

SUZUKI

GS650G

SERVICE MANUAL

99000-85700-0E3

FOREWORD

The Suzuki GS650G has been developed as a companion motorcycle to the GS models. It features highly advanced design concepts including a forged one piece crankshaft assembly and shaft drive mechanism. The GS650G provides excellent performance, precise control and handling plus outstanding riding comfort.

This service manual has been produced primarily for experienced Suzuki mechanics. Apprentice and do-it-yourself mechanics will also find this manual to be an extremely useful repair guide. This manual contains the most up-to-date information at the time of publication. The rights are reserved to update or make corrections to this manual at any time.

IMPORTANT

All GS model Suzuki motorcycles that were manufactured after January 1, 1978 are subject to Environmental Protection Agency emission regulations. These regulations set specific standards for exhaust emission output levels as well as particular servicing requirements. This manual includes specific information required to properly inspect and service the GS650G in accordance with all EPA regulations. It is strongly recommended that the chapter on Emission Control, Periodic Servicing and Carburetion be thoroughly reviewed before any type of service work is performed.

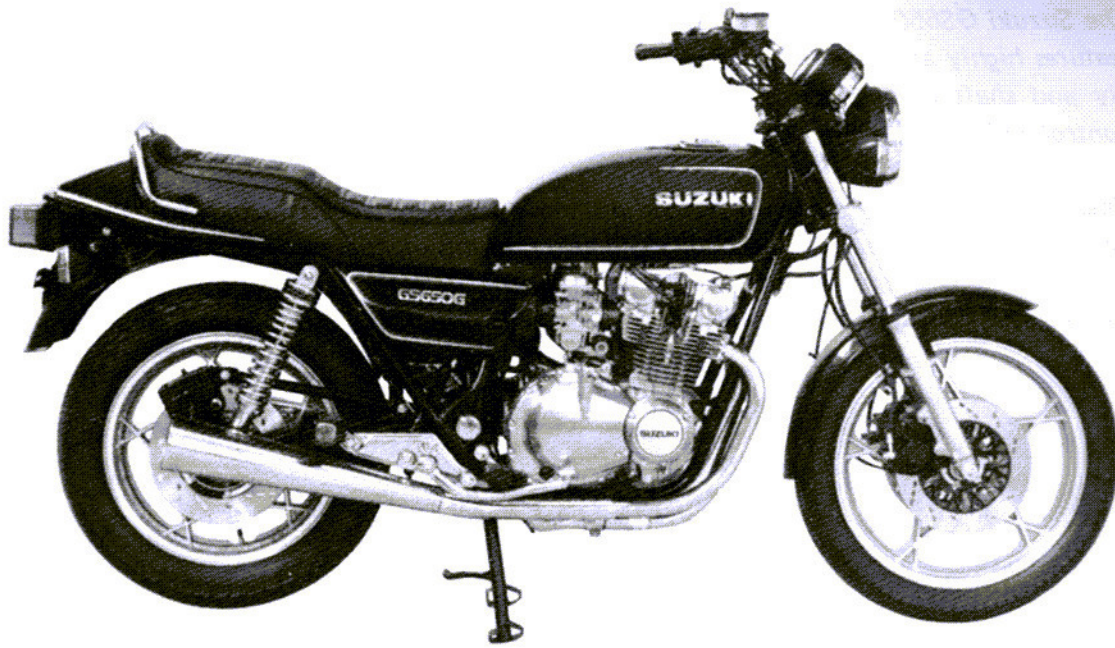
Further information concerning the EPA emission regulations and U.S. Suzuki's emission control program can be found in the U.S. SUZUKI EMISSION CONTROL PROGRAM MANUAL/SERVICE BULLETIN.

SUZUKI MOTOR CO., LTD.

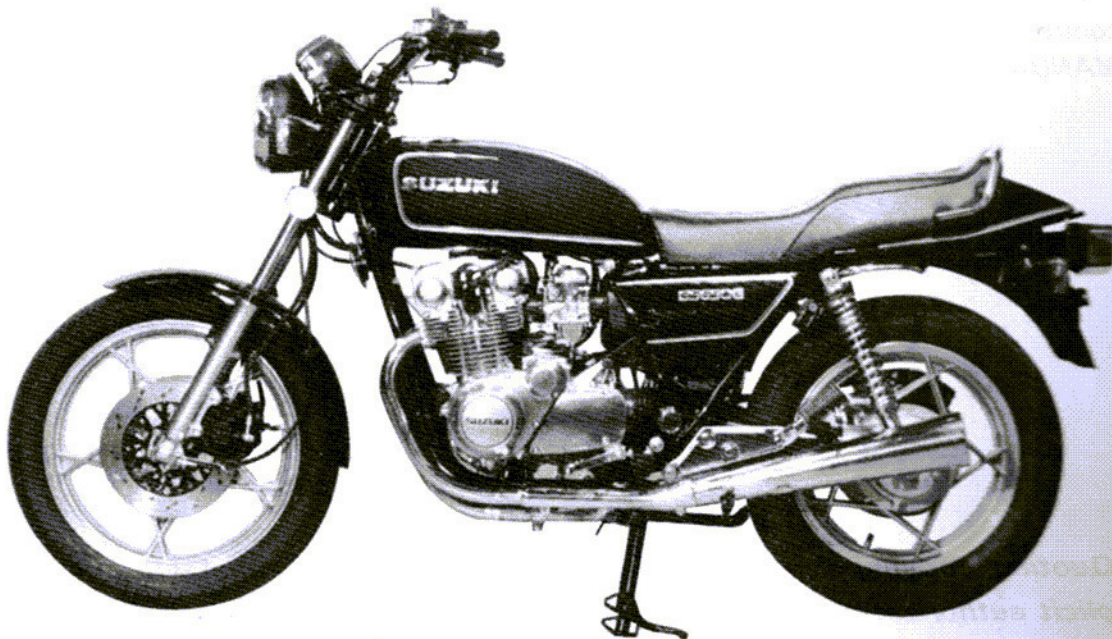
Service Department
Overseas Operations Division

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VIEW OF SUZUKI GS650G



RIGHT SIDE



LEFT SIDE

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GENERAL INFORMATION

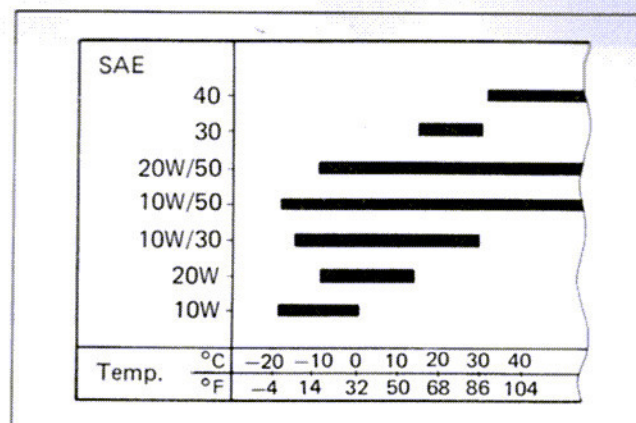
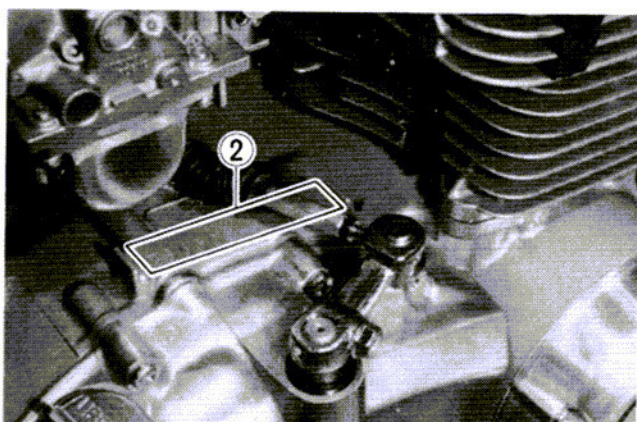
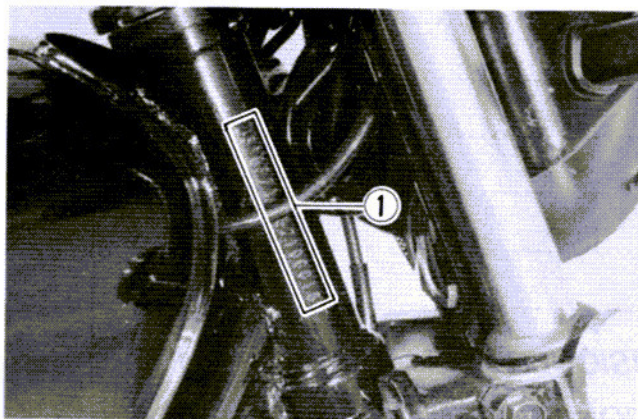
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SERIAL NUMBER LOCATIONS

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



GEAR OIL (FINAL DRIVE)

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:	DOT3 or DOT4
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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 the previous servicing and stored for a long period.

FUEL AND OIL RECOMMENDATIONS

FUEL

Use only unleaded or low-lead type gasoline of at least 85 — 95 pump octane ($\frac{R+M}{2}$ method) or 89 octane or higher rated by the Research method.

ENGINE OIL

Be sure that the engine oil you use comes under API classification of SE and that its viscosity rating is SAE 10W/40. If SAE 10W/40 motor oil is not available, select the oil viscosity according to the following chart:

FRONT FORK OIL

Use FORK OIL #15.

BREAKING-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:

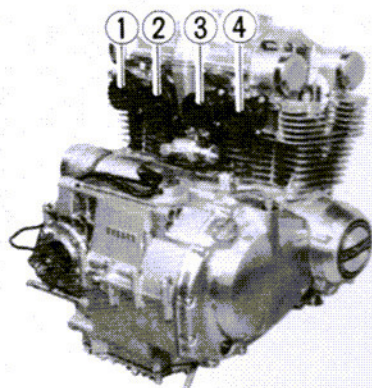
- Keep to these breaking-in engine speed limits:

Initial	800 km (500 mi)	Below 4,000 r/min
	Up to 1,600 km (1,000 mi)	Below 6,000 r/min
	Over 1,600 km (1,000 mi)	Below 9,500 r/min

- Upon reaching an odometer reading of 1,600 km (1,000 mi) you can subject the motorcycle to full throttle operation. However, do not exceed 9,500 r/min at any time.
- Do not maintain constant engine speed for an extended time period during any portion of the break-in. Try to vary the throttle position.

CYLINDER IDENTIFICATION

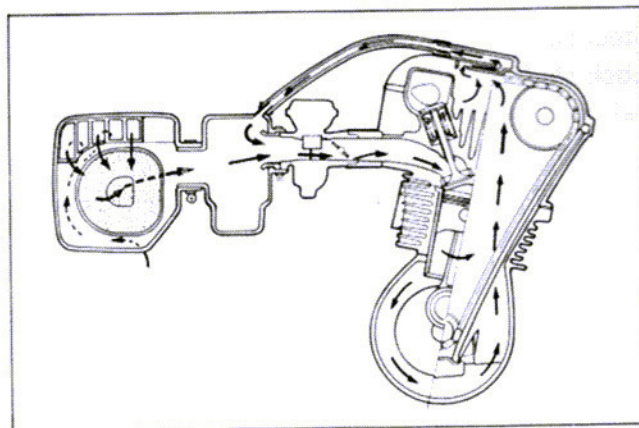
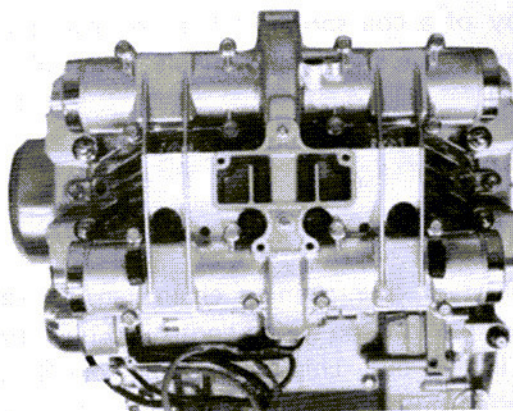
The four cylinders of this engine are identified as No. 1, No. 2, No. 3 and No. 4 cylinder, as counted from left to right (as viewed by the rider on the seat).



SPECIAL FEATURES

BLOWBY GAS RECYCLING

Blowby gases in the crankcase are constantly drawn into the chain chamber provided in the middle section of the cylinder block. The top section of this chamber is connected with the air cleaner assembly through a rubber tube. In the cleaner, the gases merge with incoming air and thus are recycled to the engine through the normal intake system.

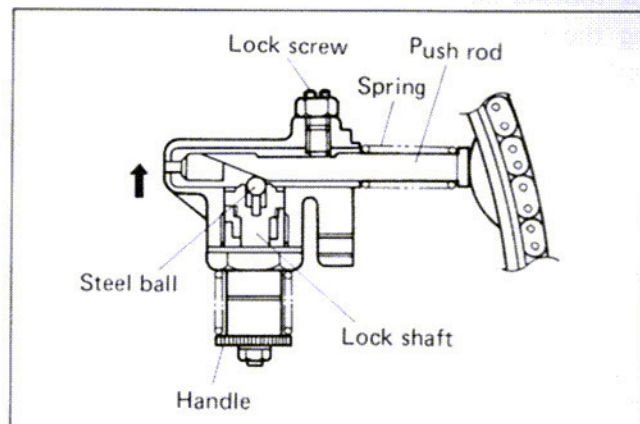


CAMSHAFT DRIVE CHAIN TENSIONER

The chain tensioner used in the Model GS650G is of self-adjusting type in that it adjusts itself to apply a constant tensioning force to the chain by compensating for the stretch of the chain.

PUSH ROD AND LOCK SCREW

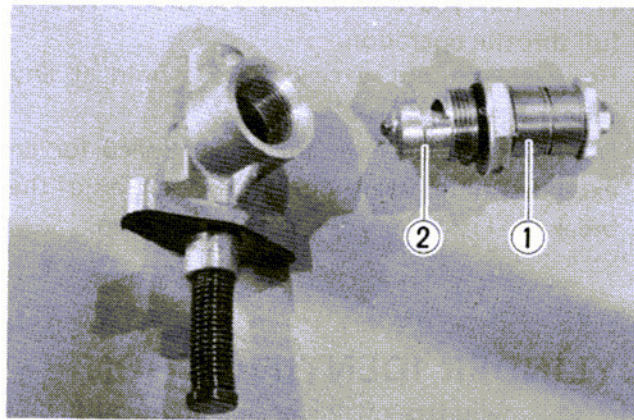
The lock screw is for locking the push rod only when removing or installing the tensioner. It is normally positioned away from the push rod to allow the push rod to move freely. As the chain in service stretches progressively, the push rod shifts by way of a coil spring to keep on exerting the tensioning force, which remains practically unchanged.



LOCK SHAFT

In operation, the running chain tension varies, tending to allow the spring controlled push rod to move in and out. This tendency is countered by preventing push rod from backing away by means of steel ball and lock shaft.

Steel ball bears against the sloped face of push rod. Lock shaft is preloaded with spring ① and keeps ball in contact with push rod by the action of this spring and the tapered contact ② between lock shaft body and shaft. Thus, ball is capable of moving forward (in the direction of the arrow) but not backward.



FULL-TRANSISTORIZED IGNITION SYSTEM

A fully transistorized ignition system is now employed on the GS650G. Its primary advantages are:

- * Trouble free operation due to elimination of contact breaker points which can become contaminated.
- * Ignition timing is maintained properly at all times and require no maintenance.
- * Free from arcing and provides the ignition coil with stable secondary voltage.
- * Excellent vibration and moisture resistance.

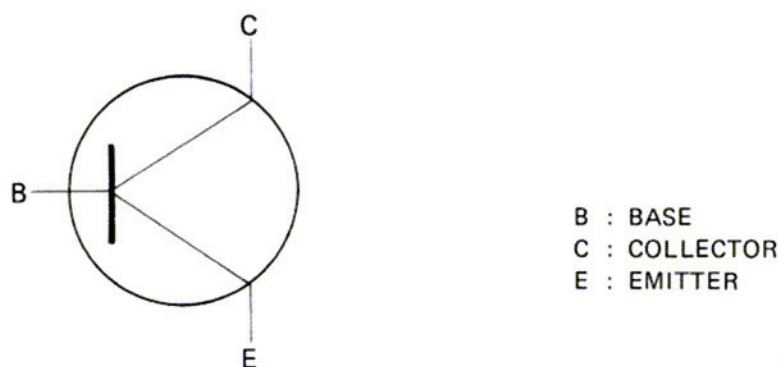
TRANSISTOR

Transistor functions can be divided into four main functions:

1. amplification
2. switching
3. oscillation
4. modulation

These functions are utilized in the ignition system employed on the GS650G.

Transistors are divided into two groups, those being of the NPN and PNP types, and the transistors used in the GS650G model is of the NPN type only, works as an amplifier and switching device.



Each transistor has three terminals identified as the Base (B), Collector (C), and Emitter (E), and operation is as follows:

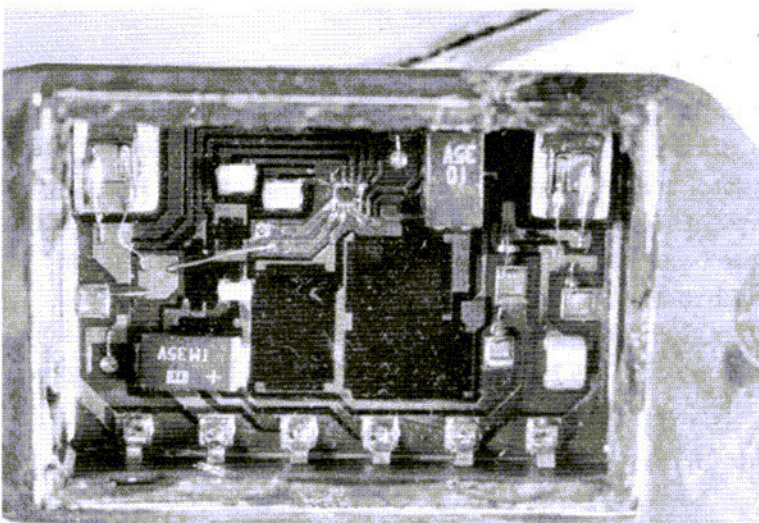
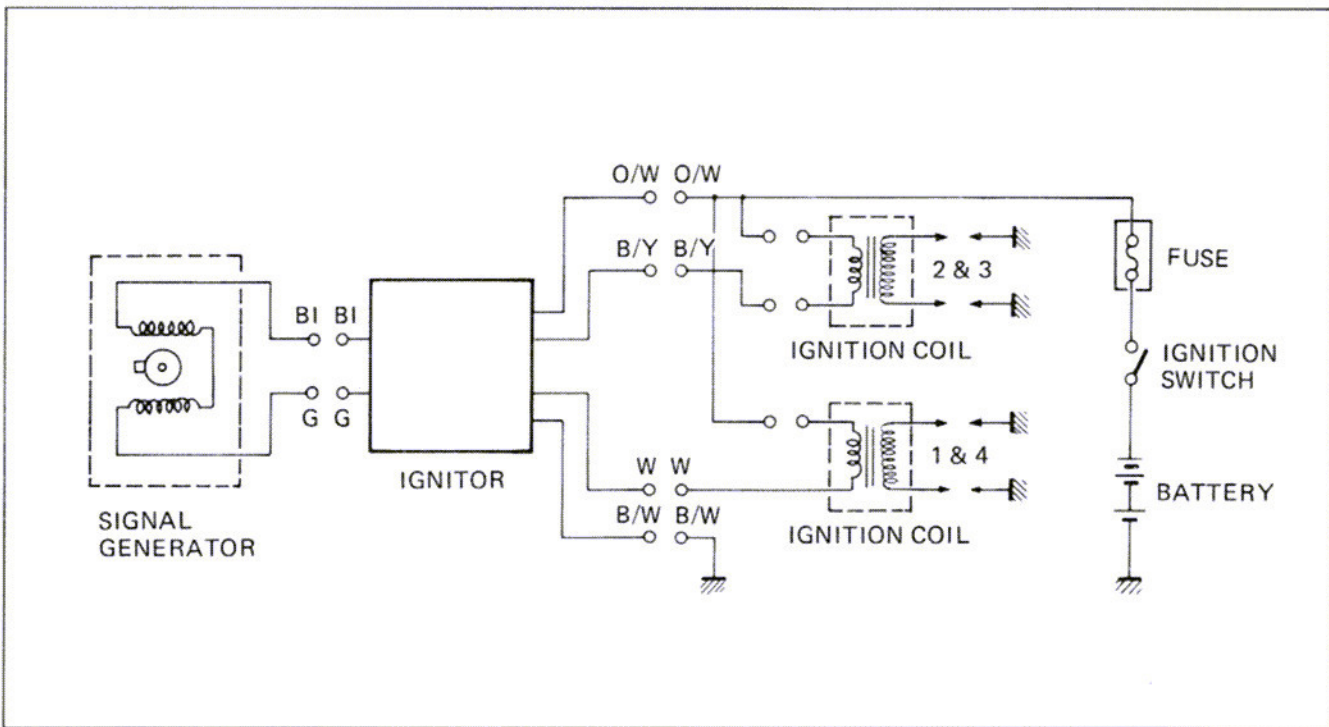
On a NPN type, the base is the controlling terminal of the transistor operation. On this type, the base utilizes only a positive or incoming signal to do the "ON", or "OFF" switching. The collector is the terminal where voltage is supplied to the transistor and the emitter is the terminal for passing this current for usage when the base has the proper "signal". Usually the voltage applied across the collector to the emitter is much larger than that needed at the base. This allows a relatively low voltage at the base to control large working voltages across the collector to the emitter.

The transistor ignition system used on the GS650G is (the Nippon Denso brand and) consists of a signal generator, which employs a rotor and two pick-up coils, the transistor unit, ignition coils, and spark plugs.

SIGNAL GENERATOR

The signal generator is mounted on the right hand side of the engine in the area commonly used for the contact breaker points. It is comprised of an iron rotor attached to a mechanical advance mechanism and two pick-up coils, with magnets at their bases, affixed to a plate. Each pick-up coil consists of a coil or wire and a yoke or coil and is mounted 180° apart on the plate. As the rotor tip is turned past the coils, AC current is produced and used for switching within the transistor unit (ignitor).

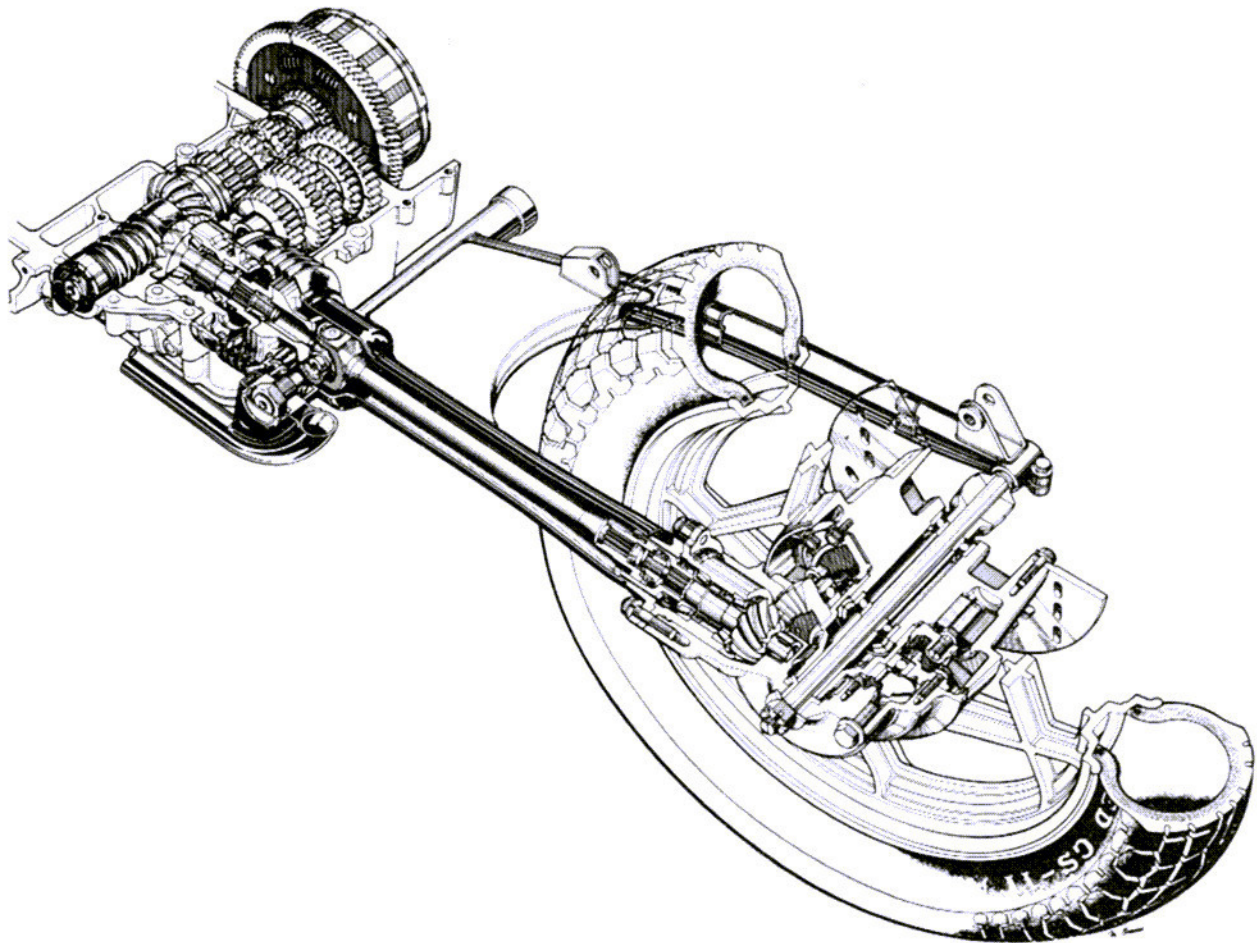
The transistor unit controls power to the ignition coils and causes the spark plugs to fire at the proper time.



Inside of the IGNITOR.
Combination transistor, Integrated Circuit.

TRANSMISSION & SHAFT DRIVE MECHANISM

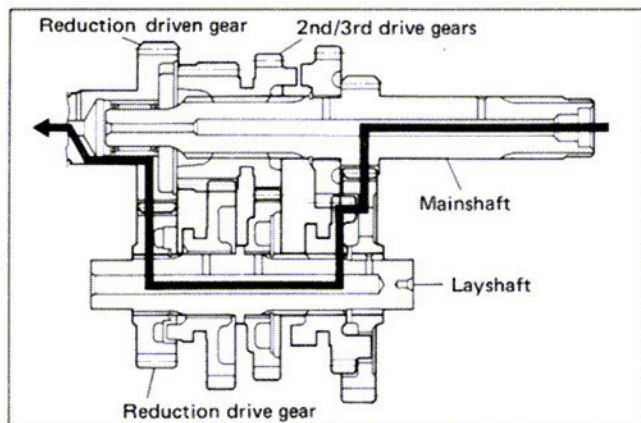
The conventional shaft drive system of transverse mounted, in-line four-cylinder motorcycles drives the propeller shaft through bevel gears (secondary drive and driven gears) driven by the end of the drive shaft. In the new Suzuki GS650G, the bevel gears are driven by the more forward located mainshaft. This shortens the overall length of the engine and, as a consequence, the engine is more compact.



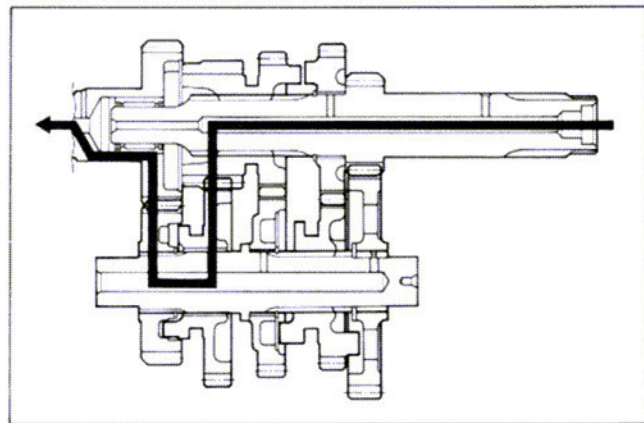
1-7 GENERAL INFORMATION

To accommodate this design, a different type of transmission is employed. As illustrated below, the power flow through the lower four gears is transmitted from the mainshaft, to the layshaft, then through a set of drive and driven reduction gears to the secondary bevel gears. In top gear, the driven reduction gear is coupled directly to the mainshaft by mating with the adjacent gear which is splined to the mainshaft. The layshaft is then bypassed and the power flow is direct.

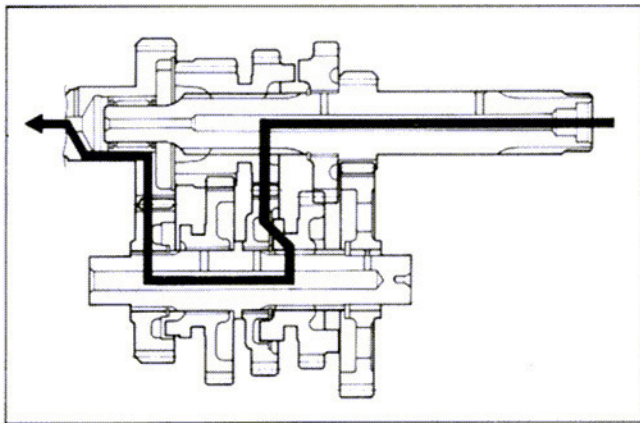
To insure the reliability of this system, a special steel alloy is used for the transmission gears and the drive and driven reduction gears are made of a very high quality nickel steel. Additionally, the teeth surface of the 2nd/3rd drive gears are treated with Special treatment for smoother, quieter break-in.



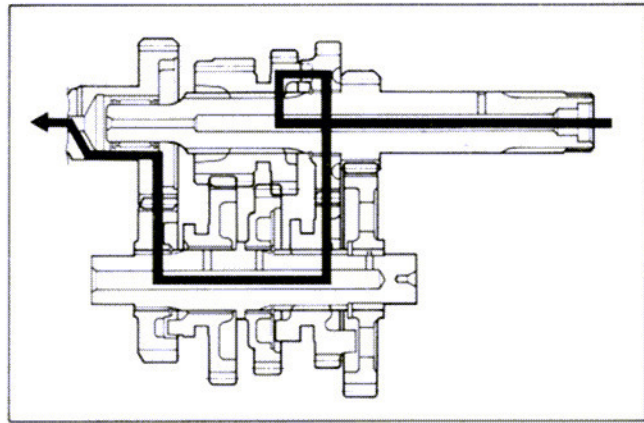
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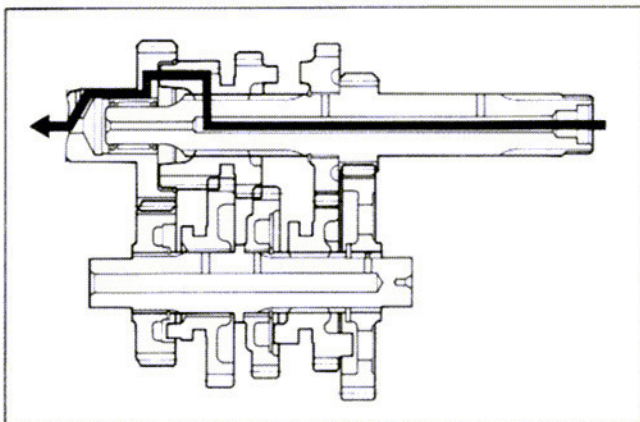
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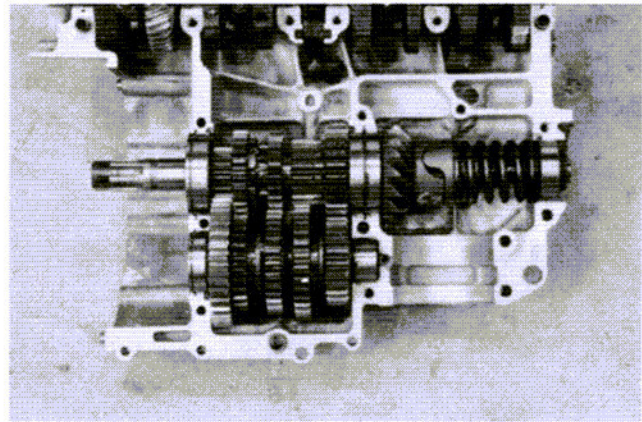
3rd



4th



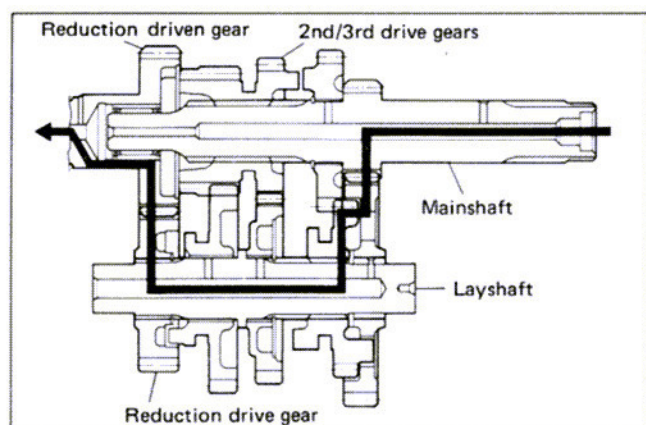
Top



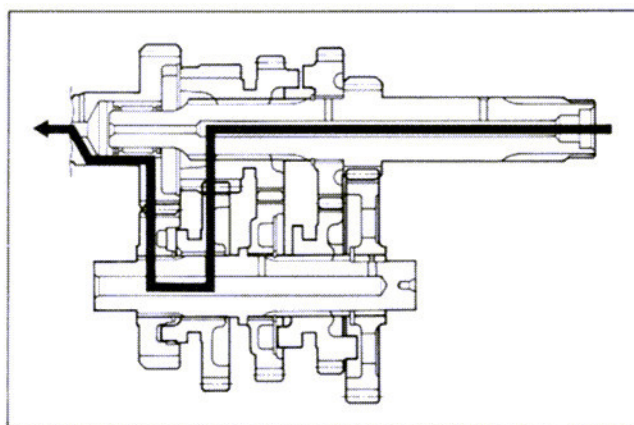
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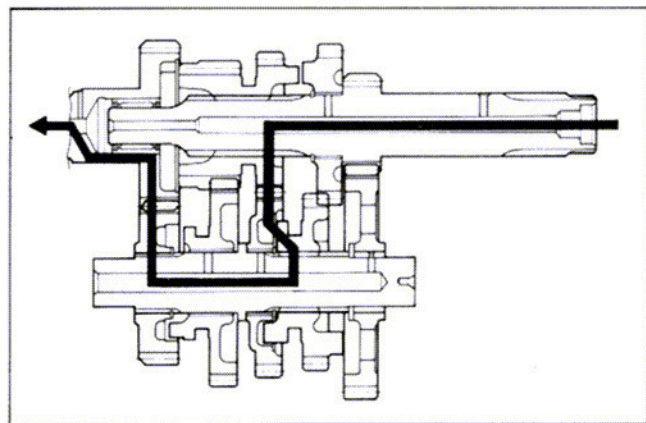
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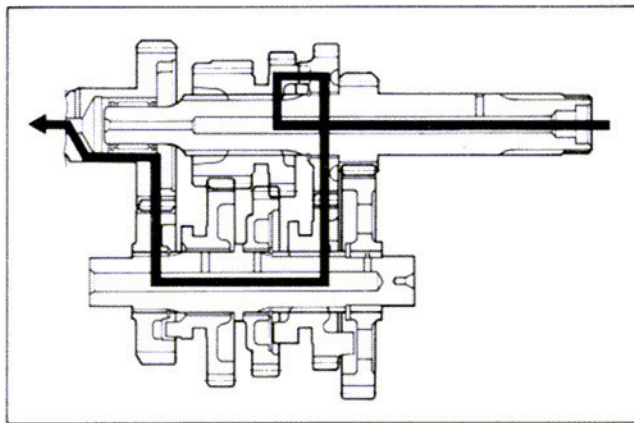
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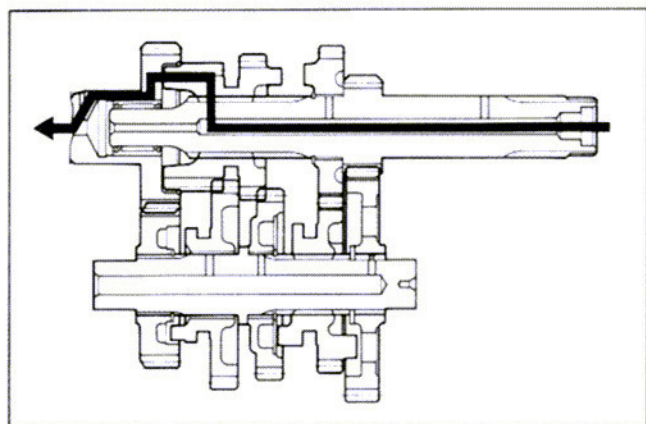
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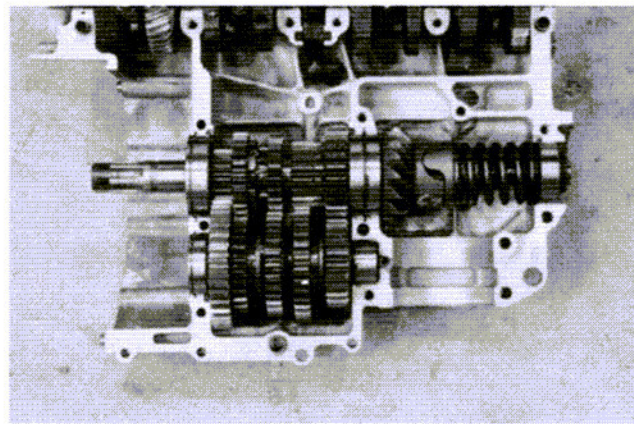
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4th

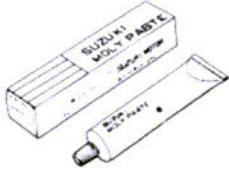


Top



SPECIAL MATERIALS

The materials listed below are needed for maintenance work on the GS650G, and should be kept on hand for ready use. They supplement such standard materials as cleaning fluids, lubricants, emery cloth and the like. How to use them and where to use them are described in the text of this manual.

Material	Part	Part
 SUZUKI SUPER GREASE "A" 99000-25030	• Oil seals • Throttle grip • Cables (speedometer and tachometer) • Clutch lever	• Wheel bearings • Swinging arm bearing and dust seal • Brake pedal shaft • Governor link • Centerstand spacer • Steering stem bearings
 SUZUKI SILICONE GREASE 99000-25100	• Caliper axle shaft	
 SUZUKI MOLY PASTE 99000-25140	• Valve stem • Cam shaft journal • Chain tensioner push rod • Conrod big end bearing • Crankshaft journal bearing • Mainshaft • Output shaft	
 SUZUKI BOND No. 1215 99104-31110	• Mating surfaces of upper and lower crankcase • Oil pressure switch • Front fork damper rod bolt • Joint portion of swinging arm and final gearcase	

1-9 GENERAL INFORMATION

Material	Part	Part
 THREAD LOCK SUPER "1361A" 99104-32020	• Cam chain guide screw • Starter clutch allen bolt • Secondary driven bevel gear nut • Final drive gear nut • Retainer plate screw	
 THREAD LOCK SUPER "1363A" 99104-32030	• Cam sprocket bolt • Gearshift arm return spring stopper • Universal joint bolt	
 THREAD LOCK CEMENT 99000-32040	• Carburetor set screw • Carburetor starter shaft lock screw • Camshaft end cap screw • Front fork damper rod bolt • Final bearing case bolt • Oil filter cap nut	
 THREAD LOCK "1363C" 99104-32050	• Generator stator securing screw • Generator lead wire guide screw • Gearshift cam stopper screw • Engine oil pump fitting screw • Mainshaft bearing retainer screw	• Starter motor securing bolt • Secondary driven bevel gear housing nut • Gearshift cam guide screw • Gearshift pawl screw
 THREAD LOCK SUPER "1332B" 99104-32090	• Generator rotor bolt	

PRECAUTIONS AND GENERAL INSTRUCTIONS

Observe the following items without fail when disassembling and reassembling motorcycles.

- Be sure to replace packings, gaskets, circlips, O rings and cotter pins with new ones.

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 insure that it is completely seated in its groove and securely fitted.

- Tighten cylinder head and case bolts and nuts beginning with larger diameter and ending with smaller diameter, and from inside to out-side diagonally, to the specified tightening torque.
- Use special tools where specified.
- Use genuine parts and recommended oils.
- When 2 or more persons work together, pay attention to the safety of each other.
- After the reassembly, check parts for tightness and operation.
- Treat gasoline, which is extremely flammable and highly explosive, with greatest care. Never use gasoline as cleaning solvent.

Warning, Caution and Note are included in this manual occasionally, describing the following contents.

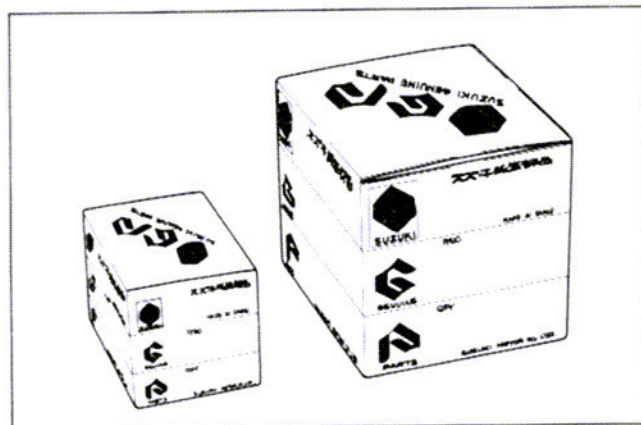
WARNING When personal safety of the rider is involved, disregard of the information could result in injury.

CAUTION For the protection of the motorcycle, the instruction or rule must be strictly adhered to.

NOTE Advice calculated to facilitate the use of the motorcycle is given under this heading.

USE OF GENUINE SUZUKI PARTS

To replace any part of the machine, use a genuine SUZUKI replacement part. Imitation parts or parts supplied from any other source than SUZUKI, if used to replace SUZUKI parts can reduce the machine's performance and, even worse, could induce costly mechanical troubles.



SPECIFICATIONS

DIMENSIONS AND DRY MASS

Overall length	2 170 mm (85.4 in)
Overall width.	830 mm (32.7 in)
Overall height	1 175 mm (46.3 in)
Wheelbase	1 440 mm (56.7 in)
Ground clearance	160 mm (6.3 in)
Seat height	780 mm (30.7 in)
Dry mass	213 kg (470 lbs)

ENGINE

Type	Four-stroke, air-cooled, DOHC
Number of cylinders	4
Bore	62.0 mm (2.441 in)
Stroke	55.8 mm (2.197 in)
Piston displacement.	673 cm ³ (41.1 cu. in)
Compression ratio	9.4 : 1
Carburetor.	MIKUNI BS32SS, four
Air cleaner.	Polyurethane foam element
Starter system	Electric
Lubrication system	Wet sump

TRANSMISSION

Clutch	Wet multi-plate type
Transmission	5-speed constant mesh
Gearshift pattern	1-down, 4-up
Primary reduction	1.956 (90/46)
Secondary reduction	0.941 (16/17)
Final reduction	3.090 (34/11)
Gear ratios, Low.	2.678 (36/14) x (25/24)
2nd	1.851 (32/18) x (25/24)
3rd	1.438 (29/21) x (25/24)
4th	1.171 (27/24) x (25/24)
Top	1.000 (Direct)
Drive system	Shaft drive

CHASSIS

Front suspension	Telescopic, pneumatic/coil spring, oil dampened
Rear suspension	Swinging arm, oil dampened, damper 4-way/ spring 5-way adjustable
Steering angle	40° (right & left)
Caster	62° 15'
Trail	113 mm (4.45 in)
Turning radius	2.5 m (8.2 ft)
Front brake	Disc brake, twin
Rear brake	Disc brake
Front tire size	3.25H19 4PR, tubeless
Rear tire size	4.25H17 4PR, tubeless
Front fork stroke	150 mm (5.91 in)
Rear wheel travel	113 mm (4.45 in)
Front tire pressure	1.75 kg/cm ² (25 psi) (Normal solo riding)
Rear tire pressure	2.00 kg/cm ² (28 psi) (Normal solo riding)

ELECTRICAL

Ignition type	Transistorized
Ignition timing	10° B.T.D.C. below at 1 650 r/min and 40° B.T.D.C. above at 3 500 r/min
Spark plug	NGK D8EA or NIPPON DENSO X24ES-U
Battery	12V 50.4 kC (14 Ah)/10 HR
Generator	Three-phase A.C. generator
Fuse	10/10/10/10/15A

CAPACITIES

Fuel tank including reserve	16.0 L (4.2 US gal)
Reserve	4.5 L (4.8 US gal)
Engine oil	2.5 L (2.6 US qt)
Final bevel gear oil	200 – 220 ml (6.76 – 7.44 US oz)
Front fork oil (each leg)	210 ml (7.10 US oz)
Front fork air pressure	0.5 kg/cm ² (7.1 psi)

* These specifications are subject to change without notice.

PERIODIC MAINTENANCE AND TUNE-UP PROCEDURES

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PERIODIC MAINTENANCE SCHEDULE

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

NOTE:

More frequent servicing may be performed on motorcycles that are used under severe conditions, however, it is not necessary for ensuring emission level compliance.

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

PERIODIC MAINTENANCE CHART

INTERVAL: THIS INTERVAL SHOULD BE JUDGED BY ODOMETER READING OR MONTHS WHICHEVER COMES FIRST	mile	600	4 000	7 500	11 000	15 000
	km	1 000	6 000	12 000	18 000	24 000
	month	2	12	24	36	48
Battery (Specific gravity of electrolyte)	—	I	I	I	I	I
Cylinder head nuts & exhaust pipe bolts	T	T	T	T	T	T
Air cleaner element	—	C	C	C	C	C
Tappet clearance	I	I	I	I	I	I
Spark plugs	—	C	R	C	R	R
Fuel line	Replace every two years.					
Engine oil & oil filter	R	R	R	R	R	R
Carburetor idle rpm*	I	I	I	I	I	I
Final driven gear oil	R	—	R	—	R	R
Brake hose	Replace every two years.					
Front fork	—	—	I	—	I	I
Check air pressure every 6 months.						

NOTE: T = Tighten, I = Inspect, R = Replace, C = Clean

* = The specified idle rpm appears on the vehicle emission control information label.

MAINTENANCE AND TUNE-UP PROCEDURES

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

BATTERY

6 000, 12 000, 18 000, 24 000 km
4 000, 7 500, 11 000, 15 000 mi

- The battery must be removed to check the electrolyte level and specific gravity.
- Remove left frame cover.
- Remove battery $\ominus$ lead at the battery terminal.
- Remove battery $\oplus$ lead wire from fuse box and starter motor relay.
- Remove battery from the frame.
- Check electrolyte for level and specific gravity. Add distilled water, as necessary, to keep the surface of the electrolyte above the LOWER level line but not above the UPPER level line.

For checking specific gravity, use a hydrometer to determine the charged condition.

09900 - 28403	Hydrometer
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Standard specific gravity	1.28 at 20°C (68°F)
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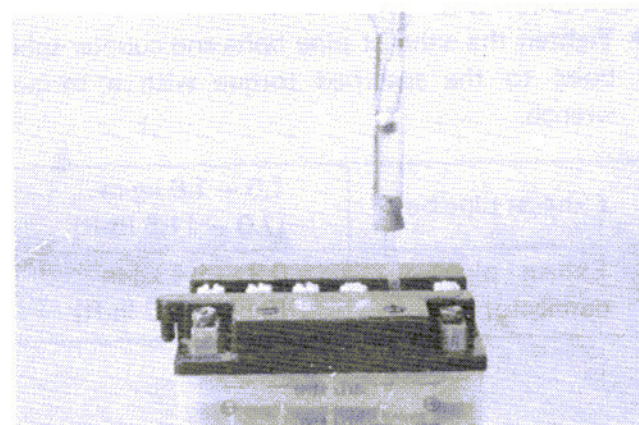
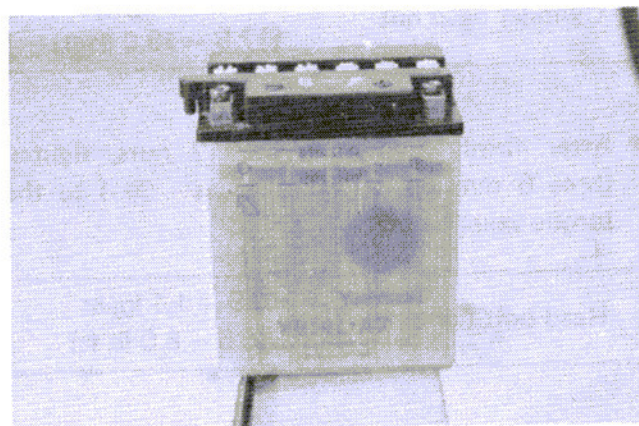
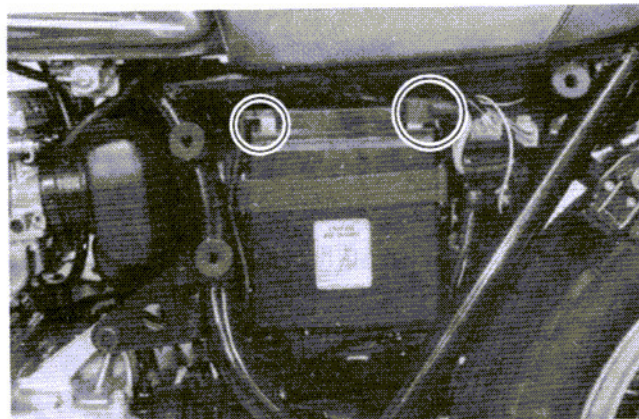
An S.G. reading of 1.22 (at 20°C) or under means that the battery needs recharging off the machine: take it off and charge it from a recharger. Charging the battery in place can lead to failure of the regulator/rectifier.

- To install the battery, reverse the procedure described above.

WARNING:

When installing the battery lead wires, fix the $\oplus$ lead first and $\ominus$ lead last.

- Make sure that the breather pipe is tightly secured and undamaged, and is routed as shown in the figure.

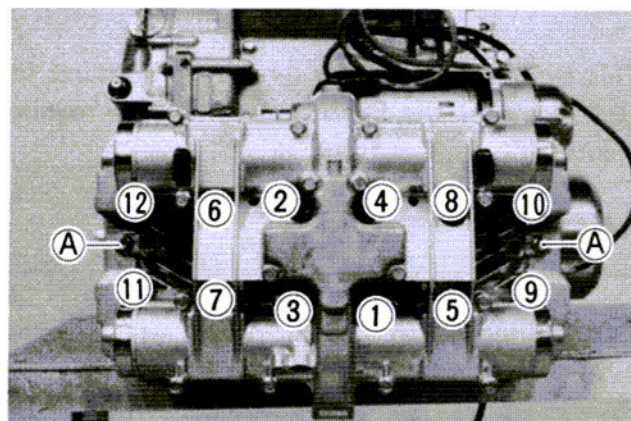


CYLINDER HEAD NUTS AND EXHAUST PIPE BOLTS

1 000, 6 000, 12 000, 18 000, 24 000 km
600, 4 000, 7 500, 11 000, 15 000 mi

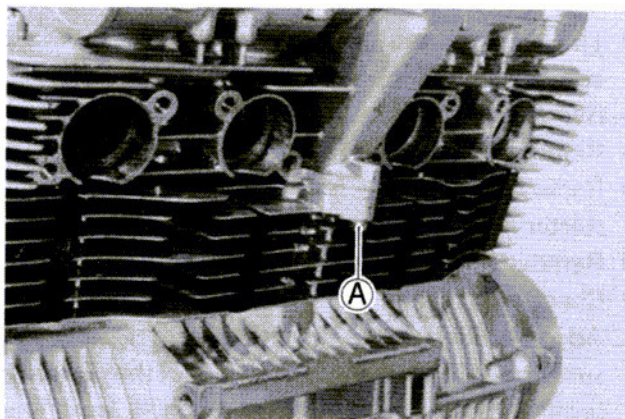
CYLINDER HEAD

- Remove the fuel tank.
- Tighten the twelve 10 mm nuts (14 mm wrench) to the specified torque with a torque wrench sequentially in ascending numerical order with the engine cold.



Cylinder head nut	2.4 – 2.6 kg-m (17.5 – 19.0 lb-ft)
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- After firmly tightening the 12 nuts, tighten three 6 mm bolts (indicated as A) to the torque value below:

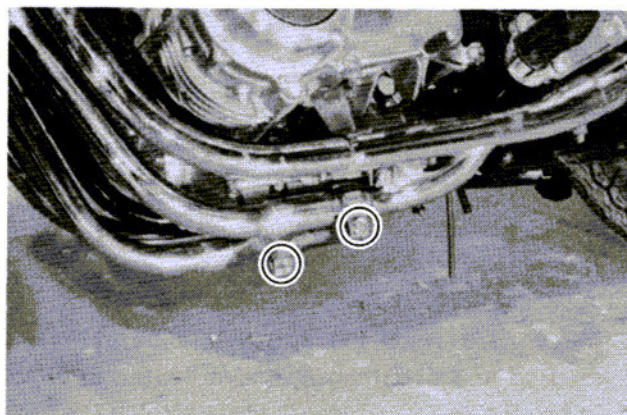
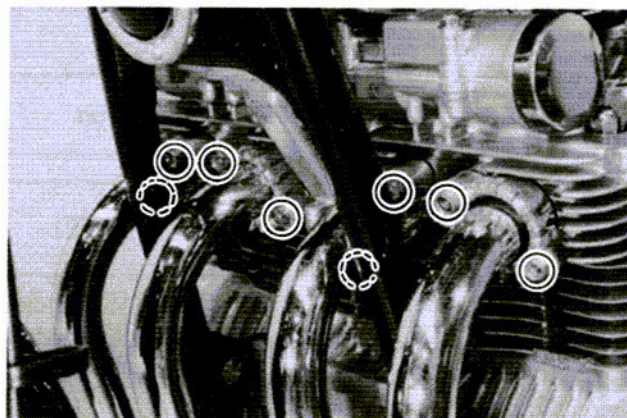


Head bolt tightening	0.9 – 1.1 kg-m (6.5 – 8.0 lb-ft)
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EXHAUST PIPE

- Tighten the exhaust pipe bolts and coupler tube bolts to the specified torque with a torque wrench.

Exhaust pipe bolt	1.0 – 1.6 kg-m (7.0 – 11.5 lb-ft)
Exhaust pipe connector bolt	0.9 – 1.4 kg-m (6.5 – 10.0 lb-ft)



AIR CLEANER ELEMENT

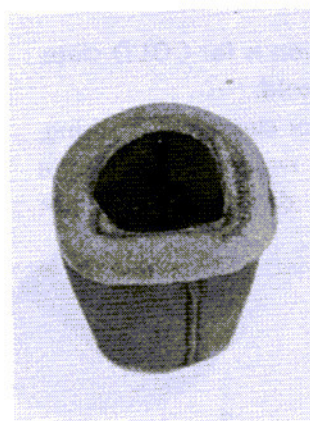
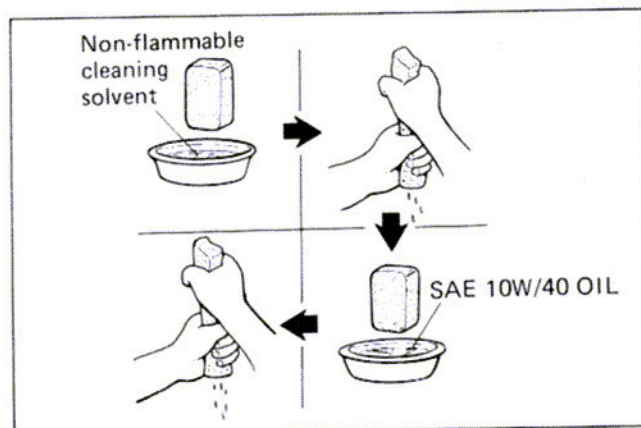
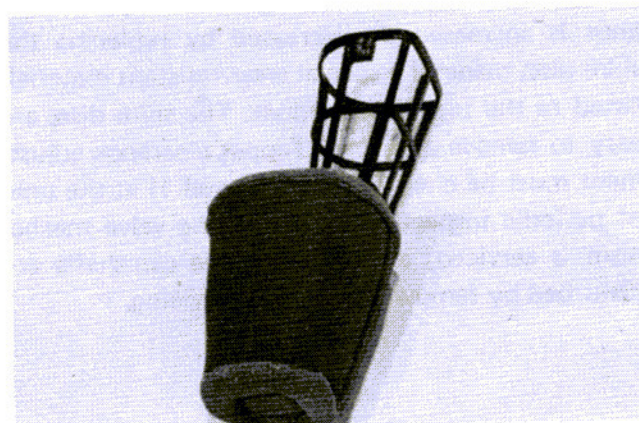
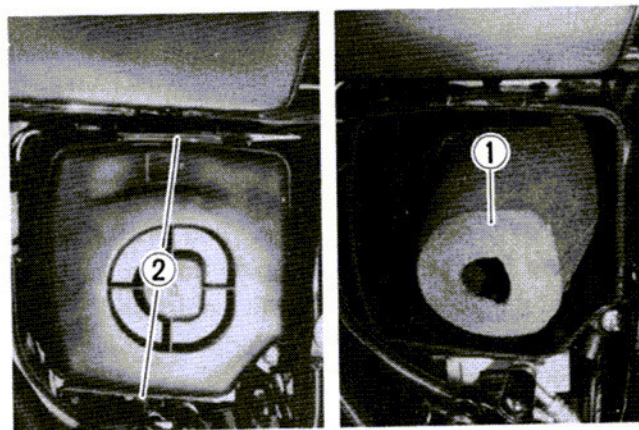
6 000, 12 000, 18 000, 24 000 km
4 000, 7 500, 11 000, 15 000 mi

If the air cleaner is clogged with dust, intake resistance will be increased with a resultant decrease in output and an increase in fuel consumption. Check and clean the element in the following manner.

- Take out air cleaner element ① from the air cleaner case by removing two guides ②.
- Fill a washing pan of a proper size with non-flammable cleaning solvent. Immerse the element in the cleaning solvent and wash it clean.
- Squeeze the cleaning solvent out of the washed element by pressing it between the palms of both hands: do not twist or wring the element or it will develop tears.
- Immerse the element in motor oil, and squeeze the oil out of the element leaving it slightly wet with oil.
- Fit the cleaner element to frame properly.

CAUTION:

- * Before and during the cleaning operation, inspect the element for tears. A torn element must be replaced.
- * Be sure to position the element snugly and correctly, so that no incoming air will bypass it. Remember, rapid wear of piston rings and cylinder bore is often caused by a defective or poorly fitted element.



CORRECT

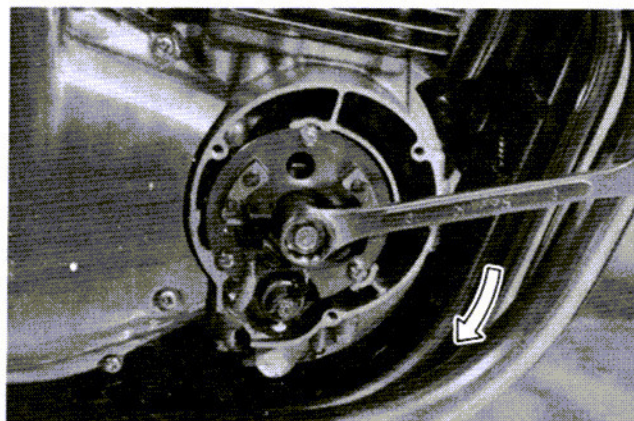
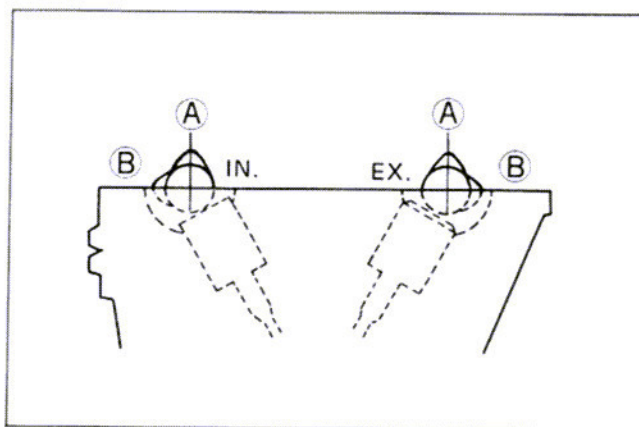


INCORRECT

TAPPET CLEARANCE

1 000, 6 000, 12 000, 18 000, 24 000 km
600, 4 000, 7 500, 11 000, 15 000 mi

The tappet clearance specification is the same for both intake and exhaust valves. Too small a tappet clearance may reduce the engine power; too large a tappet clearance increases valve noise and hastens valve and seat wear. When the tappets are set to the specified clearance, the engine will run without excessive noise from the valve mechanism and will deliver full power. In this engine, the tappet clearance is increased or decreased by replacing the shim disc, made of a special wear-resistant material, fitted to the top of the tappet. The shim discs are easy to remove and refit. Tappet clearance adjustment must be checked and adjusted 1) at the time of periodic inspection, 2) when the valve mechanism is serviced, and 3) when the camshafts are disturbed by removing them for servicing.



CHECKING THE TAPPET CLEARANCE

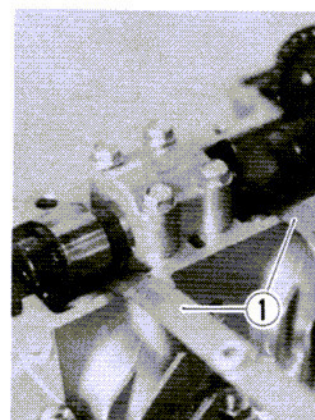
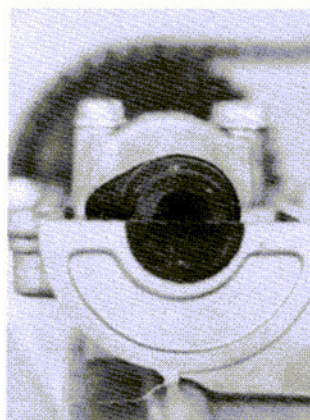
Tappet clearance specification (for both intake and exhaust valves)	0.03 – 0.08 mm
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NOTE:

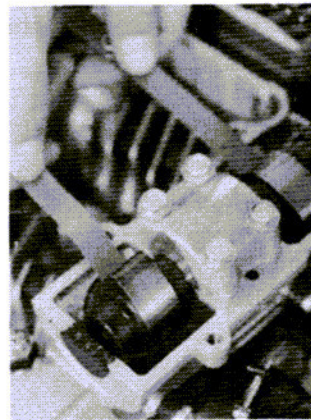
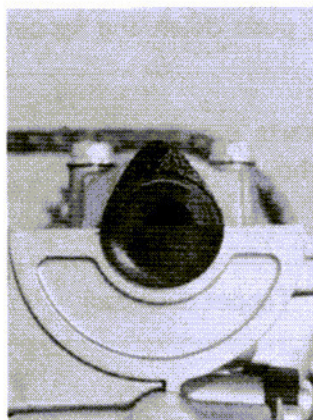
- * The cam must be at position **(A)** or **(B)** to check the tappet clearance or to remove the shim disc. Clearance readings should not be taken with the cam in any other position than these two positions.
- * The clearance specification is for COLD state. Check it when engine is cold.
- * To turn the crankshaft for clearance checking, be sure to use a 19 mm wrench and to rotate in the normal running direction. All spark plugs should be removed.

1. Turn crankshaft to bring the exhaust cam of No. 1 cylinder to this position. In this condition, read the clearance at the exhaust tappets of Nos. 1 and 2 cylinders. Use special tool **(1)** on all tappets.

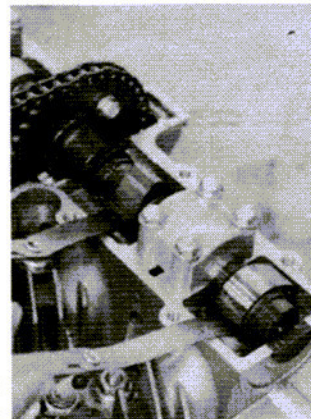
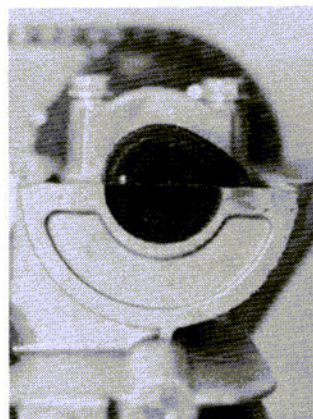
09900 - 20803	Thickness gauge
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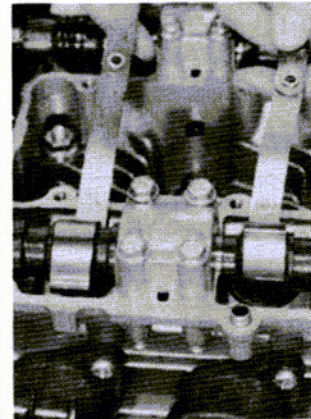
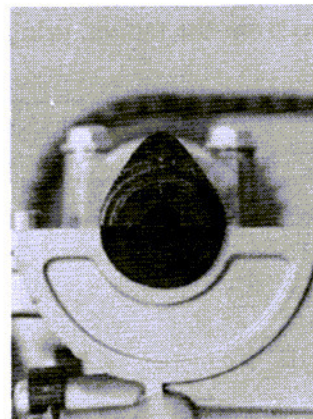
2. After setting the clearance to the specification at the exhaust tappets of Nos. 1 and 2 cylinders, turn the crankshaft 180° (half rotation) to bring the intake cam of No. 1 cylinder to the position indicated. Read the clearance at the intake tappets of Nos. 1 and 2 cylinders and, if necessary, adjust the clearance to each specification.



3. Turn the crankshaft a further 180° , bringing the exhaust cam of No. 4 cylinder to the position indicated. Under this condition, repeat the checking and adjusting process outlined in step "1" at the exhaust tappets of Nos. 3 and 4 cylinders.



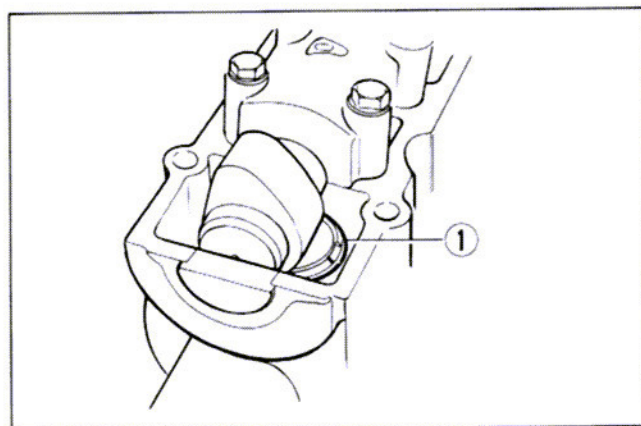
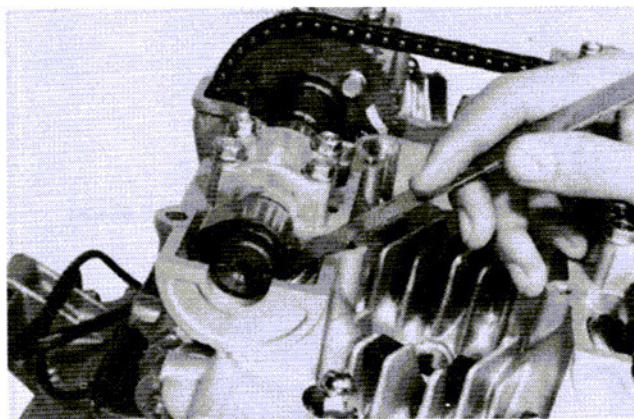
4. Again turn the crankshaft a further 180° , bringing the intake cam of No. 4 cylinder to the position indicated. Similarly check and adjust the clearance at the intake tappets of Nos. 3 and 4 cylinders.



TAPPET CLEARANCE ADJUSTMENT

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

1. Place a fingertip on the tappet, and turn it in place to bring notch ① to the position indicated.



2. Using the special tool, push down the tappet.

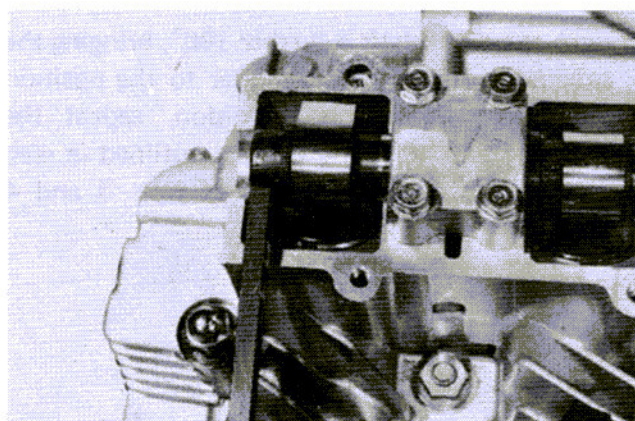
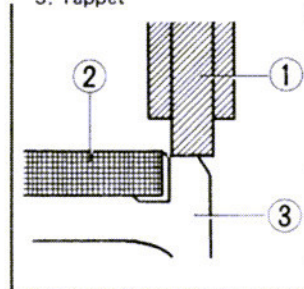
NOTE:

Make sure the tool exerts pressure on the tappet correctly, as shown, with the tip hitched securely.

09916 - 64510

Tappet depressor

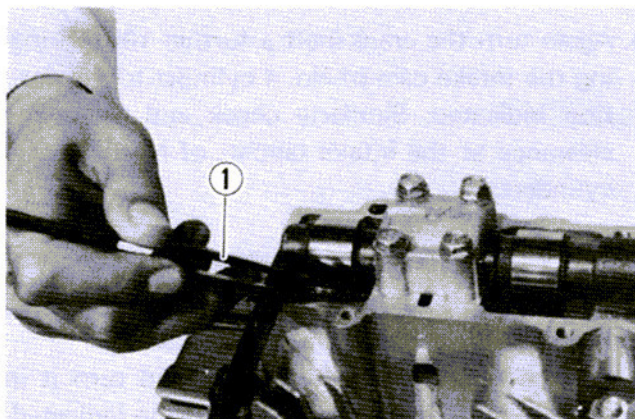
1. Tappet depressor
2. Tappet shim
3. Tappet



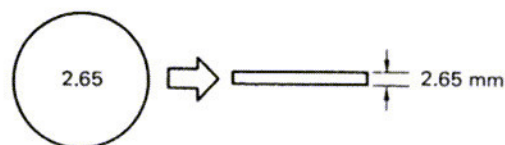
3. Take out the tappet shim from the tappet, using special tool ①.

09916 - 84510

Tweezers



4. Check the figures printed on the shim. These figures indicate the thickness of the shim, as illustrated.



5. Select a replacement shim that will provide a clearance within the specified range (0.03 – 0.08 mm). For the purpose of this adjustment, a total of 20 sizes of tappet shim are available ranging from 2.15 to 3.10 mm in steps of 0.05 mm. Fit the selected shim to the tappet, with numbers toward tappet. Be sure to check shim size with micrometer to insure its size.

NOTE:

Before fitting the tappet shim to the tappet, be sure to apply engine oil to its top and bottom faces.

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

Tappet shim size chart

No.	Thickness (mm)	Part No.
1	2.15	12892-45000
2	2.20	12892-45001
3	2.25	12892-45002
4	2.30	12892-45003
5	2.35	12892-45004
6	2.40	12892-45005
7	2.45	12892-45006
8	2.50	12892-45007
9	2.55	12892-45008
10	2.60	12892-45009
11	2.65	12892-45010
12	2.70	12892-45011
13	2.75	12892-45012
14	2.80	12892-45013
15	2.85	12892-45014
16	2.90	12892-45015
17	2.95	12892-45016
18	3.00	12892-45017
19	3.05	12892-45018
20	3.10	12892-45019

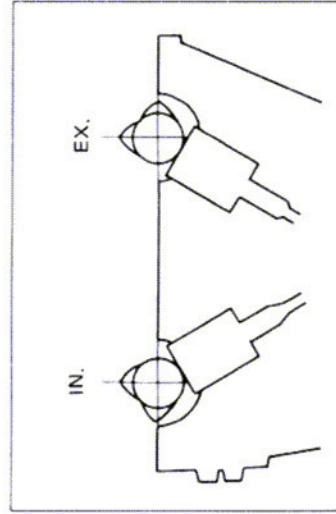
SHIM SELECTION CHART

PART NUMBER — PREFIX 12892

P/NO. SUFFIX	45000	45001	45002	45003	45004	45005	45006	45007	45008	45009	45010	45011	45012	45013	45014	45015	45016	45017	45018	45019
Tappet Clearance (mm)																				
0.00 — 0.02	2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10
0.03 — 0.08		2.15	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05
0.09 — 0.13	2.20	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	
0.14 — 0.18	2.25	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10		
0.19 — 0.23	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10			
0.24 — 0.28	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10				
0.29 — 0.33	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10					
0.34 — 0.38	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10						
0.39 — 0.43	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10							
0.44 — 0.48	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10								
0.49 — 0.53	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10									
0.54 — 0.58	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10										
0.59 — 0.63	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10											
0.64 — 0.68	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10												
0.69 — 0.73	2.80	2.85	2.90	2.95	3.00	3.05	3.10													
0.74 — 0.78	2.85	2.90	2.95	3.00	3.05	3.10														
0.79 — 0.83	2.90	2.95	3.00	3.05	3.10															
0.84 — 0.88	2.95	3.00	3.05	3.10																
0.89 — 0.93	3.00	3.05	3.10																	
0.94 — 0.98	3.05	3.10																		
0.99 — 1.03	3.10																			

SPECIFIED CLEARANCE/NO. ADJUSTMENT REQUIRED

PRESENT SHIM SIZE — mm



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

EXAMPLE

Tappet clearance is — 0.55 mm
 Present shim size — 2.40 mm
 Shim size to be used — 2.90 mm

SPARK PLUG

6 000, 12 000, 18 000, 24 000 km
4 000, 7 500, 11 000, 15 000 mi

The plug gap is adjusted to 0.6 – 0.7 mm. The gap is correctly adjusted using a thickness gauge (special tool). When carbon is deposited on the spark plug, remove the carbon with a tool with a pointed end. If electrodes are extremely worn or burnt, replace the plug. Also replace the plug if it has a broken insulator, damaged thread, etc.

09930 - 13210	Socket wrench
09930 - 14530	Universal joint
09914 - 24510	T handle
09900 - 20803	Thickness gauge

NGK D8EA or NIPPON DENSO X24ES-U listed in the table should be used as the standard plug. However, the heat range of the plug should be selected to meet the requirements of speed, actual load, fuel, etc. If the plugs need to be replaced, it is recommended that the standard plugs listed in the table be selected. Remove the plugs and inspect the insulators. Proper heat range would be indicated if both insulators were light brown in color. If they are blackened by carbon, they should be replaced by a hot type NGK D7EA or NIPPON DENSO X22ES-U and if baked white, by NGK D9EA or NIPPON DENSO X27ES-U.

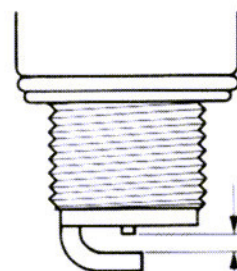
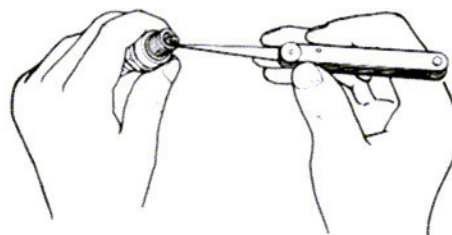
Plugs with high heat range number are used for high speed running. These plugs are designed to be sufficiently cooled to prevent overheating and are called cold type plugs.

NOTE:

To check the spark plugs, first make sure that the fuel tank contains unleaded gasoline, and after a test ride if the plugs are either sooty with carbon or burnt white, replace them altogether.

NOTE:

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.



Gap 0.6 – 0.7 mm
(0.024 – 0.028 in)

NGK	NIPPON DENSO	REMARKS
D7EA	X22ES-U	If the standard plug is apt to get wet, replace with this plug. Hot type.
D8EA	X24ES-U	Standard
D9EA	X27ES-U	If the standard plug is apt to overheat, replace with this plug. Cold type.

FUEL LINE

Replace every 2 years

ENGINE OIL AND OIL FILTER

1 000, 6 000, 12 000, 18 000, 24 000 km
600, 4 000, 7 500, 11 000, 15 000 mi

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

- Keep the motorcycle upright, supported on the center stand.
- Place an oil pan below the engine and drain the oil by removing two drain plugs ① and filler cap ②.
- Remove three nuts ④ and remove the filter cover.
- Pull out old filter ⑤, and replace with new one.
- Replace O-ring ⑥ and filter cover, and secure nuts ④ with applying thread lock cement.

99000 - 32040

Thread lock cement

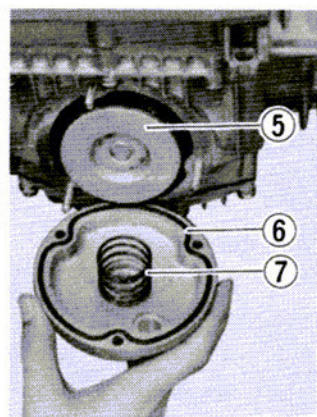
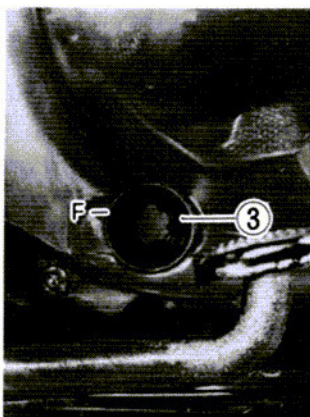
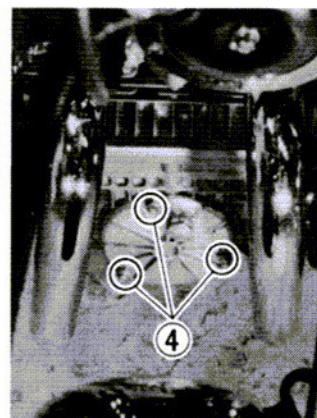
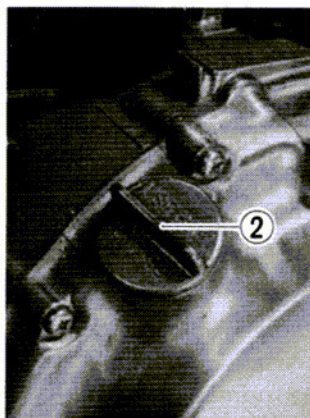
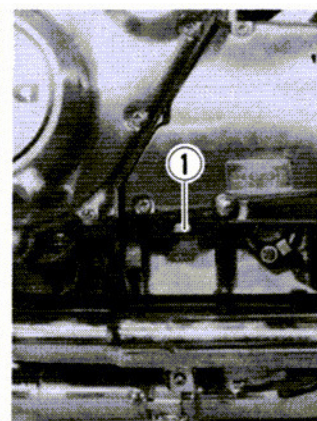
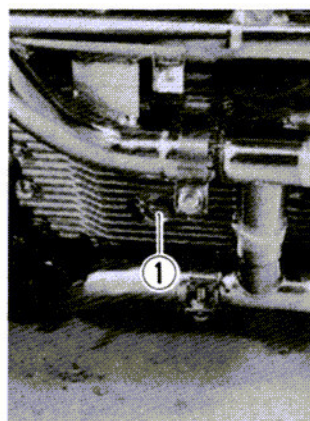
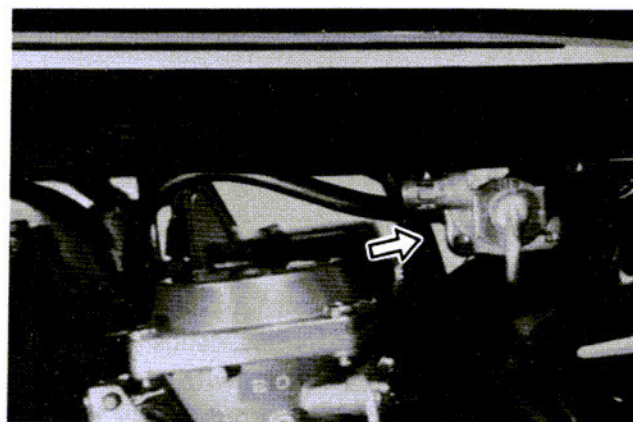
- Fit drain plugs ① securely, and add fresh oil through the filler. The engine will hold about 3.2 L (3.4 US qt) of oil.
Use API classification of SE oil with SAE 10W/40 viscosity.
- Start up the engine and allow it to run for several seconds at idling speed.
- Turn off the engine and wait about one minute, then check the oil level through the inspection window ③. If the level is below mark "F", supply oil to that level.

NECESSARY AMOUNT OF ENGINE OIL

Oil change	2.5 L (2.6 US qt)
Filter change	3.2 L (3.4 US qt)
Overhaul engine	3.7 L (3.9 US qt)

NOTE:

Be sure to take care of O-ring ⑥ to prevent any damage and be sure that filter spring ⑦ is properly in place.



CARBURETOR IDLE RPM

1 000, 6 000, 12 000, 18 000, 24 000 km
600, 4 000, 7 500, 11 000, 15 000 mi

NOTE:

Make this adjustment when the engine is hot.

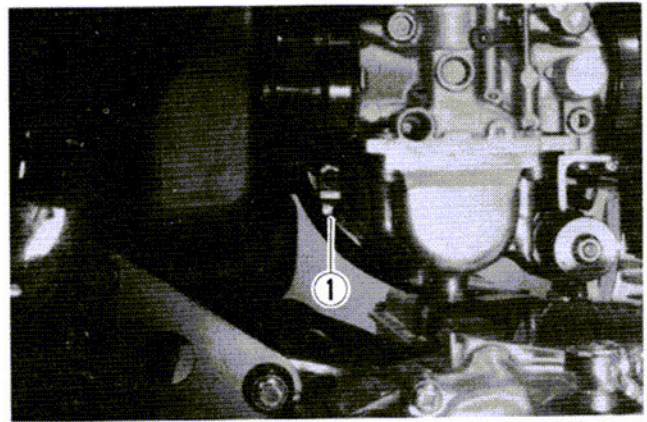
- Start up the engine and set its speed at anywhere between 1 000 and 1 200 r/min by turning throttle stop screw ①.

Engine idle speed

1 100 ± 100 r/min

CAUTION:

No adjustment except the procedure mentioned above is necessary because calibration is performed by carburetor manufacturer.

**FINAL DRIVE GEAR OIL**

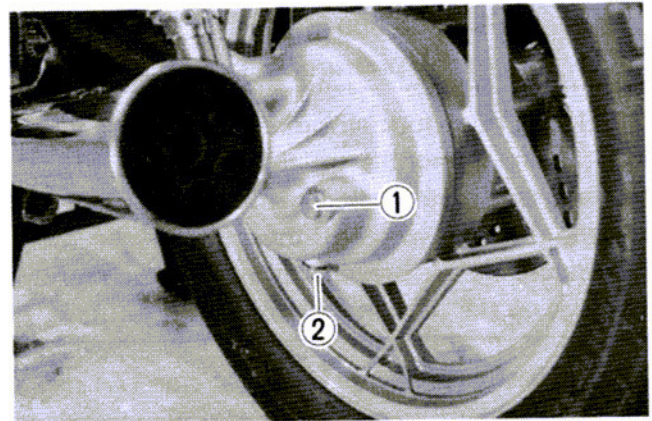
1 000, 12 000, 24 000 km
600, 7 500, 15 000 mi

Change the final drive gear oil in the following way. Use SAE # 90 hypoid gear oil.

- Keep the motorcycle erect, supporting it on the center stand.
- Drain oil by removing filler cap ① and drain plug ②.
- Refit drain plug ② and pour the specified oil in through the filler hole until it runs out from the filler hole.
- Refit filler cap ①.

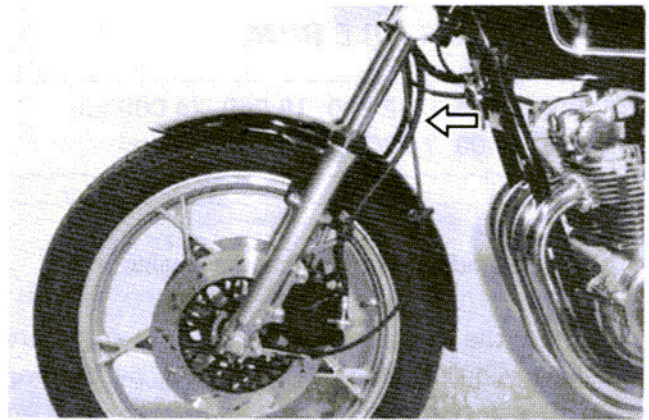
NOTE:

The amount of oil to be replaced is 200 – 220 ml (6.76 – 7.44 US oz).



BRAKE HOSE

Replace every 2 years

**FRONT FORK**

12 000, 24 000 km
7 500, 15 000 mi
Check air pressure Every 6 months

Check the front fork air pressure, when the fork is cold, every 6 months by the following manner.

- Place the motorcycle on the center stand and keep the front wheel off the ground.
- Measure the air pressure by placing the pressure gauge on the valve as shown.

Specified air pressure	0.5 kg/cm ² (7.1 psi)
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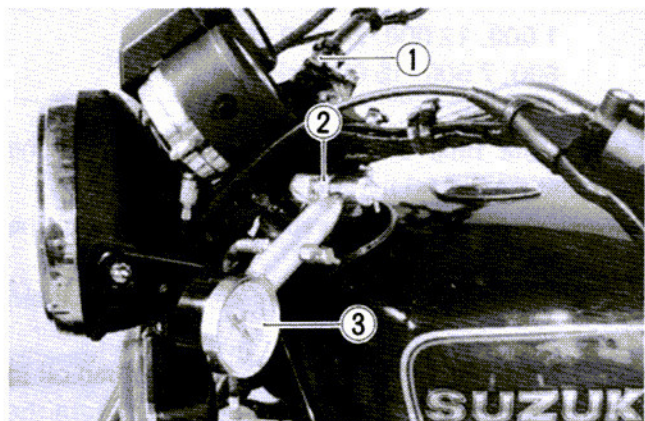
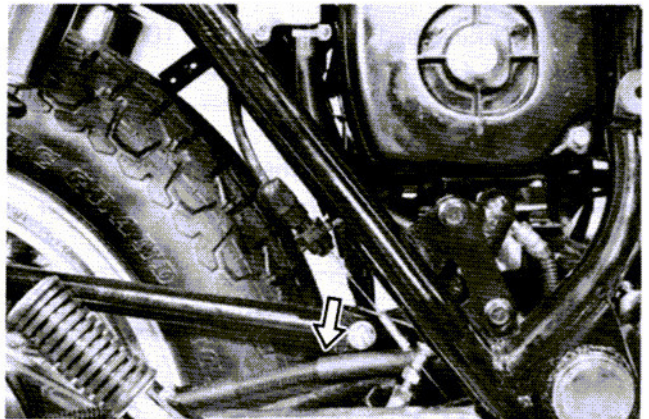
- If necessary, use only a hand air pump to raise the front air pressure.

NOTE:

*Just before charging air confirm that the valve is tight.

*Try to equalize the air pressure of the two legs, right and left, as closely as possible. The maximum permissible difference is 0.1 kg/cm² (1.4 psi).

Inspect the front fork for oil leakage, scoring and scratches on the outer surface of the inner tube every 12 000 km (7 500 mi) and replace the defective parts, if necessary.



- ① Air valve protection cap ③ Air valve
② Air pressure gauge

SERVICING ENGINE

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ENGINE COMPONENTS REMOVABLE WITH ENGINE IN PLACE

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

ENGINE LEFT SIDE

	See page
Gearshift lever.....	3- 5
Secondary gearbox cover.....	3- 5
Gear position indicator.....	3-15
Generator cover.....	3-15
Generator rotor.....	3-16
Starter clutch.....	3-16

ENGINE CENTER

	See page
Air cleaner.....	2- 4
Oil filter.....	2-11
Fuel tank.....	3- 3
Tachometer cable.....	3- 4
Exhaust pipe and muffler.....	3- 5
Carburetor and throttle cable.....	3- 4
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Cylinder head.....	3-11
Cylinder.....	3-12
Piston.....	3-12
Starter motor.....	3-15
Oil pan.....	3-17
Sump filter.....	3-17

ENGINE RIGHT SIDE

	See page
Clutch cable.....	3- 5
Clutch cover.....	3-13
Clutch plates.....	3-13
Clutch sleeve hub.....	3-13
Primary driven gear.....	3-13
Oil pump drive gear.....	3-14
Oil pump ass'y.....	3-14
Gear shifting shaft.....	3-14

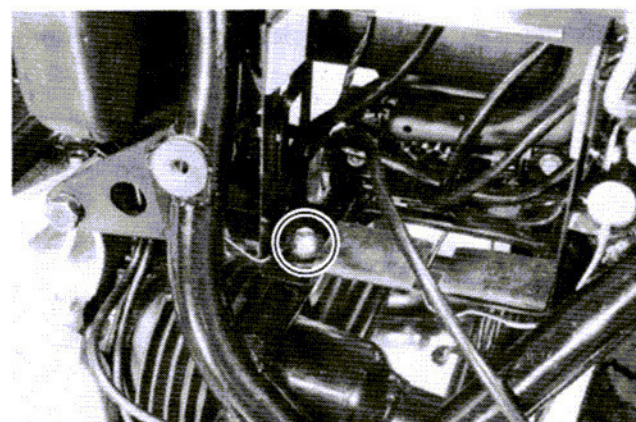
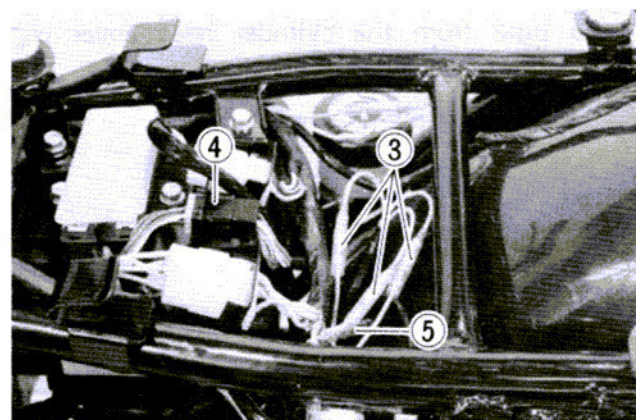
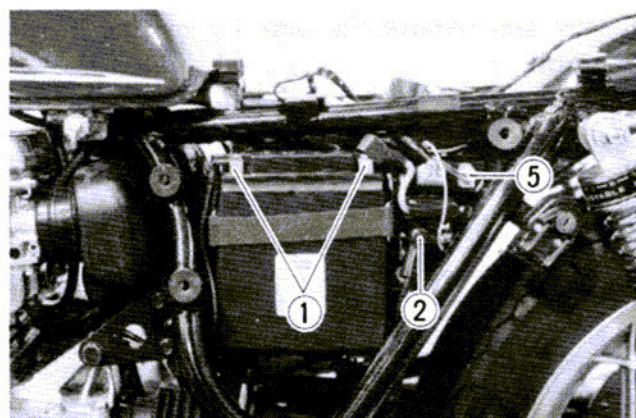
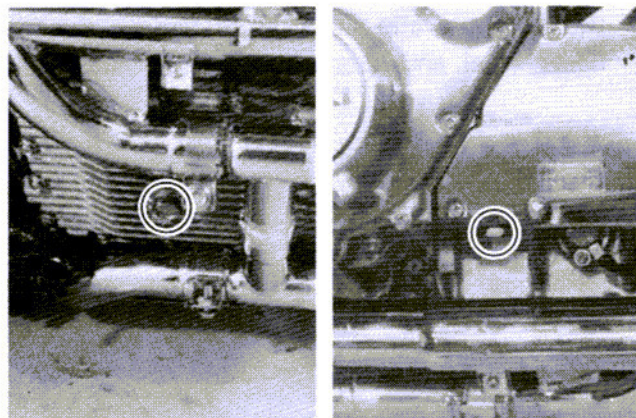
- Generator cover and starter motor lead wire should be removed from the starting motor relay side.

ENGINE REMOVAL AND REINSTALLATION

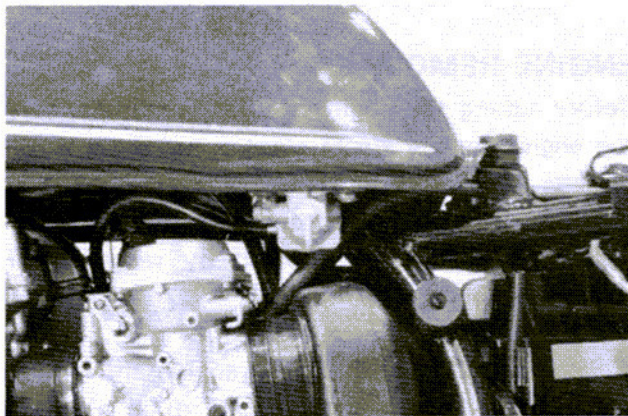
ENGINE REMOVAL

Before taking the engine out of the frame, wash the engine with a steam cleaner and drain engine oil etc. The procedure of engine removal is sequentially explained in the following steps, and engine installation is effected by reversing the removal procedure.

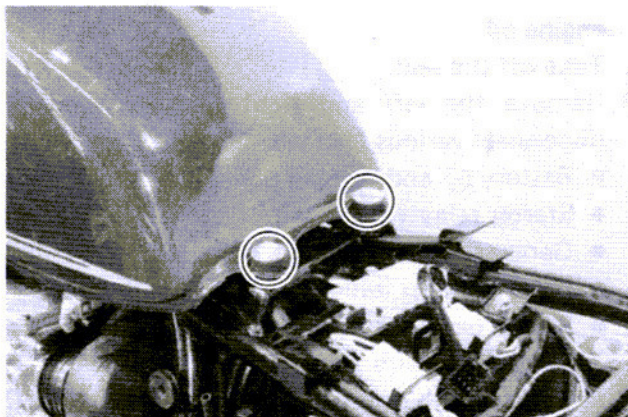
1. Place an oil pan under the engine and remove the oil filter cap and both oil drain plugs, oil pan and secondary drive gears, to drain out engine oil.
2. Take off the seat.
3. Remove the left and right frame covers and disconnect various lead wires.
 - Battery $\ominus$ and $\oplus$ lead wires ①.
 - Starter relay $\ominus$ lead wire ②.
 - Generator lead wires ③.
 - Gear position indicator switch lead wires ④.
 - Signal generator lead wires and oil pressure switch lead wire ⑤.
 - Engine ground wire from the battery holder.



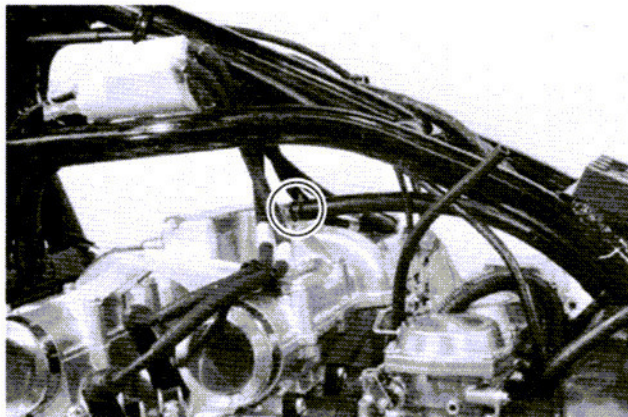
4. Set the fuel cock in the "ON" position and shift the fuel hose clip sideways to remove the two hoses (fuel and vacuum) from the fuel cock.



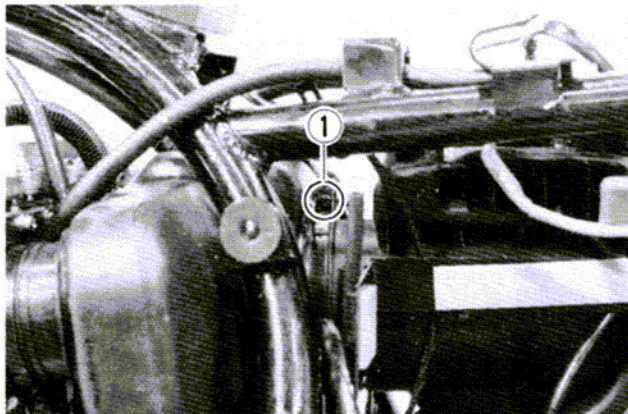
5. Remove the two bolts at the rear of the fuel tank and remove the tank by moving it rearwards.



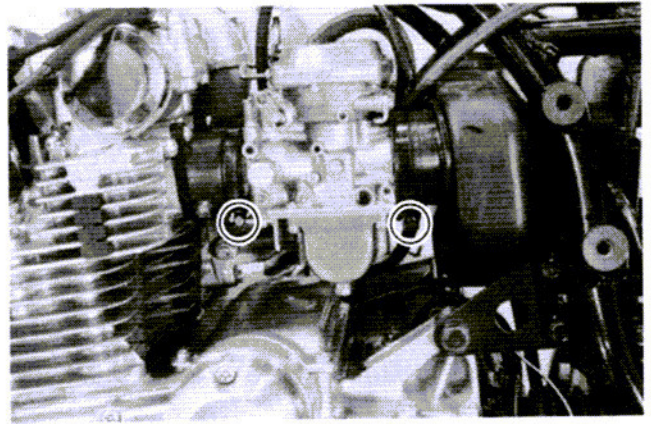
6. Shift the breather pipe clip sideways and remove the pipe from the cylinder head cover cap.



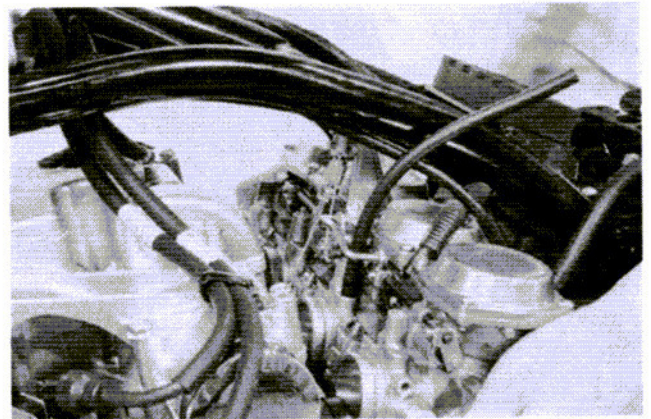
7. Loosen the clamp screw ① between the air cleaner case and the cleaner chamber body.



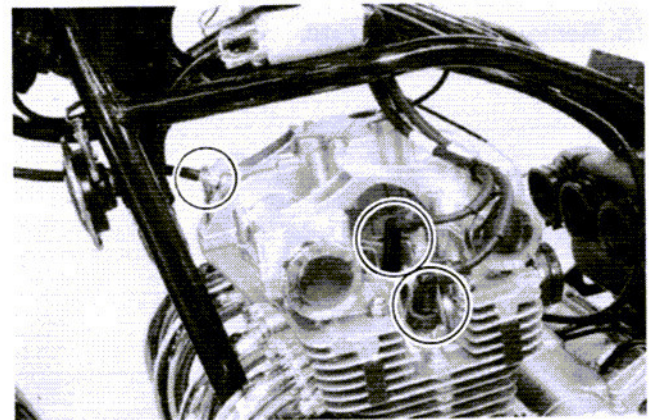
8. Loosen the respective clamps for carburetor insulator and chamber body. Shift the carburetors and chamber body to rearward.



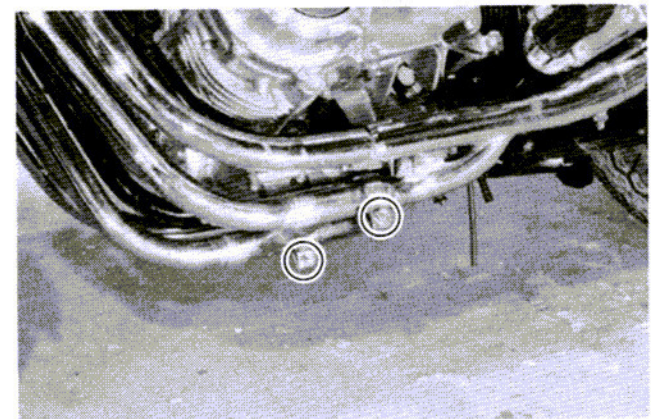
9. Remove the carburetors from right side after removing the throttle cable and starter cable from the carburetor assembly.



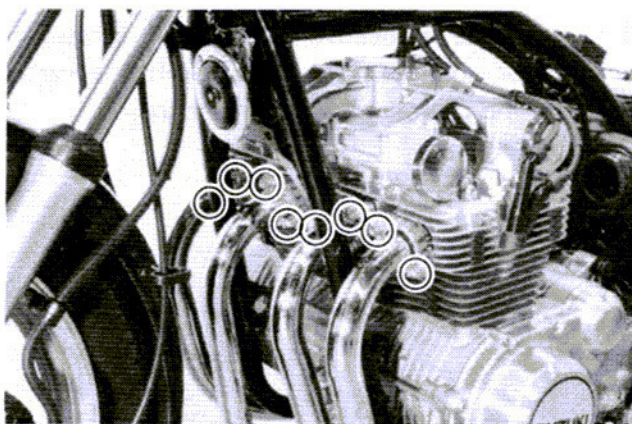
10. Pull out the spark plug caps from spark plugs.
11. Remove the tachometer cable from the cylinder head cover.



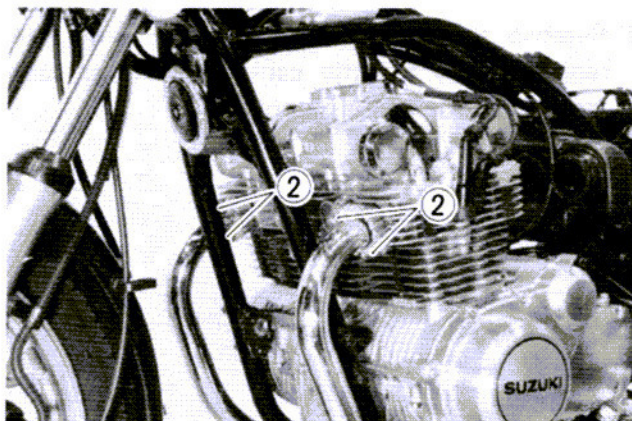
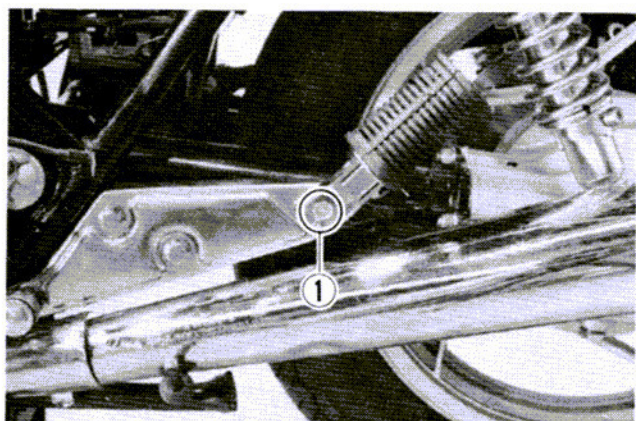
12. Remove the exhaust pipe coupler tube bolts.



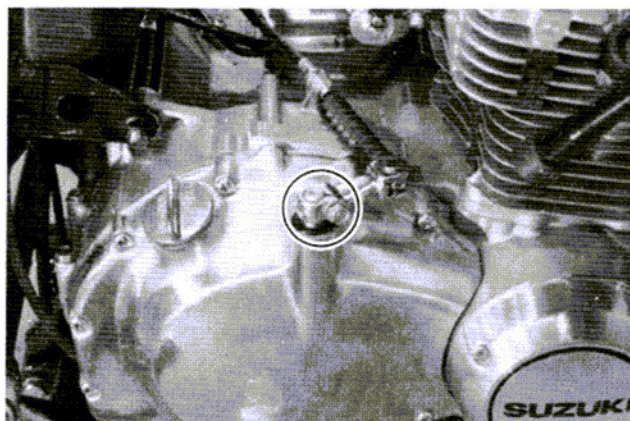
13. Remove the exhaust pipes of the Nos. 2 and 3 cylinders by unscrewing exhaust pipe clamp bolts.



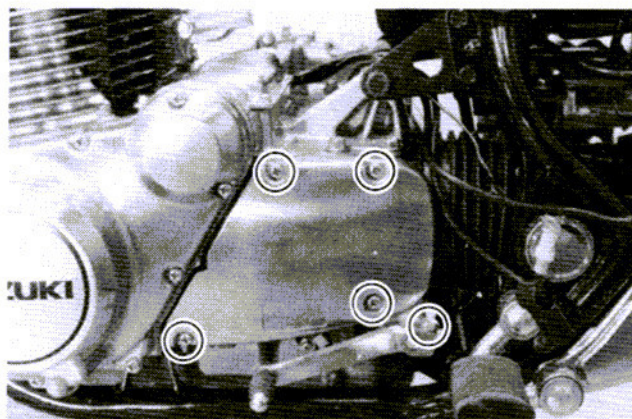
14. Remove the left and right mufflers by unscrewing muffler mounting bolts ① and exhaust pipe clamp bolts ②.



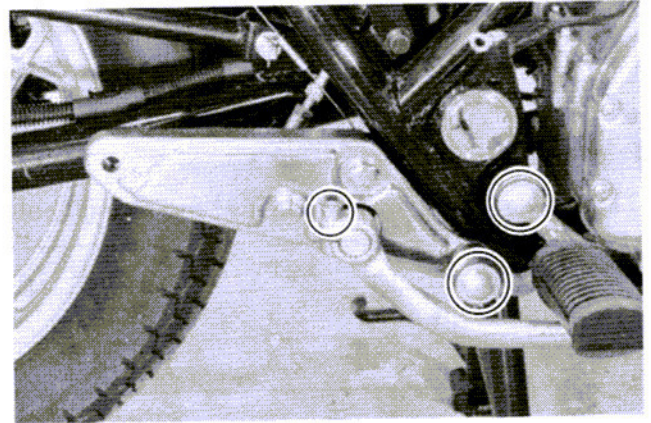
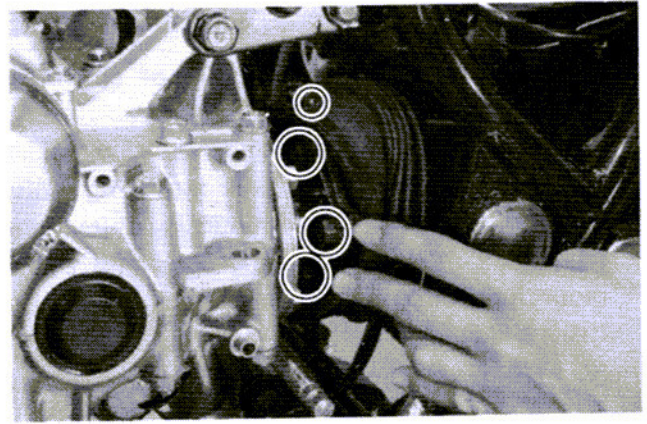
15. Remove the clutch cable.



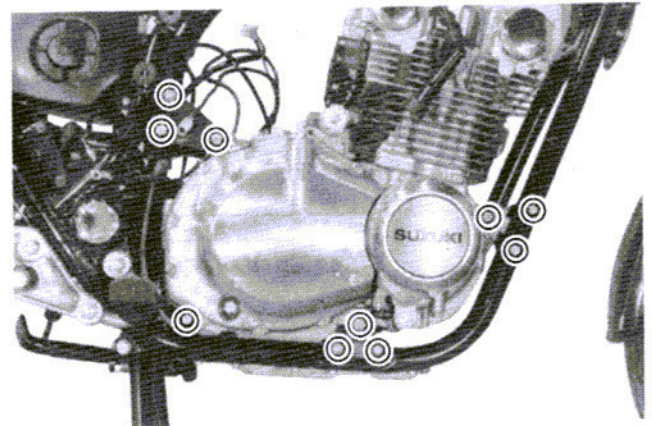
16. Remove the gearshift lever.
Remove the secondary drive gearbox cover.



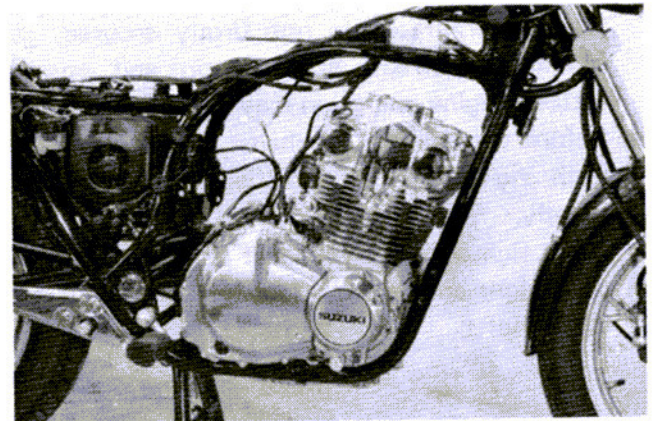
17. Loosen the clamp screw of the secondary drive shaft boot and slide the boot. Remove the four universal joint bolts while applying rear brake pedal. Remove the rear brake pedal.



18. Remove the engine mounting bolts and brackets.



19. Gradually lift up the engine and lower the engine ass'y on the right side making sure that it does not make contact with the rear bracket. Remove the engine through the right side of the frame.



ENGINE REINSTALLATION

For remounting, reverse the order of engine removal.

- Temporarily fasten the engine mounting bracket before inserting the engine mounting bolts.
- After inserting the engine mounting bolts, tighten engine mounting bracket bolts and engine mounting bolts. Insert all three long bolts from the left side.

CAUTION:

Note the lengths of bolts fitted with tear drop style nuts. Do not mix as engine crankcase damage will result.

- The nut ① takes its position in the place indicated.

Tightening torque for engine mounting bolts

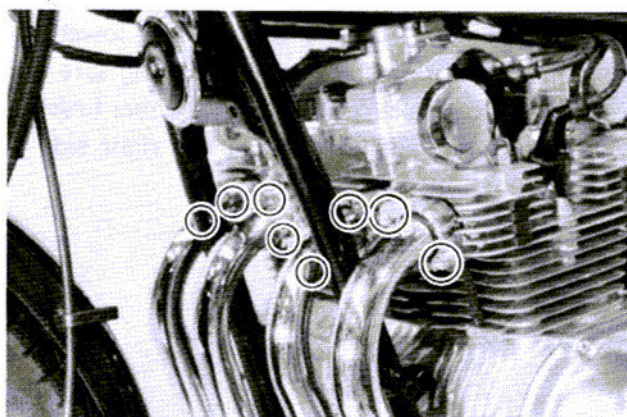
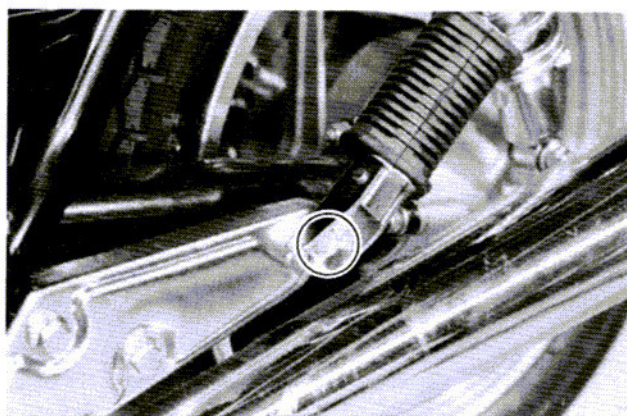
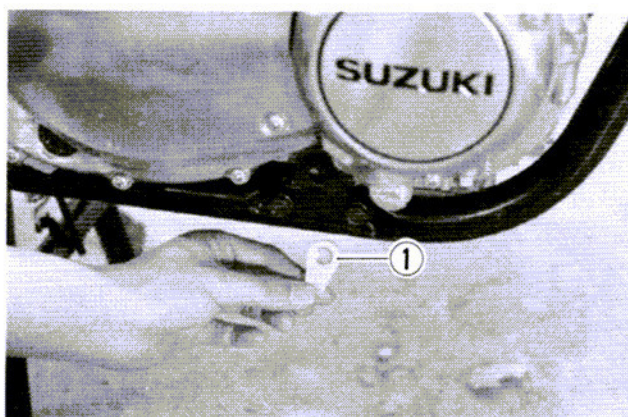
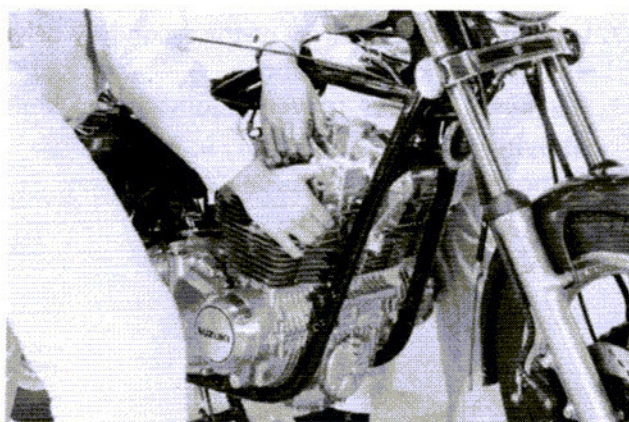
	kg-m	lb-ft
10 mm Diam.	3.5	25.5
8 mm Diam.	2.5	18.0

- Secure the universal joint flange and propeller shaft with four bolts at four places. Be sure to apply SUZUKI LOCK SUPER "1363A" to the bolts.

99104 - 32030	Thread lock super "1363A"
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Tightening torque	30 – 40 kg-m (21.5 – 29.0 lb-ft)
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- Install the propeller shaft boot with the two clamps.
- Firmly secure the carburetor with the clamps. If the carburetor is not firmly secured, gas leakage, incorrect air-fuel ratio and unsatisfactory engine operation may result.
- Before tightening the exhaust pipe bolts, install both right and left muffler mounting bolts loosely.
- After tightening the exhaust pipe bolts, tighten both right and left muffler mounting bolts and clamp bolts.

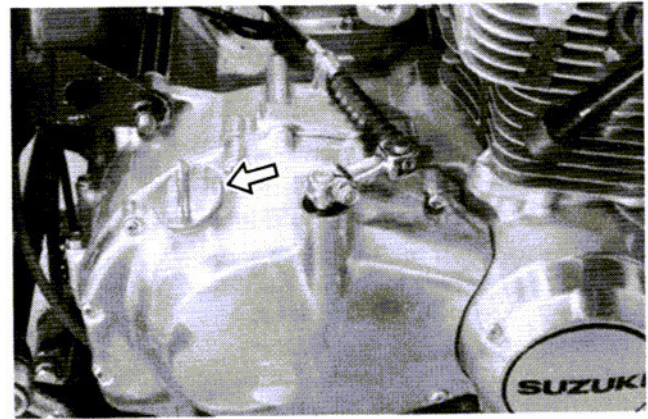


CAUTION:

Clamps are non-symmetrical. Installing them incorrectly will cross-thread the bolts.

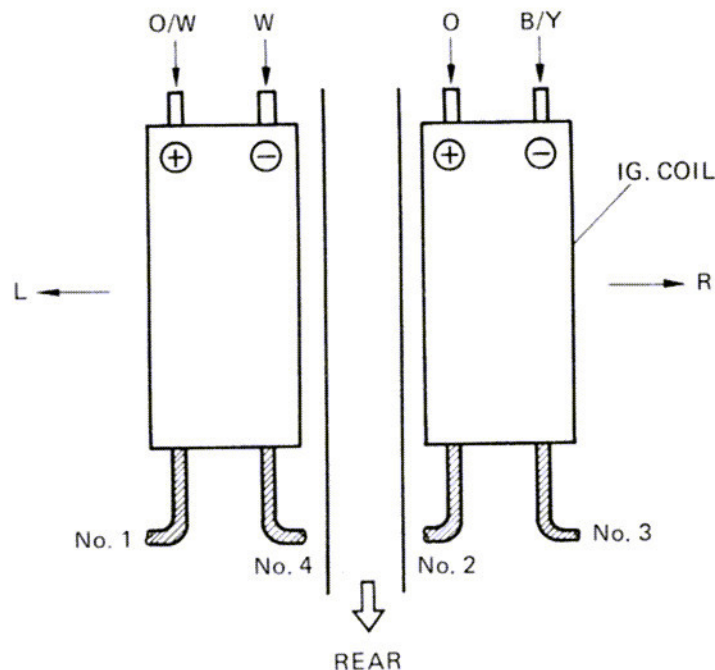
Tightening torque

	kg-m	lb-ft
Exhaust pipe bolt	1.0 – 1.6	7.0 – 11.5
Muffler mounting bolt	1.8 – 2.8	13.0 – 20.0
Coupler tube bolt	0.9 – 1.4	6.5 – 10.0



- Replace the plug caps on the spark plugs so that their code markings correspond to the cylinder numbers arranged in the order of 1, 2, 3 and 4 from the left.
- After remounting the engine, adjust the rear brake pedal, brake light switch, clutch, throttle cable and starter cable.
- Before starting the engine, make sure the amount of oil required, according to the type of work done, has been put in. Refer to page 2-11 for quantities.
- Route the lead wires and cables properly. (See 9-10 and 9-11).

HIGH TENSION CORD ROUTING



COMPRESSION CHECK

The compression of a cylinder is a good indicator of its internal condition. The decision to overhaul the cylinders 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

Standard	Limit	Difference
10 – 14 kg/cm ² (142 – 199 psi)	7 kg/cm ² (100 psi)	2 kg/cm ² (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 the grooves
- * Poor sealing of valves
- * Leaking or otherwise defective cylinder head gasket

Overhaul the engine in the following cases:

- * Compression pressure in one of the cylinders is less than 7 kg/cm² (100 psi).
- * Difference in compression pressure between the two is more than 2 kg/cm² (28 psi).
- * All compression pressure are below 10 kg/cm² (142 psi) (standard) even when they measure more than 7 kg/cm² (100 psi).

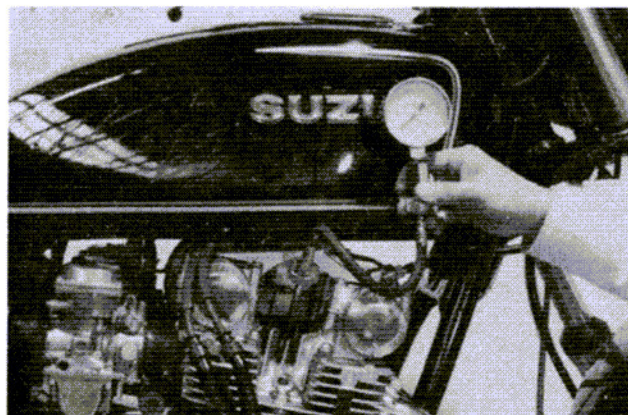
COMPRESSION TEST PROCEDURE

NOTE:

- * Before testing the compression of the engine, make sure that the cylinder head nuts and bolts are torqued to specification.
- * Warm up the engine before testing.

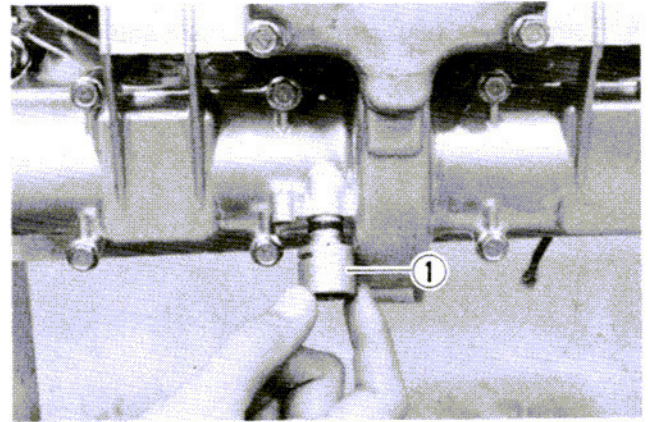
- Ground all plug leads.
- Fit the compression gauge ① in one of the plug holes, while taking care that the connection is tight.
- Twist the throttle grip full open.
- Crank the engine a few seconds with the starter, and record the maximum gauge reading as the compression of that cylinder.
- Repeat this procedure with the other cylinders.

09915 - 64510	Compression gauge
09915 - 63210	Adapter

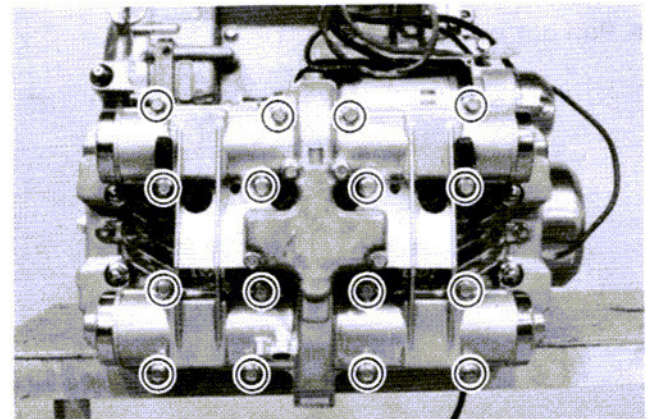


ENGINE DISASSEMBLY

- Remove tachometer drive gear ① by pulling it off after removing its stopper (secured by a cross-recessed screw).



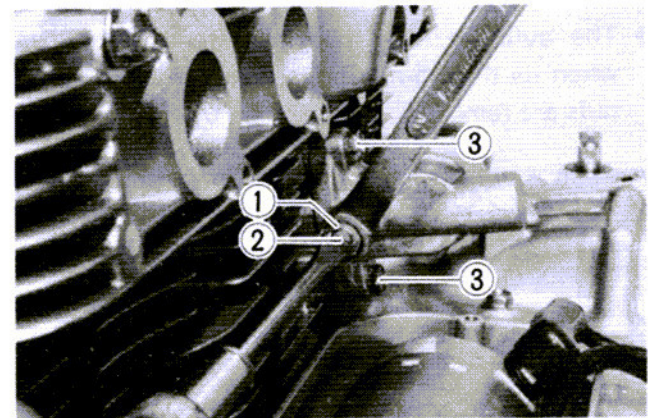
- Remove cylinder head cover and its gasket.



- Loosen the lock nut ① and tighten the stop screw ② and then remove two cam chain tensioner mounting bolts ③.

NOTE:

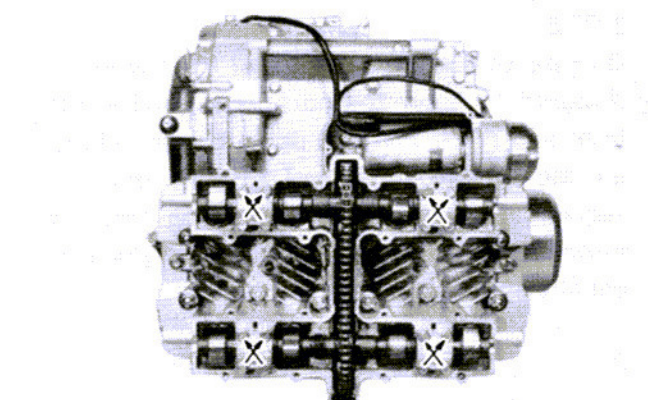
Screw ② locks the spring loaded tensioner push rod inside.



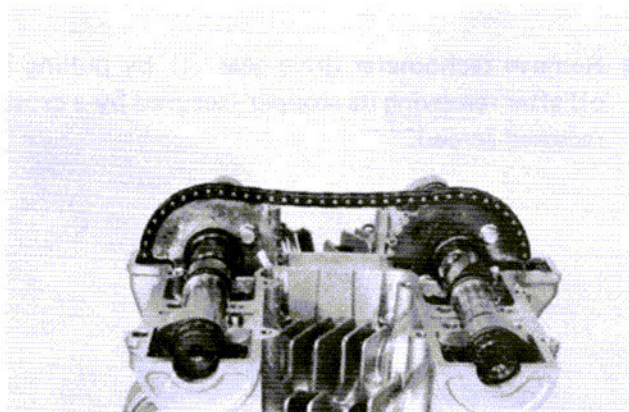
- Remove the four camshaft holders.

NOTE:

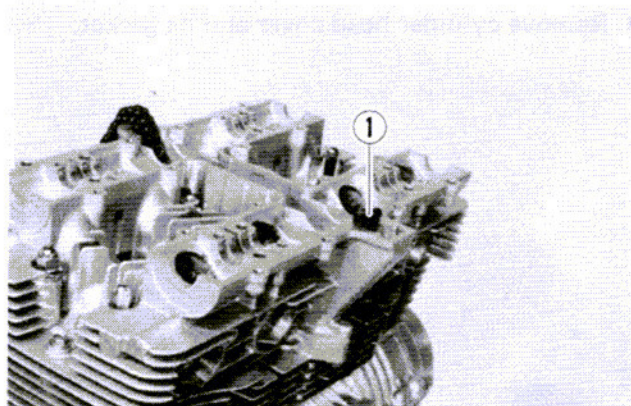
* Be sure to loosen camshaft holder bolts evenly by shifting the wrench diagonally.



- Remove the two camshafts, intake and exhaust.

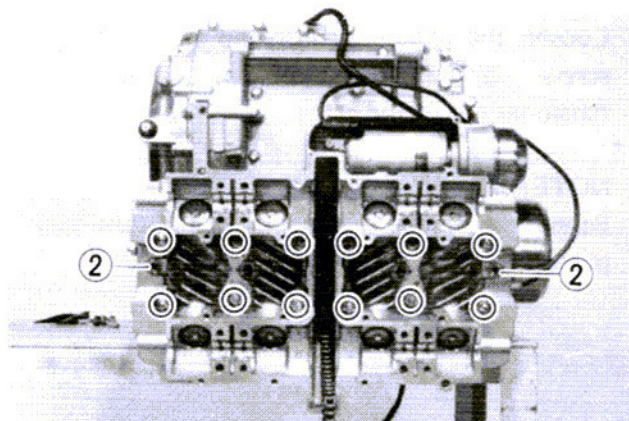


- Pull out cam chain guide ①.



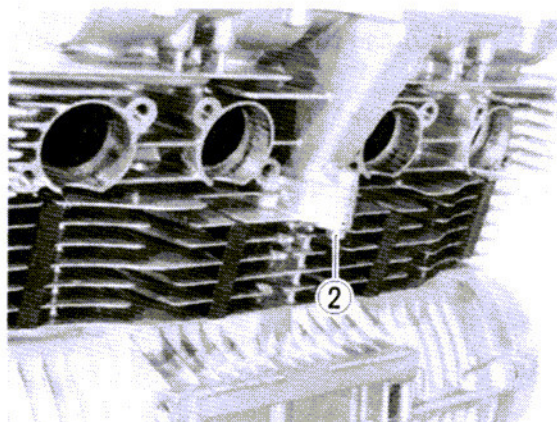
- The cylinder head becomes free for removal when its three 6-mm bolts ② and twelve 10-mm nuts are removed.

09911 - 74510	Long socket 14 mm
09914 - 24510	T handle



NOTE:

Be sure to use the special tool ("T" wrench) designed to enter the pockets formed in the head and reach the nuts down below to loosen the 10-mm nuts, and to shift the tool sequentially in the nuts descending order of numbers in order to reduce the pressure equally and evenly.



- Firmly grip the cylinder block at both ends, and lift it straight up. If the block does not come off, use the special tool.

09912 - 34210

Cylinder disassembling tool

- Place a cloth beneath the piston so as not to drop the parts in the crankcase, and remove the circlip with pliers.

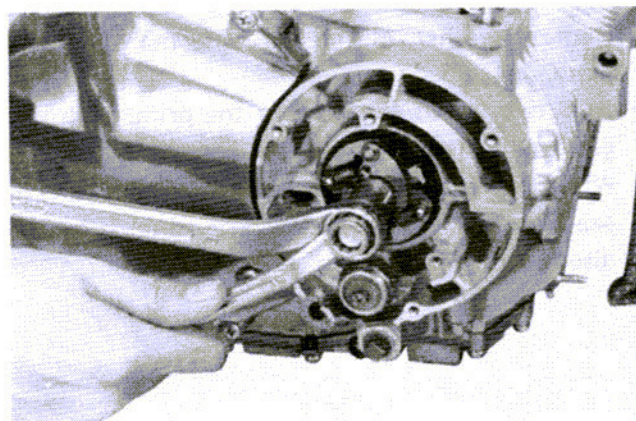
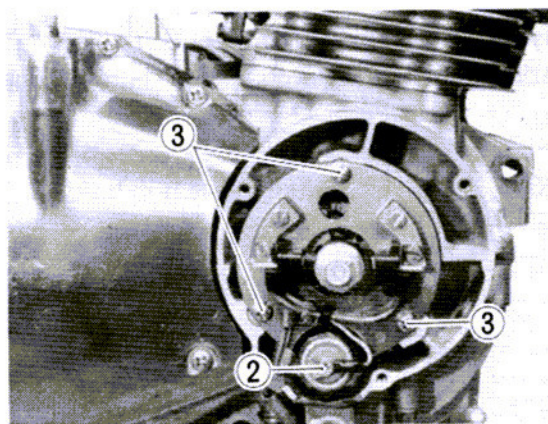
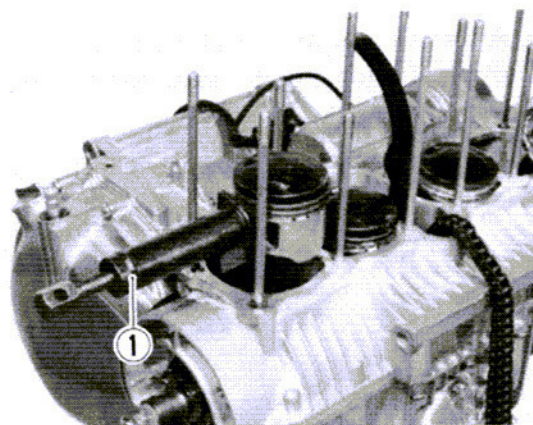
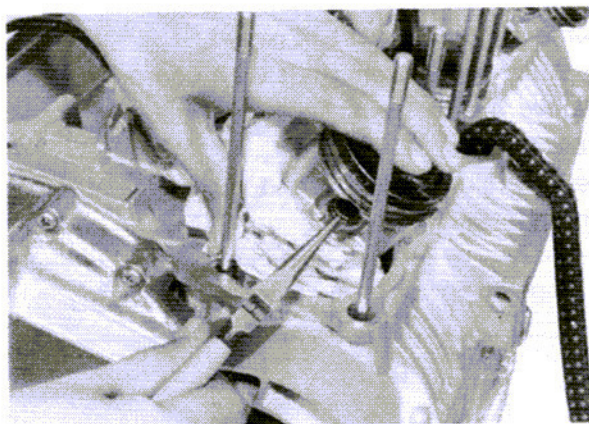
- Scribe the cylinder No. on the head of the piston, and draw out the piston pin with the special tool ①. Place the drawn-out piston pin in the same place as that given the cylinder No. on the head of the piston.

