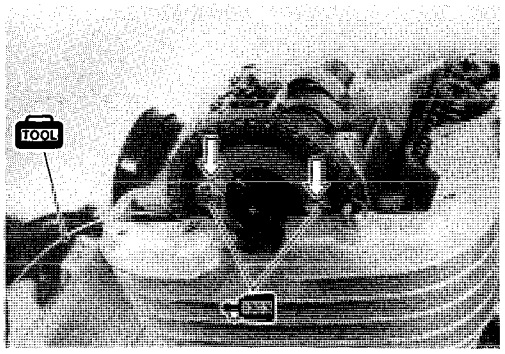
- Engage the chain on the cam sprocket with the locating pin hole ② at the one o'clock position.

NOTE:
Do not rotate the magneto rotor while doing this. When the sprocket is not positioned correctly, turn the sprocket. When installing the camshaft with "R" mark into the cam sprocket pay attention not to dislodge the locating pin or it may fall into the crankcase.



- Align the mark ③ on the camshaft so it is parallel with the surface of the cylinder head.

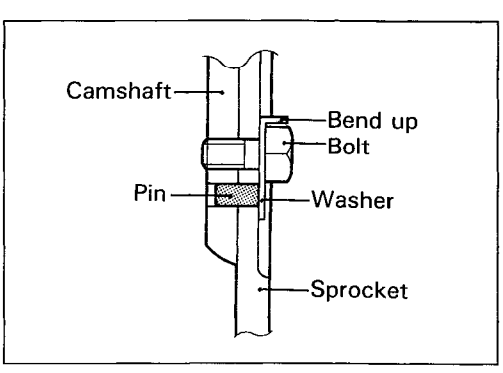
NOTE:
Arrow mark is located to forward.



- Fit the lock washer so that it is covering the locating pin.
- Apply THREAD LOCK SUPER "1303" to the bolts and tighten them.

Cam chain sprocket bolt: 15 N·m (1.5 kg-m, 11.0 lb-ft)

99000-32030: THREAD LOCK SUPER "1303"

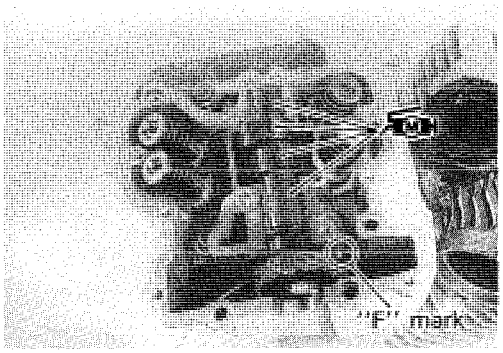


- Bend up the washer tongue positively to lock the bolts.
- Remove the cam chain tensioner locking tools.

NOTE:
Click sound is heard when the cam chain tensioner is released.

- Apply SUZUKI MOLY PASTE to the camshaft journals and cam faces.

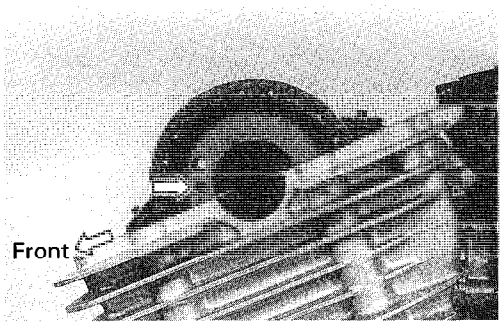
99000-25140: SUZUKI MOLY PASTE



No.2 (FRONT) ENGINE

- At this position, engage the chain on the cam sprocket with the locating pin hole at the nine half o'clock position.

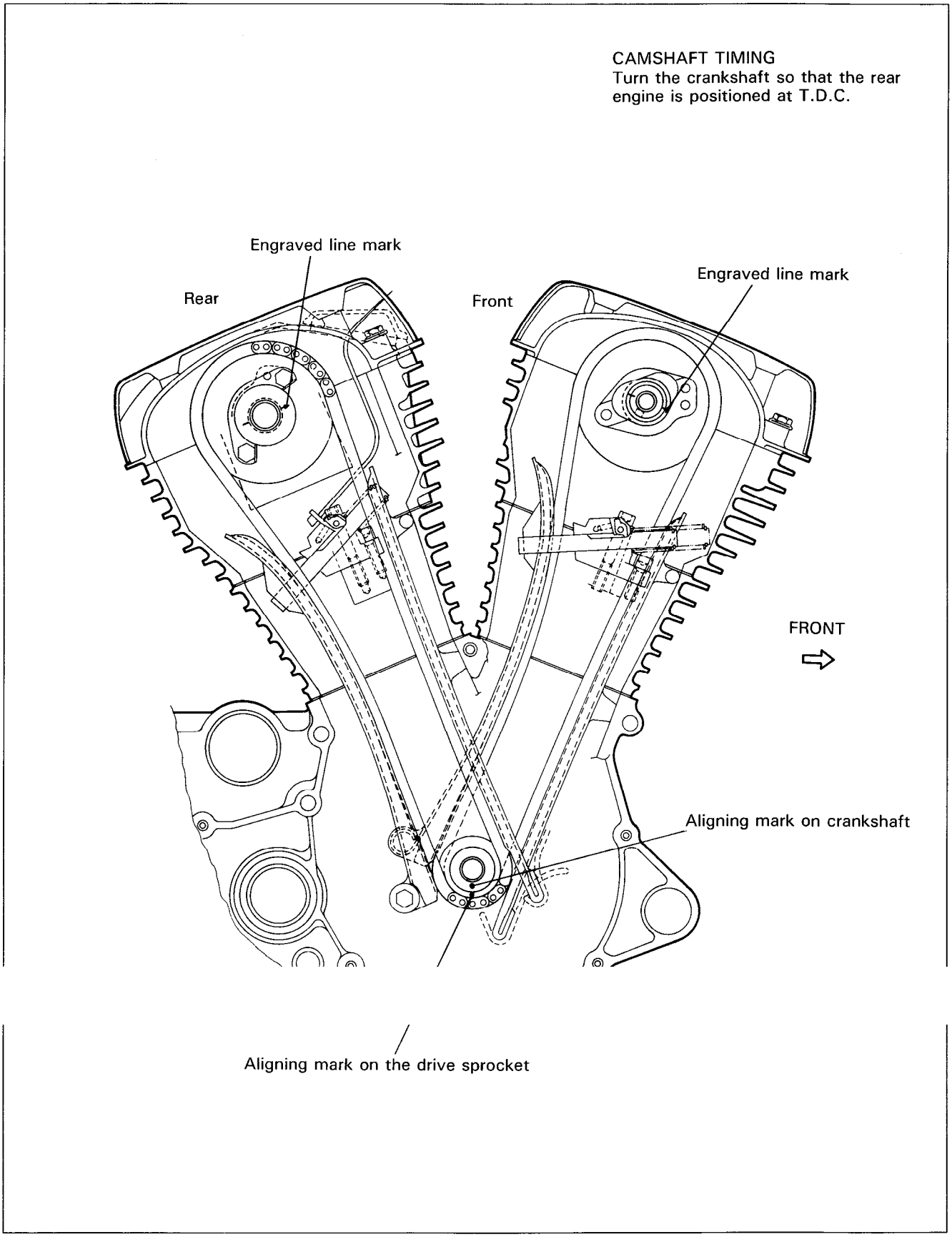
NOTE:
Do not rotate the magneto rotor while doing this. When the sprocket is not positioned correctly, turn the sprocket. When installing the camshaft with "F" mark into the cam sprocket, pay attention not to dislodge the locating pin or it may fall into the crankcase.



- Other procedures are the same manner of No.1 (REAR) engine.

CAM SHAFT TIMING

- Turn the crankshaft so that the No.1 (REAR) engine position is positioned at T.D.C.

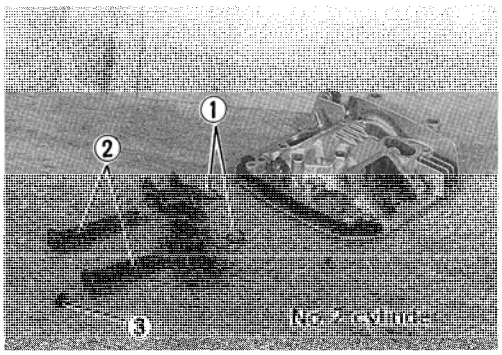


- Apply SUZUKI MOLY PASTE to the rocker arms and shafts.
- After inserting the shafts, tighten the shafts.

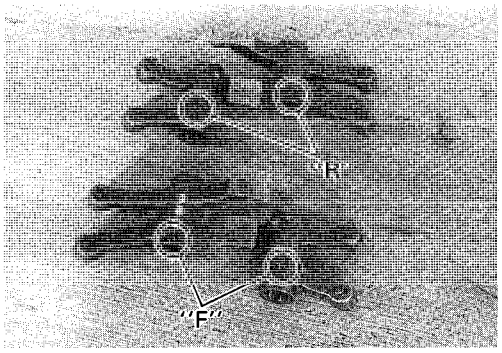
Rocker arm shaft: 28 N·m (2.8 kg-m, 20.0 lb-ft)

⚠ CAUTION

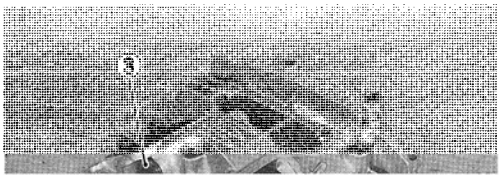
*** Do not forget the wave washer ①.**
*** Use a new gasket on the rocker arm shaft ② to prevent oil leakage.**



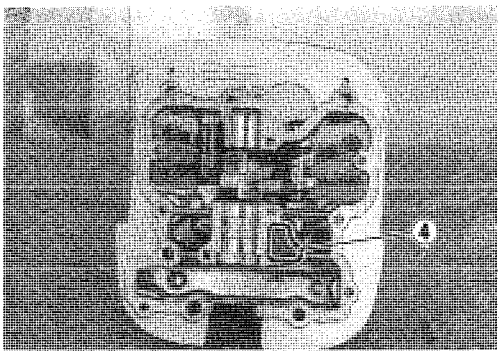
NOTE:
The rocker arms have embossed-letters, ''F'' or ''R'', ''F'' for No.2 (Front) cylinder and ''R'' for No.1 (Rear) cylinder.



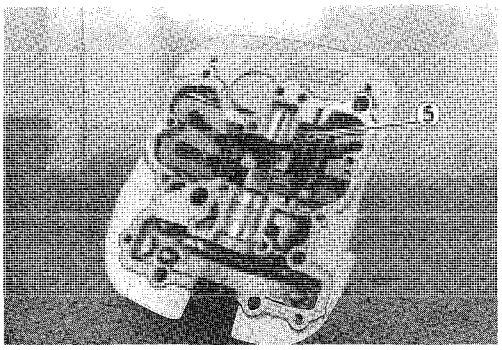
- Fit the rubber caps ③ to the rocker shaft ends as shown in the photos.



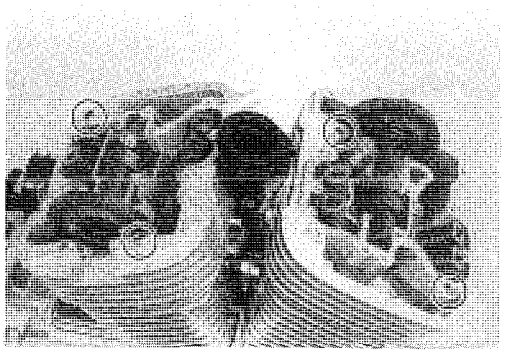
- Fit the O-ring ④ to the No.2 (front) cylinder head cover.



NOTE:
Do not forget the plate ⑤ on No.1 (rear) cylinder head cover.



- Thoroughly wipe off oil from the mating surfaces of cylinder head and cover.
- Fit the two dowel pins to the cylinder head side.
- Uniformly apply SUZUKI BOND "1216" to the cylinder head surfaces.

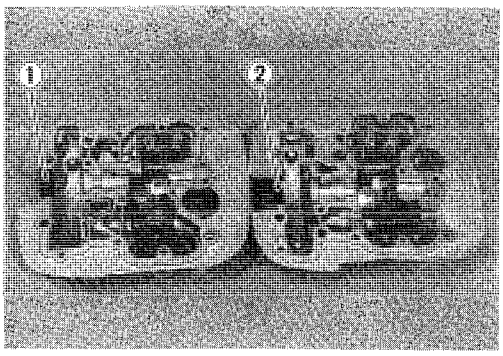


1216 99000-31160: SUZUKI BOND "1216"

NOTE:
Do not apply SUZUKI BOND NO. 1216 to the camshaft end cap.

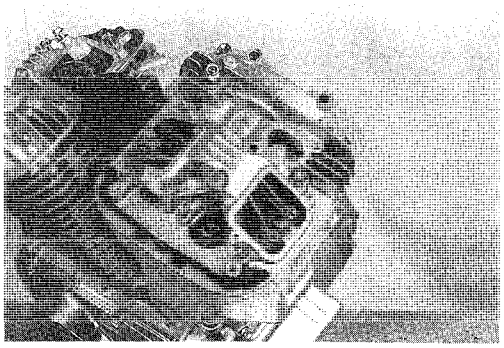
NOTE:
When tightening the cylinder head cover bolts, the piston must be at top dead center on the compression stroke.

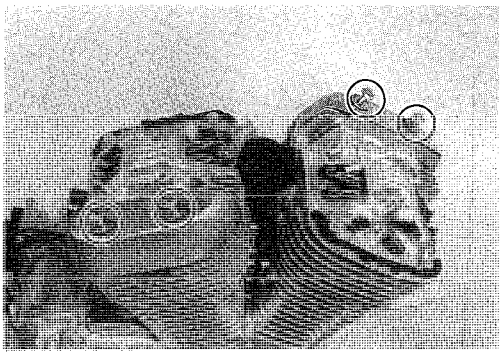
- Fit the caps, ① and ②, to each cylinder head cover.

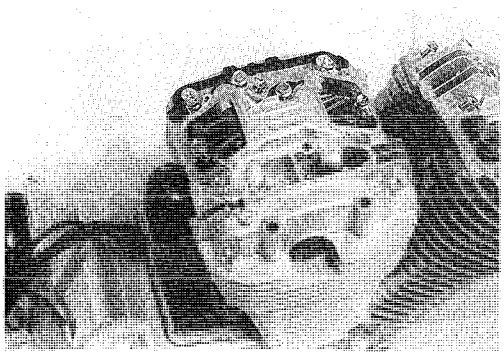


- Lightly tighten the cylinder head cover bolts diagonally, and then if everything is satisfactory, tighten securely with a torque wrench to the specified torque.

Cylinder head cover bolt:
6 mm: 10 N·m (1.0 kg-m, 7.0 lb-ft)
8 mm: 23 N·m (2.3 kg-m, 16.5 lb-ft)



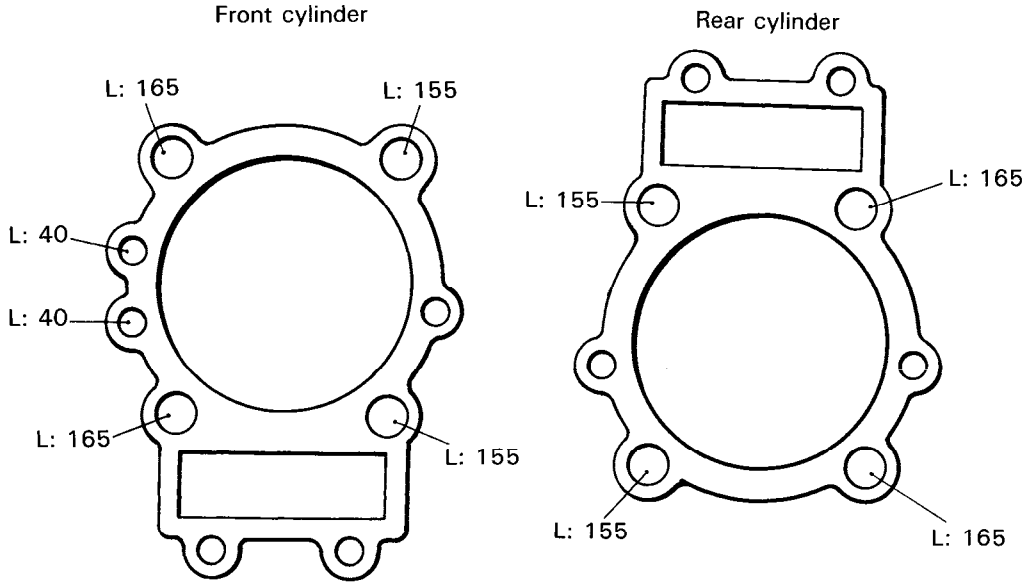




VALVE CLEARANCE

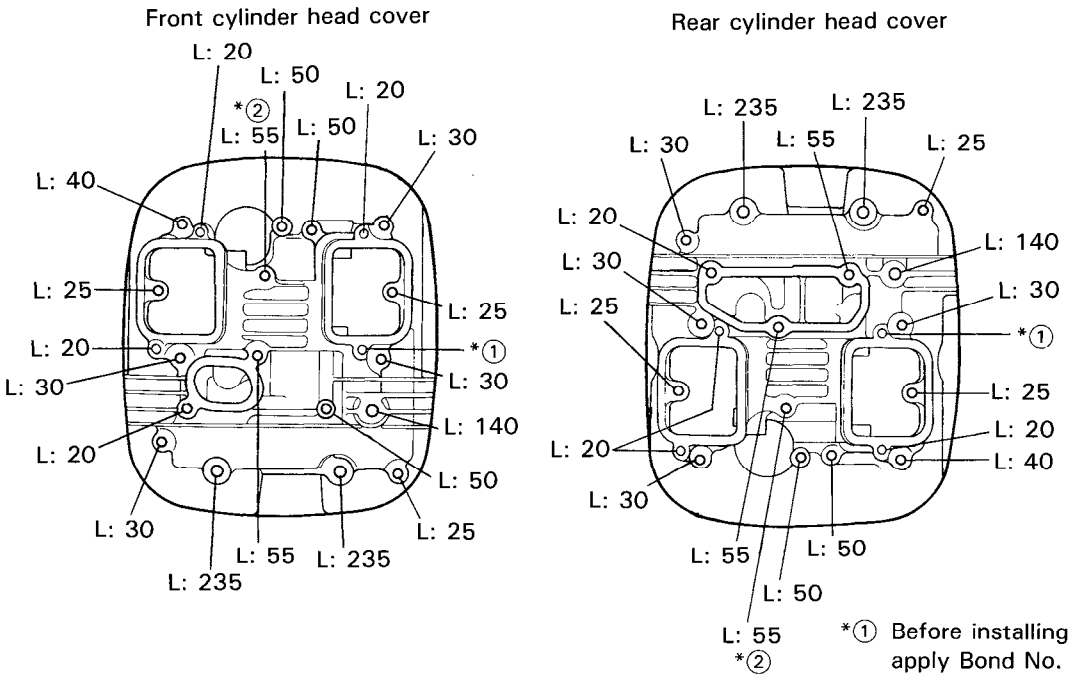
- Check and adjust the valve clearance. (Refer to page 2-6 for procedures.)

LOCATION OF CYLINDER HEAD BOLT



L: Length
Unit: mm

LOCATION OF CYLINDER HEAD COVER BOLT

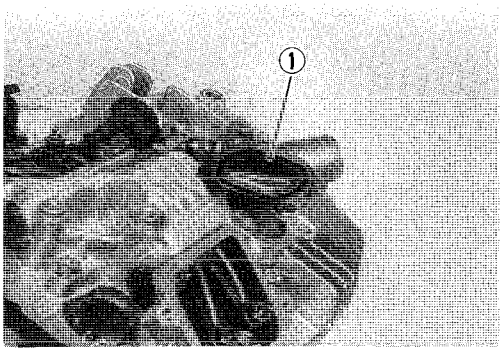


L: Length Unit: mm

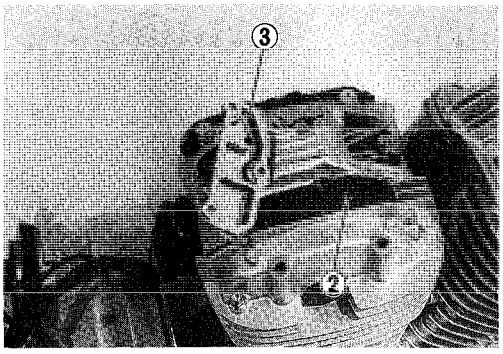
*① Before installing the stud bolt apply Bond No. 1216 to the thread of cylinder head cover side.

*② Apply Bond No. 1215 to the thread of bolt.

- Fit the O-ring ① greased to the water union and fix them to the cylinder head cover.

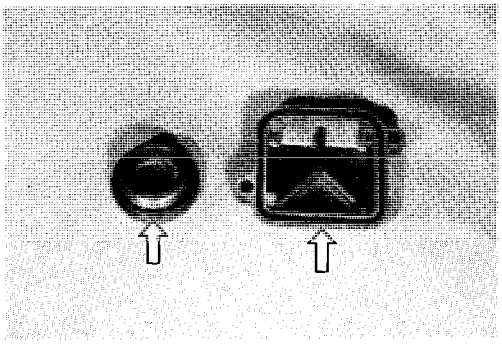


- Fit the gasket ② and the breather cover ③ to the cylinder head cover.



VALVE INSPECTION CAP AND CAM TIMING INSPECTION CAP

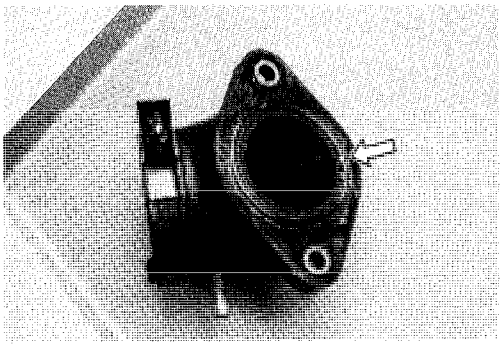
- Before installing the valve inspection caps and cam timing inspection cap, coat the respective O-rings with grease.



⚠ CAUTION

Replace the respective O-rings with new ones.

INTAKE PIPE



⚠ CAUTION

When replacing the intake pipe, use a new O-ring to prevent sucking air from the joint.

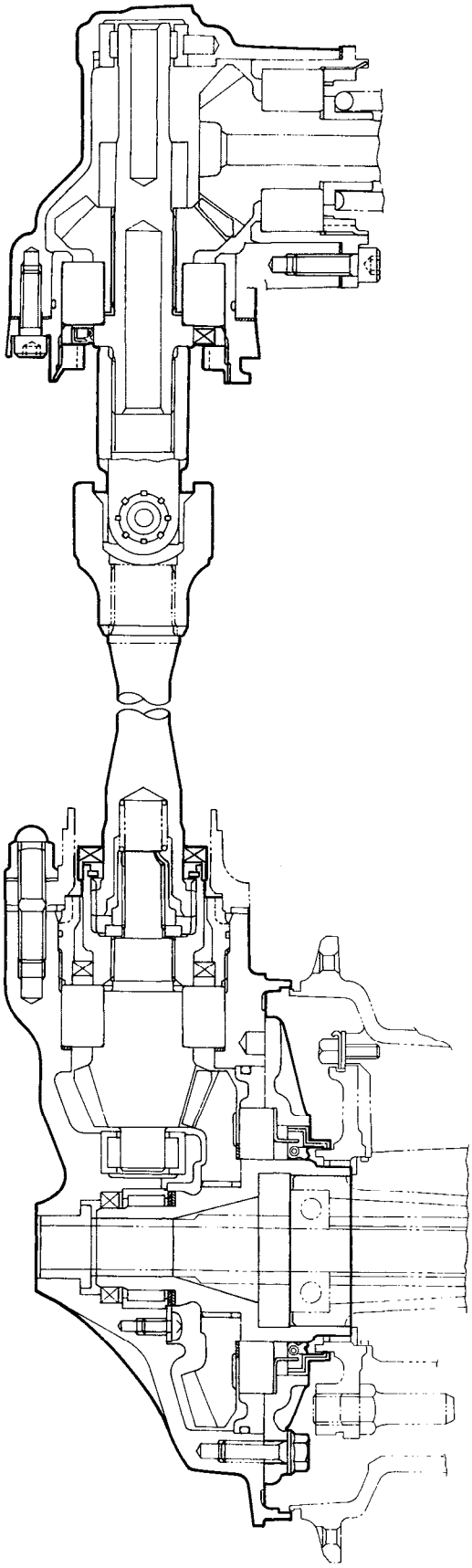
- Coat the O-ring with grease.

SHAFT DRIVE

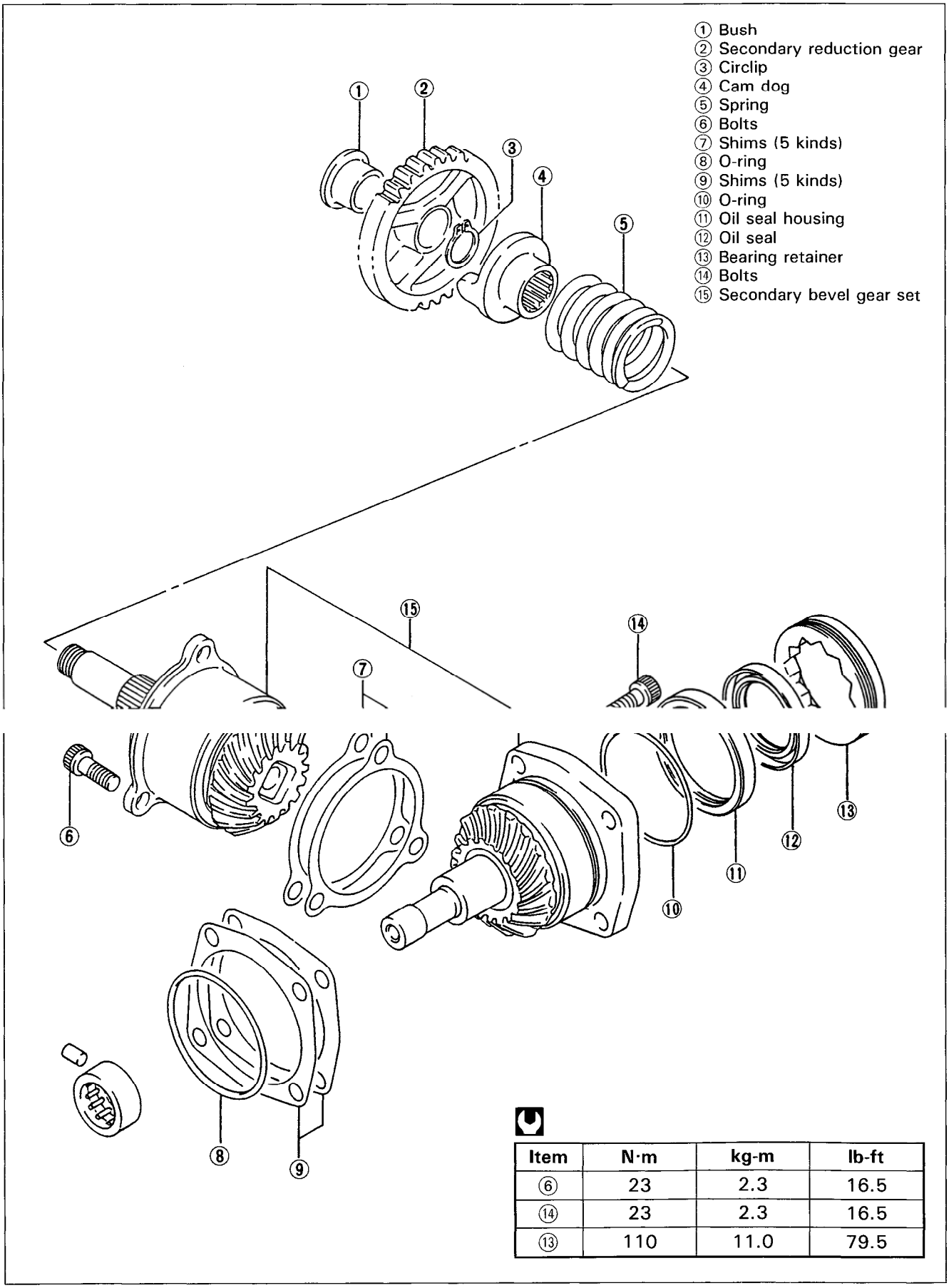
CONTENTS

4

SHAFT DRIVE



SECONDARY BEVEL GEARS CONSTRUCTION



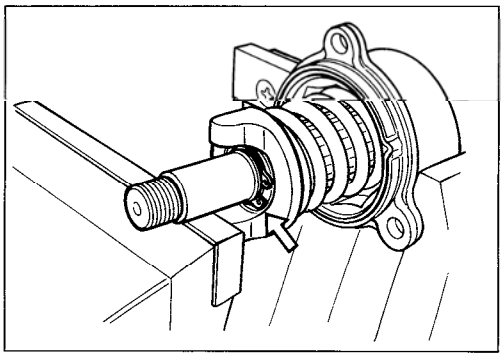
Item	N·m	kg-m	lb-ft
⑥	23	2.3	16.5
⑭	23	2.3	16.5
⑬	110	11.0	79.5

REMOVAL AND DISASSEMBLY

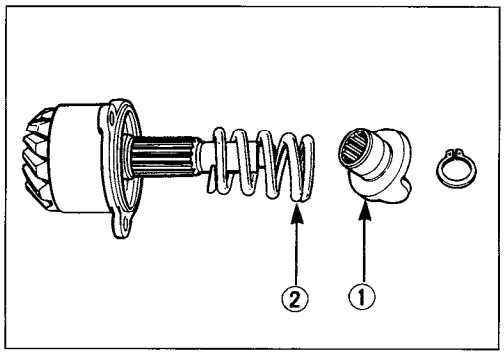
SECONDARY DRIVE BEVEL GEAR

- Remove the engine. (Refer to pages 3-2 through 3-7.)
- Remove the secondary drive bevel gear assembly. (Refer to page 3-21.)
- Compress the damper spring with a vice, and remove the circlip with the special tool.

TOOL **09900-06107: Snap ring pliers**



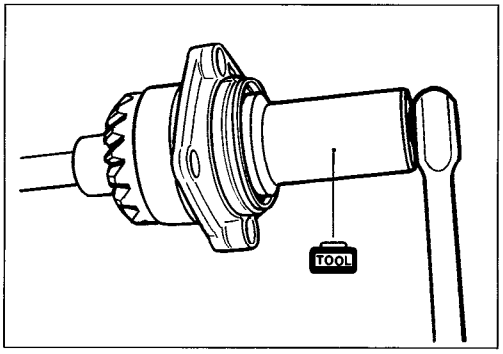
- Remove the cam dog ① and damper spring ②.



SECONDARY DRIVEN BEVEL GEAR

- Remove the secondary driven bevel gear assembly. (Refer to pages 3-19 and 20.)
- Remove the bearing retainer with the special tool.

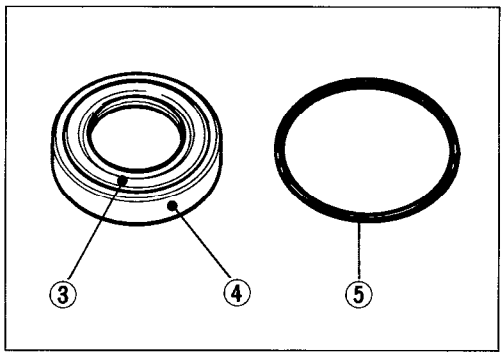
TOOL **09921-21820: Bearing retainer wrench**



- Remove the oil seal ③, oil seal housing ④ and O-ring ⑤.

⚠ CAUTION

The removed oil seal and O-ring should be replaced with new ones.



INSPECTION

Inspect the removed parts for the following abnormalities.

* Drive and driven bevel gears damage or wear
* Improper tooth contact
* Abnormal noise of bearings
* Bearing damage or wear

REASSEMBLY

Reassemble the secondary bevel gears in the reverse order of disassembly and also carry out the following steps:

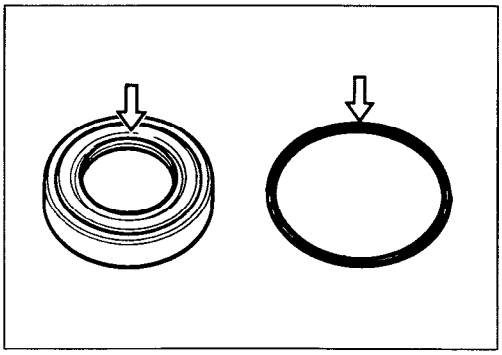
NOTE:
Before reassembly, thoroughly clean all parts in cleaning solvent.

- Apply grease to the lip of oil seal and O-ring.

99000-25010: SUZUKI SUPER GREASE "A"

⚠ CAUTION

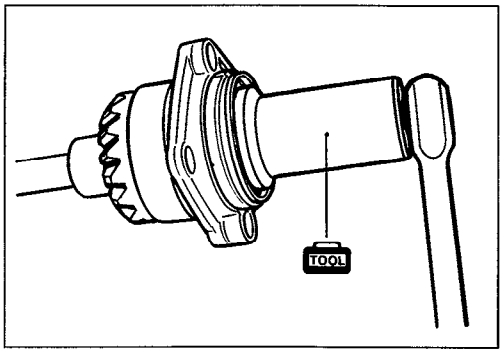
Always use a new oil seal and O-ring.



- Tighten the bearing retainer to the specified torque.

Secondary driven bevel gear bearing retainer:
110 N·m (11.0 kg-m, 79.5 lb-ft)

09921-21820: Bearing retainer wrench



⚠ CAUTION

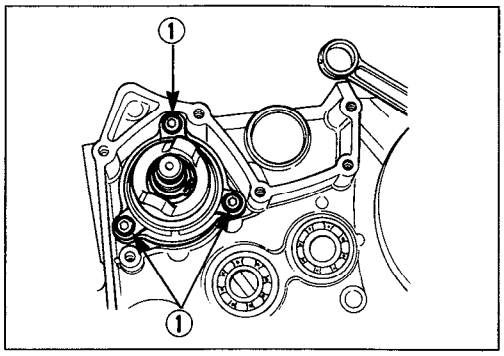
When replacing the secondary drive bevel gear, replace the secondary driven bevel gear also, as they must be replaced together.

SECONDARY GEARS SHIM ADJUSTMENT

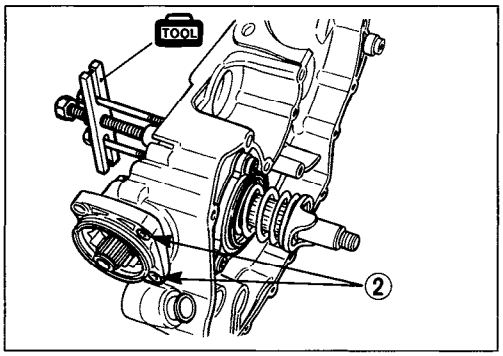
BACKLASH

- Install the secondary drive bevel gear assembly and removed shims, and tighten the three bolts ① to the specified torque.

Secondary drive bevel gear housing bolt:
23 N·m (2.3 kg-m, 16.5 lb-ft)



- Install the secondary driven bevel gear assembly and removed shims, and tighten the two bolts ② to the specified torque.



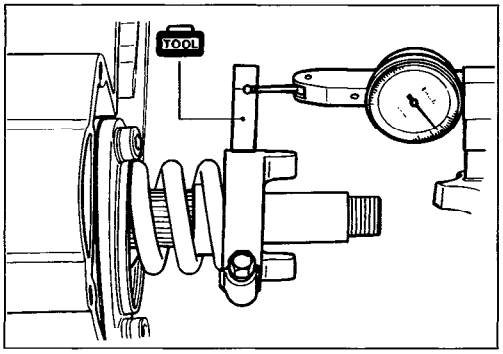
NOTE:
Do not install the O-ring on the driven gear housing at this point. O-ring is installed after backlash and tooth contact are correct.

- Hold the bearing with the special tool or secondary bevel gear case.

TOOL 09921-21910: Bearing holder

Secondary driven bevel gear housing bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)

- Install the backlash measuring tool on the drive bevel gear cam dog, and set-up a dial gauge as shown in the illustration.



TOOL 09924-34510: Backlash measuring tool (27—50 mm)

Secondary gear backlash (STD): 0.05—0.32 mm (0.002—0.013 in)

- Adjust the dial gauge so that it touches the backlash measuring tool arm at the mark; hold the driven bevel gear securely, and turn the drive bevel gear in each direction, reading the total backlash on the dial gauge.
- If the backlash is not within specification, the shims must be changed and the backlash should be re-checked until correct.
  Refer to the right chart for appropriate changes.

Backlash	Shim adjustment
Under 0.05 mm (0.002 in)	Increase shim thickness
0.05—0.32 mm (0.002—0.013 in)	Correct
Over 0.32 mm (0.013 in)	Decrease shim thickness

NOTE:
When changing the shims, measure the thickness of old shims. Using the thickness of the old shims as a guide, adjust the backlash by referring to the right chart.

List of shims Ⓐ (Refer to page 4-7.)

Part No.	Shim thickness
24945-05A00-0A0	0.30 mm
24945-05A00-0B0	0.35 mm
24945-05A00-0C0	0.40 mm
24945-05A00-0D0	0.50 mm
24945-05A00-0E0	0.60 mm

TOOTH CONTACT

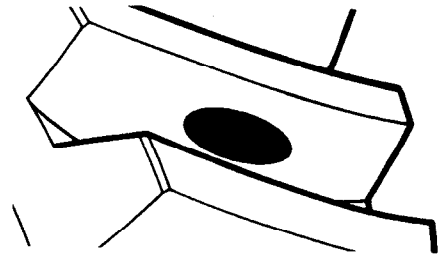
- After bringing the backlash within specification by changing the secondary driven bevel gear shims, it will be necessary to check tooth contact.

crankcase.

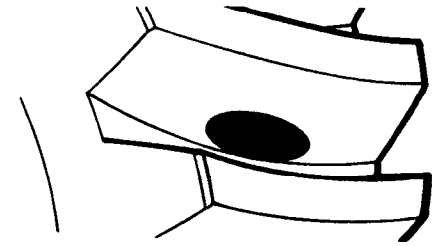
- Clean and degrease the secondary drive bevel gear teeth, and apply a coating of machinist's layout dye or paste to several teeth.
- Reinstall the secondary drive bevel gear assembly, with correct shim, onto the secondary gear housing.
- Rotate the secondary driven bevel gear several turns in both directions.
- Remove the secondary drive bevel gear from the crankcase, and observe the tooth contact pattern made in the dye or paste.
- Compare the tooth contact pattern to the examples as shown in ①, ② and ③.
- If tooth contact is found to be correct, go to the Final Assembly (Refer to page 3-50).
- If tooth contact is found to be incorrect, the shims of the secondary drive bevel gear and secondary driven bevel gear must be changed, tooth contact should be rechecked until correct.

① INCORRECT (Contact at tooth top)

② CORRECT



③ INCORRECT (Contact at tooth root)



⚠ CAUTION

After the tooth contact adjustment is made, the backlash must be re-checked, as it may change. Refer to the backlash checking sub-section, and re-adjust until both backlash and tooth contact are correct.

Tooth contact	Shim adjustment
Contact at tooth top ①	Decrease thickness of shims Ⓐ or Ⓑ
Contact at tooth root ③	Increase thickness of shims Ⓐ or Ⓑ

List of shim Ⓐ

Part No.	Shim thickness
24945-05A00-0A0	0.30 mm
24945-05A00-0B0	0.35 mm
24945-05A00-0C0	0.40 mm
24945-05A00-0D0	0.50 mm
24945-05A00-0E0	0.60 mm

List of shims Ⓑ

Part No.	Shim thickness
24935-38A00-030	0.30 mm
24935-38A00-035	0.35 mm
24935-38A00-040	0.40 mm
24935-38A00-050	0.50 mm
24935-38A00-060	0.60 mm

FINAL ASSEMBLY AND REMOUNTING

- Refer to pages 3-50, 3-53 and 3-54.

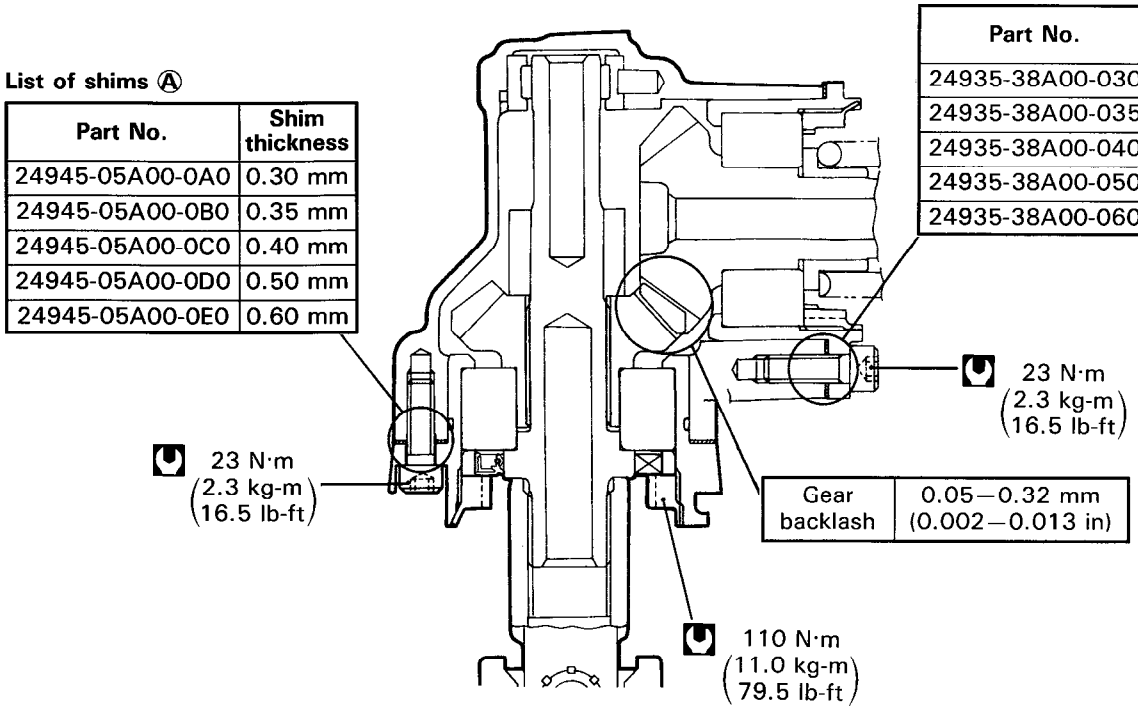
REASSEMBLY INFORMATION

List of shims Ⓐ

Part No.	Shim thickness
24945-05A00-0A0	0.30 mm
24945-05A00-0B0	0.35 mm
24945-05A00-0C0	0.40 mm
24945-05A00-0D0	0.50 mm
24945-05A00-0E0	0.60 mm

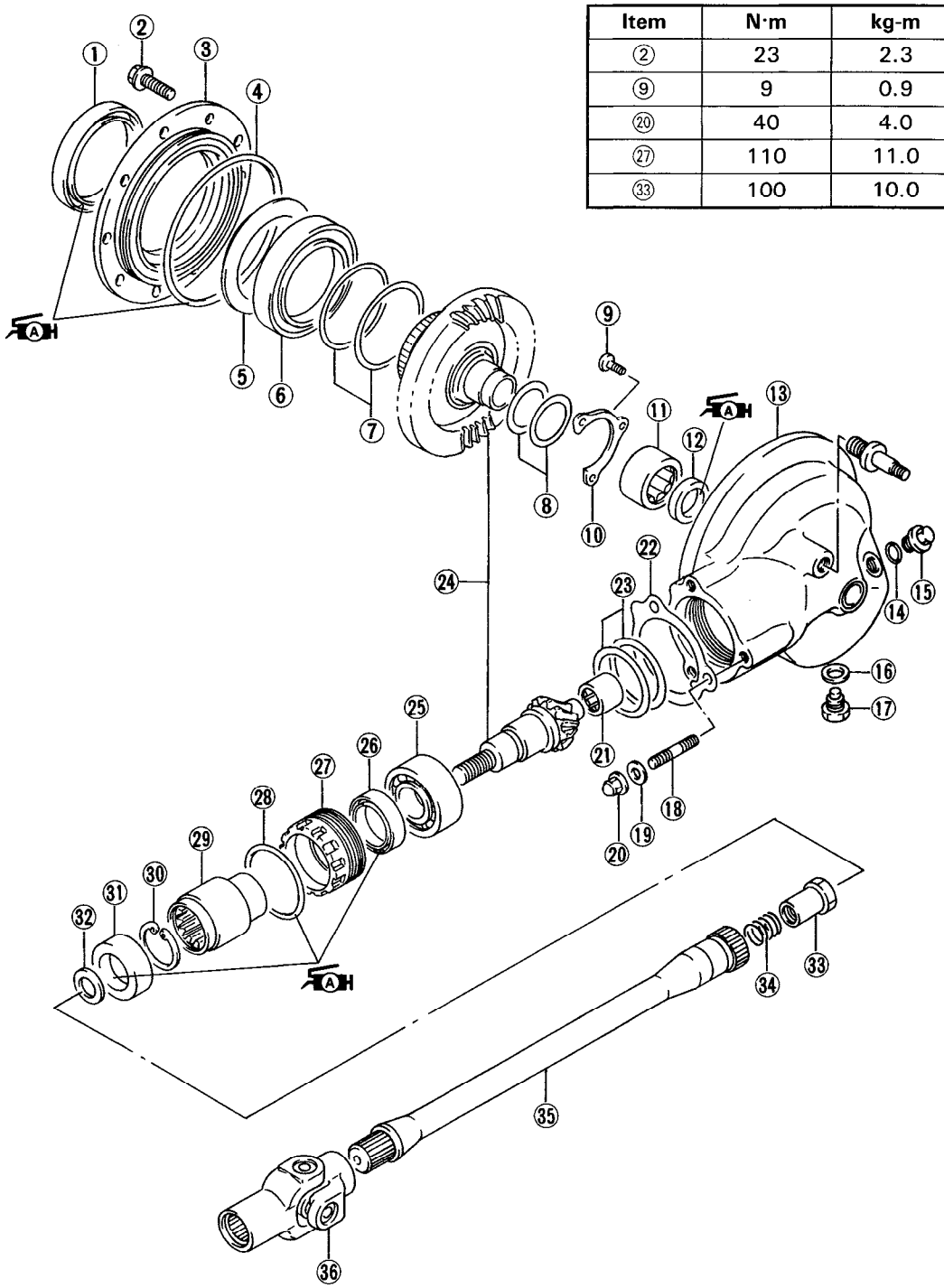
List of shims Ⓑ

Part No.	Shim thickness
24935-38A00-030	0.30 mm
24935-38A00-035	0.35 mm
24935-38A00-040	0.40 mm
24935-38A00-050	0.50 mm
24935-38A00-060	0.60 mm



FINAL BEVEL GEARS CONSTRUCTION

Item	N·m	kg-m	lb-ft
②	23	2.3	16.5
⑨	9	0.9	6.5
⑳	40	4.0	29.0
㉗	110	11.0	79.5
㉝	100	10.0	72.5



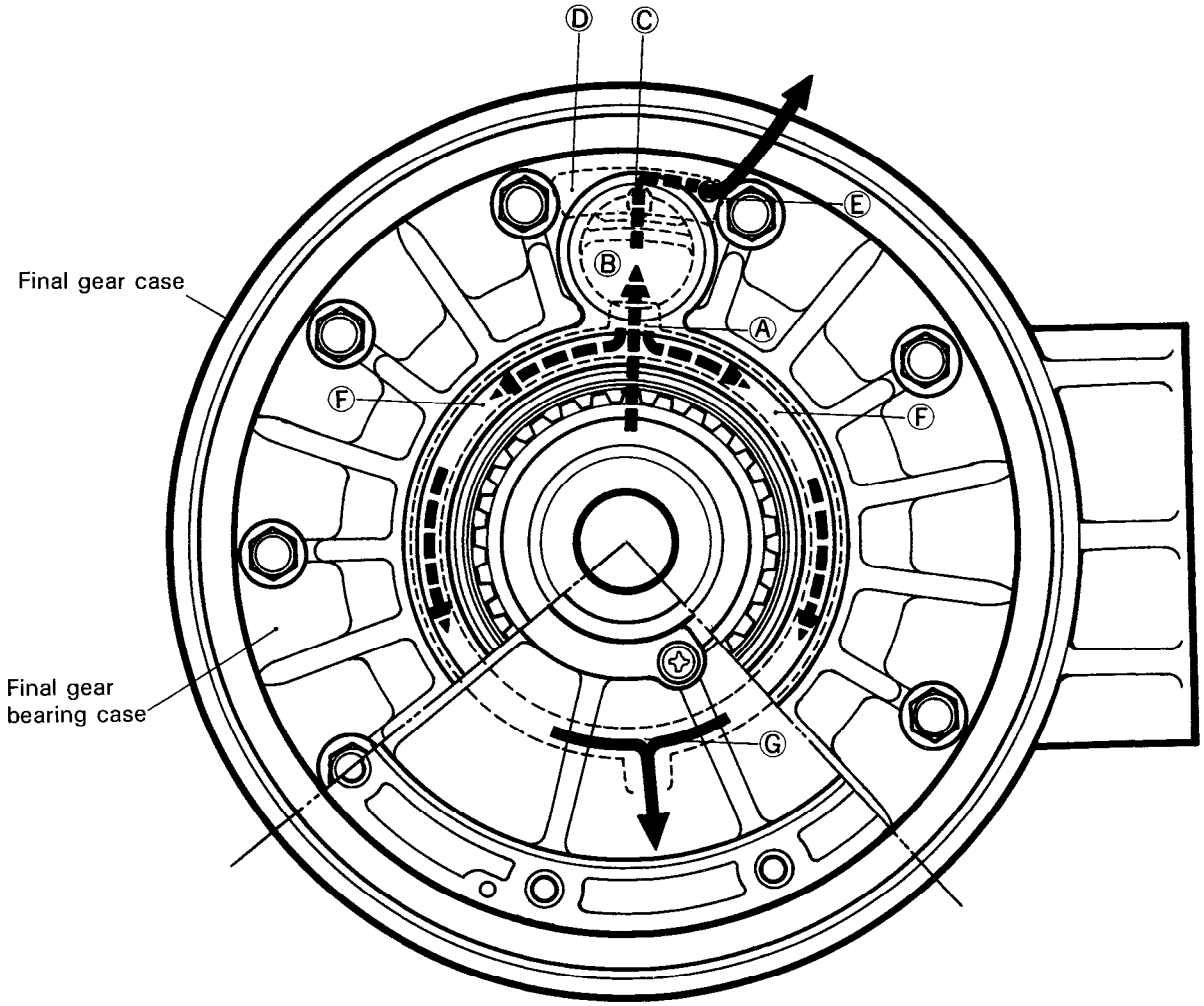
① Oil seal
② Bolts
③ Final gear bearing case
④ O-ring
⑤ Bearing plate
⑥ Bearing
⑦ Shims (4 kinds)
⑧ Shims (8 kinds)
⑨ Screws
⑩ Bearing retainer plate
⑪ Needle bearing
⑫ Oil seal
⑬ Final gear case
⑭ O-ring
⑮ Oil filler plug
⑯ Gasket
⑰ Oil drain plug
⑱ Stud bolts
⑲ Lock washer
⑳ Nuts
㉑ Pilot bearing
㉒ Bearing retainer stopper plate (2 kinds)
㉓ Shims (5 kinds)
㉔ Final bevel gear set
㉕ Bearing
㉖ Oil seal
㉗ Bearing retainer
㉘ O-ring
㉙ Final drive coupling
㉚ Circlip
㉛ Oil seal
㉜ Washer
㉝ Nut
㉞ Spring
㉟ Propeller shaft
㊱ Propeller shaft coupling

FINAL GEAR CASE BREATHER CIRCUIT

AIR AND GEAR OIL FLOW IN FINAL GEAR CASE BREATHER CIRCUIT

BREATHER CIRCUIT

Final gear case breather circuit (passage) consists of the final gear case and final gear bearing case. Air/oil mixed gas flows through the following routes.



AIR PASSAGE

When the air pressure in the final gear case becomes higher than atmospheric pressure, both air and oil flow in the following passages.

- Air flows from hole Ⓐ to chamber Ⓑ and passes through the hole Ⓒ and chamber Ⓓ to the atmosphere through the breather hole Ⓔ.

OIL PASSAGE

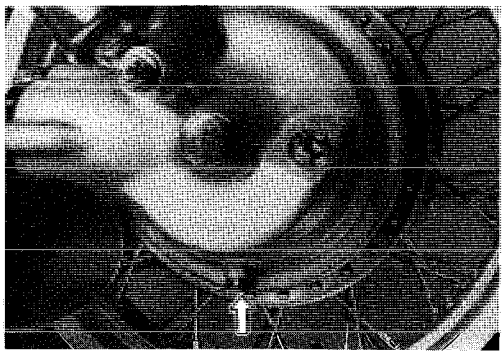
When the final gear case pressure rises abruptly or when the gear case oil level changes during cornering, the gear oil may sometime flow out into the air passage.

- In this case, the gear oil which has traveled into hole Ⓐ goes into chamber Ⓑ, where the oil is separated from the air.
- The air flows through the hole Ⓒ and chamber Ⓓ, and goes out through the breather hole Ⓔ.
- The gear oil, however, flows through the passage Ⓕ and returns to the gear case from gear oil return port Ⓖ.

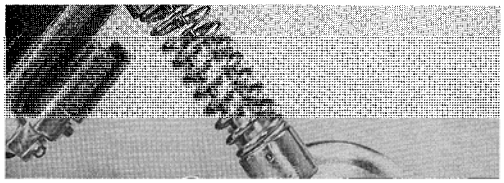
REMOVAL AND DISASSEMBLY

FINAL GEAR CASE

- Place an oil pan under the final gear case and remove the drain plug to drain out gear oil.
- Remove the rear wheel. (Refer to page 7-28.)



- Remove the final gear case from the swingarm by removing the three nuts and shock absorber mounting nut.

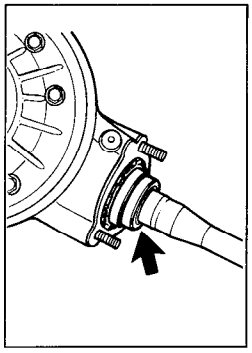


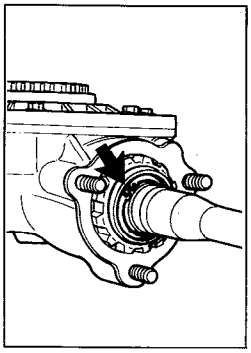
PROPELLER SHAFT

- Remove the oil seal.

⚠ CAUTION

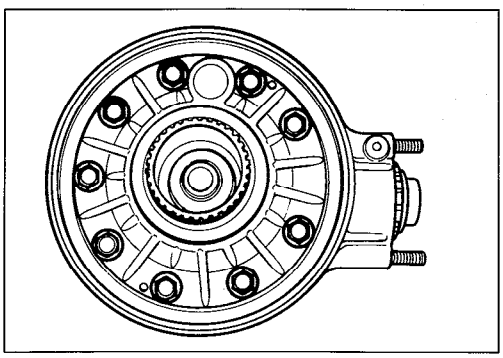
The removed oil seal should be replaced with a new one.





- Remove the circlip with the special tool while pushing the propeller shaft into the gear case and take off the propeller shaft and spring.

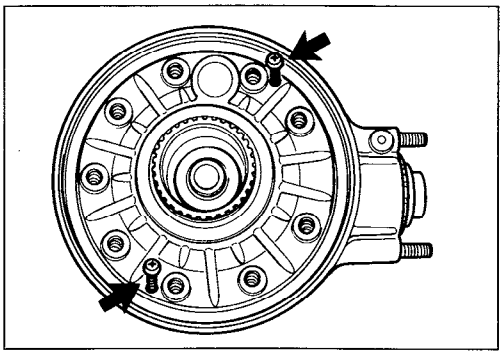
TOOL 09900-06108: Snap ring pliers



DRIVEN BEVEL GEAR

- Remove the final gear bearing case bolts.

- To remove the final gear bearing case from the final gear case by driving two 5 mm screws into.

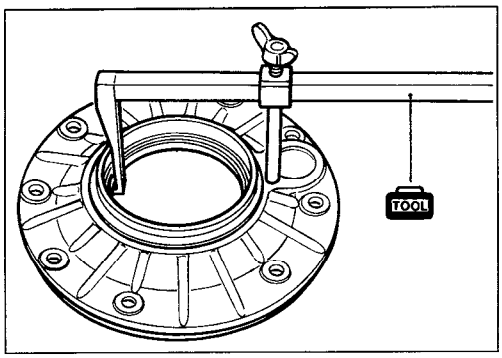


- Remove the oil seal from the final gear bearing case with the special tool.

TOOL **09913-50121: Oil seal remover**

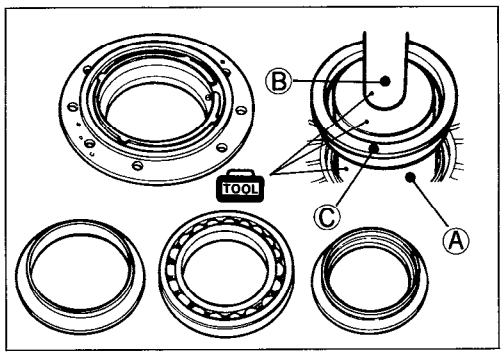
⚠ CAUTION

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

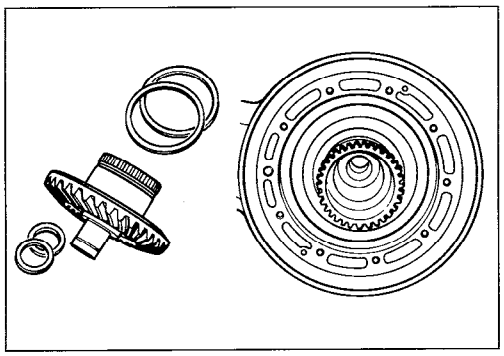


- Remove the bearing plate along with the bearing by using the special tools.

TOOL **09924-74570: Final driven gear bearing installer and remover Ⓐ**
09924-74510: Handle Ⓑ
09924-74520: Oil seal installer and remover Ⓒ



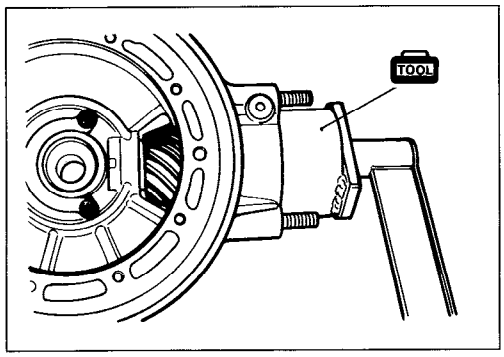
- Remove the final driven bevel gear from the final gear case.
- Remove the shims which are located at both sides of final driven bevel gear.



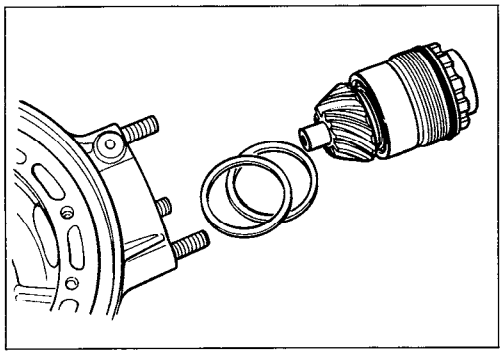
DRIVE BEVEL GEAR

- Loosen the bearing retainer with the special tool.

TOOL **09924-62410: Final drive gear bearing retainer wrench**



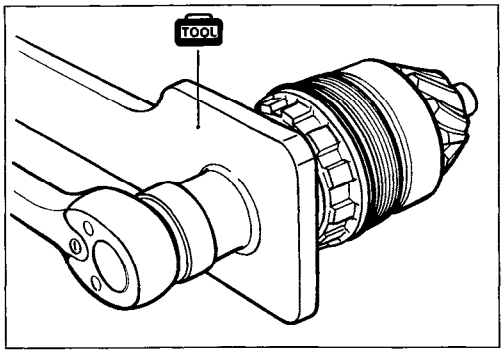
- Remove the drive bevel gear assembly and shims.



- Remove the drive bevel gear nut with the special tools and remove the coupling and bearing retainer.

TOOL 09924-62420: 22 mm long socket wrench
09924-64510: Final drive gear coupling holder

① Nut
② Washer
③ Coupling
④ Bearing retainer
⑤ Bearing
⑥ Drive bevel gear

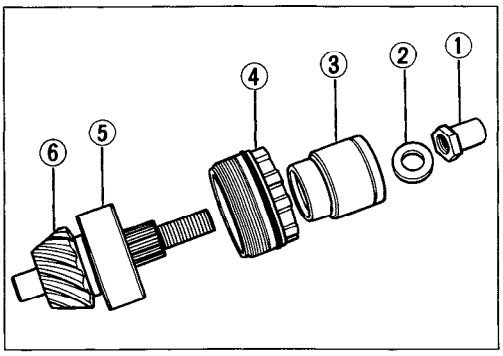


- Remove the bearing ⑤ from the drive bevel gear with the hand press machine and the bearing remover.

TOOL 09950-81910: Bearing remover

⚠ CAUTION

The removed bearing ⑤ should be replaced with a new one.

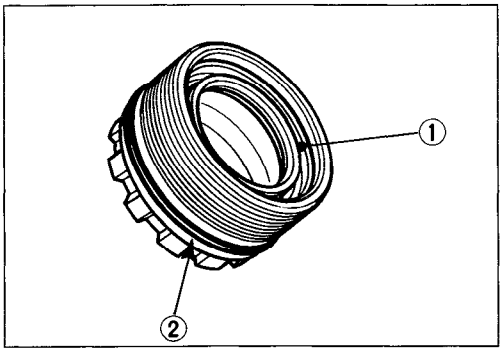


- Remove the oil seal ① and O-ring ②.

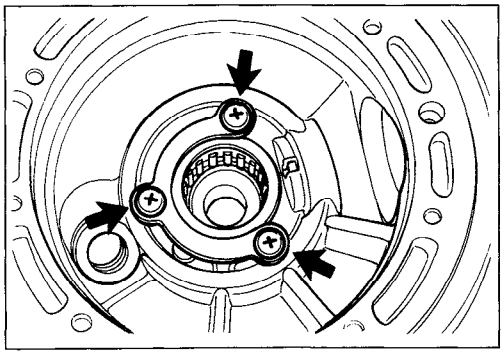
⚠ CAUTION

The removed oil seal and O-ring should be replaced with new ones.

TOOL 09913-76010: Bearing installer/remover



- Remove the bearing retainer by removing the three screws.

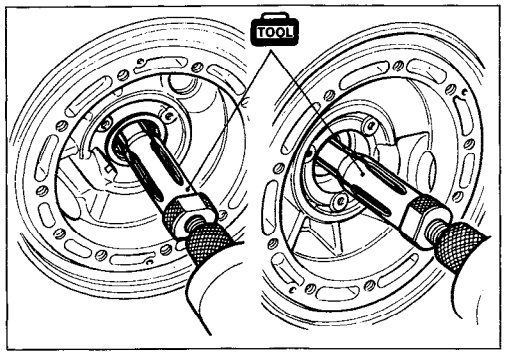


- Remove the needle roller bearing and oil seal from the final case with the special tools.

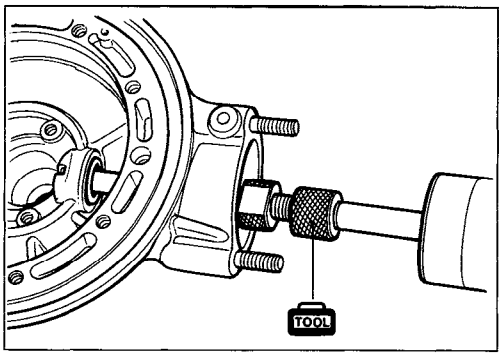
TOOL 09941-64510: Bearing and oil seal remover
09930-30102: Sliding shaft

⚠ CAUTION

The removed bearing and oil seal should be replaced with new ones.



- Remove the needle roller bearing of drive bevel gear side with the special tools.



TOOL **09930-30102: Sliding shaft**
09923-73210: Bearing remover

⚠ CAUTION

The removed bearing should be replaced with a new one.

INSPECTION

Inspect the removed parts for the following abnormalities.

* Drive and driven bevel gear damage or wear
* Improper tooth contact
* Abnormal noise of bearings
* Bearing damage or wear

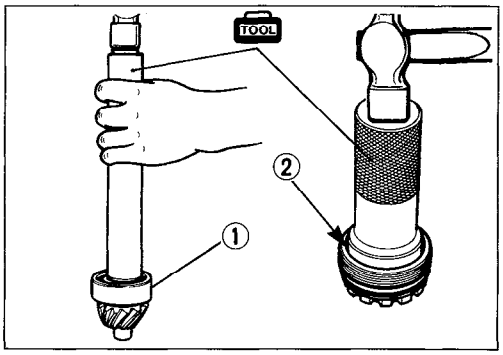
REASSEMBLY

Reassemble the final bevel gears in the reverse order of disassembly, and also carry out the following steps:

NOTE:
Before reassembly, thoroughly clean all parts in cleaning solvent.

DRIVE BEVEL GEAR

- Install the bearing ① to the drive bevel gear by using the special tool.
- Install the oil seal ② to the bearing retainer and grease the oil seal.

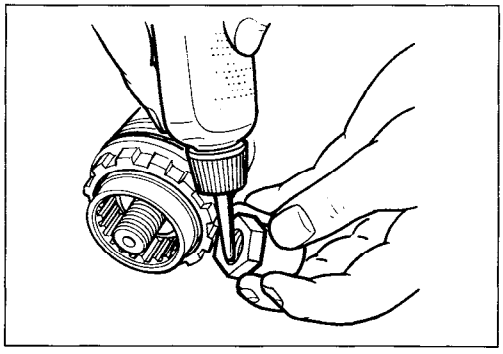


TOOL **09941-74910: Bearing installer**
09924-74510: Handle
09924-74560: Bearing installer

⚠ CAUTION

When replacing the drive bevel gear, replace the driven bevel gear also, as they must be replaced together.

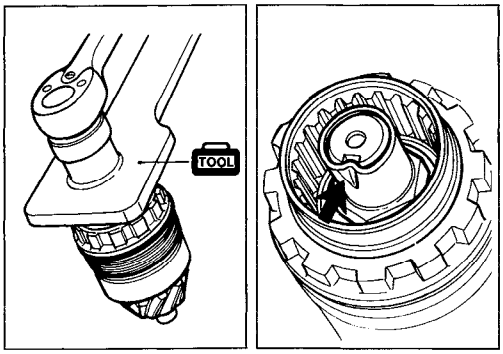
- Apply THREAD LOCK SUPER "1303" to the nut and tighten it with the specified torque by using the special tools.



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

09924-62420: 22 mm long socket wrench
09924-64510: Final drive gear coupling holder

Final drive bevel gear shaft nut: 100 N·m (10.0 kg-m, 72.5 lb-ft)

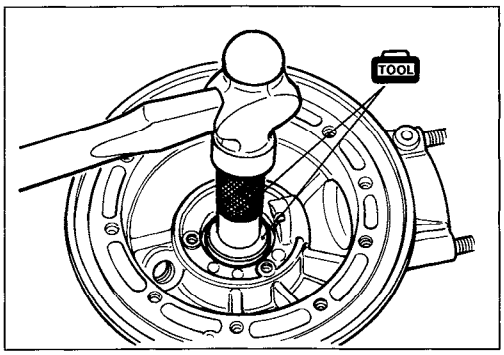


- Bend the collar of the nut over into the notch in the drive bevel gear shaft.

FINAL GEAR CASE AND BEARING CASE

- Install the oil seal into the final gear case with the special tools.

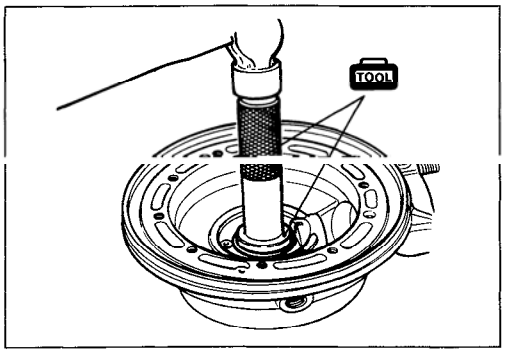
09924-74550: Bearing installer
09924-74510: Handle



NOTE:
The lip of oil seal faces driven bevel gear side.

- Install the needle roller bearing into the final gear case with the special tools.

09924-74510: Handle
09924-74550: Bearing installer

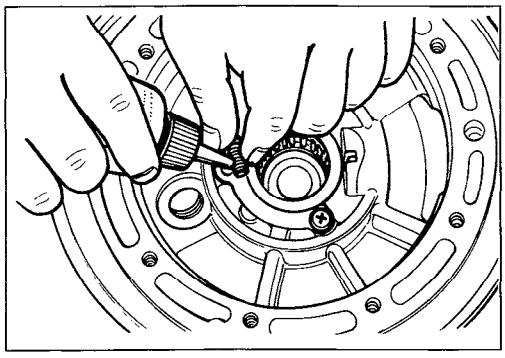


NOTE:
The bearing case has a stamped mark on its one end, which must face inside.

- Install the bearing retainer. Apply THREAD LOCK SUPER "1303" to the screws and tighten them to the specified torque.

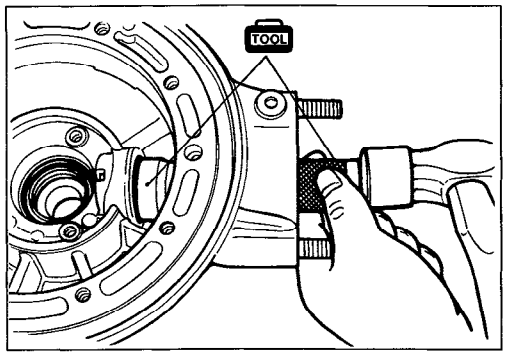
99000-32030: THREAD LOCK SUPER "1303"

Final driven gear bearing retainer screw: 9 N·m (0.9 kg-m, 6.5 lb-ft)



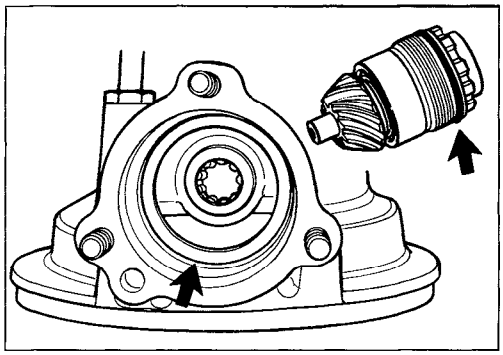
- Install the needle roller bearing for the final drive bevel gear into the final gear case with the special tool.

09924-74510: Handle
09924-74550: Bearing installer



- Install the removed shims and drive bevel gear assembly to the final case.

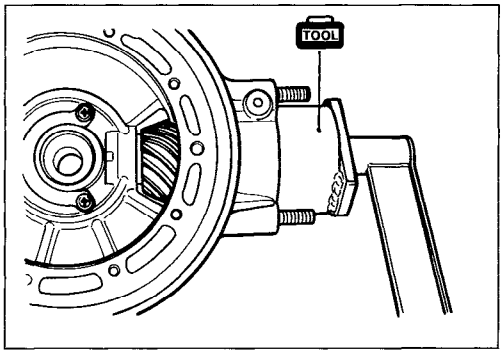
NOTE:
Do not install the O-ring at this point. O-ring installed after backlash and tooth contact are correct.



- Tighten the bearing retainer to the specified torque with the special tool.

TOOL 09924-62410: Final drive gear bearing retainer wrench

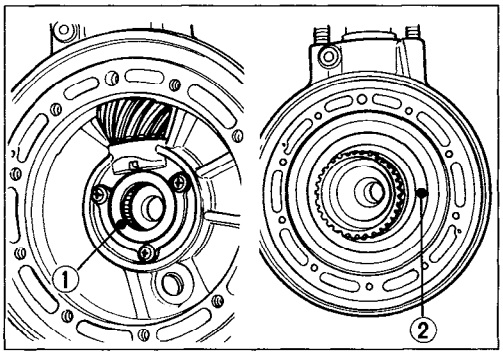
Final drive bevel gear bearing retainer: 110 N·m (11.0 kg-m, 79.5 lb-ft)



- Install the driven bevel gear shims, ① and ②, removed during disassembly on the needle bearing and driven bevel gear.

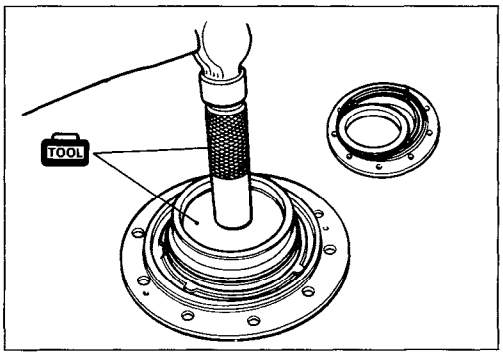
⚠ CAUTION

When replacing the driven bevel gear, replace the drive bevel gear also, as they must be replaced together.



- After installing the bearing plate into the final gear bearing case, install the bearing with the special tools.

TOOL 09924-74510: Handle
09924-74520: Bearing installer

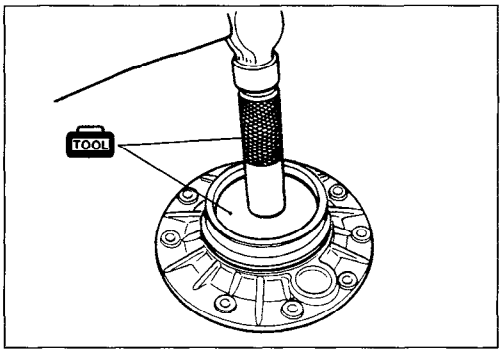


- Install a new oil seal into the final gear bearing case with the special tools.

TOOL 09924-74510: Handle
09924-74520: Bearing installer

- Apply grease to the lip of oil seal.

99000-25010: SUZUKI SUPER GREASE "A"

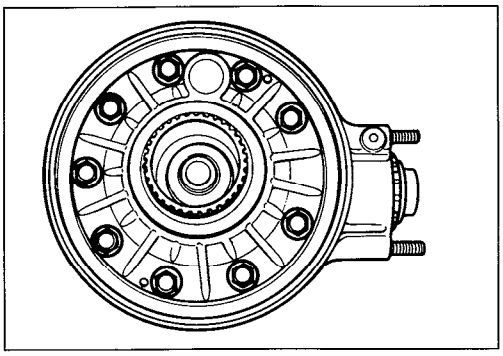


- Place the plastigauge on the final driven bevel gear shim.