09910 - 34510

Piston pin puller

- Remove signal generator cover and gasket.
- Remove the oil pressure switch lead wire ②.
- Remove three mounting screws ③ for signal generator assembly, and then remove the assembly.

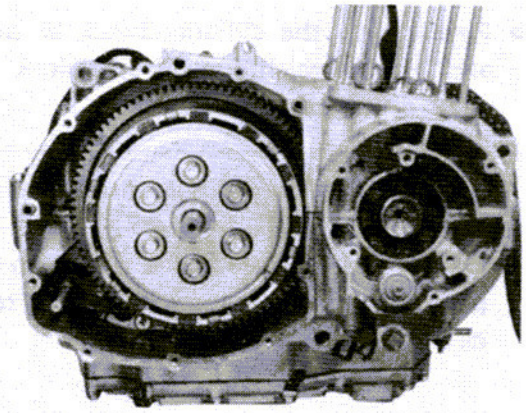
- Apply wrench to crank turning nut to remove automatic advance governor mounting bolt and the crank turning nut.
Remove signal generator rotor and advance governor.



- Remove clutch cover and gasket.
- By holding the crankshaft with conrod stopper, remove clutch spring mounting bolts in a criss cross manner.
- Remove clutch springs and pressure plate with clutch release rack.

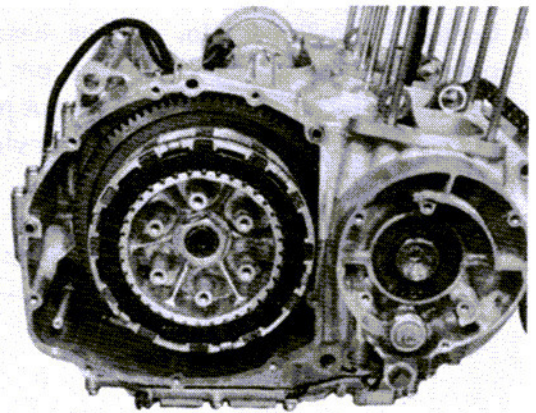
09910 - 20115

Conrod stopper



- After removal of several clutch driven and drive plates, flatten clutch sleeve hub nut lock washer by using chisel.

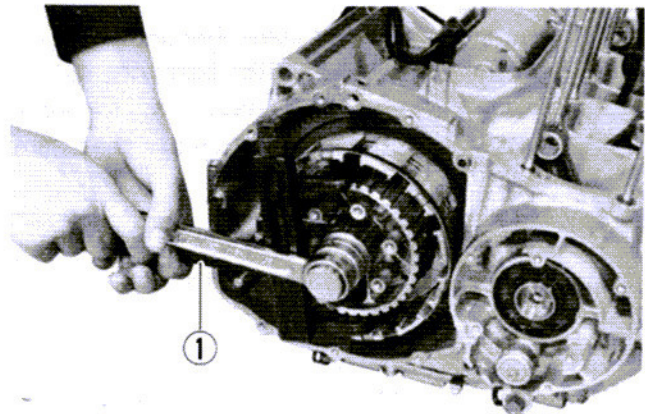
*Right hand crank seal installed
so the inner lip + spring
positioned ~~in~~ towards the
inside of the engine*



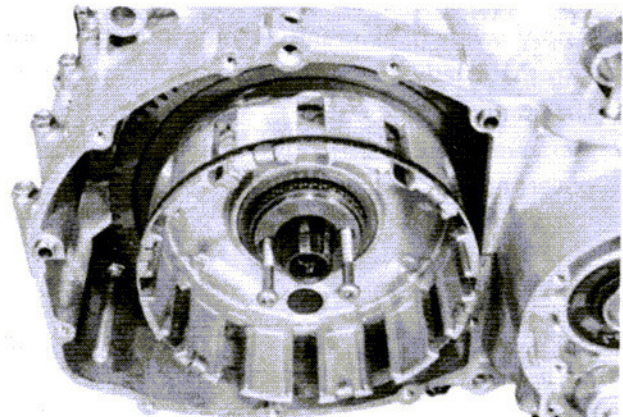
- Firmly secure clutch sleeve hub to remove mounting nut with clutch sleeve hub holder
① .

09920 - 53710

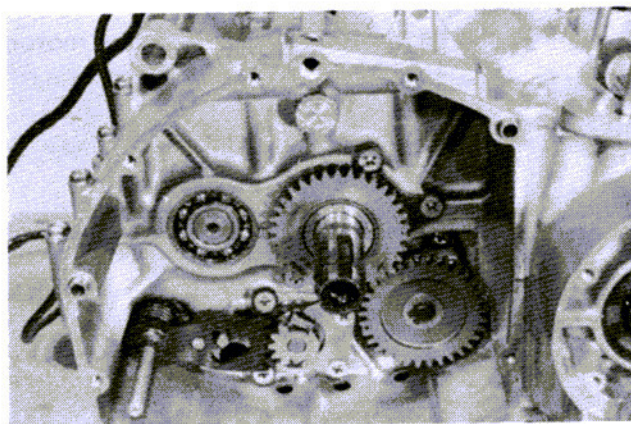
Clutch sleeve hub holder



- Remove washer, clutch hub, and the remaining plate.
- Run two 6-mm screws into the primary driven gear spacer to ease out the spacer by pulling. With the spacer removed, the primary driven gear (integral with the clutch housing) is free to disengage from the primary drive gear.



- Pull out oil pump drive gear, its spacer, bearing and thrust washer.



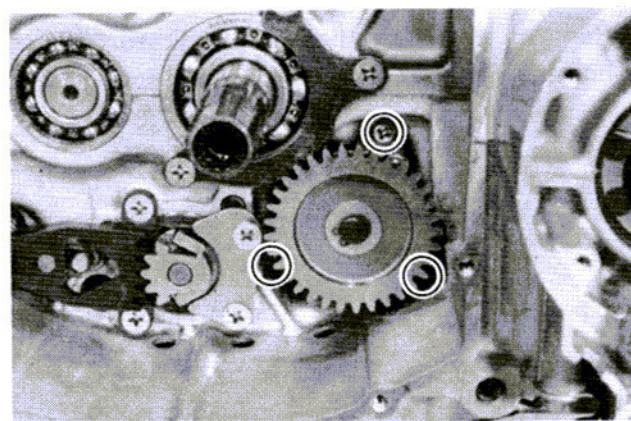
- Using circlip remover, remove oil pump driven gear, drive pin and washer. Then remove oil pump with O-ring by removing three oil pump securing screws.

NOTE:

Do not confuse the oil pump securing screws with the oil pump body screws (small size).

09900 - 06107

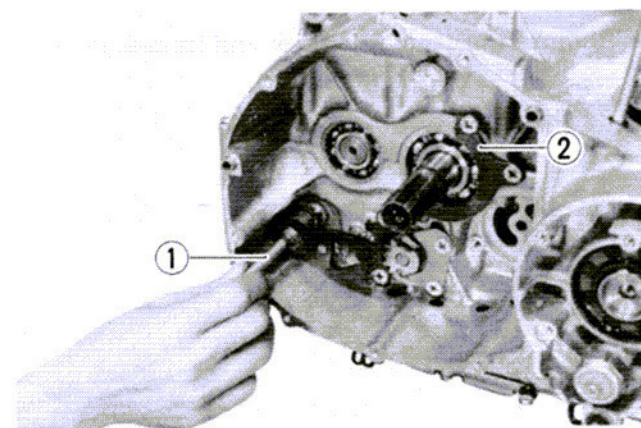
Circlip remover



- Extract gear shifting shaft ①.
- Using shock driver, extract screws for counter-shaft bearing retainer ②.

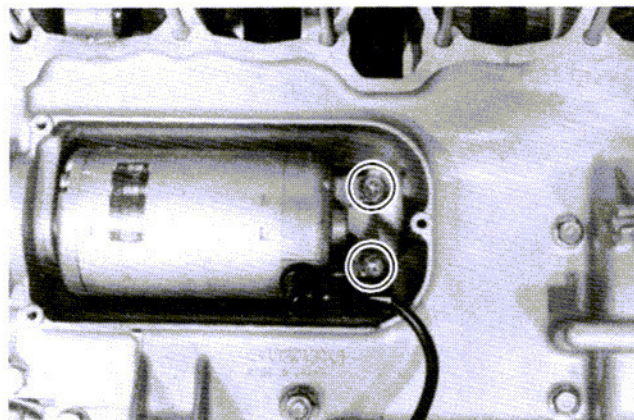
09900 - 09002

Shock driver set

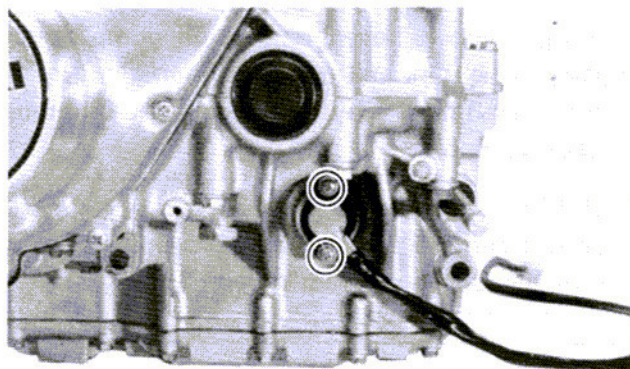


Right hand crank seal installed so the inner lip & spring positioned towards the inside of the engine

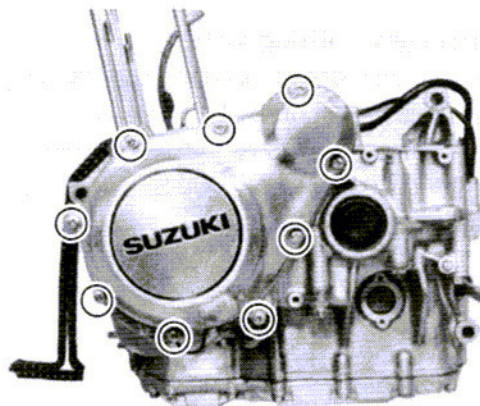
- Remove starter motor cover and starter motor.



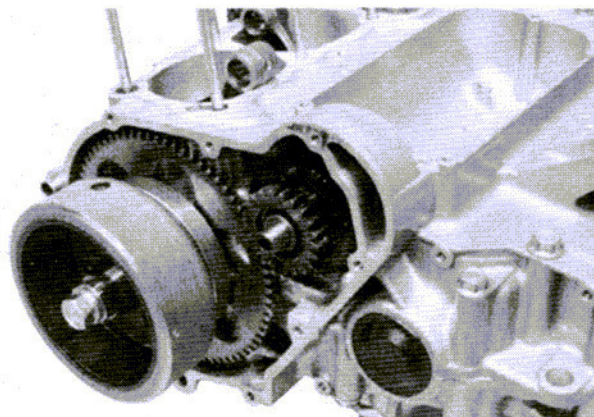
- Remove the gear position indicator switch housing. Set the O-ring, plunger and spring aside.



- Remove the generator cover and its gasket.

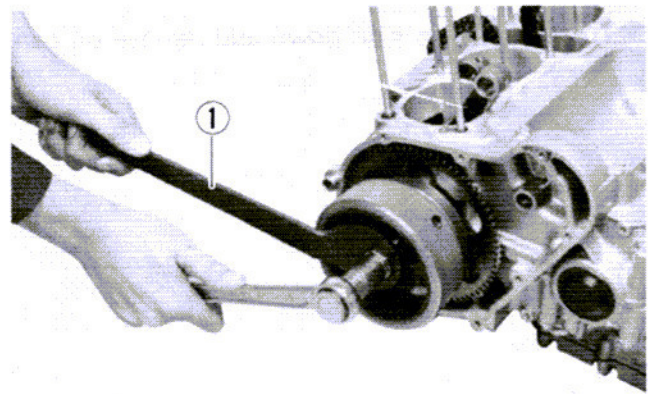


- Remove the starter idle gear shaft and idle gear.



- Using rotor holder ①, remove rotor securing bolt.

09930 - 44510	Rotor holder
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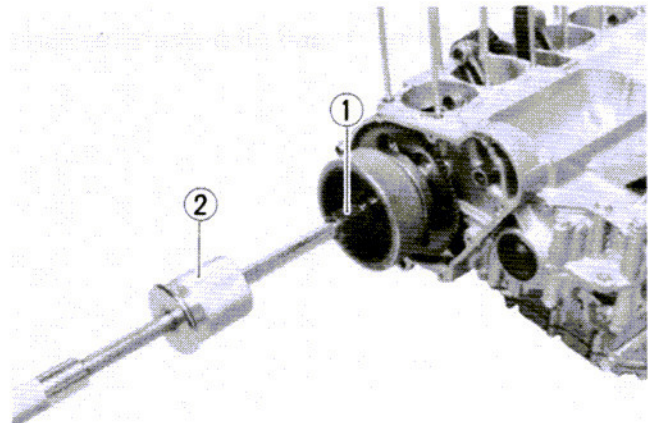


- Install rotor remover attachment ① and sliding hammer assembly ② into the boss of rotor and remove rotor with starter clutch assembly while sliding the remover.

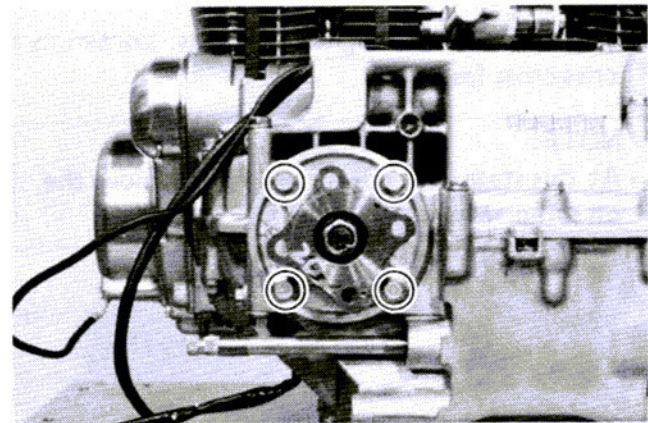
NOTE:

Do not hit the rotor with a hammer.

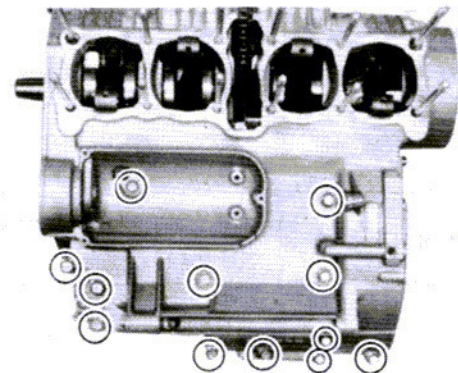
09930 - 30102	Rotor remover shaft
09930 - 33710	Attachment



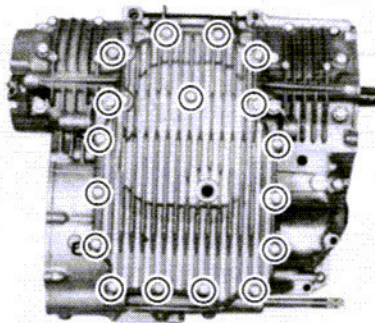
- Remove the four bolts securing the secondary driven bevel gear housing.



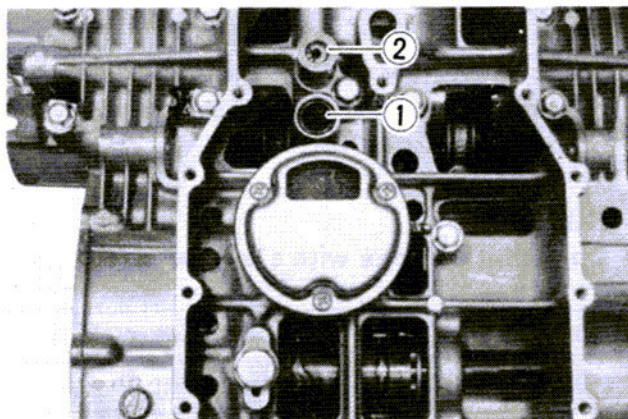
- Remove crankcase securing bolts from upper crankcase.



- Turn engine up side down and remove oil pan.



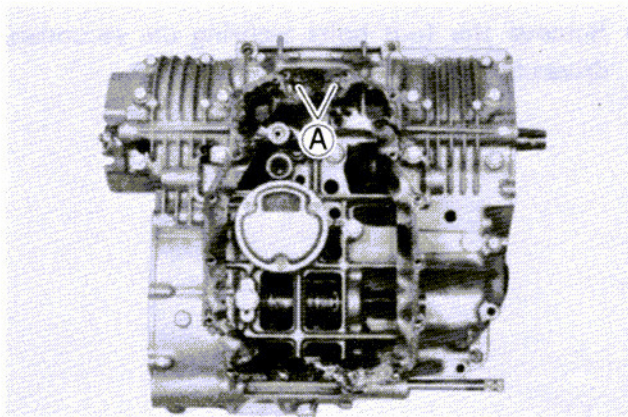
- Remove the O-ring ① and oil pressure regulator ② by pulling.



- Remove crankcase tightening bolts. Loosen in a criss-cross fashion.

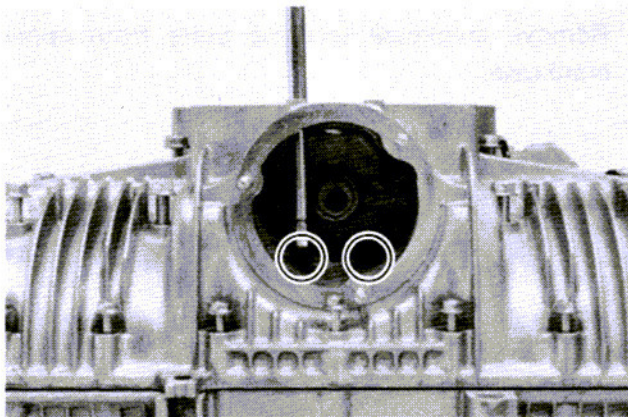
NOTE:

At this stage, it is not necessary to remove the oil sump screen.



NOTE:

Two allen bolts are used for securing crankcase at the portion ① .



09914 - 25811

"T" type hexagon wrench
(6 mm)

- Make sure that all bolts are removed without fail. Hammer lightly the lower crankcase side with a plastic hammer to separate the upper and lower crankcase halves and then lift the latter.

NOTE:

To separate the crankcases is made easier by the use of the cylinder disassembling tool.

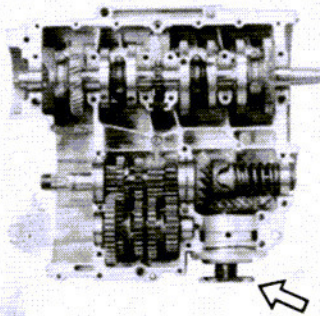
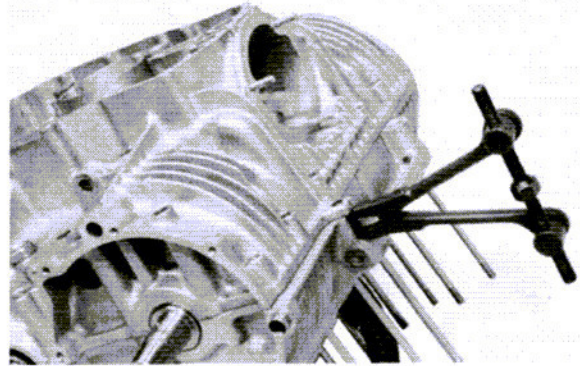
09912 - 34510

Cylinder disassembling tool

CAUTION:

Do not drop the crankshaft journal bearings from the lower crankcase.

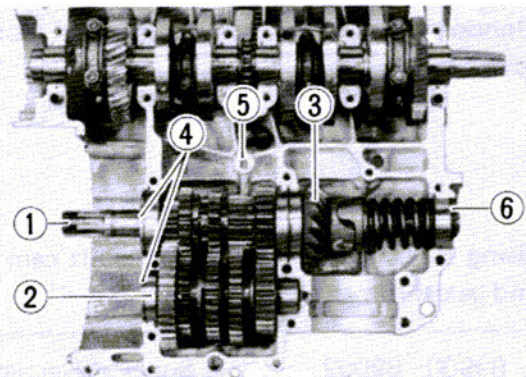
- Remove the secondary driven bevel gear assembly.



- Remove the mainshaft assembly ①, layshaft assembly ② and output shaft assembly ③.

NOTE:

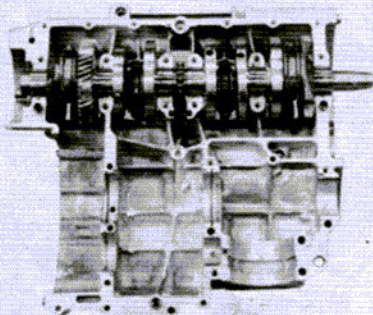
Be careful not to drop two "C"-rings ④, one O-ring and washer ⑤ and output shaft end cap ⑥.



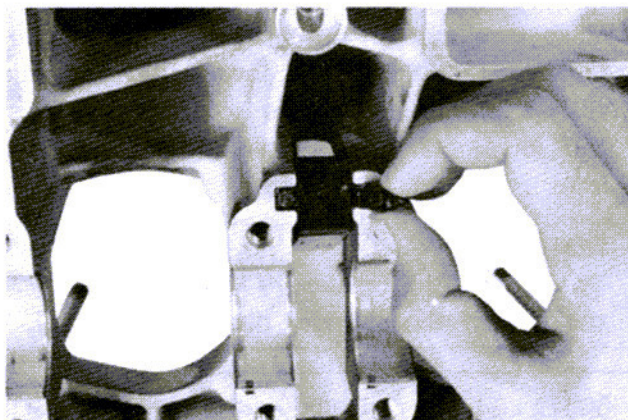
- Remove the crankshaft assembly from the upper crankcase.

CAUTION:

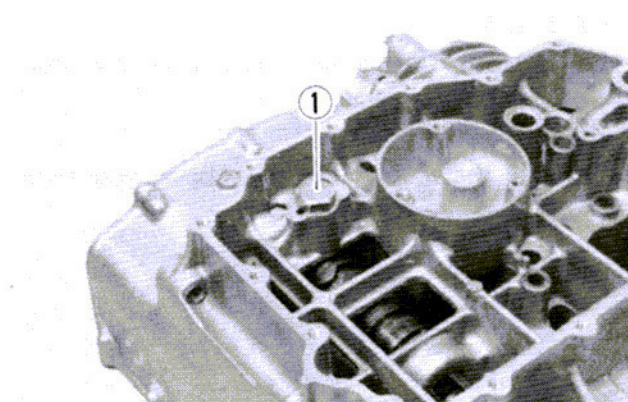
Do not drop the crankshaft journal bearings.



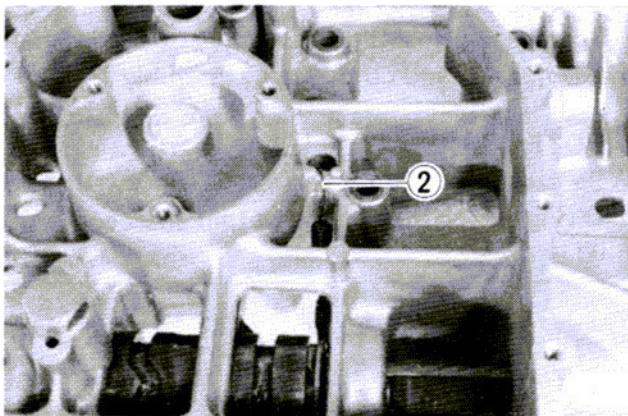
- Pull out the chain guide and two dampers.



- Remove the neutral stopper housing ①, spring and stopper.



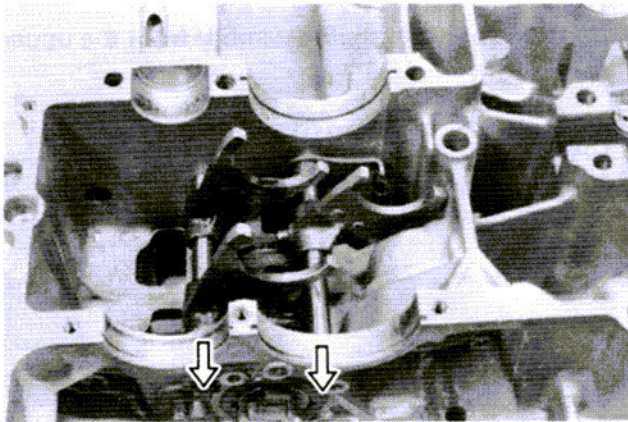
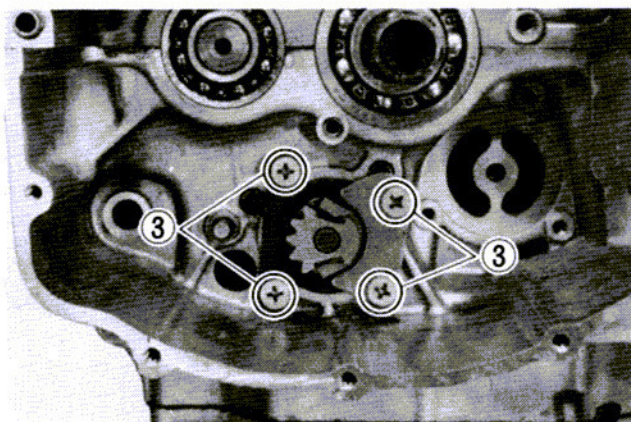
- Unhook the cam stopper spring ② from the lower crankcase.



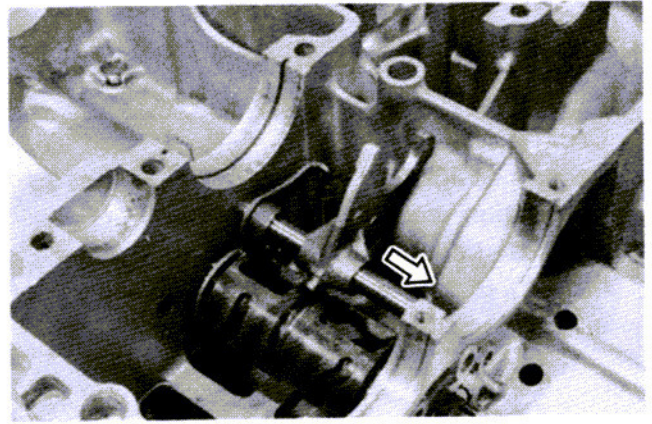
- Using shock driver, remove gearshift cam guide and gearshift pawl screws ③.

09900 - 09002

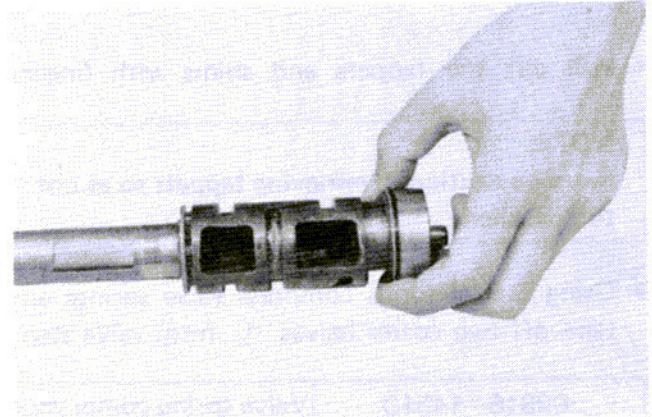
Shock driver set



- Hold gear shifting forks by hand to extract two gear shifting fork shafts from the lower crankcase.



- Extract gear shifting cam to the right side.



ENGINE COMPONENTS INSPECTION AND SERVICING

CYLINDER HEAD SERVICING

CAUTION:

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

- Pull out the tappets and shims with fingers.

NOTE:

Exercise caution in removing tappets so as not to nick them.

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

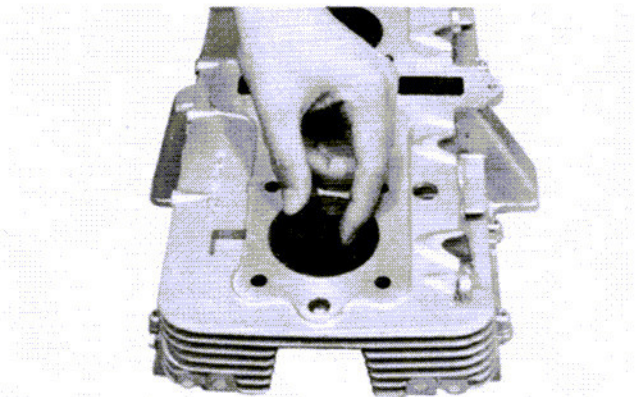
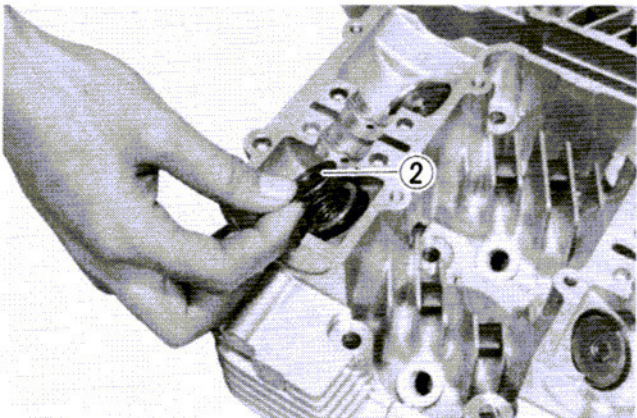
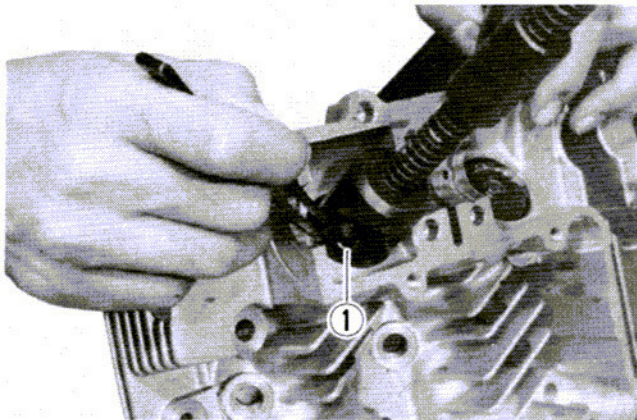
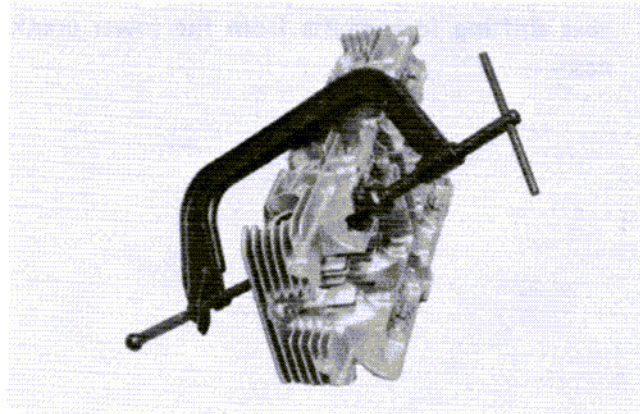
09916 - 14510	Valve spring compressor
09916 - 84510	Tweezers

- Take out the spring retainer ②, inner and outer springs.

- From the other side, pull out the valve.

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.

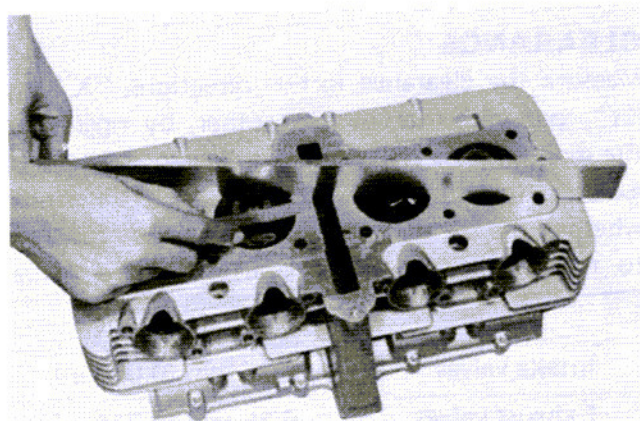
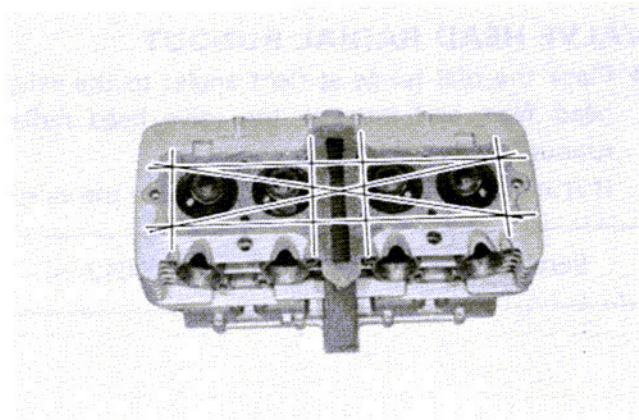


CYLINDER HEAD DISTORTION

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

09900 - 20803	Thickness gauge
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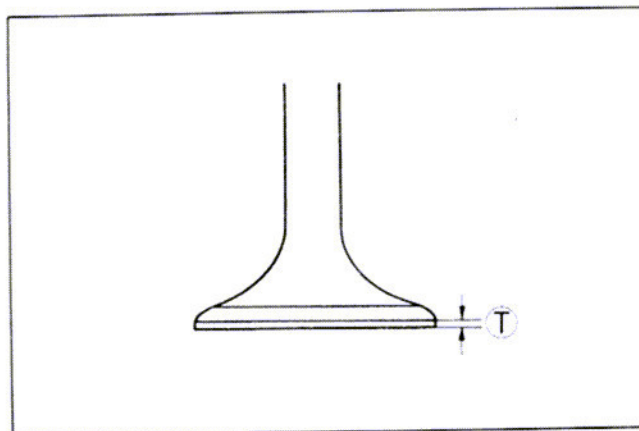
Service Limit	0.2 mm (0.008 in)
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VALVE FACE WEAR

- Visually inspect each valve for wear of its seating face. Replace any valve with an abnormally worn face.
- The thickness T 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.

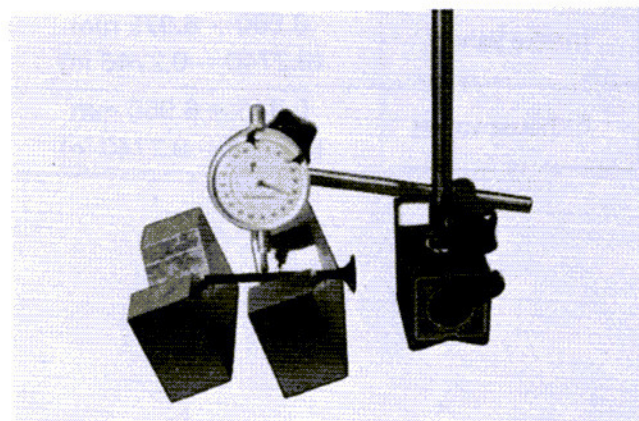
Service Limit T	0.5 mm (0.02 in)
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VALVE STEM RUNOUT

- 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)
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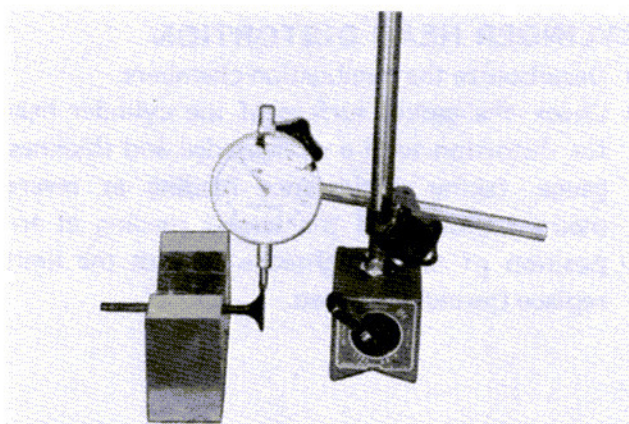


VALVE HEAD RADIAL RUNOUT

- 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.

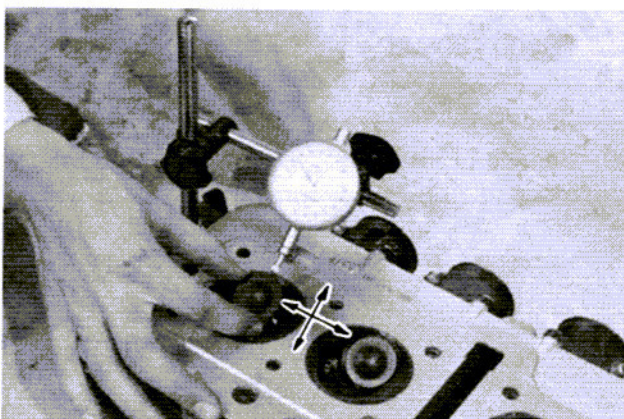
Service Limit	0.03 mm (0.0012 in)
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VALVE GUIDE-VALVE STEM CLEARANCE

Measure the clearance in two directions, "X" and "Y", perpendicular to each other, by rigging up the dial gauge as shown. If the clearance measured exceeds the limit, (see below) then determine whether the valve or the guide should be replaced to reduce the clearance to the standard range:

Valve	Service Limit
Intake valves	0.35 mm (0.014 in)
Exhaust valves	0.35 mm (0.014 in)

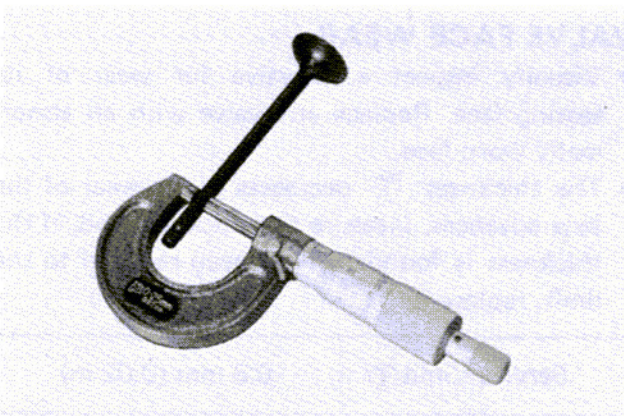


VALVE STEM WEAR

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 recheck the clearance.

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

Valve	Standard
Intake valves	6.960 – 6.975 mm (0.2740 – 0.2746 in)
Exhaust valves	6.945 – 6.960 mm (0.2734 – 0.2740 in)



VALVE GUIDE SERVICING

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

09916 - 44511	Valve guide remover
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NOTE:

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

- Re-finish the valve guide holes in cylinder head with a 12.2 mm reamer and handle.

09916 - 34530	12.2 mm reamer
09916 - 34540	Reamer handle

- Fit a ring to each valve guide. Be sure to use new rings and valve guides. Reuse of rings and valve guides removed during disassembly is prohibited. Remember that the guide and oil seal for intake valve differs in shape from those of the exhaust valve in production, however, the replacements of oil seal are identical in shape.

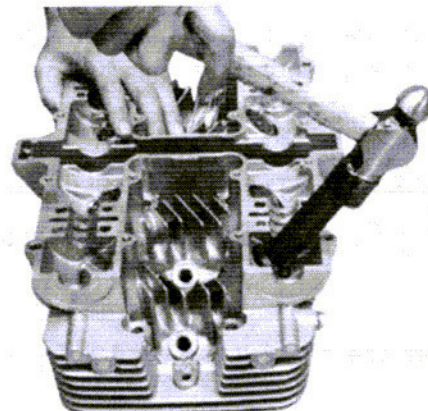
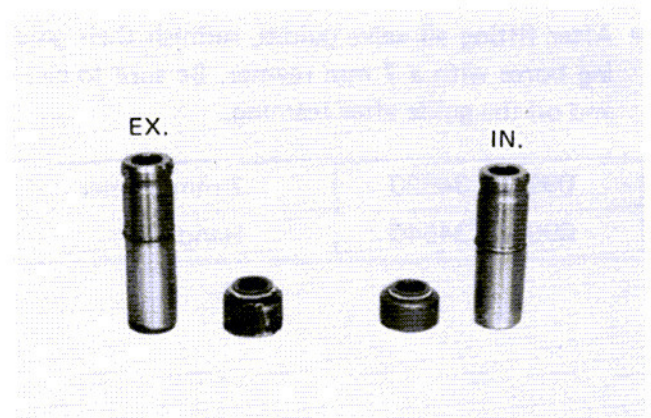
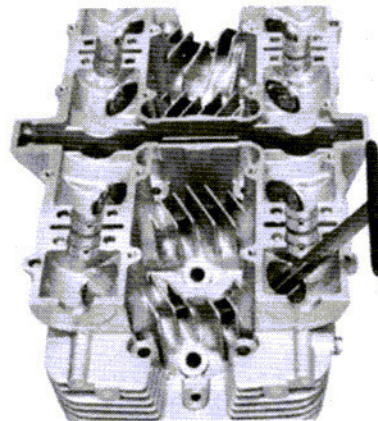
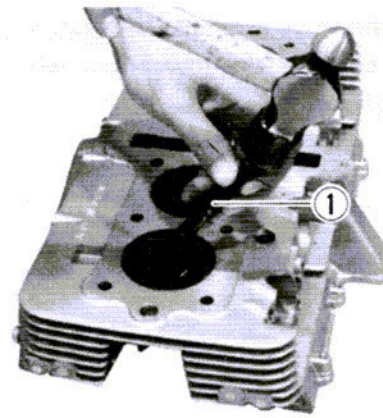
11115 - 34270	Intake valve guide
11116 - 47740	Exhaust valve guide
09289 - 07002	Valve guide oil seal

- Oil the stem hole, too, of each valve guide and drive the guide into the guide hole with the valve guide installer handle and attachment.

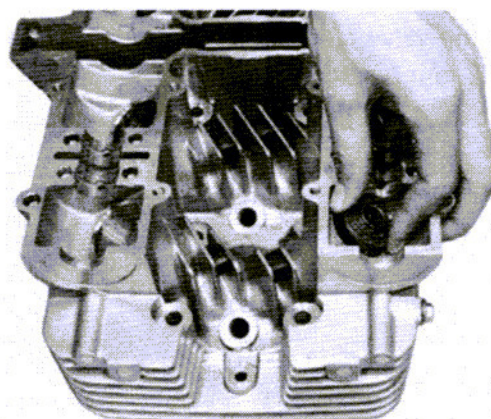
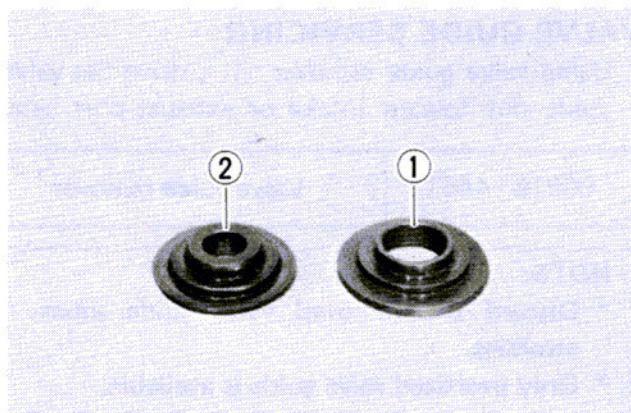
09916 - 57320	Valve guide installer handle
09916 - 54530	Valve guide installer attachment

CAUTION:

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

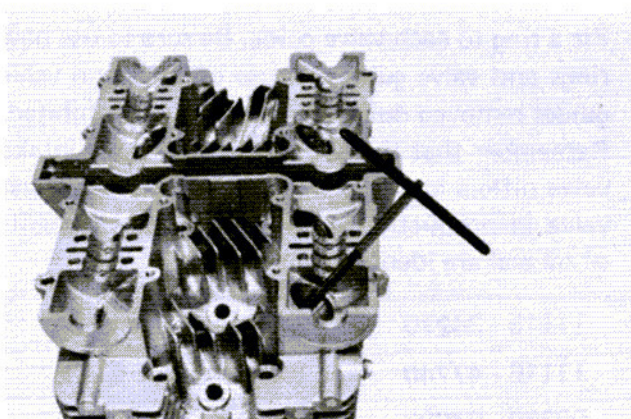


- Install the valve spring lower seat ① . Be careful not to confuse the lower seat with the spring retainer ② .



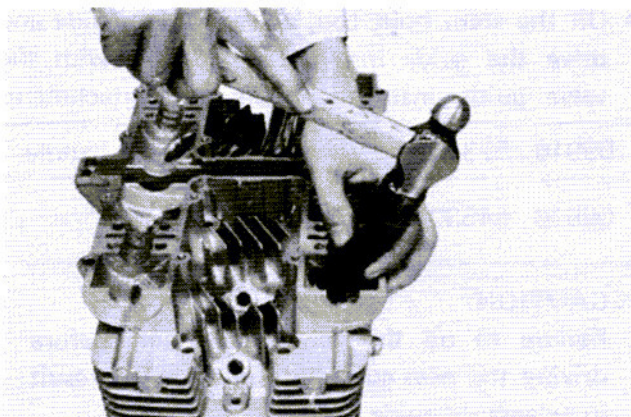
- After fitting all valve guides, refinish their guiding bores with a 7 mm reamer. Be sure to clean and oil the guide after reaming.

09916 - 34520	7 mm reamer
09916 - 34540	Handle



- Oil each oil seal, and drive them into position with the valve guide installer handle and attachment.

09916 - 57320	Valve guide installer handle
09911 - 94710	Oil seal installer attachment



NOTE:

Do not use the oil seals removed once: Use new seals.

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—and, in addition to this requirement, the width of the dye ring, which is the visualized seat “width”, must be within the following specification:

Valve seat width

Seat width	Standard
Ⓜ	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

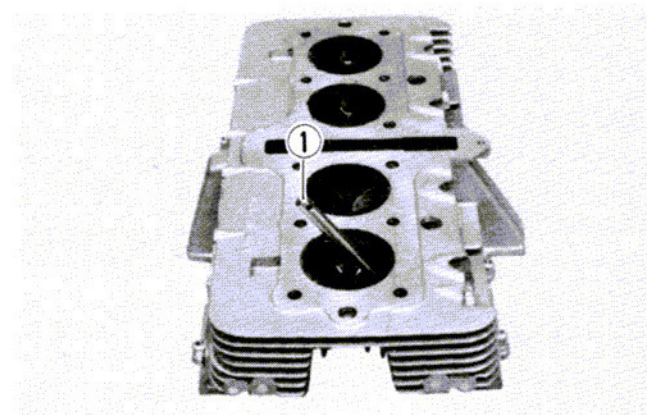
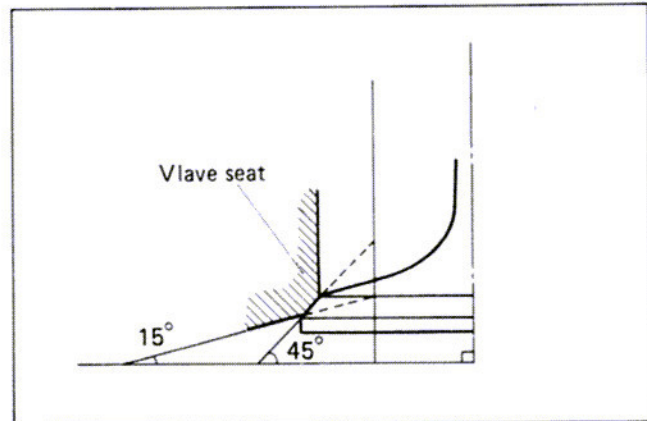
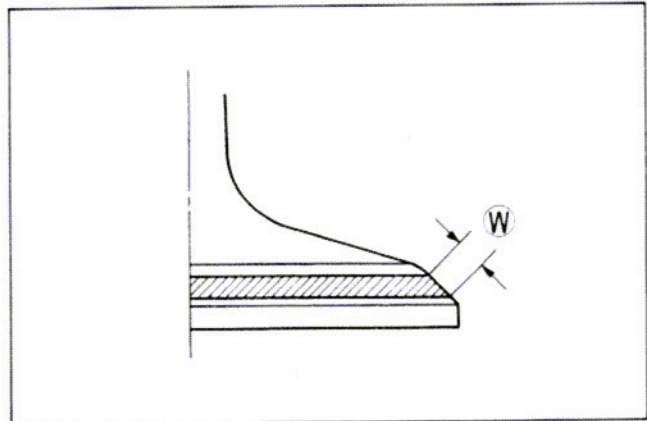
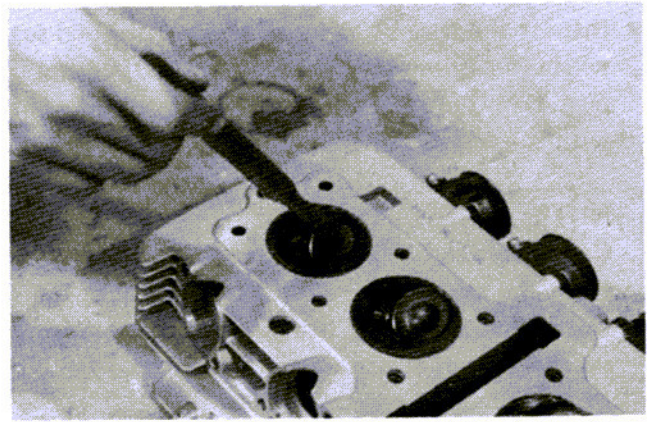
The valve seats for both the intake and exhaust valves are machined to two different angles. The seat contact surface is cut 45° and the area above the contact service (closest to the combustion chamber) is cut to 15°.

99103 - 45014 - 001	Valve seat cutter head (45°)
99103 - 45011 - 001	Valve seat cutter head (15° x 75°)

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 previously described seat width measurement procedure. If the seat is pitted or burned, additional seat conditioning with the 45° cutter is required.

NOTE:

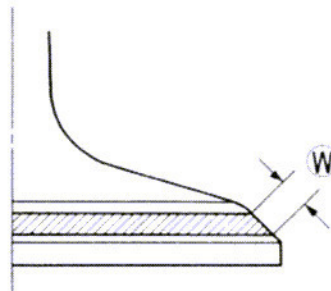
Cut only the minimum amount necessary from the seat to prevent the possibility of the valve stem becoming too close to the cam for correct tappet clearance adjustment.

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.

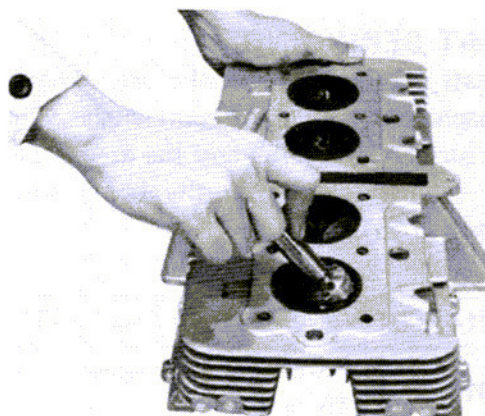
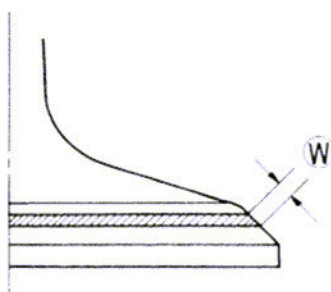
If the contact area is too low or too narrow, use the 45° cutter to raise and widen the contact area.

- 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.

Contact area too high and too wide on face of valve



Contact area too low and too narrow on face of valve



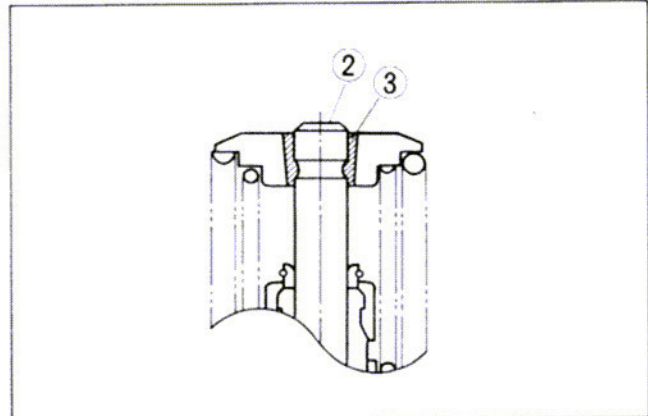
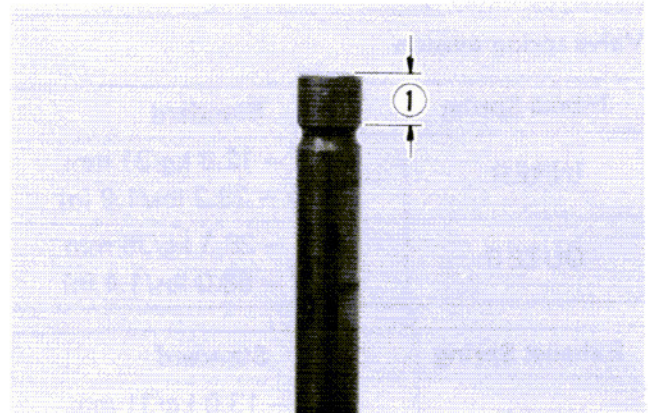
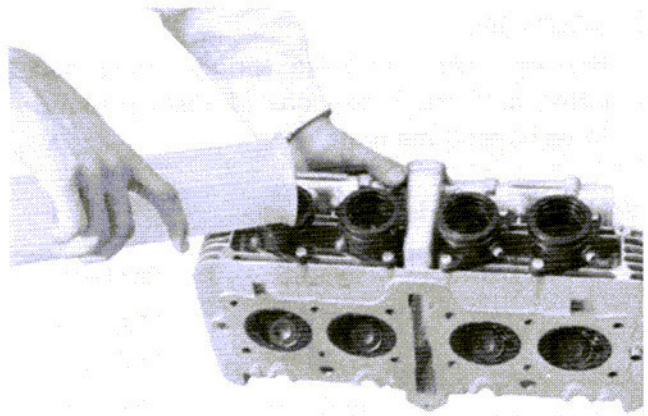
- Clean and assemble the head and valve components. Fill the intake and exhaust ports with gasoline to check for leaks. If any leaks occur, inspect the valve seat and face for burrs or other things that could prevent the valve from sealing.

NOTE:

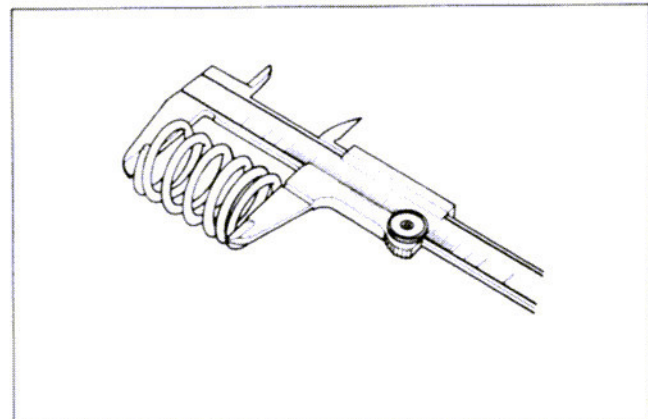
- * Always use extreme caution when handling gasoline.
- * After servicing the valve seats, be sure to adjust the tappet clearance after the cylinder head has been reinstalled. (see page 2-5)

CAUTION:

- * Refacing valve stem end face is permissible where the length ① will not be reduced to less than 3.6 mm. If this length becomes shorter than 3.6 mm (0.14 in), then the valve must be replaced.
- * After installing the valve whose stem end has been ground off as above, check that the face ② of valve stem end is above the valve cotter ③.

**VALVE SPRINGS**

- 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 measured force does not fall within the range specified, replace with a SUZUKI spring.



CAUTION:

Replace both the valve springs, inner and outer, as a set, if any one of these is found to be beyond the limit.

Valve spring free length

Service Limit	INNER	OUTER
INTAKE	35.6 mm (1.40 in)	41.6 mm (1.64 in)
EXHAUST	35.0 mm (1.38 in)	40.5 mm (1.59 in)

Valve spring tension

Intake Spring	Standard
INNER	10.6 – 12.8 kg/31 mm (23.4 – 28.2 lbs/1.2 in)
OUTER	22.3 – 26.3 kg/35 mm (49.2 – 58.0 lbs/1.4 in)

Exhaust Spring	Standard
INNER	11.0 – 13.0 kg/31 mm (24.25 – 28.66 lbs/1.2 in)
OUTER	22.1 – 25.9 kg/35 mm (48.72 – 57.10 lbs/1.4 in)

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.

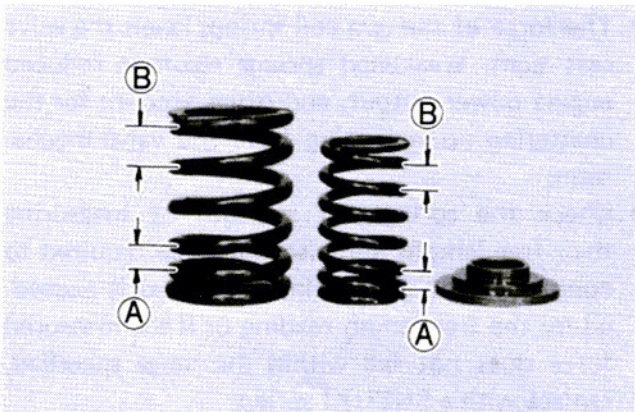
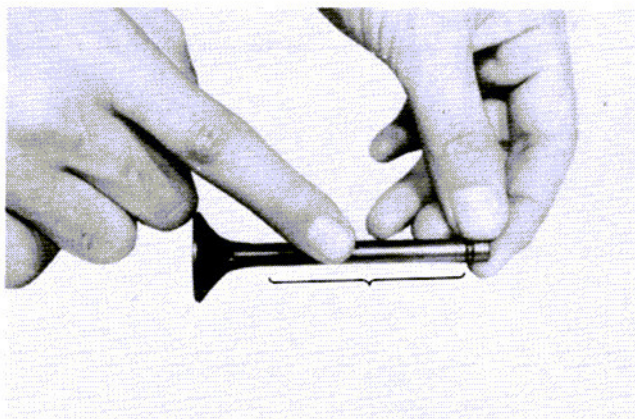
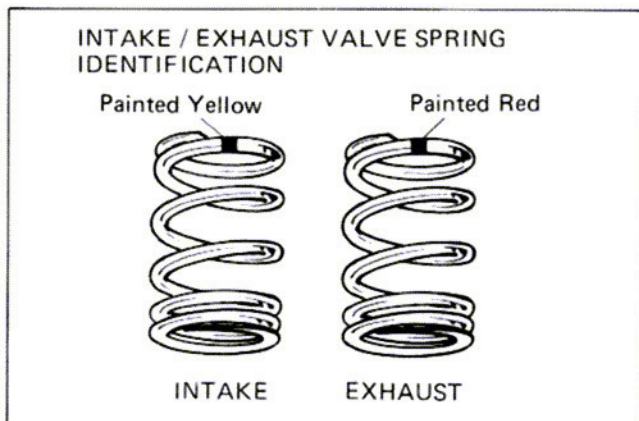
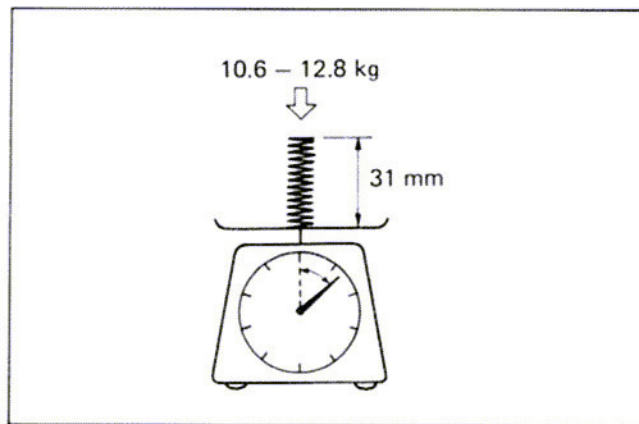
99000 - 25140

SUZUKI Moly Paste

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

CAUTION:

Do not mix-up intake valve springs with exhaust valve springs.



- Put on the valve retainer and, using the valve lifter, press down the springs, fit the cotter halves to the stem end, and release the lifter to allow the cotter ① to wedge in between retainer and stem. Be sure that the rounded lip ② of the cotter fits snugly into the groove ③ in the stem end.

09916 - 14510	Valve spring compressor
09916 - 84510	Tweezers

CAUTION:

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

CAMSHAFT

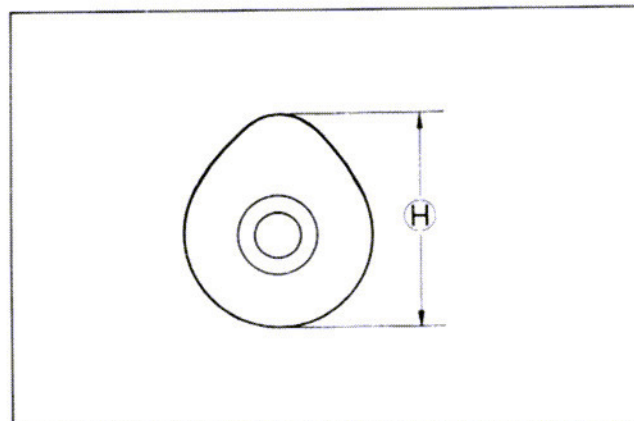
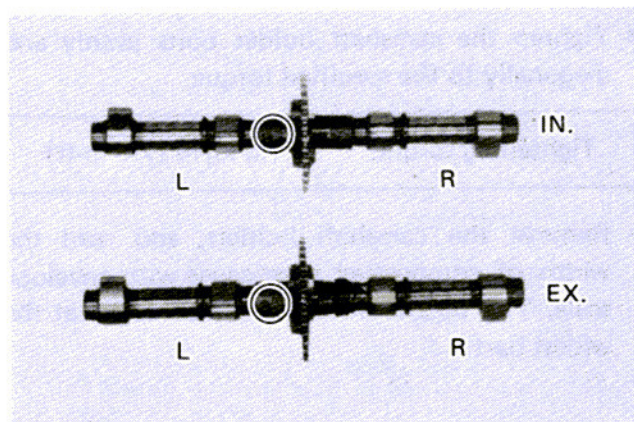
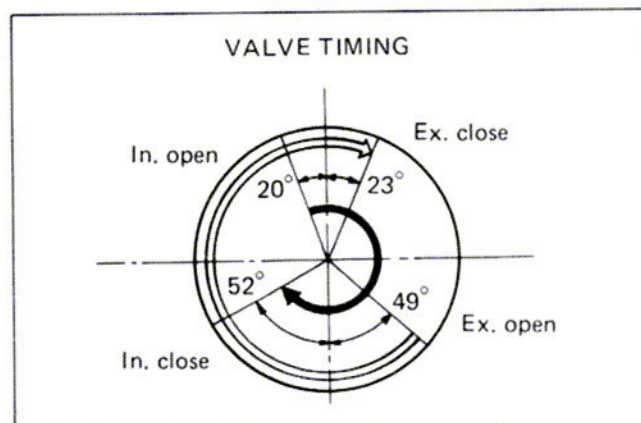
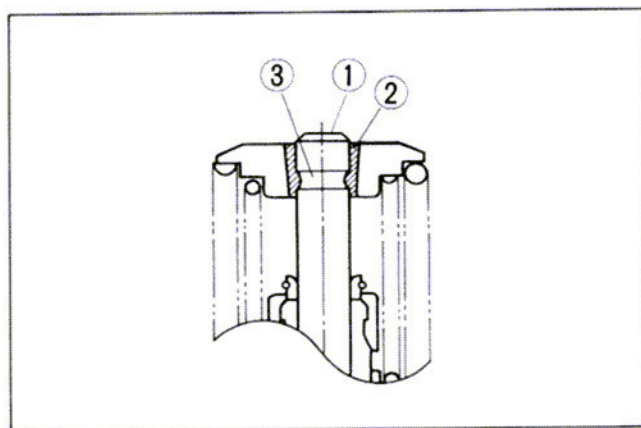
- Both camshafts should be checked for runout and also for wear of cams and journals if the engine has been noted as giving abnormal noise or vibration or lack power output. Any of these conditions may be caused by camshafts worn down or distorted to the service limit.
- The exhaust camshaft can be distinguished from that of the intake by the embossed letters "EX" (for exhaust) as against letters "IN" (for intake). Similarly, the right end can be distinguished by the notch from the left end.

CAM WEAR

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

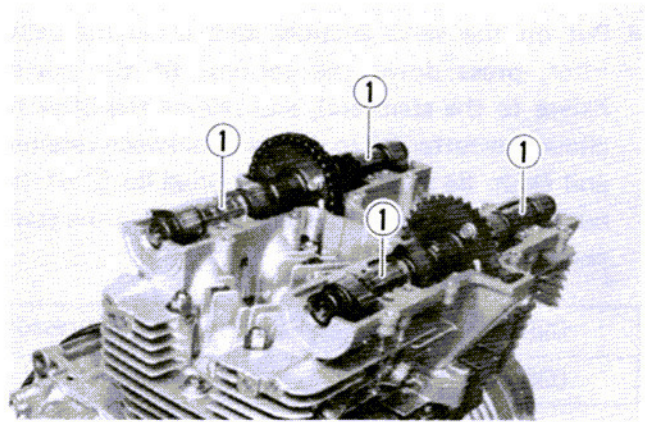
Cam height

Height H	Service Limit
Intake cams	35.190 mm (1.3854 in)
Exhaust cams	34.990 mm (1.3776 in)



CAMSHAFT JOURNAL WEAR

- Determine whether or not each journal is worn down to the limit by measuring the running clearance with the camshaft installed in place. Use plastigauge ① to read the clearance at the widest portion, which is specified as follows:

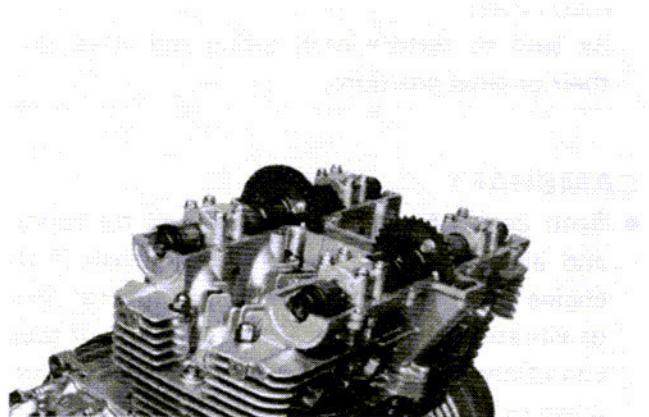


Camshaft—Journal clearance (IN & EX)

Service Limit	0.15 mm (0.006 in)
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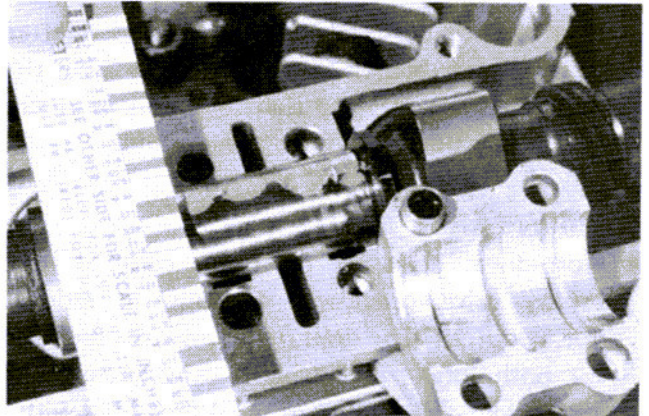
NOTE:

Install each holder to their original positions.



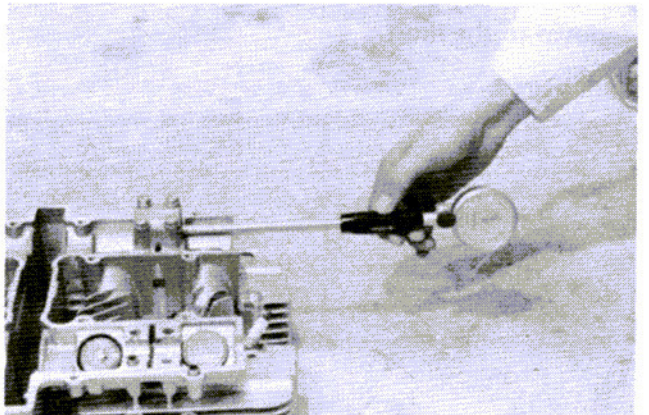
- Tighten the camshaft holder bolts evenly and diagonally to the specified torque.

Tightening torque	1.0 kg-m (7.0 lb-ft)
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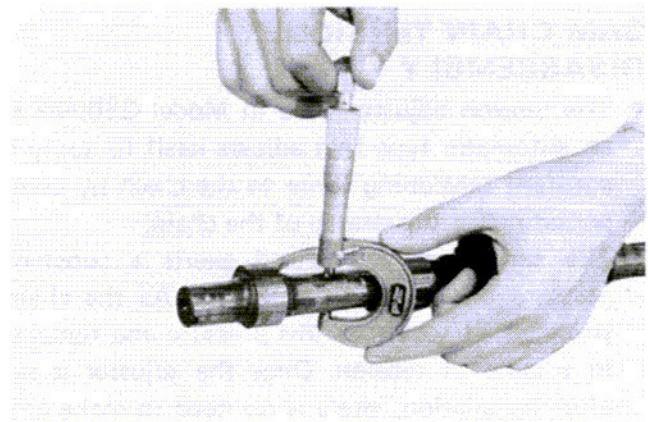
- Remove the camshaft holders, and read the width of compressed plastigauge with envelope scale. This measurement should be taken at the widest part.

- If the camshaft journal clearance measured exceeds the limit, measure the inside diameter of camshaft bearing holder and outside diameter of the camshaft journal, whichever the difference from specification is greater.



09900 - 20205	Micrometer (0 – 25 mm)
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	Standard
Journal holder I.D. (In & Ex)	22.012 – 22.025 mm (0.8666 – 0.8671 in)
Camshaft journal O.D. (In & Ex)	21.959 – 21.980 mm (0.8645 – 0.8654 in)

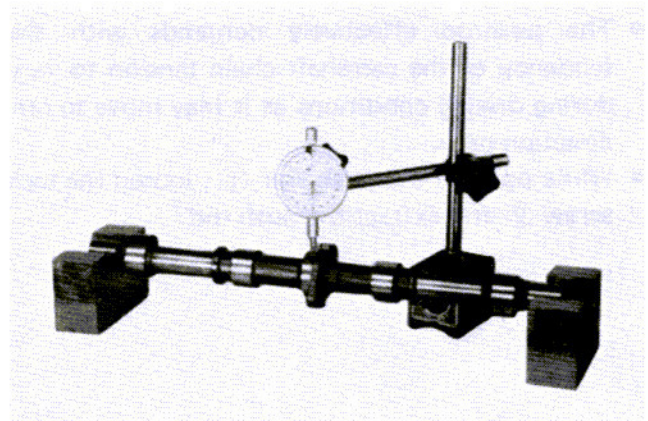


CAMSHAFT RUNOUT

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

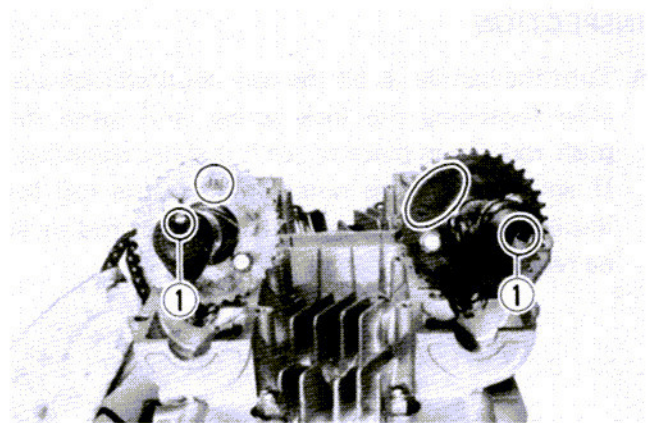
Camshaft runout (IN & EX)

Service Limit	0.1 mm (0.004 in)
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CAM SPROCKET REASSEMBLY

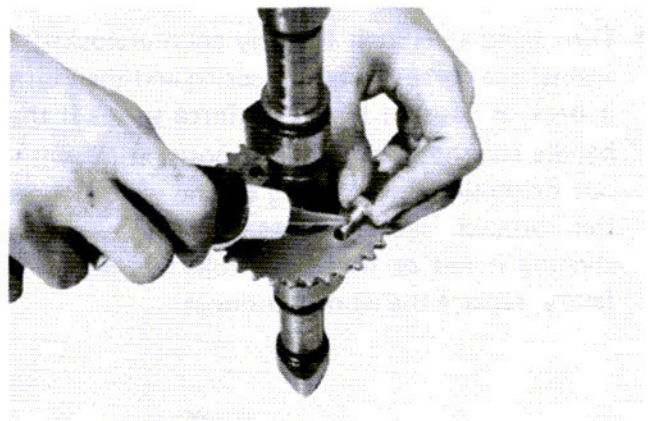
- It is very important that each sprocket be positioned angularly on its camshaft as illustrated. Its correct position is determined by arrow mark "3" (on INTAKE sprocket) or arrow marks "1" and "2" (on EXHAUST sprocket) located (as shown) in reference to the notch ① in the camshaft end.



- Apply THREAD LOCK SUPER "1363A" (99104-32030) to the threads of Allen-head bolts, and tighten them to the following torque value:

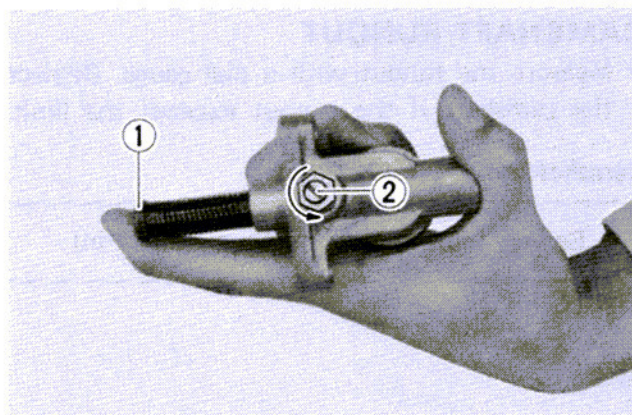
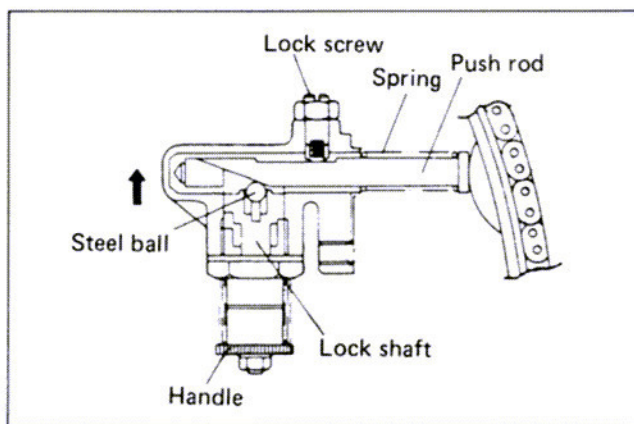
99104 - 32030	Thread lock super "1363A"
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Tightening torque	2.4 – 2.6 kg-m (17.5 – 19.0 lb-ft)
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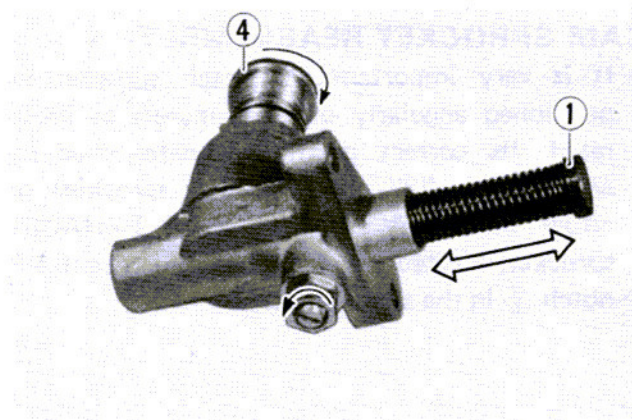
CAM CHAIN TENSIONER DISASSEMBLY

- The tension adjuster used in Model GS650G is an automatic type that adjusts itself to apply a constant tensioning force to the chain by compensating for the stretch of the chain.
- The spring-loaded pushrod exerts a constant pressure on the camshaft chain. As the chain stretches, it yields to this pressure and remains in a state of tension. Once the adjuster is set after installation, there is no need to make any further adjustment.
- The pushrod effectively contends with the tendency of the camshaft chain tension to vary during driving conditions as it may move to one direction only.
- While pushing the push rod ①, loosen the lock screw ② and extract the push rod.

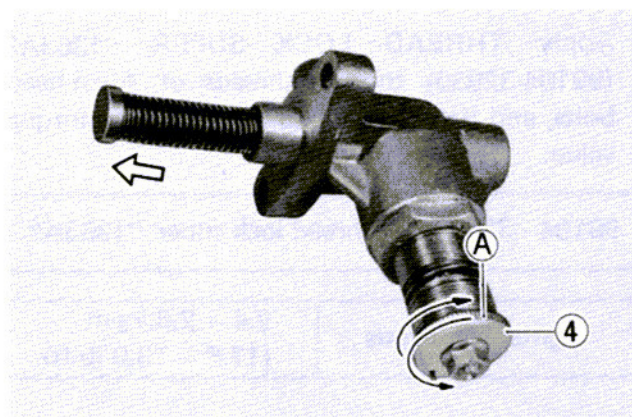


INSPECTION

- Turn the handle ④ all the way counterclockwise after loosening the lock screw, and move the push rod ① in place to see if it slides smoothly. If any stickiness is noted, remove the rod for inspection. A bent or scratched push rod must be replaced.

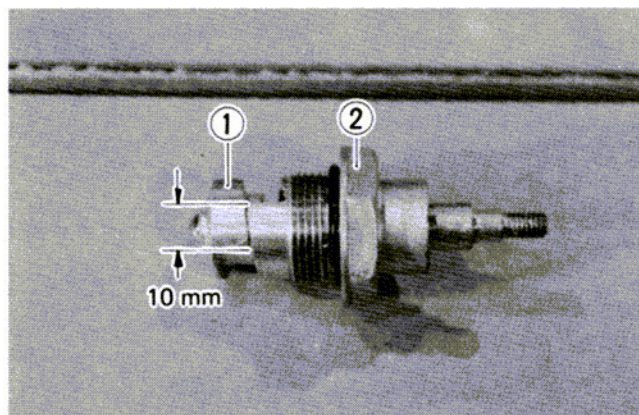


- Turn handle ④ all the way counterclockwise against the force of its coil spring and then turn it back as assisted by spring force to see if the handle returns to the original position A without exhibiting any sticking on the way. Repeat this process several times. If any excessive sticking is felt or if the self-adjusting action is faulty, replace the whole tensioner.

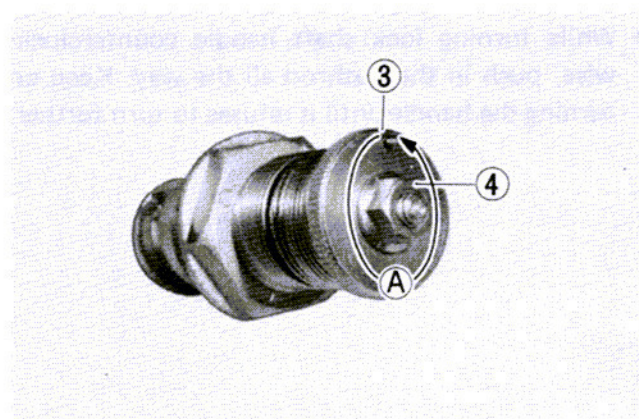
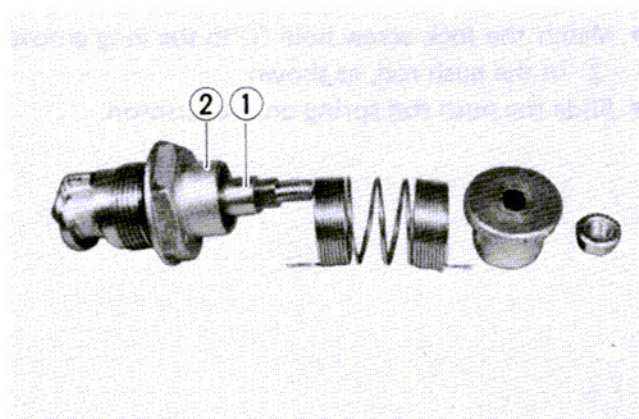


REASSEMBLING

- Apply engine oil to the lock shaft ①. Insert the shaft into the holder ②, and bring the two into the relative position indicated.



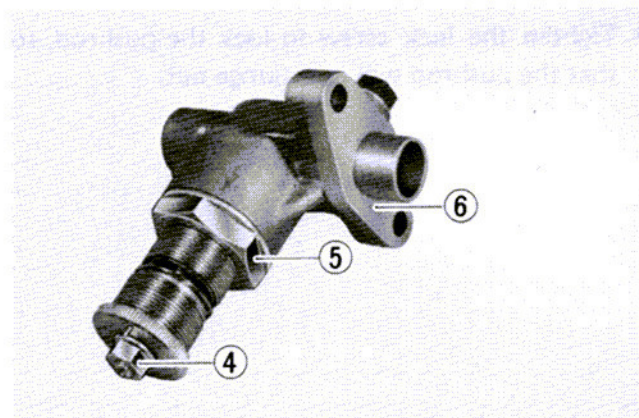
- Hook the spring onto the holder and handle ③, twist the spring by one complete rotation counterclockwise ④, fit the handle onto the shaft, and then tighten it by nut ④.



- After tightening the lock shaft nut ④, install the lock shaft assembly ⑤ on the tensioner body ⑥. Be sure to adhere to the following torque specifications:

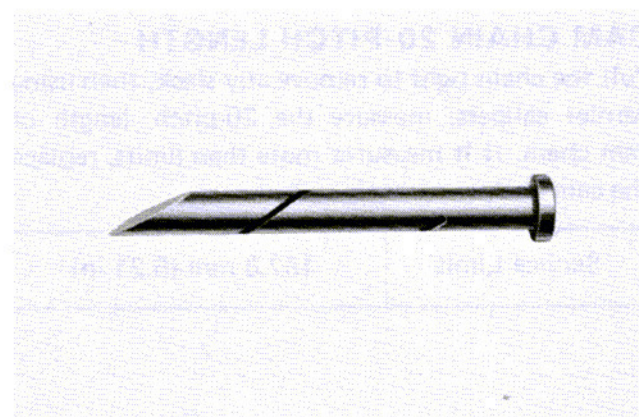
Lock shaft nut tightening torque	0.8 – 1.0 kg-m (6.0 – 7.0 lb-ft)
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Shaft assembly tightening torque	3.1 – 3.5 kg-m (22.5 – 25.5 lb-ft)
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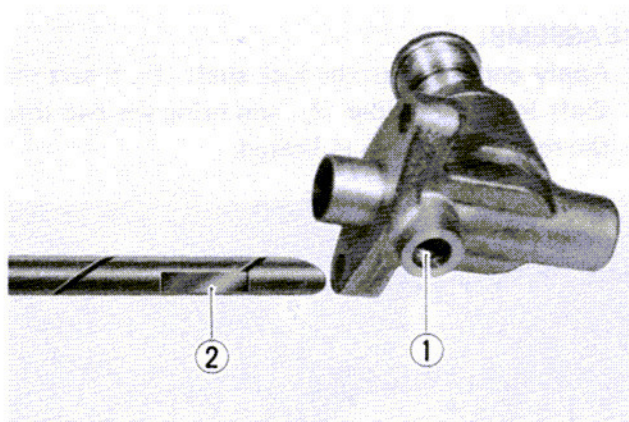


- Apply a high quality molybdenum disulfide lubricant (SUZUKI MOLY PASTE) to the push rod and engine oil to the push rod guide hole.

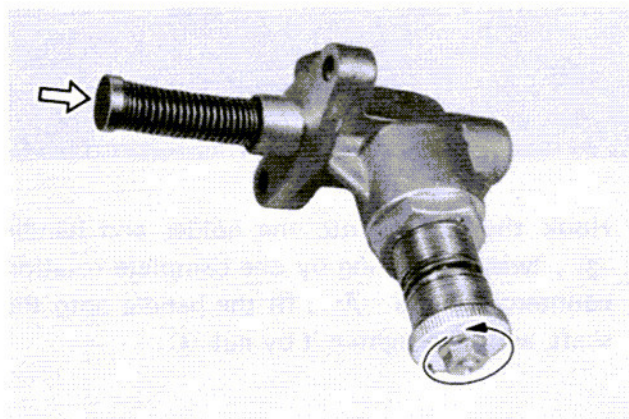
99000 - 25140	SUZUKI Moly Paste
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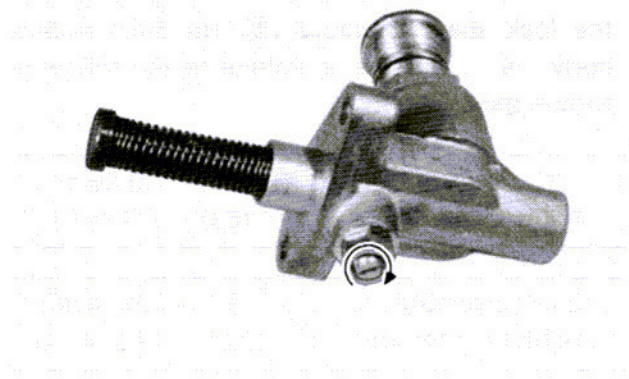
- Match the lock screw hole ① to the long groove ② in the push rod, as shown.
- Slide the push rod spring on the pushrod.



- While turning lock shaft handle counterclockwise, push in the pushrod all the way. Keep on turning the handle until it refuses to turn further.



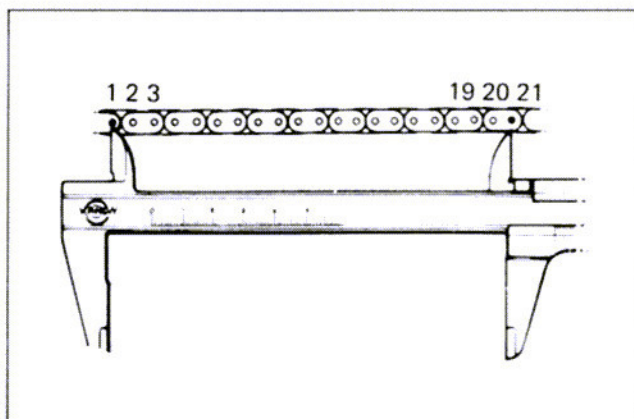
- Tighten the lock screw to lock the pushrod, so that the pushrod will not plunge out.



CAM CHAIN 20-PITCH LENGTH

Pull the chain tight to remove any slack, then using vernier calipers, measure the 20-pitch length of cam chain. If it measures more than limits, replace the cam chain.

Service Limit	157.8 mm (6.21 in)
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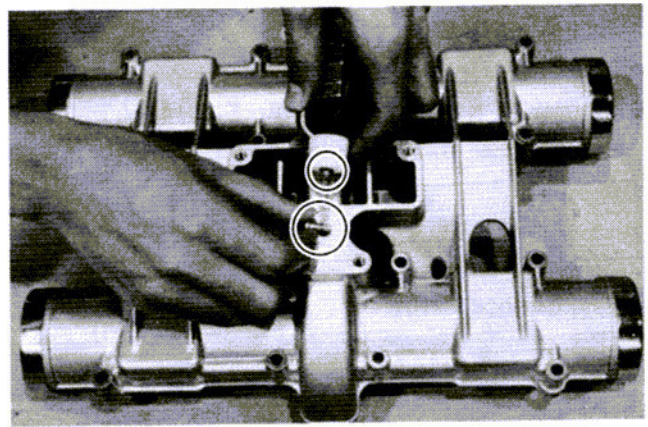
CAM CHAIN GUIDE

NOTE:

When replacing following chain guides, apply SUZUKI Thread lock cement "1361A" to screws thread.

99104 - 32020

Thread lock super "1361A"



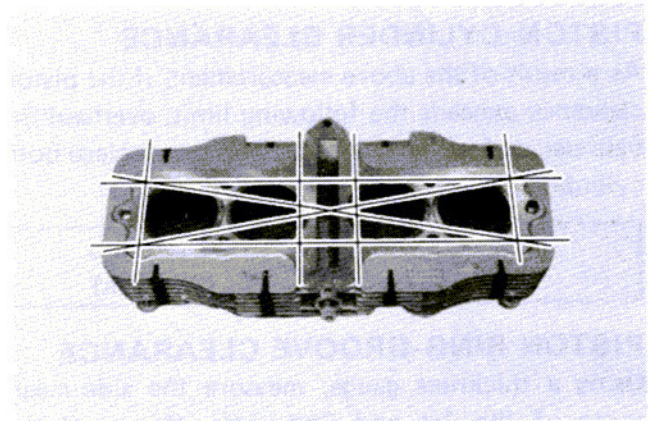
CYLINDER DISTORTION

Check the gasketed surface of the cylinder 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.

Cylinder distortion specification

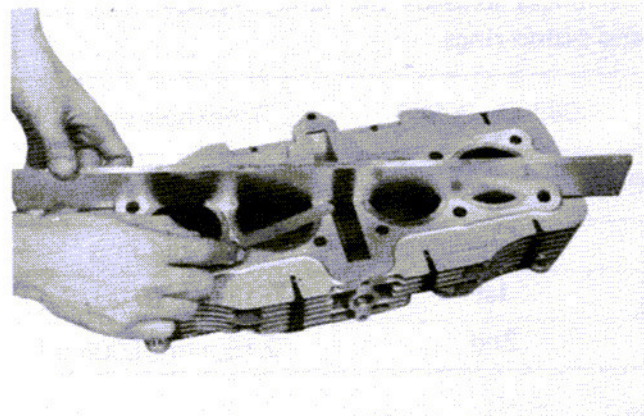
Service Limit

0.2 mm (0.008 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 measurement is beyond the limit, the remaining cylinders must be also rebored accordingly. Otherwise the imbalance might causes excess vibration.



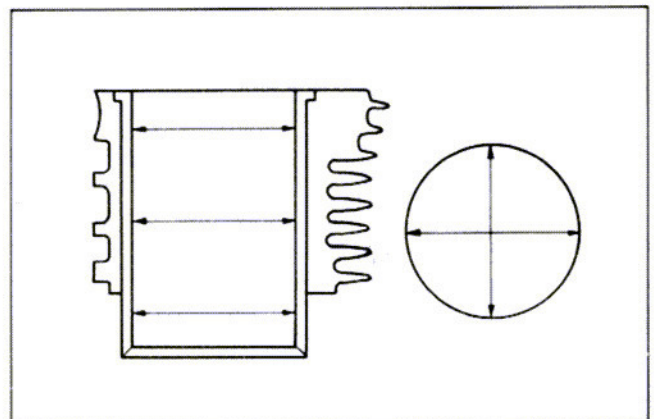
Cylinder bore

Service Limit

62.095 mm
(2.4447 in)

09900 - 20508

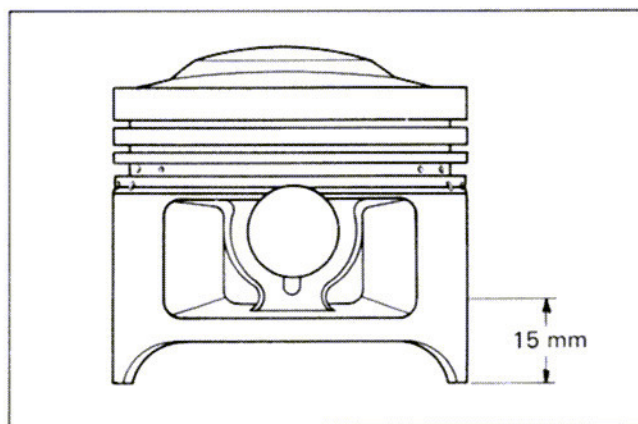
Cylinder gauge set



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	61.880 mm (2.4362 in)
09900 - 20203	Micrometer (50 – 75 mm)



PISTON-CYLINDER CLEARANCE

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

Service Limit	0.120 mm (0.005 in)
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PISTON RING-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.

09900 - 20803	Thickness gauge
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Piston ring—groove clearance

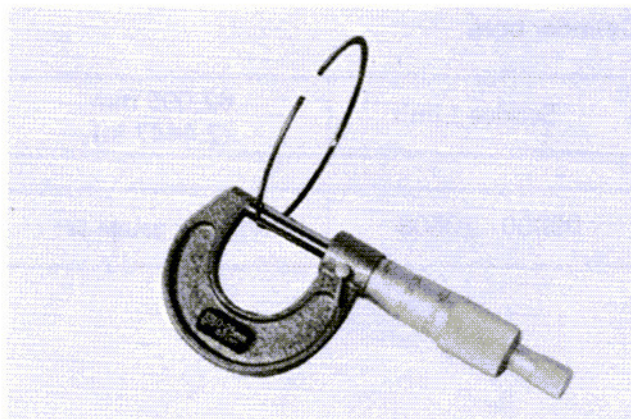
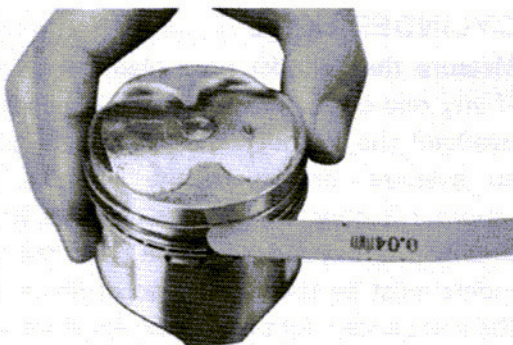
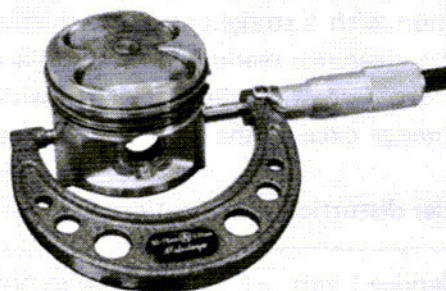
Piston ring	Service Limit
1st	0.18 mm (0.007 in)
2nd	0.15 mm (0.006 in)

Piston ring groove width

Piston ring	Standard
1st	1.21 – 1.23 mm (0.0476 – 0.0484 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	1.175 – 1.190 mm (0.0463 – 0.0469 in)
2nd	1.170 – 1.190 mm (0.0461 – 0.0469 in)



PISTON RING FREE END GAP AND PISTON RING 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.

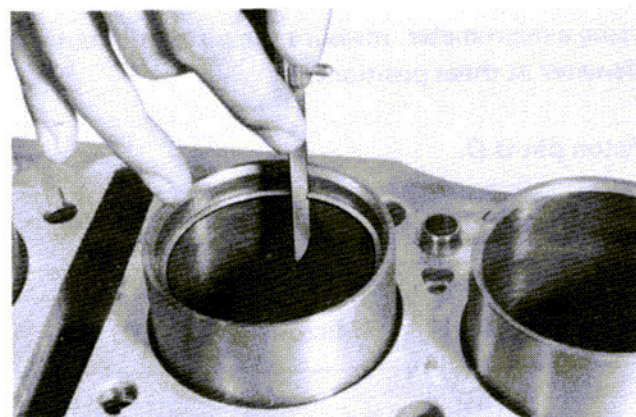
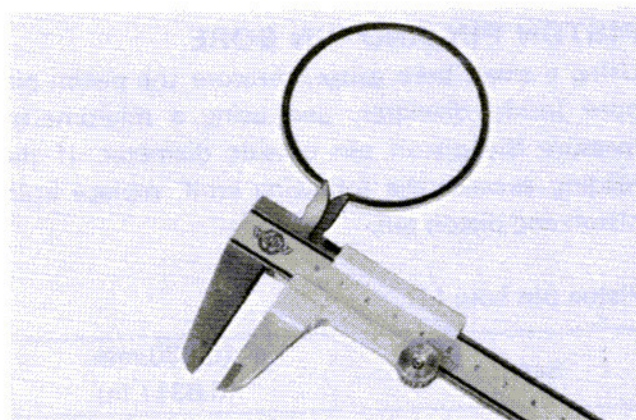
If any ring has an excess end gap, replace the ring.

Piston ring free end gap

Piston ring	Service Limit
1st	6.0 mm (0.24 in)
2nd	7.6 mm (0.30 in)

Piston ring end gap

Piston ring	Service Limit
1st & 2nd	0.7 mm (0.03 in)
09900 - 20803	Thickness gauge



● Oversize piston rings

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

	1st	2nd
0.5 mm	50	50
1.0 mm	100	100

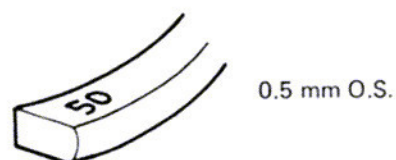
● Oversize oil rings

The following two types of oversize oil rings are used. They bear the following identification marks.

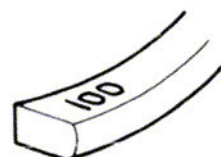
SIZE	COLOR
STD	Painted red
0.5 mm O.S.	Painted blue
1.0 mm O.S.	Painted yellow

● Oversize side rail

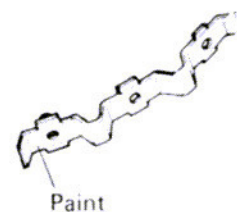
Just measure out side diameter.



0.5 mm O.S.



1.0 mm O.S.



Oil ring spacer

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 the following limit, replace both piston and piston pin.

Piston pin bore I.D.

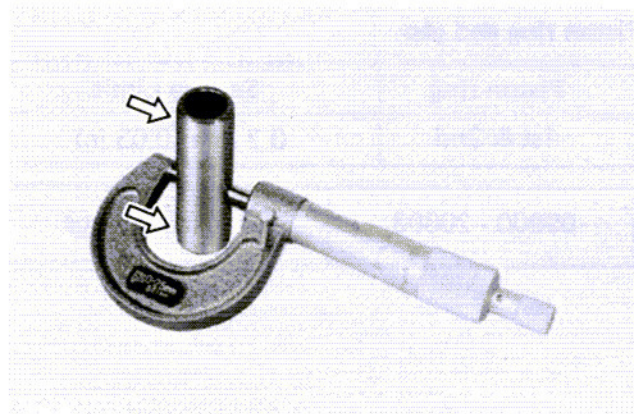
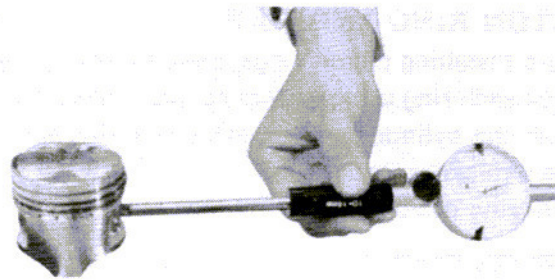
Service Limit	16.030 mm (0.6311 in)
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Using a micrometer, measure the piston pin outside diameter at three positions.

Piston pin O.D.

Service Limit	15.980 mm (0.6291 in)
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09900 - 20205	Micrometer (0 – 25 mm)
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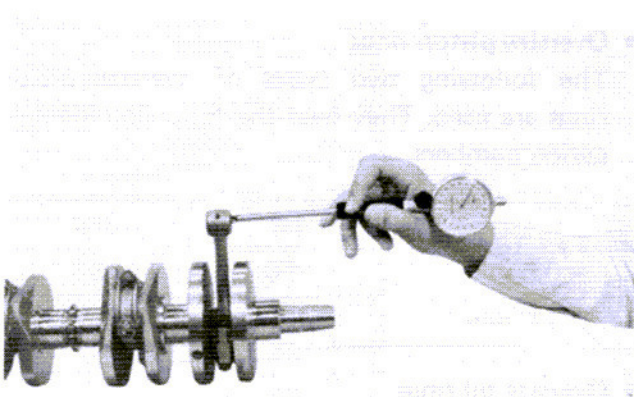
CONNECTING ROD SMALL END BORE I.D.

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

Connecting rod small end bore I.D.

Service Limit	16.040 mm (0.6315 in)
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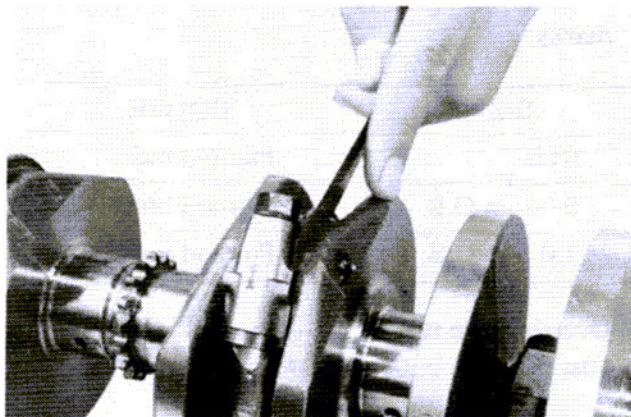
- If the connecting rod small end bore inside diameter exceeds the abovementioned limit, replace the connecting rod.



CONNECTING ROD BIG END THRUST CLEARANCE

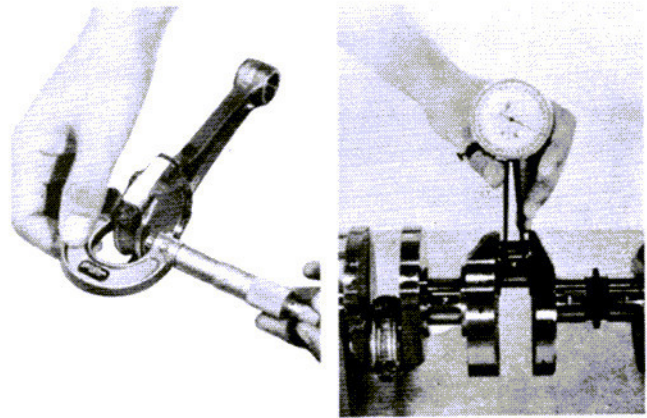
Check the connecting rod side clearance by using thickness gauge. If the clearance exceeds the limit, replace connecting rod or crankshaft.

Service Limit	0.3 mm (0.01 in)
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	Standard
Big end width	20.95 – 21.00 mm (0.825 – 0.827 in)
Crank pin width	21.10 – 21.15 mm (0.831 – 0.833 in)

09900 - 20803	Thickness gauge
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CONNECTING ROD-CRANK PIN BEARING SELECTION

- Loosen bearing cap nuts, and tap the bolt end lightly with plastic hammer to remove bearing cap.
- Remove rods, and mark them to identify the cylinder position.
- Inspect bearing surfaces for any sign of fusion, pitting, burn, or flaws. If any, replace them with specified set of bearings.

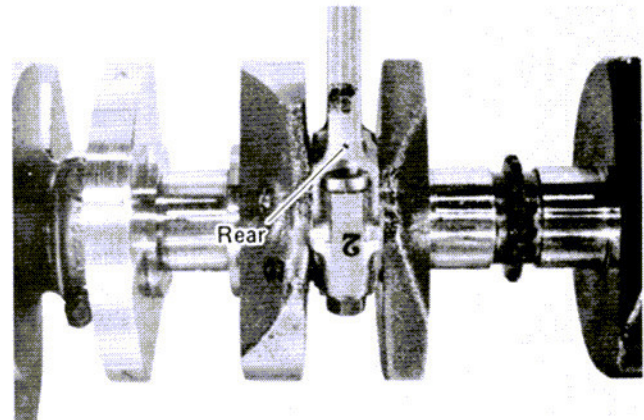
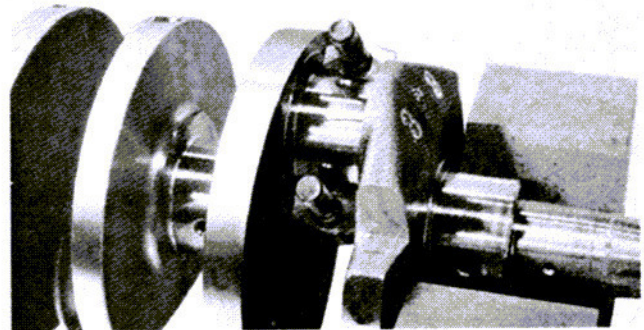
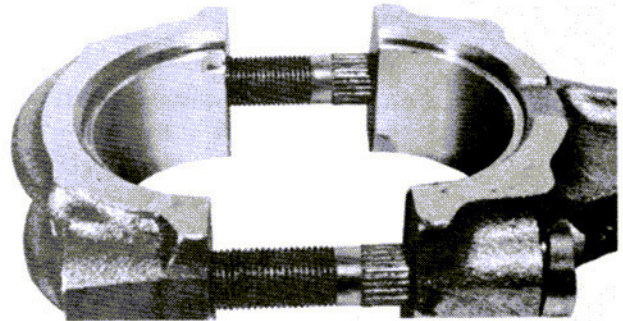
NOTE:

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

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

NOTE:

When fitting bearing cap to crank pin, be sure to discriminate one end from the other, namely front and rear.



Initial tightening torque	1.2 – 1.8 kg-m (8.5 – 13.0 lb-ft)
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Final tightening torque	3.0 – 3.4 kg-m (21.5 – 24.5 lb-ft)
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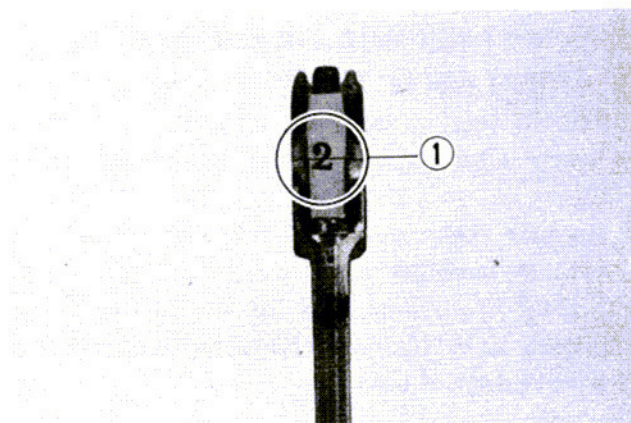
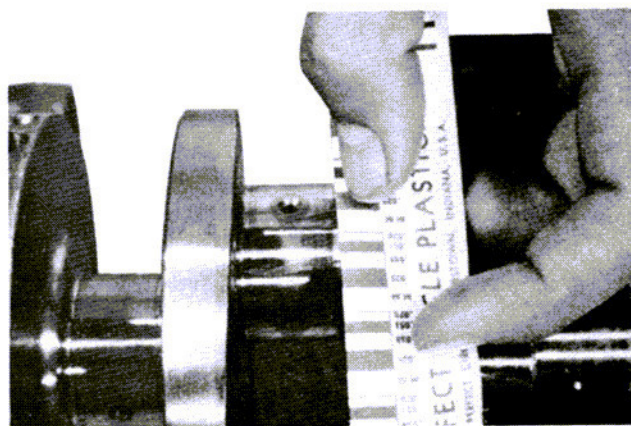
NOTE:

Never rotate crankshaft or connecting rod when a piece of Plastigauge is in the clearance.

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

Service Limit	0.080 mm (0.0031 in)
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- If oil clearance is exceeded service limit, select the specified bearings from the following table.
- Check the corresponding rod I.D. code number ①, "1" or "2".
- Check the corresponding crank pin O.D. code number, "1", "2" or "3".

**Bearing selection table**

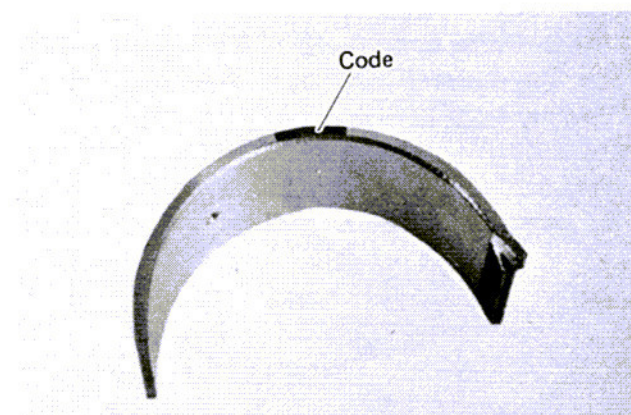
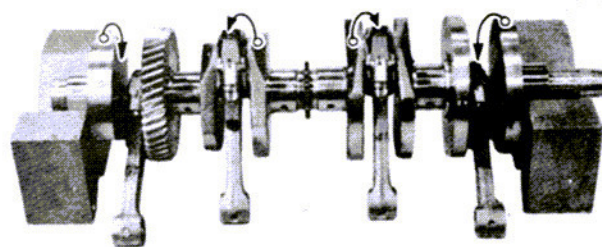
		Crank pin		
	Code	1	2	3
Conrod	1	Green	Black	Brown
	2	Black	Brown	Yellow

Bearing oil clearance

Standard	0.024 – 0.048 mm (0.0009 – 0.0019 in)
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Connecting rod I.D. specification

Code	I.D.
1	37.000 – 37.008 mm (1.4567 – 1.4570 in)
2	37.008 – 37.016 mm (1.4570 – 1.4573 in)

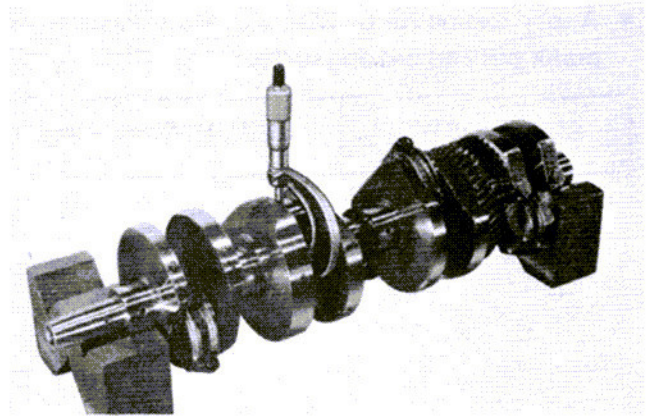


Crank pin O.D. specification

Code	O.D. SPECIFICATIONS
1	33.992 — 34.000 mm (1.3383 — 1.3386 in.)
2	33.984 — 33.992 mm (1.3380 — 1.3383 in.)
3	33.976 — 33.984 mm (1.3376 — 1.3380 in.)

Bearing thickness

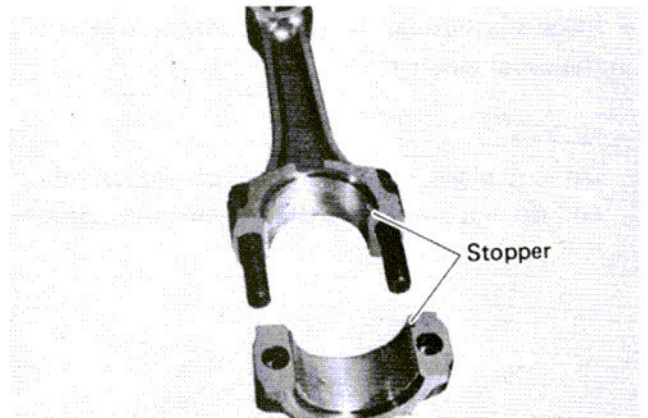
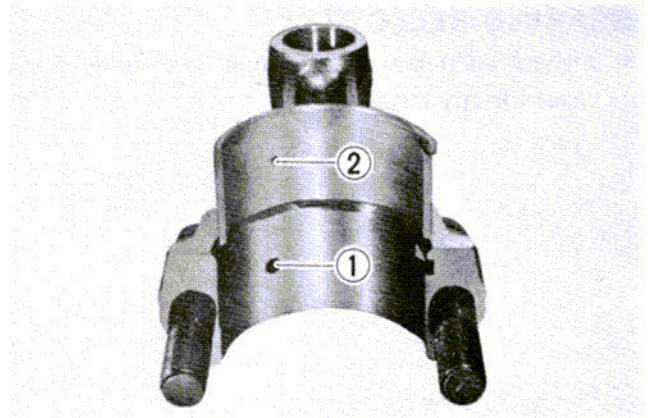
Color	Thickness
Green	1.484 — 1.488 mm (0.0584 — 0.0586 in)
Black	1.488 — 1.492 mm (0.0586 — 0.0587 in)
Brown	1.492 — 1.496 mm (0.0587 — 0.0589 in)
Yellow	1.496 — 1.500 mm (0.0589 — 0.0590 in)

**CAUTION:**

- * Bearing should be replaced as a set.
- * There are two kinds of under-size bearings as an optional parts as follows.

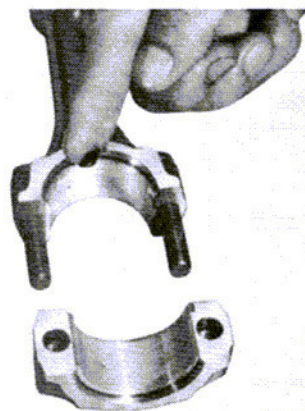
BEARING ASSEMBLY

- Check the connecting rod oil hole ① to align with the bearing oil hole ②.
- When fitting the bearings to the bearing cap and connecting rod, be sure to fix the stopper part first, and press the other end.



- Apply engine oil or SUZUKI Moly Paste to the crank pin and bearing surface.

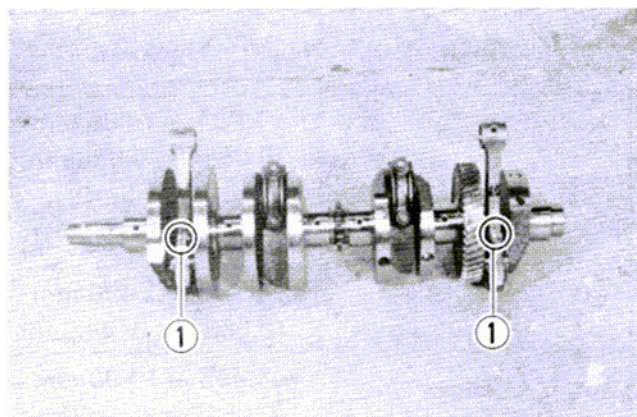
99000 - 25140	SUZUKI Moly Paste
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- When mounting connecting rod on the crank shaft, make sure that oil hole ① of the connecting rod faces rearward.
- Tighten the connecting rod fitting nuts with specified torque.

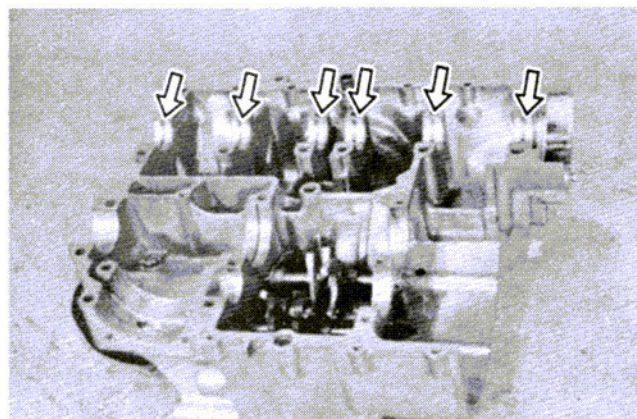
Tightening torque	3.0 – 3.4 kg-m (21.5 – 24.5 lb-ft)
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- Check the connecting rod for smooth turning.



CRANKCASE-CRANKSHAFT BEARING SELECTION

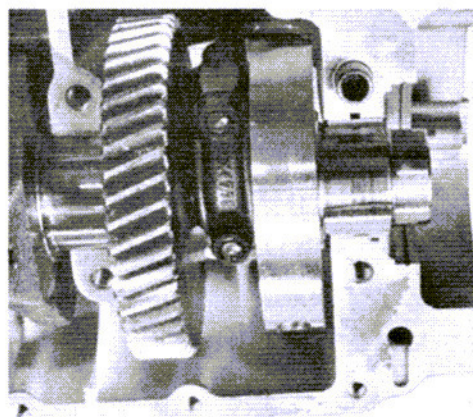
- Inspect each bearing of upper and lower crankcases for any damage.



- Place plastigauge on each crankshaft journal in the usual manner.

NOTE:

Do not place the plastigauge on the oil hole, and do not rotate the shafts when plastigauge is in place.

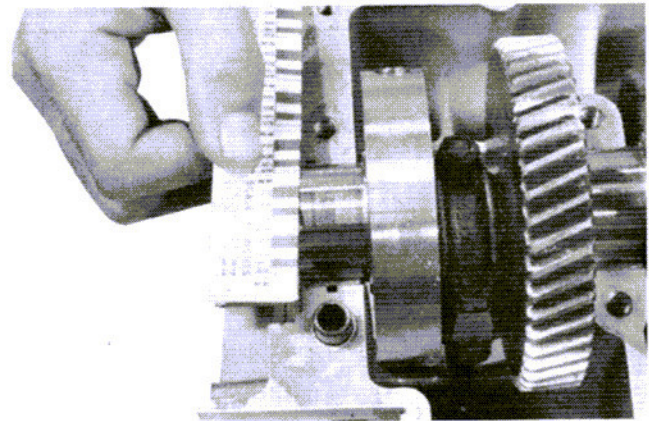
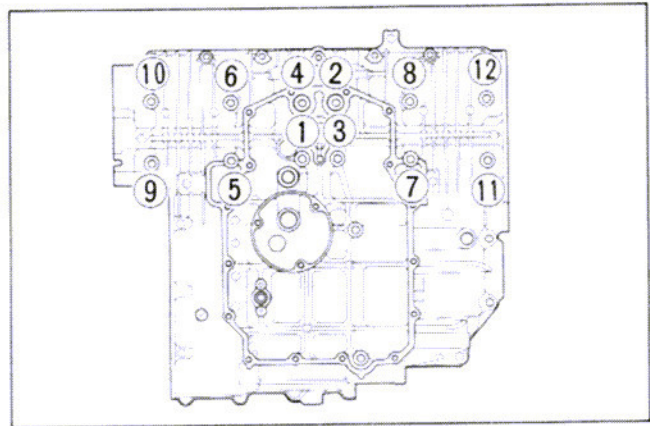


- Mate the lower crankcase with the upper crankcase, and tighten the crankcase securing bolts with specified torque value in the indicated order.

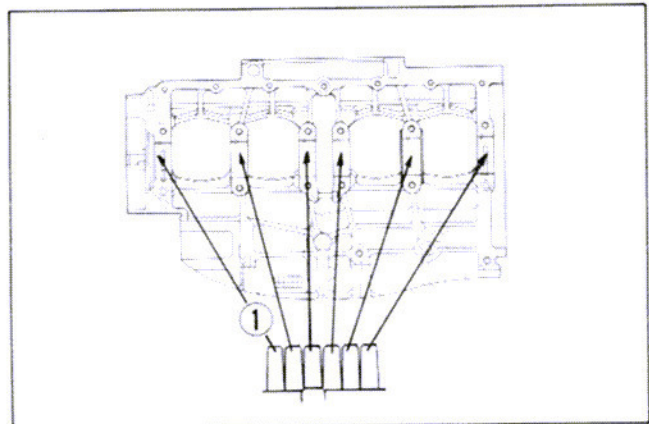
	Initial Tightening	Final Tightening
6 mm bolt	0.6 kg-m (4.5 lb-ft)	0.9 – 1.1 kg-m (6.5 – 8.0 lb-ft)
8 mm bolt	1.3 kg-m (9.5 lb-ft)	2.0 – 2.4 kg-m (14.5 – 17.5 lb-ft)

- Remove the lower crankcase, and measure the width of compressed plastigauge in the usual manner.

Service Limit	0.080 mm (0.0031 in)
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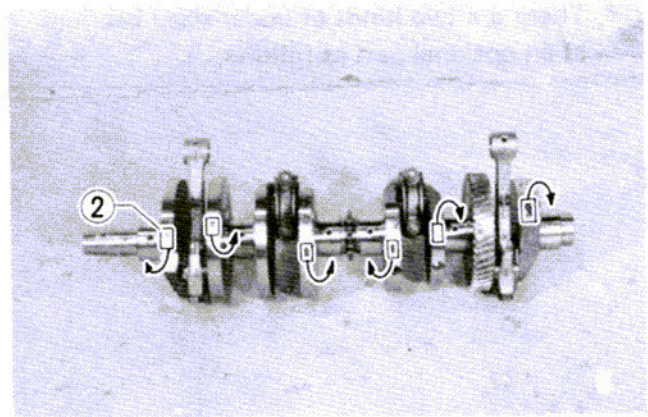
- If the width at the widest part exceeds the limit, replace the set of bearing with new ones by referring to the selection table.
- Check the corresponding crankcase journal I.D. code number ① "A" or "B" which are stamped on the rear of upper crankcase.



- Check the corresponding crankshaft journal O.D. code number ② "A", "B" or "C".

Bearing selection table

Crankcase	Crankshaft			
	Code	A	B	C
	A	Green	Black	Brown
	B	Black	Brown	Yellow



Crankcase I.D. specification

Code	I.D. specification
A	39.000 – 39.008 mm (1.5354 – 1.5357 in)
B	39.008 – 39.016 mm (1.5357 – 1.5361 in)

Crankshaft journal O.D. specification

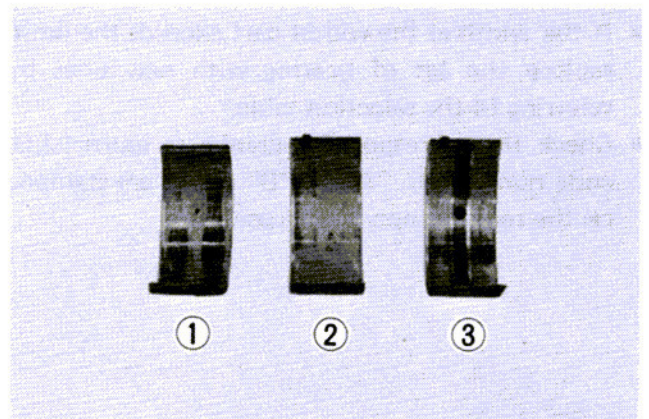
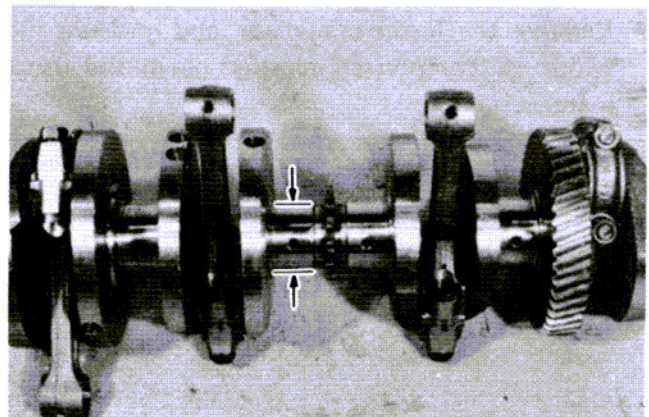
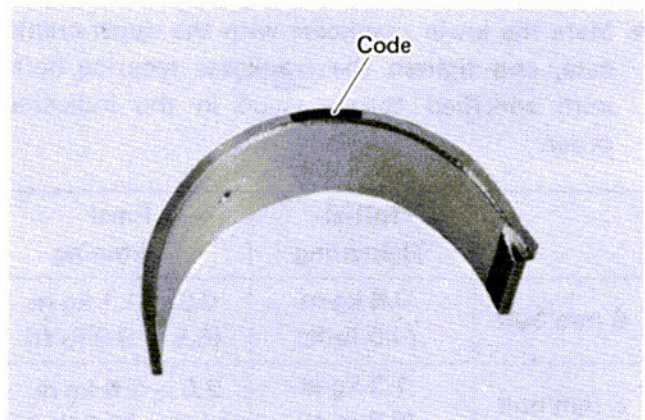
Code	O.D. specification
A	35.992 – 36.000 mm (1.4170 – 1.4173 in)
B	35.984 – 35.992 mm (1.4167 – 1.4170 in)
C	35.976 – 35.984 mm (1.4164 – 1.4167 in)

Bearing thickness specification

Color	Specification
Green	1.486 – 1.490 mm (0.0585 – 0.0587 in)
Black	1.490 – 1.494 mm (0.0587 – 0.0588 in)
Brown	1.494 – 1.498 mm (0.0588 – 0.0590 in)
Yellow	1.498 – 1.502 mm (0.0590 – 0.0591 in)

CAUTION:

- * Make sure to identify the upper crankcase journal bearing from the lower crankcase journal bearing which has oil groove, and to fit both bearings as a replacement.
- * Upper bearings have no oil groove and these parts numbers are shown as follows.
12229-45410-XXX.
- * There are two kinds of under-sized bearings as an optional part as follows.



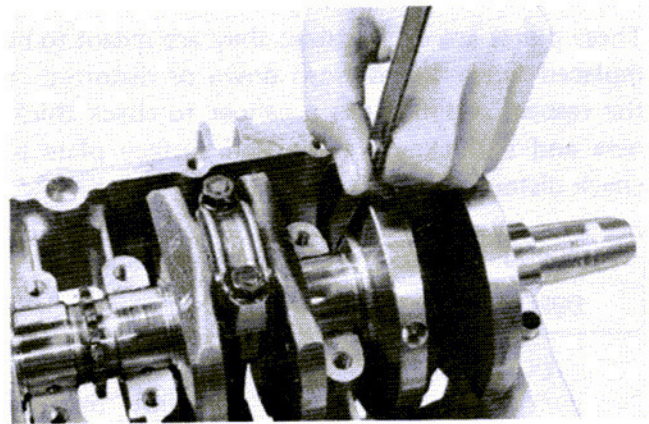
- ① Crank pin bearing (for conrod)
- ② Crank journal upper bearing (for upper crankcase)
- ③ Crank journal lower bearing (for lower crankcase)

CRANKSHAFT THRUST CLEARANCE

- Check crankshaft thrust clearance with thickness gauge. If it exceeds the service limit, measure the crankcase width (A) and crankshaft width (B), and replace crankcase or crankshaft, whichever the difference from specification is greater.

09900 - 20803

Thickness gauge

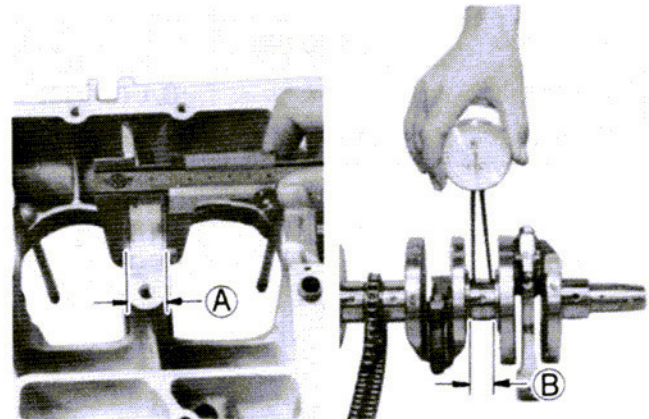


Thrust clearance

Service Limit

0.5 mm (0.02 in)

	Standard
Crankcase (A)	21.8 – 21.9 mm (0.858 – 0.862 in)
Crankshaft (B)	22.0 – 22.1 mm (0.866 – 0.870 in)



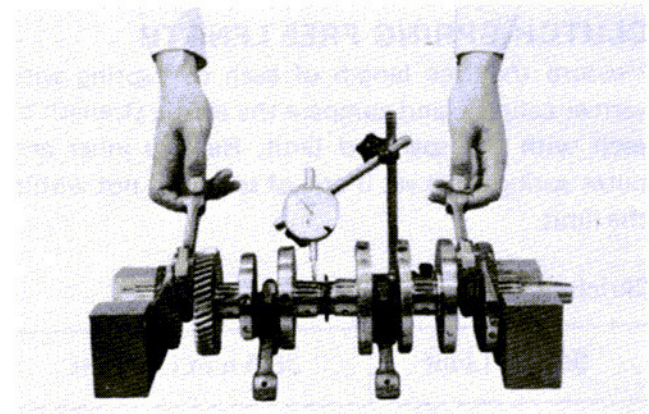
CRANKSHAFT RUNOUT

Support the crankshaft with "V" blocks as shown, with the two end journal resting on the blocks. Rig up the dial gauge, as shown, and rotate the crankshaft slowly to read the runout. Replace the crankshaft if the runout is greater than the limit.

Crankshaft runout specification

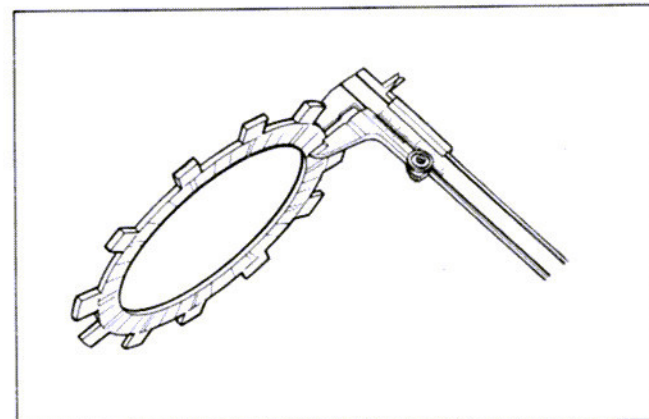
Service Limit

0.05 mm (0.002 in)



CLUTCH DRIVE PLATES AND DRIVEN PLATES

Clutch plates in service remain in oily condition as they are 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.

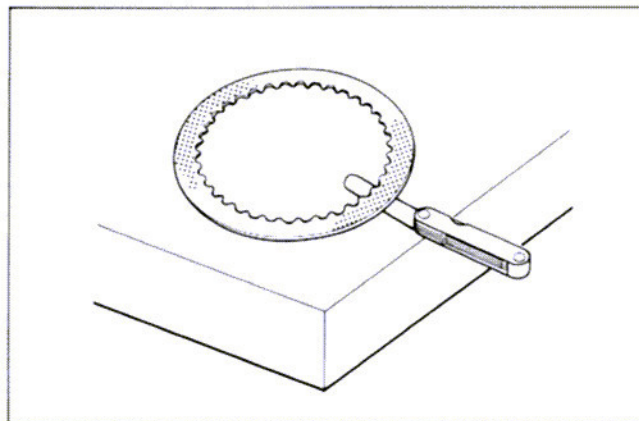


These plates are expendable: they are meant to be replaced when found worn down or distorted to the respective limit: use a caliper to check thickness and a thickness gauge and surface plate to check distortion.