TOOL 09900-22302: Plastigauge

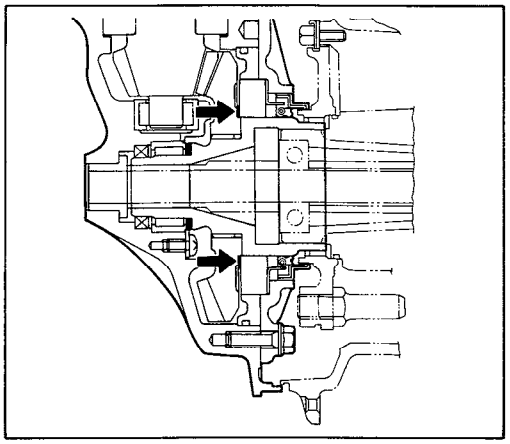
- Tighten the bearing case bolts to the specified torque.

Final gear bearing case bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)



NOTE:
Do not rotate the final driven bevel gear when plastigauge is in place.
Do not install the bearing case O-ring at this point. O-ring is installed after backlash and tooth contact are correct.

"FINAL GEAR SHIM ADJUSTMENT" is necessary
(Refer to pages 4-16 to 4-18.)



FINAL GEAR SHIM ADJUSTMENT

FINAL GEAR BEARING CASE SHIM CLEARANCE

- Remove the final gear bearing case and measure the clearance between the shims and bearing with the compressed plastigauge. If it is not within the specification, the shims must be changed.

Final gear bearing case shim clearance: 0.10 mm (0.004 in)

TOOL 09900-22302: Plastigauge

List of shims Ⓐ (Refer to page 4-21.)

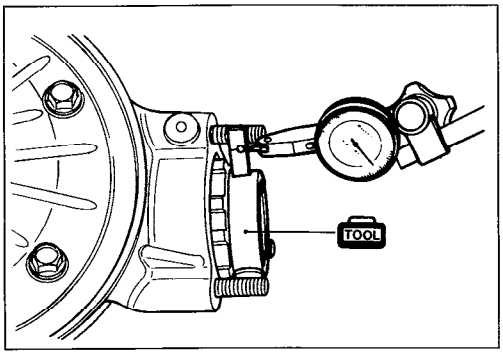
Part No.	Shim thickness
27327-34200	0.35 mm
27327-34210	0.40 mm
27327-34220	0.50 mm
27327-34230	0.60 mm

BACKLASH

- Install the backlash measuring tool on the drive bevel gear coupling, and set-up a dial gauge as shown in the illustration.

TOOL 09924-34510: Backlash measuring tool (27—50 mm)

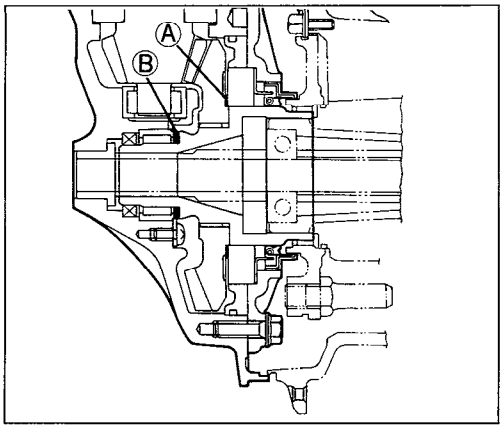
Final gear backlash: 0.03—0.64 mm (0.001—0.025 in)



- Adjust the dial gauge so that it touches the backlash measuring tool arm at the mark; hold the final driven bevel gear securely, and turn the final drive bevel gear coupling slightly in each direction, reading the total backlash on the dial gauge.

NOTE:
If the backlash is not within specification, adjust the shim thickness as follows:

- Remove shims from final gear bearing case and final gear case, and measure total thickness.
- In order not to change the clearance between final driven bevel gear and bearing, the total thickness of the shims installed after a change is made must equal the original total thickness of shims.
- If backlash is too large:
  a) Install a thinner shim pack Ⓑbetween final driven bevel gear and final gear case.
  b) Increase thickness of shims Ⓐbetween final driven bevel gear and bearing by an amount equal to decrease above.
- If backlash is too small:
  a) Install a thicker shim pack Ⓑbetween final driven bevel gear and final gear case.
  b) Decrease thickness of shims Ⓐ between final driven gear and bearing by an amount equal to increase above.



List of shims Ⓑ(Refer to page 4-21.)

Part No.	Shim thickness
27326-34201	1.05 mm
27326-34211	1.10 mm
27326-34221	1.20 mm
27326-34231	1.25 mm
27326-34241	1.35 mm
27326-34201-140	1.40 mm
27326-34201-145	1.45 mm
27326-34201-150	1.50 mm

List of shims Ⓐ(Refer to page 4-21.)

Part No.	Shim thickness
27327-34200	0.35 mm
27327-34210	0.40 mm
27327-34220	0.50 mm
27327-34230	0.60 mm

EXAMPLE:
Ⓑ Final gear to case shims;
1.35 mm + 1.05 mm = 2.40 mm
Ⓐ Final gear to bearing shims;
0.50 mm + 0.40 mm = 0.90 mm
Original total measurement = 3.30 mm

Backlash too large:
Ⓑ Final gear to case shims;
1.25 mm + 1.10 mm = 2.35 mm
Ⓐ Final gear to bearing shims;
0.60 mm + 0.35 mm = 0.95 mm
Total thickness = 3.30 mm

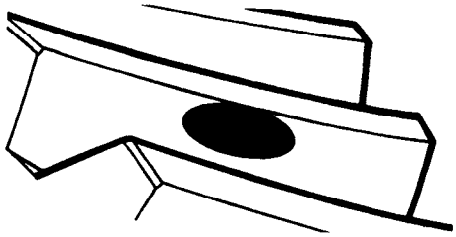
Backlash too small:
Ⓑ Final gear to case shims;
1.35 mm + 1.10 mm = 2.45 mm
Ⓐ Final gear to bearing shims;
0.50 mm + 0.35 mm = 0.85 mm
Total thickness = 3.30 mm

TOOTH CONTACT

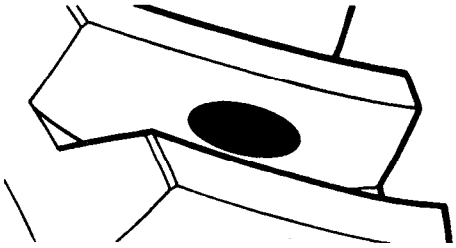
- After backlash adjustment is carried out, the tooth contact must be checked.
- Remove the 9 bolts from the final gear bearing case, and remove the case, using the two 5 mm screws (see page 4-10). Do not misplace the shims. Remove the final driven bevel gear.
- Clean and de-grease several teeth on the final driven bevel gear. Coat these teeth with machinist's dye or paste, preferably of a light color.
- Re-install the final driven bevel gear with shims in place, positioning the coated teeth so that they are centered on the final drive bevel gear.
- Re-install the final gear bearing case and tighten the bolts to the specified torque.

Final gear bearing case bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)

① INCORRECT (Contact at tooth top)

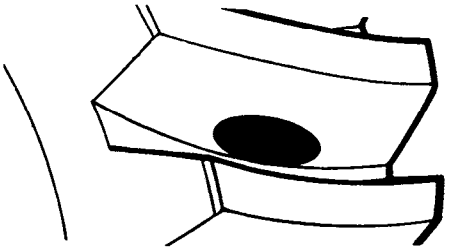


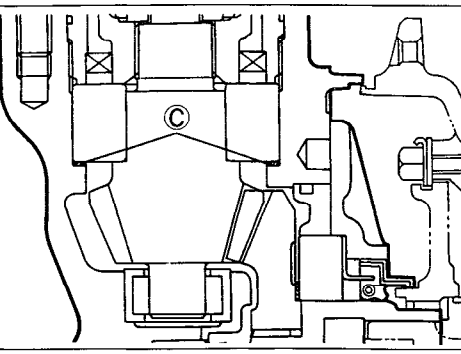
② CORRECT



- Using a long socket wrench and handle on the final drive bevel gear coupling nut, rotate the final drive bevel gear several turns in each direction, while loading the final driven bevel gear. This will provide a contact pattern on the coated teeth of the driven bevel gear.
- Remove the final gear bearing case and final driven bevel gear, and inspect the coated teeth of the driven bevel gear. The contact patch should be as shown at right:
- If the tooth contact pattern is correct, as shown in Fig. ②, go to the Final Assembly sub-section.
- If the tooth contact pattern is incorrect, as shown in Fig. ①, a thinner shim is needed between the final drive bevel gear bearing and final gear case.
- If the tooth contact pattern is incorrect, as shown in Fig. ③, a thicker shim is needed between the final drive bevel gear bearing and final gear case.
- If the tooth contact pattern is incorrect for either reason, the appropriate shim must be installed, and the tooth contact pattern rechecked by repeating the tooth coating procedure above.

③ INCORRECT (Contact at tooth root)





List of shims Ⓒ(Refer to page 4-21.)

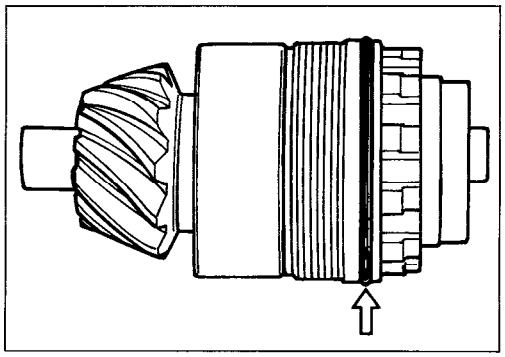
Part No.	Shim thickness
27445-38A00-030	0.30 mm
27445-38A00-035	0.35 mm
27445-38A00-040	0.40 mm
27445-38A00-050	0.50 mm
27445-38A00-060	0.60 mm

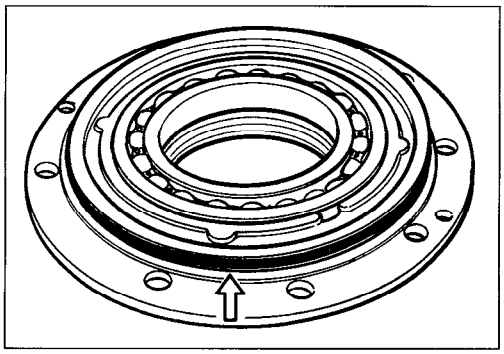
NOTE:

If it is necessary to adjust the shim thickness between final drive bevel gear bearing and final gear case, the final gear backlash may change, and should be re-checked according to the procedure outlined under the Backlash Measurement sub-section. Both adjustments may be needed until both backlash and tooth contact are correct.

FINAL ASSEMBLY AND REMOUNTING

- After adjusting the backlash, tooth contact and clearance between the bearing case and the bearing, remove the final gear bearing case and final drive bevel gear assembly from the final gear case.
- Clean off any machinist's dye or paste from the gear teeth, and lubricate the teeth with Hypoid gear oil.
- Install the new O-rings to the final gear bearing case and final drive bevel gear bearing retainer. Coat the O-rings with grease.
- Install the final drive bevel gear assembly into the final gear case.

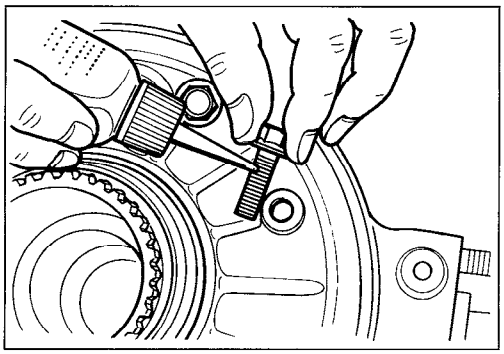




- Install the final gear bearing case to the final gear case and apply a small quantity of THREAD LOCK "1342" to the 9 bolts and tighten them to the specified torque.

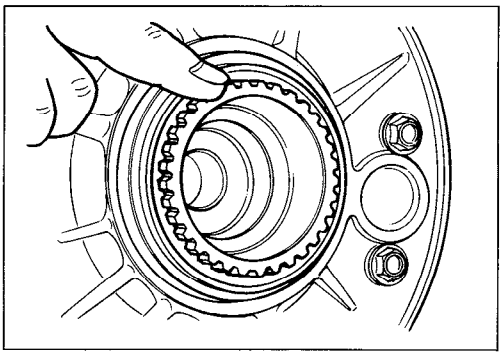
99000-32050: THREAD LOCK "1342"

Final gear bearing case bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)

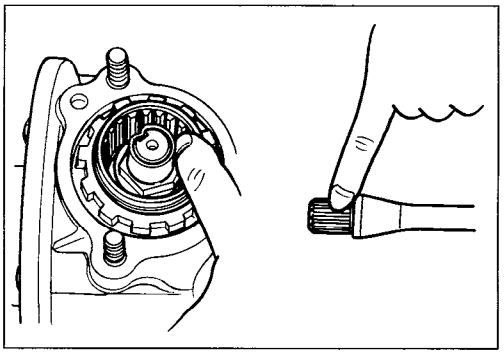


- Apply grease to the final driven bevel gear coupling.

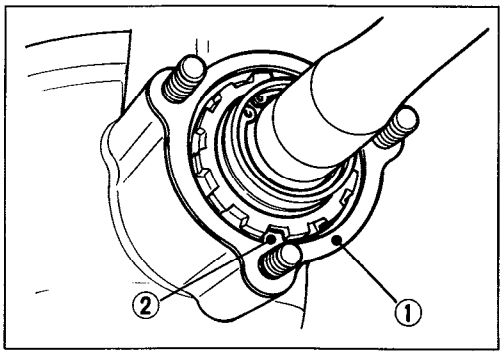
99000-25010: SUZUKI SUPER GREASE "A"



- Apply Lithium Base Molybdenum grease (NLGI #2) to the propeller shaft splines and universal joint coupling.



- Install the spring, propeller shaft and circlip.
- Install the bearing retainer stopper plate ①.



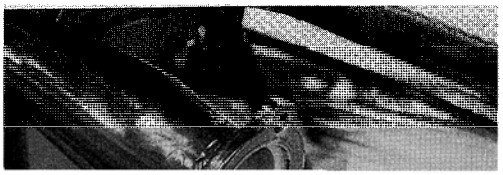
⚠ CAUTION

When installing the plate ①, align the lug ② of plate to the bearing retainer stopper groove.

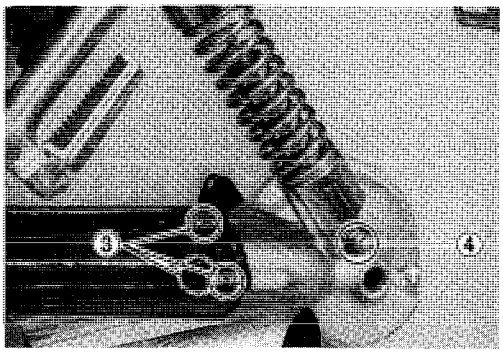
NOTE:
There are two kinds of plate.

- Install the new oil seal.
- Apply SUZUKI BOND "1215" to the mating surface of swingarm and final gear case.

1215 99000-31110: SUZUKI BOND "1215"



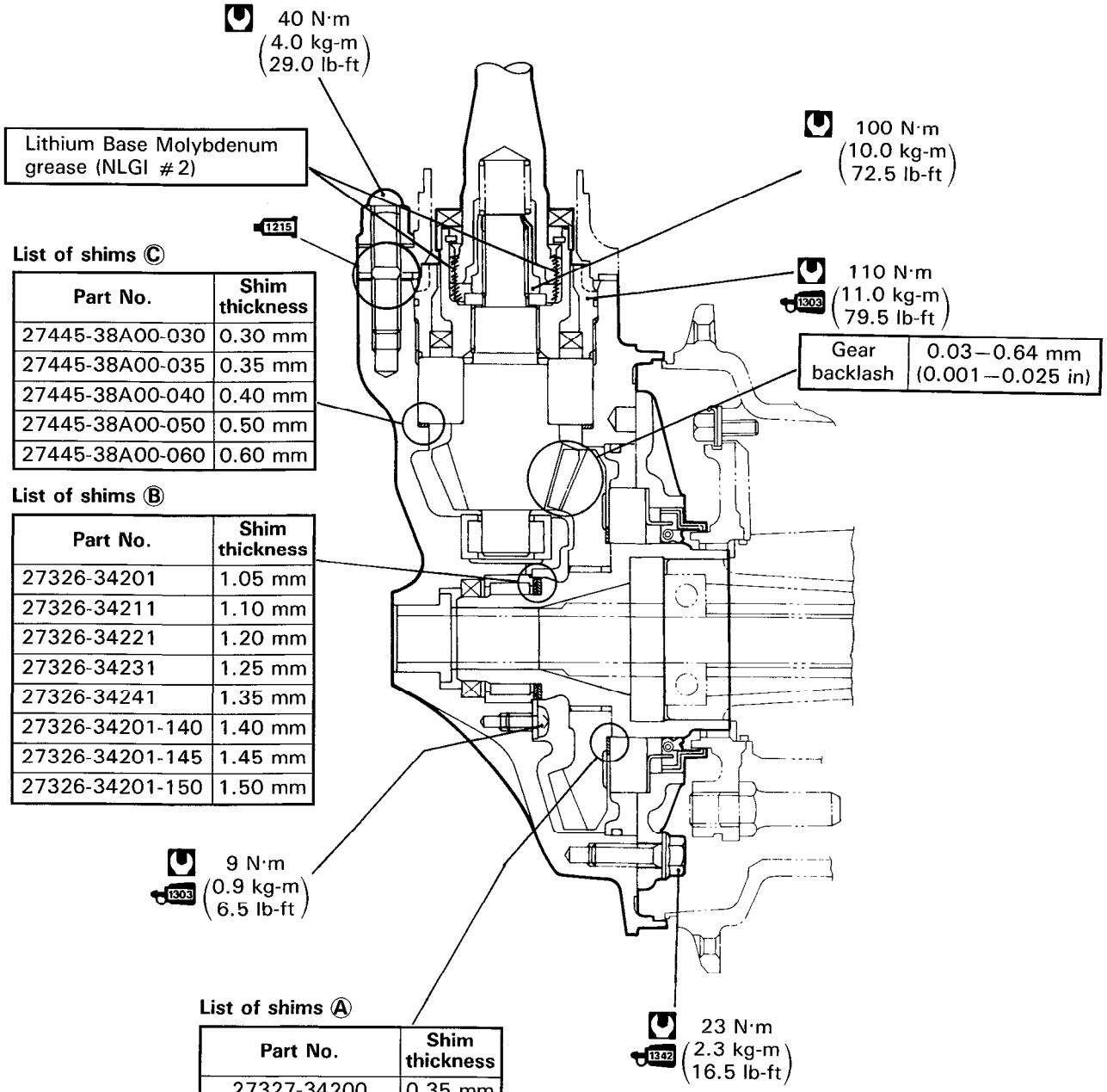
- Tighten the three nuts ③ and shock absorber mounting nut ④ to the specified torque.



Final gear case
joint nut ③: 40 N·m (4.0 kg-m, 29.0 lb-ft)
Rear shock absorber
fitting nut ④: 29 N·m (2.9 kg-m, 21.0 lb-ft)

NOTE:
After remounting the final gear case, the following service is necessary.
** Fill the final gear case with Hypoid gear oil.*
Specified capacity: 200—220 ml
(6.8/7.0—7.4/7.7 US/Imp oz)

REASSEMBLY INFORMATION



List of shims Ⓒ

Part No.	Shim thickness
27445-38A00-030	0.30 mm
27445-38A00-035	0.35 mm
27445-38A00-040	0.40 mm
27445-38A00-050	0.50 mm
27445-38A00-060	0.60 mm

List of shims Ⓑ

Part No.	Shim thickness
27326-34201	1.05 mm
27326-34211	1.10 mm
27326-34221	1.20 mm
27326-34231	1.25 mm
27326-34241	1.35 mm
27326-34201-140	1.40 mm
27326-34201-145	1.45 mm
27326-34201-150	1.50 mm

List of shims Ⓐ

Part No.	Shim thickness
27327-34200	0.35 mm
27327-34210	0.40 mm
27327-34220	0.50 mm
27327-34230	0.60 mm
Shim clearance	0.10 mm (0.004 in)

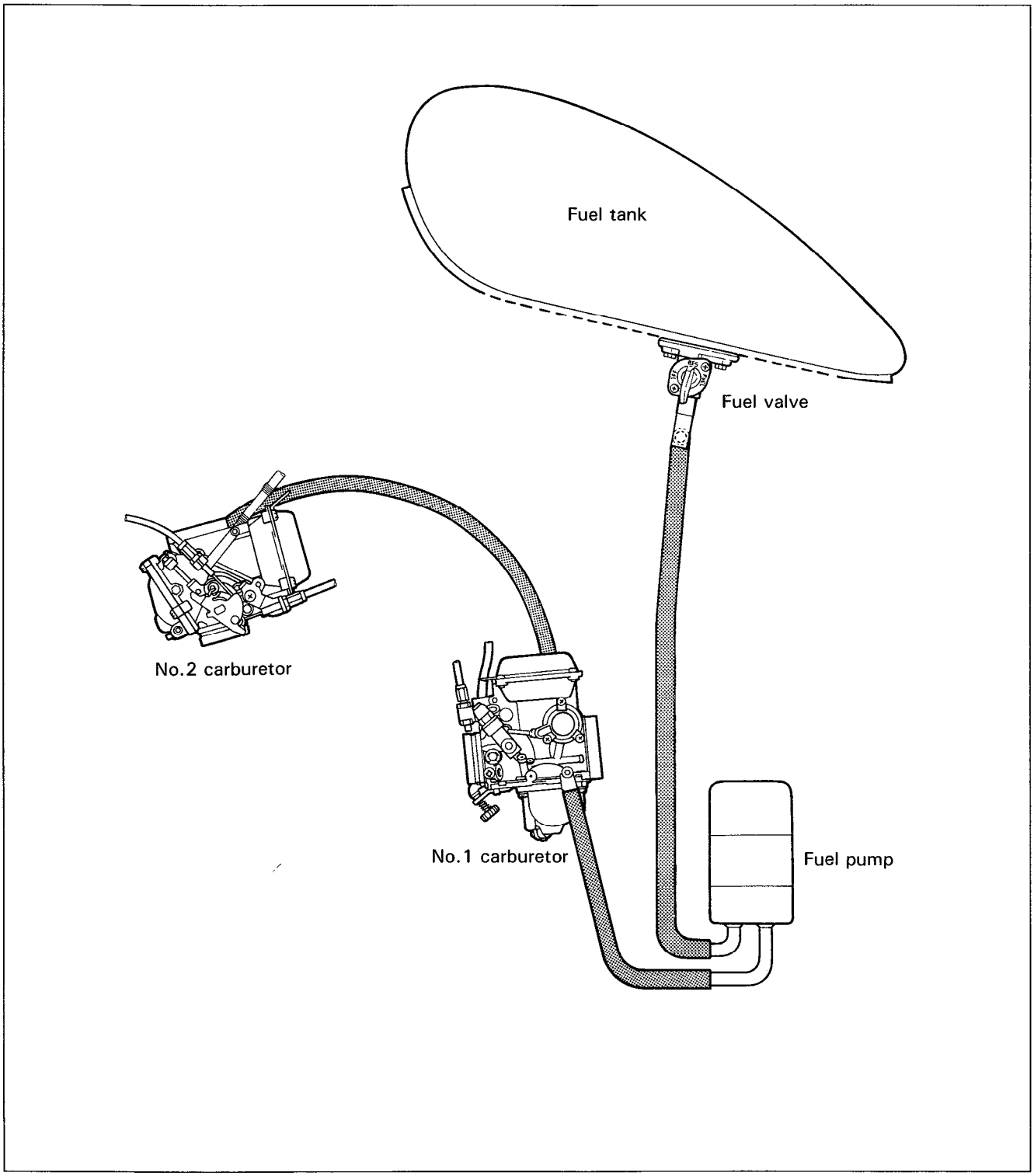
FUEL AND LUBRICATION SYSTEM

CONTENTS

5

FUEL SYSTEM

As shown in the following figure, the fuel system is composed of the fuel tank, fuel valve, fuel pump, and carburetors. The fuel pump is operated by an electro-magnetic force and its electrical energy is supplied from the battery which is controlled by the fuel pump relay's control circuit. The fuel sent under pressure by the fuel pump flows into the float chamber when the float of the carburetor has dropped and the needle valve is open. When the needle valve closes, the pressure of the fuel in the hose connecting the carburetor and the fuel pump increases, and when the set pressure is reached, the operation of the fuel pump is stopped by the fuel pressure to prevent excessive supply.



FUEL PUMP

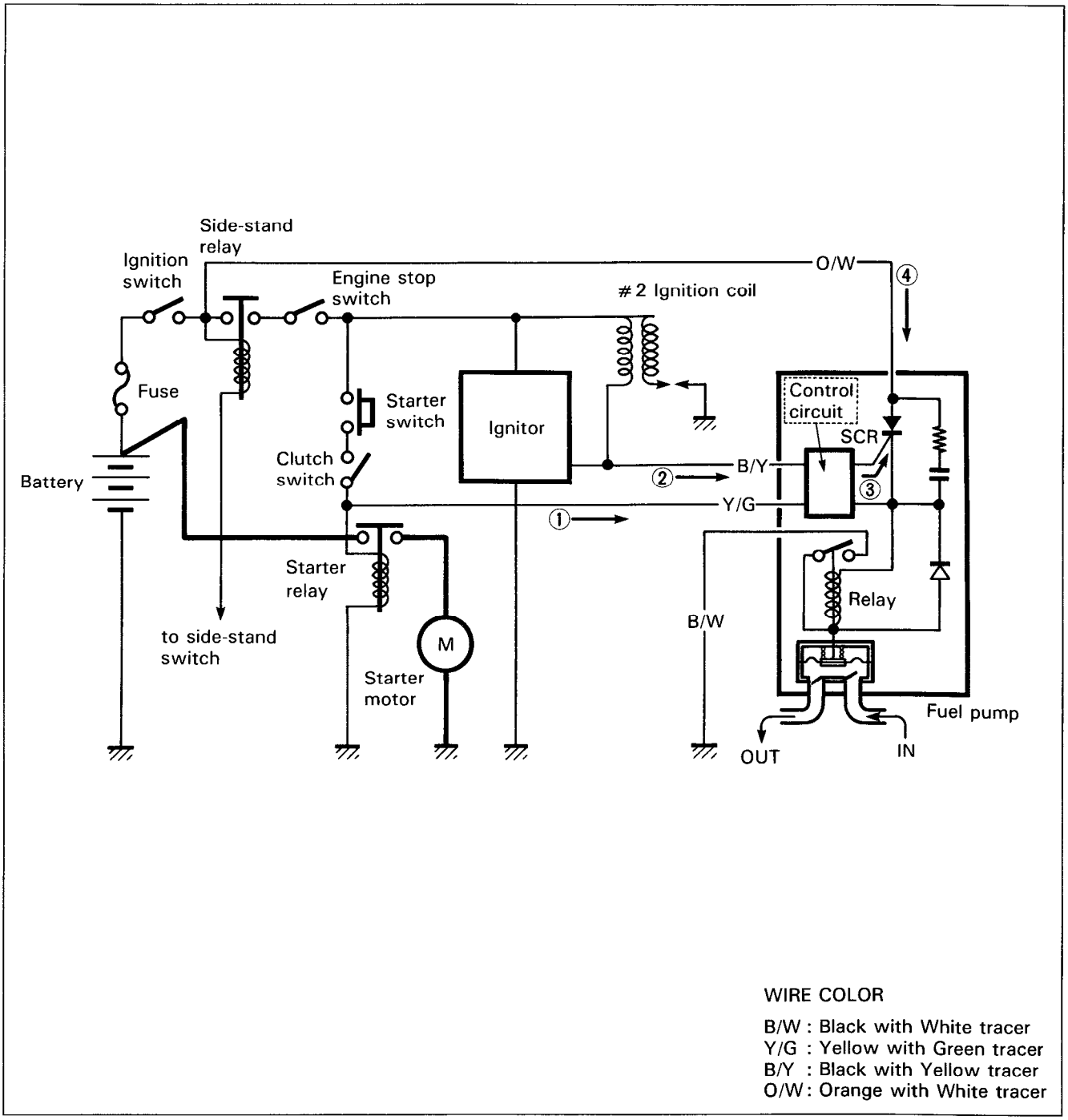
DESCRIPTION

Starting Engine:

In order to supplement fuel supply when starting the engine by turning the starter switch ON, current ① is sent directly from the battery and passes through the fuel pump relay, thus operating the fuel pump.

After start:

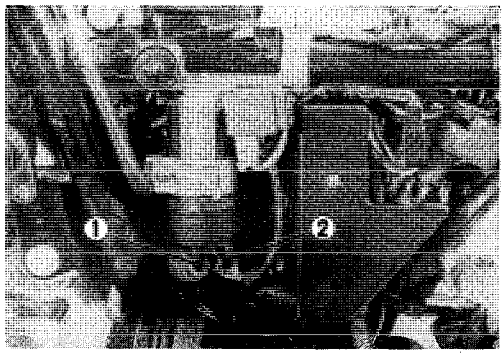
The current ② generated at coils No.2 flows to the fuel pump relay's control circuit. The control circuit receives this current ② and sends signal ③ to the SCR, turning it ON. When the SCR turns ON, current ④ is sent from the battery through the fuel pump relay, thus operating the fuel pump.



WIRE COLOR

B/W : Black with White tracer
Y/G : Yellow with Green tracer
B/Y : Black with Yellow tracer
O/W: Orange with White tracer

FUEL PUMP REMOVAL



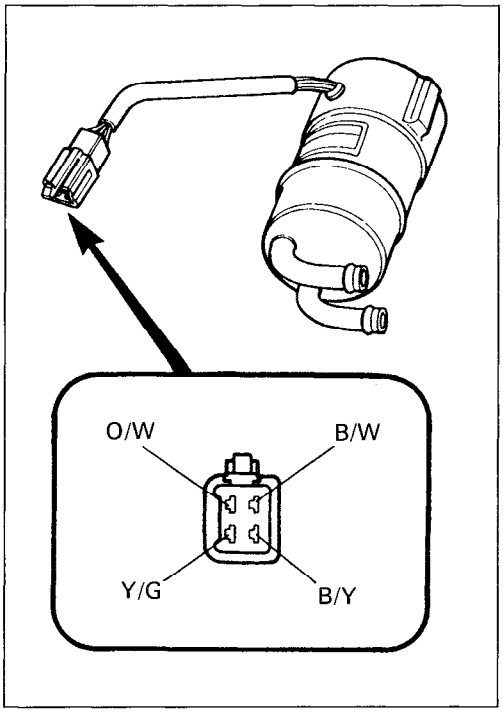
- Remove the frame cover and seat. (Refer to page 7-1.)
- Turn the fuel valve "OFF" position and disconnect the fuel hoses (① and ②) from the fuel pump.
- Disconnect the fuel pump lead wire coupler and remove the fuel pump mounting bolts.

①: Outlet hose
②: Inlet hose

⚠ WARNING

Gasoline is very explosive. Extreme care must be taken.

FUEL PUMP INSPECTION



- Using the pocket tester, measure the resistance between the lead wires in the following table. If the resistance checked is incorrect, replace the fuel pump.

TOOL 09900-25002: Pocket tester

Tester knob indication: × 1 kΩ range

NOTE:
As capacitor, diodes, etc. are used inside this fuel pump, the resistance values will differ when an ohmmeter other than SUZUKI pocket tester is used.

(Approx. kΩ)

⊖ Probe of tester to:	⊕ Probe of tester to: O/W	B/Y	Y/G	B/W
O/W		∞	∞	∞
B/Y	∞		∞	∞
Y/G	∞	30—50		10—14
B/W	∞	20—40	10—14	

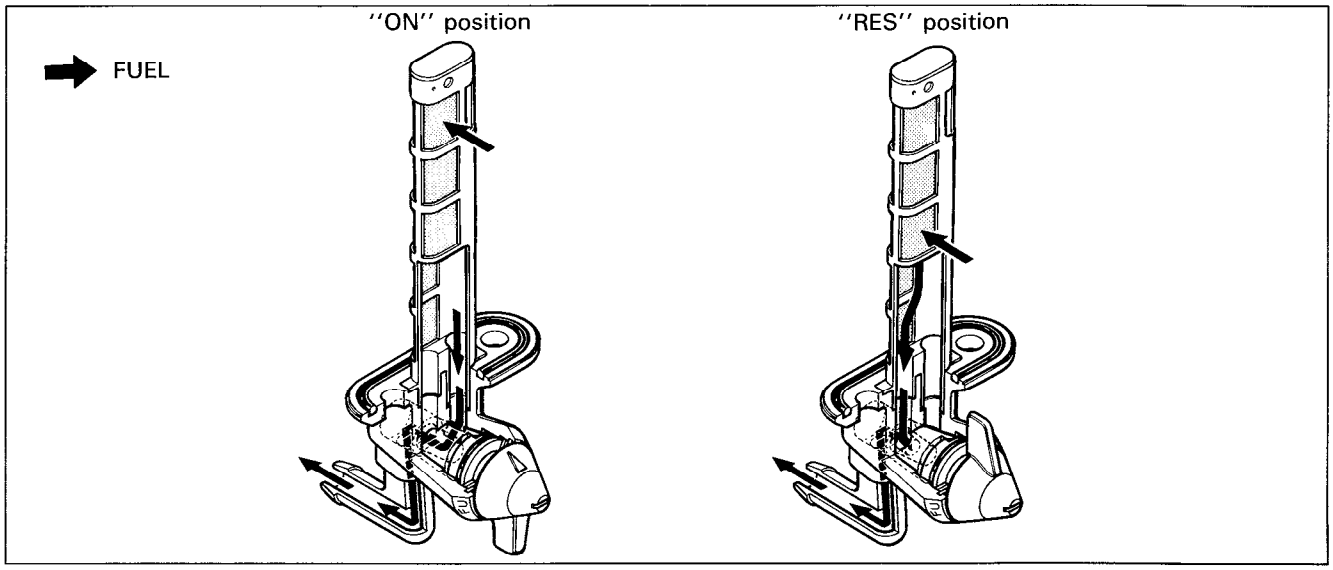
WIRE COLOR

O/W : Orange with White tracer
B/Y : Black with Yellow tracer
Y/G : Yellow with Green tracer
B/W : Black with White tracer
∞ : Infinity

FUEL TANK AND FUEL VALVE

FUEL VALVE MECHANISM

A valve is provided at the top of the fuel tap lever and can switch over to "OFF", "ON" and "RES". With the valve "ON" (normal), the main passage opens. With the valve "OFF", both holes close.

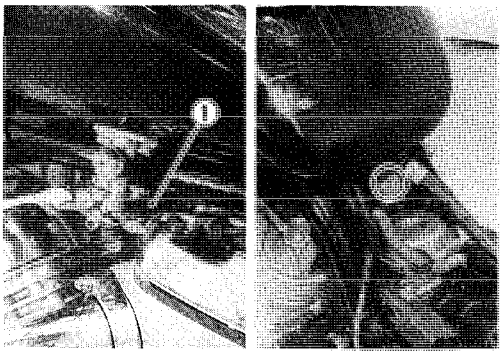


FUEL TANK REMOVAL

- Remove the frame cover and seat. (Refer to page 7-1.)
- Turn the fuel valve to "OFF" position and disconnect the fuel valve outlet hose ①.
- Remove the fuel tank by removing the mounting bolt.

⚠ WARNING

Gasoline is very explosive. Extreme care must be taken.

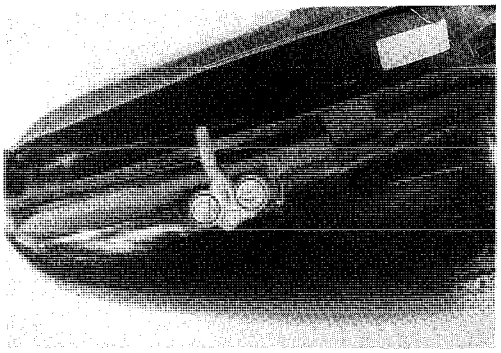


FUEL VALVE REMOVAL

- Remove the fuel valve by removing the bolts.

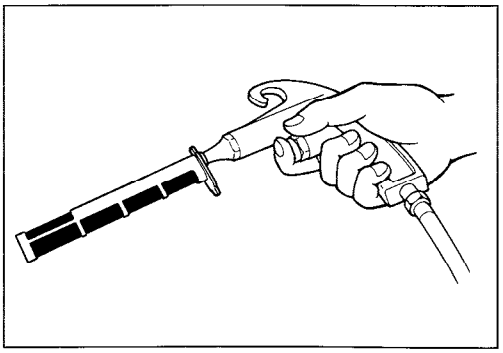
⚠ WARNING

Gasoline is very explosive. Extreme care must be taken. Gaskets and O-ring must be replaced with new ones to prevent fuel leakage.



INSPECTION AND CLEANING

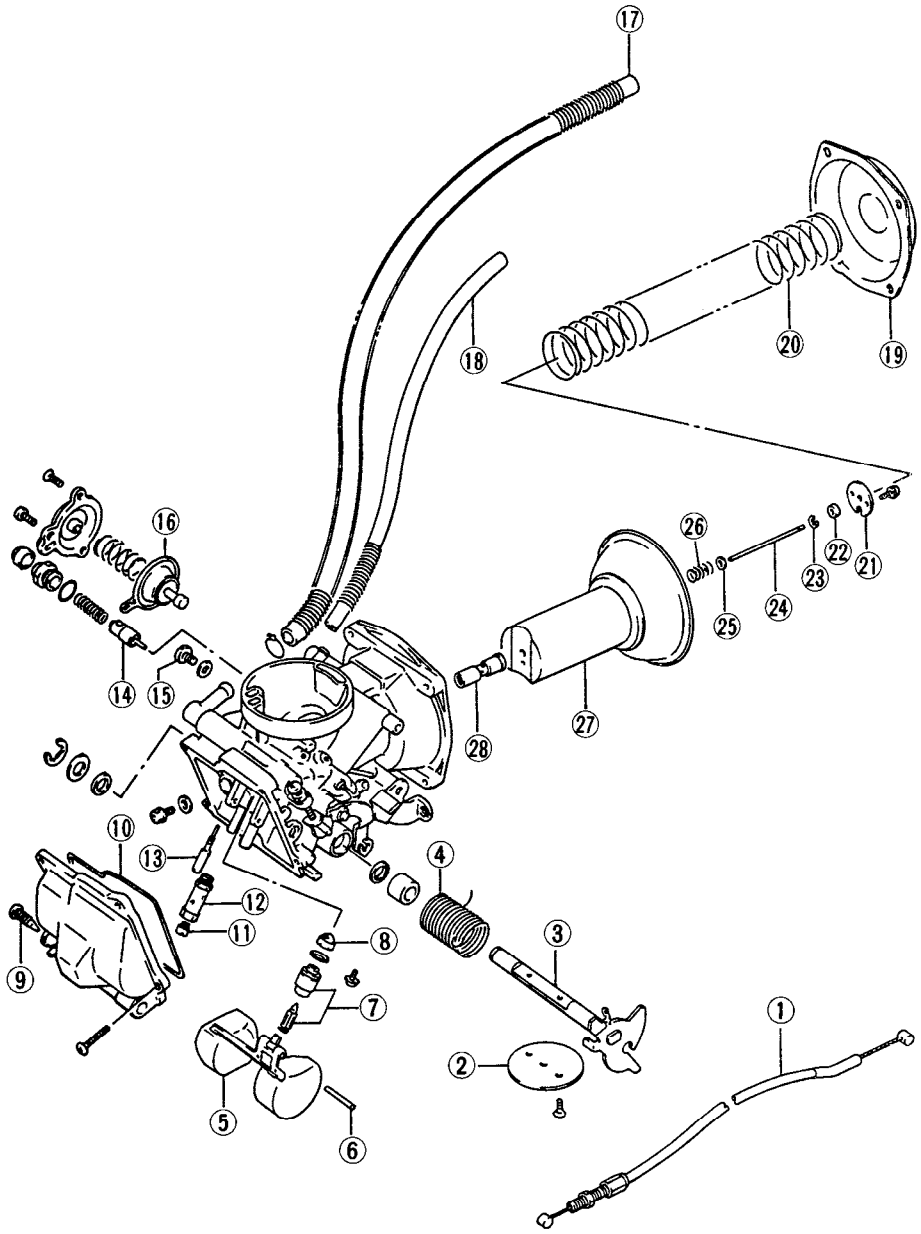
If the fuel filter is dirty with sediment or rust, fuel will not flow smoothly and loss in engine power may result. Clean the fuel filter with compressed air.



CARBURETOR

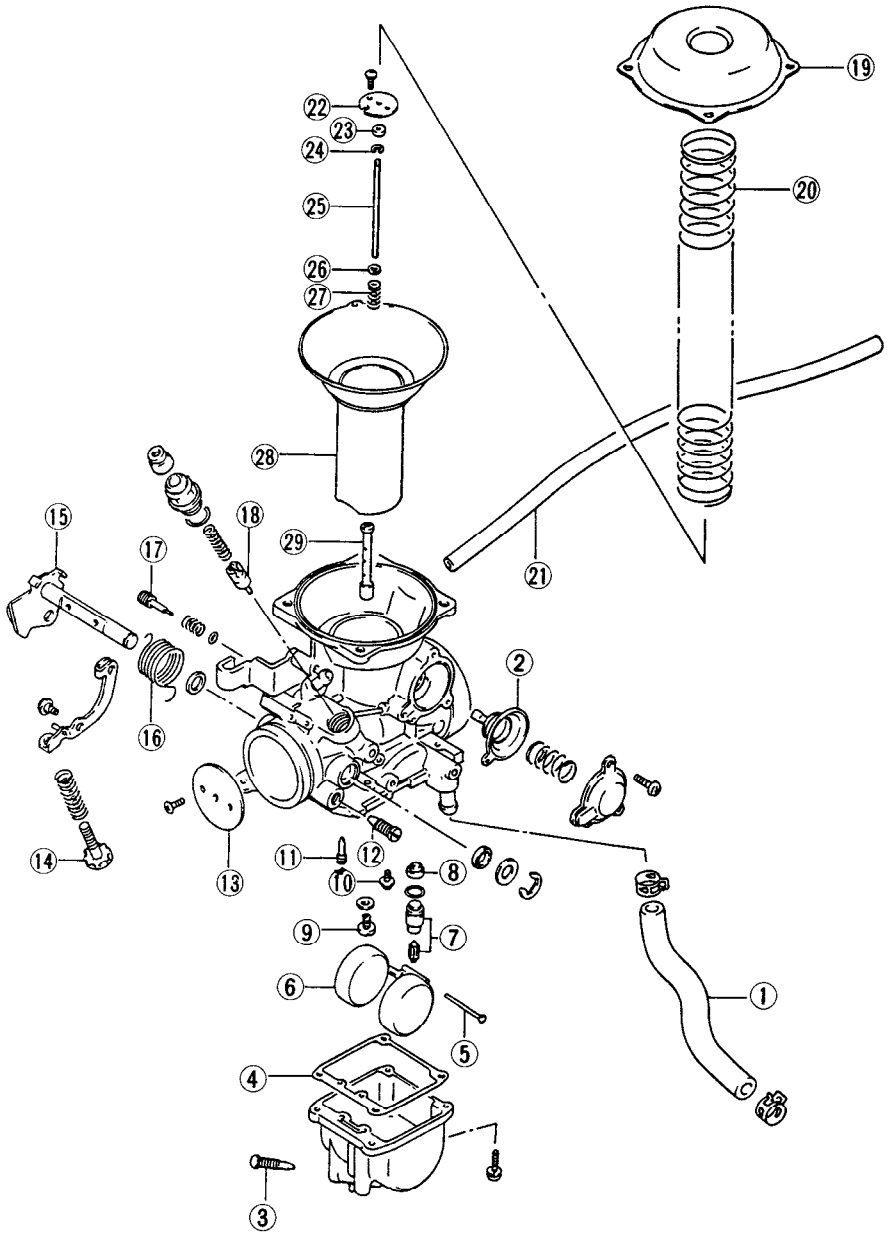
CONSTRUCTION

No.2 (FRONT) CARBURETOR



① Synchronizing cable
② Throttle valve
③ Throttle valve shaft
④ Throttle valve return spring
⑤ Float
⑥ Float pin
⑦ Needle valve
⑧ Filter
⑨ Drain screw
⑩ Seal ring
⑪ Main jet
⑫ Main jet holder
⑬ Pilot jet
⑭ Starter plunger
⑮ Balance screw
⑯ Coasting valve
⑰ Fuel hose
⑱ Air vent hose
⑲ Carburetor top cap
⑳ Piston valve spring
㉑ Jet needle stopper plate
㉒ Spacer
㉓ E-ring
㉔ Jet needle
㉕ Washer
㉖ Spring
㉗ Piston valve
㉘ Needle jet

No.1 (REAR) CARBURETOR



① Fuel hose
② Coasting valve
③ Drain screw
④ Gasket
⑤ Float pin
⑥ Float
⑦ Needle valve
⑧ Filter
⑨ Main jet
⑩ Needle valve stopper screw
⑪ Pilot jet
⑫ Balance screw
⑬ Throttle valve
⑭ Throttle stop screw
⑮ Throttle valve shaft
⑯ Throttle valve return spring
⑰ Pilot screw
⑱ Starter plunger
⑲ Carburetor top cap
⑳ Piston valve spring
㉑ Air vent hose
㉒ Jet needle stopper plate
㉓ Spacer
㉔ E-ring
㉕ Jet needle
㉖ Washer
㉗ Spring
㉘ Piston valve
㉙ Needle jet

SPECIFICATION

ITEM		SPECIFICATION	
		E-02,04,34	
Carburetor type		MIKUNI BS34SS (No.1)	MIKUNI BDS34SS (No.2)
Bore size		34 mm	←
I.D. No.		39E5	←
Idle r/min.		1 200±100 r/min.	←
Float height		27.7±1.0 mm (1.09±0.04 in)	11.5±1.0 mm (0.45±0.04 in)
Main jet	(M.J.)	#102.5	#97.5
Main air jet	(M.A.J.)	0.6 mm	1.0 mm
Jet needle	(J.N.)	5D22-4th	5D22-3rd
Needle jet	(N.J.)	P-3	←
Throttle valve	(Th.V.)	#110	←
Pilot jet	(P.J.)	#40	#32.5
Valve seat	(V.S.)	1.5 mm	←
Starter jet	(G.S.)	#25	←
Pilot screw	(P.S.)	PRE-SET (1.0 turn back)	PRE-SET (3¼ turns back)
Pilot air jet	(P.A.J.)	#75	←
Throttle cable play		3—6 mm (0.12—0.24 in)	←
Choke cable play		0.5—1.0 mm (0.02—0.04 in)	←

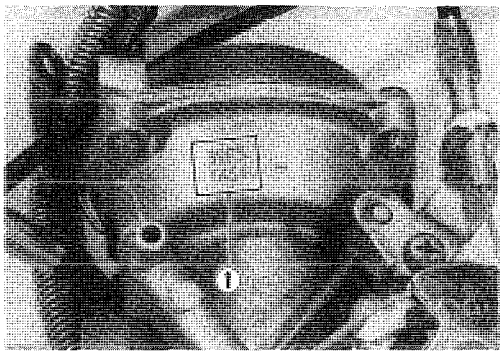
ITEM		SPECIFICATION	
		E-22	
Carburetor type		MIKUNI BS34SS (No.1)	MIKUNI BDS34SS (No.2)
Bore size		34 mm	←
I.D. No.		39E7	←
Idle r/min.		1 200±100 r/min.	←
Float height		27.7±1.0 mm (1.09±0.04 in)	11.5±1.0 mm (0.45±0.04 in)
Main jet	(M.J.)	#102.5	#97.5
Main air jet	(M.A.J.)	0.6 mm	1.0 mm
Jet needle	(J.N.)	5D22-4th	5D22-3rd
Needle jet	(N.J.)	P-3	←
Throttle valve	(Th.V.)	#110	←
Pilot jet	(P.J.)	#35	#32.5
Valve seat	(V.S.)	1.5 mm	←
Starter jet	(G.S.)	#25	←
Pilot screw	(P.S.)	PRE-SET (1¾ turns back)	PRE-SET (3.0 turns back)
Pilot air jet	(P.A.J.)	#75	←
Throttle cable play		3—6 mm (0.12—0.24 in)	←
Choke cable play		0.5—1.0 mm (0.02—0.04 in)	←

ITEM	SPECIFICATION	
	E-22 (VS600GLUS)	
Carburetor type	MIKUNI BS34SS (No.1)	MIKUNI BDS34SS (No.2)
Bore size	34 mm	←
I.D. No.	39E8	←
Idle r/min.	1 200 ± 100 r/min.	←
Float height	27.7 ± 1.0 mm (1.09 ± 0.04 in)	11.5 ± 1.0 mm (0.45 ± 0.04 in)
Main air jet (M.A.J.)	0.6 mm	1.0 mm
Jet needle (J.N.)	5D22-4th	5D22-3rd
Needle jet (N.J.)	P-3	←
Throttle valve (Th.V.)	#110	←
Pilot jet (P.J.)	#35	#32.5
Valve seat (V.S.)	1.5 mm	←
Starter jet (G.S.)	#25	←
Pilot screw (P.S.)	PRE-SET (2.0 turns back)	PRE-SET (3¼ turns back)
Pilot air jet (P.A.J.)	#75	←
Throttle cable play	3—6 mm (0.12—0.24 in)	←
Choke cable play	0.5—1.0 mm (0.02—0.04 in)	←

ITEM	SPECIFICATION	
	E-18	
Carburetor type	MIKUNI BS34SS (No.1)	MIKUNI BDS34SS (No.2)
Bore size	34 mm	←
I.D. No.	39E6	←
Idle r/min.	1 200 $^{+100}_{-50}$ r/min.	←
Float height	27.7 ± 1.0 mm (1.09 ± 0.04 in)	11.5 ± 1.0 mm (0.45 ± 0.04 in)
Main jet (M.J.)	#105	#97.5
Main air jet (M.A.J.)	0.7 mm	←
Jet needle (J.N.)	5D33-4th	5D32-3rd
Needle jet (N.J.)	P-1	P-2
Throttle valve (Th.V.)	#110	#120
Pilot jet (P.J.)	#30	#25
Valve seat (V.S.)	1.5 mm	←
Starter jet (G.S.)	#25	←
Pilot screw (P.S.)	PRE-SET (1½ turns back)	PRE-SET (2.0 turns back)
Pilot air jet (P.A.J.)	#60	#77.5
Throttle cable play	3—6 mm (0.12—0.24 in)	←
Choke cable play	0.5—1.0 mm (0.02—0.04 in)	←

I.D. NO. LOCATION

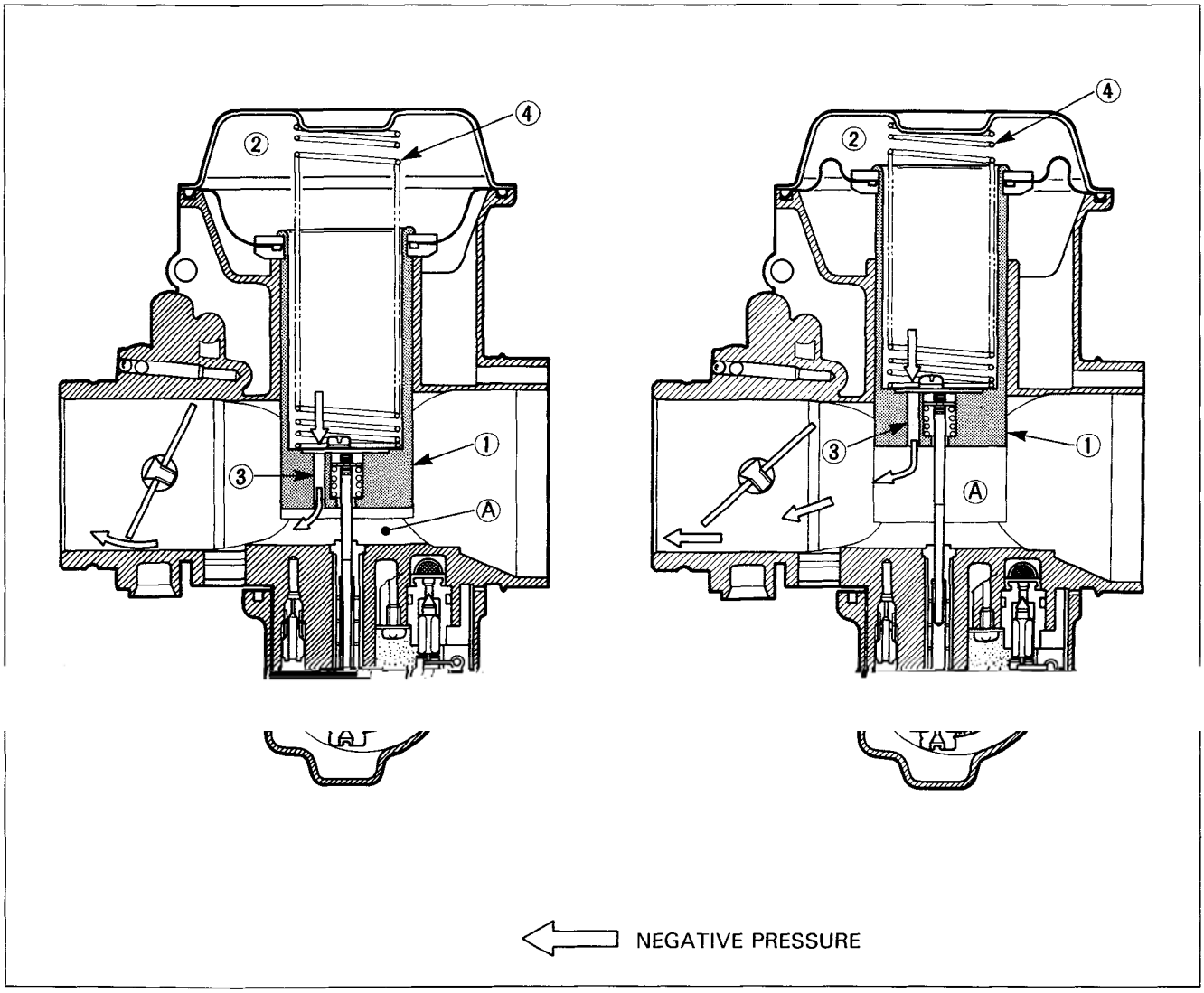
Each carburetor has I.D. Number ① stamped on the carburetor body according to its specifications.



DIAPHRAGM AND PISTON OPERATION

The carburetor is a variable-venturi type, whose venturi cross section area is increased or decreased automatically by the piston valve ① which moves according to the negative pressure present on the downstream side of the venturi Ⓐ. 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 to increase the said area and thus prevent the air velocity from increasing. Thus, air velocity in the venturi passage is kept relatively constant for improved fuel atomization and for securing optimum ratio of fuel/air mixture.



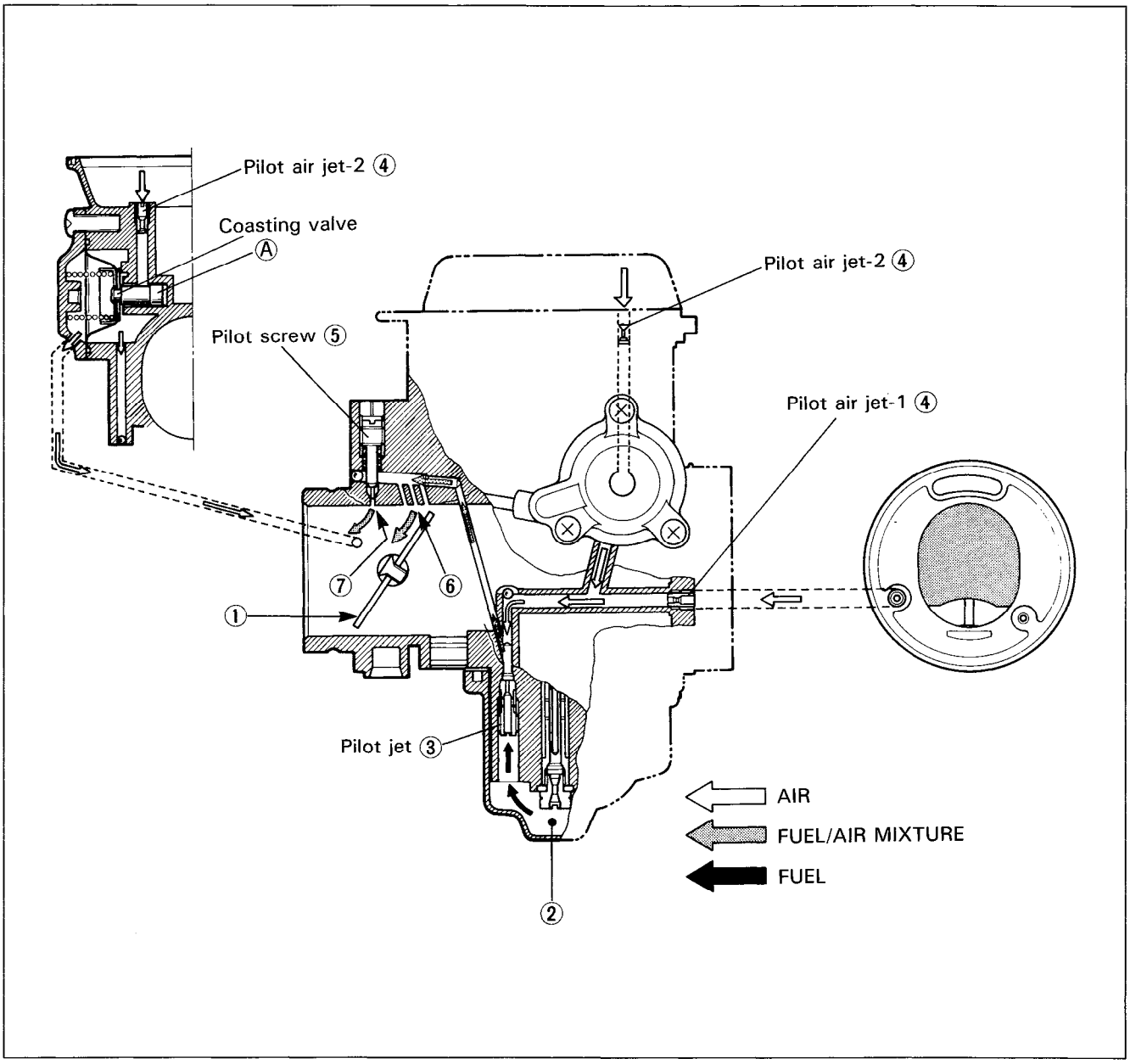
SLOW SYSTEM

This system supplies fuel during engine operation with throttle valve ① closed or slight opened. The fuel from float chamber ② is metered by pilot jet ③ where it mixes with air coming in through pilot air jets (#1 and #2) ④. This mixture, rich with fuel, then goes up through pilot passage to pilot screw ⑤. A part of the mixture is discharged into the main bore out of by-pass ports ⑥. The remainder is then metered by pilot screw ⑤ and sprayed out into the main bore through pilot outlet ⑦.

TRANSIENT ENRICHMENT SYSTEM

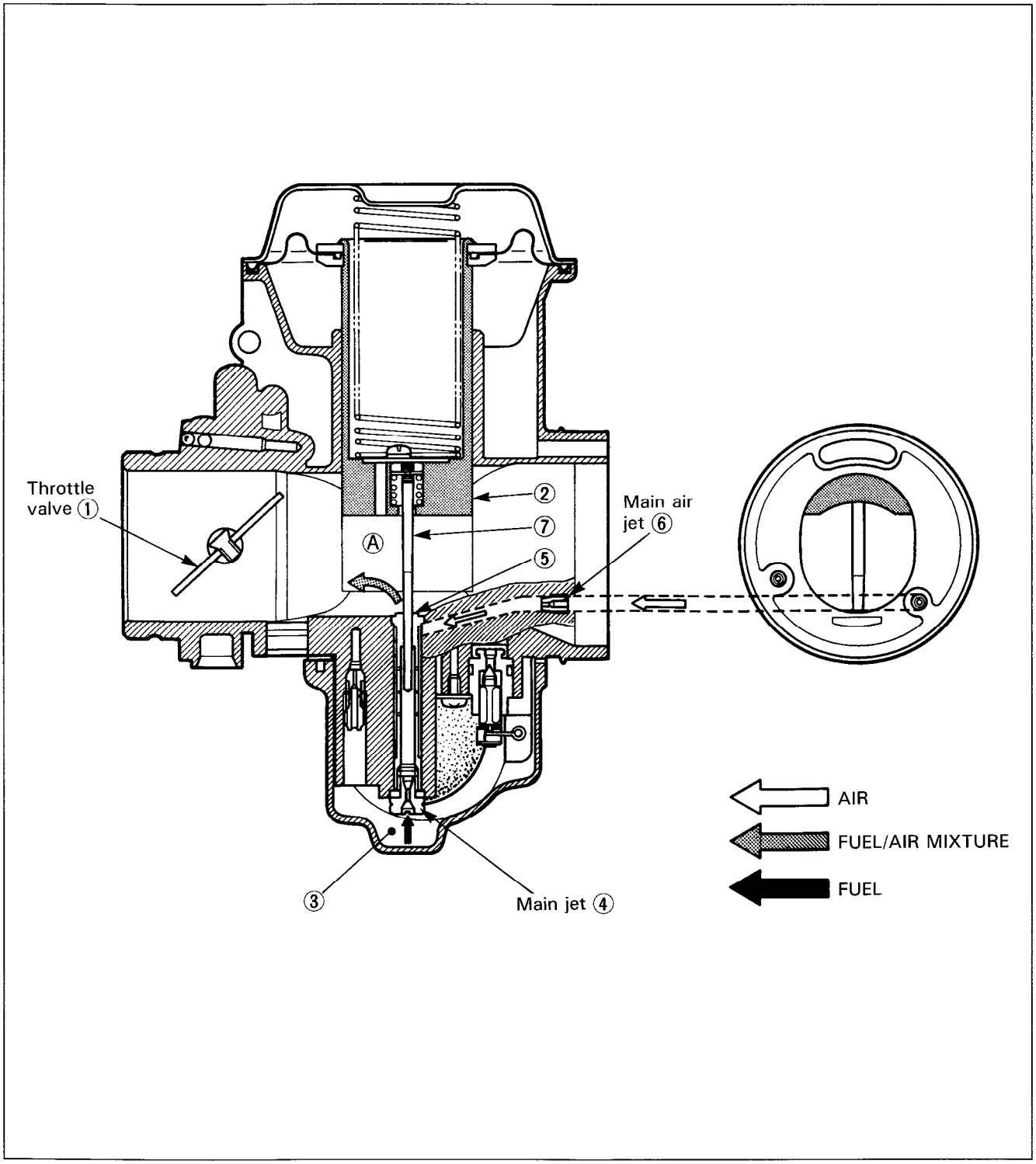
This transient enrichment system is a device which keeps fuel/air mixture ratio constant in order not to generate unstable combustion when the throttle grip is returned suddenly during high speed driving. For normal operation, joining of the air from upper part of carburetor inlet side to pilot air

pressure generated on cylinder side is applied to a diaphragm. The valve Ⓐ which interlocks with the diaphragm closes an air passage, thus, the pressure flows out to the pilot air passage.
This is system to keep the combustion condition constant by varying the fuel/air mixture ratio by controling air flow in the pilot circuit.



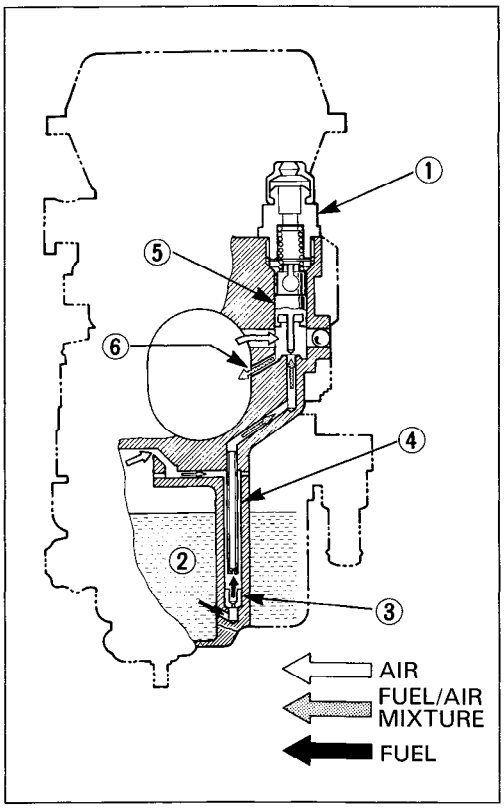
MAIN SYSTEM

As throttle valve ① is opened, engine speed rises, and this increases negative pressure in the venturi Ⓐ. Consequently the piston valve ② moves upward.
Meanwhile, the fuel in float chamber ③ is metered by main jet ④, and the metered fuel enters needle jet ⑤, in which it mixes with the air admitted through main air jet ⑥ to form an emulsion. The emulsified fuel then passes through the clearance between needle jet ⑤ and jet needle ⑦, and is discharged into the venturi Ⓐ, in which it meets main air stream being drawn by the engine. Mixture proportioning is accomplished in needle jet ⑤; the clearance through which the emulsified fuel must flow in large or small, depending ultimately on throttle position.



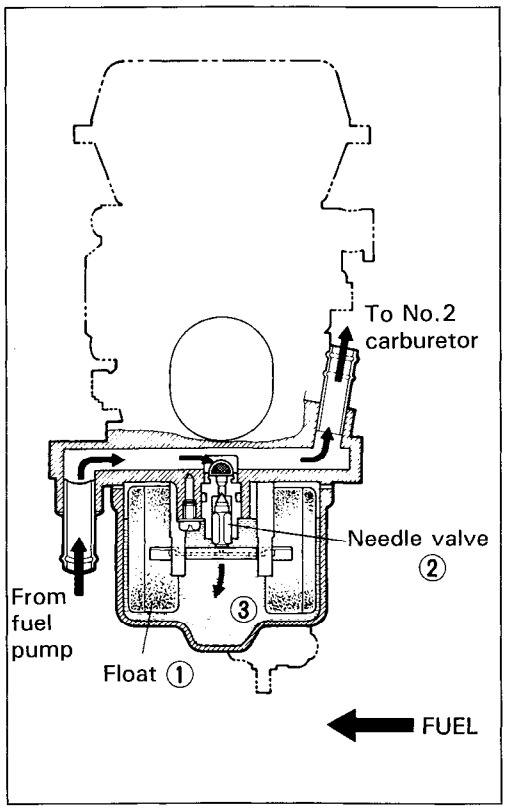
STARTER SYSTEM

Pulling up the starter shaft ① , fuel is drawn into the starter circuit from the float chamber ② .
Starter jet ③ meters this fuel, which then flows into starter pipe ④ and mixes with the air coming from the float chamber ② . The mixture, rich in fuel content, reaches starter plunger ⑤ and mixes again with the air coming through a passage extending from main bore.
The two successive mixings of fuel with air are such that proper fuel/air mixture for starting is produced when the mixture is sprayed out through starter outlet ⑥ into the main bore.



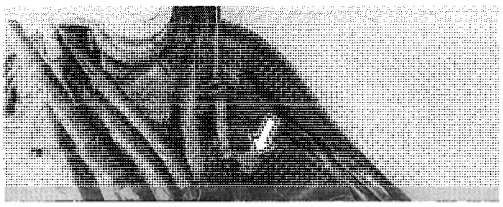
FLOAT SYSTEM

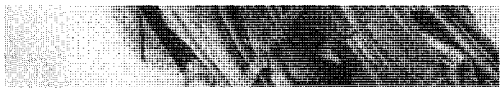
Floats ① and needle valve ② are associated with the same mechanism, so that, as the floats ① move up and down, the needle valve ② too moves likewise.
When fuel level is up in float chamber ③ , floats ① are up and needle valve ② remains pushed up against valve seat. Under this condition, no fuel enters the float chamber ③ .
As the fuel level falls, floats ① go down and needle valve ② unseats itself to admit fuel into the chamber ③ .
In this manner, needle valve ② admits and shuts off fuel alternately to maintain a practically constant fuel level inside the float chamber ③ .



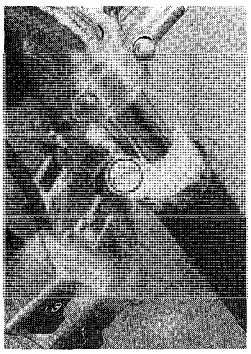
REMOVAL

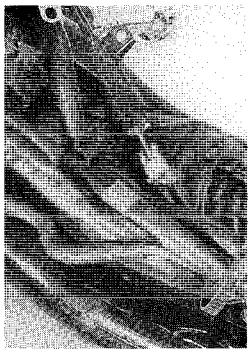
- Remove the fuel tank and fuel tank mounting bracket. (Refer to pages 5-4 and 7-2.)
- Remove the throttle cable connector mounting bolts.



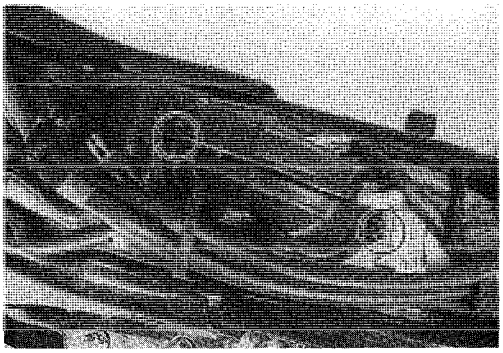


- Separate the right handlebar switch and disconnect the throttle cable.
- Separate the throttle cable connector and disconnect the throttle cable.

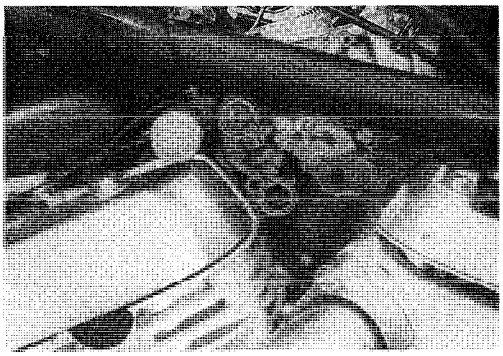




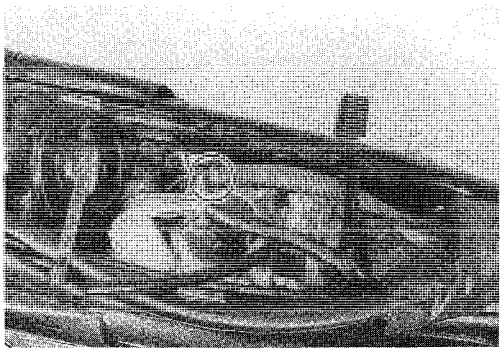
- Loosen the two clamp screws and remove the No.2 carburetor joint hose.



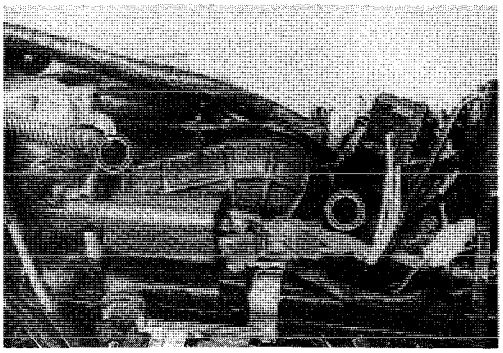
- Remove the choke knob mounting bolt.
- Loosen the clamp screw.



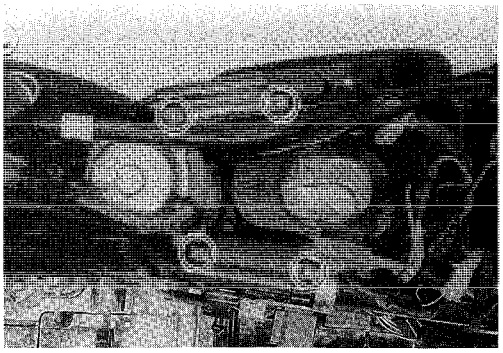
- Disconnect the fuel hose from the No.2 carburetor.



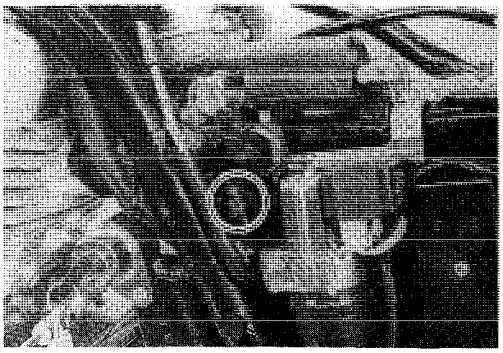
- Loosen the two screws and remove the No.1 carburetor joint hose.



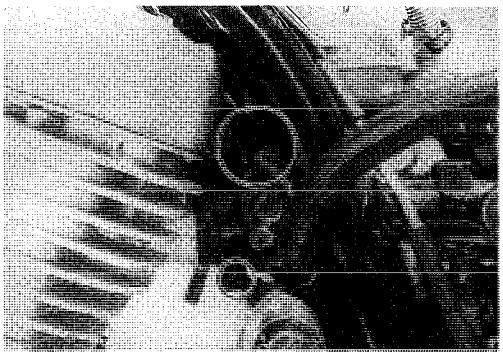
- Remove the ignition coil mounting bolts.



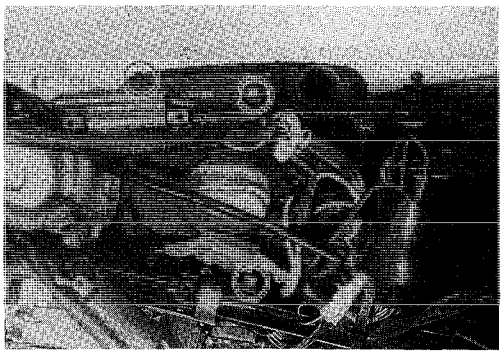
- Disconnect the fuel hose from the No.1 carburetor.



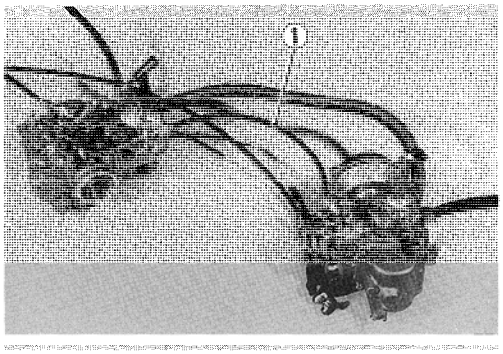
- Disconnect the starter plunger cable from the No.1 carburetor.
- Loosen the clamp screw.