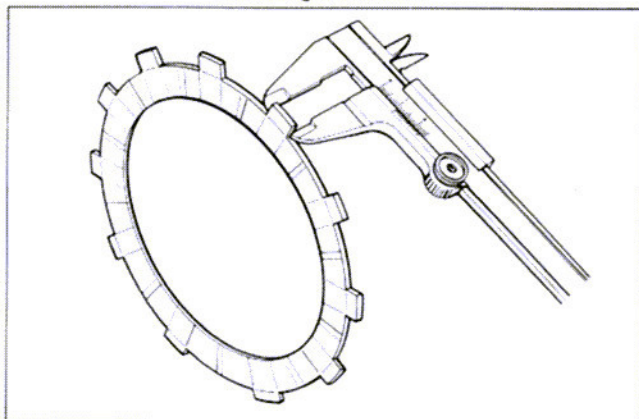
09900 - 20101	Vernier calipers
09900 - 20803	Thickness gauge

Unit: mm (in)

Service Limit	Drive plate	Driven plate
Thickness	2.4 (0.09)	—
Distortion	—	0.1 (0.004)
Claw width	11.0 (0.43)	—



Checking distortion



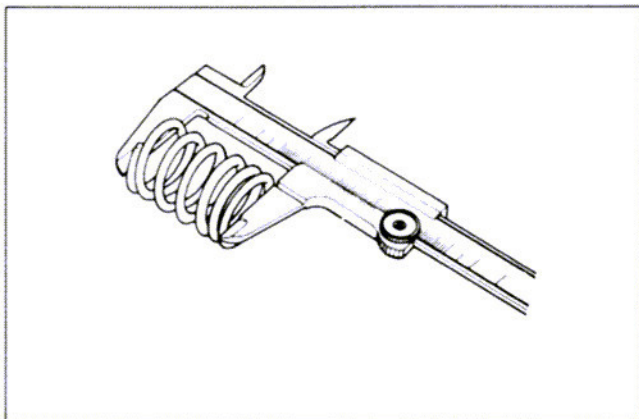
Checking Claw width

CLUTCH SPRING FREE LENGTH

Measure the free length of each coil spring with vernier calipers, and compare the elastic strength of each with the specified limit. Replace inner and outer springs as a set if one of springs is not within the limit.

Clutch spring free length

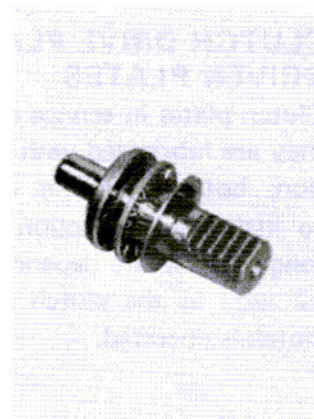
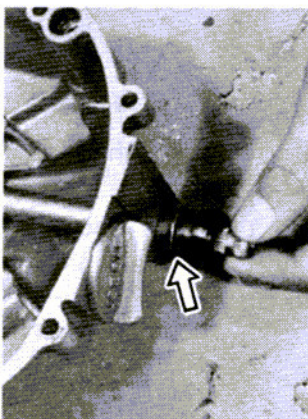
Service Limit	36.5 mm (1.44 in)
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CLUTCH BEARINGS

Inspect clutch release and rack bearings 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 these bearings.



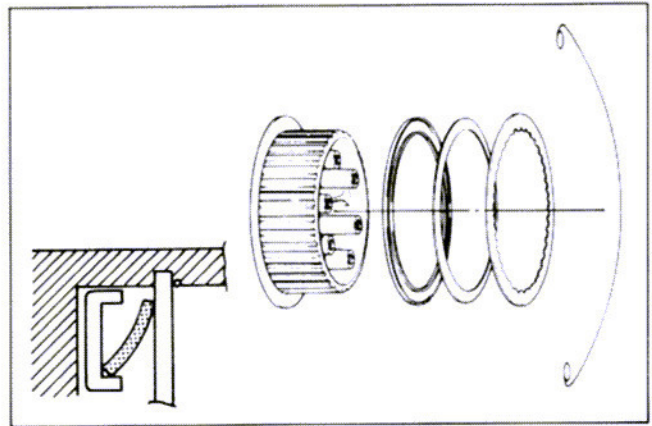
SLEEVE HUB WAVE WASHER

- Install the spring seat, spring, and driven plate in the clutch sleeve hub. Check that these three parts are positioned correctly as illustrated.

While holding the driven plate with pliers, install the piano wire clip.

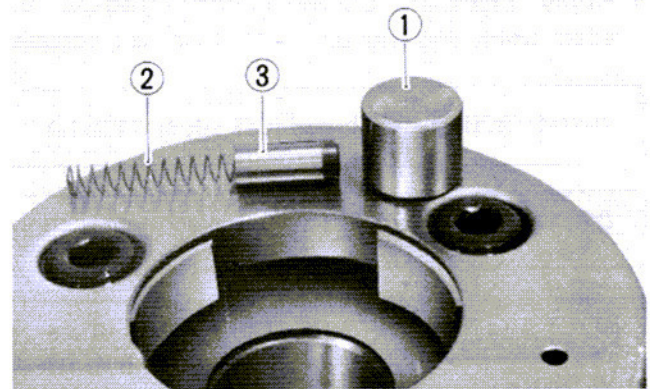
NOTE:

Always use a new piano wire clip.



STARTER CLUTCH REMOVAL

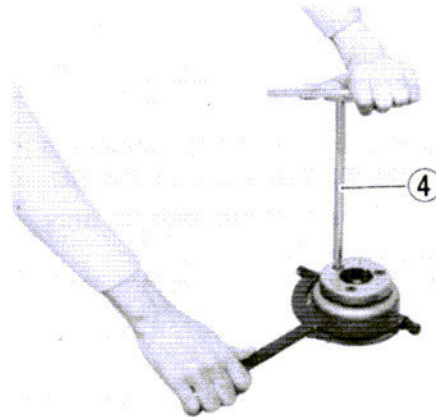
- Remove roller ①, spring ②, and push piece ③ from starter clutch.



- Clamp the rotor with a vise taking care not to damage it and separate starter clutch from the rotor using the T type hexagon wrench ④.

09914 - 25811

"T" type hexagon wrench (6 mm)



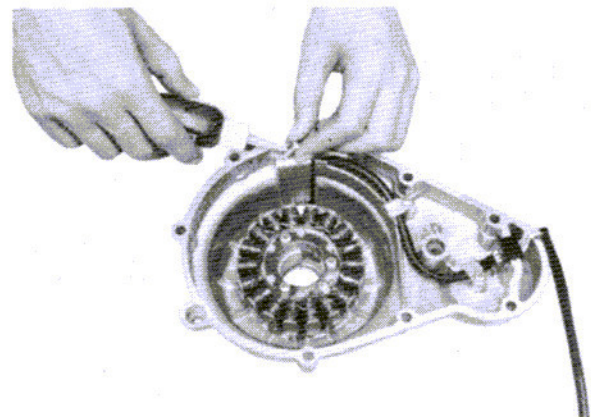
ASSEMBLY

- Apply THREAD LOCK "1363C" (99104-32050) to the stator set screws and its lead wire guide screws.

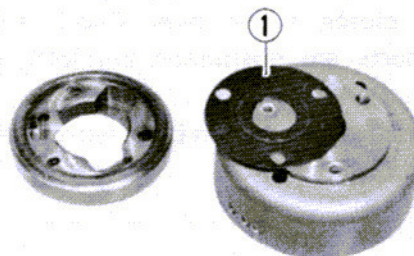
NOTE:

Wipe off oil and grease on screw completely, and then apply the screw lock.

- Mount the lead wire clamp as shown in the photo.



- Locate the shim ① to the proper position.

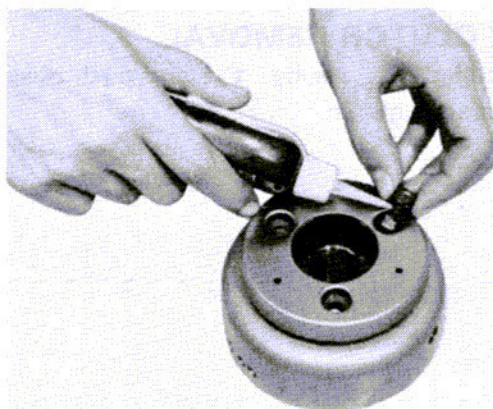


- Apply THREAD LOCK SUPER "1361A" to allen bolts and tighten with specified torque.

99104 - 32020	Thread lock super "1361A"
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09914 - 25811	T-type hexagon wrench
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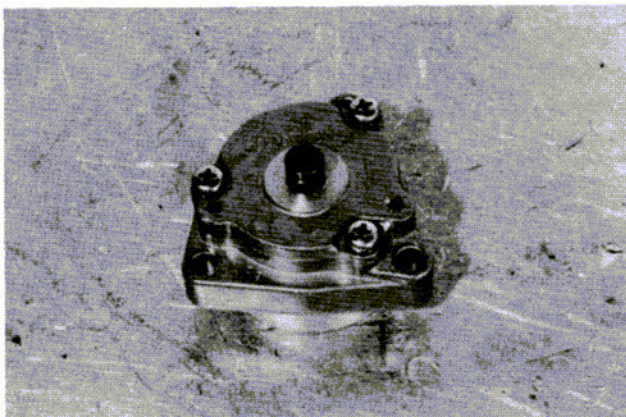
Tightening torque	1.5 – 2.0 kg-m (11.0 – 14.5 lb-ft)
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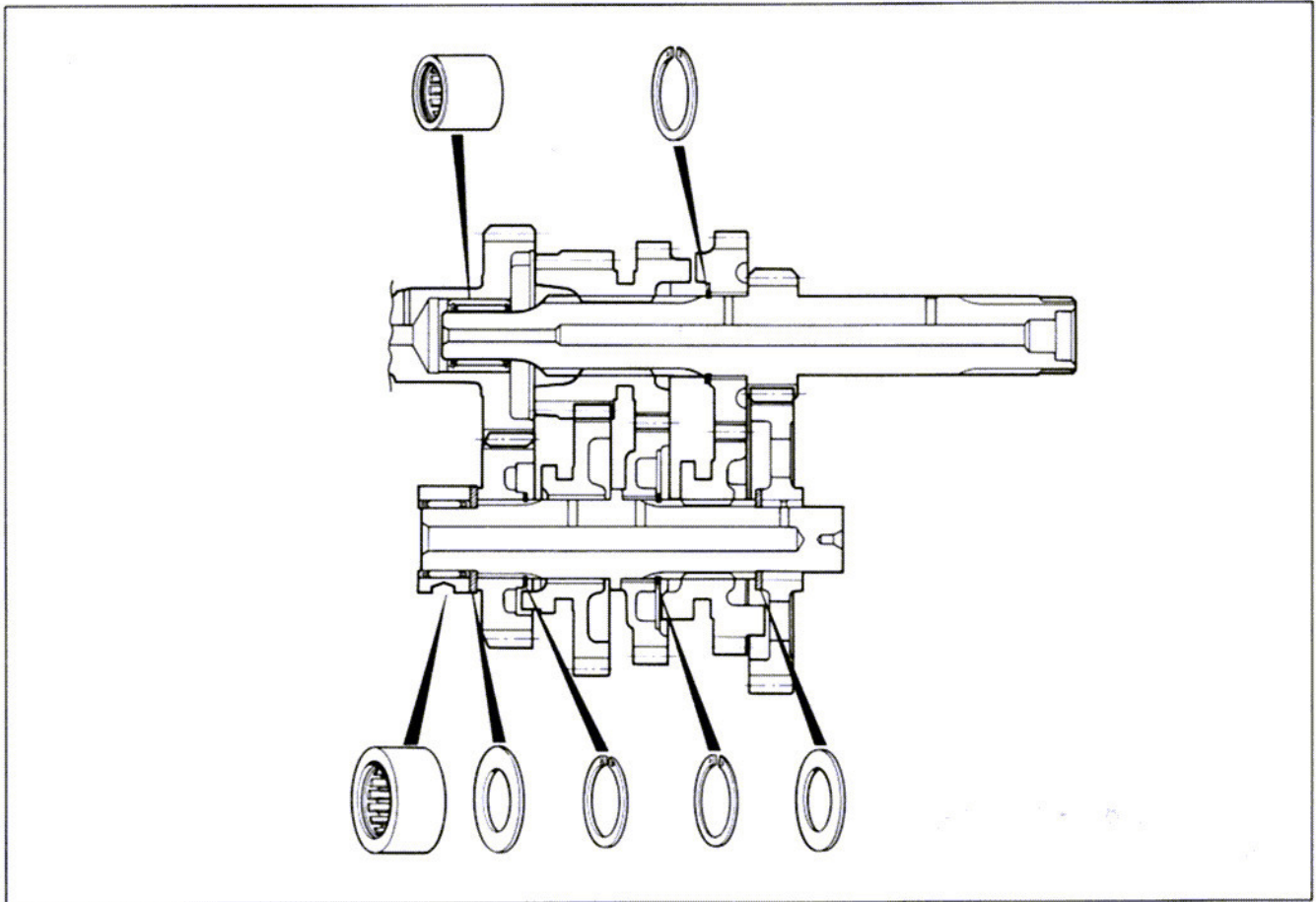
OIL PUMP

CAUTION:

The three oil pump case securing screws are applied with SUZUKI THREAD LOCK SUPER "1363A". The oil pump unit is only available as a unit assembly.



TRANSMISSION



SHIFT FORK-GROOVE CLEARANCE

Using a thickness gauge, check the shifting fork clearance in the groove of its gear.

This 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.

09900 - 20803	Thickness gauge
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Shift fork-Groove clearance

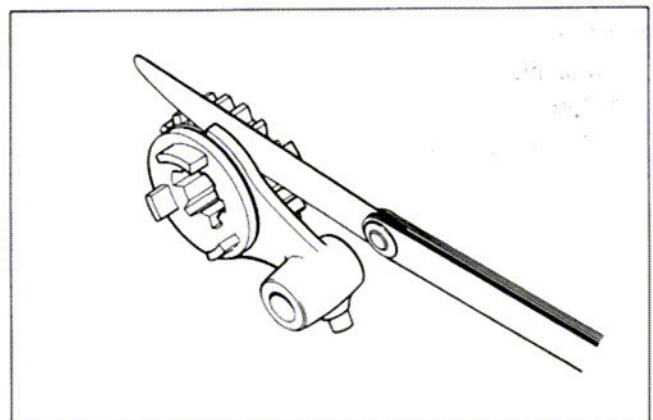
		Service Limit
No. 1	for 2nd and 4th driven gears	0.5 mm (0.02 in)
No. 2	for 2nd/3rd drive gear	

Shift fork groove width

Standard	5.5 – 5.6 mm (0.217 – 0.220 in)
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Shift fork thickness

Standard	5.30 – 5.40 mm (0.209 – 0.213 in)
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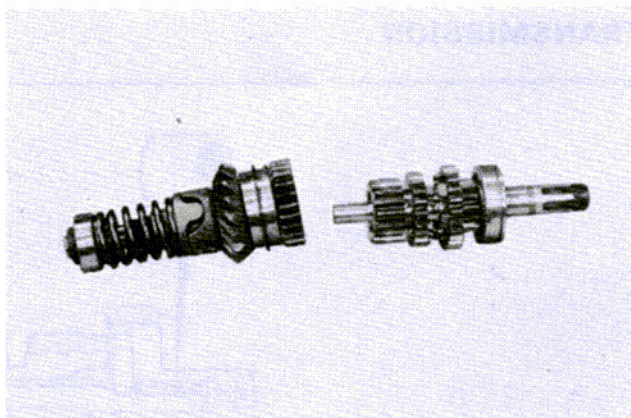


MAINSHAFT DISASSEMBLY

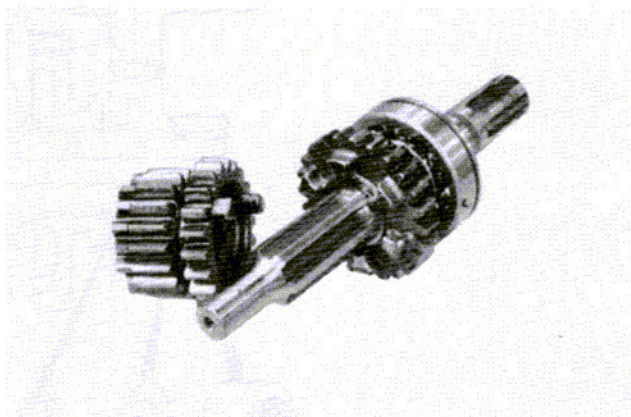
- Disconnect the mainshaft from the output shaft.

NOTE:

When disassembling the output shaft, refer to the chapter 4 "Shaft drive". (Page 4-1)



- Remove the 2nd/3rd drive gears from the mainshaft.



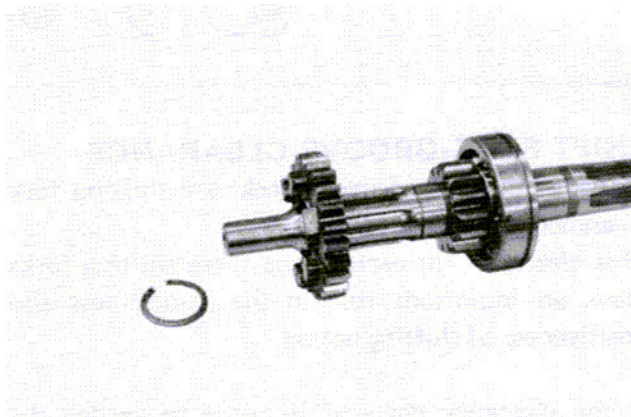
- Using a circlip opener and remove the 4th drive gear.

NOTE:

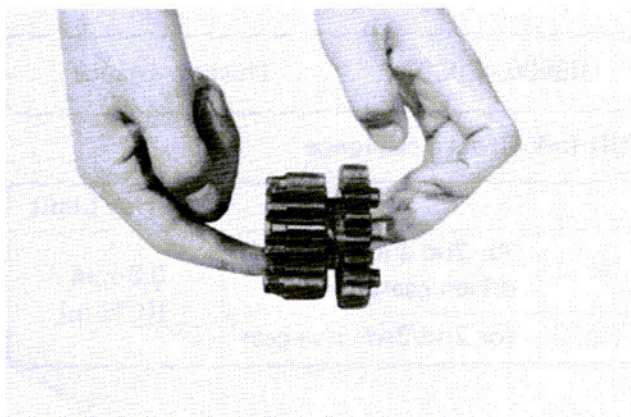
When reassembling, always use a new circlip.

09900 - 06107

Circlip opener



- Inspect each component parts thoroughly before reassembling.
 - * Gears worn or rubbing
 - * Spline worn or sticky
 - * Bearing play

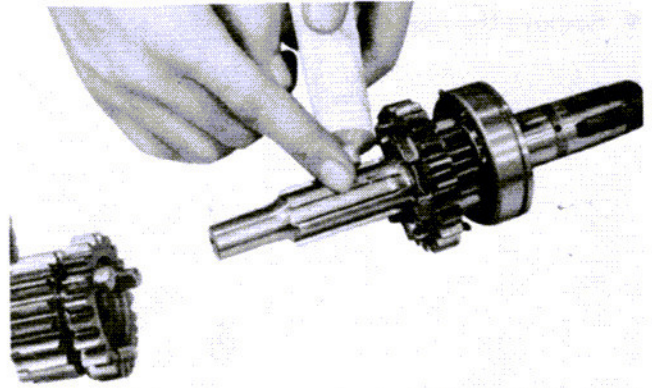


REASSEMBLY

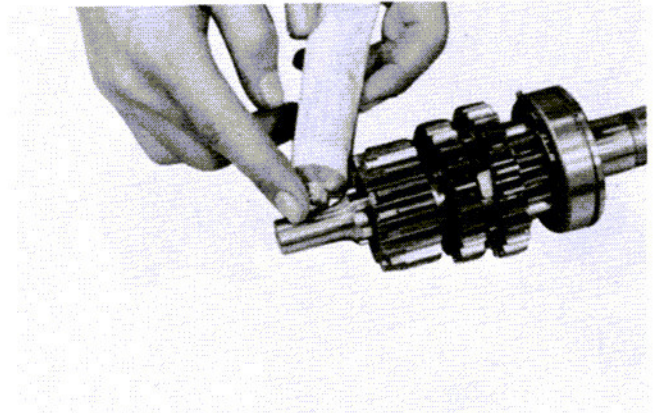
- Before installing the gears, wash and clean each component with cleaning solvent.
- Apply SUZUKI Moly Paste to the mainshaft spline lightly.

99000 - 25140

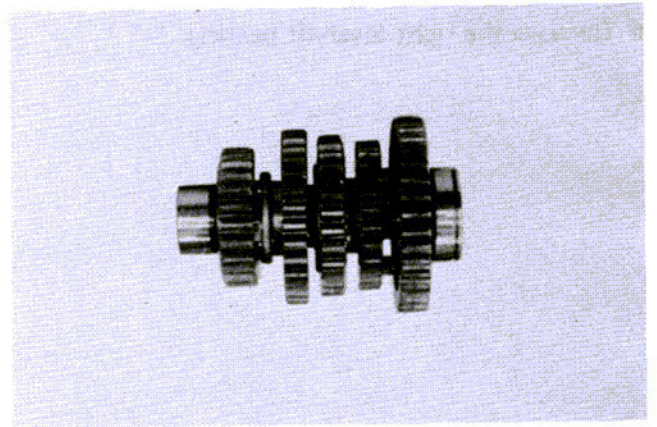
SUZUKI Moly Paste



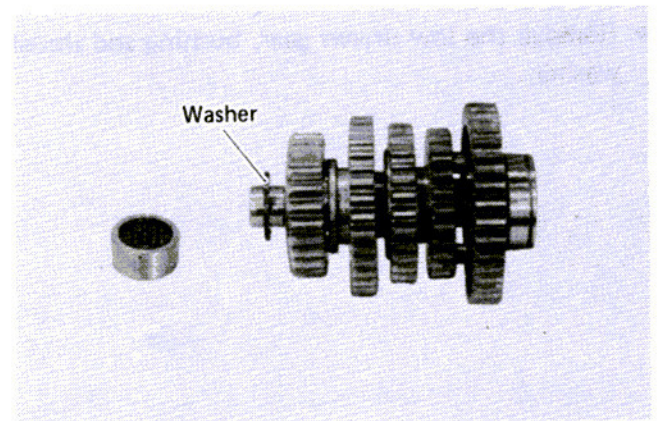
- Before joining the mainshaft with output shaft, apply SUZUKI Moly Paste to the joint part of the mainshaft

**LAYSHAFT****DISASSEMBLY**

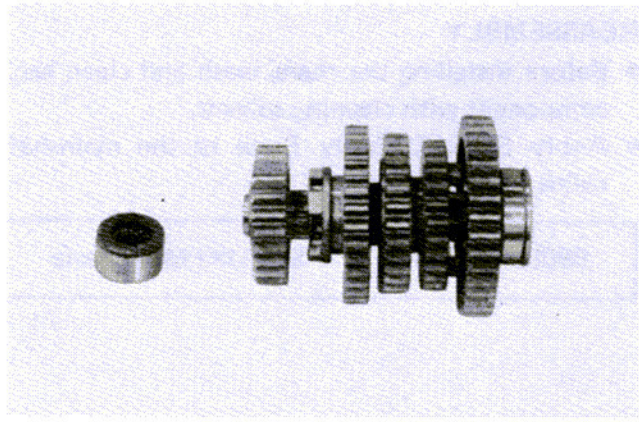
- Remove the bearing from the layshaft.



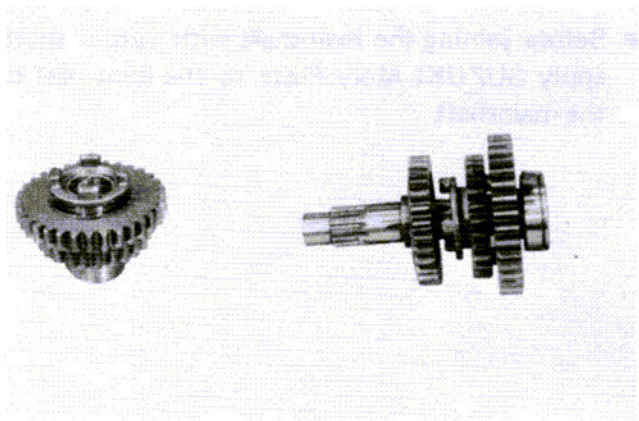
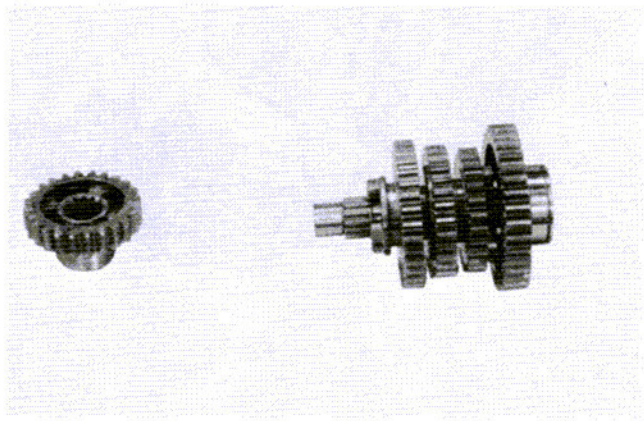
- Remove the thrust washer of the reduction gear.



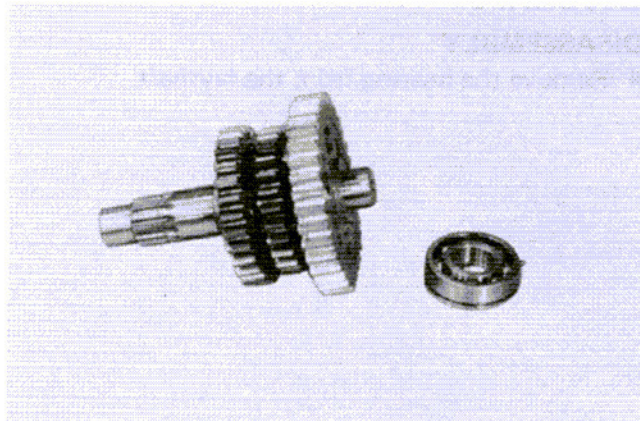
- Remove the reduction gear.



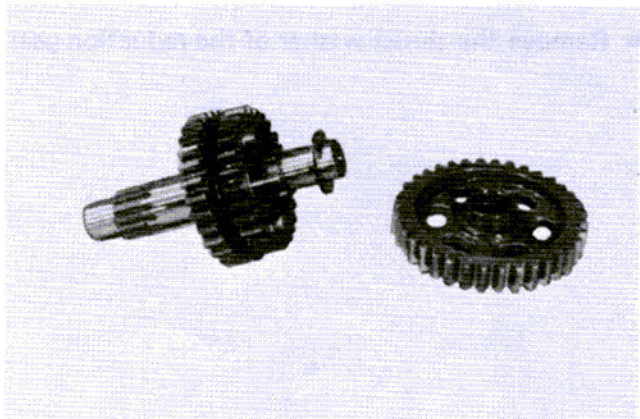
- Remove the 2nd driven gear.



- Remove the right layshaft bearing.



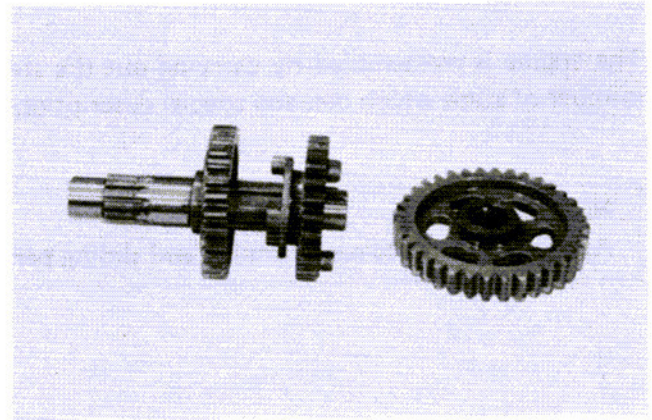
- Remove the low driven gear, bushing and thrust washer.



- Remove the 4th driven gear.
- Using circlip opener, remove the circlip and 3rd driven gear from the layshaft.

99000 - 06107

Circlip opener

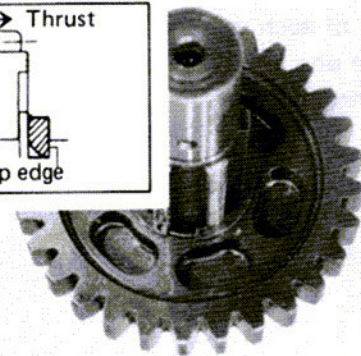
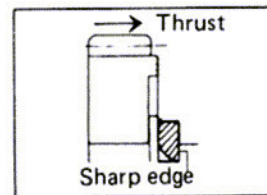


REASSEMBLY

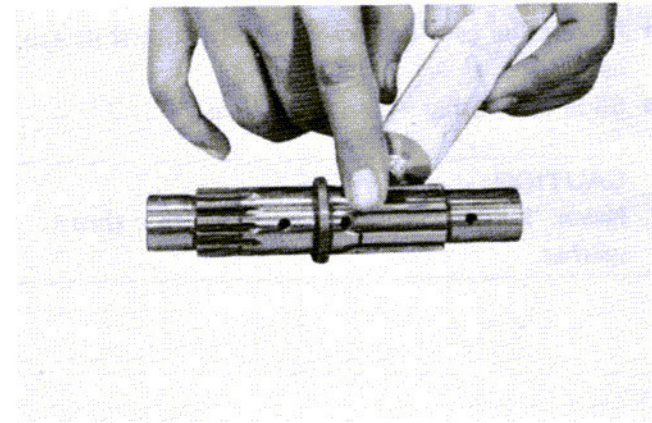
- When mounting circlip, pay attention to the direction of the circlip. Fit it to the side where the thrust is as shown in the figure with the rounded side against the gear surface.

CAUTION:

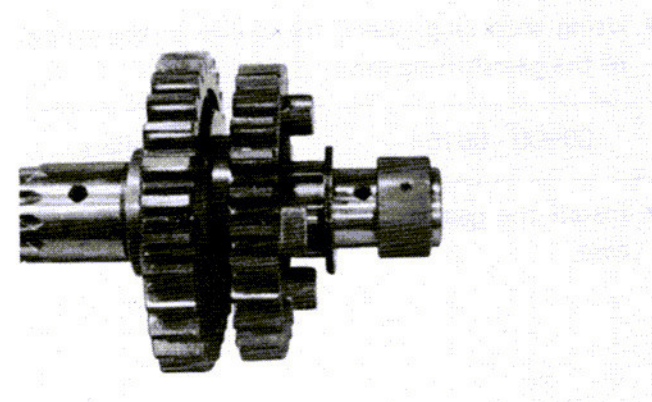
Always use new circlip when reassembling.



- Coat SUZUKI Moly Paste lightly on the layshaft spline.



- When installing low driven gear bushing, align the oil hole of the layshaft and the bushing oil hole.



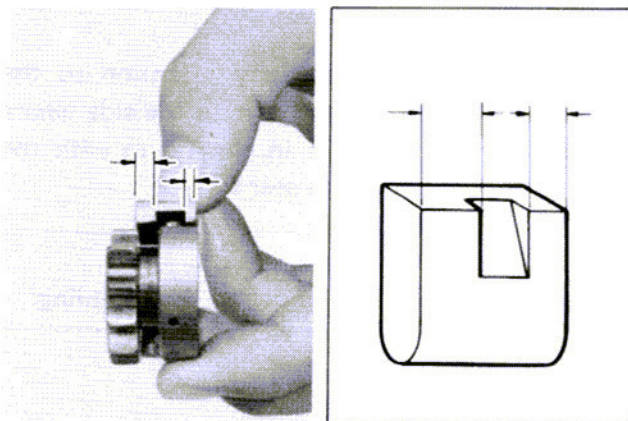
ENGINE REASSEMBLY

The engine is reassembled by carrying out the steps of disassembly in the reversed 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 reinstalling.

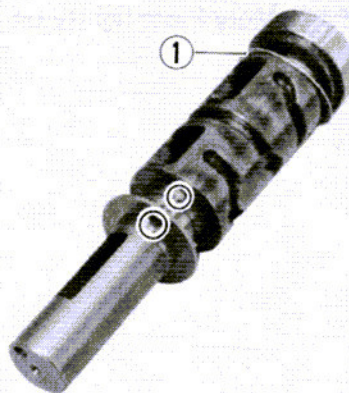
- The shape of each gear shifting pawl is different. Mount the one with the narrower width on the gear shifting cam side.



- Mount the cam driven gear on the gearshift cam as shown.
- Slide the washer ① onto the cam.

CAUTION:

Never fail to properly position the thrust washer.

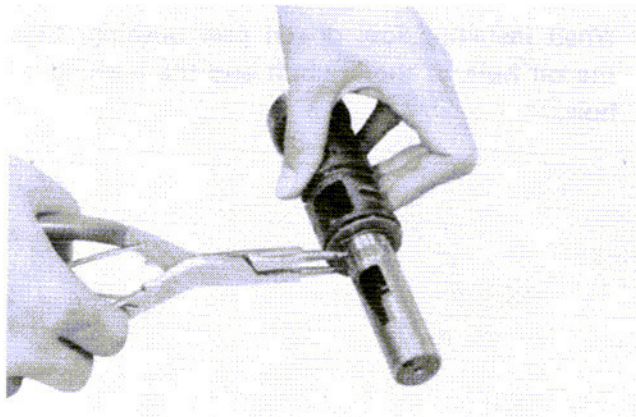


- Using snap ring pliers, fix circlip in the groove of the gearshifting cam.

09900 - 06104

Snap ring pliers

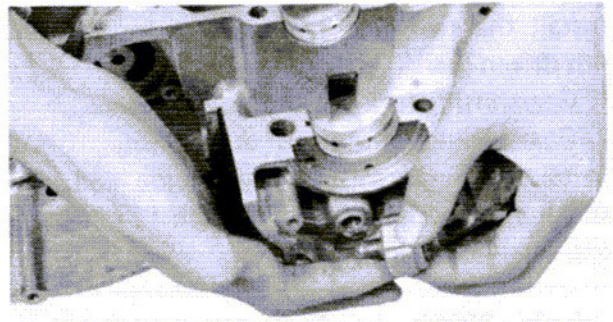
- Install the gearshifting cam to the lower crankcase.



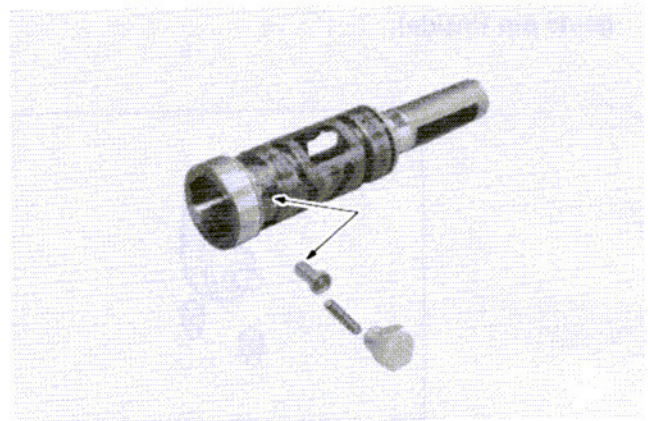
- When fitting the oil pressure switch, apply SUZUKI Bond No. 1215 to its thread lightly to prevent oil leakage.

99104 - 31110	SUZUKI Bond No. 1215
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Tightening torque	1.3 – 1.7 kg-m (9.5 – 12.5 lb-ft)
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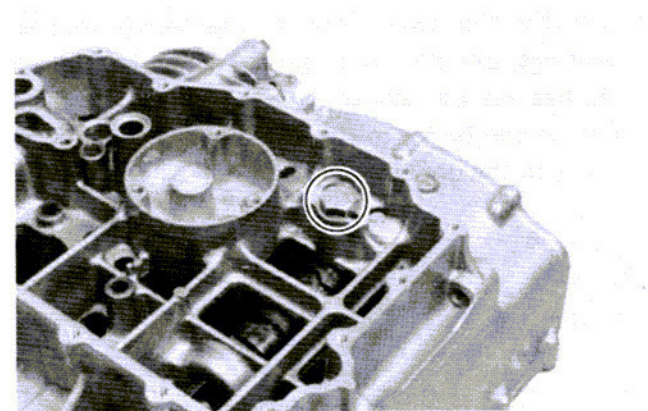


- Install the gearshifting cam with the dent for the neutral stopper directed downward, and meet the neutral stopper with this dent.



- Tighten the neutral stopper housing to the following torque value.

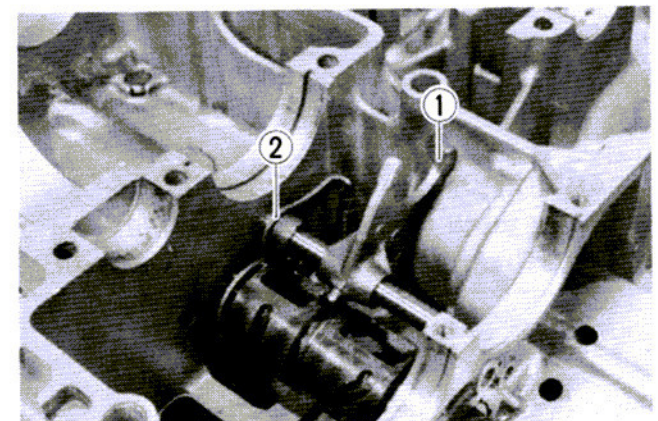
Tightening torque	1.8 – 2.8 kg-m (13.0 – 20.0 lb-ft)
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- Install gearshifting fork ① for the 2nd/3rd drive gears and gearshift cam stopper ②.

NOTE:

Hitch the cam stopper spring to the other side of the crankcase rib.

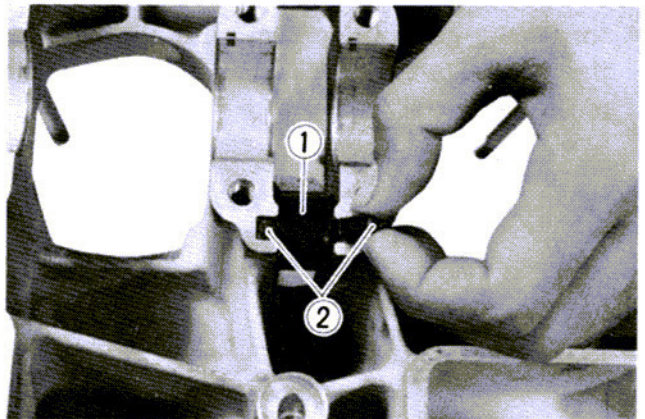
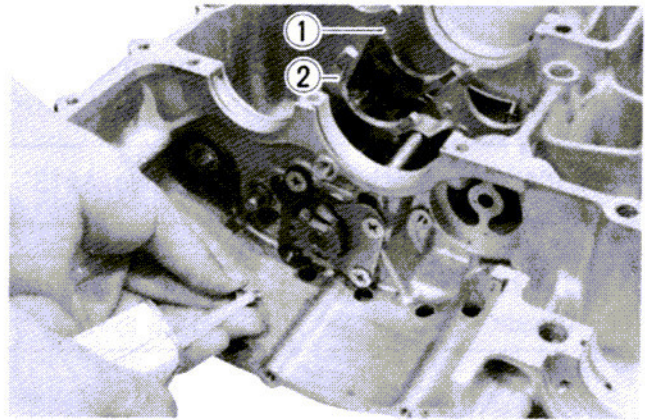
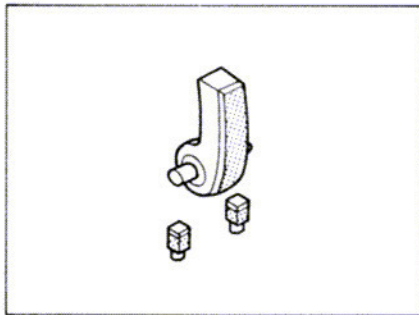


- Install the two gearshifting forks for 2nd and 4th driven gears.
 1. Gearshifting fork for 2nd driven gear.
 2. Gearshifting fork for 4th driven gear.
- Install both gearshifting cam guide and gearshifting pawl screws (overall length 12 mm) with applying thread lock "1363C".

99104 - 32050

Thread Lock "1363C"

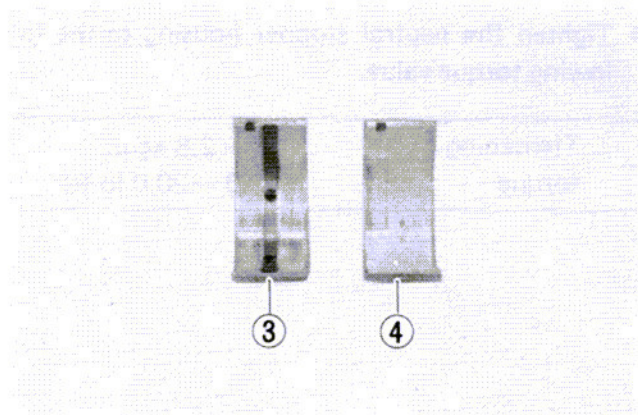
- Place cam chain guide ① properly, and fix two dampers ② so that iron side faces to the chain guide pin (inside).



- Identify the two kinds of crankshaft journal bearings, one has an oil groove ③ and the other ④ has no oil groove on its surface. Grooved one should be fix to the lower crankcase and the other to the upper crankcase.

③ : for lower crankcase

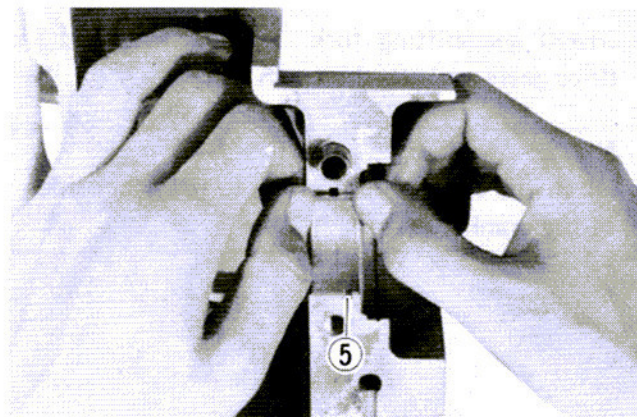
④ : for upper crankcase



- When fitting the bearings to the crankcase, be sure to fix the stopper part ⑤ first and press the other end.

CAUTION:

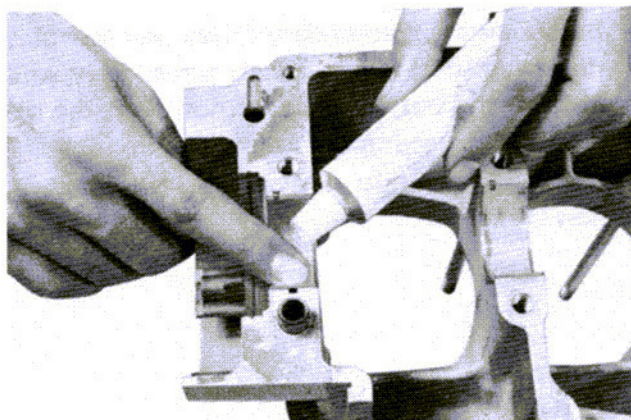
Do not touch the bearing surfaces with your hands. Grasp by the edge of the bearing shell.



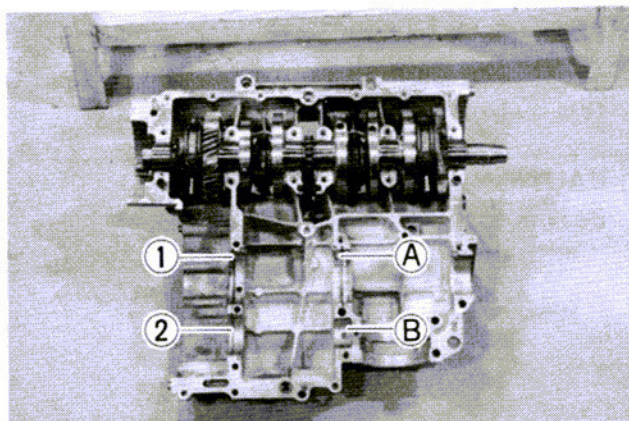
- Apply SUZUKI Moly Paste to each journal bearing lightly.

99000 - 25140

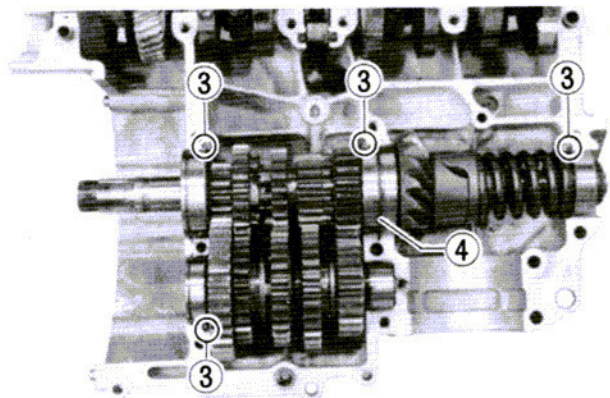
SUZUKI Moly Paste



- Mount the crankshaft with cam drive chain to the upper crankcase.
- Apply SUZUKI super grease "A" to the lip of the crankshaft oil seal.
- Install the two C-rings to the positions ① and ② as shown.



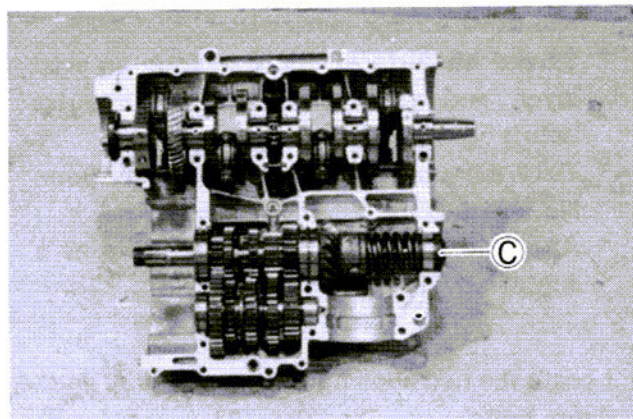
- Connect the mainshaft to the output shaft.



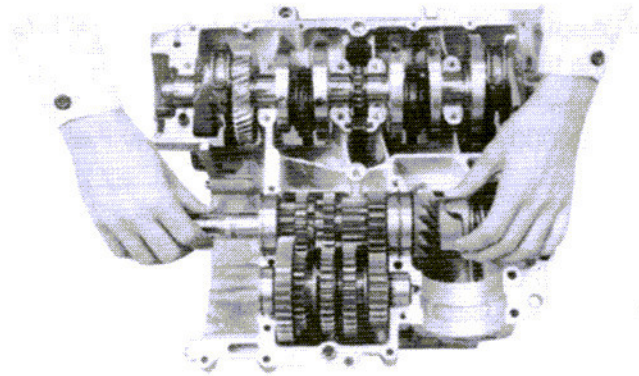
- Mount the both mainshaft with output shaft and layshaft on the upper crankcase.

NOTE:

- * Be sure to install the bearing dowel pins ③ in the respective positions.
- * Install the positioning ring ④ of the output shaft bearing to the groove A of the crankcase.
- * Align dent of the layshaft bearing with the positioning pin B.
- * Install the output shaft end cap to the position C.



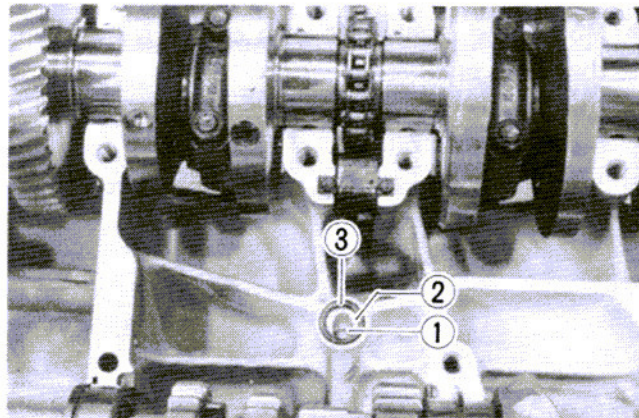
- Before installing secondary driven gear assembly, make sure that the mainshaft turns freely while holding the output shaft. If not, shift the gear which is engaged to the neutral position.
- Install the secondary driven gear assembly with new O-ring.



- Check oil jet ① for clogging. Locate the washer ② (oil jet stopper) and O-ring ③ to the respective positions.

CAUTION:

Be sure to replace the new O-rings.



- Clean the mating surfaces of the crankcases before matching the upper and lower ones.
- Apply SUZUKI BOND No. 1215 to the mating surface of the lower crankcase in the following procedure.

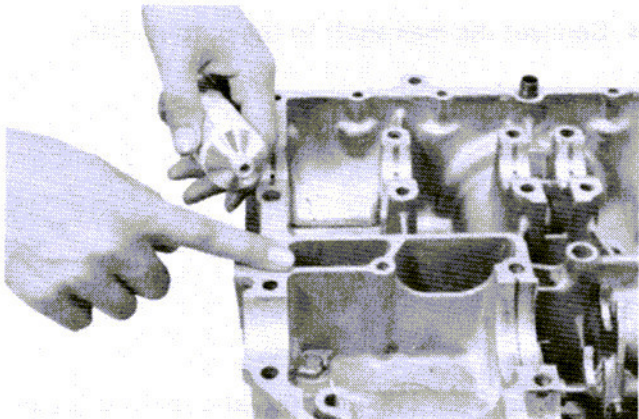
99104 - 31110

SUZUKI Bond No. 1215

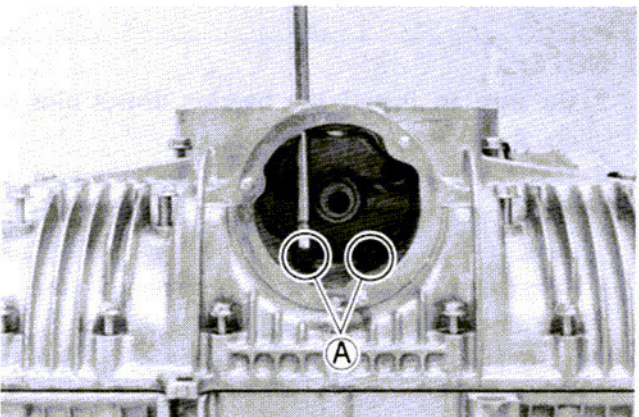
NOTE:

Use of SUZUKI BOND No. 1215 is as follows:

- * Make surfaces free from moisture, oil, dust and other foreign materials.
- * Spread on surfaces thinly to form an even layer, and wait for around 10 minutes before assembling.
- * Take extreme care not to apply any bond No. 1215 to the bearing surfaces.
- * Apply to distorted surface as it forms a comparatively thick film.



- Locate the two allen bolts at position ① and ten 8 mm bolts.



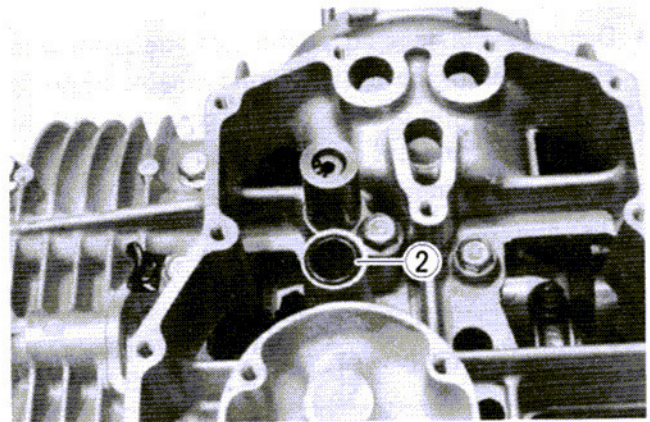
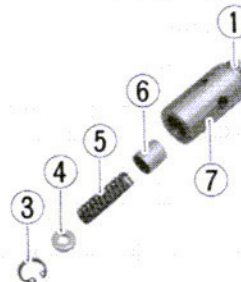
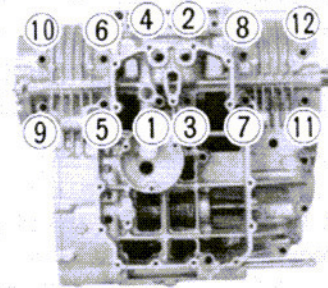
- When securing the lower crankcase, tighten the 8 mm bolts and the 6 mm bolts in the ascending order of numbers assigned to these bolts, tightening each bolt a little at a time to equalize the pressure. Tighten all the securing bolts to the specified torque values.

09914 - 25811

6 mm T-type hexagon wrench

Tightening torque	Initial tightening		Final tightening	
	kg-m	lb-ft	kg-m	lb-ft
6 mm bolt	0.6	4.5	1.3	9.5
8 mm bolt	1.3	9.5	2.4	17.5

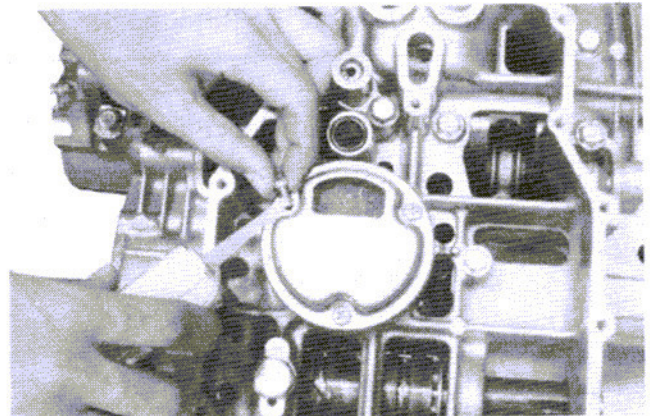
- Install the oil pressure regulator with new O-ring ①
- Install the new O-ring ②
 - ① O-ring
 - ③ Snap ring
 - ④ Spring stopper
 - ⑤ Spring
 - ⑥ End piece
 - ⑦ Body



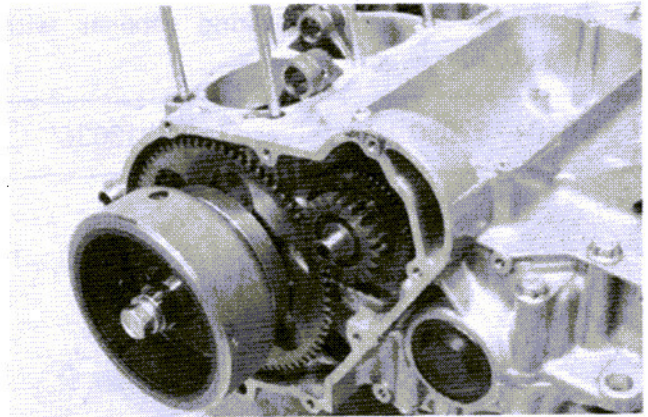
- Install the oil sump filter to face the oil inlet to the front.
- Apply thread lock "1363C" to the three screws.

99104 - 32050

Thread Lock "1363C"



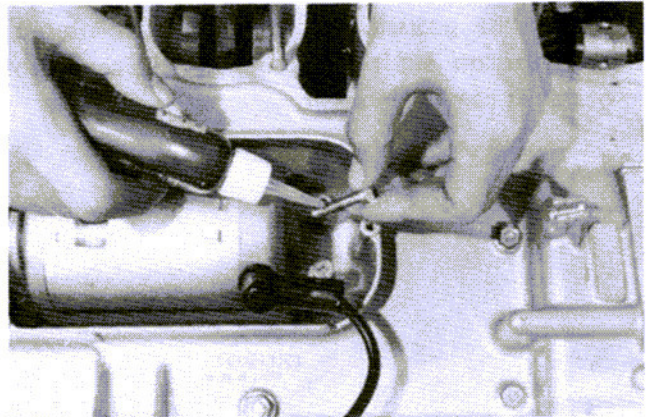
- Install the starter idle gear and its shaft.



- Mount starter motor, and route the lead wire properly.

99104 - 32050

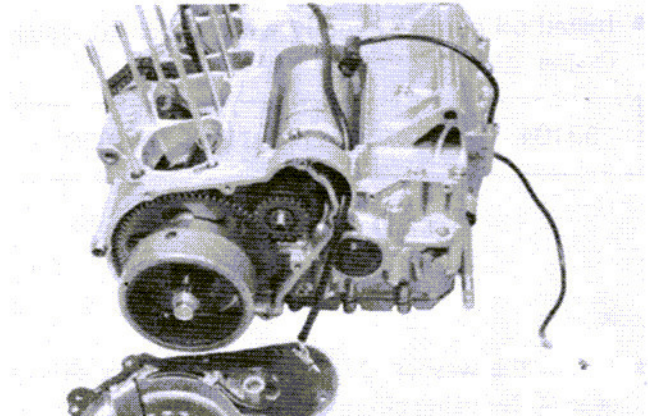
Thread Lock "1363C"



- Pass the generator stator lead wire through gasket and upper crankcase. Route its lead wire properly.

NOTE:

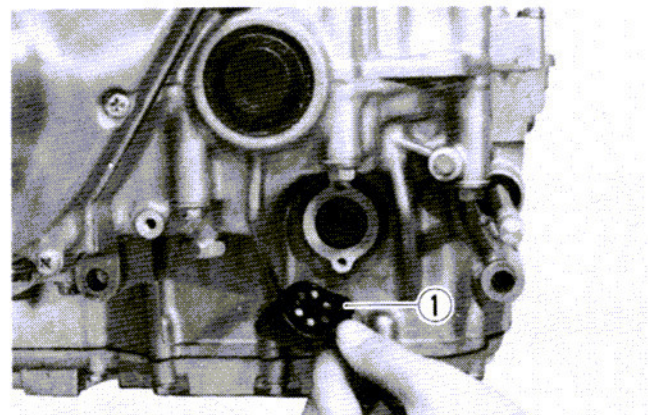
Always use new gasket, and install knock pin.



- Install the gear position indicator switch ①.

NOTE:

When installing gear position indicator switch, be sure to locate spring, switch contact, and O-ring.

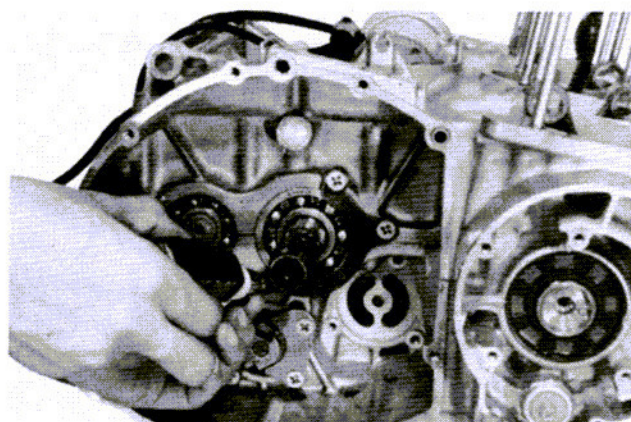


- Install the mainshaft bearing retainer with three (16 mm length) screws.

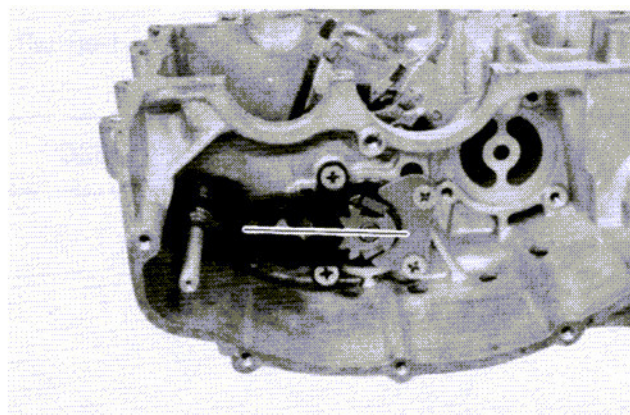
99104 - 32050

Thread Lock "1363C"

R.H. crankshaft seal installed so Zaner Lip and spring positioned Towards inside of Engine.



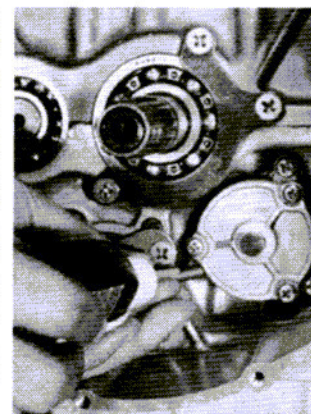
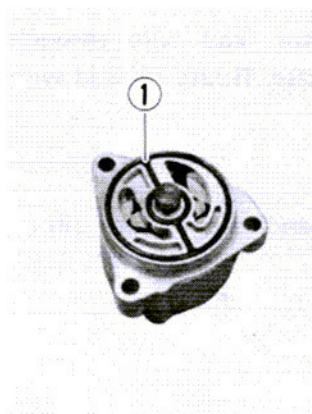
- Install the gearshift shaft with the center of the gear on shaft side aligned the center of gearshift cam driven gear.



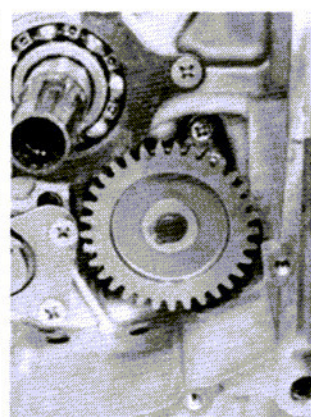
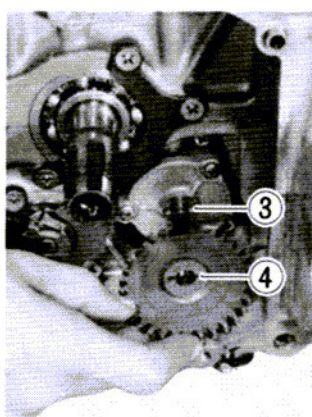
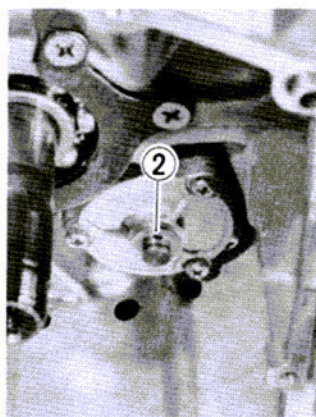
- Install oil pump assembly without fail to install O-ring ①.

99104 - 32050

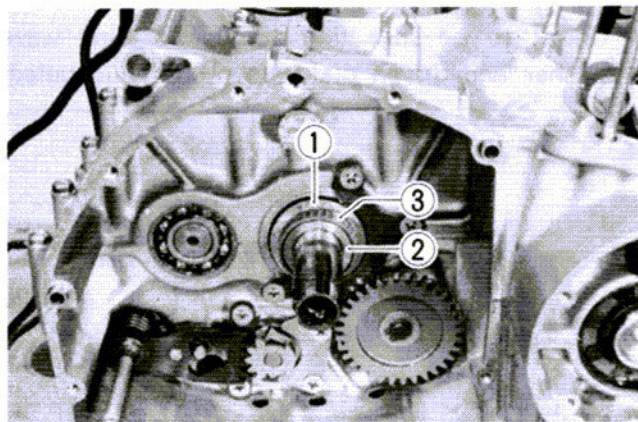
Thread Lock "1363C"



- Install the washer ②, drive pin ③ and driven gear ④ by using circlip opener.

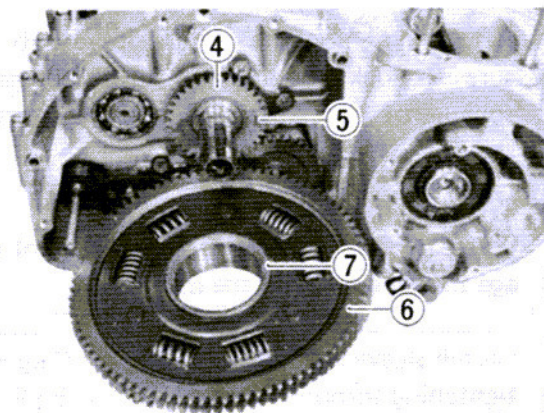


- Install the washer ①, oil pump driven gear spacer ② and bearing ③.
- Apply engine oil to the oil pump drive gear bearing.

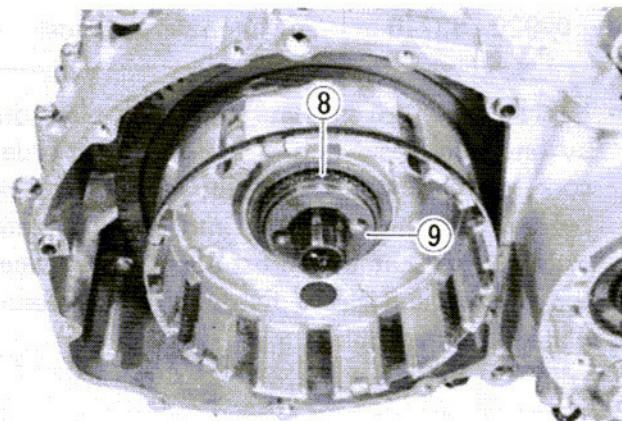


- Fix the drive gear ④ to face the protorusions ⑤ outside.
- Assemble the primary driven gear ⑥ so that the protorusions ⑤ align with the notch ⑦ behind the primary driven gear.

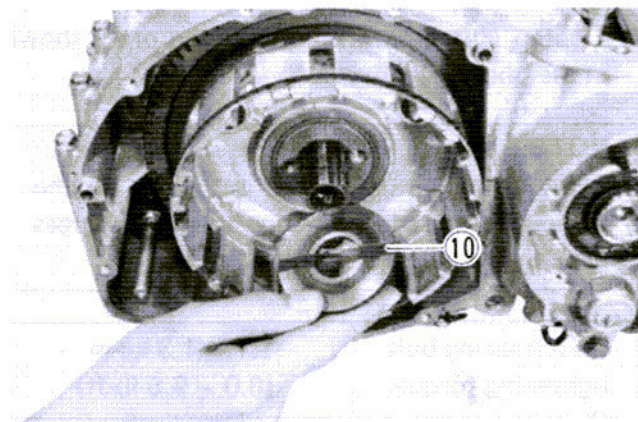
R.H. crankshaft seal positioned so
lip + spring installed toward inside
of engine.



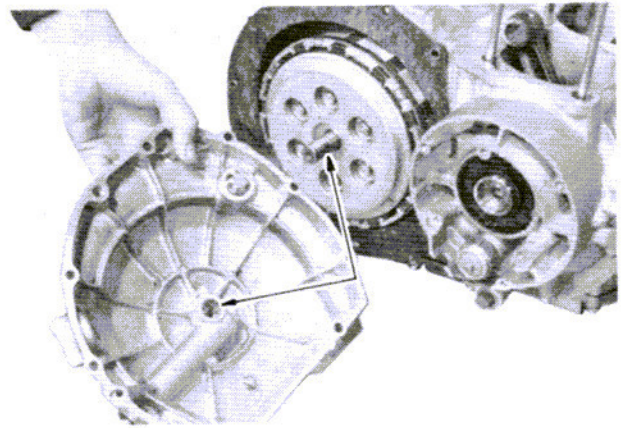
- Oil the needle bearing ⑧ and spacer ⑨ and install the oil groove on the spacer facing inside.



- Thrust washer must be installed with the oil groove side ⑩ facing in.

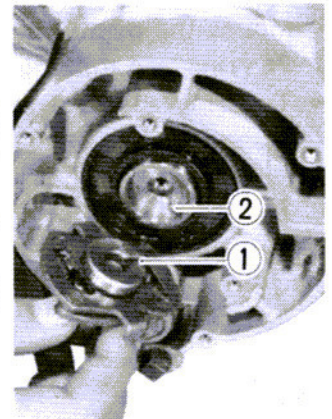
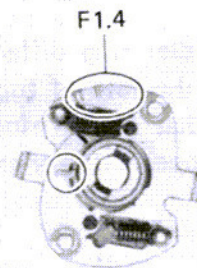


- Replace clutch cover gasket with new one to prevent oil leakage.
- Engage the teeth of clutch release rack with those of pinion gear at the clutch cover side, and replace clutch cover. Make sure that the rack and pinion gear engage positively. To install cover, tap lightly with plastic hammer, and tighten screws.



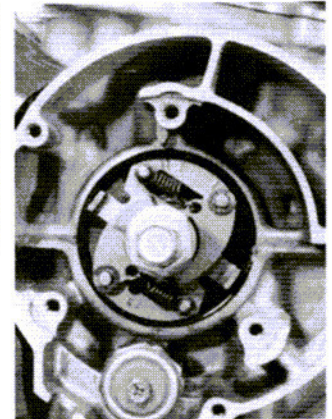
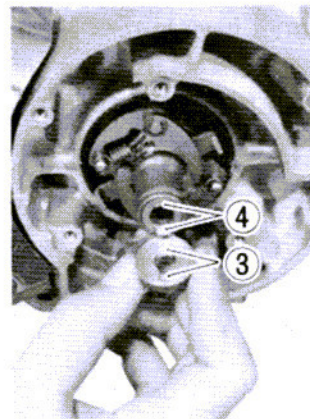
- Install the signal generator rotor to the advance governor properly.
- Make sure to fit the slot ① on the back surface of the automatic advance governor over the locating pin ② at the end of crankshaft.

R.H. Crankshaft seal positioned so L.P. and spring toward inside of engine.

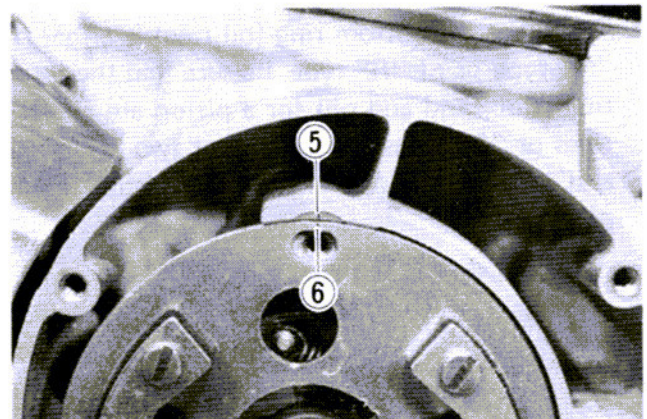


- Fit the groove ③ of the crankshaft turning nut on protrusion ④ of the advance governor body.
- Hold the crankshaft turning nut and tighten the governor center bolt with specified torque.

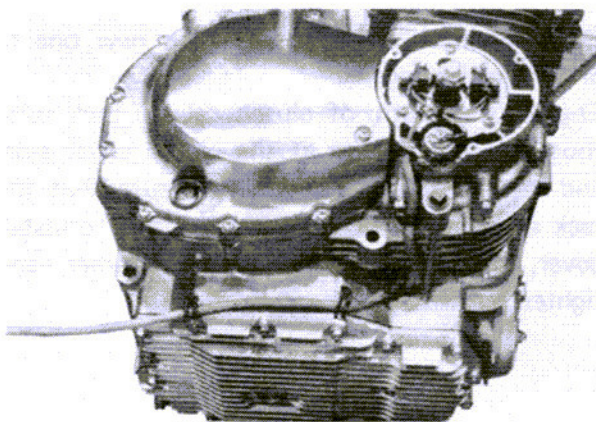
Tightening torque	1.3 – 2.3 kg-m (9.5 – 16.5 lb-ft)
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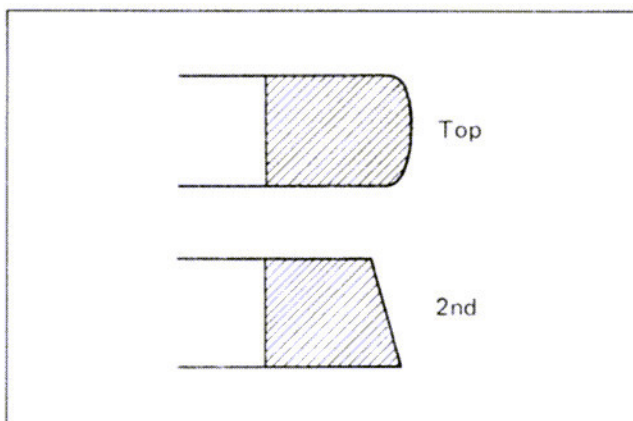
- Install the signal generator so that the index line ⑤ aligns with the center ⑥ of the fitting screw.
- Install the lead wire to the oil pressure switch.



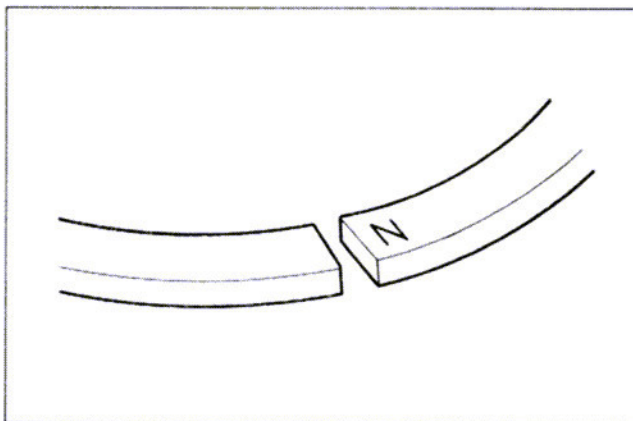
- Route the signal generator lead wire as shown.



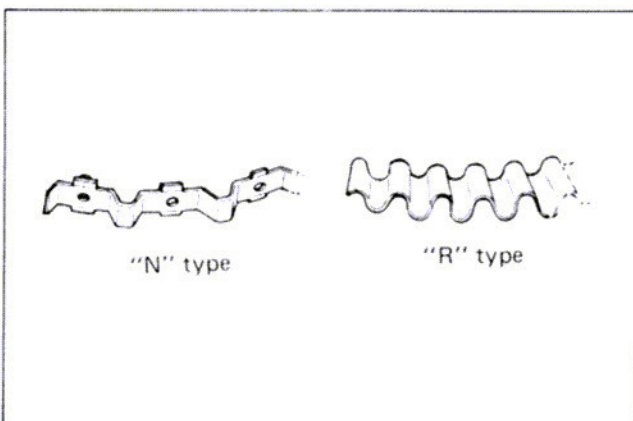
- Mount the piston ring in the order of oil ring, 2nd ring, and top ring.
- Top ring and 2nd (middle) ring differ in the shape of ring face, and the face of top ring is chrome-plated whereas that of 2nd ring is not. The color of 2nd ring appears darker than that of the top one.



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



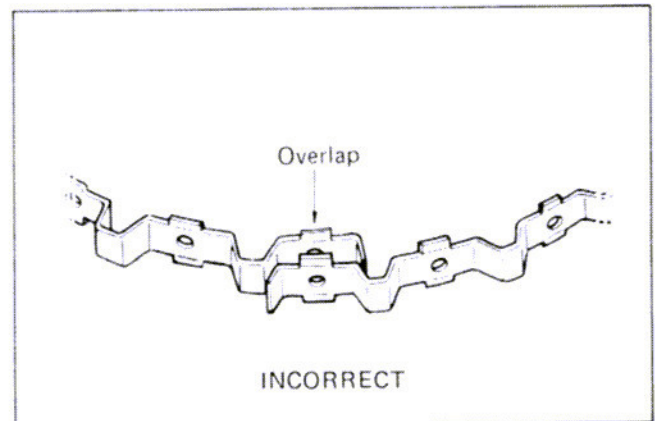
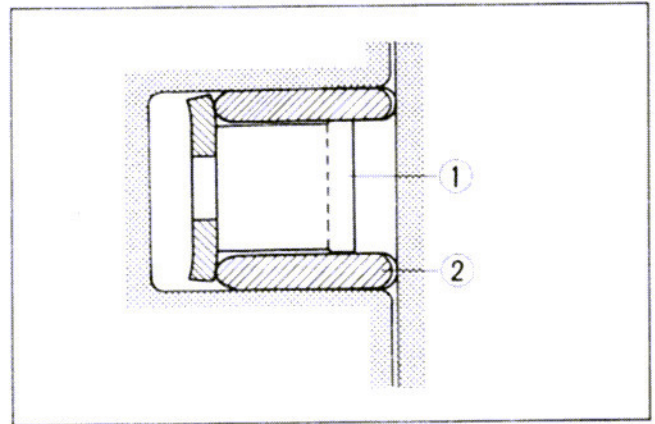
- The spacer of bottom ring (oil ring) is either of "N" type or of "R" type. Be sure that the three rings (top, 2nd and oil) for a piston are all "N" rings or "R" rings: use of one or two "N" rings and two or one "R" rings on a piston is not permitted.



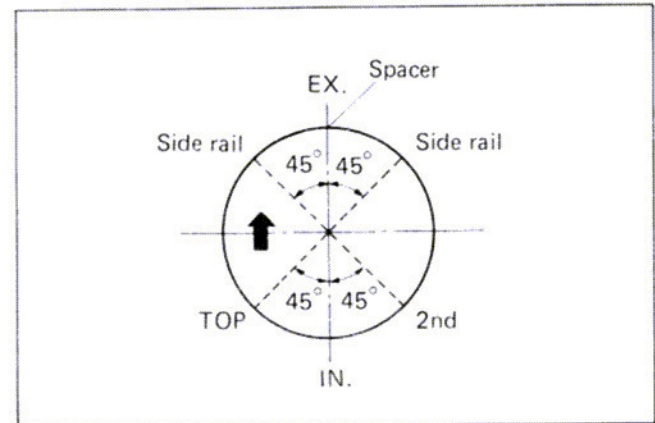
- The first member to go into the ring groove is spacer ①. After placing spacer, fit the two side rails ②. Side designations, top and bottom, are not applied to the spacer and side rails: you can position each either way.

CAUTION:

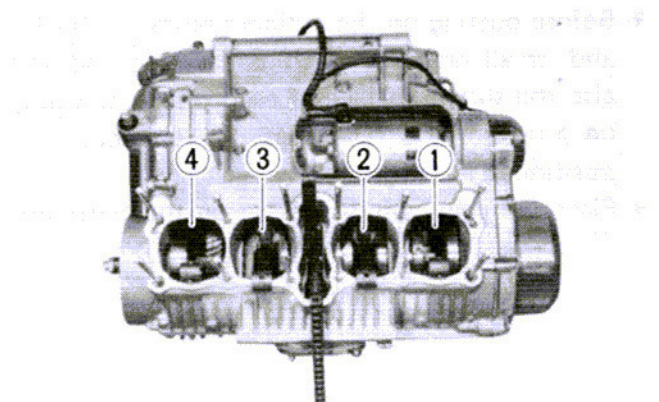
If the spacer is of "N" type, be careful not to allow its two ends to overlap in the groove.



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



- The piston is in correct position when its arrow (on the crown) points forward.
- Be sure to install the pistons in the cylinder from which they were taken out in disassembly, refer to the letter mark, "1" through "4", scribed on the piston.



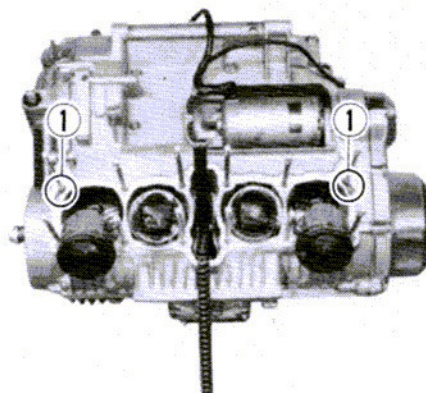
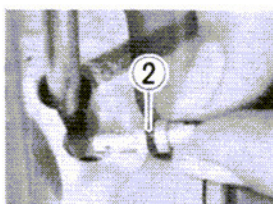
- Have each piston oiled lightly before installing it.
- Place a rag beneath the piston, and install the circlip.

CAUTION:

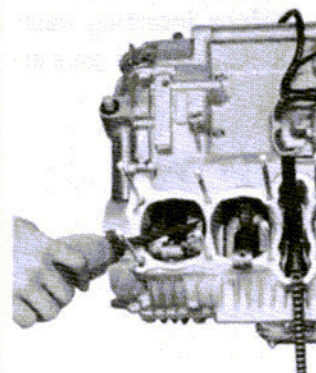
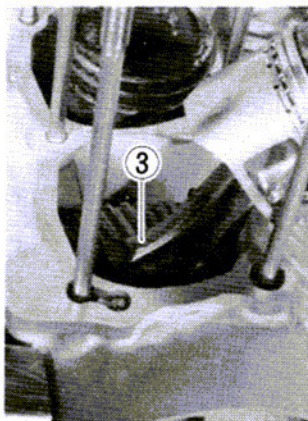
Be sure to use new circlips.



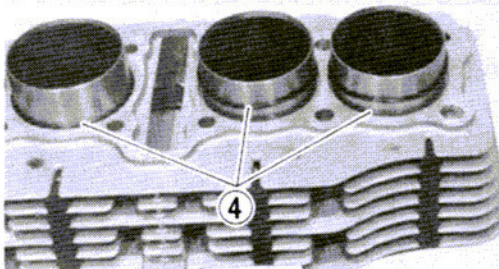
- Check to be sure two oil jet orifices ① are not clogged.
- Install the new O-ring ②.



- Make sure that the conrod oil hole ③ is located rearside.
- Oil the conrod big end and primary drive gear.



- Before putting on the cylinder block, oil the big and small ends of each connecting rod and also the sliding surface of each piston. Check to be sure that the "O" rings ④ are accurately positioned in the groove.
- Place the new cylinder gasket on the crankcase.

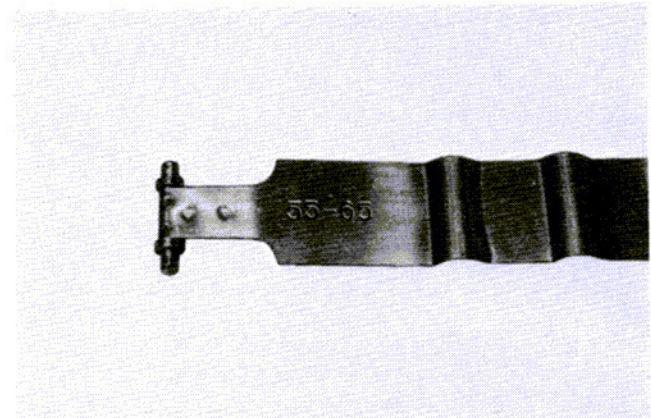
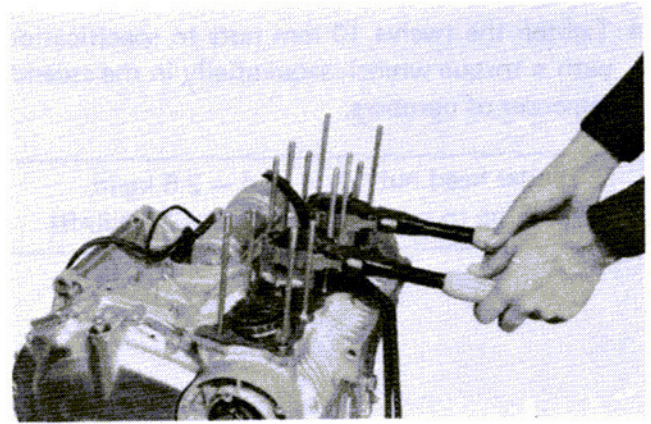


- Install piston ring holders in the indicated manner. Some light resistance must be overcome to lower the cylinder block.
- With No. 2 and No. 3 pistons in place, install No. 1 and No. 4 pistons, and insert them into the cylinder.

09916 - 74520	Holder body
09916 - 74530	Band (Bore 55 — 65 mm)

NOTE:

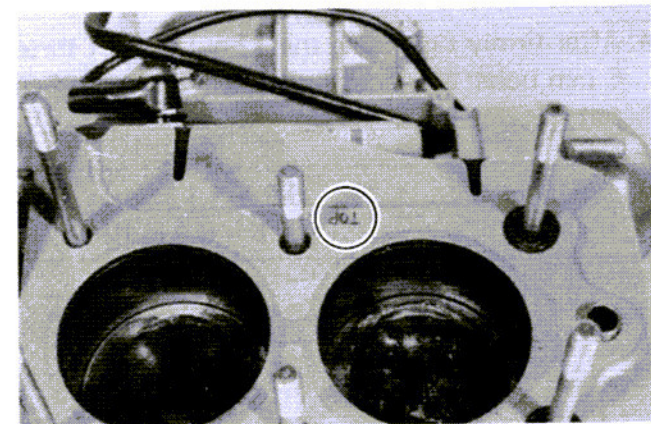
- * Do not overtighten the special tool bands or the cylinders will resist to admit the pistons.
- * Each band has a number punchmarked on it. The number refers to a particular range of piston sizes.



- Be sure to replace cylinder head gasket with new one to prevent gas leakage.

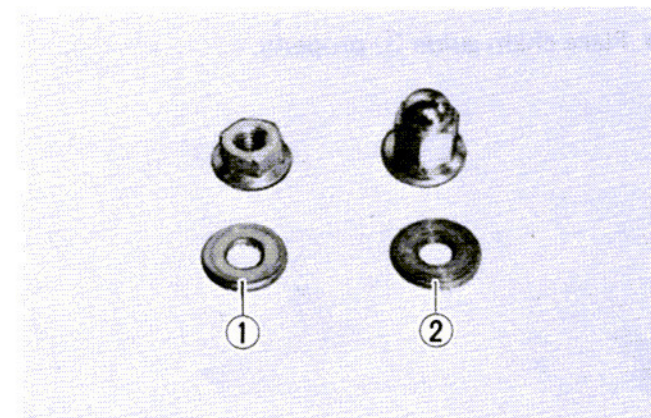
NOTE:

Be sure to identify the "top" surface of the cylinder head gasket as shown.



- Fix two knock pins properly.

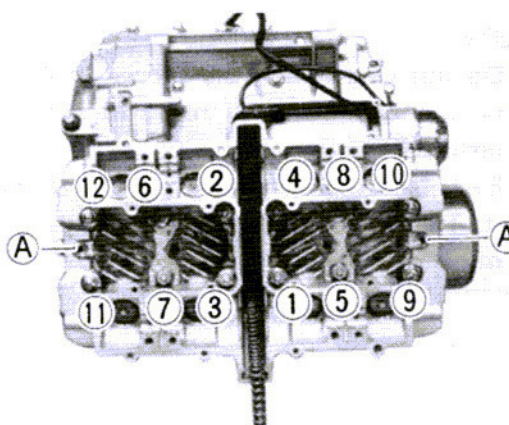
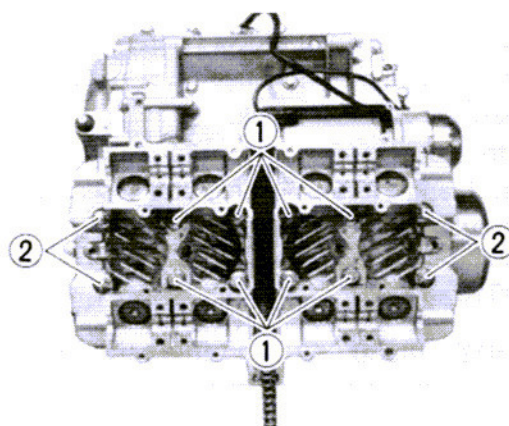
- Mount the cylinder head on the cylinder block.
- Install two kinds of cylinder head nuts in the respective positions indicated.



- ① Iron washer
- ② Copper washer

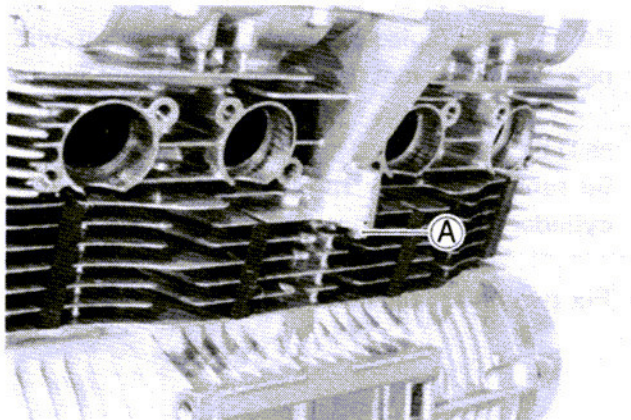
- Tighten the twelve 10 mm nuts to specification with a torque wrench sequentially in the ascending order of numbers.

Cylinder head nut tightening torque	2.4 – 2.6 kg-m (17.5 – 19.0 lb-ft)
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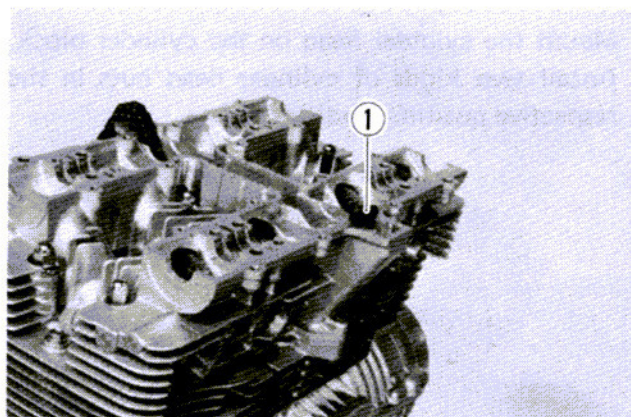


- After firmly tightening the 12-nuts, insert three 6 mm bolts (A) and tighten them with specified torque.

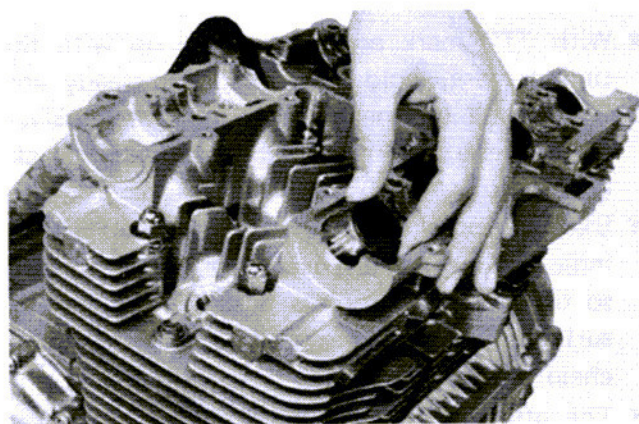
Tightening torque	0.9 – 1.1 kg-m (6.5 – 8.0 lb-ft)
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- Place chain guide ① properly.



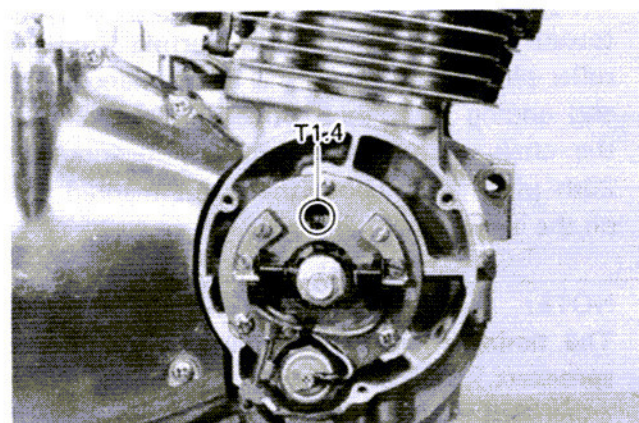
- Install each tappet to their original positions.



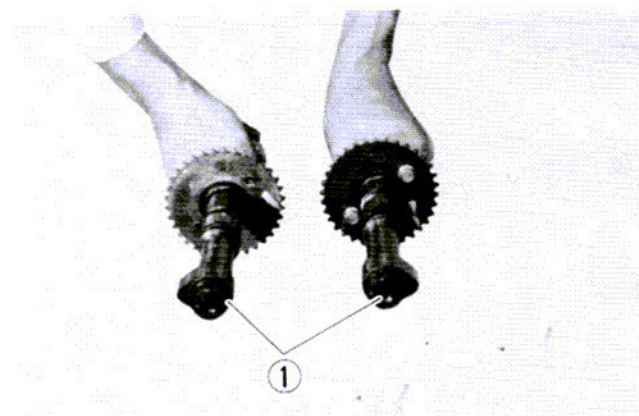
- While holding down the timing chain, rotate the crankshaft in normal direction to bring the "T" mark (on Nos. 1 and 4 cylinder side of the advance governor) to the timing mark.

CAUTION:

To turn over crankshaft, torque nut with a 19 mm wrench. Never try to rotate crankshaft by putting a 12 mm wrench to bolt.

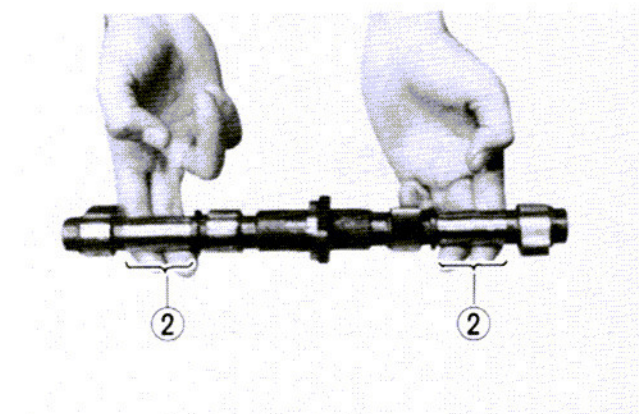


- The exhaust camshaft can be distinguished from that of the intake by the embossed letters "EX" (for exhaust) as against letters "IN" (for intake). Similarly, the right end can be distinguished by the notch ① at the right end.



NOTE:

Just before placing the camshaft on the cylinder head, apply high quality molybdenum disulfide lubricant to its journals, fully coating each journal ② with the paste taking care not to leave any dry spot. Apply engine oil to the journal bearings.



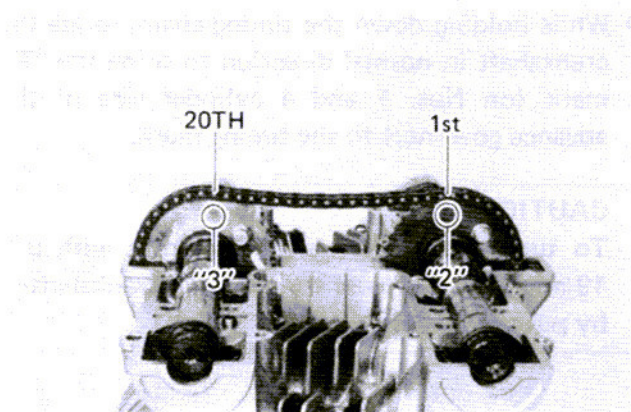
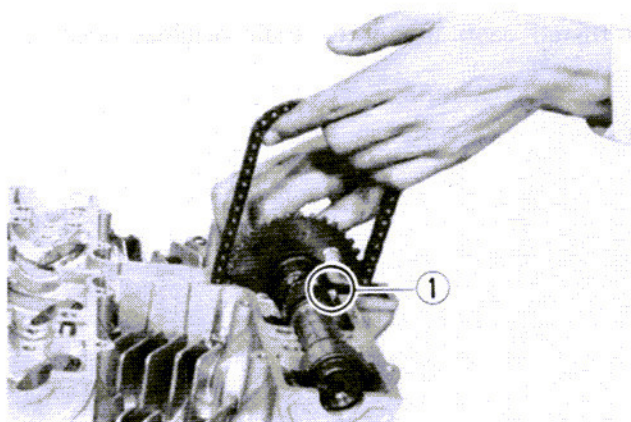
99000 - 25140

SUZUKI Moly Paste

- With "T" mark accurately lined up with the timing mark, hold the crankshaft steady and lightly pull up the chain to remove the slack between the crank sprocket and exhaust sprocket.
- Exhaust sprocket bears an arrow marked "1" indicated as ①. Turn over the exhaust camshaft so that the arrow points flush with the gasketed surface of the cylinder head. Engage the timing chain with this sprocket.
- The other arrow marked "2" is now pointing straight upward. Count the chain roller pins toward the intake camshaft, starting from the roller pin directly above this arrow marked "2" and ending with the 20th roller pin. Engage the chain with intake sprocket, locating the 20th pin at and above the arrow marked "3" on the intake sprocket.

NOTE:

The timing chain is now riding on all three sprockets. Be careful not to disturb the crankshaft until the four holders and chain tensioner adjuster are secured.



- Each camshaft holder is identified with a cast-on letter with a triangle. A matching cast-on symbol appears on the head. Install each holder at it's matching letter, with triangle symbols pointing forward.
- Secure the four camshaft journal holders evenly by tightening the camshaft journal holder bolts sequentially. Try to equalize the pressure by moving the wrench diagonally from one bolt to another and from one camshaft journal holder to another, to push shafts down evenly.

NOTE:

Damage to head or cam journal holder thrust surfaces may result in the situation that cam journal holders are not drawn down evenly.

- Tighten the camshaft journal holder bolts to the following torque value:

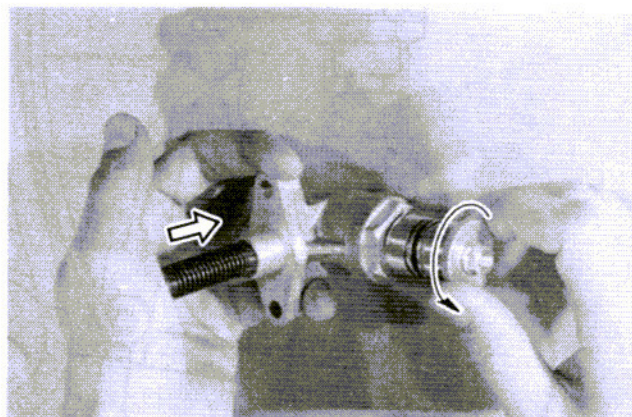
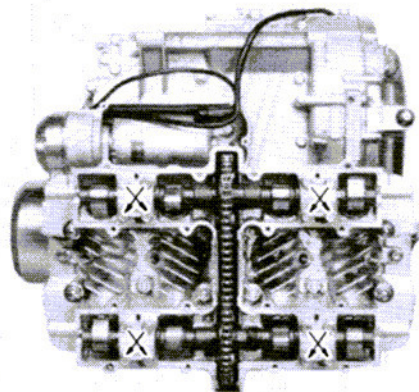
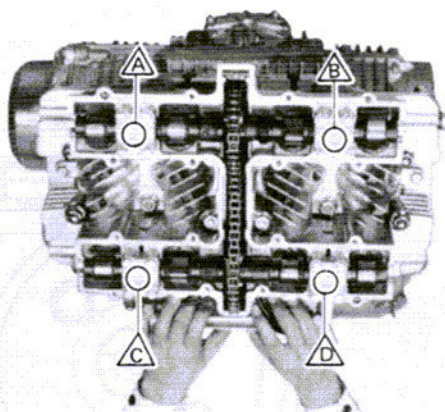
CAUTION:

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

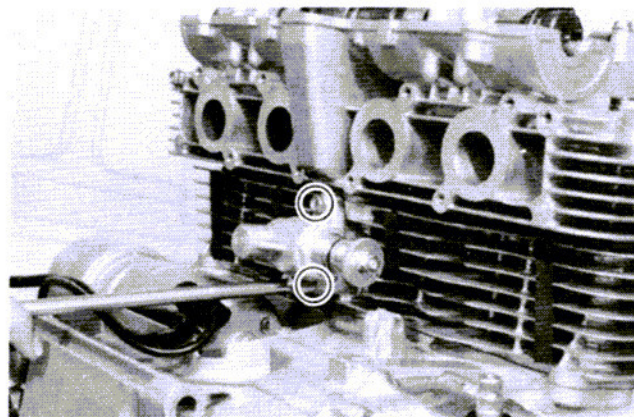
Take special care not to use other types of bolts instead of these special bolts. To identify these bolts, each of them has a figure "9" on its head.

Camshaft journal
holder bolt
tightening torque

0.8 – 1.2 kg-m
(6.0 – 8.5 lb-ft)



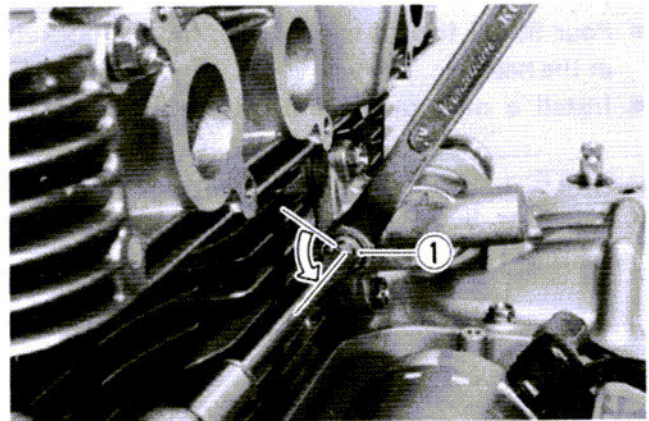
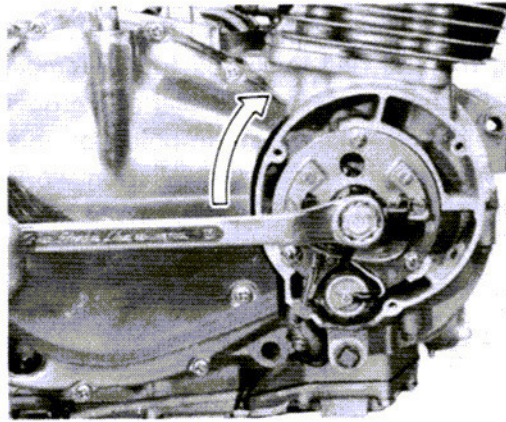
- While turning lock shaft handle counterclockwise, push in the pushrod all the way. Keep on turning the handle until it refuses to turn further.
- Tighten the lock screw to lock the pushrod, so that the pushrod will not plunge out.
- Secure the adjuster to the cylinder block.



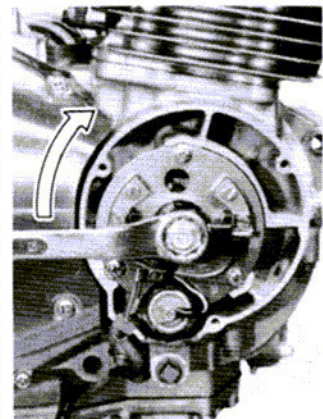
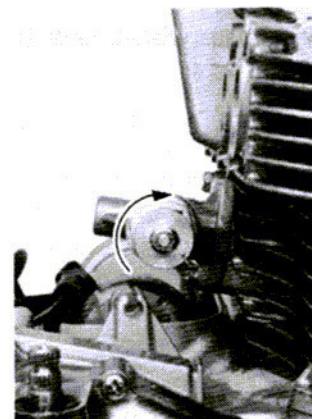
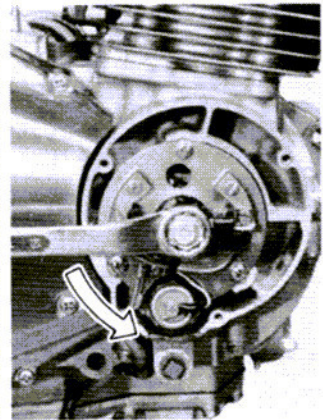
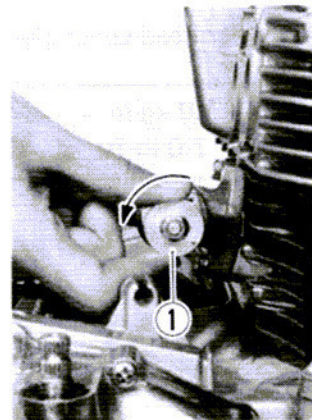
- If tensioner adjuster is not going in, turn the crankshaft slowly clockwise to get chain play at inlet side.
- Withdraw the lock screw by one-quarter to half a turn: this separates the tip of the screw from the pushrod, thereby allowing the pushrod to advance under spring force and to press the tensioner against the camshaft chain.
- Tighten the lock nut ①.

NOTE:

When tightening the lock nut, take care to prevent the lock screw from turning.

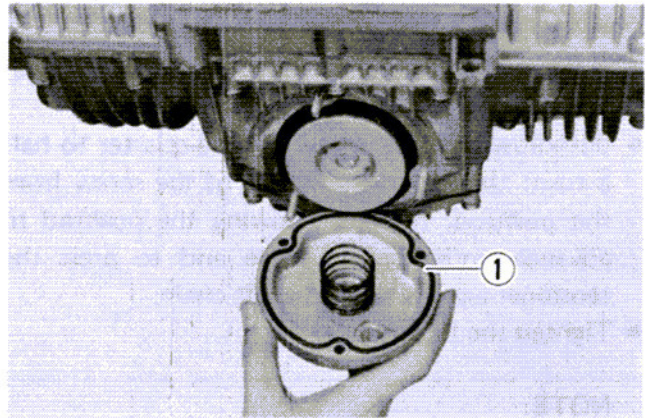


- While turning the handle ① counterclockwise, slowly rotate the crankshaft in reverse direction (thus causing the chain to push back the tensioner).
- Release the handle and slowly turn back the crankshaft in normal running direction (to slacken that portion of the chain extending along the tensioner). See if the handle rotates by itself as the chain becomes progressively slackened; if it does, then the pushrod inside is obviously moving forward under spring force as it should, thus signifying that the tensioner is in good operable condition. If the handle rotates, but sluggishly, it means that the pushrod or lock shaft is sticking and, in such a case, remove the tensioner and service the pushrod and lock shaft to make them move smoothly.

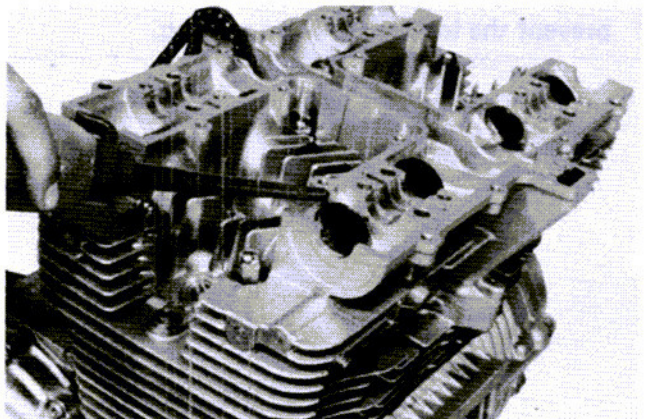
**CAUTION:**

After installing the tensioner and checking it in initially set condition for operation, do not attempt to turn the handle in either direction until the next overhaul.

- Adjust the tappet clearance. (see page 2-5).
- In fitting the seal ring to the oil filter chamber cap, lightly coat grease on the seal ring groove ① to avoid any chance of dropping or mislocating the ring during the installation work.
- Install engine oil drain plugs.



- Pour 50 ml (cc) of engine oil in four oil pockets in the head.
- Install a new gasket and cylinder head cover.

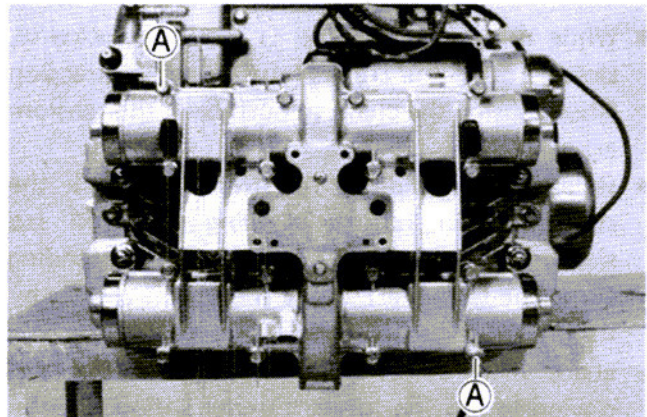


NOTE:

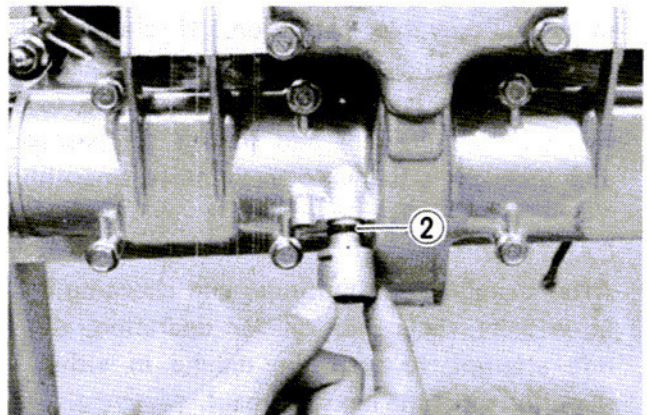
Place the two longer bolts at the knock pin positions ①.

- Install a new gasket and cylinder head cover cap.

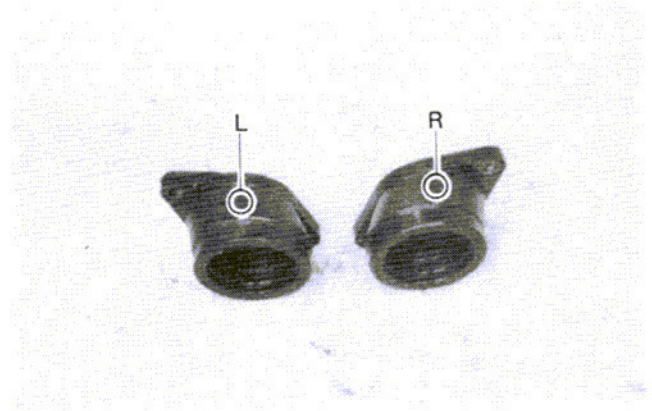
Tightening torque	0.9 – 1.0 kg-m (6.5 – 7.0 lb-ft)
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- Install the tachometer drive gear with a new O-ring ②.



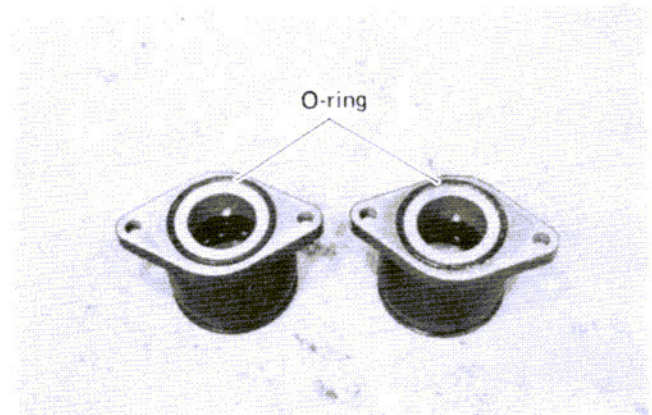
- Each cylinder head intake pipe is identified with a letter "R" for right side or "L" for left side on it. Fit each pipe to cylinder head properly.



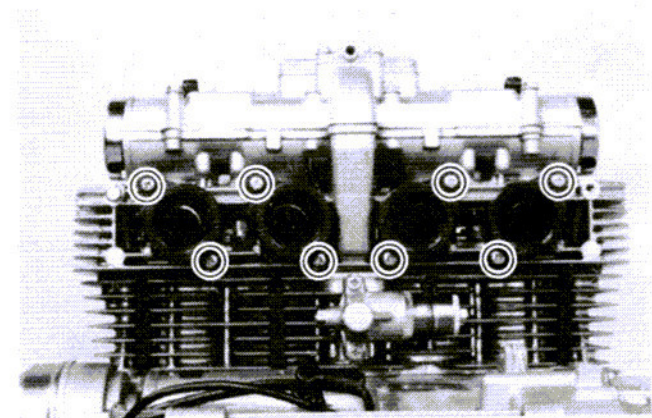
- Install new O-ring to the intake pipe groove as shown.

CAUTION:

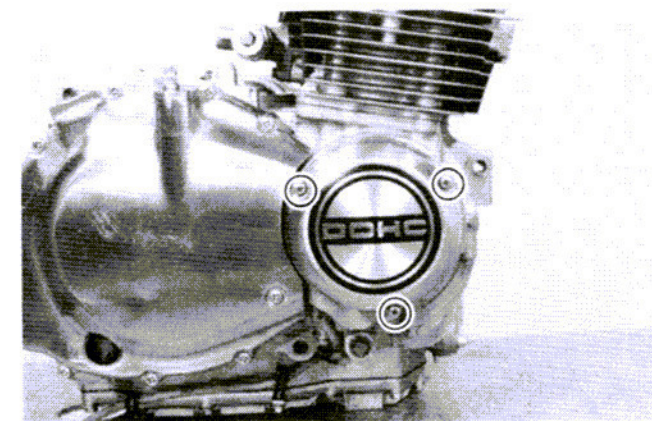
Always use new O-rings to prevent sucking air from the joint part.



- Install each intake pipe to the cylinder head properly.



- Install the signal generator cover and gasket with three screws.



SHAFT DRIVE

CONTENTS

OUTPUT SHAFT.....	4- 1
SECONDARY DRIVEN BEVEL GEAR.....	4- 4
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FINAL GEAR CASE BREATHER CIRCUIT.....	4-12
FINAL DRIVE AND DRIVEN GEARS	4-13
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FINAL GEAR BEARING COVER SHIM CLEARANCE	4-24
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OUTPUT SHAFT DISASSEMBLY

NOTE:

When removing the output shaft assembly from the crankcase, separate the upper and lower crankcase halves. (Refer to chapter 3 "Servicing engine")

- Using the special tool, compress the spring.

09924 - 44510	Dog cam stopper set tool
09924 - 44520	Bolt, dog cam stopper set tool

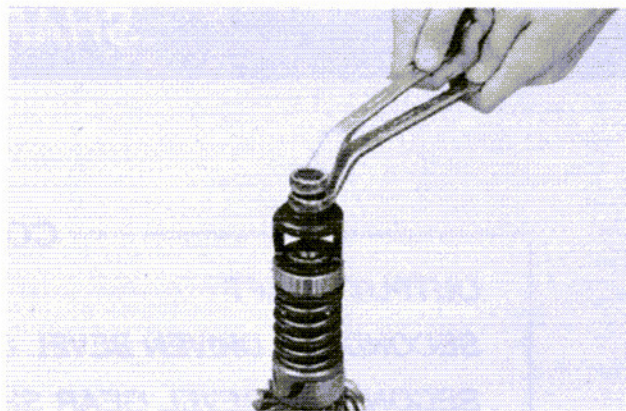
- Remove the two cam dog stoppers ① .

CAUTION:

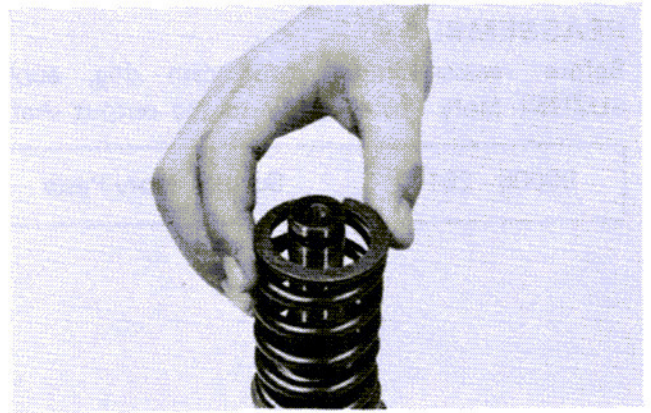
When removing the special tool from the output shaft assembly, pay attention that the spring load is released and bearing is push upside.

- Remove the cam stopper dog holder and bearing.

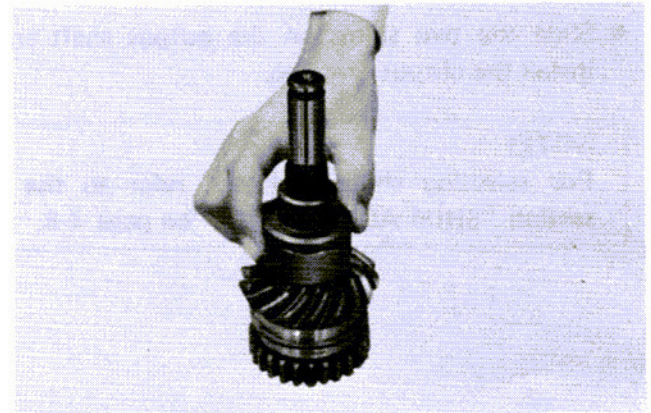
- Remove the cam dog sliding stopper.



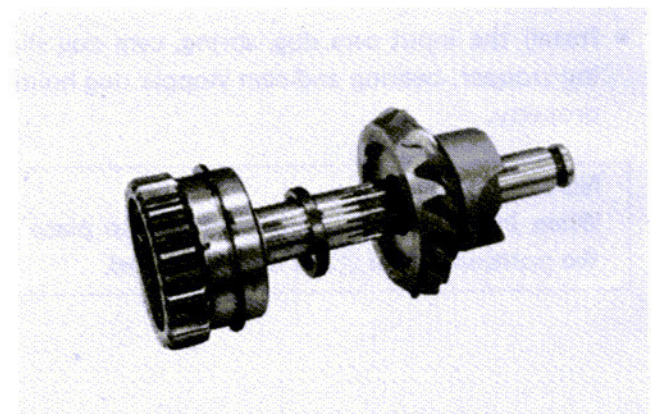
- Remove the cam dog spring.



- Remove the input cam dog.

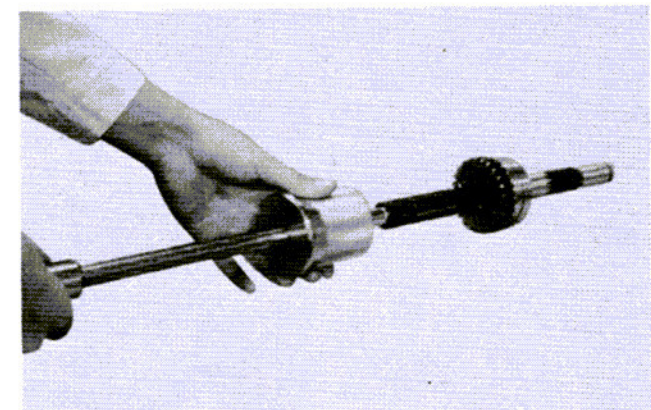


- Remove output cam dog with the secondary drive bevel gear.



- Using the bearing puller and sliding shaft, remove the output shaft bearing.

09923 - 73210	Bearing puller
09930 - 30102	Sliding shaft



REASSEMBLY

Before reassembling output cam dog, apply SUZUKI Moly Paste lightly to the output shaft.

99000 - 25140	Suzuki Moly Paste
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- Slide the two shims on the output shaft and install the output cam dog.

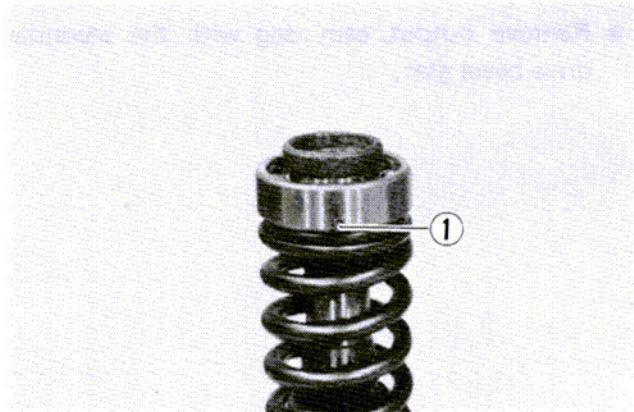
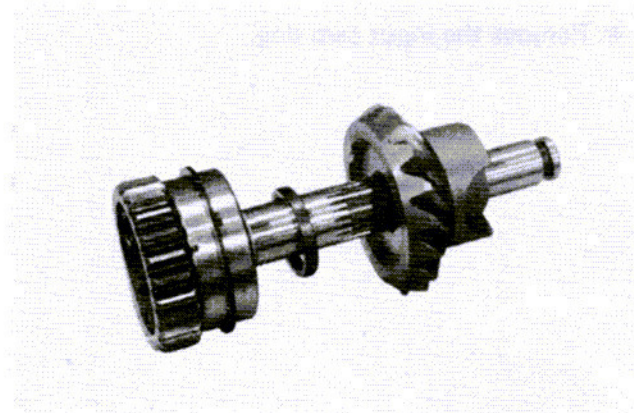
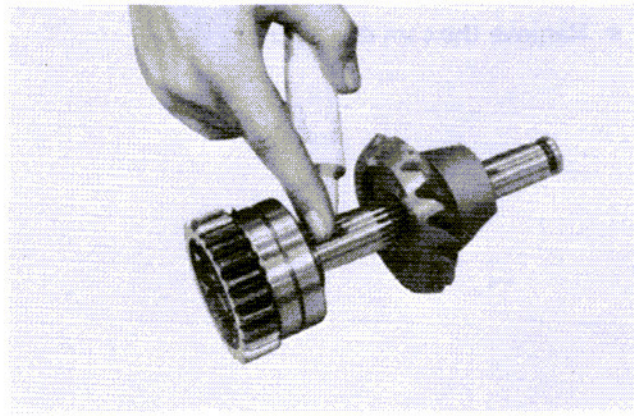
NOTE:

For selecting shim thickness, refer to the section "SHIM ADJUSTMENT" on page 4-8.

- Install the input cam dog, spring, cam dog sliding stopper, bearing and cam stopper dog holder properly.

NOTE:

When installing the bearing, be sure to place the positioning pin ① to the downward.

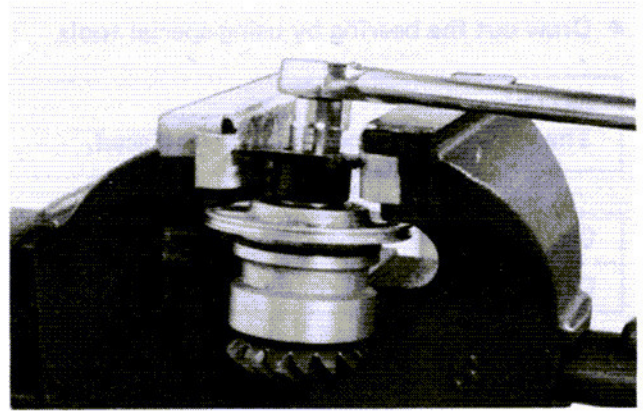


SECONDARY DRIVEN BEVEL GEAR DISASSEMBLY

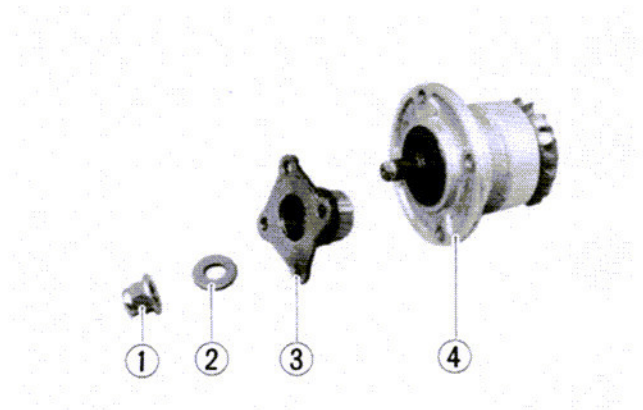
- By holding the flange with a vice, remove the nut.

NOTE:

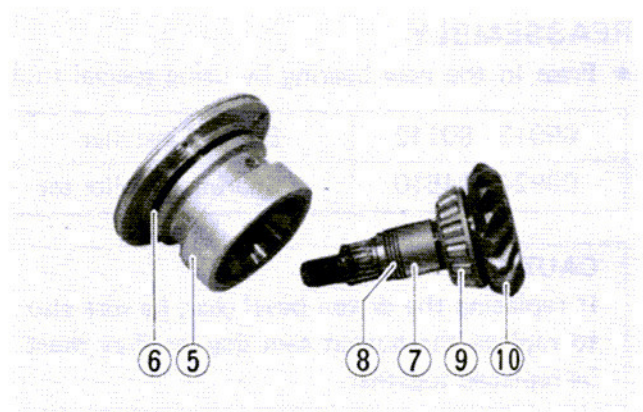
Hold the driven bevel gear by hand to prevent dropping.



- ① Nut
- ② Washer
- ③ Flange
- ④ Housing



- ⑤ Housing
- ⑥ O-ring
- ⑦ Spacer
- ⑧ Shim
- ⑨ Bearing
- ⑩ Driven bevel gear



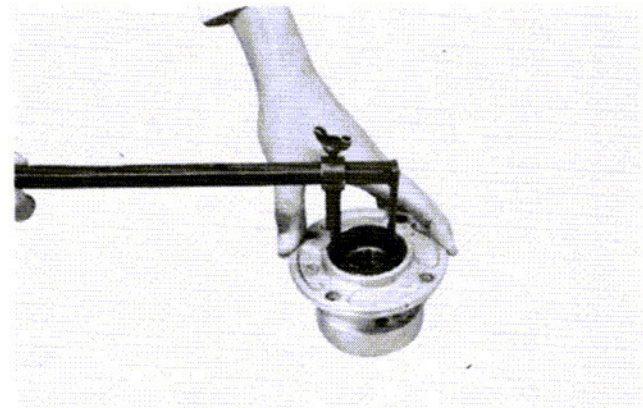
- Using oil seal remover, remove the oil seal from the housing.

NOTE:

Discard the removed oil seal.

09913 - 50121

Oil seal remover

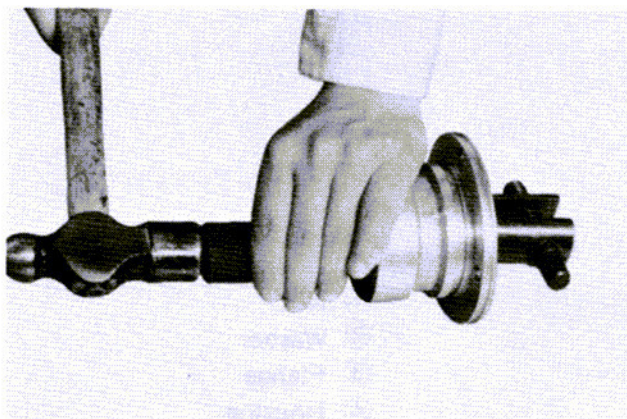


- Draw out the bearing by using special tools.

NOTE:

The removed bearing should be replaced.

09941 - 84510	Bearing remover
09941 - 54911	Bearing outer race remover

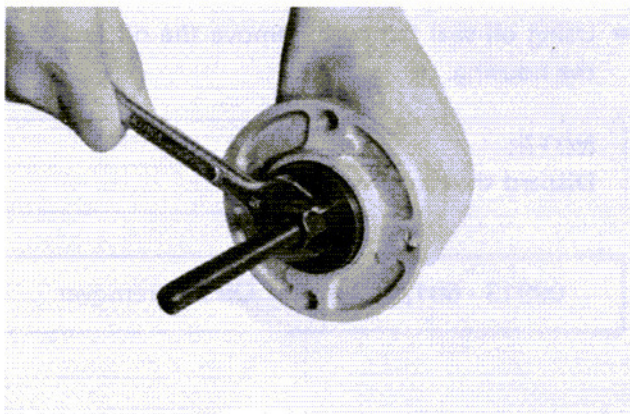
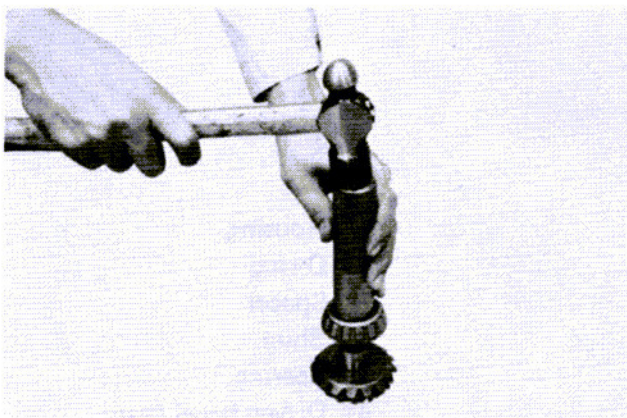
**REASSEMBLY**

- Press in the new bearing by using special tools.

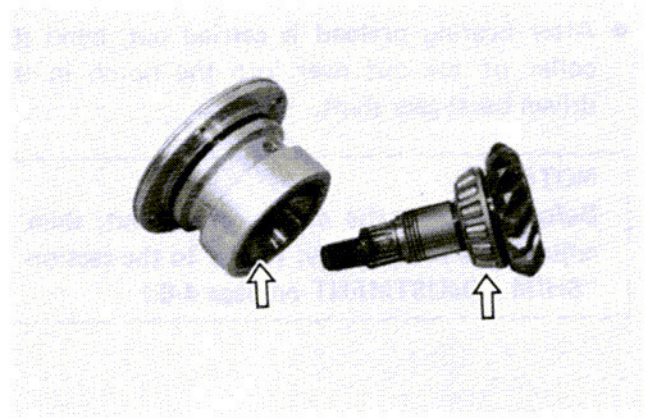
09913 - 80112	Bearing installer
09924 - 84510	Bearing installer set

CAUTION:

If replacing the driven bevel gear, be sure also to replace the output cam dog, as they must be replaced together.



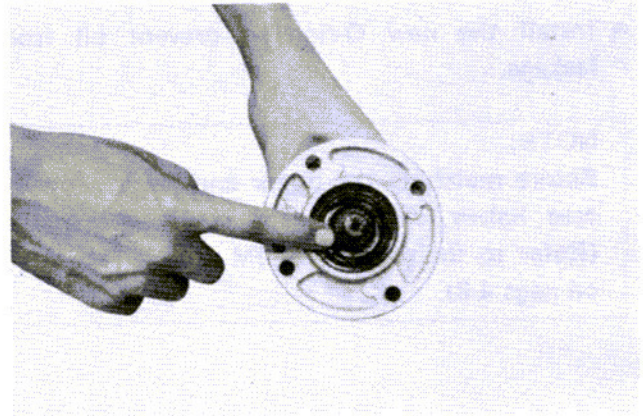
- Apply engine oil to the outer races and bearings.
- Install the spacer and shims.



- Apply grease to the lip of the oil seal lightly.
- Install the driven bevel gear to the housing.

99000 - 25030

Suzuki Super Grease "A"



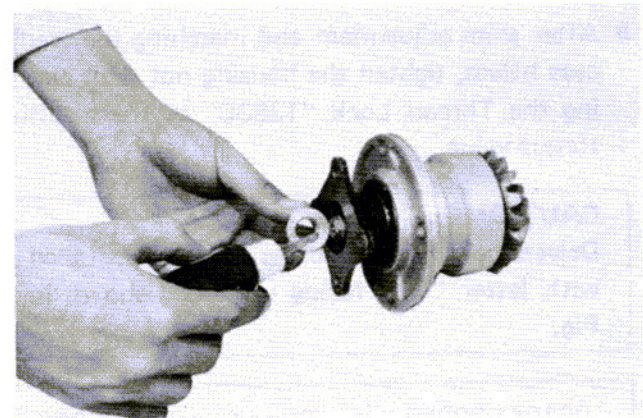
- Install the flange and washer.
- Apply SUZUKI Thread Lock Super "1361A" to the new nut.

99104 - 32020

Thread Lock Super "1361A"

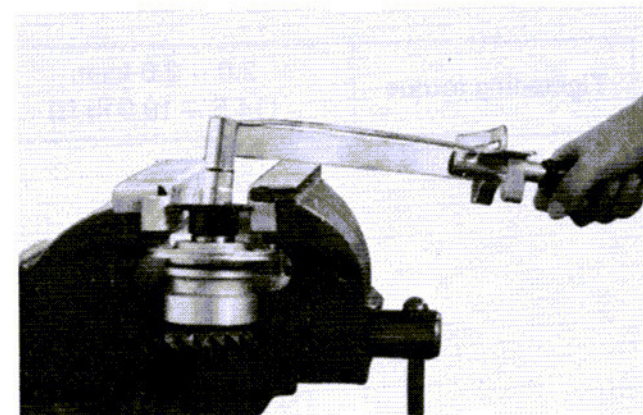
CAUTION:

Always use a new nut.



- Tighten the nut with specified torque value.