- Remove the air cleaner mounting bolts and move the air cleaner to the right.

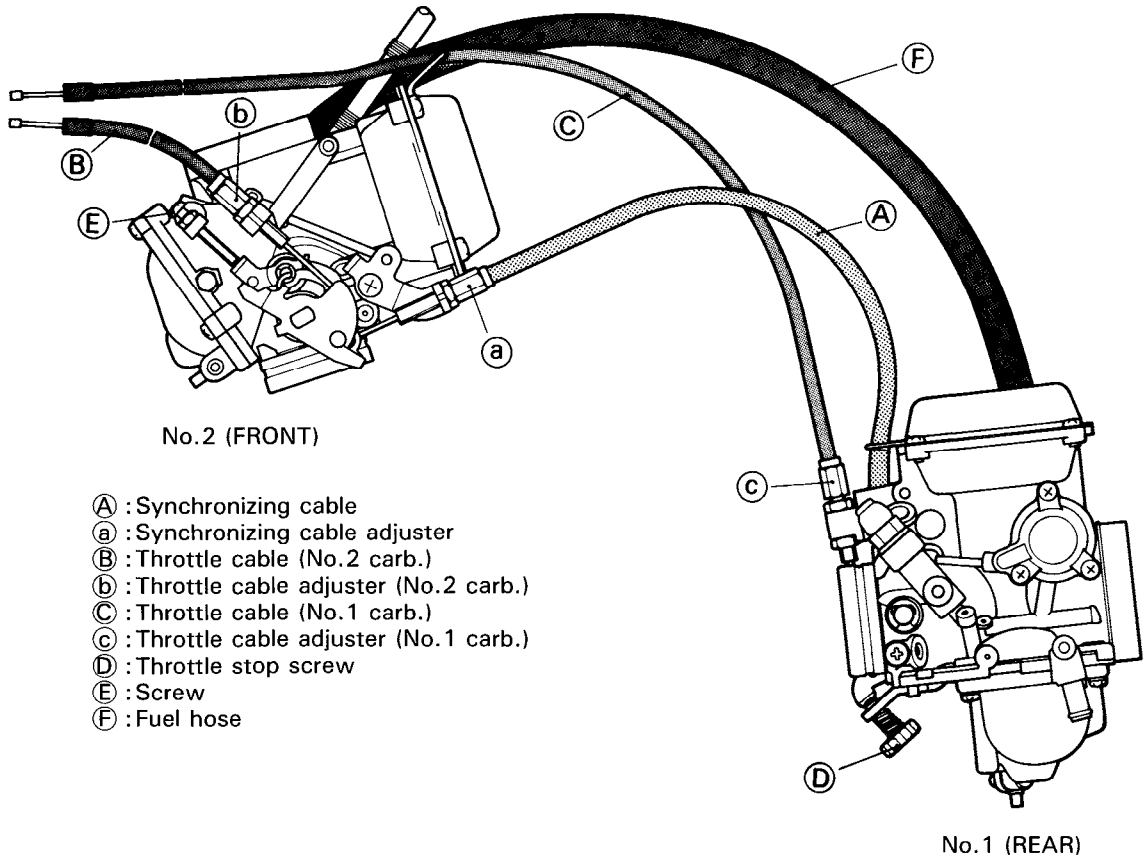


- Remove the No.1 and No.2 carburetors along with the synchronizing cable ① attached to the carburetors.



⚠ CAUTION

Be sure to identify each removed parts as to its location, and lay the parts out in groups designated as "No.1 carburetor", "No.2 carburetor", so that each will be restored to the original location during assembly.



NOTE:

Do not turn the throttle cable adjusters ⓑ, ⓒ and the synchronizing cable adjuster ⓐ.

⚠ CAUTION

Do not turn the screw Ⓔ of the No.2 carburetor.
Once removing a throttle cable or the synchronizing cable or a carburetor body, it is necessary to balance the two carburetors.

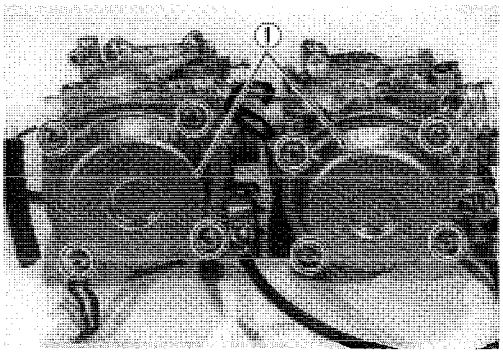
DISASSEMBLY

- Remove the carburetor top cap ①.

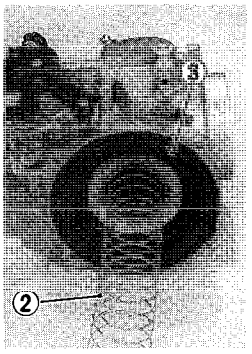
TOOL **09900-09003: Impact driver set**

⚠ CAUTION

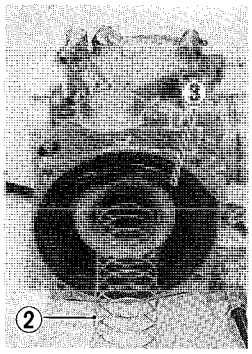
Do not blow the carburetor body with compressed air, before removing the diaphragm. It may cause a damage to the diaphragm.



- Remove the piston valve return spring ② and piston valve with diaphragm ③.



No.1 carburetor



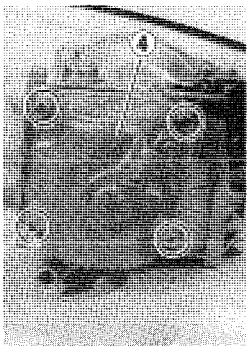
No.2 carburetor

- Remove the float chamber body ④.

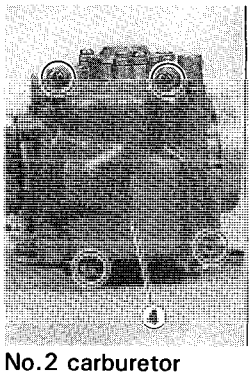
TOOL **09900-09003: Impact driver set**

⚠ CAUTION

Gasket and O-ring must be replaced with new ones to prevent fuel leakage.



No.1 carburetor

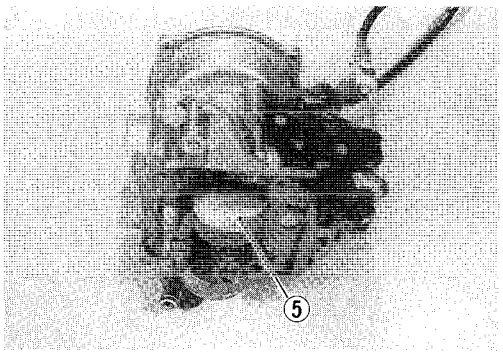


No.2 carburetor

- Remove the float assembly ⑤ by remaining the float pin.

⚠ CAUTION

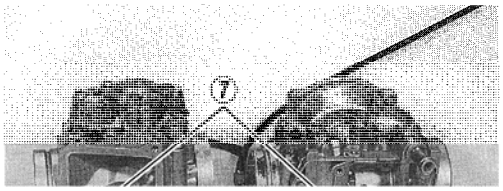
Do not use a wire for cleaning the valve seat.



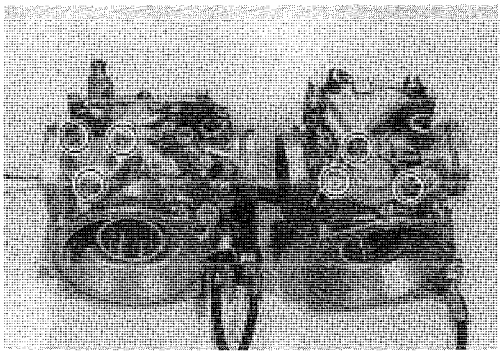
- Remove the main jet ⑥, pilot jet ⑦ and pilot screw.

⚠ CAUTION

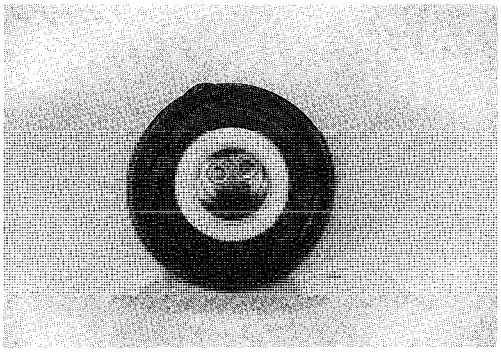
Do not use a wire for cleaning of passage and jets.



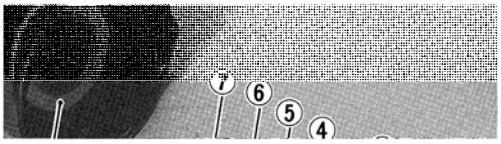
- Remove the coasting valve and spring by removing the screws.

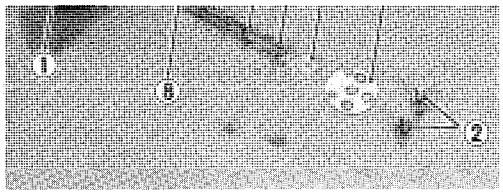


- Remove the jet needle from the piston valve by removing the screws.

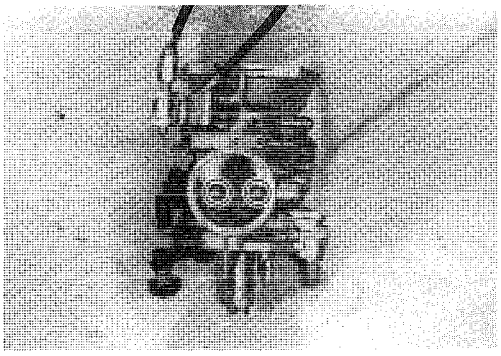


① Piston valve
② Screw
③ Jet needle stopper plate
④ Spacer
⑤ E-ring
⑥ Washer
⑦ Spring
⑧ Jet needle





- Remove two throttle valve screws and pull out throttle valve plate.



TOOL **09900-09003: Impact driver set**

⚠ CAUTION

These two screws are locked by punching these ends. Once removing the screws, they will be damaged.

NOTE:
Apply a small quantity of THREAD LOCK "1342" to the screws, when installing the throttle valve to the shaft.

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

⚠ CAUTION

Face the stamped side of throttle valve to outside.

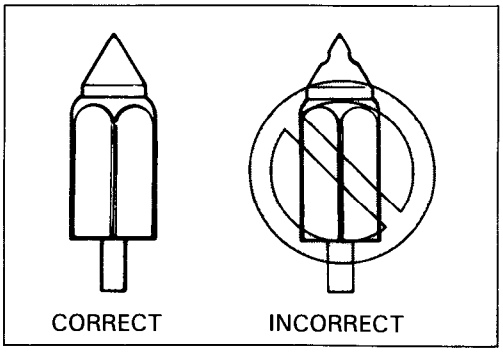
INSPECTION AND ADJUSTMENT

Check following items for any damage or clogging.

* Pilot jet
* Main jet
* Main air jet
* Pilot air jet
* Needle jet air bleeding hole
* Float
* Needle valve mesh and O-ring
* Diaphragm
* Gasket
* Throttle valve shaft oil seals
* Pilot outlet and by-pass holes
* Fuel hose
* Coasting valve
* Starter jet

NEEDLE VALVE INSPECTION

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

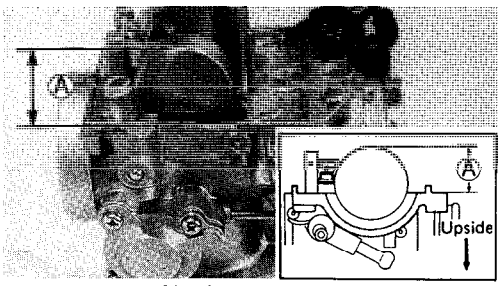


FLOAT HEIGHT ADJUSTMENT

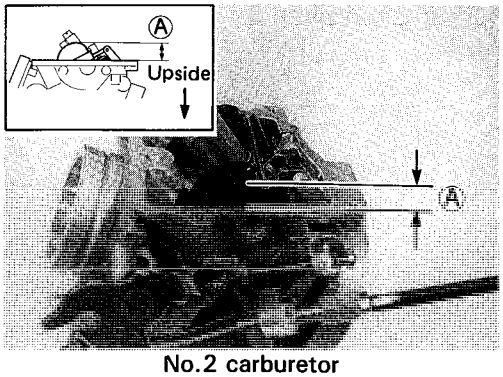
To check the float height, invert the carburetor body, with the float arm kept free, measure the height Ⓐ while float arm is just in contact with needle valve by using calipers.

Float height Ⓐ	No.1	27.7 ± 1.0 mm (1.09 ± 0.04 in)
	No.2	11.5 ± 1.0 mm (0.45 ± 0.04 in)

TOOL **09900-20101: Vernier calipers**

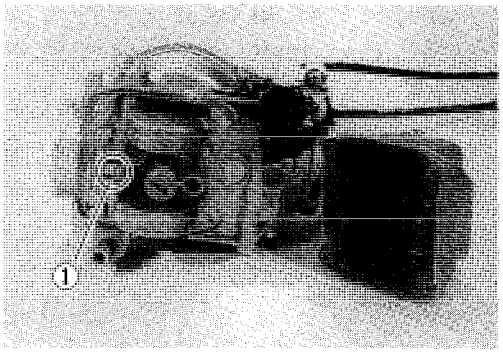


No.1 carburetor



No.2 carburetor

Bend the tongue ① as necessary to bring the height Ⓐ to this value.

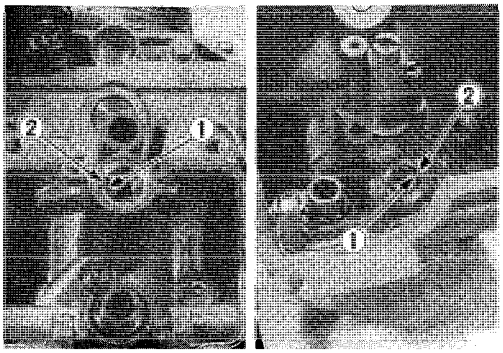


REASSEMBLY AND REMOUNTING

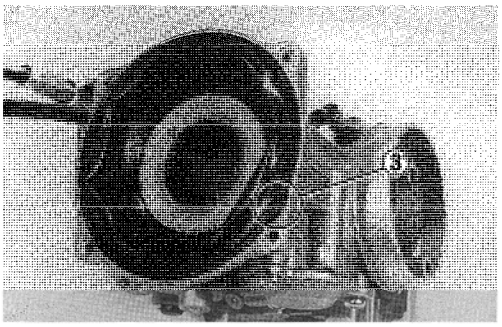
Reassemble and remount the carburetors in the reverse order of disassembly and removal.

Pay attention to the following points:

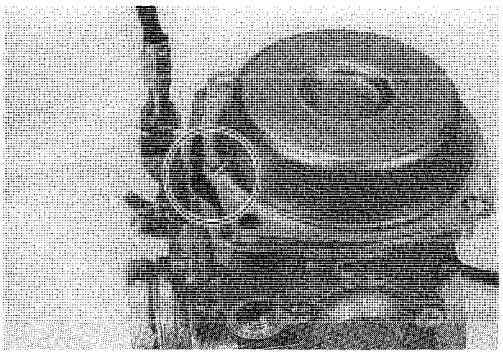
- Align the groove ① of the needle jet with the pin ② and replace it.



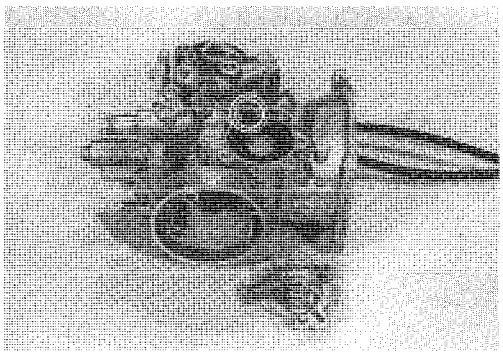
- Place the tongue ③ of diaphragm to the No.1 and No.2 carburetor body properly.



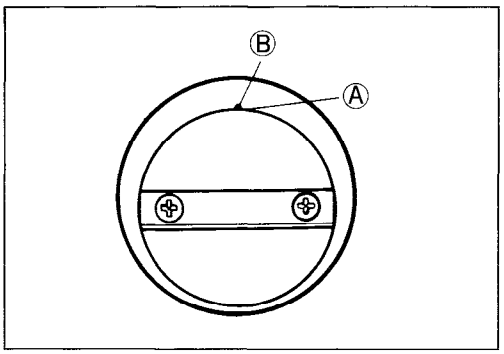
- Align the hole of diaphragm with the protrusion of the No.2 carburetor top cap.



- When installing the coasting valve to the body, align the holes.

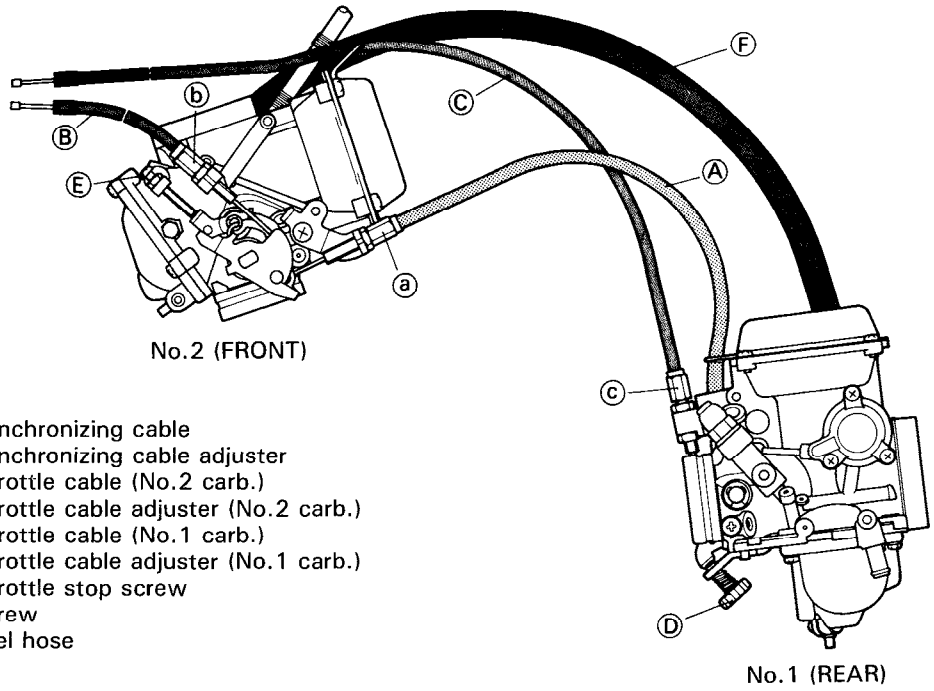


- Set each throttle valve in such a way that its top end Ⓐ meets the foremost by-pass Ⓑ.



- After all wok is completed, mount the carburetors on the engine and the following adjustments are necessary.
  * Engine idle RPM ..... Page 2-10
  * Throttle cable play ..... Page 2-10
  * Balancing carburetors ..... Page 5-20

BALANCE OF CARBURETORS



Ⓐ : Synchronizing cable
ⓐ : Synchronizing cable adjuster
Ⓑ : Throttle cable (No.2 carb.)
ⓑ : Throttle cable adjuster (No.2 carb.)
Ⓒ : Throttle cable (No.1 carb.)
ⓒ : Throttle cable adjuster (No.1 carb.)
Ⓓ : Throttle stop screw
Ⓔ : Screw
Ⓕ : Fuel hose

⚠ CAUTION

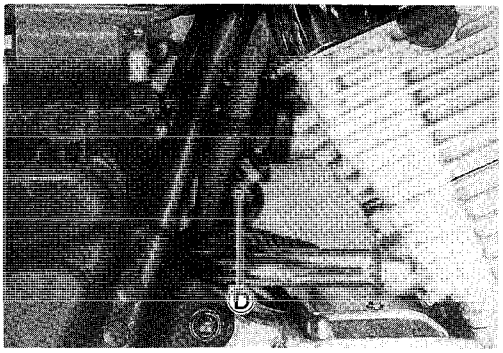
Once removing the synchronizing cable Ⓐ or throttle cables Ⓑ, Ⓒ or carburetors, it is necessary to balance the two carburetors.

IN CASE OF CHANGING THE SYNCHRONIZING CABLE Ⓐ:
As the first step, calibrate the carburetor balancer gauge, as follows:

TOOL 09913-13121: Carburetor balancer set (09913-13140: Adapter)

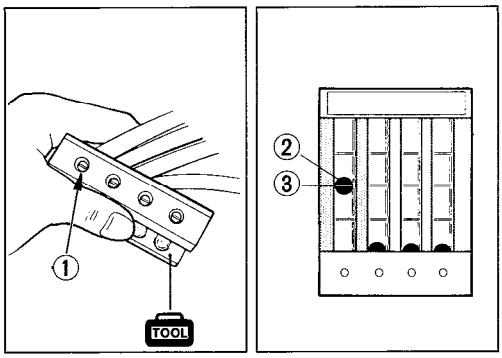
warming up.

- Stop the warm-up engine. Remove the vacuum inspection screw for No.2 carburetor and install the adapter with gasket.
- Connect one of the four rubber hoses of the balancer gauge to this adapter, and start up the engine, and keep it running at idle speed by turning throttle stop screw Ⓓ.

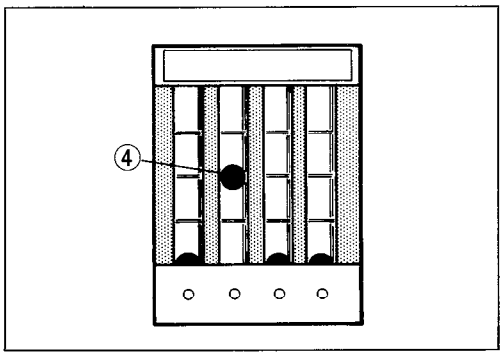


NOTE:
The idle speed is different among the countries. (Refer to pages 5-7 and 8.)

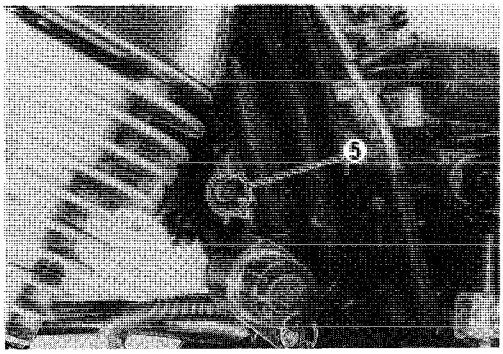
- Turn the air screw ① of the gauge so that the vacuum acting on the tube of that hose will bring the steel ball ② in the tube to the center line ③.



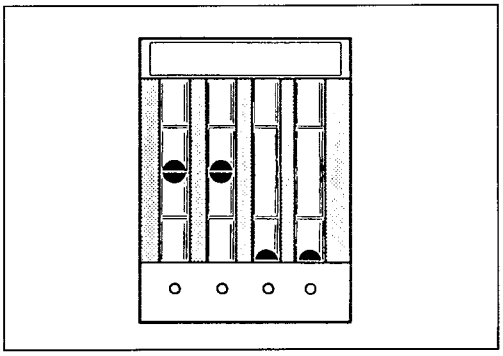
- After making sure that the steel ball stays steady at the center line, disconnect the hose from the adapter and connect the next hose to the adapter. Turn air screw to bring the other steel ball ④ to the center line. Now the balancer has been calibrated.



- Remove the vacuum inspection screw ⑤ for No.1 carburetor and install the adapter with gasket.
- Connect each calibrated balancer gauge hose to their respective adapters.



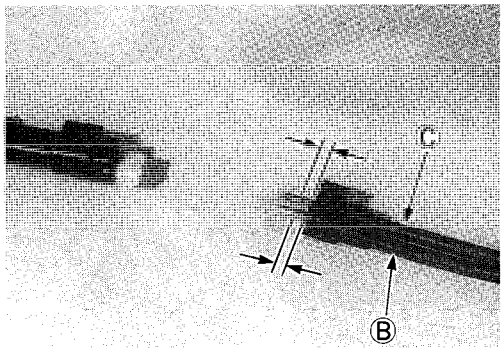
- Warm up the engine, and keep it running at idle speed.
- Under this condition, see if the two steel balls stay equally at the center level line, as they should, to signify that the two carburetors are in balance: if not, loosen the lock nut and turn the synchronizing adjuster ⓐ and the throttle stop screw Ⓓ to bring the steel balls to the center level line by keeping the engine running at idle speed.



IN CASE OF CHANGING THE THROTTLE CABLE Ⓑ, Ⓒ:

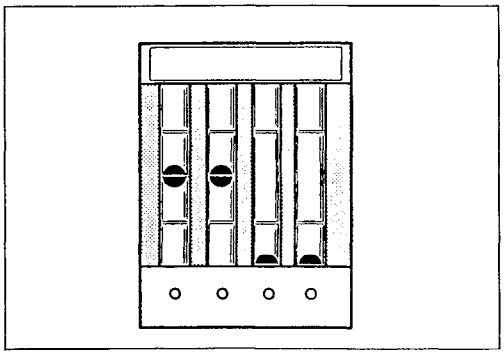
As the first step, calibrate the carburetor balancer gauge at 1 500 r/min, as the same manners of the case of changing the synchronizing cable.

- Temporarily remove the No.1 carburetor.
- Equalize the throttle cables' inner length at the connector by turning the adjuster ⓑ, ⓒ after loosening the lock nuts.



NOTE;
* *Be careful not to twist the throttle cables Ⓑ, Ⓒ.*
* *Throttle cable adjuster ⓒ can not be turned when the No.1 carburetor is installed to the engine.*
* *The idle speed is different among the countries. (Refer to pages 5-7 and 8.)*

- Install the No.1 carburetor and set the carburetor balancer which is calibrated at 1 500 r/min.
- Warm up the engine, and keep it running at 1 500 r/min by turning the throttle grip.
- Under this condition, see if the two steel balls stay equally at the center level line, as they should, to signify the two carburetors are in balance: if not, loosen the lock nut and turn the throttle cable adjuster ⓑ to adjust the throttle valve setting to bring the steel balls to the center level line.



NOTE:
When equalizing the throttle cables' inner length, make sure that each throttle cable have enough play.

IN CASE OF CHANGING THE CARBURETORS

When changing the carburetors, it is necessary to remove the synchronizing cable and throttle cables. So once removing the carburetor, it becomes necessary to adjust the cables by performing above two steps (i.e. IN CASE OF CHANGING THE SYNCHRONIZING CABLE and IN CASE OF CHANGING THE THROTTLE CABLE).

⚠ CAUTION

In this case first adjust the synchronizing cable.

LUBRICATION SYSTEM

OIL PRESSURE

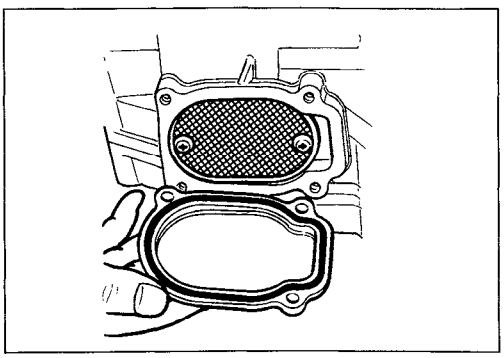
Refer to page 2-20.

OIL FILTER

Refer to page 2-9.

OIL SUMP FILTER

When you wash the oil sump filter cap, check to be sure that the oil sump filter is free from any sign of rupture, also wash the filter clean periodically.

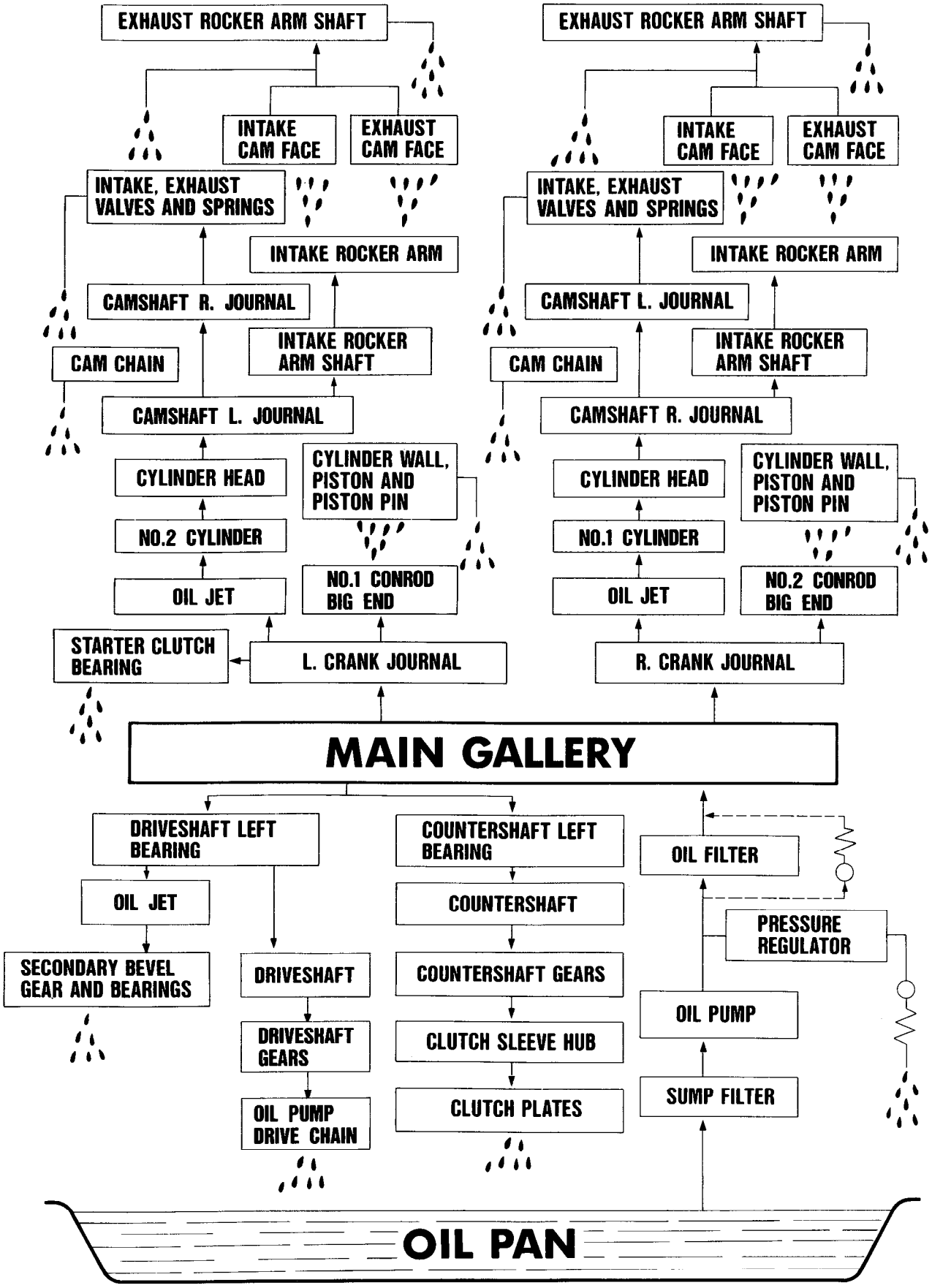


⚠ CAUTION

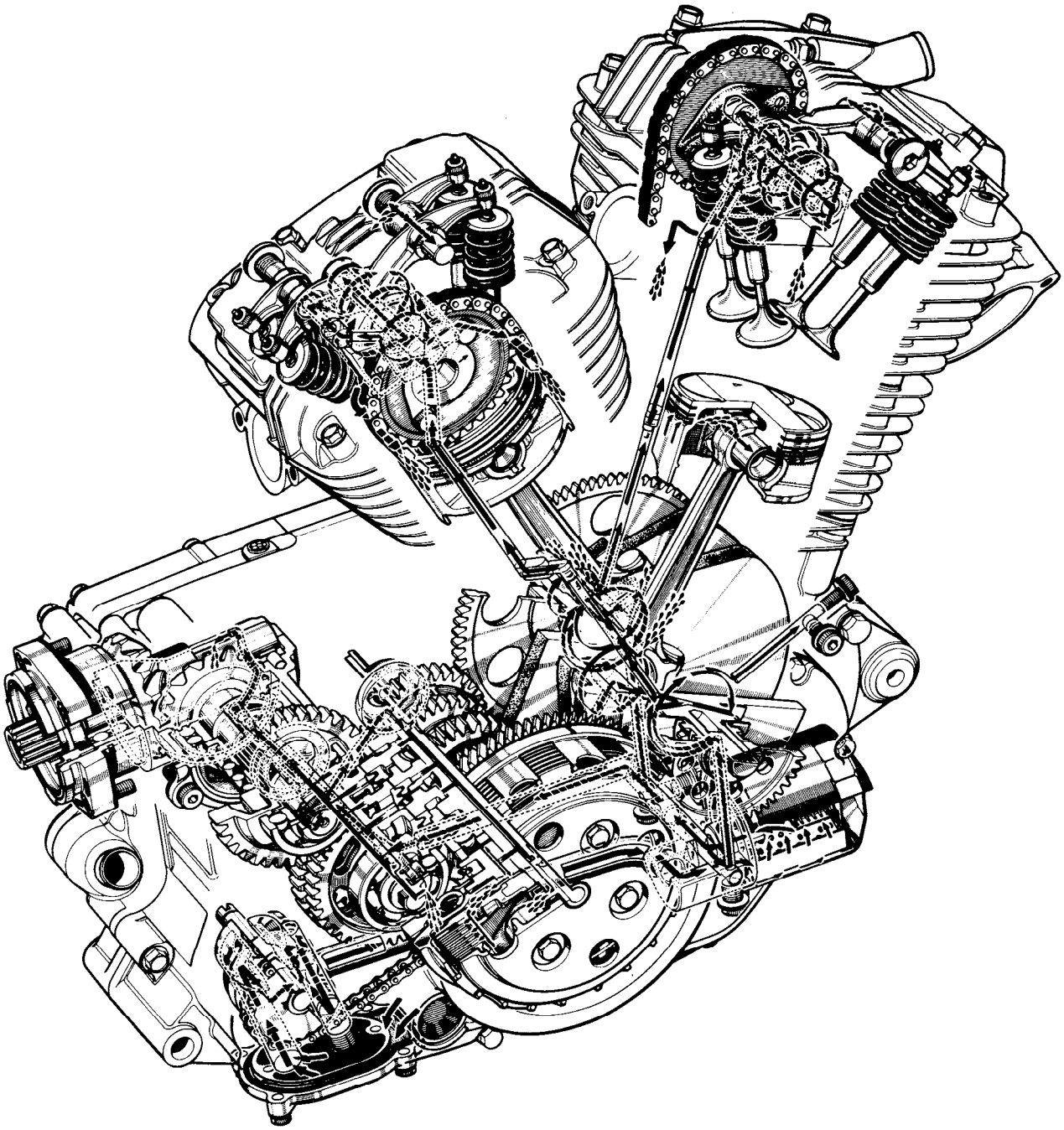
Replace the O-ring with a new one to prevent oil leakage.

(Refer to page 3-52.)

ENGINE LUBRICATION SYSTEM CHART



ENGINE LUBRICATION SYSTEM



COOLING SYSTEM

CONTENTS

COOLING SYSTEM

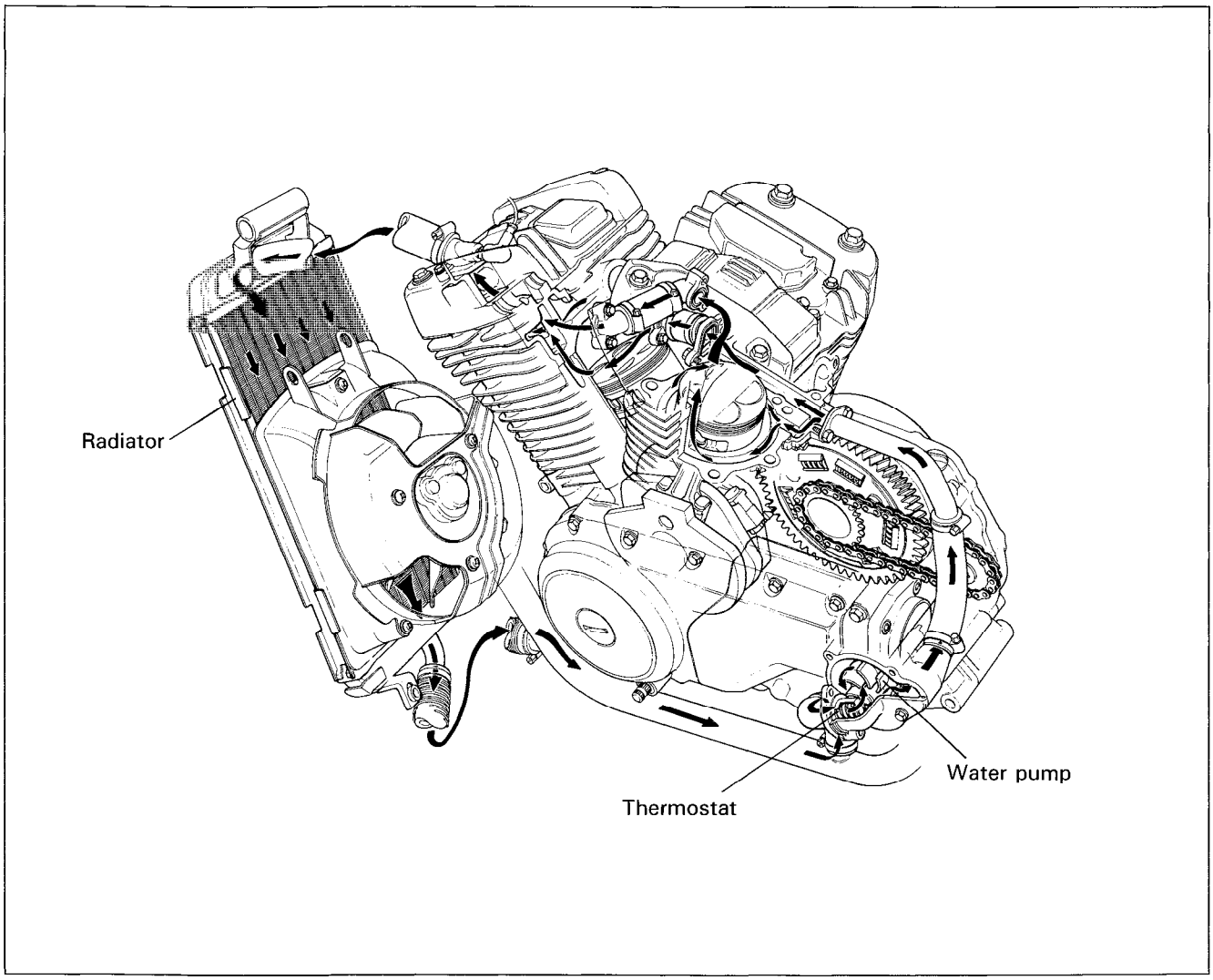
DESCRIPTION

The engine is cooled by coolant set in forced recirculation through jackets formed in the cylinder and head, and through the radiator. For the water pump, a high-capacity centrifugal pump is used. The radiator is a tube-and-fin type made of aluminum material, which is characterized by lightness in weight and good heat dissipation.

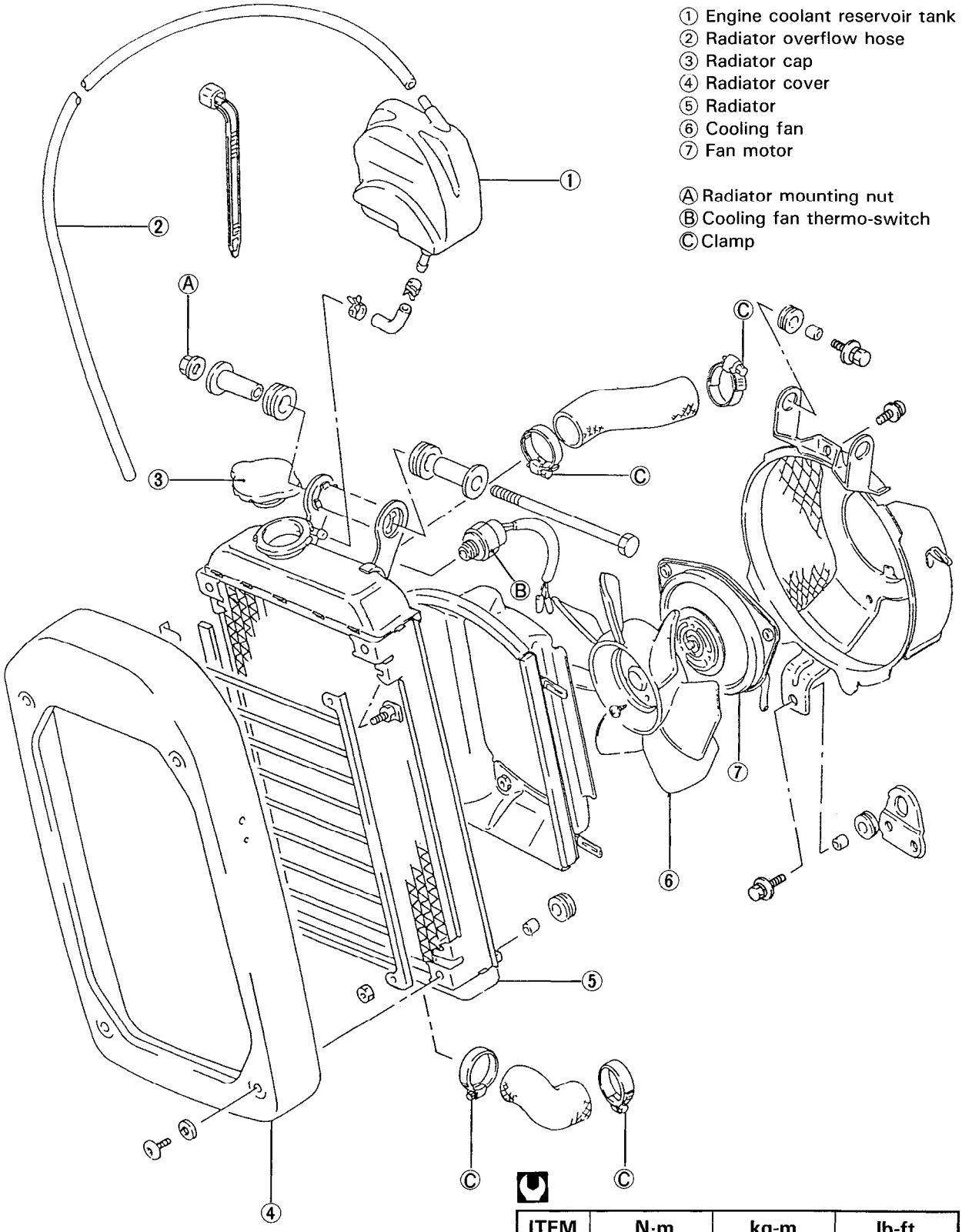
The thermostat is of wax pellet type, complete with a valve as the means of temperature-dependent control over the flow of coolant through the radiator. The valve is actuated by the temperature-sensitive wax contained in the pellet.

Referring to the following illustration, the thermostat is in the closed condition, so that water recirculates through the route comprising pump, engine, radiator and by-pass holes of the thermostat in the regulated condition.

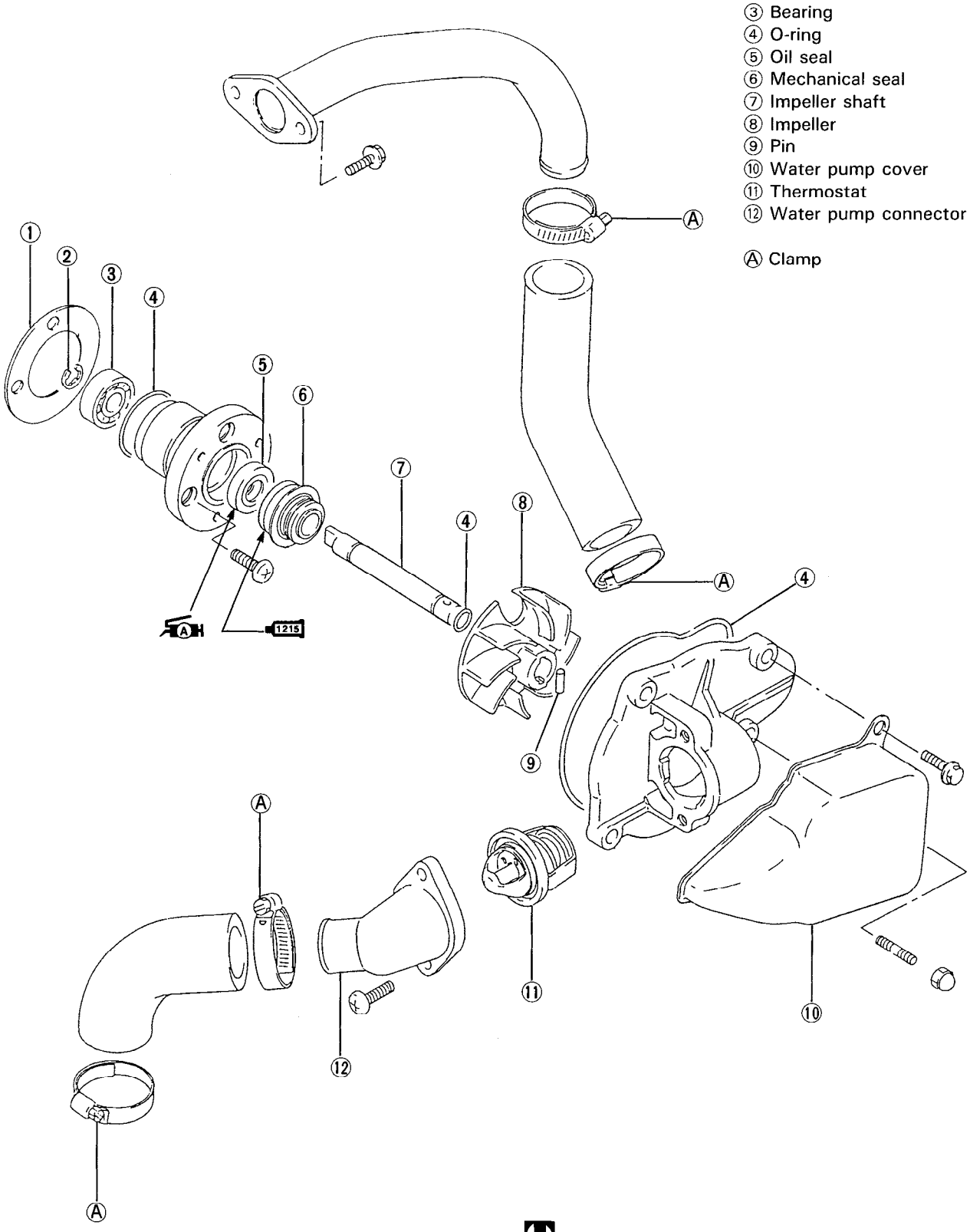
As the coolant temperature rises to 75°C and the thermostat valve unseats, the normal coolant flow is established. At about 90°C of coolant temperature, the thermostat becomes completely open and most of heat is released to the atmosphere through the radiator core.



CONSTRUCTION



ITEM	N·m	kg-m	lb-ft
Ⓐ	58	5.8	42.0
Ⓑ	13	1.3	9.5
Ⓒ	23	2.3	16.5



ITEM	N·m	kg-m	lb-ft
Ⓐ	23	2.3	16.5

ENGINE COOLANT

At the time of manufacture, the cooling system is filled with a 50 : 50 mixture of distilled water and ethylene glycol anti-freeze. This 50 : 50 mixture will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above −31°C (−24°F).

If the motorcycle is to be exposed to temperatures below −31°C (−24°F), this mixing ratio should be increased up to 55% or 60% according to the figure.

Anti-freeze density	Freezing point
50%	−31°C (−24°F)
55%	−40°C (−40°F)
60%	−55°C (−67°F)

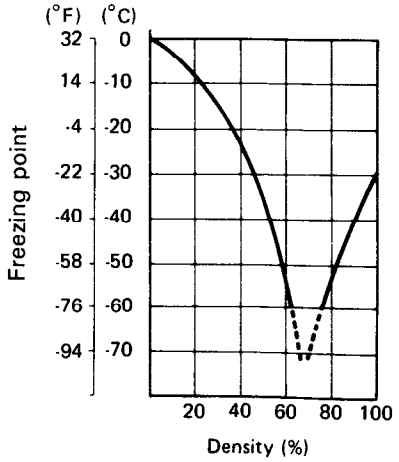


Fig. 1 Engine coolant density-freezing point curve.

⚠ CAUTION

- *** Use a high quality ethylene glycol base anti-freeze, mixed with distilled water. Do not mix a alcohol base anti-freeze and different brands of anti-freeze.**
- *** Do not put in more than 60% anti-freeze or less than 50%. (Refer to Right figure.)**
- *** Do not use a radiator anti-leak additive.**

50% Engine coolant including reserve

Anti-freeze	850 ml (1.8/1.5 US/Imp. pt)
Water	850 ml (1.8/1.5 US/Imp. pt)

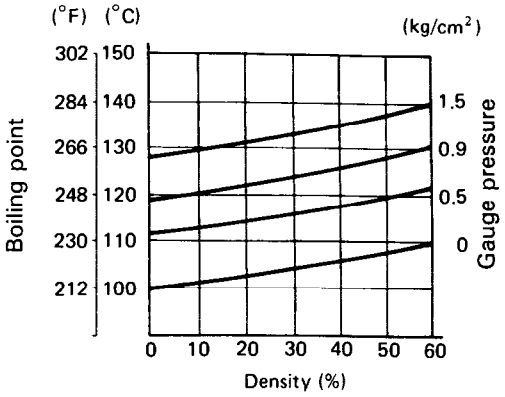


Fig. 2 Engine coolant density-boiling point curve.

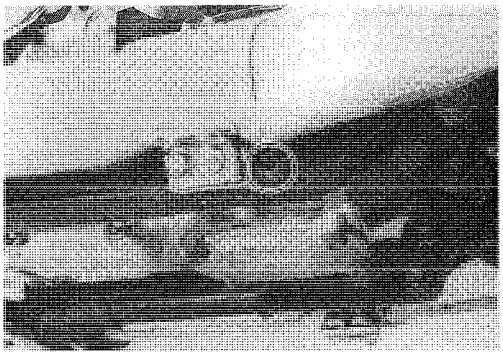
⚠ WARNING

- *** You can be injured by scalding fluid or steam if you open the radiator cap when the engine is hot. After the engine cools, wrap a thick cloth around cap and carefully remove the cap by turning it a quarter turn to allow pressure to escape and then turn the cap all the way off.**
- *** The engine must be cool before servicing the cooling system.**
- *** The coolant is harmful;**
  - **If it comes in contact with skin or eyes, flush with water.**
  - **If swallow it accidentally, induce vomiting and call physician immediately.**
  - **Keep it away from children.**

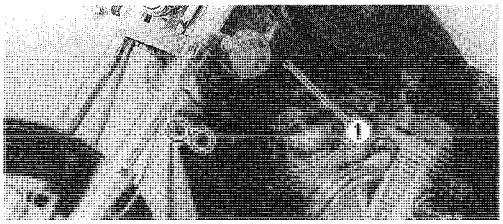
COOLING SYSTEM REMOVAL AND DISASSEMBLY

RADIATOR AND WATER HOSES

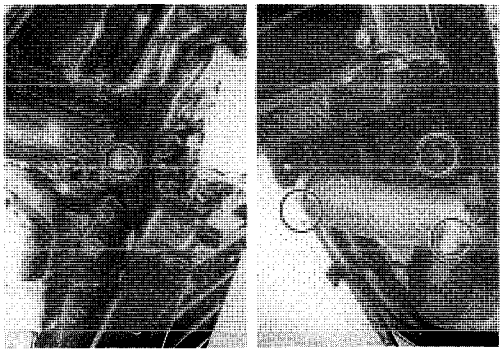
- Drain the engine coolant by removing the drain plug and air bleeder plug.



- Remove the frame head cover ①. (Refer to page 7-2.)
- Remove the radiator cover ②.

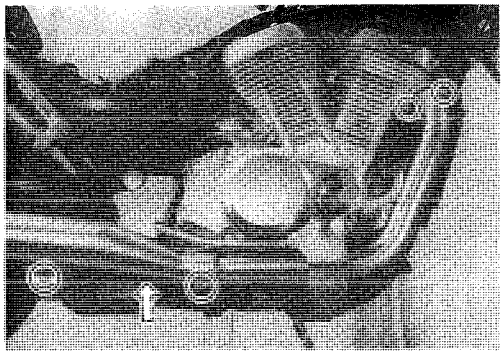


- Remove the radiator by removing the radiator mounting bolt, nut and clamps.

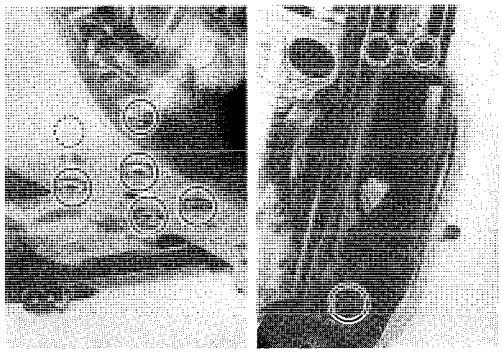


COOLING FAN

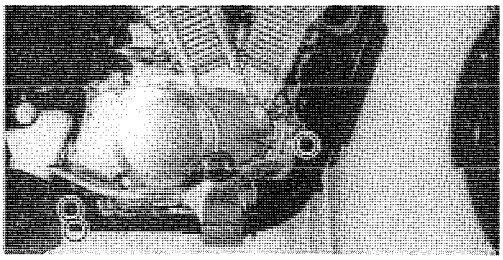
- Remove the radiator.
- Remove the right side exhaust pipe and mufflers.



- Support the motorcycle with a jack.
- Remove the right side front footrest mounting bolt pins and bolts.
- Remove the cooling fan mounting bolts.

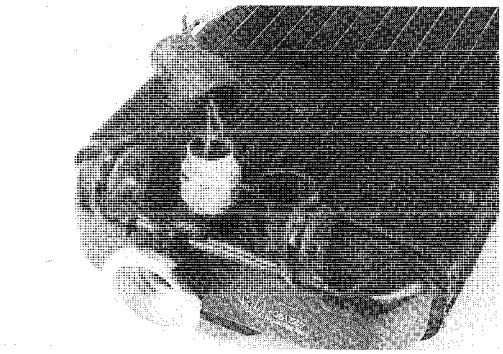


- Disconnect the cooling fan lead wire.
- Remove the cooling fan by removing the right frame down



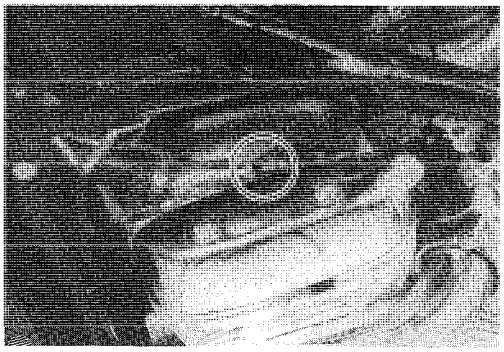
COOLING FAN THERMO-SWITCH

- Remove the cooling fan thermo-switch.



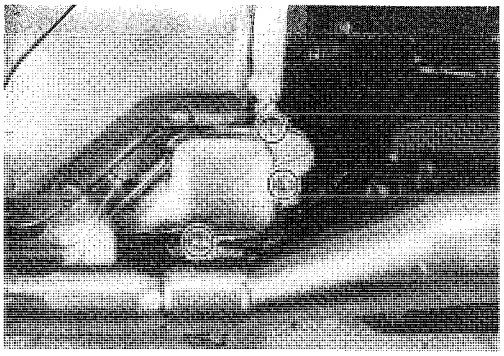
ENGINE COOLANT TEMPERATURE GAUGE

- Remove the engine coolant temperature gauge after disconnecting the wires.

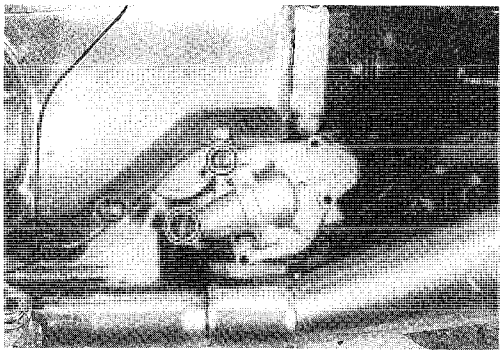


WATER PUMP

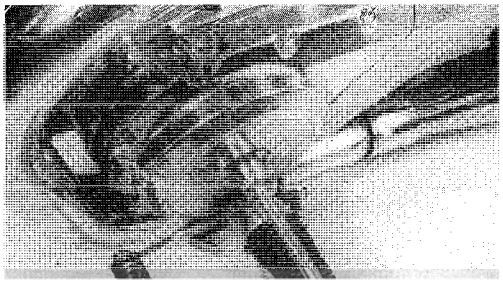
- Drain the engine oil and engine coolant. (Refer to pages 2-9 and 6-5.)
- Remove the water pump cover.



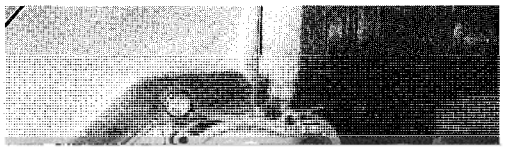
- Remove the water pump case.



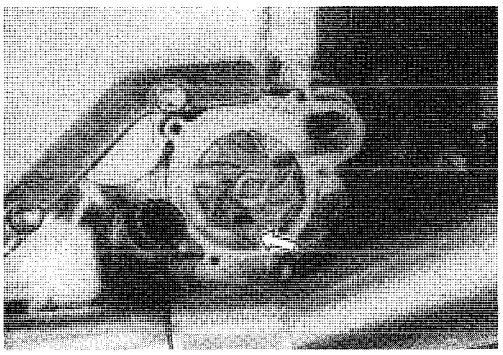
- Remove the magneto cover plug, then set the three openings of the impeller to the three screws by rotating the generator rotor.



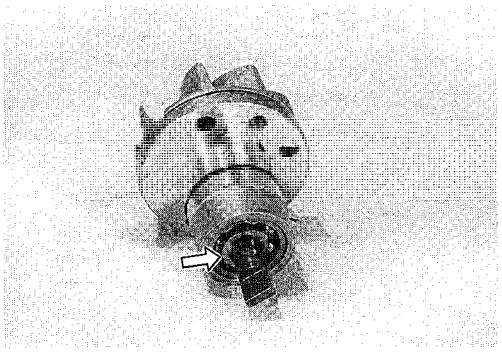
- Remove the three screws securing water pump assembly.



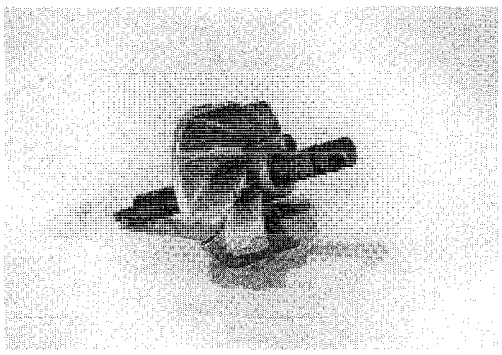
- Set one of the openings to an unused female screw by rotating the generator rotor.
- Drive out the water pump assembly by threading a removed screw into the female screw.



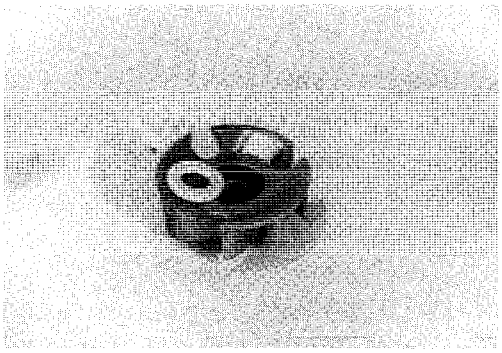
- Remove the E-ring.



- Pull out the impeller shaft.
- Remove the impeller from the impeller shaft.

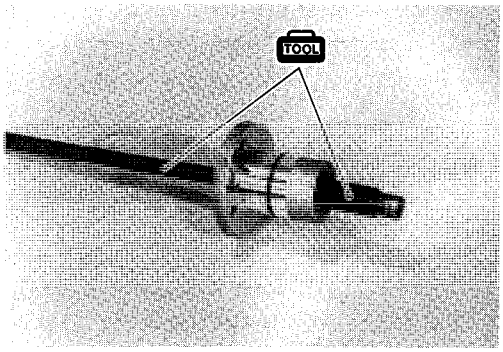


- Remove the mechanical seal ring.



- Remove the water pump bearing by using the special tools.

TOOL 09941-50111: Bearing remover

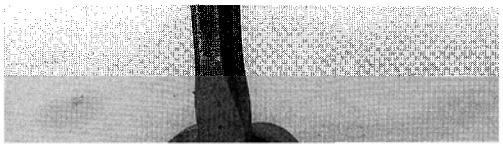


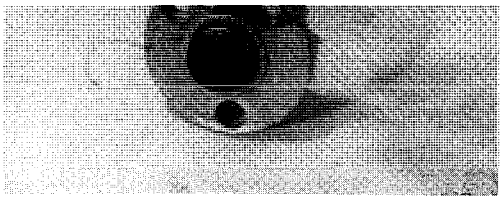
⚠ CAUTION

The removed bearing should be replaced with a new one.

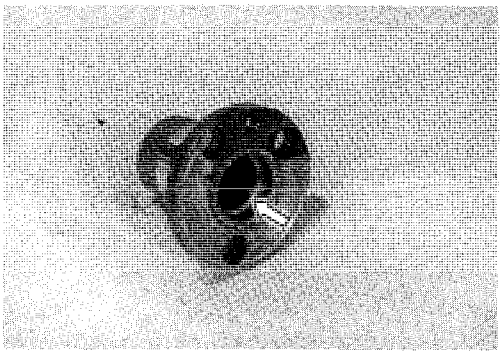
NOTE:
If abnormal noise does not occur, it is not necessary to remove the bearing.

- Gouge out the mechanical seal by using the chisel with care to prevent damage to the stuffing box.





- Gouge out the oil seal.



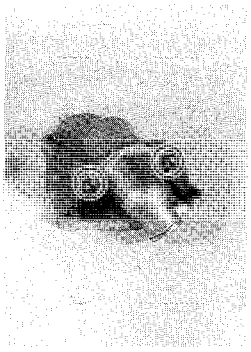
⚠ CAUTION

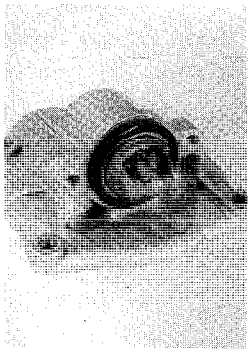
The removed mechanical seal or oil seal should be replaced with a new one.

NOTE:
If water leakage or oil leakage from the water pump does not occur, it is not necessary to remove the mechanical seal or oil seal.

THERMOSTAT

- Remove the water pump case. (Refer to page 6-6.)
- Separate the water pump case by removing the screws.
- Remove the thermostat.



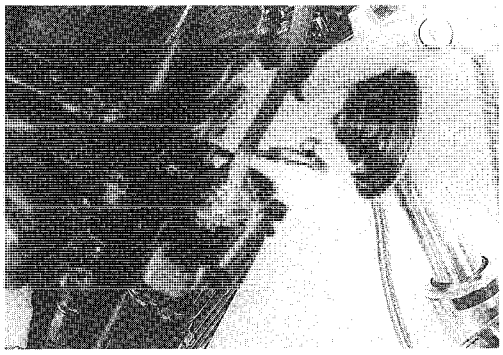


RADIATOR

INSPECTION

Before removing the radiator and draining the engine coolant, inspect the following items.

1. Test the cooling system for tightness by using the radiator tester as follows: Remove the radiator cap, and connect the tester to the filler. Give a pressure of about 120 kPa (1.2kg/cm², 17 psi) and see if the system holds this pressure for 10 seconds. If the pressure should fall during this 10-second interval, it means that there is a leaking point in the system. In such a case, inspect the entire system and replace the leaking component or part.

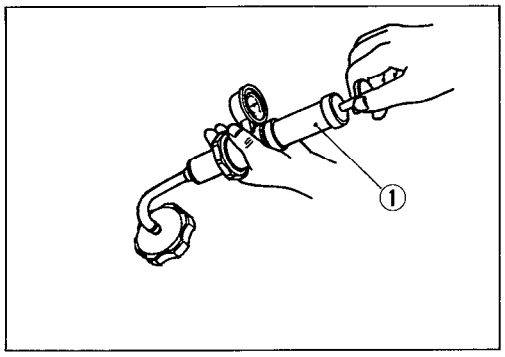


⚠ WARNING

Do not remove the radiator cap when the engine is hot.

⚠ WARNING

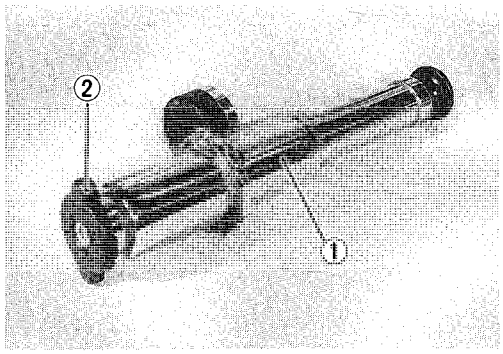
When removing the radiator cap tester, put a rag on the filler to prevent spouting of engine coolant.



⚠ CAUTION

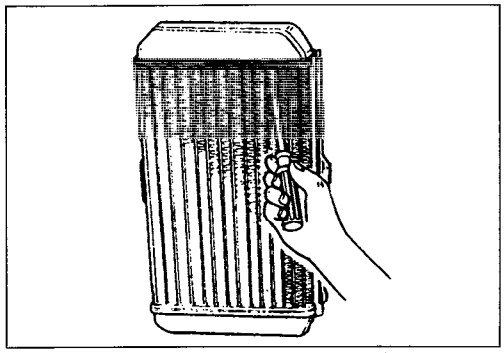
Do not exceed the radiator cap release pressure, or the radiator can be damaged.

2. Test the radiator cap ② for release pressure by using the radiator tester ① in the following manner: Fit the cap to the tester, as shown, and build up pressure slowly by operating the tester. Make sure that the pressure build-up stops at 110 ± 15 kPa (1.1 ± 0.15 kg/cm², 15.6 ± 2.1 psi) and that, with the tester held standstill, the cap is capable of that pressure for at least 10 seconds. Replace the cap if it is found not to satisfy either of these two requirements.



Radiator cap valve
release pressure: 110 ± 15 kPa
(1.1 ± 0.15 kg/cm², 15.6 ± 2.1 psi)

3. Road dirt or trash stuck to the fins must be removed. Use of compressed air is recommended for this cleaning. Fins bent down or dented can be repaired by straightening them with the blade of a small screwdriver.
4. Any water hose found in a cracked condition or flattened must be replaced. Any leakage from the connecting section should be corrected by proper tightening.



REMOVAL

• Refer to page 6-5.

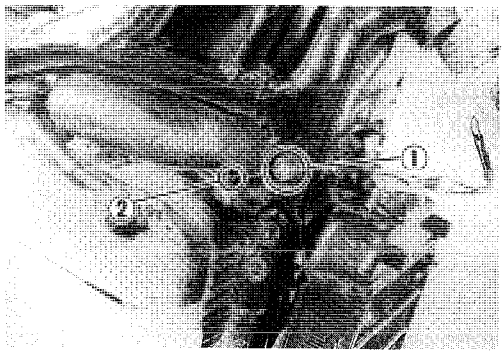
INSTALLATION

The radiator is to be installed in the reverse order of the removal procedure. Pay attention to the following points:

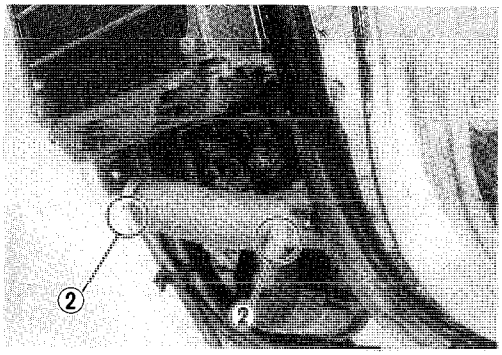
RADIATOR MOUNTING NUT AND CLAMP

- Tighten the radiator mounting nut ① and clamps ② to the specified torque.

Radiator mounting nut ①: 58 N·m (5.8 kg-m, 42.0 lb-ft)
Clamp ②: 23 N·m (2.3 kg-m, 16.5 lb-ft)



- Be sure to route the radiator overflow hose. (Refer to page 9-16.)
- After installing the radiator, be sure to add engine coolant: refer to page 2-11 for refilling information.



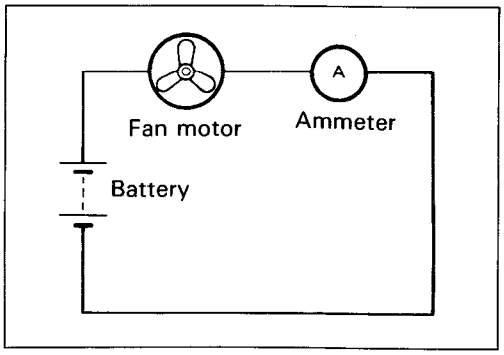
COOLING FAN

REMOVAL

- Refer to page 6-5.

INSPECTION

Test the cooling fan drive motor for load current with an ammeter connected as shown in the illustration.
The voltmeter is for making sure that the battery applies 12 volts to the motor. With the motor with electric motor fan running at full speed, the ammeter should be indicating not more than 5 amperes.
If the fan motor does not turn, replace the motor assembly with a new one.

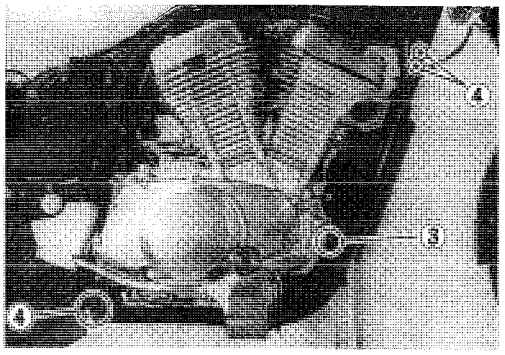


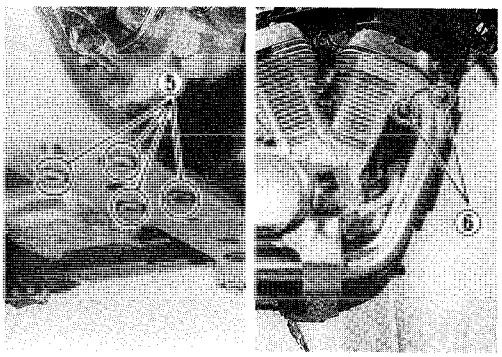
INSTALLATION

The cooling fan is to be installed in the reverse order of removal. Pay attention to the following point.

- Tighten the engine mounting bolts, frame mounting bolts, front footrest bolts and exhaust pipe clamp bolts to the specified torque.

Engine mounting bolt ③: 79 N·m (7.9 kg-m, 57.0 lb-ft)
Frame mounting bolt ④: 50 N·m (5.0 kg-m, 16.5 lb-ft)
Front footrest bolt ⑤: 26 N·m (2.6 kg-m, 19.0 lb-ft)
Exhaust pipe clamp bolt ⑥: 23 N·m (2.3 kg-m, 16.5 lb-ft)





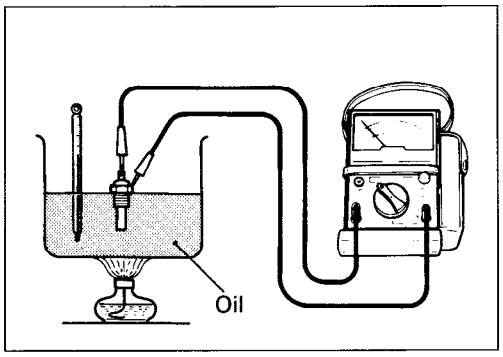
ENGINE COOLANT TEMPERATURE GAUGE

REMOVAL

- Refer to page 6-6.

INSPECTION

Test the temperature gauge at the bench to see if its ohmic value changes, as specified, with temperature. The test is to be run as follows: Connect the temperature gauge to the ohmmeter and place it in the oil contained in a pan, which is placed on a stove; heat the oil to raise its temperature slowly, reading the thermometer placed in the pan and also the ohmmeter. A temperature gauge whose ohmic value does not change in the proportion indicated in the table must be replaced.



TOOL 09900-25002: Pocket tester

Temperature gauge specification

Engine coolant temperature	Standard resistance
50°C (122°F)	Approx. 153.9 Ω
80°C (176°F)	Approx. 51.9 Ω
100°C (212°F)	Approx. 27.4 Ω
120°C (248°F)	Approx. 16.1 Ω

⚠ CAUTION

Do not allow the temperature gauge to touch the pan, or false reading will result.

If the resistance noted to show infinity or too much different resistance value, temperature gauge must be replaced.

REASSEMBLY

Apply SUZUKI BOND "1215" to the thread portion of the engine coolant temperature gauge and tighten the engine coolant temperature gauge to the specified torque.