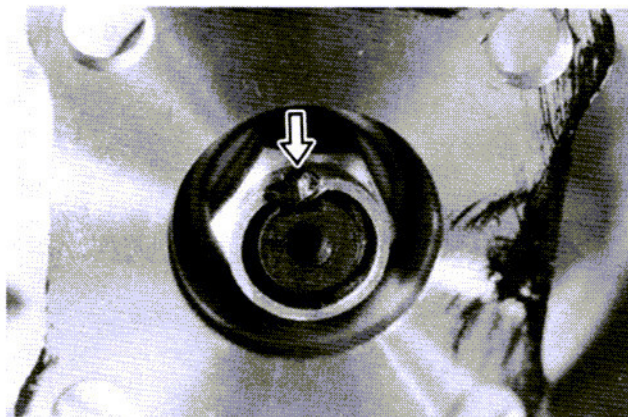
Tightening torque

9.0 – 11.0 kg-m
(65.0 – 79.5 lb-ft)

- After bearing preload is carried out, bend the collar of the nut over into the notch in the driven bevel gear shaft.

NOTE:

Before bending the collar of the nut, shim adjustment is necessary. (Refer to the section "SHIM ADJUSTMENT on page 4-8.)



- Install the new O-ring to prevent oil from leakage.

NOTE:

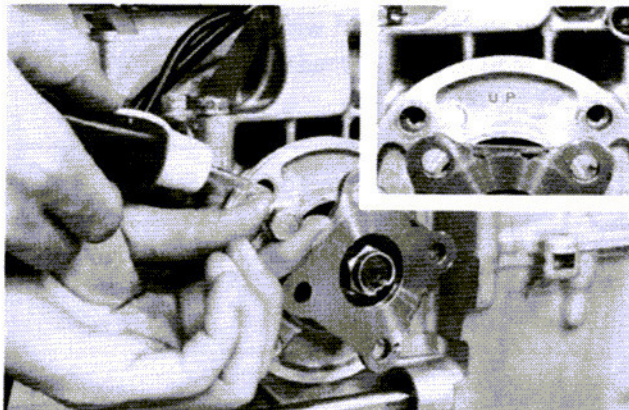
Before matching the upper and lower crank-case halves, shim adjustment is necessary. (Refer to the section "SHIM ADJUSTMENT on page 4-8).



- After shim adjustment and matching the crank-case halves, tighten the housing nut with applying the Thread Lock "1363C" to the specified torque value.

CAUTION:

Driven bevel gear housing must be installed with letter "UP" facing upward as shown in Fig.



99104 - 32050

Thread Lock "1363C"

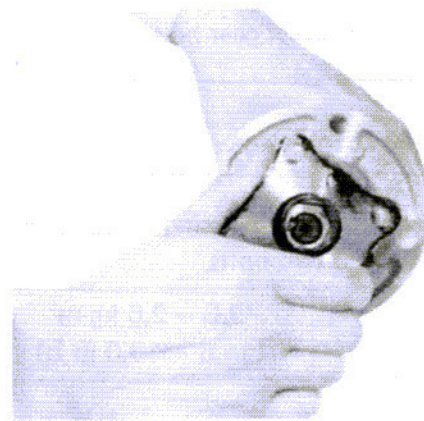
Tightening torque

2.0 – 2.6 kg-m
(14.5 – 19.0 lb-ft)

SECONDARY BEVEL GEAR SHIM ADJUSTMENT

BEARING PRELOAD

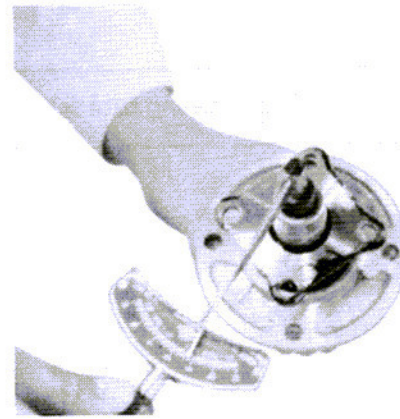
- After nut is tightened to specification, turn bevel gear several turns in both directions to seat bearings.



- Using special tools, measure the bearing preload.

09900 - 21107	Torque wrench 0 – 15 kg·cm
09915 - 24550	Adapter socket 12.7 x 6.3 mm

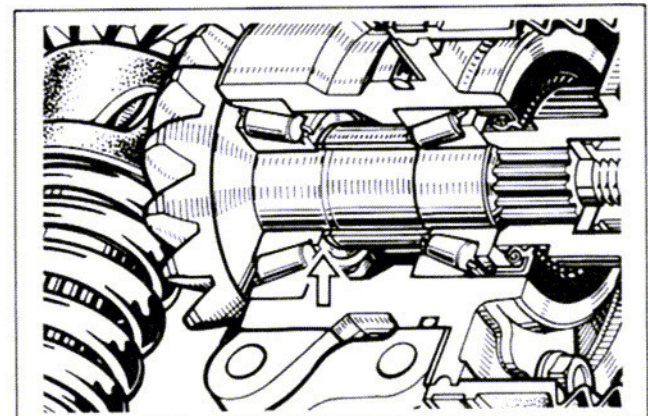
Preload	4.0 – 7.0 kg·cm (3.45 – 6.05 lb·in)
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- If the bearing preload is not within specification, the shims between the bearings must be changed and the preload rechecked until correct. Refer to the table for appropriate changes.

NOTE:

Each time the preload is checked after a shim change, the gear must be rotated in both directions to seat the bearings after the nut is retorqued to specification.



Preload	Shim Adjustment
Under 4.0 kg·cm	Decrease shim thickness
4.0 – 7.0 kg·cm	CORRECT
Over 7.0 kg·cm	Increase shim thickness

List of shims

Part No.	Shim thickness
09181 - 25006	1.60 mm
- 25007	1.62
- 25008	1.64
- 25009	1.66
- 25010	1.68
- 25011	1.70
- 25012	1.80
- 25013	1.90
- 25014	2.00

BACKLASH

- Install the housing shims removed during disassembly onto driven bevel gear housing.

NOTE:

No O-ring is used at this stage.

- Install driven bevel gear housing onto upper crankcase and tighten two bolts.

Tightening torque

2.0 – 2.6 kg-m
(14.5 – 19.0 lb-ft)

- Install the special tool as shown in Fig. and tighten 6 bolts.

09921 - 43411

Gear holding tool set

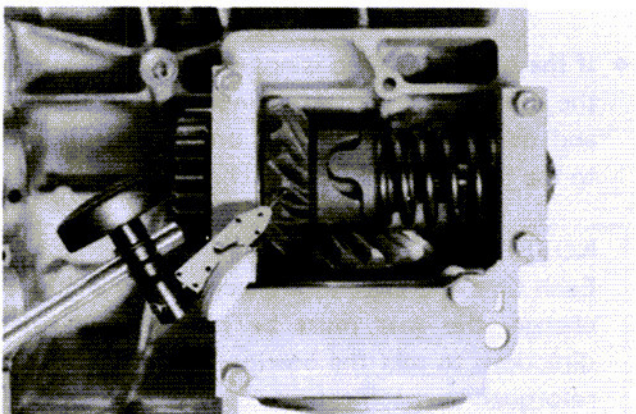
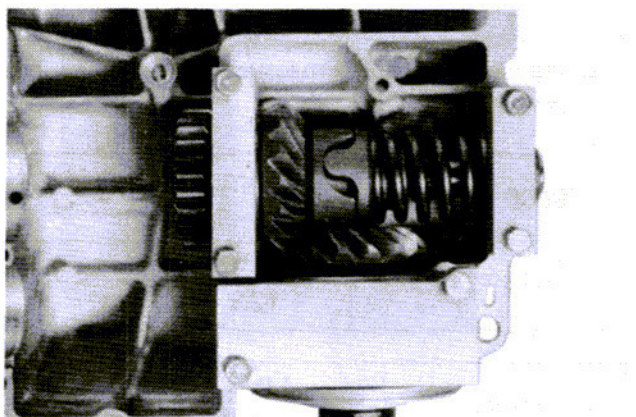
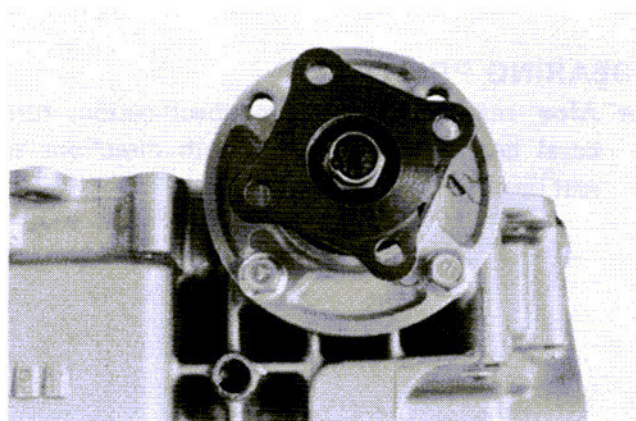
- Using a dial gauge, measure the backlash.

Backlash

0.08 – 0.13 mm
(0.0031 – 0.0051 in)

- If the backlash is not within specification, the shim between the driven bevel gear housing and crankcase must be changed and the backlash rechecked until correct. Refer to the table for appropriate changes.

Backlash	Shim adjustment
Under 0.08 mm	Increase shim thickness
0.08 – 0.13 mm	CORRECT
Over 0.13 mm	Decrease shim thickness



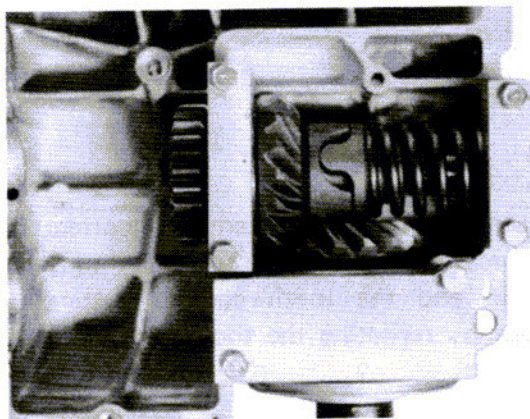
List of Shims

Part No.	Shim thickness
24945-45100	0.35 mm
-45101	0.30
-45102	0.40
-45103	0.50
-45104	0.60

TOOTH CONTACT

- After backlash adjustment is carried out, the tooth contact must be checked.
- Remove the special tool (09921-43411) and two bolts, and remove the driven bevel gear housing.
- Clean and de-grease several teeth on the driven bevel gear. Coat these teeth with machinist's dye or past, preferably of a light color.
- Re-install the driven bevel gear housing with shims in place, and install the special tool as shown in Fig.

09921 - 43411	Gear holding tool set
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- Rotate the driven bevel gear several turns in each direction, while loading the drive bevel gear. This will provide a contact pattern on the coated teeth of the driven bevel gear.
- Remove the driven bevel gear housing, and inspect the coated teeth of the driven bevel gear. The contact patch should be shown below.
- If the tooth contact pattern is correct, as shown in Fig. A.

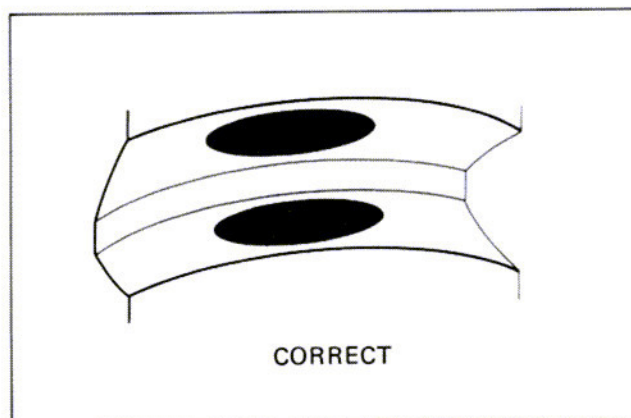


Fig. A

- If the tooth contact pattern is incorrect, as shown in Fig. B, a thinner shim is needed between the drive bevel gear and bearing.

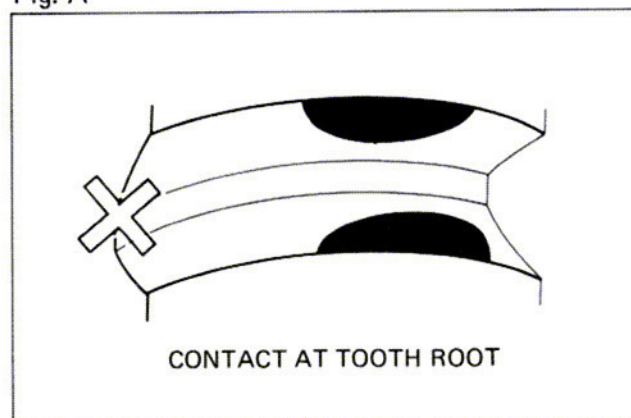


Fig. B

- If the tooth contact pattern is incorrect, as shown in Fig. C, a thicker shim is needed between the drive bevel gear and bearing.

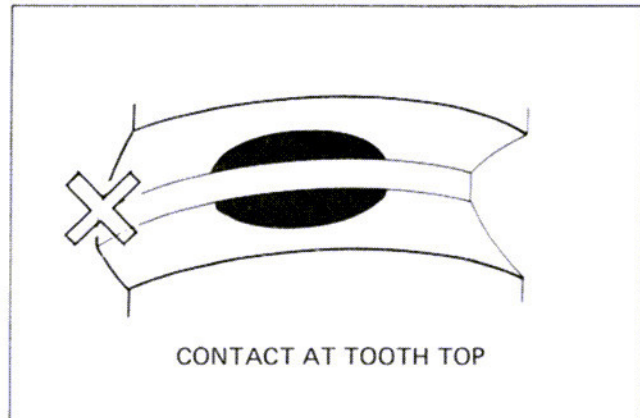
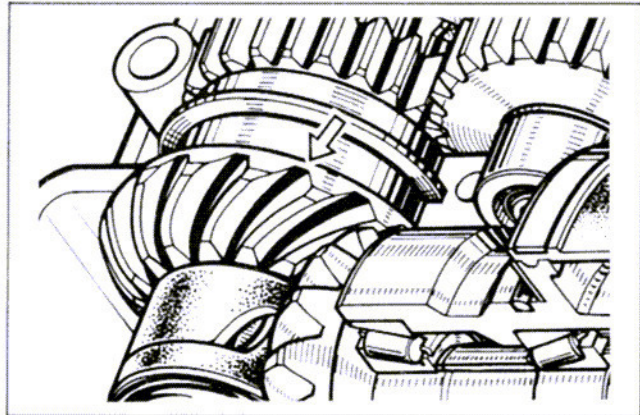


Fig. C

- 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.

CAUTION:

After the tooth contact adjustment is made, the backlash must be rechecked, as it may change. Refer to the backlash measurement subsection, and readjust until both backlash and tooth contact are correct.



List of shims

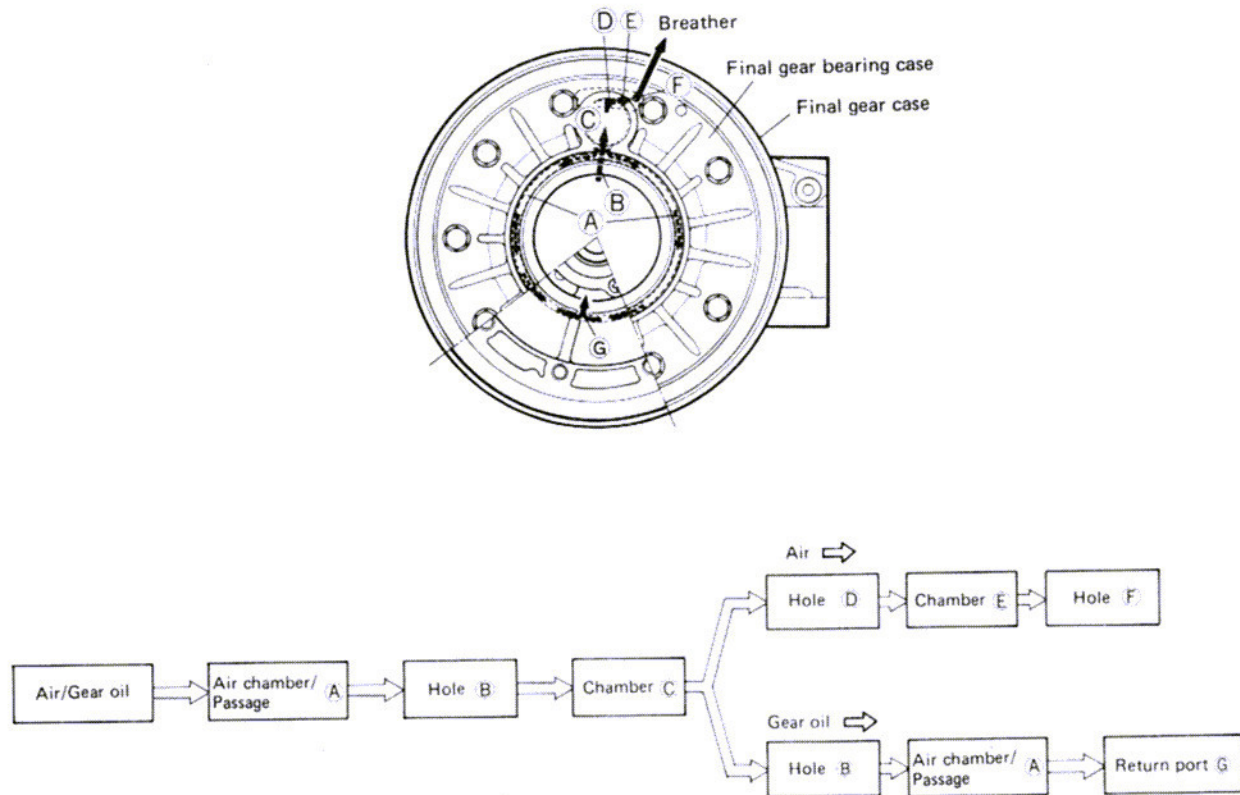
Part No.	Shim thickness	Part No.	Shim thickness
24934-34200	1.50 mm	24935-34280	4.25 mm
24935-34200	3.85	-34290	4.30
-34210	3.90	-34300	4.35
-34220	3.95	-34310	4.40
-34230	4.00	-34320	4.45
-34240	4.05	-34330	4.50
-34250	4.10	-34340	4.55
-34260	4.15	-34350	4.60
-34270	4.20		

FINAL GEAR CASE BREATHING CIRCUIT

AIR AND GEAR OIL FLOW IN FINAL GEAR CASE BREATHING CIRCUIT

Breather circuit

The GS650G final gear case breather circuit (passage) consists of the final gear case, final bearing plate and final gear bearing case, and 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 passage.

- Air flows from air chamber (A) to hole (B), chamber (C) and passes through the hole (D) and chamber (E) to the atmosphere through the breather hole (F).

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 flows out into the air passage.

- In this case, the gear oil, which has flown into hole (B), goes into chamber (C), where the oil is separated from the air.
- Then, the air flows through the hole (D) and chamber (E) and goes out through the breather.
- On the other hand, the gear oil, when the gear case pressure is higher than atmospheric pressure, flows through the passage (A) and returns to the gear case from gear oil return port (G).

FINAL DRIVE AND DRIVEN GEARS

FINAL GEAR ASSEMBLY REMOVAL

- Place an oil pan under the final drive bevel gear assembly, remove the drain plug and drain the oil.
- Remove the rear wheel assembly. (See page 8-21).
- Remove the left side rear suspension.
- Remove three nuts attaching the final drive gear housing to the swinging arm, and move the final gear case to the rear to detach it from the swinging arm.

FINAL GEAR ASSEMBLY REINSTALLATION

- For reinstallation, reverse the procedure of removal.
- Apply Suzuki Bond No. 1215 to the end of the swinging arm.

99104 - 31110

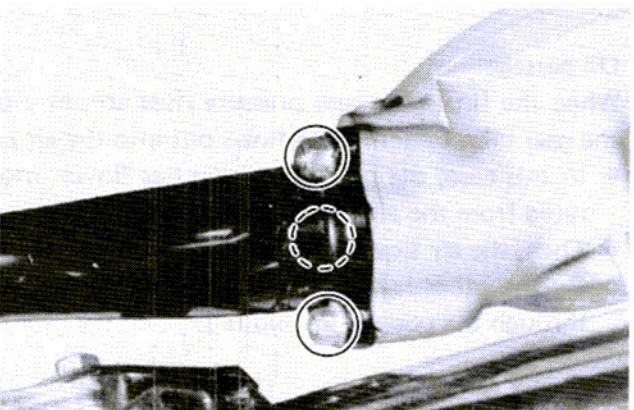
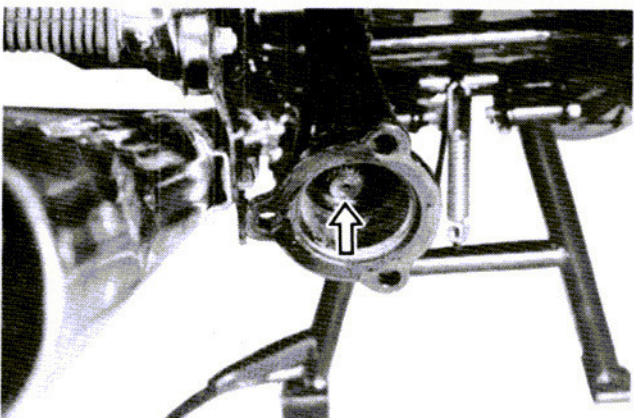
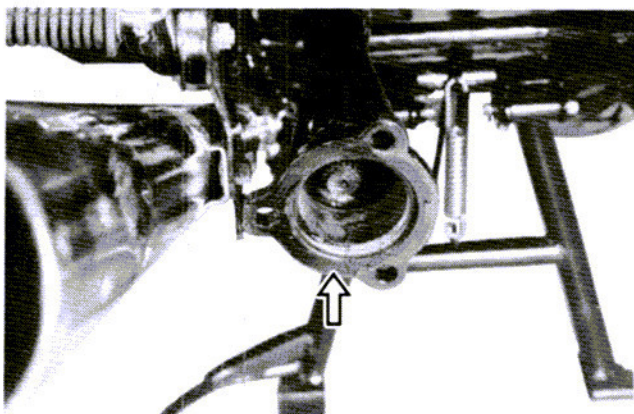
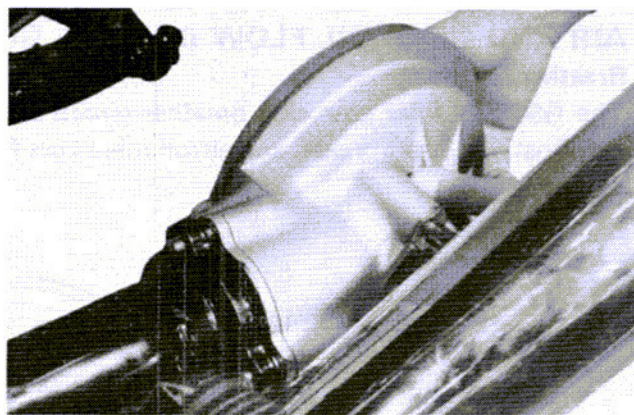
Suzuki Bond No. 1215

- Apply propeller shaft splines with Lithium Base Molybdenum Grease (NLGI#2).
- Install the final gear assembly, making sure the propeller shaft splines are aligned into the coupling.

- Tighten the attachment three nuts to the specified torque value.

Tightening torque

3.5 – 4.5 kg-m
(25.5 – 32.5 lb-ft)

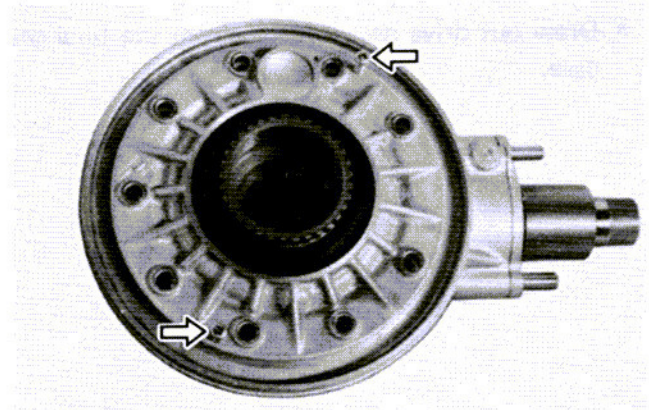
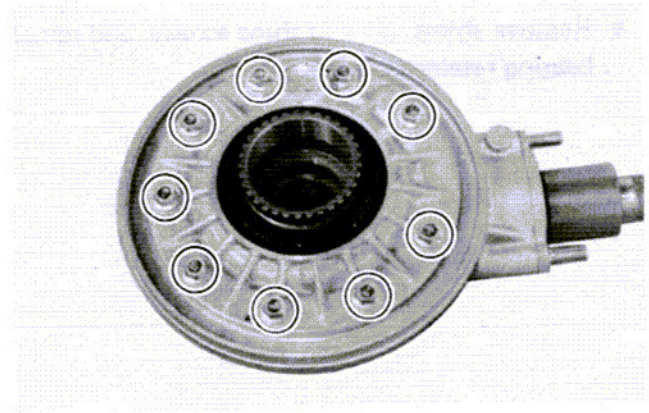


DISASSEMBLY

NOTE:

Be sure to retain all adjusting shims for reassembly.

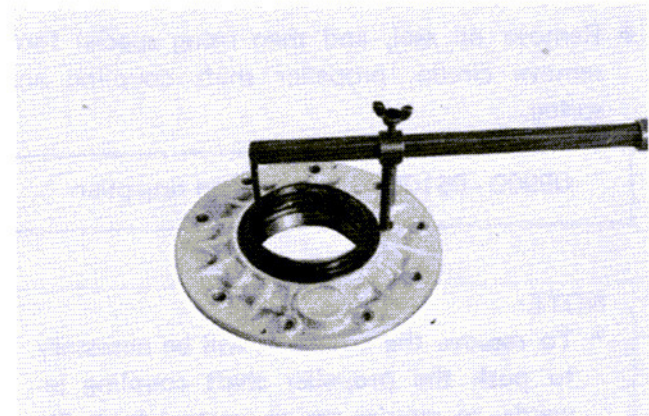
- Remove nine final gear bearing case bolts.
- Using two 5 mm screws, remove the final gear bearing case; screw then into the holes provided and draw the cover off evenly.



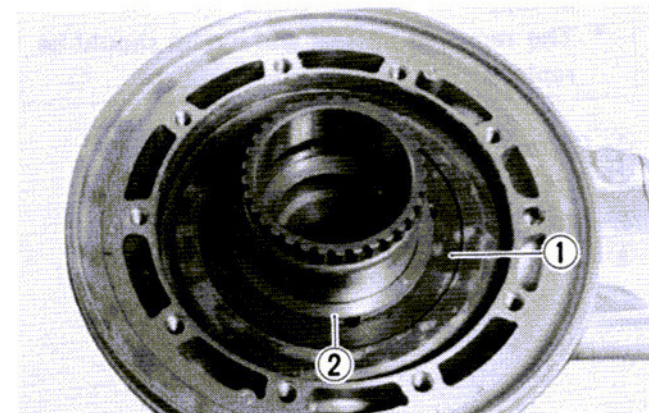
- Using special tool, remove the oil seal.

09913 - 50121	Oil seal remover
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- Remove the ball bearing and bearing plate.



- Remove driven bevel gear ① and shims ②.

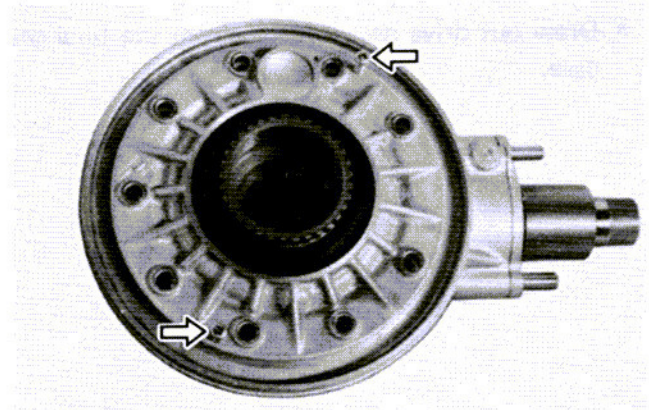
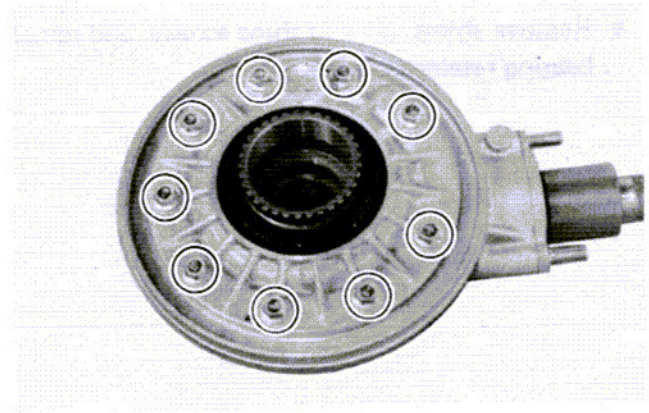


DISASSEMBLY

NOTE:

Be sure to retain all adjusting shims for reassembly.

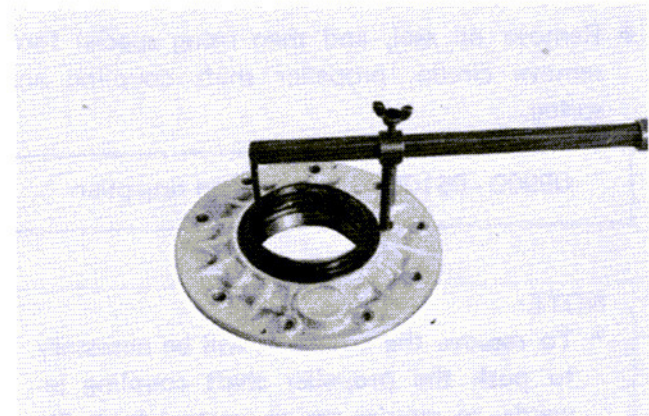
- Remove nine final gear bearing case bolts.
- Using two 5 mm screws, remove the final gear bearing case; screw then into the holes provided and draw the cover off evenly.



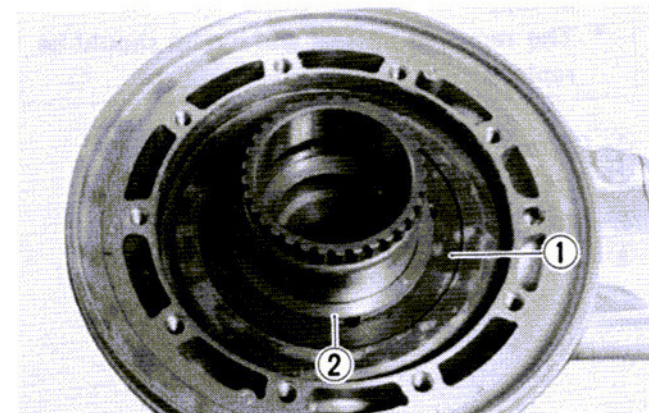
- Using special tool, remove the oil seal.

09913 - 50121	Oil seal remover
---------------	------------------

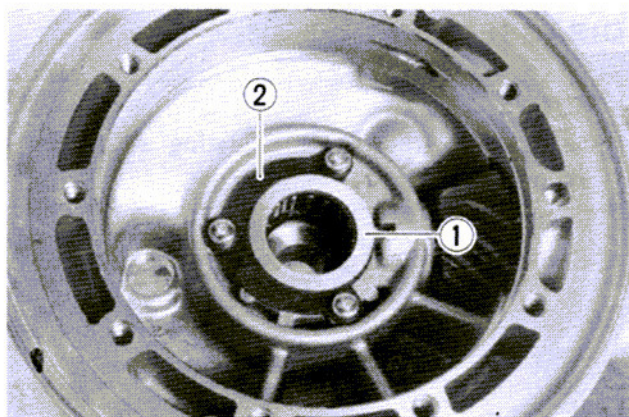
- Remove the ball bearing and bearing plate.



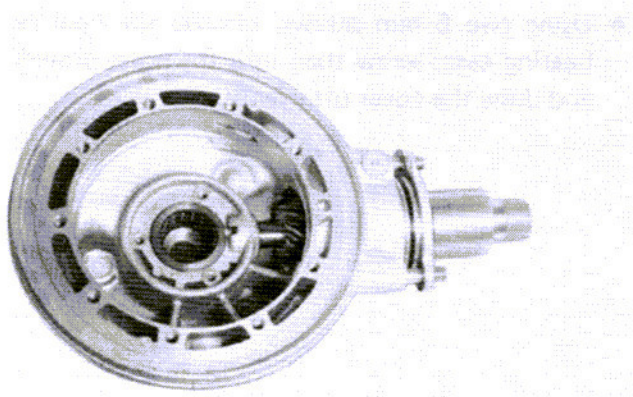
- Remove driven bevel gear ① and shims ②.



- Remove shims ① and three screws, and remove bearing retainer plate ② .



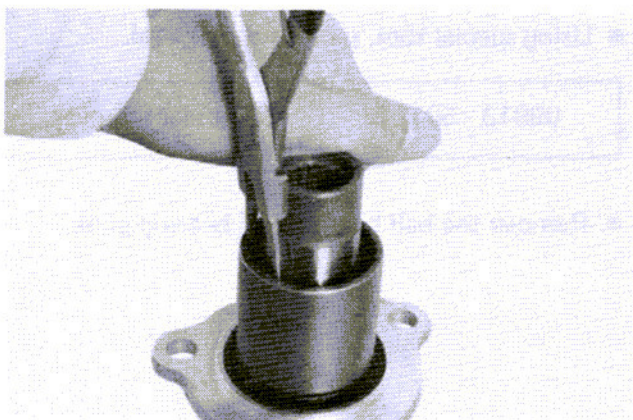
- Draw out drive gear housing from the final gear case.



- Remove oil seal, and then using special tool, remove circlip, propeller shaft coupling and spring.

09900 - 06108

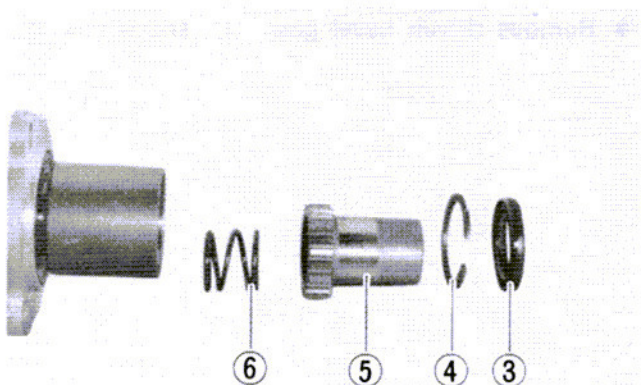
Snap ring pliers



NOTE:

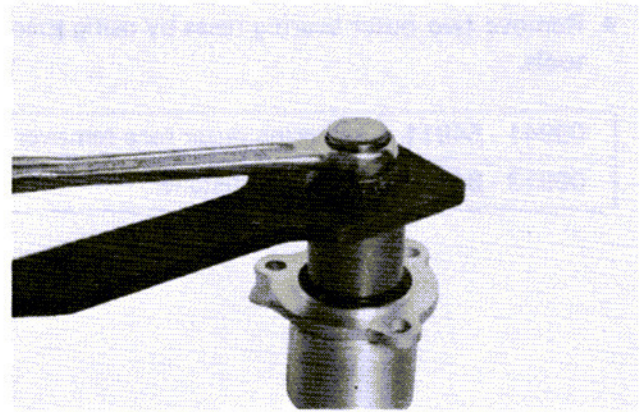
- * To remove the circlip, it will be necessary to push the propeller shaft coupling inwards, to remove spring pressure from the circlip.
- * The removed oil seal and circlip should be replaced.

- ③ Oil seal
- ④ Circlip
- ⑤ Propeller shaft coupling
- ⑥ Spring



- Using special tool, remove the nut.

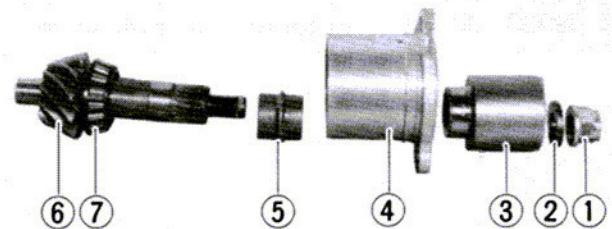
09924 - 64510	Final drive gear coupling holder
---------------	----------------------------------



- ① Nut
- ② Washer
- ③ Drive gear coupling
- ④ Housing
- ⑤ Spacer
- ⑥ Drive bevel gear
- ⑦ Bearing

NOTE:

The removed spacer and nut should be replaced.

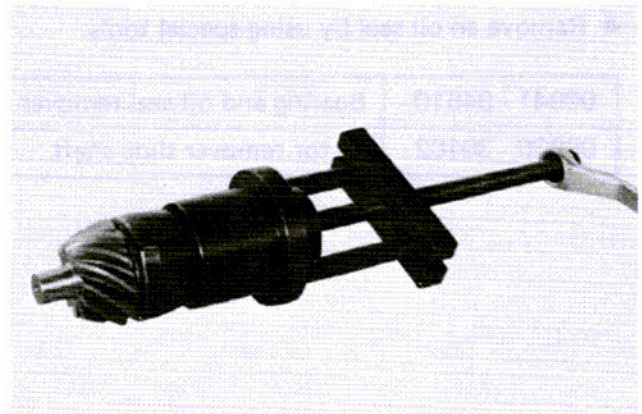


- Draw out the bearing by using special tool.

NOTE:

The removed bearing should be replaced.

09941 - 84510	Bearing remover
---------------	-----------------

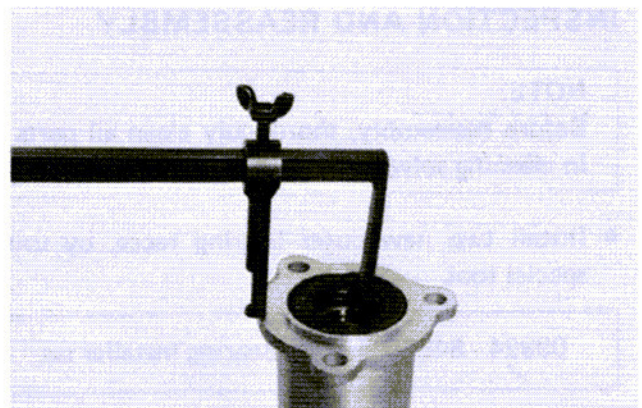


- Remove an oil seal by using special tool.

NOTE:

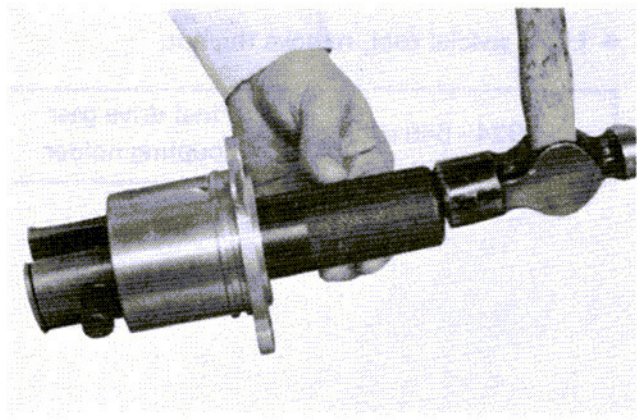
The removed oil seal should be replaced.

09913 - 50121	Oil seal remover
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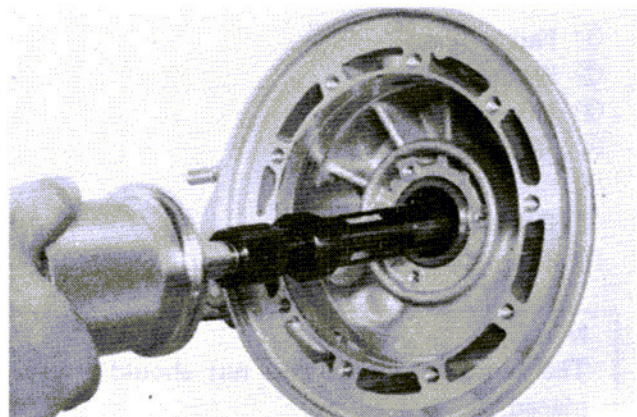
- Remove two outer bearing races by using special tools.

09941 - 54911	Bearing outer race remover
09913 - 84510	Bearing installer



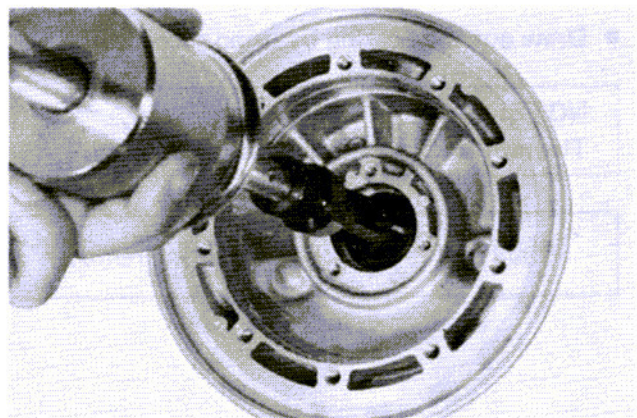
- Remove a needle roller bearing by using special tools.

09941 - 64510	Bearing and oil seal remover
09930 - 30102	Rotor remover slide shaft



- Remove an oil seal by using special tools.

09941 - 64510	Bearing and oil seal remover
09930 - 30102	Rotor remover slide shaft



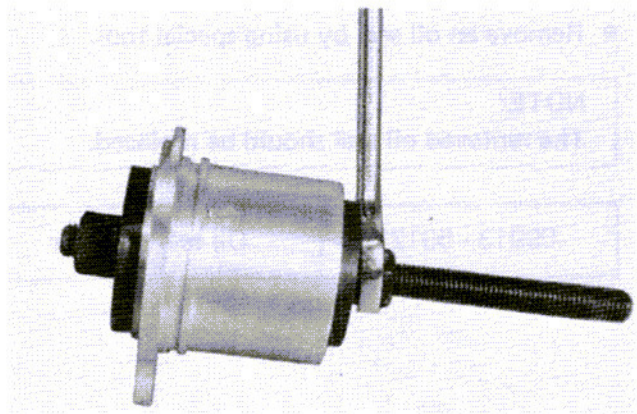
INSPECTION AND REASSEMBLY

NOTE:

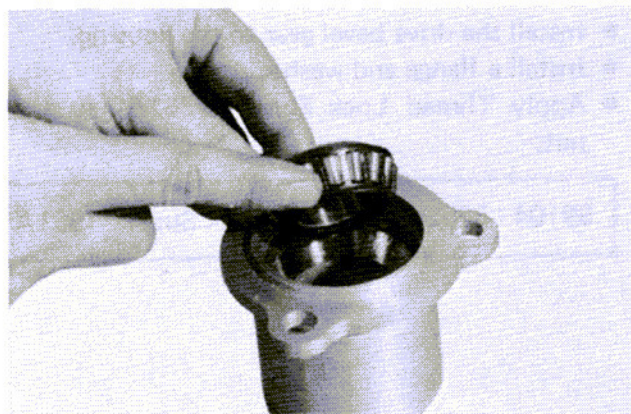
Before reassembly, thoroughly clean all parts in cleaning solvent.

- Install two new outer bearing races, by using special tool.

09924 - 84510	Bearing installer set
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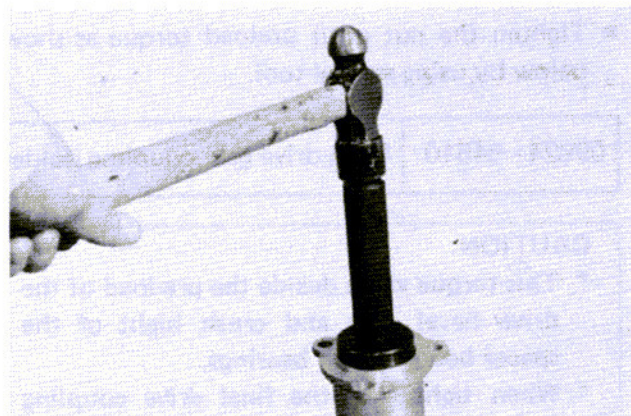


- Before installing a new inner bearing, apply Hypoid Gear Oil to the inner bearing and outer bearing race.



- Install a new oil seal by using special tools.

09924 - 74510	Bearing and oil seal handle
09924 - 74560	Final drive bevel gear housing oil seal installer

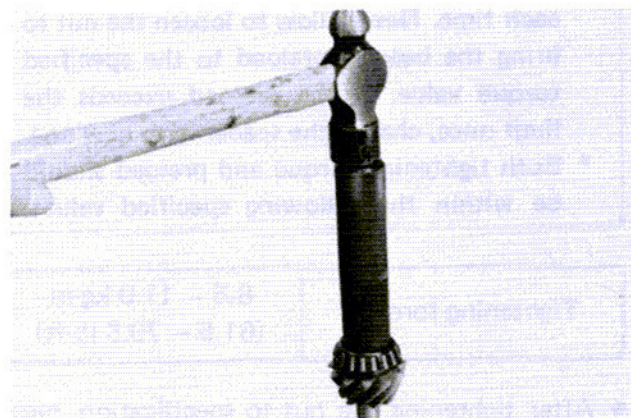


- Apply grease to lip of the oil seal lightly.

99000 - 25030	Suzuki Super Grease "A"
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- Press in a new inner bearing by using special tool.

09913 - 80112	Drive pinion race installer
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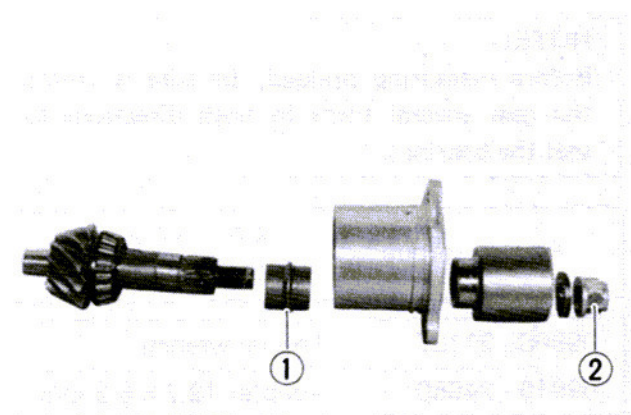
CAUTION:

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

- Apply Hypoid Gear Oil to the outer race and bearing.
- Install a new spacer ① to the drive bevel gear.

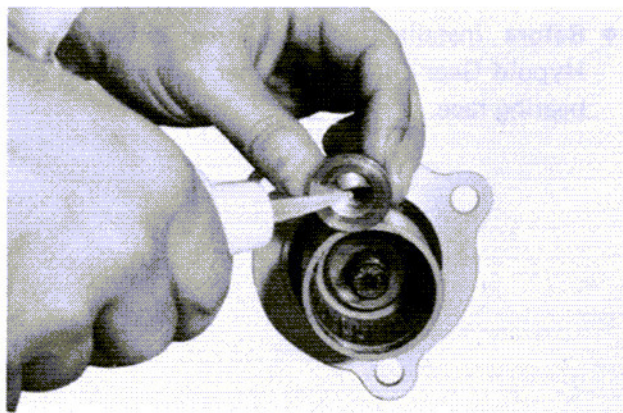
CAUTION:

When reassembling, always use new spacer ① and nut ②.



- Install the drive bevel gear to the housing.
- Install a flange and washer.
- Apply Thread Lock Super "1361A" to a new nut.

99104 - 32020	Thread Lock Super "1361A"
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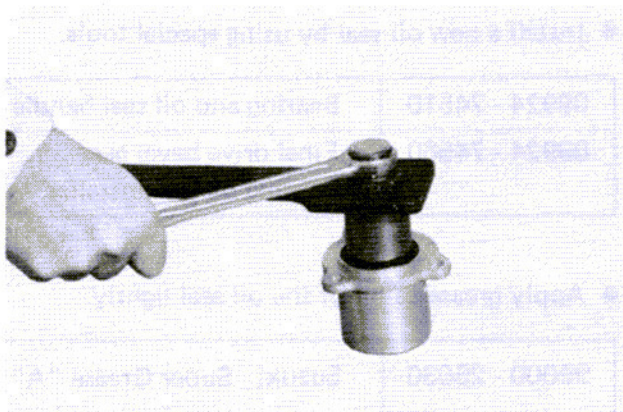


- Tighten the nut until preload torque as shown below by using special tool.

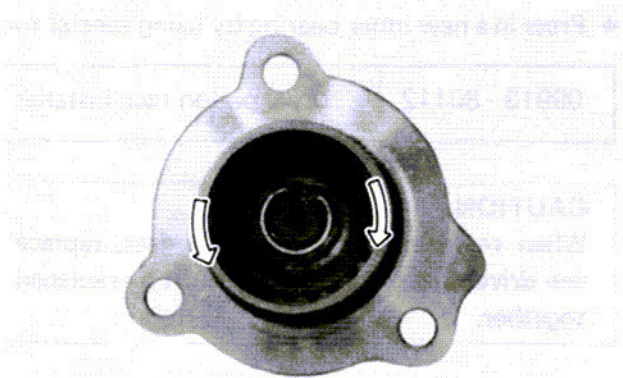
09924 - 64510	Final drive gear coupling holder
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CAUTION:

- * This torque value decide the pre-load of the drive bevel gear and crush height of the spacer between two bearings.
- * When tightening the final drive coupling nut gradually, be sure to check the preload each time. Never allow to loosen the nut to bring the bearing preload to the specified torque value. If the preload exceeds the limit once, change the spacer with new one.
- * Both tightening torque and preload should be within the following specified values.



Tightening torque	8.5 – 11.0 kg-m (61.5 – 79.5 lb-ft)
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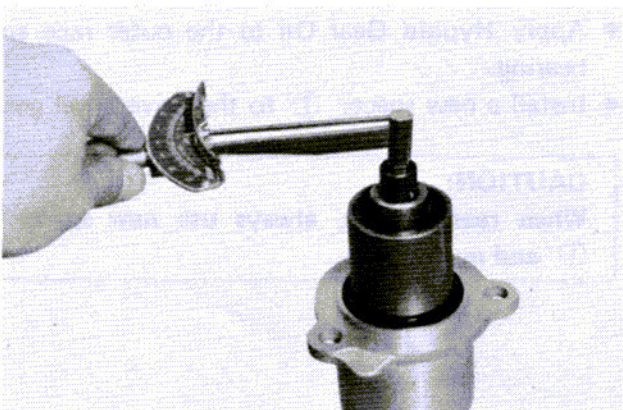


- After tightening the nut to specification, measure the bearing preload by using special tools.

NOTE:

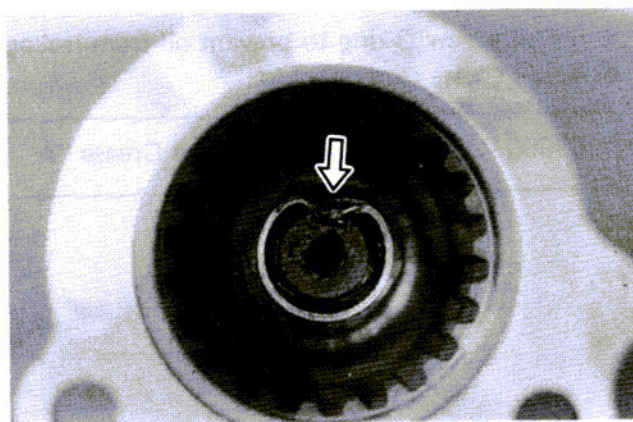
Before measuring preload, be sure to rotate the gear several turns in both directions to seat the bearings.

Preload torque	4.0 – 8.0 kg-cm (3.45 – 6.95 lb-in)
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09900 - 21107	Torque wrench
09915 - 24550	Adapter 12.7 x 6.3 mm

- After bearing preload is carried out, bend the collar of the nut over into the notch in the final drive gear shaft.

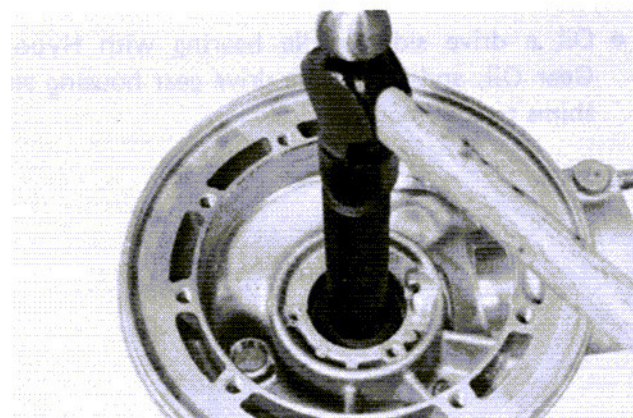


- Press in a new oil seal by using special tools.

09924 - 74550	Oil seal installer
09924 - 74510	Bearing and oil seal handle

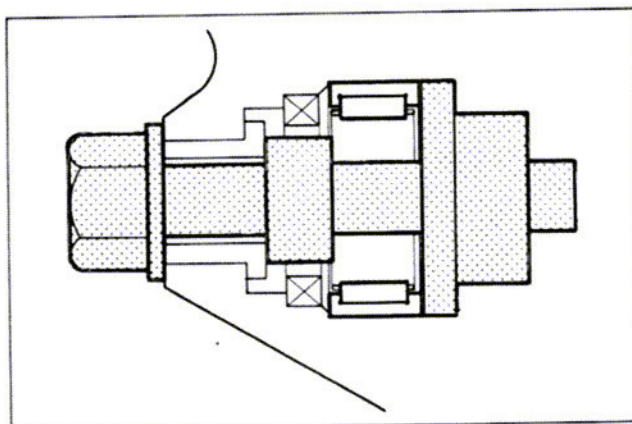
- Apply grease to lip of the oil seal lightly.

99000 - 25030	Suzuki Super Grease "A"
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- Press in a new needle roller bearing by using special tool.

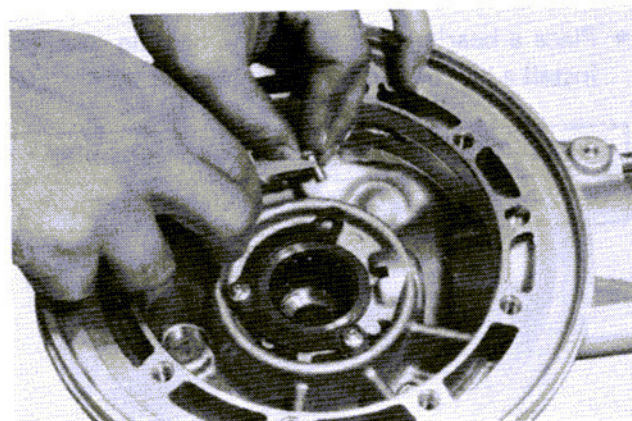
09924 - 94510	Final gear case needle bearing installer
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- Place a bearing retainer plate.
- Apply Thread Lock Super "1361A" to the screws and tighten the specified torque value.

99104 - 32020	Thread Lock Super "1361A"
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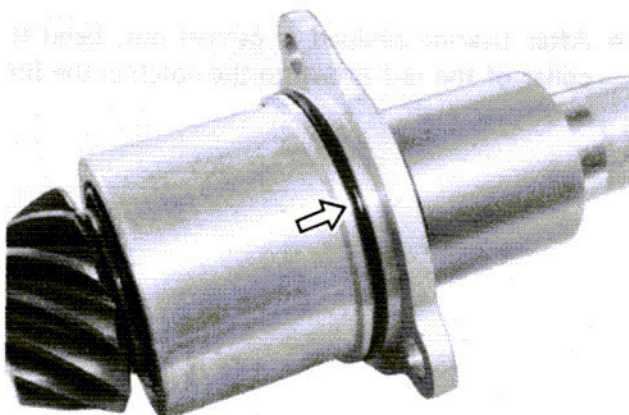
Tightening torque	0.8 – 1.0 kg-m (6.0 – 7.0 lb-ft)
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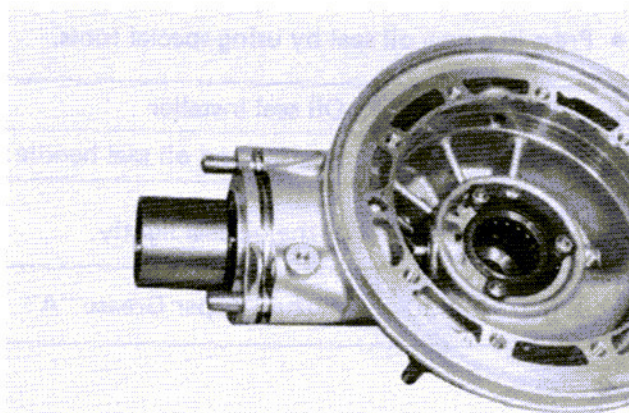
- Install a new O-ring to prevent oil from leakage.
- Apply grease to the O-ring.

99000 - 25030

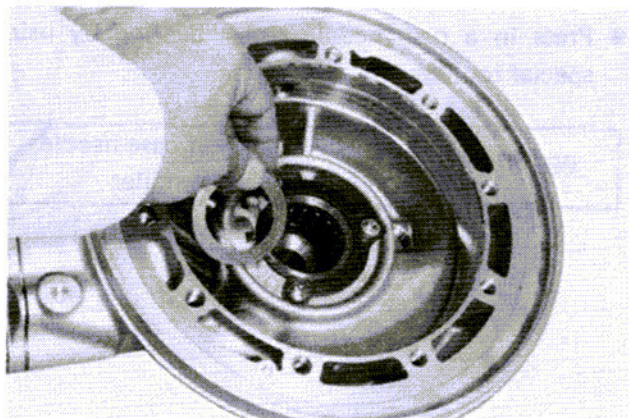
Suzuki Super Grease "A"



- Oil a drive side needle bearing with Hypoid Gear Oil, and install the drive gear housing and shims to the final gear case.



- Place the driven gear shims on the driven gear needle bearing, oil the bearing with Hypoid Gear Oil, and install the driven gear and shims to the final gear case.



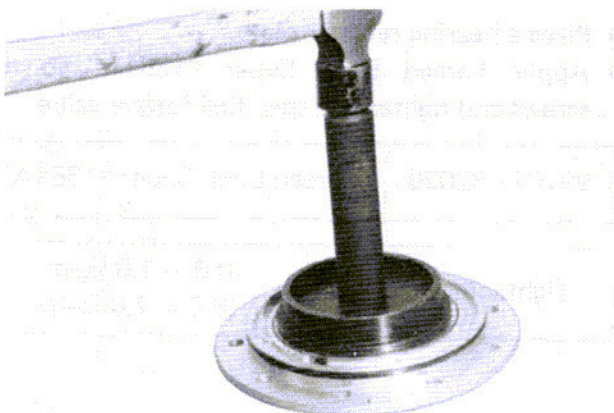
- Place a bearing plate onto the bearing case, and install a ball bearing by using special tool.

09924 - 74510

Bearing and oil seal handle

09924 - 74520

Oil seal installer and remover



- Press a new oil seal by using special tools.

09924 - 74510	Bearing and oil seal handle
09924 - 74520	Oil seal installer and remover

- Apply grease to lip of the oil seal lightly.

99000 - 25030	Suzuki Super Grease "A"
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NOTE:

Before installing the oil seal, shim adjustment is necessary. (Refer to the section "SHIM ADJUSTMENT" on page 4-24)

- Before install the bearing case to the final gear case, apply grease to new O-ring, and tighten nine bolts with applying Thread Lock "1363C" to the specified torque value.

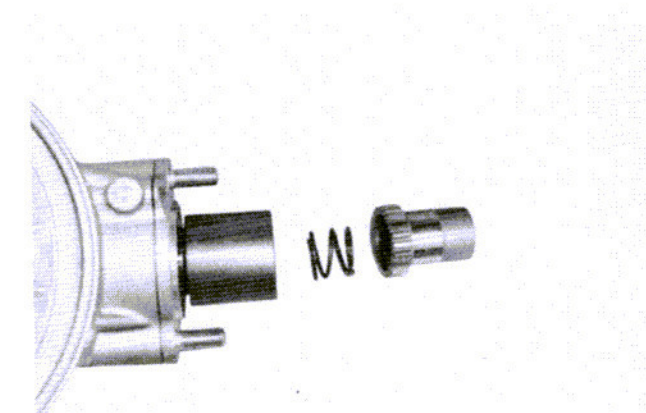
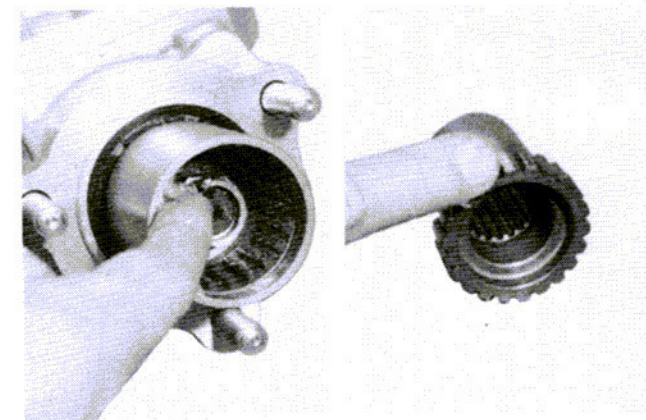
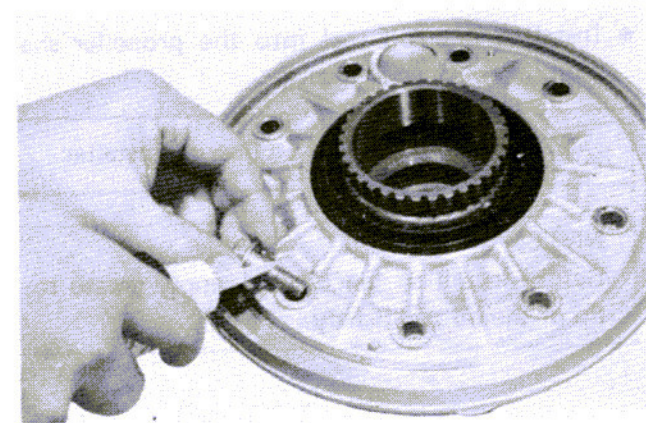
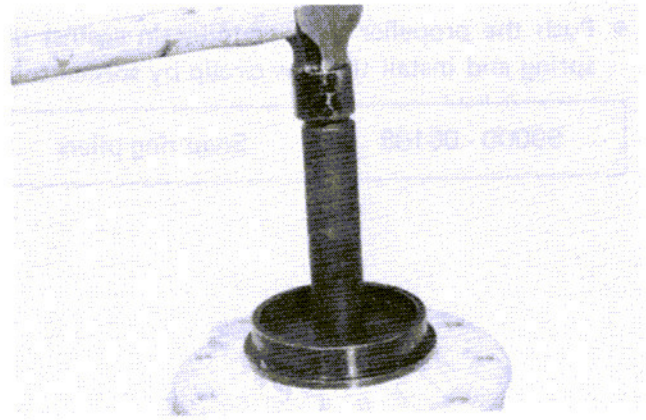
99000 - 25030	Suzuki Super Grease "A"
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99104 - 32050	Thread Lock "1363C"
---------------	---------------------

Tightening torque	2.0 – 2.6 kg-m (14.5 – 19.0 lb-ft)
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- Apply Lithium Base Molybdenum Grease (NLGI#2) to splines of final drive gear coupling and propeller shaft coupling.

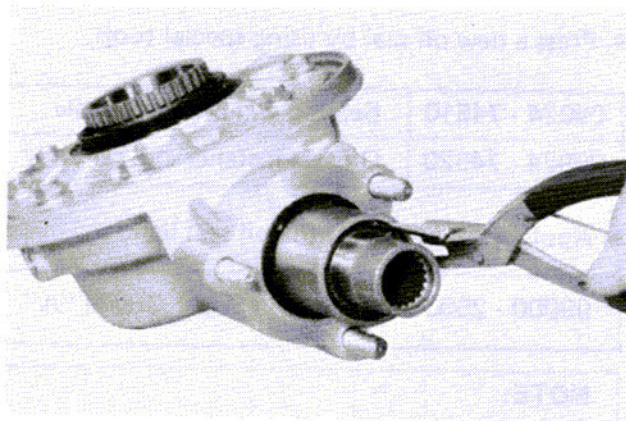
- Install a spring and propeller shaft coupling into the final drive gear coupling.



4-23 SHAFT DRIVE

- Push the propeller shaft coupling in against the spring and install the new circlip by special tool.

99000 - 06108	Snap ring pliers
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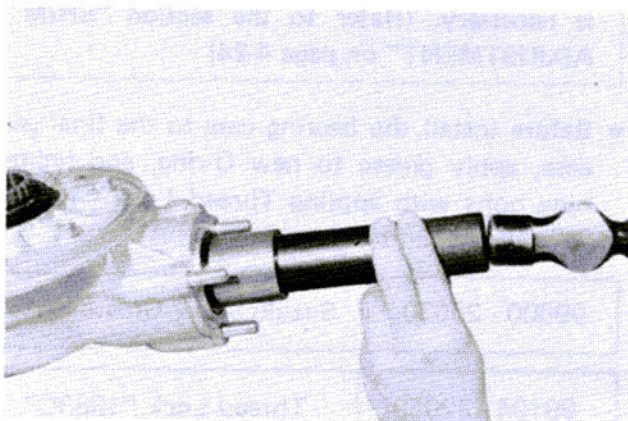


- Install a new oil seal into the propeller shaft coupling by special tool.

09913 - 84510	Bearing installer
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NOTE:

Before installing the oil seal, apply grease to lip of the oil seal lightly.



FINAL BEVEL GEAR SHIM ADJUSTMENT

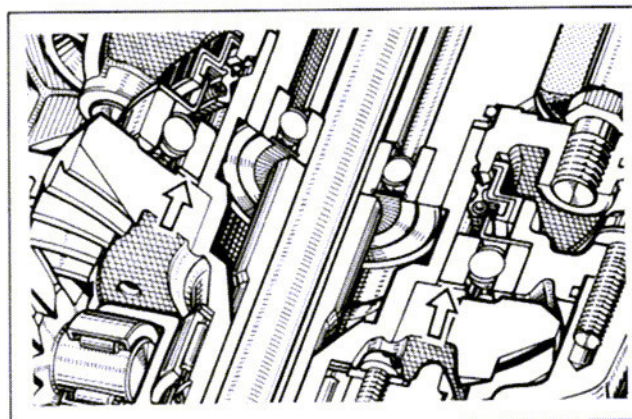
FINAL GEAR BEARING COVER SHIM CLEARANCE

- Measure the clearance between the shims and the bearing. If not within specification, the shims must be changed.

Final gear bearing cover shim clearance	0.20 mm (0.0079 in)
---	------------------------

List of Shims

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



BACKLASH

- Using the shims removed during disassembly, install the final drive gear housing, without O-ring, into the final gear case and remove the final gear bearing case oil seal and O-ring. Tighten the nuts ① and bolts ② to specification. There are two ways to measure the backlash, so either way will do (A) or (B).

A) Install the backlash measuring tool ③ on the drive gear coupling, and set-up a dial gauge as shown in Fig.

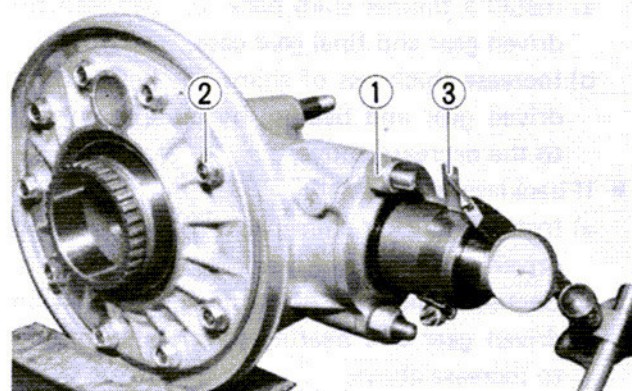
09924 - 34510	Backlash measuring tool (27 – 50φ)
---------------	---------------------------------------

Final gear backlash	0.03 – 0.64 mm (0.0012 – 0.0252 in)
---------------------	--

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

Tightening torque

Final drive gear housing nut	3.5 – 4.5 kg-m (25.5 – 32.5 lb-ft)
Final gear bearing case bolt	2.0 – 2.6 kg-m (14.5 – 19.0 lb-ft)



- B) In the other way, install the backlash measuring tool to the rack gear located on the rear side of the final driven gear and measure the backlash between drive and driven gears with dial gauge.

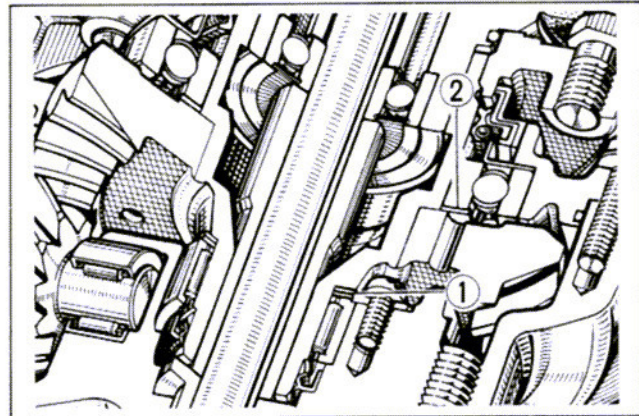
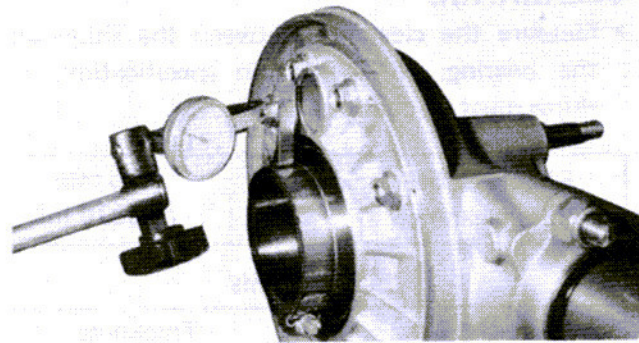
09924 - 34520	Backlash measuring tool (52 – 76φ)
---------------	---------------------------------------

Final gear backlash	0.02 – 0.35 mm (0.0008 – 0.0138 in)
---------------------	--

NOTE:

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

- Remove shims from final gear cover and final gear case, and measure total thickness.
- In order not to change the clearance between final driven gear and final driven gear 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 ① between final driven gear and final gear case.
 - b) Increase thickness of shims ② between final driven gear and bearing by an amount equal to the decrease above.
- If backlash is too small:
 - a) Install a thicker shim pack ① between final driven gear and final gear case.
 - b) Decrease thickness of shims ② between final driven gear and bearing by an amount equal to increase above.



EXAMPLE

Final gear to case shims;

$$1.35 \text{ mm} + 1.05 \text{ mm} = 2.40 \text{ mm}$$

Final driven gear to bearing shims;

$$0.50 \text{ mm} + 0.40 \text{ mm} = 0.90 \text{ mm}$$

$$\text{Original total measurement} = 3.30 \text{ mm}$$

Backlash too large:

Final gear to case shims;

$$1.30 \text{ mm} + 1.05 \text{ mm} = 2.35 \text{ mm}$$

Final driven gear to bearing shims;

$$0.60 \text{ mm} + 0.35 \text{ mm} = 0.95 \text{ mm}$$

$$3.30 \text{ mm}$$

Backlash too small:

Final gear to case shims;

$$1.35 \text{ mm} + 1.10 \text{ mm} = 2.45 \text{ mm}$$

Final driven gear to bearing shims;

$$0.50 \text{ mm} + 0.35 \text{ mm} = 0.85 \text{ mm}$$

$$3.30 \text{ mm}$$

List of Shims-Final gear to Case

Part No.	Thickness
27326 - 34201	1.05 mm
- 34211	1.10
- 34221	1.20
- 34231	1.25
- 34241	1.35

List of Shims – Final driven gear to Bearing

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

TOOTH CONTACT

- After backlash adjustment is carried out, the tooth contact must be checked.
- Remove the nine bolts from the final gear cover, and remove the cover, (see page 4-14). Do not misplace the shims.
Remove the driven gear.
- Clean and de-grease several teeth on the final driven gear. Coat these teeth with machinist's dye or paste, preferably of a light color.
- Re-install the driven gear with shims in place, positioning the coated teeth so they are centered on the final drive gear.
- Re-install the final gear cover and bolts, and tighten to specification.
- Using a socket and handle on the final drive gear coupling nut, rotate the final drive gear several turns in each direction, while loading the final driven gear. This will provide a contact pattern on the coated teeth of the driven gear.
- Remove the final gear cover and final gear, and inspect the coated teeth of the driven gear. The contact patch should be as shown below:

Final Gear Cover Bolt Torque	2.0 – 2.6 kg-m (14.5 – 19.0 lb-ft)
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- If the tooth contact pattern is correct, as shown in Fig. A.

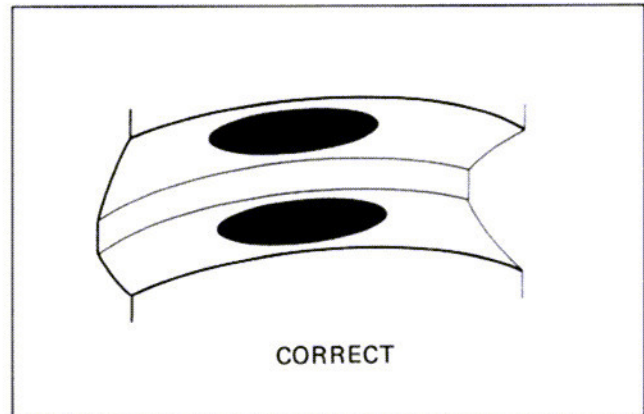


Fig. A

- If the tooth contact pattern is incorrect, as shown in Fig. B, a thinner shim is needed between the final drive gear housing and final gear case.
- If the tooth contact pattern is incorrect, as shown in Fig. C, a thicker shim is needed between the final drive gear housing 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 re-checked by repeating the tooth coating procedure above.

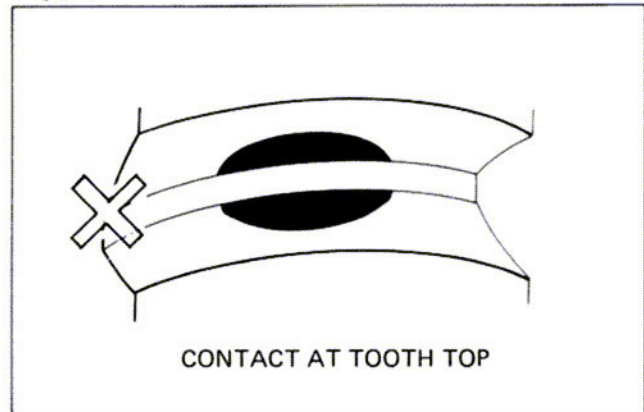


Fig. B

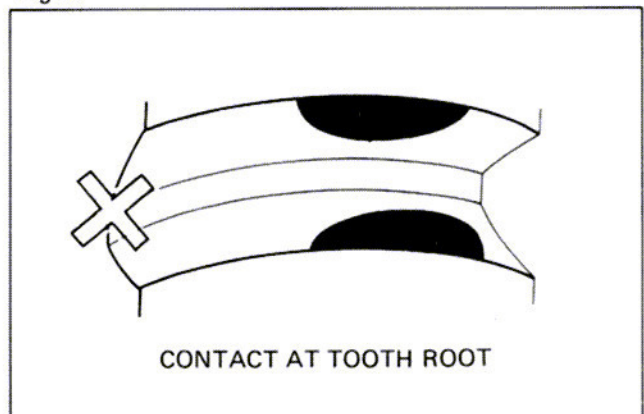


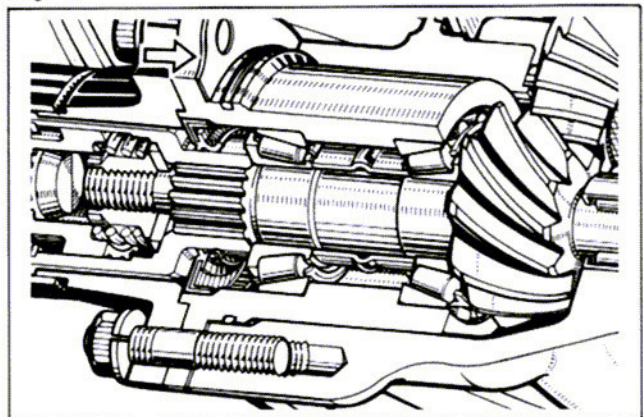
Fig. C

List of Shims — Final drive gear housing to Final gear case.

Part No.	Thickness
27445 - 45100	0.15 mm
- 45101	0.35
- 45102	0.30
- 45103	0.40

NOTE:

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



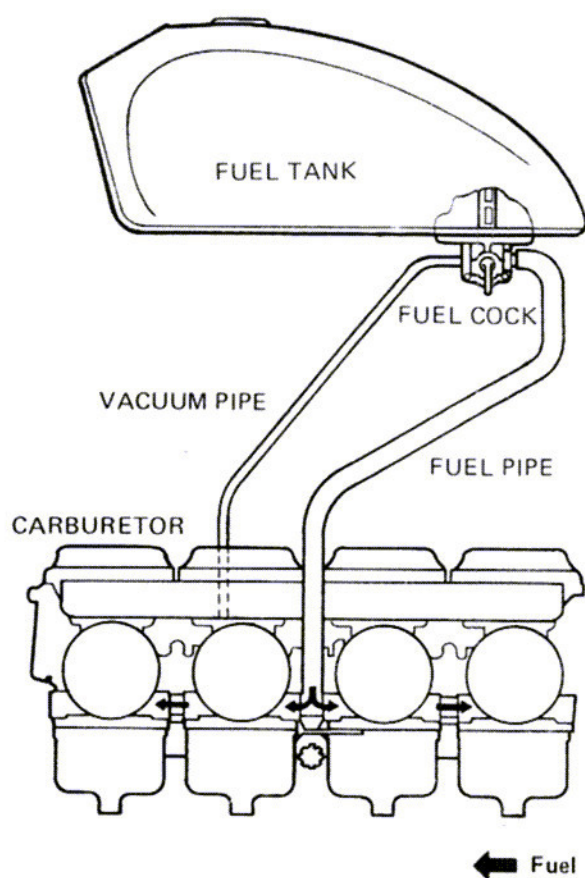
FUEL AND LUBRICATION SYSTEM

CONTENTS

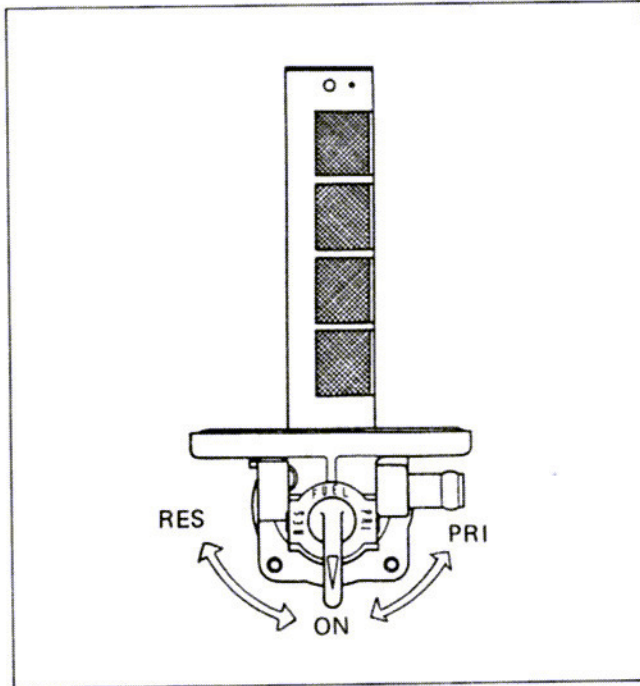
FUEL SYSTEM	5- 1
FUEL COCK	5- 2
CARBURETOR	5- 3
SPECIFICATION	5- 4
DISASSEMBLY	5- 9
INSPECTION	5-12
REASSEMBLY	5-15
LUBRICATION SYSTEM	5-18

FUEL SYSTEM

When engaging starter motor, negative pressure is generated in the combustion chamber. This negative pressure works on the diaphragm of fuel cock through passageway provided in the carburetor main bore and vacuum pipe, and diaphragm builds up a negative pressure which is higher than the spring pressure. Fuel valve is forced to open due to diaphragm operation, and thus allow fuel to flow into carburetor float chamber.

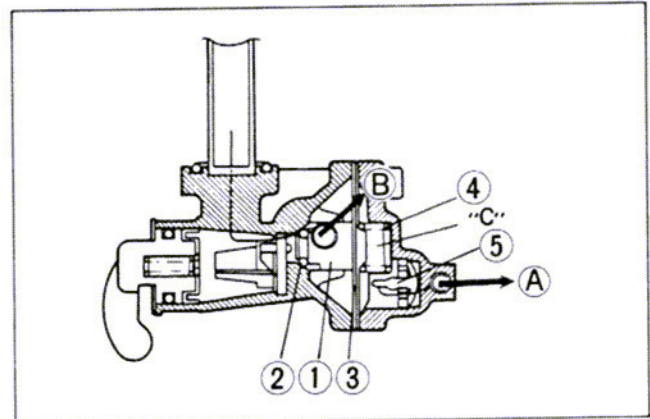


FUEL COCK



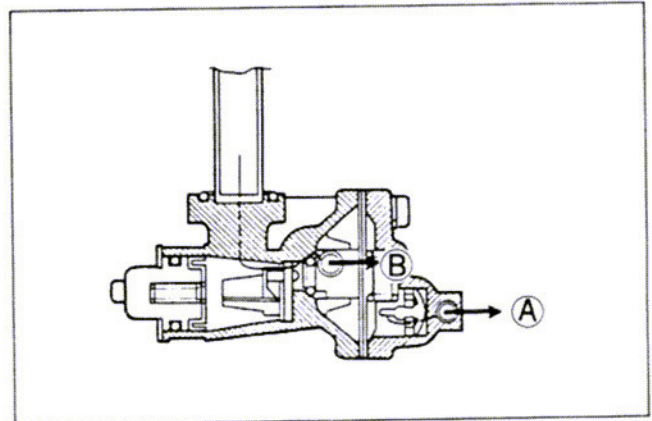
When the engine is not running and the valve in the ON or RES position, the fuel valve is kept in the closed position by applying pressure utilizing a spring so that no fuel will flow to the carburetors. When the engine is engaged, a negative pressure is generated in the diaphragm chamber "C" through the vacuum (negative pressure) pipe which is connected to the No. 2 carburetor, and builds up a negative pressure which is higher than the spring pressure so that the diaphragm is forced to open the fuel valve and thus allow the fuel to flow to the carburetors.

When the lever is set to PRI position, the protrusion ⑥ located on the lever end pushes back the fuel valve mechanically against the spring force and it allows fuel to flow to the carburetors directly, whether the engine is running or not, through the RES side fuel filter and fuel valve clearance.

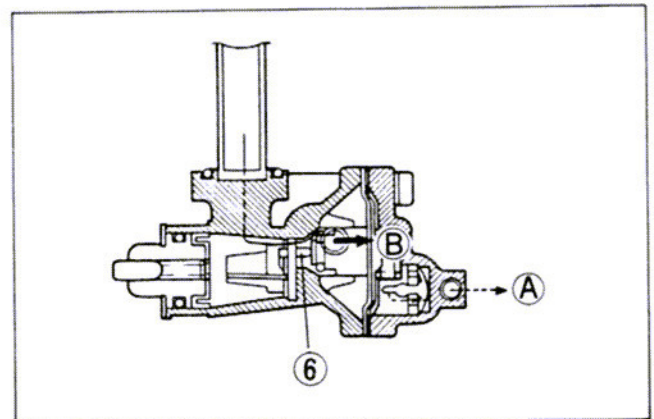


"ON"

- ① Fuel valve ② O-ring ③ Diaphragm
- ④ Spring ⑤ One way valve
- Ⓐ Vacuum Ⓑ Fuel flow

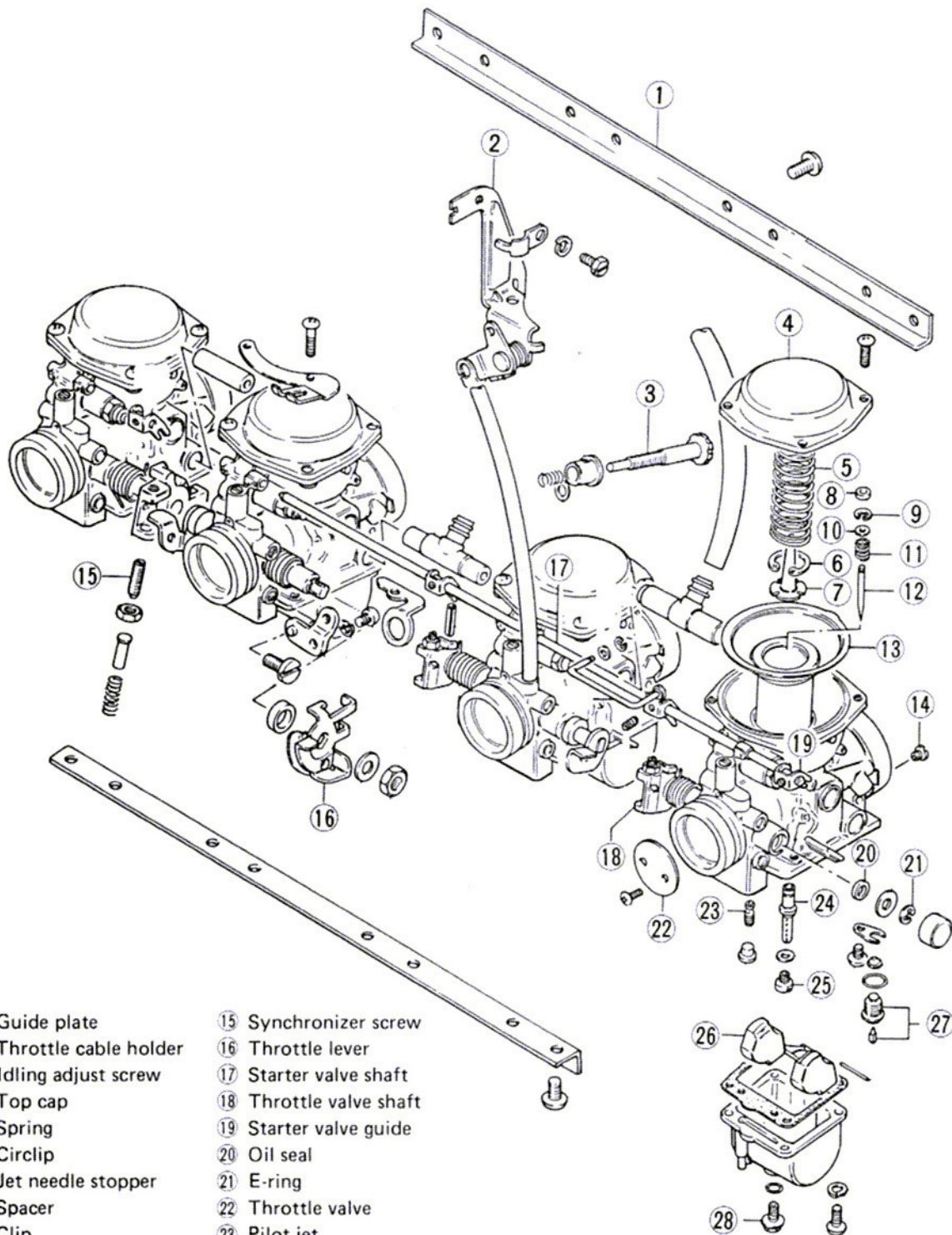


"RES"



"PRI"

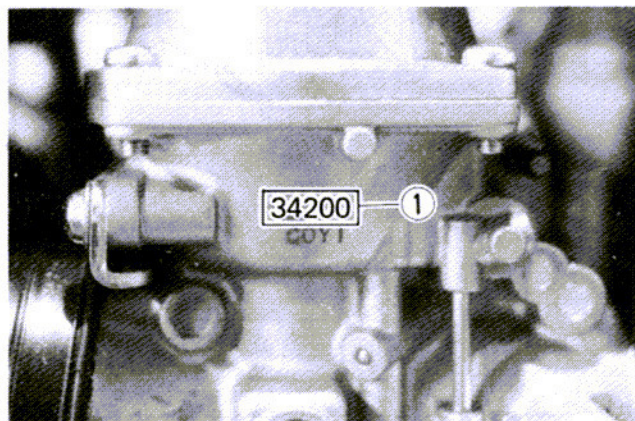
CARBURETOR



SPECIFICATIONS

ITEM	SPECIFICATIONS
Type	MIKUNI BS32SS
I.D. No.	34200
Bore	32 mm (1.26 in)
Idle r/min	1 100 $\pm$ 100 r/min
Fuel level	5.0 $\pm$ 1.0 mm (0.20 $\pm$ 0.04 in)
Float height	22.4 $\pm$ 1.0 mm (0.88 $\pm$ 0.04 in)
Main jet	# 110
Main air jet	2.0 mm
Jet needle	5C45
Needle jet	Y-7
Pilot jet	# 42.5
By pass	0.8, 0.7, 0.8 mm
Pilot outlet	0.7 mm
Valve seat	2.0
Starter jet	# 45
Pilot screw	Pre-set
Pilot air jet	# 160
Throttle cable play	0.5 – 1.0 mm (0.02 – 0.04 in)
Starter cable play	0.5 – 1.0 mm (0.02 – 0.04 in)

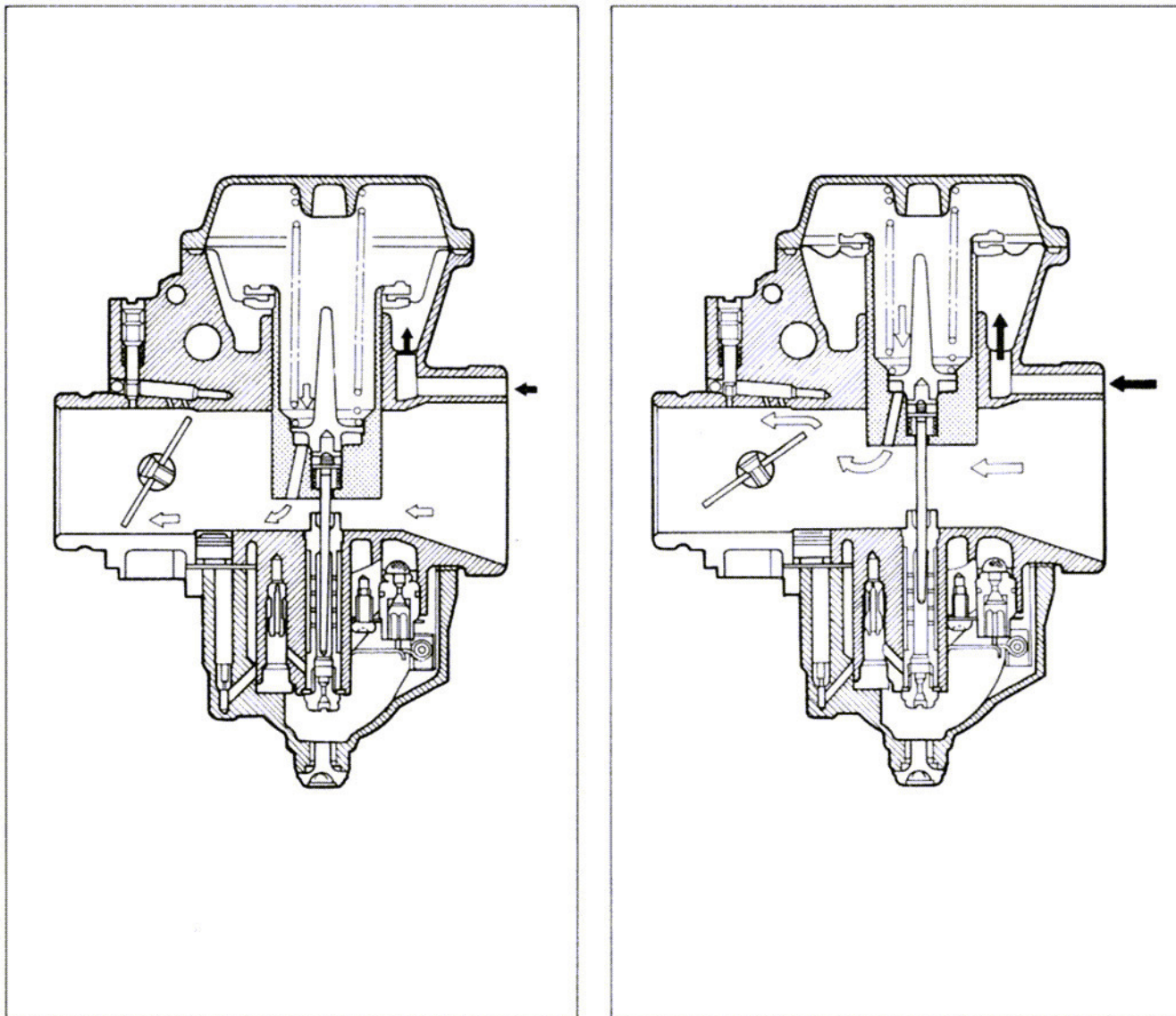
Each carburetor has I.D. Number ① printed on the carburetor body according to its specifications.



DIAPHRAGM AND PISTON OPERATION

The carburetor is of a variable-venturi type, whose venturi cross section area is increased or decreased automatically by the piston according to the vacuum present on the downstream side of the venturi. Vacuum is admitted into the diaphragm chamber through an orifice provided in the piston.

Rising vacuum overcomes the spring force, causing the piston to rise to increase the said area and thus to prevent the air velocity from increasing. Therefore, air velocity in the venturi passage is kept relatively constant for improved fuel atomization and for securing an optimum ratio of fuel to air in the mixture.

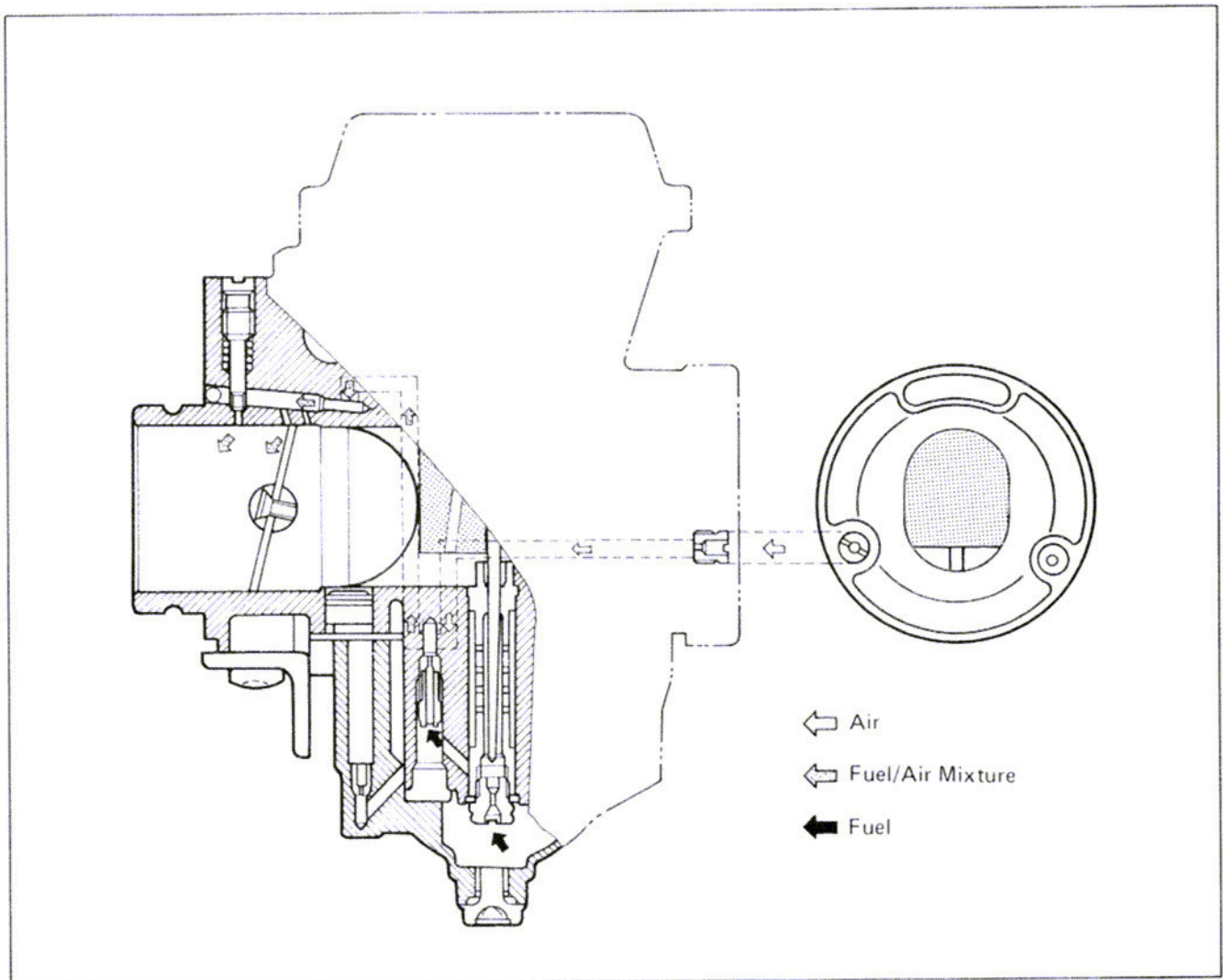


SLOW SYSTEM

This system supplies fuel during engine operation with throttle valve closed or slight opened.

The fuel from float chamber is first passed through main jet and metered by pilot jet where it mixes with air coming in through pilot air jet.

This mixture, rich with fuel, then goes up through pilot pipe to pilot screw. A part of the mixture is discharged into the main bore out of bypass ports. The remainder is then metered by pilot screw and sprayed out into the main bore through pilot outlet.



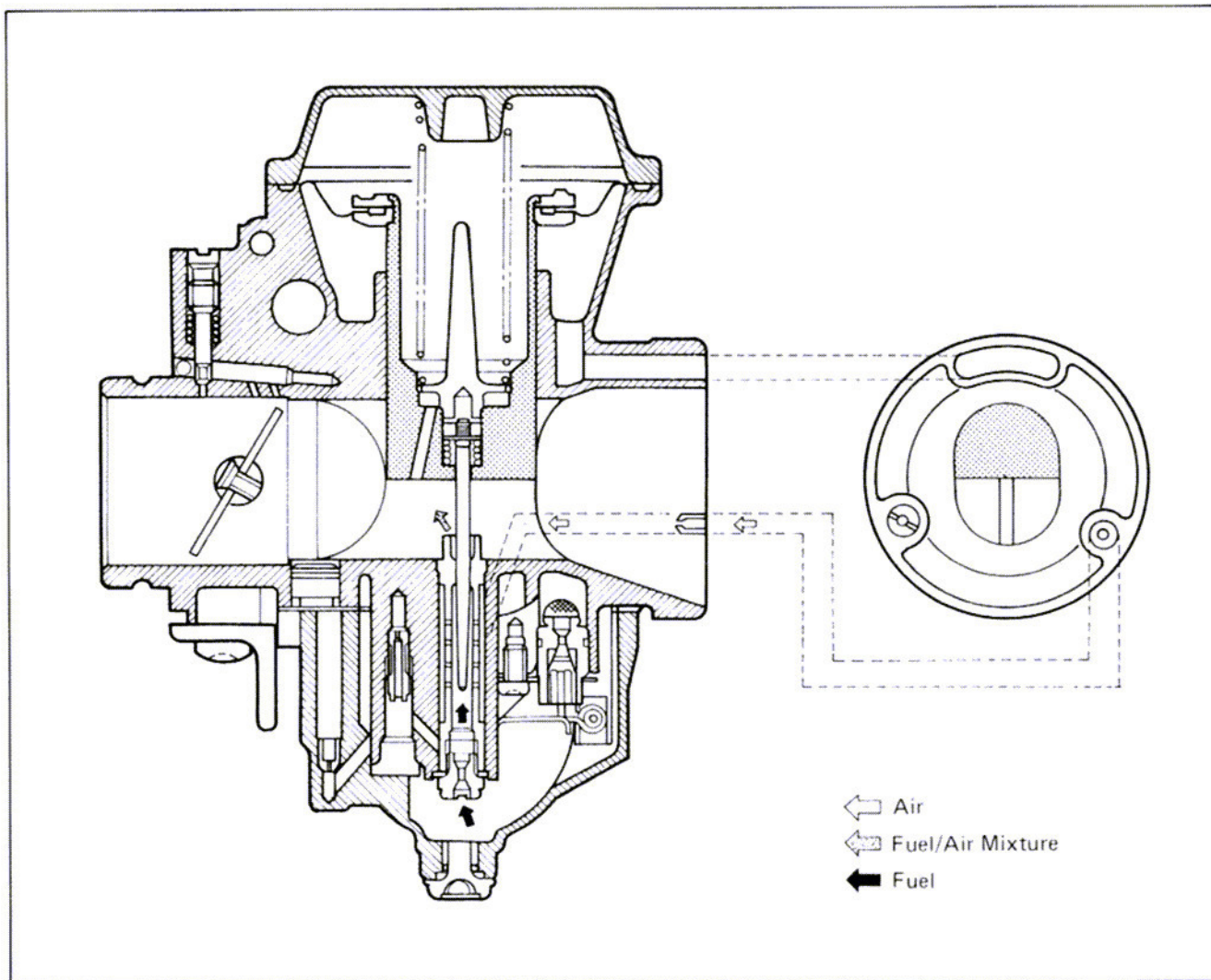
MAIN SYSTEM

As throttle valve is opened, engine speed rises, and this increases vacuum in the venturi. Consequently the piston valve moves upward.

Meanwhile, the fuel in float chamber is metered by main jet, and the metered fuel enters needle jet, in which it mixes with the air admitted through main air jet to form an emulsion.

The emulsified fuel then passes through the clearance between needle jet and jet needle, 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; the clearance through which the emulsified fuel must flow is either large or small, depending ultimately on throttle position.

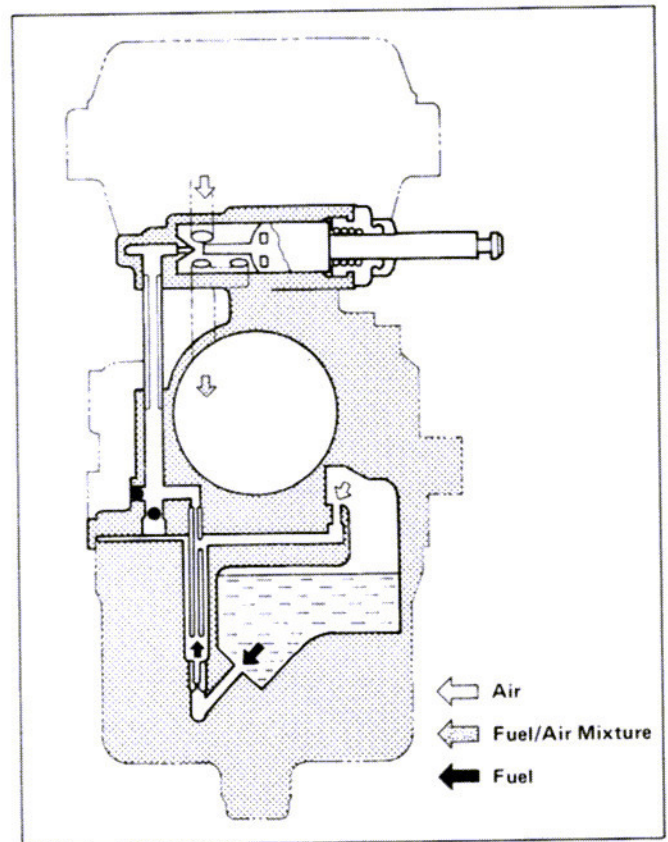


STARTER SYSTEM

Pulling up the choke knob allows the starting plunger to draw fuel into the starter circuit from the float chamber through starter jet.

Starter jet meters this fuel, which then flows into starter pipe and mixes with the air coming from the float chamber. The mixture, rich in fuel content, reaches starting plunger and mixes again with the air coming through a passage extended from behind the diaphragm.

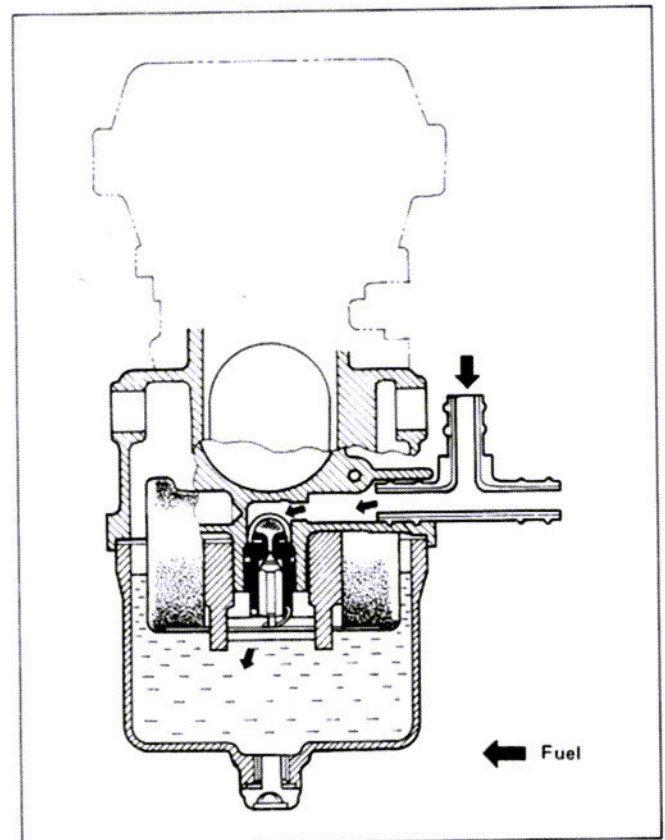
The two successive mixings of fuel with air are such that proper air/fuel mixture for starting is produced when the mixture is sprayed out through starter outlet into the main bore.



FLOAT SYSTEM

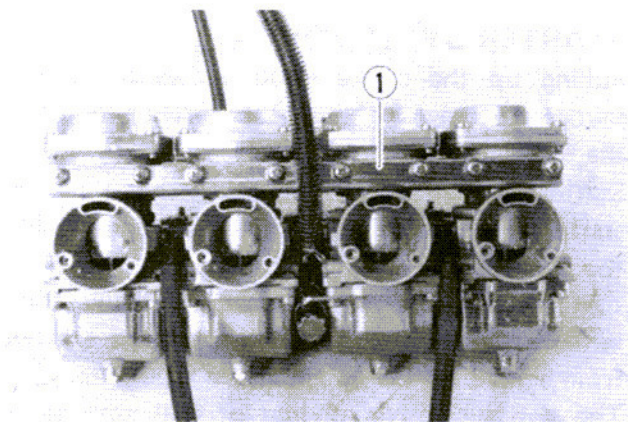
Floats and needle valve are associated with the same mechanism, so that, as the floats move up and down, the needle valve too moves likewise. When fuel level is up in float chamber, floats are up and needle valve remains pushed up against valve seat. Under this condition, no fuel enters the float chamber.

As the fuel level falls, floats go down and needle valve unseats itself to admit fuel into the chamber. In this manner, needle valve admits and shuts off fuel alternately to maintain a practically constant fuel level inside the float chamber.

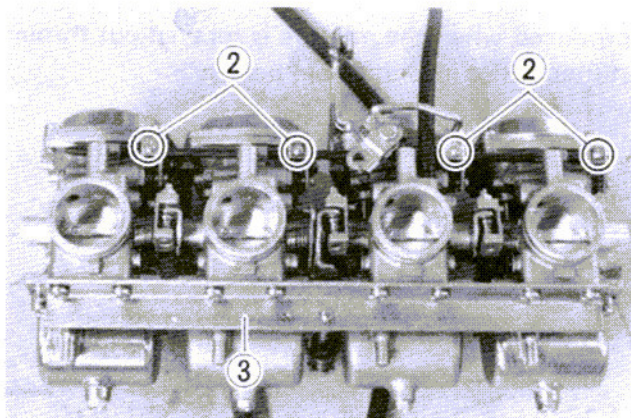


DISASSEMBLY

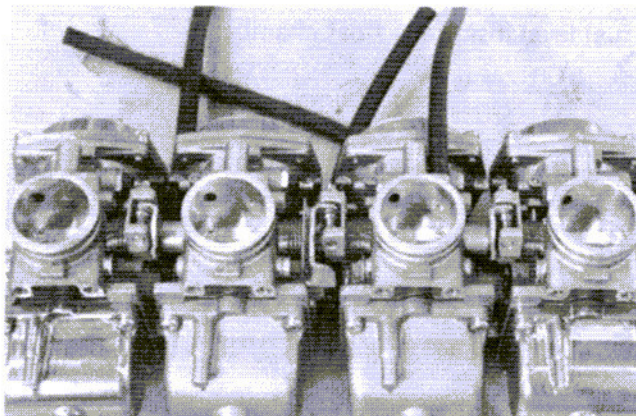
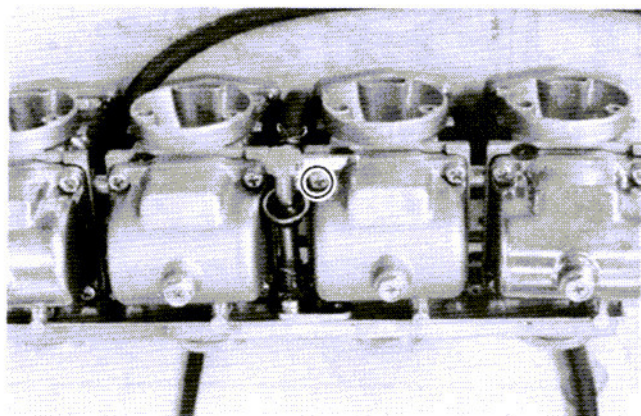
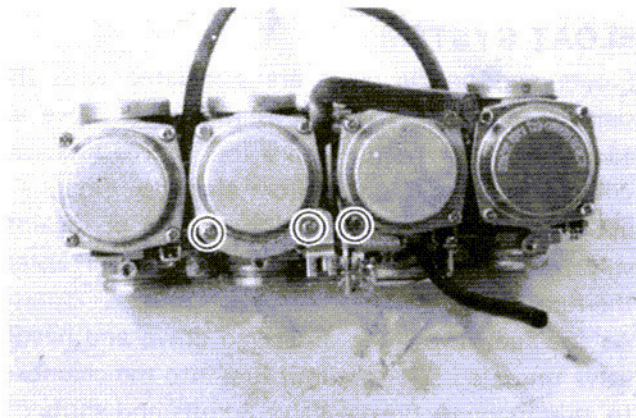
- Remove the carburetor set upper plate ① by unscrewing 8 screws.



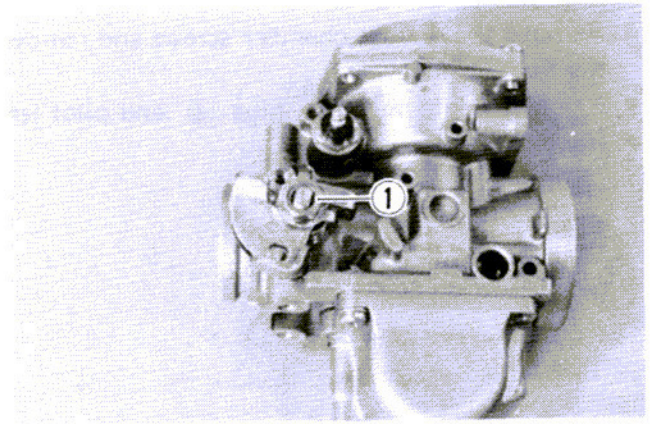
- Loosen 4 tightening screws ② of the starter shaft and pull out the starter shaft to the right.
- Remove the throttle bracket and starter bracket by unscrewing respective screws.



- Remove carburetor set lower plate ③ by unscrewing 8 screws.
- Separate 4 carburetors each and remove throttle valve stop screw plate.



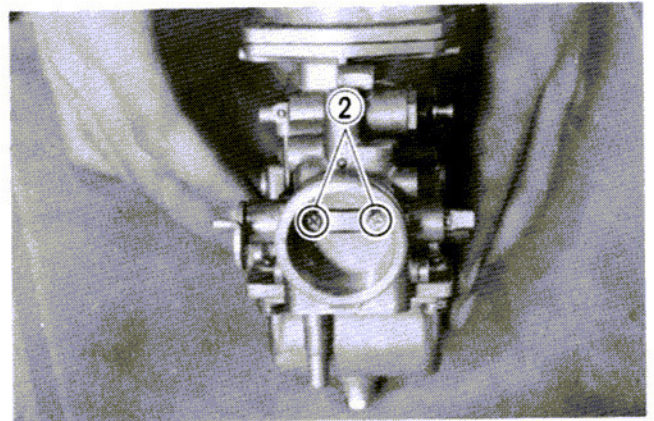
- Take off the adjuster lever by removing nut ①.



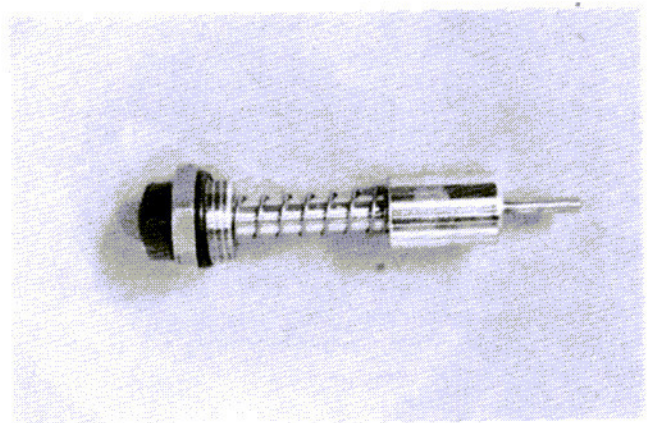
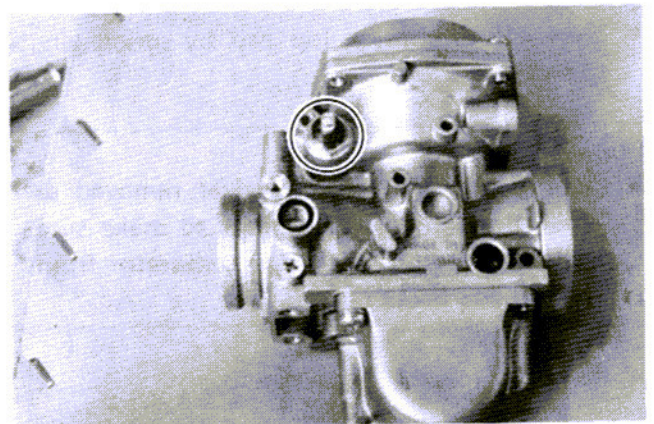
- Remove two throttle valve screws ②, and pull out the valve by turning throttle valve shaft.

CAUTION:

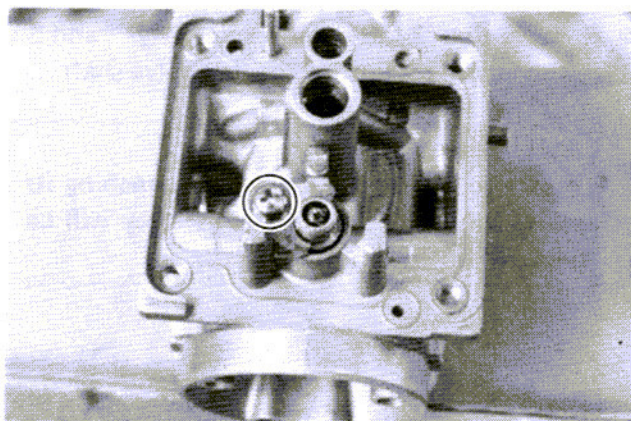
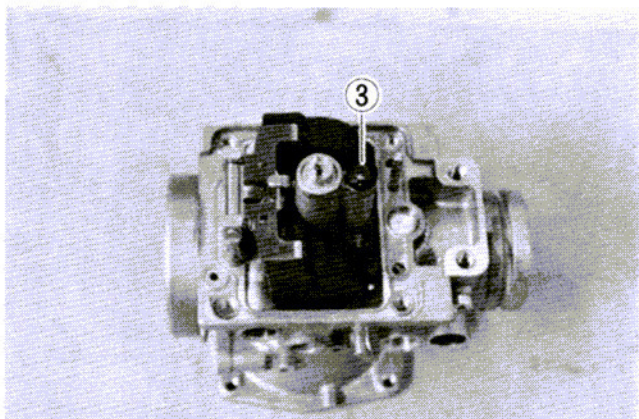
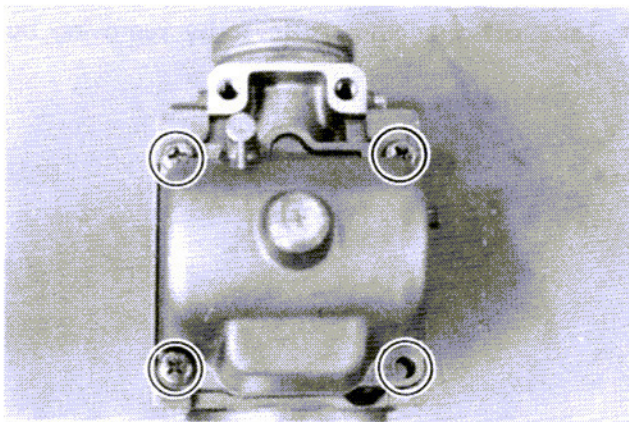
These two screws are locked by punching its end. Once removing the screws, they will be damaged.



- Remove the starter valve from the carburetor body.



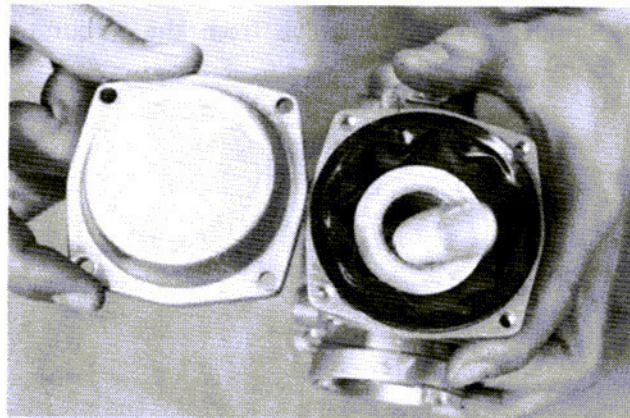
- Remove the 4 float chamber screws and remove the float chamber.
- Remove float, main jet, plug ③ and pilot jet.
- Remove the needle valve.



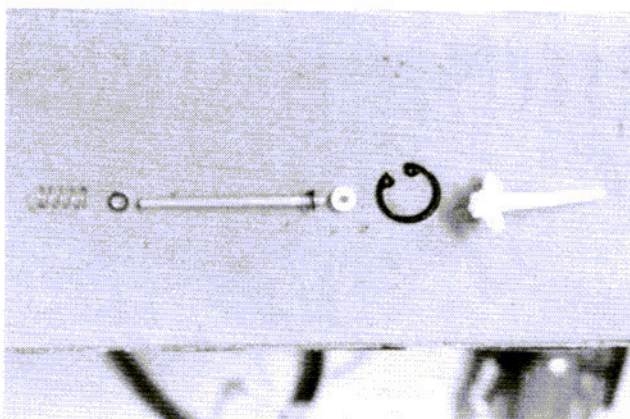
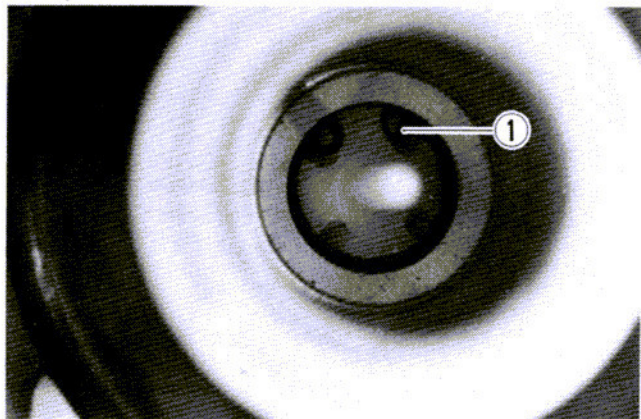
- Take off carburetor top cap by unscrewing 4 screws.

NOTE:

Identify the four piston valves removed as No. 1 through No. 4 in order to make sure each will be restored to the carburetor from which it was taken out.



- Remove circlip ① from piston.

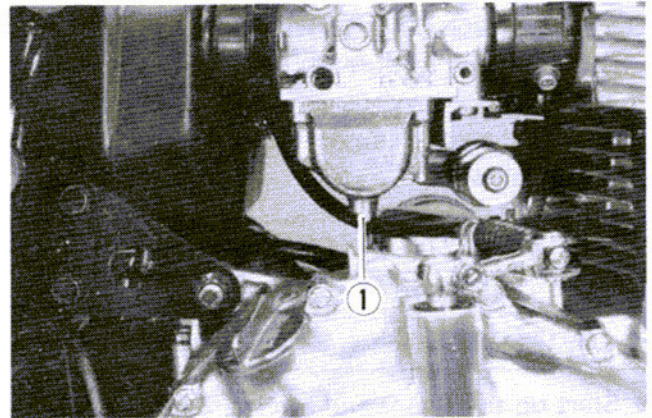


FUEL LEVEL INSPECTION

- Place machine on center stand.
- Remove carburetor drain plug and install the fuel level gauge ①.

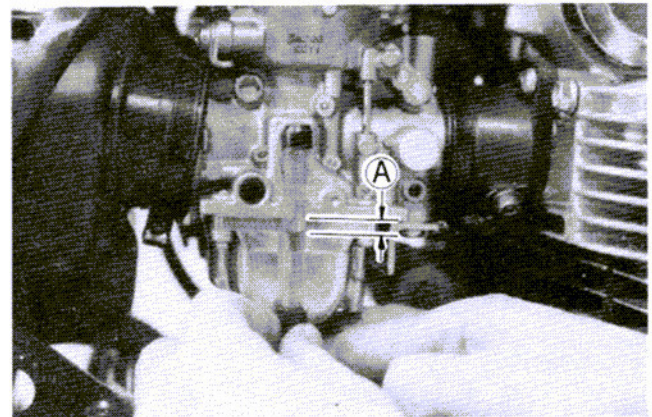
09913 - 14511

Fuel gauge set



- Run the engine at the idling speed (1 000 – 1 200 r/min), and measure the distance with the middle line of the level gauge aligned with the lower surface of carburetor body as shown in photo. Ⓐ should be within the specified range.

Distance Ⓐ	$5.0 \pm 1.0 \text{ mm}$ ($0.20 \pm 0.04 \text{ in}$)
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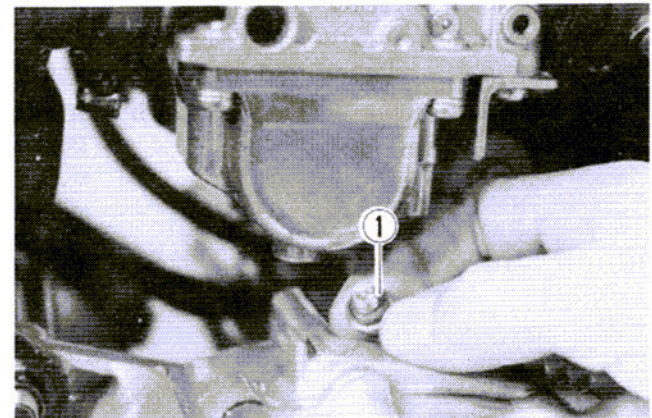


- Repeat the procedure on each carburetor.

NOTE:

When refitting the screw, be sure to use the "O" ring ①.

- If fuel level readjustment is necessary, see the following procedure to adjust the float height.



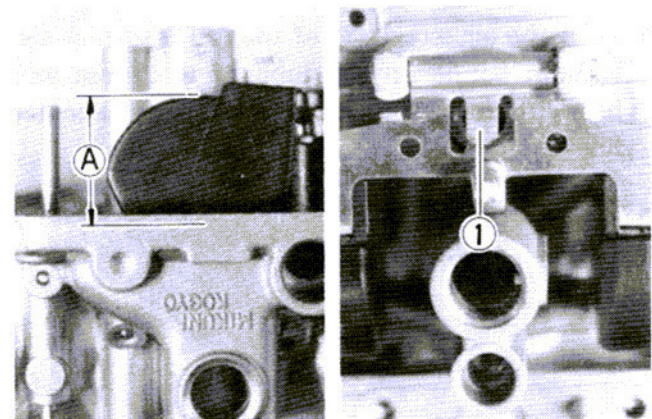
FLOAT HEIGHT ADJUSTMENT

To check the float height, invert the carburetor body holding the float arm pin so that the pin will not slip off. With the float arm kept free, measure the height Ⓐ while float arm is just in contact with needle valve by using the calipers. Bend the tongue ① as necessary to bring the height Ⓐ to this value.

NOTE:

Be sure to have the gasket removed before measuring the height.

Float height	$22.4 \pm 1.0 \text{ mm}$ ($0.88 \pm 0.04 \text{ in}$)
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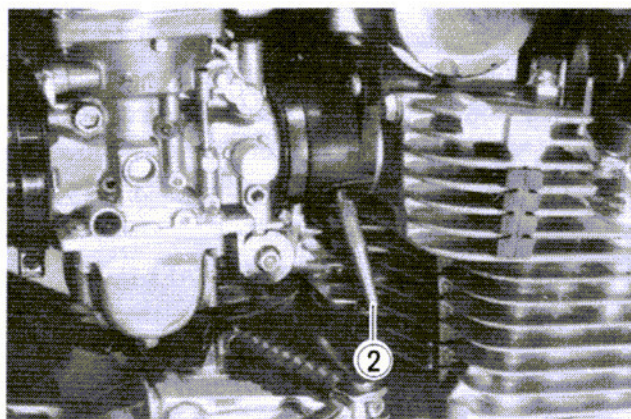
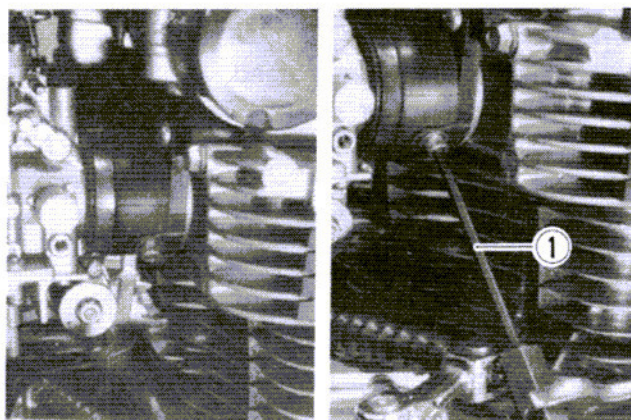
BALANCING CARBURETORS

Check the four carburetors for balance according to the following procedures.

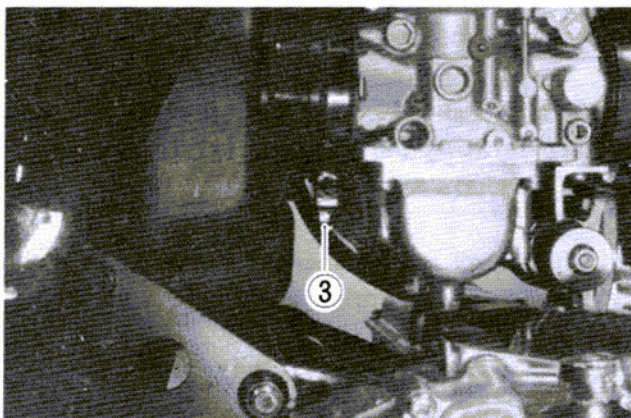
As the first step, calibrate the carburetor balancer gauge as follows:

09913 - 13121	Carburetor balancer
09913 - 13140	Adaptor
09911 - 70130	4 mm Hexagon wrench

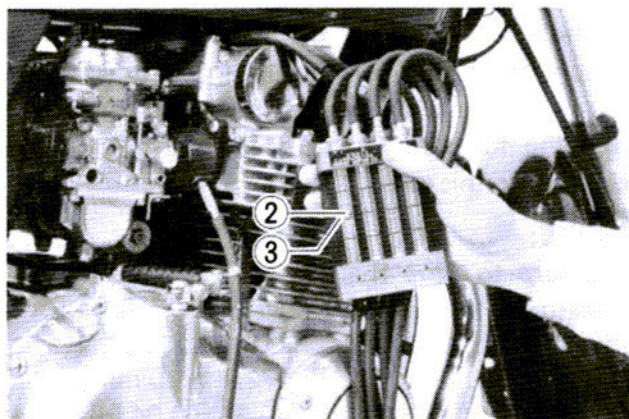
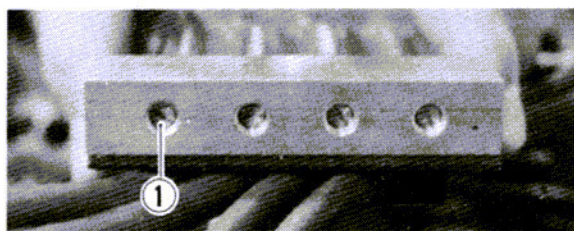
- Start up the engine and run it in idling condition for warming up.
- Stop the warmed-up engine. By using special tool ①, remove vacuum inlet screw for No. 1 or No. 4 cylinder and install adaptor ② with O ring.



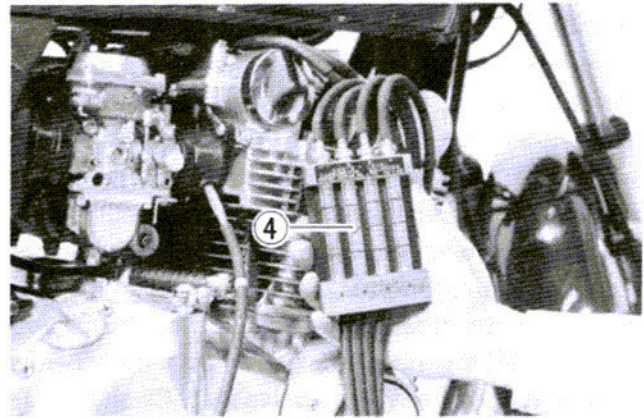
- Plug one of the four rubber hoses of the balancer gauge to this adaptor, and start up the engine, and keep it running at 1 750 r/min by turning throttle stop screw ③.



- 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.

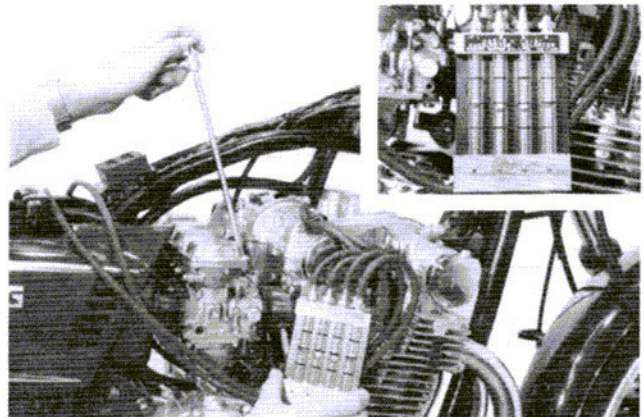


- After making sure that the steel ball stays steady at the center line, disconnect the hose from the adaptor and connect the next hose to the adaptor. Turn air screw to bring the other steel ball ④ to the center line.
- Repeat the process on the third and fourth tubes. The balancer gauge is now ready for use in balancing the carburetors.



Remove the respective vacuum inlet screws and insert the adaptors in the holes. Connect the balancer gauge hoses to these adaptors, one hose to one adaptor, and balance the four carburetors as follows:

- Start up the engine, and keep it running at 1 750 r/min.
- A correctly adjusted carburetor has the steel balls in the Nos. 1 and 4 tubes at the same level, and those in the Nos. 2 and 3 tubes also at the same level, but lower by one half of the ball diameter than the Nos. 1 and 4 tubes as shown.
- If the steel balls are not in line positions, adjust the throttle valve adjusting screw correctly by using throttle valve adjust wrench.

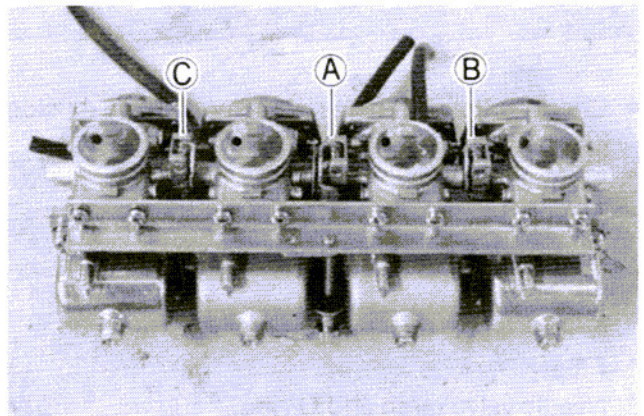


09913 - 14910

Throttle valve adjust wrench

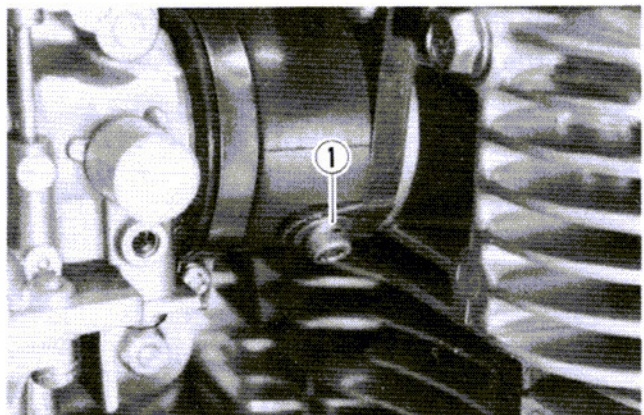
Adjusting order:

Ⓐ (for No. 2 Carb) → Ⓑ (for No. 1)
→ Ⓒ (for No. 4)



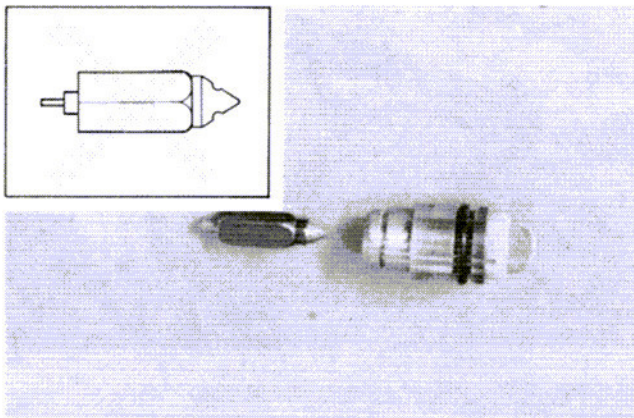
NOTE:

- * If an adjustment is required, it is suggested that the fuel tank is removed, and fuel should be supplied by a separate fuel tank.
- * Be sure to plug the fuel cock vacuum line.
- * Each vacuum inlet screw has a gasket. Be careful not to leave out this gasket ①.



NEEDLE VALVE

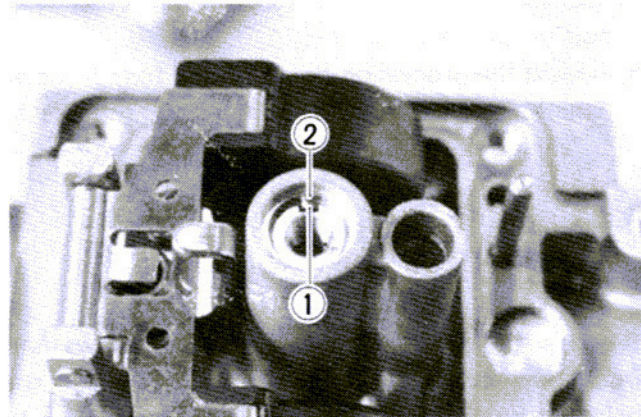
If foreign matter is caught between the valve seat and the needle, the gasoline will continue to flow and result in overflowing. If the seat and needle are worn out beyond the permissible limits, similar trouble will occur. Conversely, if the needle sticks, the gasoline will not flow into the float chamber. Remove the carburetor, float chamber and floats, and clean the float chamber and float parts with gasoline. If the needle is worn as shown below, replace it together with a valve seat. Clean the fuel passage of the mixing chamber with compressed air.



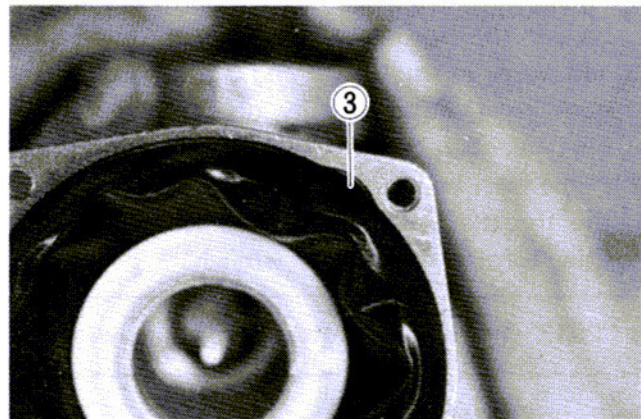
- Check following items for any damage or clogging.
 - * Pilot jet
 - * Main jet
 - * Main air jet
 - * Pilot air jet
 - * Needle jet air bleeding holes
 - * Float
 - * Needle valve mesh and O-ring
 - * Diaphragm
 - * Gasket and O-ring
 - * Throttle valve shaft oil seals
 - * Drain plug O-ring
 - * Pilot screw bleeding hole and rubber cap
 - * Pilot outlet and bypass holes
 - * Fuel pipe O-rings

REASSEMBLY

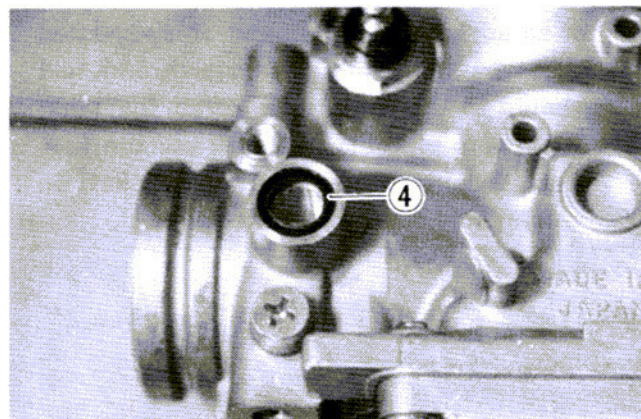
- Align the groove ① of the needle jet with the pin ② and replace it.



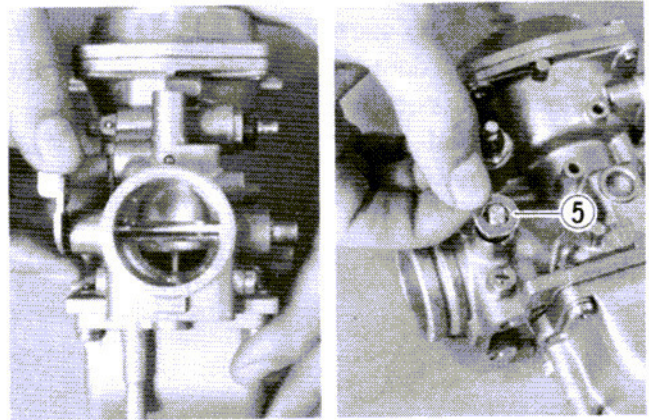
- Place tongue ③ of diaphragm to carburetor body properly.



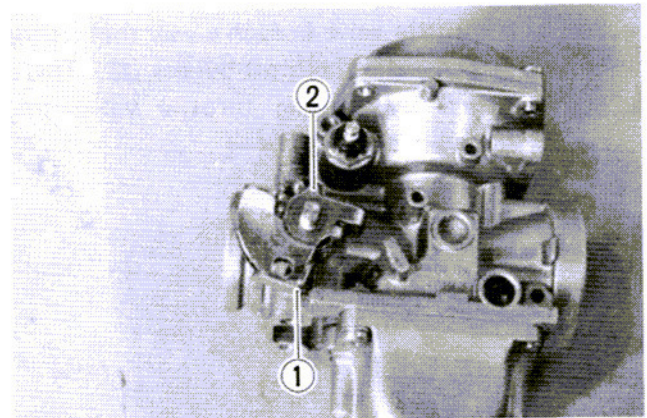
- When fitting throttle valve shaft oil seals, groove should be faced outside ④.



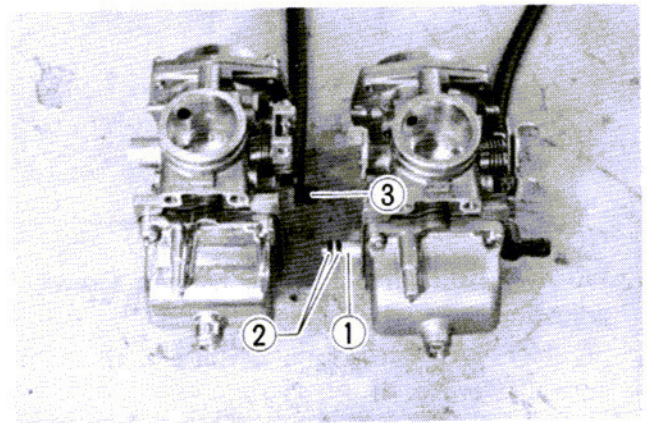
- Set the throttle valve shaft and install the washer ⑤ as shown.



- Hook one end of spring to the boss ①, turn the other end ② clockwise by one turn, and hook it to the cable guide properly. Tighten lock nut and bend up lock washer.
- Apply thread lock "1342" to two screws for securing throttle valve.



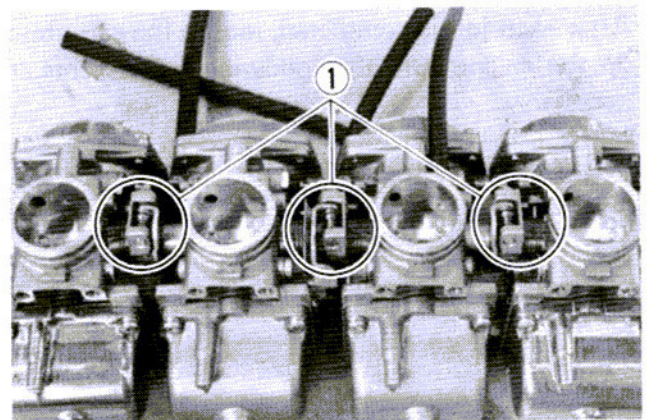
- When engaging four carburetors, be sure to fix fuel pipe ① with four O-rings ② and breather connector ③ properly.



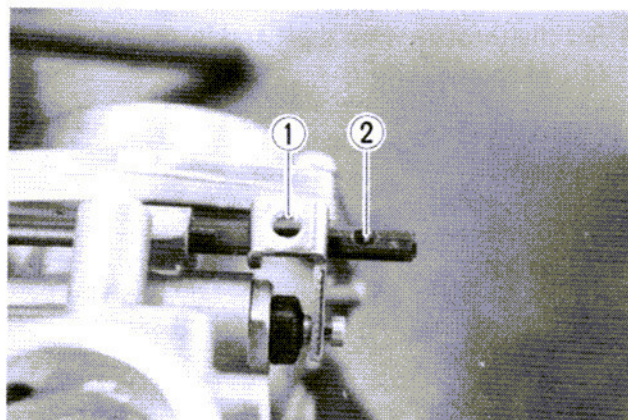
- Position throttle valve control lever ① correctly.
- Apply thread lock cement to lower bracket screws.
- Apply thread lock cement to the upper bracket screws.

99000 - 32040

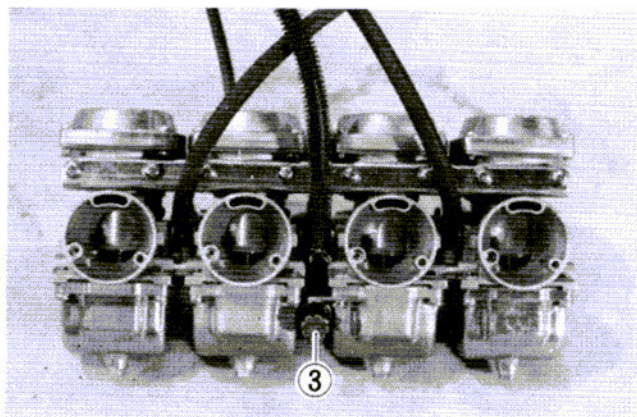
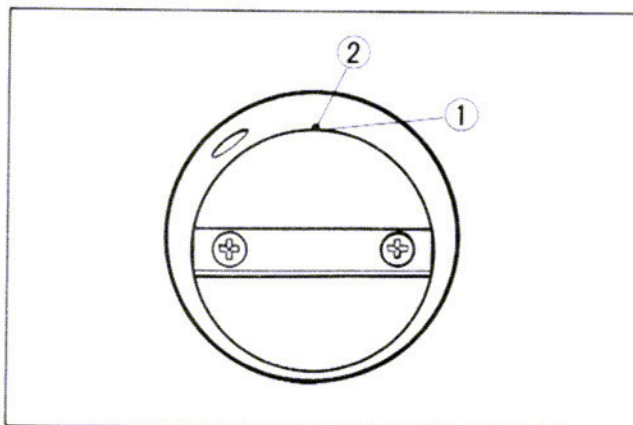
Thread lock cement



- When mounting starter shaft, align starter valve screw ① with dent mark ② on starter shaft and grease sliding portions.
- Apply thread lock cement to starter shaft securing screws.



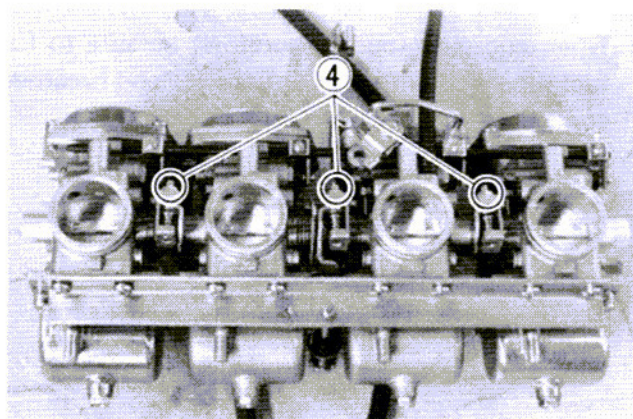
- Set each throttle valve in such a way that its top end ① meets the foremost bypass ②. This is accomplished by turning throttle valve stop screw ③ and balance screw ④.



NOTE:

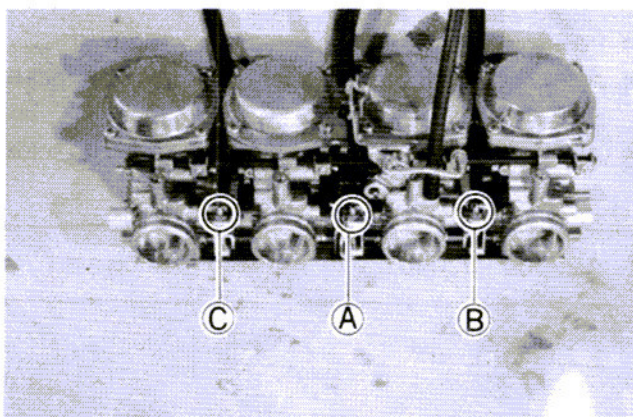
When adjusting the throttle balance screws, adjusting order is as follows:

- ① (for No. 2 Carb.) → ② (for No. 1)
→ ③ (for No. 4)



After each job is completed, mount the carburetor on the engine, and the following adjustments are necessary.

	Page
* Engine idle rpm.	2 - 13
* Throttle cable play	2 - 13
* Balancing carburetor	5 - 13

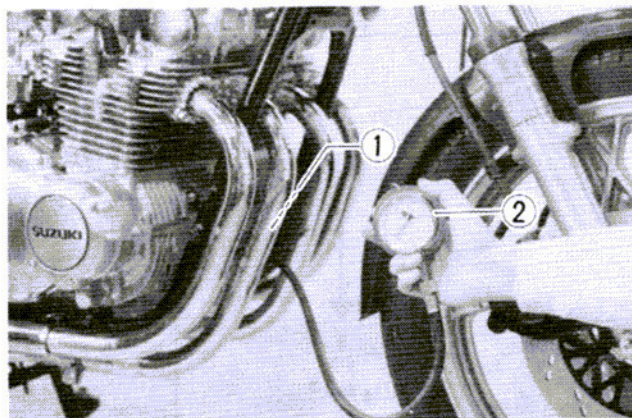


LUBRICATION SYSTEM

OIL PRESSURE

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

- Remove the oil pressure inspection plug ① from oil filter cap.
- Install the oil pressure gauge ② in the position shown in the figure.
- Warm up the engine as follows:
Summer 10 min. or so at 2 000 r/min
Winter 20 min. or so at 2 000 r/min
- After warming up operation, increase the engine speed to 3 000 r/min, and read the oil pressure gauge.



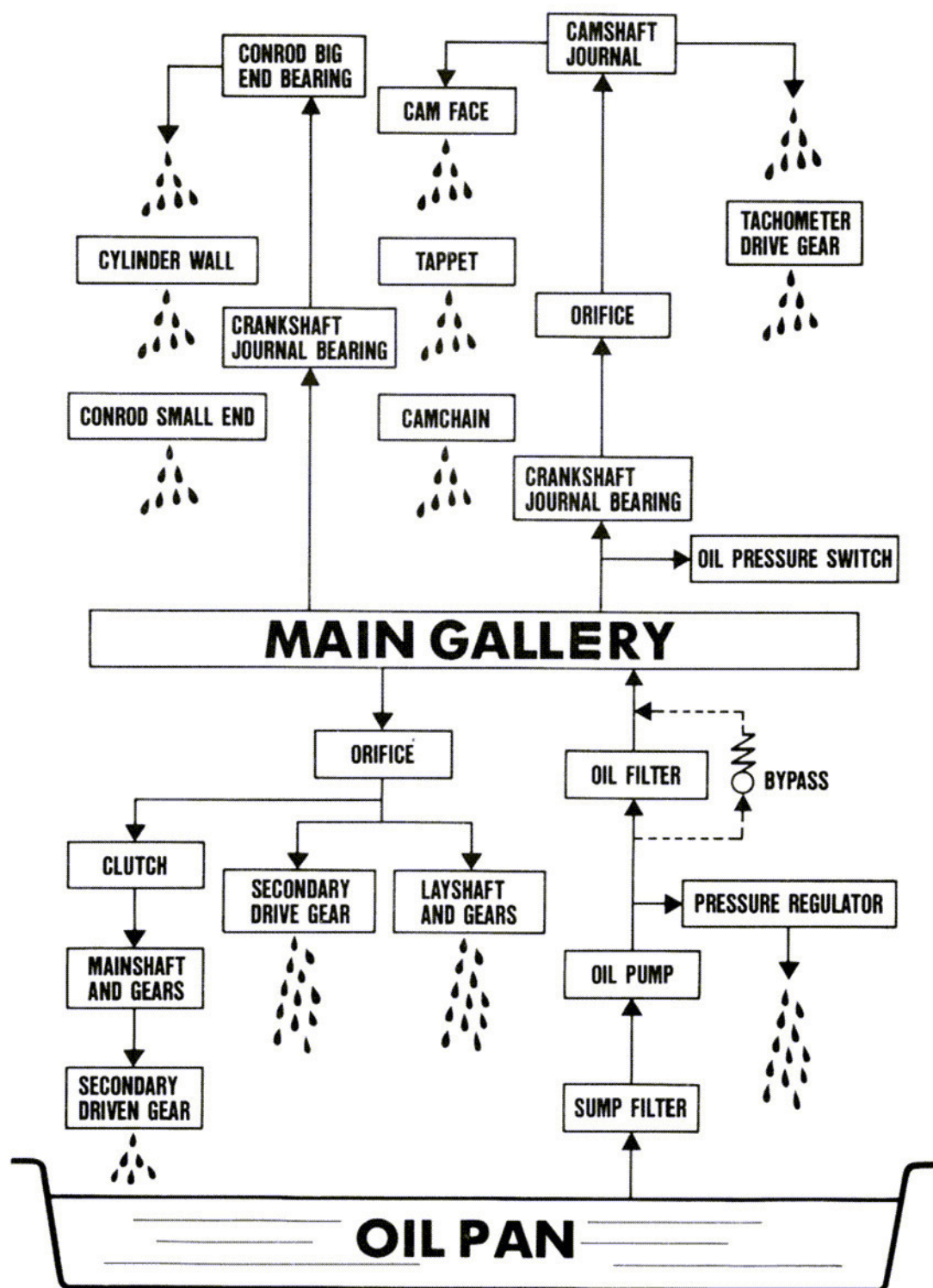
Oil pump pressure specification

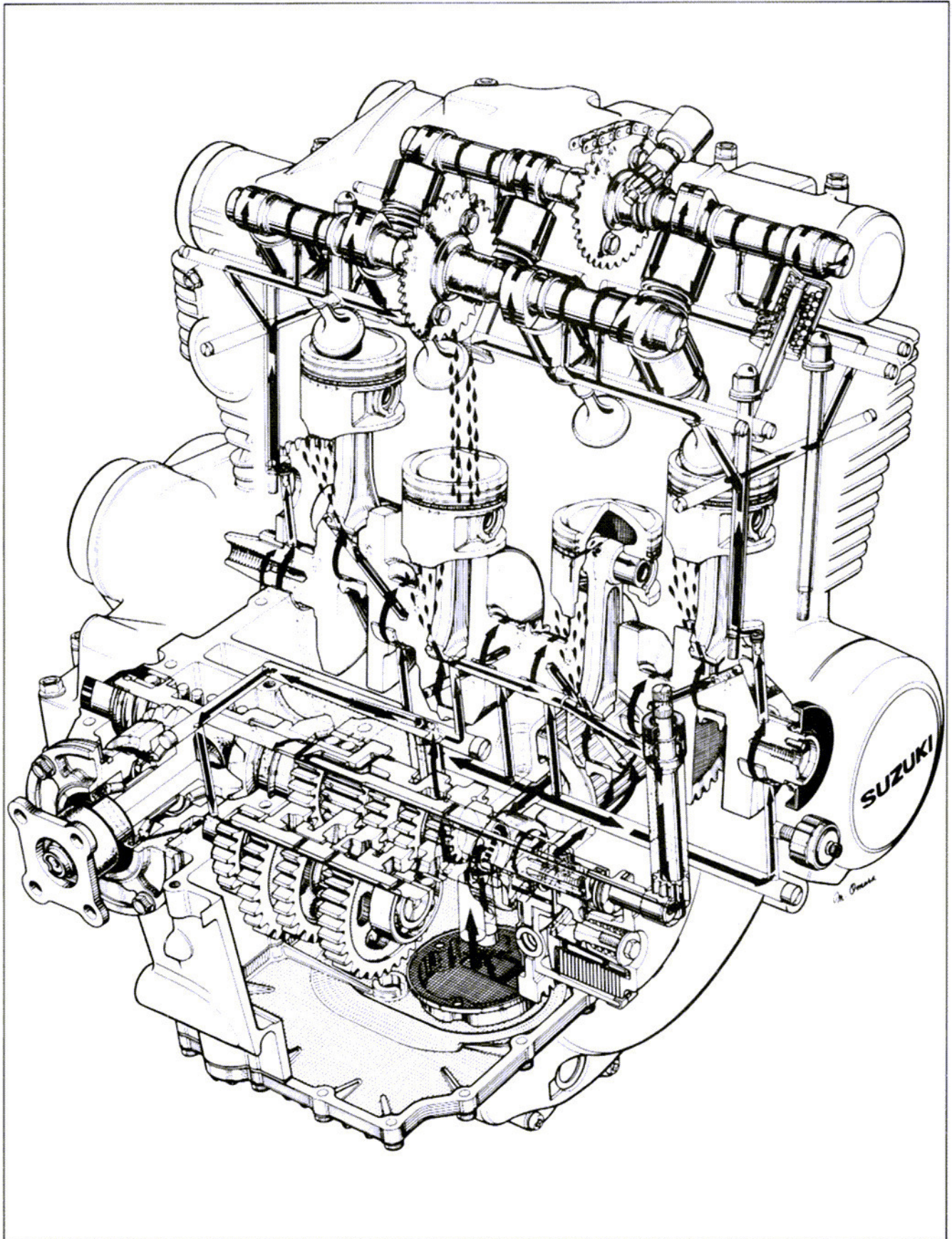
Above 3.0 kg/cm² (43 psi),
Below 5.5 kg/cm² (78 psi) at 3 000 r/min

If the pressure is too low, it means that the oil pump is internally worn or otherwise defective and needs to be replaced.

- Install oil pressure inspection plug and tighten it.

LUBRICATION SYSTEM





EMISSION CONTROL & REGULATIONS

CONTENTS

<i>EMISSION REGULATIONS.....</i>	<i>6-1</i>
<i>EMISSION CONTROL CARBURETOR COMPONENTS</i>	<i>6-2</i>
<i>GENERAL EMISSION INFORMATION</i>	<i>6-3</i>

EMISSION REGULATIONS

On February 4, 1977, Federal Emission Regulations for motorcycles that may be licensable took effect. The regulations provided for a gradual, multi-step application of stricter emission limits beginning with all effected motorcycles manufactured after January 1, 1978, culminating with the present 1980 emission level restrictions. For the 1980 and succeeding years one set of emission limits will be in effect. They are as follows:

1980 EMISSION LIMITS

CATEGORIES	HYDROCARBONS (HC)	CARBON MONOXIDE
All motorcycles 50 cc – Larger	5.0 Grams/Kilometer (8.0 Grams/Mile)	12 Grams/Kilometer (19.3 Grams/Mile)

Emission-controlled motorcycles which are subject to the emission regulations are those motorcycles which are equipped with a headlight, taillight, stop light and which have an engine displacement larger than 50 cc.

Suzuki Motor Company performed all the necessary testing and certification of emission-controlled models in strict compliance with the E.P.A. testing regulations. Suzuki motorcycle dealers are not required to either test or certify emission levels on any motorcycles as Suzuki Motor Company is legally responsible for the entire certification procedure.

E.P.A. regulations also provide fines for individuals who alter, render inoperative or improperly service emission-controlled motorcycles ranging up to \$10,000.00 per motorcycle. It is essential that the individual servicing this emission-controlled motorcycle review thoroughly all the service procedures presented in this manual. Under no circumstances should the recommended service procedures be deviated from nor adjustments made which are not in accordance with the factory specifications or service procedures.

EMISSION CONTROL CARBURETOR COMPONENTS

GS650G motorcycles are equipped with precision, manufactured carburetors for emission level control. These carburetors require special mixture control components and other precision adjustments to function properly.

There are several carburetor mixture control components in each carburetor assembly. Three (3) of these components are machined to much closer tolerances than standard machined carburetor jets. These three (3) particular jets — MAIN JET, NEEDLE JET, PILOT JET — must not be replaced by standard jets. To aid in identifying these three (3) jets a different design of letter and number are used. If replacement of these close tolerance jets becomes necessary, be sure to replace them with the same type close tolerance jets marked as in the examples shown below.

The jet needle is also of special manufacture. Only one clip position is provided on the jet needle. If replacement becomes necessary the jet needle may only be replaced with an equivalent performing replacement component. Suzuki recommends that Genuine Suzuki Parts be utilized whenever possible for the best possible performance and durability.

Conventional Figures Used on Standard Tolerance Jet Components	1	2	3	4	5	6	7	8	9	0
Emission Type Figures Used On Close Tolerance Jet Components	1	2	3	4	5	6	7	8	9	0

The carburetor specification for the emission-controlled GS650G are as follows.

Carburetor I.D. No.	Main Jet	Needle Jet	Jet Needle	Pilot Jet	Pilot Screw
34200	#110	Y-7	5C45	#42.5	PRE-SET DO NOT ADJUST

The pilot screw is pre-set by the factory utilizing specialized testing and adjusting procedures. The pilot screw is not adjustable as the idle circuit is "sealed" after factory adjustment. Adjusting, interfering with, improper replacement, or resetting of any of the carburetor components may adversely affect carburetor performance and cause the motorcycle to exceed the exhaust emission level limits. If persons, who are unaware of these special carburetor servicing requirements tamper with the carburetors the Suzuki dealer should restore the carburetors to their original condition or if unable to effect repairs, contact the distributors representative for further technical information and assistance.

GENERAL EMISSION INFORMATION

There are three different types of regulated exhaust emissions. They are:

- Hydrocarbons (HC)
- Carbon Monoxide (CO)
- Oxides of Nitrogen (NO_x)

Automobiles must meet specific emission standards for all three of these pollutants. Motorcycles must only meet the requirements for the following:

- Hydrocarbons (HC)
- Carbon Monoxide (CO)

HC exhaust emissions are basically unburned fuel vapors which have passed through the engine and escaped the combustion process.

CO exhaust emissions are formed during an incomplete combustion cycle as a result of a rich air/fuel mixture. The only way that CO can be produced is by the combustion cycle.

Total NO_x emissions from all motorcycles is considered negligible. The EPA states that total NO_x emission from motorcycles by 1990 will only amount to approximately 0.5%. NO_x is formed during the combustion process at high combustion chamber temperatures.

CARBON MONOXIDE

Carbon monoxide is a product of an incomplete combustion cycle. CO is measured in grams per mile or kilometer and also in percentage (%).

The most common cause of CO is rich carburetion. As the mixture is richened excessively, the CO amount increases proportionately. Engine oil is also a hydrocarbon, so engine problems which lead to oil burning increase carbon monoxide.

CARBURETION MALFUNCTION

1. Air Cleaner — Dirty or over oiled.
2. Idle Mixture — Adjusted incorrectly.
3. Idle Speed — Too high or low.
4. Fuel Level — Sticking float, leaking needle, incorrect setting.
5. Choke — Leaking or linkage sticking.
6. Synchronization — Improper balance on multi cylinders.

ENGINE MALFUNCTION

1. Valve Seals — Leaking or torn.
2. Valve Guide — Worn and leaking excess oil.
3. Gaskets — Leaking oil into combustion chamber.

HYDROCARBONS

Hydrocarbons are unburnt gasoline vapors and can be measured in two different ways. The first is to measure the weight of the pollutants over a specific distance such as grams per mile or grams per kilometer. The second method is to measure the concentration of HC in the exhaust gas in parts per million (PPM).

The most common cause of high HC emissions are ignition system problems. If the ignition system fails to ignite the fuel mixture properly, then raw gasoline vapors will pass through the engine into the exhaust system. Listed are the most common ignition problems which occur and which can affect HC emission output.

IGNITION SYSTEM MALFUNCTIONS

1. Spark Plugs – Fouled, dirty, improper type or improperly gapped.
2. Ignition Timing – Advanced or Retarded.
3. Timing Advance – Too fast or too slow an advance rate.
4. Battery – Low charge or faulty.

Carburetion can also lead to high HC emissions if the mixture is either excessively rich or excessively lean.

MIXTURE-RELATED MALFUNCTIONS

1. Air Cleaner – Dirty, over oiled or torn.
2. Jets – Clogged, restricted or incorrect size.
3. Float Level – Level too low (lean) or too high (rich).
4. Choke – Leaking choke plunger or sticking linkage.
5. Air Leaks – Intake manifolds, engine gaskets and other sealing surfaces.
6. Synchronization – Unbalanced on multi-cylinder machines.
7. Exhaust System – Restricted flow or improper exhaust system.

Engine wear or damage can also cause high HC emissions.

1. Rings – Low compression, leakage into crankcase.
2. Valves – Improper adjustment, bent stem or burnt.
3. Gaskets – Leaking, loss of compression.
4. Crank Seals – Leaking.
5. Oil Consumption – Worn valve guides, worn rings, clogged crankcase breather.
6. Oil – Improper engine oil.

ELECTRICAL SYSTEM

CONTENTS

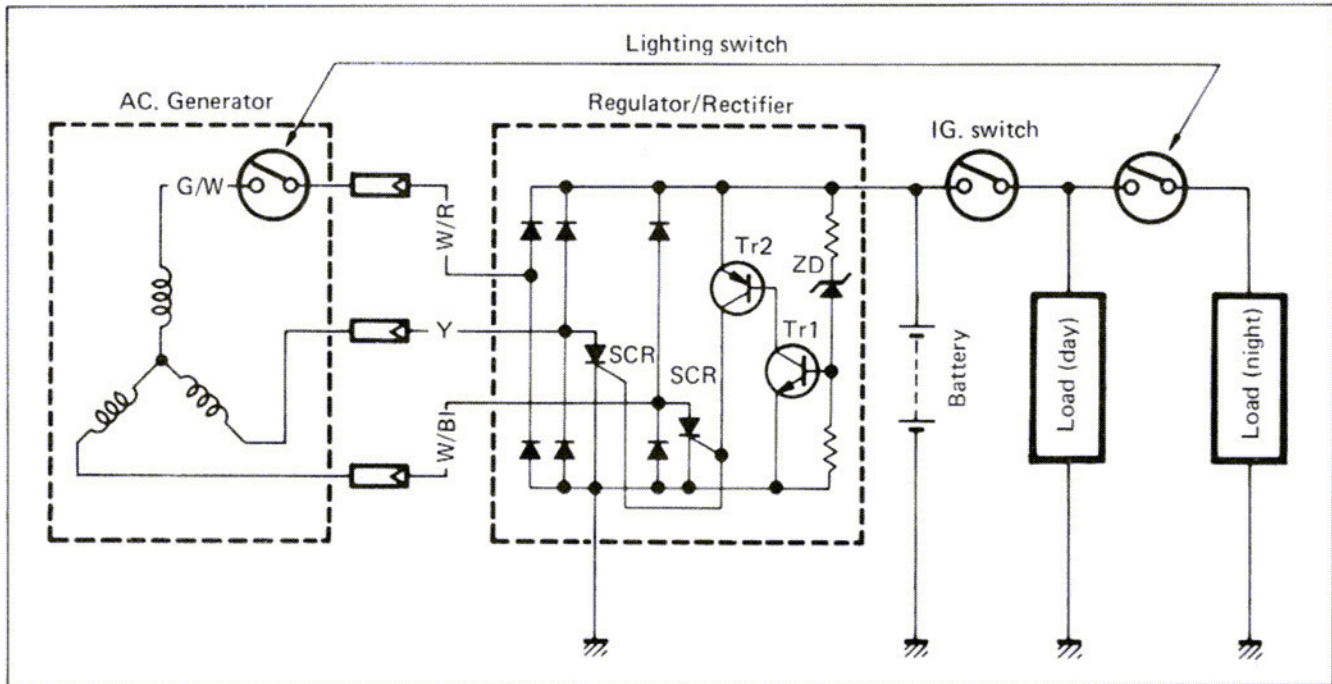
CHARGING SYSTEM	7- 1
IGNITION SYSTEM	7- 5
STARTER SYSTEM	7- 8
COMBINATION METERS	7-11
LAMPS	7-12
SWITCHES	7-14

CHARGING SYSTEM

DESCRIPTION

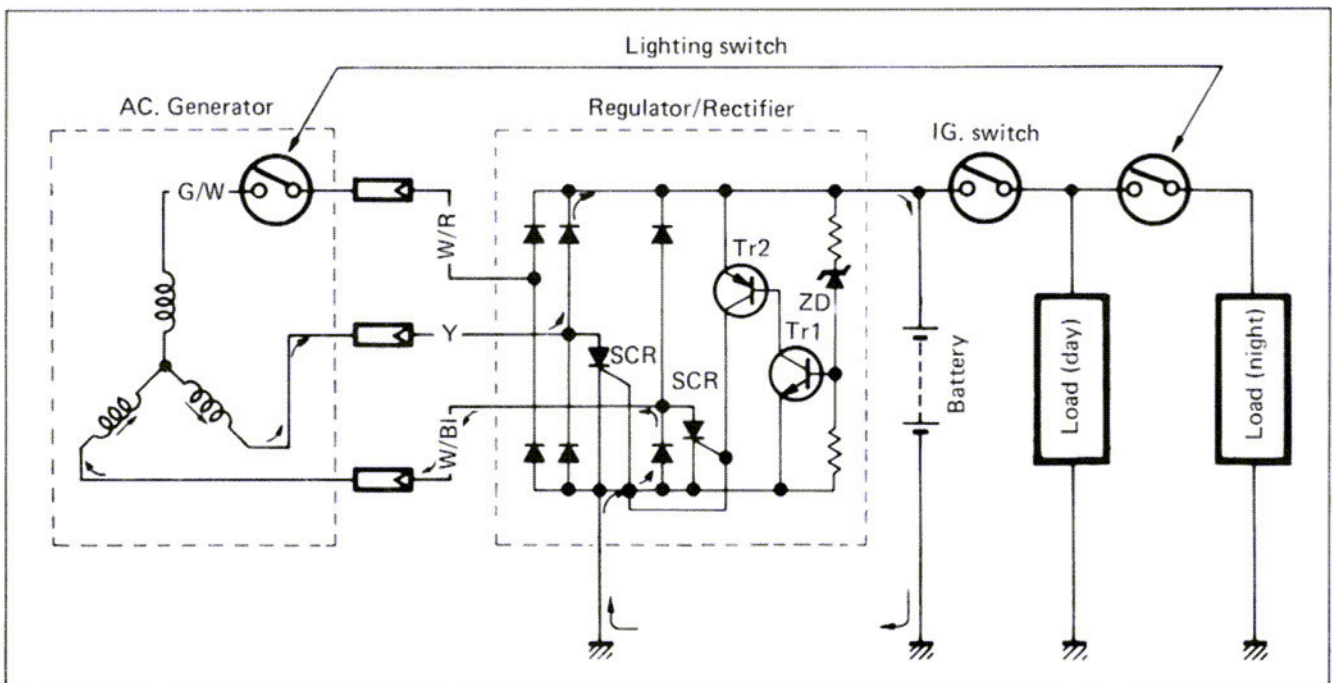
The circuit of the charging system is indicated in figure, which is composed of an AC generator, regulator/rectifier unit and battery.

The AC current generated from AC generator converted by rectifier and is turned into DC current, then it charges the battery.



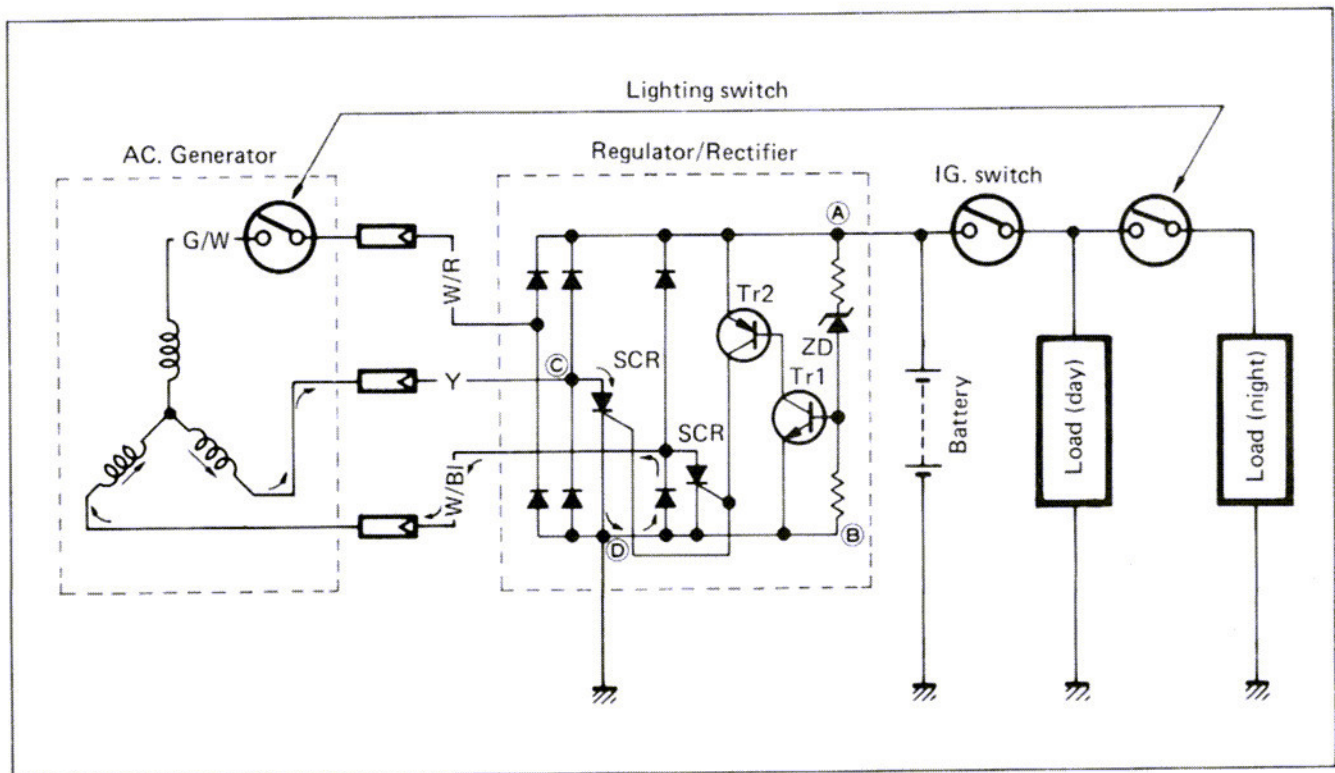
Function of Regulator

While the engine r/min is low and the generated voltage of AC generator is lower than the adjusted voltage of Regulator, the regulator does not function, incidentally the generated current charges the battery directly.



When the engine r/min becomes higher, the generated voltage of AC generator also becomes higher and the voltage between points **A** and **B** of regulator becomes high accordingly, and when it reaches the adjusted voltage of regulator, ZD (Zener diode) becomes "ON" condition and Tr1 becomes "ON" condition because the base current flows to Tr1 and also Tr2 becomes "ON" condition consequently because the base current flows to Tr2. When Tr2 becomes "ON", signal will be sent to the SCR (Thyristor) gate probe and SCR will become "ON" condition.

Then the SCR becomes conductive to the direction from point **C** to point **D**. Namely at the state of this, the current generated from the AC generator gets through 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 into the point **D**, reverse current tends to flow to SCR, then the circuit of SCR turns to OFF mode and begins to charge the battery again. Thus these repetitions maintain charging voltage to the battery constant and protect it from overcharging.



INSPECTION

CHARGING OUTPUT CHECK

Remove the left frame cover.

Start the engine and keep it running at 5 000 r/min with dimmer switch turned HI position.

Using pocket tester, measure the DC voltage between the battery terminal $\oplus$ and $\ominus$.

If the tester reads under 14V or over 15.5V, check the AC generator no-load performance and regulator/rectifier.

NOTE:

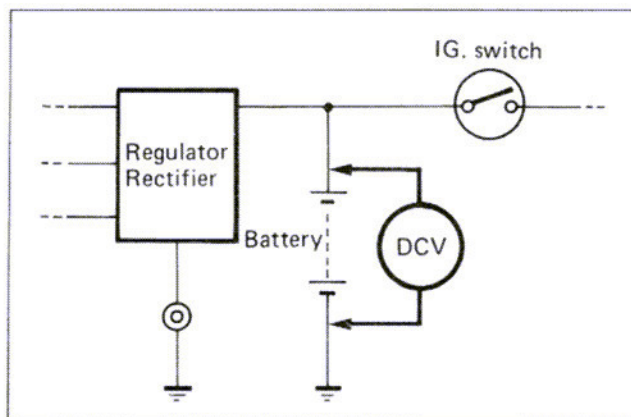
When making this test, be sure that the battery is fully-charged condition.

STD charging output

14 – 15.5 V (DC) at 5 000 r/min

09900 - 25002

Pocket tester



AC GENERATOR NO-ROAD PERFORMANCE

Disconnect the three lead wires from the AC generator terminal.

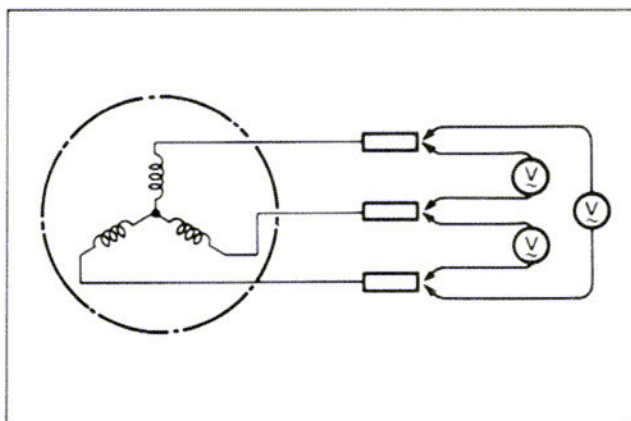
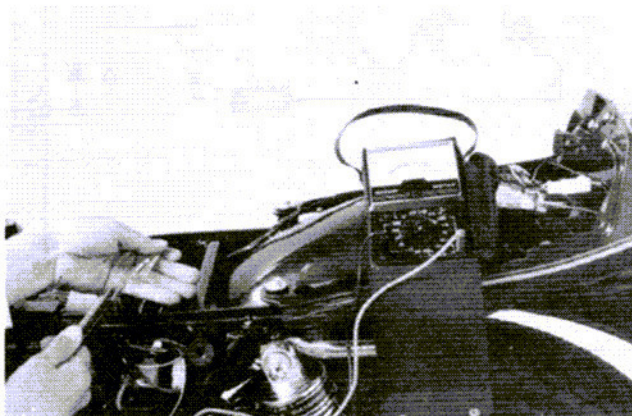
Start the engine and keep it running at 5 000 r/min.

Using the pocket tester, measure the AC voltage between the three lead wires.

If the tester reads under 80V, the AC generator is faulty.

STD No-load performance

80V (AC) or Over at 5 000 r/min



AC GENERATOR CONTINUITY CHECK

Using the pocket tester, check the continuity between the lead wires of the stator.

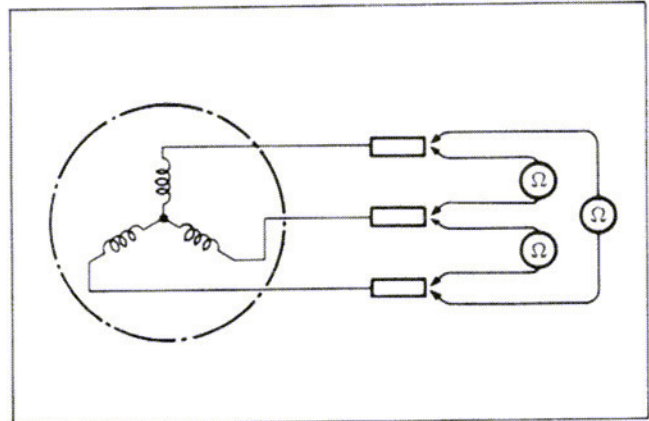
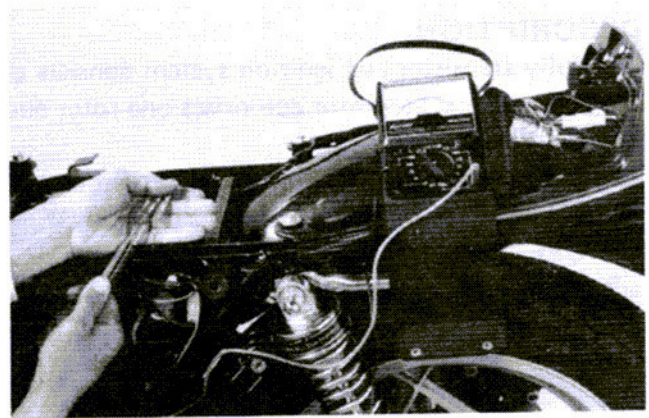
Also check that the stator core is insulated.

NOTE:

When making this test, it is not necessary to remove the AC generator.

09900 - 25002

Pocket tester

**REGULATOR/RECTIFIER**

Using the pocket tester (X1 Ω range), measure the resistance between the lead wires in the following table.

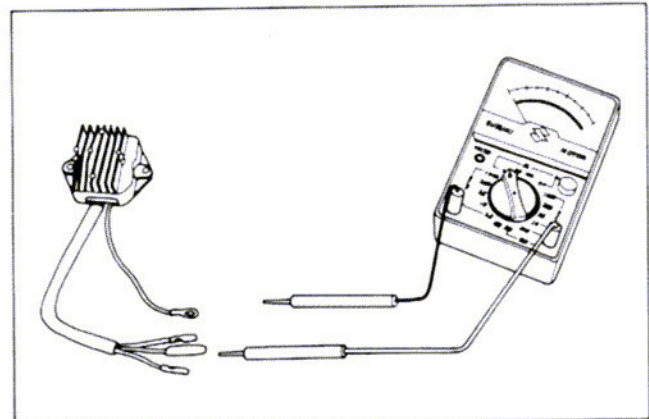
If the resistance checked is incorrect, replace the regulator/rectifier.

09900 - 25002

Pocket tester



I probe of tester	+ Probe of tester					
	R	W/BI	W/R	Y	B/W	
R		OFF	OFF	OFF	OFF	
W/BI	5-6 Ω		OFF	OFF	OFF	
W/R	5-6 Ω	OFF		OFF	OFF	
Y	5-6 Ω	OFF	OFF		OFF	
B/W	35-45 Ω	5-6 Ω	5-6 Ω	5-6 Ω		

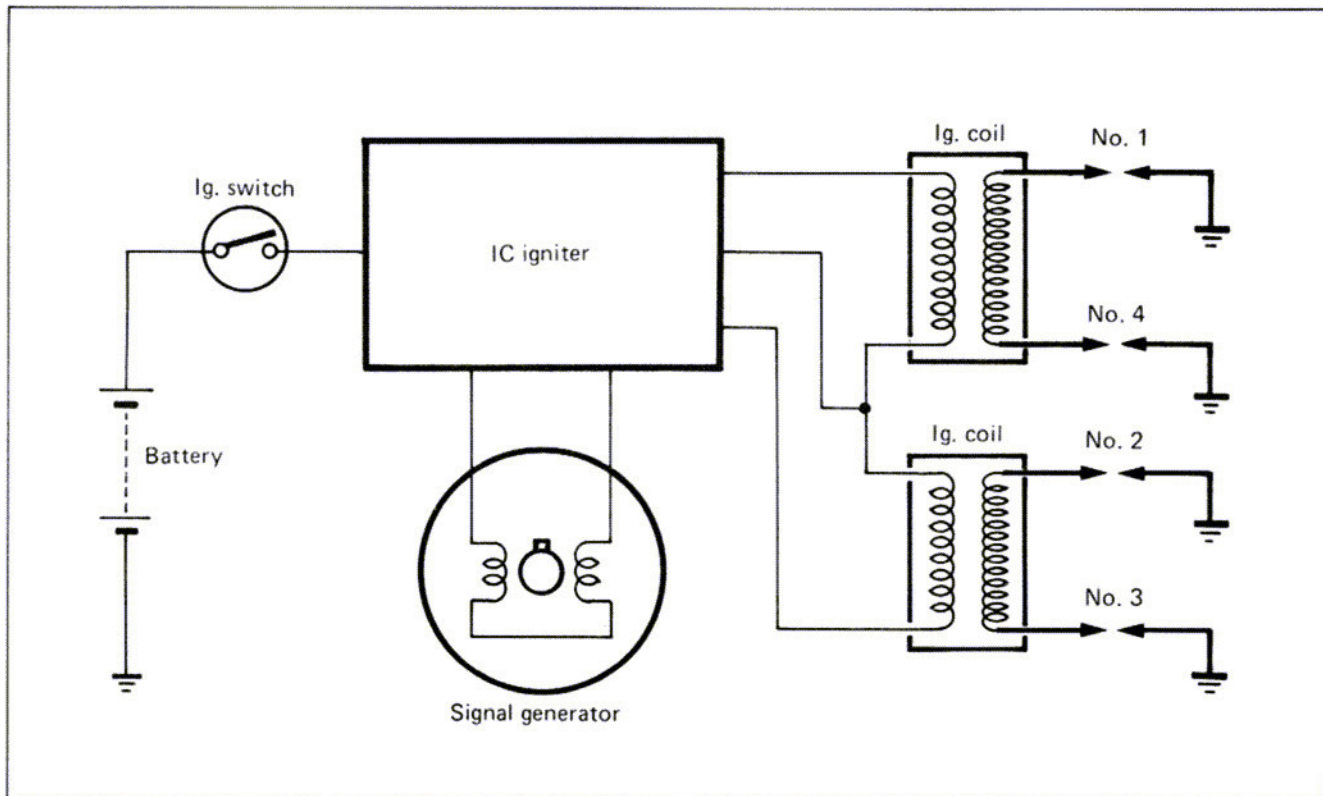


IGNITION SYSTEM

DESCRIPTION

The fully transistorized ignition system consists of a signal generator, IC Igniter, ignition coils, and spark plugs. The signal generator comprises one rotor and two pickup coils.

The signal generator is mounted at the right end of the crankshaft. The output of the signal generator goes to the IC Igniter unit, where it turns ON and OFF the transistor alternately. As the transistor is turned ON and OFF, the current passing through the primary winding of the ignition coil is also 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.



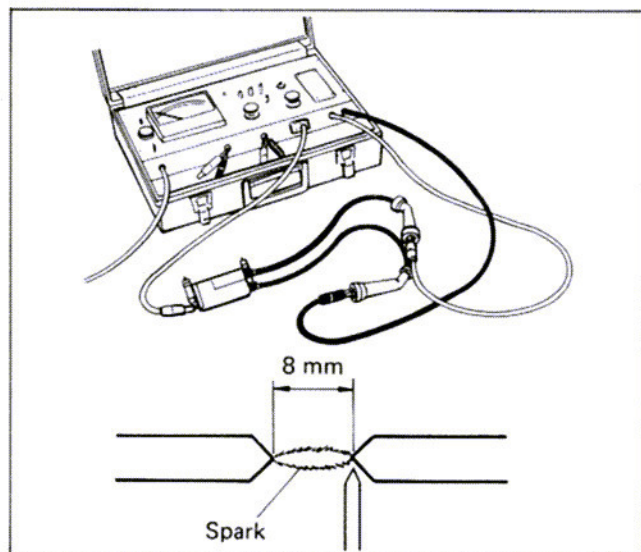
INSPECTION

IGNITION COILS (Checking with Electro Tester)

Using the electro tester, test each ignition coil for sparking performance. The test connection is as indicated. Make sure that the three-needle sparking distance is at least 8 mm (0.3 in).

If no sparking or orange color sparking occurs with this much gap, then it is defective and must be replaced. Test for 5 minutes.

09900 - 28106	Electro tester
STD Spark performance	8 mm (0.3 in)

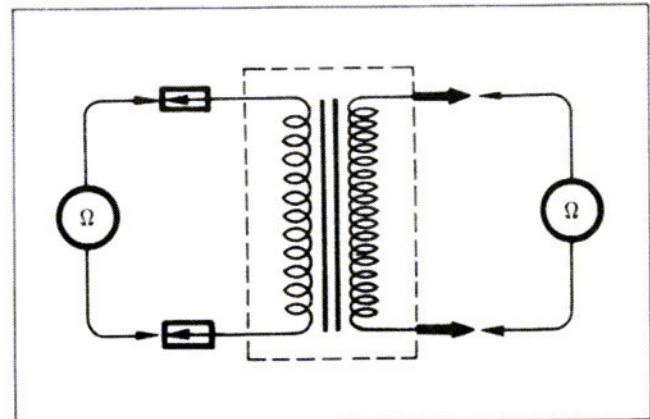
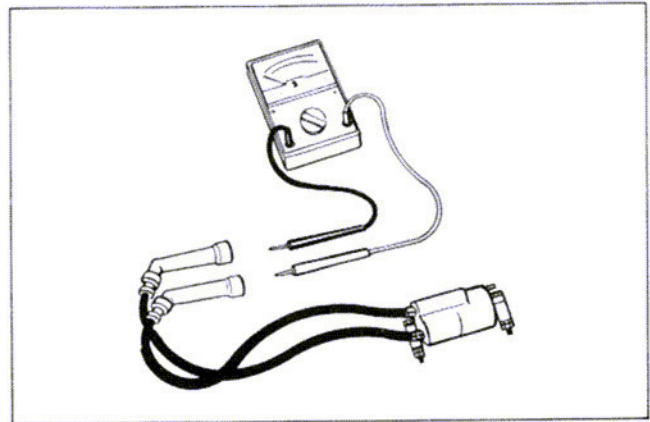


IGNITION COILS (Checking with Pocket Tester)

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.

09900 - 25002	Pocket tester
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Ignition coil resistance	
Primary	Approx. 3 – 5 Ω
Secondary	Approx. 30 – 35k Ω

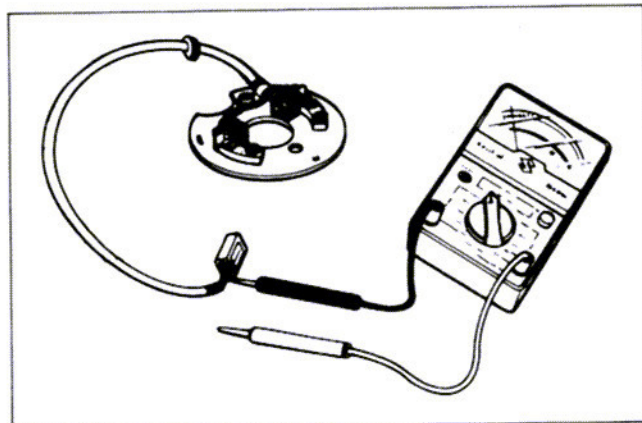
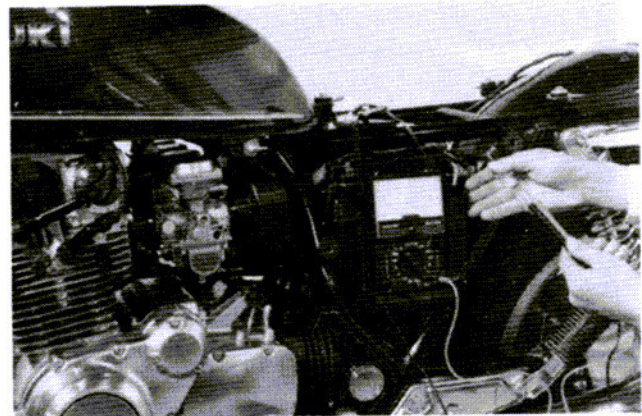
**SIGNAL GENERATOR**

Measure the resistance between lead wires.

If the resistance noted to show infinity or too low a resistance value must be replaced.

09900 - 25002	Pocket tester
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STD resistance	
BI – G	250 – 360 Ω



IC IGNITER UNIT

Remove each spark plug of Nos. 1 and 2 cylinders, fit it to respective plug cap and place it on the cylinder head.

Remove the frame cover on the left side and disconnect the lead wire from the signal generator.

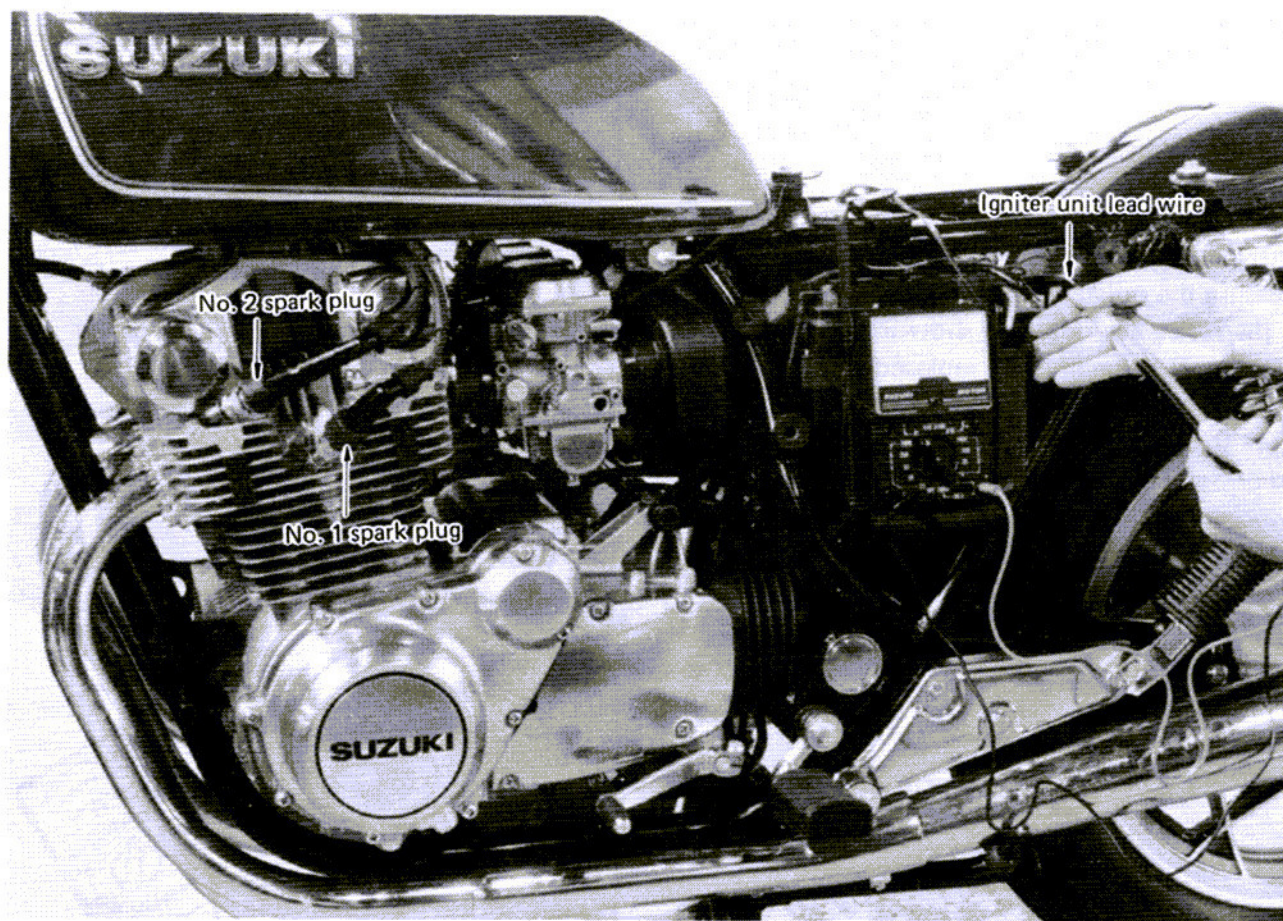
Now connect $\oplus$ pin of SUZUKI Pocket Tester ($\times 1\Omega$ range) with Blue lead wire on the transistor unit side and $\ominus$ pin with Green lead wire.

The transistor unit is in good condition if the following is observed:

The moment the test pins are connected the spark plug of No. 1 cylinder sparks and the moment the tester pins are disconnected the spark plug of No. 2 cylinder sparks.

NOTE:

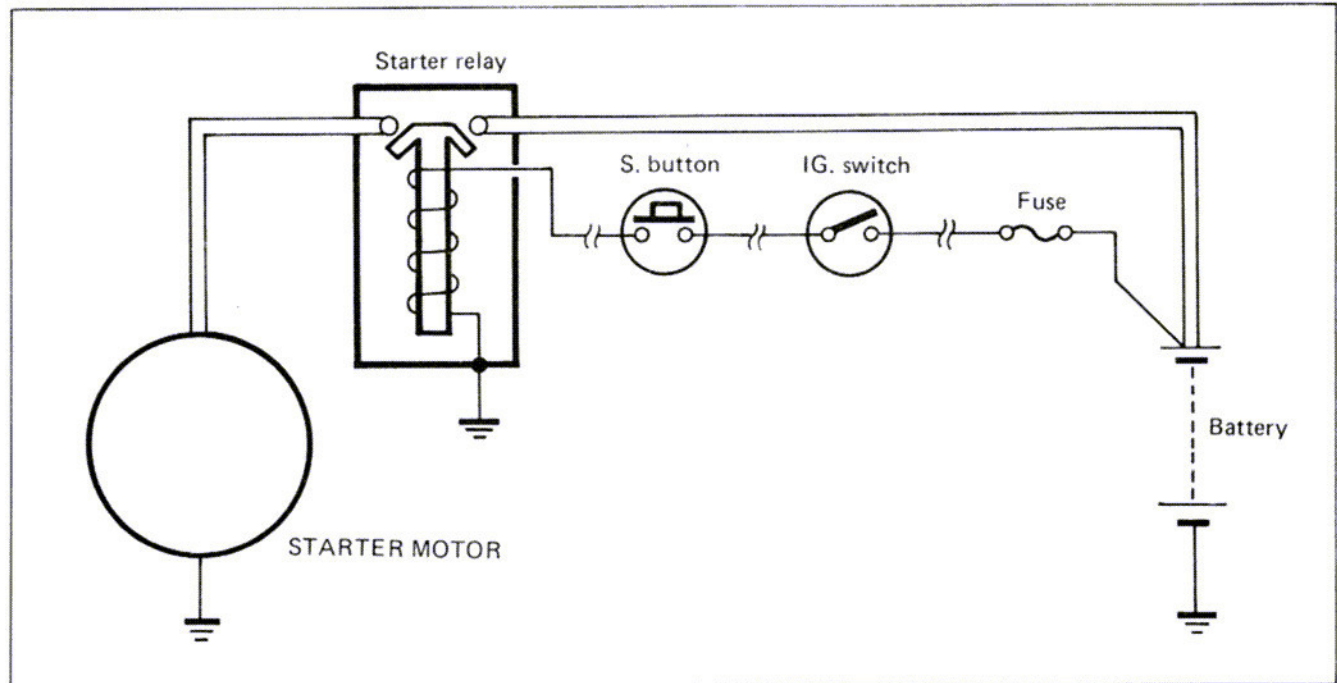
This checking presupposes that the ignition coil used for checking is a good one.



STARTER SYSTEM

DESCRIPTION

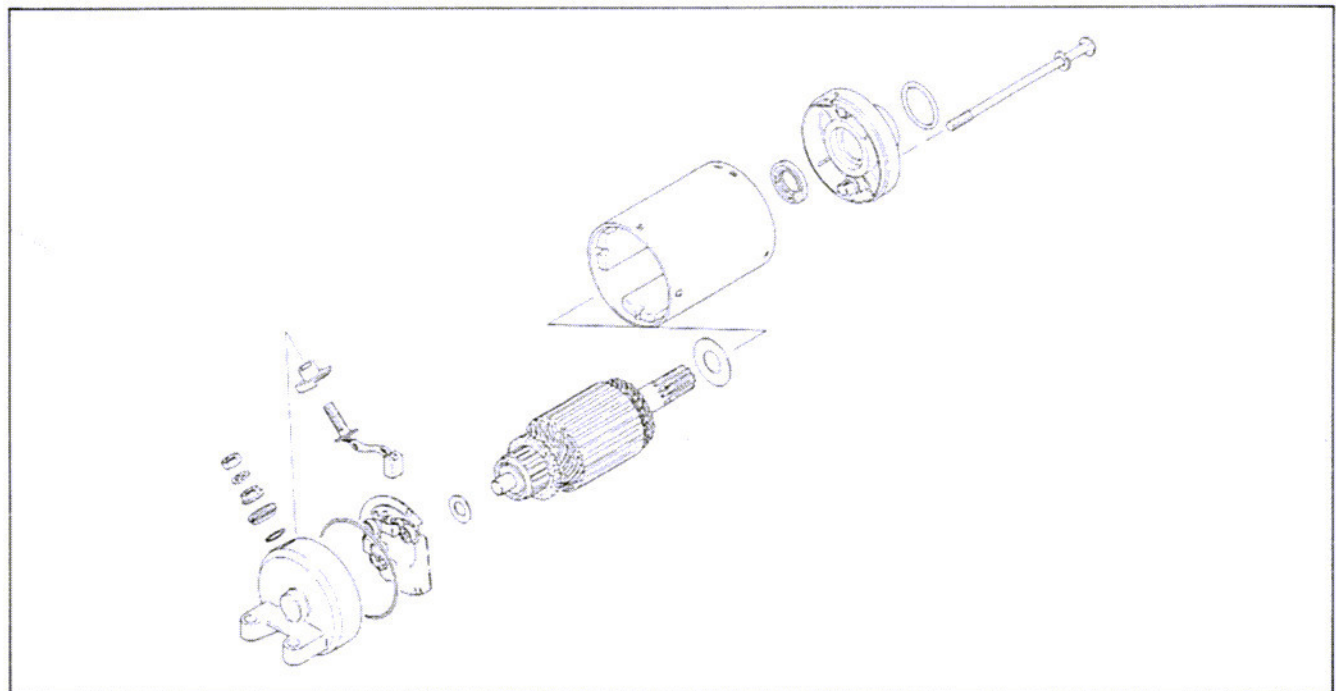
The starter system is shown in the diagram below: namely, the starter motor, relay, starter switch and battery. Depressing the starter button (on the right handlebar switch box) energizes the relay, causing the contact points to close which connects the starter motor to the battery. The motor draws about 80 amperes to start the engine.



STARTER MOTOR REMOVAL AND DISASSEMBLY

Remove the starter motor (See page 3-15).

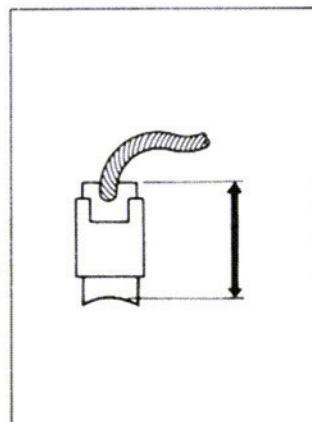
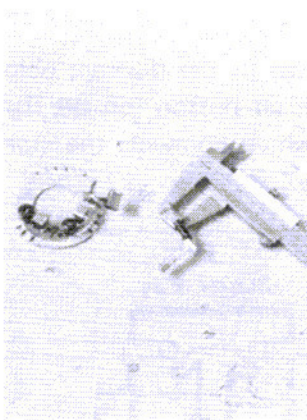
Disassembly the starter motor as follows.



STARTER MOTOR INSPECTION**CARBON BRUSHES**

When the brushes are worn, the motor will be unable to produce sufficient torque, and the engine will be difficult to turn over. To prevent this, periodically, inspect the length of the brushes, replacing them when they are too short or chipping.

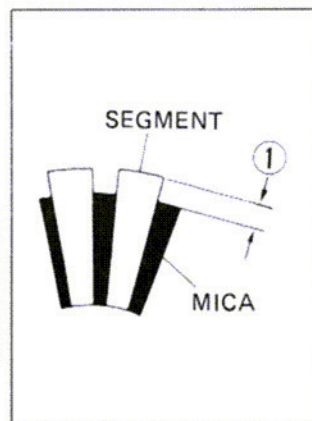
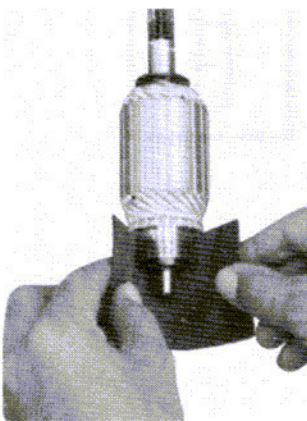
Service Limit	6 mm (0.24 in)
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**COMMUTATOR**

If the commutator surface is dirty, starting performance decrease. Polish the commutator with #400 or similar fine emery paper when it is dirty. After polishing wipe the commutator with a clean dry cloth.

Measure the commutator under cut ①.

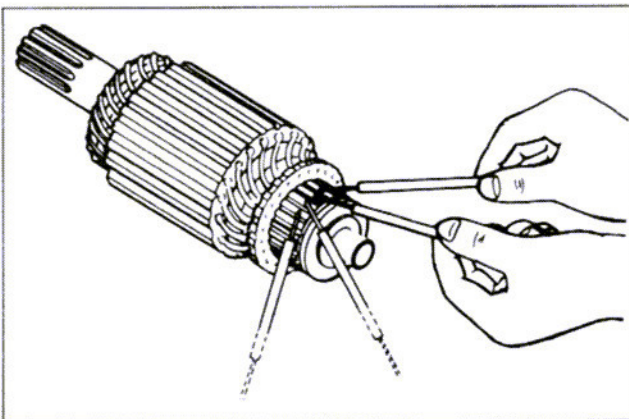
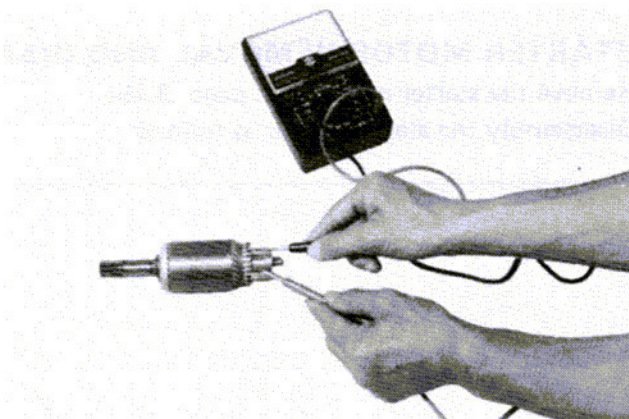
Service Limit	0.2 mm (0.008 in)
---------------	-------------------

**ARMATURE COIL**

Using a pocket tester, check the coil for open and ground by placing probe pins on each commutator segment and rotor core (to test for ground) and on any two segments at various places (to test for open), with the brushes lifted off the commutator surface.

If the coil is found to be open-circuited or grounded replace the armature. Continuous use of a defective armature will cause the starter motor to suddenly fail.

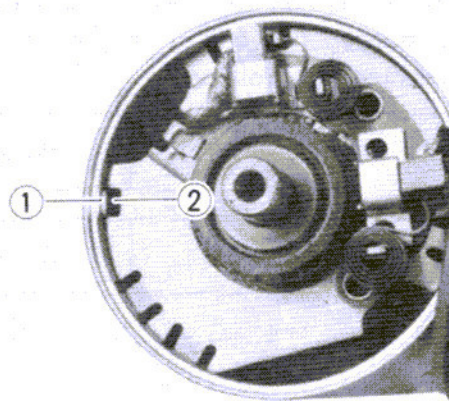
09900 - 25002	Pocket tester
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STARTER MOTOR REASSEMBLY

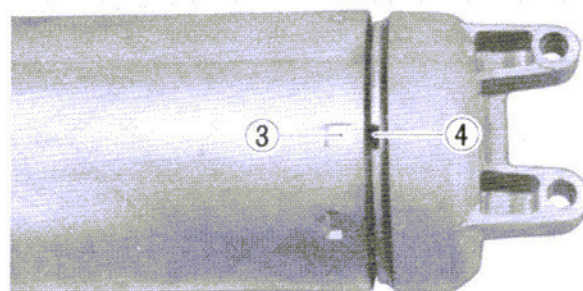
BRUSH HOLDER

When fixing brush holder to starter motor case, align the notch ① of the starter motor case with the protrusion ② of the brush holder.



HOUSING END

When installing housing end, fix the protrusion ③ of the brush holder to the notch ④ on the housing end.

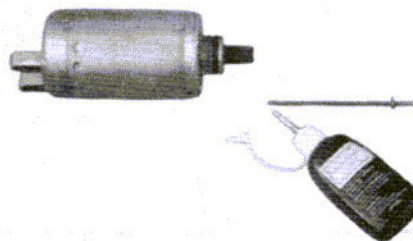


SECURING SCREWS

Apply Thread Lock "1363C" to starter motor securing screws.

99104 - 32050

Thread Lock "1363C"



STARTER RELAY INSPECTION

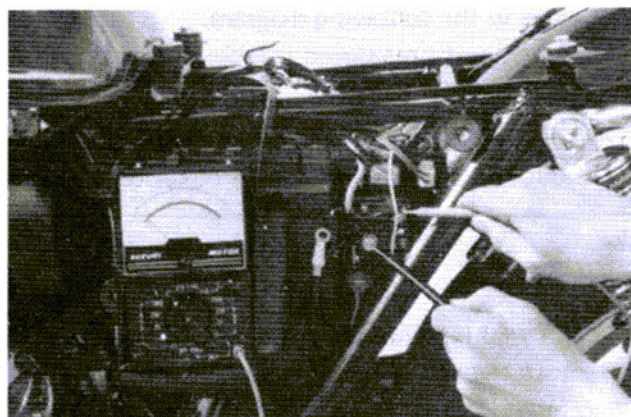
Disconnect lead wire of the starter motor at starter relay.

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

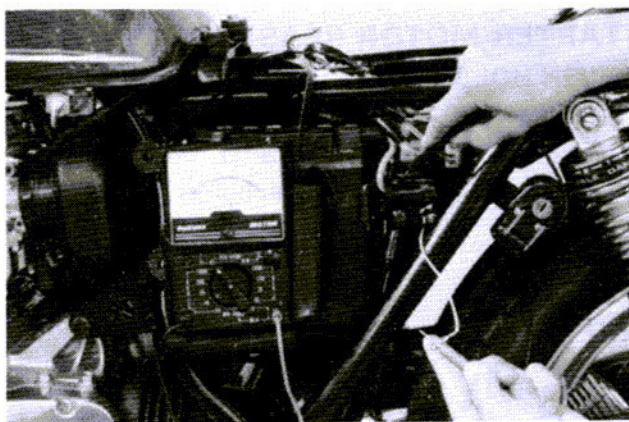
Pocket tester



Check the coil for "open", "ground" and ohmic resistance. The coil is in good condition if the resistance is as follows.

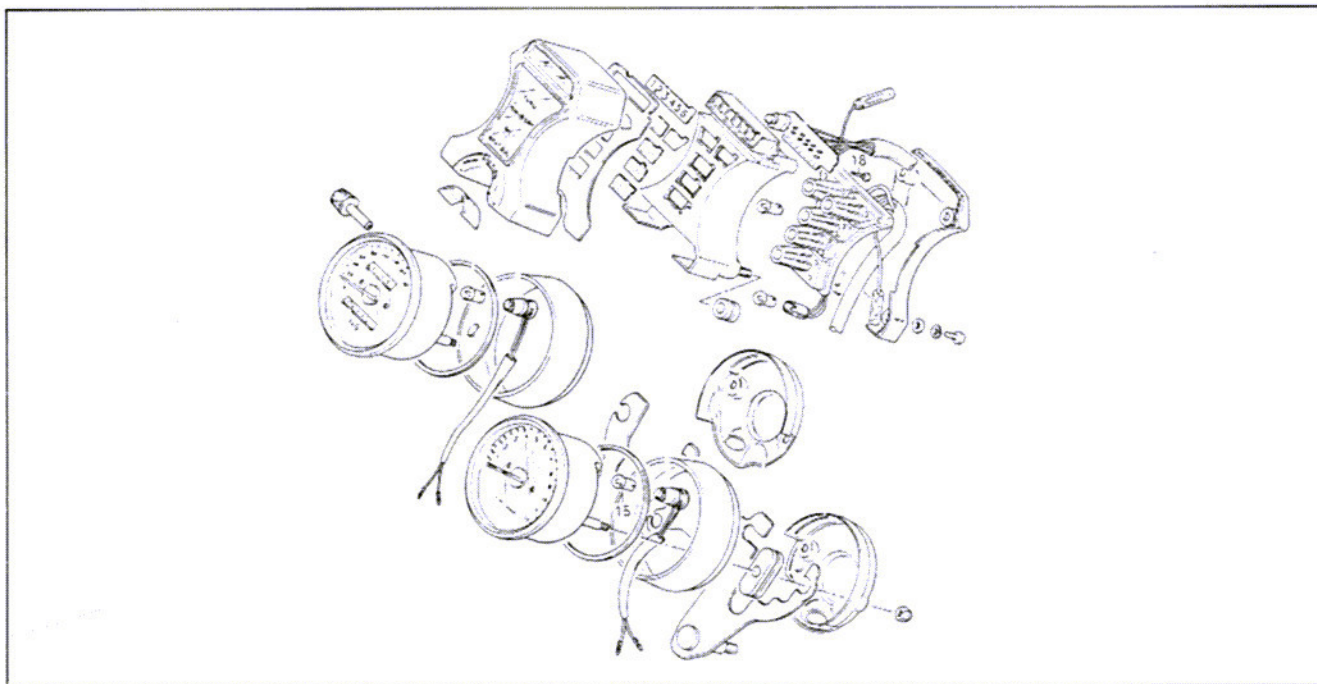
09900 - 25002	Pocket tester
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STD resistance	3 – 4Ω
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COMBINATION METER

Remove the combination meter (See page 7-18).
Disassembly the combination meter as follows.



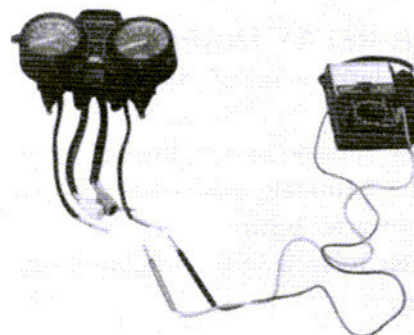
INSPECTION

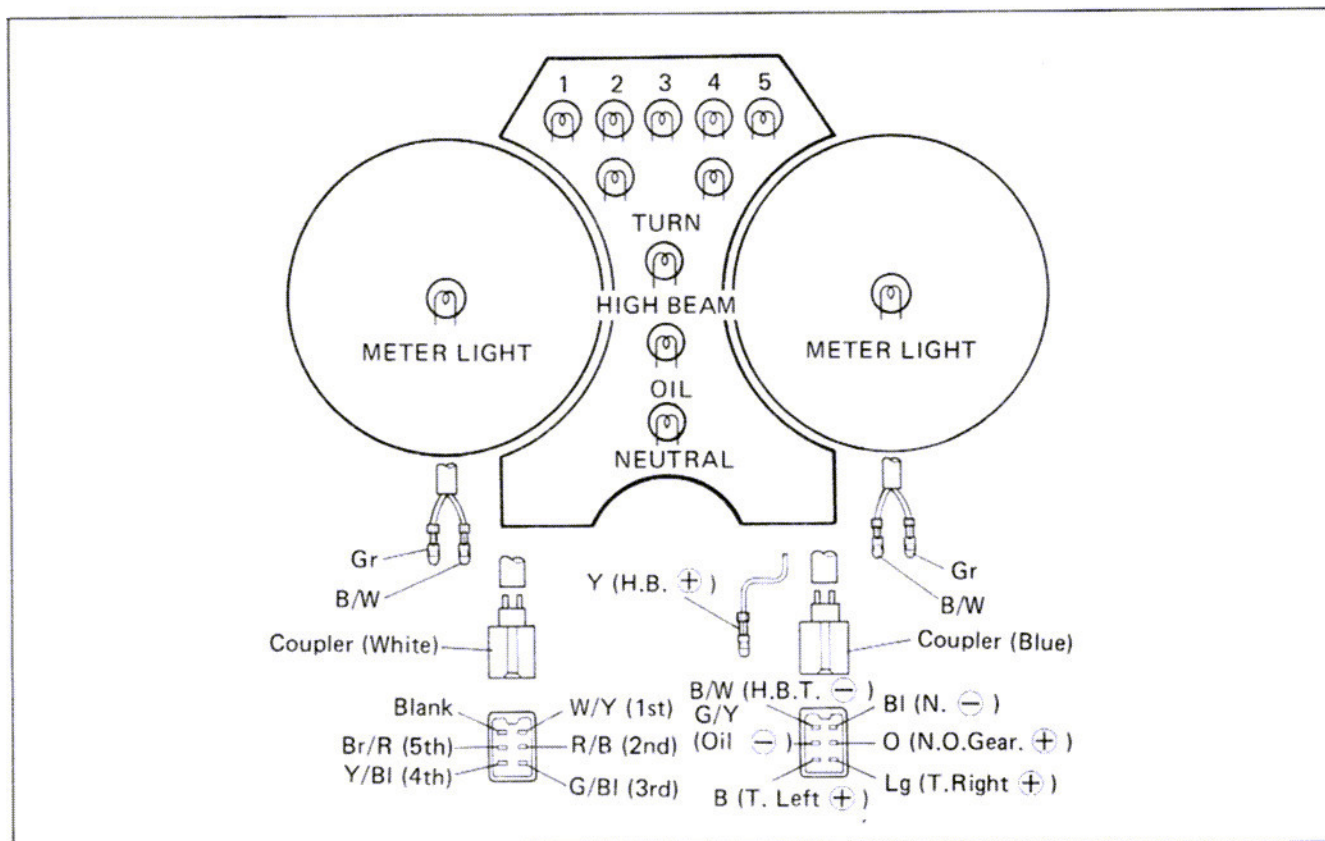
Using pocket tester, check the continuity between lead wires in the following diagram.
If the continuity measured is incorrect, replace the respective part.

09900 - 25002	Pocket tester
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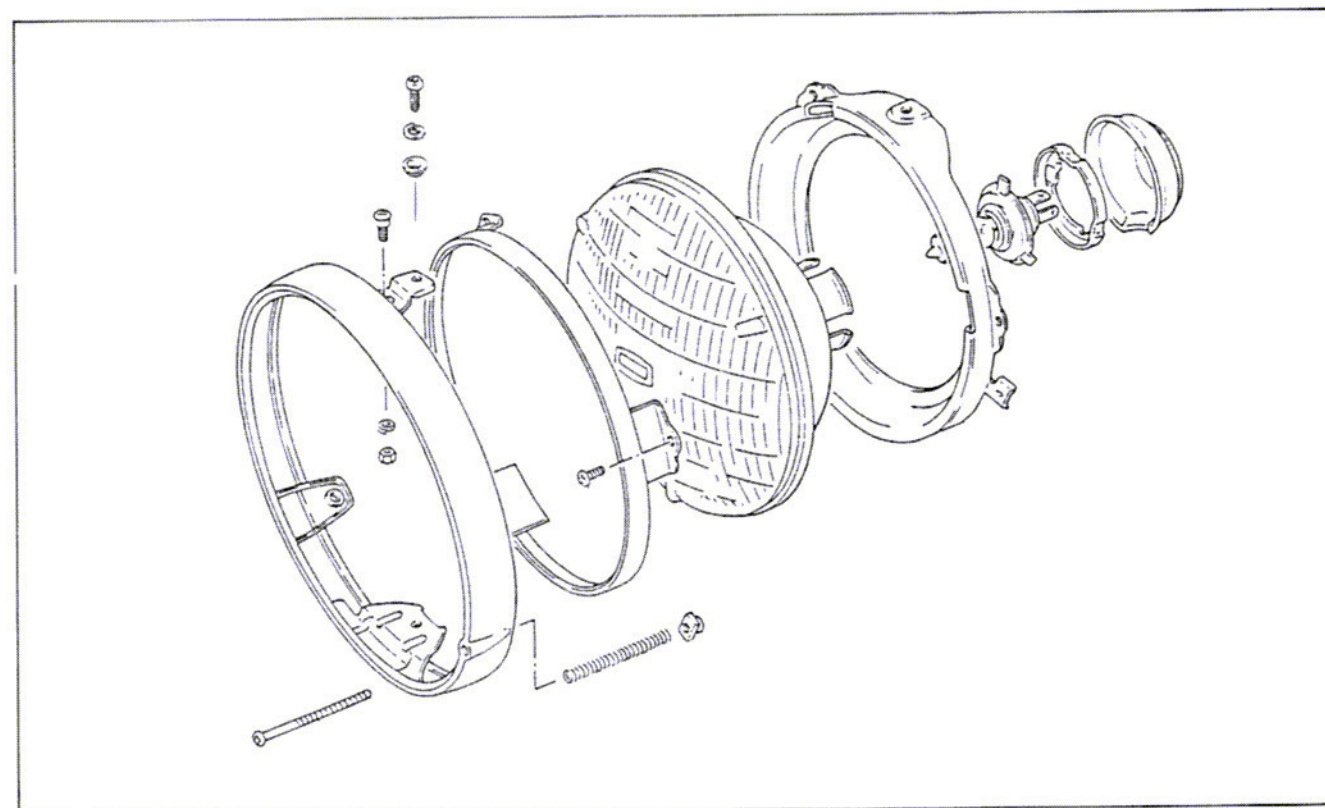
NOTE:

When making this test, it is not necessary to remove the combination meter.

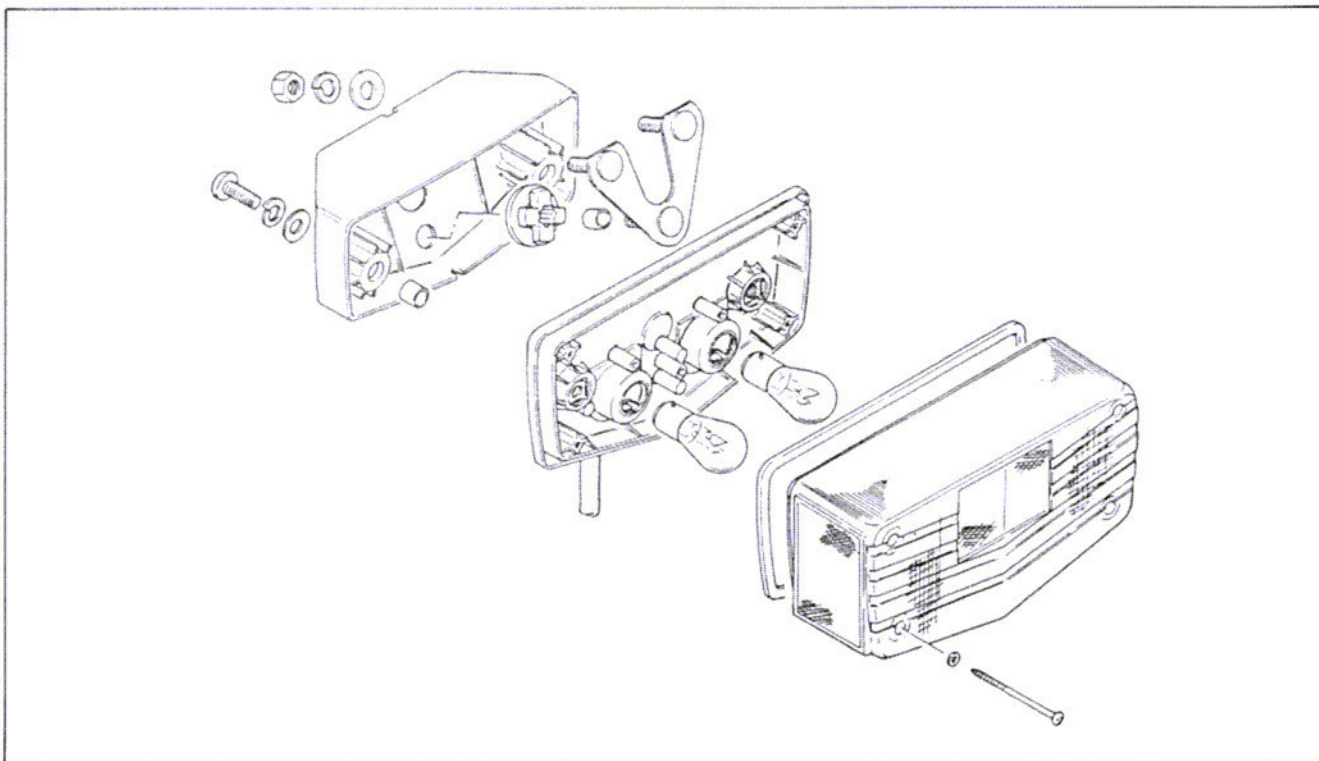




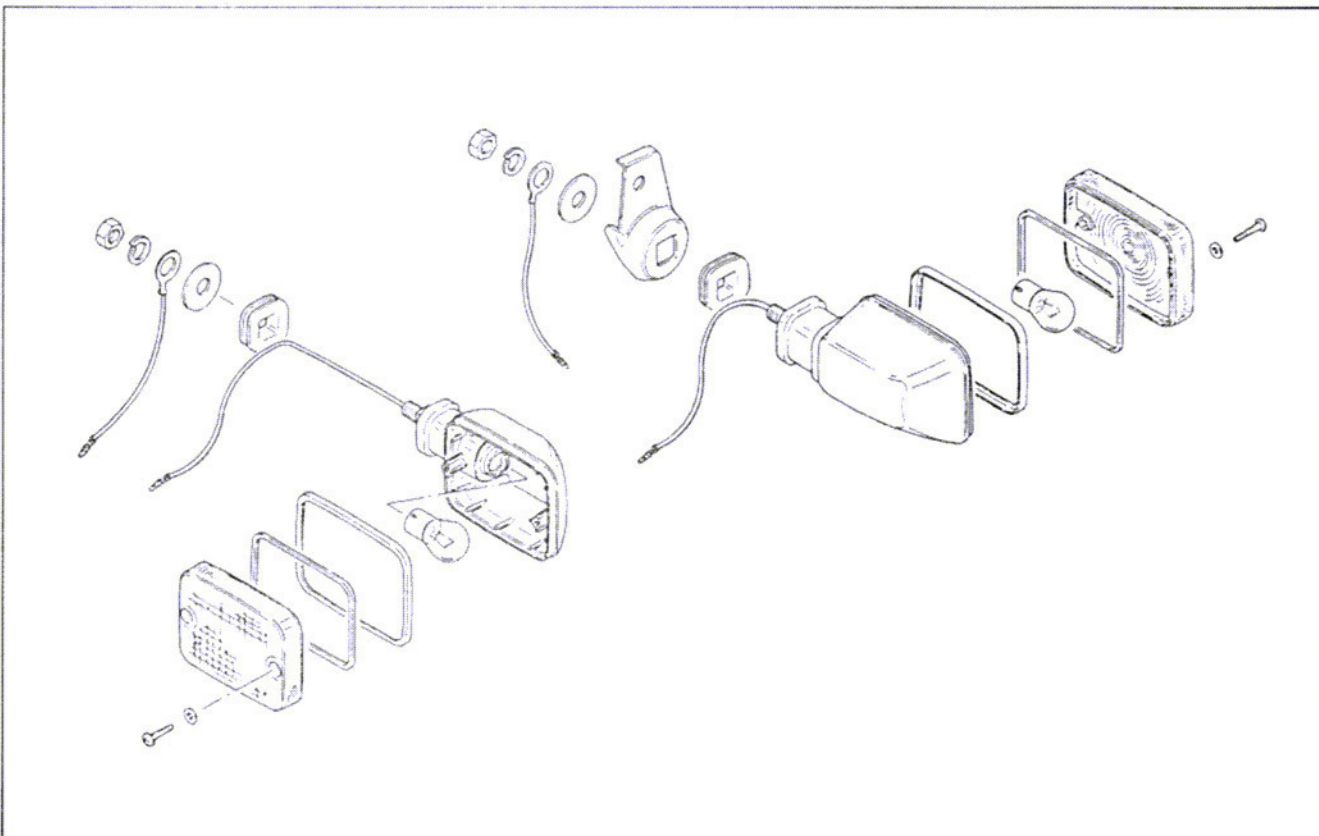
LAMPS HEADLIGHT



TAIL/BRAKE LIGHT



TURN SIGNAL LIGHT



SWITCHES

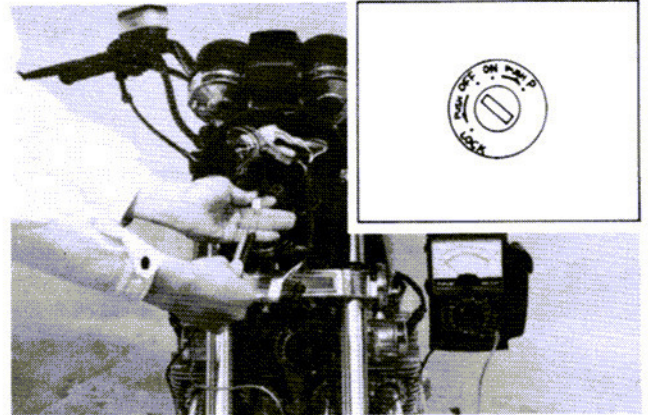
Inspect each switch for continuity with the pocket tester referring to the chart.

If it is found any abnormality, replace the respective switch assembly with new one.

09900 - 25002	Pocket tester
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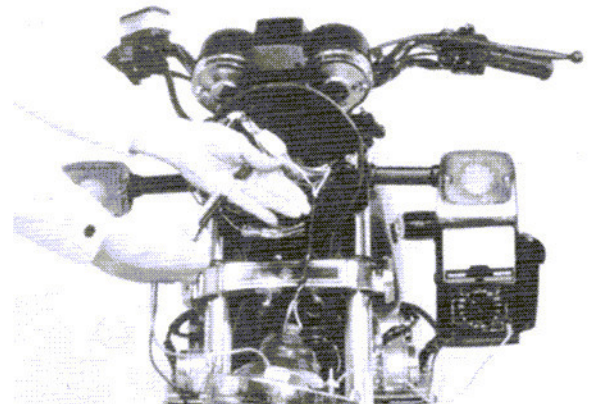
IGNITION SWITCH

	R	O	Gr	Br
OFF				
ON	○	○	○	○
P	○			○



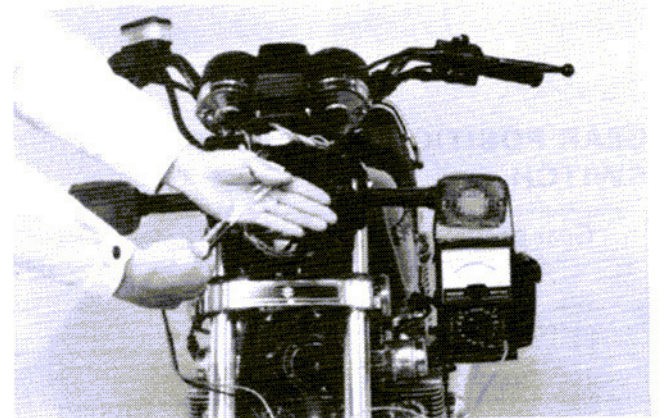
ENGINE STOP AND START SWITCH

	O	O/W	Y/G
OFF			
RUN	○	○	
START		○	○



FRONT BRAKE RIGHT SWITCH

	R/BI	O/G
OFF		
ON	○	○

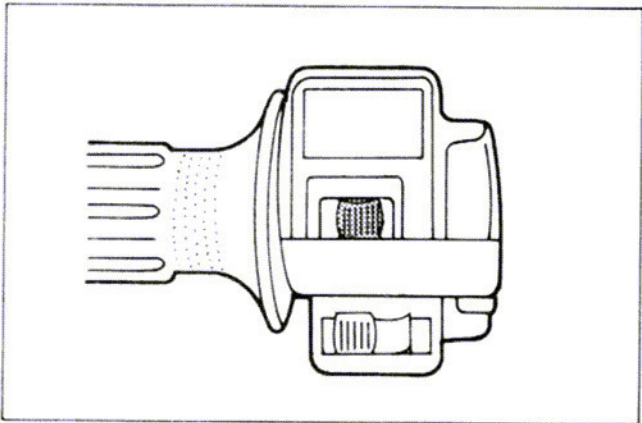
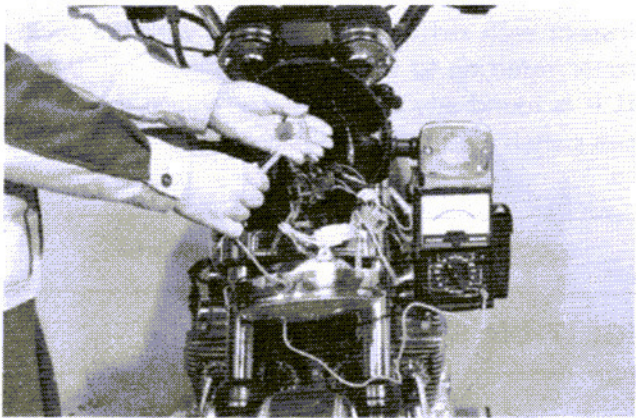


DIMMER SWITCH

	W	Y	Y/W
HI			
LO			

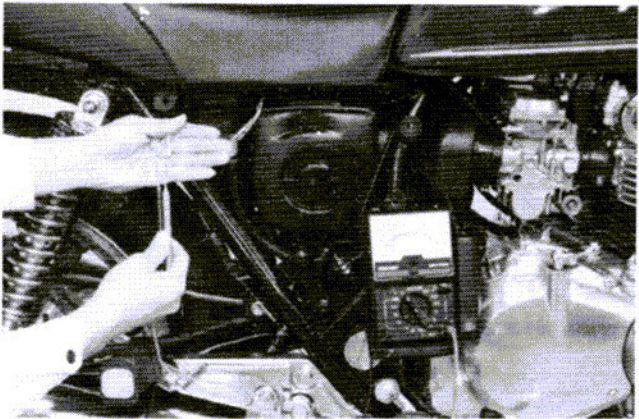
HORN AND PASSING SWITCH

	Y/W	BI/W	G	B/W
OFF				
HORN				
PASS				



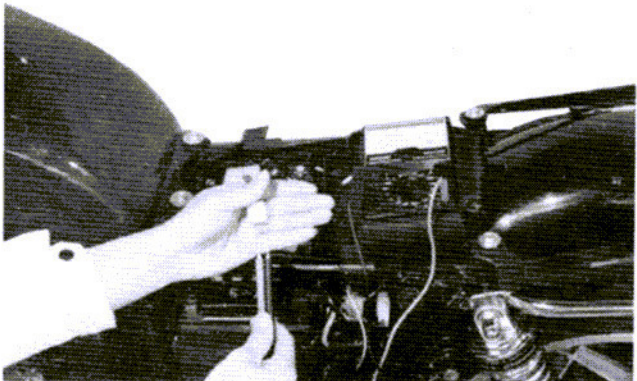
REAR BRAKE LIGHT SWITCH

	R/BI	O/G
OFF		
ON		



GEAR POSITION INDICATOR LIGHT SWITCH

Gear position	Wire color	
1st	W/Y	Ground
Neutral	BI	
2nd	R/B	
3rd	G/BI	
4th	Y/BI	
Top	Br/R	



BATTERY

Specifications

Type designation	YB14L-A2
Capacity	14.4 kC (14 Ah)
Standard electrolyte S.G.	1.28 at 20°C (68°F)

In fitting the battery to the motorcycle, connect the breather tube to the battery vent.

INITIAL CHARGING

Filling electrolyte

Remove short sealed tube before filling electrolyte. Fill 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. Filling 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 tables shown below.

Maximum charging current	1.4 A
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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

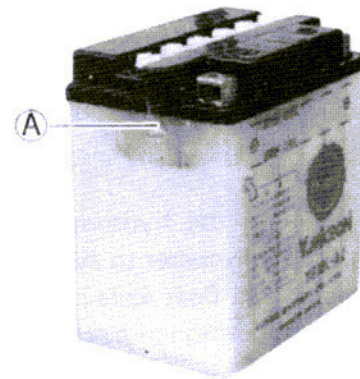
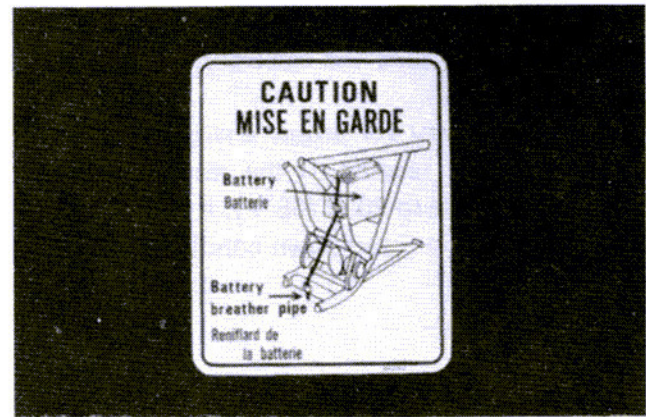
Date of manufacture is indicated by a three-part number ①, as follows, each indicating month, date and year.

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.

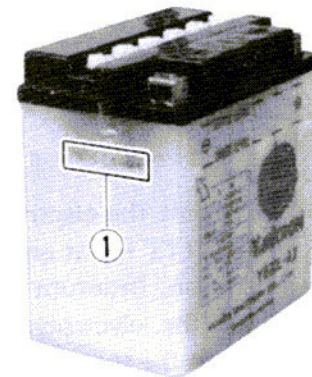
SERVICING

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.



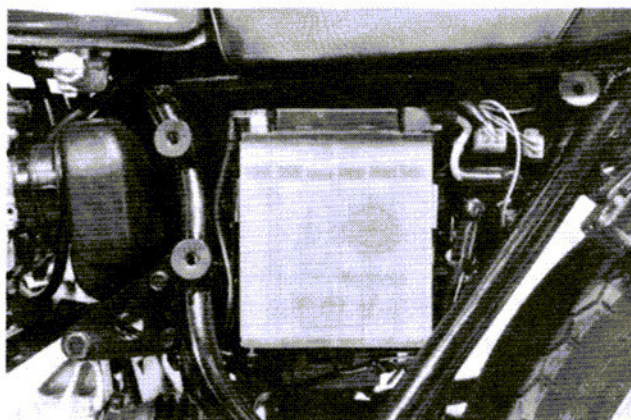
A Sealed tube



Months after manufacturing	Within 6	Within 9	Within 12	Over 12
Necessary charging hours	20	30	40	60

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.



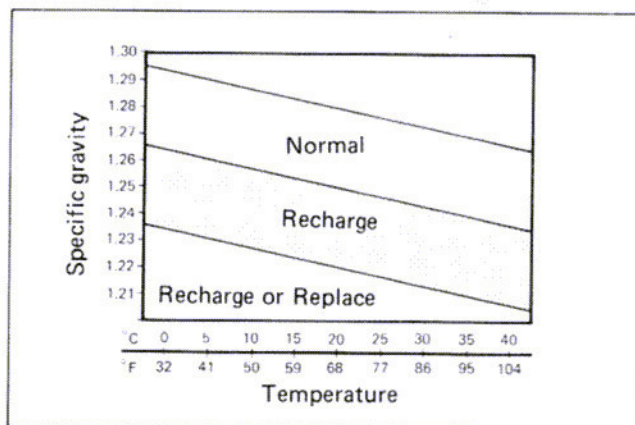
BASED ON S.G. READING RECHARGING OPERATION

To correct a S.G. reading 20°C (68°F), use following table.

To read the S.G. on the hydrometer, bring the electrolyte in the hydrometer to eye level and read the graduations on the float scale bordering on the meniscus (curved-up portion of electrolyte surface), as shown in figure.

Check the reading (as corrected to 20°C) with chart to determine the recharging time in hours by constant-current charging at a charging rate of 1.4 amperes (which is a tenth of the capacity of the present battery).

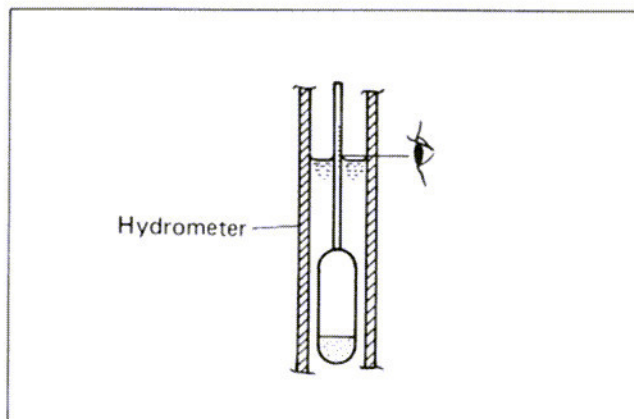
Be careful not to permit the electrolyte temperature to exceed 45°C (113°F), at any time, during the recharging operation. Interrupt the operation, as necessary, to let the electrolyte cool down. Recharge the battery to the specification.



Electrolyte specific gravity	1.28 at 20°C (68°F)
------------------------------	---------------------

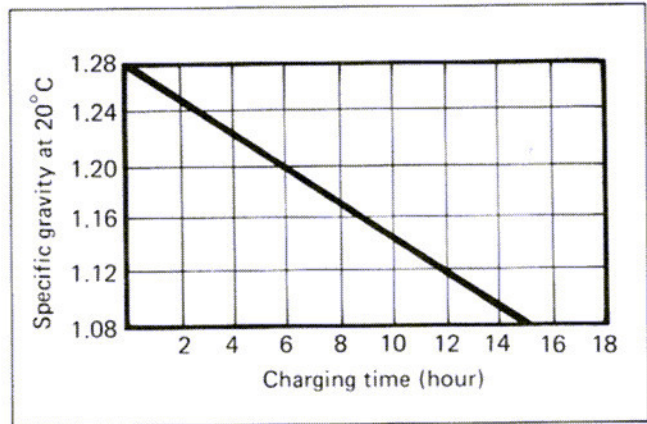
CAUTION:

Constant-voltage charging, otherwise called "quick" charging, is not recommendable for it could shorten the life of the battery.



09900 - 28403

Hydrometer



SERVICE LIFE

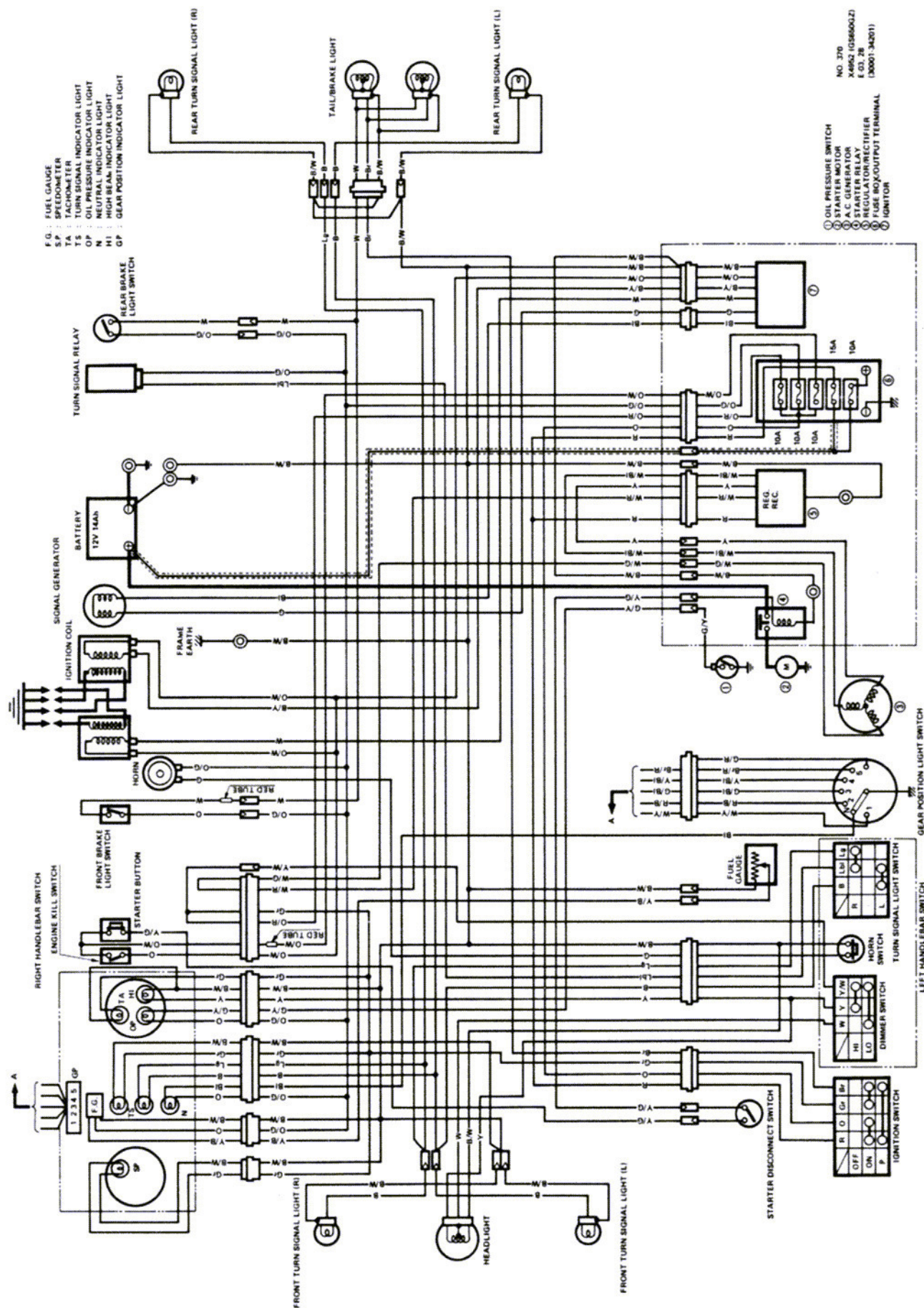
Lead oxide is applied to the pole plate of the battery which will come off gradually during the service. When the bottom of the battery case becomes full of the sediment, the battery cannot be used any more. If the battery is not charged for a long time, lead sulfate is generated on the surface of the pole plate 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.

GS650GZ WIRING DIAGRAM

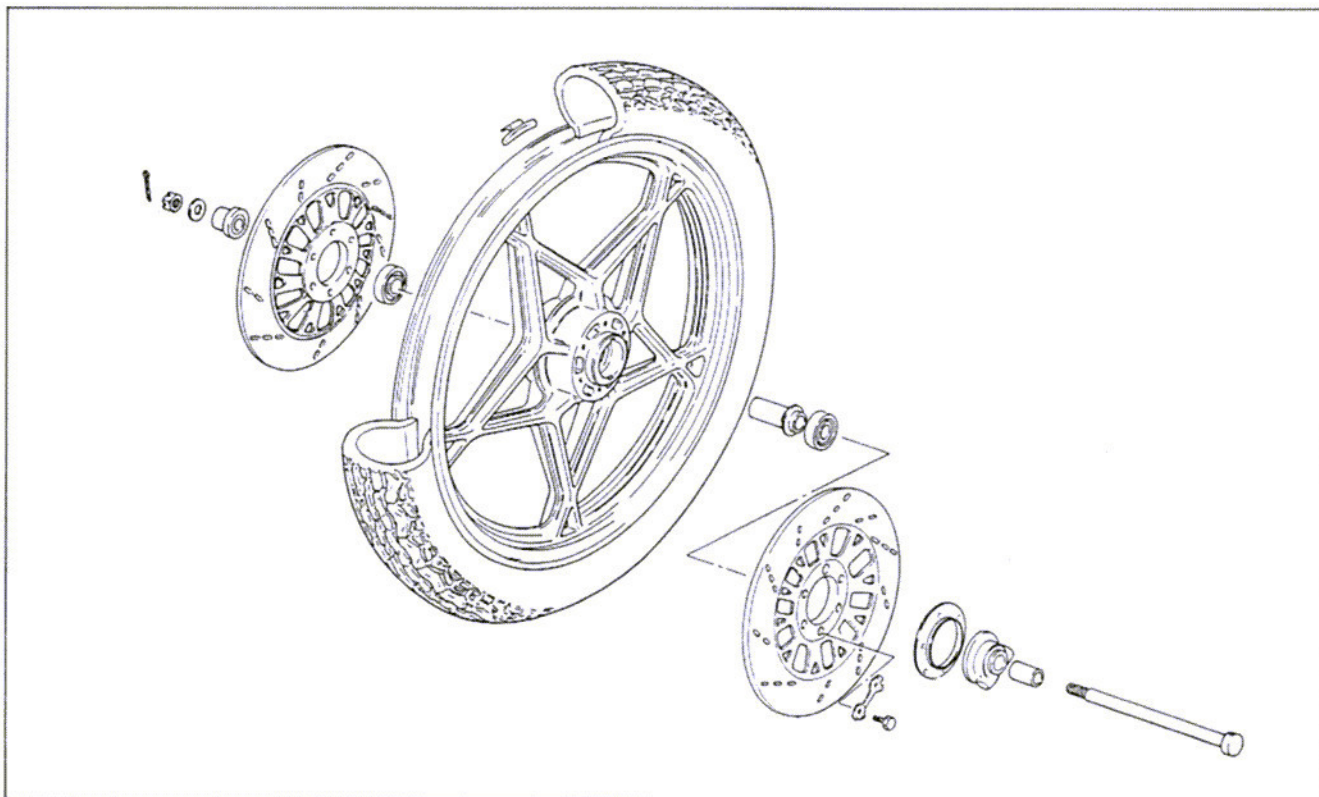


CHASSIS

CONTENTS

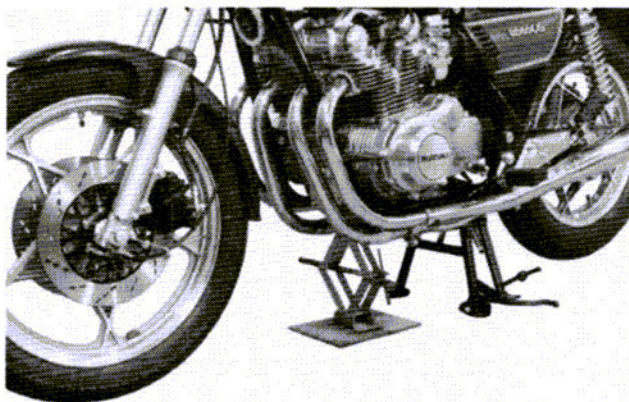
<i>FRONT WHEEL</i>	8- 1
<i>FRONT BRAKE</i>	8- 5
<i>FRONT FORK</i>	8-11
<i>STEERING STEM</i>	8-17
<i>REAR WHEEL</i>	8-21
<i>REAR BRAKE</i>	8-26
<i>REAR SUSPENSION</i>	8-32

FRONT WHEEL CONSTRUCTION



REMOVAL AND DISASSEMBLY

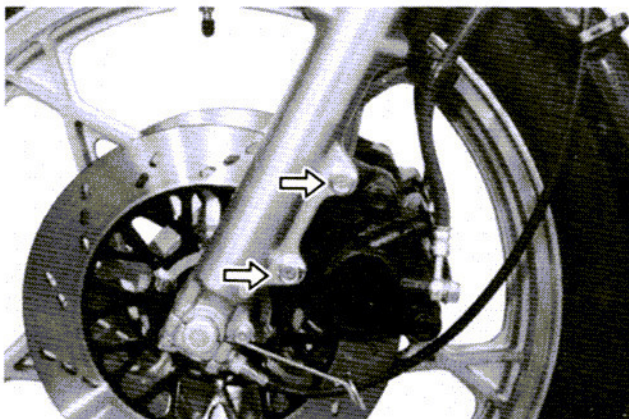
Support the machine by centerstand and jack.



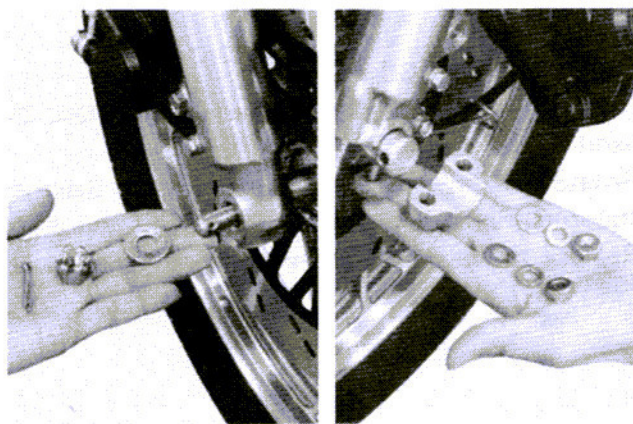
Remove caliper mounting bolts and dismount the caliper.

NOTE:

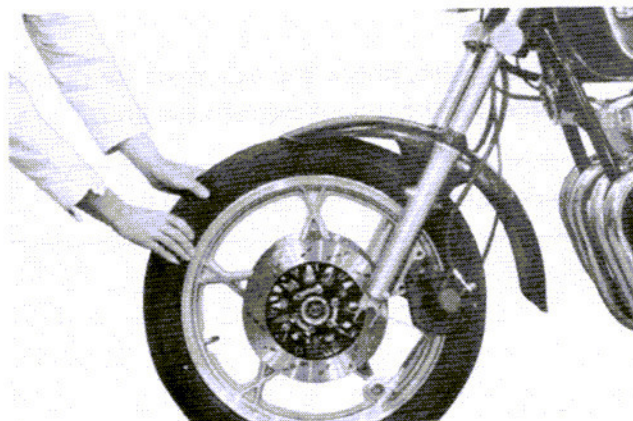
Do not operate the brake lever while dismounting the caliper.



Pull off cotter pin and remove axle nut.
Remove axle holder.

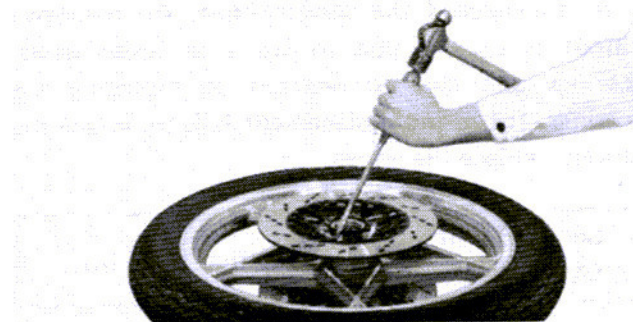


Draw out axle shaft and take off front wheel.



Unlock the lock washer.
Remove the securing bolts and separate the disc
from wheel (Right and Left).

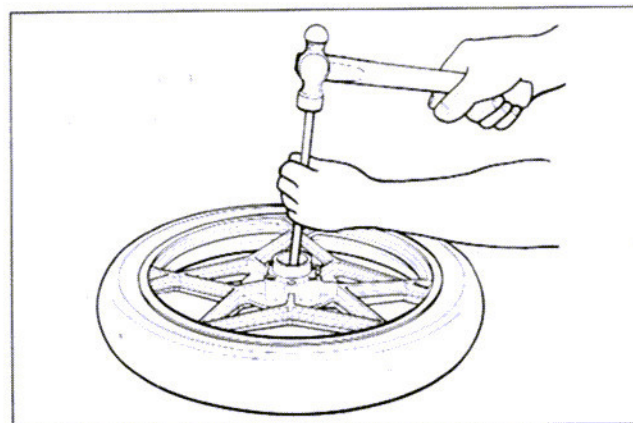
CAUTION:
Do not reuse the lock washer.



Draw out the right and left wheel bearings.

NOTE:
Draw out the left side bearing first, it makes
the job easier.

CAUTION:
The removed bearing should be replaced.

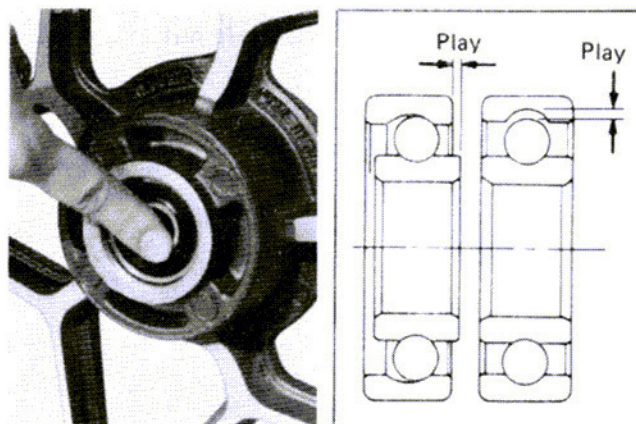


INSPECTION**WHEEL BEARINGS**

Inspect the play of wheel bearing inner race by hand while fixing it in the wheel.

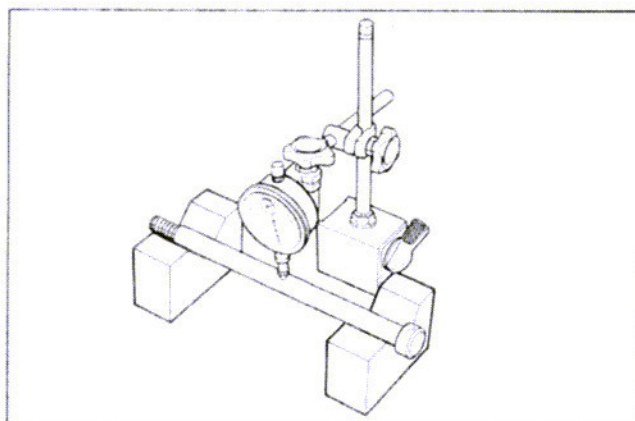
Rotate the inner race by hand to inspect whether abnormal noise occurs or rotating smoothly.

Replace the bearing if there is something unusual.

**AXLE SHAFT**

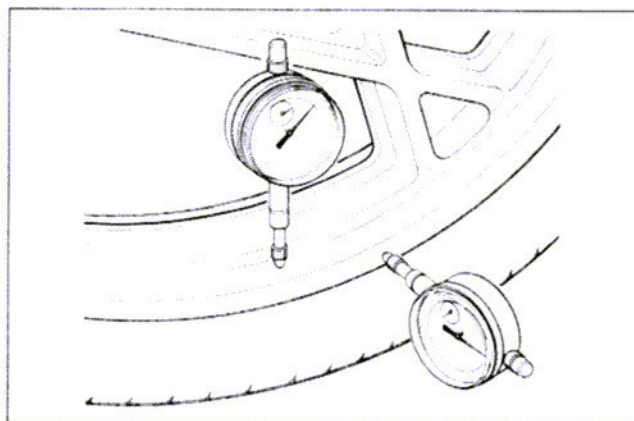
Using a dial gauge, check the axle shaft for runout and replace it if the runout exceeds the limit.

Service Limit	0.25 mm (0.010 in)
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**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 loose wheel bearings and can be reduced by replacing the bearings. If bearing replacement fails to reduce the runout, replace the wheel.

Service Limit (Axial and Radial)	2.0 mm (0.08 in)
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**REASSEMBLY**

Reassembly and remount the front wheel in the reverse order of disassembly and removal, and also carry out the following steps:

WHEEL BEARING

Apply grease before install the bearings.

99000 - 25030	Suzuki super grease "A"
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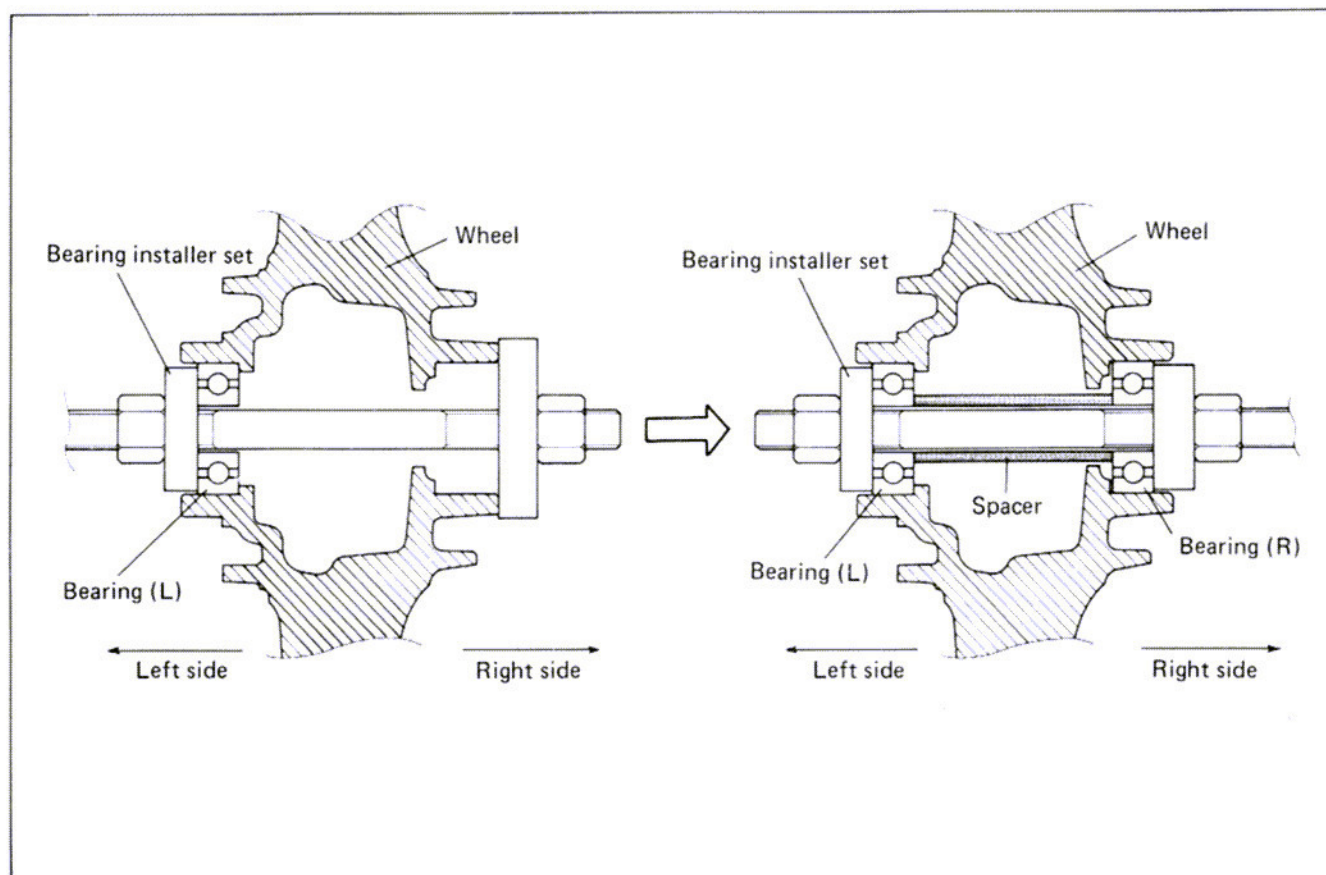
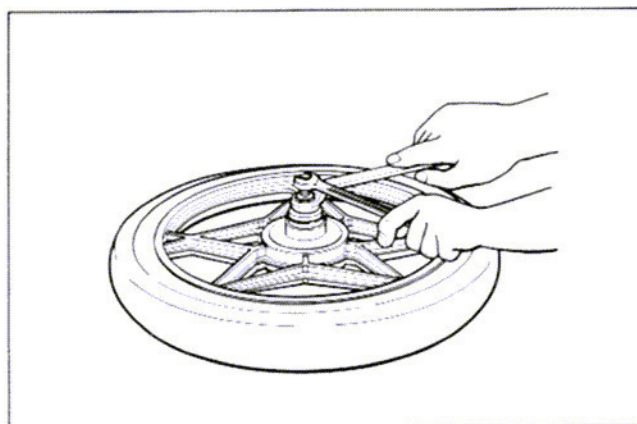
Install the wheel bearings as follows by using special tool.