Engine coolant temperature gauge: 13 N·m (1.3 kg-m, 9.5 lb-ft)

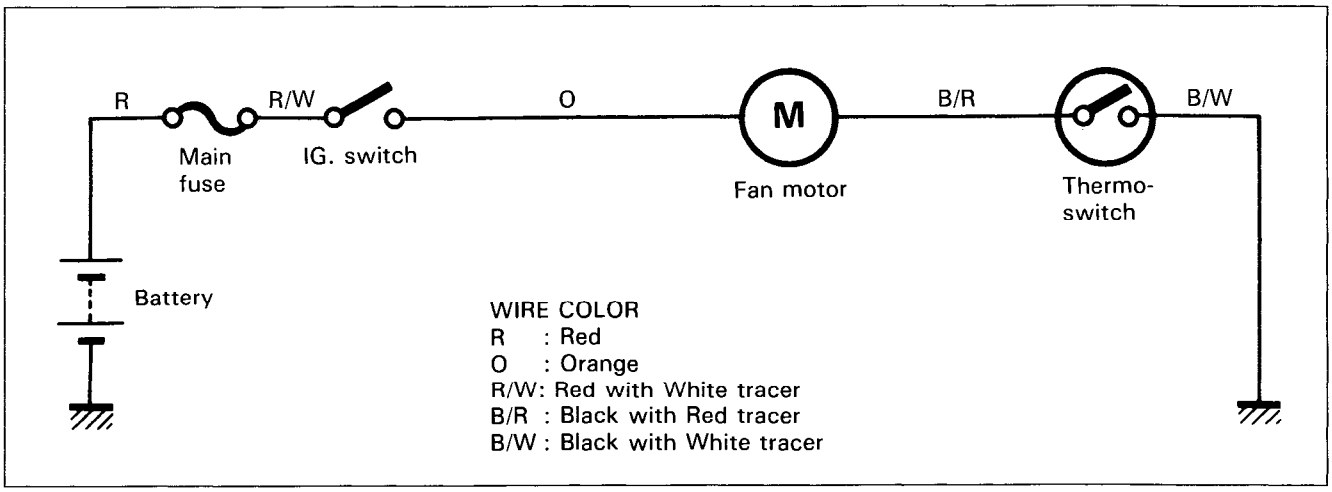
⚠ CAUTION

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

- Fill the specified engine coolant. (Refer to page 2-11.)

COOLING FAN THERMO-SWITCH

The cooling fan, being located behind the radiator, is secured to the frame down tube by the bolts. The fan drive motor is automatically controlled by the thermo-switch. This switch remains open when the temperature of engine coolant is low, but it closes at about 105°C (221°F) of rising engine coolant temperature to set the fan in motion.

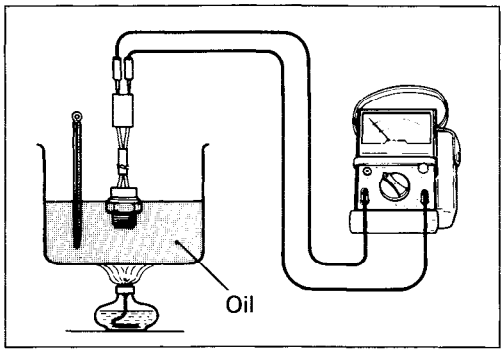


REMOVAL

- Refer to page 6-6.

INSPECTION

The thermo-switch must be checked for its temperature-initiated closing action at the specification value of 105°C (221°F) by testing it at the bench as shown in the figure. Connect the thermo-switch to a circuit tester and place it in the oil contained in a pan, which is placed on a stove; heat the oil to raise its temperature slowly, and read the column thermometer when the switch closes.



TOOL **09900-25002: Pocket tester**

Thermo-switch specification

OFF → ON	Approx. 105°C (221°F)
ON → OFF	Approx. 100°C (212°F)

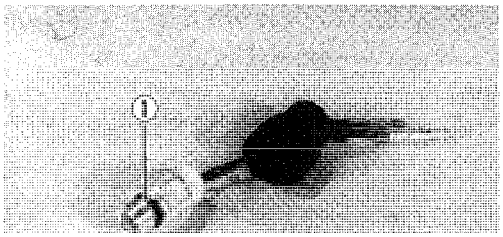
⚠ CAUTION

Do not allow the switch to touch the pan, or false reading will result.

REASSEMBLY

NOTE:
Do not forget the new O-ring ①.

Cooling fan thermo-switch: 13 N·m (1.3 kg-m, 9.5 lb-ft)

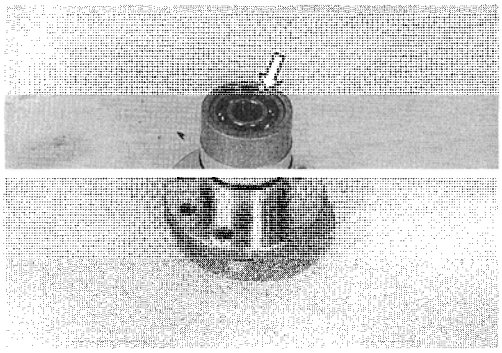


It may cause damage if it gets a sharp impact. Replace the O-ring with a new one.

WATER PUMP

REMOVAL AND DISASSEMBLY

- Refer to page 6-6 for the water pump removal and disassembly procedures



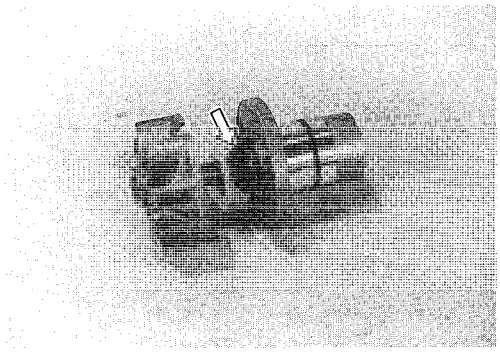
INSPECTION

WATER PUMP BEARING

Turn the inner race and check the bearing play. If abnormal noise occurs or any sign of stickiness is noted, replace the bearing with a new one.

MECHANICAL SEAL

Visually inspect the mechanical seal for damage, with particular attention given to the sealing face. Replace the mechanical seal that shows indications of leakage. Also replace the oil seal if necessary.

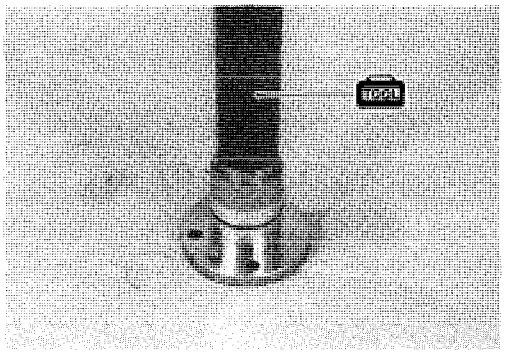


REASSEMBLY

Reassemble and remount the water pump in the reverse order of removal and disassembly. Pay attention to the following points:

- Install the new bearing by using the special tool.

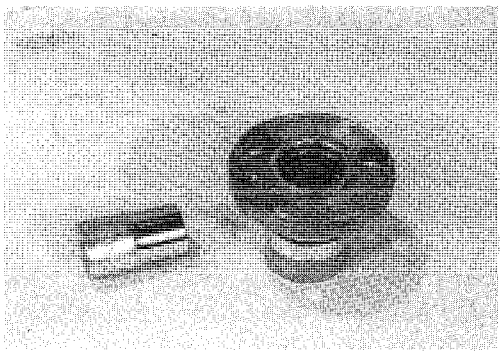
TOOL 09925-98221: Bearing installer



NOTE:
When reinstalling the bearing, stamped mark of bearing is positioned outside.

- Apply grease to the oil seal lip before installing.

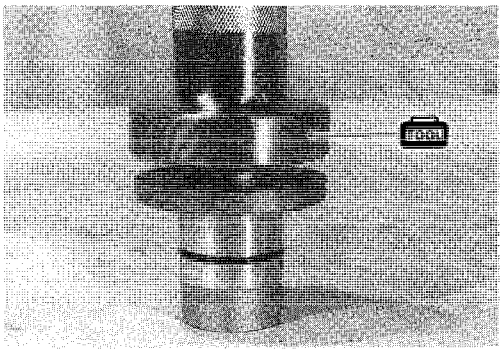
A H 99000-25010: SUZUKI SUPER GREASE "A"



- Press the new oil seal into the stuffing box by using a suitable size sleeve and so on.

- Press the new mechanical seal into the stuffing box by using the special tool.

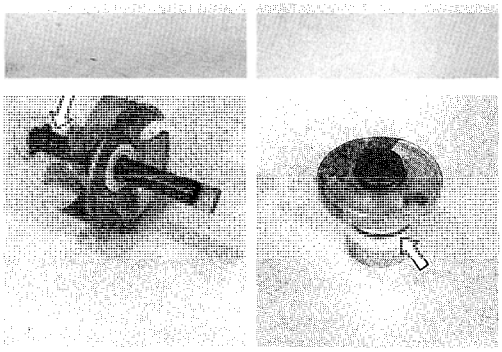
TOOL 09913-75520: Bearing installer



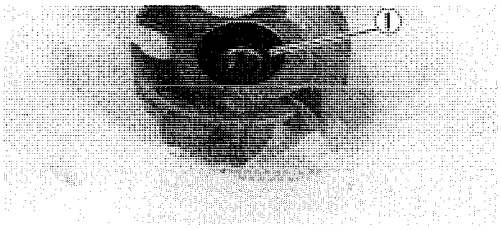
NOTE:
When installing the mechanical seal, apply SUZUKI BOND "1215" to its outer surface.

1215 99000-31110: SUZUKI BOND "1215"

- Replace the O-rings and water seal ① with new ones when reassembling the water pump.

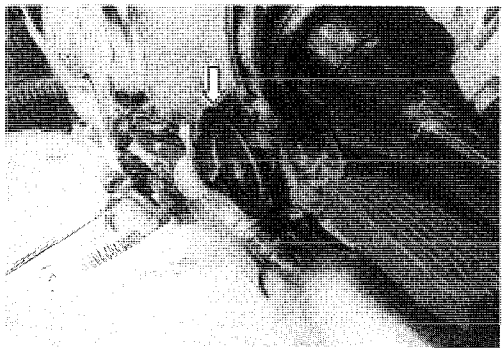


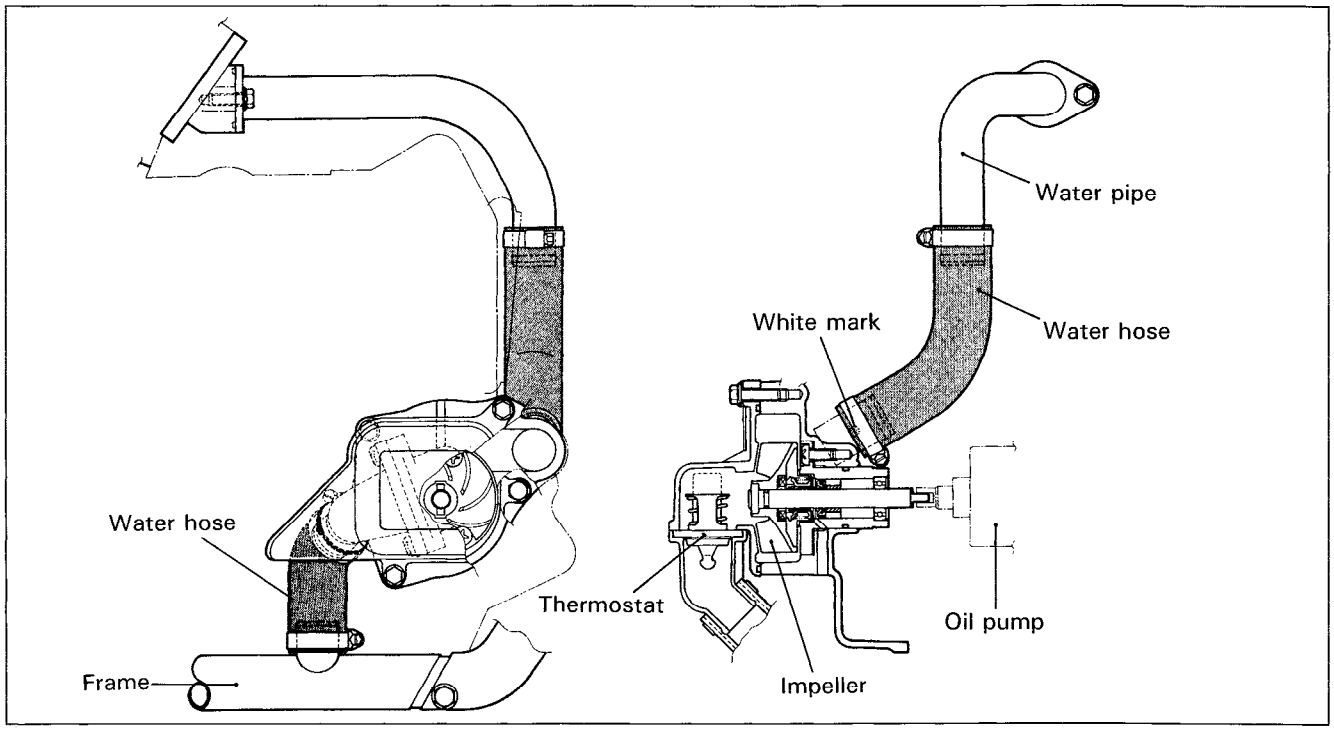
NOTE:
The mechanical seal ring must be assembled with marked



- Replace the O-ring with a new one when reinstalling the water pump case.
- Tighten the clamp to the specified torque.

Clamp: 23 N·m (2.3 kg-m, 16.5 lb-ft)





THERMOSTAT

REMOVAL

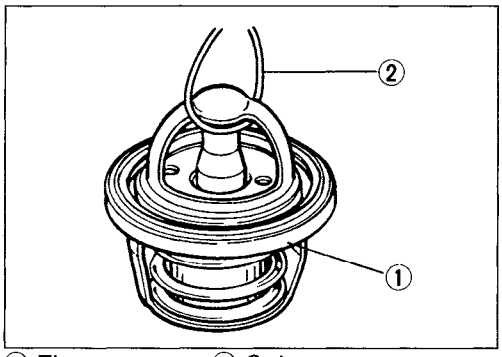
- Refer to page 6-8.

INSPECTION

Inspect the thermostat pellet for signs of cracking.

Test the thermostat at the bench for control action, in the following manner.

- Pass a string between flange, as shown in the illustration.
- Immerse the thermostat in the water contained in a beaker, as shown in the illustration. Note that the immersed thermostat is in suspension. Heat the water by placing the beaker on a stove and observe the rising temperature on a thermometer.



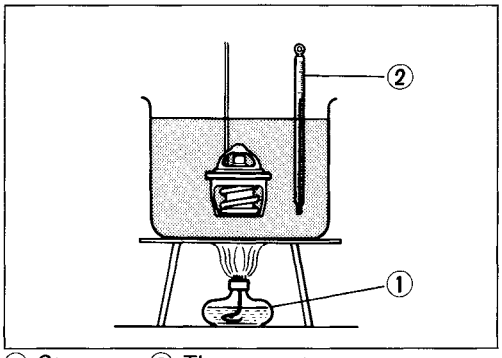
① Thermostat ② String

⚠ CAUTION

Do not allow the thermostat to touch the pan, or false reading will result.

- Read the thermometer just when opening the thermostat. This reading, which is the temperature level at which the thermostat valve begins to open, should be anywhere between 73.5°C (164.3°F) and 76.5°C (169.7°F).

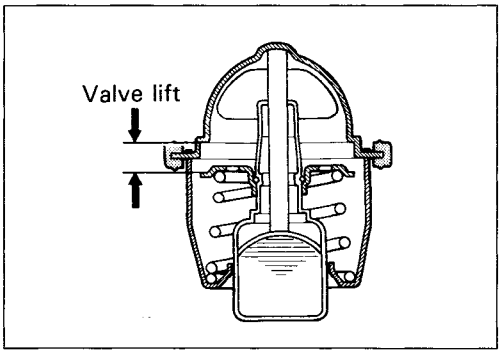
Thermostat valve opening temperature: 73.5—76.5°C (164.3—169.7°F)



① Stove ② Thermometer

- Keep on heating the water to raise its temperature to and beyond 90°C (194°F).
- Just when the water reaches 90°C (194°F), the thermostat valve should have lifted by at least 6.0 mm (0.24 in).

Thermostat valve lift: Over 6.0 mm at 90°C (Over 0.24 in at 194°F)



- A thermostat failing to satisfy either of the two requirements (start-to-open temperature and valve lift) must be replaced.

REASSEMBLY

- Reassemble the thermostat in the reverse order of removal.

CHASSIS

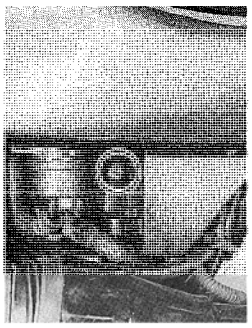
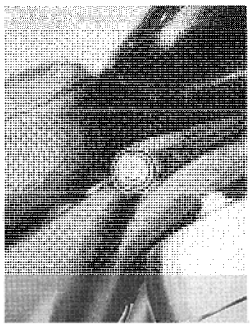
CONTENTS

EXTERIOR PARTS

REMOVAL

FRAME COVER

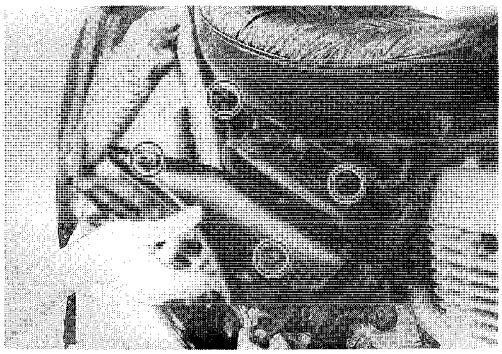
- Remove the screw and bolt, left and right.

- Remove the frame cover by extracting the hooked parts, left and right.

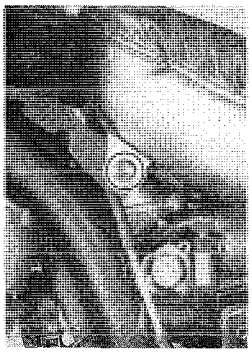
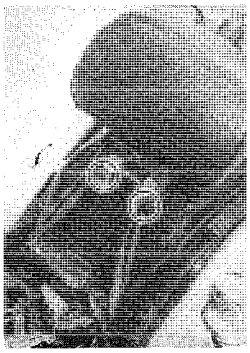
⚠ CAUTION

Be careful not to scratch the frame.

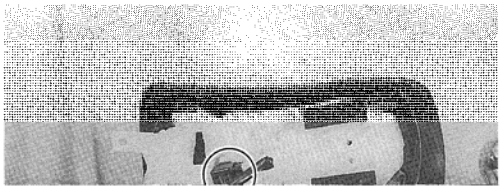
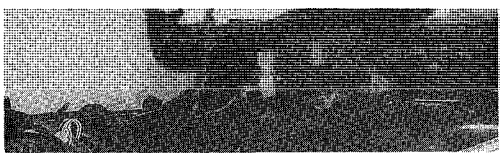


SEAT

- Remove the frame cover.
- Remove the front seat by removing the bolts, left and light.
- Remove the two bolts.

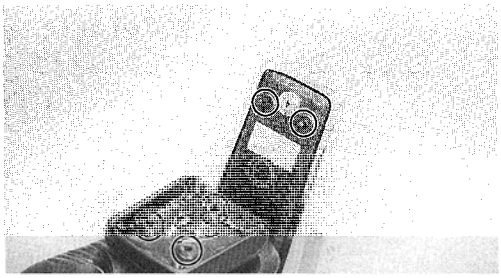



- Remove the rear seat by disconnecting the side-stand relay.

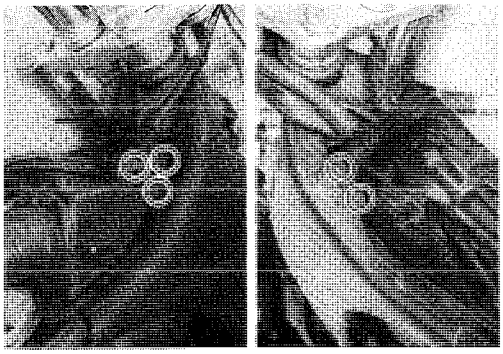
REAR CUSHION

- Extract the hooked parts, and remove the rear cushion.

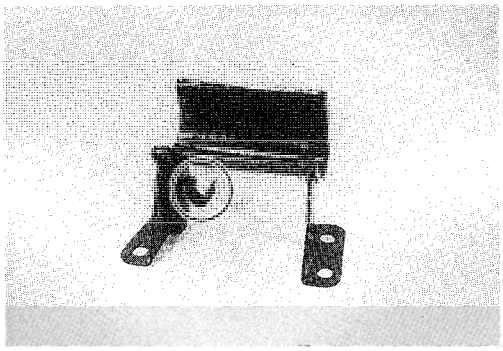



FUEL TANK MOUNTING BRACKET

- Remove the seat. (Refer to page 7-1.)
- Remove the fuel tank. (Refer to page 5-4.)
- Remove the bolt and screws.

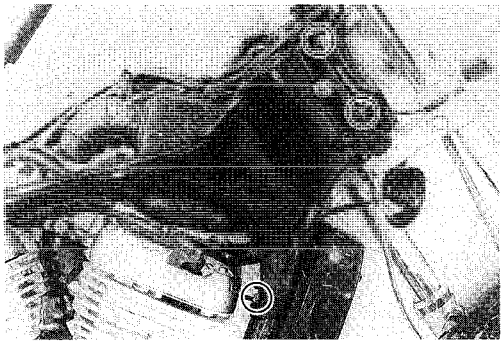


- Remove the fuel tank mounting bracket by removing the clutch hose from the hose guide.



FRAME HEAD COVER

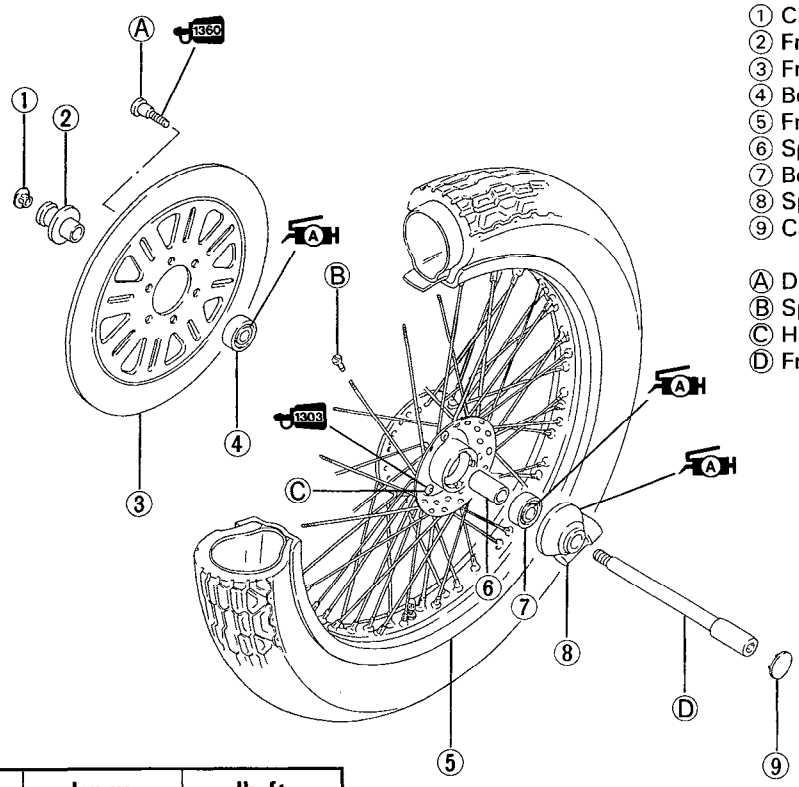
- Remove the fuel tank mounting bracket.
- Remove the right and left frame head cover by removing the screws and clamp screws.



REMOUNTING

Remount the frame cover, seat, rear cushion, fuel tank mounting bracket and frame head cover in the reverse order of its removal.

FRONT WHEEL



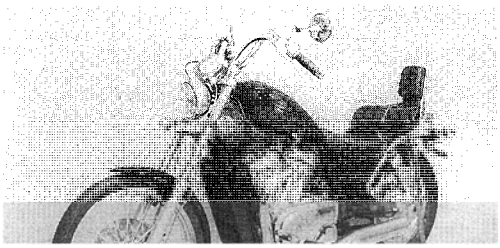
① Cap
② Front axle spacer
③ Front brake disc
④ Bearing
⑤ Front wheel
⑥ Speacer
⑦ Bearing
⑧ Speedometer gearbox
⑨ Cap

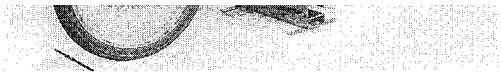
Ⓐ Disc plate bolt
Ⓑ Spork nipple
Ⓒ Hub flange bolt
Ⓓ Front axle

ITEM	N·m	kg-m	lb-ft
Ⓐ	23	2.3	16.5
Ⓑ	5	0.5	3.5
Ⓒ	25	2.5	18.0
Ⓓ	44	4.4	32.0

REMOVAL

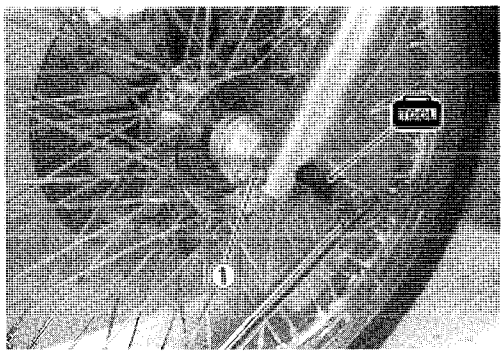
- Remove the axle pinch bolt cap and the front axle cap.
- Loosen the axle pinch bolt ①.
- Loosen the front axle.
- Raise the front wheel off the ground with a jack.
- Remove the front axle and the front wheel.



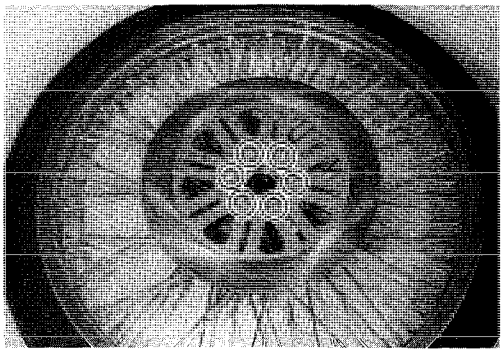


⚠ CAUTION

Do not operate the brake lever while dismounting the front wheel.



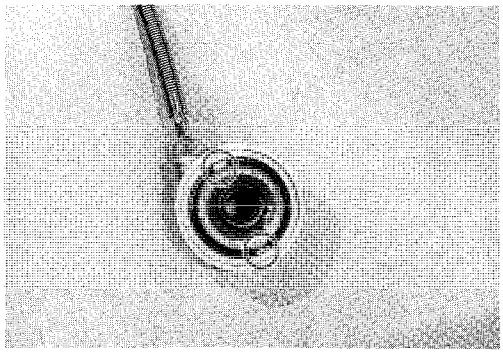
- Remove the brake disc from the front wheel.



INSPECTION AND DISASSEMBLY

SPEEDOMETER GEARBOX

Inspect the lip of dust seal and the drive lugs for damage.



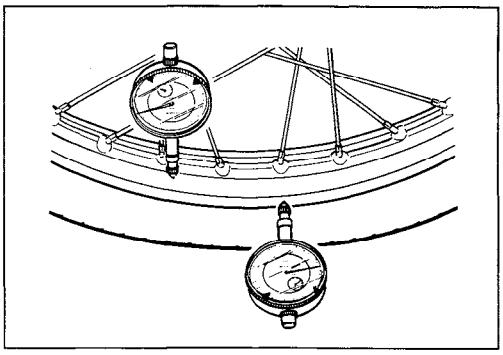
TIRE

Refer to page 2-15.

FRONT WHEEL

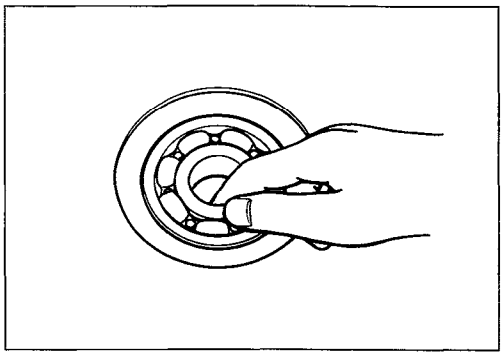
Make sure that the wheel runout checked as shown does not exceed the service limit. An excessive runout is usually due to worn or loosen wheel bearings. If bearing replacement fails to reduce the runout, replace the wheel.

Service Limit (Axial and Radial): 2.0 mm (0.08 in)



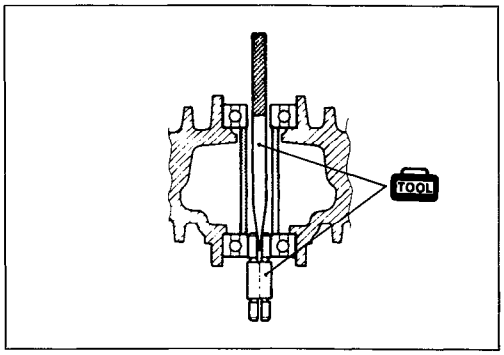
WHEEL BEARINGS

Inspect the play of the wheel bearings by finger while they are in the wheel. Rotate the inner race by finger to inspect for abnormal noise and smooth rotation.
Replace the bearing in the following procedure if there is anything unusual.



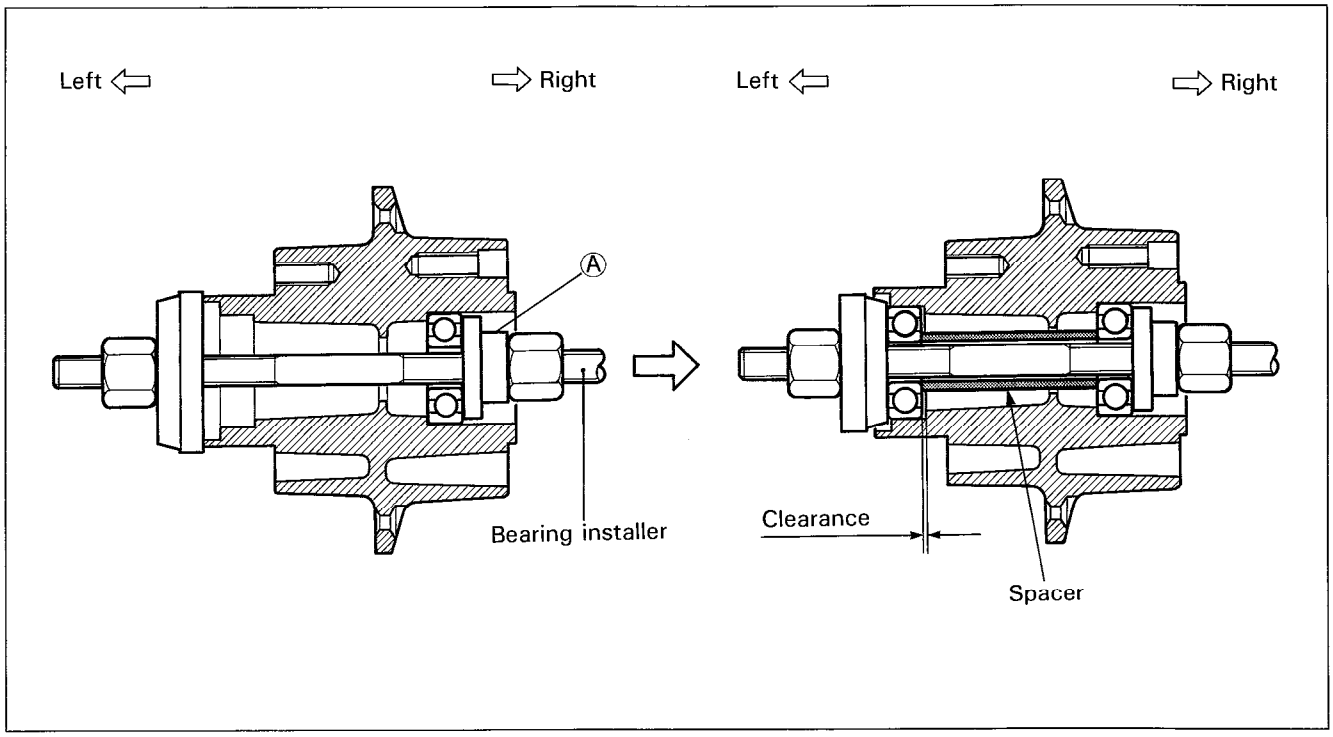
- Insert the adaptor into the wheel bearing.
- After inserting the wedge bar from the opposite side, lock the wedge bar in the slit of the adaptor.
- Drive out the wheel bearing by knocking the wedge bar.

TOOL 09941-50111: Bearing remover



⚠ CAUTION

The removed bearings should be replaced with new ones.

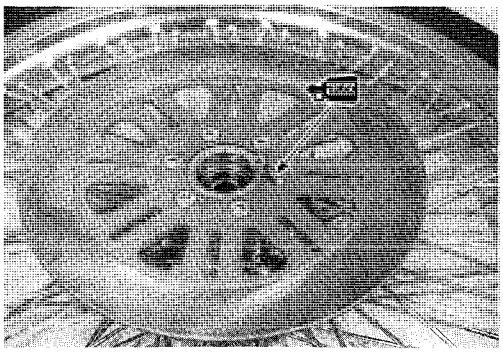


BRAKE DISC

- Make sure that the brake disc is clean and free of any greasy matter. Apply THREAD LOCK SUPER ''1360'' to the disc mounting bolts and tighten them to the specified torque.

99000-32130: THREAD LOCK SUPER ''1360''

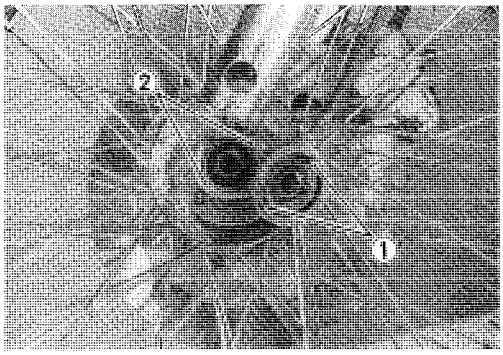
Brake disc bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)



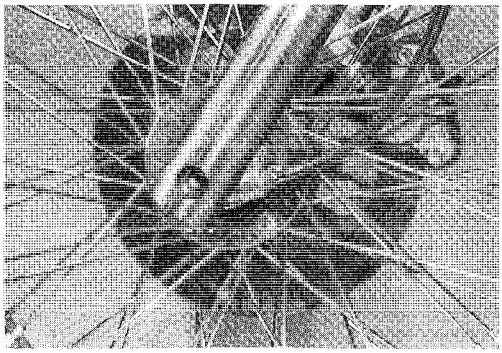
SPEEDOMETER GEARBOX

- Before installing the speedometer gearbox, apply SUZUKI SUPER GREASE ''A'' to its dust seal lip and align the drive lugs ① to the recesses ② of the wheel hub and attach the speedometer gearbox to the wheel hub.

99000-25010: SUZUKI SUPER GREASE ''A''



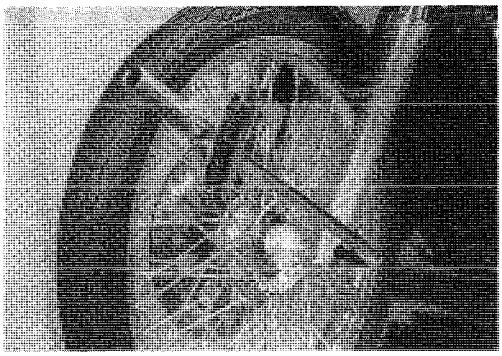
- Set to be sure that the speedometer gearbox is in the position as shown.



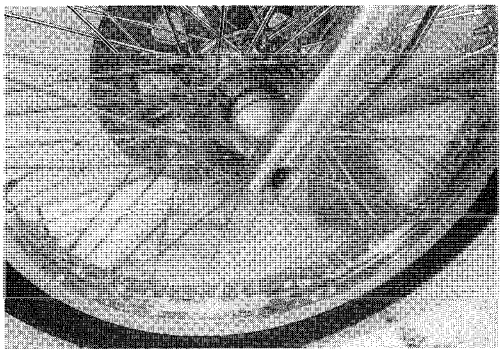
FRONT AXLE

- Tighten the front axle to the specified torque and then moving the motorcycle up and down.
- Tighten the front axle pinch bolt to the specified torque.

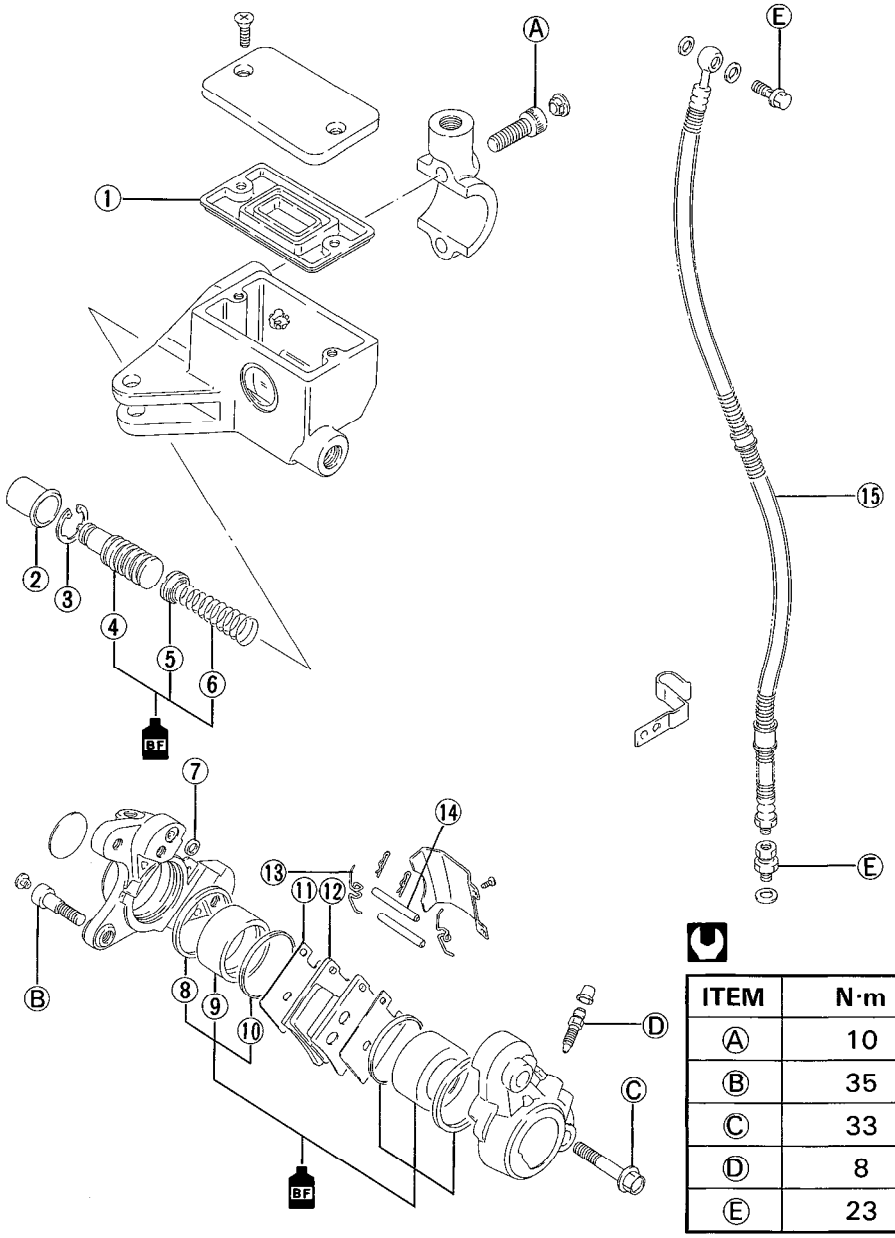
Front axle: 44 N·m (4.4 kg-m, 32.0 lb-ft)
Front axle pinch bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)



- Reassemble the axle pinch bolt cap and the front axle cap.



FRONT BRAKE



① Diaphragm
② Dust boot
③ Circlip
④ Piston
⑤ Primary cup
⑥ Return spring
⑦ O-ring
⑧ Piston seal
⑨ Piston
⑩ Dust seal
⑪ Pad shim
⑫ Brake pad
⑬ Spring
⑭ Pad mounting pin
⑮ Brake hose

Ⓐ Front master cylinder mounting bolt
Ⓑ Caliper mounting bolt
Ⓒ Caliper housing bolt
Ⓓ Caliper air bleeder valve
Ⓔ Brake hose union bolt

ITEM	N·m	kg-m	lb-ft
Ⓐ	10	1.0	7.0
Ⓑ	35	3.5	25.5
Ⓒ	33	3.3	24.0
Ⓓ	8	0.8	6.0
Ⓔ	23	2.3	16.5

⚠ WARNING

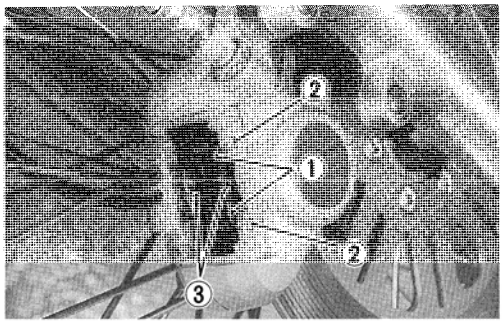
* This brake system is filled with a ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid such as silicone-based or petroleum-based.
* Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or stored for long periods.
* When storing the brake fluid, seal the container completely and keep away from children.
* When replenishing brake fluid, take care not to get dust into fluid.
* When washing brake components, use fresh brake fluid. Never use cleaning solvent.
* A contaminated brake disc or brake pad reduces braking performance. Discard contaminated pads and clean the disc with high quality brake cleaner or neutral detergent.

⚠ CAUTION

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

BRAKE PAD REPLACEMENT

- Remove the cover.
- Remove the brake pads with pad shims by removing the clips ①, pad mounting pins ② and springs ③.



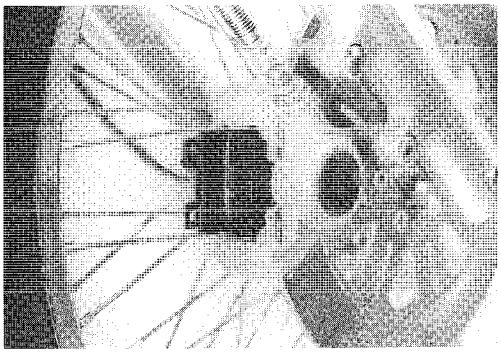
⚠ CAUTION

*** Do not operate the brake lever while dismounting the pads.**

performance will be adversely affected.

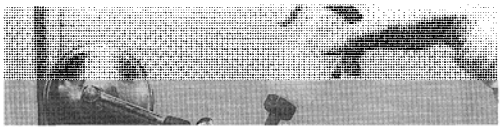
- Remount the new pads.

NOTE:
After replacing the brake pads, pump with the brake lever few times to operate the brake correctly and then check the brake fluid level.

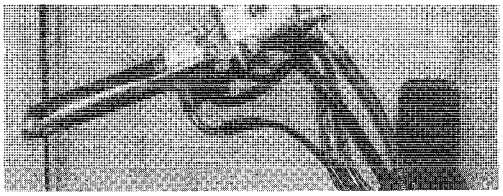


BRAKE FLUID REPLACEMENT

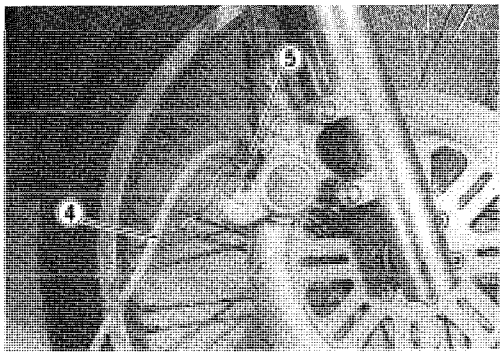
- Place the motorcycle on a level surface and keep the handlebars straight.



- Remove the master cylinder reservoir cap and diaphragm.
- Suck up the old brake fluid as much as possible.
- Fill the reservoir with fresh brake fluid.



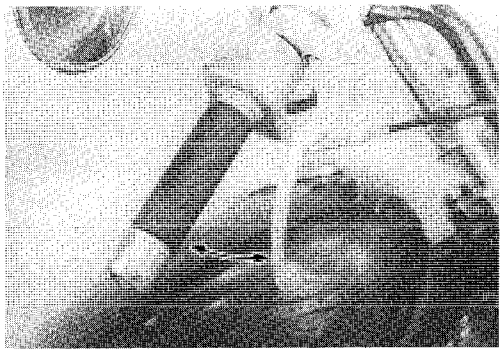
- Attach a pipe ④ to the caliper air bleeder valve ⑤, and insert the free end of hose into a receptacle.
- Loosen the bleeder valve and pump the brake lever until no more old brake fluid flows out of the bleeder valve.
- Close the caliper air bleeder valve, and disconnect a clear hose. Fill the reservoir with fresh brake fluid to the upper end of the inspection window.



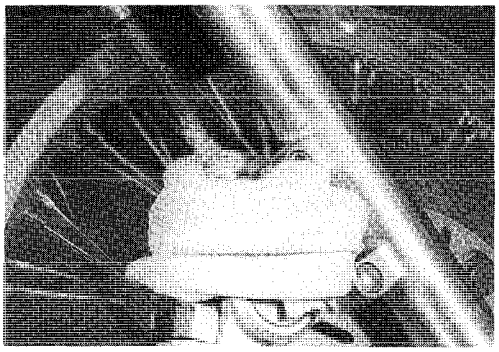
Specification and Classification: DOT 4

⚠ CAUTION

Bleed air in the brake fluid circuit. (Refer to page 2-13.)



CALIPER REMOVAL AND DISASSEMBLY



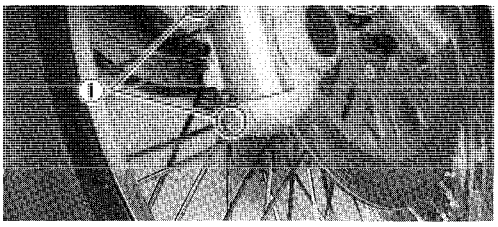
- Disconnect the brake hose from the caliper by removing the union bolt and catch the brake fluid in a suitable receptacle.

NOTE:
Place a rag underneath the union bolt on the brake caliper to catch the spilled drops of brake fluid.

- Remove the brake caliper by removing the caliper mounting bolts.

⚠ CAUTION

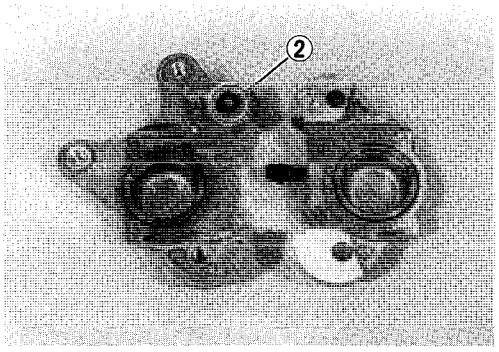
Never reuse the brake fluid left over from previous ser-



⚠ WARNING

Brake fluid, if it leaks, will interfere with safe running and discolor painted surfaces. Check the brake hose and hose joints for cracks and fluid leakage.

NOTE:
Slightly loosen the caliper housing bolts ① to facilitate later disassembly before removing the caliper mounting bolts.

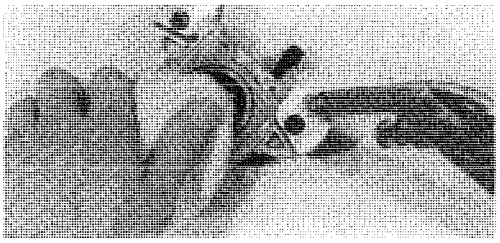


- Remove the pads. (Refer to page 7-9.)
- Remove the caliper housing bolts ①.
- Separate the caliper halves.
- Remove the O-ring ②.

⚠ CAUTION

Do not reuse the O-ring to prevent fluid leakage.

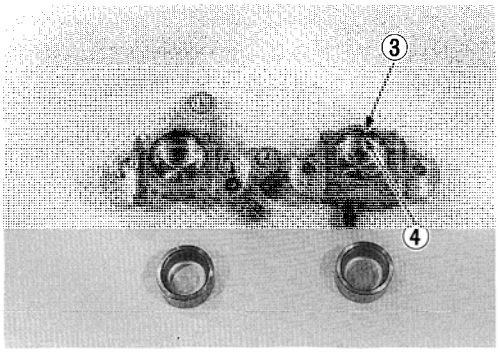
- Place a rag over the piston to prevent its popping out and push out the piston with an air gun.



⚠ CAUTION

Do not use high pressure air to prevent piston damage.

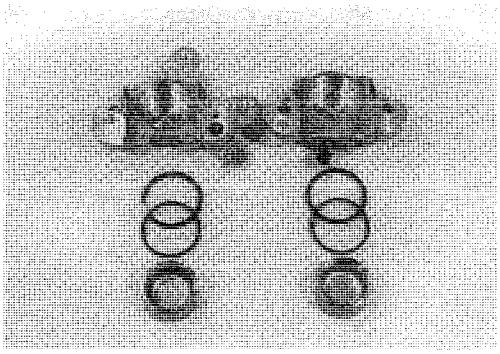
- Remove the dust seals ③ and piston seals ④.



⚠ CAUTION

Do not reuse the dust seals and piston seals to prevent fluid leakage.

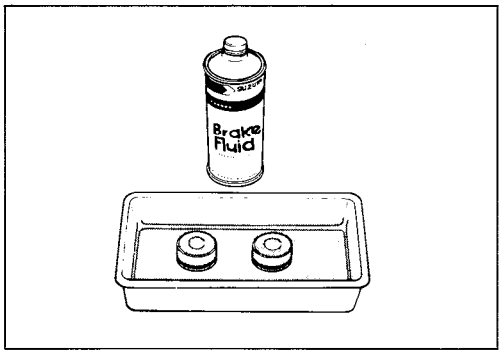
CALIPER INSPECTION



CALIPER
Inspect the caliper cylinder wall for nicks, scratches or other damage.

PISTON
Inspect the piston surface for any scratches or other damage.

CALIPER REASSEMBLY AND REMOUNTING



Reassemble the caliper in the reverse order of removal and disassembly. Pay attention to the following points:

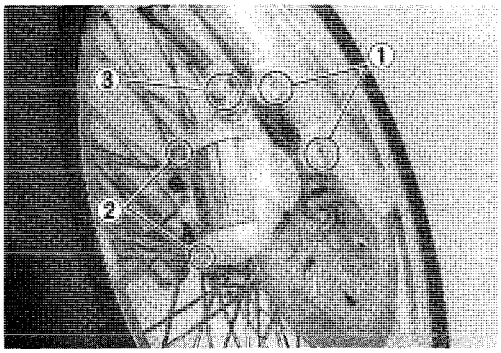
- Wash the caliper bores and pistons with specified brake fluid. Particularly wash the dust seal grooves and piston seal grooves.

BF Specification and Classification: DOT 4

⚠ CAUTION

*** Wash the caliper components with fresh 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 solvent such as gasoline, kerosine or the others.**
*** Replace the piston seals and dust seals with new ones when reassembly. Apply the brake fluid to both seals when installing them.**

- Tighten each bolt to the specified torque.



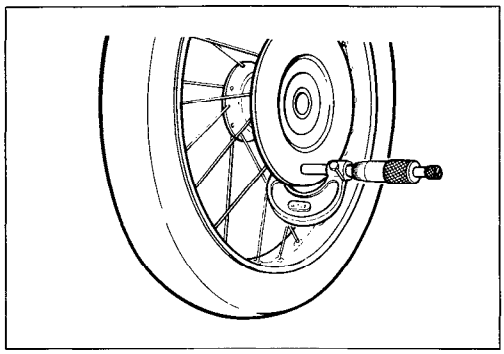
Caliper mounting bolt ①: 35 N·m (3.5 kg-m, 25.5 lb-ft)
Caliper housing bolt ②: 33 N·m (3.3 kg-m, 24.0 lb-ft)
Brake hose union bolt ③: 23 N·m (2.3 kg-m, 16.5 lb-ft)

NOTE:
Before remounting the caliper, push the piston all the way into the caliper.

⚠ CAUTION

Bleed air from the system after reassembling the caliper. (Refer to page 2-13.)

BRAKE DISC INSPECTION

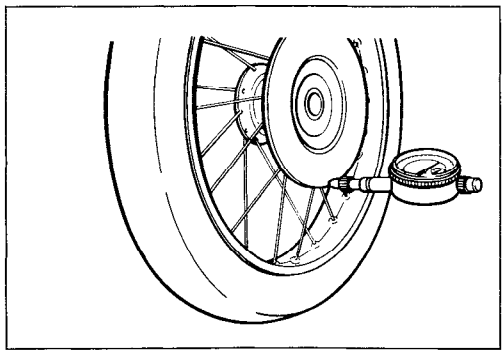


- Remove the front wheel. (Refer to page 7-3.)

Visually check the brake disc for damage or cracks.
Measure the thickness with a micrometer.
Replace the disc if the thickness is less than the service limit or if damage is found.

Service Limit
Front disc: 4.5 mm (0.18 in)

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



Measure the runout with a dial gauge.
Replace the disc if the runout exceeds the service limit.

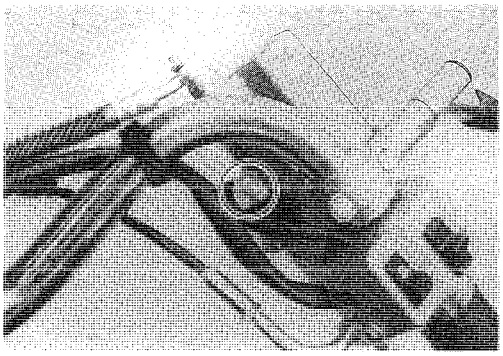
Service Limit
Front disc: 0.3 mm (0.012 in)

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

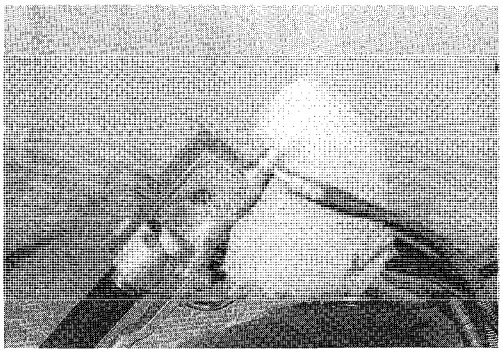
- Remove the disc. (Refer to page 7-4.)
- Install the disc. (Refer to page 7-6.)

MASTER CYLINDER REMOVAL AND DISASSEMBLY

- Disconnect the front brake light switch lead wires and remove the rear-view mirror.



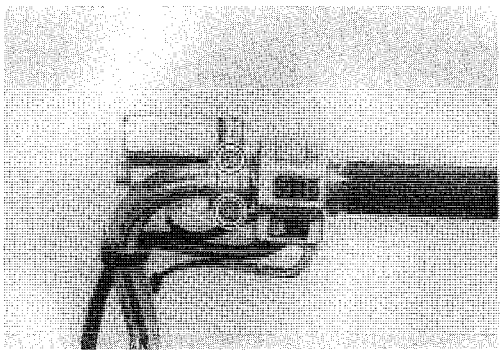
- Place a rag underneath the union bolt on the master cylinder to catch any spilled drops of brake fluid. Remove the union bolt and disconnect the brake hose/master cylinder joint.



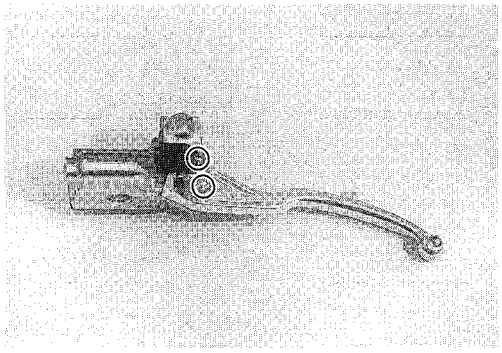
⚠ CAUTION

Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The fluid reacts chemically with paint, plastics and rubber materials, etc. and will damage them severely.

- Remove the master cylinder assembly.

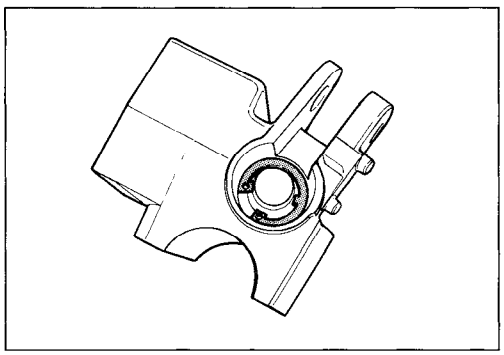


- Remove the brake lever and brake light switch.
- Remove the reservoir cap and diaphragm.
- Drain brake fluid.



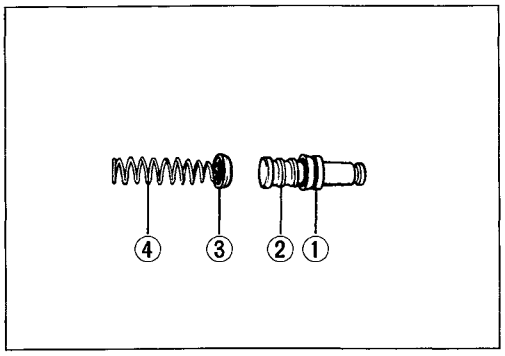
- Pull the dust boot out and remove the circlip.

TOOL **09900-06108: Snap ring pliers**



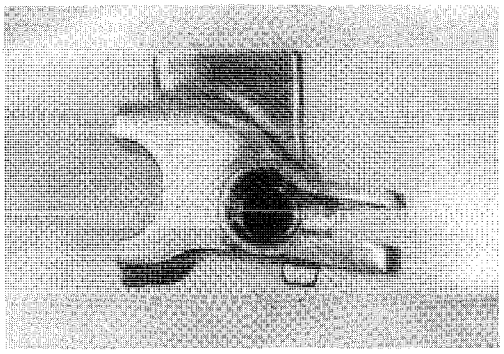
- Remove the piston, secondary cup, primary cup and return spring.

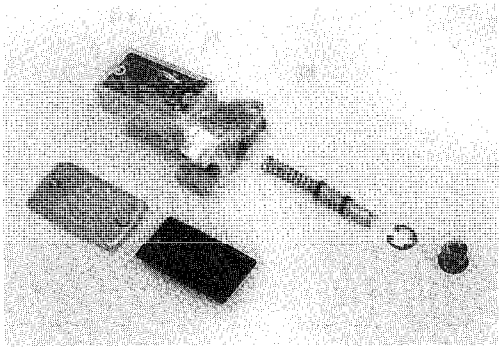
① Secondary cup
② Piston
③ Primary cup
④ Return spring



MASTER CYLINDER INSPECTION

Inspect the master cylinder bore for any scratches or other damage.
Inspect the piston surface for any scratches or other damage.
Inspect the primary cup, secondary cup and dust seal for wear or damage.



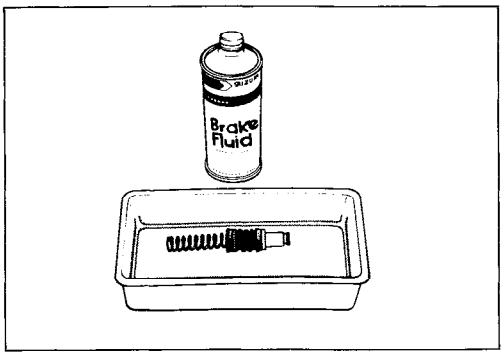


MASTER CYLINDER REASSEMBLY AND REMOUNTING

Reassemble the master cylinder in the reverse order of removal and disassembly. Pay attention to the following points:

⚠ CAUTION

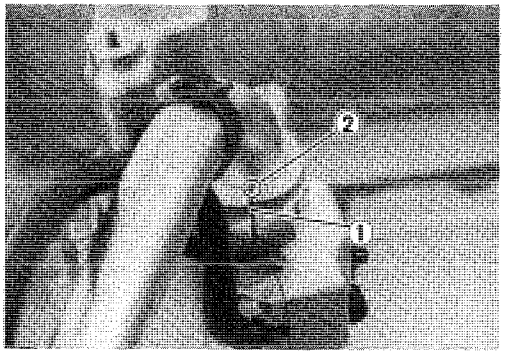
*** Wash the master cylinder components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.**
*** Do not wipe the components with a rag.**
*** Apply brake fluid to the cylinder bore and all the component to be inserted into the bore.**



BF Specification and Classification: DOT 4

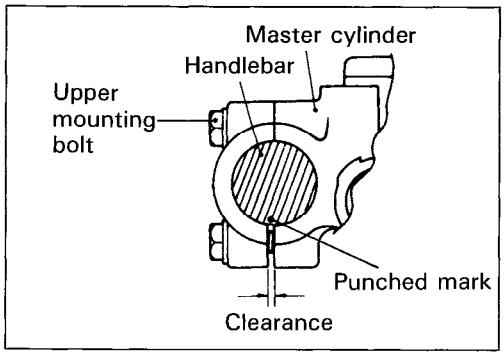
- When remounting the master cylinder on the handlebar, align the master cylinder holder's mating surface ① with punched mark ② on the handlebar and tighten the upper mounting bolt first as shown.

Front master cylinder mounting bolt: 10 N·m (1.0 kg-m, 7.0 lb-ft)

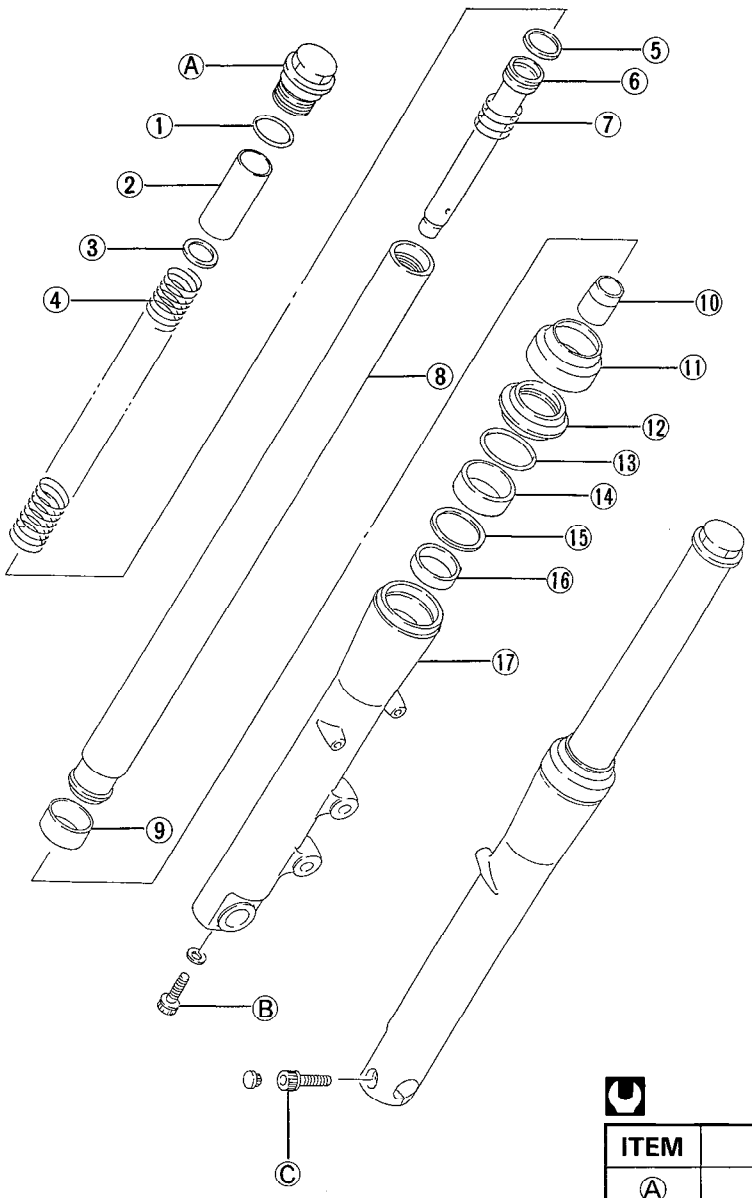


⚠ CAUTION

Bleed air from the system after reassembling master cylinder. (Refer to page 2-13.)



FRONT FORK



① O-ring
② Spacer
③ Spring seat
④ Spring
⑤ Damper rod ring
⑥ Damper rod
⑦ Rebound spring
⑧ Inner tube
⑨ Inner tube metal
⑩ Oil lock piece
⑪ Dust seal cover
⑫ Dust seal
⑬ Oil seal stopper ring
⑭ Oil seal
⑮ Oil seal retainer
⑯ Outer tube metal
⑰ Outer tube

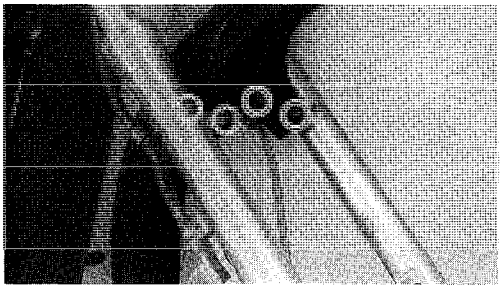
Ⓐ Front fork cap bolt
Ⓑ Front fork damper rod bolt
Ⓒ Front axle pinch bolt

ITEM	N·m	kg-m	lb-ft
Ⓐ	90	9.0	65.0
Ⓑ	20	2.0	14.5
Ⓒ	23	2.3	16.5

REMOVAL AND DISASSEMBLY

Support the motorcycle with a jack.

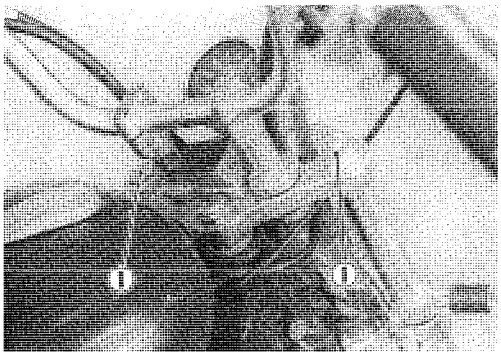
- Remove the front wheel. (Refer to page 7-3.)
- Remove the front fender by removing the four bolts.
- Remove the brake caliper.



⚠ CAUTION

Hang the brake caliper from the motorcycle frame by using a string and so on, taking care not to bend the brake hose.

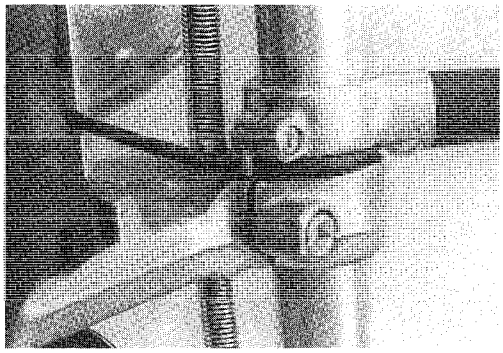
- Remove the front fork cap bolts ①.



⚠ WARNING

Hold the front fork cap bolt down when removing it, or the cap bolt will jump out of the front fork due to spring pressure and may cause injury.

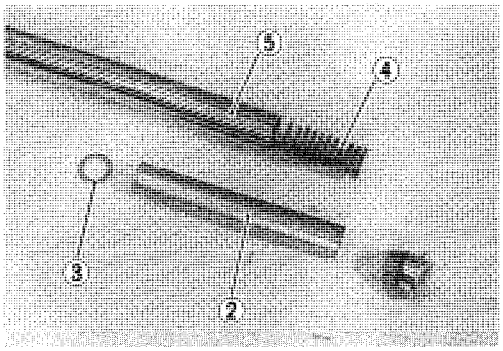
- Loosen the front fork lower clamp bolts and the turn signal light clamp bolts.
- Remove the front forks.



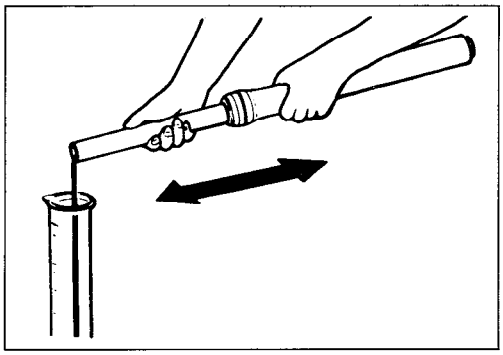
⚠ CAUTION

Be careful not to drop the front fork when loosening the bolts.

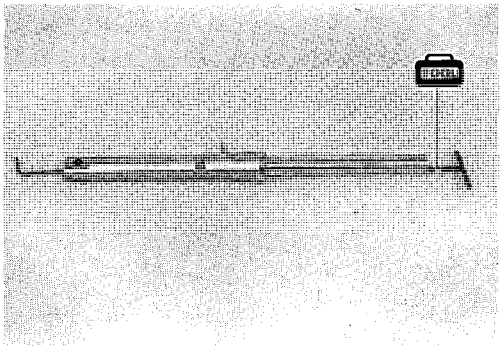
- Remove the spacer ②, spring seat ③ and spring ④ out of the inner tube ⑤.



- Turn the fork upside down and stroke it several times to let out fork oil.
- Hold the fork upside down for a few minutes to drain oil.

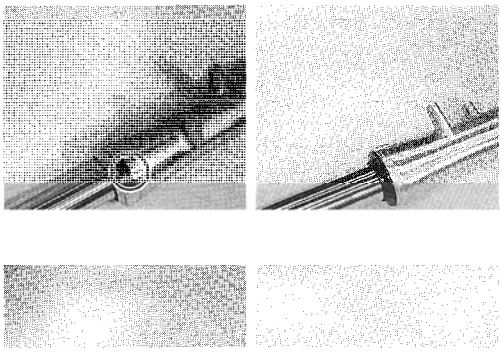


- While holding the caliper or front fender mounting portion by vise and remove the damper rod with the special tool and the hexagon wrench.



TOOL **09940-34520: T-handle**
09940-34530: Attachment "A"

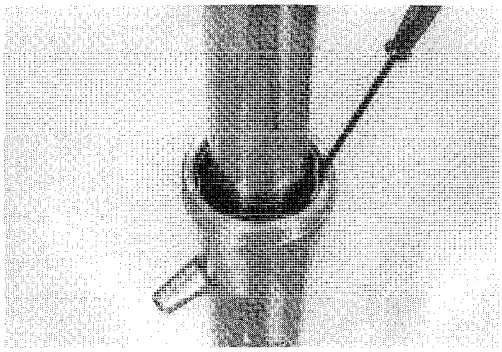
- Remove the dust seal cover and the dust seal.



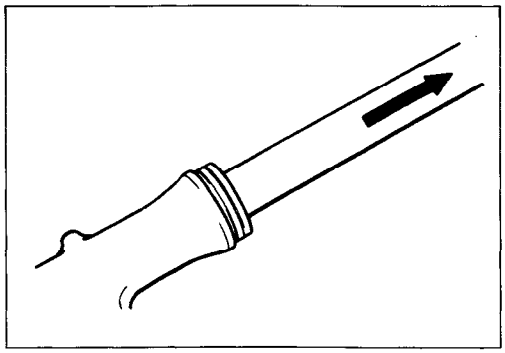
- Remove the oil seal stopper ring.

⚠ CAUTION

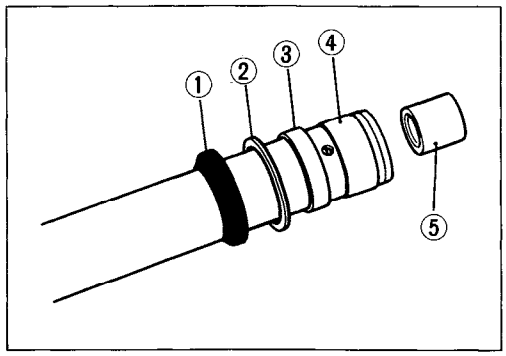
Be careful not to scratch the outer and inner tube when removing the dust seal cover, dust seal and oil seal stopper ring.



- Remove the inner tube from the outer tube.



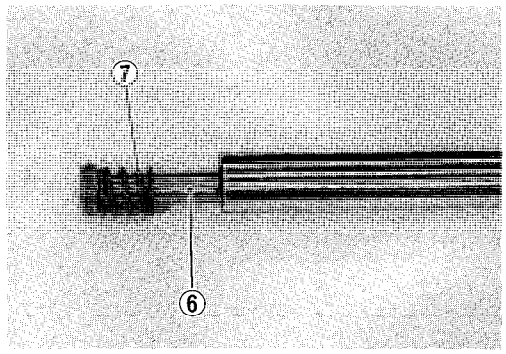
- Remove the following parts.
  ① Oil seal
  ② Oil seal retainer
  ③ Anti-friction metal (Outer tube metal)
  ④ Anti-friction metal (Inner tube metal)
  ⑤ Oil lock piece



⚠ CAUTION

The outer tube and inner tube "anti-friction" metals must be replaced along with oil seal and dust seal.

- Remove the damper rod ⑥ and the rebound spring ⑦ out of the inner tube.

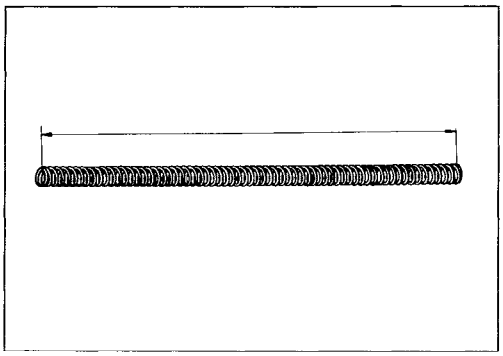


INSPECTION

FORK SPRING

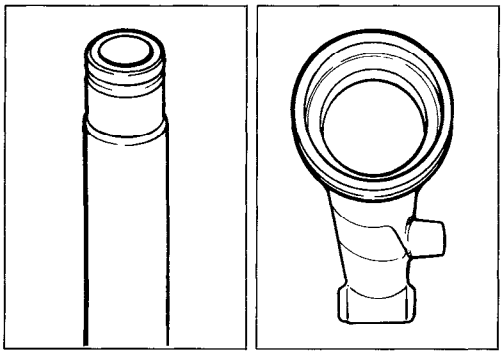
Measure the fork spring free length. If it is shorter than the service limit, replace it with a new one.

Service Limit: 348.3 mm (13.71 in)



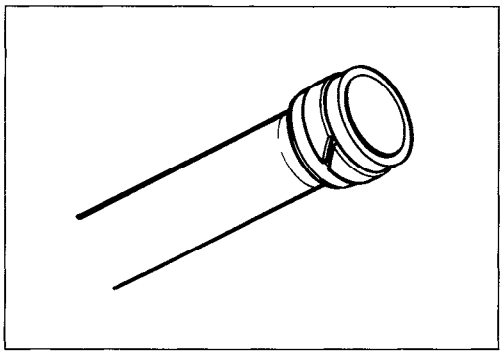
INNER AND OUTER TUBE

Inspect the inner tube sliding surface and outer tube sliding surface for any scuffing.