CAUTION:

First install the wheel bearing for left side.

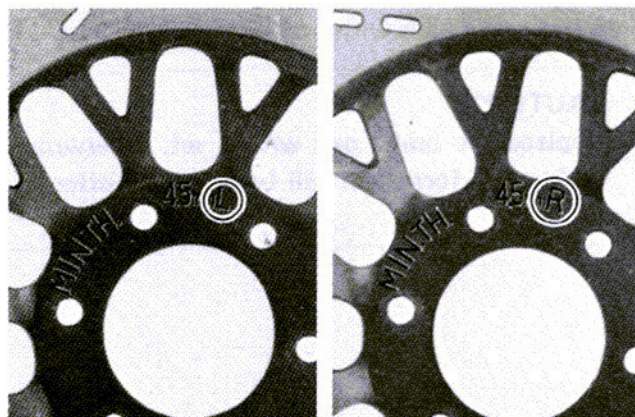
09924 - 84510

Bearing installer set



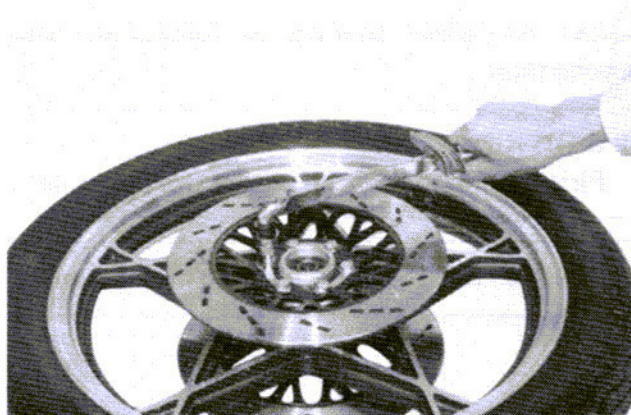
Mount each brake disc properly according to the stamped marks, "R" or "L", on the respective disc plate.

"R"	Right side
"L"	Left side

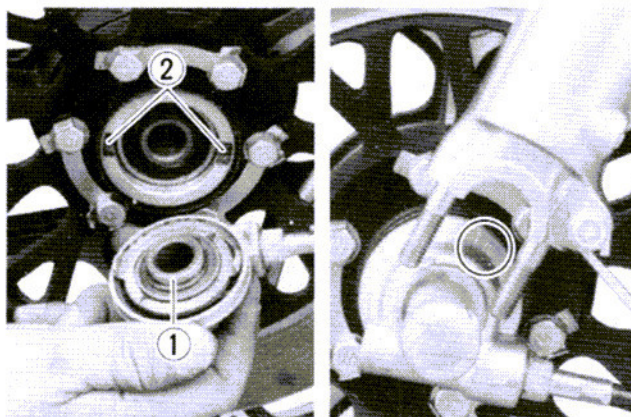


Make sure that the brake disc is clean and free of any greasy matter. After securing it in place by tightening its bolts, be sure to lock each tongue.

Tightening torque	1.5 – 2.5 kg-m (11.0 – 18.0 lb-ft)
-------------------	---------------------------------------



Before installing the speedometer gearbox ①, grease it and align its groove ②, (for fitting to the hub of two drive pawls) with the hub to insert the gearbox to the wheel side.



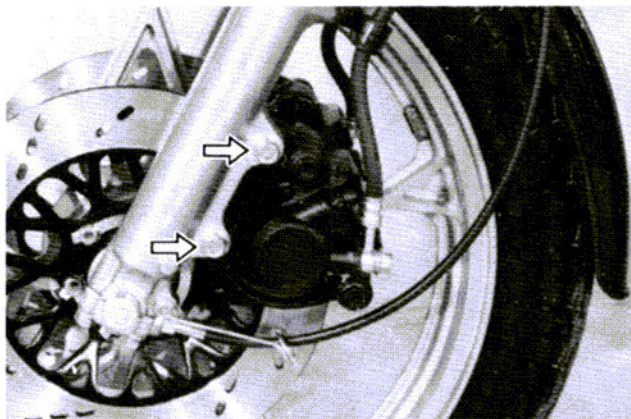
When tightening the front axle, check to be sure that the speedometer gearbox is in the position shown.

FRONT BRAKE BRAKE PAD REPLACEMENT

Remove caliper axle bolts and take off caliper.

CAUTION:

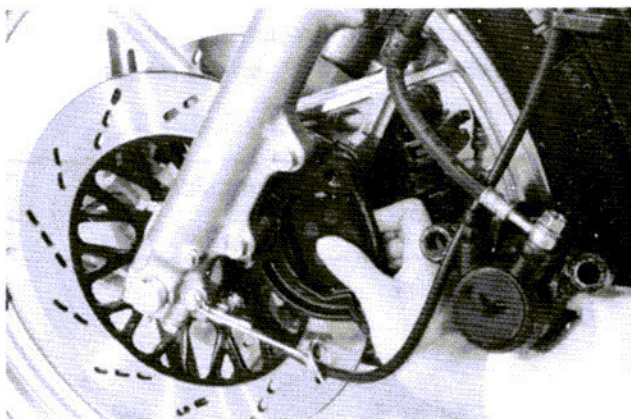
Do not operate the brake lever while dismounting the caliper.



Pull out brake pads with pad shim.

CAUTION:

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

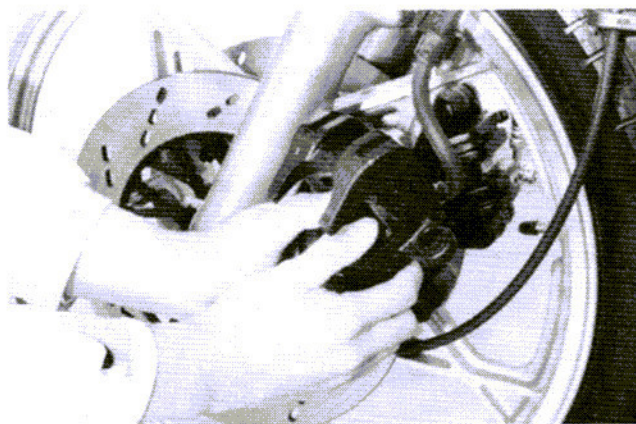


NOTE:

Push in the piston all the way to the caliper when remount the caliper.

Tightening torque

4.0 – 5.5 kg-m
(29.0 – 40.0 lb-ft)

**CALIPER REMOVAL AND DISASSEMBLY**

Disconnect brake hose and catch the brake fluid in a suitable receptacle.

CAUTION:

Never re-use the brake fluid left over from the last servicing and stored for long periods.

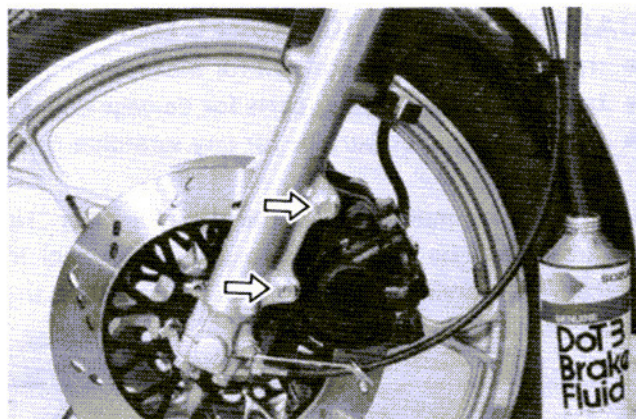
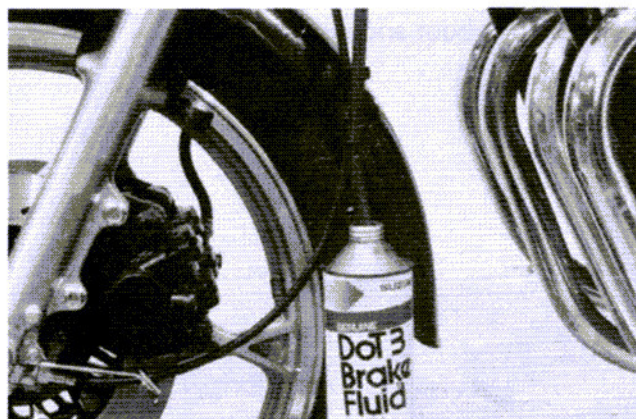
WARNING:

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

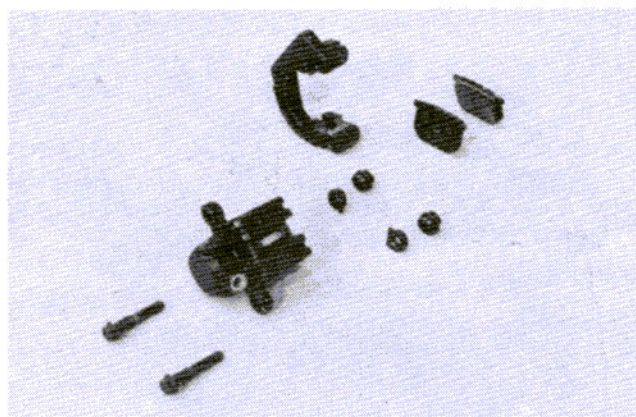
Remove caliper mounting bolts and take off caliper.

NOTE:

Slightly loosen the caliper axle bolts to facilitate later disassembly.



Remove caliper axle bolts, separate the caliper and caliper holder.



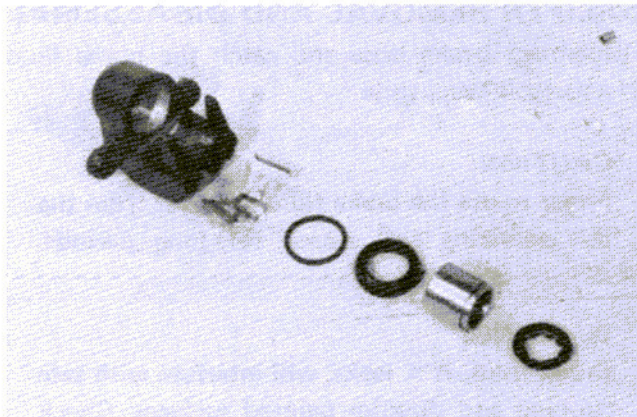
Place a rag over the piston to prevent popping up.
Force out the piston by using air gun.

CAUTION:

Do not use high pressure air to prevent
piston damage.



Remove dust boot and piston seal.

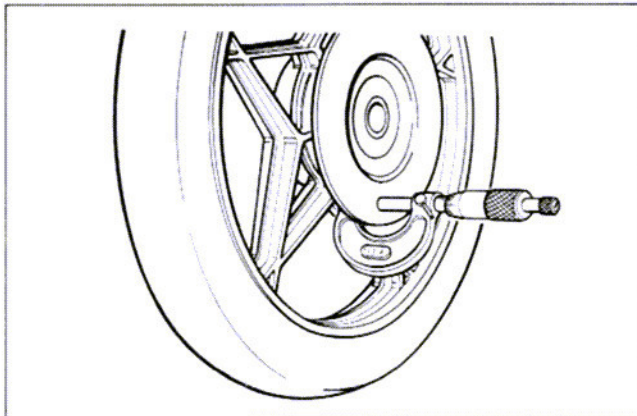


CALIPER AND DISC INSPECTION

- Inspect the caliper bore wall for nicks, scratches or other damage.
- Inspect the each rubber parts for damage and wear.
- Inspect the piston surface for any scratches or other damage.

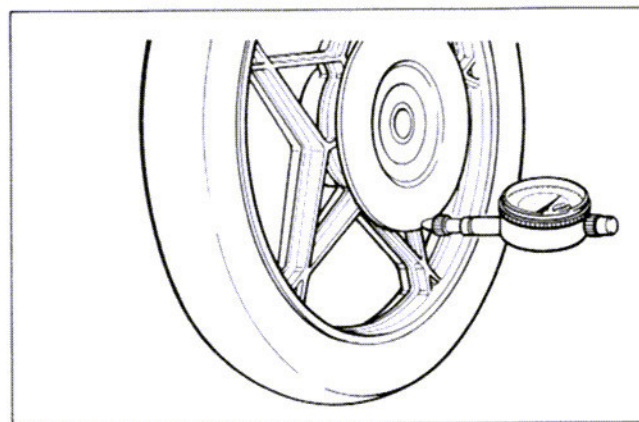
Using a micrometer check the disc for wear. Its thickness can be checked with disc and wheel in place. The service limit for the thickness of the discs:

Service Limit	4.5 mm (0.18 in)
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With the disc mounted on the wheel, check the disc for face runout with a dial gauge, as shown.

Service Limit	0.30 mm (0.012 in)
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CALIPER REASSEMBLY

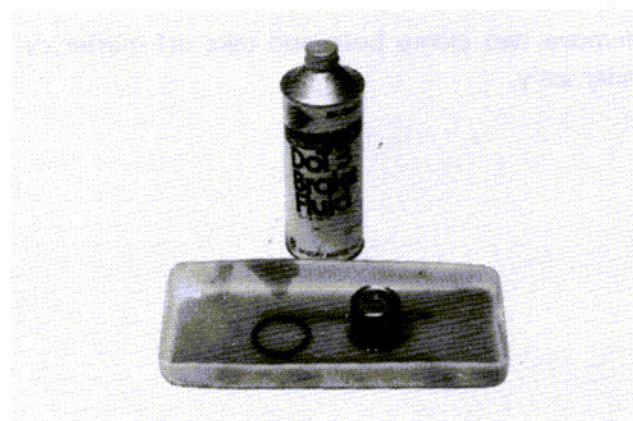
Reassemble the caliper in the reverse orders of disassembly and by taking the following steps:

CAUTION:

Wash the caliper components with fresh brake fluid before reassembly.

Never use cleaning solvent or gasoline to wash them.

Apply brake fluid to the caliper bore and piston to be inserted into the bore.

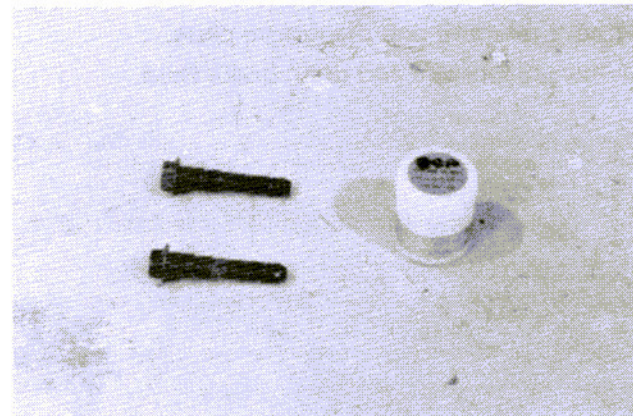


Apply SUZUKI silicone grease to the caliper axles.

99000 - 25100	SUZUKI silicone grease
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WARNING:

Bleeding the air after reassembling caliper.

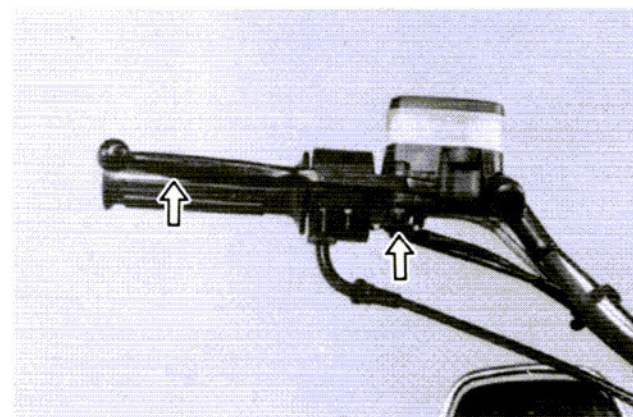


Tightening torque:

	kg-m	lb-ft
Union bolt	2.0 – 2.5	14.5 – 18.0
Caliper mounting bolt	2.5 – 4.0	18.0 – 29.0
Caliper axle bolt	4.0 – 5.5	29.0 – 40.0

MASTER CYLINDER REMOVAL AND DISASSEMBLY

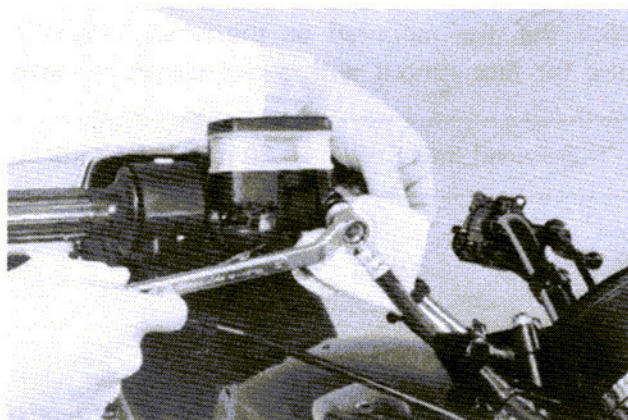
Take off front brake light switch and remove front brake lever.



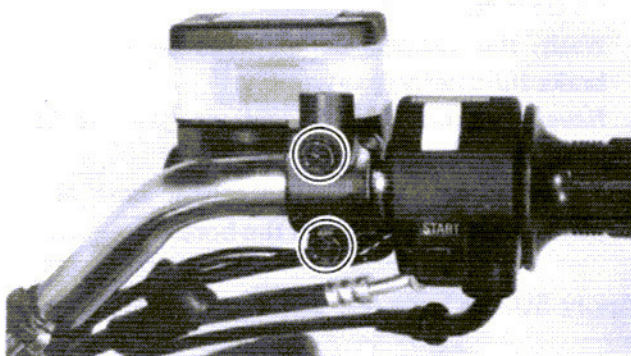
Place a cloth underneath the union bolt on the master cylinder to catch spilled drops of brake fluid. Unscrew the union bolt and disconnect the brake hose/master cylinder joint.

CAUTION:

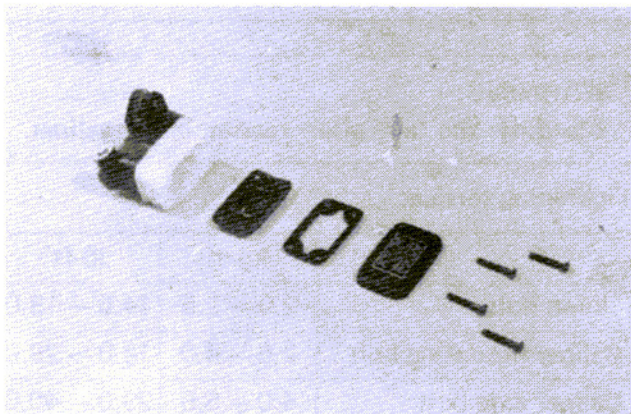
Immediately completely wipe off any brake fluid adhering to any part of motorcycle. The fluid reacts chemically with paint, plastics, rubber materials, etc.



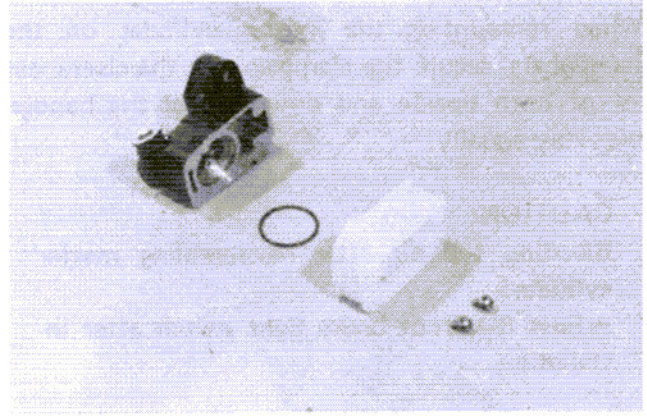
Remove two clamp bolts and take off master cylinder ass'y.



Remove reservoir and diaphragm plate.
Remove diaphragm and drain brake fluid.



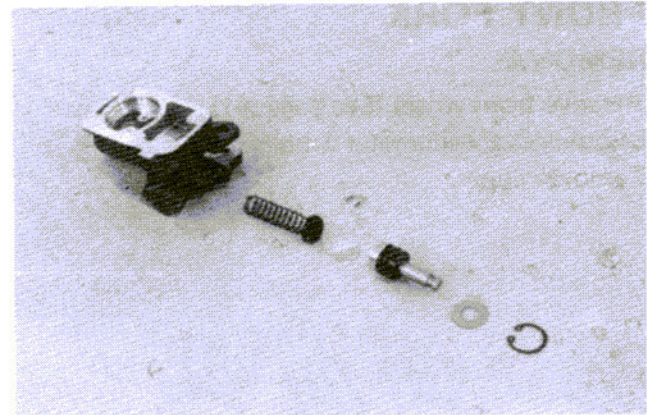
Remove reservoir and O ring.



Pull off dust boot.

Remove circlip by using special tool.

Remove piston, primary cup and spring.



MASTER CYLINDER INSPECTION

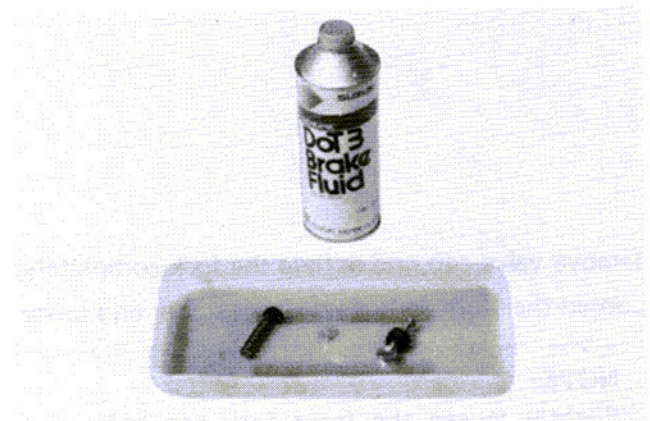
- Inspect the master cylinder bore for any scratches or other damage.
- Inspect the piston surface for scratches or other damage.
- Inspect the primary cup, secondary cup and dust boot for wear or damage.

MASTER CYLINDER REASSEMBLY

Reassemble the master cylinder in the reverse orders of disassembly and by taking the following steps:

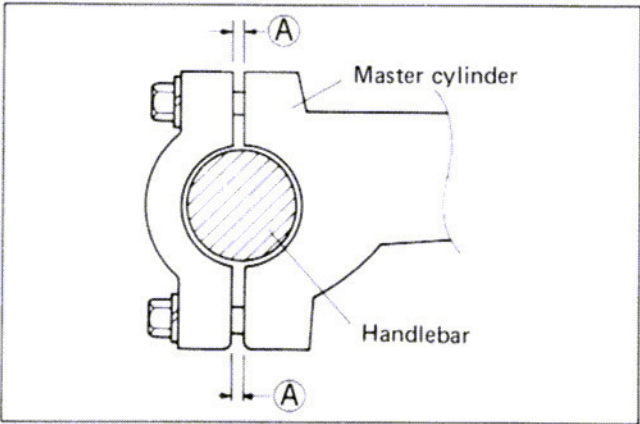
CAUTION:

Wash the master cylinder components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them. Apply brake fluid to the cylinder bore and all the internals to be inserted into the bore.



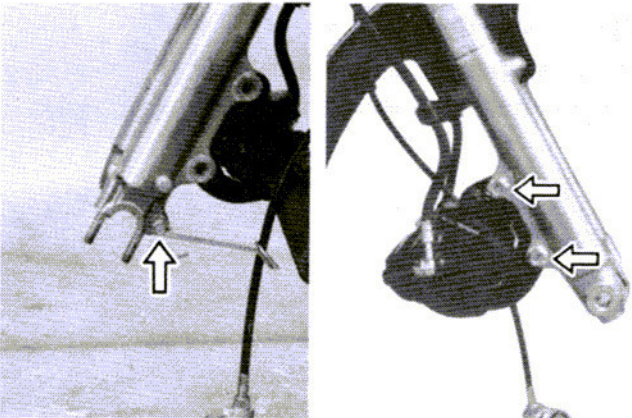
When remounting the master cylinder on the handlebars, secure the clamp so that the clearances **A** of both upside and downside of the handlebars stay equally.

CAUTION:
Bleeding the air after reassembling master cylinder.
Adjust the front brake light switch after installation.

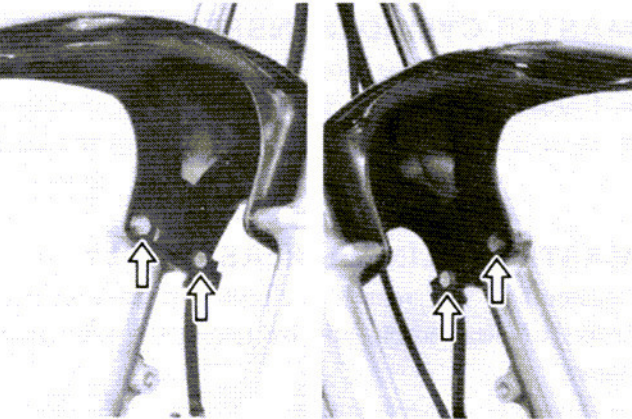


FRONT FORK REMOVAL

Remove front wheel (See page 8-1).
Disconnect speedometer cable guide.
Remove caliper.

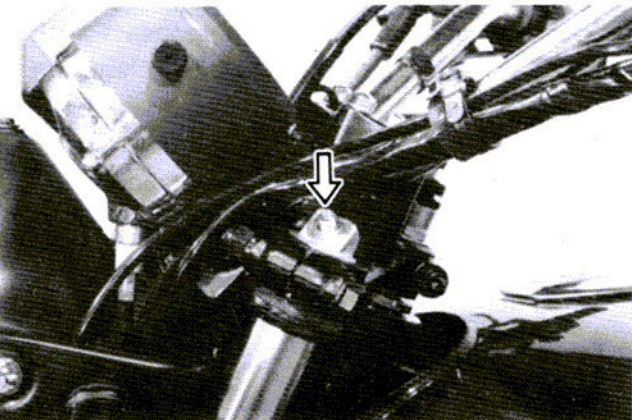


Remove fender.

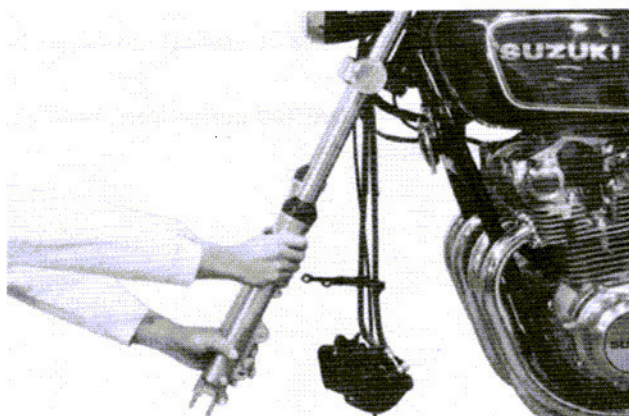


Remove valve cap and deflate the fork completely.
Loosen the front fork clamp bolts upper and lower.

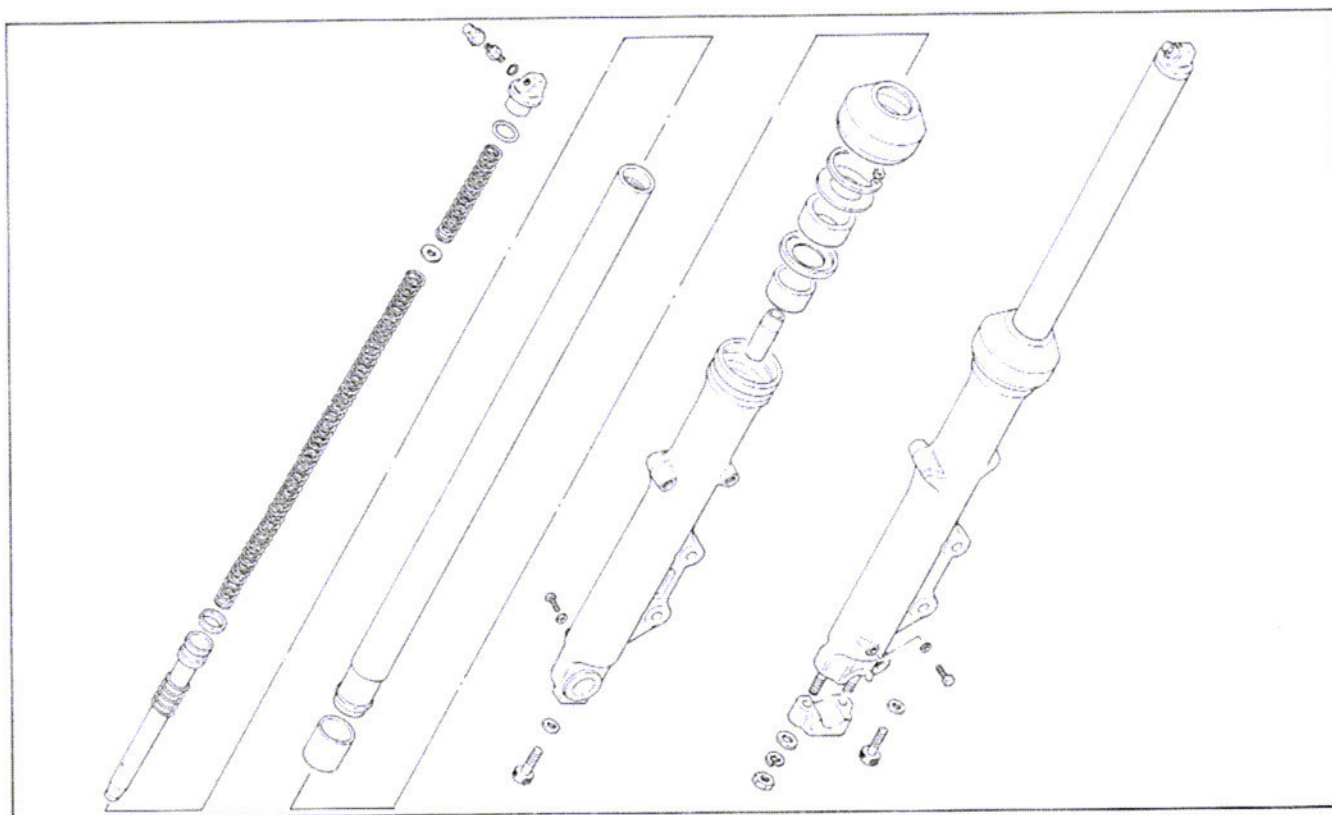
NOTE:
Slightly loosen the front fork cap bolts to facilitate later disassembly.



Pull off front fork.



DISASSEMBLY

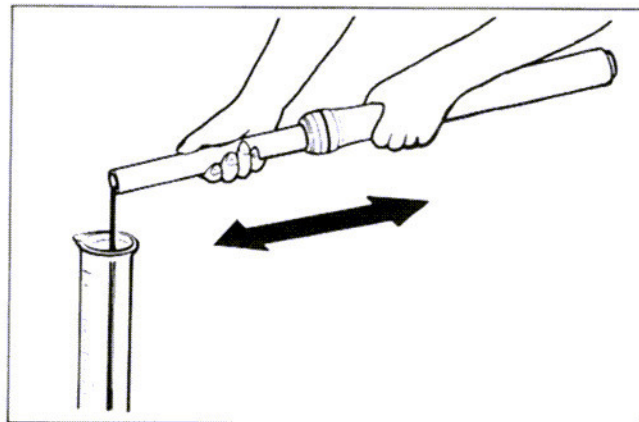


Remove front fork cap bolt and draw out fork springs and spring guide.



Invert the fork and stroke it several times to let out the oil inside.

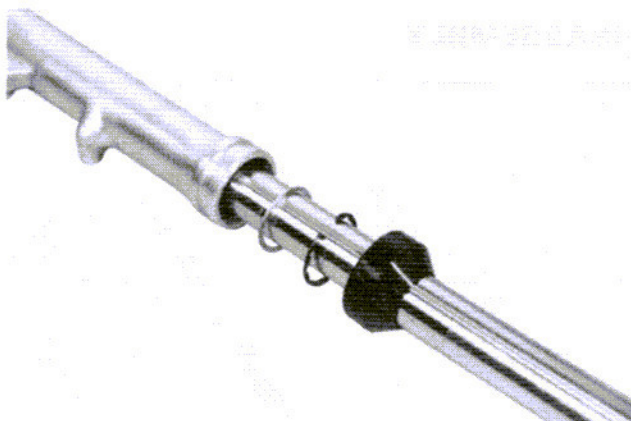
Under the condition (inverted condition), hold the fork for a few minutes.



Draw out dust seal.

Remove circlip by using special tool and stopper ring.

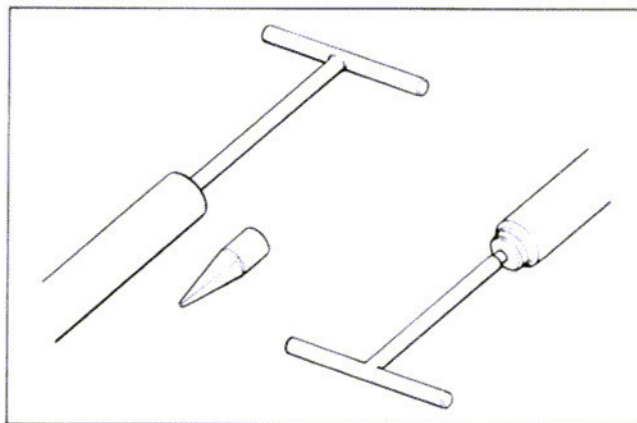
09900 - 06105	Snap ring pliers
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Remove damper rod securing bolt by using special tools.

Draw out damper rod and rebound spring.

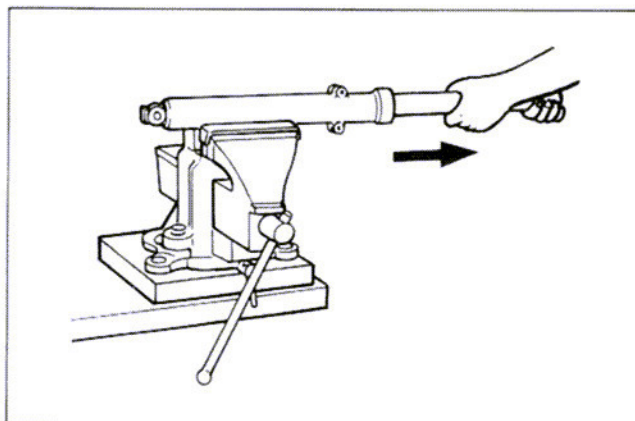
09940 - 34520	"T" handle
09940 - 34561	Attachment "D"
09914 - 25811	"T" type hexagon wrench



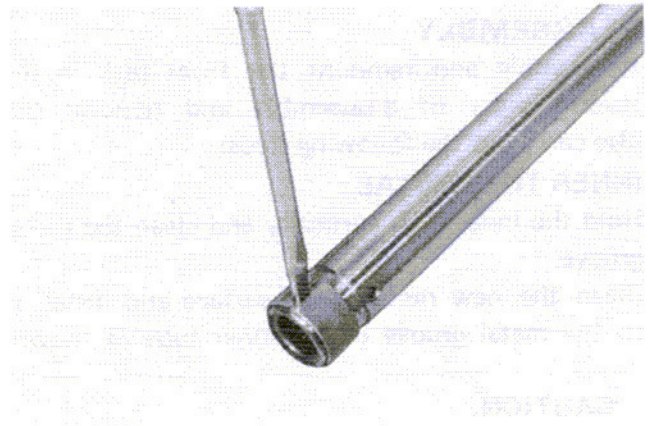
While holding the caliper mounting portion of the outer tube by vise, separate the inner tube from the outer tube as shown.

CAUTION:

The outer tube and inner tube "anti-friction" rings or metal slide rings must be replaced along with the oil seal any time the fork is disassembled.



Remove inner tube metal.

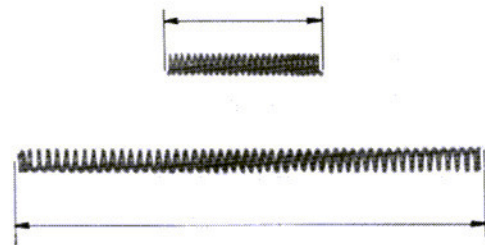


INSPECTION

FORK SPRING

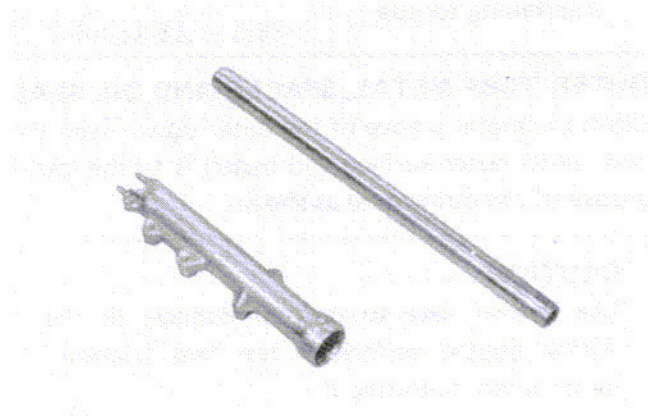
Measure the fork spring free length. If it is shorter than service limit, replace it.

Service Limit	S	105 mm (4.13 in)
	L	401 mm (15.79 in)



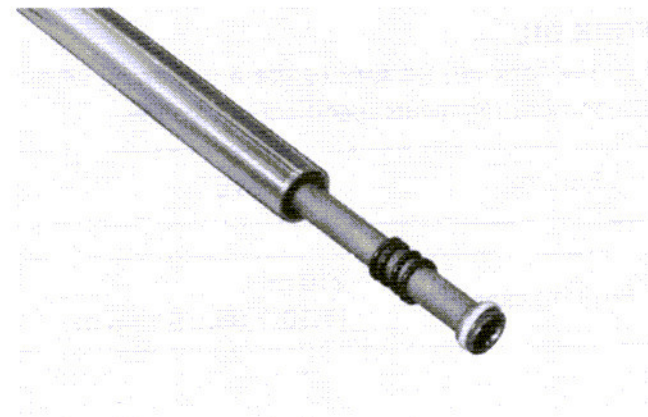
INNER TUBE AND OUTER TUBE

Inspect inner tube sliding surface for any scuffing and check the bend. Inspect outer tube sliding surface for any scuffing.



DAMPER ROD RING

Inspect damper rod ring for wear and damage.



REASSEMBLY

Reassemble and remount the front fork in the reverse order of disassembly and removal and also carry out the following steps:

INNER TUBE METAL

Hold the inner tube vertically and clean the metal groove.

Clean the new metal inner surface and install it to the metal groove of the inner tube as shown.

CAUTION.

Use special care to prevent damage to the Teflon coated surface of the "anti-friction" metal when mounting it.

DAMPER ROD BOLT

Apply Thread Lock Cement and SUZUKI BOND NO. 1215 to the damper rod bolt. Tighten the damper rod bolt with specified torque.

99000 - 32040	Thread Lock Cement
99104 - 31110	SUZUKI BOND NO. 1215

Tightening torque	15 – 25 N·m (1.5 – 2.5 kg-m)
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OUTER TUBE METAL, SPACER AND OIL SEAL

Clean the metal groove of the outer tube. Clean the new metal outer surface and install it to the metal groove of the outer tube as shown.

CAUTION:

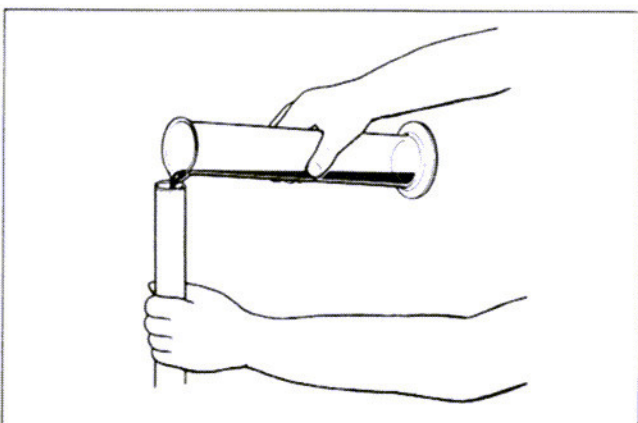
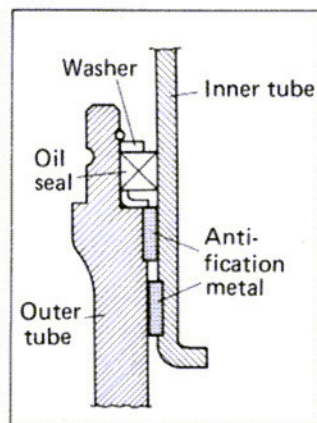
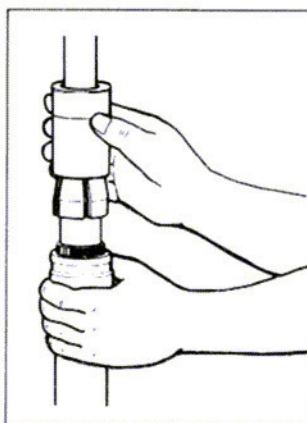
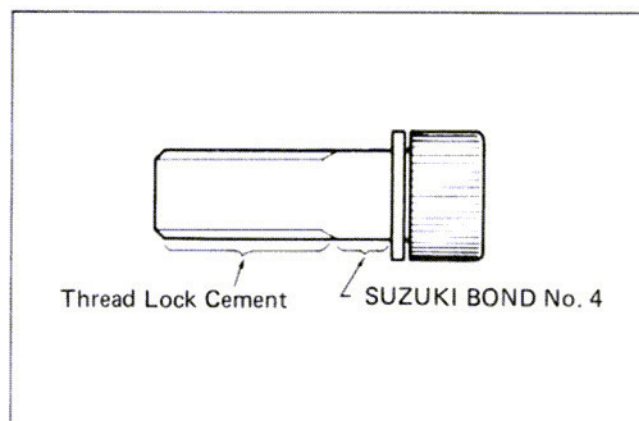
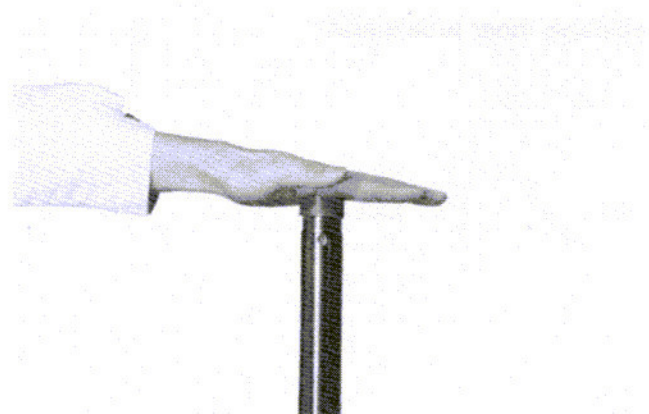
Use special care to prevent damage to the Teflon coated surface of the "anti-friction" metal when mounting it.

FORK OIL

For the fork oil, be sure to use a motor oil whose viscosity rating meets specifications below.

Fork oil	# 15
----------	------

Fork oil capacity	210 ml (7.10/7.39 US/Imp oz)
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Hold the front fork vertical and adjust the fork oil level with a special tool.

NOTE:

When adjusting oil level, remove the fork spring and compress the inner tube fully.

09943 - 74111	Fork oil level gauge
STD Oil level	165.0 mm (6.50 in)

FORK SPRING

When installing the upper fork spring, large diameter end should position in bottom.

Tightening torque:

	kg-m	lb-ft
Front fork cap bolt	1.5 – 3.0	11.0 – 21.5
Front fork clamp bolt (U)	2.0 – 3.0	14.5 – 21.5
Front fork clamp bolt (L)	1.5 – 2.5	11.0 – 18.0
Damper rod bolt	1.5 – 2.5	11.0 – 18.0

FORK AIR

Lift up the front wheel by jack.

Set the air pressure gauge to the valve ①, and turn the valve handle ② clockwise.

Set the hand pump to the valve ③, turn the valve handle ④ clockwise, and pump the air.

Let the air out by loosening the handle ④ till the specified air pressure is left inside.

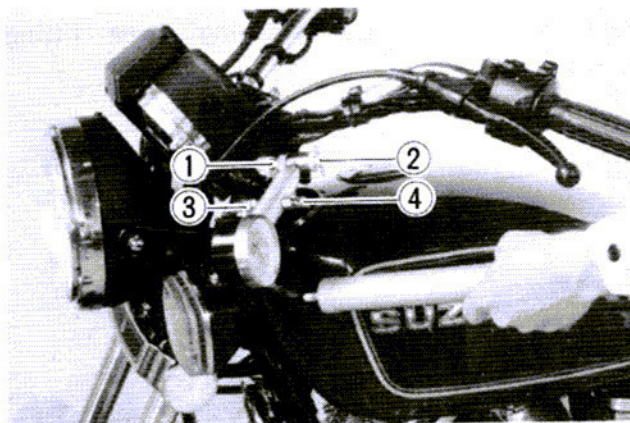
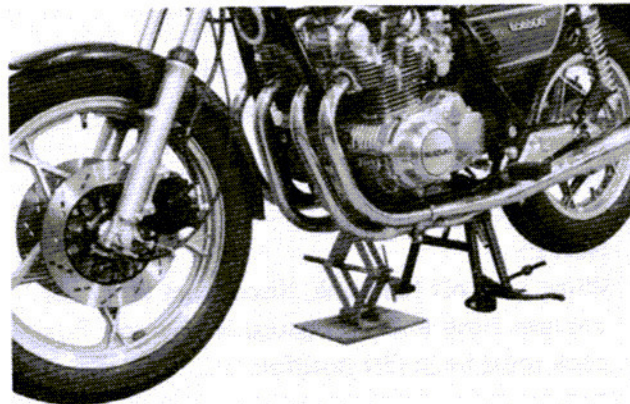
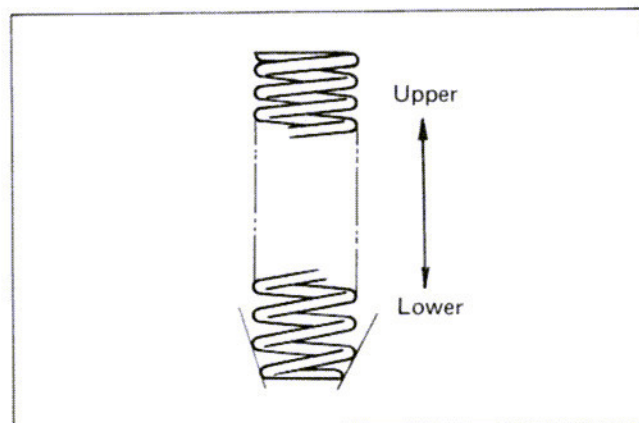
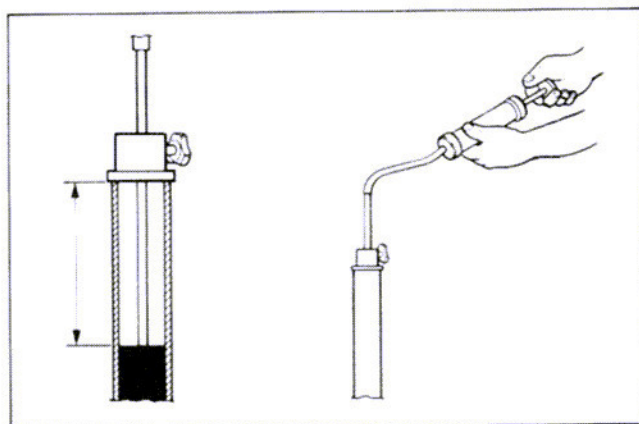
Loosen the valve handle ②, and remove the air pressure gauge.

CAUTION.

Do not charge air more than 2.5 kg/cm² (35 psi).

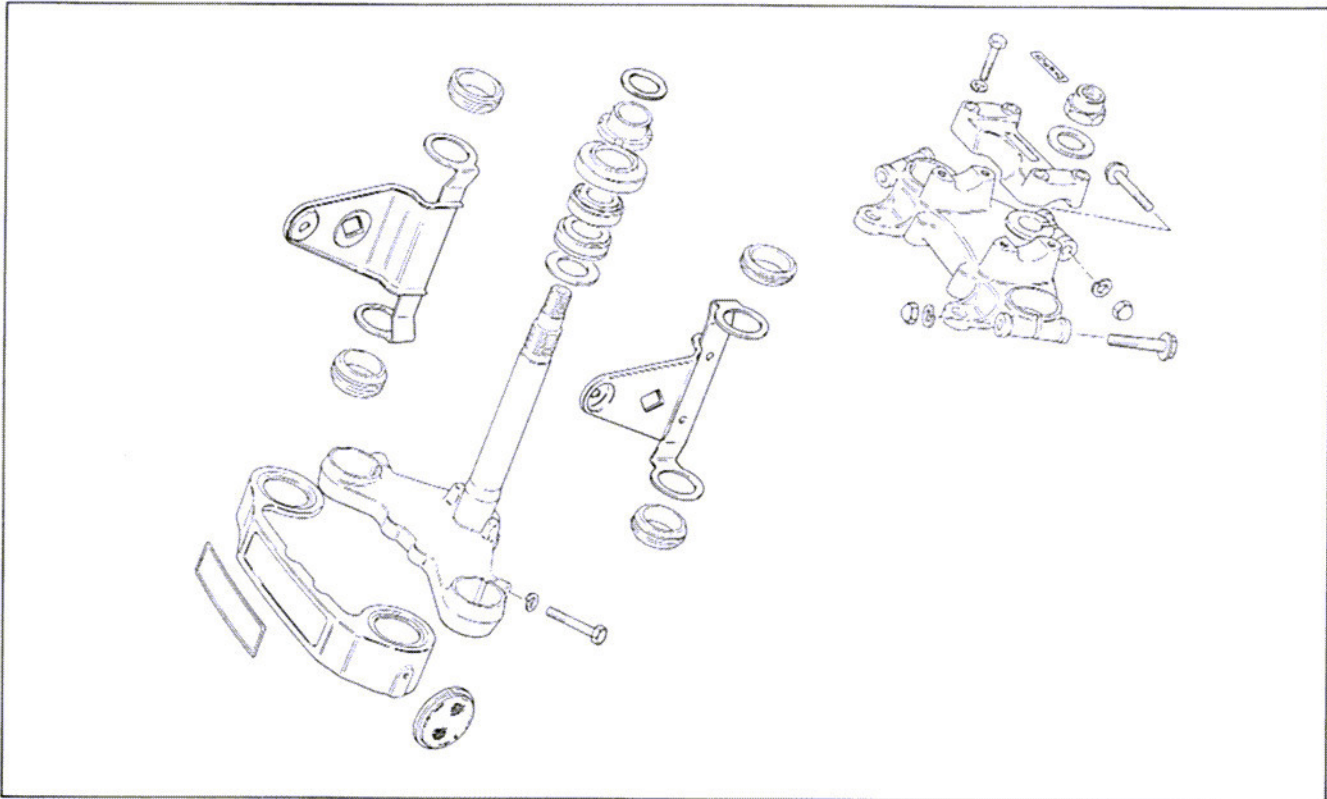
Balance the air pressure of both right and left forks.

STD Air pressure	0.5 kg/cm ² (7.11 psi)
09940 - 44110	Front fork air gauge



STEERING STEM

CONSTRUCTION

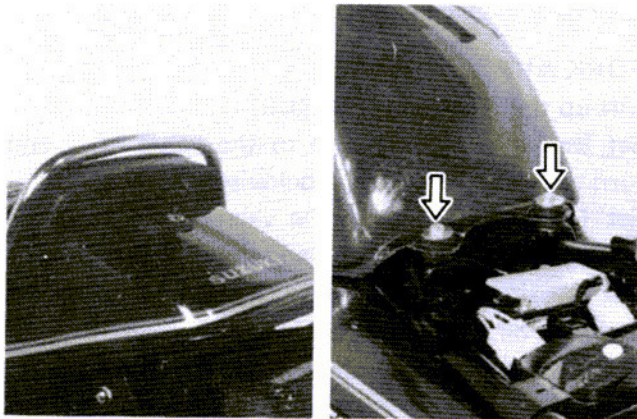


DISASSEMBLY

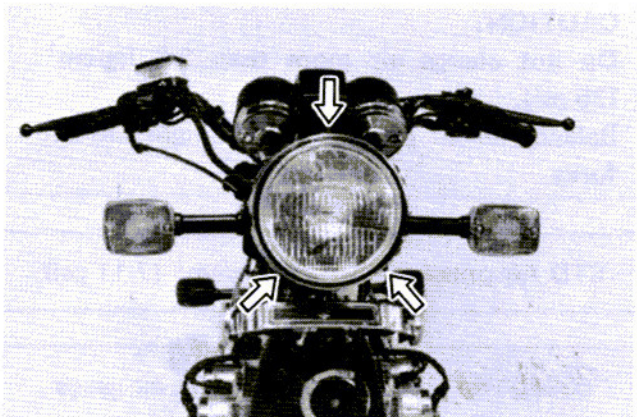
Remove front wheel (See page 8-1).
 Remove front forks (See page 8-11).
 Remove seat.
 Take off fuel tank.

NOTE:

When take off fuel tank, disconnect fuel hose, vacuum hose and fuel gauge lead wires. Fuel cock must be in ON position.

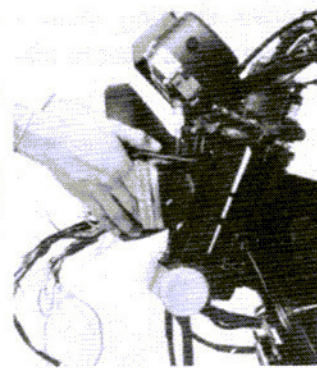
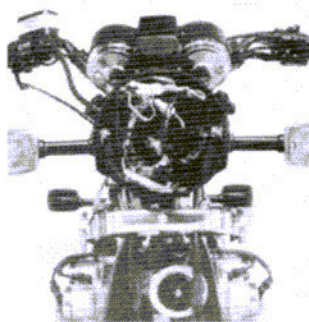


Remove headlight by removing three fitting screws.

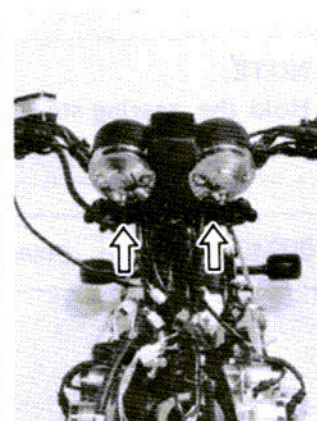
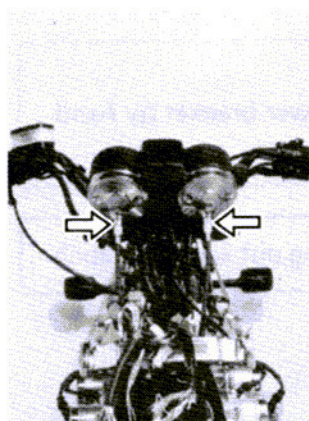


Disconnect lead wires.

Dismount the headlight housing, turn signal light and headlight bracket for same time.

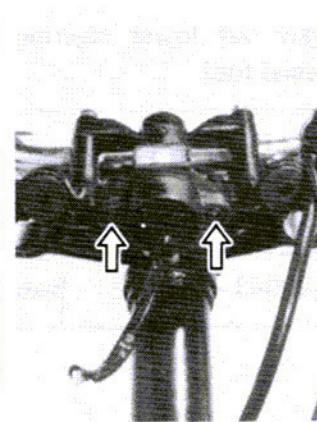
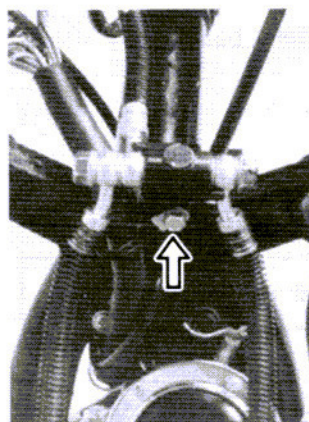


Disconnect speedometer and tachometer cables.
Remove meter mounting nuts and take off meter.



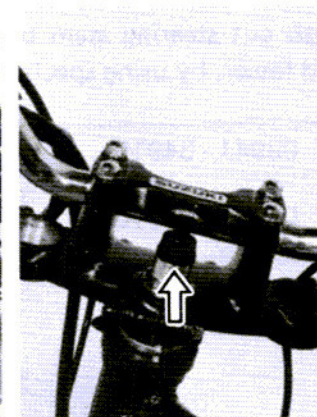
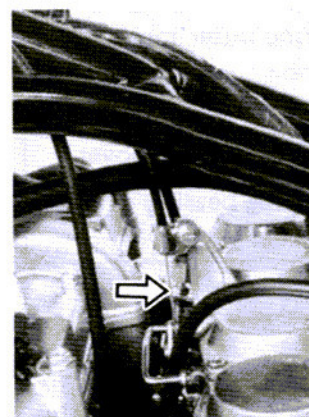
Disconnect brake hose joint.
Remove ignition switch by using special tool.

09911 - 73730	T type hexagon wrench
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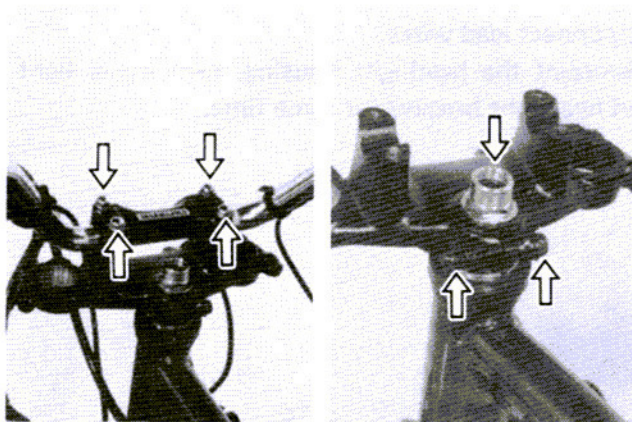


Disconnect choke cable for carburetor side.

Loosen the lock nut and remove choke cable.



Loosen the steering stem clamp bolt.
Remove steering stem head nut and take off steering stem upper bracket.



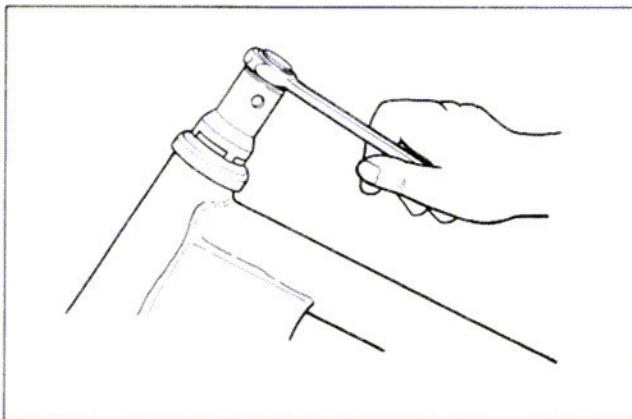
Remove steering stem nut by using special tool.

NOTE:

Hold the steering stem lower bracket by hand to prevent dropping.

09940 - 14910

Steering nut socket wrench



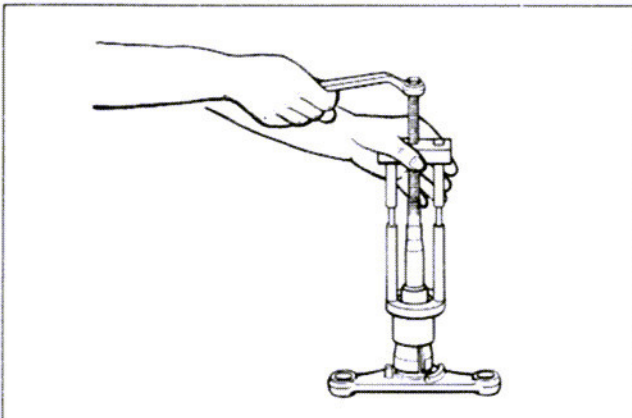
Draw out lower steering stem bearing by using special tool.

CAUTION.

The removed bearing should be replaced.

09941 - 84510

Bearing inner race remover



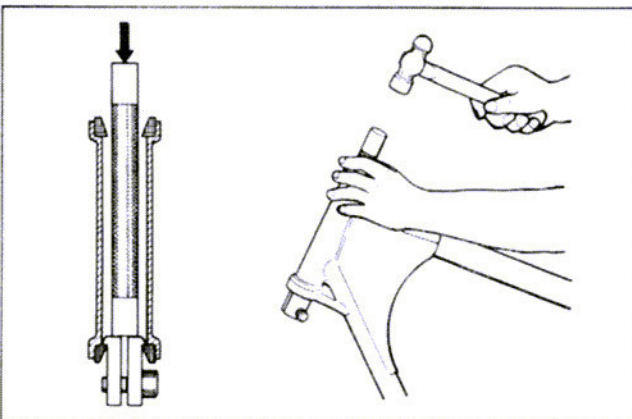
Push out steering stem bearing outer races, upper and lower, by using special tools.

09941 - 54910

Steering race remover

09941 - 74910

Steering bearing installer



REASSEMBLY

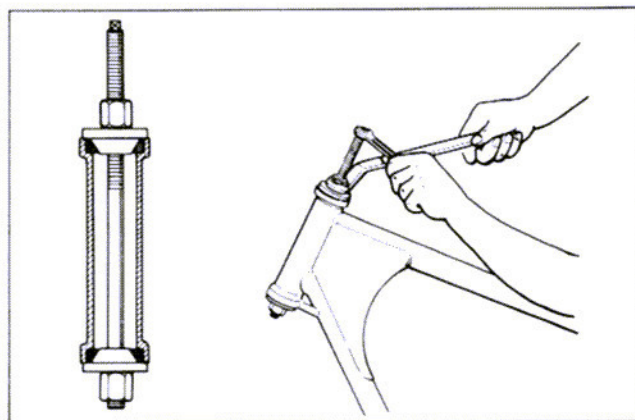
Reassemble and remount the steering stem in the reverse order of disassembly and removal, and also carry out the following steps:

OUTER RACES

Press in the upper and lower outer races using special tool.

09941 - 34511

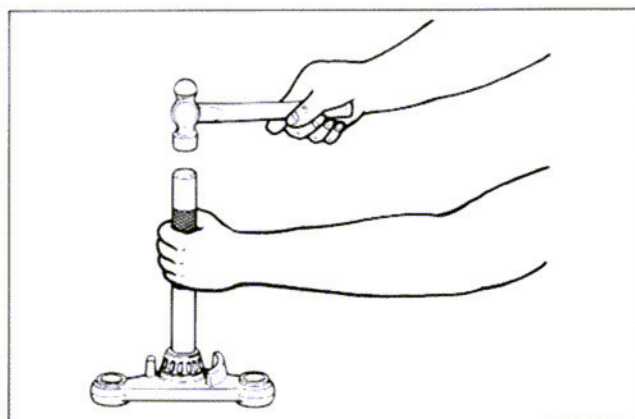
Steering outer race installer

**BEARING**

Press in the lower bearing by using special tool.

09941 - 74910

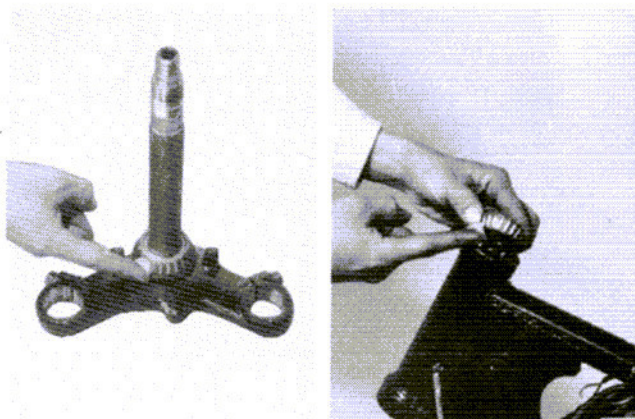
Steering bearing installer



Apply grease upper and lower bearing before remounting the steering stem.

99000 - 25030

Suzuki super grease "A"

**STEM NUT**

Tighten the steering stem nut by using special tool with specified torque.

Turn the front fork right and left 5 or 6 times to seat the bearings.

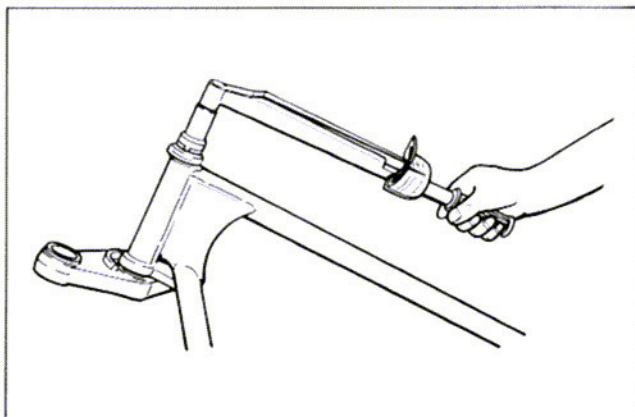
Turn out the steering stem nut 1/4 turn.

Then retighten very lightly so that no play can be detected in the stem.

09940 - 14911

Stem nut socket wrench

Tightening torque

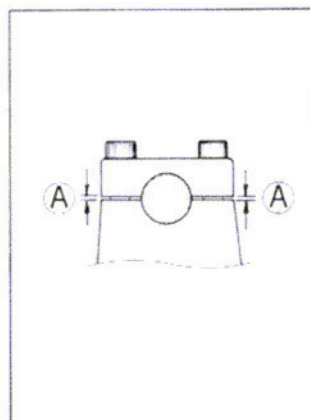
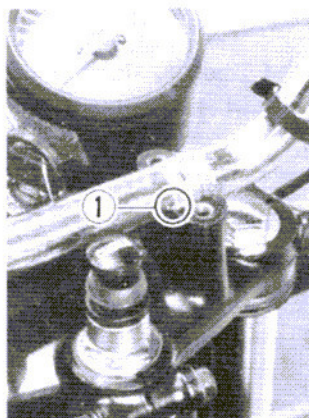
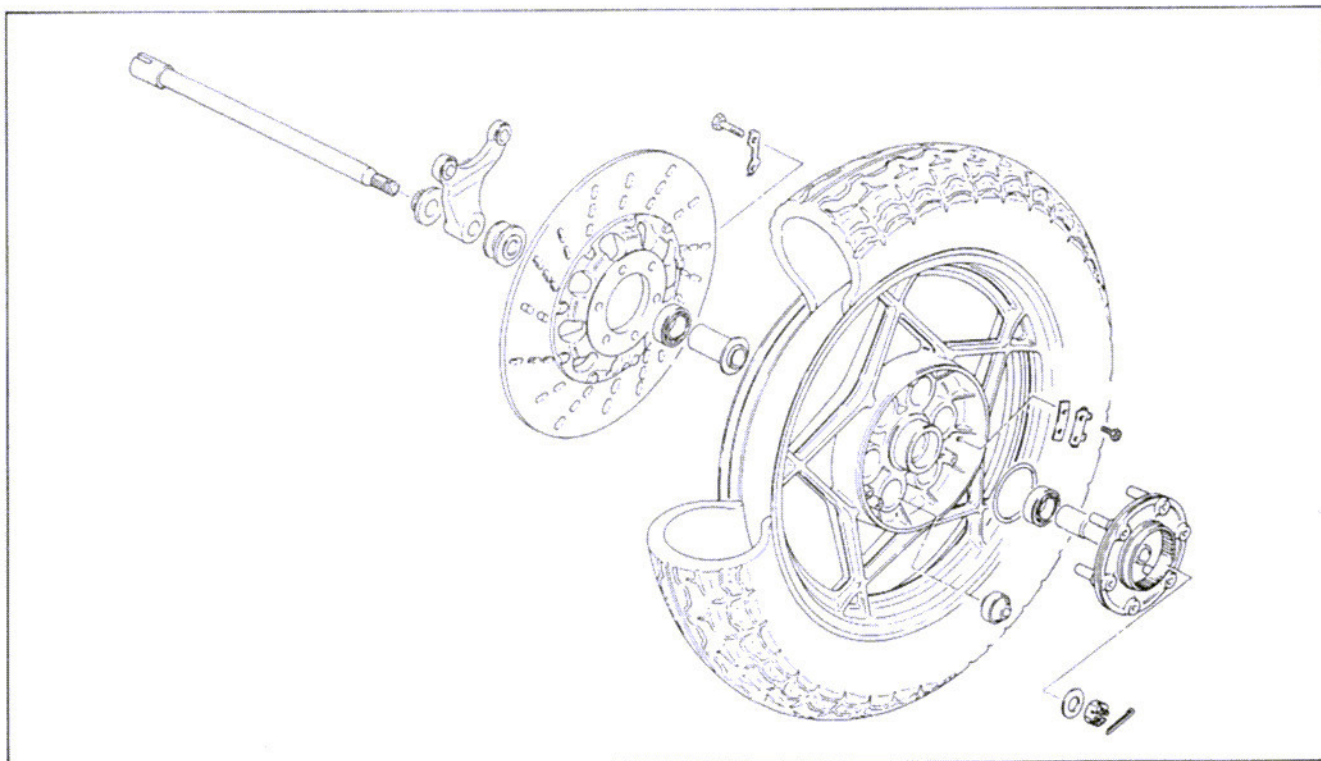
4.0 – 5.0 kg-m
(29.0 – 36.0 lb-ft)

HANDLEBARS

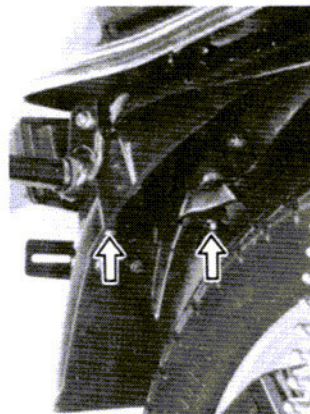
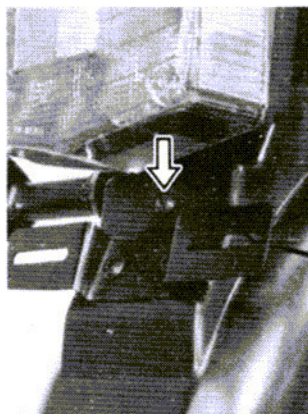
Set the handlebars to match its punched mark ① to the mating face of the holder.

Secure the each handlebars clamp in such a way that the clearances **A** ahead of and behind the handlebars are equalized.

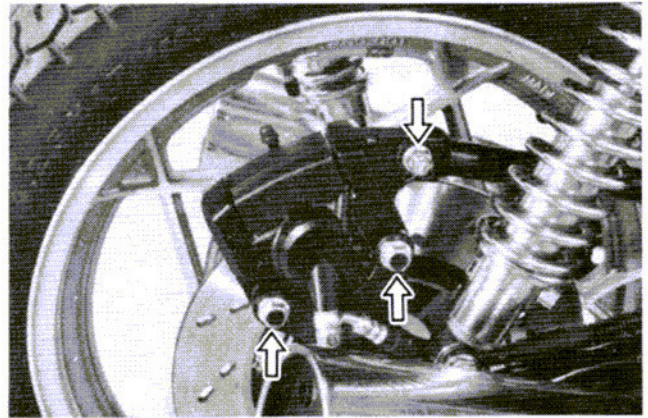
Tightening torque	1.2 – 2.0 kg-m (8.5 – 14.5 lb-ft)
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**REAR WHEEL CONSTRUCTION****REMOVAL**

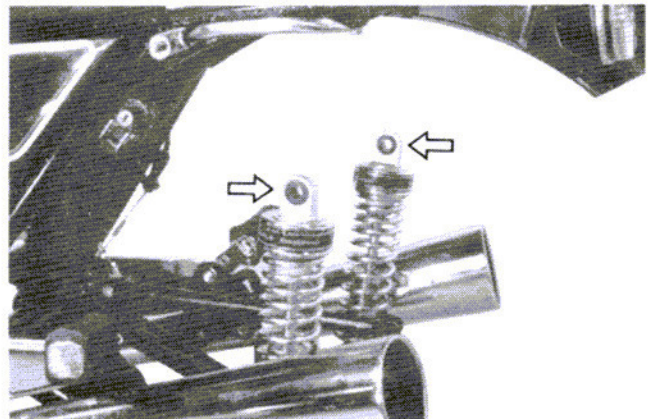
Support the machine by center stand.
Remove the rear fender extension.



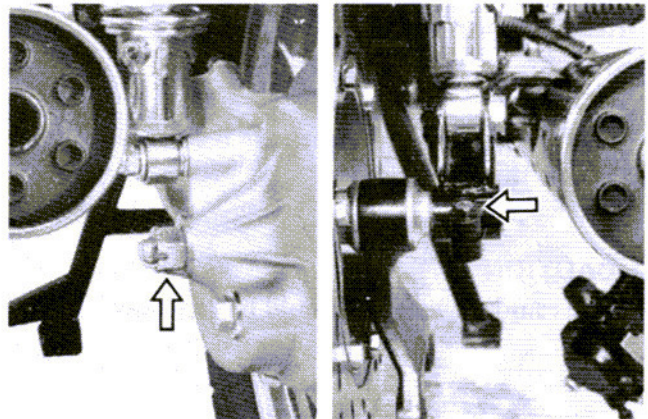
Remove rear torque link bolt for rear side.
Remove rear caliper mounting bolts and take off caliper.



Remove rear shock absorber fitting nuts for upper side (right and left).



Pull off cotter pin and remove axle nut.
Loosen the rear axle clamp bolt and draw out axle shaft.



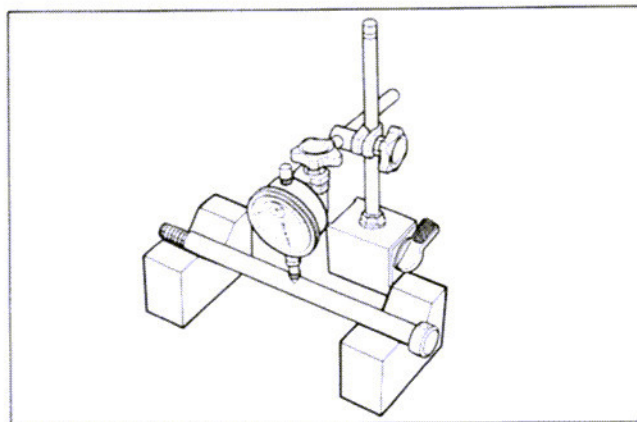
Slide the rear wheel to right side and move it rearward.



AXLE SHAFT

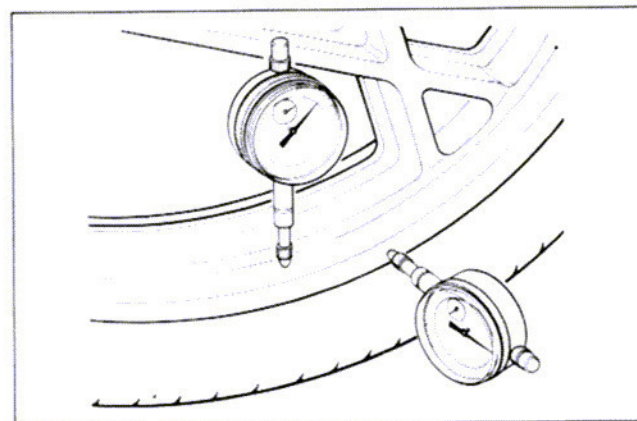
Using a dial gauge, check the axle shaft for runout and replace it if the runout exceeds the limit.

Service Limit	0.25 mm (0.010 in)
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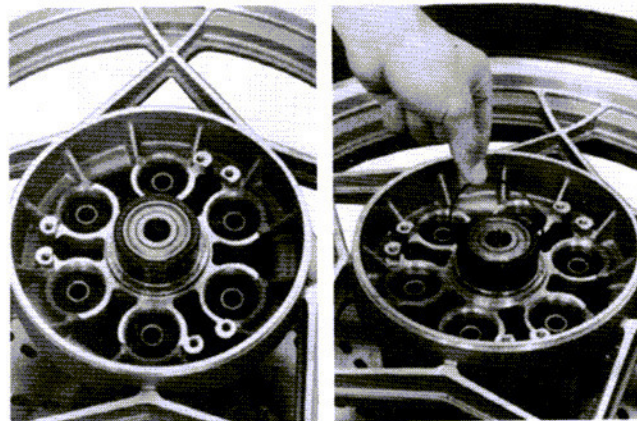
**WHEEL**

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

Service Limit (Axial and Radial)	2.0 mm (0.08 in)
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**WHEEL DAMPER**

Inspect the wheel dampers for damage or wear. Inspect the driven joint O ring for damage or wear.

**REASSEMBLY**

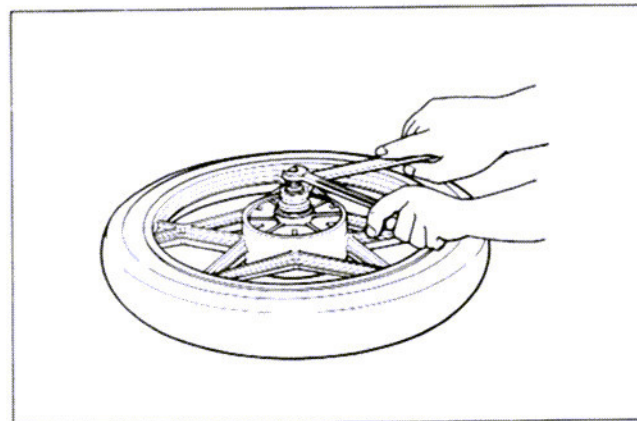
Reassemble and remount the rear wheel in the reverse order of disassembly and removal and also carry out the following steps:

WHEEL BEARINGS

Install the wheel bearings by using special tool as shown.

CAUTION:

First install the wheel bearing for right side.

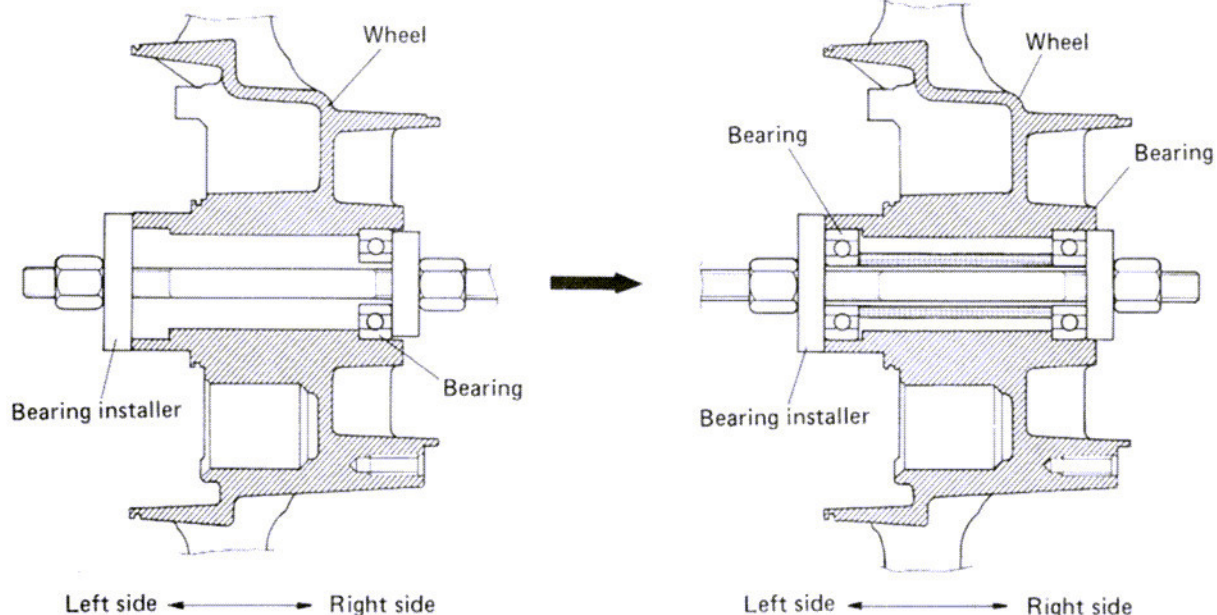
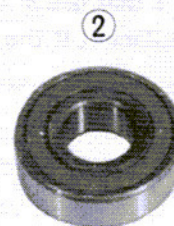
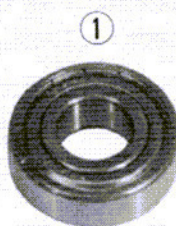


CAUTION:

Make sure to identify each bearing, the left side (iron plate sealed type) ① and right side (rubber sealed type) ② .

09924 - 84510

Bearing installer set

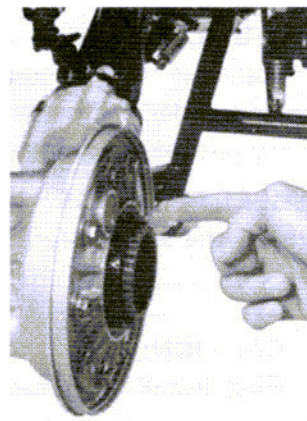
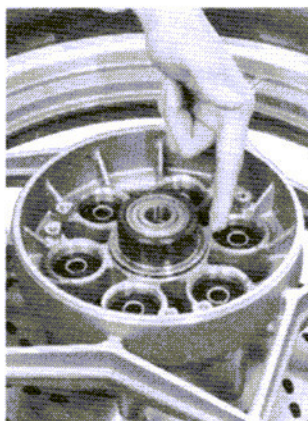


Apply grease to the O ring before install the driven joint.

Apply grease to the final gear spline before install the rear wheel.

99000 - 25030

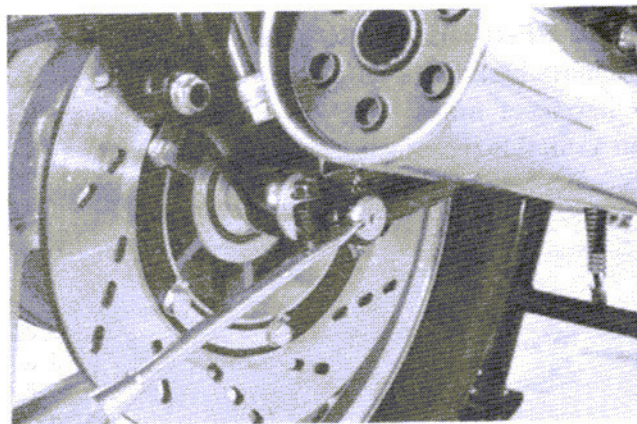
Suzuki super grease "A"



When tighten the axle nut, hold the axle shaft to prevent turning with plain screw driver inserting in the axle groove as shown and then tighten the axle clamp bolt.

Tightening torque:

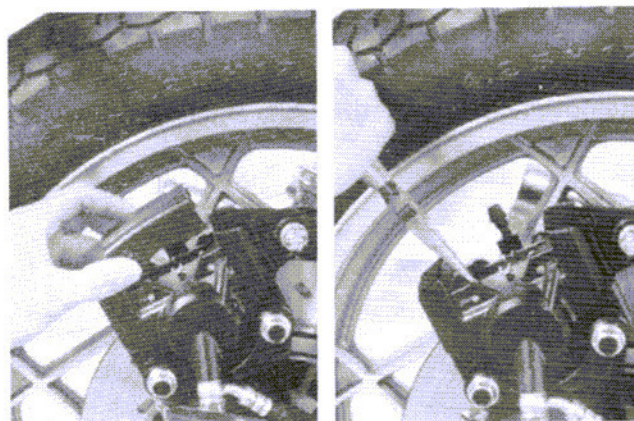
	kg-m	lb-ft
Axle nut	8.5 – 11.5	61.5 – 83.0
Axle clamp bolt	1.5 – 2.5	11.0 – 18.0



REAR BRAKE BRAKE PAD REPLACEMENT

Remove dust cover.

Pull off clips.



Pull off brake pad hold pins.

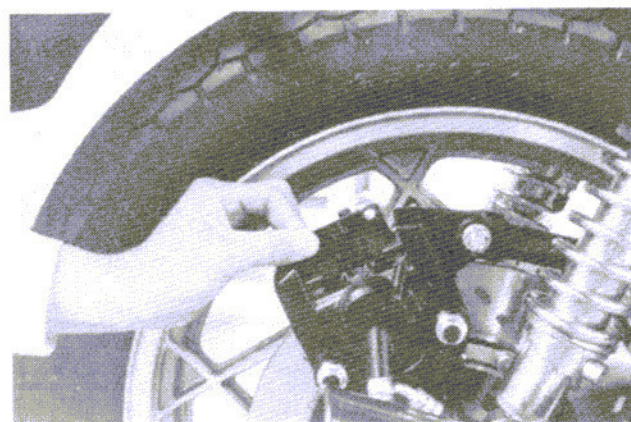
Take off brake pads with pad shims.

NOTE:

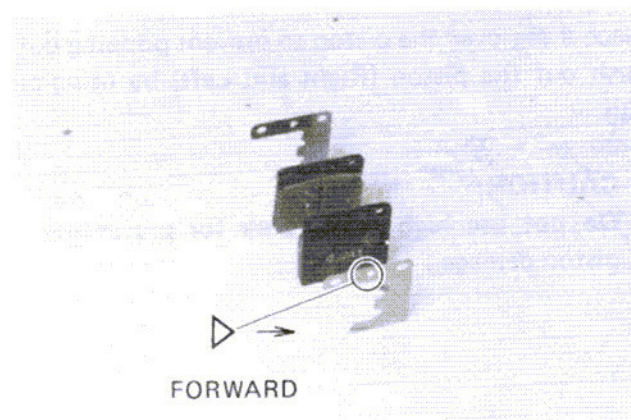
Do not operate the brake pedal while taking off the brake pads.

CAUTION:

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



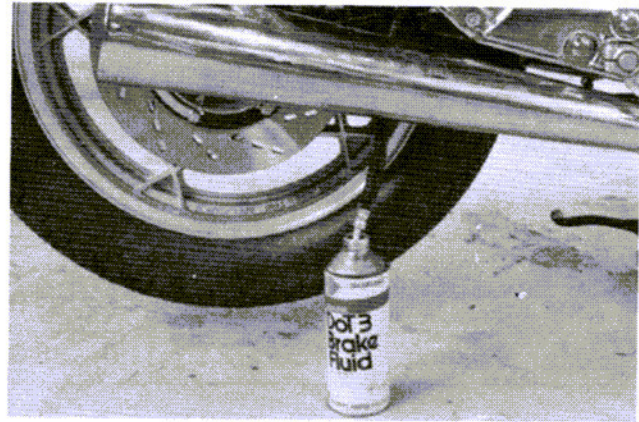
Fit brake pad shim to the rear of each brake pad so that the "hole" in the shim points to the front.



CALIPER REMOVAL AND DISASSEMBLY

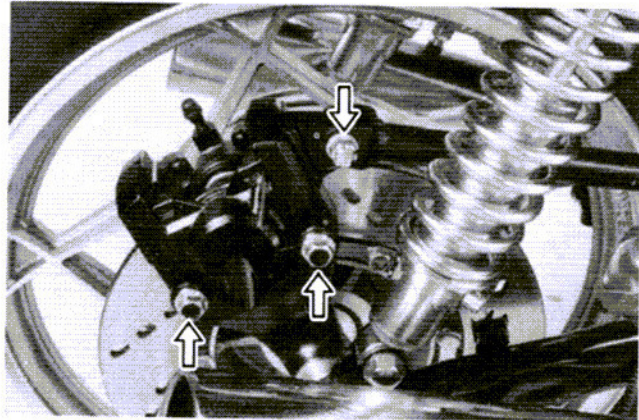
Remove brake pads (See page 8-26).

Disconnect brake hose and catch the brake fluid in a suitable receptacle.

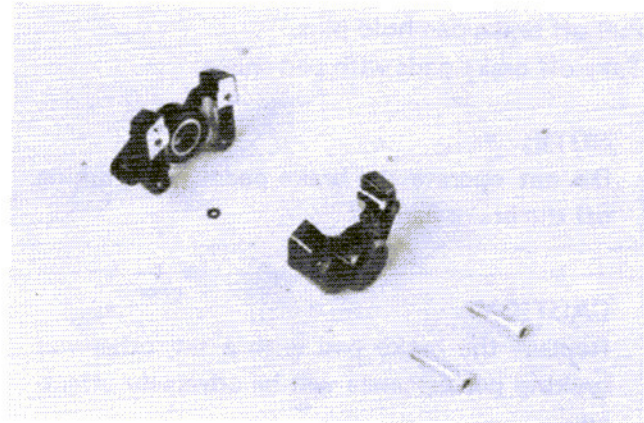


Pull off cotter pin and remove torque link bolt rearward.

Remove caliper mounting bolts and take off caliper.



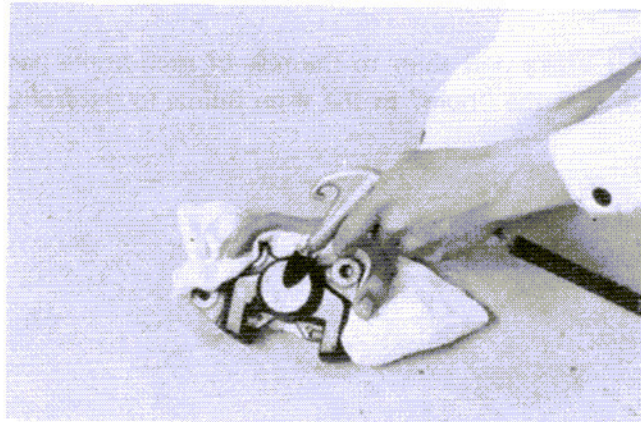
Separate the caliper after removing caliper bolts.



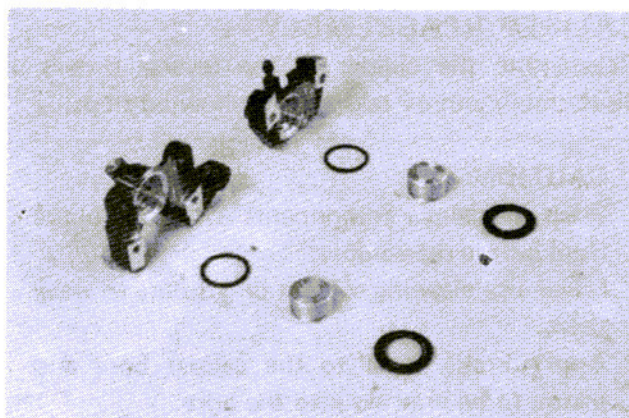
Place a rag over the piston to prevent popping out. Push out the piston (Right and Left) by using air gun.

CAUTION:

Do not use high pressure air for preventing piston damage.



Remove dust boot and piston seal.

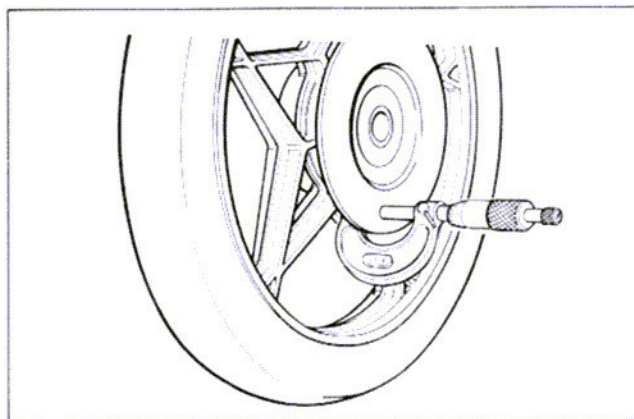


CALIPER AND DISC INSPECTION

- Inspect the cylinder bore wall for nick, scratch or other damage.
- Inspect the piston surface for any flow or other damage.
- Inspect the each rubber parts for damage and wear.

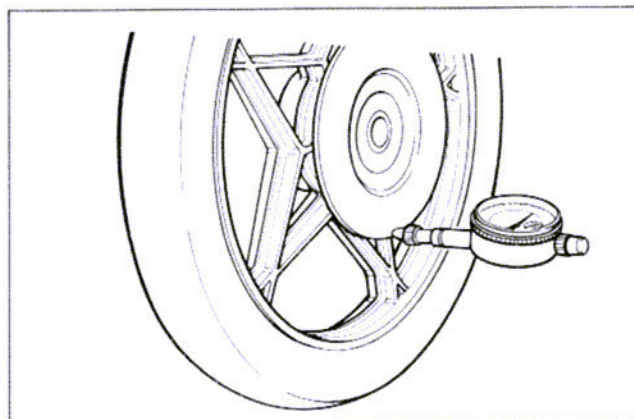
Using a micrometer check the disc for wear. Its thickness can be checked with disc and wheel in place. The service limit is specified for the thickness of the disc:

09900 - 20205	Micrometer (0 – 25 mm)
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With the disc mounted on the wheel, check the disc for face runout with a dial gauge, as shown.

Service Limit	0.30 mm (0.012 in)
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CALIPER REASSEMBLY

Reassemble the caliper in the reverse orders of disassembly and by taking the following steps:

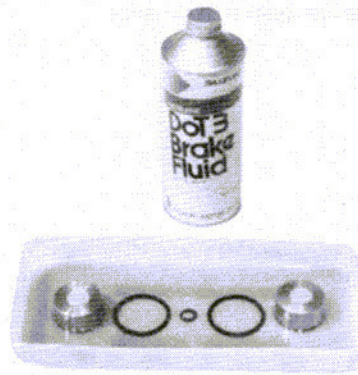
CAUTION:

Wash the caliper components with fresh brake fluid before reassembly.

Never use cleaning solvent or gasoline to wash them.

Apply brake fluid to the caliper bore and piston to be inserted into the bore.

Bleeding the air after reassembling master cylinder.



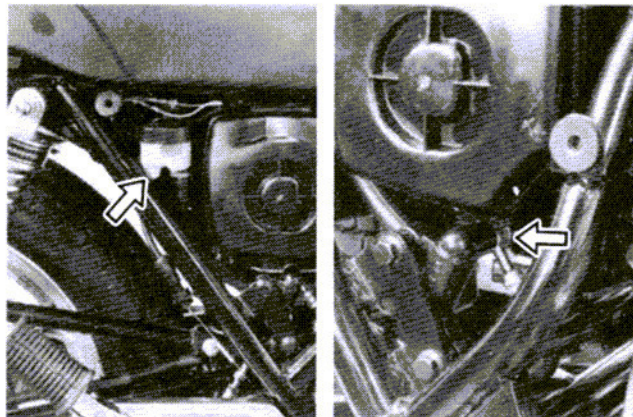
Tightening torque:

	kg-m	lb-ft
Union bolt	2.0 – 2.5	14.5 – 18.0
Torque link bolt	2.0 – 3.0	14.5 – 21.5
Caliper bolt	2.0 – 3.0	14.5 – 21.5
Caliper mounting bolt	2.5 – 4.0	18.0 – 29.0

MASTER CYLINDER REMOVAL AND DISASSEMBLY

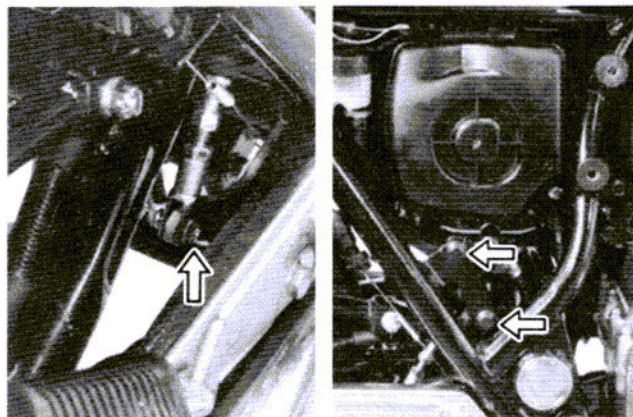
Remove reservoir fitting bolt.

Slightly loosen the brake hose union bolt to facilitate later disassembly.

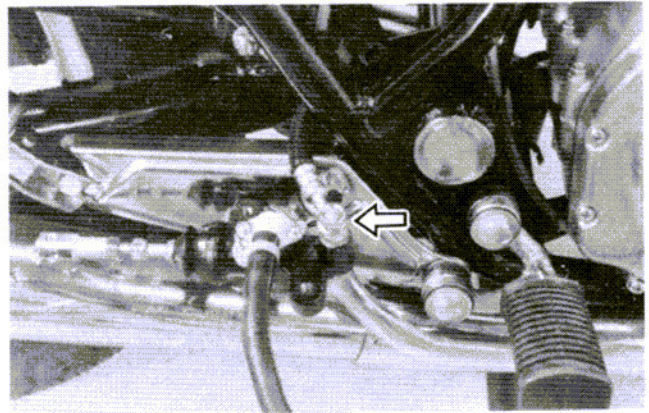


Disconnect master cylinder rod from the brake pedal arm.

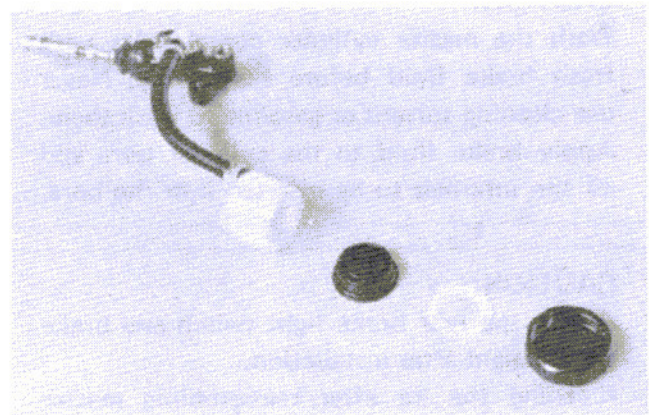
Remove master cylinder mounting bolts and take off master cylinder.



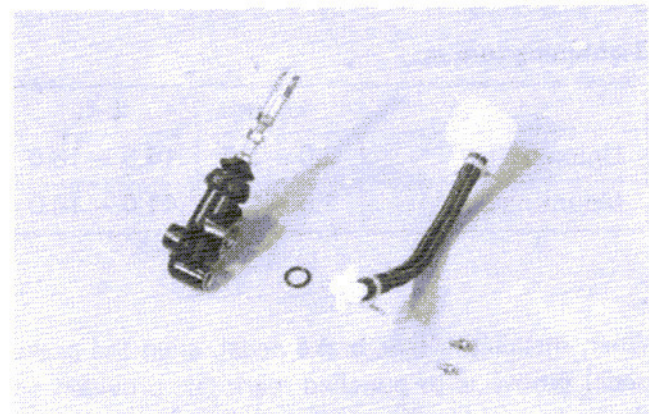
Disconnect brake hose.



Remove reservoir cap and drain brake fluid.



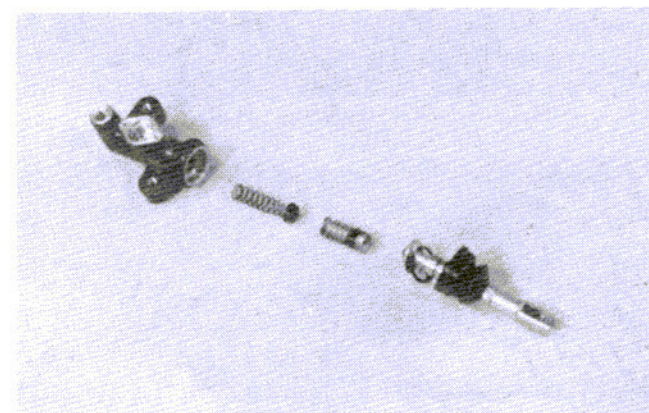
Remove reservoir.



Remove rod, piston, primary cup and spring by using special tool.

09900 - 06105

Snap ring pliers



MASTER CYLINDER INSPECTION

- Inspect the cylinder bore wall for any scratch or other damage.
- Inspect the primary cup, secondary cup and each rubber parts for damage.
- Inspect the piston surface for scratch or other damage.

MASTER CYLINDER REASSEMBLY

Reassemble the master cylinder in the reverse orders of disassembly and by taking the following steps:

CAUTION:

Wash the master cylinder components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them. Apply brake fluid to the cylinder bore and all the internals to be inserted into the bore.

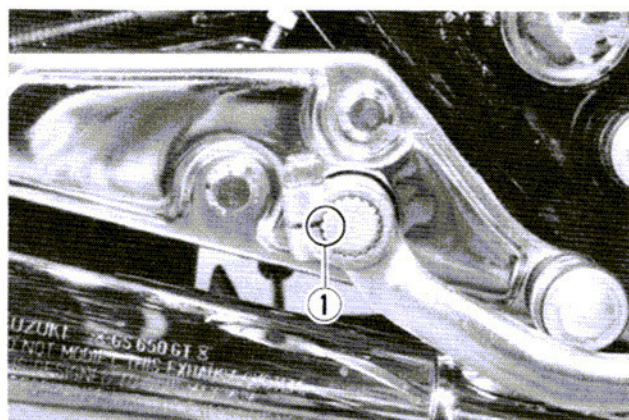
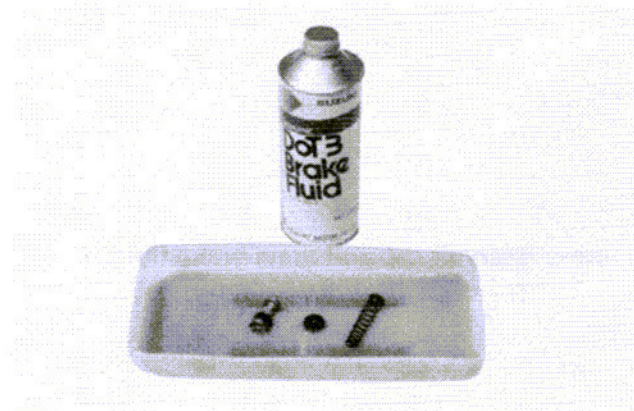
CAUTION:

Adjust the rear brake light switch and brake pedal height after installation.
Bleeding the air after reassembling master cylinder.

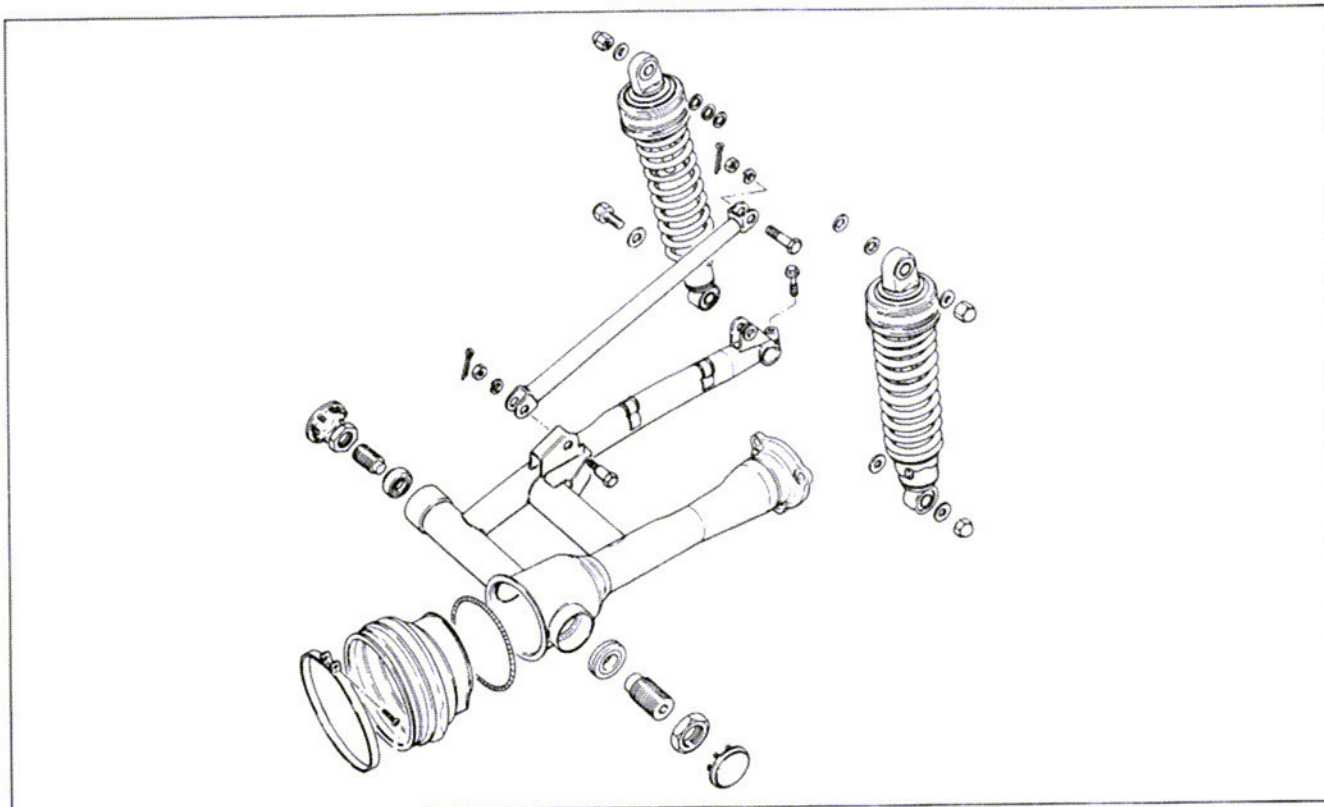
Tightening torque:

	kg-m	lb-ft
Union bolt	2.0 – 2.5	14.5 – 18.0
Mounting bolt	1.5 – 2.5	11.0 – 18.0

When install the rear brake pedal, align the brake pedal groove with punched mark ① provided on the end face of brake pedal shaft.



REAR SUSPENSION CONSTRUCTION

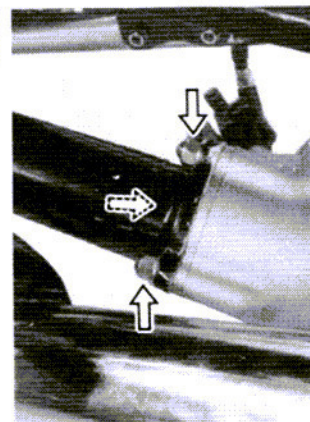
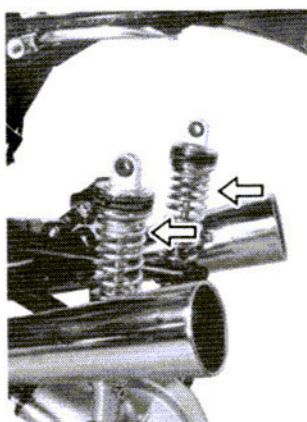


REMOVAL AND DISASSEMBLY

Remove rear wheel (See page 8-21).

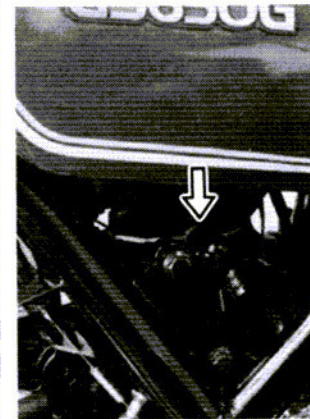
Remove rear shock absorber right and left.

Remove three mounting nuts and take off final gear case.



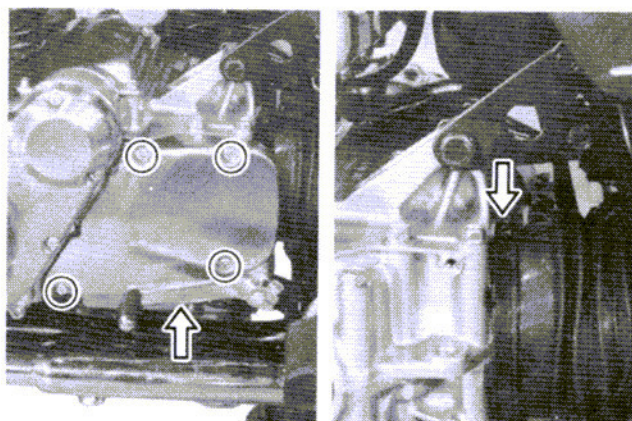
Remove torque link bolt after pulling off cotter pin and take off torque link.

Remove brake hose union bolt and remove rear brake caliper with brake hose.



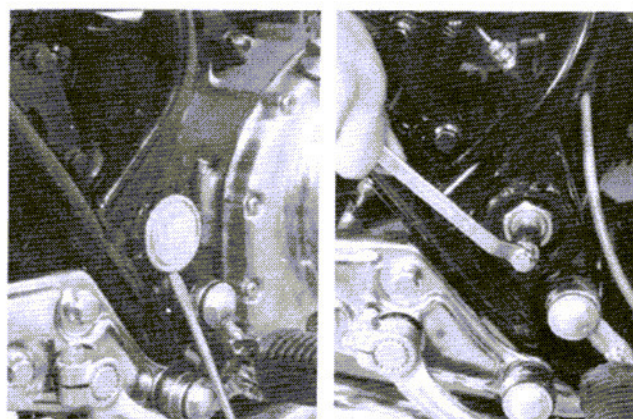
Remove gearshift lever and secondary gearcase cover.

Loosen the drive shaft boot clamp screw.

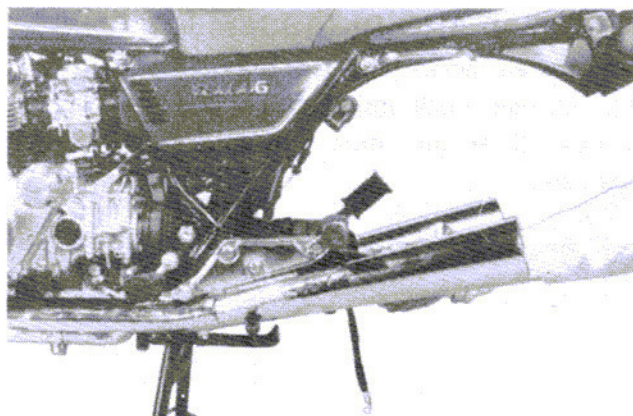


Remove swing arm pivot cover right and left.

Loosen the lock nut and pivot bolt right and left.



Take off swing arm.

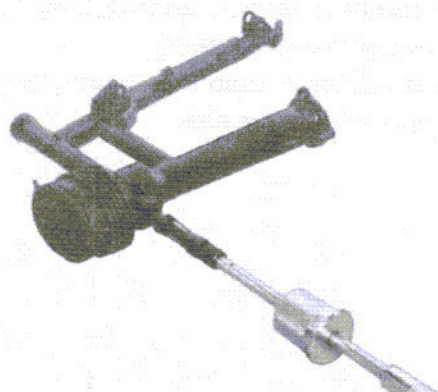


Remove the bearing outer race by using special tools.

CAUTION:

The removed bearing should be replaced.

09923 - 74510	Bearing puller
09930 - 30102	Slide shaft



REASSEMBLY

Reassemble and remount the swinging arm and rear shock absorbers in the reverse order of disassembly and removal and also carry out the following steps:

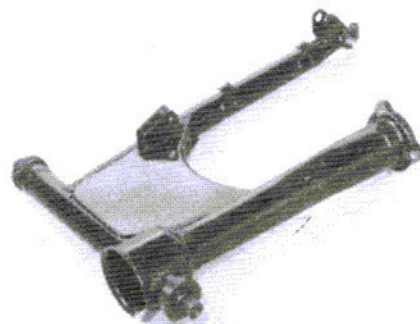
SWING ARM BEARING

Press in the bearing outer race by using special tool.

09941 - 34511	Bearing installer
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Apply grease to the bearings.

99000 - 25030	Suzuki super grease "A"
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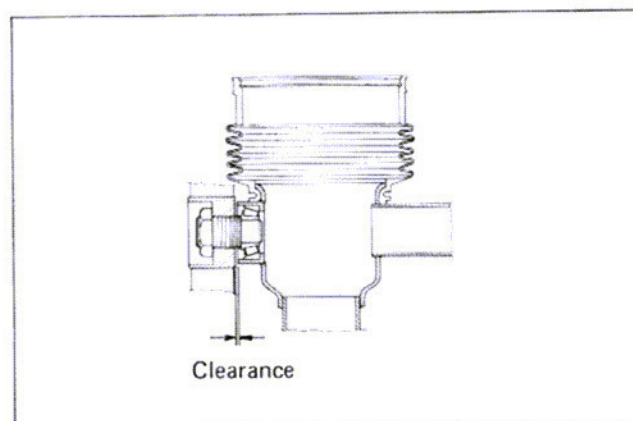
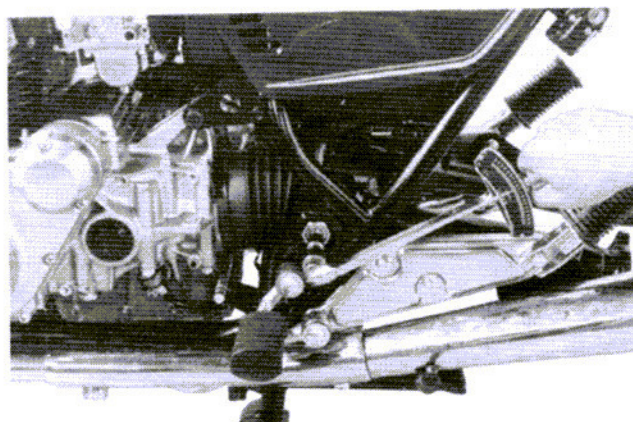
PIVOT BOLT

Tighten both pivot bolt with specified torque and tighten the lock nut.

CAUTION:

The clearance between the frame and swing arm should be even.

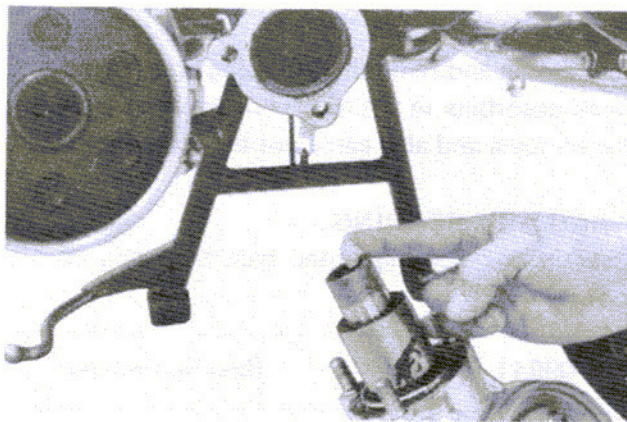
Pivot bolt tightening torque	0.35 – 0.45 kg-m (2.5 – 3.3 lb-ft)
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FINAL GEAR CASE

Apply grease to inside of drive shaft coupling.

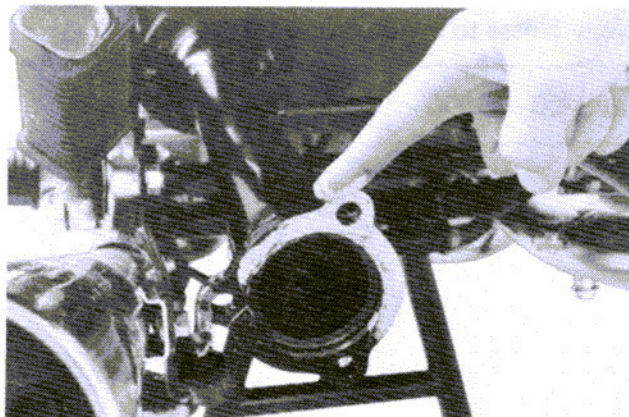
99000 - 25030	Suzuki super grease "A"
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Apply SUZUKI BOND NO. 1215 to mating surface of swing arm and final gearcase.

99104 - 31110	SUZUKI BOND NO. 1215
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Tightening torque	3.5 – 4.5 kg-m (25.5 – 32.5 lb-ft)
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**WARNING:**

Bleeding the air to the rear master cylinder after reassembling swing arm and rear wheel.

STD Setting:

Spring	"I" Softest
Damping	"I" Softest

SERVICING INFORMATION

CONTENTS

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TROUBLESHOOTING

ENGINE

Complaint	Symptom and possible causes	Remedy
Engine will not start, or is hard to start.	Compression too low 1. Tappet clearance out of adjustment. 2. Worn valve guides or poor seating of valves. 3. Valves mistiming. 4. Piston rings excessively worn. 5. Worn-down cylinder bores. 6. Starter motor cranks but too slowly. Plugs not sparking 1. Fouled spark plugs. 2. Wet spark plugs. 3. Ignition timing out of adjustment. 4. Defective ignition coil. 5. Open or short in high-tension cords. 6. Defective signal generator or transistor unit No fuel reaching the carburetors 1. Clogged hole in the fuel tank cap. 2. Clogged or defective fuel cock. 3. Defective carburetor float valve. 4. Clogged fuel pipe or suction cock pipe. 5. Defective fuel cock diaphragm.	Adjust. Repair, or replace. Adjust. Replace. Replace, or rebore. Consult "electrical complaints". Clean. Clean and dry. Adjust. Replace. Replace. Replace. Clean. Clean or replace. Replace. Clean. Replace.
Engine stalls easily.	1. Fouled spark plugs. 2. Ignition timing out of adjustment. 3. Defective signal generator or transistor unit. 4. Clogged fuel pipe. 5. Clogged jets in carburetors. 6. Tappet clearance out of adjustment.	Clean. Adjust. Replace. Clean. Clean. Adjust.
Noisy engine.	Excessive valve chatter 1. Tappet clearance too large. 2. Weakened or broken valve springs. 3. Camshaft journal worn and burnt. Noise appears to come from pistons 1. Pistons or cylinders worn down. 2. Combustion chambers fouled with carbon. 3. Piston pins worn. Noise seems to come from timing chain 1. Stretched chain. 2. Worn sprockets. 3. Tension adjuster not working. Noise seems to come from clutch 1. Worn splines of countershaft or hub. 2. Worn teeth of clutch plates. 3. Distorted clutch plates, driven and drive. Noise seems to come from crankshaft 1. Rattling bearings due to wear. 2. Big-end bearings worn and burnt. 3. Journal bearing worn and burnt.	Adjust. Replace. Replace. Replace. Clean. Replace. Replace. Replace. Repair or replace. Replace. Replace. Repair or replace. Replace. Replace. Replace.

Complaint	Symptom and possible causes	Remedy
Noisy engine.	Noise seems to come from transmission 1. Gears worn or rubbing. 2. Badly worn splines. 3. Primary gears worn or rubbing.	Replace. Replace. Replace.
Slipping clutch	1. Clutch control out of adjustment or loss of play. 2. Weakened clutch springs. 3. Worn or distorted pressure plate. 4. Distorted clutch plates, driven and drive.	Adjust. Replace. Replace. Replace.
Dragging clutch	1. Clutch control out of adjustment or too much play. 2. Some clutch springs weakened while others are not. 3. Distorted pressure plate or clutch plates.	Adjust. Replace. Replace.
Transmission will not shift	1. Broken gearshift cam. 2. Distorted gearshift forks.	Replace. Replace.
Transmission will not shift back.	1. Broken return spring on shift shaft. 2. Shift shafts are rubbing or sticky.	Replace. Repair.
Transmission jumps out of gear.	1. Worn shifting gears on mainshaft or layshaft. 2. Distorted or worn gearshift forks. 3. Weakened stopper spring on gearshift stopper.	Replace. Replace. Replace.
Engine idles poorly.	1. Tappet clearance out of adjustment. 2. Poor seating of valves. 3. Defective valve guides. 4. Ignition timing out of adjustment. 5. Spark plug gaps too wide. 6. Defective ignition coil. 7. Defective signal generator or transistor unit. 8. Float-chamber fuel level out of adjustment in carburetors. 9. Clogged jets or imbalance of carburetors.	Adjust. Replace. Replace. Adjust. Adjust or replace. Replace. Replace. Adjust. Clean or adjust.
Engine runs poorly in high-speed range.	1. Valve springs weakened. 2. Valve timing out of adjustment. 3. Spark plug gaps too narrow. 4. Ignition not advanced sufficiently due to poorly working advancer. 5. Defective ignition coil. 6. Defective signal generator or transistor unit. 7. Float-chamber fuel level too low. 8. Clogged air cleaner element. 9. Clogged fuel pipe, resulting in inadequate fuel supply to carburetors. 10. Clogged suction cock pipe.	Replace. Adjust. Adjust. Replace. Replace. Replace. Adjust. Clean. Clean, and prime. Clean.
Dirty or heavy exhaust smoke	1. Too much engine oil in the engine. 2. Worn piston rings or cylinders. 3. Worn valve guides. 4. Cylinder walls scored or scuffed. 5. Worn valves stems. 6. Defective stem seal.	Check with level window drain out excess oil. Replace. Replace. Rebore or replace. Replace. Replace.

Complaint	Symptom and possible causes	Remedy
Engine lacks power	1. Loss of tappet clearance. 2. Weakened valve springs. 3. Valve timing out of adjustment. 4. Worn piston rings or cylinders. 5. Poor seating of valves. 6. Ignition timing out of adjustment. 7. Spark plug gaps incorrect. 8. Clogged jets in carburetors. 9. Float-chamber fuel level out of adjustment. 10. Clogged air cleaner element. 11. Carburetor balancing screw loose. 12. Sucking air from intake pipe. 13. Too much engine oil in the engine.	Adjust. Replace. Adjust. Replace. Repair. Adjust. Adjust or replace. Clean. Adjust. Clean. Retighten. Retighten or replace. Drain out excess oil.
Engine overheats.	1. Heavy carbon deposit on piston crowns. 2. Not enough oil in the engine. 3. Defective oil pump or clogged oil circuit. 4. Fuel level too low in float chambers. 5. Suck air from intake pipes. 6. Use incorrect engine oil.	Clean. Add oil. Replace or clean. Adjust. Retighten or replace. Change.
Noisy shaft drive	Noise seems to come from secondary bevel gear and final bevel gear assemblies. 1. Oil level too low. (final bevel gear) 2. Excessive backlash 3. Improper tooth contact 4. Damage to bearings Noise seems to come from propeller shaft area. 1. Propeller shaft joint bolts loose. 2. Propeller shaft splines damaged or worn. 3. Insufficient lubricant	Refill Adjust Adjust Replace Retighten Replace Refill
No power transmitted from engine to rear wheel	1. Broken propeller shaft 2. Broken gear teeth	Replace Replace
Secondary bevel gear and final bevel gear assemblies oil leak	1. Damage to oil seals 2. Damage to O rings	Replace Replace

CARBURETOR

Complaint	Symptom and possible causes	Remedy
Trouble with starting	1. Starter jet is clogged. 2. Starter pipe is clogged. 3. Air leaking from a joint between starter body and carburetor. 4. Air leaking from carburetor's joint or vacuum gauge joint. 5. Starter plunger is not operating properly.	Clean. Clean. Check starter body and carburetor for tightness, adjust and replace gasket. Check and adjust. Check and adjust.
Idling or low-speed trouble	1. Pilot jet, pilot air jet are clogged or loose. 2. Air leaking from carburetor's joint, vacuum gauge joint, or starter. 3. Pilot outlet or bypass is clogged. 4. Starter plunger is not fully closed.	Check and clean. Check and adjust. Check and clean. Check and adjust.
Medium- or high-speed trouble	1. Main jet or main air jet is clogged. 2. Needle jet is clogged. 3. Fuel leaking due to a broken O-ring in needle jet. 4. Throttle valve is not operating properly. 5. Filter is clogged.	Check and clean. Check and clean. Replace O-ring. Check throttle valve for operation. Check and clean.
Overflow and fuel level fluctuations	1. Needle valve is worn or damaged. 2. Spring in needle valve is broken. 3. Float is not working properly. 4. Foreign matter has adhered to needle valve. 5. Fuel level is too high or low.	Replace. Replace. Check and adjust. Clean. Adjust float height

ELECTRICAL

Complaint	Symptom and possible causes	Remedy
No sparking or poor sparking	1. Defective ignition coil. 2. Defective spark plugs. 3. Defective signal generator or transistor unit.	Replace. Replace. Replace.
Spark plugs 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. Spark plugs too cold.	Adjust carburetors. Adjust carburetors. Change. Clean. Replace by hot type plugs.
Spark plugs become fouled too soon.	1. Worn piston rings. 2. Pistons or cylinders worn. 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. Spark plugs too hot. 2. The engine overheats. 3. Ignition timing out of adjustment. 4. Spark plugs loose. 5. Mixture too lean.	Replace by cold type plugs. Tune up. Adjust. Retighten. Adjust carburetors.
Generator does not charge.	1. Open or short in lead wires, or loose lead connections. 2. Shorted, grounded or open generator coils. 3. Shorted or punctured regulator/rectifier.	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 of generator. 3. Defective regulator/rectifier. 4. Not enough electrolyte in the battery. 5. Defective cell plates in the battery.	Repair, or retighten. Replace. Replace. Add distilled water to the upper level. Replace the battery.
Generator Overcharges.	1. Internal short-circuit in the battery. 2. Resistor element in the regulator/rectifier damaged or defective. 3. Regulator/rectifier poorly grounded.	Replace the battery. Replace. Clean and tighten ground connection.
Unstable charging	1. Lead wire insulation frayed due to vibration, resulting in intermittent shorting. 2. Generator internally shorted. 3. Defective regulator/rectifier.	Repair or replace. Replace. Replace.
Starter button is not effective.	1. Battery run down. 2. Defective switch contacts. 3. Brushes not seating properly on commutator in starter motor. 4. Defective starter relay.	Recharge or replace. Replace. Repair or replace. Replace.

BATTERY

Symptom	Probable cause	Remedy
"Sulfation", acidic white powdery substance or spots on surfaces of cell plates.	1. Not enough electrolyte 2. Battery case is cracked. 3. Battery has been left in a run-down condition for a long time. 4. Adulterated electrolyte (Foreign matter has entered the battery and become mixed with the electrolyte.	Add distilled water, if the battery has not been damaged and "sulfation" has not advanced too far, and recharge. Replace the battery. Replace the battery. 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 motor-cycle and then adjusting electrolyte S.G.
Battery runs down quickly.	1. The charging method is not correct. 2. Cell plates have lost much of their active material as a result of over-charging. 3. A short-circuit condition exists within the battery due to excessive accumulation of sediments caused by the high electrolyte S.G. 4. Electrolyte S.G. is too low. 5. Adulterated electrolyte. 6. Battery is too old.	Check the generator, regulator/rectifier and circuit connections, and make necessary adjustments to obtain specified charging operation. Replace the battery, and correct the charging system. Replace the battery. Recharge the battery fully and adjust electrolyte S.G. Replace the electrolyte, recharge the battery and then adjust S.G. 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. Charging rate too low or too high. (When not in use batteries should be recharged at least once a month to avoid sulfation.) 2. Battery electrolyte excessive or insufficient, or its specific gravity too high or too low. 3. The battery left unused for too long in cold climate.	Replace the battery. Keep the electrolyte up to the prescribed level, or adjust the S.G. by consulting the battery maker's directions. Replace the battery, if badly sulfated.
Battery discharges too rapidly.	1. Dirty container top and sides. 2. Impurities in the electrolyte or electrolyte S.G. is too high.	Clean. Change the electrolyte by consulting the battery maker's directions.

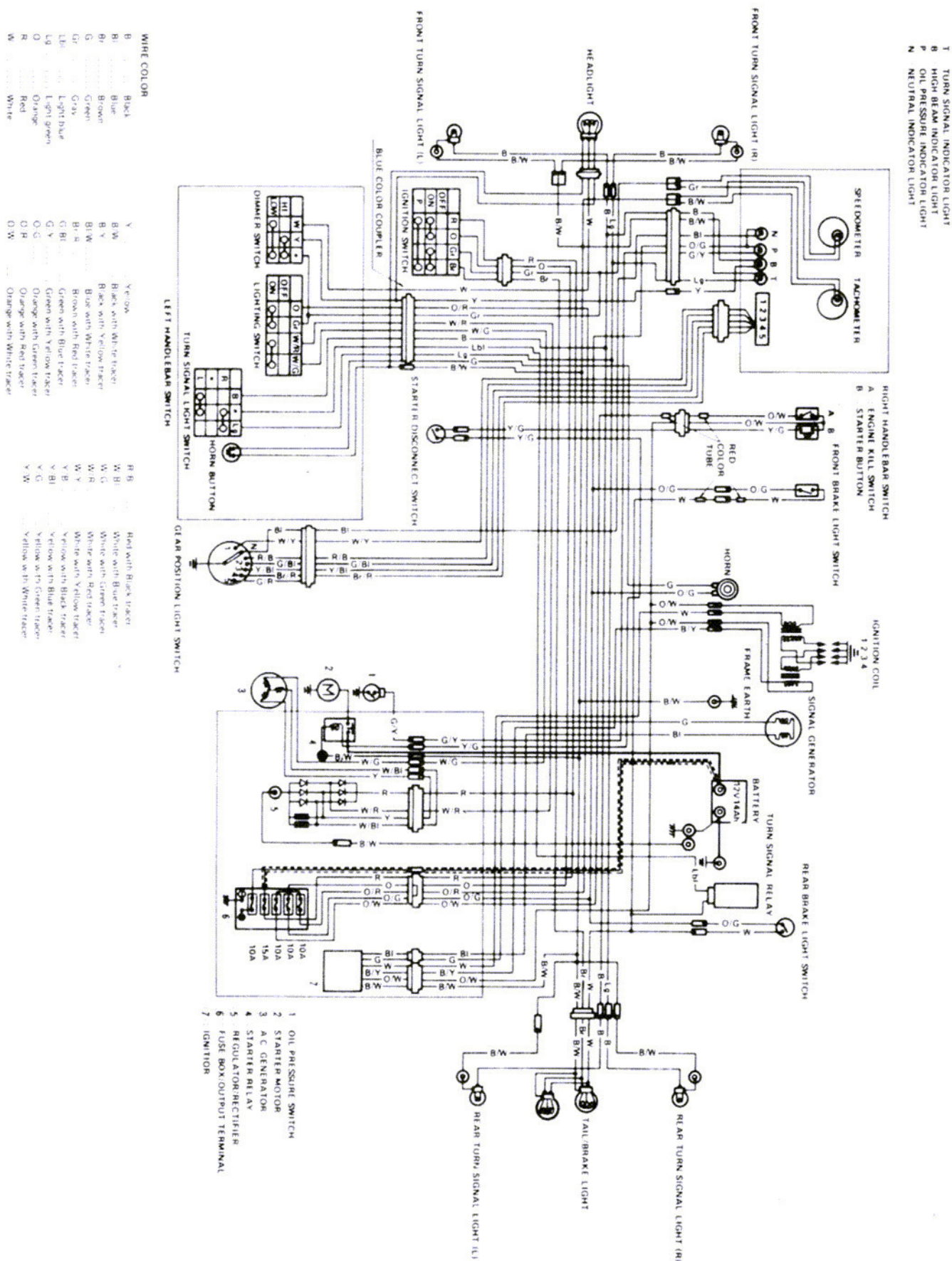
CHASSIS

Complaint	Symptom and possible causes	Remedy
Heavy steering	1. Steering stem nut overtightened. 2. Broken bearing in steering stem. 3. Distorted steering stem. 4. Not enough pressure in tires.	Adjust. Replace. Replace. Adjust.
Wobbly handle	1. Loss of balance between right and left suspension 2. Distorted front fork. 3. Distorted front axle or cocked tire.	Replace. Repair or replace. Replace.
Wobbly front wheel	1. Distorted wheel rim. 2. Worn-down front wheel bearings. 3. Defective or incorrect tire. 4. Loose nut on axle.	Replace. Replace. Replace. Retighten.
Front suspension too soft	1. Weakened springs. 2. Not enough fork oil.	Replace. Refill
Front suspension too stiff	1. Fork oil too viscous. 2. Too much fork oil.	Replace. Drain excess oil.
Noisy front suspension	1. Not enough fork oil. 2. Loose nuts on suspension.	Refill. Retighten.
Wobbly rear wheel	1. Distorted wheel rim. 2. Worn-down rear wheel bearings. 3. Defective or incorrect tire.	Replace. Replace. Replace.
Rear suspension too soft	1. Weakened springs. 2. Rear suspension adjusters improperly set.	Replace. Adjust.
Rear suspension too stiff	Rear suspension adjusters improperly set.	Adjust.
Noisy rear suspension	Loose nuts on suspension.	Retighten.
Poor braking (FRONT and REAR)	1. Not enough brake fluid in the reservoir. 2. Air trapped in brake fluid circuit. 3. Pads or linings worn down. 4. Too much play on brake pedal.	Refill to level mark. Bleed air out. Replace. Adjust.

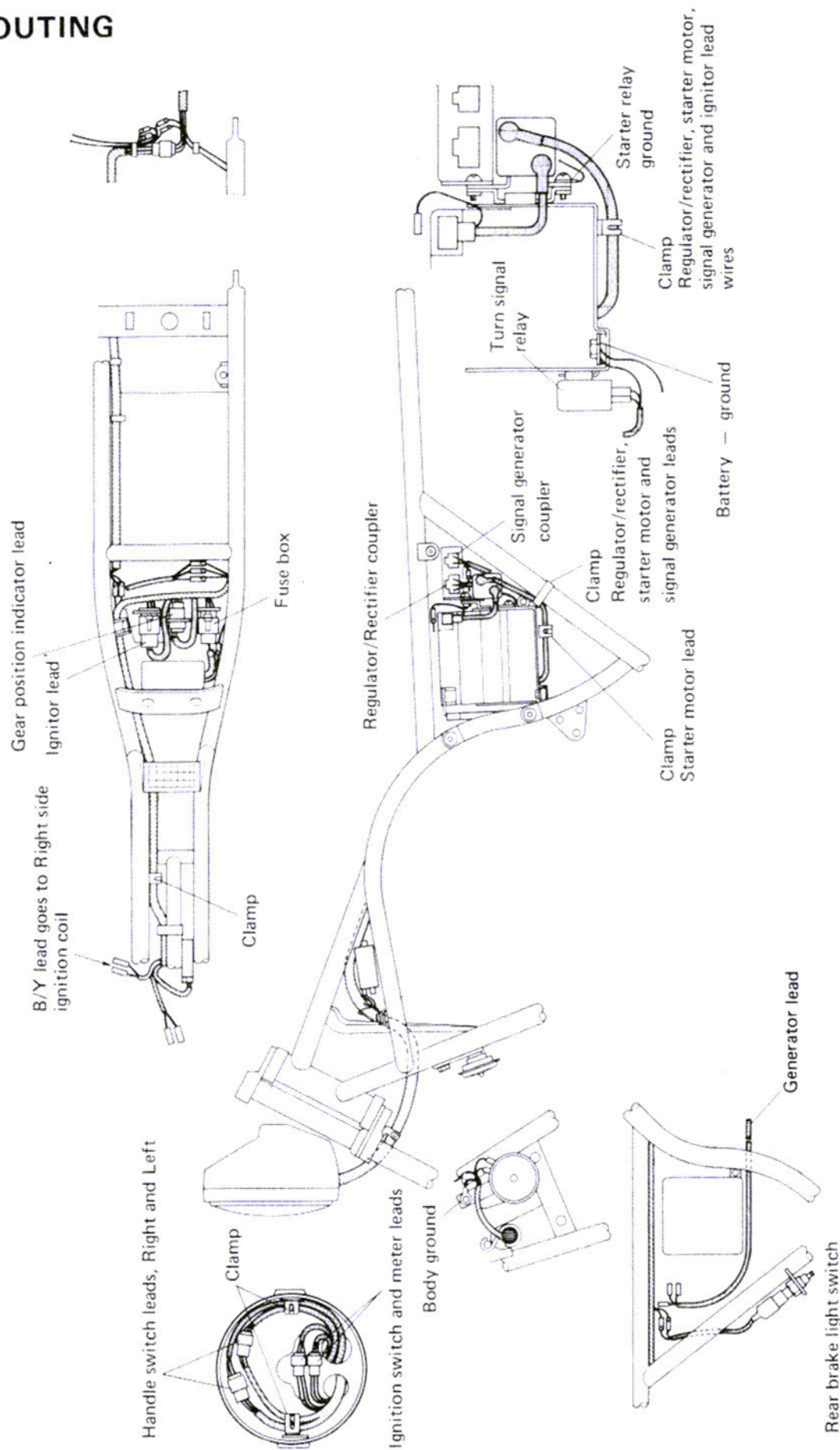
BRAKES

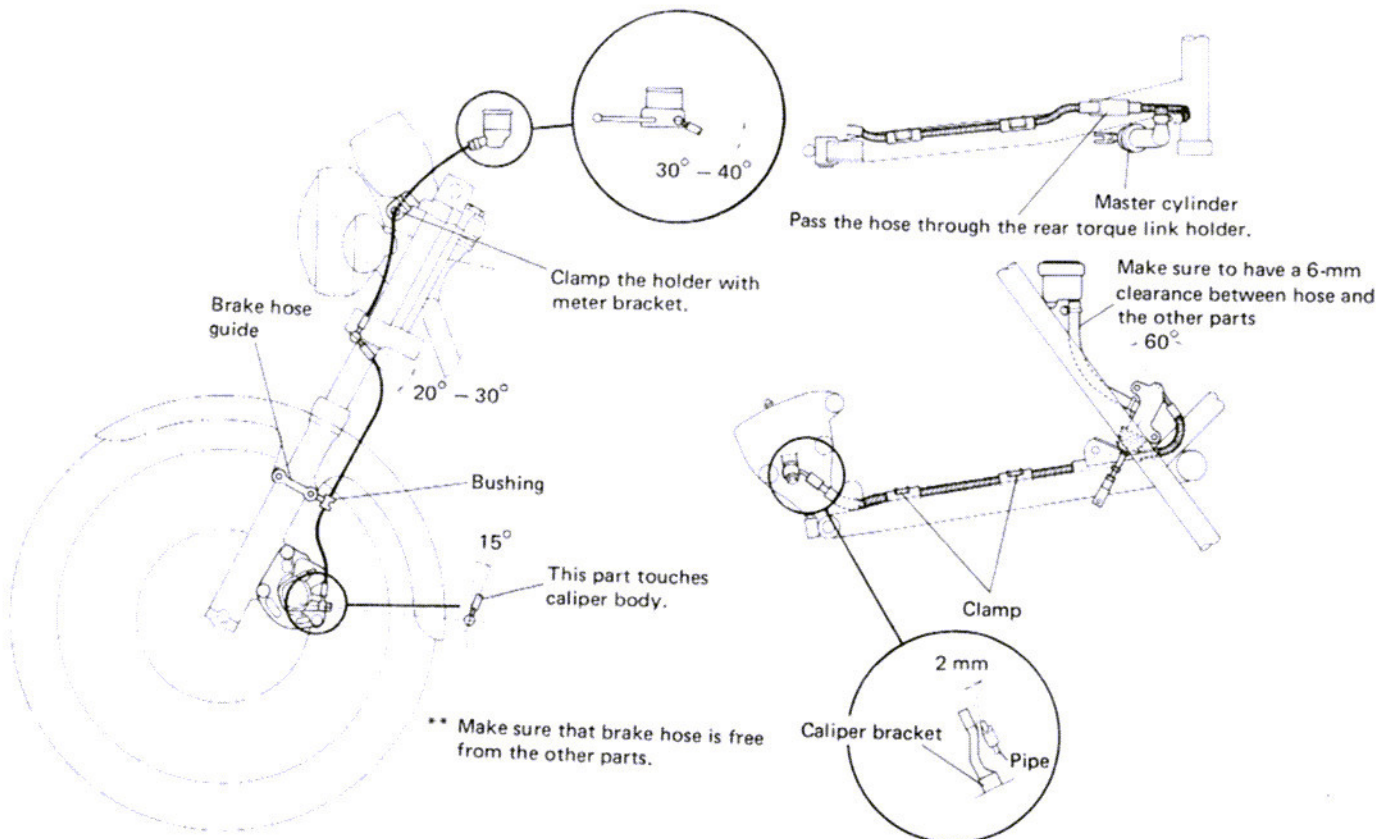
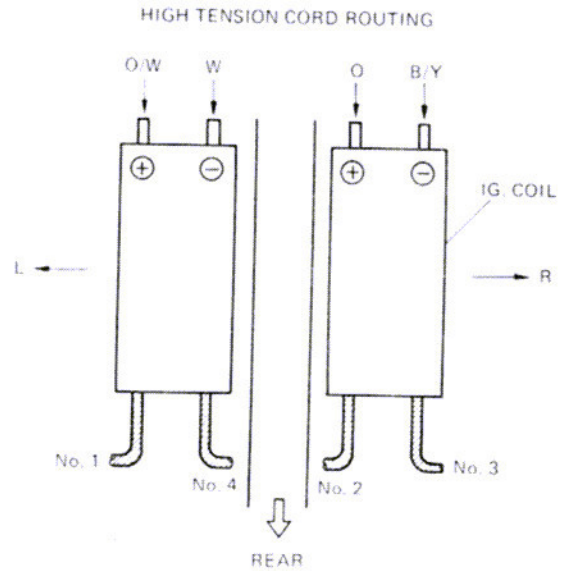
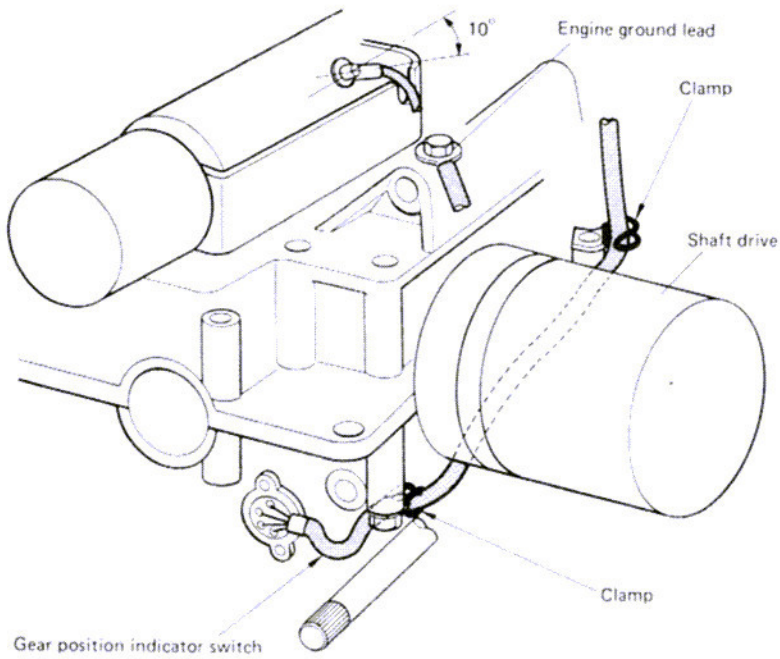
Complaint	Symptom and possible causes	Remedy
Insufficient brake power	1. Leakage of brake fluid from hydraulic system. 2. Worn pads. 3. Oil adhesion on engaging surface of pads. 4. Worn disc. 5. Air in hydraulic system.	Repair or replace. Replace. Clean disc and pads. Replace. Bleed air.
Brake squeaking	1. Carbon adhesion on pad surface. 2. Tilted pad. 3. Damaged wheel bearing. 4. Loose 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 sand-paper. Modify pad fitting. Replace. Tighten to specified torque. Replace. Replace brake fluid Disassemble and clean master cylinder.
Excessive brake lever stroke	1. Air in hydraulic system. 2. Worn brake lever cam. 3. Insufficient brake fluid. 4. Improper quality of brake fluid.	Bleed air. Replace brake lever. 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.

WIRING DIAGRAM



WIRE ROUTING

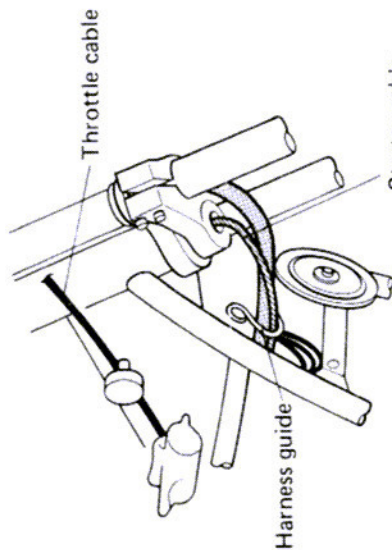
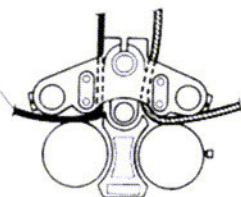




CABLE ROUTING

Route the cable under the meter and in front of the brake hose.

Throttle cable

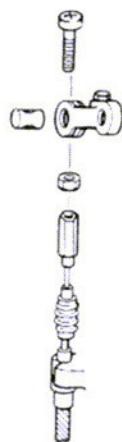


Throttle cable

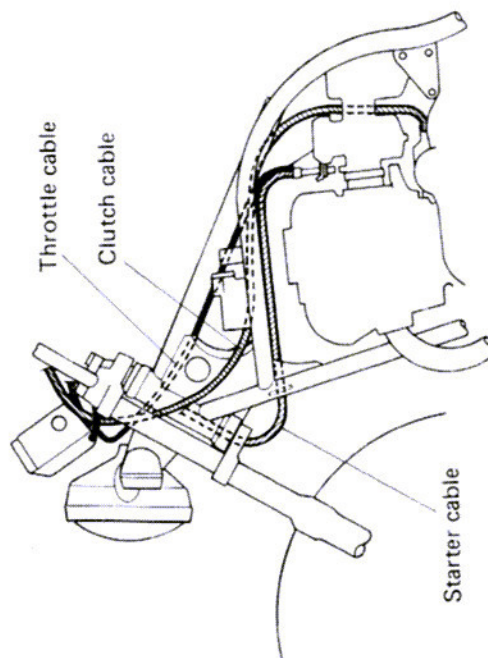
Harness guide

Starter cable

Route the cable into cable guide



Clutch cable assembling order



Throttle cable

Clutch cable

Starter cable

Ignition coil

Clamp

Clutch cable

Brake hose

Tachometer cable

Speedometer cable

Brake hose joint

Fork lower bracket

Clamp

1. Speedo and tachometer cables should be route between the brake hose joint and front fork lower bracket.

2. Route the tachometer cable inside the clamp for wiring harness.

SPECIAL TOOLS

Item	Part No.	Part Name
1	09900 - 06104	Snap ring pliers (Opening type)
2	09900 - 06105	Snap ring pliers (Closing type)
3	09900 - 06107	Snap ring pliers (Opening type)
4	09900 - 06108	Snap ring pliers (Closing type)
5	09900 - 09002	Shock driver set
6	09900 - 20101	Vernier calipers (150 mm)
7	09900 - 20205	Micrometer (0 – 25 mm)
	- 20202	" (25 – 50 mm)
	- 20203	" (50 – 75 mm)
8	09900 - 20508	Cylinder gauge set
9	09900 - 20606	Dial gauge (1/100 mm)
10	09900 - 20803	Thickness gauge
11	09900 - 21102	Torque wrench (0 – 1.2 kg-m)
	- 21103	" (1.0 – 9.0 kg-m)
	- 21107	" (0 – 15 kg-cm)
12	09900 - 25002	Pocket tester
13	09900 - 28106	Electrotester
14	09900 - 28403	Hydrometer
15	09910 - 10710	Stud bolt installer
16	09910 - 20115	Conrod stopper
17	09910 - 34510	Piston pin puller
18	09911 - 70131	4 mm Hexagon wrench
19	09911 - 73730	"T" type hexagon wrench (5 mm)
	- 25811	"T" type hexagon wrench (6 mm)
20	09911 - 94710	Oil seal installer attachment
21	09912 - 34510	Cylinder disassembling tool
22	09913 - 13121	Carburetor balancer gauge set
23	09913 - 14511	Gauge body (6 mm x P0.75)
24	09913 - 14910	Throttle valve adjust wrench
25	09913 - 50121	Oil seal remover
26	09913 - 80112	Drive pinion race installer (34 mm)
27	09913 - 84510	Bearing installer (38 mm)
28	09915 - 24550	Adapter socket (6.3 – 12.7 mm)
29	09915 - 64510	Compression gauge
30	09915 - 63210	Adapter
31	09915 - 74510	Oil pressure gauge
32	09915 - 77330	Meter (0 – 10 kg/cm ²)

Item	Part No.	Part Name
33	09916 - 14510	Valve lifter
34	09916 - 34530	A Valve guide reamer (12.2 mm)
	- 34540	B Reamer handle
	- 34520	C Valve guide reamer (7 mm)
35	09916 - 44511	Valve guide remover
36	09916 - 57320	Valve guide installer handle
37	09916 - 54530	Valve guide installer attachment
38	09916 - 64510	Tappet depressor
39	09916 - 74520	A Piston ring holder body
	- 74530	B Band (Bore : 55 – 65 mm)
40	09916 - 84510	Tweezers
41	09920 - 53710	Clutch sleeve hub holder
42	09921 - 43411	Gear holding tool set
43	09923 - 74510	Bearing puller (I.D. : 20 – 38 mm)
44	09923 - 73210	Bearing puller
45	09924 - 34510	Backlash measuring tool (27 – 50φ) (drive side)
	- 34520	" (52 – 76φ) (driven side)
46	09924 - 44511	Dog cam stopper set tool
47	09924 - 64510	Final drive gear coupling holder
48	09924 - 74510	Bearing and oil seal handle
49	09924 - 74520	Oil seal installer and remover
50	09924 - 74550	Oil seal installer
51	09924 - 74560	Final drive bevel gear housing oil seal installer
52	09924 - 84510	Bearing installer set
53	09924 - 94510	Final gear case needle bearing installer
54	09930 - 14511	Cylinder head nut and spark plug wrench set
		A 09914 - 24510 "T" handle
		B 09911 - 74510 Long socket (14 mm)
		C 09911 - 74520 " (12 mm)
		D 09930 - 14530 Universal joint
		E 09930 - 14520 Spark plug wrench (21 mm)
55	09930 - 13210	Spark plug socket wrench (19 mm)
56	09930 - 30102	Rotor remover sliding shaft
57	09930 - 33710	Attachment (14 mm screw)
58	09930 - 40113	Rotor and engine sprocket holder
59	09930 - 44510	Rotor holder
60	*09940 - 14911	Steering nut socket wrench

9-15 SERVICING INFORMATION

Item	Part No.	Part Name
61	09940 - 34520 - 34561	Ⓐ Front fork assembling "T" handle Ⓑ Attachment "D"
62	09940 - 50111	Front fork oil seal installer
63	09941 - 03610	8 x 10 mm Hexagon combination wrench
64	09941 - 34511	Steering race installer
65	09941 - 54911	Bearing outer race remover
66	09941 - 64510	Bearing and oil seal remover
67	09941 - 74910	Steering bearing installer
68	09941 - 84510	Bearing inner race remover
69	09943 - 74111	Front fork oil level gauge
70	*99103 - 45014-001	Valve seat cutter head (45°)
71	*99103 - 45011-001	" (15°)

NOTE: (*) mark shows newly applied for GS650G.

TIGHTENING TORQUE

ENGINE

ITEM	kg-m	lb-ft
Cylinder head cover bolt	0.9 – 1.0	6.5 – 7.0
Cylinder head bolt	0.9 – 1.1	6.5 – 8.0
Cylinder head nut	2.4 – 2.6	17.5 – 19.0
Camshaft holder bolt	0.8 – 1.2	6.0 – 8.5
Cam sprocket bolt	2.4 – 2.6	17.5 – 19.0
Cam chain tensioner fitting bolt	0.6 – 0.8	4.5 – 6.0
Cam chain tensioner shaft assy	3.1 – 3.5	22.5 – 25.5
Cam chain tensioner lock shaft nut	0.8 – 1.0	6.0 – 7.0
Cam chain tensioner adjuster lock nut	0.9 – 1.4	6.5 – 10.0
Generator rotor bolt	9.0 – 10.0	65.0 – 72.5
Starter clutch allen bolt	1.5 – 2.0	11.0 – 14.5
Conrod nut	3.0 – 3.4	21.5 – 24.5
Governor center bolt	1.3 – 2.3	9.5 – 16.5
Crankcase bolt (6 mm)	0.9 – 1.3	6.5 – 9.5
(8 mm)	2.0 – 2.4	14.5 – 17.5
Starter motor bolt	0.4 – 0.7	3.0 – 5.0
Oil pan bolt	1.0	7.0
Oil pressure switch	1.3 – 1.7	9.5 – 12.5
Oil filter cover nut	0.6 – 0.8	4.5 – 6.0
Neutral stopper housing	1.8 – 2.8	13.0 – 20.0
Gearshift arm stopper	1.5 – 2.3	11.0 – 16.5
Clutch sleeve hub nut	5.0 – 7.0	36.0 – 50.5
Clutch spring bolt	1.1 – 1.3	8.0 – 9.5
Engine mounting bolt (8 mm)	2.0 – 3.0	14.5 – 21.5
(10 mm)	3.0 – 3.7	21.5 – 27.0
Gearshift lever bolt	1.3 – 2.3	9.5 – 16.5
Clutch release arm bolt	0.6 – 0.8	4.5 – 6.0

SHAFT DRIVE

ITEM	kg-m	lb-ft
Secondary driven bevel gear nut	9.0 – 11.0	65.0 – 79.5
Secondary driven bevel gear housing bolt	2.0 – 2.6	14.5 – 19.0
Propeller shaft flange nut	3.0 – 4.0	21.5 – 29.0
Final drive bevel gear nut	8.5 – 11.0	61.5 – 79.5
Final gearcase bearing retainer plate screw	0.8 – 1.0	6.0 – 7.0
Final gear bearing case fitting bolt	2.0 – 2.6	14.5 – 19.0
Final gear case joint nut	3.5 – 4.5	25.5 – 32.5

CHASSIS

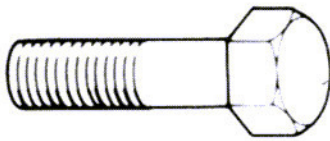
ITEM	kg-m	lb-ft
Disc bolt	1.5 – 2.5	11.0 – 18.0
Front axle nut	3.6 – 5.2	26.0 – 37.5
Front axle holder nut	1.5 – 2.5	11.0 – 18.0
Front caliper mounting bolt	2.5 – 4.0	18.0 – 29.0
Front caliper axle bolt	4.0 – 5.5	29.0 – 40.0
Brake hose union bolt	2.0 – 2.5	14.5 – 18.0
Caliper bleeder	0.7 – 0.9	5.0 – 6.5
Front fork damper rod bolt	1.5 – 2.5	11.0 – 18.0
Front fork lower clamp bolt	1.5 – 2.5	11.0 – 18.0
Front fork upper clamp bolt	2.0 – 3.0	14.5 – 21.5
Front fork cap bolt	1.5 – 3.0	11.0 – 21.5
Steering stem nut	4.0 – 5.0	29.0 – 36.0
Steering stem clamp bolt	1.5 – 2.5	11.0 – 18.0
Steering stem head nut	2.0 – 3.0	14.5 – 21.5
Handlebar clamp bolt	1.2 – 2.0	8.5 – 14.5
Front master cylinder clamp bolt	0.5 – 0.8	3.5 – 6.0
Front footrest bolt	2.7 – 4.3	19.5 – 31.0
Swing arm pivot bolt	0.35 – 0.45	2.55 – 3.25
Swing arm pivot lock nut	11.0 – 13.0	79.5 – 94.0
Brake pedal arm bolt	1.0 – 1.5	7.0 – 11.0
Rear master cylinder mounting bolt	1.5 – 2.5	11.0 – 18.0
Rear torque link bolt and nut	2.0 – 3.0	14.5 – 21.5
Rear caliper mounting bolt	2.5 – 4.0	18.0 – 29.0
Rear caliper bolt	2.0 – 3.0	14.5 – 21.5
Muffler bracket nut	1.5 – 2.0	11.0 – 14.5
Rear shock absorber fitting bolt or nut	2.0 – 3.0	14.5 – 21.5
Rear footrest bolt	2.7 – 4.3	19.5 – 31.0
Wheel hub driven joint fitting bolt	0.8 – 1.2	6.0 – 8.5
Rear axle nut	8.5 – 11.5	61.5 – 83.0
Rear axle clamp bolt	1.5 – 2.0	11.0 – 14.5

TIGHTENING TORQUE CHART

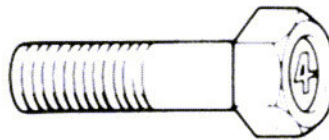
For other bolts and nuts not listed above, refer to this chart:

Tightening torque

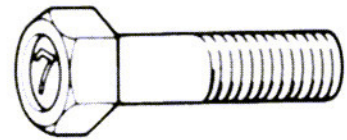
Bolt Diameter (mm)	Conventional or "4" marked bolt			"7" marked bolt		
	N·m	kg-m	lb-ft	N·m	kg-m	lb-ft
4	1 – 2	0.1 – 0.2	0.7 – 1.5	1.5 – 3	0.15 – 0.3	1.0 – 2.0
5	2 – 4	0.2 – 0.4	1.5 – 3.0	3 – 6	0.3 – 0.6	2.0 – 4.5
6	4 – 7	0.4 – 0.7	3.0 – 5.0	8 – 12	1.8 – 1.2	6.0 – 8.5
8	10 – 16	1.0 – 1.6	7.0 – 11.5	18 – 28	1.8 – 2.8	13.0 – 20.0
10	22 – 35	2.2 – 3.5	16.0 – 25.5	40 – 60	4.0 – 6.0	29.0 – 43.5
12	35 – 55	3.5 – 5.5	25.5 – 40.0	70 – 100	7.0 – 10.0	50.5 – 72.5
14	50 – 80	5.0 – 8.0	36.0 – 58.0	110 – 160	11.0 – 16.0	79.5 – 115.5
16	80 – 130	8.0 – 13.0	58.0 – 94.0	170 – 250	17.0 – 25.0	123.0 – 181.0
18	130 – 190	13.0 – 19.0	94.0 – 137.5	200 – 280	20.0 – 28.0	144.5 – 202.5



Conventional bolt



"4" marked bolt



"7" marked bolt

SERVICE DATA

VALVE + GUIDE

Unit: mm (in)

ITEM	STANDARD		LIMIT
Valve diam.	IN.	32.0 (1.26)	_____
	EX.	27.0 (1.06)	_____
Valve lift	IN.	7.2 (0.283)	_____
	EX.	7.0 (0.276)	_____
Tappet clearance (when cold)	IN. & EX.	0.03 – 0.08 (0.001 – 0.003)	_____
Valve guide to valve stem clearance	IN.	0.025 – 0.055 (0.0010 – 0.0022)	0.35 (0.014)
	EX.	0.040 – 0.070 (0.0016 – 0.0028)	0.35 (0.014)
Valve guide I.D.	IN. & EX.	7.000 – 7.015 (0.2756 – 0.2762)	_____
Valve stem O.D.	IN.	6.960 – 6.975 (0.2740 – 0.2746)	_____
	EX.	6.945 – 6.960 (0.2734 – 0.2740)	_____
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 (IN. & EX.)	INNER	_____	35.6 (1.40)
	OUTER	_____	41.6 (1.64)
Valve spring tension (INTAKE)	INNER	10.6 – 12.8 kg (23.37 – 28.22 lbs) at length 31 mm (1.2 in)	_____
	OUTER	22.3 – 26.3 kg (49.16 – 57.98 lbs) at length 35 mm (1.4 in)	_____
(EXHAUST)	INNER	11.0 – 13.0 kg (24.25 – 28.66 lbs) at length 31 mm (1.2 in)	_____
	OUTER	22.1 – 25.9 kg (48.72 – 57.10 lbs) at length 35 mm (1.4 in)	_____

CAMSHAFT + CYLINDER HEAD

Unit: mm (in)

ITEM		STANDARD	LIMIT
Cam height	IN.	35.485 — 35.515 (1.3970 — 1.3982)	35.190 (1.3854)
	EX.	35.285 — 35.315 (1.3892 — 1.3904)	34.990 (1.3776)
Camshaft journal oil clearance	IN. & EX.	0.032 — 0.066 (0.0013 — 0.0026)	0.150 (0.0059)
Camshaft journal holder I.D.	IN. & EX.	22.012 — 22.025 (0.8666 — 0.8671)	—
Camshaft journal O.D.	IN. & EX.	21.959 — 21.980 (0.8645 — 0.8654)	—
Camshaft runout	IN. & EX.	—	0.10 (0.004)
Cam chain 20 pitch length		—	157.80 (6.213)
Cam chain pin (at arrow "3")		20th pin	—
Cylinder head distortion		—	0.2 (0.008)

CYLINDER + PISTON + PISTONRING

Unit: mm (in)

ITEM		STANDARD	LIMIT
Compression pressure		10 — 14 kg/cm ² (142 — 199 psi)	7 kg/cm ² (100 psi)
Compression pressure difference		—	2 kg/cm ² (28 psi)
Piston to cylinder clearance		0.035 — 0.045 (0.0014 — 0.0018)	0.120 (0.0047)
Cylinder bore		62.000 — 62.015 (2.4409 — 2.4415)	62.095 (2.4447)
Piston dia.		61.960 — 61.975 (2.4394 — 2.4400) Measure at the 15 (0.6) from skirt end.	61.880 (2.4362)
Cylinder distortion		—	0.2 (0.008)

Unit: mm (in)

ITEM	STANDARD			LIMIT
Piston ring free end gap	1st	N	Approx. 7.5 (0.30)	6.0 (0.24)
		R	Approx. 7.5 (0.30)	6.0 (0.24)
	2nd	N	Approx. 9.5 (0.37)	7.6 (0.30)
		R	Approx. 9.5 (0.37)	7.6 (0.30)
Piston ring end gap	1st	0.10 – 0.30 (0.004 – 0.012)		0.70 (0.028)
	2nd	0.10 – 0.30 (0.004 – 0.012)		0.70 (0.028)
Piston ring to groove clearance	1st	_____		0.18 (0.007)
	2nd	_____		0.15 (0.006)
Piston ring groove width	1st	1.210 – 1.230 (0.0476 – 0.0484)		_____
	2nd	1.210 – 1.230 (0.0476 – 0.0484)		_____
	Oil	2.510 – 2.530 (0.0988 – 0.0996)		_____
Piston ring thickness	1st	1.175 – 1.190 (0.0463 – 0.0469)		_____
	2nd	1.170 – 1.190 (0.0461 – 0.0469)		_____
Piston pin bore	16.002 – 16.008 (0.6300 – 0.6302)			16.030 (0.6311)
Piston pin O.D.	15.995 – 16.000 (0.6297 – 0.6300)			15.980 (0.6291)

CONROD + CRANKSHAFT

Unit: mm (in)

ITEM	STANDARD	LIMIT
Conrod small end I.D.	16.010 – 16.018 (0.6303 – 0.6306)	16.040 (0.6315)
Conrod big end side clearance	0.10 – 0.20 (0.004 – 0.008)	0.30 (0.012)
Conrod big end width	20.95 – 21.00 (0.825 – 0.827)	—
Crank pin width	21.10 – 21.15 (0.831 – 0.833)	—
Conrod big end oil clearance	0.024 – 0.048 (0.0009 – 0.0019)	0.080 (0.0031)
Crank pin O.D.	33.976 – 34.000 (1.3376 – 1.3386)	—
Crankshaft journal oil clearance	0.020 – 0.044 (0.0008 – 0.0017)	0.080 (0.0031)
Crankshaft journal O.D.	35.976 – 36.000 (1.4164 – 1.4173)	—
Crankshaft thrust clearance	0.1 – 0.3 (0.004 – 0.012)	0.5 (0.020)
Crankshaft journal holder width	21.8 – 21.9 (0.858 – 0.862)	—
Crankshaft journal width	22.0 – 22.1 (0.86 – 0.87)	—
Crankshaft runout	—	0.05 (0.002)

OIL PUMP

Unit: mm (in)

ITEM	STANDARD	LIMIT
Oil pump reduction ratio	1.898 (90/46 x 33/34)	—
Oil pressure (at 60°C, 140°F)	Above 3.0 kg/cm ² (43 psi) Below 5.5 kg/cm ² (78 psi) at 3 000 r/min	—

SHAFT DRIVE

Unit: mm (in)

ITEM	STANDARD	LIMIT
Secondary bevel gear backlash	0.08 – 0.13 (0.003 – 0.005)	—
Final bevel gear backlash	Drive side 0.03 – 0.64 (0.001 – 0.025)	—
	Driven side 0.02 – 0.35 (0.001 – 0.013)	—
Secondary driven bevel gear preload	4 – 7 kg-cm (3.45 – 6.05 lb-in)	—
Final drive bevel gear preload	4 – 8 kg-cm (3.45 – 6.95 lb-in)	—

CARBURETOR

Unit: mm (in)

ITEM	SPECIFICATION
Carburetor type	MIKUNI BS32, Four
Bore size	32
I.D. No.	34200
Idle r/min.	1 100 ± 100 r/min
Fuel level	5.0 ± 1.0 (0.20 ± 0.04)
Float height	22.4 ± 1.0 (0.88 ± 0.04)
Main jet (M. J.)	# 110
Main air jet (M. A. J.)	2.0
Jet needle (J. N.)	5C45
Needle jet (N. J.)	Y-7
Pilot jet (P. J.)	# 42.5
By pass (B. P.)	0.8, 0.7, 0.8
Pilot outlet (P. O.)	0.7
Valve seat (V. S.)	2.0
Starter jet (G. S.)	# 45
Pilot screw (P. S.)	PRE-SET
Pilot air jet (P. A. J.)	# 160
Throttle cable play	0.5 – 1.0 (0.02 – 0.04)
Choke cable play	0.5 – 1.0 (0.02 – 0.04)

ELECTRICAL

Unit: mm (in)

ITEM	SPECIFICATION			NOTE
Ignition timing	10° B.T.D.C. Below 1 650 ± 100 r/min and 40° B.T.D.C. Above 3 500 ± 100 r/min.			
Firing order	1. 2. 4. 3.			
Spark plug	Type	NGK : D8EA ND : X24ES-U		
	Gap	0.6 – 0.7 (0.024 – 0.028)		
Spark performance	Over 8 (0.3) at 1 atm			
Signal coil resistance	Approx. 250 – 360 Ω			
Ignition coil resistance	Primary	Terminal – Terminal Approx. 3 – 5 Ω		
	Secondary	Plug cap – Plug cap Approx. 30 – 35 kΩ		
Generator no-load voltage	More than 80V (AC) at 5 000 r/min.			
Regulated voltage	14 – 15.5 V at 5 000 r/min.			
Starter motor	Brush length	N. D.	Limit: 6 (0.24)	
	Commutator under cut		Limit:0.2 (0.008)	
Starter relay resistance	Approx.	3 – 4 Ω		
Battery	Type designation	YB14L – A2		
	Capacity	50.4 kC (14 Ah)		
	Standard electrolyte S. G.	1.28 at 20°C (68°F)		
Fuse size	Headlight	10 A		
	Signal	10 A		
	Ignition	10 A		
	Main	15 A		
	Power source	10 A		

BRAKE + WHEEL

Unit: mm (in)

ITEM	STANDARD		LIMIT
Rear brake pedal height	20 (0.8)		—
Brake disc thickness	Front	5.0 ± 0.2 (0.20 ± 0.008)	4.5 (0.18)
	Rear	6.7 ± 0.2 (0.26 ± 0.008)	6.0 (0.24)
Brake disc runout	—		0.30 (0.012)
Master cylinder bore	Front	15.870 – 15.913 (0.6248 – 0.6265)	—
	Rear	14.000 – 14.043 (0.5512 – 0.5529)	—
Master cylinder piston diam.	Front	15.827 – 15.854 (0.6231 – 0.6242)	—
	Rear	13.957 – 13.984 (0.5495 – 0.5506)	—
Brake caliper cylinder bore	Front	38.180 – 38.256 (1.5031 – 1.5061)	—
	Rear	38.180 – 38.256 (1.5031 – 1.5061)	—
Brake caliper piston diam.	Front	38.098 – 38.148 (1.4999 – 1.5019)	—
	Rear	38.098 – 38.148 (1.4999 – 1.5019)	—
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	3.25H19 4PR	—
	Rear	4.25H17 4PR	—
Tire tread depth	Front	—	1.6 (0.06)
	Rear	—	2.0 (0.08)

TIRE PRESSURE

COLD INFLATION TIRE PRESSURE	NORMAL RIDING						CONTINUOUS HIGH SPEED RIDING					
	SOLO RIDING			DUAL RIDING			SOLO RIDING			DUAL RIDING		
	kPa	kg/cm ²	psi	kPa	kg/cm ²	psi	kPa	kg/cm ²	psi	kPa	kg/cm ²	psi
FRONT	175	1.75	25	175	1.75	25	200	2.00	28	200	2.00	28
REAR	200	2.00	28	250	2.50	36	225	2.25	32	280	2.80	40

SUSPENSION

Unit: mm (in)

ITEM	STANDARD		LIMIT
Front fork stroke	150 (5.9)		_____
Front fork spring free length	Short	_____	105 (4.13)
	Long	_____	401 (15.79)
Front fork oil level	165.0 (6.50)		_____
Front fork air pressure	50 kPa 0.5 kg/cm ² , 7.1 psi		_____
Rear wheel travel	113 (4.4)		_____

FUEL + OIL

ITEM	SPECIFICATION
Fuel type	Use only unleaded or low-lead type gasoline of at least 85 - 95 pump octane ($\frac{R+M}{2}$ method) or 89 octane or higher rated by the Research Method.
Fuel tank including reserve	16 L (4.2/3.5 US/Imp gal)
reserve	4.5 L (1.2/1.0 US/Imp gal)
Engine oil type	SAE 10W/40
Engine oil capacity	Change 2 500 ml (2.6/2.2 US/Imp qt)
	Filter change 3 200 ml (3.4/2.8 US/Imp qt)
	Overhaul 3 700 ml (3.9/3.3 US/Imp qt)
Front fork oil type	Front fork oil SAE # 15
Front fork oil capacity (each leg)	210 ml (7.10/7.39 US/Imp oz)
Bevel gear oil type	Hypoid Gear or SAE90, API Grade GL-5
Bevel gear oil capacity	Final 200 – 220 ml (6.76/7.44 – 7.04/7.75 US/Imp oz)
Brake fluid type	DOT3, DOT4

WATTAGE

(W)

	SPECIFICATION
Headlight HI/LO	60/55
Tail/Brake light	8/23
Turn signal light	23
Speedometer light	3.4
Tachometer light	3.4
Turn signal indicator light	3.4
High beam indicator light	3.4
Neutral indicator light	3.4
Oil pressure indicator light	3.4
Gear position indicator light	1.4

SUZUKI

GS650GL

SERVICE MANUAL

99000-85700-0E3

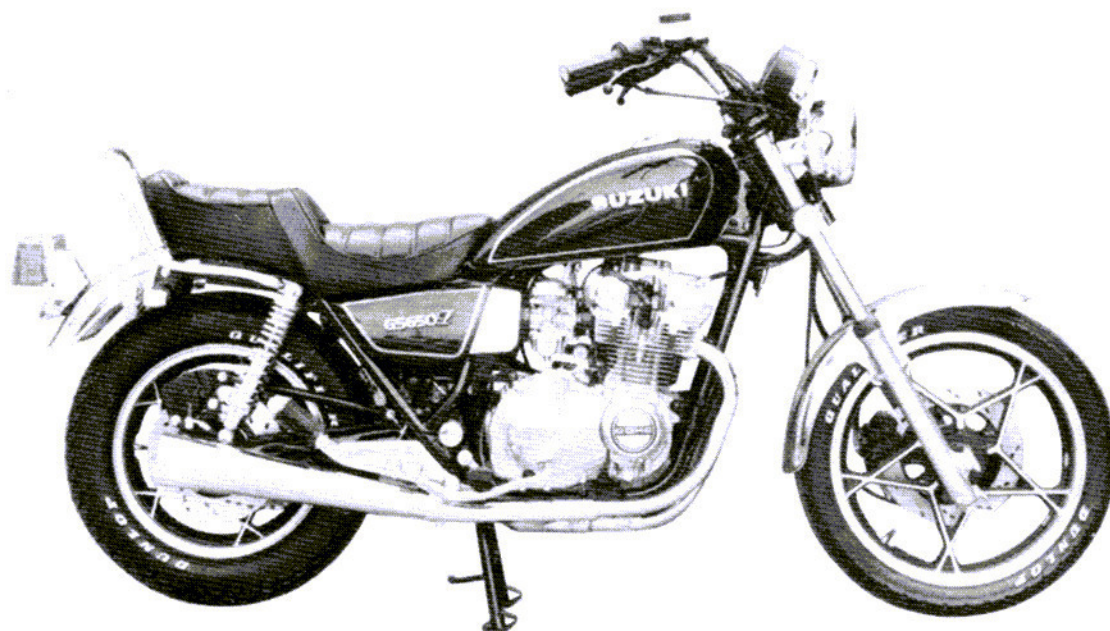
GS650GL

This section gives only service data and servicing procedures which differ from those of the GS650G and describes the new features of the GS650GL.

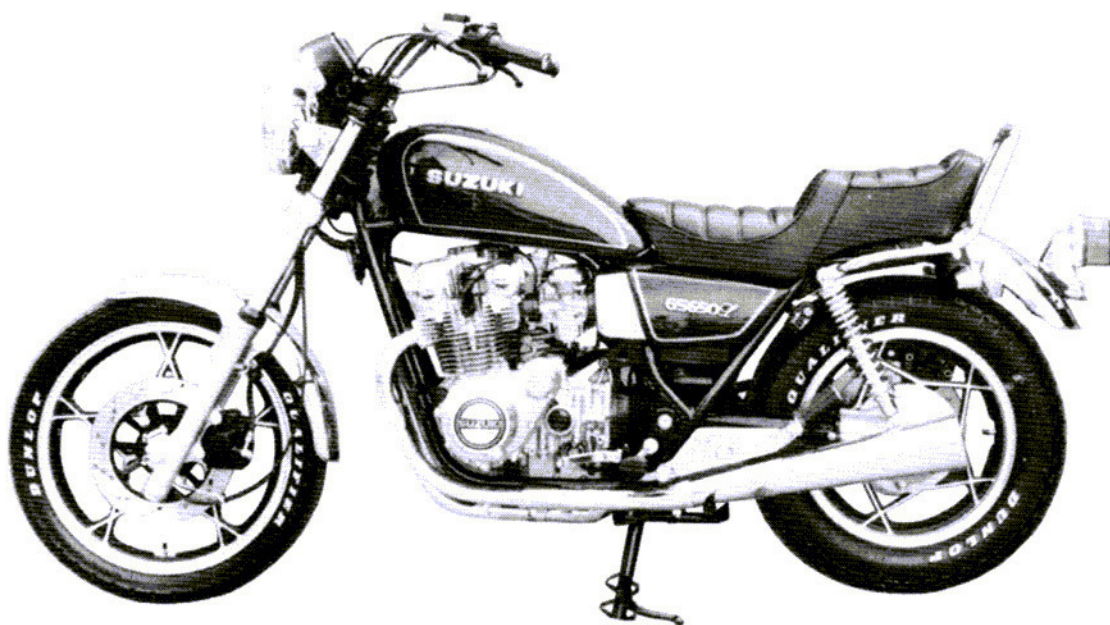
CONTENS

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VIEW OF SUZUKI GS650GL



Right side



Left side

SPECIFICATIONS

DIMENSIONS AND DRY MASS

Overall length	2 190 mm (86.2 in)
Overall width	870 mm (34.3 in)
Overall height	1 160 mm (45.7 in)
Wheelbase	1 460 mm (57.5 in)
Ground clearance	140 mm (5.5 in)
Seat height	740 mm (29.1 in)
Dry mass	212 kg (467 lbs)
Gross vehicle weight	470 kg (1 038 lbs)

ENGINE

Type	Four-stroke, air-cooled, DOHC
Number of cylinders	4
Bore	62.0 mm (2.441 in)
Stroke	55.8 mm (2.197 in)
Piston displacement	673 cm ³ (41.1 cu. in)
Compression ratio	9.4 : 1
Carburetor	MIKUNI BS32SS, four
Air cleaner	Polyurethane foam element
Starter system	Electric
Lubrication system	Wet sump

TRANSMISSION

Clutch	Wet multi-plate type
Transmission	5-speed constant mesh
Gearshift pattern	1-down, 4-up
Primary reduction	1.956 (90/46)
Secondary reduction	0.941 (16/17)
Final reduction	3.090 (34/11)
Gear ratios, Low	2.678 (36/14) x (25/24)
2nd	1.851 (32/18) x (25/24)
3rd	1.438 (29/21) x (25/24)
4th	1.171 (27/24) x (25/24)
Top	1.000 (Direct)
Drive system	Shaft drive

CHASSIS

Front suspension	Telescopic, oil dampened
Rear suspension	Swinging arm, oil dampened, spring 5-way adjustable
Steering angle	40° (right & left)
Caster	60° 30'
Trail	109 mm (4.29 in)
Turning radius	2.6 m (8.5 ft)
Front brake	Disc brake
Rear brake	Disc brake
Front tire size	90/90-19 52H, tubeless
Rear tire size	130/90-16 67H, tubeless
Front fork stroke	160 mm (6.30 in)
Rear wheel travel	95 mm (3.74 in)
Front tire pressure	1.75 kg/cm ² (25 psi) (Normal solo riding)
Rear tire pressure	2.00 kg/cm ² (28 psi) (Normal solo riding)

ELECTRICAL

Ignition type	Transistorized
Ignition timing	10° B.T.D.C. below at 1 650 r/min and 40° B.T.D.C. above at 3 500 r/min
Spark plug	NGK D8EA or NIPPON DENSO X24ES-U
Battery	12V 50.4 kC (14 Ah)/10 HR
Generator	Three-phase A.C. generator
Fuse	10/10/10/10/15A

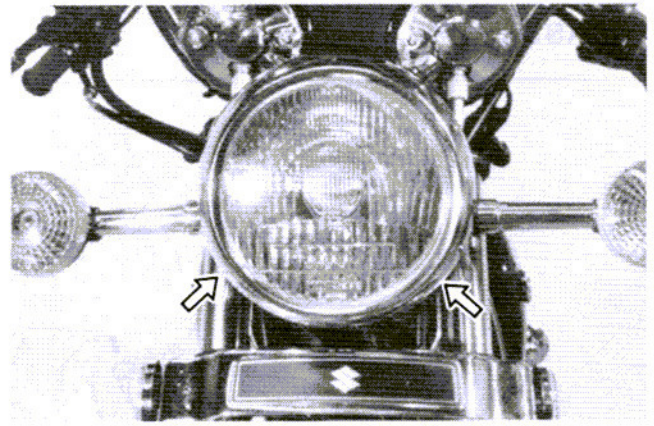
CAPACITIES

Fuel tank including reserve	12 L (3.2 US gal)
Reserve	4.0 L (4.2 US qt)
Engine oil	2.5 L (2.6 US qt)
Final bevel gear oil	200 – 220 ml (6.76 – 7.44 US oz)
Front fork oil (each leg)	228 ml (7.71 US oz)

* These specifications subject to change without notice.

COMBINATION METER

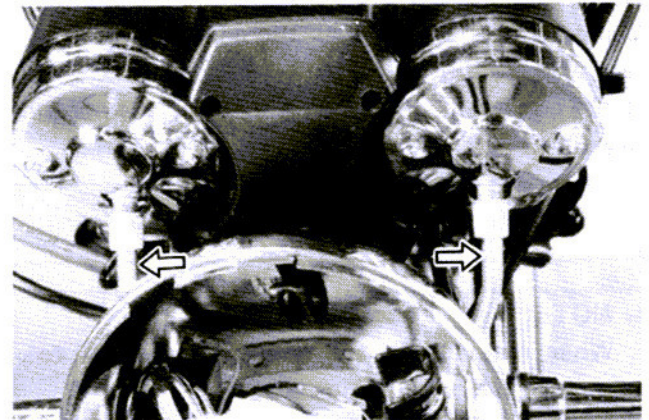
- Remove headlight by removing two fitting screws.



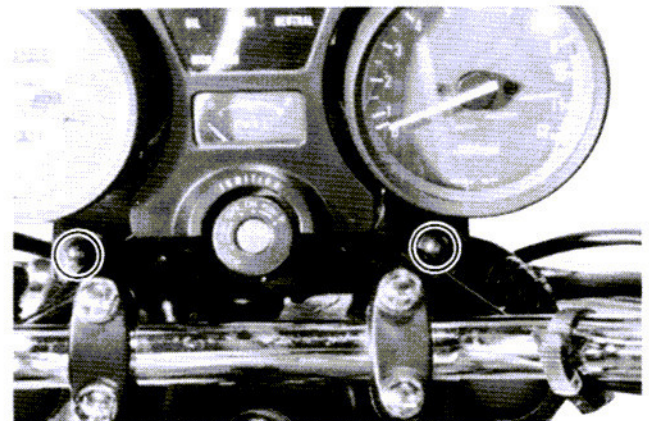
- Disconnect combination meter couplers and lead wires.
- Remove fuel tank and disconnect the gear position indicator lead wire coupler.



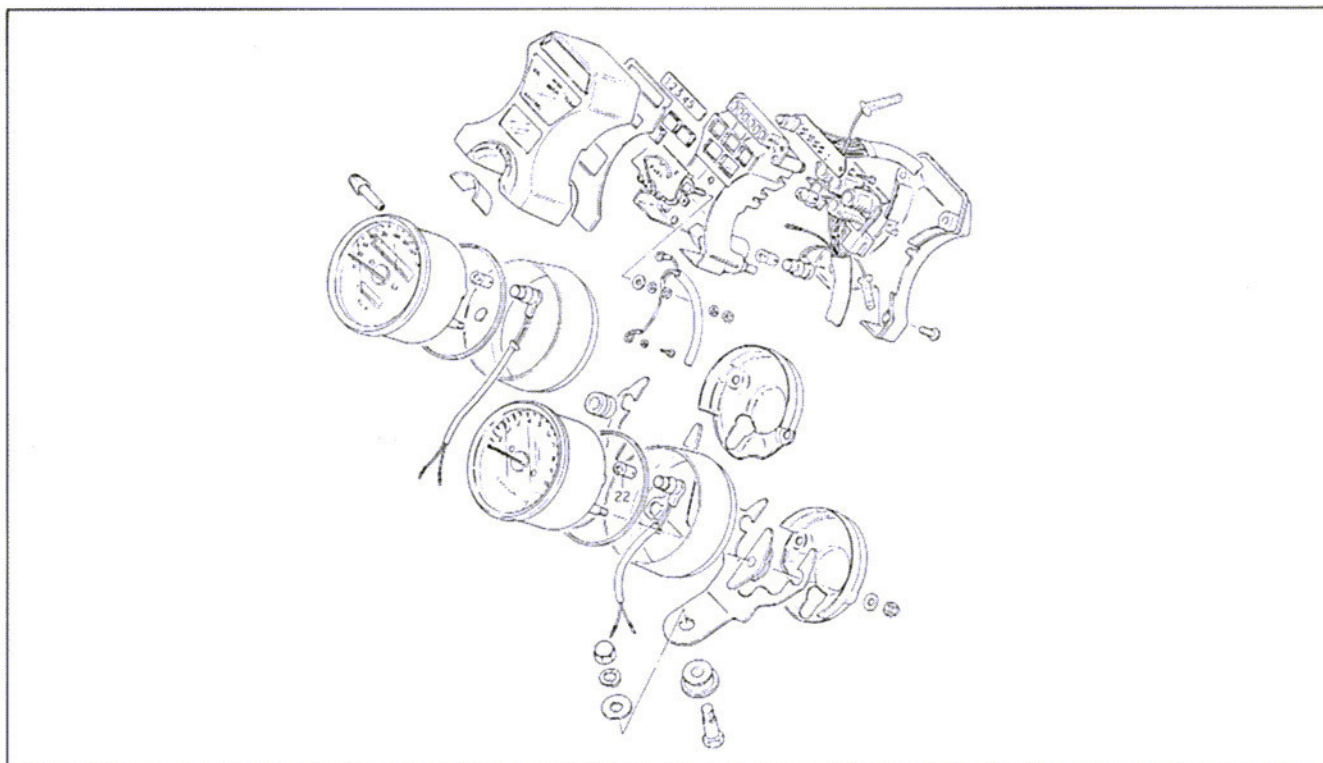
- Disconnect speedometer and tachometer cables.



- Remove combination meter by removing the nuts.



DISASSEMBLY



INSPECTION

Using pocket tester, check the continuity between lead wires as shown in Fig.

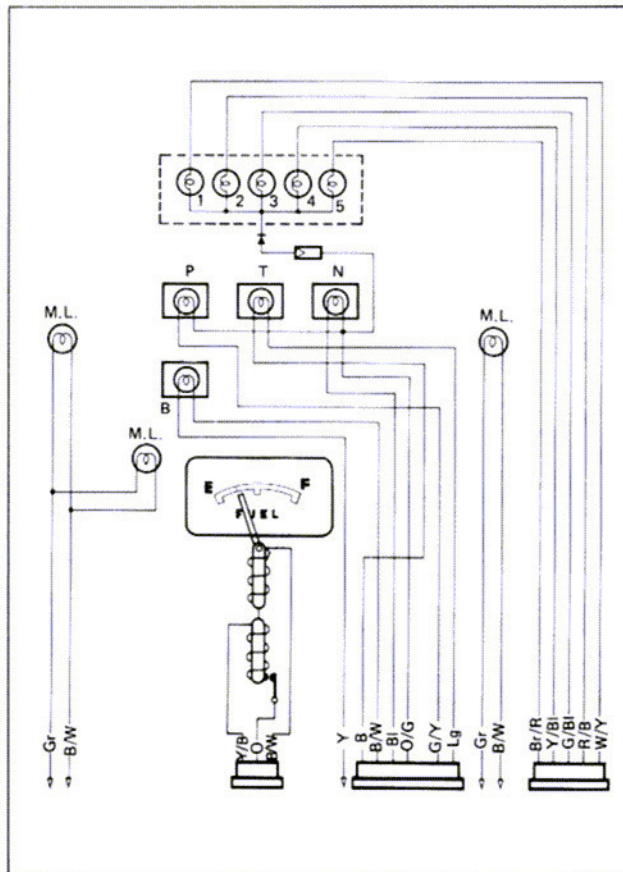
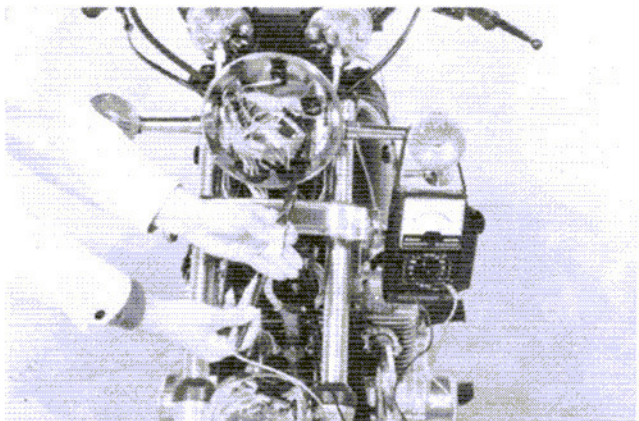
If the continuity measured is incorrect, replace the respective part.

09900 - 25002

Pocket tester

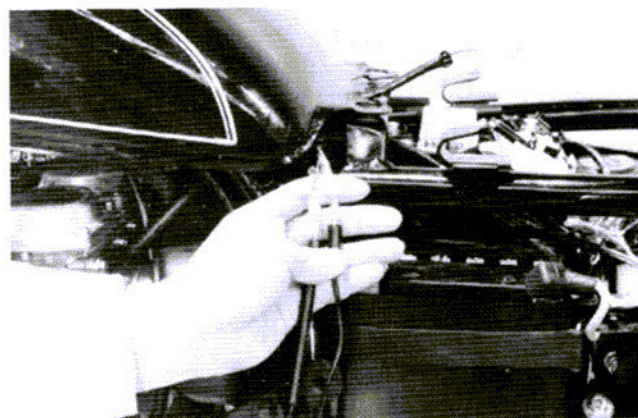
NOTE:

When making this test it is not necessary to remove the combination meter.



FUEL METER

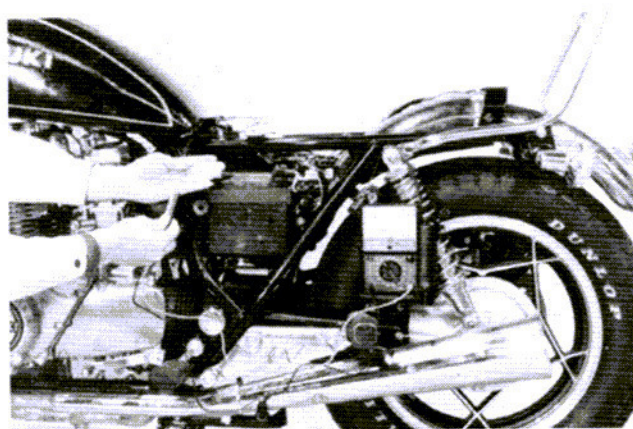
With the ignition switch turned on, remove seat, remove two lead wires going into the fuel gauge, connect the lead wires on the main wiring harness side, and check the fuel meter. If "F" is indicated, the fuel meter is in good condition.



FUEL GAUGE

Remove the lead wires coming out of the fuel gauge and check resistance of each of them. If the resistance measured is incorrect, replace the fuel gauge assembly with new one.

POSITION	RESISTANCE
FULL	Approx. 1 – 5Ω
1/2	Approx. 25 – 40Ω
EMP	Approx. 105 – 110Ω

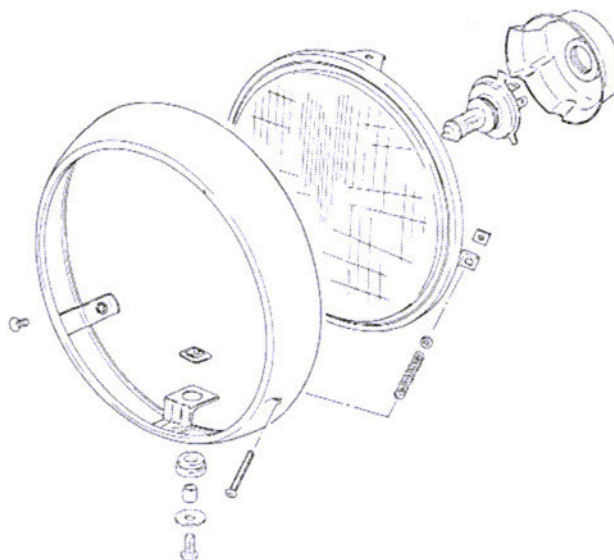


LAMPS

HEADLIGHT

NOTE:

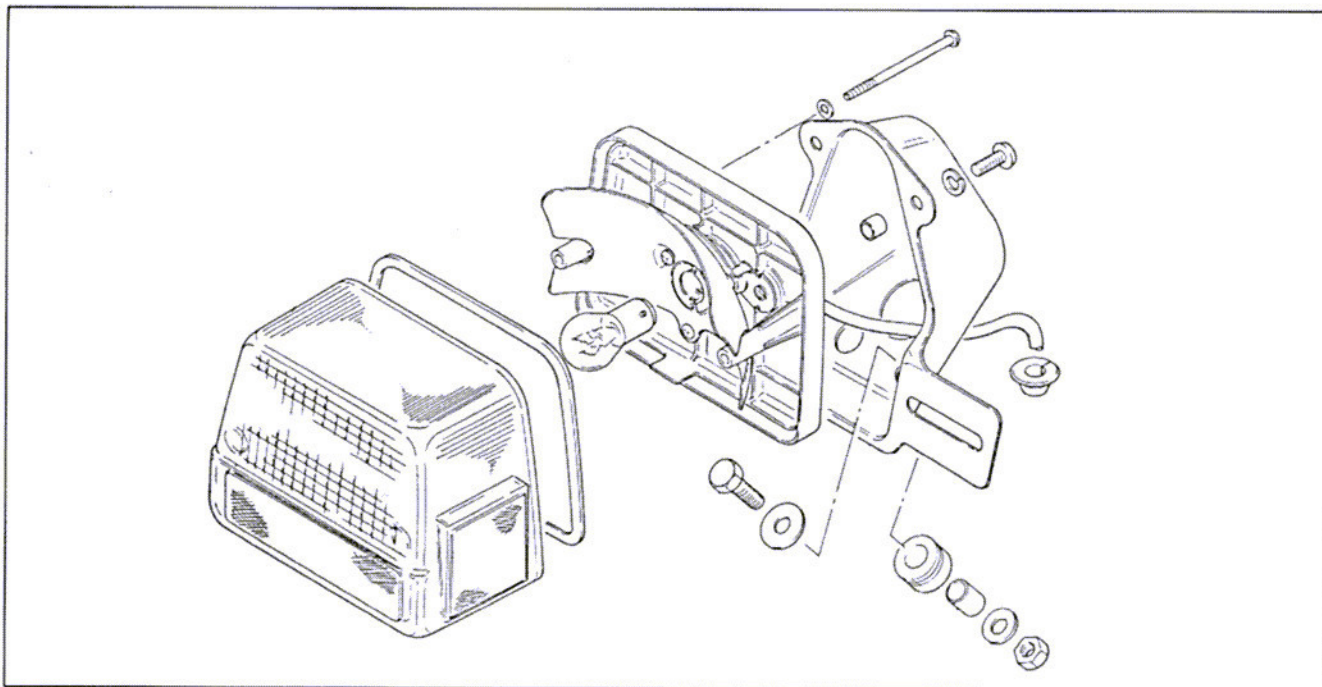
Adjust the headlight, both vertical and horizontal, after reassembling.



TAIL/BRAKE LIGHT

CAUTION:

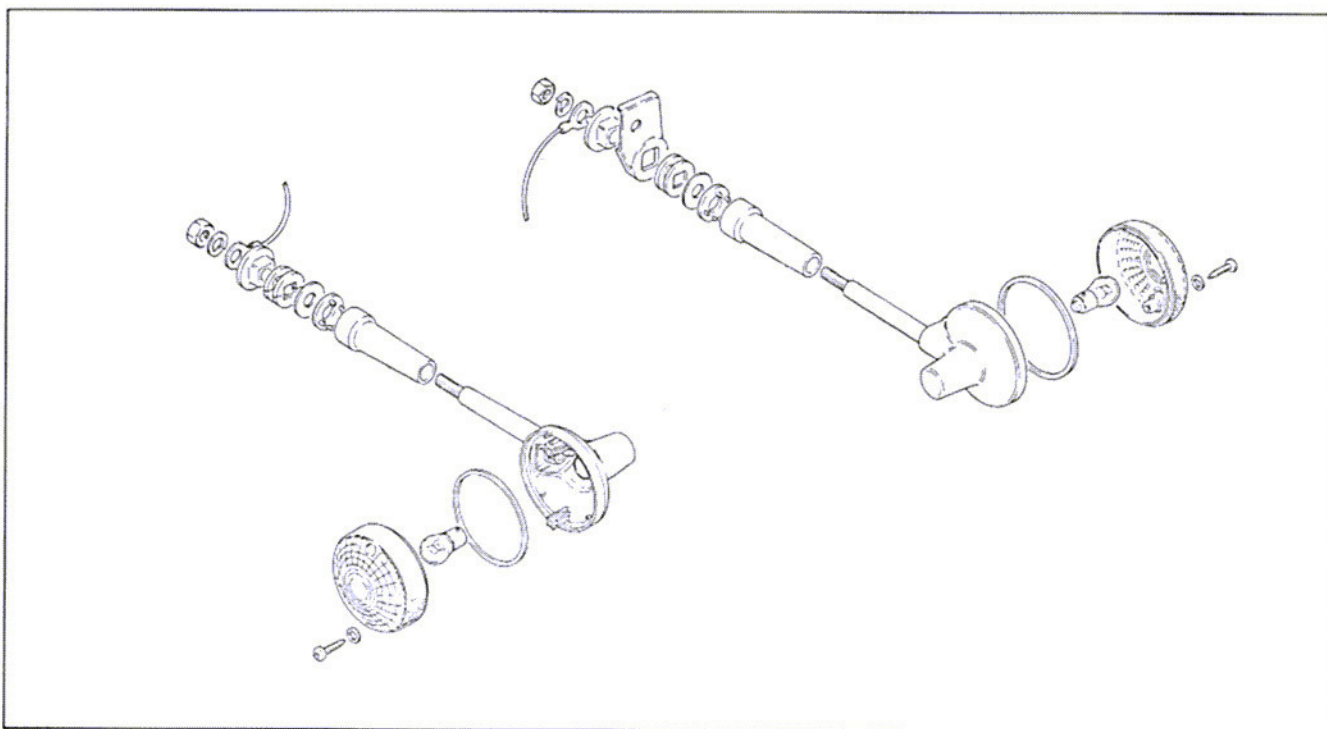
Do not overtighten the lens fitting screws.



TURN SIGNAL LIGHT

CAUTION:

Do not overtighten the lens fitting screws.



SWITCHES

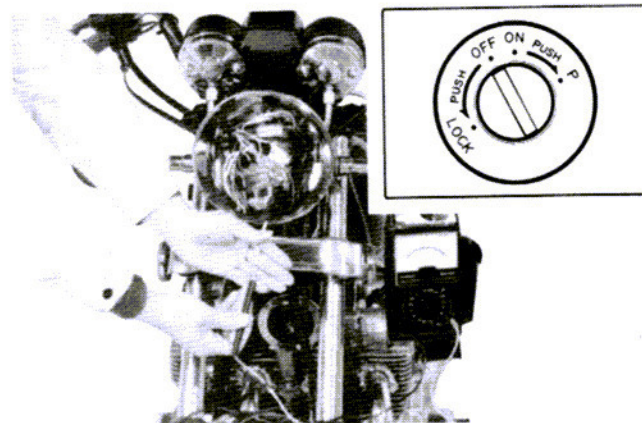
Inspect each switches for continuity with the pocket tester referring to the chart. If it is found any abnormality, replace the respective switch assembly with new one.

09900 - 25002

Pocket tester

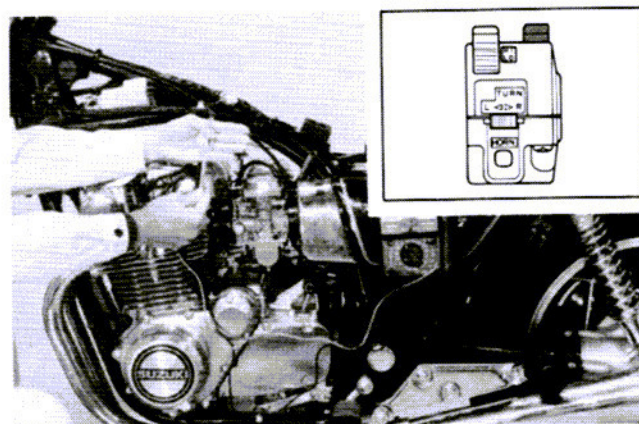
IGNITION SWITCH

	R	O	Br	Gr
OFF				
ON	○ — ○		○ — ○	
P	○ — ○		○ — ○	



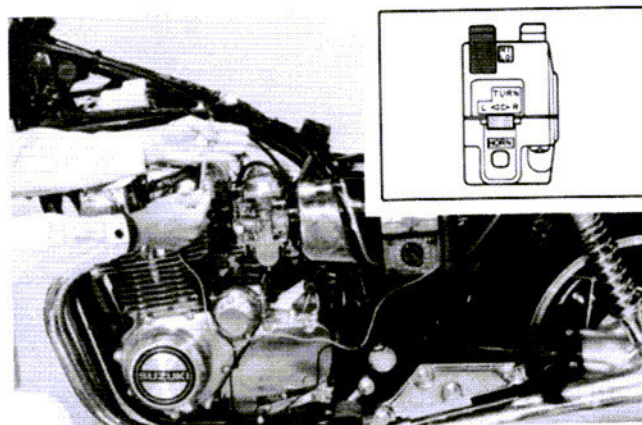
LIGHTING SWITCH

	O	Gr	W/R	W/G
(OFF)				
ON	○ — ○		○ — ○	

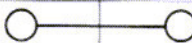


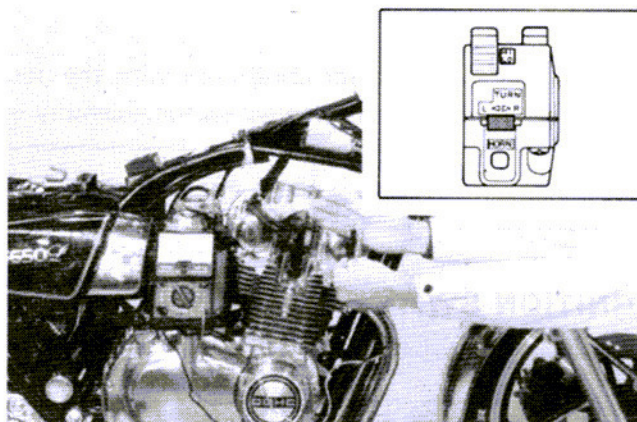
DIMMER SWITCH

	Gr	Y	W
HI	○ — ○		
LO	○ — ○		○ — ○

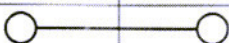


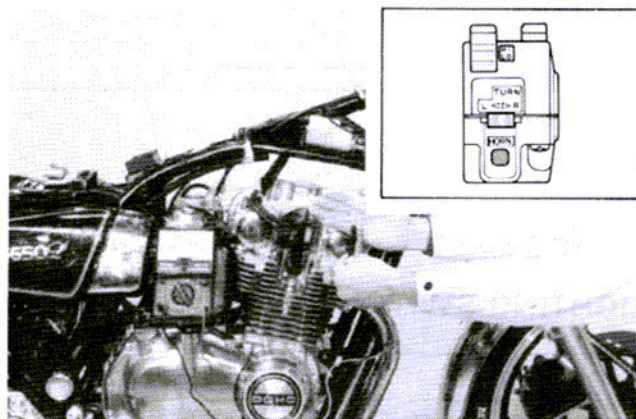
TURN SIGNAL LIGHT SWITCH

	B	Lbl	Lg
R			
•			
L			



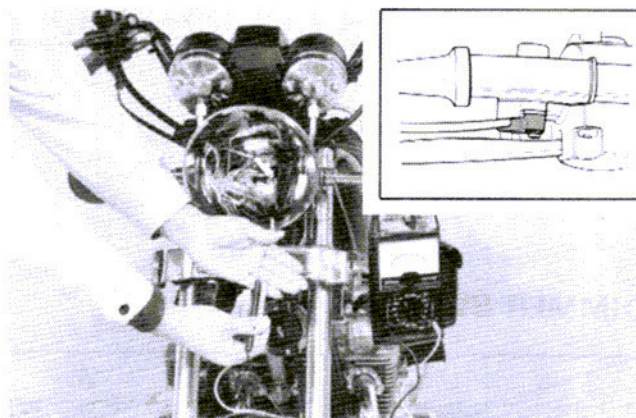
HORN SWITCH

	B/W	G
OFF		
ON (Push)		

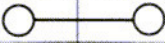
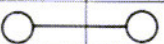


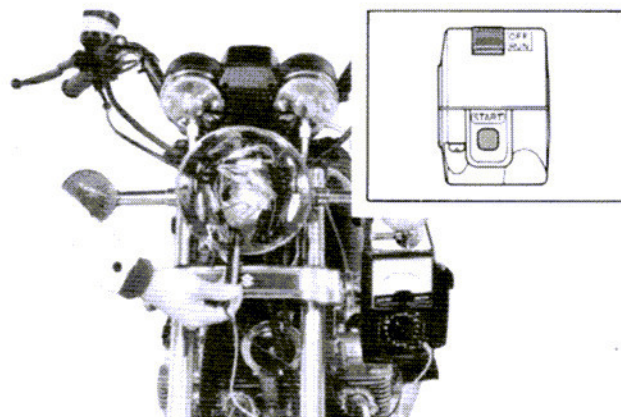
STARTER DISCONNECT SWITCH

	Y/G	Y/G
OFF		
ON		



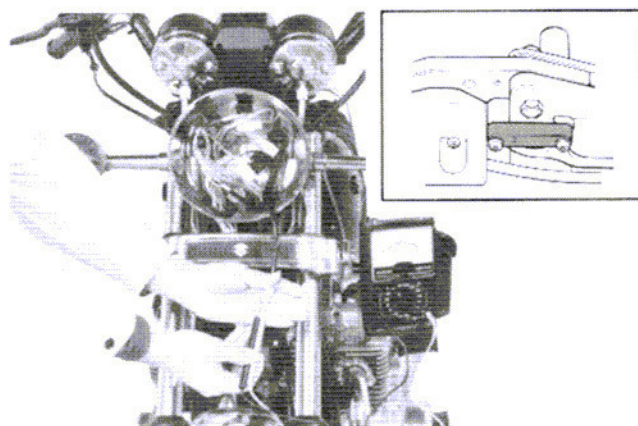
ENGINE KILL AND STARTER SWITCH

	O	O/W	Y/G
OFF			
RUN			
START (Push)			

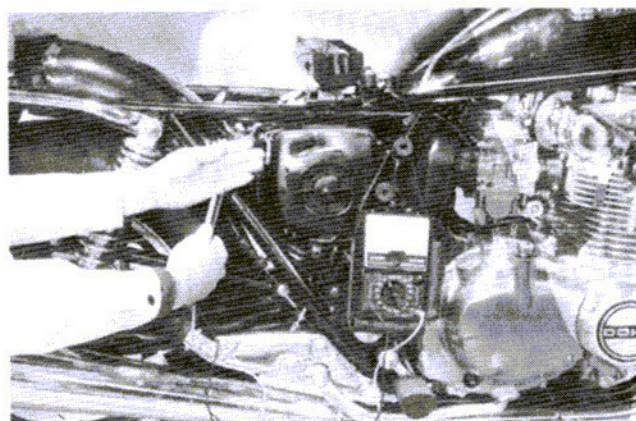


FRONT BRAKE LIGHT SWITCH

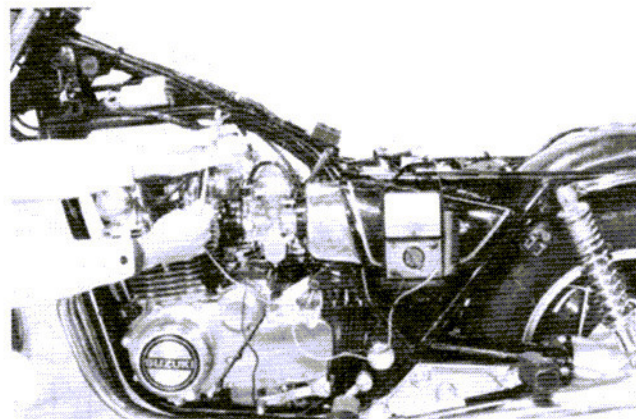
	O/G	W
OFF		
ON	○	○

**REAR BRAKE LIGHT SWITCH**

	O/G	W
OFF		
ON	○	○

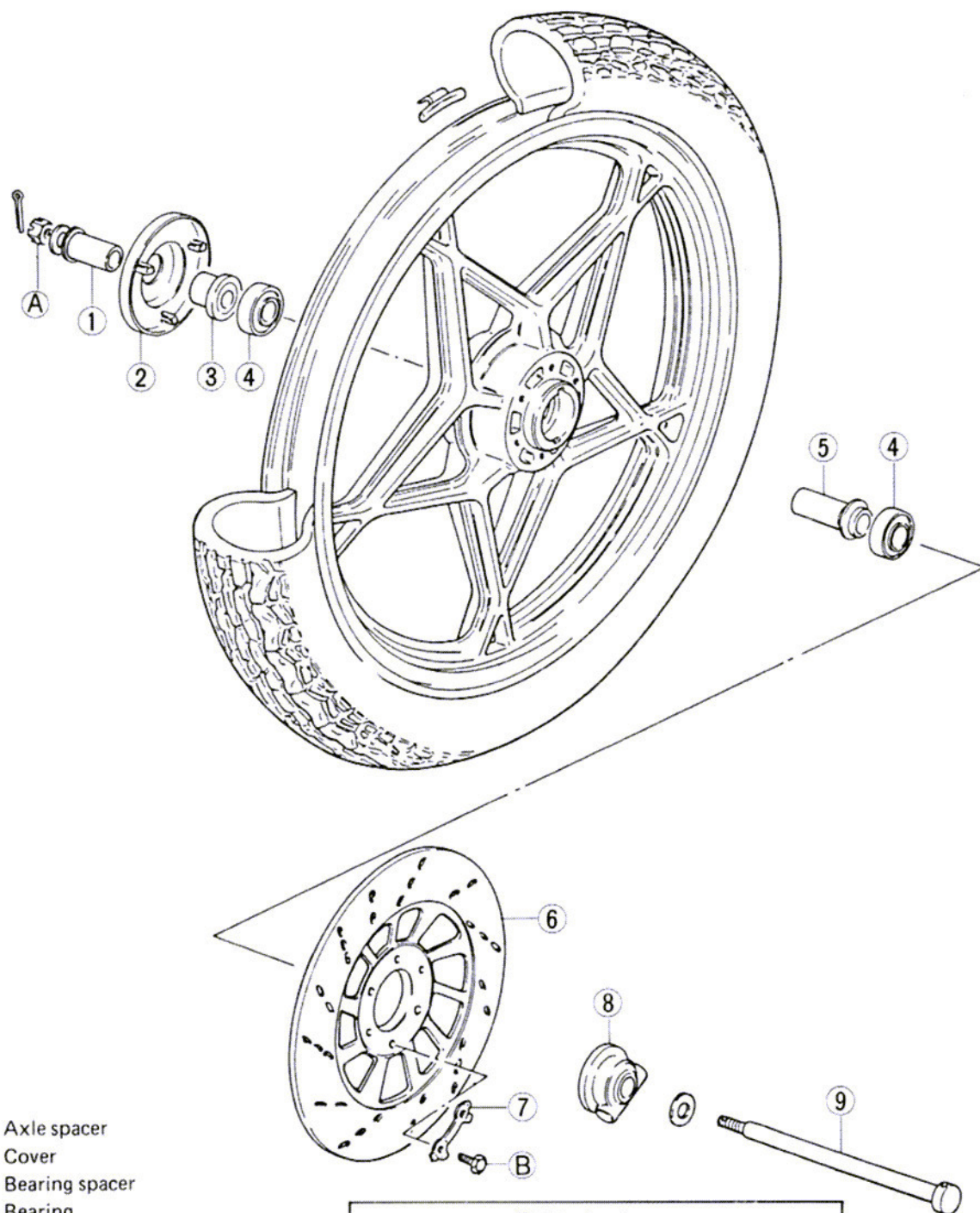
**GEAR POSITION INDICATOR LIGHT SWITCH**

Gear position	Wire color	
1st	W/Y	Ground
Neutral	Bl	
2nd	R/B	
3rd	G/Bl	
4th	Y/Bl	
Top	Br/R	

**NOTE:****WIRE COLOR**

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

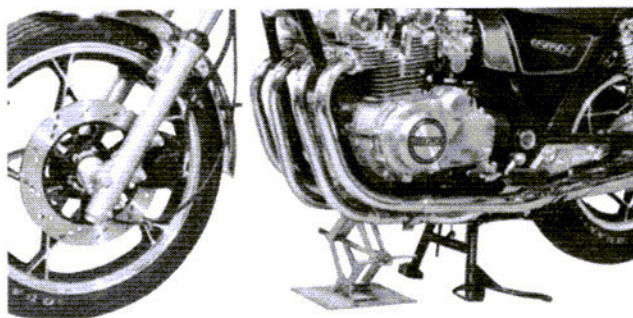
FRONT WHEEL



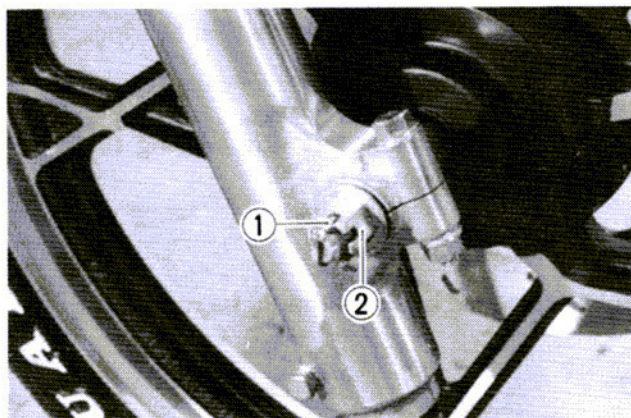
Tightening torque		
	N·m	kg·m
A	36 – 52	3.6 – 5.2
B	15 – 25	1.5 – 2.5

REMOVAL

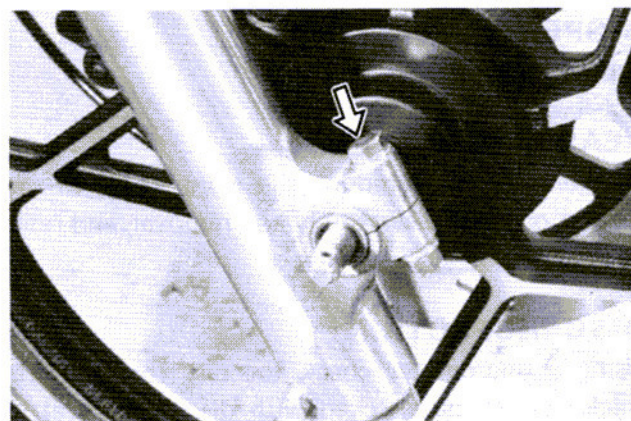
- Support the machine by center stand and jack.



- Pull off cotter pin ① and remove axle nut ②.



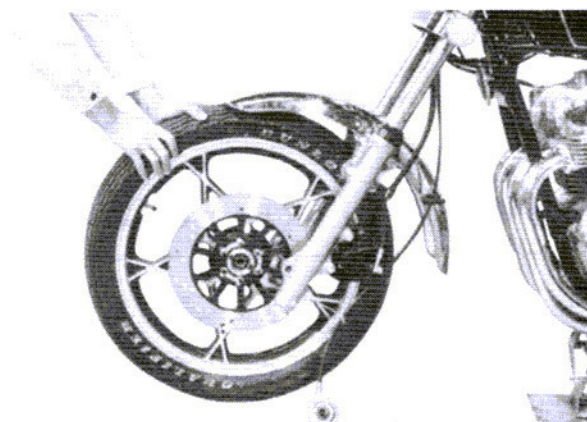
- Loosen axle pinch bolt.



- Draw out axle shaft and take off front wheel.

NOTE:

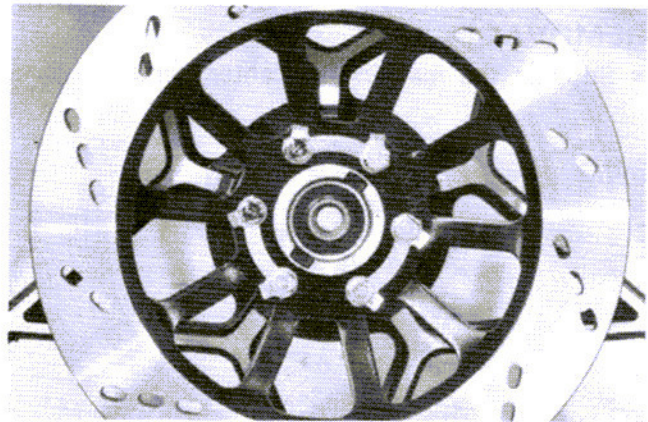
Do not operate the brake lever when removing the front wheel.



- Unlock the lock washer.
- Remove the securing bolts and separate the disc from wheel.

CAUTION:

Do not reuse the lock washer.



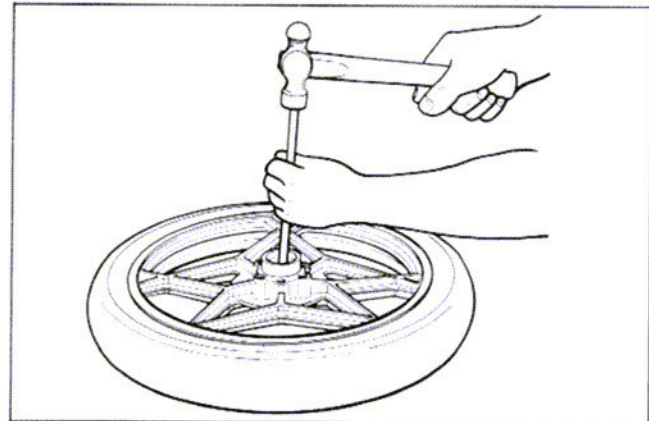
- Draw out the right and left wheel bearings.

NOTE:

If drawing out the left side bearing first, it makes the job easier.

CAUTION:

The removed bearings should be replaced.

**INSPECTION**

Refer to page 8-3.

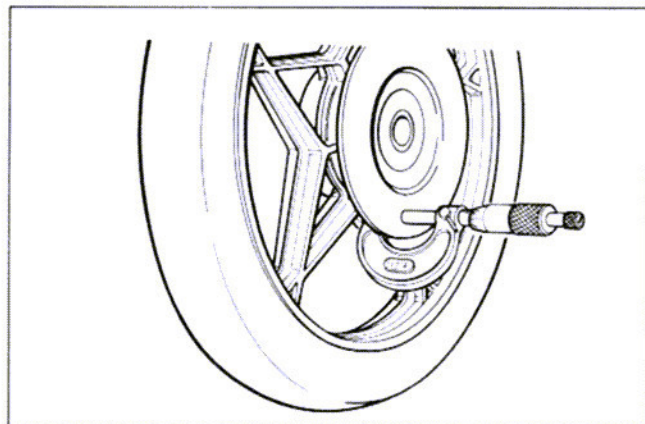
REASSEMBLY

Reassembly and remount the front wheel in the reverse order of disassembly and removal, and refer to page 8-3.

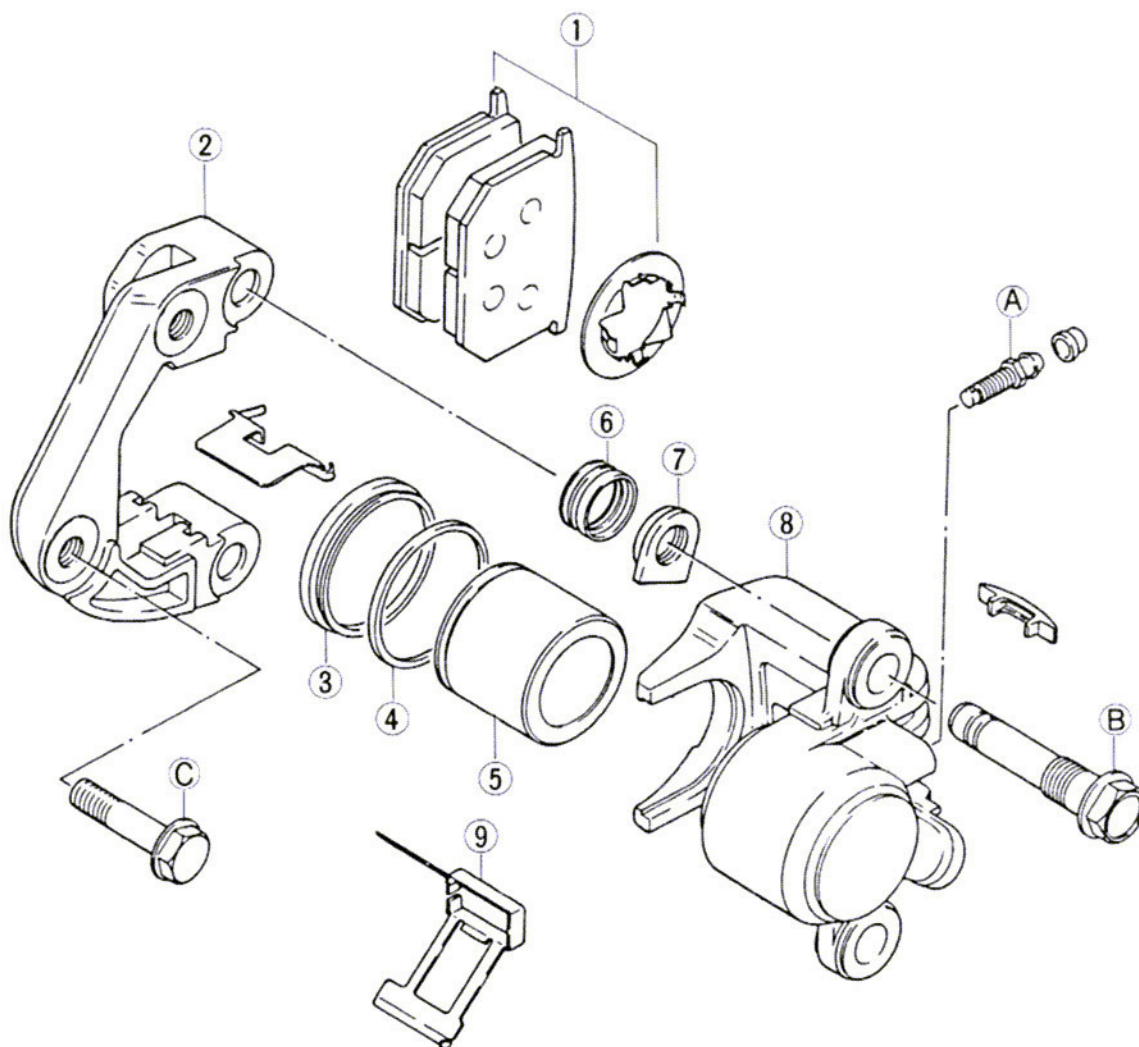
DISC INSPECTION

Using a micrometer check the disc for wear. Its thickness can be checked with disc and wheel in place. The service limit for the thickness of the disc:

09900 - 20201	Micrometer (0 – 25 mm)
Service limit	5.5 mm (0.22 in)



FRONT CALIPER



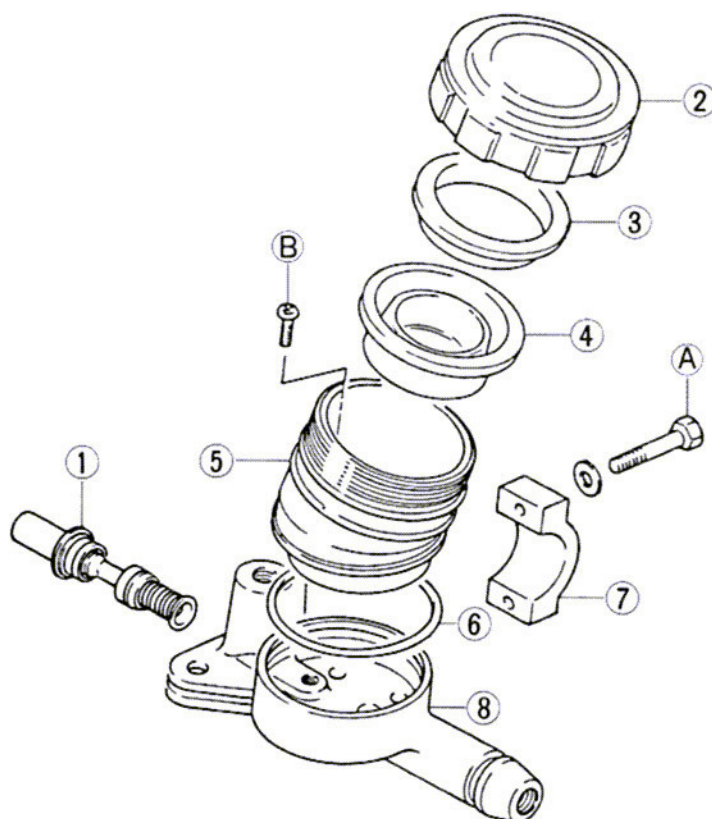
- ① Pad set
- ② Caliper
- ③ Dust boot
- ④ Piston seal
- ⑤ Piston
- ⑥ Axle boot
- ⑦ Axle nut
- ⑧ Caliper
- ⑨ Pad spring

Tightening torque		
	N·m	kg·m
A	6 – 9	0.6 – 0.9
B	40 – 55	4.0 – 5.5
C	25 – 40	2.5 – 4.0

NOTE:

Please refer to the front brake section of GS650G when disassembling and reassembling the front caliper (See page 8-6).

FRONT MASTER CYLINDER

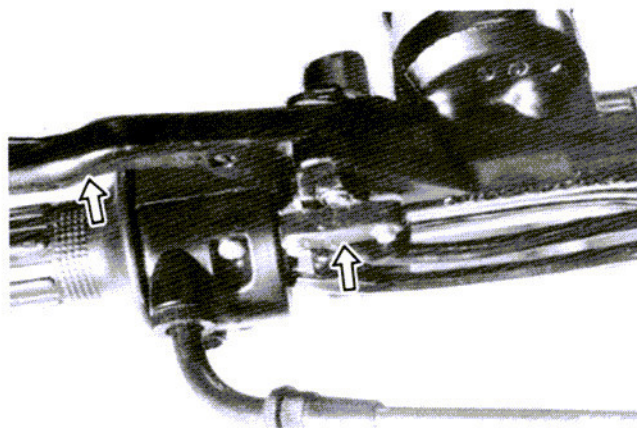


- ① Piston and cup set
- ② Cap
- ③ Plate
- ④ Diaphragm
- ⑤ Reservoir
- ⑥ O-ring
- ⑦ Holder
- ⑧ Body

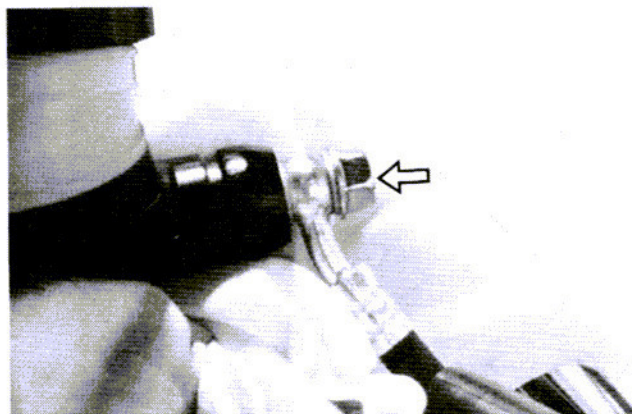
Tightening torque		
	N·m	kg-m
(A)	5 – 8	0.5 – 0.8
(B)	3 – 5	0.3 – 0.5

MASTER CYLINDER REMOVAL AND DISASSEMBLY

- Take off front brake light switch and front brake lever.



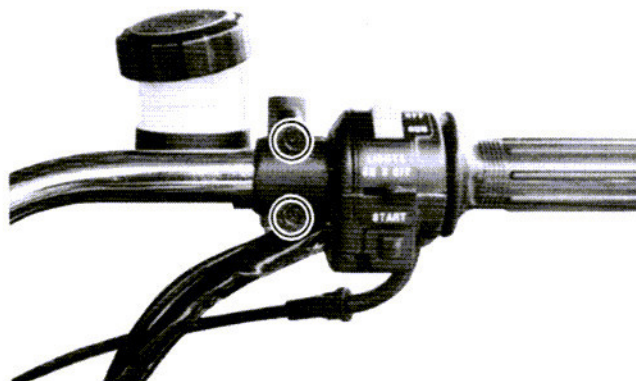
- Place a cloth under neath the union bolt on the master cylinder to catch spilled drops of brake fluid. Unscrew the union bolt and disconnect the brake hose/master cylinder joint.



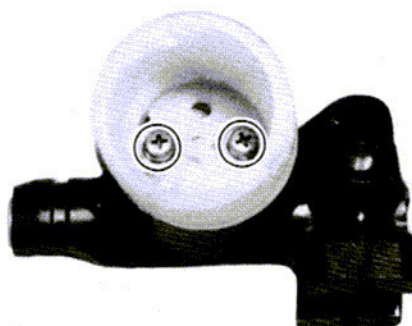
CAUTION:

Immediately completely wipe off any brake fluid adhering to any part of motorcycle. The fluid reacts chemically with paints, plastics, rubber materials, etc. and will damage them severally.

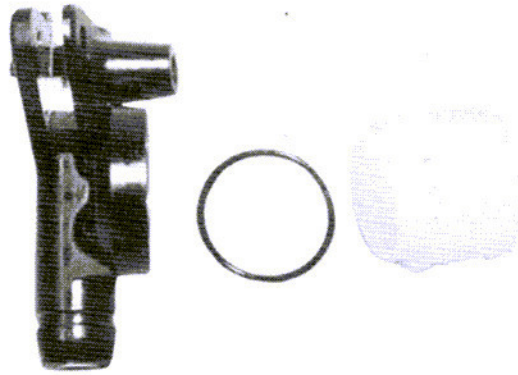
- Remove master cylinder ass'y after removing two fitting bolts.



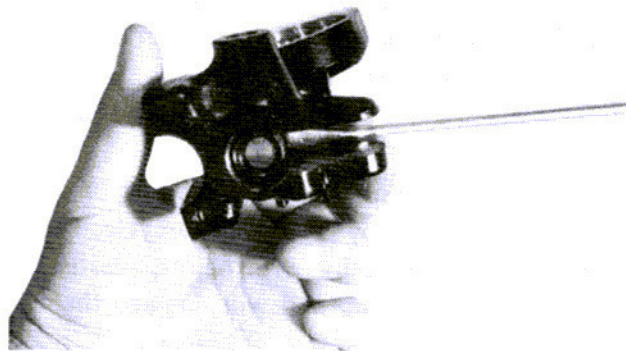
- Remove the two screws.



- Pull out the reservoir and O ring.

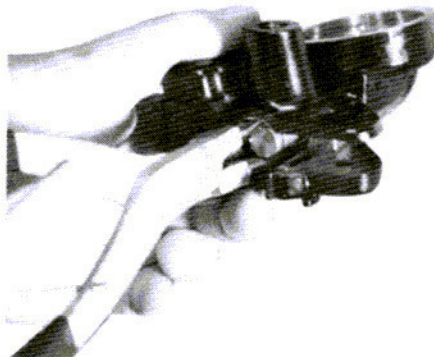


- Draw out dust seal boot.

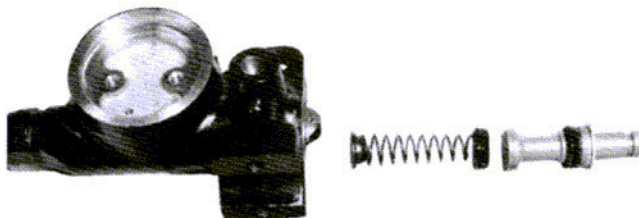


- Remove circlip by using special tool.

09900 - 06108	Snap ring pliers
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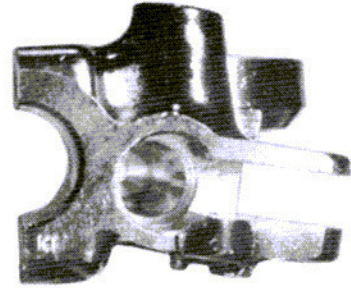


- Pull out piston, primary cup and spring.

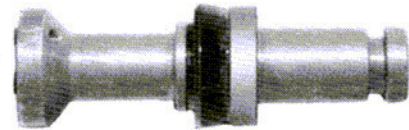


MASTER CYLINDER INSPECTION

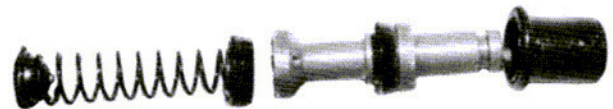
- Inspect the cylinder bore wall for any scratch or other damage.



- Inspect the piston surface for scratch or other damage.



- Inspect the primary cup, secondary cup and dust seal boot for damage.



MASTER CYLINDER REASSEMBLY

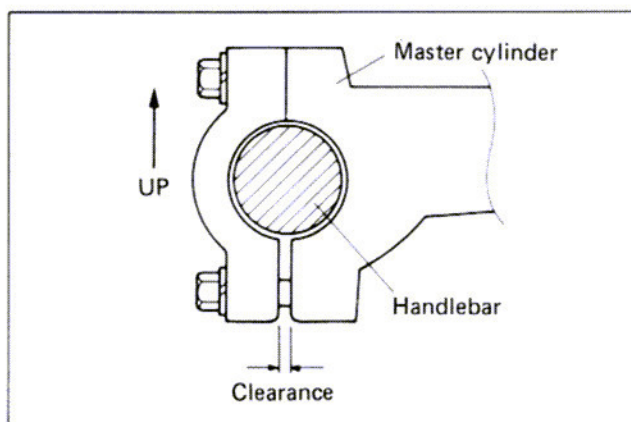
- Reassemble the master cylinder in the reverse order of disassembly and by taking the following steps:

WARNING:

Wash the master cylinder components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.

Apply brake fluid to the cylinder bore and all the internals to be inserted into the bore.

- When installing the master cylinder on the handlebars, first tighten the clamp bolt on the upper side.



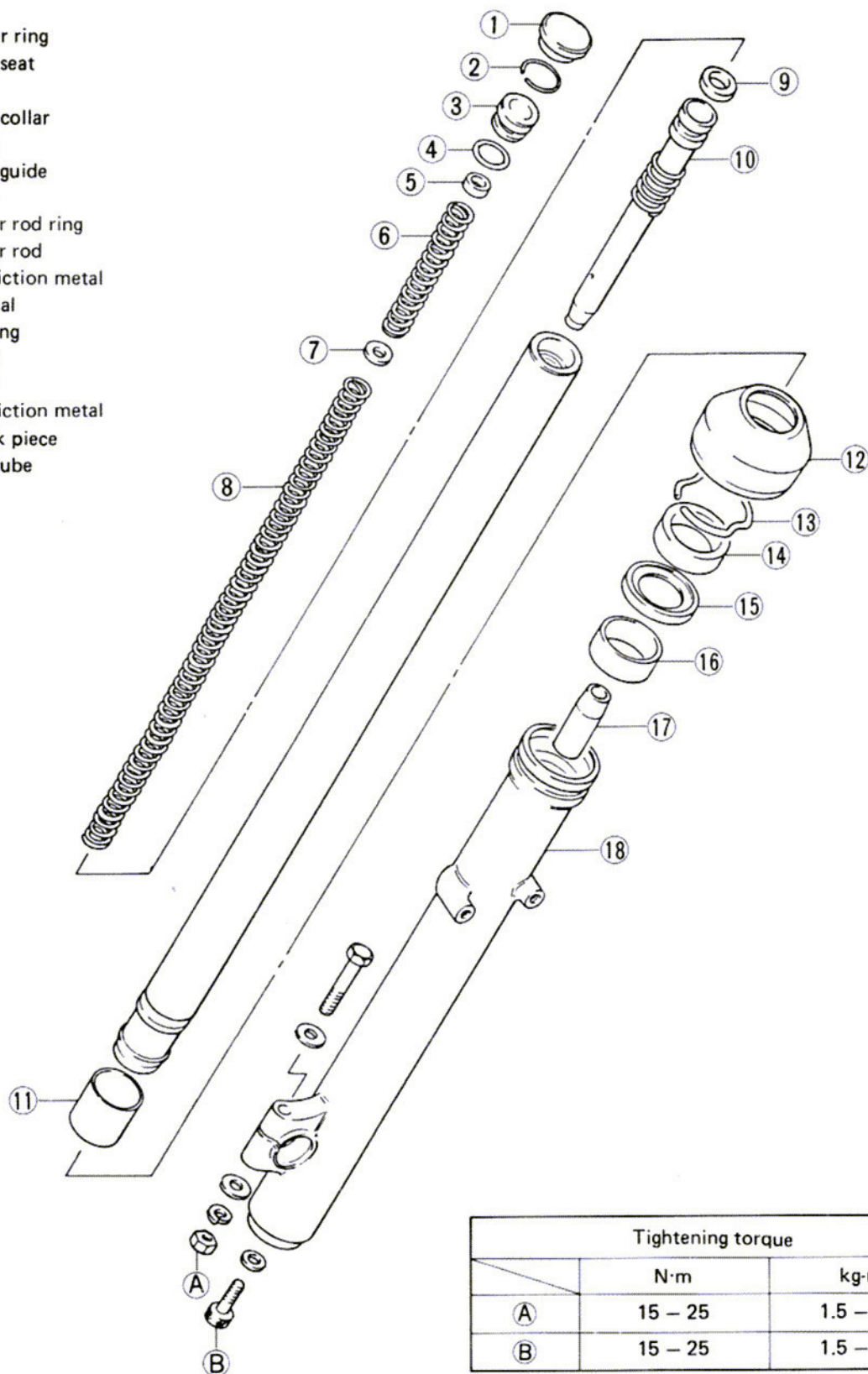
WARNING:

Adjust the front brake light switch after installation.

Bleeding the air after reassembling master cylinder.

FRONT FORK

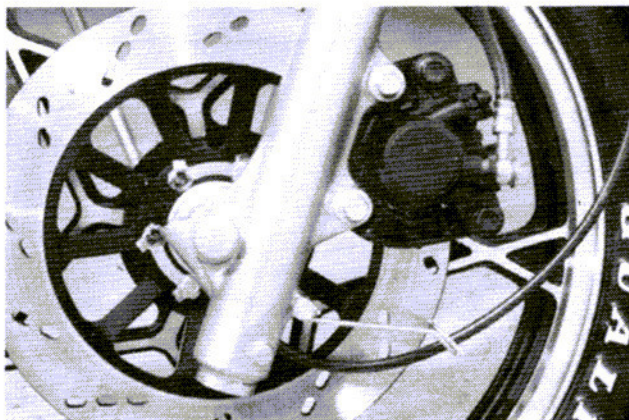
- ① Cap
- ② Stopper ring
- ③ Spring seat
- ④ O-ring
- ⑤ Spring collar
- ⑥ Spring
- ⑦ Spring guide
- ⑧ Spring
- ⑨ Damper rod ring
- ⑩ Damper rod
- ⑪ Anti-friction metal
- ⑫ Dust seal
- ⑬ Snap ring
- ⑭ Oil seal
- ⑮ Spacer
- ⑯ Anti-friction metal
- ⑰ Oil lock piece
- ⑱ Outer tube



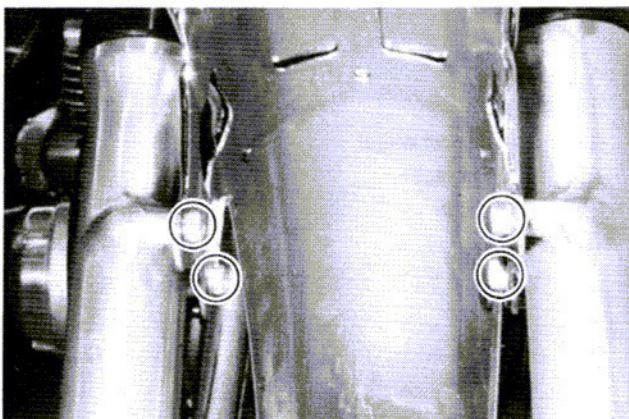
Tightening torque		
	N·m	kg·m
(A)	15 - 25	1.5 - 2.5
(B)	15 - 25	1.5 - 2.5

REMOVAL AND DISASSEMBLY

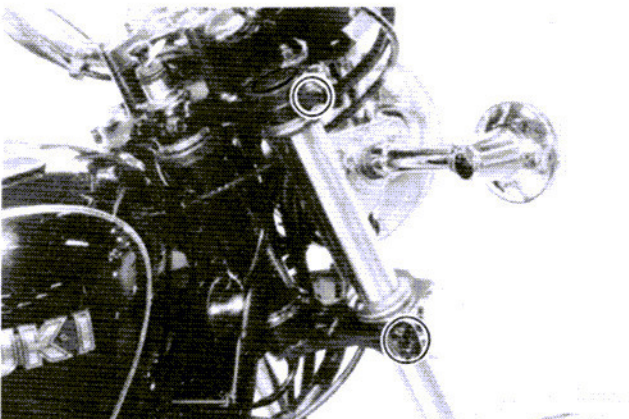
- Remove the front wheel. (Refer to page 10-12.)
- Take off the front brake caliper and speedometer cable guide.



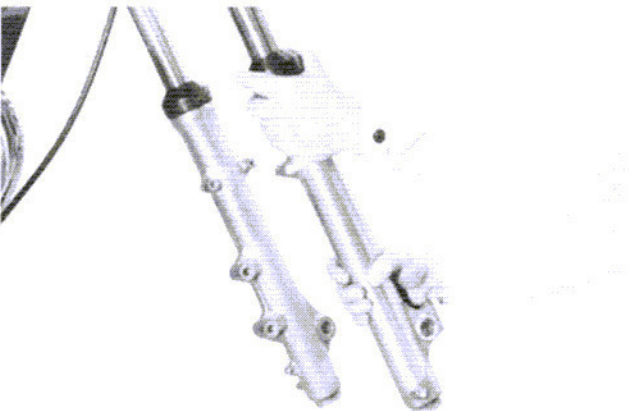
- Remove four bolts and front fender.



- Loosen the front fork upper and lower clamp bolts.



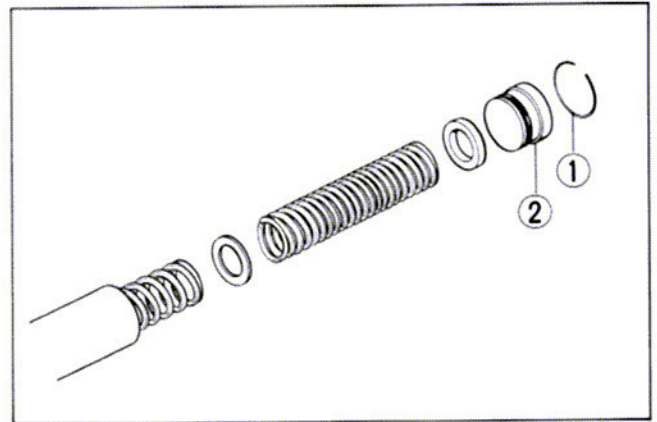
- Pull down right and left front forks.



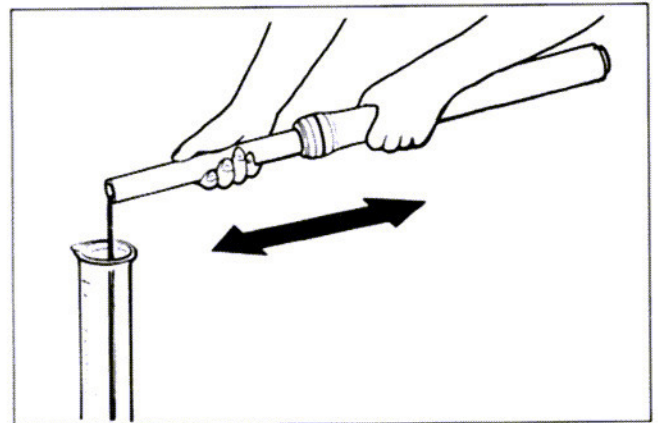
- Remove front fork cap, stopper ring ① and spring seat ②, and draw out fork springs.

CAUTION:

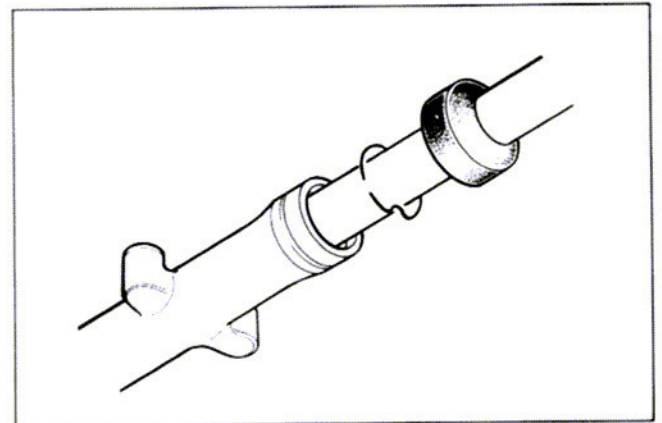
- To remove the stopper ring ①, it will be necessary to push the spring seat ② inwards, to remove spring pressure from the stopper ring.
- The removed stopper ring ① should be replaced.



- Invert the fork and stroke it several times to let out the oil inside.
- Under this condition (inverted condition), hold the fork for a few minutes.

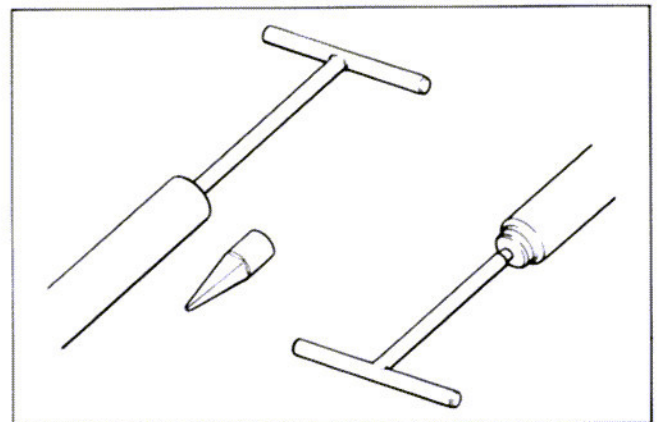


- Draw out dust seal and snap ring.

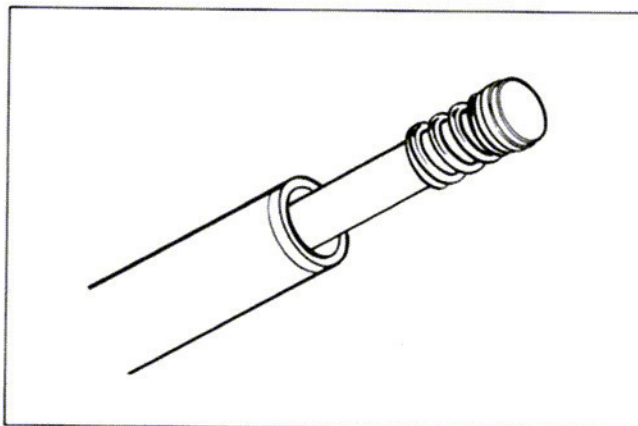


- Remove damper rod securing bolt by using special tools.

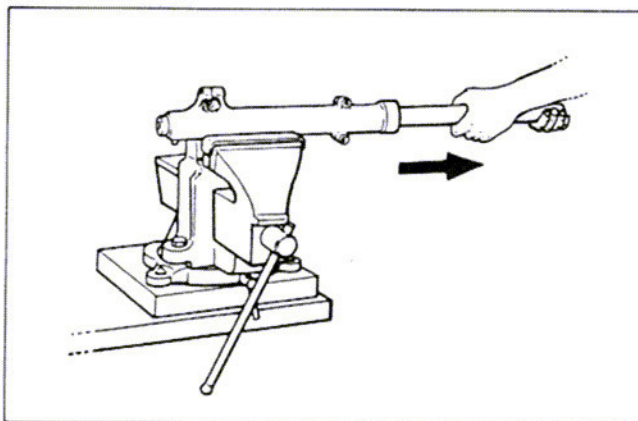
09940 - 34520	"T" handle
09940 - 34561	Attachment "D"
09914 - 25811	"T" type hexagon wrench



- Draw out damper rod and rebound spring.

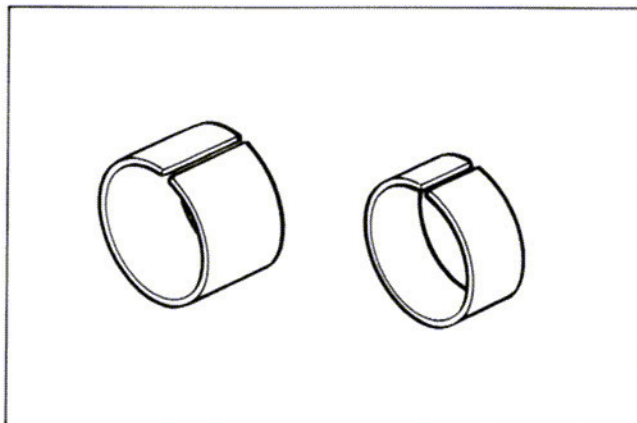


- While holding the caliper mounting portion of the outer tube by vise, separate the inner tube from the outer tube as shown.



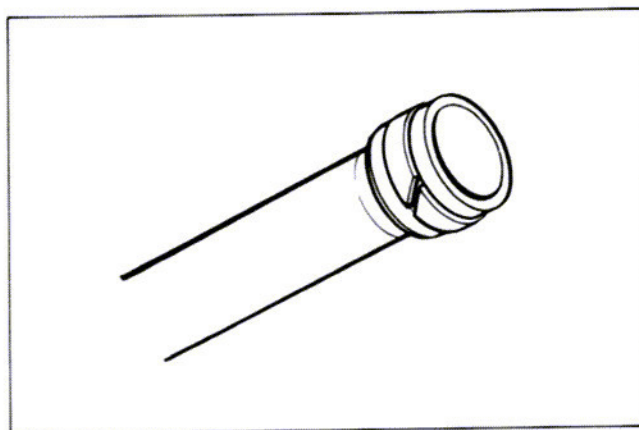
CAUTION:

The outer tube and inner tube anti-friction rings or metal slide rings must be replaced along with the oil seal any time the fork is disassembled.



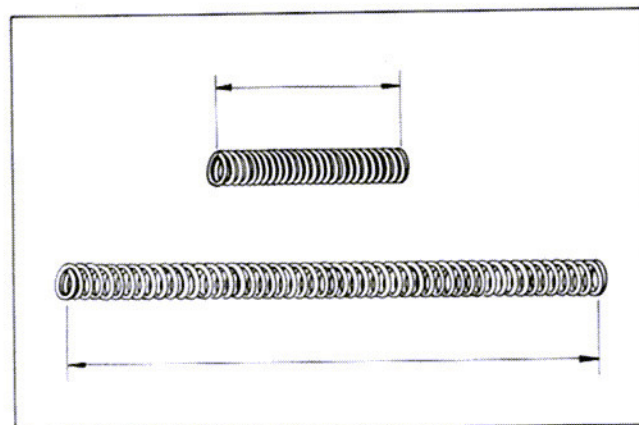
INSPECTION**DAMPER ROD RING**

Inspect damper rod ring for wear and damage.

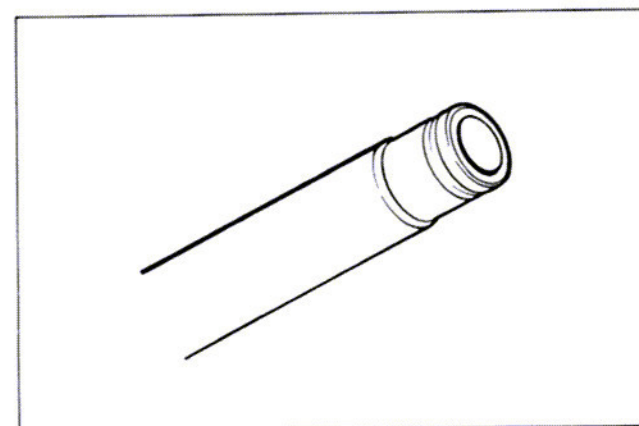
**FORK SPRING**

Measure the fork spring free length. If it is shorter than service limit, replace it.

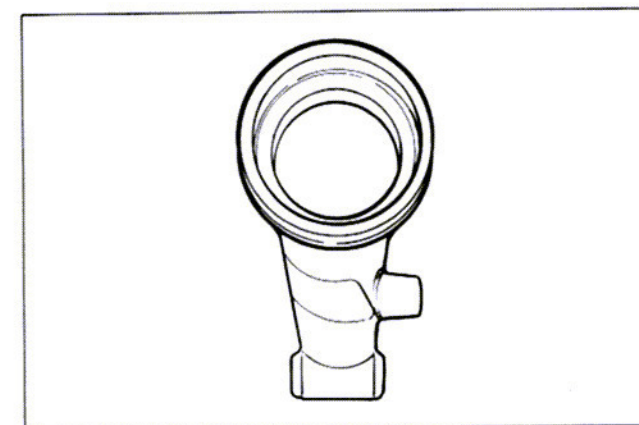
Service Limit	Upper: 153.0 mm (6.02 in)
	Lower: 451.0 mm (17.76 in)

**INNER TUBE**

Inspect inner tube outer surface for any scuffing.

**OUTER TUBE**

Inspect outer tube inner surface for any scuffing.



REASSEMBLY

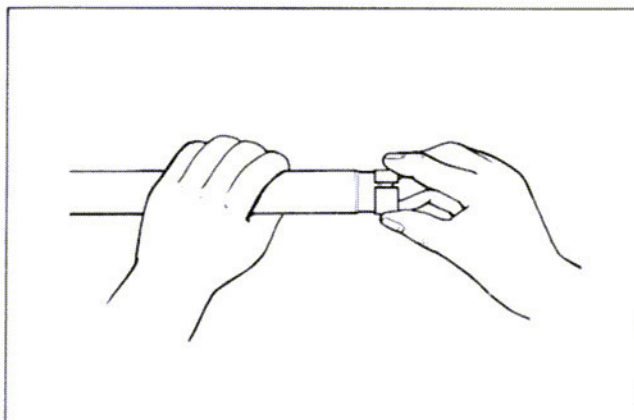
Reassemble and remount the front fork in the reverse order of disassembly and removal, and also carry out the following steps:

INNER TUBE METAL

Install the metal by hand as shown.

CAUTION:

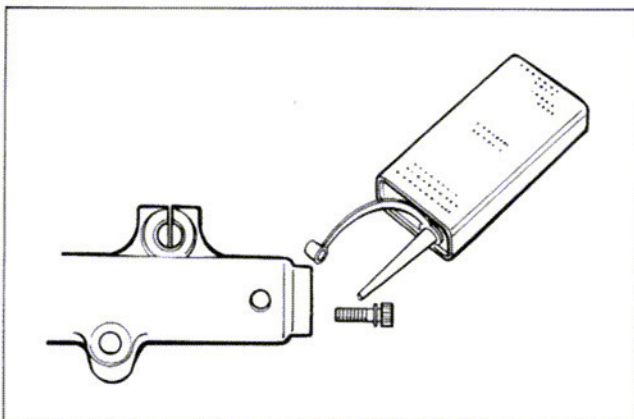
Use special care to prevent damage to the Teflon coated surface of the anti-friction metal when mounting it.



DAMPER ROD BOLT

Apply Thread Lock Cement to the damper rod bolt and tighten with specified torque.

99000 - 32040	Thread Lock Cement
09940 - 34520	"T" handle
09940 - 34561	Attachment "D"
09914 - 25811	"T" type hexagon wrench
Tightening torque	1.5 – 2.5 kg-m (11.0 – 18.0 lb-ft)



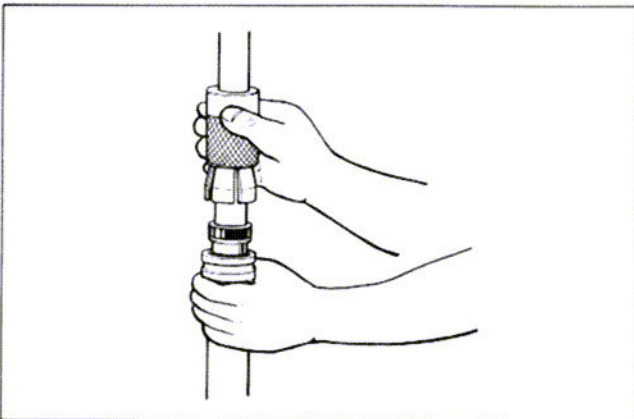
OUTER TUBE METAL, SPACER AND OIL SEAL

Mounting outer tube metal, spacer and oil seal by using special tool as shown.

CAUTION:

Use special care to prevent damage to the Teflon coated surface of the anti-friction metal when mounting it.

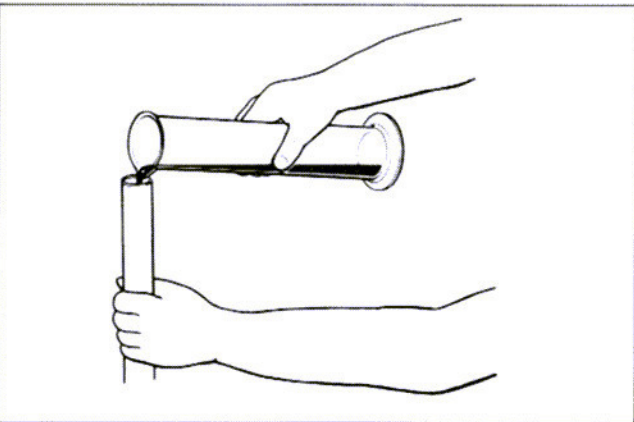
09940-50111	Front fork oil seal installer
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FORK OIL

For the fork oil, be sure to use a motor oil whose viscosity rating meets specifications below.

Fork oil	# 15
Capacity	228 ml (7.71 US oz)



Hold the front fork vertical and adjust the fork oil level with a special tool.

NOTE:

When adjusting oil level, remove the fork springs and compress the inner tube fully.

09943 - 74111

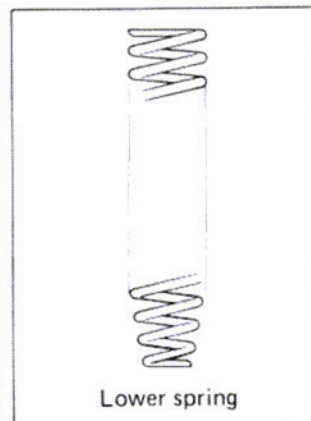
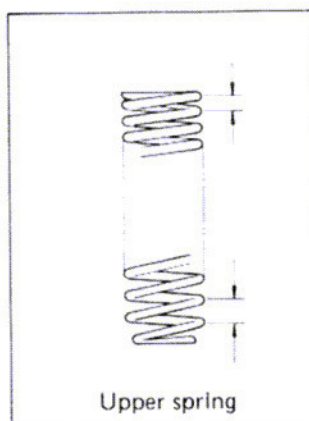
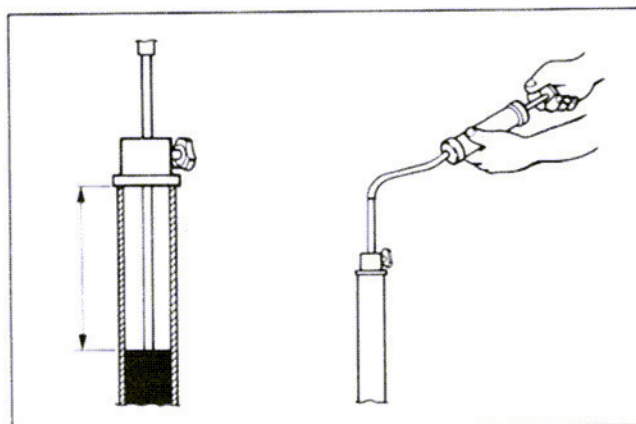
Fork oil level gauge

Oil level

248 mm (9.76 in)

FORK SPRING

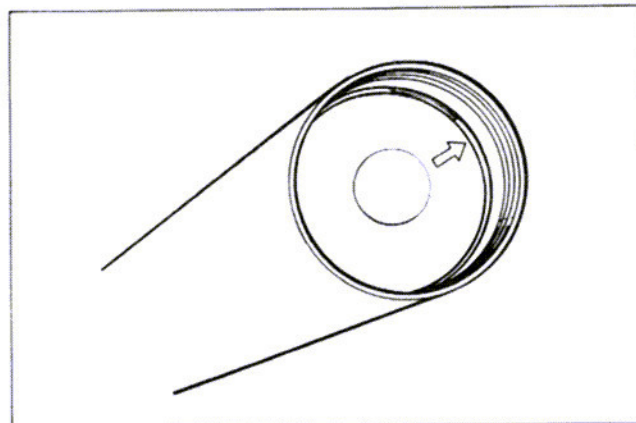
When installing the upper and lower fork springs as shown in Fig.



To install a new stopper ring, it will be necessary to push the spring seat inward.

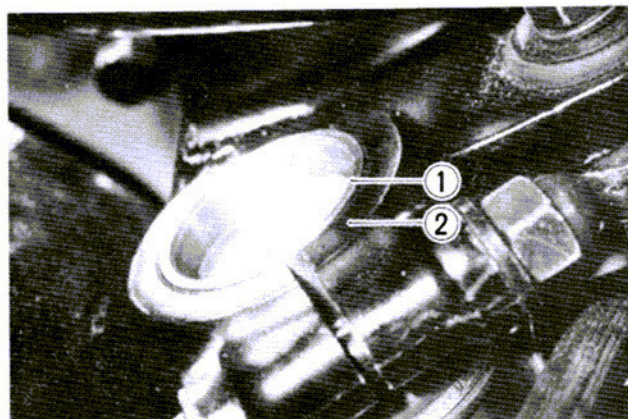
CAUTION:

- *Always use a new stopper ring.
- *After installing a stopper ring, always insure that it is completely seated in its groove and securely fitted.

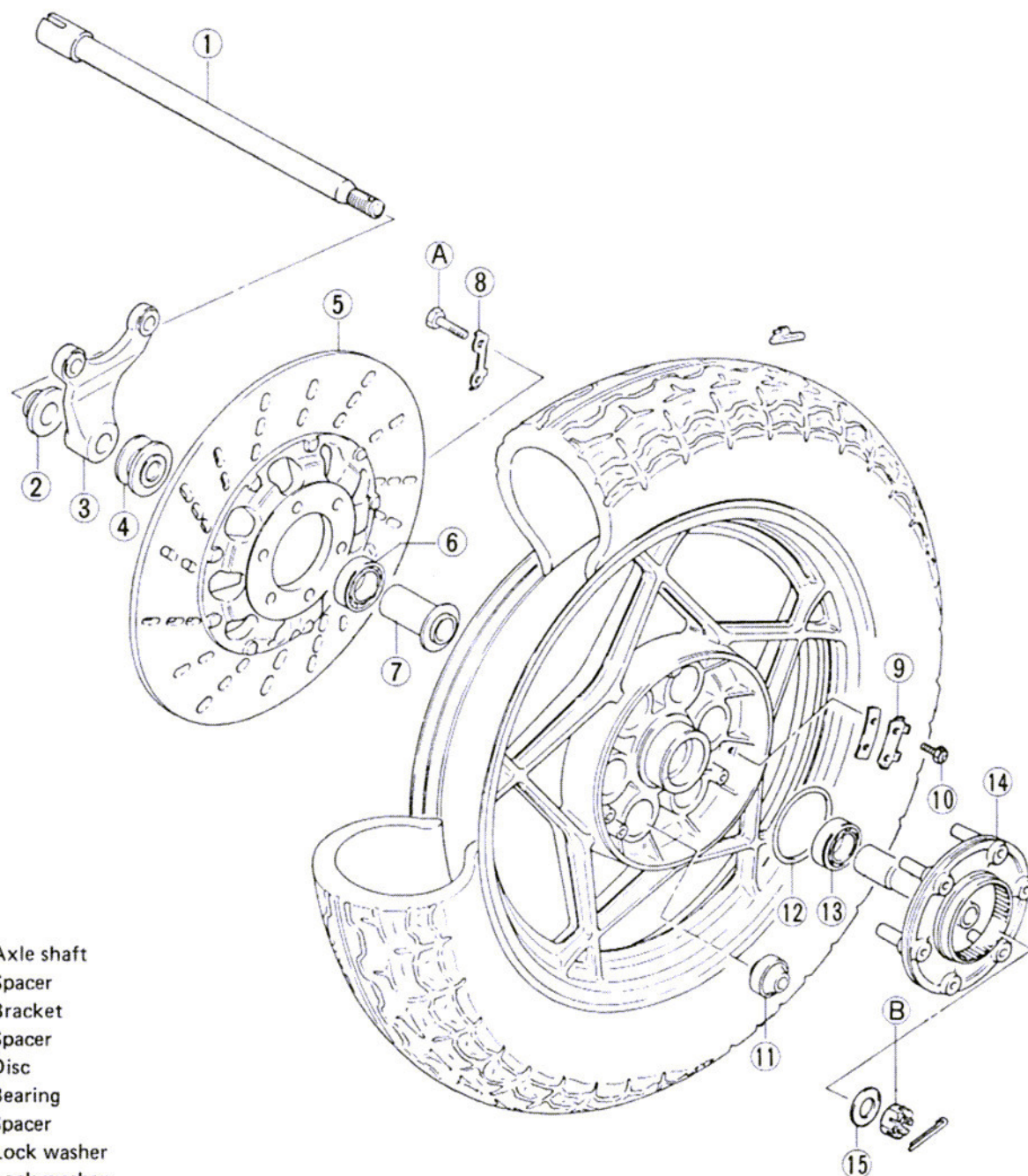


INNER TUBE

Install the front fork assembly with aligning engraved line ① on the inner tube to the upper surface ② of the steering stem upper bracket.