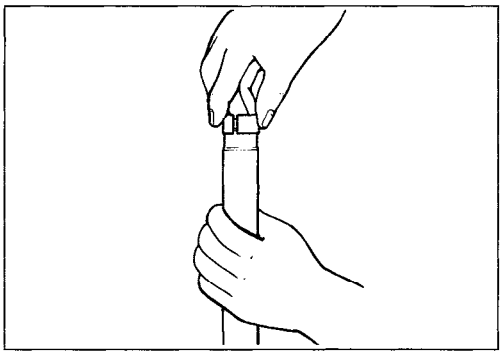
DAMPER ROD RING

Inspect the damper rod ring for wear or damage.



REASSEMBLY AND REMOUNTING

Reassemble and remount the front fork in the reverse order of removal and disassembly. Pay attention to the following points:



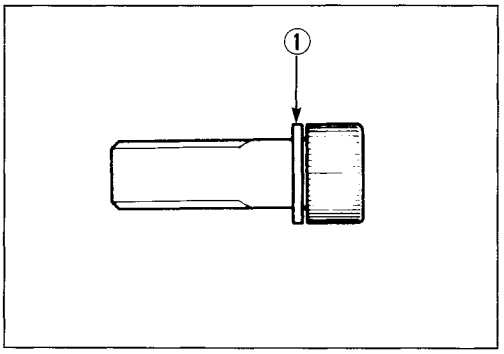
INNER TUBE METAL

- Hold the inner tube vertically and clean the metal groove and install the anti-friction metal by hand as shown.

DAMPER ROD

- Install the oil lock piece to the damper rod.
- Replace the gasket ① with a new one.
- Tighten the damper rod bolt to the specified torque.

Front fork damper rod bolt: 20 N·m (2.0 kg-m, 14.5 lb-ft)



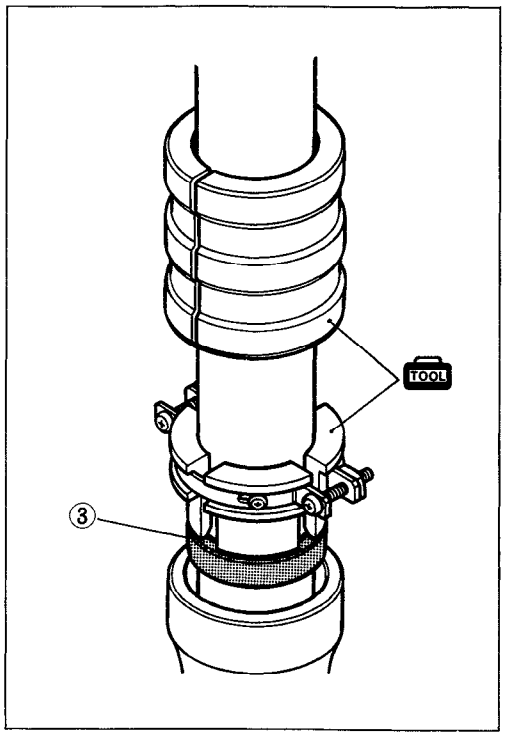
OUTER TUBE METAL, OIL SEAL AND DUST SEAL

- Install the outer tube metal ①, oil seal retainer ② and oil seal ③ with the special tool.

TOOL 09940-52860: Front fork oil seal installer

⚠ CAUTION

Use special care to prevent damage to the "Teflon" coated surface of the Anti-friction inner tube metal when mounting it.

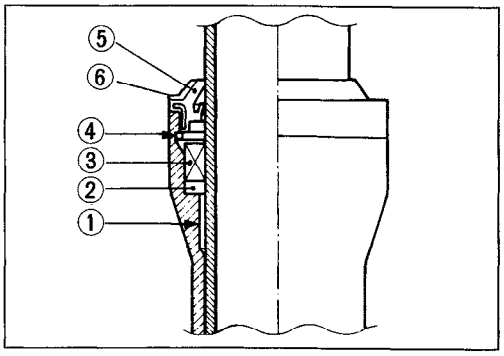


- Install the oil seal stopper ring ④.

⚠ CAUTION

Make sure that the oil seal stopper ring fitted securely.

- Install the dust seal ⑤.
- Install the dust seal cover ⑥.



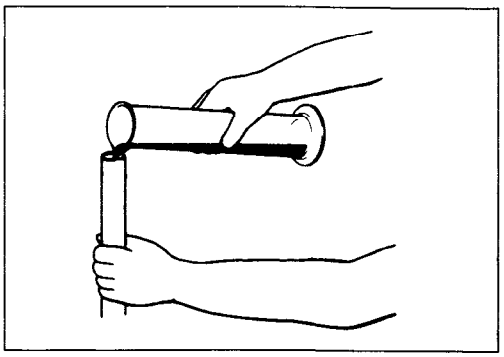
FORK OIL

- Pour specified fork oil into the inner tube.

Fork oil type: Fork oil #10

FORK 99000-99044-10G: SUZUKI FORK OIL #10

Capacity (each leg): 418 ml (14.1/14.7 US/Imp oz)

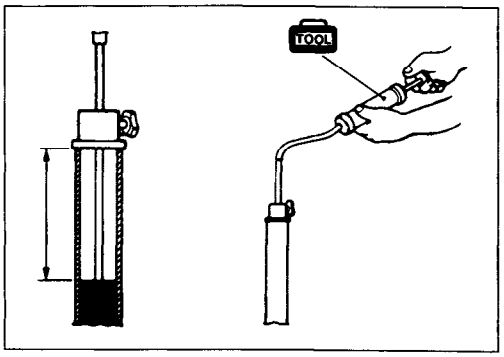


- Hold the front fork vertical and adjust the fork oil level with the special tool.

TOOL 09943-74111: Fork oil level gauge

Oil level: 118 mm (4.6 in)

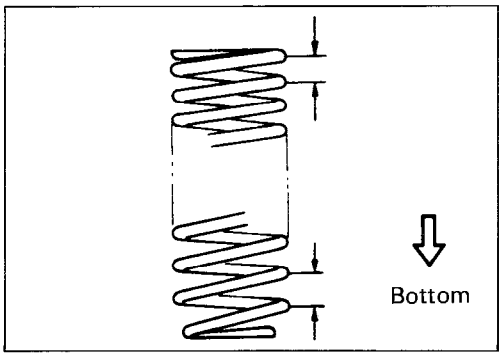
NOTE:
When adjusting the oil level, remove the fork spring and compress the inner tube fully.



FORK SPRING

- Install the fork spring as shown in the illustration.

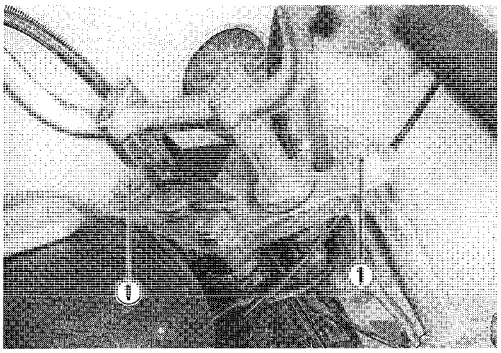
NOTE:
Close-pitch end of spring should position upper.



FRONT FORK REMOUNTING

- Remount the front fork assembly and the turn signal light assembly.
- Tighten the front fork cap bolt ① to the specified torque.

Front fork cap bolt: 90 N·m (9.0 kg-m, 65.0 lb-ft)



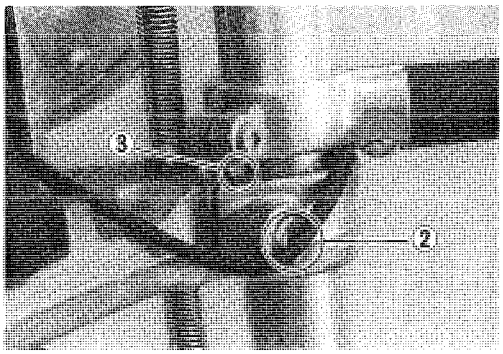
⚠ CAUTION

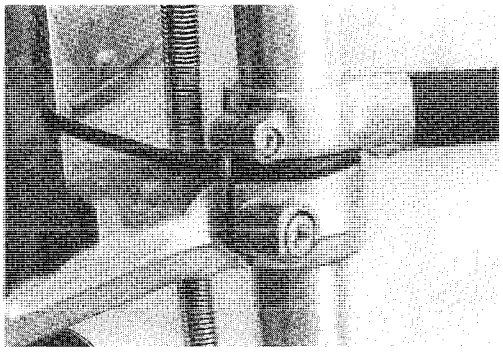
Replace the O-ring with a new one to prevent oil leakage.

- Tighten the front fork lower clamp bolt ② to the specified torque.

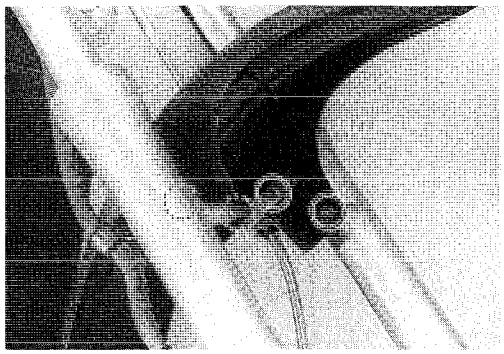
Front fork lower clamp bolt: 33 N·m (3.3 kg-m, 24.0 lb-ft)

- After touching the stopper of turn signal light bracket ③ to the mating surface, tighten the turn signal light bracket bolt.





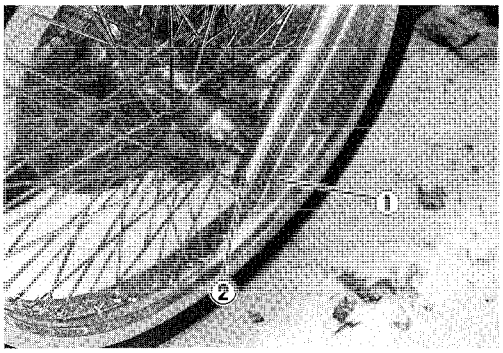
- Remount the front fender.



- Remount the front wheel. (Refer to pages 7-6, 7-7.)

Front axle ①: **44 N·m (4.4 kg-m, 32.0 lg-ft)**
Front axle pinch bolt ②: **23 N·m (2.3 kg-m, 16.5 lb-ft)**

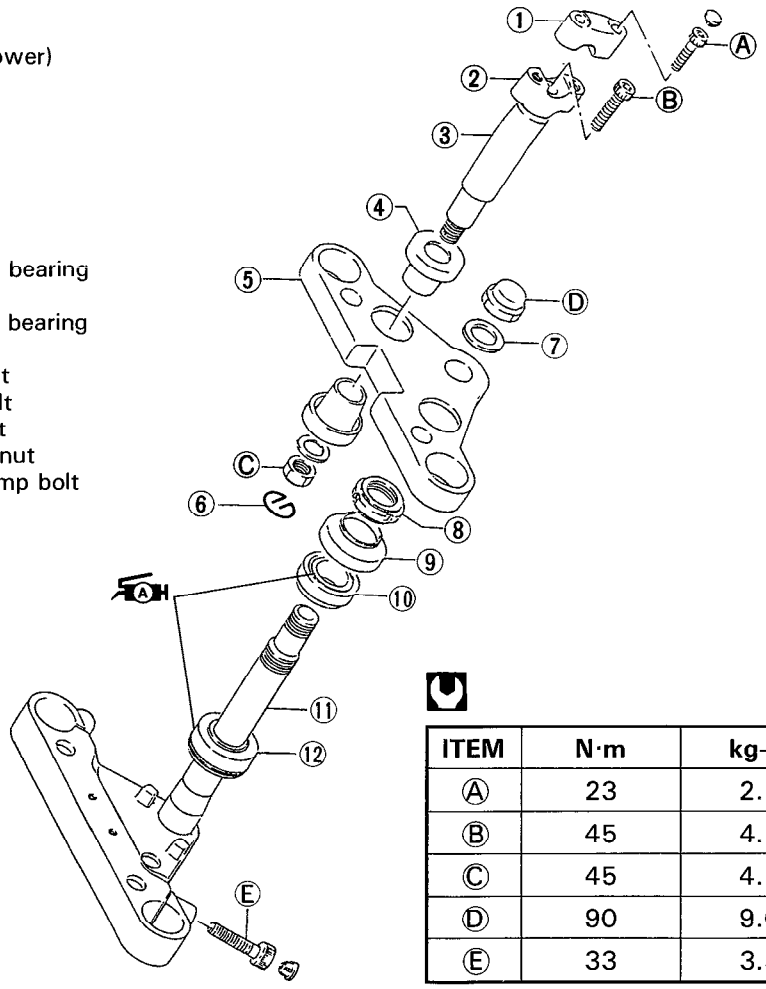
- Remount the brake caliper. (Refer to page 7-11.)



STEERING

① Handlebar clamp
② Handlebar clamp (Lower)
③ Handlebar holder
④ Damper
⑤ Steering stem head
⑥ Stopper ring
⑦ Washer
⑧ Steering stem nut
⑨ Dust seal
⑩ Steering stem upper bearing
⑪ Steering stem
⑫ Steering stem lower bearing

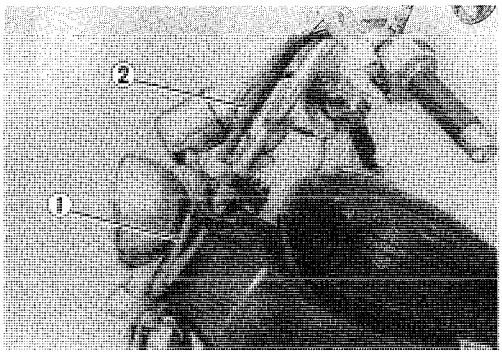
Ⓐ Handlebar clamp bolt
Ⓑ Handlebar holder bolt
Ⓒ Handlebar holder nut
Ⓓ Steering stem head nut
Ⓔ Front fork lower clamp bolt



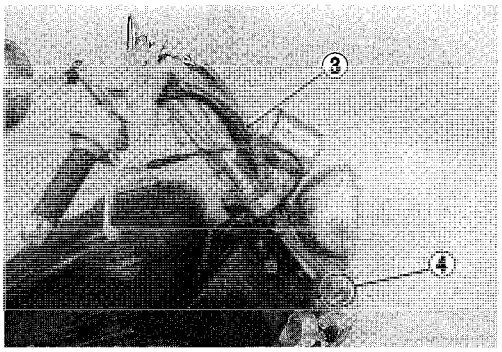
ITEM	N·m	kg-m	lb-ft
Ⓐ	23	2.3	16.5
Ⓑ	45	4.5	32.5
Ⓒ	45	4.5	32.5
Ⓓ	90	9.0	65.0
Ⓔ	33	3.3	24.0

REMOVAL AND DISASSEMBLY

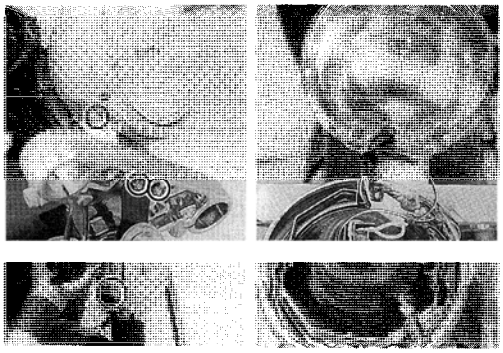
- Remove the front wheel. (Refer to page 7-3.)
- Remove the front forks. (Refer to pages 7-16, 7-17.)
- Remove the speedometer cable ①.
- Remove the clutch hose ②. (Refer to page 7-41.)



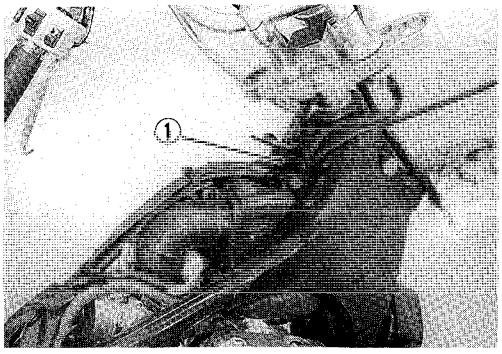
- Remove the brake hose ③ and brake hose joint ④. (Refer to page 7-13.)



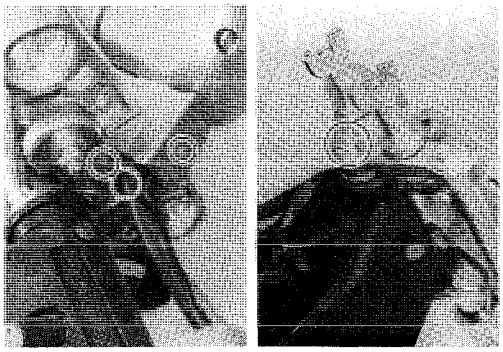
- Disconnect the horn lead wires.
- Disconnect the lead wires in the headlight housing and remove the headlight.
- Remove the headlight housing and the horn.



- Remove the fuel tank. (Refer to page 5-4.)
- Remove the fuel tank mounting bracket ① (Refer to page 7-2).
- Disconnect the right and left handlebar switch lead wires and remove its from the steering stem head.
- Remove the handlebars by removing handlebar clamp bolts.



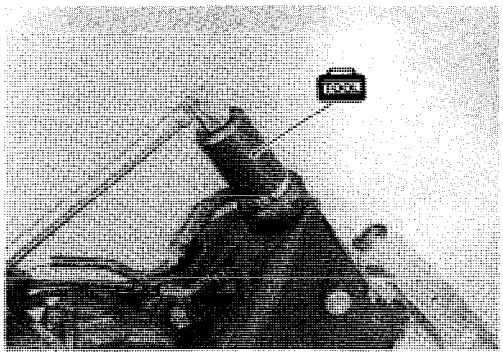
- Remove the speedometer from the steering stem head.
- Remove the steering stem head by removing the steering stem head nut.



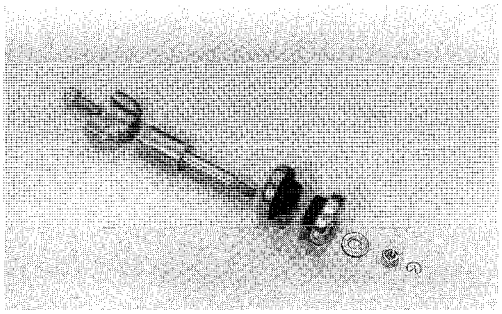
- Remove the steering stem nut by using the special tool, then remove the steering stem.

TOOL 09940-14911: Steering stem nut wrench

NOTE:
Hold the steering stem by hand to prevent it from falling.



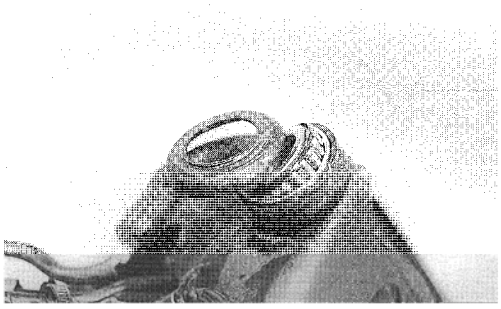
- Disassemble the handlebar holders.



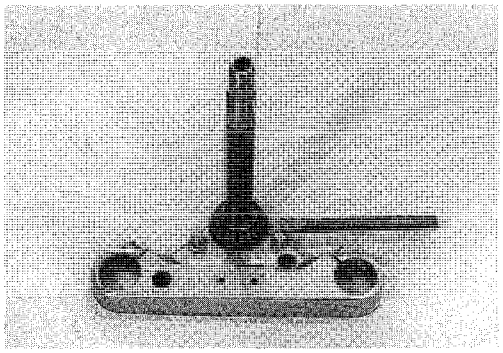
INSPECTION AND DISASSEMBLY

Inspect the removed parts for the following abnormalities.

* Handlebars distortion
* Handlebar clamp wear
* Race wear and brinelling
* Bearing wear or damage
* Abnormal noise of bearing
* Distortion of steering stem



- Remove the steering stem upper bearing.
- Remove the steering stem lower bearing by using the chisel.

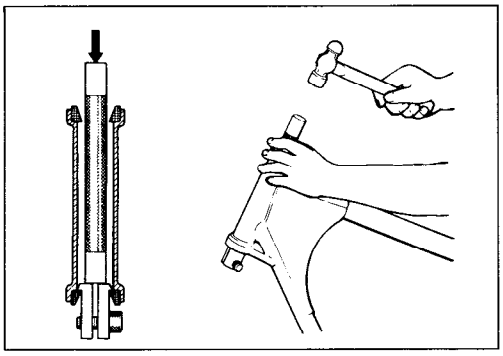


⚠ CAUTION

The removed bearing should be replaced with a new one.

- Drive out the steering stem bearing races, upper and lower, by using the special tools.

TOOL 09941-54911: Bearing outer race remover
09941-74910: Steering bearing installer/remover



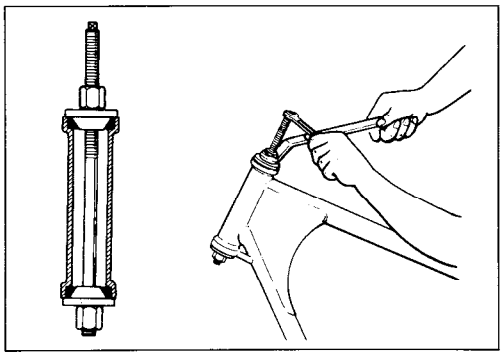
REASSEMBLY AND REMOUNTING

Reassemble and remount the steering stem in the reverse order of removal and disassembly. Pay attention to the following points:

OUTER RACES

- Press in the upper and lower outer races by using the special tool.

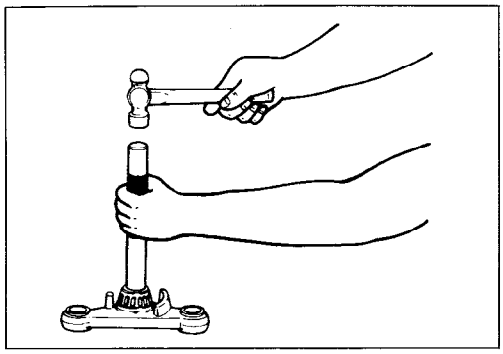
TOOL 09941-34513: Steering race installer



BEARING

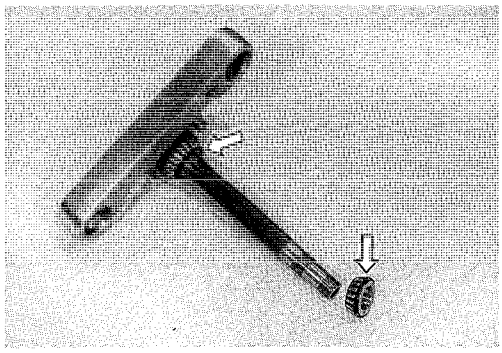
- Press in the lower bearing by using the special tool.

TOOL 09941-74910: Steering bearing installer/remover



- Apply SUZUKI SUPER GREASE "A" to the upper and lower bearings before remounting the steering stem.

99000-25010: SUZUKI SUPER GREASE "A"

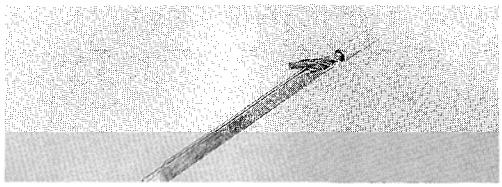


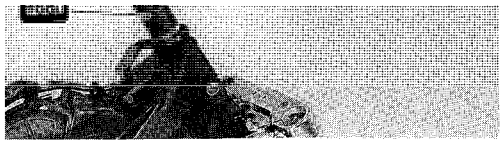
STEM NUT

- Tighten the steering stem nut to the specified torque.

09940-14911: Steering stem nut wrench

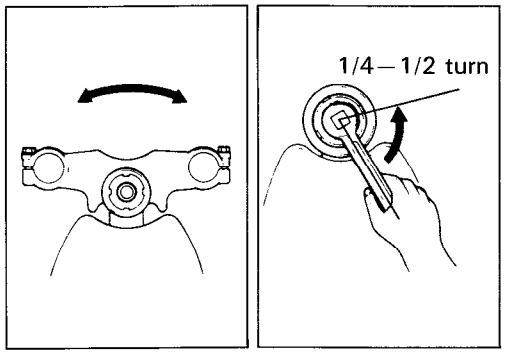
Steering stem nut: 45 N·m (4.5 kg-m, 32.5 lb-ft)





- Turn the steering stem about five or six times to the left and right so that the taper roller bearing will be seated properly.
- Turn back the stem nut by 1/4—1/2 turn.
  Then retighten very lightly so that no play can be defected in the stem.

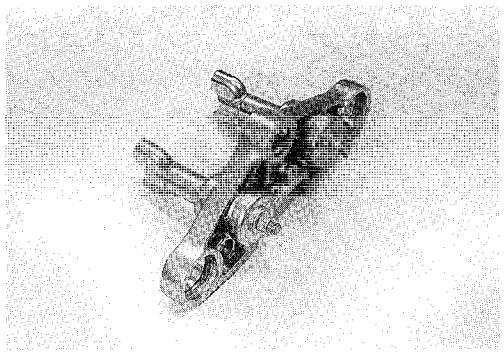
NOTE:
This adjustment will vary from motorcycle to motorcycle.



HANDLEBAR HOLDER

- Tighten the handlebar holder mounting nuts and bolts to the specified torque.

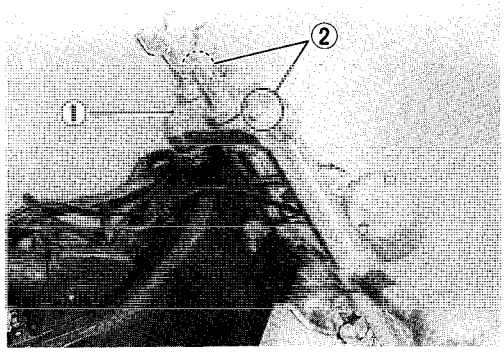
Handlebar holder nut: 45 N·m (4.5 kg-m, 32.5 lb-ft)
Handlebar holder bolt: 45 N·m (4.5 kg-m, 32.5 lb-ft)



STEERING STEM HEAD NUT

- Before tighten the steering stem head nut ①, remount the front forks and tighten the front fork cap bolts ② to the specified torque. (Refer to page 7-21.)

Front fork cap bolt ②: 90 N·m (9.0 kg-m, 65.0 lb-ft)
Steering stem head nut ①: 90 N·m (9.0 kg-m, 65.0 lb-ft)

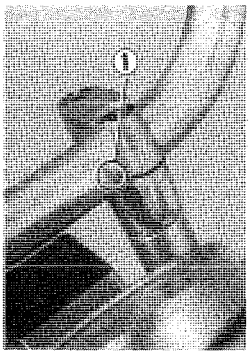


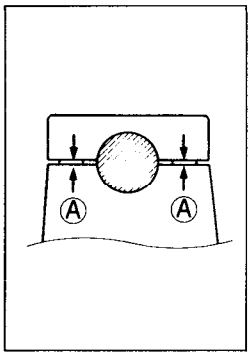
NOTE:
Then remount the front forks, make sure of the throttle cable, wiring harness and turn signal lamp position.

HANDLEBARS

- Set the handlebars to match its punched mark ① to the mating face of the holder.
- Secure the each handlebar clamp in such a way that the clearances Ⓐ ahead and behind the handlebar are equalized.

Handlebar clamp bolt: 23 N·m (2.3 kg-m, 16.5 lb-ft)

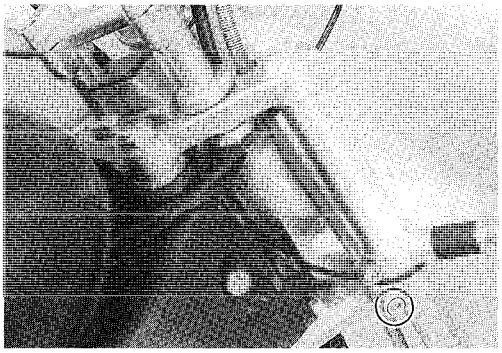




FRONT FORK LOWER CLAMP BOLT

- Tighten the front fork lower clamp bolt to the specified torque.

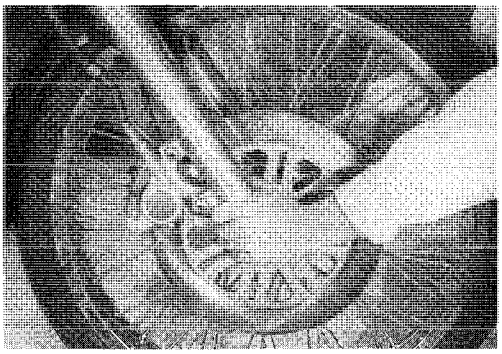
Front fork lower clamp bolt: 33 N·m (3.3 kg-m, 24.0 lb-ft)

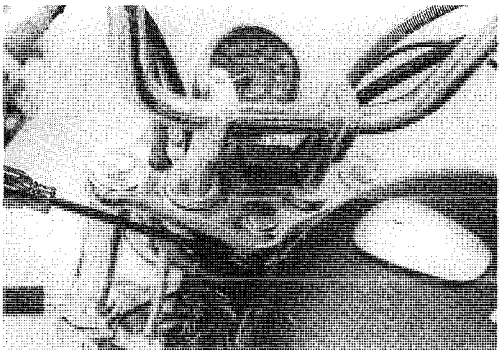


STEERING TENSION ADJUSTMENT

- Check the steering movement after reassemble and re-mount the all parts. (Refer to page 2-16.)
- If play is found, adjust it in following procedure.
  1) First, loosen the front fork lower clamp bolts and steering stem head nut, and then adjust the steering stem nut by loosening or tightening it.
  2) Tighten the steering stem head nut and clamp bolts to the specified torque and re-check.

Steering stem head nut: 90 N·m (9.0 kg-m, 65.0 lb-ft)
Front fork lower clamp bolt: 33 N·m (3.3 kg-m, 24.0 lb-ft)

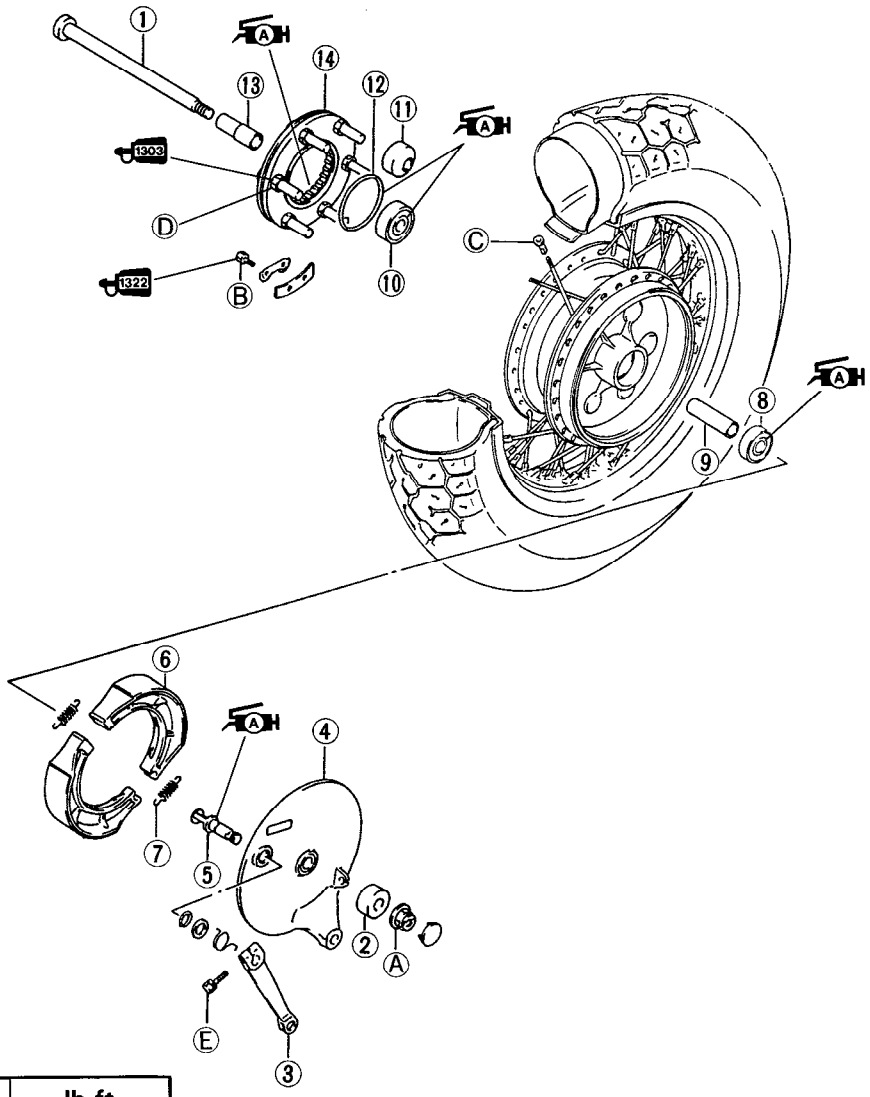




REAR WHEEL AND BRAKE

① Rear axle
② Spacer (RH)
③ Brake cam lever
④ Brake panel
⑤ Brake cam
⑥ Brake shoe
⑦ Return spring
⑧ Bearing (RH)
⑨ Spacer
⑩ Bearing (LH)
⑪ Damper
⑫ O-ring
⑬ Spacer (LH)
⑭ Driven joint

Ⓐ Rear axle nut
Ⓑ Rear wheel driven joint bolt
Ⓒ Spoke nipple
Ⓓ Rear hub shock absorber bolt
Ⓔ Rear brake cam lever bolt

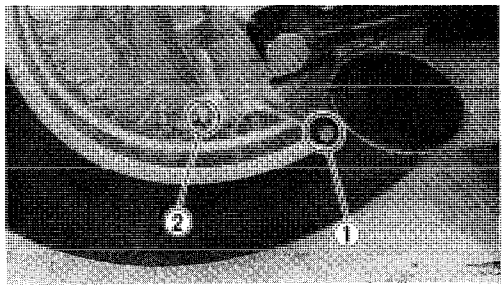


ITEM	N·m	kg-m	lb-ft
Ⓐ	78	7.8	56.5
Ⓑ	10	1.0	7.0
Ⓒ	5	0.5	3.5
Ⓓ	96	9.6	69.5
Ⓔ	10	1.0	7.0

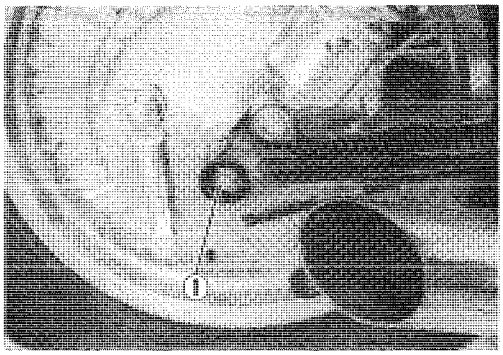
REMOVAL

Support the motorcycle by a jack.

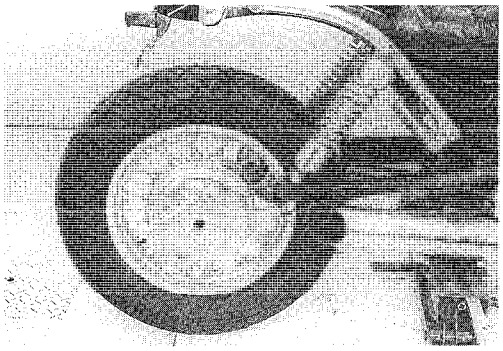
- Remove the rear torque link nut (rear) ① and rear brake adjuster nut ②.



- Remove the rear axle nut cap and the rear axle nut ①.

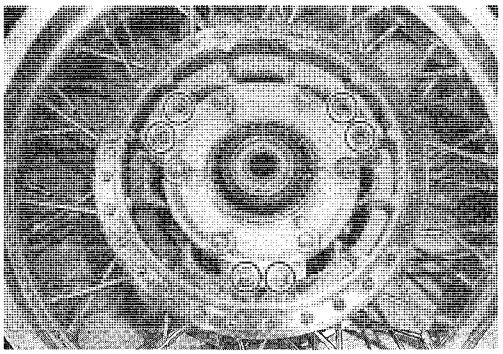


- Draw out the rear axle and remove the rear wheel.

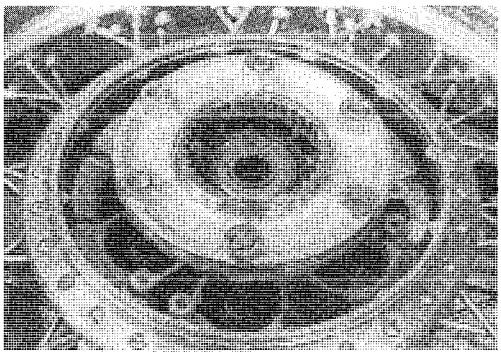


DISASSEMBLY

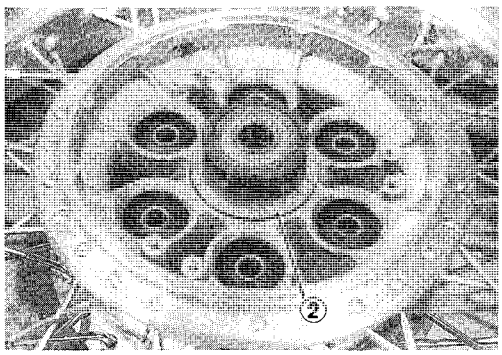
- Flatten the lock washers and remove the rear wheel driven joint bolts.



- Remove the driven joint.



- Remove the O-ring ②.
- Remove the dampers.

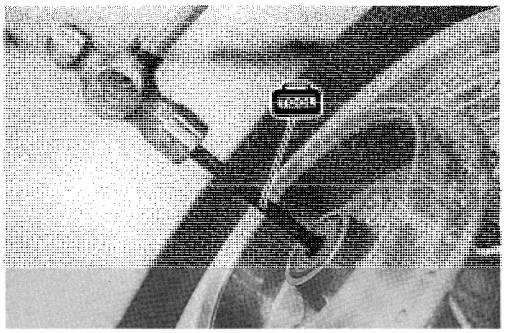


- Remove the wheel bearings with same manner as that of front bearing. (Refer to page 7-4.)

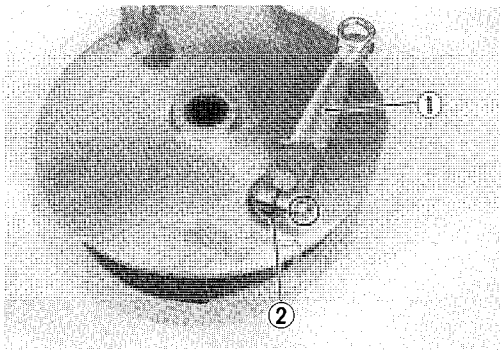
TOOL **09941-50111: Bearing remover**

⚠ CAUTION

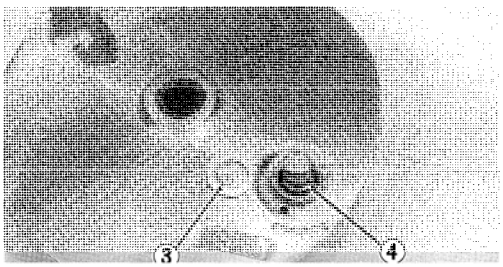
The removed bearing should be replaced.



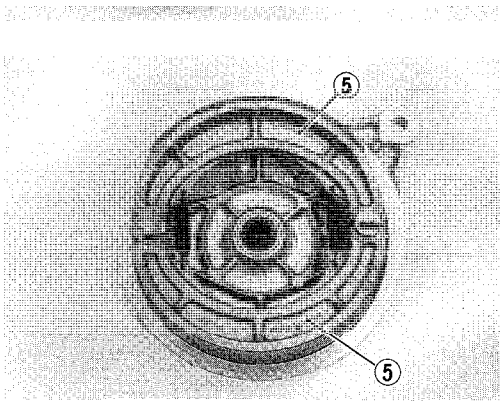
- Remove the rear brake cam lever ① and spring ②.



- Remove the washer ③ and O-ring ④.



- Remove the brake shoes ⑤.

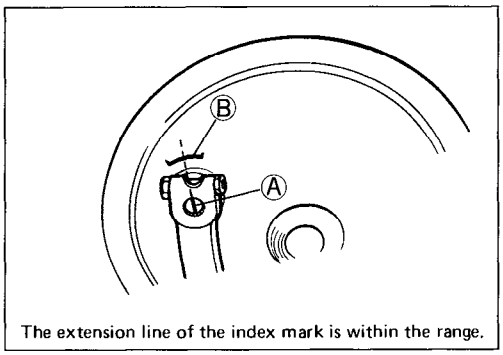


INSPECTION

WHEEL BEARING ..... Refer to page 7-4.
AXLE ..... Refer to page 7-5.
SPOKE NIPPLE ..... Refer to page 7-5.
WHEEL RIM ..... Refer to page 7-4.
TIRE ..... Refer to page 2-15.

BRAKE SHOE

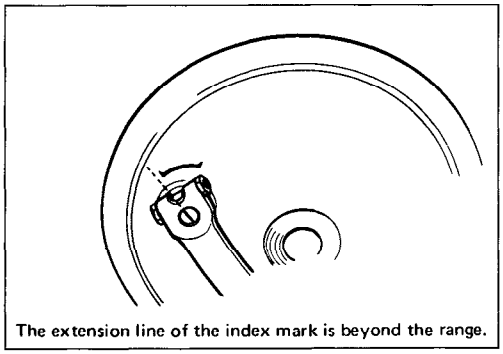
Brake panel incorporate a brake lining wear limit range. if the lining condition is normal, the brake shoe wear indicator Ⓐ, when extended, will fall within the range Ⓑembossed on the brake panel (when brake is on).



The extension line of the index mark is within the range.

- First check that the brake system is properly adjusted.
- Then check that the indicator extension line; the brake should be on at this time.

If the extended line falls outside the indicated range, replace the brake shoe assembly.


The extension line of the index mark is beyond the range.

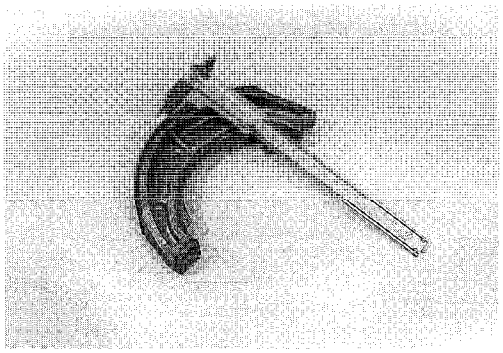
⚠ CAUTION

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

- Check the brake shoe for the thickness of the brake shoe lining. If the brake shoe lining is worn down to the limit, replace the brake shoe.

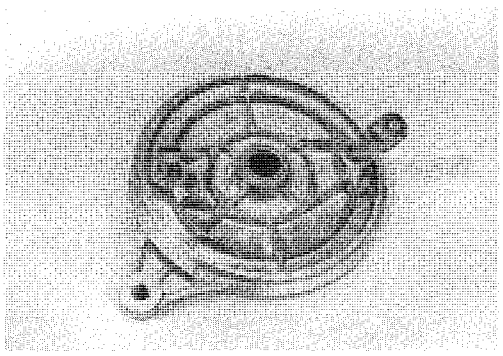
Service Limit: 1.5 mm (0.056 in)

TOOL 09900-20102: Vernier calipers



BRAKE PANEL

- Check the brake panel and brake cam for wear, rust and damage.

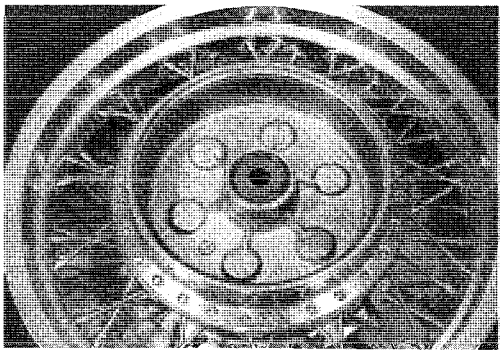


BRAKE DRUM

Measure the brake drum I.D. to determine the extent of wear and, if the limit is exceeded by the wear noted, replace the drum. The value of this limit is indicated inside the drum.

Service limit: 180.7 mm (7.11 in)

Inspect the drum I.D. for scratch marks. If the I.D. surface is scratched or otherwise roughened, smoothen it with sandpaper.



WHEEL DAMPER

Inspect the wheel dampers and driven joint O-ring for damage or wear.

REASSEMBLY AND REMOUNTING

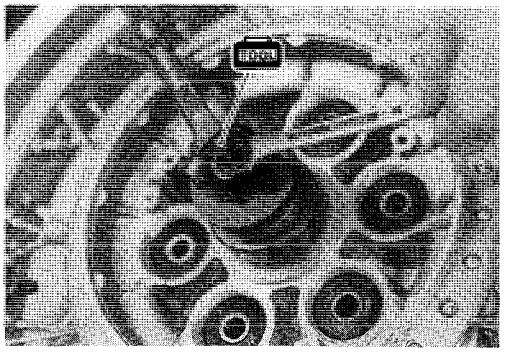
Reassemble and remount the rear wheel in the reverse order of disassembly and removal, pay attention to the following points.

WHEEL BEARINGS

- Apply SUZUKI SUPER GREASE "A" to the bearing before installing.

99000-25010: SUZUKI SUPER GREASE "A"

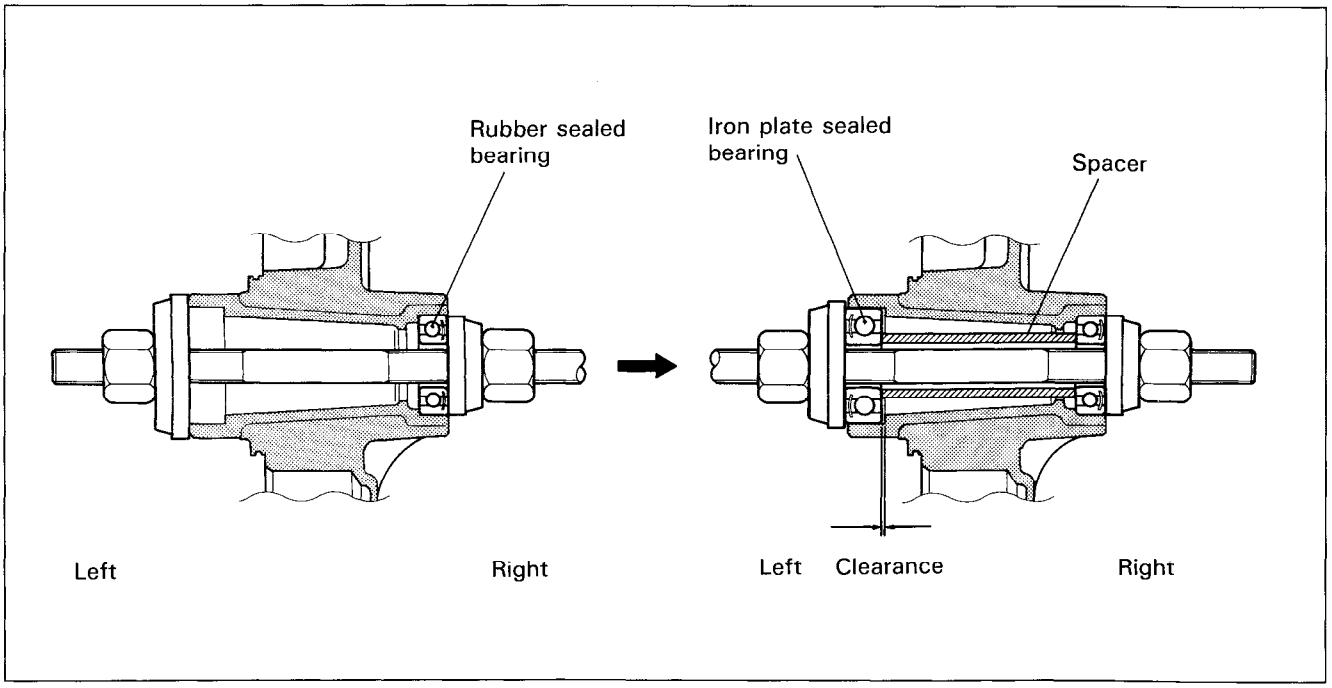
- Install the wheel bearing by using the special tool as shown.



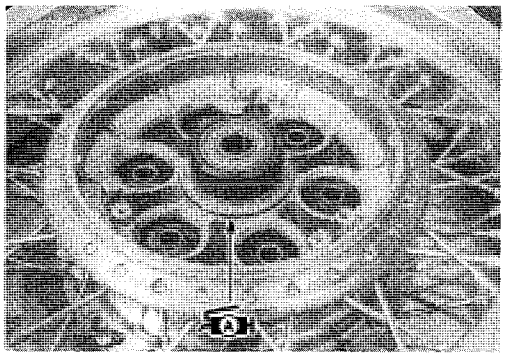
⚠ CAUTION

First install the wheel bearing for right side (Brake drum side).

09941-34513: Bearing/Steering race installer



- Install the dampers.

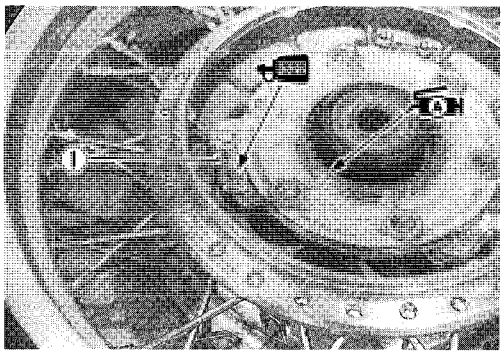


NOTE:
If soap water is applied around the damper, it makes the job easier.

- Apply SUZUKI SUPER GREASE "A" to the O-ring before installing the driven joint.

99000-25010: SUZUKI SUPER GREASE "A"

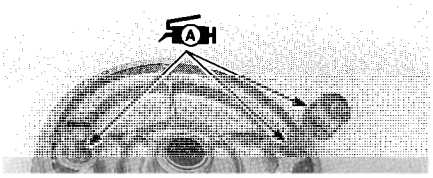
- Apply THREAD LOCK SUPER "1322" to the thread of driven joint stopper bolts.
- Tighten the rear wheel driven joint bolts ①.



99000-32110: THREAD LOCK SUPER "1322"

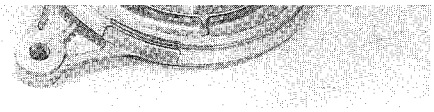
Rear wheel driven joint bolts: 10 N·m (1.0 kg-m, 7.0 lb-ft)

- Bend up the washer tongue positively to lock the bolts.
- Apply SUZUKI SUPER GREASE "A" to the brake camshaft, camshaft surface, final drive and driven gear spline.

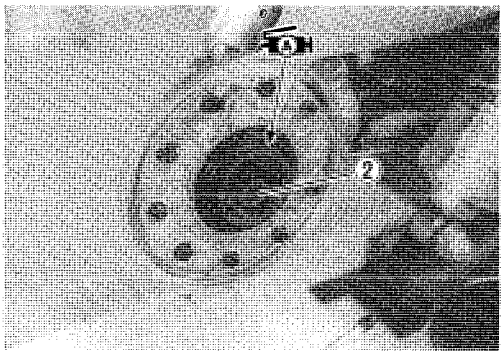


99000-25010: SUZUKI SUPER GREASE "A"

Be careful not to apply too much grease to the brake camshaft.



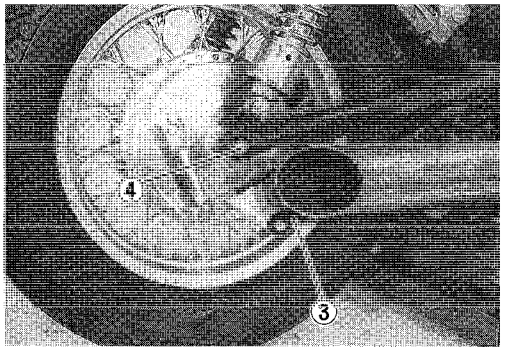
- Install the brake cam lever and tighten the bolt to the specification.



Rear brake cam lever bolt: 10 N·m (1.0 kg-m, 7.0 lb-ft)

- Install the spacer ②.

- Reassemble the cushion between the torque link ③ and the brake panel.
- Tighten the rear torque link nut (rear) to the specified torque.



Rear torque link nut (rear): 29 N·m (2.9 kg-m, 21.0 lb-ft)

- Install the rear axle and tighen the rear axle nut ④ to the specified torque.

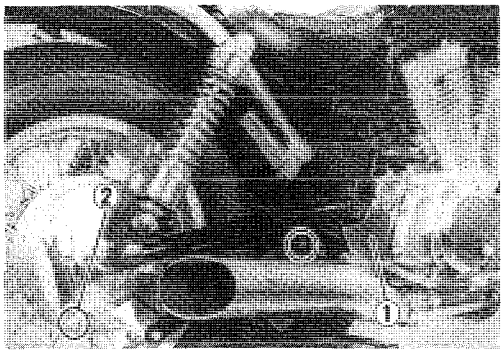
Rear axle nut ④: 78 N·m (7.8 kg-m, 56.5 lb-ft)

NOTE:
Face the 6.5 mm hole of the axle to the down side.

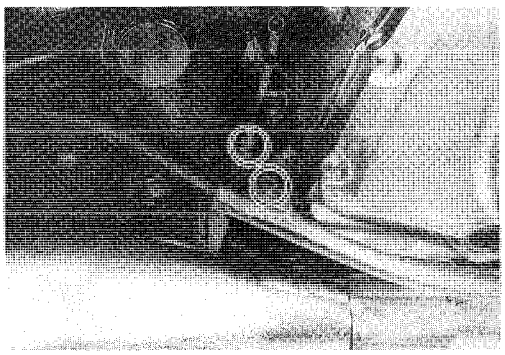
REAR BRAKE PEDAL

REMOVAL AND REASSEMBLY

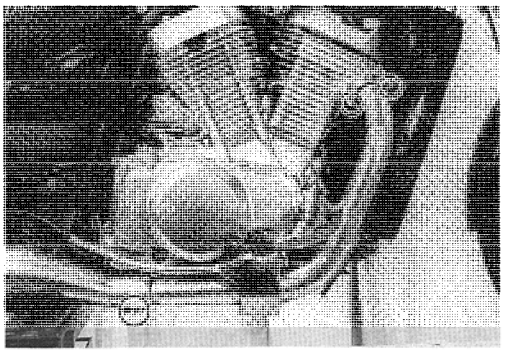
- Remove the brake cable cover ① and brake adjuster nut ②.
- Remove the rear torque link nut (front) and brake cable guide.



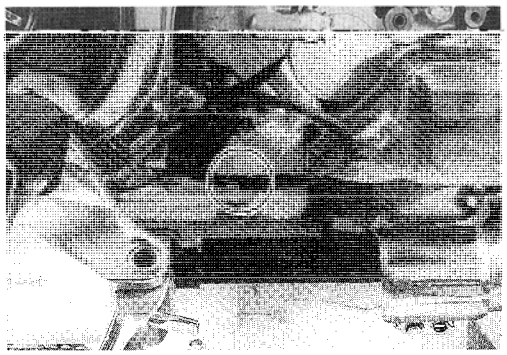
- Remove the rear brake light switch cable and rear brake cable bracket.



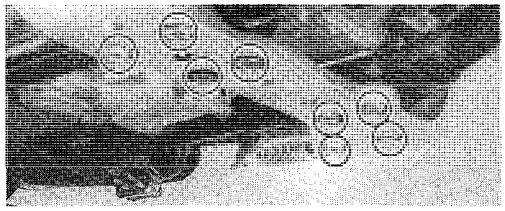
- Remove the exhaust pipes, left and right.



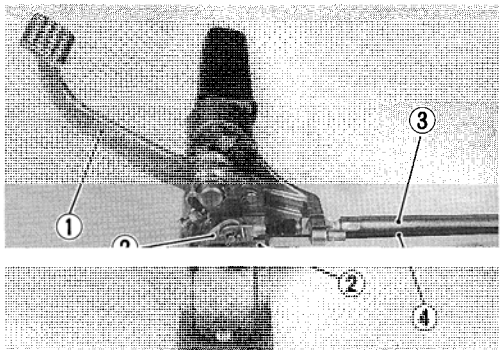
- Remove the secondary bevel gear case cover.
- Disconnect the side-stand switch lead wire coupler.



- Support the motorcycle with a jack.
- Remove the pins.
- Remove the front footrest



- Remove the brake pedal ①, rear brake rod links ②, rear brake cable ③ and rear brake light switch cable ④ by pulling out the cotter pins.



INSPECTION

- Inspect the pins, shaft and rubber parts for nicks, scratches or other damage. If there are any, replace the part with a new one.

REMOUNTING AND REASSEMBLY

- Remount and reassemble the rear brake pedal in the reverse order of removal and disassembly, pay attention

- Apply SUZUKI SUPER GREASE "A" to the brake pedal pivot and brake rod link.

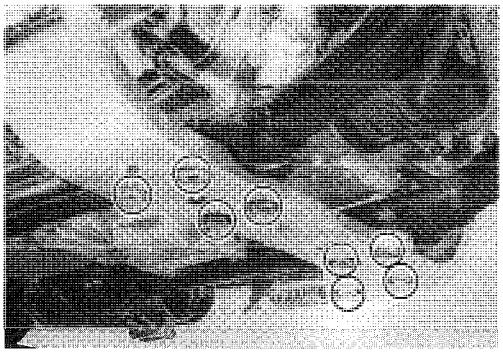
99000-25010: SUZUKI SUPER GREASE "A"

⚠ CAUTION

Always install a new cotter pin.

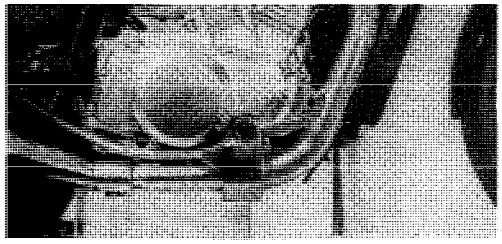
- Tighten the front footrest bolts to the specified torque.

Front footrest bolt: 26 N·m (2.6 kg-m, 19.0 lb-ft)



- Tighten the exhaust pipe clamp bolts to the specified torque.

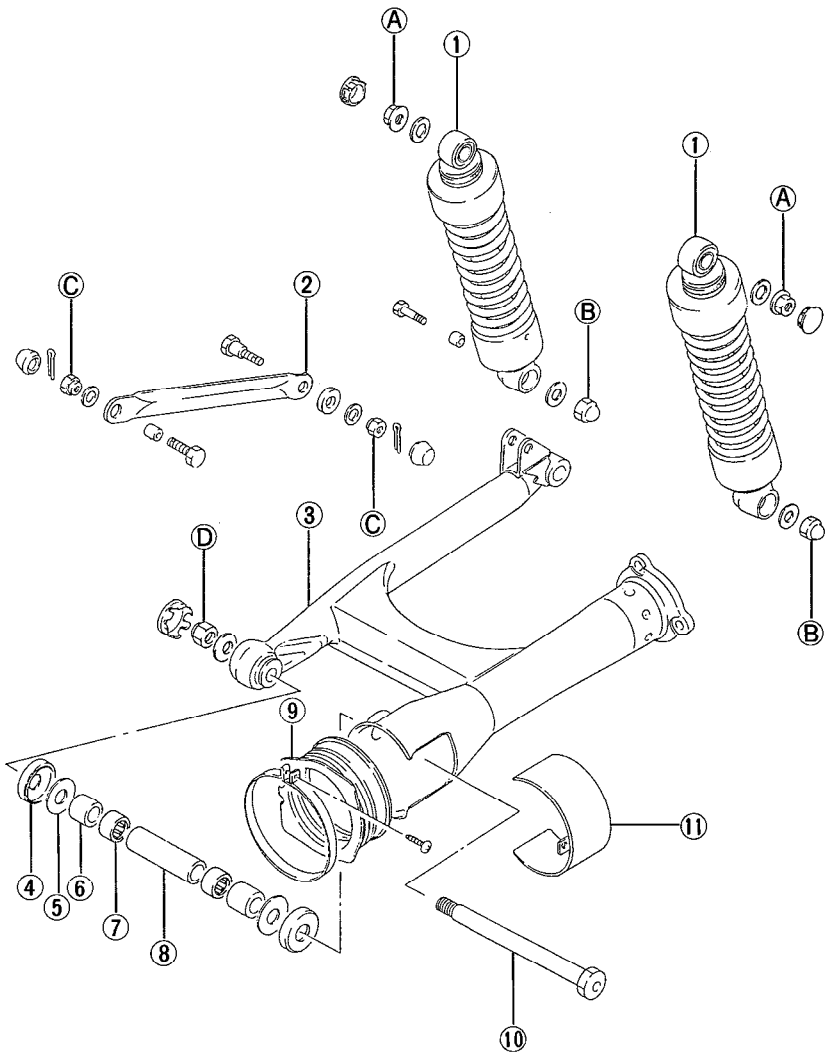
Exhaust pipe clamp bolt: 20 N·m (2.0 kg-m, 15.0 lb-ft)



- After installing the rear brake pedal, adjust the brake. (Refer to page 2-14.)
- Make sure that the brake system operates positively.

REAR SUSPENSION AND SWINGARM

① Rear shock absorber
② Rear torque link
③ Swingarm
④ Dust seal
⑤ Washer
⑥ Spacer
⑦ Needle bearing
⑧ Center spacer
⑨ Dust boot
⑩ Swingarm pivot shaft
⑪ Swingarm cover

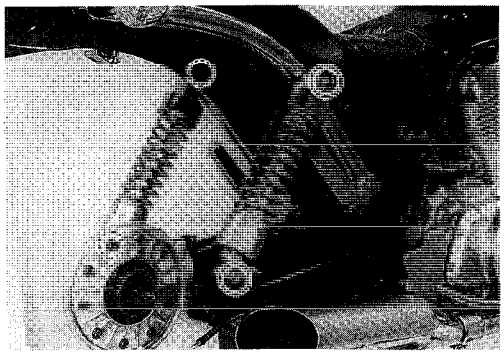


ITEM	N·m	kg-m	lb-ft
Ⓐ	32	3.2	23.0
Ⓑ	29	2.9	21.0
Ⓒ	29	2.9	21.0
Ⓓ	96	9.6	69.5

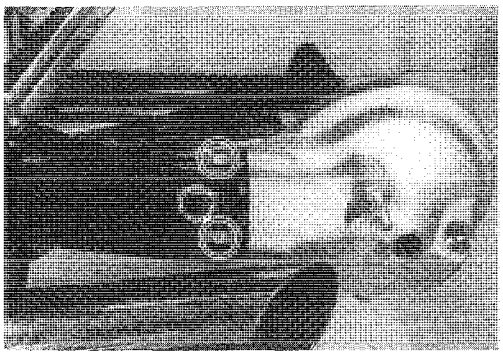
Ⓐ Rear shock absorber fitting nut (upper)
Ⓑ Rear shock absorber fitting nut (lower)
Ⓒ Rear torque link nut
Ⓓ Rear swingarm pivot nut

REMOVAL

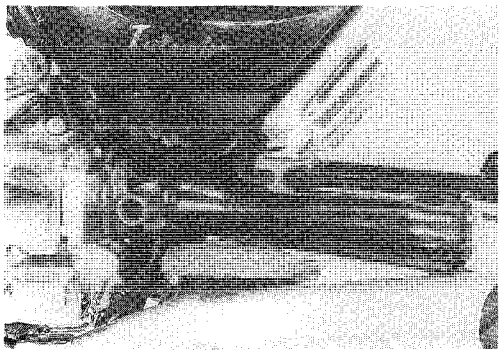
- Remove the rear wheel. (Refer to pages 7-28, 7-29.)
- Remove the left and right rear shock absorbers.



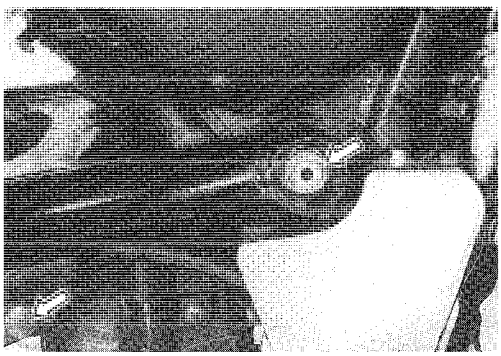
- Remove the final gear case with propeller shaft.



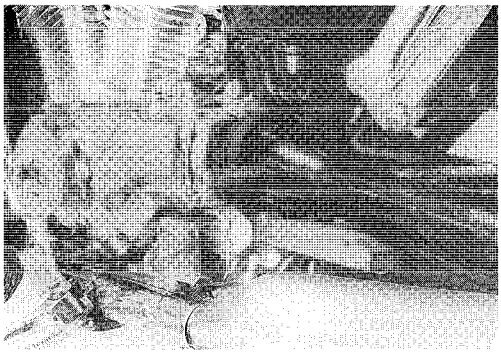
- Loosen the clamp screw and slide the dust boot forward. Remove the swingarm cover and take out the universal joint from the swingarm.



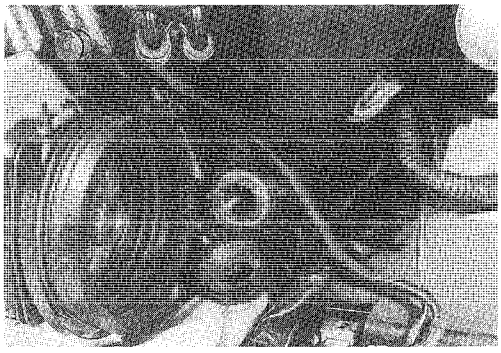
- Remove the rear torque link nut (front) and brake cable guide.
- Remove the cap and swingarm pivot shaft nut.



- Remove the swingarm by removing the swingarm pivot shaft.



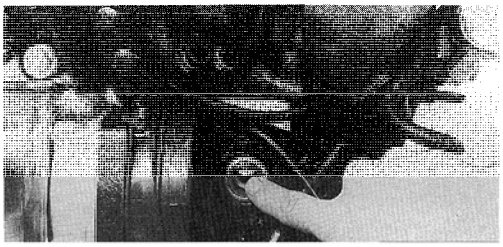
- Remove the dust seals and washers, left and right.



INSPECTION AND DISASSEMBLY

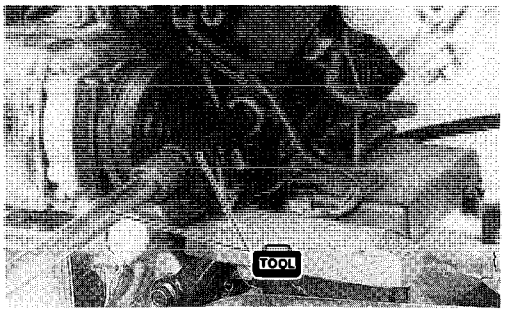
SWINGARM PIVOT BEARINGS

Inspect the swingarm pivot bearings for wear while they are in the frame. Rotate the spacer by hand to inspect for abnormal noise and smooth rotation. Replace the bearings if there is anything unusual. Also replace the spacer if necessary.



- Using the special tools, remove the swingarm bearings from the pivoting hole.

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

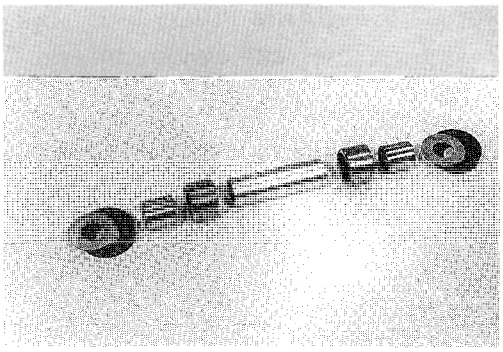


⚠ CAUTION

The removed bearings should be replaced with new ones.

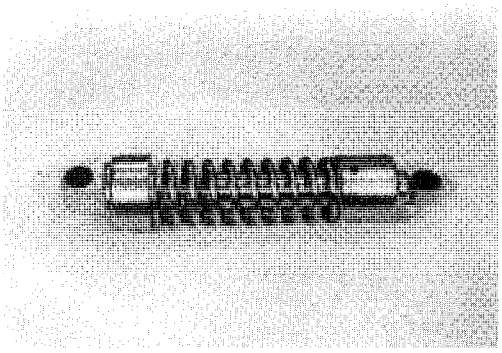
DUST SEAL

Inspect the dust seals, if they are found to be damaged, replace them with new ones.



SHOCK ABSORBER

Inspect the shock absorber body for damage and oil leakage. If any defects are found, replace the shock absorber with new one.



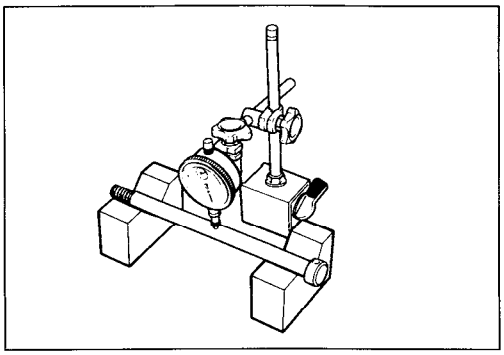
⚠ CAUTION

Do not attempt to disassemble the rear shock absorber unit. It is unserviceable.

SWINGARM PIVOT SHAFT

Using a dial gauge, check the pivot shaft runout and replace it if the runout exceeds the limit.

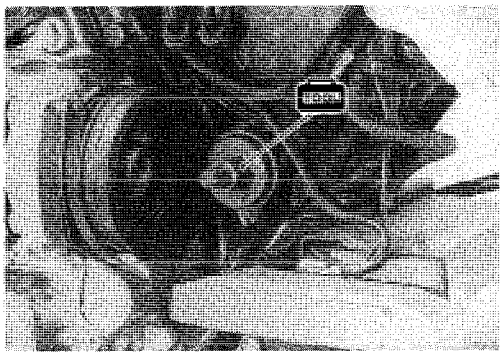
TOOL 09900-20606: Dial gauge (1/100 mm)
09900-20701: Magnetic stand
09900-21304: V-block (100 mm)



Service Limit: 0.30 mm (0.012 in)

REASSEMBLY AND REMOUNTING

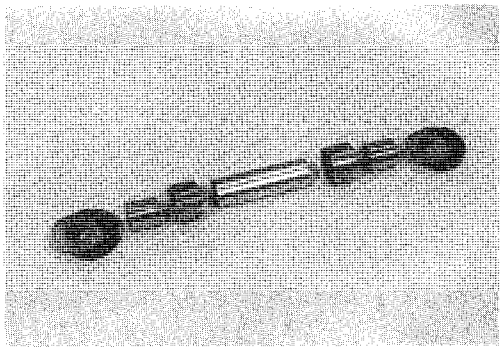
Reassemble and remount the swingarm and rear shock absorbers in the reverse order of disaseembly and removal, and also carry out the following steps:



SWINGARM BEARING

- Press the bearings into the swingarm pivot by using the special tool.

TOOL 09941-34513: Bearing/Steering race installer



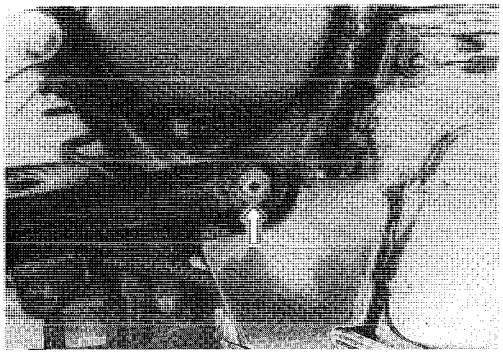
NOTE:
When reinstalling the bearing, stamped mark of bearing is positioned outside.

- Apply SUZUKI SUPER GREASE "A" to the spacers, bearings, washers and dust seals.

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

REAR SWINGARM PIVOT NUT

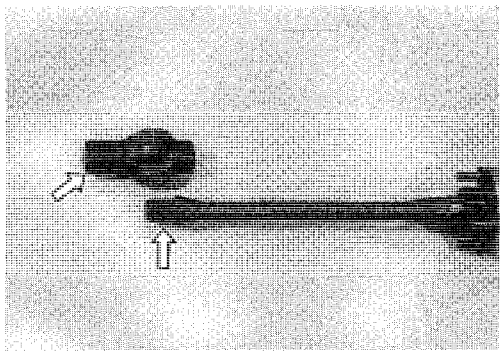
- Tighten the rear swingarm pivot nut to the specified torque.



Rear swingarm pivot nut: 96 N·m (9.6 kg-m, 69.5 lb-ft)

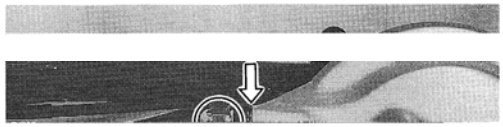
FINAL BEVEL GEAR CASE

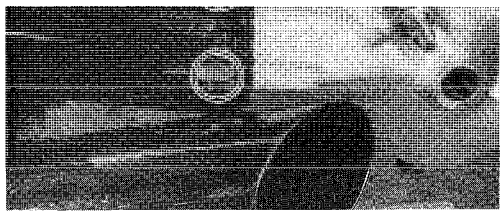
- Apply Lithium Base Molybdenum grease to the joint part of universal joint and propeller shaft.
- Install the propeller shaft and final gear case.



- Apply SUZUKI BOND "1215" to the mating surface.

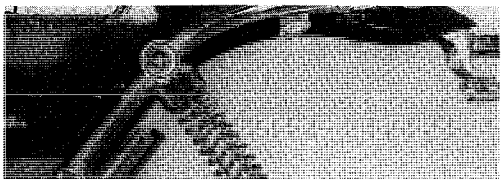
1215 99000-31110: SUZUKI BOND "1215"





Final gear case joint nut: 40 N·m (4.0 kg-m, 29.0 lb-ft)

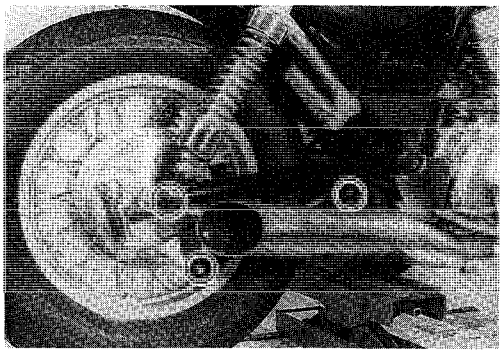
REAR SHOCK ABSORBER



- Remounting the rear shock absorbers, left and right.

Rear shock absorber fitting nut (upper):
32 N·m (3.2 kg-m, 23.0 lb-ft)

REAR AXLE AND TORQUE LINK NUT



- Tighten the rear torque link nuts and rear axle nut to the specified torque.

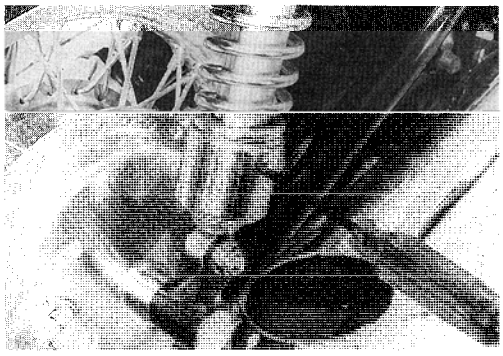
Rear torque link nut (front and rear):
29 N·m (2.9 kg-m, 21.0 lb-ft)
Rear axle nut: 78 N·m (7.8 kg-m, 56.5 lb-ft)

FINAL INSPECTION AND ADJUSTMENT

After installing the rear suspention and rear wheel, the following adjustments are required before driving motorcycle.

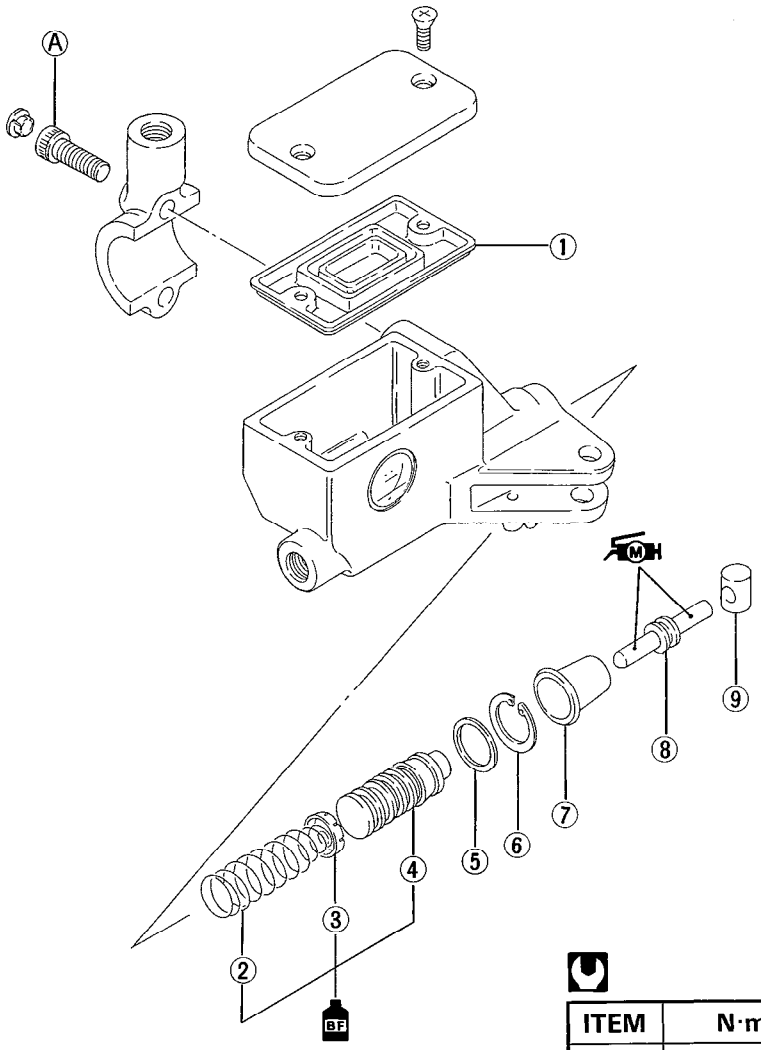
REAR BRAKE ..... Refer to page 2-14.
TIRE PRESSURE ..... Refer to page 2-15.
SHOCK ABSORBERS ..... Refer to page 2-16.

- When reinstalling the rear shock absorbers, make sure that both spring position should be equalized.



Standard setting	3 position

CLUTCH MASTER CYLINDER



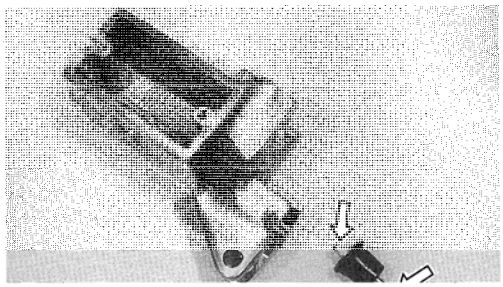
① Diaphragm
② Return spring
③ Primary cup
④ Piston
⑤ Washer
⑥ Circlip
⑦ Dust boot
⑧ Push rod
⑨ Push rod holder piece

Ⓐ Clutch master cylinder mounting bolts

ITEM	N·m	kg-m	lb-ft
Ⓐ	10	1.0	7.0

DISASSEMBLY AND REASSEMBLY

- Disassemble and reassemble the clutch master cylinder in the same manner of the front brake master cylinder . Pay attention to the following point.
  (Refer to page 7-13 through 7-15 for details.)
- Before reassemble the clutch lever, apply SUZUKI MOLY PASTE to both ends of the push rod.



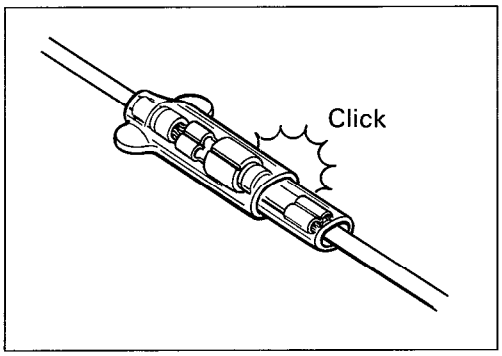
ELECTRICAL SYSTEM

CONTENTS

CAUTIONS IN SERVICING

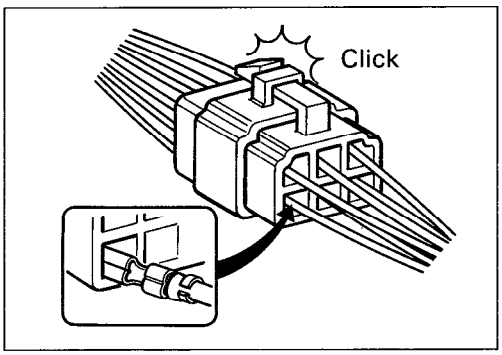
CONNECTOR

- When connecting a connector, be sure to push it in untill a click is felt.
- Inspect the connector for corrosion, contamination and breakage in its cover.



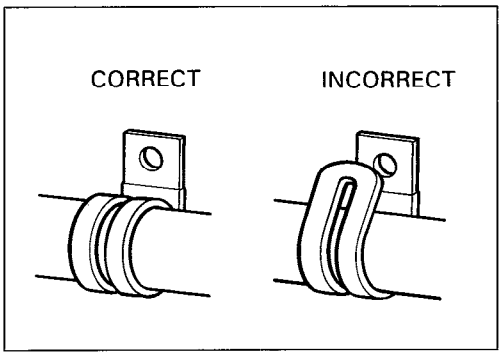
COUPLER

- With a lock type coupler, be sure to release the lock before disconnecting it and push it in fully till the lock works when connecting it.
- When disconnecting the coupler, be sure to hold the coupler itself and do not pull the lead wires.
- Inspect each terminal on the coupler for being loose or bent.
- Inspect each terminal for corrosion and contamination.



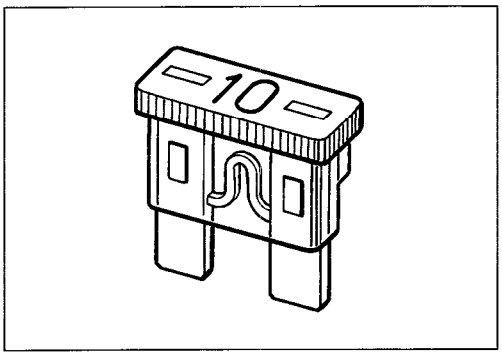
CLAMP

- Clamp the wire harness at such positions as indicated in "WIRE HARNESS ROUTING" (Refer to pages 9-10 and 11.).
- Bend the clamp properly so that the wire harness is clamped securely.
- In clamping the wire harness, use care not to allow it to hang down.
- Do not use wire or any other substitute for the band type clamp.



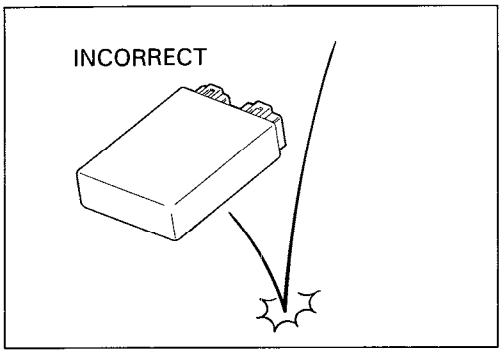
FUSE

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



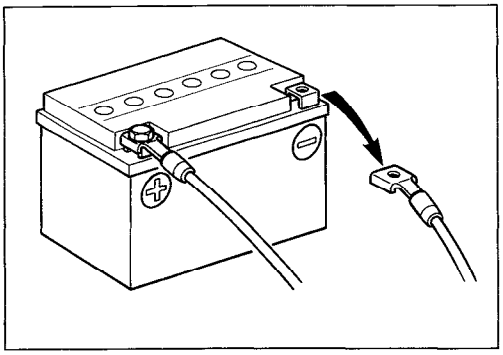
SEMI-CONDUCTOR EQUIPPED PART

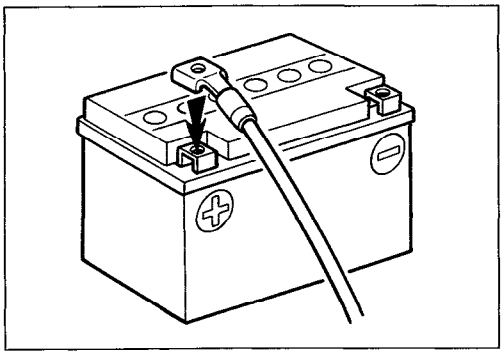
- Be careful not to drop the part with a semi-conductor built in such as a ignitor unit.
- When inspecting this part, follow inspection instruction strictly. Neglecting proper procedure may cause damage to this part.



CONNECTING BATTERY

- When disconnecting terminals from the battery for disassembly or servicing, be sure to disconnect the negative (⊖) terminal first.
- When connecting terminals to the battery, be sure to connect the positive (⊕) terminal first.
- If the terminal is found corroded, remove the battery, pour warm water over it and clean with a wire brush.
- Upon completion of connection, apply grease lightly.
- Put a cover over the positive (⊕) terminal.



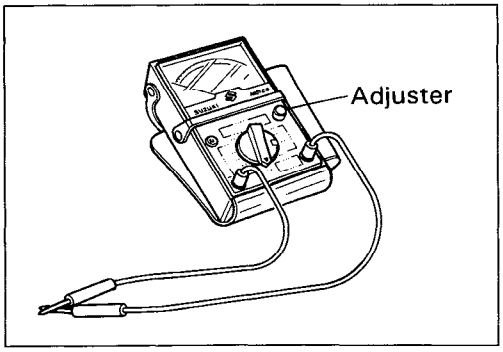


WIRING PROCEDURE

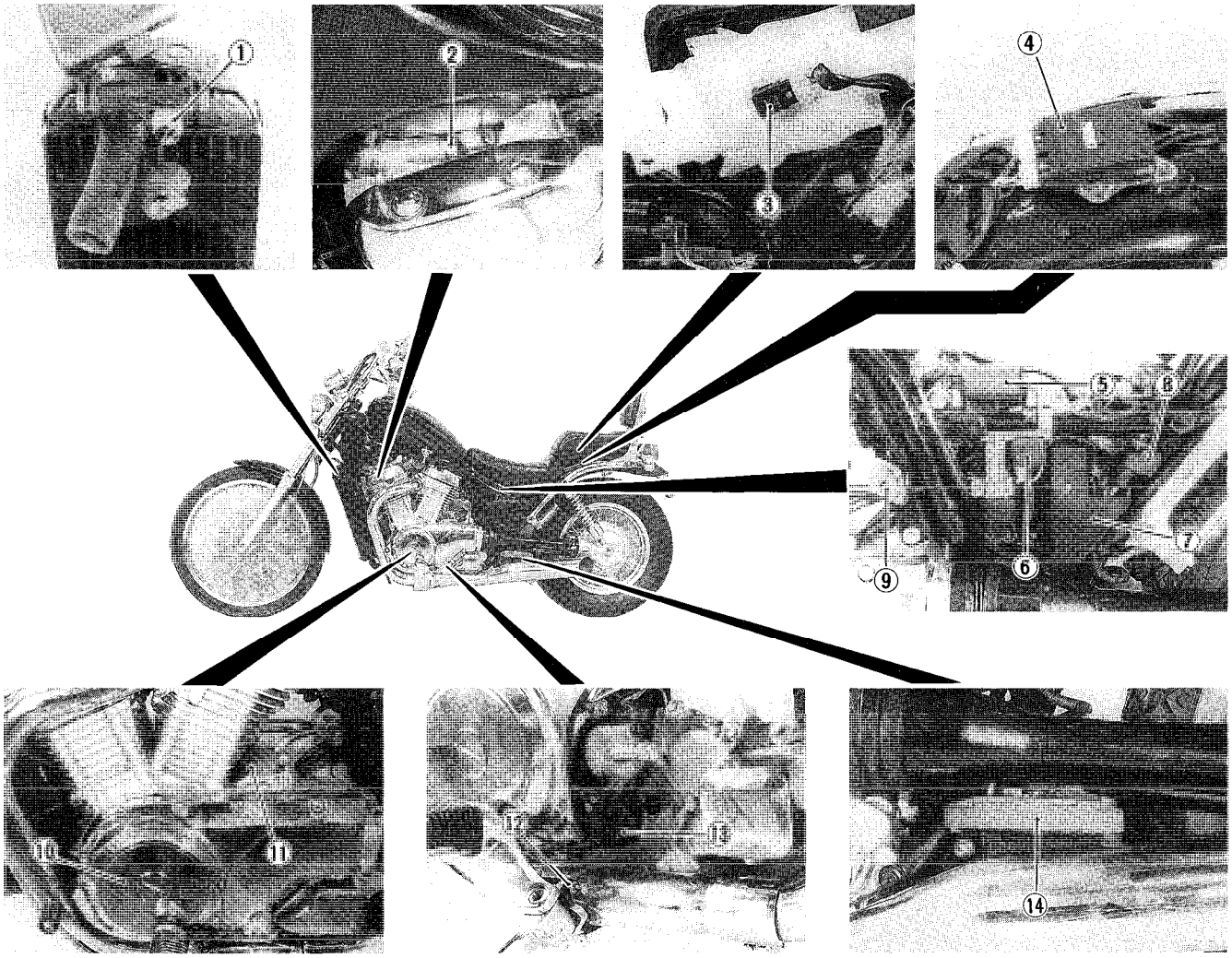
- Route the wire harness properly according to "WIRE HARNESS ROUTING" (Refer to pages 9-10 and 11.).

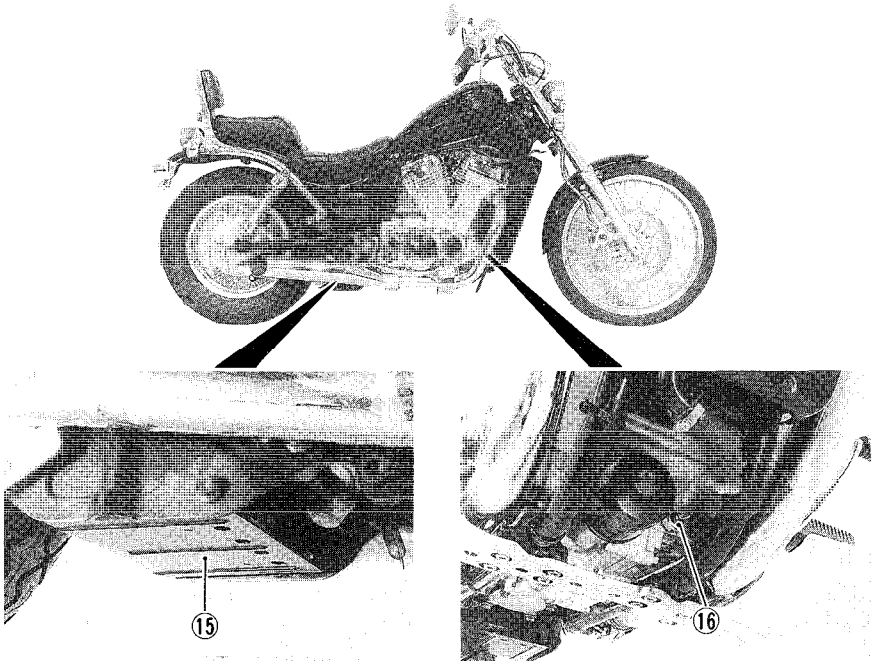
USING POCKET TESTER

- Be sure to use positive (⊕) and negative (⊖) probes of the tester properly. Their false use may cause damage in the tester.
- If the voltage and current values are not known, start measuring in the higher range.
- Before measuring the resistance and after changing the resistance range, always perform 0 Ω adjustment.
- Taking a measurement where voltage is applied in the resistance range may cause damage in the tester. When measuring resistance, check to make sure that no voltage is applied there.
- After using the tester, turn the switch to the OFF position.



LOCATION OF ELECTRICAL COMPONENTS





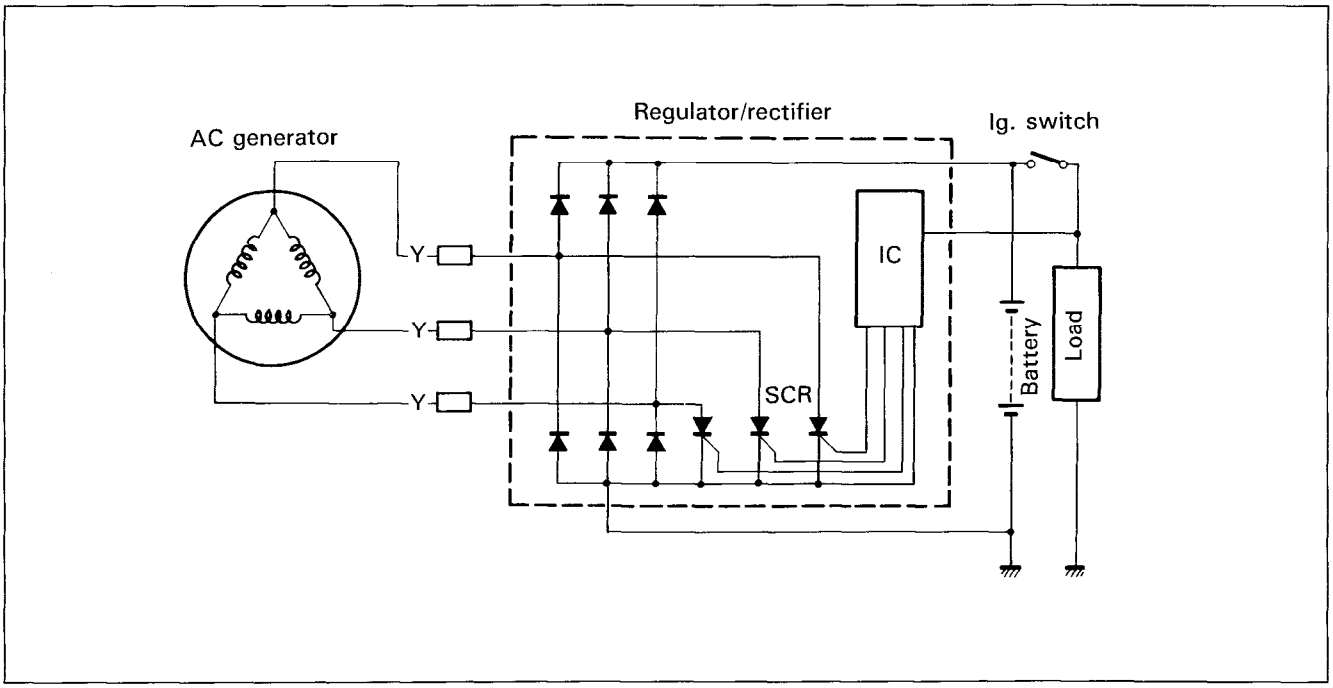
① : Cooling fan thermo-switch
② : Engine coolant temperature gauge
③ : Side-stand relay
④ : Ignitor
⑤ : Ignition coil
⑥ : Turn signal relay
⑦ : Fuse
⑧ : Starter relay
⑨ : Ignition switch
⑩ : AC generator
⑪ : Starter motor
⑫ : Side-stand switch
⑬ : Neutral switch
⑭ : Regulator/rectifier
⑮ : Battery
⑯ : Oil pressure switch

CHARGING SYSTEM

DESCRIPTION

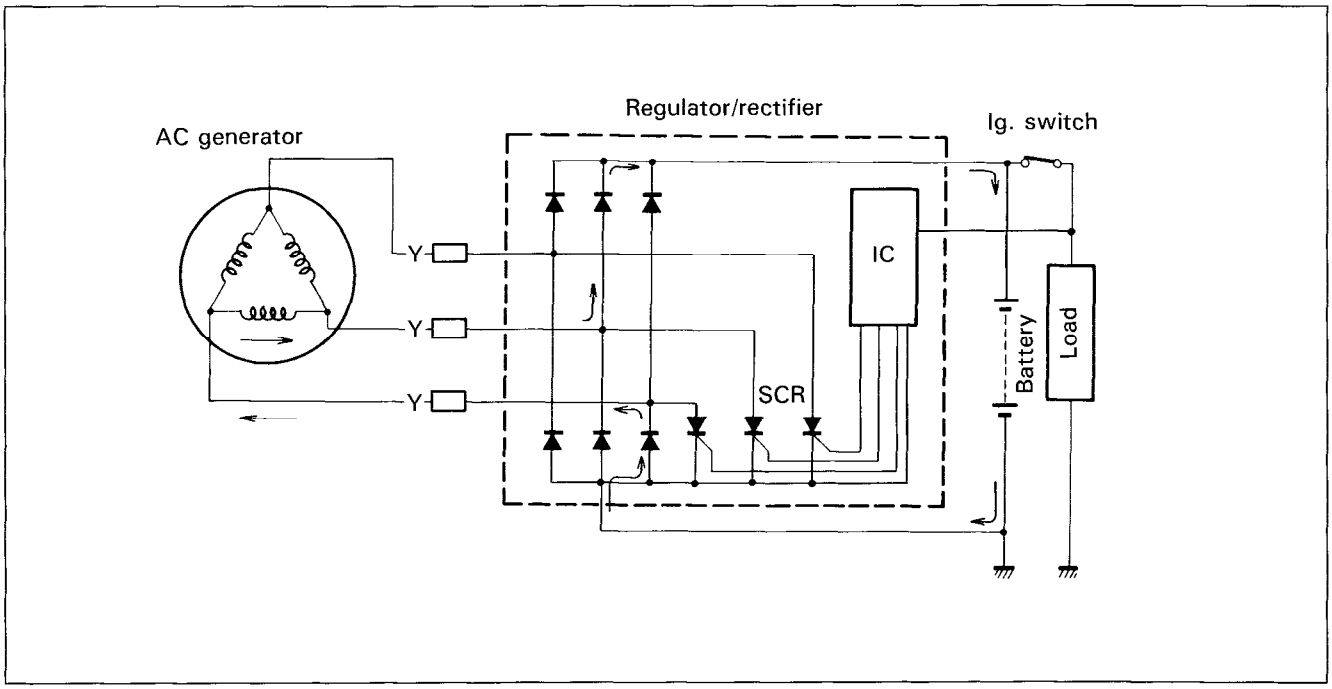
The circuit of the charging system is indicated in the figure, which is composed of an AC generator, regulator/rectifier unit and battery.

The AC current generated from the AC generator is rectified by the rectifier and is turned into DC current, then it charges the battery.

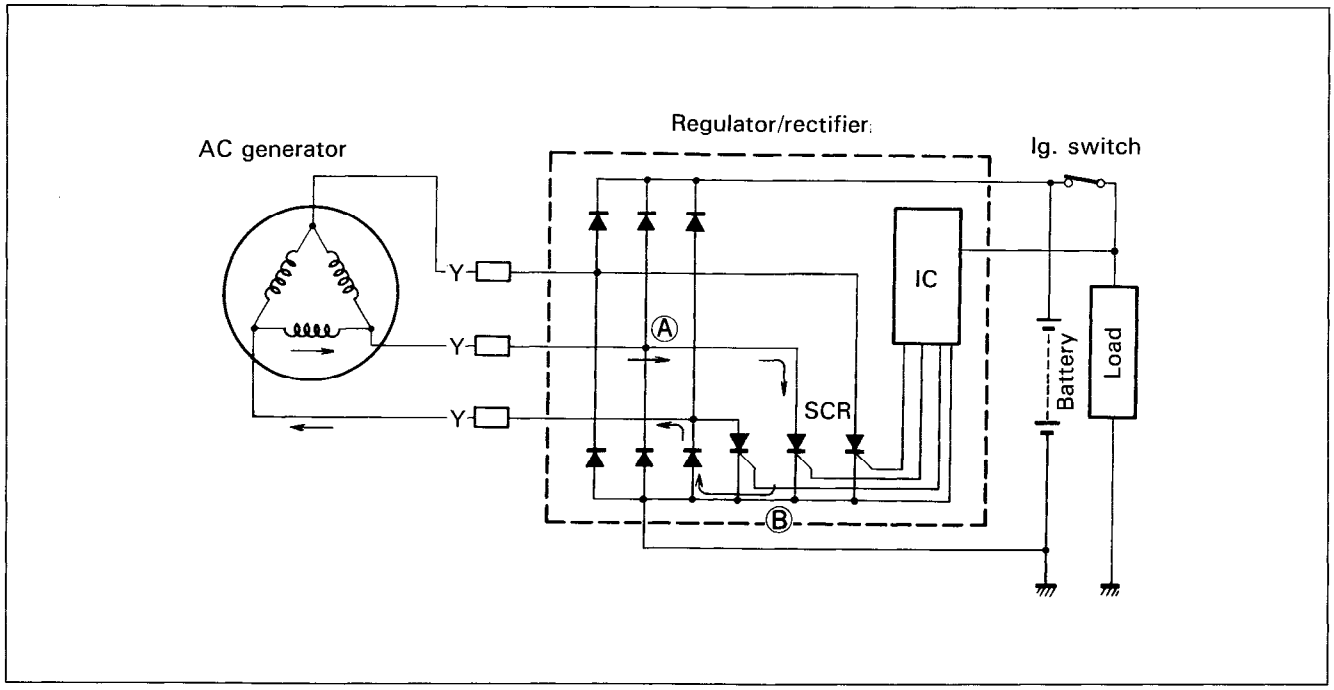


FUNCTION OF REGULATOR

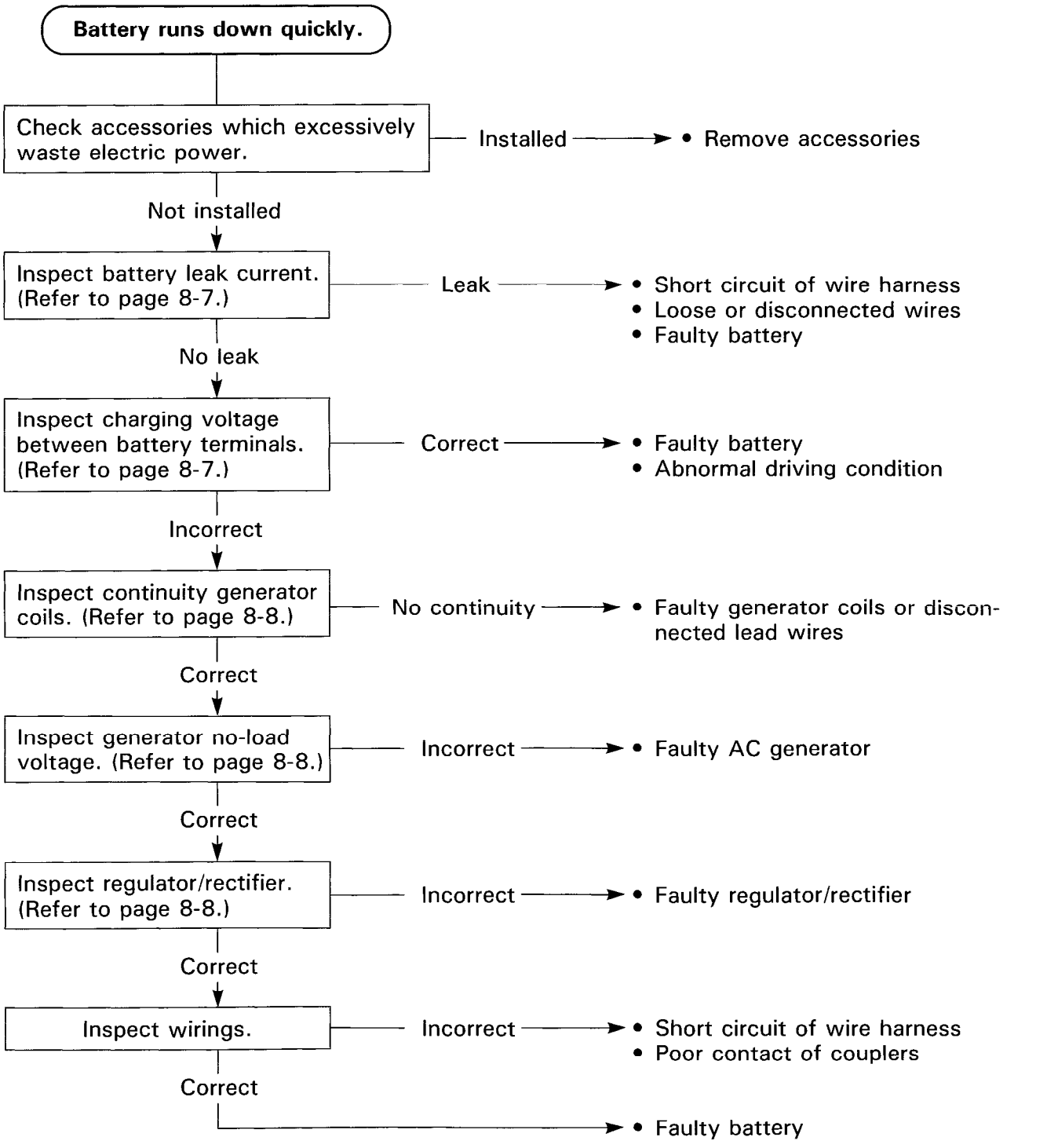
While the engine r/min is low and the generated voltage of the AC generator is lower than the adjusted voltage of Regulator, the regulator does not function. However, the generated current charges the battery directly at this time.



When the engine r/min becomes higher, the generated voltage of the AC generator also becomes higher and the voltage between the battery terminals becomes high accordingly. When it reaches the adjusted voltage of the I.C., (Integrated Circuit) and it is turned "ON", a signal will be sent to the SCR (Thyristor) gate probe and the SCR will be turned "ON".
Then, the SCR becomes conductive in the direction from point Ⓐ to point Ⓑ. At this time, the current generated from the AC generator gets through the SCR without charging the battery and returns to AC generator again. At the end of this state, since the AC current generated from AC generator flows to point Ⓑ, the reverse current tends to flow to SCR. Then, the circuit of SCR turns to the OFF mode and begins to charge the battery again. Thus these repetitions maintain charging voltage and current to the battery constant and protect it from overcharging.



TROUBLESHOOTING

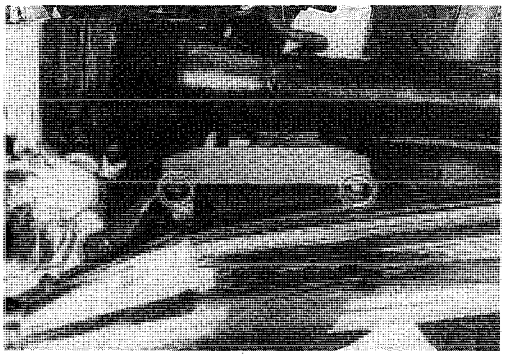


Others

Battery overcharge	• Faulty regulator/rectifier • Faulty battery • Poor contact of generator lead wire coupler

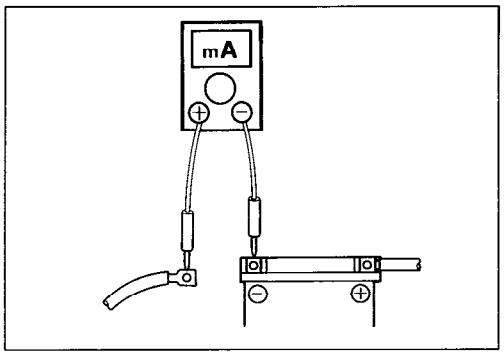
INSPECTION

BATTERY LEAK CURRENT INSPECTION



- Remove the regulator/rectifier mounting bolts.
- Turn the ignition switch to the OFF position.
- Disconnect the battery ⊖ lead wire.

Note that leakage is indicated if the needle swings even a little when the milliampare meter of the pocket tester is connected between a ⊖ terminal and the lead wire of the battery as shown.



TOOL 09900-25002: Pocket tester

⚠ CAUTION

*** Because the leak current might be large, turn the tester to high range first when connecting an ammeter.**
*** Do not turn the ignition switch to the ON position when measuring current.**

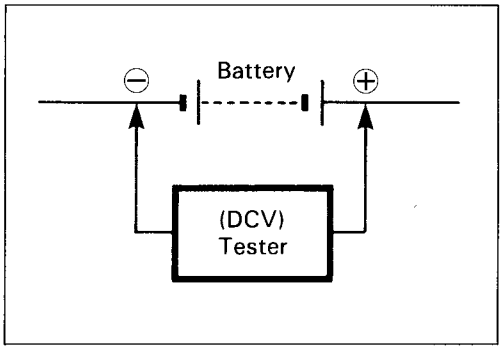
When leakage is found, look for the part where the needle does not swing through the couplers and connectors are removed one by one.

CHARGING OUTPUT INSPECTION

- Remove the regulator/rectifier mounting bolts and battery ⊕ terminal cover.
- Start the engine and keep it running at 5 000 r/min. with lighting switch turned ON and dimmer switch turned HI

Measure the DC voltage between the battery terminals ⊕ and ⊖ with a pocket tester. If the tester reads under 13.5V or over 15.5V, inspect the generator coil and regulator/rectifier.

NOTE:
When making this test, be sure that the battery is fully-charged condition.

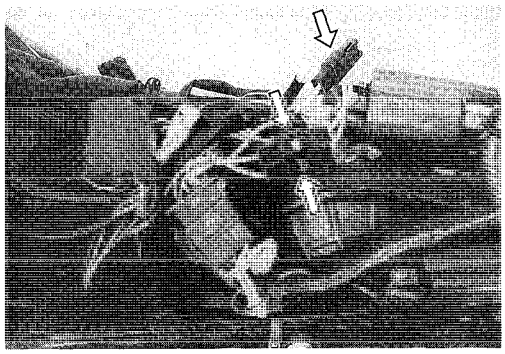


TOOL 09900-25002: Pocket tester

Tester knob indication: DC 25V

Charging output
Standard: 13.5—15.5 at 5 000 r/min.

GENERATOR COIL CONTINUITY INSPECTION



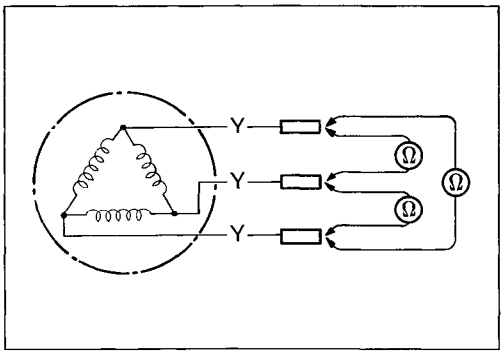
- Remove the frame cover and seat. (Refer to page 7-1.)
- Disconnect the generator couplers.

Using a pocket tester, inspect the continuity between the three lead wires.
Also check that the stator core is insulated.
If there is no continuity, replace the stator with a new one.

TOOL 09900-25002: Pocket tester

Tester knob indication: x 1Ω range

NOTE:
When making above test, it is not necessary to remove the AC generator.



GENERATOR NO-LOAD PERFORMANCE INSPECTION

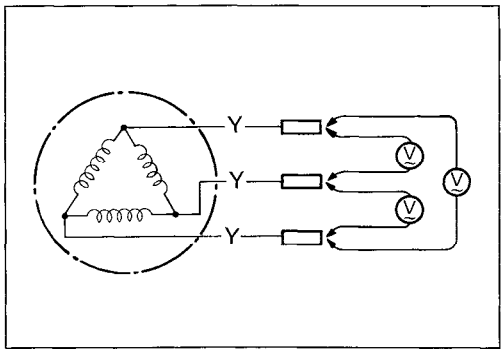
- Start the engine and keep it running at 5 000 r/min.

Using a pocket tester, measure the voltage between the three lead wires.
If the tester reads under the specified value, replace the AC generator with a new one.

TOOL 09900-25002: Pocket tester

Tester knob indication: AC250V

Generator no-load performance:
More than 65V at 5 000 r/min
(When engine is cold)



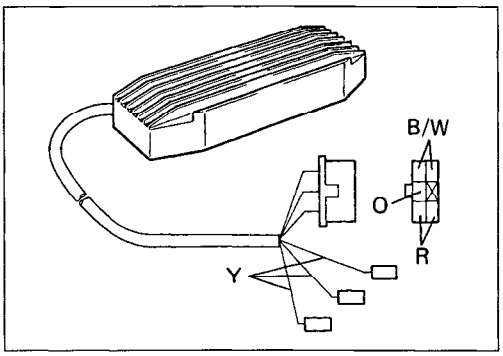
REGULATOR/RECTIFIER INSPECTION

- Remove the frame cover, seat and rear seat. (Refer to page 7-1.)
- Disconnect the regulator/rectifier couplers.

Using a pocket tester, measure the resistance between the lead wires in the following table.
If resistance is incorrect, replace the regulator/rectifier.

TOOL 09900-25002: Pocket tester

Tester knob indication: x 1kΩ range



Unit: kΩ

⊖ Probe of tester to: / ⊕ Probe of tester to:	R	O	B/W	Y_1	Y_2	Y_3
R		∞	∞	∞	∞	∞
O	50—150		15—60	20—80	20—80	20—80
B/W	3—15	2—10		1—5	1—5	1—5
Y_1	1—5	∞	∞		∞	∞
Y_2	1—5	∞	∞	∞		∞
Y_3	1—5	∞	∞	∞	∞	

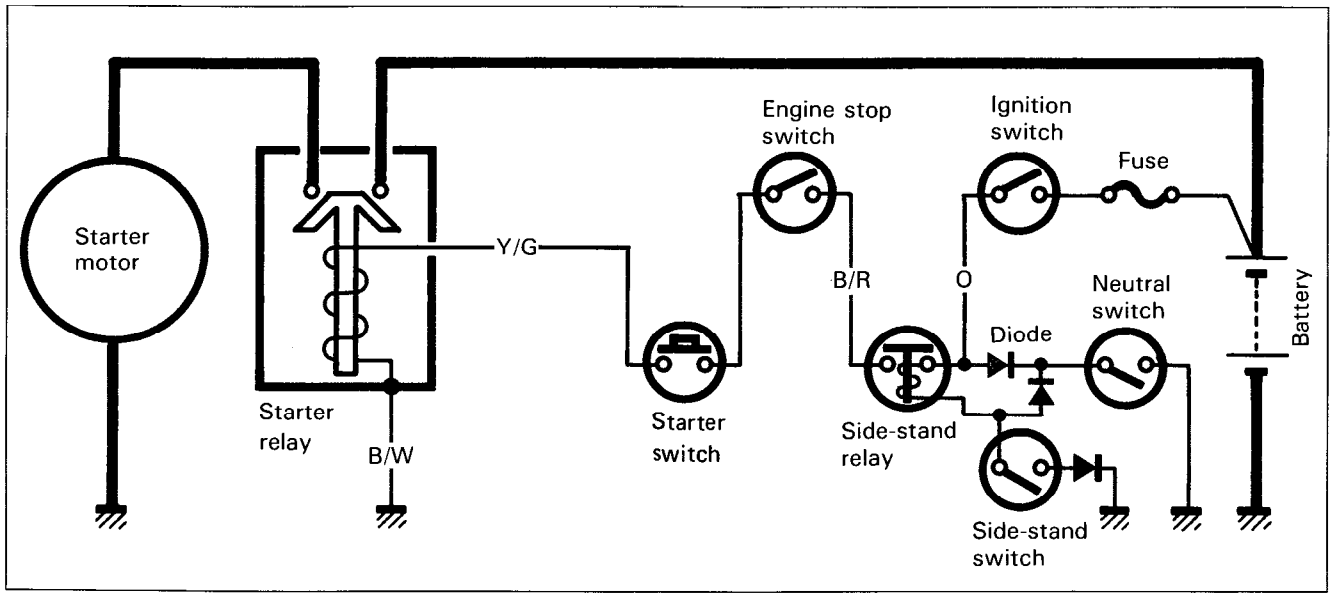
Y: Yellow, R: Red, O: Orange, B/W: Black with White tracer, ∞: Infinity

NOTE:
As diodes, thyristors are used inside this regulator/rectifier, the resistance values will deffer when an ohmmeter other than the SUZUKI pocket tester is used.

STARTER SYSTEM AND SIDE-STAND/IGNITION INTERLOCK SYSTEM

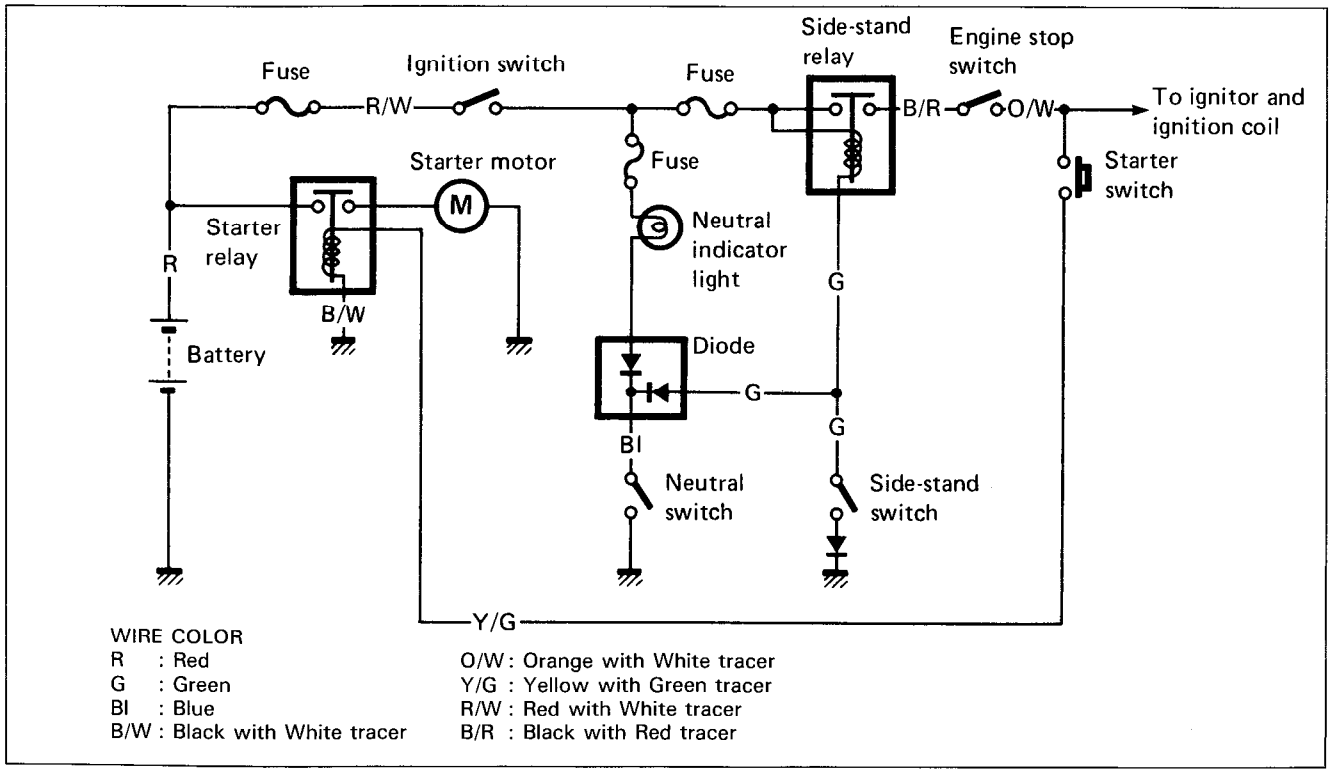
STARTER SYSTEM DESCRIPTION

The starter system is shown in the diagram below: namely, the starter motor, starter relay, side-stand relay, side-stand switch, neutral switch, starter switch, engine stop switch, IG switch and battery. Depressing the starter switch (on the right handlebar switch box) energizes the relay, causing the contact points to close which connects the starter motor to the battery. The motor draws about 80 amperes to start the engine.



SIDE-STAND/IGNITION INTERLOCK SYSTEM DESCRIPTION

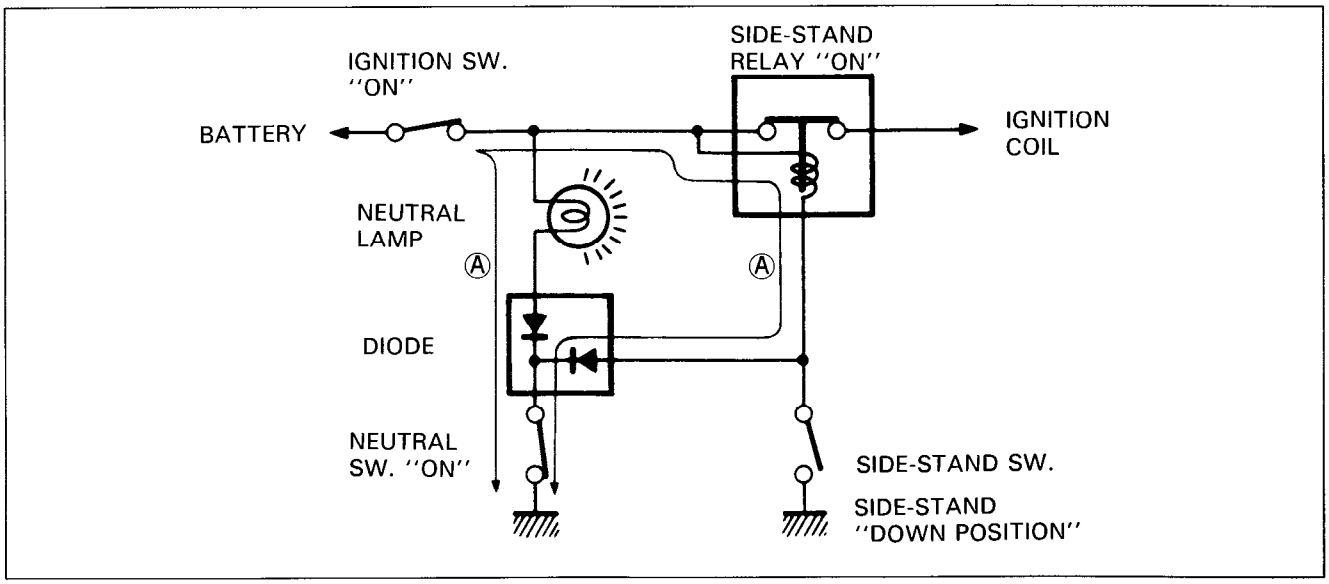
This side-stand/ignition interlock system is to prevent starting the motorcycle with the side-stand left down. The system is operated by an electric circuit provided between the battery and ignition coil.



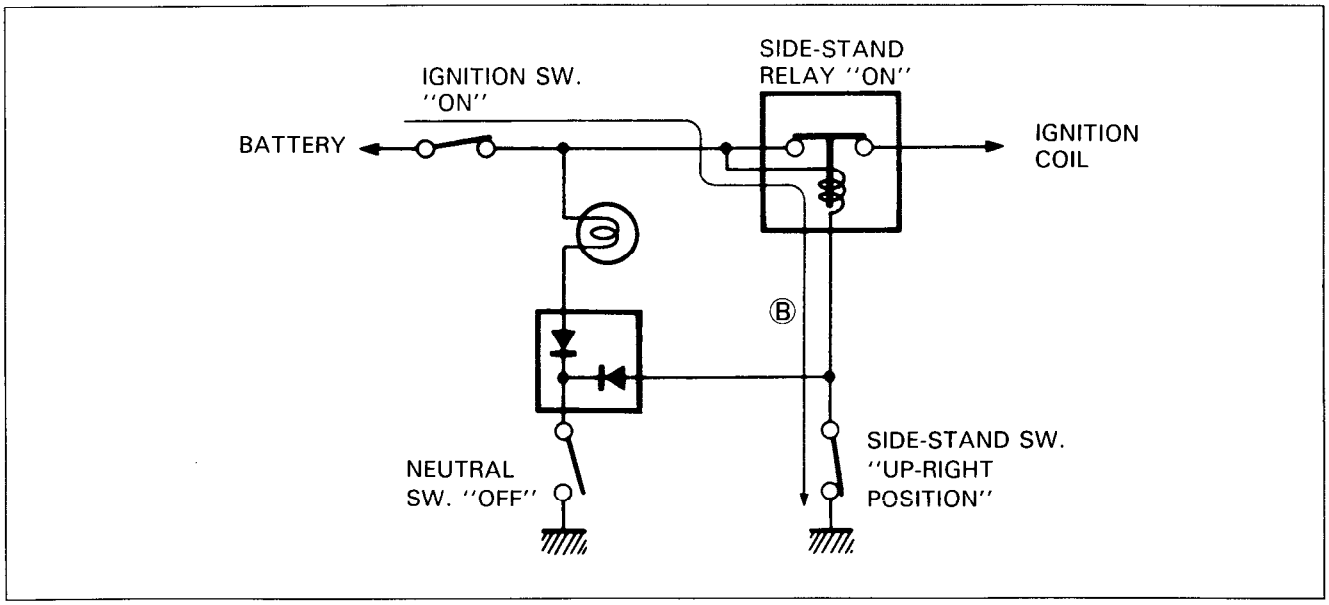
The circuit consists of relay, lamp, diode and switches and decides to live the ignition coil depending on the position of the TRANSMISSION and SIDE-STAND with the neutral and side-stand switches working mutually.

The ignition coil lives only in two situations as follows.

1. Transmission: "NEUTRAL (ON)" Side-stand: "DOWN (OFF)"
   The current flow Ⓐ turns "ON" the relay and the ignition coil lives even the side-stand is kept down. This is or warming up the engine.



2. Side-stand: "UP-RIGHT (ON)"
   The current flow Ⓑ turns "ON" the relay and the ignition coil lives. The engine can be easily started at any transmission position.



TROUBLESHOOTING

Starter motor will not run.

The transmission is in neutral.
Turn on the ignition switch with the engine stop switch in "RUN" position.
Check whether to hear the click noise from the starter relay when the starter button is pushed.

- Clicks → Check whether to run the starter motor when connect the starter motor terminal to the battery ⊕ terminal directly. (Do not use thin wire, because a large amount of current flows.)
  - Run
    - Faulty starter relay
    - Loosen or disconnected starter motor lead wire
  - Not run
    - Faulty starter motor
- No click

Measure the starter relay voltage at the starter relay connectors (between Y/G ⊕ and B/W ⊖) when the starter button is pushed.

- Not voltage
  - Faulty ignition switch
  - Faulty engine stop switch
  - Faulty neutral switch
  - Faulty diode
  - Faulty side-stand relay
  - Faulty starter button
  - Poor contact of connector
  - Open circuit in wiring harness
- Voltage measured

Check the starter relay. (Refer to page 8-14.)

- Incorrect
  - Faulty starter relay
- Correct
  - Poor contact of the starter relay

Starter motor runs when the transmission is in neutral, but does not run with the transmission in any position except neutral, with the side-stand up position.

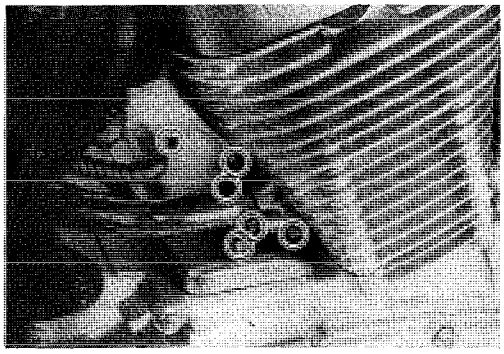
Check the side-stand switch. (Refer to page 8-15.)

- Incorrect
  - Faulty side-stand switch
- Correct
  - Open circuit in wiring harness
  - Poor contact of connector

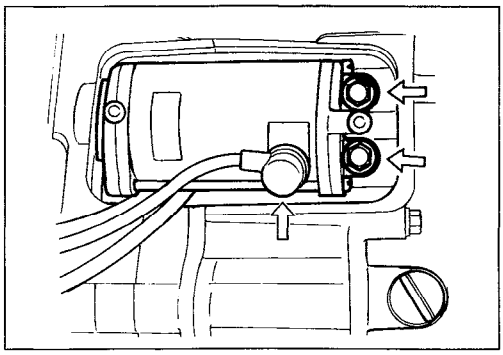
Others

Engine does not turn though starter motor runs.	• Faulty starter clutch

STARTER MOTOR REMOVAL AND DISASSEMBLY

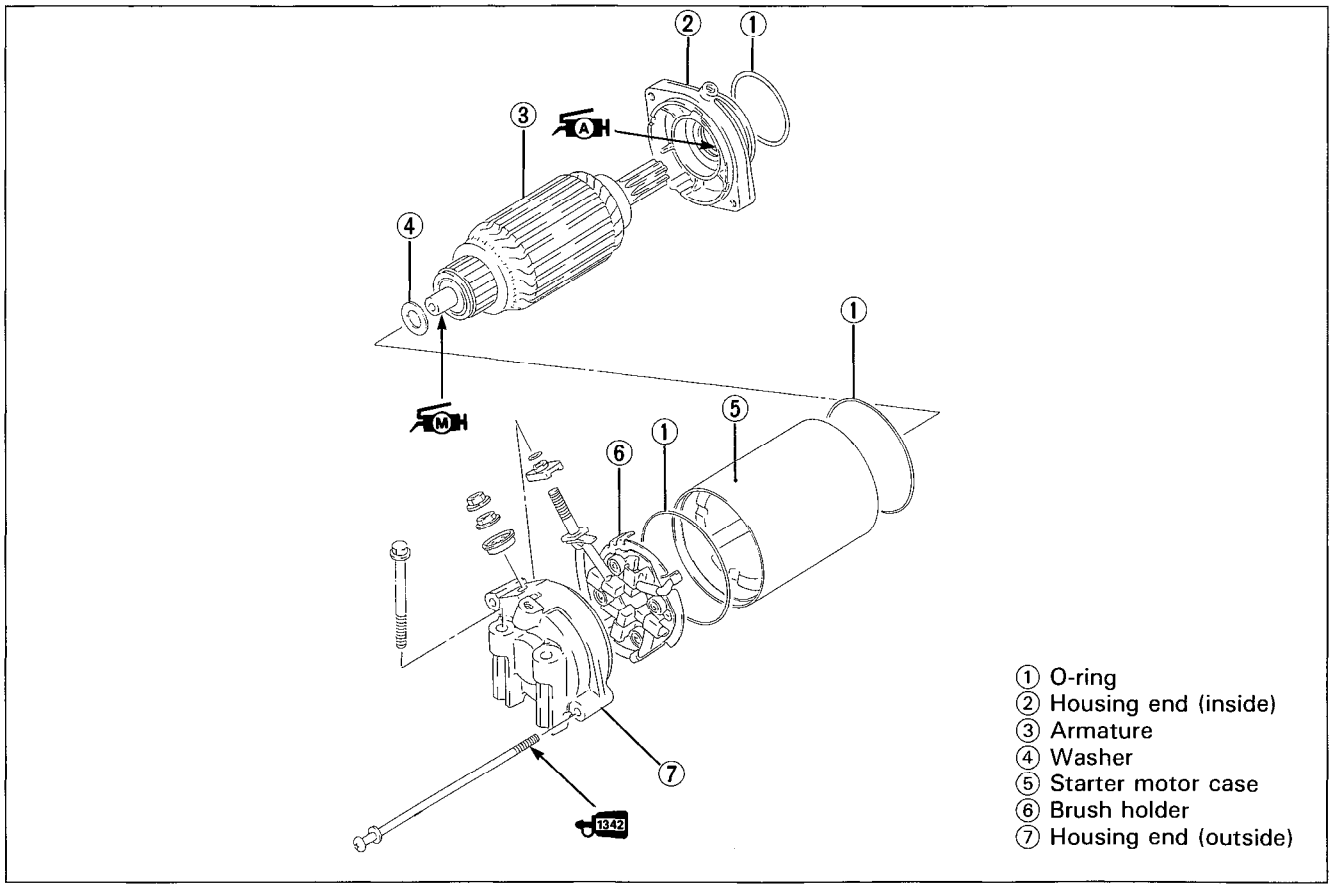


- Drain the engine coolant by removing the drain plug and air bleeder plug.
- Remove the water pipe.
- Remove the secondary bevel gear case cover and move the clutch hose.
- Remove the starter motor cover.



- Remove the water inlet chamber.
- Disconnect the starter motor lead wire and remove the starter motor.

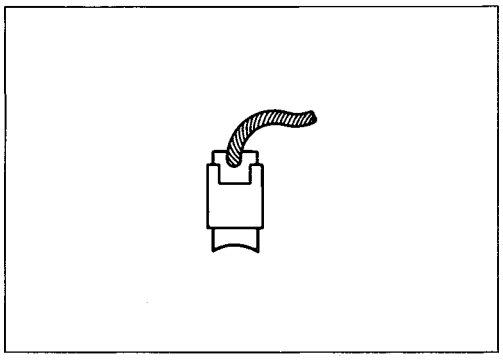
- Disassemble the starter motor as shown in the illustration.



STARTER MOTOR INSPECTION

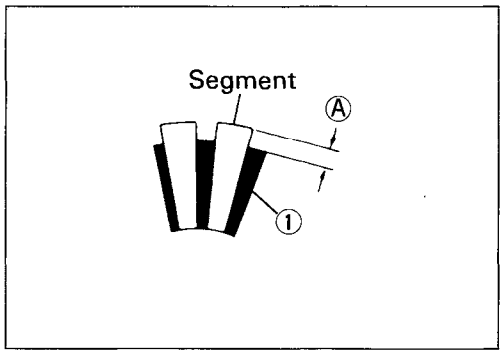
CARBON BRUSH

Inspect the brushed for abnormal wear, crack or smoothness in the brush holder.
If the brush has failed, replace the brush sub assy.



COMMUTATOR

Inspect the commutator for discoloration, abnormal wear or undercut Ⓐ.
If the commutator is abnormally worn, replace the armature.
When surface is descolored, polish it with #400 sand paper and clean it with dry cloth.
If there is no undercut, scrape out the insulator ① with saw blade.

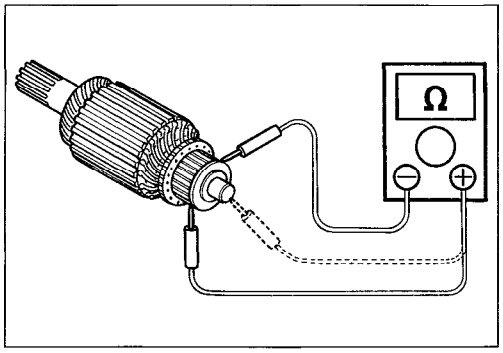


ARMATURE COIL INSPECTION

Check for continuity between each segment.
Check for continuity between each segment and the armature shaft.
If there is no continuity between the segments or there is continuity between the segments and shaft, replace the armature with a new one.

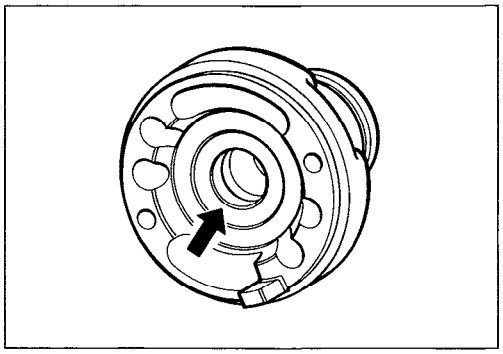
09900-25002: Pocket tester

Tester knob indication: x 1Ω range



OIL SEAL INSPECTION

Check the seal lip for damage or leakage.
If any damage is found, replace the bracket.



STARTER MOTOR REASSEMBLY

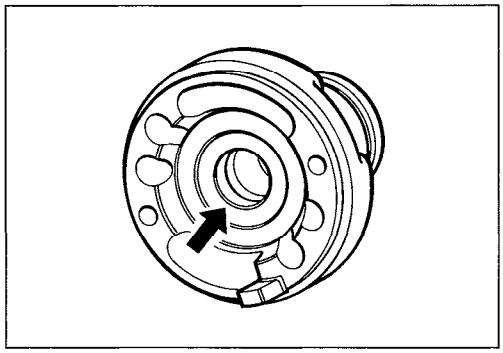
Reassemble the starter motor in the reverse order of disassembly. Pay attention to the following points:

⚠ CAUTION

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

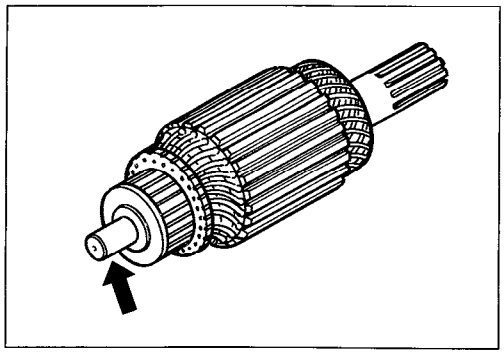
- Apply SUZUKI SUPER GREASE "A" to the lip of the oil seal.

99000-25010: SUZUKI SUPER GREASE "A"



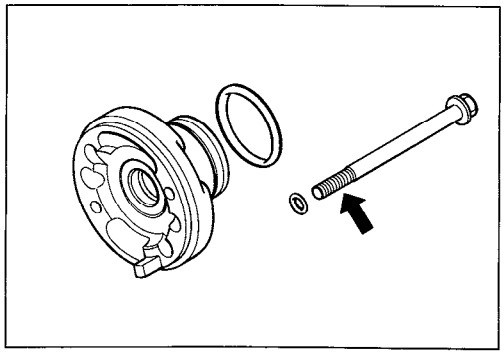
- Apply a small quantity of MOLY PASTE to the armature shaft.

99000-25140: SUZUKI MOLY PASTE



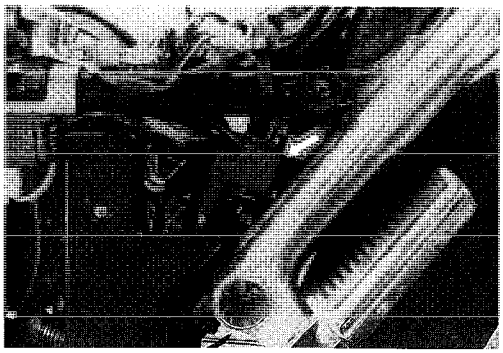
- Apply a small quantity of THREAD LOCK "1342" to the starter motor housing bolts.

99000-32050: THREAD LOCK "1342"



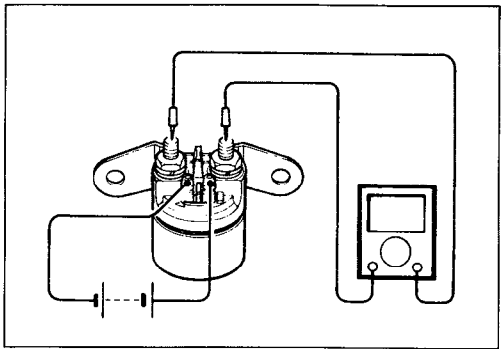
STARTER RELAY INSPECTION

- Remove the frame cover and seat. (Refer to page 7-1.)
- Remove the starter relay cover.
- Disconnect the starter motor lead wire and battery lead wire at the starter relay.
- Turn on the ignition switch, inspect the continuity between the terminals, positive and negative, when pushing the starter button.
  If the starter relay is in sound condition, continuity is found.



09900-25002: Pocket tester

Tester knob indication: x 1Ω range



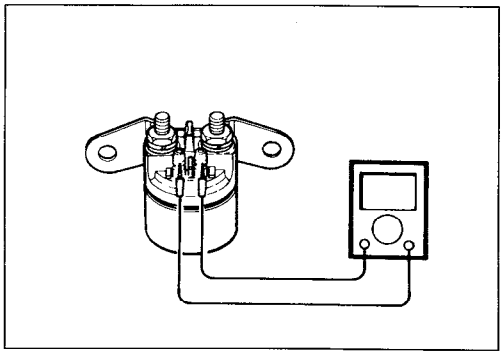
⚠ CAUTION

Do not apply a battery voltage more than 5 seconds to the starter relay as it may overheat and cause damage to the relay coil.

- Disconnect the lead wires from the starter relay.
- Check the coil for "open", "ground" and ohmic resistance. The coil is in good condition if the resistance is as follows.

09900-25002: Pocket tester

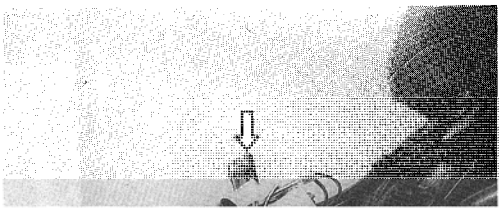
Tester knob indication: x 1Ω range



Starter relay resistance
Standard: 2—6Ω

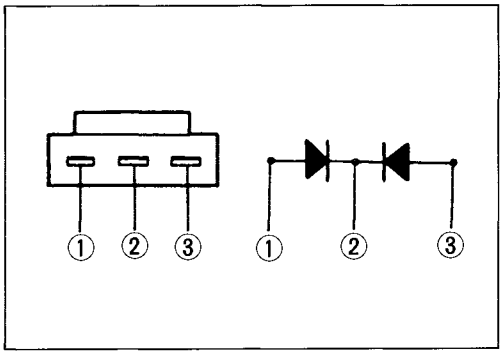
SIDE-STAND/IGNITION INTERLOCK SYSTEM PART INSPECTION

If the interlock system does not operate properly, check each component. If any abnormality is found, replace the component with a new one.



DIODE

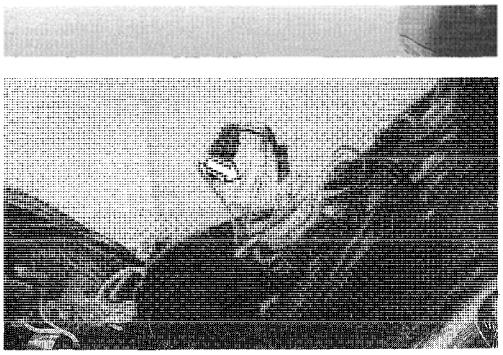
The diode is located under the seat.
The diode can pass current only in one direction.
Check the continuity between ① and ②. If one way continuity the diode is in good condition.
Also check the continuity between ② and ③ as required.



NEUTRAL SWITCH

The neutral switch lead wire coupler is located under the seat.

- Remove the frame cover and seat. (Refer to page 7-1.)
- Disconnect the neutral switch lead wire and check the continuity between Blue and Ground (B/W) with the transmission in "NEUTRAL".

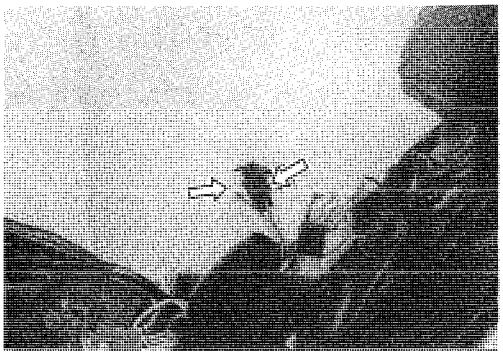


	Blue	Black/White
ON (Neutral)	○———	———○
OFF (Except neutral)		

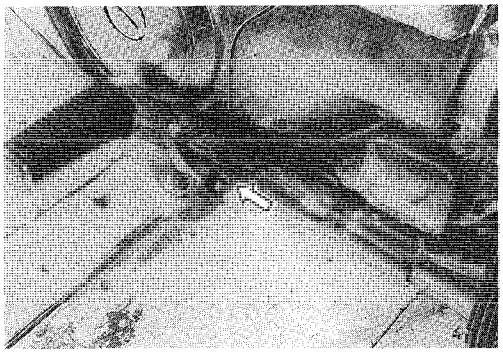
SIDE-STAND SWITCH

The side-stand switch lead wire coupler is located under the seat.

- Disconnect the side-stand switch lead wire and check the continuity between Green and Black/White with the side-stand in up-right position.



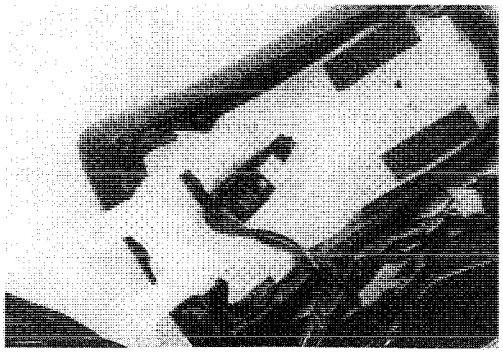
	Green (⊖ Proboe)	Black/White (⊕ Proboe)
ON (UP-right position)	○———	———○
OFF (Down position)		



SIDE-STAND/IGNITION INTERLOCK RELAY

The side-stand/ignition interlock relay is located under the rear seat.

- Remove the rear seat. (Refer to page 7-1.)

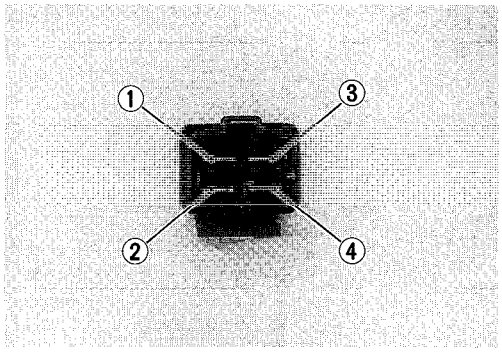


First, check the insulation between ① and ② terminals with pocket tester. Then apply 12 volts to ③ and ④ terminals, ⊕ to ③ and ⊖ to ④, and check the continuity between ① and ②.

If there is no continuity, replace it with a new one.

TOOL 09900-25002: Pocket tester

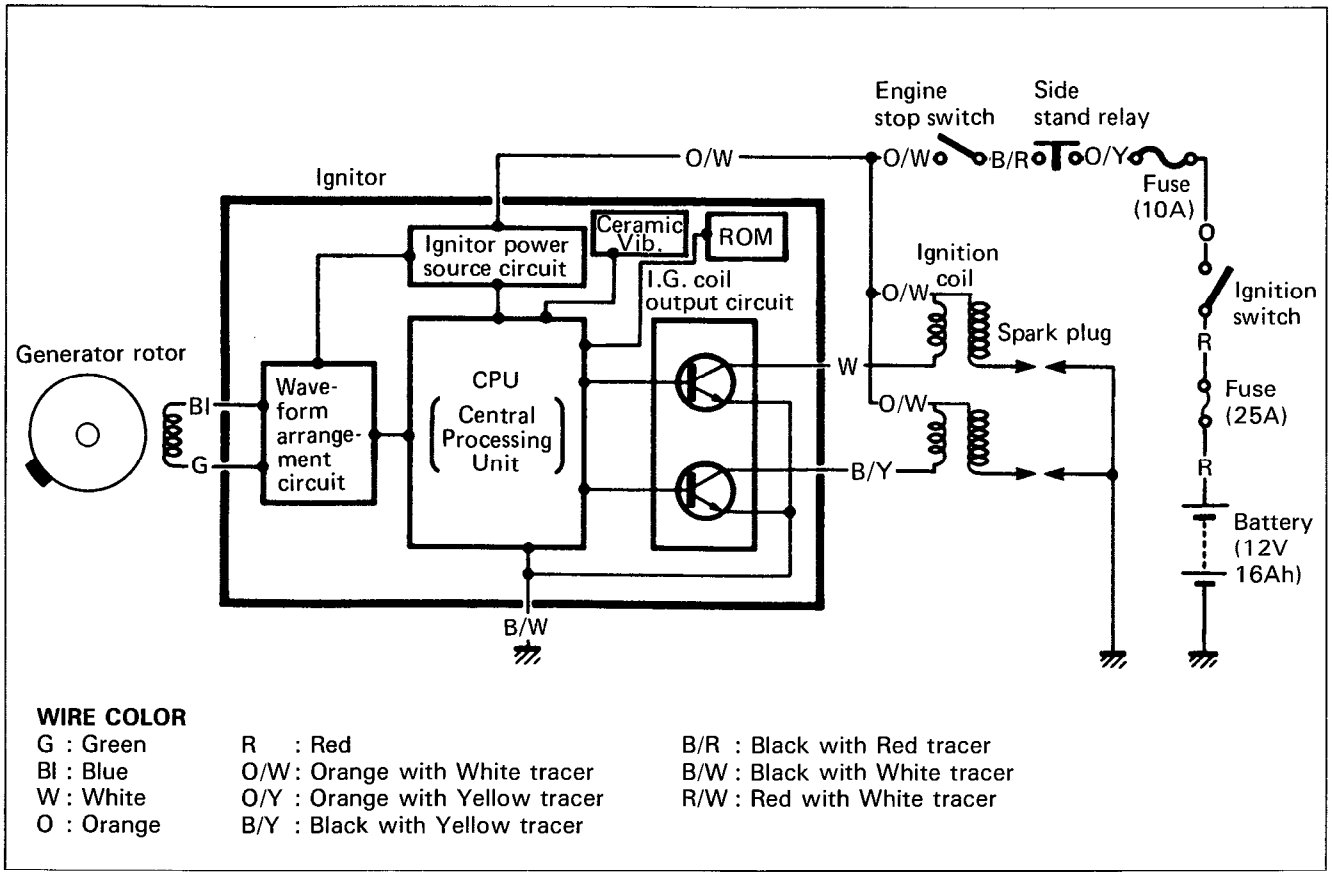
Tester knob indication: x 1Ω range



IGNITION SYSTEM

DESCRIPTION

The fully transistorized ignition system consists of the signal generator, ignitor, ignition coils, and spark plugs. The signal generator comprises the rotor tip and signal coil.
The rotor tip is mounted at the rotor. The signal coil is mounted at the generator cover. The induced signal in the signal generator is sent to wave-form arrangement circuit, and CPU receives this signal and calculates the best ignition timing from the signal of ceramic vibrator and data stored in the ROM. The CPU outputs signal to the transistor of the I.G. coil output circuit which is connected to the primary windings of the ignition coil which is turned OFF and ON accordingly, thus it induces the secondary current on the ignition coil secondary windings and produce the spark between spark plug gaps.

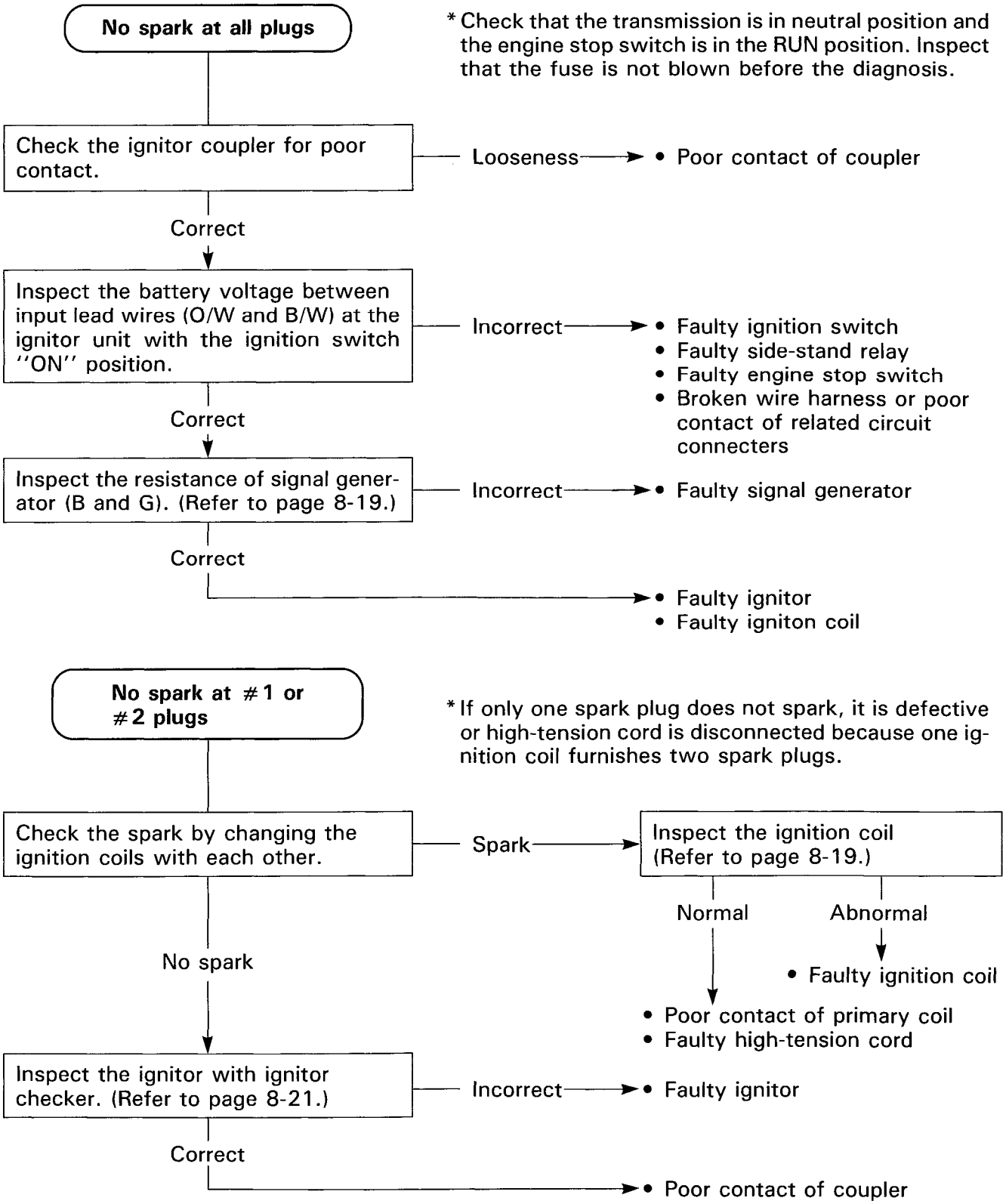


WIRE COLOR

G : Green	R : Red	B/R : Black with Red tracer
Bl : Blue	O/W : Orange with White tracer	B/W : Black with White tracer
W : White	O/Y : Orange with Yellow tracer	R/W : Red with White tracer
O : Orange	B/Y : Black with Yellow tracer	

NOTE:
The ignition cut-off circuit is not incorporated in this ignitor unit.

TROUBLESHOOTING

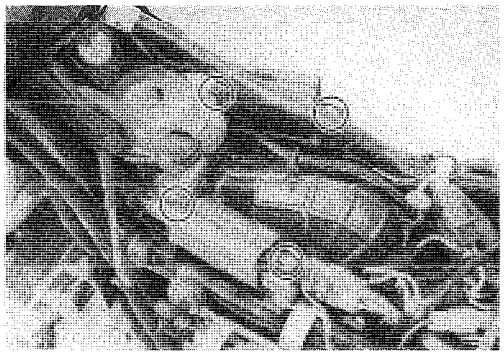


INSPECTION

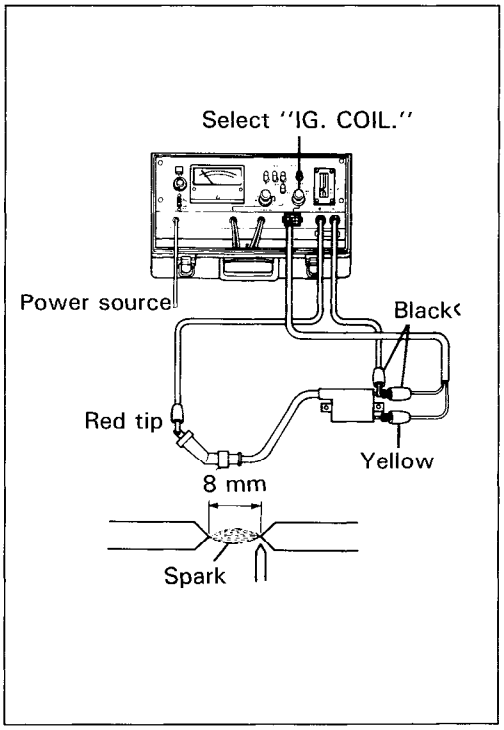
IGNITION COIL (Checking with Electro Tester)

- Remove the frame cover and seat. (Refer to page 7-1.)
- Remove the ignition coils.

NOTE:
Make sure that the three-needle sparking distance of electro tester is set at 8 mm (0.3 in).



- With the tester, test the ignition coil for sparking performance. The test connection is as indicated.
  If no sparking or orange color sparking occures in the above conditions, it may be caused by defective coil.



TOOL 09900-28106: Electro tester

Spark performance: Over 8 mm (0.3 in)

IGNITION COIL (Checking with Pocket Tester)

- A SUZUKI pocket tester or an ohm meter may be used, instead of the electro tester. In either case, the ignition coil is to be checked for continuity in both primary and secondary windings. Exact ohmic readings are not necessary, but, if the windings are in sound condition, their continuity will be noted with these approximate ohmic values.

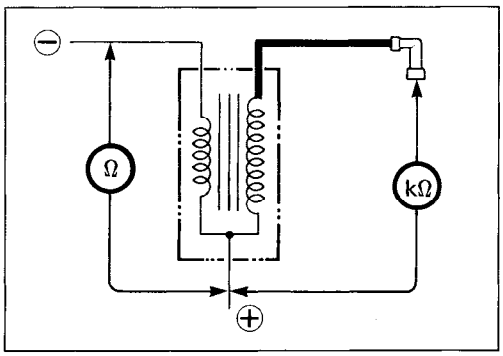
TOOL 09900-25002: Pocket tester

Ignition coil resistance
Primary: 2—6Ω (⊕ tap—⊖ tap)

Tester knob indication: x 1Ω range

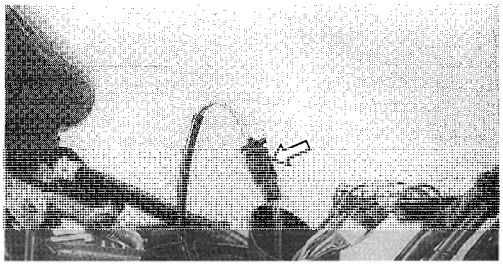
Secondary: 15—40kΩ (Plug cap—⊕ tap)

Tester knob indication: x 1kΩ range



SIGNAL GENERATOR (Checking with Pocket Tester)

- Remove the frame cover and seat and disconnect the lead wires.
- Measure the resistance between lead wires. If the resistance is infinity or less than the specifications, the signal coil must be replaced.



TOOL 09900-25002: Pocket tester

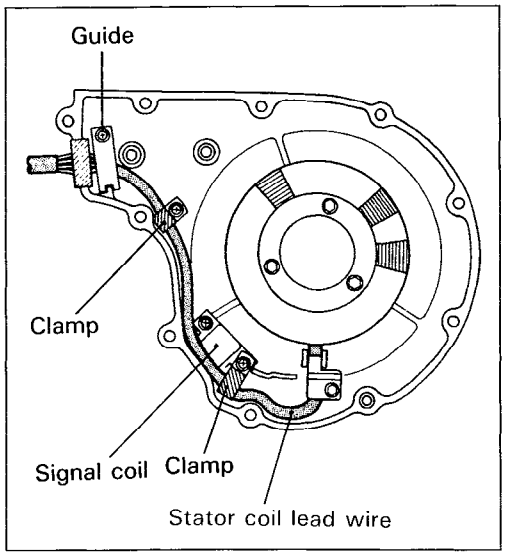
Signal coil resistance: Approx. 50—200Ω

Tester knob indication: x 100Ω range

⚠ CAUTION

When replacing the signal coil, apply a small quantity of THREAD LOCK "1342" to its mounting bolts and lead wire guide screws.

99000-32050: THREAD LOCK "1342"



SPARK PLUGS

- Remove the spark plugs. (Refer to page 2-8.)

Carbon Deposit

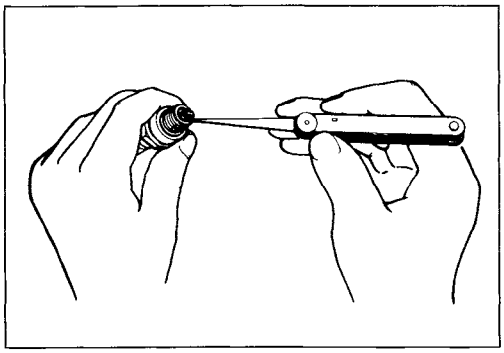
Check to see the carbon deposit on the plug.
If the carbon is deposited, remove it with a spark plug cleaner machine or carefully using a tool with a pointed end.

Spark Plug Gap

Measure the plug gap with a thickness gauge if it is correct. If not, adjust it to the following gap.

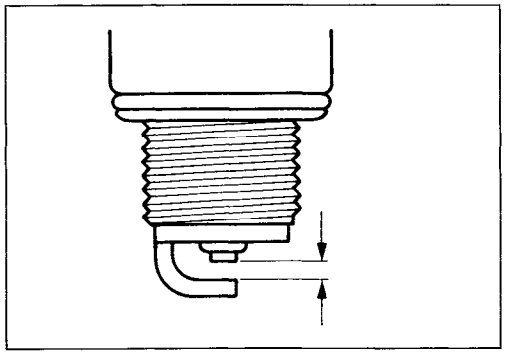
09900-20803: Thickness gauge

Spark plug gap
Standard: 0.8—0.9 mm (0.031—0.035 in)



Electrode's Condition

Check to see a worn or burnt condition of the electrode. If it is extremely worn or burnt, replace the plug. Also replace the plug if it has a broken insulator, damaged thread, and so on.



Heat Range

NGK DPR8EA-9 should be used as the standard. However, the heat range of the spark plug should be selected to meet the requirements of speed, actual load, fuel and so on. Proper heat range would be indicated if all insulators were LIGHT BROWN in color. If they are baked white, they should be replaced with a cold type plug NGK DPR9EA-9 or NIPPON-DENSO X27EPR-U9.

	Standard	Cold type	Hot type
NGK	DPR8EA-9	DPR9EA-9	DPR7EA-9
NIPPONDENSO	X24EPR-U9	X27EPR-U9	X22EPR-U9

⚠ CAUTION

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

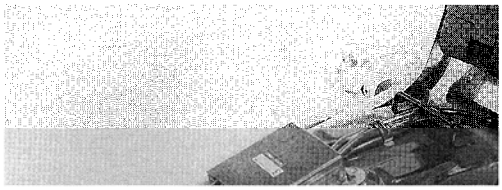
IGNITOR UNIT (Checking with Digital Ignitor Checker)

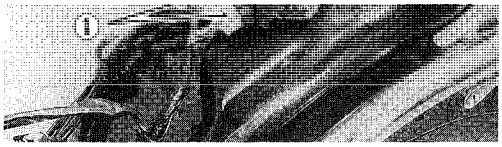
This section explains the checking procedure for the ignitor unit using Digital Ignitor Checker (special tool).
With this checker, the ignitor unit can be checked either on the machine or off the machine. The following explains the checking procedure on the machine.

TOOL 09931-94490: Digital ignitor checker

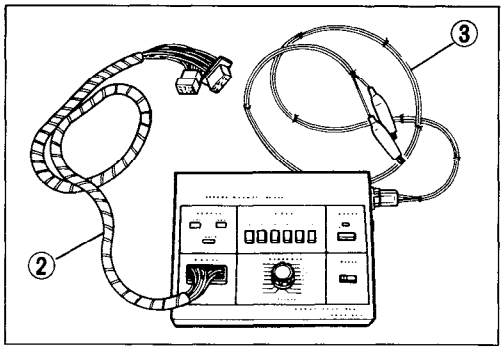
WIRING PROCEDURE:

- Remove the rear seat. (Refer to page 7-1.)
- Disconnect two ignitor lead wire couplers ① at the ignitor unit.





- Prepare the ignitor checker lead wire "MODE 1-A" ② which comes supplied with the ignitor checker and connect its end to the ignitor unit and another end to the checker.
- Connect the power source leads ③ to the battery.



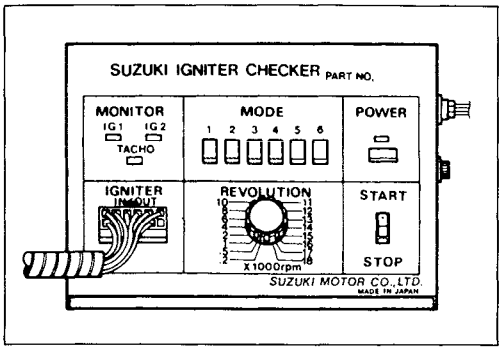
⚠ CAUTION

*** Be sure that the BLACK lead is connected to the battery ⊖ terminal and RED lead to the ⊕ terminal.**
*** Before connecting the power source leads, make sure that both "POWER" button and "START" switch are in "off" position (POWER button not depressed).**

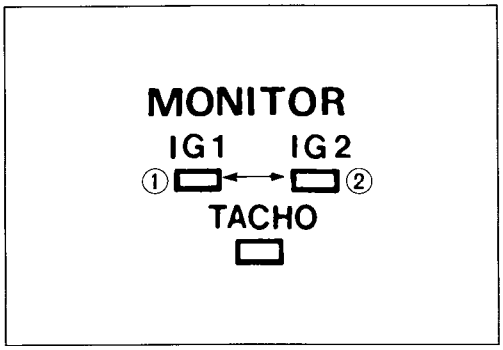
NOTE:
Be sure that the battery used is in fully-charged condition.

CHECK PROCEDURE:
With all the lead wires properly connected, check the ignitor unit in the following four steps.

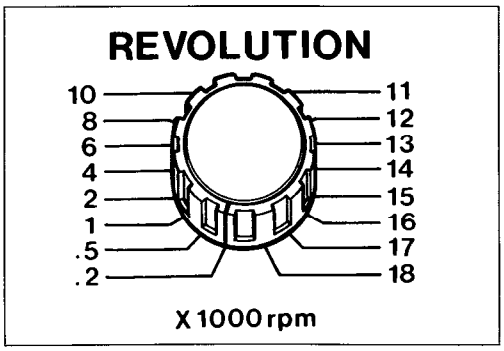
First Step:
Depress "MODE 1" button then "POWER" button. This time, "POWER" lamp should come on, if not, battery is undercharged.



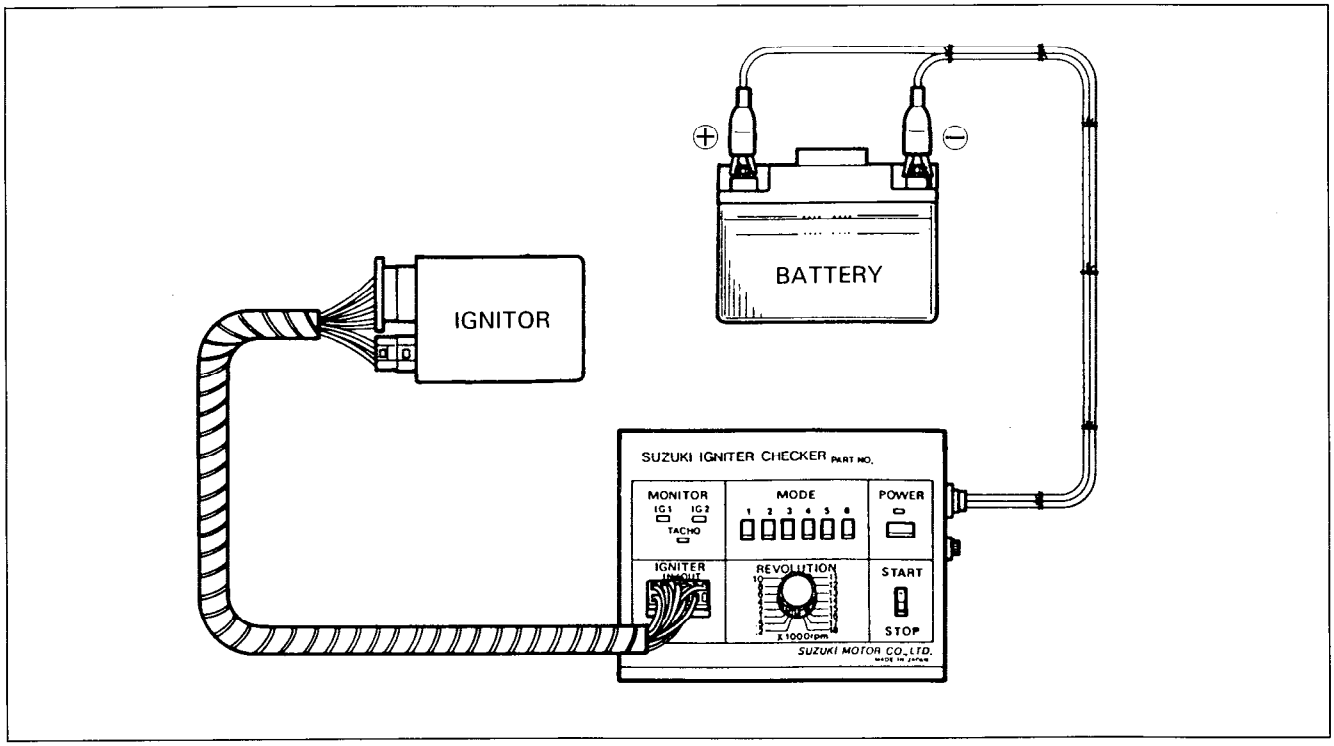
Second Step:
Set "REVOLUTION" dial pointer to ".2" position in which the checker produces the ignition primary current pulses simulating 200 r/min of engine revolution when "START" switch is turned on. With "START" switch is turned to ON position, check that three "MONITOR" lamps turn on and off in slow frequency in order of ①—② as illustrated.
If the lamps do not turn on and off, the ignitor unit should be replaced.



Third Step:
Turn "REVOLUTION" dial up gradually (assuming the engine gradually revved up) and check that the MONITOR lamp flash frequency as explained in the second step above increases. As the dial pointer passes beyond the graduation "4" (4 000 r/min), the two lamps should show continuously lighted.
If the lamps go off at the graduation below "10", the engine can not perform properly and therefore the ignitor unit must be replaced.



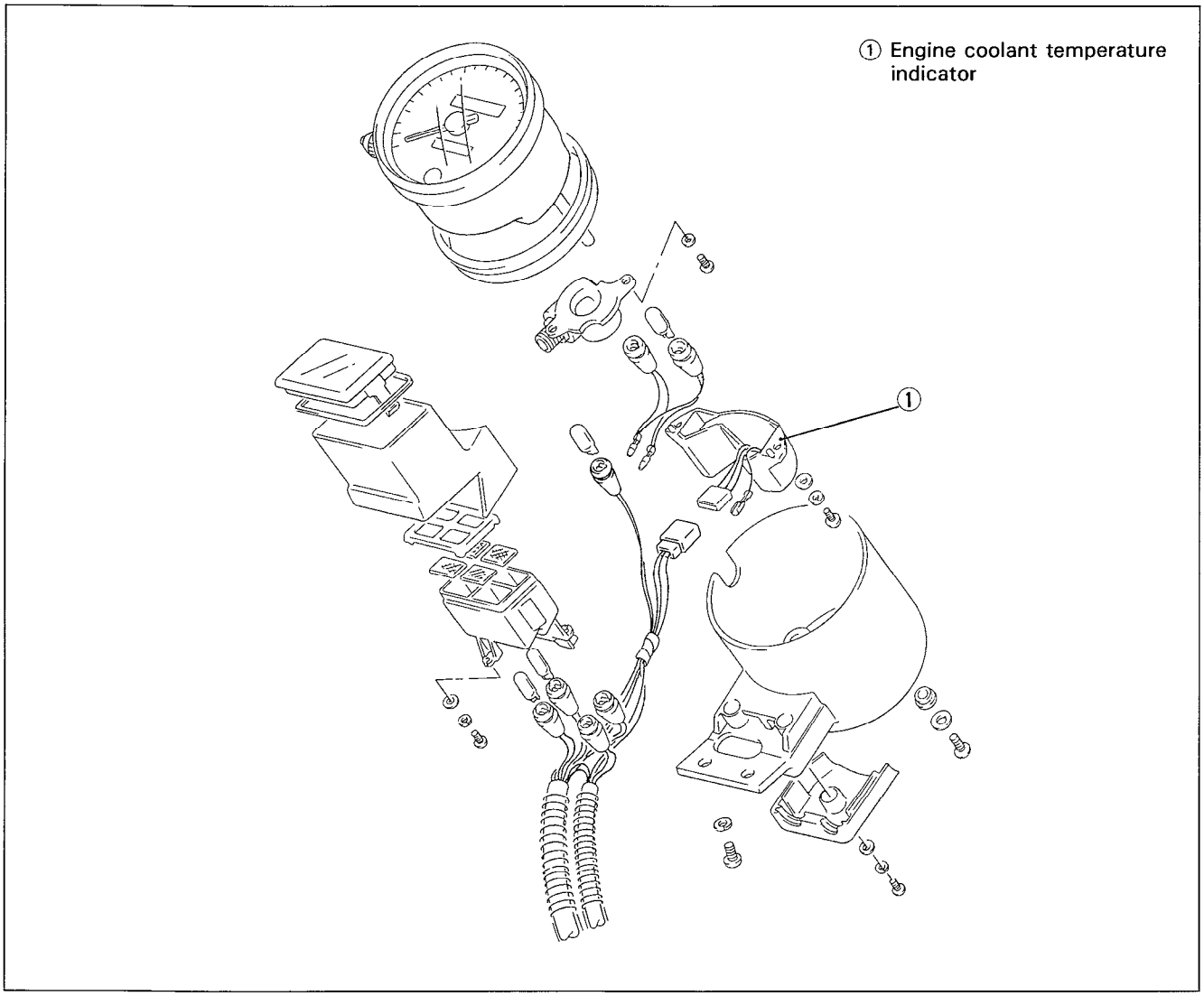
Fourth Step:
Turn "START" switch to STOP position. If the "IG1" or "IG2", or both lamps remain light more than 5 seconds, the ignitor unit must be replaced.



SPEEDOMETER AND INSTRUMENT PANEL

REMOVAL AND DISASSEMBLY

- Remove the speedometer. (Refer to pages 7-23 and 24.)
- Disassemble the speedometer as follows.



INSPECTION

Using the pocket tester, check the continuity between lead wires in the diagram on next page.
If the continuity measured is incorrect, replace the respective parts.

09900-25002: Pocket tester

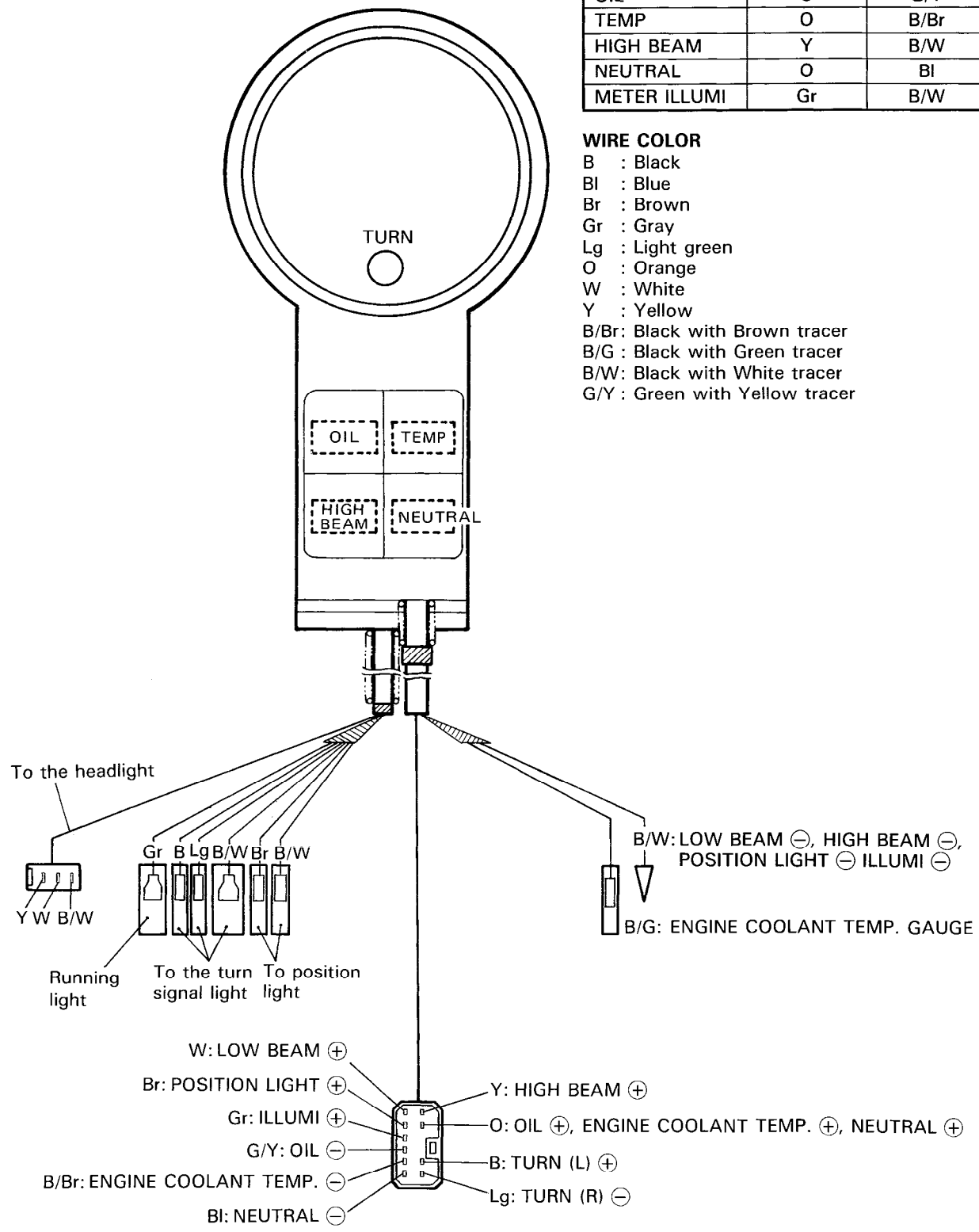
Tester knob indication: x 1Ω range

NOTE:
When making this test, it is not necessary to remove the speedometer.

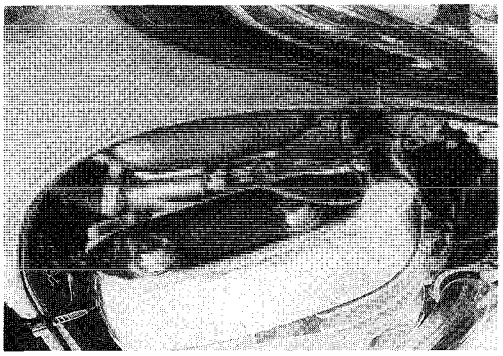
ITEM	⊕ Probe of tester to:	⊖ Probe of tester to:
POSITION LIGHT	Br	B/W
TURN	B	Lg
OIL	O	G/Y
TEMP	O	B/Br
HIGH BEAM	Y	B/W
NEUTRAL	O	Bl
METER ILLUMI	Gr	B/W

WIRE COLOR

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



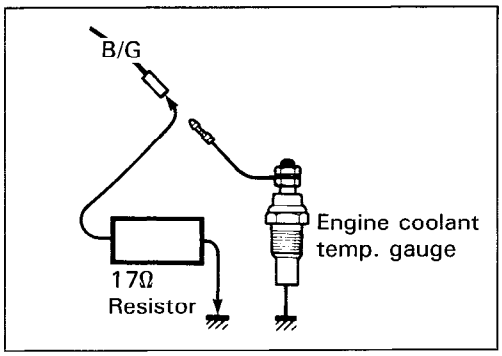
ENGINE COOLANT TEMPERATURE INDICATOR



INSPECTION

- Disconnect the Black/Green lead wire from the engine coolant temperature gauge.

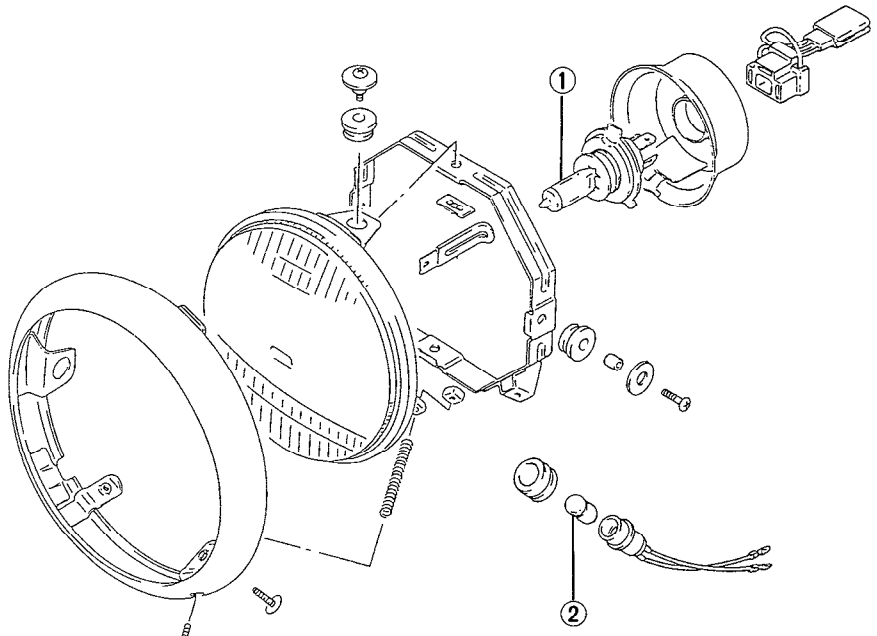
- Connect a 17-ohm resistor between the Black/Green lead wire and ground as shown in illustration.
- With the ignition switch turned on, engine coolant temperature indicator light in instrument panel should light.



If the engine coolant temperature indicator light does not light, replace the indicator bulb or repair the circuit connection. If the bulb is in good condition, the engine coolant temperature indicator may be faulty, replace engine coolant temperature indicator (refer to page 8-23.) with a new one or inspect the engine coolant temperature gauge. (Refer to page 6-11.)

LAMPS

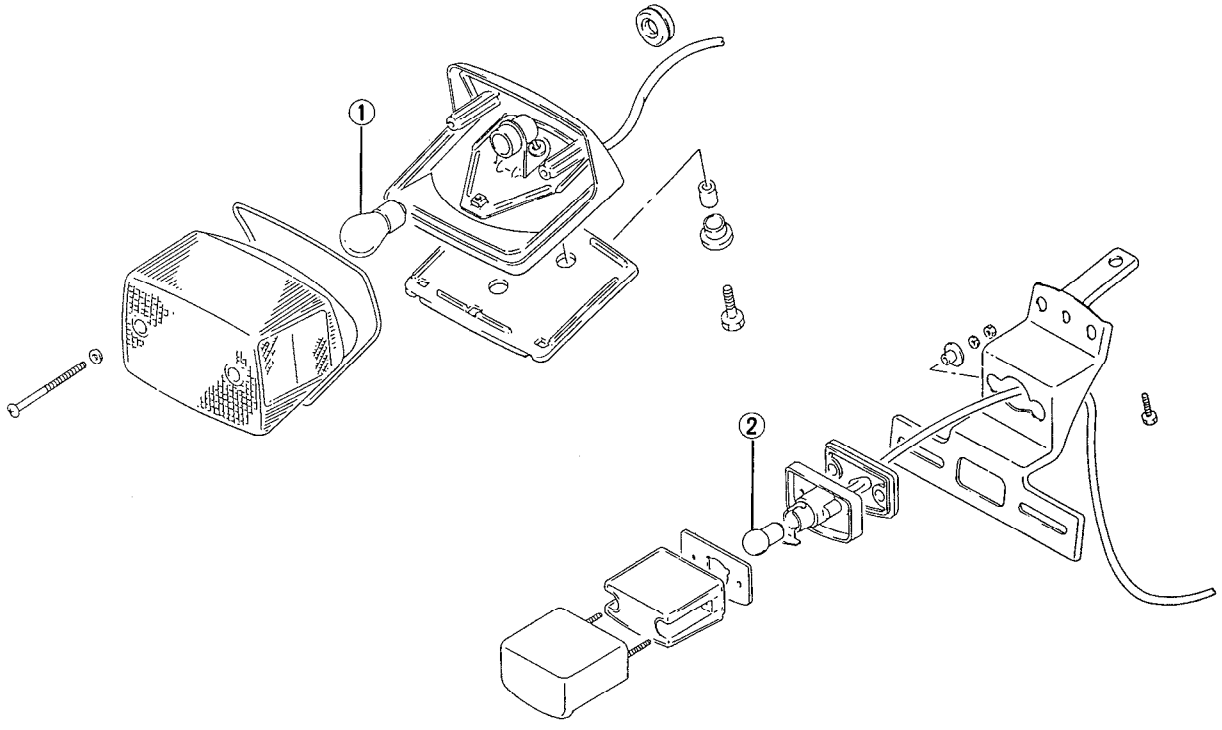
HEADLIGHT



① **Headlight bulb: 12V 60/55W**
② **Position light bulb: 12V 4W**

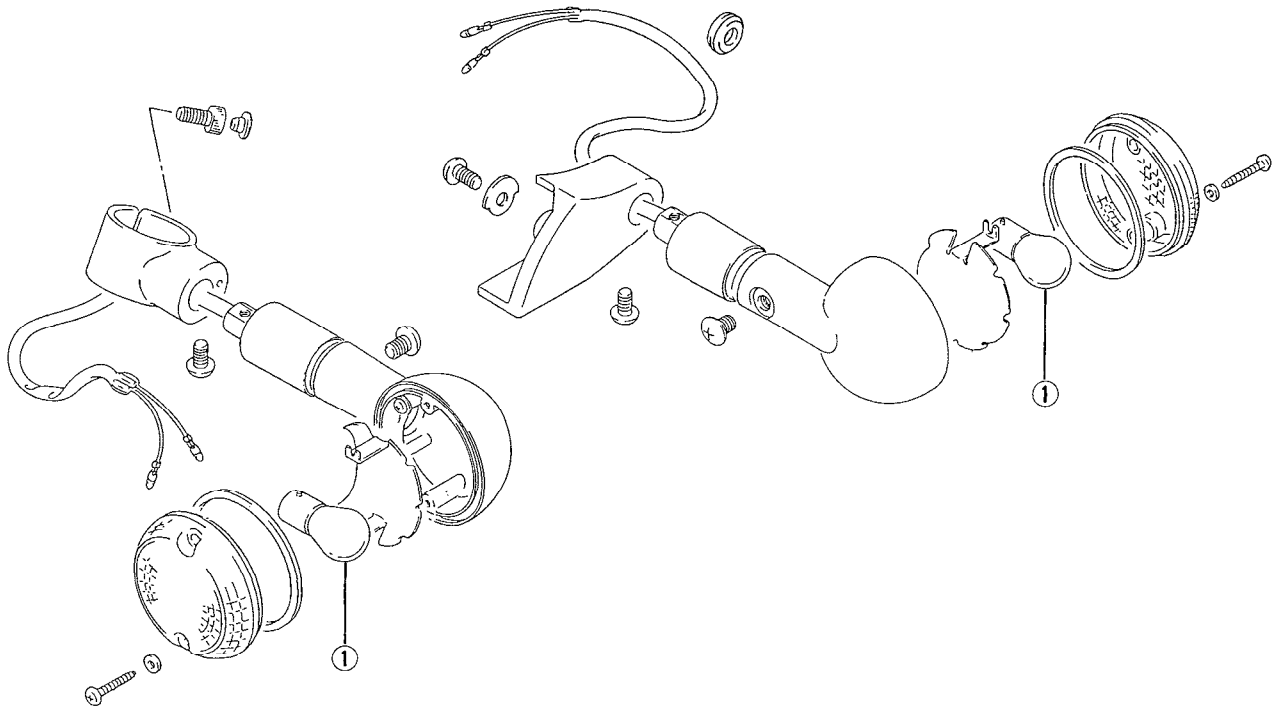
NOTE:
Adjust the headlight, both vertical and horizontal, after reassembling.

TAIL/BRAKE LIGHT



① **Tail/brake light bulb: 12V 5/21W**
② **License plate light bulb: 12V 5W**

TURN SIGNAL LIGHT



① **Turn signal light bulb: 12V 21W**

⚠ CAUTION

If you touch the bulb with your bare hands, clean it with a cloth moistened with alcohol or soapy water to prevent early failure.

RELAY

STARTER RELAY

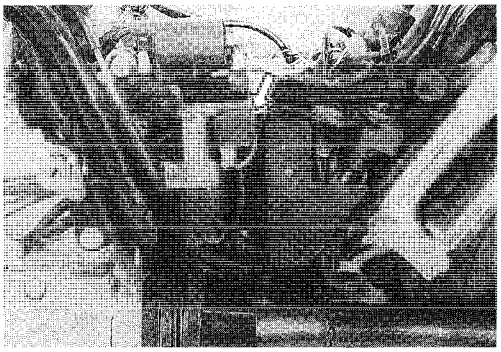
The starter relay is located behind the left frame cover. (Refer to page 8-14 for details.)

SIDE-STAND RELAY

The side-stand relay is located under the rear seat. (Refer to page 8-16 for details.)

TURN SIGNAL RELAY

The turn signal relay is located behind the left frame cover. If the turn signal light does not light, inspect the bulb, turn signal switch and circuit connection.
If the bulb, turn signal switch and circuit connection checked are correct, the turn signal relay may be faulty, replace it with a new one.



NOTE:
Be sure that the battery used is in fully-charged condition.

SWITCHES

Inspect each switch for continuity with the pocket tester. If any abnormality is found, replace the respective switch assemblies with new ones.

09900-25002: Pocket tester

Tester knob indication: x 1Ω range

IGNITION SWITCH

Position \ Color	R	O	Gr	Br
OFF				
ON	○——	——○	○——	——○
P	○——	——	——	——○

LIGHTING SWITCH

Position \ Color	B/Bl	Gr	G	Y/W
OFF				
S	○——	——○		
ON	○——	——○	○——	——○

DIMMER SWITCH

Position \ Color	Y/W	W	Y
HI	○——	——	——○
LO	○——	——○	

TURN SIGNAL SWITCH

Position \ Color	Lg	Lbl	B
L		○——	——○
PUSH			
R	○——	——○	

PASSING LIGHT SWITCH

Position \ Color	O/R	Y
•		
PUSH	○——	——○

ENGINE STOP SWITCH

Position \ Color	B/R	O/W
OFF		
RUN	○——	——○

STARTER BUTTON

Position \ Color	O/W	Y/G
•		
PUSH	○——	——○

HORN BUTTON

Position \ Color	B/G	B/W
•		
PUSH	○——	——○

FRONT BRAKE SWITCH

Position \ Color	O	W/B
OFF		
ON	○——	——○

REAR BRAKE SWITCH

Position \ Color	O	W/B
OFF		
ON	○——	——○

OIL PRESSURE SWITCH

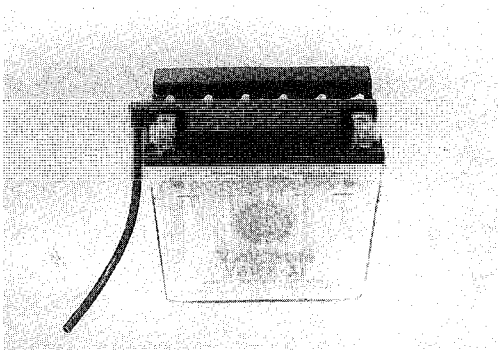
Position \ Color	B	Ground
Engine is stopped	○——	——○
Engine is running		

NOTE:
Before inspecting the oil pressure switch, check if the engine oil level is enough.

WIRE COLOR

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

BATTERY



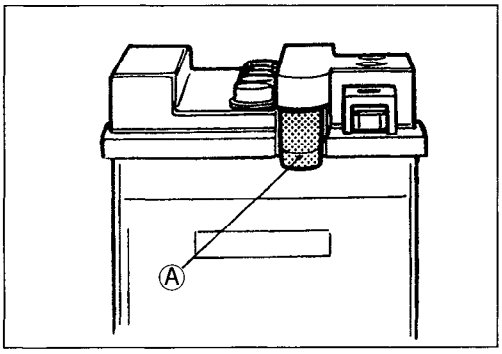
SPECIFICATIONS

Type designation	YB16B-A1
Capacity	12V, 57.6 kC (16 Ah)/10HR
Standard electrolyte S.G.	1.28 at 20°C (68°F)

In fitting the battery to the motorcycle, connect the breather hose to the battery vent.

INITIAL CHARGING

FILLING ELECTROLYTE



Remove the short sealed tube Ⓐ before filling electrolyte. Fill the battery with electrolyte (dilute sulfuric acid solution with acid concentration of 35.0% by weight, having a specific gravity of 1.28 at 20°C (68°F)) up to indicated UPPER LEVEL. Electrolyte should be always cooled below 30°C (86°F) before filling into battery. Leave battery standing for half an hour after filling. Add additional electrolyte if necessary. Charge battery with current as described in the table shown below.

Maximum charging current	1.6A

CHARGING TIME

The charging time for a new battery is determined by the number of months that have elapsed since the date of manufacture.

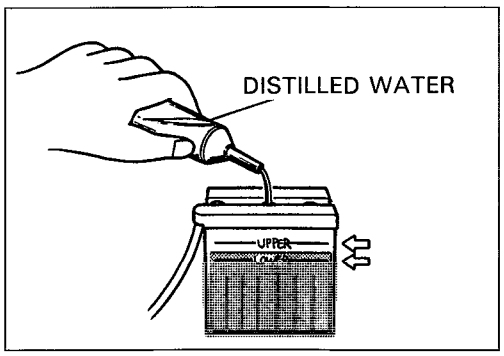
CONFIRMATION FOR DATE OF MANUFACTURE

Near the end of charging period, adjust the specific gravity of electrolyte to value specified. After charging, adjust the electrolyte level to the UPPER LEVEL with DISTILLED WATER.

SERVICING

Visually inspect the surface of the battery container. If any signs of cracking or electrolyte leakage from the sides of the battery have occurred, replace the battery with a new one. If the battery terminals are found to be coated with rust or an acidic white powdery substance, then this can be cleaned away with sandpaper.

Check the electrolyte level and add distilled water, as necessary to raise the electrolyte to each cell's UPPER level. Check the battery for proper charge by taking an electrolyte S.G. reading. If the reading is 1.22 or less, as corrected to 20°C (68°F), it means that the battery is still in a run-down condition and needs recharging.

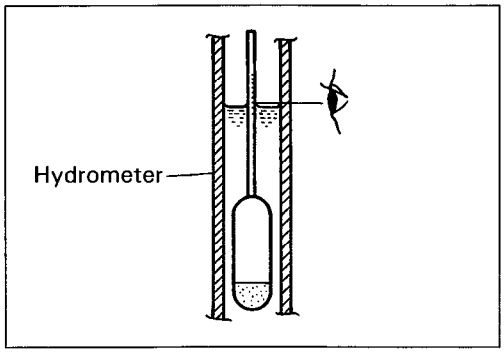


NOTE:
First, remove the ⊖ lead wire.

Months after manufacturing	Within 6	Within 9	Within 12	Over 12
Necessary charging hours	20	30	40	60

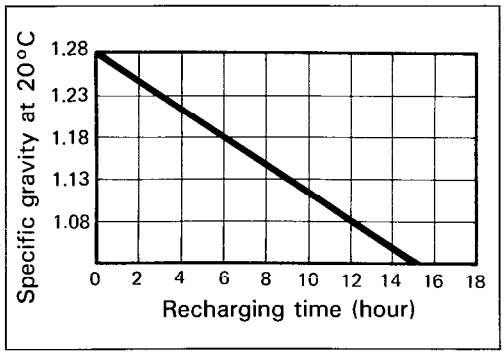
RECHARGING OPERATION BASED ON S.G. READING

To read the S.G. on the hydrometer, bring the electrolyte in the hydrometer to eye level and read the graduation on the float scale bordering on the meniscus (curved-up portion of electrolyte surface), as shown in figure.



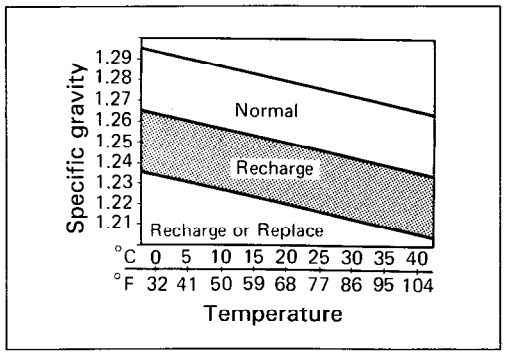
TOOL 09900-28403: Hydrometer

Check the reading (as corrected to 20°C) with chart to determine the recharging time in hour by constant-current charging at a charging rate of 1.6 amperes (which is tenth of the capacity of the present battery).



Electrolyte specific gravity	1.28 at 20°C (68°F)

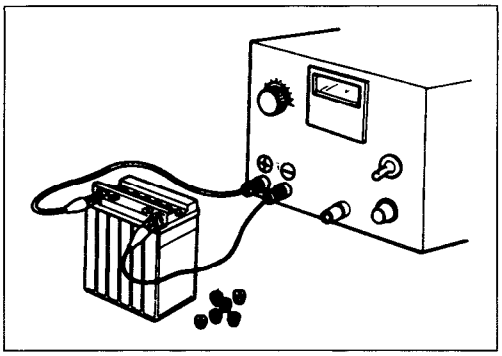
Be careful not to permit the electrolyte temperature to exceed 45°C (113°F), at any time, during the recharging operation. Interrupt the operation, as necessary, to let the electrolyte cool down. Recharge the battery to the specification.



⚠ CAUTION

Constant-voltage charging, otherwise called "quick" charging, is not recommendable for it could shorten the life of the battery.

SERVICE LIFE



Lead oxide is applied to the pole plates of the battery which will come off gradually during the service. When the bottom of the battery case becomes full of the sediment, the battery cannot be used any more. If the battery is not charged for a long time, lead sulfate is generated on the surface of the pole plates and will deteriorate the performance (sulfation). Replace the battery with new one in such a case. When a battery is left for a long term without using, it is apt to subject to sulfation. When the motorcycle is not used for more than 1 month (especially during the winter season), recharge the battery once a month at least.

⚠ WARNING

- **Before charging a battery, remove the seal cap from each cell.**
- **Keep fire and sparks away from a battery being charged.**
- **When removing a battery from the motorcycle, be sure to remove the ⊖ terminal first.**

SERVICING INFORMATION

CONTENTS

TROUBLESHOOTING

ENGINE

Complaint	Symptom and possible causes	Remedy
Engine will not start, or is hard to start.	**Compression too low**	
	1. Out of adjustment valve clearance.	Adjust.
	2. Worn valve guides or poor seating of valves.	Repair or replace.
	3. Mistiming valves.	Adjust.
	4. Excessively worn piston rings.	Replace.
	5. Worn-down cylinder bores.	Replace or rebore.
	6. Too slowly starter motor cranks.	See electrical section.
	7. Poor seating of spark plugs.	Retighten.
	Plugs not sparking	
	1. Fouled spark plugs.	Clean.
	2. Wet spark plugs.	Clean and dry.
	3. Defective ignition coil.	Replace.
	4. Open or short in high-tension cords.	Replace.
	5. Defective signal coil or ignitor unit.	Replace.
	No fuel reaching the carburetors	
	1. Clogged fuel tank vent hose.	Clean or replace.
	2. Clogged or defective fuel valve.	Clean or replace.
	3. Defective fuel pump.	Replace.
	4. Defective carburetor needle valve.	Replace.
	5. Clogged fuel hose or fuel valve strainer.	Clean or replace.
	6. Defective signal coil, ignition coil and ignitor.	Replace.
Engine stalls easily.	1. Fouled spark plugs.	Clean.
	2. Defective signal coil or ignitor unit.	Replace.
	3. Clogged fuel hose.	Clean.
	4. Clogged jets in carburetors.	Clean.
	5. Out of adjustment valve clearance.	Adjust.
	6. Defective fuel pump.	Replace.
Noisy engine.	**Excessive valve chatter**	
	1. Too large valve clearance.	Adjust.
	2. Weakened or broken valve springs.	Replace.
	3. Worn down rocker arm or rocker arm shaft.	Replace.
	4. Worn and burnt camshaft journal.	Replace.
	Noise seems to come from piston	
	1. Worn down pistons or cylinders.	Replace.
	2. Fouled with carbon combustion chambers.	Clean.
	3. Worn piston pins or piston pin bore.	Replace.
	4. Worn piston rings or ring grooves.	Replace.
	Noise seems to come from timing chain	
	1. Stretched chain.	Replace.
	2. Worn sprockets.	Replace.
	3. Not working tension adjuster.	Repair or replace.
	Noise seems to come from clutch	
	1. Worn splines of countershaft or hub.	Replace.
	2. Worn teeth of clutch plates.	Replace.
	3. Distorted clutch plates, driven and drive.	Replace.
	4. Worn clutch release bearing.	Replace.
	5. Weakened clutch dampers.	Replace the primary driven gear.

Complaint	Symptom and possible causes	Remedy
Noisy engine.	**Noise seems to come from crankshaft**	
	1. Due to wear rattling bearings.	Replace.
	2. Worn and burnt big-end bearings.	Replace.
	3. Worn and burnt journal bearings.	Replace.
	4. Too large thrust clearance.	Replace thrust bearing.
	Noise seems to come from transmission	
	1. Worn or rubbing gears.	Replace.
	2. Worn splines.	Replace.
	3. Worn or rubbing primary gears.	Replace.
	4. Worn bearings.	Replace.
	Noise seems to come from water pump	
	1. Too much play on pump shaft bearing.	Adjust.
	2. Worn or damaged drive chain sprocket.	Replace.
	3. Worn or damaged mechanical seal.	Replace.
	4. Touches pump case and impeller.	Replace.
Slipping clutch.	1. Out of adjustment or loss of play clutch control.	Adjust.
	2. Weakened clutch springs.	Replace.
	3. Worn or distorted pressure plate.	Replace.
	4. Distorted clutch plates, driven and drive.	Replace.
Dragging clutch.	1. Leakage of clutch fluid.	Repair.
	2. Worn or damaged clutch master cylinder/clutch release cylinder.	Replace.
	3. Damaged oil seal/clutch hose.	Replace.
	4. Some clutch springs weakened while others are not.	Replace.
	5. Distorted pressure plate or clutch plate.	Replace.
Transmission will not shift.	1. Broken gearshift cam.	Replace.
	2. Distorted gearshift forks.	Replace.
	3. Worn gearshift pawl.	Replace.
Transmission will not shift back.	1. Broken return spring on shift shaft.	Replace.
	2. Rubbing or stickly shift shaft.	Repair or replace.
	3. Distorted or worn gearshift forks.	Replace.
Transmission jumps out of gear.	1. Worn shifting gears on driveshaft or countershaft.	Replace.
	2. Distorted or worn gearshift forks.	Replace.
	3. Weakened stopper spring on gearshift stopper.	Replace.
	4. Worn gearshift pawl.	Replace.
Engine idles poorly.	1. Out of adjustment valve clearance.	Adjust.
	2. Poor seating of valves.	Replace or repair.
	3. Defective valve guides.	Replace.
	4. Worn tappet or camsurface.	Replace.
	5. Too wide spark plug gaps.	Adjust or replace.
	6. Defective ignition coil.	Replace.
	7. Defective signal coil or ignitor unit.	Replace.
	8. Out of adjustment in carburetors float-chamber fuel level.	Adjust.
	9. Clogged jets or imbalance of carburetors.	Clean or adjust.
	10. Defective fuel pump or ignitor unit.	Replace.

Complaint	Symptom and possible causes	Remedy
Engine runs poorly in high speed range.	1. Weakened valve springs.	Replace.
	2. Worn camshafts.	Replace.
	3. Valve timing out of adjustment.	Adjust.
	4. Too narrow spark plug gaps.	Adjust.
	5. Ignition not advanced sufficiently due to poorly working timing advance circuit.	Replace ignitor unit.
	6. Defective ignition coil.	Replace.
	7. Defective signal coil or ignitor unit.	Replace.
	8. Too low float-chamber fuel level.	Adjust.
	9. Clogged air cleaner element.	Clean.
	10. Clogged fuel hose, resulting in inadequate fuel supply to carburetors.	Clean and prime.
	11. Defective fuel pump or ignitor unit.	Replace.
Dirty or heavy exhaust smoke.	1. Too much engine oil in the engine.	Check with inspection window drain out excess oil.
	2. Worn piston rings or cylinders.	Replace.
	3. Worn valve guides.	Replace.
	4. Scored or scuffed cylinder walls.	Rebore or replace.
	5. Worn valves stems.	Replace.
	6. Defective stem seal.	Replace.
	7. Worn oil ring side rails.	Replace.
Engine lacks power.	1. Loss of valve clearance.	Adjust.
	2. Weakened valve springs.	Replace.
	3. Out of adjustment valve timing.	Adjust.
	4. Worn piston rings or cylinders.	Replace.
	5. Poor seating of valves.	Repair.
	6. Fouled spark plug.	Clean or replace.
	7. Incorrect spark plug.	Adjust or replace.
	8. Clogged jets in carburetors.	Clean.
	9. Out of adjustment float-chamber fuel level.	Adjust.
	10. Clogged air cleaner element.	Clean.
	11. Loose carburetor balancing adjuster.	Retighten and balance the carburetor.
	12. Sucking air from intake pipe.	Retighten or replace.
	13. Too much engine oil.	Drain out excess oil.
	14. Defective fuel pump or ignitor unit.	Replace.
	15. Defective signal coil, ignitor unit and ignition coil.	Replace.
Engine overheats.	1. Heavy carbon deposit on piston crowns.	Clean.
	2. Not enough oil in the engine.	Add oil.
	3. Defective oil pump or clogged oil circuit.	Replace or clean.
	4. Too low in float chambers fuel level.	Adjust.
	5. Sucking air from intake pipes.	Retighten or replace.
	6. Use incorrect engine oil.	Change.
	7. Defective cooling system.	See radiator section.

SHAFT DRIVE

Complaint	Symptom and possible causes	Remedy
Noisy shaft drive.	**Noise seems to come from secondary bevel gear and final bevel gear assemblies.**	
	1. Oil level too low.	Refill. (Check oil jet/replace oil seal.)
	2. Drive and driven bevel gears damaged or worn.	Replace.
	3. Excessive backlash.	Adjust.
	4. Improper tooth contact.	Adjust.
	5. Damage to bearings.	Replace.
	Noise seems to come from propeller shaft area.	
	1. Propeller shaft universal joint damaged.	Replace.
	2. Propeller shaft splines damaged or worn.	Replace.
	3. Insufficient lubricant.	Refill. (Replace oil seal.)
	4. Cam dog contacting surface damaged or worn.	Replace.
No power transmitted from engine to rear wheel.	1. Broken propeller shaft.	Replace.
	2. Broken gear teeth.	Replace.
	3. Broken or damaged input/output cam dog.	Replace.
Secondary bevel gear and final bevel gear assemblies oil leak.	1. Damage to oil seals.	Replace.
	2. Damage to O-rings.	Replace.
	3. Loose bolts on secondary gear case and final gear bearing case.	Retighten.

CARBURETOR

Complaint	Symptom and possible causes	Remedy
Trouble with starting.	1. Clogged starter jet.	Clean.
	2. Clogged starter pipe.	Clean.
	3. Air leaking from a joint between starter body and carburetor.	Check starter body and carburetor for tightness, adjust and replace gasket.
	4. Air leaking from carburetor's joint or vacuum gauge joint.	Check and adjust.
	5. Not operation properly starter plunger.	Check and adjust.
Idling or low-speed trouble.	1. Clogged or loose pilot jet, pilot air jet.	Check and clean.
	2. Air leaking from carburetor's joint, vacuum gauge joint, or starter.	Check and adjust.
	3. Clogged pilot outlet or bypass.	Check and clean.
	4. Not fully closed starter plunger.	Check and adjust.
Medium-or high speed trouble.	1. Clogged main jet or main air jet.	Check and clean.
	2. Clogged needle jet.	Check and clean.
	3. Not operating properly throttle valve.	Check throttle valve for operation.
	4. Clogged fuel filter.	Check and clean.
	5. Carburetor balancing adjuster loose.	Retighten and balance the carburetor.

Complaint	Symptom and possible causes	Remedy
Overflow and fuel level fluctuations.	1. Worn or damaged needle valve. 2. Broken spring in needle valve. 3. Not working properly float. 4. Foreign matter has adhered to needle valve. 5. Too high or low fuel level. 6. Defective fuel pump or ignitor unit. 7. Clogged carburetor air vent pipe. 8. Defective signal coil, ignitor unit and ignition coil.	Replace. Replace. Check and adjust. Clean. Adjust float height. Replace. Clean. Replace.

RADIATOR

Complaint	Symptom and possible causes	Remedy
Engine overheats.	1. Not enough engine coolant. 2. Clogged with dirt or trashes radiator core. 3. Erratic thermostat, stuck in closed position. 4. Faulty cooling fan. 5. Defective cooling fan thermo-switch. 6. Clogged water passage. 7. Air trapped in the cooling circuit. 8. Defective water pump. 9. Use incorrect engine coolant.	Add engine coolant. Clean. Replace. Repair or replace. Replace. Clean. Bleed out air. Replace. Replace.
Engine overcools.	1. Erratic thermostat, stuck in full-open position. 2. Defective cooling fan thermo-switch. 3. Extremely cold weather.	Replace. Replace. Put on the radiator cover.

CHASSIS

Complaint	Symptom and possible causes	Remedy
Heavy steering.	1. Overtightened steering stem nut. 2. Broken bearing in steering stem. 3. Distorted steering stem. 4. Not enough pressure in tires.	Adjust. Replace. Replace. Adjust.
Wobbly handlebars.	1. Loss of balance between right and left front forks. 2. Distorted front fork. 3. Distorted front axle or crooked tire. 4. Loose steering stem nut. 5. Worn or incorrect tire or wrong tire pressure.	Replace. Repair or replace. Replace. Adjust. Adjust or replace.
Wobby front wheel.	1. Distorted wheel rim. 2. Worn front wheel bearings. 3. Defective or incorrect tire. 4. Loose axle, axle nut or axle pinch bolts. 5. Incorrect front fork oil level.	Replace. Replace. Replace. Retighten. Adjust.
Front suspension too soft.	1. Weakened springs. 2. Not enough fork oil. 3. Wrong weight fork oil.	Replace. Replenish. Replace.
Front suspension too stiff.	1. Too viscous fork oil. 2. Too much fork oil. 3. Front axle bent.	Replace. Drain excess oil. Replace.

Complaint	Symptom and possible causes	Remedy
Noisy front suspension.	1. Not enough fork oil. 2. Loose bolts on suspension.	Replenish. Retighten.
Wobbly rear wheel.	1. Distorted wheel rim. 2. Worn rear wheel bearing or swingarm bearings. 3. Defective or incorrect tire. 4. Worn swingarm and rear cushion related bearings. 5. Loose nuts or bolts on rear suspensions.	Replace. Replace. Replace. Replace. Retighten.
Rear suspension too soft.	1. Weakened shock absorber spring. 2. Improperly set rear suspension adjuster. 3. Leakage oil of shock absorber.	Replace. Adjust. Replace.
Rear suspension too stiff.	1. Improperly set rear suspension adjuster. 2. Bent shock absorber shaft. 3. Bent swingarm. 4. Worn swingarm and rear cushion related bearings.	Adjust. Replace. Replace. Replace.
Noisy rear suspension.	1. Loose nuts or bolts on rear suspension. 2. Worn swingarm and rear cushion related bearings.	Retighten. Replace.

BRAKES

Complaint	Symptom and possible causes	Remedy
Insufficient brake power.	1. Leakage of brake fluid from hydraulic system. 2. Worn pads/shoe. 3. Oil adhesion of engaging surface of pads/shoe. 4. Worn disc/drum. 5. Air in hydraulic system. 6. Not enough brake fluid in the reservoir. 7. Too much play on brake pedal.	Repair or replace. Replace. Clean disc and pads. Replace. Bleed air. Replenish. Ajust.
Brake squeaking.	1. Carbon adhesion on pad/shoe surface. 2. Tilted pad. 3. Damaged wheel bearing. 4. Loosen front-wheel axle or rear-wheel axle. 5. Worn pads. 6. Foreign material in brake fluid. 7. Clogged return port of master cylinder.	Repair surface with sandpaper. Modify pad fitting or replace. Replace. Tighten to specified torque. Replace. Replace brake fluid. Disassemble and clean master cylinder.
Excessive brake lever stroke.	1. Air in hydraulic system. 2. Insufficient brake fluid. 3. Improper quality of brake fluid.	Bleed air. Replenish fluid to specified level; bleed air. Replace with correct fluid.
Leakage of brake fluid.	1. Insufficient tightening of connection joints. 2. Cracked hose. 3. Worn piston and/or cup.	Tighten to specified torque. Replace. Replace piston and/or cup.

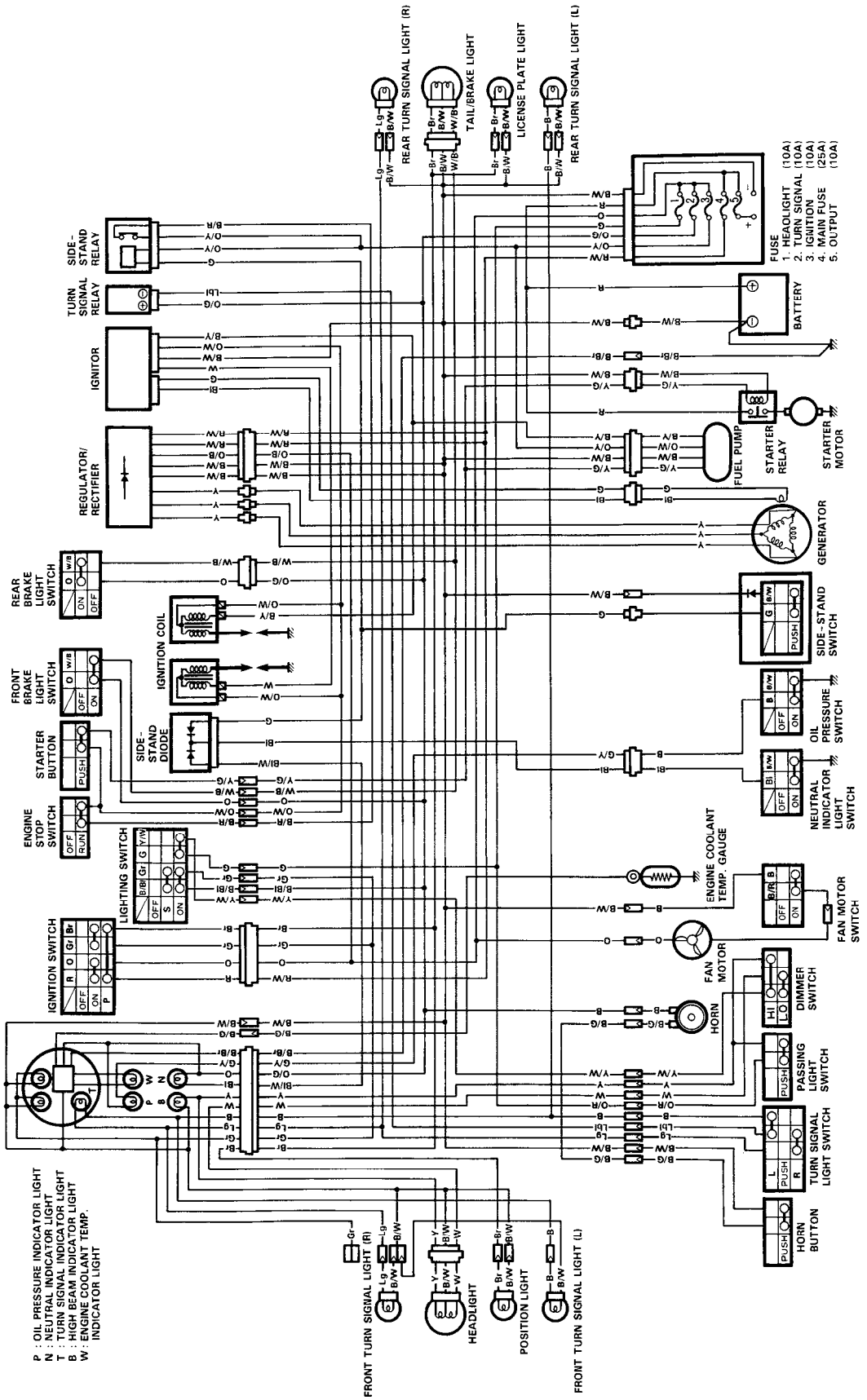
ELECTRICAL

Complaint	Symptom and possible causes	Remedy
No sparking or poor sparking.	1. Defective ignition coil. 2. Defective spark plugs. 3. Defective signal coil or ignitor unit.	Replace. Replace. Replace.
Spark plug soon become fouled with carbon.	1. Mixture too rich. 2. Idling speed set too high. 3. Incorrect gasoline. 4. Dirty element in air cleaner. 5. Too cold spark plugs.	Adjust carburetors. Adjust carburetors. Change. Clean. Replace with hot type plugs.
Spark plugs become fouled too soon.	1. Worn piston rings. 2. Worn piston or cylinders. 3. Excessive clearance of valve stems in valve guides. 4. Worn stem oil seal.	Replace. Replace. Replace. Replace.
Spark plug electrodes overheat or burn.	1. Too hot spark plugs. 2. Overheated the engine. 3. Loose spark plugs. 4. Too lean mixture.	Replace with cold type plugs. Tune up. Retighten. Adjust carburetors.
Generator does not charge.	1. Open or short lead wires, or loose lead connections. 2. Shorted, grounded or open generator coils. 3. Shorted or panctured regulator/rectifiers.	Repair or replace or retighten. Replace. Replace.
Generator does charge, but charging rate is below the specification.	1. Lead wires tend to get shorted or open-circuited or loosely connected at terminals. 2. Grounded or open-circuited stator coils or generator. 3. Defective regulator/rectifier. 4. Defective cell plates in the battery. 5. Not enough electrolyte in the battery.	Repair or retighten. Replace. Replace. Replace the battery. Add distilled water between the level lines.
Generator overcharges.	1. Internal short-circuit in the battery. 2. Damaged or defective resistor element in the regulator/rectifier. 3. Poorly grounded regulator/rectifier.	Replace the battery. Replace. Clean and tighten ground connection.
Unstable charging.	1. Lead wire insulation frayed due to vibration, resulting in intermittent shorting. 2. Internally shorted generator. 3. Defective regulator/rectifier.	Repair or replace. Replace. Replace.
Starter button is not effective.	1. Run down battery. 2. Defective switch contacts. 3. Not seating properly brushes on commutator in starter motor. 4. Defective starter relay/starter interlock switch.	Repair or replace. Replace. Repair or replace. Replace.

BATTERY

Complaint	Symptom and possible causes	Remedy
"Sulfation", acidic white powdery substance or spots on surfaces of cell plates.	1. Not enough electrolyte.	Add distilled water, if the battery has not been damaged and "sulfation" has not advanced too far, and recharge.
	2. Battery case is cracked.	Replace the battery.
	3. Battery has been left in a run-down condition for a long time.	Replace the battery.
	4. Contaminated electrolyte (Foreign matter has enteres the battery and become mixed with the electrolyte.)	If "sulfation" has not advanced too far, try to restore the battery by replacing the electrolyte, recharging it fully with the battery detached from the motorcycle and then adjusting electrolyte S.G.
Battery runs down quickly.	1. Incorrect charging system.	Check the generator, regulator/ rectifier and circuit connections, and make necessary adjustments to obtain specified charging operation.
	2. Cell plates have lost much of their active material as a result of over-charging.	Replace the battery, and correct the charging system.
	3. A short-circuit condition exists within the battery due to excessive accumulation of sediments caused by the high electrolyte S.G.	Replace the battery.
	4. Electrolyte S.G. is too low.	Recharge the battery fully and adjust electrolyte S.G.
	5. Contaminated electrolyte.	Replace the electrolyte, recharge the battery and then adjust S.G.
	6. Too old battery.	Replace the battery.
Reversed battery polarity.	The battery has been connected the wrong way round in the system, so that it is being charged in the reverse direction.	Replace the battery and be sure to connect the battery properly.
Battery "sulfation".	1. Too low or too high charging rate. (When not in use batteries should be recharged at least once a month to avoid sulfation.)	Replace the battery.
	2. Battery electrolyte excessive or insufficient, or its specific gravity too high or too low.	Keep the electrolyte up to the prescribed level, or adjust the S.G. by consulting the battery maker's direction.
	3. The battery left unused for too long in cold climate.	Replace the battery, if badly sulfated.
Battery discharges too rapidly.	1. Dirty container top and sides.	Clean.
	2. Impurities in the electrolyte or electrolyte S.G. is too high.	Change the electrolyte by consulting the battery maker's directions.

WIRING DIAGRAM

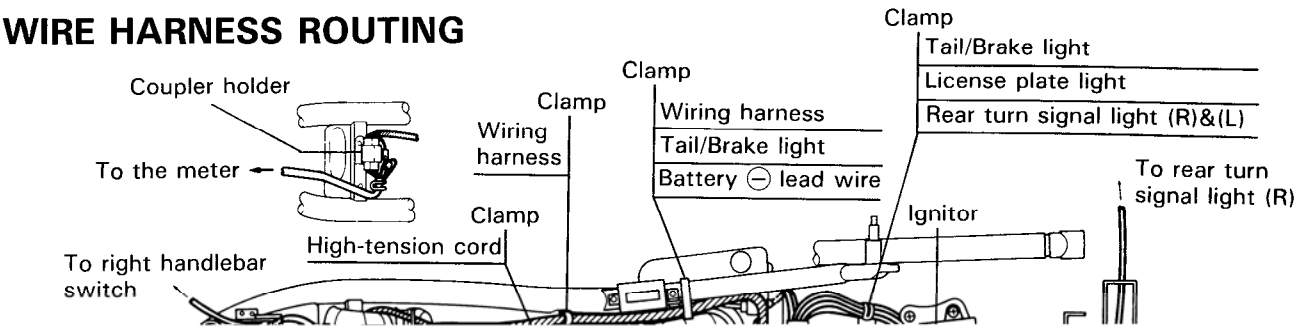


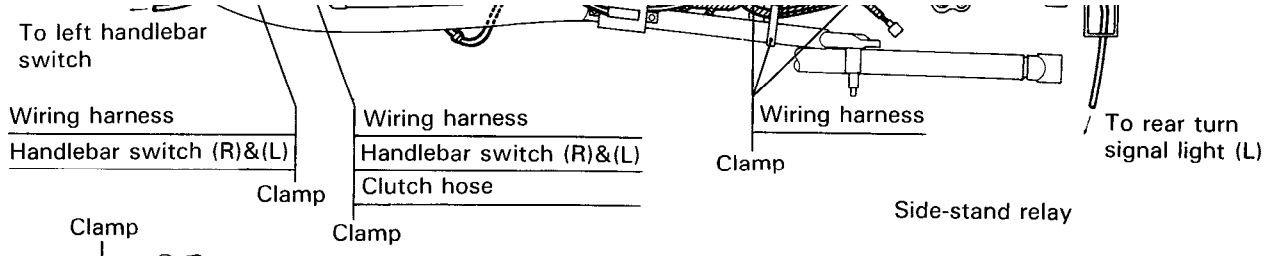
WIRE COLOR

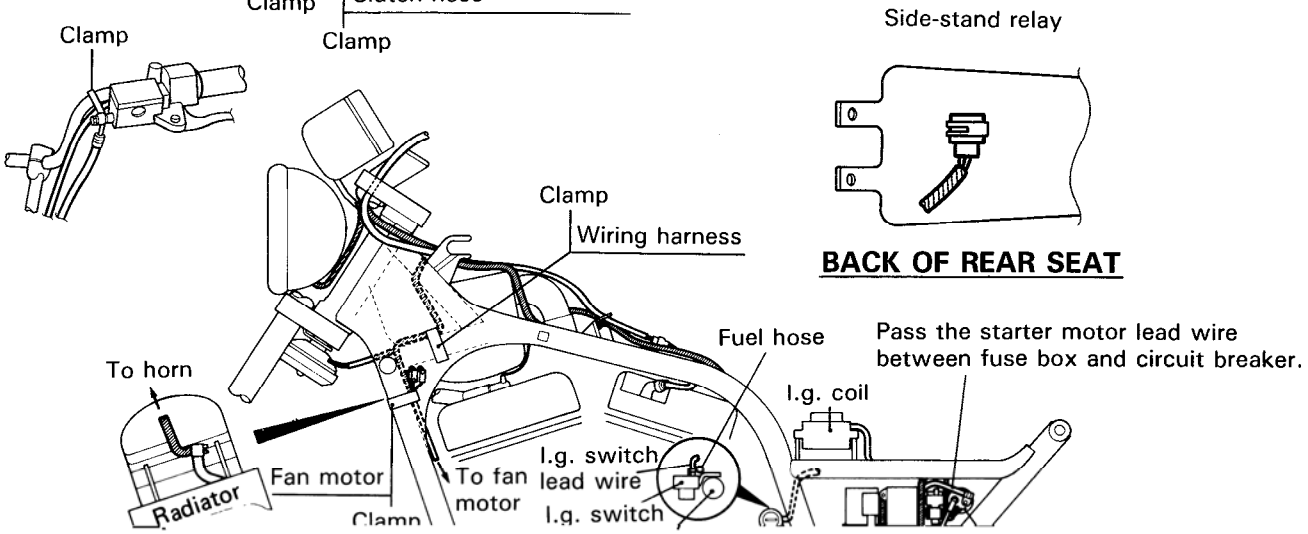
B	: Black	O	: Orange	B/R	: Black with Red tracer
Bl	: Blue	R	: Red	B/W	: Black with White tracer
Br	: Brown	Y	: Yellow	B/Y	: Black with Yellow tracer
G	: Green	W	: White	Bl/W	: Blue with White tracer
Gr	: Gray	B/Bl	: Black with Blue tracer	G/Y	: Green with Yellow tracer
Lbl	: Light blue	B/Br	: Black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

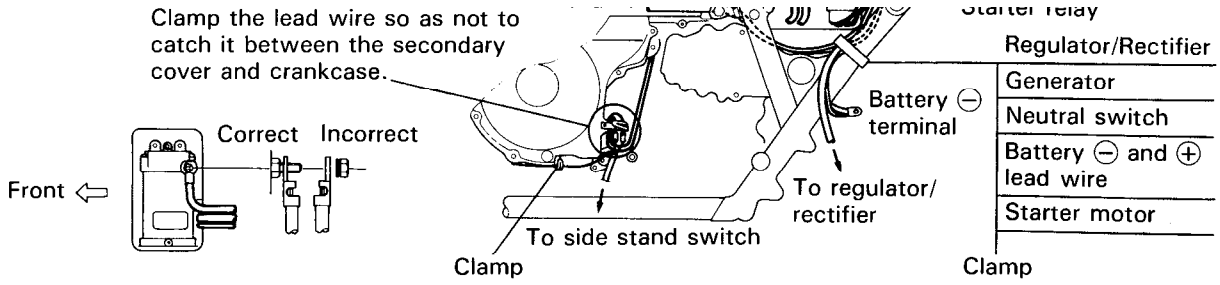
WIRE HARNESS, CABLE AND HOSE ROUTING

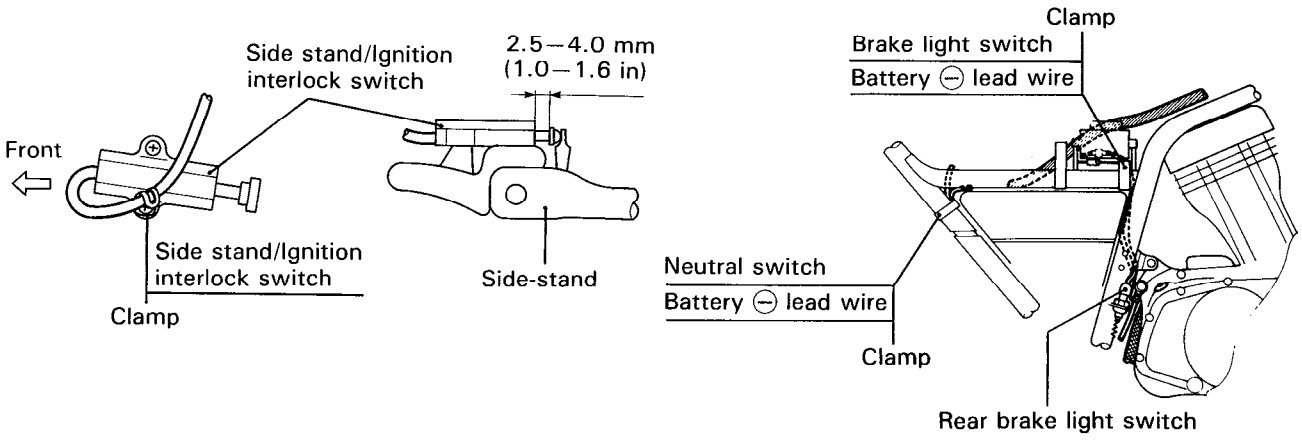
WIRE HARNESS ROUTING

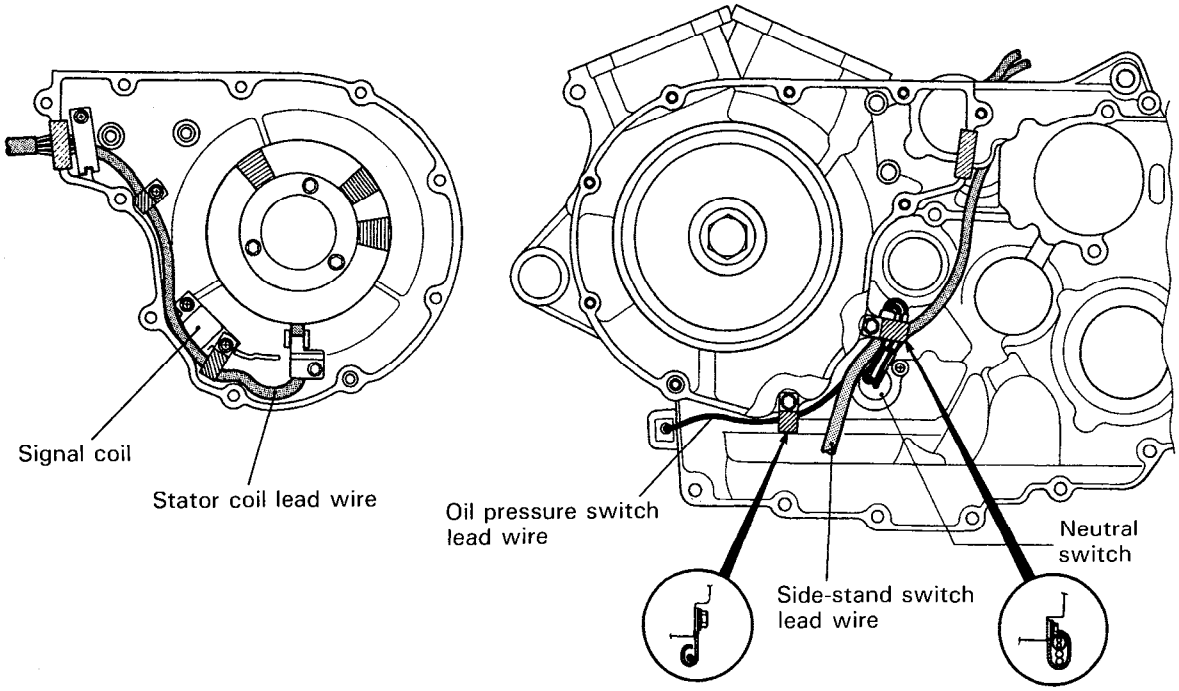




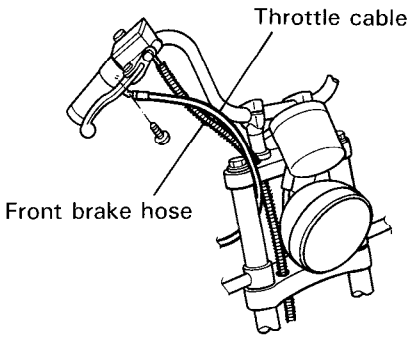


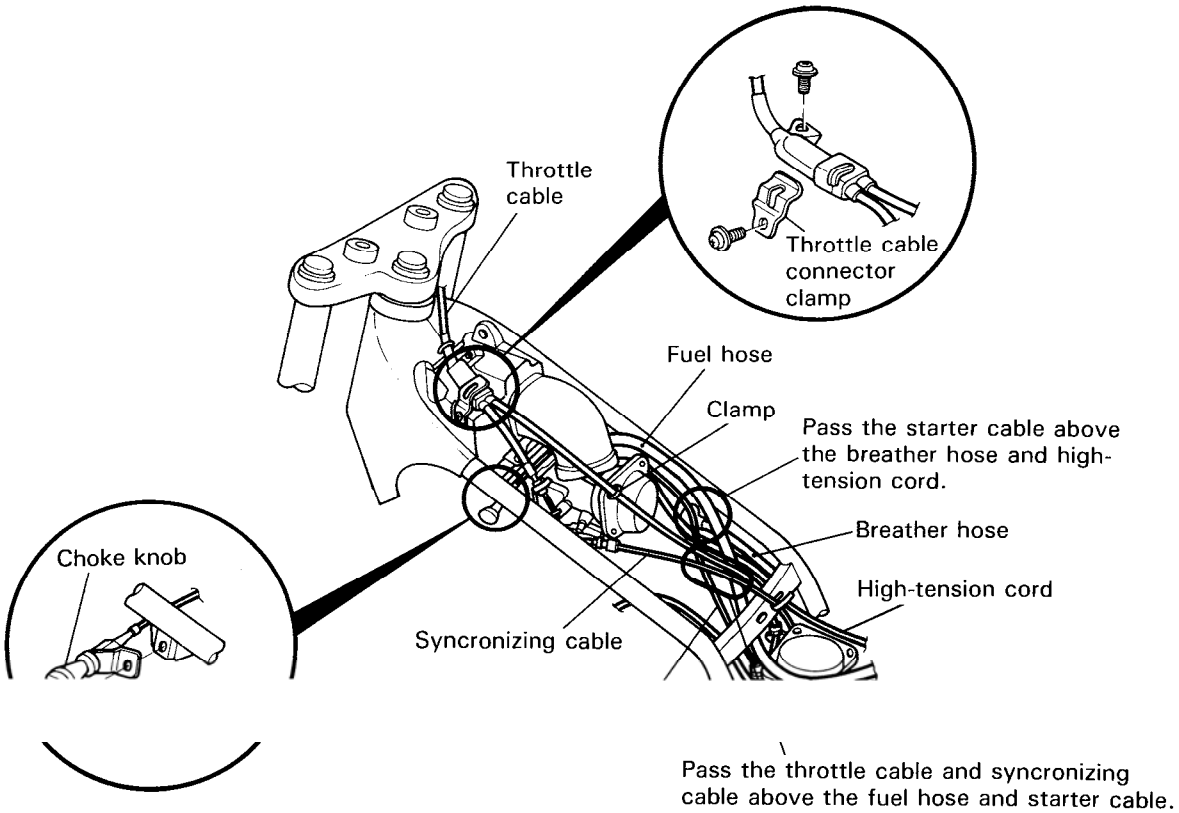


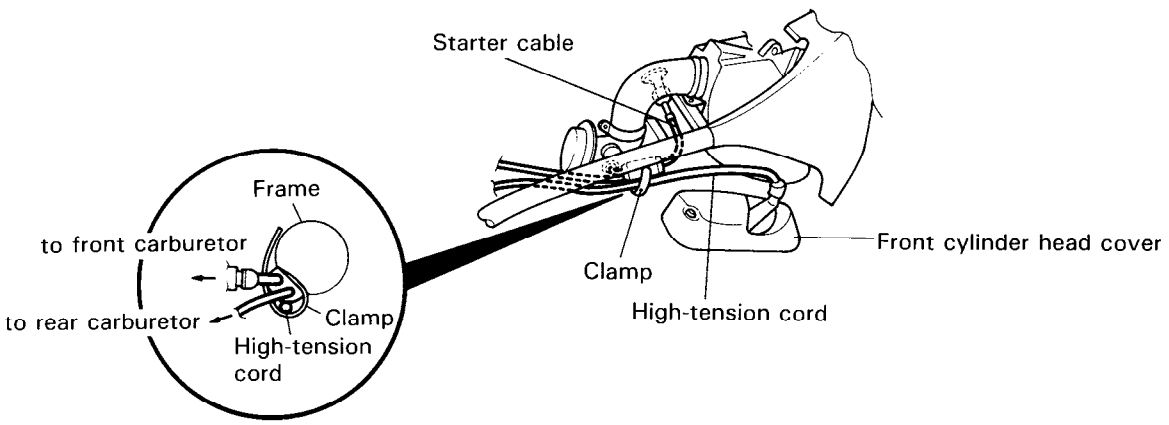


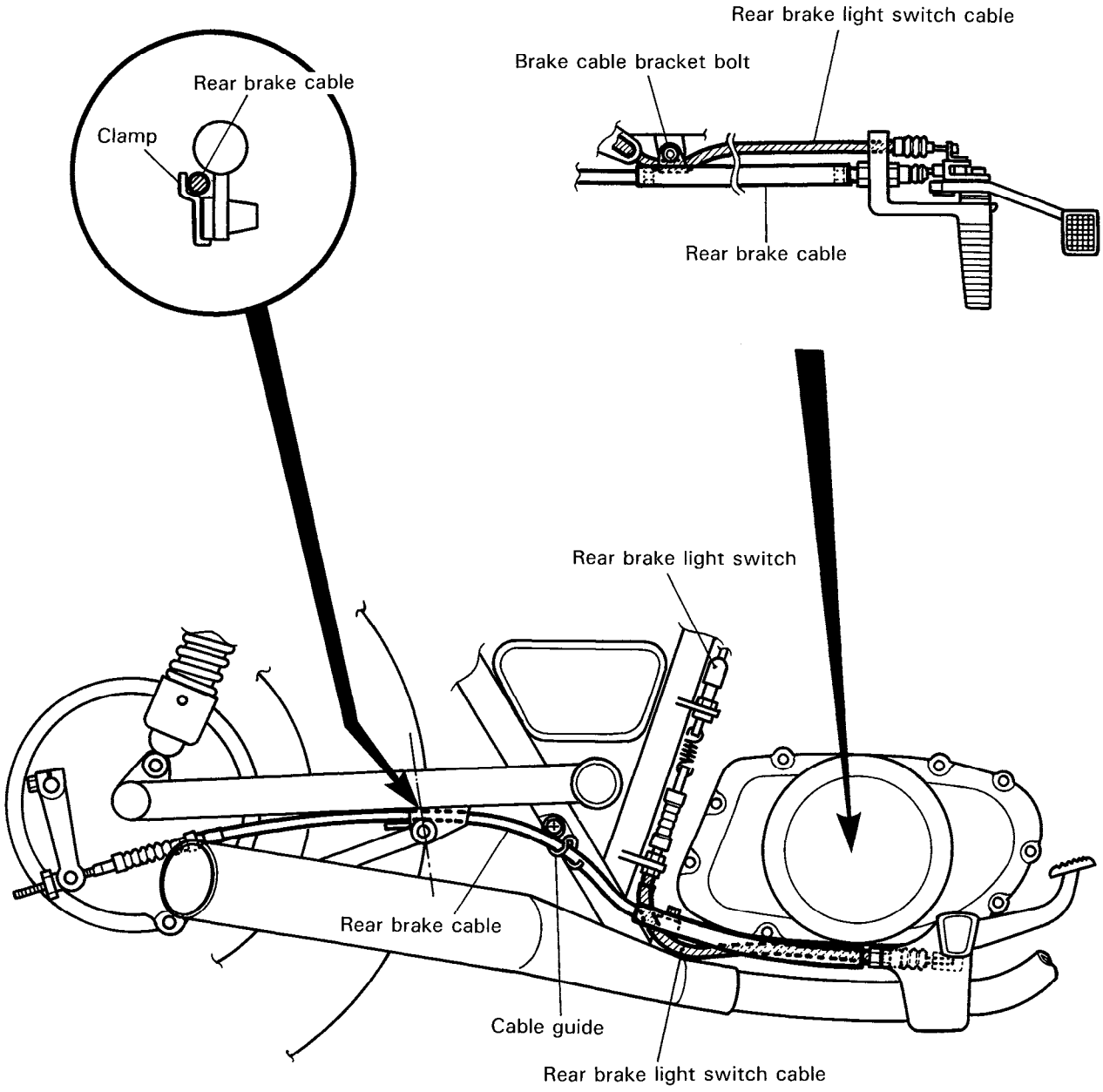


CABLE ROUTING

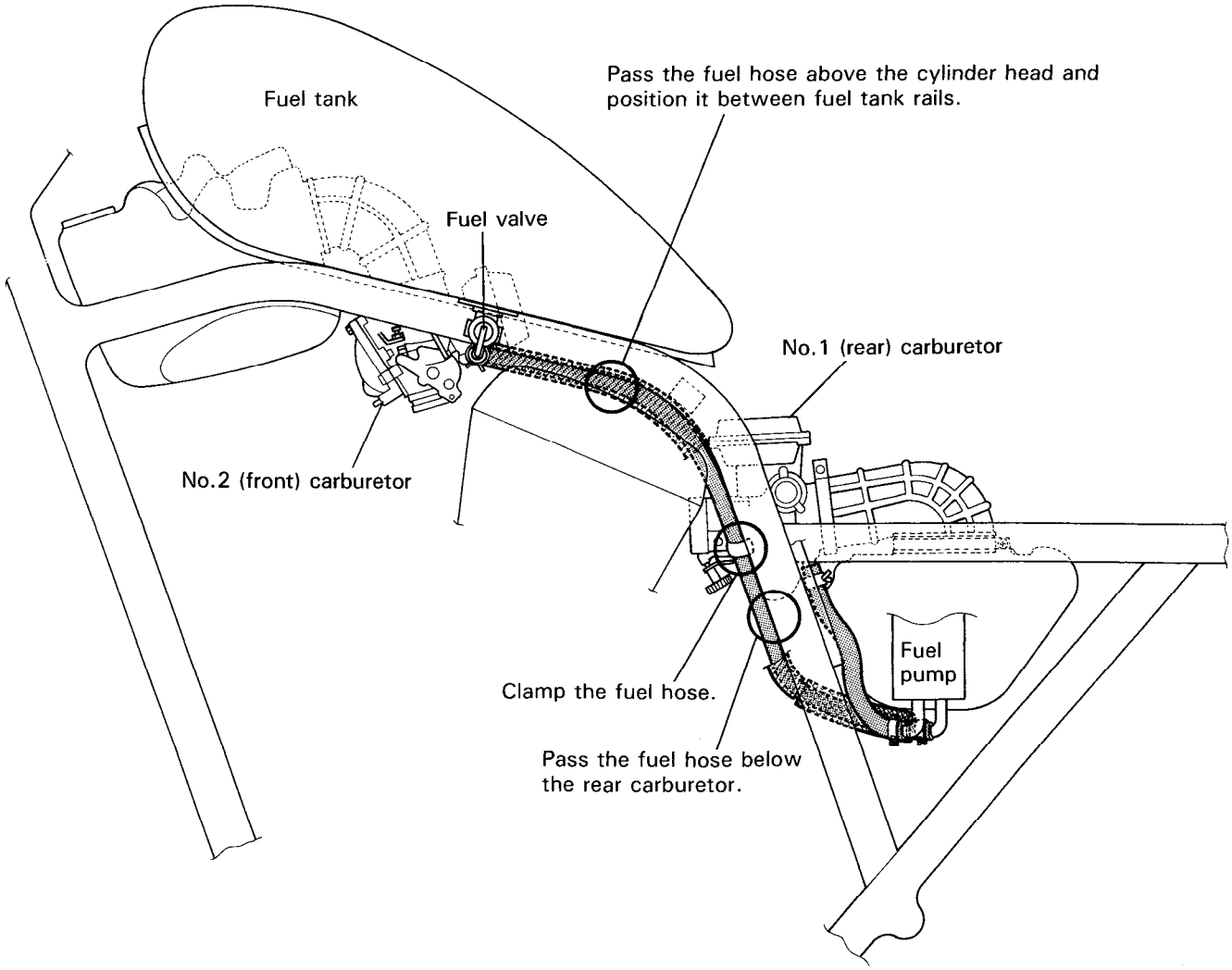


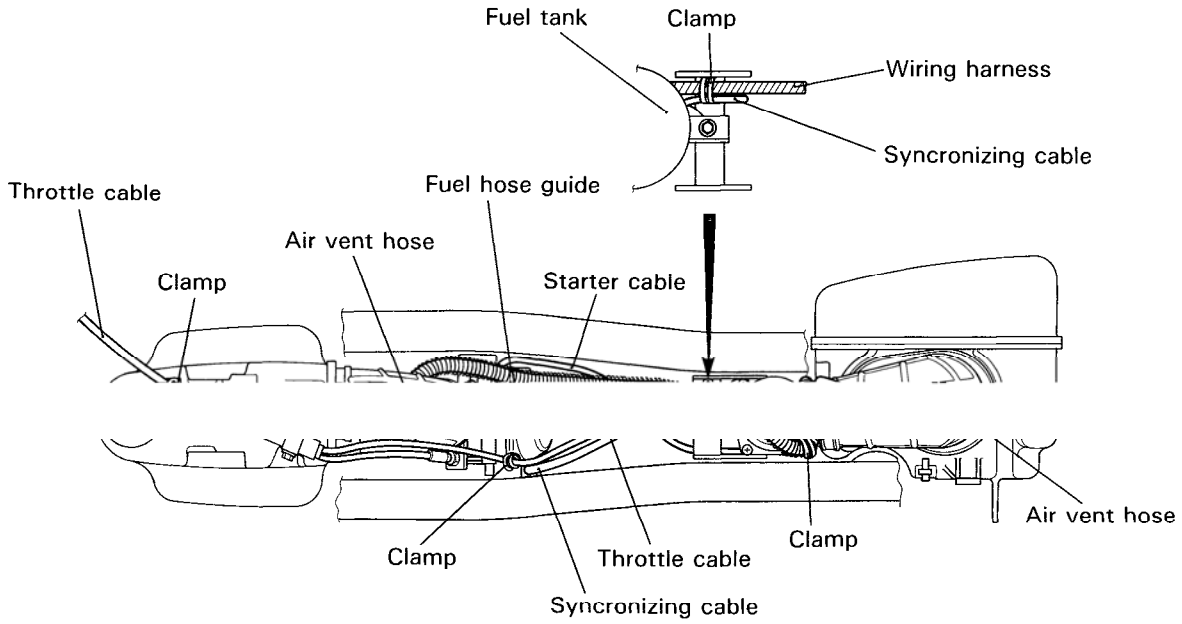


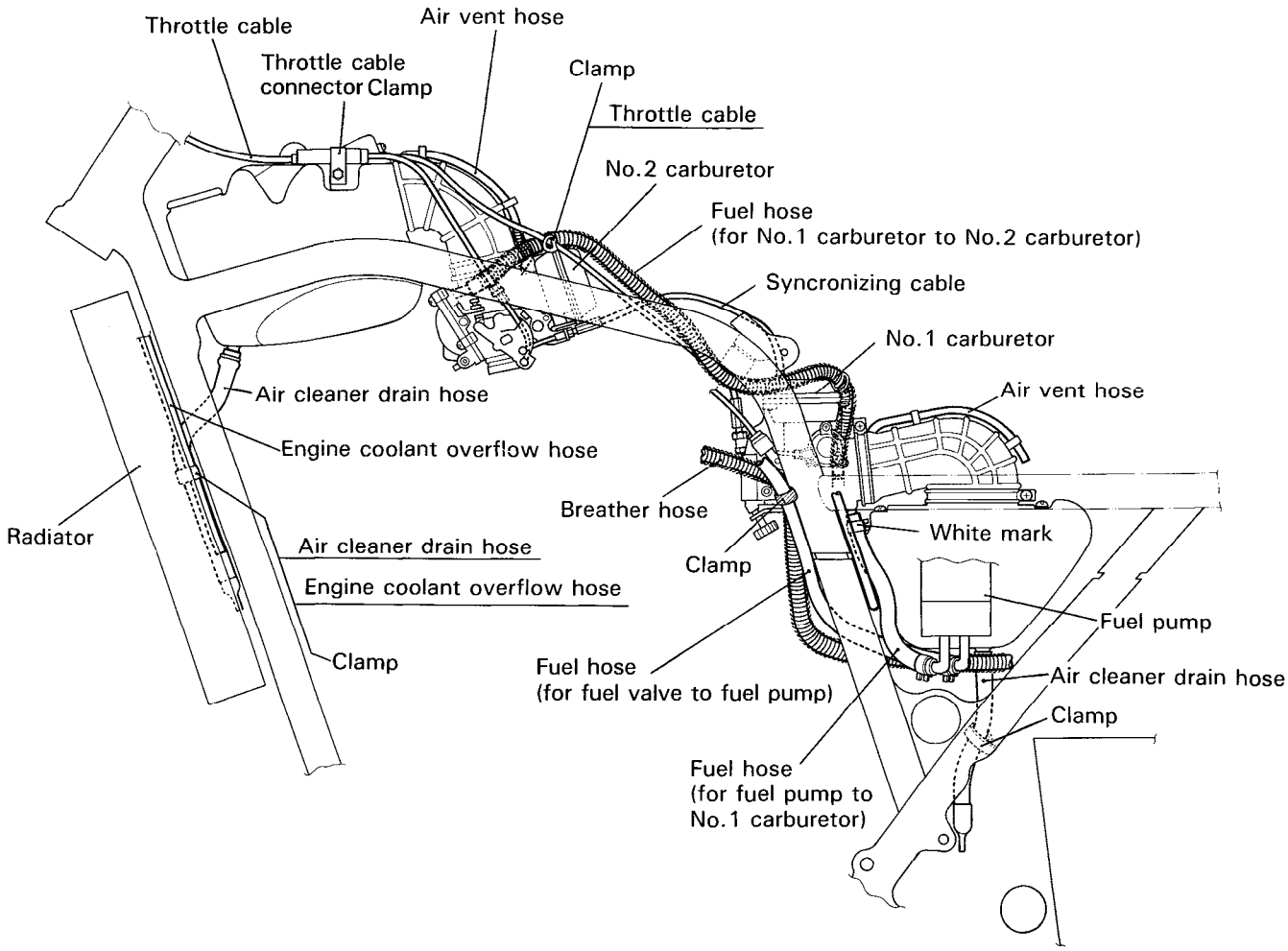




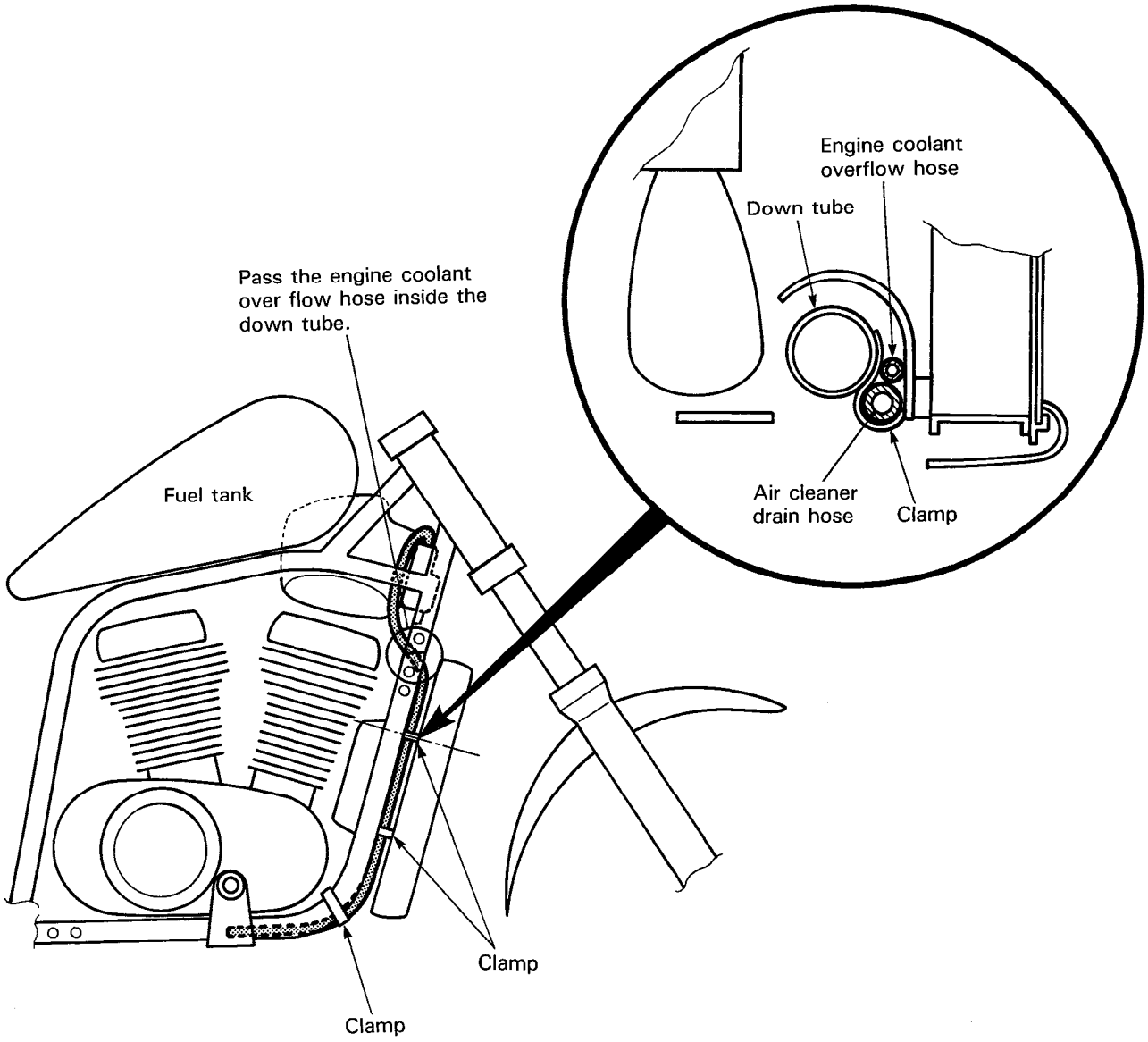
FUEL SYSTEM HOSE ROUTING



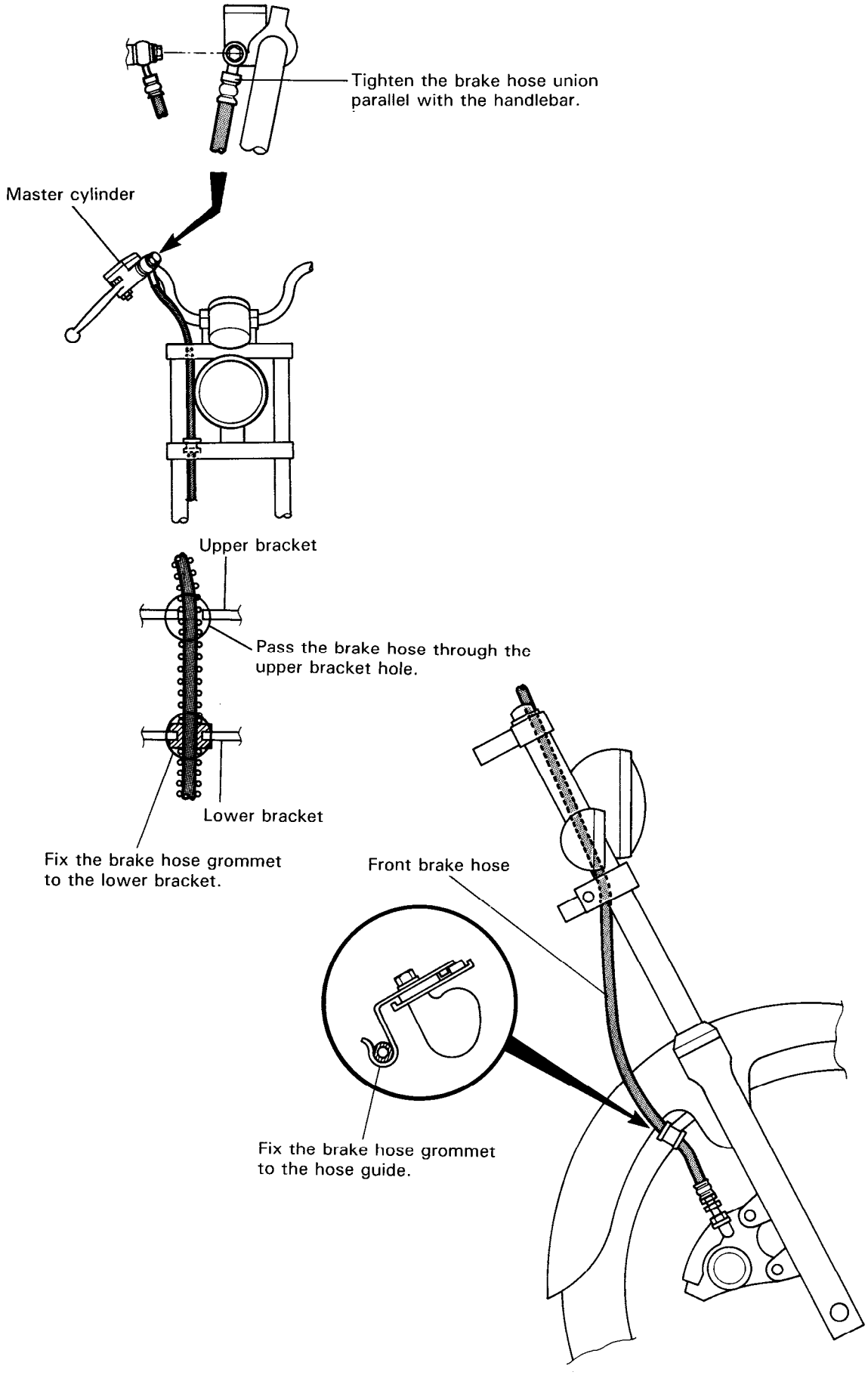




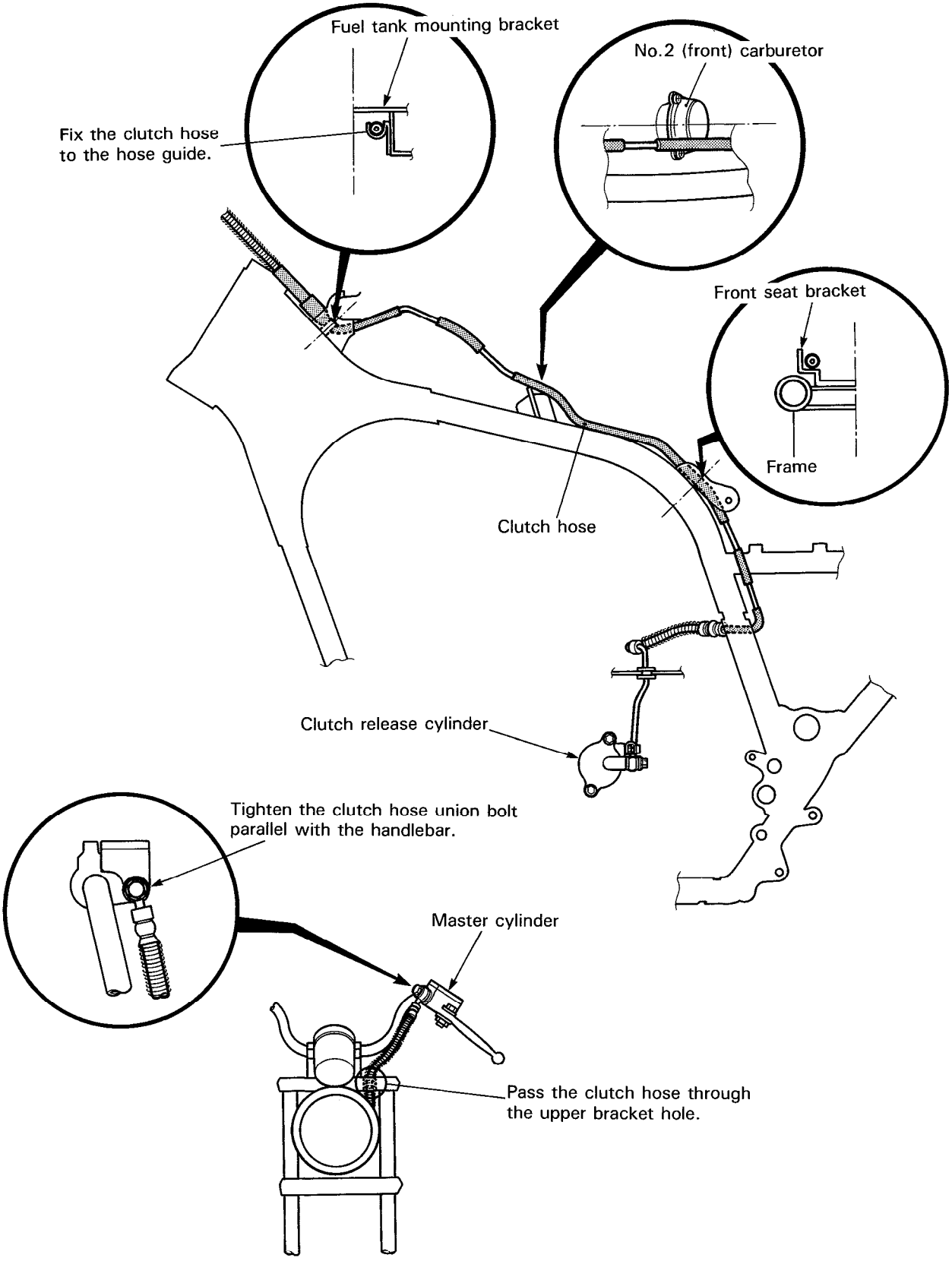
COOLING SYSTEM HOSE ROUTING



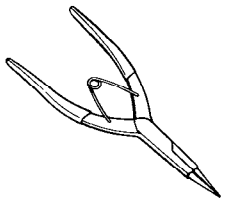
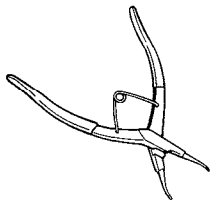
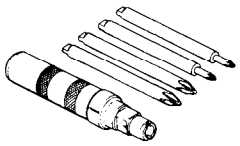
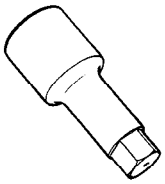
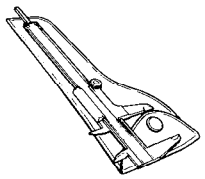
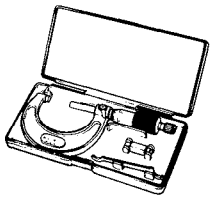
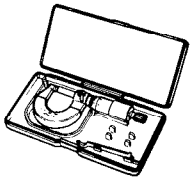
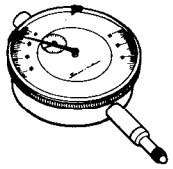
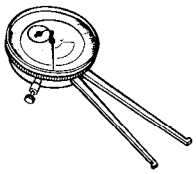
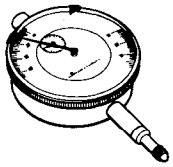
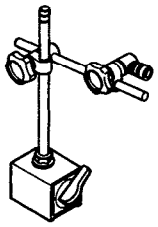
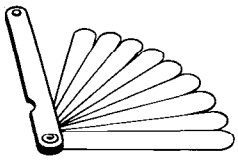
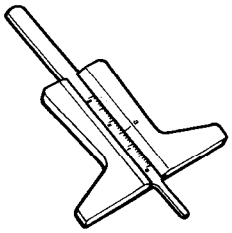
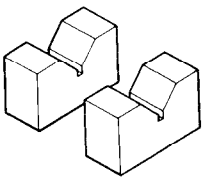
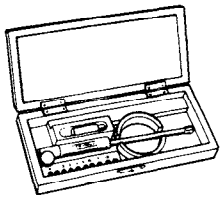
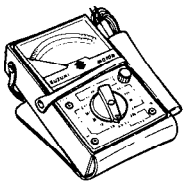
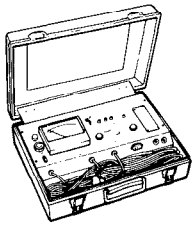
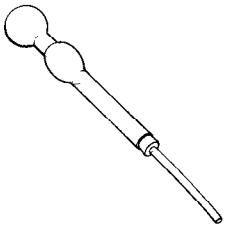
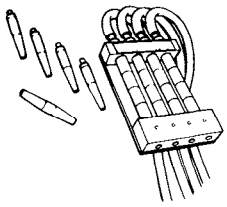
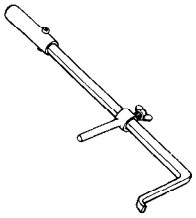
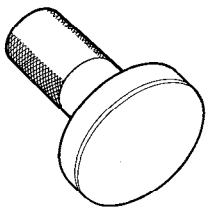
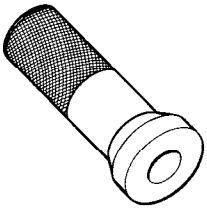
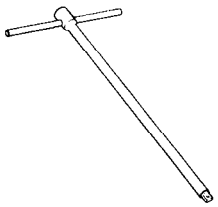
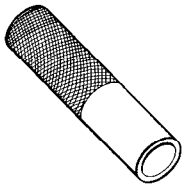
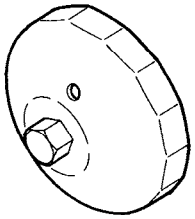
FRONT BRAKE HOSE ROUTING

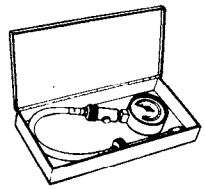
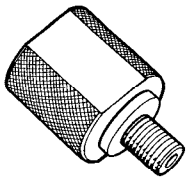
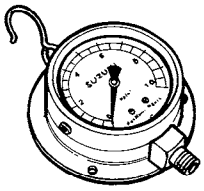
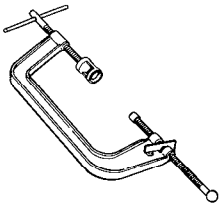
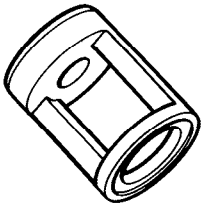
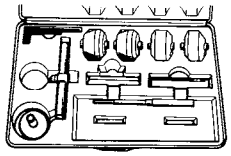
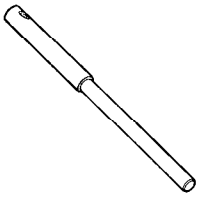
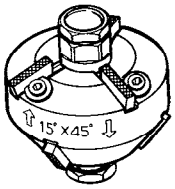
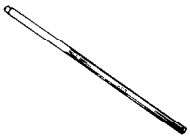
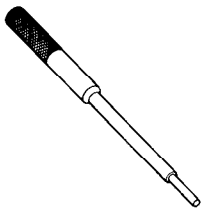
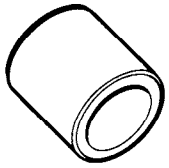
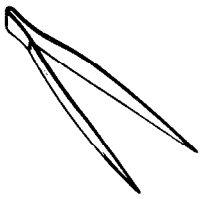
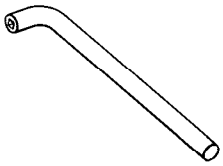
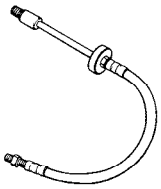
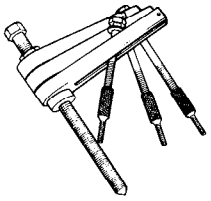
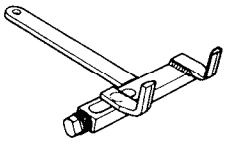
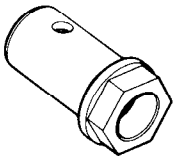
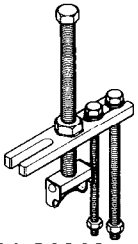
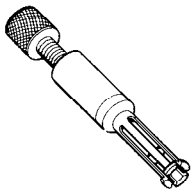
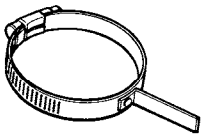
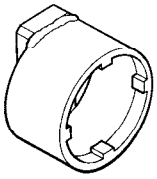
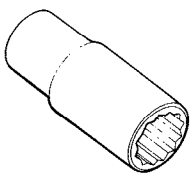
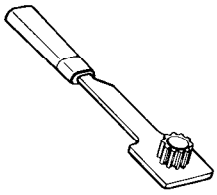
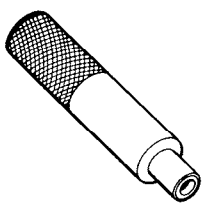
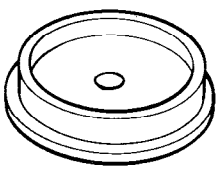


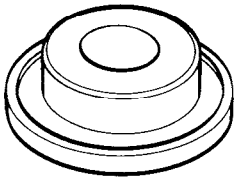
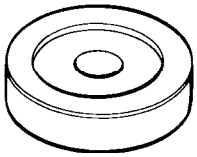
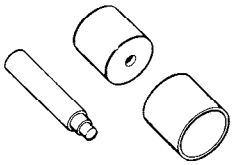
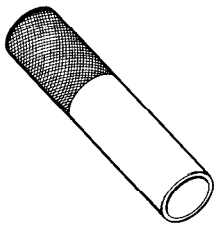
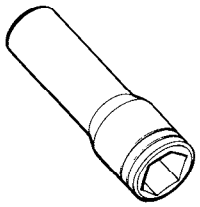
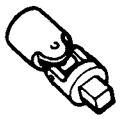
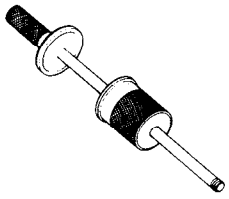
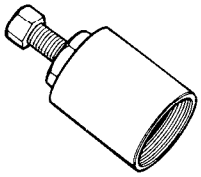
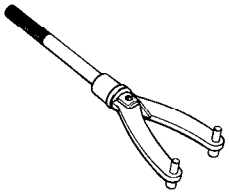
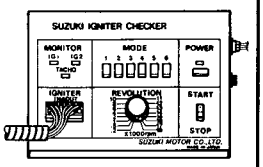
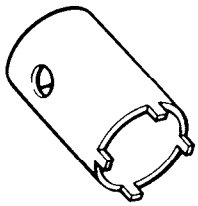
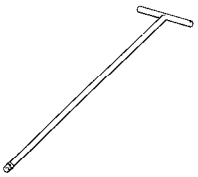
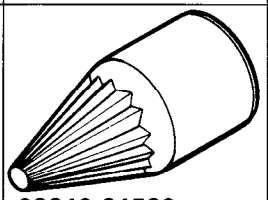
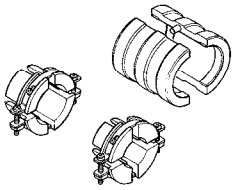
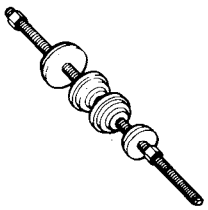
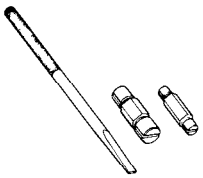
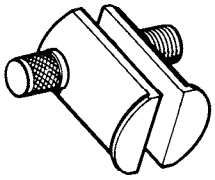
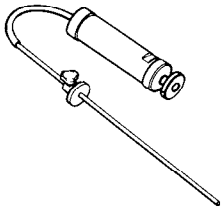
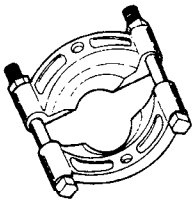
CLUTCH HOSE ROUTING



SPECIAL TOOLS

 09900-06107 Snap ring pliers	 09900-06108 Snap ring pliers	 09900-09003 Impact driver set	 09900-18710 12 mm Hexagon socket	 09900-20101 or 09900-20102 Vernier calipers
 09900-20202 Micrometer (25—50 mm)	 09900-20204 Micrometer (75—100 mm)	 09900-20205 Micrometer (0—25 mm)	 09900-20508 Cylinder bore gauge set	 09900-20602 Dial gauge (1/1000 mm, 1 mm)
 09900-20605 Dial calipers	 09900-20606 Dial gauge (1/100 mm, 10 mm)	 09900-20701 Magnetic stand	 09900-20803 09900-20806 Thickness gauge	 09900-20805 Tire depth gauge
 09900-21304 V-block (100 mm)	 09900-22301 09900-22302 Plastigauge	 09900-22403 Small bore gauge (18—35 mm)	 09900-25002 Pocket tester	 09900-28106 Electro tester
 09900-28403 Hydrometer	 09913-13121 Carburetor balancer set	 09913-13140 Adapter (carburetor balancer gauge)	 09913-50121 Oil seal remover	 09913-75520 Bearing installer
 09913-76010 Bearing remover/installer	 09914-24510 T-handle	 09914-25811 6 mm "T" type hexagon wrench	 09914-79610 Bearing and oil seal installer	 09915-40610 Oil filter wrench

 09915-64510 Compression gauge	 09915-74510 Oil pressure gauge	 09915-74531 Oil pressure gauge adaptor	 09915-77330 Meter (for high pressure)	 09916-14510 Valve lifter
 09916-14910 Valve lifter attachment	 09916-21110 Valve seat cutter set	 09916-24480 Solid pilot (N-140-5.5)	 09916-27720 Valve seat cutter head N-229 See page 3-33.	 09916-34541 Reamer handle
 09916-34550 Valve guide reamer (5.5 mm)	 09916-34580 Valve guide reamer (10.8 mm)	 09916-44910 Valve guide remover/ installer	 09916-44920 Attachment	 09916-84510 Tweezers
 09917-10410 Valve adjuster driver	 09918-03810 Compression gauge adaptor	 09918-53810 Tensioner lock tool	 09920-13120 Crankcase separating tool	 09920-53740 Clutch sleeve hub holder
 09921-21820 Bearing retainer wrench	 09921-21910 Bearing holder	 09923-73210 Bearing puller	 09923-74510 Bearing puller	 09924-34510 Backlash measuring tool
 09924-62410 Final drive gear bearing holder wrench	 09924-62420 22 mm Long socket	 09924-64510 Final drive gear coupling holder	 09924-74510 Handle	 09924-74520 Oil seal remover

 09924-74550 Final gear oil seal installer	 09924-74560 Bearing installer	 09924-74570 Final driven gear bearing installer and remover	 09925-98221 Bearing installer	 09930-10141 Socket wrench
 09930-14530 Universal joint	 09930-30102 Sliding shaft	 09930-30720 Rotor remover	 09930-40113 Rotor holder	 09931-94490 Ignitor checker (Digital type)
 09940-14911 Steering stem nut wrench	 09940-34520 T-handle (Front fork disassembler)	 09940-34530 Attachment A (Front fork disassembler)	 09940-52860 Front fork oil seal installer	 09941-34513 Steering race installer
 09941-50111 Bearing remover	 09941-54911 Bearing outer race remover	 09941-64510 Bearing and oil seal remover	 09941-74910 Steering bearing installer	 09943-74111 Fork oil level gauge
 09950-81910 Bearing remover				

NOTE:
When order the special tool, please confirm whether it is available or not.

TIGHTENING TORQUE

ENGINE

ITEM		N·m	kg-m	lb-ft
Cylinder head cover bolt	M6	10	1.0	7.0
	M8	23	2.3	16.5
Cylinder head bolt and nut	M10	38	3.8	27.5
	M8	10	1.0	7.0
	M6	10	1.0	7.0
Primary drive gear bolt		95	9.5	68.5
Clutch sleeve hub nut		60	6.0	43.5
Rocker arm shaft		28	2.8	20.0
Cam chain tensioner bolt		10	1.0	7.0
Cam chain guide set bolt		10	1.0	7.0
Cam chain sprocket bolt		15	1.5	11.0
Valve adjuster lock nut		15	1.5	11.0
Crankcase bolt	M6	11	1.1	8.0
	M8	22	2.2	16.0
Secondary bevel gear case bolt		22	2.2	16.0
Oil gallery plug	M6	6	0.6	4.5
	M8	10	1.0	7.0
	M10	15	1.5	11.0
	M14	23	2.3	16.5
	M16	23	2.3	16.5
Oil pipe clamp bolt		10	1.0	7.0
Generator cover hole plug		15	1.5	11.0
T.D.C. Inspection plug		23	2.3	16.5
Oil drain plug		21	2.1	15.0
Oil pump bolt		11	1.1	8.0
Oil pressure regulator		28	2.8	20.0
Oil filter union bolt		15	1.5	11.0
Engine mounting bolt	L:125	79	7.9	57.0
	L:130	79	7.9	57.0
	L:150	79	7.9	57.0
Driveshaft bolt		65	6.5	47.0
Secondary drive bevel gear shaft nut		95	9.5	68.5
Generator rotor bolt		160	16.0	115.5
Frame mounting bolt		50	5.0	36.0
Engine mounting bracket bolt	M8	23	2.3	16.5
	M6	10	1.0	7.0
Conrod nut		51	5.1	37.0
Exhaust pipe clamp bolt		23	2.3	16.5

ITEM	N·m	kg-m	lb-ft
Starter clutch securing bolt	26	2.6	18.5
Gearshift arm stopper	19	1.9	14.0
Clutch spring mounting bolt	12	1.2	8.5
Water union bolt	10	1.0	7.0

ENGINE COOLING

ITEM		N·m	kg-m	lb-ft
Radiator mounting nut	M10	58	5.8	42.0
Cooling fan thermo-switch		13	1.3	9.5
Engine coolant temperature gauge		13	1.3	9.5

SHAFT DRIVE

ITEM	N·m	kg-m	lb-ft
Secondary drive bevel gear housing bolt	23	2.3	16.5
Secondary driven bevel gear housing bolt	23	2.3	16.5
Secondary driven bevel gear bearing retainer	110	11.0	79.5
Final drive bevel gear shaft nut	100	10.0	72.5
Final drive bevel gear bearing retainer	110	11.0	79.5
Final driven gear bearing retainer screw	9	0.9	6.5
Final gear bearing case bolt	23	2.3	16.5

CHASSIS

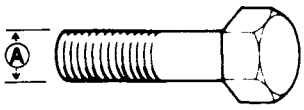
ITEM	N·m	kg-m	lb-ft
Steering stem head nut	90	9.0	65.0
Front fork cap bolt	90	9.0	65.0
Front fork lower clamp bolt	33	3.3	24.0
Handlebars clamp bolt	23	2.3	16.5
Handlebars holder bolt	45	4.5	32.5
Handlebars holder nut	45	4.5	32.5
Front fork damper rod bolt	20	2.0	14.5
Front axle	44	4.4	32.0
Front axle pinch bolt	23	2.3	16.5
Front master cylinder mounting bolt	10	1.0	7.0
Brake hose union bolt	23	2.3	16.5
Caliper mounting bolt	35	3.5	25.5
Caliper housing bolt	33	3.3	24.0
Caliper air bleeder valve	8	0.8	6.0
Brake disc plate bolt	23	2.3	16.5
Hub flange bolt	25	2.5	18.0
Spoke nipple	5	0.5	3.5
Clutch master cylinder mounting bolt	10	1.0	7.0

ITEM	N·m	kg-m	lb-ft
Rear shock absorber fitting nut (upper)	32	3.2	23.0
(lower)	29	2.9	21.0
Rear axle nut	78	7.8	56.5
Rear brake cam lever bolt	10	1.0	7.0
Rear torque link nut (front)	29	2.9	21.0
(rear)	29	2.9	21.0
Final gear case joint nut	40	4.0	29.0
Rear wheel driven joint bolt	10	1.0	7.0
Rear swingarm pivot nut	96	9.6	69.5
Front footrest bolt	26	2.6	19.0
Rear hub shock absorber bolt	96	9.6	69.5

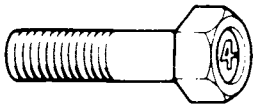
TIGHTENING TORQUE CHART

For other bolts and nuts listed previously, refer to this chart:

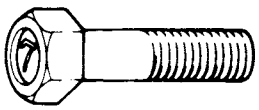
Bolt Diameter Ⓐ (mm)	Conventional or "4" marked bolt			"7" marked bolt		
	N·m	kg-m	lb-ft	N·m	kg-m	lb-ft
4	1.5	0.15	1.0	2.3	0.23	1.5
5	3	0.3	2.0	4.5	0.45	3.0
6	5.5	0.55	4.0	10	1.0	7.0
8	13	1.3	9.5	23	2.3	16.5
10	29	2.9	21.0	50	5.0	36.0
12	45	4.5	32.5	85	8.5	61.5
14	65	6.5	47.0	135	13.5	97.5
16	105	10.5	76.0	210	21.0	152.0
18	160	16.0	115.5	240	24.0	173.5



Conventional bolt



"4" marked bolt



"7" marked bolt

SERVICE DATA

VALVE + GUIDE

Unit: mm (in)

ITEM	STANDARD		LIMIT
Valve diam.	IN.	30 (1.18)	———
	EX.	26 (1.02)	———
Valve clearance (when cold)	IN. & EX.	0.08—0.13 (0.003—0.005)	———
Valve guide to valve stem clearance	IN.	0.020—0.047 (0.0008—0.0019)	———
	EX.	0.035—0.062 (0.0014—0.0024)	———
Valve stem deflection	IN. & EX.	———	0.35 (0.014)
Valve guide I.D.	IN. & EX.	5.500—5.512 (0.2165—0.2170)	———
Valve stem O.D.	IN.	5.465—5.480 (0.2152—0.2157)	———
	EX.	5.450—5.465 (0.2146—0.2152)	———
Valve stem runout	IN. & EX.	———	0.05 (0.002)
Valve head thickness	IN. & EX.	———	0.5 (0.02)
Valve stem end length	IN. & EX.	———	4.0 (0.16)
Valve seat width	IN. & EX.	0.9—1.1 (0.035—0.043)	———
Valve head radial runout	IN. & EX.	———	0.03 (0.001)
Valve spring free length	INNER	———	38.3 (1.51)
Valve spring tension	INNER	6.51—7.49 kg (14.35—16.51 lbs) at length 32.5 mm (1.28 in)	———
	OUTER	12.09—13.91 kg (26.65—30.67 lbs) at length 36.0 mm (1.42 in)	———

CAMSHAFT + CYLINDER HEAD

Unit: mm (in)

ITEM	STANDARD		LIMIT
Cam height	IN.	35.958—35.998 (1.4157—1.4172)	35.660 (1.4039)
	EX.	36.923—36.963 (1.4537—1.4552)	36.630 (1.4421)

ITEM	STANDARD		LIMIT
Camshaft journal oil clearance	0.032—0.066 (0.0013—0.0026)		0.150 (0.0059)
Camshaft journal holder I.D.	No.1 Left side No.2 Right side	20.012—20.025 (0.7879—0.7884)	—
	No.1 Right side No.2 Left side	25.012—25.025 (0.9847—0.9852)	—
Camshaft journal O.D.	No.1 Left side No.2 Right side	19.959—19.980 (0.7858—0.7866)	—
	No.1 Right side No.2 Left side	24.959—24.980 (0.9826—0.9835)	—
Camshaft runout	—		0.10 (0.004)
Rocker arm I.D.	IN. & EX.	12.000—12.018 (0.4724—0.4731)	—
Rocker arm shaft O.D.	IN. & EX.	11.966—11.984 (0.4711—0.4718)	—
Cylinder head distortion	—		0.05 (0.002)
Cylinder head cover distortion	—		0.05 (0.002)

CYLINDER + PISTON + PISTON RING

Unit: mm (in)

ITEM	STANDARD		LIMIT
Compression pressure	1 450 kPa (14.5 kg/cm², 206 psi)		1 000 kPa (10 kg/cm², 142 psi)
Compression pressure difference	—		200 kPa (2 kg/cm², 28 psi)
Piston to cylinder clearance	0.035—0.065 (0.0014—0.0026)		0.120 (0.0047)
Cylinder bore	80.000—80.015 (3.1496—3.1502)		80.085 (3.1529)
Piston diam.	79.950—79.965 (3.1476—3.1482) Measure at 15 mm (0.6 in) from the skirt end.		79.880 (3.1449)
Cylinder distortion	—		0.05 (0.002)
Piston ring free end gap	1st N	Approx. 10.5 (0.413)	8.4 (0.331)
	2nd N	Approx. 10.5 (0.413)	8.4 (0.331)
Piston ring end gap	1st	0.20—0.35 (0.008—0.014)	0.70 (0.028)
	2nd	0.20—0.35 (0.008—0.014)	0.70 (0.028)
Piston ring groove clearance	1st	—	0.180 (0.007)
	2nd	—	0.150 (0.006)

ITEM	STANDARD		LIMIT
Piston ring groove width	1st	1.01—1.03 (0.0398—0.0406)	—
	2nd	1.21—1.23 (0.0476—0.0484)	—
	Oil	2.51—2.53 (0.0988—0.0996)	—
Piston ring thickness	1st	0.975—0.990 (0.0384—0.0390)	—
	2nd	1.170—1.190 (0.0461—0.0469)	—
Piston pin bore	20.002—20.008 (0.7875—0.7877)		20.030 (0.7886)
Piston pin O.D.	19.996—20.000 (0.7827—0.7874)		19.980 (0.7866)

CONROD + CRANKSHAFT

Unit: mm (in)

ITEM	STANDARD	LIMIT
Conrod small end I.D.	20.010—20.018 (0.7878—0.7881)	20.040 (0.7890)
Conrod big end side clearance	0.10—0.20 (0.004—0.008)	0.30 (0.012)
Conrod big end width	21.95—22.00 (0.864—0.866)	—
Crank pin width	22.10—22.15 (0.870—0.872)	—
Conrod big end oil clearance	0.024—0.042 (0.0009—0.0017)	0.080 (0.0031)
Crank pin O.D.	40.982—41.000 (1.6135—1.6142)	—
Crankshaft journal oil clearance	0.020—0.050 (0.0008—0.0020)	0.080 (0.0031)
Crankshaft journal O.D.	47.965—47.980 (1.8884—1.8890)	—
Crankshaft thrust bearing thickness	1.925—2.175 (0.0758—0.0856)	—
Crankshaft thrust clearance	0.05—0.10 (0.002—0.004)	—
Crankshaft runout	—	0.05 (0.002)

OIL PUMP

ITEM	STANDARD	LIMIT
Oil pump reduction ratio	1.859 (71/42 x 32/29)	—
Oil pressure (at 60°C,140°F)	Above 350 kPa (3.5 kg/cm², 50 psi) Below 650 kPa (6.5 kg/cm², 92 psi) at 3 000 r/min.	—

CLUTCH

Unit: mm (in)

ITEM	STANDARD		LIMIT
Drive plate thickness	No.1	2.92—3.08 (0.115—0.121)	2.62 (0.103)
	No.2	3.42—3.58 (0.135—0.141)	3.12 (0.123)
Driven plate distortion	———		0.10 (0.004)
Clutch spring free length	———		34.0 (1.34)
Clutch master cylinder bore	14.000—14.043 (0.5512—0.5529)		———
Clutch master cylinder piston diam.	13.957—13.984 (0.5495—0.5506)		———
Clutch release cylinder bore	38.100—38.162 (1.5000—1.5024)		———
Clutch release cylinder piston diam.	38.042—38.075 (1.4977—1.4990)		———

TRANSMISSION

Unit: mm (in) Except ratio

ITEM		STANDARD		LIMIT
Primary reduction ratio		1.690 (71/42)		———
Secondary reduction ratio		1.133 (30/30 x 17/15)		———
Final reduction ratio		3.090 (34/11)		———
Gear ratios	Low	2.285 (32/14)		———
	2nd	1.631 (31/19)		———
	3rd	1.227 (27/22)		———
	4th	1.000 (25/25)		———
	Top	0.851 (23/27)		———
Shift fork to groove clearance		No.1	0.10—0.30 (0.004—0.012)	0.50 (0.020)
		No.2	0.10—0.30 (0.004—0.012)	0.50 (0.020)
Shift fork groove width		No.1	5.50—5.60 (0.217—0.220)	———
		No.2	4.50—4.60 (0.177—0.181)	———
Shift fork thickness		No.1	5.30—5.40 (0.209—0.213)	———
		No.2	4.30—4.40 (0.169—0.173)	———

SHAFT DRIVE

Unit: mm (in)

ITEM	STANDARD		LIMIT
Secondary bevel gear backlash	0.05—0.32 (0.002—0.013)		———
Final bevel gear backlash	Drive side	0.03—0.064 (0.001—0.025)	———

CARBURETOR (E-02,04,34)

ITEM		SPECIFICATION	
		E-02,04,34	
Carburetor type		MIKUNI BS34SS (No.1)	MIKUNI BDS34SS (No.2)
Bore size		34 mm	←
I.D. No.		39E5	←
Idle r/min.		1 200 ± 100 r/min.	←
Float height		27.7 ± 1.0 mm (1.09 ± 0.04 in)	11.5 ± 1.0 mm (0.45 ± 0.04 in)
Main jet	(M.J.)	#102.5	#97.5
Main air jet	(M.A.J.)	0.6 mm	1.0 mm
Jet needle	(J.N.)	5D22-4th	5D22-3rd
Needle jet	(N.J.)	P-3	←
Throttle valve	(Th.V.)	#110	←
Pilot jet	(P.J.)	#40	#32.5
Valve seat	(V.S.)	1.5 mm	←
Starter jet	(G.S.)	#25	←
Pilot screw	(P.S.)	PRE-SET (1.0 turn back)	PRE-SET (3¼ turns back)
Pilot air jet	(P.A.J.)	#75	←
Throttle cable play		3—6 mm (0.12—0.24 in)	←
Choke cable play		0.5—1.0 mm (0.02—0.04 in)	←

CARBURETOR (E-22)

ITEM		SPECIFICATION	
		E-22	
Carburetor type		MIKUNI BS34SS (No.1)	MIKUNI BDS34SS (No.2)
Bore size		34 mm	←
I.D. No.		39E7	←
Idle r/min.		1 200 ± 100 r/min.	←
Float height		27.7 ± 1.0 mm (1.09 ± 0.04 in)	11.5 ± 1.0 mm (0.45 ± 0.04 in)
Main jet	(M.J.)	#102.5	#97.5
Main air jet	(M.A.J.)	0.6 mm	1.0 mm
Jet needle	(J.N.)	5D22-4th	5D22-3rd
Needle jet	(N.J.)	P-3	←
Throttle valve	(Th.V.)	#110	←
Pilot jet	(P.J.)	#35	#32.5
Valve seat	(V.S.)	1.5 mm	←
Starter jet	(G.S.)	#25	←
Pilot screw	(P.S.)	PRE-SET (1¾ turns back)	PRE-SET (3.0 turns back)
Pilot air jet	(P.A.J.)	#75	←
Throttle cable play		3—6 mm (0.12—0.24 in)	←
Choke cable play		0.5—1.0 mm (0.02—0.04 in)	←

CARBURETOR (E-22 (VS600GLUS))

ITEM	SPECIFICATION	
	E-22 (VS600GLUS)	
Carburetor type	MIKUNI BS34SS (No.1)	MIKUNI BDS34SS (No.2)
Bore size	34 mm	←
I.D. No.	39E8	←
Idle r/min.	1 200 ± 100 r/min.	←
Float height	27.7 ± 1.0 mm (1.09 ± 0.04 in)	11.5 ± 1.0 mm (0.45 ± 0.04 in)
Main jet (M.J.)	#102.5	#97.5
Main air jet (M.A.J.)	0.6 mm	1.0 mm
Jet needle (J.N.)	5D22-4th	5D22-3rd
Needle jet (N.J.)	P-3	←
Throttle valve (Th.V.)	#110	←
Pilot jet (P.J.)	#35	#32.5
Valve seat (V.S.)	1.5 mm	←
Starter jet (G.S.)	#25	←
Pilot screw (P.S.)	PRE-SET (2.0 turns back)	PRE-SET (3¼ turns back)
Pilot air jet (P.A.J.)	#75	←
Throttle cable play	3—6 mm (0.12—0.24 in)	←
Choke cable play	0.5—1.0 mm (0.02—0.04 in)	←

CARBURETOR (E-18)

ITEM	SPECIFICATION	
	E-18	
Carburetor type	MIKUNI BS34SS (No.1)	MIKUNI BDS34SS (No.2)
Bore size	34 mm	←
I.D. No.	39E6	←
Idle r/min.	1 200 $^{+100}_{-50}$ r/min.	←
Float height	27.7 ± 1.0 mm (1.09 ± 0.04 in)	11.5 ± 1.0 mm (0.45 ± 0.04 in)
Main jet (M.J.)	#105	#97.5
Main air jet (M.A.J.)	0.7 mm	←
Jet needle (J.N.)	5D33-4th	5D32-3rd
Needle jet (N.J.)	P-1	P-2
Throttle valve (Th.V.)	#110	#120
Pilot jet (P.J.)	#30	#25
Valve seat (V.S.)	1.5 mm	←
Starter jet (G.S.)	#25	←
Pilot screw (P.S.)	PRE-SET (1½ turns back)	PRE-SET (2.0 turn back)
Pilot air jet (P.A.J.)	#60	#77.5
Throttle cable play	3—6 mm (0.12—0.24 in)	←
Choke cable play	0.5—1.0 mm (0.02—0.04 in)	←

ELECTRICAL

Unit: mm (in)

ITEM		SPECIFICATION		NOTE
Ignition timing		5° B.T.D.C. Below 1 650 r/min. and 30° B.T.D.C. Above 3 500 r/min.		
Firing order		1-2		
Spark plug		Type	N.G.K.: DPR8EA-9 ND: X24EPR-U9	
		Gap	0.8—0.9 (0.031—0.035)	
Spark performance		Over 8 (0.3) at 1 atm.		
Signal coil resistance		Approx. 50—200 Ω (G—Bl)		
Generator coil resistance		Charging	0.1—1.5 Ω	Y—Y
Ignition coil resistance		Primary	2—6 Ω	⊕ tap—⊖ tap
		Secondary	15—40 kΩ	Plug cap—⊕ tap
Generator no-load voltage (When engine cold)		More than 65V (AC) at 5 000 r/min.		
Regulated voltage		13.5—15.5 V at 5 000 r/min.		
Starter relay resistance		2—6 Ω		
Battery		Type designation	YB16B-A1	
		Capacity	12V57.6kC (16Ah)/10HR	
		Standard electrolyte S.G.	1.28 at 20°C (68°F)	
Fuse size	Headlight	10 A		
	Signal	10 A		
	Ignition	10 A		
	Main	25 A		
	Power source	10 A		

WATTAGE

Unit:W

ITEM		SPECIFICATION
Headlight	HI	60
	LO	55
Position light		4
Tail/Brake light		5/21
Turn signal light		21
Speedometer light		3.4
Engine coolant temp. indicator light		3
Turn signal indicator light		3
High beam indicator light		1.7
Oil pressure indicator light		3
License light		5

BRAKE + WHEEL

Unit: mm (in)

ITEM	STANDARD		LIMIT
Rear brake pedal free travel	20—30 (0.8—1.2)		—
Rear brake pedal height	40 (1.6)		—
Brake lining thickness	Rear	—	1.5 (0.056)
Brake drum I.D.	Rear	—	180.7 (7.11)
Brake disc thickness	Front	5.0±0.2 (0.20±0.01)	4.5 (0.18)
Brake disc runout	—		0.30 (0.012)
Master cylinder bore	Front	12.700—12.743 (0.5000—0.5017)	—
Master cylinder piston diam.	Front	12.657—12.684 (0.4983—0.4993)	—
Brake caliper cylinder bore	Front	42.850—42.926 (1.6870—1.6900)	—
Brake caliper piston diam.	Front	42.770—42.820 (1.6839—1.6858)	—
Wheel rim runout	Axial	—	2.0 (0.08)
	Radial	—	2.0 (0.08)
Wheel axle runout	Front	—	0.25 (0.010)
	Rear	—	0.25 (0.010)
Tire size	Front	80/90-21 48H	—
	Rear	140/90-15 M/C 70H	—
Tire tread depth	Front	—	1.6 (0.06)
	Rear	—	2.0 (0.08)

SUSPENSION

Unit: mm (in)

ITEM	STANDARD	LIMIT	NOTE
Front fork stroke	130 (5.12)	—	
Front fork spring free length	—	348.3 (13.71)	
Front fork oil level	118 (4.6)	—	
Rear wheel travel	90 (3.5)	—	
Swingarm pivot shaft runout	—	0.30 (0.012)	

TIRE PRESSURE

COLD INFLATION TIRE PRESSURE	NORMAL RIDING					
	SOLO RIDING			DUAL RIDING		
	kPa	kg/cm²	psi	kPa	kg/cm²	psi
FRONT	200	2.00	29	225	2.25	33
REAR	225	2.25	33	250	2.50	36

FUEL + OIL + COOLANT

ITEM	SPECIFICATION		NOTE
Fuel type	Gasoline used should be graded 85-95 oc-		
	recommended.		
Fuel tank including reserve	12.0 L (3.2/2.6 US/Imp gal)		
reserve	3.0 L (0.8/0.7 US/Imp gal)		
Engine oil type	SAE 10W/40, API SE or SF		
Engine oil capacity	Change	2 400 ml (2.5/2.1 US/Imp qt)	
	Filter change	2 800 ml (3.0/2.5 US/Imp qt)	
	Overhaul	3 300 ml (3.5/2.9 US/Imp qt)	
Front fork oil type	Fork oil #10		
Front fork oil capacity (each leg)	418 ml (14.1/14.7 US/Imp oz)		
Final bevel gear oil type	SAE 90 hypoid gear oil with GL-5 under API classification		
Final bevel gear oil capacity	200—220 ml (6.8/7.0—7.4/7.7 US/Imp oz)		
Brake fluid type	DOT 4		
Coolant capacity	1 700 ml (1.8/1.5 US/Imp qt)		

THERMOSTAT + RADIATOR + FAN

ITEM		STANDARD		LIMIT
Thermostat valve opening temperature		75.0±1.5°C (167±2.7°F)		—
Thermostat valve lift		Over 6 mm (0.24 in) at 90°C (194°F)		—
Radiator cap valve release pressure		110±15 kPa (1.1±0.15 kg/cm², 15.6±2.1 psi)		—
Cooling fan thermo-switch operating temperature	ON	Approx. 105°C (221°F)		—
	OFF	Approx. 100°C (212°F)		—
Engine coolant temperature gauge resistance		50°C (122°F)	Approx. 153.9 Ω	—
		80°C (176°F)	Approx. 51.9 Ω	—
		100°C (212°F)	Approx. 27.4 Ω	—
		120°C (248°F)	Approx. 16.1 Ω	—