REAR WHEEL

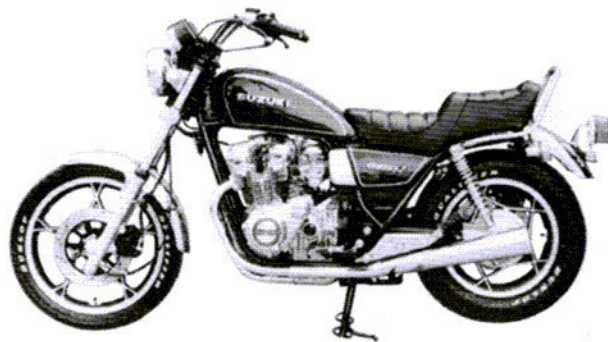


- ① Axle shaft
- ② Spacer
- ③ Bracket
- ④ Spacer
- ⑤ Disc
- ⑥ Bearing
- ⑦ Spacer
- ⑧ Lock washer
- ⑨ Lock washer
- ⑩ Bolt
- ⑪ Bushing
- ⑫ O-ring
- ⑬ Bearing
- ⑭ Driven joint
- ⑮ Washer

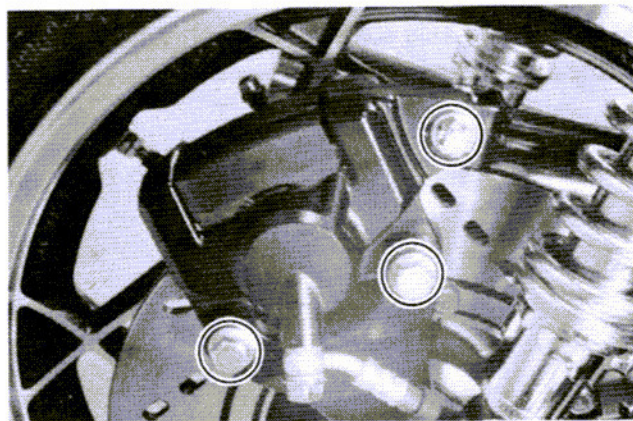
Tightening torque		
	N·m	kg-m
A	15 – 25	1.5 – 2.5
B	50 – 80	5.0 – 8.0

REMOVAL

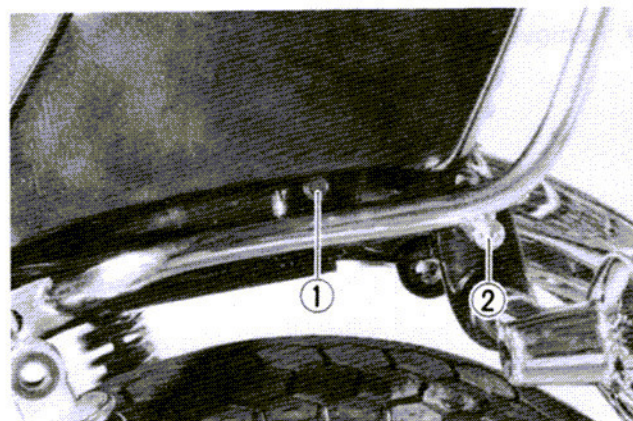
- Support the machine by center stand.
- Remove the upper nuts of rear shock absorbers and pull the top side of the shock absorbers free from mounting lugs.



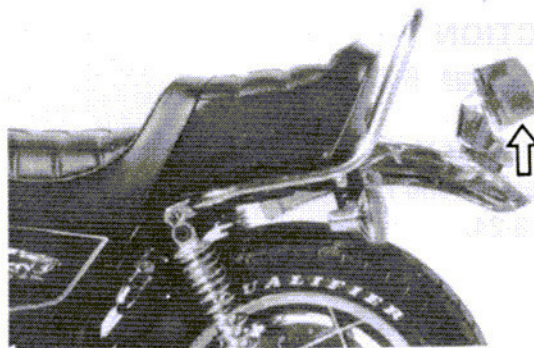
- Remove the caliper mounting bolts, the torque link cotter pin and the torque link nut.



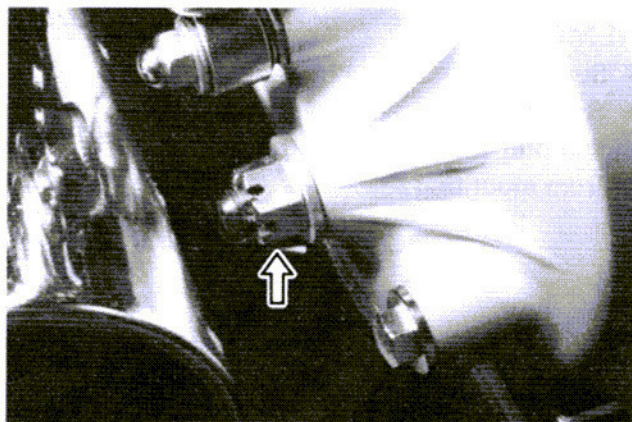
- Remove right and left bolts ① and slightly loosen right and left bolts ②.



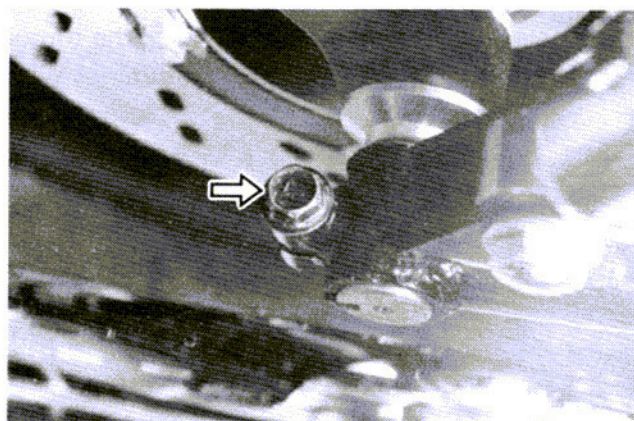
- Pull up the rear side of the rear fender as shown in photo.



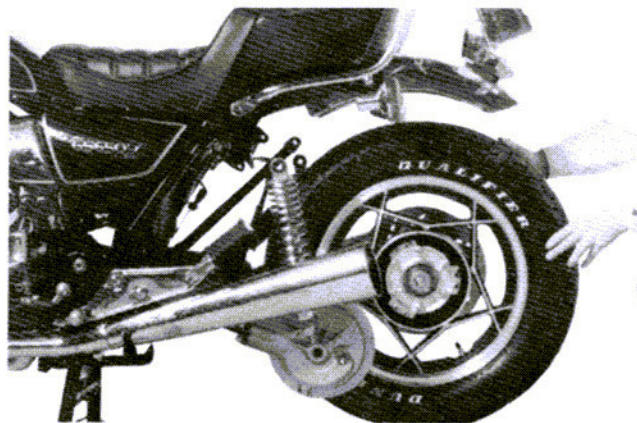
- Remove the cotter pin and axle shaft nut.



- Loosen the axle shaft holder bolt and draw out the axle shaft.



- Remove the rear wheel.



REAR WHEEL DISASSEMBLY

- Refer to page 8-21.

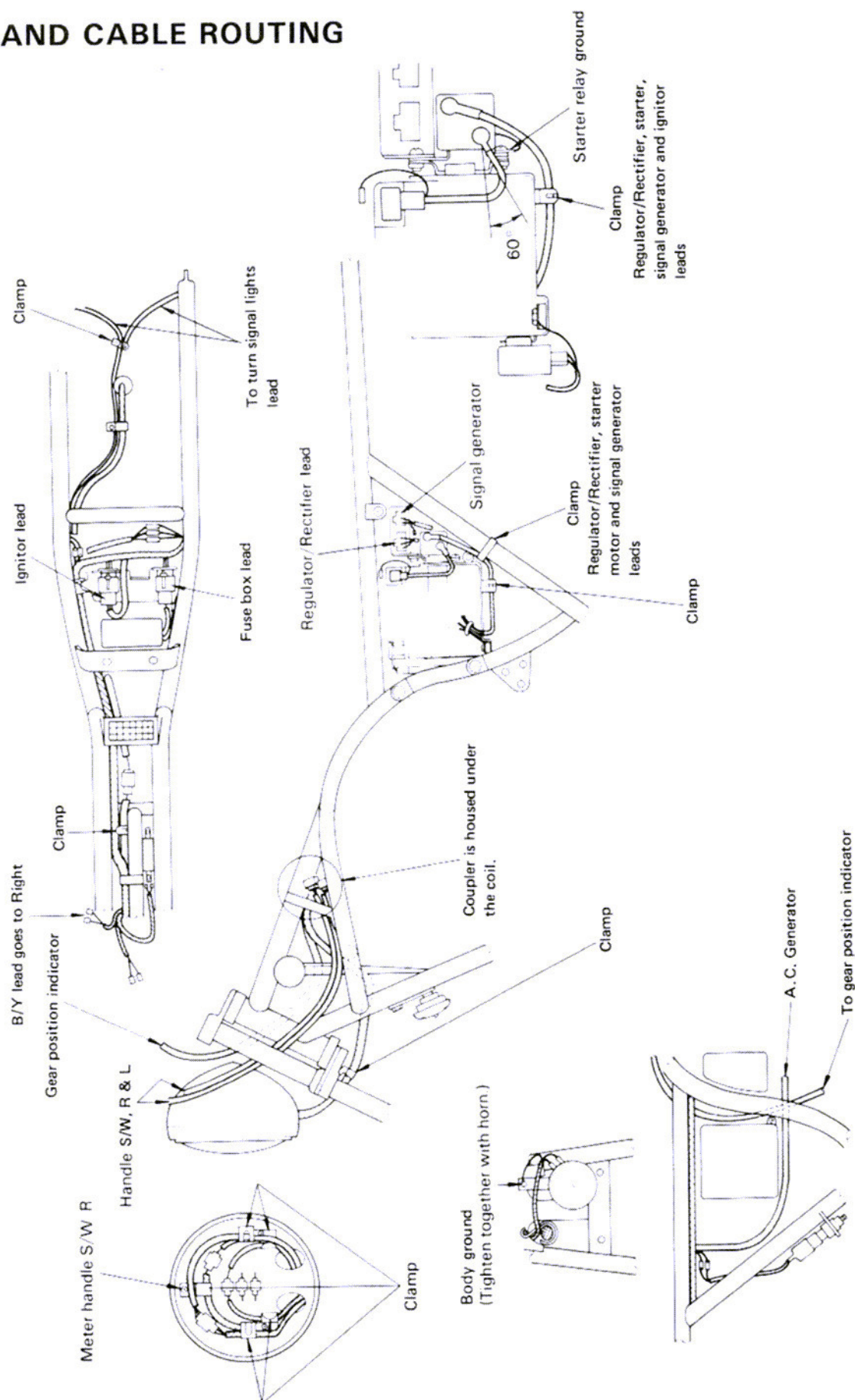
INSPECTION

- Refer to page 8-23.

REASSEMBLY

- Reassembly and remount the rear wheel in the reverse order of disassembly and removal, and refer to page 8-24.

WIRE AND CABLE ROUTING



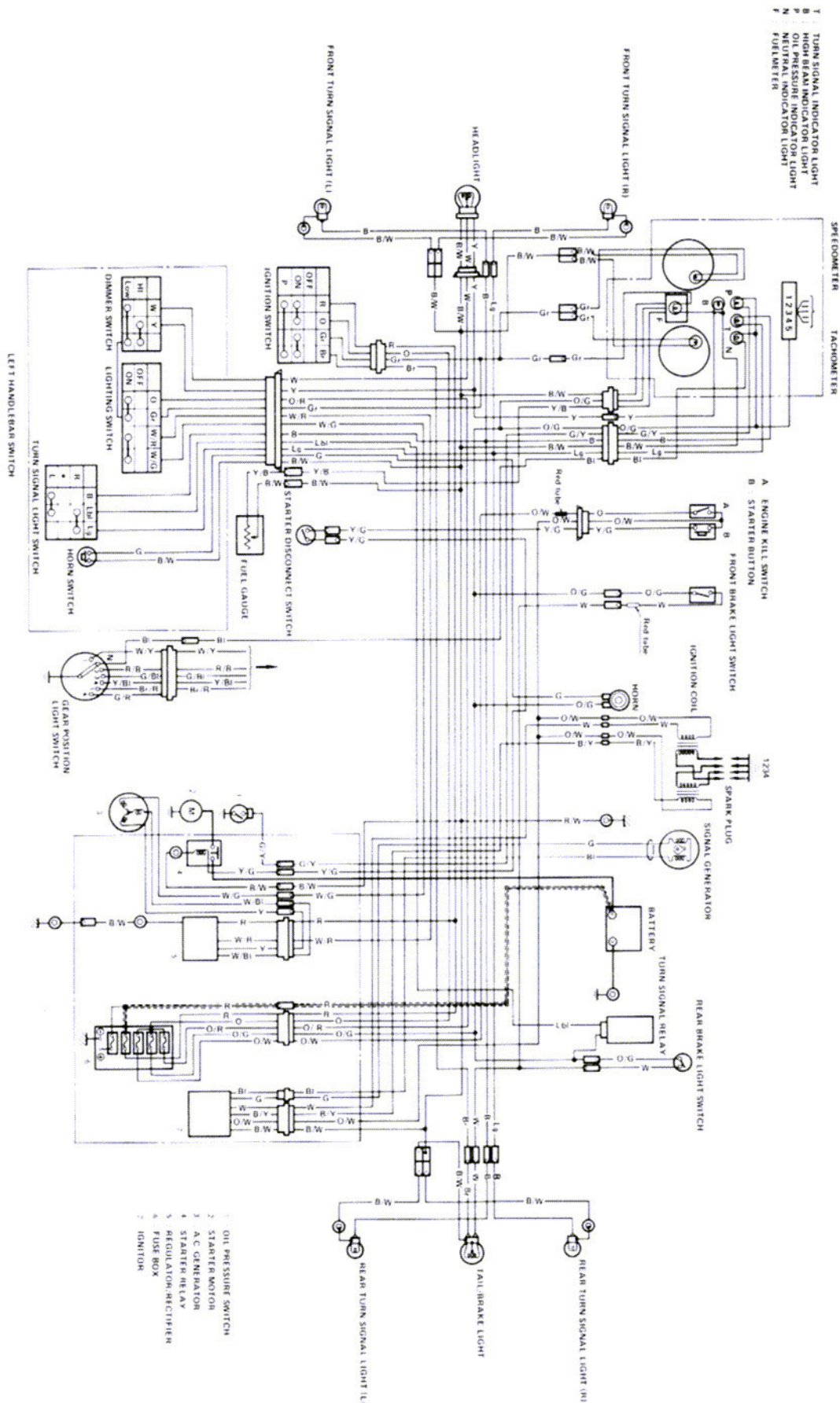
WIRING DIAGRAM

WIRE COLOR

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

B/W	Black with White tracer
B/Y	Black with Yellow tracer
Br/R	Brown with Red tracer
G/Bl	Green with Blue tracer
G/R	Green with Red tracer
G/Y	Green with Yellow tracer
O/G	Orange with Green tracer
O/R	Orange with Red tracer
R/B	Red with Blue tracer
W/Bl	White with Blue tracer

W/G	White with Green tracer
W/R	White with Red tracer
W/Y	White with Yellow tracer
Y/Bl	Yellow with Blue tracer
Y/G	Yellow with Green tracer



SERVICE DATA

Please refer to the service data of GS650G except for the service data shown below.

BRAKE + WHEEL

Unit: mm (in)

ITEM	STANDARD		LIMIT
Rear brake pedal height		20 (0.8)	—
Brake disc thickness	Front	6.0 ± 0.2 (0.24 ± 0.008)	5.5 (0.22)
	Rear	6.7 ± 0.2 (0.26 ± 0.008)	6.0 (0.24)
Brake disc runout		—	0.30 (0.012)
Master cylinder bore	Front	14.000 – 14.043 (0.5512 – 0.5529)	—
	Rear	14.000 – 14.043 (0.5512 – 0.5529)	—
Master cylinder piston diam.	Front	13.957 – 13.984 (0.5495 – 0.5506)	—
	Rear	13.957 – 13.984 (0.5495 – 0.5506)	—
Brake caliper cylinder bore	Front	42.860 – 42.899 (1.6874 – 1.6889)	—
	Rear	38.180 – 38.256 (1.5031 – 1.5061)	—
Brake caliper piston diam.	Front	42.785 – 42.810 (1.6844 – 1.6854)	—
	Rear	38.098 – 38.148 (1.4999 – 1.5019)	—
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	90/90-19 52H, tubeless	—
	Rear	130/90-16 67H, tubeless	—
Tire tread depth	Front	—	1.6 (0.06)
	Rear	—	2.0 (0.08)

SUSPENSION

Unit: mm (in)

ITEM	STANDARD		LIMIT
Front fork stroke	160 (6.3)		—
Front fork spring free length	Upper	—	153.0 (6.02)
	Lower	—	451.0 (17.76)
Front fork oil level	248.0 (9.76)		—
Rear wheel travel	95 (3.7)		—

FUEL + OIL

ITEM	SPECIFICATION	
Fuel type	Use only unleaded or low-lead type gasoline of at least 85 - 95 pump octane ($\frac{R+M}{2}$ method) or 89 octane or higher rated by the Research Method.	
Fuel tank including reserve	12 L (3.2 US gal)	
reserve	4.0 L (4.2 US qt)	
Engine oil type	SAE 10W/40	
Engine oil capacity	Change	2 500 ml (2.6 US qt)
	Filter change	3 200 ml (3.4 US qt)
	Overhaul	3 700 ml (3.9 US qt)
Front fork oil type	# 15	
Front fork oil capacity (each leg)	228 ml (7.71 US oz)	
Final bevel gear oil type	Hypoid Gear of SAE90, API Grade GL-5	
Final bevel gear oil capacity	200 – 220 ml (6.76 – 7.44 US oz)	
Brake fluid type	DOT3, DOT4	

TIRE PRESSURE

COLD INFLATION TIRE PRESSURE	NORMAL RIDING				CONTINUOUS HIGH SPEED RIDING			
	SOLO RIDING		DUAL RIDING		SOLO RIDING		DUAL RIDING	
	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi	kg/cm ²	psi
FRONT	1.75	25	2.00	28	2.00	28	2.25	32
REAR	2.00	28	2.25	32	2.50	36	2.80	40

WATTAGE

Unit: W (cp)

		SPECIFICATION
Headlight	HI	60
	LO	55
Tail/Brake light		8/23 (3/32)
Turn signal light		23 (32)
Speedometer light		3.4
Tachometer light		3.4
Fuelmeter light		3.4
Turn signal indicator light		3.4
High beam indicator light		3.4
Neutral indicator light		3.4
Oil pressure indicator light		3.4

SUZUKI

GS650G/GL

SUPPLEMENTARY SERVICE MANUAL

99501-36020-03E

(英)

FOREWORD

This supplementary service manual has been produced to aid Suzuki mechanics in properly maintaining and repairing the 1982 "Z" model.

This manual has been written primarily for the experienced Suzuki mechanic but will also be very useful even for the apprentice mechanics and do-it-yourself mechanics. The entire manual should be thoroughly reviewed before any servicing is performed.

Please also refer to the GS650G "X" MODEL (1981 MODEL) Service Manual (99500-36000-03E) for all other areas of information not covered in this publication.

IMPORTANT

All Suzuki motorcycles manufactured on or after January 1, 1978, were subject to Environmental Protection Agency emission regulations.

These regulations set specific standards for emission control, and also set new servicing requirements. This manual contains pertinent information that should be carefully studied. Other vital emission information is also contained in the GS650G 1981 "X" MODEL Service Manual and should also be carefully reviewed.

NOTE:

1. How the manual is compiled.

- *This supplementary service manual lists only the points relating to maintenance work which differ from those applying to the GS650G/GL "X" model.*
- *However, in order to make this manual easier to use some parts have the same information as provided in the service manual (99500-36000-03E) for the GS650G model.*
- *Any differences in service data, service specifications and tightening torque tables with those that apply to the GS650G/GL "X" model are clearly indicated with an asterisk (*).*

2. How to use the manual.

- *Give precedence to this supplementary service manual when using it as the service manual for the GS650GZ/GLZ model.*
- *Refer to the service manual for details which are not given in this supplementary service manual.*

SUZUKI MOTOR CO., LTD.

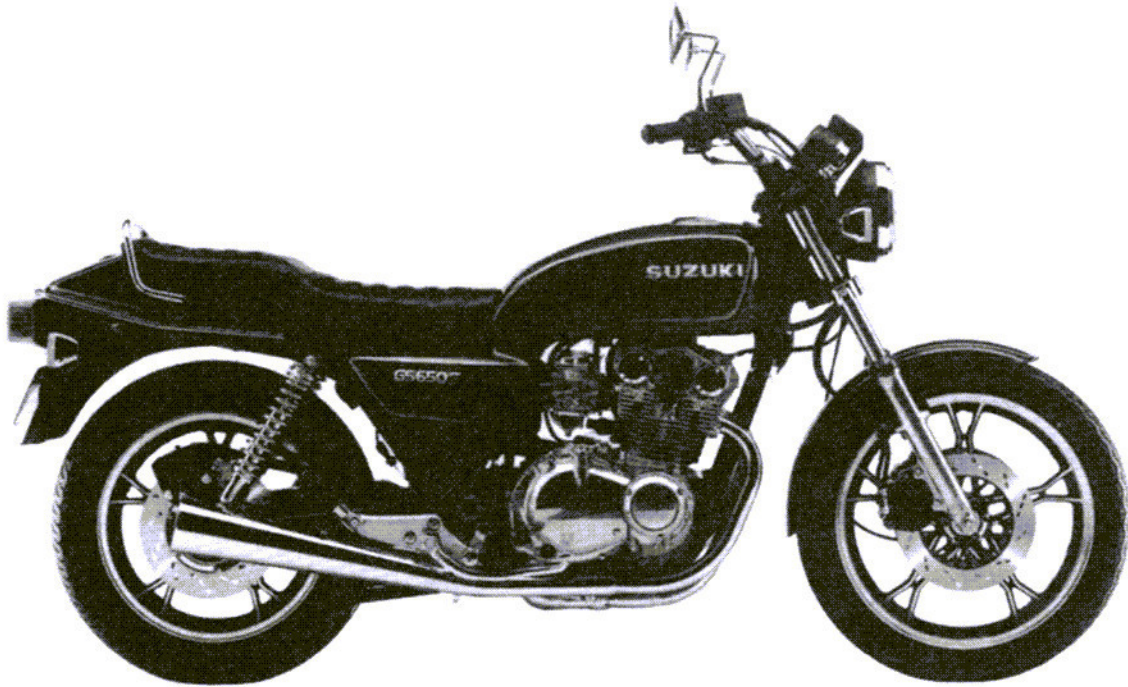
Administration Department
Overseas Service Division

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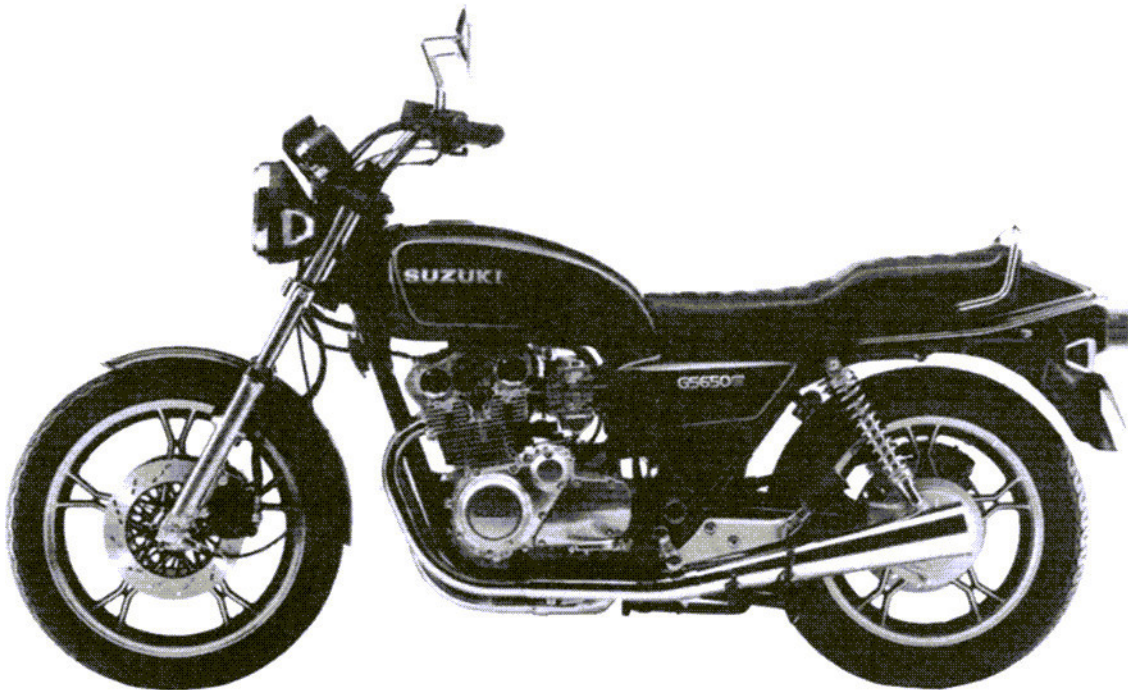
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VIEW OF SUZUKI GS650GZ



RIGHT SIDE



LEFT SIDE

SPECIFICATIONS

DIMENSIONS AND DRY MASS

Overall length	2 170 mm
Overall width.	830 mm
Overall height	1 175 mm
Wheelbase	1 440 mm
Ground clearance	160 mm
Dry mass	213 kg

ENGINE

Type	Four-stroke, air-cooled, DOHC
Number of cylinders	4
Bore	62.0 mm
Stroke	55.8 mm
Piston displacement.	673 cm ³
Compression ratio	9.4 : 1
Carburetor.	MIKUNI BS32SS, four
Air cleaner.	Polyurethane foam element
Starter system	Electric
Lubrication system	Wet sump

TRANSMISSION

Clutch	Wet multi-plate type
Transmission	5-speed constant mesh
Gearshift pattern.	1-down, 4-up
Primary reduction	1.956 (90/46)
Secondary reduction	0.941 (16/17)
Final reduction	3.090 (34/11)
Gear ratios, Low.	2.678 (36/14) x (25/24)
2nd	1.851 (32/18) x (25/24)
3rd	1.438 (29/21) x (25/24)
4th	1.171 (27/24) x (25/24)
Top	1.000 (Direct)
Drive system	Shaft drive

CHASSIS

Front suspension	Telescopic, pneumatic/coil spring, oil dampened
Rear suspension	Swing arm, oil dampened, damper 4-way/spring 5-way adjustable
Steering angle	40° (right & left)
Caster	26° 15'
Trail	113 mm
Turning radius	2.5 m
Front brake	Disc brake, twin
Rear brake	Disc brake
Front tire size	3.25H19 4PR
Rear tire size	4.25H17 4PR
Front tire pressure	175 kPa (1.75 kg/cm ²)(Normal solo riding)
Rear tire pressure	200 kPa (2.00 kg/cm ²)(Normal solo riding)
Front fork stroke	150 mm
Rear wheel travel	112 mm

ELECTRICAL

Ignition type	Transistorized
Ignition timing	10° B.T.D.C. below 1 650 r/min and 40° B.T.D.C. above 3 500 r/min
Spark plug	NGK D8EA or NIPPON DENSO X24ES-U
Battery	12V 50.4 kC (14 Ah)/10 HR
Generator	Three-phase A.C. generator
Fuse	10/10/10/10/15A

CAPACITIES

Fuel tank including reserve	16 L
reserve	4.5 L
Engine oil when changing	*2.9 L
Final bevel gear oil	200 – 220 ml
Front fork oil	210 ml

* Asterisk indicates new GS650GZ specification.

** These specifications are subject to change without notice.

SERVICE DATA

VALVE + GUIDE

Unit: mm

ITEM	STANDARD		LIMIT
Valve diam.	IN.	32.0	——
	EX.	27.0	——
Valve lift	IN.	7.2	——
	EX.	7.0	——
Tappet clearance (when cold)	IN. & EX.	0.03 – 0.08	——
Valve guide to valve stem clearance	IN.	0.025 – 0.055	0.35
	EX.	0.040 – 0.070	0.35
Valve guide I.D.	IN. & EX.	7.000 – 7.015	——
Valve stem O.D.	IN.	6.960 – 6.975	——
	EX.	6.945 – 6.960	——
Valve stem runout	IN. & EX.	——	0.05
Valve head thickness	IN. & EX.	——	0.5
Valve stem end length	IN. & EX.	——	4.0
Valve seat width	IN. & EX.	0.9 – 1.1	——
Valve head radial runout	IN. & EX.	——	0.03
Valve spring free length INTAKE	INNER	——	35.6
	OUTER	——	41.6
EXHAUST	INNER	——	* 35.0
	OUTER	——	* 40.5
Valve spring tension INTAKE	INNER	10.6 – 12.8kg at length 31mm	——
	OUTER	22.3 – 26.3kg at length 35mm	——
EXHAUST	INNER	11.0 – 13.0kg at length 31mm	——
	OUTER	22.1 – 25.9kg at length 35mm	——

* Asterisk mark indicates new GS650GZ specifications.

CAMSHAFT + CYLINDER HEAD

Unit: mm

ITEM	STANDARD		LIMIT
Cam height	IN.	35.485 – 35.515	35.190
	EX.	35.285 – 35.315	34.990
Camshaft journal oil clearance	IN. & EX.	0.032 – 0.066	0.150
Camshaft journal holder I.D.	IN. & EX.	22.012 – 22.025	—
Camshaft journal O.D.	IN. & EX.	21.959 – 21.980	—
Camshaft runout	IN. & EX.	—	0.10
Cam chain 20-pitch length	—		157.80
Cam chain (at arrow "3")	20th pin		—
Cylinder head distortion	—		0.2

CYLINDER + PISTON + PISTON RING

Unit: mm

ITEM	STANDARD	LIMIT
Compression pressure	10 – 14 kg/cm ²	7 kg/cm ²
Compression pressure difference	—	2 kg/cm ²
Piston to cylinder clearance	0.035 – 0.045	0.120
Cylinder bore	62.000 – 62.015	62.095
Piston diam.	61.960 – 61.975 Measure at 15 from the skirt end.	61.880
Cylinder distortion	—	0.2

Unit: mm

ITEM	STANDARD			LIMIT
Piston ring free end gap	1st	N	Approx. 7.5	6.0
		R	Approx. 7.5	6.0
	2nd	N	Approx. 9.5	7.6
		R	Approx. 9.5	7.6
Piston ring end gap	1st		0.10 – 0.30	0.70
	2nd		0.10 – 0.30	0.70
Piston ring to groove clearance	1st		—	0.18
	2nd		—	0.15
Piston ring groove width	1st		1.210 – 1.230	—
	2nd		1.210 – 1.230	—
	Oil		2.510 – 2.530	—
Piston ring thickness	1st		1.175 – 1.190	—
	2nd		1.170 – 1.190	—
Piston pin bore			16.002 – 16.008	16.030
Piston pin O.D.			15.995 – 16.000	15.980

CONROD + CRANKSHAFT

Unit: mm

ITEM	STANDARD	LIMIT
Conrod small end I.D.	16.010 – 16.018	16.040
Conrod big end side clearance	0.10 – 0.20	0.30
Conrod big end width	20.95 – 21.00	—
Crank pin width	21.10 – 21.15	—
Conrod big end oil clearance	0.024 – 0.048	0.080
Crank pin O.D.	33.976 – 34.000	—
Crankshaft journal oil clearance	0.020 – 0.044	0.080
Crankshaft journal O.D.	35.976 – 36.000	—
Crankshaft thrust clearance	0.1 – 0.3	0.5
Crankshaft journal holder width	21.8 – 21.9	—
Crankshaft journal width	22.0 – 22.1	—
Crankshaft runout	—	0.05

OIL PUMP

Unit: mm

ITEM	STANDARD	LIMIT
Oil pump reduction ratio	1.898 (90/46 x 33/34)	—
Oil pressure (at 60°C, 140°F)	Above 3.0 kg/cm ² Below 5.5 kg/cm ² at 3000 r/min.	—

CLUTCH

Unit: mm

ITEM	STANDARD	LIMIT
Clutch cable play	2 – 3	—
Drive plate thickness	2.7 – 2.9	2.4
Drive plate claw width	11.8 – 12.0	11.0
Driven plate thickness	2.00 ± 0.06	—
Driven plate distortion	—	0.1
Clutch spring free length	—	36.5

TRANSMISSION

Unit: mm

ITEM	STANDARD		LIMIT
Primary reduction ratio	1.956 (90/46)		—
Secondary reduction ratio	0.941 (16/17)		—
Final reduction ratio	3.090 (34/11)		—
Gear ratios	Low	2.678 (36/14) x (25/24)	—
	2nd	1.851 (32/18) x (25/24)	—
	3rd	1.438 (29/21) x (25/24)	—
	4th	1.171 (27/24) x (25/24)	—
	Top	1.000 (Direct)	—
Shift fork to groove clearance	0.10 – 0.30		0.50
Shift fork groove width	5.50 – 5.60		—
Shift fork thickness	5.30 – 5.40		—

SHAFT DRIVE

Unit: mm

ITEM	STANDARD		LIMIT
Secondary bevel gear backlash	0.08 – 0.13		——
Final bevel gear backlash	Drive side	0.03 – 0.64	——
	Driven side	0.02 – 0.35	——
Secondary driven bevel gear preload	4 – 7 kg-cm		——
Final drive bevel gear preload	4 – 8 kg-cm		——

CARBURETOR

Unit: mm

ITEM	SPECIFICATION
Carburetor type	MIKUNI BS32SS
Bore size	32
I.D. No.	* 34300
Idle r/min.	1 100 ± 50 r/min.
Fuel level	5.0 ± 1.0
Float height	22.4 ± 1.0
Main jet (M.J.)	# 110
Main air jet (M.A.J.)	2.0
Jet needle (J.N.)	5C45
Needle jet (N.J.)	Y-7
Throttle valve (T.V.)	# 135
Pilot jet (P.J.)	# 42.5
By pass (B.P.)	0.8, 0.7, 0.8
Pilot outlet (P.O.)	0.7
Valve seat (V.S.)	2.0
Starter jet (G.S.)	# 45
Pilot screw (P.S.)	PRE-SET
Pilot air jet (P.A.J.)	# 160
Throttle cable play	0.5 – 1.0
Choke cable play	0.5 – 1.0

* Asterisk mark indicates new GS650GZ specifications.

ELECTRICAL

Unit: mm

ITEM	SPECIFICATION		NOTE
Ignition timing	10° B.T.D.C. Below 1650 ± 100 r/min. and 40° B.T.D.C. Above 3500 ± 100 r/min.		
Firing order	1. 2. 4. 3.		
Spark plug	Type	NGK : D8EA or ND : X24ES-U	
	Gap	0.6 – 0.7	
Spark performance	Over 8 at 1 atm		
Signal coil resistance	G – BI : Approx. 250 – 360 Ω		
Ignition coil resistance	Primary	Terminal – Terminal Approx. 3 – 5 Ω	
	Secondary	Plug cap – Plug cap Approx. 30 – 35 kΩ	
Generator no-load voltage	More than 80 V (AC) at 5000 r/min.		
Regulated voltage	14.0 – 15.5 V at 5000 r/min.		
Starter motor	Brush length	Limit: 6	N.D.
	Commutator under cut	Limit: 0.2	
Starter relay resistance	Approx. 3 – 4 Ω		
Battery	Type designation	YB14L - A2	
	Capacity	12V,50.4kC(14Ah)/10HR	
	Standard electrolyte S.G.	1.28 at 20°C (68°F)	
Fuse size	Main	15 A	
	Headlight	10 A	
	Signal	10 A	
	Ignition	10 A	
	Output terminal	10 A	

BRAKE + WHEEL

Unit: mm

ITEM	STANDARD		LIMIT
Rear brake pedal height	20		—
Brake disc thickness	Front	5.0 ± 0.2	4.5
	Rear	6.7 ± 0.2	6.0
Brake disc runout	—		0.30
Master cylinder bore	Front	15.870 – 15.913	—
	Rear	14.000 – 14.043	—
Master cylinder piston diam.	Front	* 15.811 – 15.838	—
	Rear	13.957 – 13.984	—
Brake caliper cylinder bore	Front	38.180 – 38.256	—
	Rear	38.180 – 38.256	—
Brake caliper piston diam.	Front	38.098 – 38.148	—
	Rear	38.098 – 38.148	—
Wheel rim runout	Axial	—	2.0
	Radial	—	2.0
Wheel axle runout	Front	—	0.25
	Rear	—	0.25
Tire size	Front	3.25H19 4PR, tubeless	—
	Rear	4.25H17 4PR, tubeless	—
Tire tread depth	Front	—	1.6
	Rear	—	2.0

* Asterisk mark indicates new GS650GZ specifications.

SUSPENSION

Unit: mm

ITEM	STANDARD		LIMIT
Front fork stroke	150		—
Front fork spring free length	Short	—	105
	Long	—	401
Front fork oil level	165		—
Front fork air pressure	50 kPa 0.5 kg/cm ²		—
Rear wheel travel	113		—

FUEL + OIL

ITEM	SPECIFICATION		
Fuel type	Use only unleaded or low-lead type gasoline of at least 85 – 95 pump octane ($\frac{R+M}{2}$ method) or 89 octane or higher rated by the Research Method.		
Fuel tank including reserve	16 L		
reserve	4.5 L		
Engine oil type	SAE 10W/40		
Engine oil capacity	Change	* 2 900 ml	on and after E/No. 136795 ~
	Filter change	* 3 600 ml	
	Overhaul	* 4 100 ml	
Front fork oil type	Fork oil SAE # 15		
Front fork oil capacity (each leg)	210 ml		
Final bevel gear oil type	Hypoid gear oil SAE # 90, API Grade GL-5		
Final bevel gear oil capacity	200 – 220 ml		
Brake fluid type	DOT3 or DOT4		

* Asterisk mark indicates new GS650GZ specification.

TIRE PRESSURE

COLD INFLATION TIRE PRESSURE	NORMAL RIDING						CONTINUOUS HIGH SPEED RIDING					
	SOLO RIDING			DUAL RIDING			SOLO RIDING			DUAL RIDING		
	kPa	kg/cm ²	psi	kPa	kg/cm ²	psi	kPa	kg/cm ²	psi	kPa	kg/cm ²	psi
FRONT	175	1.75	25	175	1.75	25	200	2.00	28	200	2.00	28
REAR	200	2.00	28	250	2.50	36	225	2.25	32	280	2.80	40

WATTAGE

W(cp)

ITEM		SPECIFICATION
Headlight	HI	60
	LO	55
Tail/Brake light		8/23 (3/32)
Turn signal light		23 (32)
Speedometer light		3.4
Tachometer light		3.4
Turn signal indicator light		3.4
High beam indicator light		3.4
Neutral indicator light		3.4
Oil pressure indicator light		3.4
Gear position indicator light		1.4
Fuel meter light		* 1.7

EMISSION REGULATIONS

On February 4, 1977, Federal Emission Regulations for motorcycles that may be licensable took effect. The regulations provided for a gradual, multi-step application of stricter emission limits beginning with all effected motorcycles manufactured after January 1, 1978, culminating with the present 1980 emission level restrictions. For the 1980 and succeeding years one set of emission limits will be in effect. They are as follows:

1980 EMISSION LIMITS

CATEGORIES	HYDROCARBONS (HC)	CARBON MONOXIDE
All motorcycles 50 cc — Larger	5.0 Grams/Kilometer (8.0 Grams/Mile)	12 Grams/Kilometer (19.3 Grams/Mile)

Emission-controlled motorcycles which are subject to the emission regulations are those motorcycles which are equipped with a headlight, taillight, stop light and which have an engine displacement larger than 50 cc.

Suzuki Motor Company performed all the necessary testing and certification of emission-controlled models in strict compliance with the E.P.A. testing regulations. Suzuki motorcycle dealers are not required to either test or certify emission levels on any motorcycles as Suzuki Motor Company is legally responsible for the entire certification procedure.

E.P.A. regulations also provide fines for individuals who alter, render inoperative or improperly service emission-controlled motorcycles ranging up to \$10,000.00 per motorcycle. It is essential that the individual servicing this emission-controlled motorcycle review thoroughly all the service procedures presented in this manual. Under no circumstances should the recommended service procedures be deviated from nor adjustments made which are not in accordance with the factory specifications or service procedures.

EMISSION CONTROL CARBURETOR COMPONENTS

GS650G/GL motorcycles are equipped with precision, manufactured carburetors for emission level control. These carburetors require special mixture control components and other precision adjustments to function properly.

There are several carburetor mixture control components in each carburetor assembly. Three (3) of these components are machined to much closer tolerances than standard machined carburetor jets. These three (3) particular jets – MAIN JET, NEEDLE JET, PILOT JET – must not be replaced by standard jets. To aid in identifying these three (3) jets a different design of letter and number are used. If replacement of these close tolerance jets becomes necessary, be sure to replace them with the same type close tolerance jets marked as in the examples shown below.

The jet needle is also of special manufacture. Only one clip position is provided on the jet needle. If replacement becomes necessary the jet needle may only be replaced with an equivalent performing replacement component. Suzuki recommends that Genuine Suzuki Parts be utilized whenever possible for the best possible performance and durability.

Conventional Figures Used on Standard Tolerance Jet Components	1 2 3 4 5 6 7 8 9 0
Emission Type Figures Used On Close Tolerance Jet Components	<i>1 2 3 4 5 6 7 8 9 0</i>

The carburetor specification for the emission-controlled GS650G are as follows.

Carburetor I.D. No.	Main Jet	Needle Jet	Jet Needle	Pilot Jet	Pilot Screw
34300	#110	Y-7	5C45	#42.5	PRE-SET DO NOT ADJUST

The pilot screw is pre-set by the factory utilizing specialized testing and adjusting procedures. The pilot screw is not adjustable as the idle circuit is "sealed" after factory adjustment. Adjusting, interfering with, improper replacement, or resetting of any of the carburetor components may adversely affect carburetor performance and cause the motorcycle to exceed the exhaust emission level limits. If persons, who are unaware of these special carburetor servicing requirements tamper with the carburetors the Suzuki dealer should restore the carburetors to their original condition or if unable to effect repairs, contact the distributors representative for further technical information and assistance.

GENERAL EMISSION INFORMATION

There are three different types of regulated exhaust emissions. They are:

- Hydrocarbons (HC)
- Carbon Monoxide (CO)
- Oxides of Nitrogen (NOx)

Automobiles must meet specific emission standards for all three of these pollutants. Motorcycles must only meet the requirements for the following:

- Hydrocarbons (HC)
- Carbon Monoxide (CO)

HC exhaust emissions are basically unburned fuel vapors which have passed through the engine and escaped the combustion process.

CO exhaust emissions are formed during an incomplete combustion cycle as a result of a rich air/fuel mixture. The only way that CO can be produced is by the combustion cycle.

Total NOx emissions from all motorcycles is considered negligible. The EPA states that total NOx emission from motorcycles by 1980 will only amount to approximately 0.5%. NOx is formed during the combustion process at high combustion chamber temperatures.

CARBON MONOXIDE

Carbon monoxide is a product of an incomplete combustion cycle. CO is measured in grams per mile or kilometer and also in percentage (%).

The most common cause of CO is rich carburetion. As the mixture is richened excessively, the CO amount increases proportionately. Engine oil is also a hydrocarbon, so engine problems which lead to oil burning increase carbon monoxide.

CARBURETION MALFUNCTION

1. Air Cleaner — Dirty or over oiled.
2. Idle Mixture — Adjusted incorrectly.
3. Idle Speed — Too high or low.
4. Fuel Level — Sticking float, leaking needle, incorrect setting.
5. Choke — Leaking or linkage sticking.
6. Synchronization — Improper balance on multi cylinders.

ENGINE MALFUNCTION

1. Valve Seals — Leaking or torn.
2. Valve Guide — Worn and leaking excess oil.
3. Gaskets — Leaking oil into combustion chamber.

HYDROCARBONS

Hydrocarbons are unburnt gasoline vapors and can be measured in two different ways. The first is to measure the weight of the pollutants over a specific distance such as grams per mile or grams per kilometer. The second method is to measure the concentration of HC in the exhaust gas in parts per million (PPM).

The most common cause of high HC emissions are ignition system problems. If the ignition system fails to ignite the fuel mixture properly, then raw gasoline vapors will pass through the engine into the exhaust system. Listed are the most common ignition problems which occur and which can affect HC emission output.

IGNITION SYSTEM MALFUNCTIONS

1. Spark Plugs — Fouled, dirty, improper type or improperly gapped.
2. Ignition Timing — Advanced or Retarded.
3. Timing Advance — Too fast or too slow an advance rate.
4. Battery — Low charge or faulty.

Carburetion can also lead to high HC emissions if the mixture is either excessively rich or excessively lean.

MIXTURE-RELATED MALFUNCTIONS

1. Air Cleaner — Dirty, over oiled or torn.
2. Jets — Clogged, restricted or incorrect size.
3. Float Level — Level too low (lean) or too high (rich).
4. Choke — Leaking choke plunger or sticking linkage.
5. Air Leaks — Intake manifolds, engine gaskets and other sealing surfaces.
6. Synchronization — Unbalanced on multi-cylinder machines.
7. Exhaust System — Restricted flow or improper exhaust system.

Engine wear or damage can also cause high HC emissions.

1. Rings — Low compression, leakage into crankcase.
2. Valves — Improper adjustment, bent stem or burnt.
3. Gaskets — Leaking, loss of compression.
4. Crank Seals — Leaking.
5. Oil Consumption — Worn valve guides, worn rings, clogged crankcase breather.
6. Oil — Improper engine oil.

PERIODIC MAINTENANCE SCHEDULE

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

NOTE:

Vehicles operated under severe conditions may require more frequent servicing.

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

PERIODIC MAINTENANCE CHART

INTERVAL: THIS INTERVAL SHOULD BE JUDGED BY ODOMETER READING OR MONTHS WHICHEVER COMES FIRST	mile	600	4 000	7 500	11 000	15 000
	km	1 000	6 000	12 000	18 000	24 000
	month	2	12	24	36	48
Battery (Specific gravity of electrolyte)	—	I	I	I	I	I
Cylinder head nuts & exhaust pipe bolts	T	T	T	T	T	T
Air cleaner element	—	C	C	C	C	C
Tappet clearance	I	I	I	I	I	I
Spark plugs	—	C	R	C	R	R
Fuel line	Replace every four years.					
Engine oil & oil filter	R	R	R	R	R	R
Carburetor idle rpm*	I	I	I	I	I	I
Final driven gear oil	R	—	R	—	R	R
Brake hose	Replace every two years.					
Front fork	—	—	I	—	I	I
Check air pressure every 6 months.						

NOTE: T = Tighten, I = Inspect, R = Replace, C = Clean

* = The specified idle rpm appears on the vehicle emission control information label.

MODIFICATIONS

The following number of refinements have been carried out on the GS650GZ (1982 model) and new mechanisms adopted.

1. Handling ease has been improved by moving the choke lever position from its location on the steering stem head to the left handlebar. The carburetor has been modified, slightly.

This modification is also applicable to the GLZ model.

2. The engine cover screws have been replaced with bolts and the following special tools have been newly provided for extra convenience in mounting and removal.

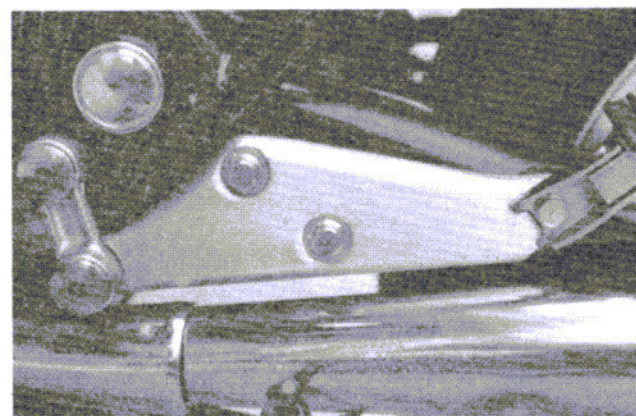
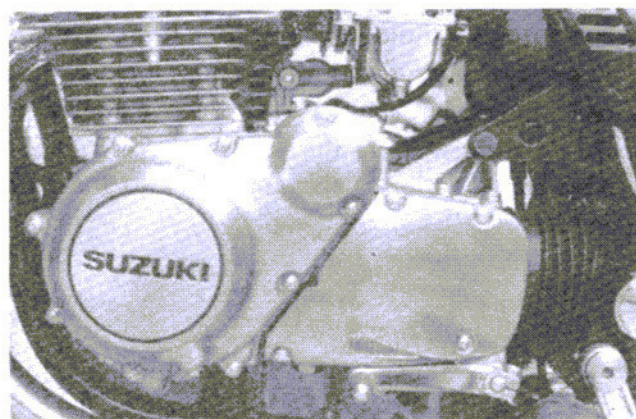
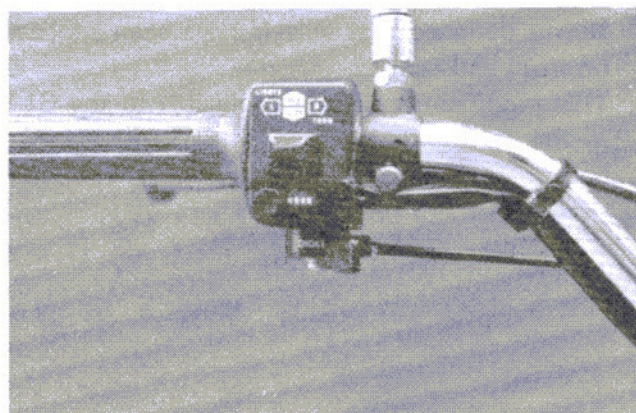
This modification is also applicable to the GLZ model.

09900-06711	T-type box wrench (6-mm)
09900-00302-015	T-type box wrench (7-mm)

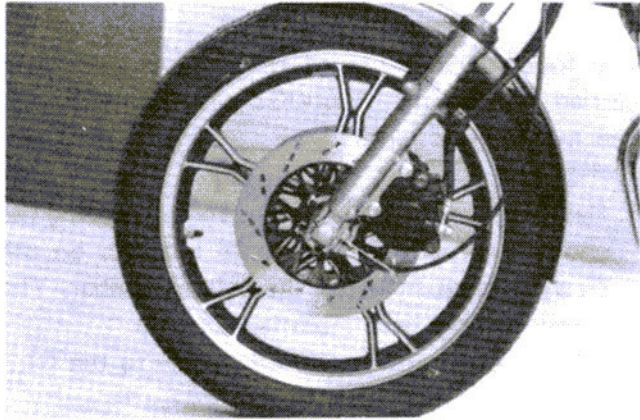
3. A fuel level gauge has been adopted and a fuel meter added so that the remaining amount of fuel can be seen at a glance. Along with the adoption of the fuel level gauge, the position of the fuel cock has been moved to the front.

4. The chrome plating iron which was used as the material for the muffler mounting bracket has been replaced with aluminum.

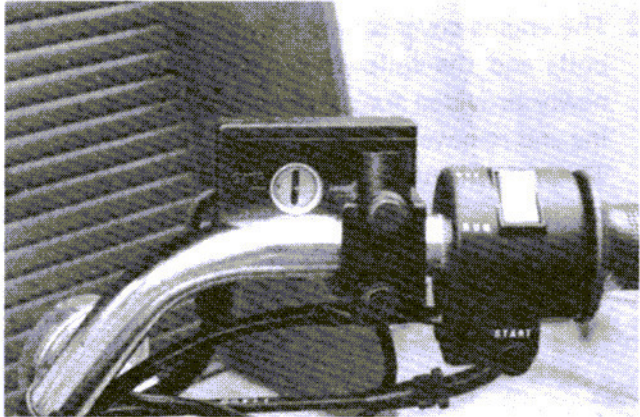
This modification is also applicable to the GLZ model.



5. Newly designed cast wheels have been adopted on front and rear.
This modification is also applicable to the GLZ model.



6. Front brake fluid reservoir has been changed from a plastic type to an aluminum type. A fluid level inspection window has been installed so that it is easier to see the fluid level.
This modification is also applicable to the GLZ model.

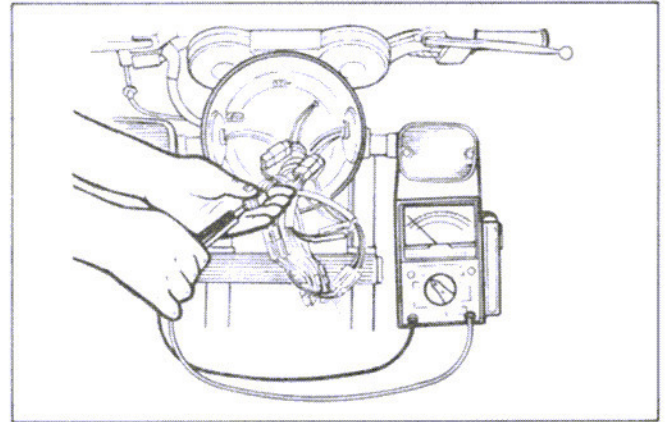


INSTRUMENT/METER LIGHTS

NOTE:

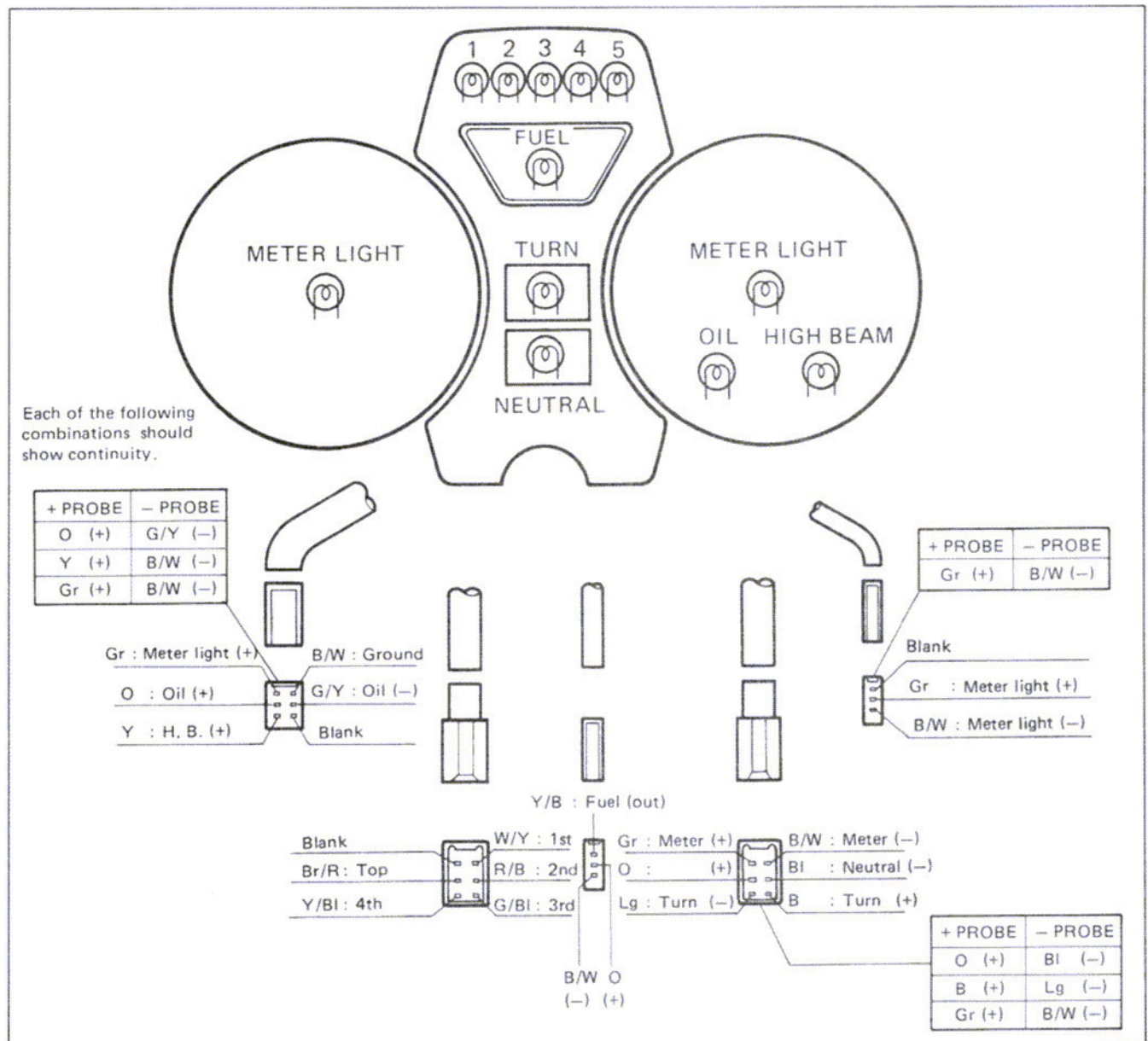
When making this test, it is not necessary to remove the combination meter.

Using the pocket tester, check the continuity between lead wires in the following diagram. If continuity is not present, replace the respective part. This inspection is also applicable to the GLZ model.



09900 - 25002

Pocket tester



COIL TYPE FUEL GAUGE

As shown in Fig.1, coils N_1 , N_2 , N_3 and N_4 are set in the fuel gauge. When the ignition switch is ON, the float in the tank is displaced in proportion to the change in the amount of gasoline, the resistance of the fuel gauge sending unit varies, currents I_1 and I_2 vary, strength of the magnetic field generated by the coils vary, compound vector H (Fig.2) varies, and the magnet of the fuel gauge rotates to deflect the pointer.

Even when the ignition is turned off, the pointer remains in the position where it was when the switch was ON. This function is displayed by using high-viscosity oil and a balanced magnet.

FUEL LEVEL SYSTEM

The Fuel Level System can be divided into two sections:

- (1) The Fuel Meter : Located in the instrument cluster
- (2) The Fuel Tank Float Assembly (Fuel gauge sending unit)

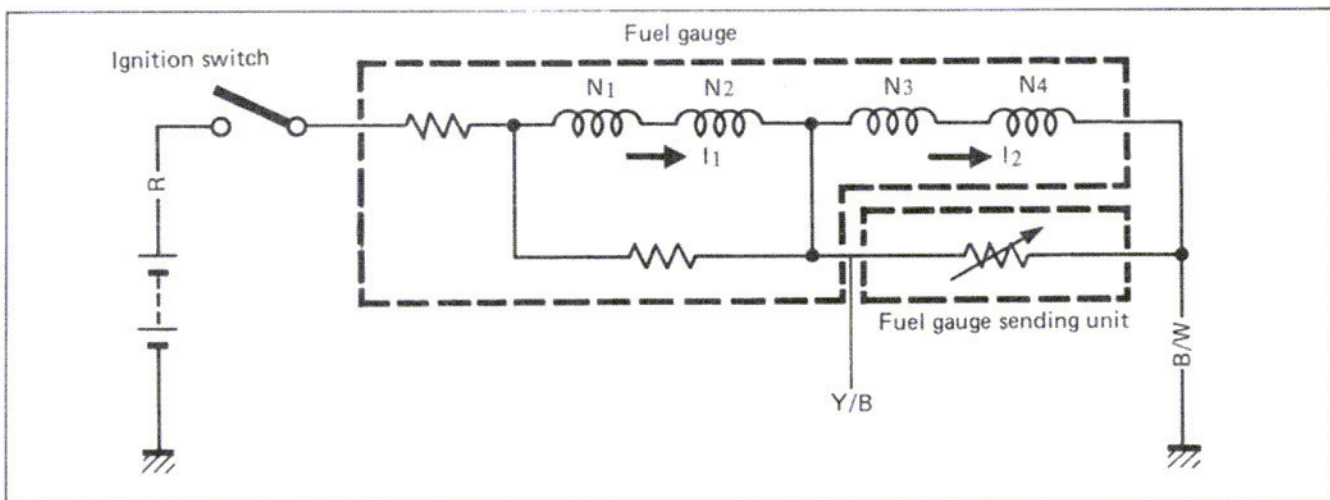


Fig 1

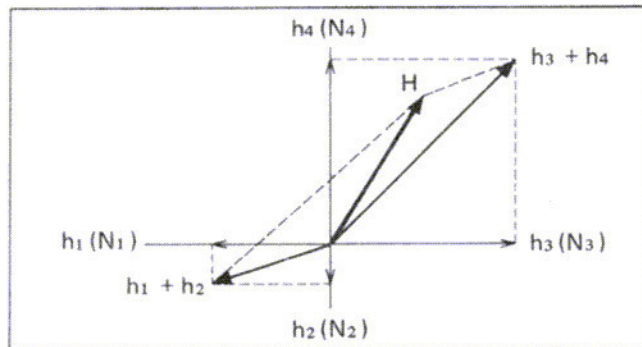
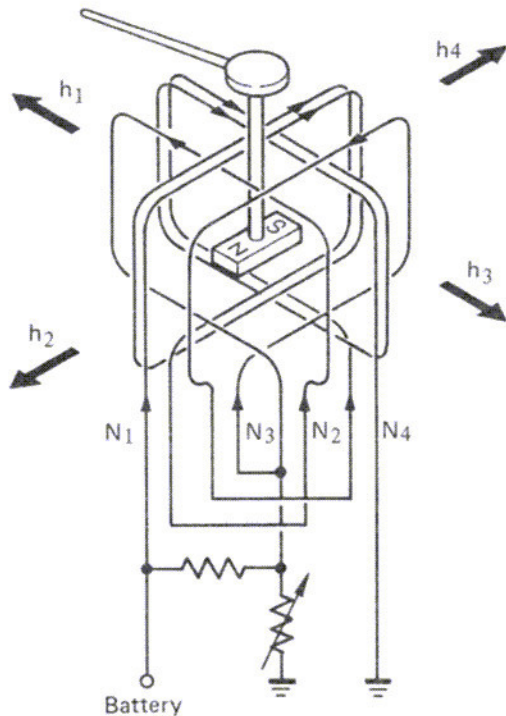


Fig 2

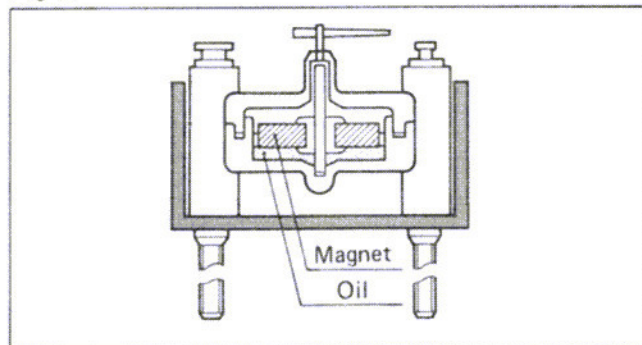


Fig 3

NOTE:

Prior to testing the Fuel Level System, verify that the battery is in a fully charged condition.

FUEL METER

To test the Fuel Meter two different checks may be used. The first, and simplest test will tell if the meter is operating but will not indicate the meters accuracy throughout the range.

To perform this test, disconnect the B/W and Y/B wires going to the Fuel Tank Float Assembly. Connect a jumper wire between the B/W and Y/B wires coming from the main harness. With the ignition switch turned on, the fuel meter should indicate "F".

The second test will check the accuracy of the meter in the full and empty positions.

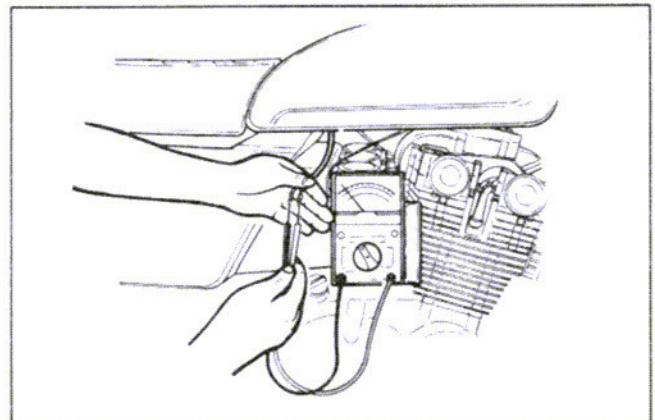
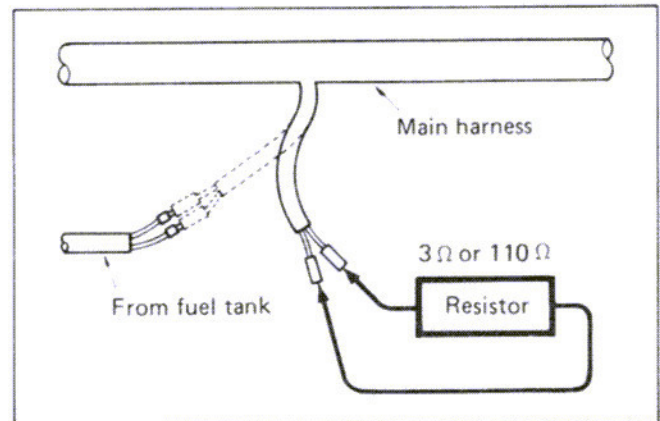
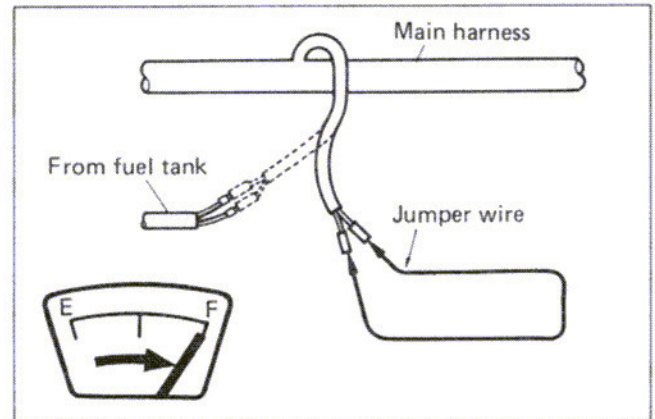
Disconnect the B/W and Y/B wires which connect to the Float Assembly and install a 3Ω resistor between the two leads coming from the main harness. Turn the ignition switch on and the fuel meter should indicate "F". Remove the 3Ω resistor and install a 110Ω resistor in its place and the fuel meter should indicate "E".

If the fuel meter does not read as perscribed above, replace the meter.

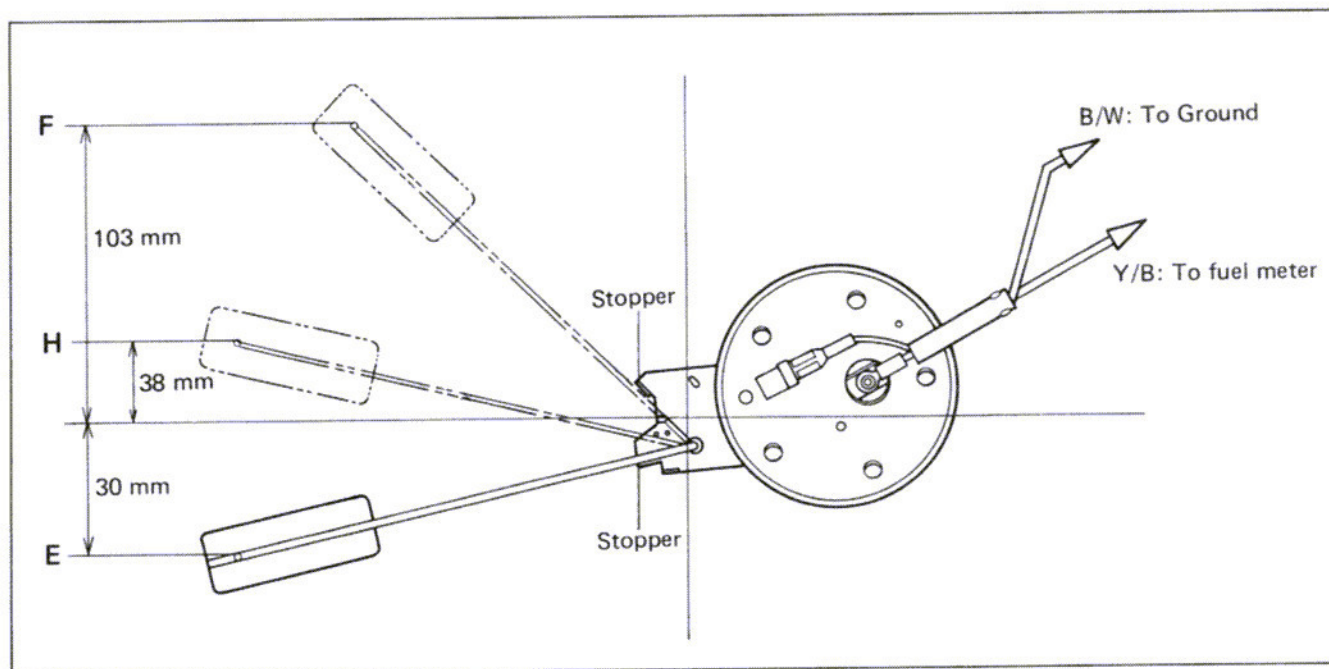
**FUEL TANK FLOAT ASSEMBLY
(FUEL GAUGE SENDING UNIT)**

To check the variable resistor in the Float Assembly, disconnect the two wires (B/W – Y/B) coming out of the Float Assembly. Using the Pocket tester, measure the resistance in each of the following positions:

09900-25002	Pocket Tester
FLOAT POSITION	RESISTANCE
Full	Approx. 3Ω
1/2	Approx. 32.5Ω
Empty	Approx. 110Ω



If the resistance measured is incorrect, replace the Float Assembly.



OIL PUMP

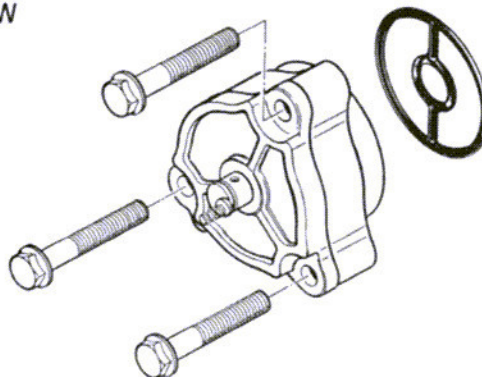
The three screws used to secure the oil pump to the crankcase have been replaced with three bolts. In addition, the three screws that were utilized to secure the oil pump cover to the housing have been eliminated and the three bolts now retain the entire assembly. The tightening torque for the oil retaining bolts is as follows:

Tightening torque	7 – 9 N·m (0.7 – 0.9 kg-m)
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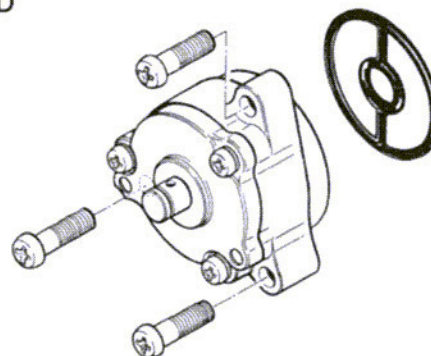
CAUTION:

- * Never disassemble the oil pump. No replacement parts are available for the oil pump. It is available only as an assembled unit for replacement.
- * When replacing the oil pump with a new unit, be sure to replace the O-ring also.

NEW



OLD



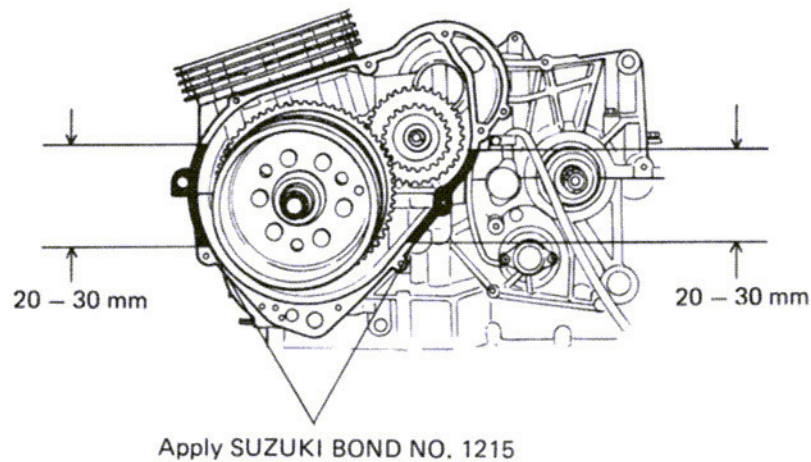
CLUTCH COVER AND GENERATOR COVER

When reinstalling the clutch cover and the generator cover of all GS650G/GL models, be sure to replace the gaskets with new ones.

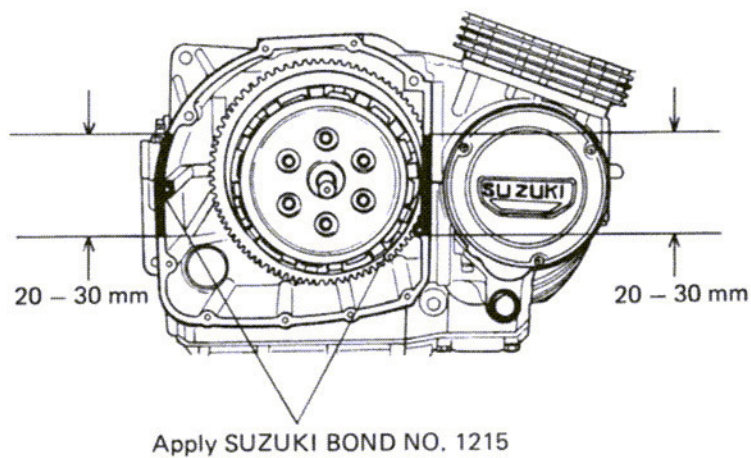
At the same time, do not forget to apply SUZUKI BOND No.1215 on the surfaces shown below.

99104 - 31110	SUZUKI BOND NO.1215
---------------	---------------------

GENERATOR COVER SIDE



CLUTCH COVER SIDE



CRANKSHAFT JOURNAL BEARING AND CONROD BIG END BEARING

SUBJECT: CHANGE OF CONROD BIG END BEARING AND CRANKSHAFT JOURNAL BEARING
APPLICABLE MODEL: GS650G/GL
EFFECTIVE ENGINE OR FRAME NO.: GS650G/GL E/NO. 122709 ~
REFERENCE:

Further improvement in material for longer durability has been applied to the conrod bearing of one-piece forged crankshaft for models GS650G/GL. At the same time the location of crankshaft journal bearing has been changed to facilitate the oil distribution for a more effective lubrication.

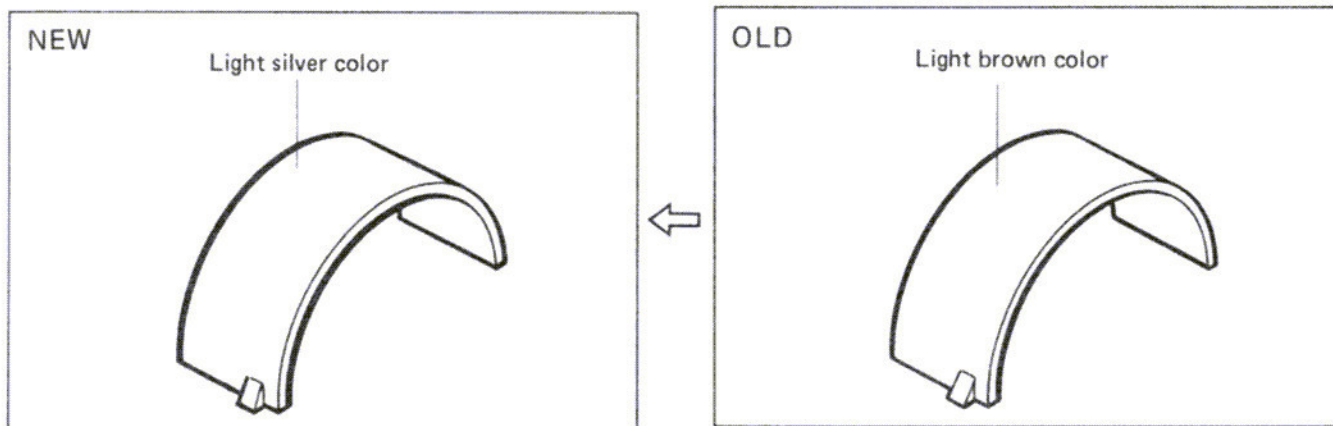
CONROD BIG END BEARING

The material of the conrod big end bearing has been changed to a copper based type from an aluminum based one to increase its durability. The surface of this new type of copper based bearing is plated with a light silver metallic color. A new bearing can be distinguished from early bearing by its light silver color on the back surface. When replacing conrod big end bearings, all the bearings, No.1 conrod bearings through No.4, should be replaced with the new type.

PART SUPPLY DATA FOR CRANKSHAFT JOURNAL BEARING

MODEL	OLD PART NO.	NEW PART NO.
GS650G/GL/GT	-010	-010
	-020	-020
	-030	-030
	-040	-040
	12164 - 34201	12164 - 34210

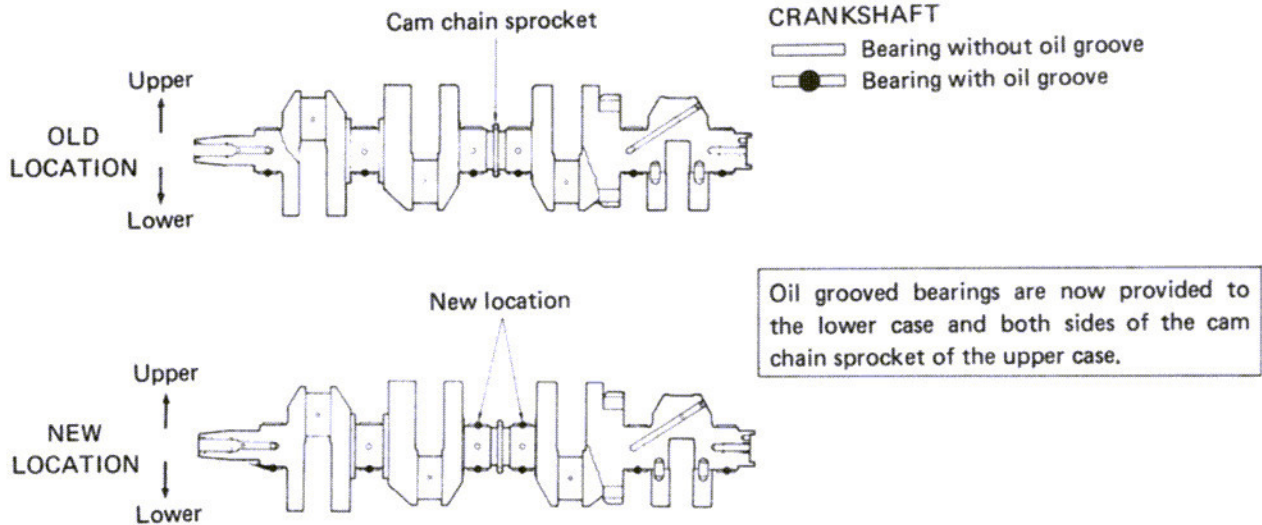
Four different sizes of bearing are provided as a standard size to each of above mentioned big end bearings, and also two sizes, 0.25 mm and 0.50 mm, are available as an under-size.



CRANKSHAFT JOURNAL BEARING

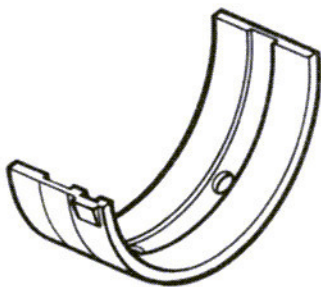
1981 GS650G/GL models were equipped with non grooved bearings in the upper crankcase position and oil grooved bearings in the lower crankcase. To improve oil distribution and provide better lubrication, oil grooved bearings are now utilized in the upper crankcase bearings located on each side of the cam chain sprocket.

When overhauling an engine which has not been modified to this configuration, the bearings should be changed as noted.

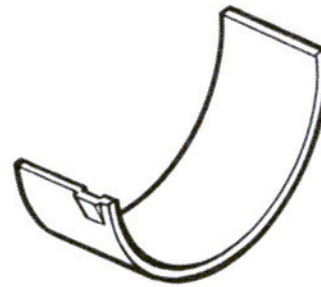


When replacing crankshaft journal bearings, it is necessary to replace the pair of bearings, but make sure, to always identify the two types of bearings, and to place them in the proper position. Care must be taken when installing the bearing which does not have an oil groove. If it were placed to the lower crankcase, this would disturb the proper oil distribution and as a result cause damage to the internal engine parts.

OIL GROOVED BEARING



NO OIL GROOVED BEARING



PART SUPPLY DATA FOR CRANKSHAFT JOURNAL BEARING

MODEL	NO OIL GROOVED BEARING	OIL GROOVED BEARING
GS650G/GL	-010	-010
	12229 - 45410 -020	12229 - 45400 -020
	-030	-030
	-040	-040

Four different sizes of bearing are provided as a standard size to each of above mentioned journal bearings, and also two sizes, 0.25 mm and 0.50 mm, are available as an under-size.

CAUTION:

- * When changing any conrod big end bearing, and crankshaft journal bearing to new one, make it a rule to check the I.D. code number printed or stamped on the crank web, conrod, and crankcase. Select the specified size of bearing, and install properly as explained in the service manual.
- * Apply SUZUKI Moly Paste to each journal bearing lightly.
- * Please inform your customers to maintain the following engine r/min limit, whenever changing new bearing.

Up to 1 000 km Below 4 000 r/min.

Up to 2 000 km Below 5 000 r/min.

The above modifications have been completed on and after the following engine numbers.

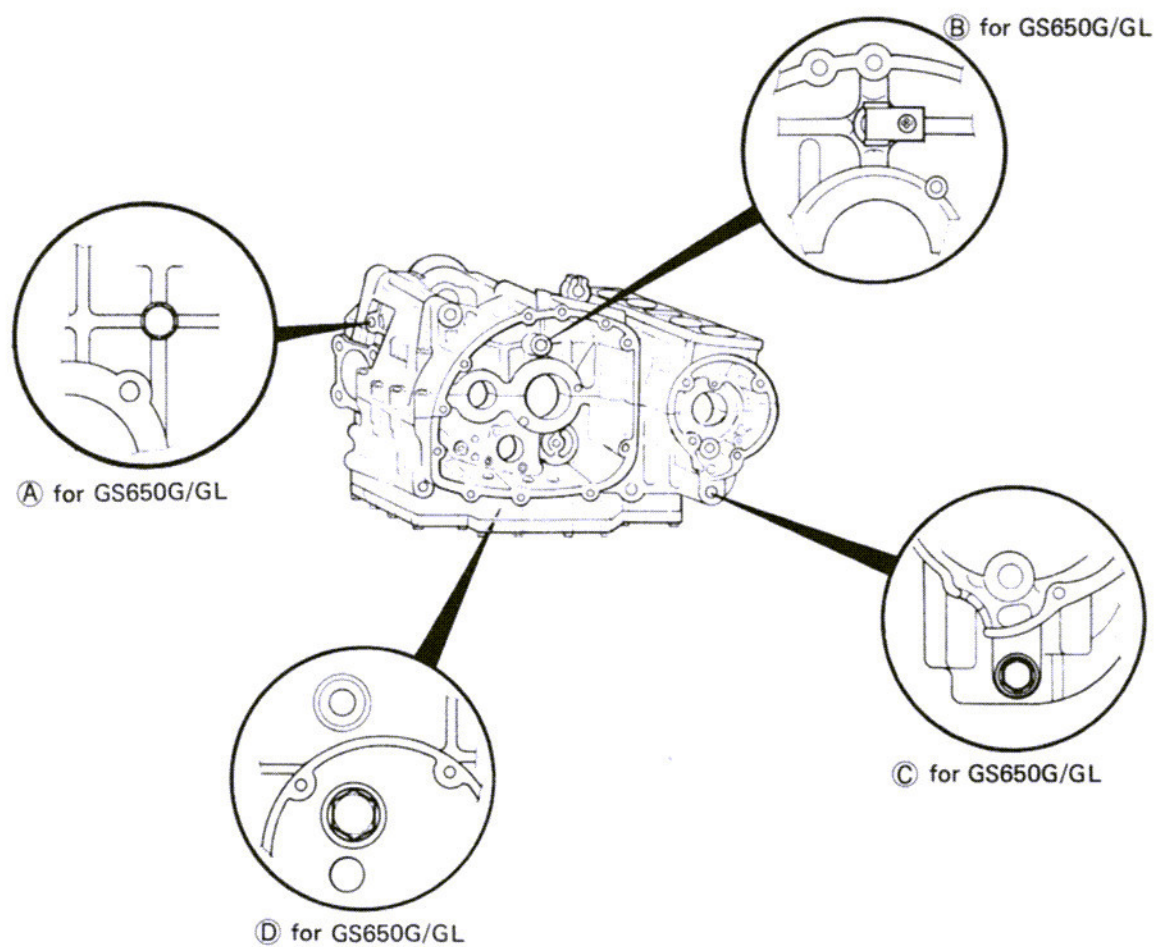
GS650G/GL E/NO. 122709 ~

OIL GALLERY PLUG STOPPER

All oil stopper plugs in the lubrication compartment of the crankcases of models GS650G/GL are to be covered by locking plates.

Please take notice of the following remarks on each respective position, when reinstalling each locking plate together with its bolt.

Below are the illustration of the modified area.

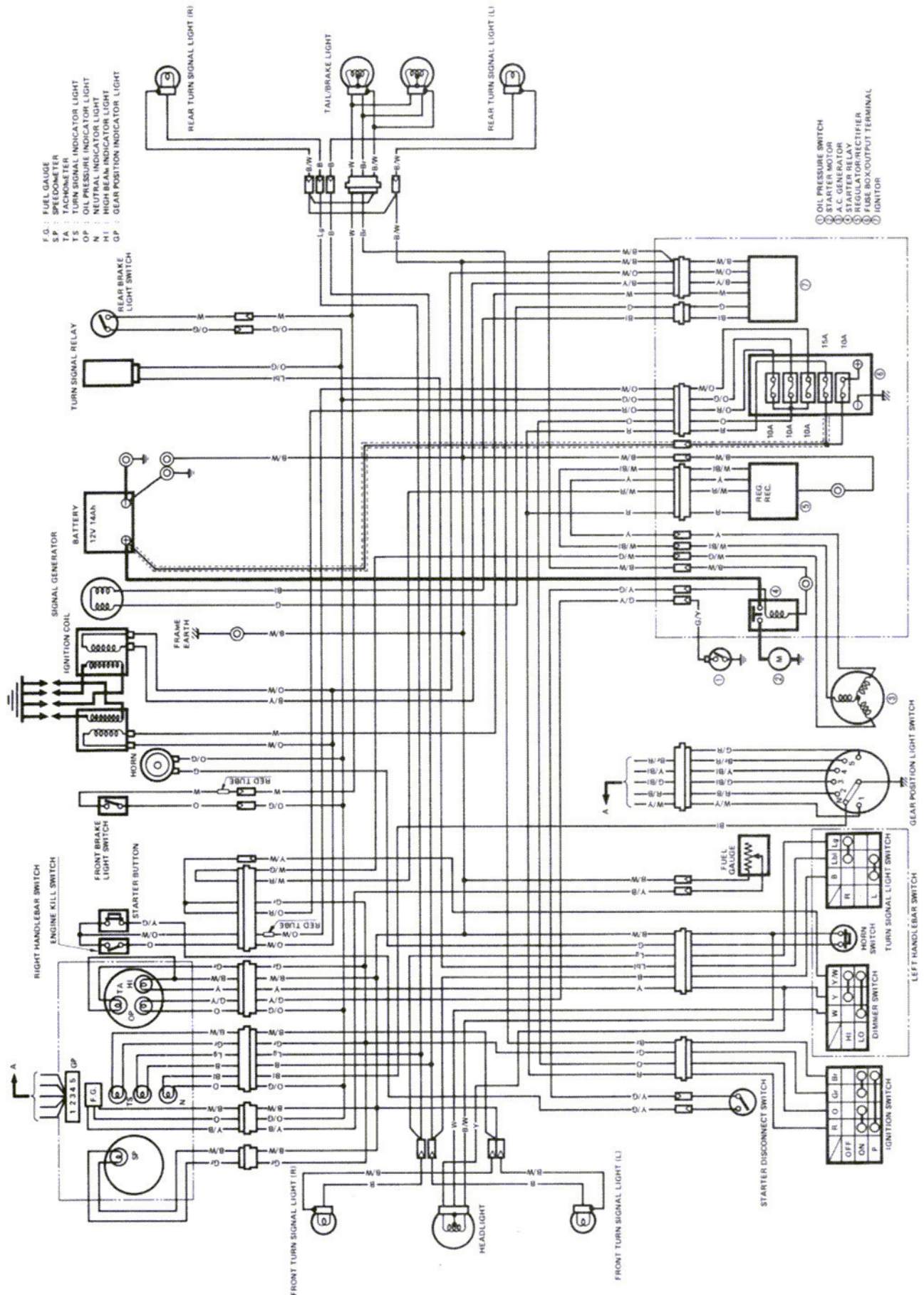


POSITION	REMARKS
A	Tightening torque for 12 mm bolt is 25 – 35 N·m (2.5 – 3.5 kg-m).
B	Apply thread lock “1342” to the screw and locate the plate properly.
C	Tightening torque for 18 mm bolt is 35 – 45 N·m (3.5 – 4.5 kg-m).
D	Tightening torque for 16 mm bolt is 35 – 45 N·m (3.5 – 4.5 kg-m).

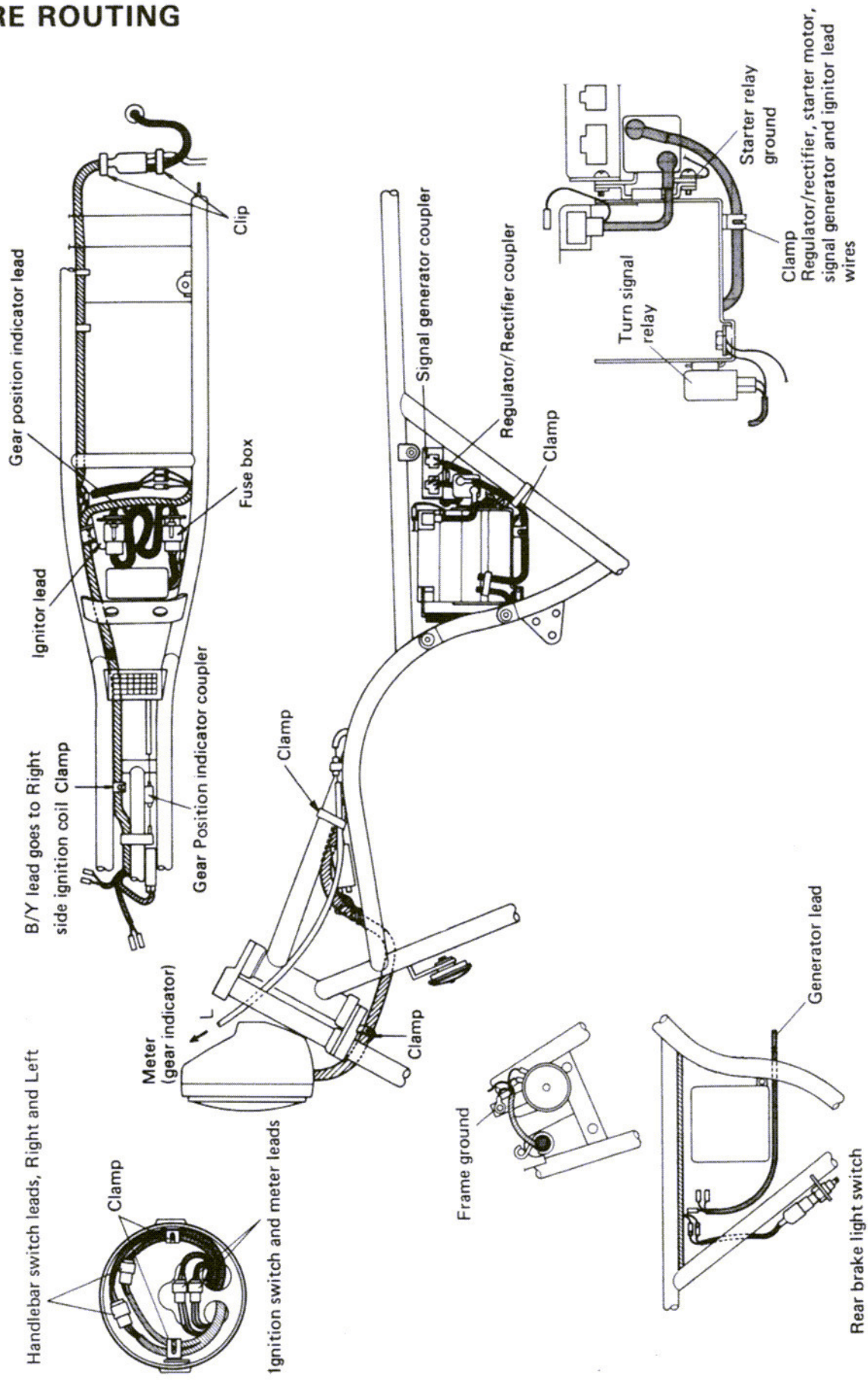
PART SUPPLY DATA

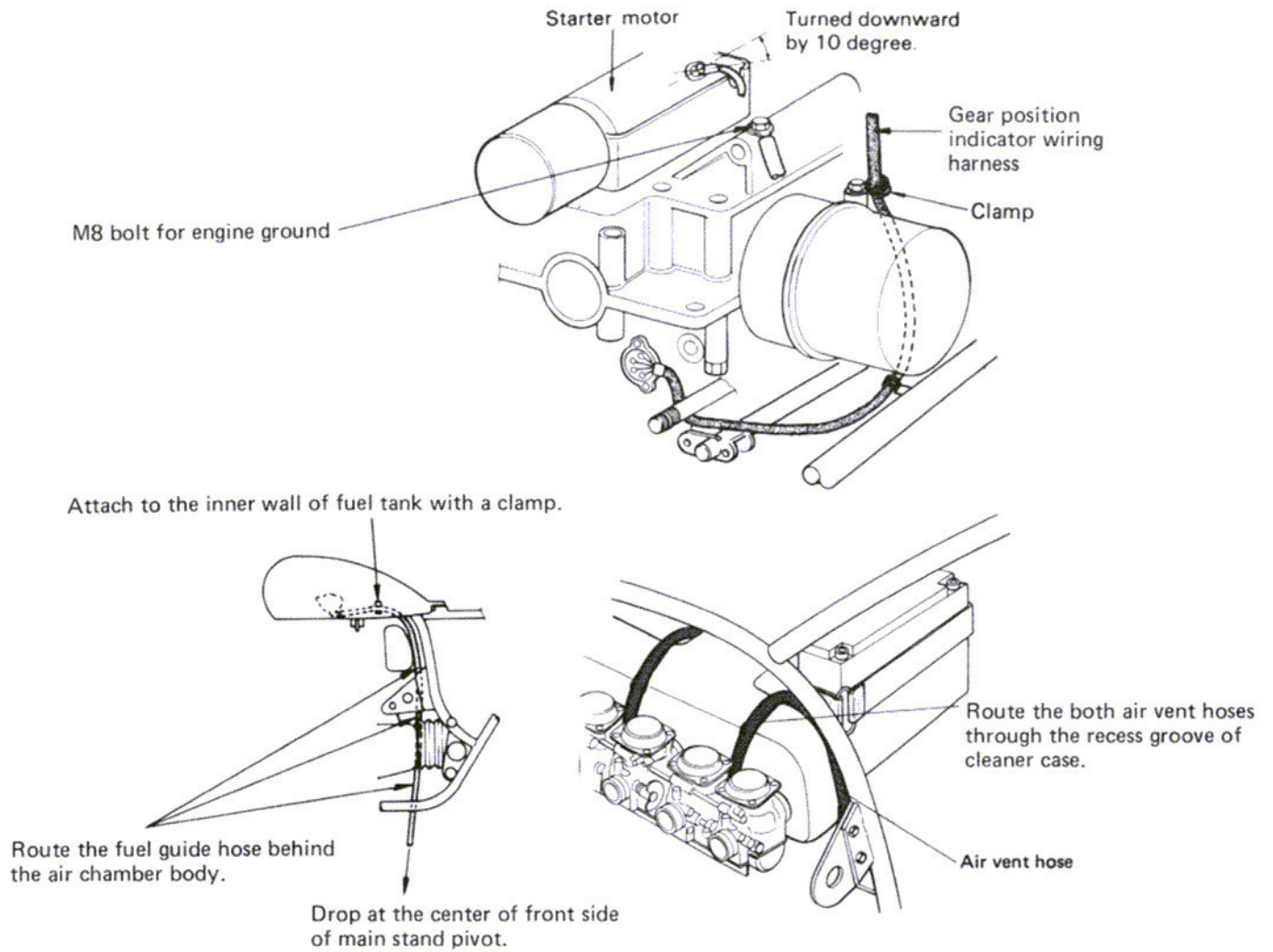
POSITION	PART NO.	PART NAME
A	09247 - 12005	Bolt (12 mm)
	09168 - 12002	Gasket
B	11319 - 34200	Plate
	02122 - 06168	Screw
C	09247 - 18001	Bolt (18 mm)
	09280 - 18004	O-ring
D	09247 - 16002	Bolt (16 mm)
	09168 - 16002	Gasket

WIRING DIAGRAM

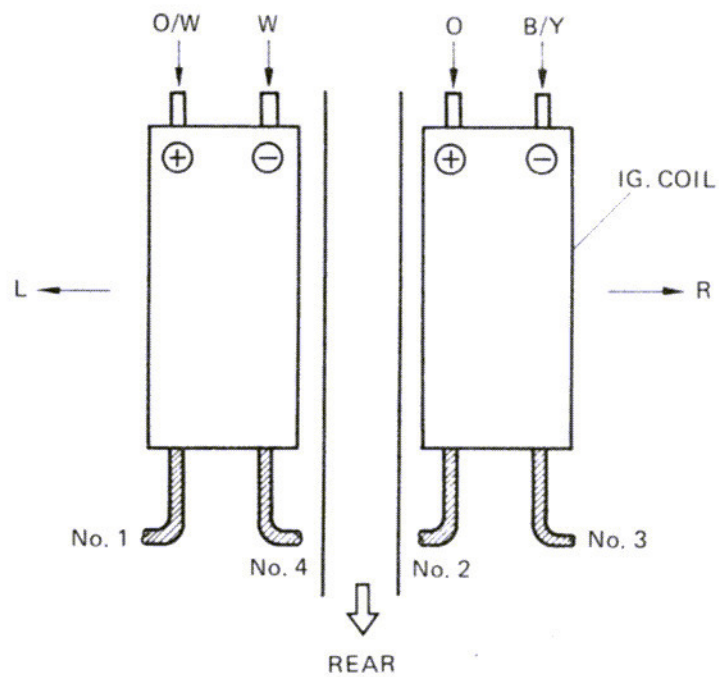


WIRE ROUTING

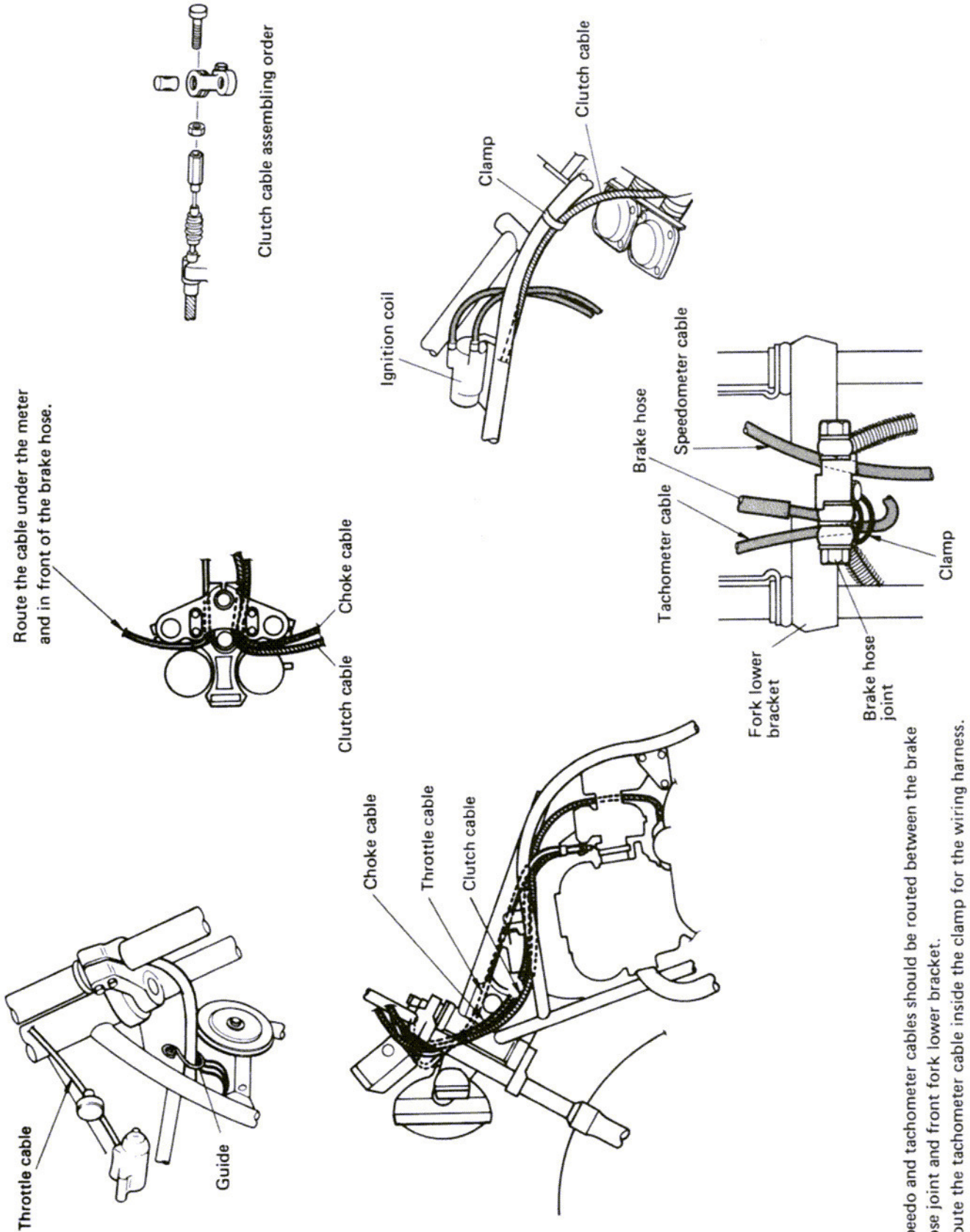




HIGH TENSION CORD ROUTING



CABLE ROUTING



1. Speedo and tachometer cables should be routed between the brake hose joint and front fork lower bracket.
2. Route the tachometer cable inside the clamp for the wiring harness.

TIGHTENING TORQUE

ENGINE

ITEM	lb-ft	kg-m
Cylinder head cover bolt	6.5 – 7.0	0.9 – 1.0
Cylinder head bolt	6.5 – 8.0	0.9 – 1.1
Cylinder head nut	17.5 – 19.0	2.4 – 2.6
Camshaft holder bolt	6.5 – 8.5	0.8 – 1.2
Cam sprocket bolt	17.5 – 19.0	2.4 – 2.6
Cam chain tensioner fitting bolt	4.5 – 6.0	0.6 – 0.8
Cam chain tensioner shaft assy	22.5 – 25.5	3.1 – 3.5
Cam chain tensioner lock shaft nut	6.0 – 7.0	0.8 – 1.0
Cam chain tensioner adjuster lock nut	6.5 – 10.0	0.9 – 1.4
Generator rotor bolt	65.0 – 72.5	9.0 – 10.0
Starter clutch allen bolt	11.0 – 14.5	1.5 – 2.0
Conrod nut	21.5 – 24.5	3.0 – 3.4
Governor center bolt	9.5 – 16.5	1.3 – 2.3
Crankcase bolt (6 mm)	6.5 – 9.5	0.9 – 1.3
(8 mm)	14.5 – 17.5	2.0 – 2.4
Starter motor bolt	3.0 – 5.0	0.4 – 0.7
Oil pan bolt	7.0	1.0
Oil pressure switch	9.5 – 12.5	1.3 – 1.7
Oil filter cover nut	4.5 – 6.0	0.6 – 0.8
Neutral stopper housing	13.0 – 20.0	1.8 – 2.8
Gearshift arm stopper	11.0 – 16.5	1.5 – 2.3
Clutch sleeve hub nut	36.0 – 50.5	5.0 – 7.0
Clutch spring bolt	8.0 – 9.5	1.1 – 1.3
Engine mounting bolt (8 mm)	14.5 – 21.5	2.0 – 3.0
(10 mm)	21.5 – 27.0	3.0 – 3.7
Gearshift lever bolt	9.5 – 16.5	1.3 – 2.3
Clutch release arm bolt	4.5 – 6.0	0.6 – 0.8

SHAFT DRIVE

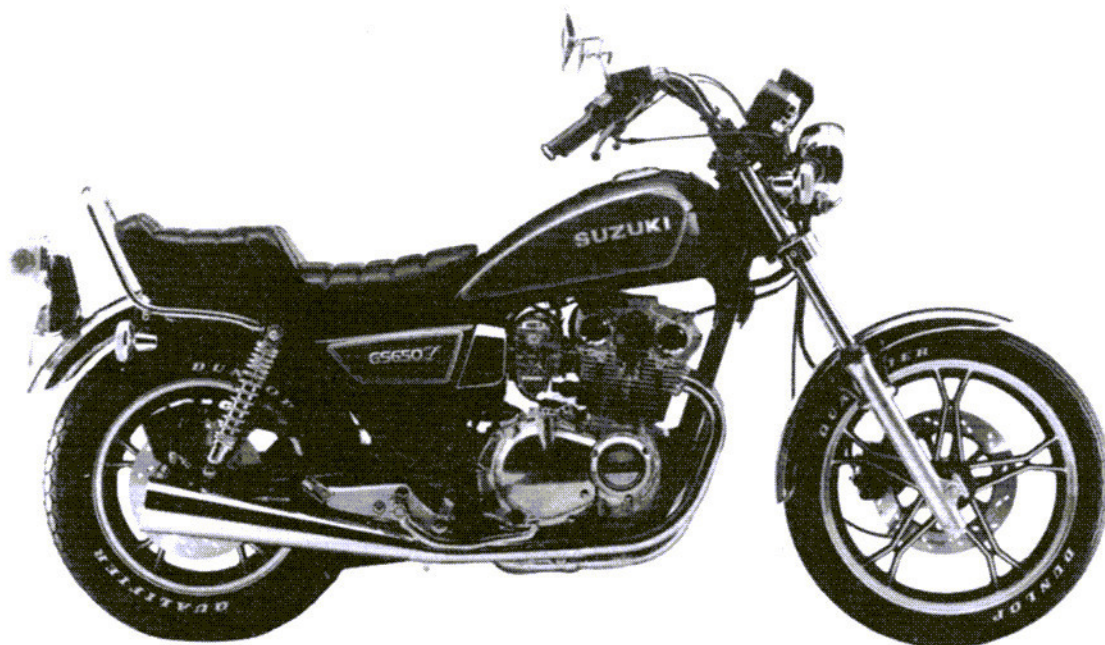
ITEM	lb-ft	kg-m
Secondary driven bevel gear nut	65.0 – 79.5	9.0 – 11.0
Secondary driven bevel gear housing bolt	14.5 – 19.0	2.0 – 2.6
Propeller shaft flange nut	21.5 – 29.0	3.0 – 4.0
Final drive bevel gear nut	61.5 – 79.5	8.5 – 11.0
Final gearcase bearing retainer plate screw	6.0 – 7.0	0.8 – 1.0
Final gear bearing case fitting bolt	14.5 – 19.0	2.0 – 2.6
Final gear case joint nut	25.5 – 32.5	3.5 – 4.5

CHASSIS

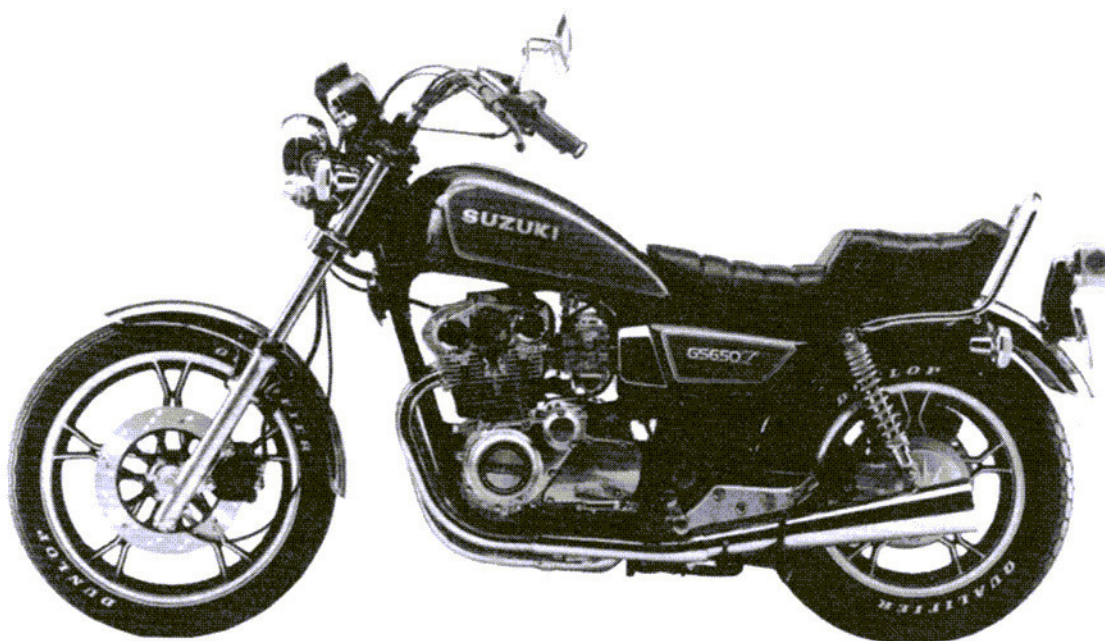
ITEM	lb-ft	kg-m
Disc bolt	11.0 – 18.0	1.5 – 2.5
Front axle nut	26.0 – 37.5	3.6 – 5.2
Front axle holder nut	11.0 – 18.0	1.5 – 2.5
Front brake master cylinder mounting bolt	* 6.0 – 8.5	0.8 – 1.2
Front caliper mounting bolt	18.0 – 29.0	2.5 – 4.0
Front caliper axle bolt	29.0 – 40.0	4.0 – 5.5
Brake hose union bolt	14.5 – 18.0	2.0 – 2.5
Caliper bleeder	5.0 – 6.5	0.7 – 0.9
Front fork damper rod bolt	11.0 – 18.0	1.5 – 2.5
Front fork lower clamp bolt	11.0 – 18.0	1.5 – 2.5
Front fork upper clamp bolt	14.5 – 21.5	2.0 – 3.0
Front fork cap bolt	11.0 – 21.5	1.5 – 3.0
Steering stem nut	*29.0 – 36.0	4.0 – 5.0
Steering stem clamp bolt	11.0 – 18.0	1.5 – 2.5
Steering stem head bolt	*25.5 – 36.0	3.5 – 5.0
Handlebar clamp bolt	8.5 – 14.5	1.2 – 2.0
Front footrest bolt	19.5 – 31.0	2.7 – 4.3
Swing arm pivot bolt	2.55 – 3.25	0.35 – 0.45
Swing arm pivot lock nut	79.5 – 94.0	11.0 – 13.0
Brake pedal arm bolt	7.0 – 11.0	1.0 – 1.5
Rear master cylinder mounting bolt	11.0 – 18.0	1.5 – 2.5
Rear torque link bolt and nut	14.5 – 21.5	2.0 – 3.0
Rear caliper mounting bolt	18.0 – 29.0	2.5 – 4.0
Rear caliper bolt	14.5 – 21.5	2.0 – 3.0
Muffler bracket nut	11.0 – 14.5	1.5 – 2.0
Rear shock absorber fitting bolt or nut	14.5 – 21.5	2.0 – 3.0
Rear footrest bolt	19.5 – 31.0	2.7 – 4.3
Wheel hub driven joint fitting bolt	6.0 – 8.5	0.8 – 1.2
Rear axle nut	61.5 – 83.0	8.5 – 11.5
Rear axle clamp bolt	11.0 – 14.5	1.5 – 2.0

* Asterisk mark indicates new GS650GZ specifications.

VIEW OF SUZUKI GS650GLZ



RIGHT SIDE



LEFT SIDE

SPECIFICATIONS

DIMENSIONS AND DRY MASS

Overall length	2 180 mm
Overall width	870 mm
Overall height	1 160 mm
Wheelbase	1 450 mm
Ground clearance	140 mm
Seat height	740 mm
Dry mass	212 kg

ENGINE

Type	Four-stroke, air-cooled, DOHC
Number of cylinders	4
Bore	62.0 mm
Stroke	55.8 mm
Piston displacement	673 cm ³
Compression ratio	9.4 : 1
Carburetor	MIKUNI BS32SS, four
Air cleaner	Polyurethane foam element
Starter system	Electric
Lubrication system	Wet sump

TRANSMISSION

Clutch	Wet multi-plate type
Transmission	5-speed constant mesh
Gearshift pattern	1-down, 4-up
Primary reduction	1.956 (90/46)
Secondary reduction	0.941 (16/17)
Final reduction	3.090 (34/11)
Gear ratios, Low	2.678 (36/14) x (25/24)
2nd	1.851 (32/18) x (25/24)
3rd	1.438 (29/21) x (25/24)
4th	1.171 (27/24) x (25/24)
Top	1.000 (Direct)
Drive system	Shaft drive

CHASSIS

Front suspension	Telescopic, pneumatic/coil spring, oil dampened
Rear suspension	Swinging arm, oil dampened, spring 5-way adjustable
Steering angle	40° (right & left)
Caster	60° 30'
Trail	109 mm
Turning radius	2.6 m
Front brake	Disc brake
Rear brake	Disc brake
Front tire size	90/90-19 52H, tubeless
Rear tire size	130/90-16 67H, tubeless
Front fork stroke	160 mm
Rear wheel travel	95 mm
Front tire pressure	175 kPa (1.75 kg/cm ² , 25 psi) (Normal solo riding)
Rear tire pressure	200 kPa (2.00 kg/cm ² , 28 psi) (Normal solo riding)

ELECTRICAL

Ignition type	Transistorized
Ignition timing	10° B.T.D.C. below 1650 r/min and 40° B.T.D.C. above 3500 r/min
Spark plug	NGK D8EA or NIPPON DENSO X24ES-U
Battery	12V 50.4kC (14 Ah)/10 HR
Generator	Three-phase A.C. generator
Fuse	10/10/10/10/15A

CAPACITIES

Fuel tank including reserve	12L
reserve	4.0 L
Engine oil	* 2.9 L
Front fork oil	239 ml
Final bevel gear oil	200 – 220 ml

* Asterisk indicates the new GS650GL specification.

** These specifications are subject to change without notice.

SERVICE DATA

VALVE + GUIDE

Unit: mm

ITEM	STANDARD		LIMIT
Valve diam.	IN.	32.0	——
	EX.	27.0	——
Valve lift	IN.	7.2	——
	EX.	7.0	——
Tappet clearance (when cold)	IN. & EX.	0.03 – 0.08	——
Valve guide to valve stem clearance	IN.	0.025 – 0.055	0.35
	EX.	0.040 – 0.070	0.35
Valve guide I.D.	IN. & EX.	7.000 – 7.015	——
Valve stem O.D.	IN.	6.960 – 6.975	——
	EX.	6.945 – 6.960	——
Valve stem runout	IN. & EX.	——	0.05
Valve head thickness	IN. & EX.	——	0.5
Valve stem end length	IN. & EX.	——	4.0
Valve seat width	IN. & EX.	0.9 – 1.1	——
Valve head radial runout	IN. & EX.	——	0.03
Valve spring free length INTAKE	INNER	——	35.6
	OUTER	——	41.6
EXHAUST	INNER	——	35.0
	OUTER	——	40.5
Valve spring tension INTAKE	INNER	10.6 – 12.8 kg at length 31 mm	——
	OUTER	22.3 – 26.3 kg at length 35 mm	——
EXHAUST	INNER	11.0 – 13.0 kg at length 31 mm	——
	OUTER	22.1 – 25.9 kg at length 35 mm	——

CAMSHAFT + CYLINDER HEAD

Unit: mm

ITEM	STANDARD		LIMIT
Cam height	IN.	35.485 – 35.515	35.190
	EX.	35.285 – 35.315	34.990
Camshaft journal oil clearance	IN. & EX.	0.032 – 0.066	0.150
Camshaft journal holder I.D.	IN. & EX.	22.012 – 22.025	—
Camshaft journal O.D.	IN. & EX.	21.959 – 21.980	—
Camshaft runout	IN. & EX.	—	0.10
Cam chain 20-pitch length	—		157.80
Cam chain (at arrow "3")	20th pin		—
Cylinder head distortion	—		0.2

CYLINDER + PISTON + PISTON RING

Unit: mm

ITEM	STANDARD	LIMIT
Compression pressure	10 – 14 kg/cm ²	7 kg/cm ²
Compression pressure difference	—	2 kg/cm ²
Piston to cylinder clearance	0.035 – 0.045	0.120
Cylinder bore	62.000 – 62.015	62.095
Piston diam.	61.960 – 61.975 Measure at 15 from the skirt end.	61.880
Cylinder distortion	—	0.2

Unit: mm

ITEM	STANDARD			LIMIT
Piston ring free end gap	1st	N	Approx. 7.5	6.0
		R	Approx. 7.5	6.0
	2nd	N	Approx. 9.5	7.6
		R	Approx. 9.5	7.6
Piston ring end gap	1st		0.10 – 0.30	0.70
	2nd		0.10 – 0.30	0.70
Piston ring to groove clearance	1st		———	0.18
	2nd		———	0.15
Piston ring groove width	1st		1.210 – 1.230	———
	2nd		1.210 – 1.230	———
	Oil		2.510 – 2.530	———
Piston ring thickness	1st		1.175 – 1.190	———
	2nd		1.170 – 1.190	———
Piston pin bore			16.002 – 16.008	16.030
Piston pin O.D.			15.995 – 16.000	15.980

CONROD + CRANKSHAFT

Unit: mm

ITEM	STANDARD	LIMIT
Conrod small end I.D.	16.010 – 16.018	16.040
Conrod big end side clearance	0.10 – 0.20	0.30
Conrod big end width	20.95 – 21.00	———
Crank pin width	21.10 – 21.15	———
Conrod big end oil clearance	0.024 – 0.048	0.080
Crank pin O.D.	33.976 – 34.000	———
Crankshaft journal oil clearance	0.020 – 0.044	0.080
Crankshaft journal O.D.	35.976 – 36.000	———
Crankshaft thrust clearance	0.1 – 0.3	0.5
Crankshaft journal holder width	21.8 – 21.9	———
Crankshaft journal width	22.0 – 22.1	———
Crankshaft runout	———	0.05

OIL PUMP

Unit: mm

ITEM	STANDARD	LIMIT
Oil pump reduction ratio	1.898 (90/46 x 33/34)	—
Oil pressure (at 60°C, 140°F)	Above 3.0 kg/cm ² Below 5.5 kg/cm ² at 3 000 r/min.	—

CLUTCH

Unit: mm

ITEM	STANDARD	LIMIT
Clutch cable play	2 – 3	—
Drive plate thickness	2.7 – 2.9	2.4
Drive plate claw width	11.8 – 12.0	11.0
Driven plate thickness	2.00 ± 0.06	—
Driven plate distortion	—	0.1
Clutch spring free length	—	36.5

TRANSMISSION

Unit: mm

ITEM	STANDARD		LIMIT
Primary reduction ratio	1.956 (90/46)		—
Secondary reduction ratio	0.941 (16/17)		—
Final reduction ratio	3.090 (34/11)		—
Gear ratios	Low	2.678 (36/14) x (25/24)	—
	2nd	1.851 (32/18) x (25/24)	—
	3rd	1.438 (29/21) x (25/24)	—
	4th	1.171 (27/24) x (25/24)	—
	Top	1.000 (Direct)	—
Shift fork to groove clearance	0.10 – 0.30		0.50
Shift fork groove width	5.50 – 5.60		—
Shift fork thickness	5.30 – 5.40		—

SHAFT DRIVE

Unit: mm

ITEM	STANDARD		LIMIT
Secondary bevel gear backlash	0.08 – 0.13		—
Final bevel gear backlash	Drive side	0.03 – 0.64	—
	Driven side	0.02 – 0.35	—
Secondary driven bevel gear preload	4 – 7 kg-cm		—
Final drive bevel gear preload	4 – 8 kg-cm		—

CARBURETOR

Unit: mm

ITEM	SPECIFICATION
Carburetor type	MIKUNI BS32SS
Bore size	32
I.D. No.	* 34300
Idle r/min.	1 100 ± 50 r/min.
Fuel level	5.0 ± 1.0
Float height	22.4 ± 1.0
Main jet (M.J.)	# 110
Main air jet (M.A.J.)	2.0
Jet needle (J.N.)	5C45
Needle jet (N.J.)	Y-7
Throttle valve (T.V.)	# 135
Pilot jet (P.J.)	# 42.5
By pass (B.P.)	0.8, 0.7, 0.8
Pilot outlet (P.O.)	0.7
Valve seat (V.S.)	2.0
Starter jet (G.S.)	# 45
Pilot screw (P.S.)	PRE-SET
Pilot air jet (P.A.J.)	# 160
Throttle cable play	0.5 – 1.0
Choke cable play	0.5 – 1.0

ELECTRICAL

Unit: mm

ITEM	SPECIFICATION		NOTE
Ignition timing	10° B.T.D.C. Below 1 650 ± 100 r/min. and 40° B.T.D.C. Above 3 500 ± 100 r/min.		
Firing order	1. 2. 4. 3		
Spark plug	Type	NGK: D8EA or ND: X24ES-U	
	Gap	0.6 – 0.7	
Spark performance	Over 8 at 1 atm		
Signal coil resistance	Approx. 250 – 360 Ω		
Ignition coil resistance	Primary	Terminal – Terminal Approx. 3 – 5 Ω	
	Secondary	Plug cap – Plug cap Approx. 30 – 35 kΩ	
Generator no-load voltage	More than 80 V (AC) at 5 000 r/min.		
Regulated voltage	14.0 – 15.5 V at 5 000 r/min.		
Starter motor	Brush length	Limit. 6	N.D.
	Commutator under cut	Limit: 0.2	
Starter relay resistance	Approx. 3 – 4 Ω		
Battery	Type designation	YB14L-A2	
	Capacity	12V,50.4kC(14Ah)/10HR	
	Standard electrolyte S.G.	1.28 at 20°C (68°F)	
Fuse size	Main	15 A	
	Headlight	10 A	
	Signal	10 A	
	Ignition	10 A	
	Output terminal	10 A	

BRAKE + WHEEL

Unit: mm

ITEM	STANDARD		LIMIT
Rear brake pedal height	20		——
Brake disc thickness	Front	6.0 ± 0.2	5.5
	Rear	6.7 ± 0.2	6.0
Brake disc runout	——		0.30
Master cylinder bore	Front	14.000 – 14.043	——
	Rear	14.000 – 14.043	——
Master cylinder piston diam.	Front	13.957 – 13.984	——
	Rear	13.957 – 13.984	——
Brake caliper cylinder bore	Front	42.860 – 42.899	——
	Rear	38.180 – 38.256	——
Brake caliper piston diam.	Front	42.785 – 42.810	——
	Rear	38.098 – 38.148	——
Wheel rim runout	Axial	——	2.0
	Radial	——	2.0
Wheel axle runout	Front	——	0.25
	Rear	——	0.25
Tire size	Front	90/90-19 52H, tubeless	——
	Rear	130/90-16 67H, tubeless	——
Tire tread depth	Front	——	1.6
	Rear	——	2.0

SUSPENSION

Unit: mm

ITEM	STANDARD	LIMIT	NOTE
Front fork stroke	160	—	
Front fork spring free length	—	* 528	
Front fork oil level	* 143.4	—	
Front fork air pressure	* 50 kPa 0.5 kg/cm ²	—	
Rear wheel travel	95	—	

FUEL + OIL

ITEM	SPECIFICATION	NOTE
Fuel type	Use only unleaded or low-lead type gasoline of at least 85-95 pump octane ($\frac{R+M}{2}$ method) or 89 octane or higher rated by the Research Method.	
Fuel tank including reserve	12 L	
reserve	4.0 L	
Engine oil type	SAE 10W/40	
Engine oil capacity	Change * 2 900 ml	on and after E/No.136795~
	Filter change * 3 600 ml	
	Overhaul * 4 100 ml	
Front fork oil type	Fork oil SAE # 15	
Front fork oil capacity (each leg)	* 239 ml	
Final bevel gear oil type	Hypoid gear oil SAE # 90, API Grade GL-5	
Final bevel gear oil capacity	200 – 220 ml	
Brake fluid type	DOT3 or DOT4	

* Asterisk mark indicates new GS650GZ specifications.

TIRE PRESSURE

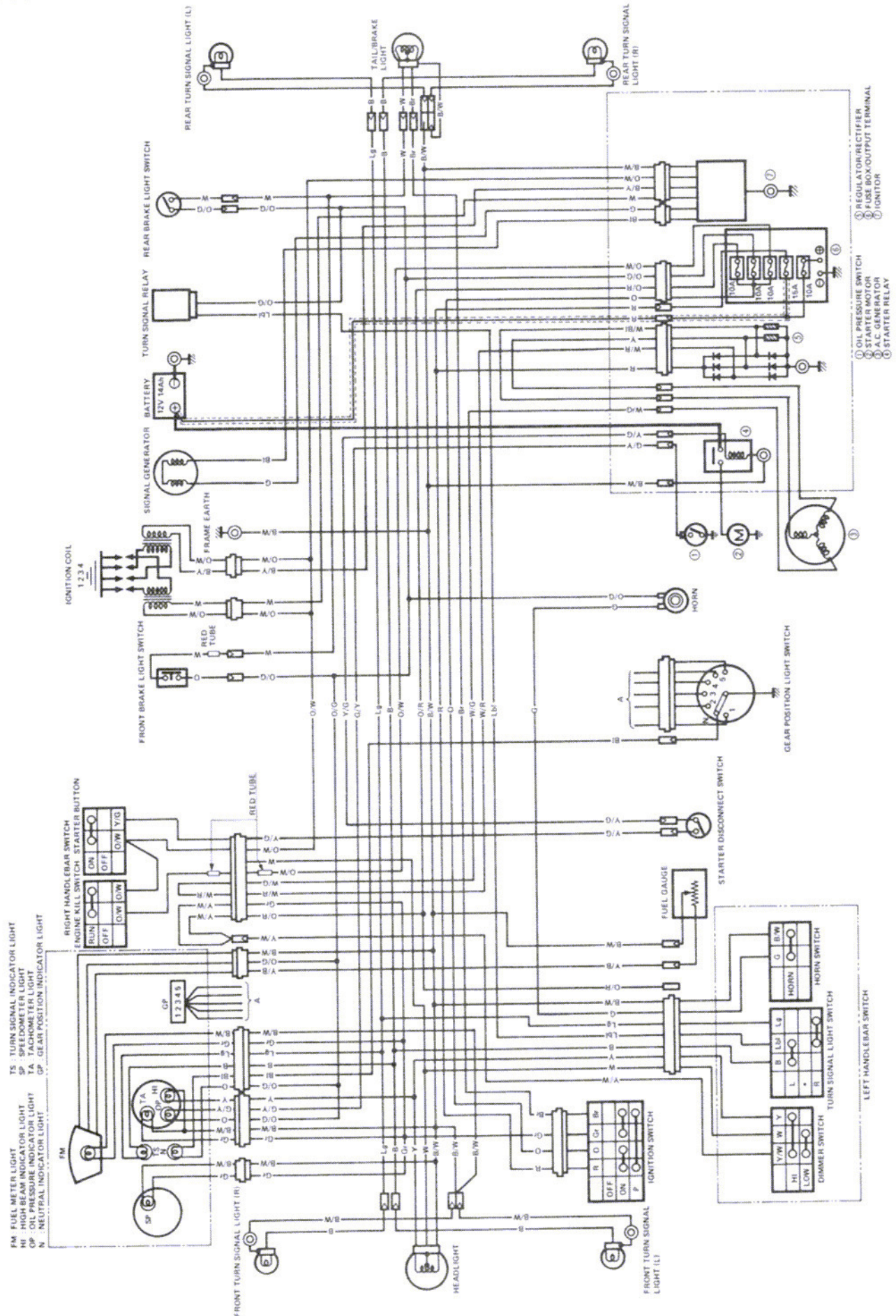
COLD INFLATION TIRE PRESSURE	NORMAL RIDING						CONTINUOUS HIGH SPEED RIDING					
	SOLO RIDING			DUAL RIDING			SOLO RIDING			DUAL RIDING		
	kPa	kg/cm ²	psi	kPa	kg/cm ²	psi	kPa	kg/cm ²	psi	kPa	kg/cm ²	psi
FRONT	175	1.75	25	200	2.00	28	200	2.00	28	225	2.25	32
REAR	200	2.00	28	225	2.25	32	250	2.50	36	280	2.80	40

WATTAGE

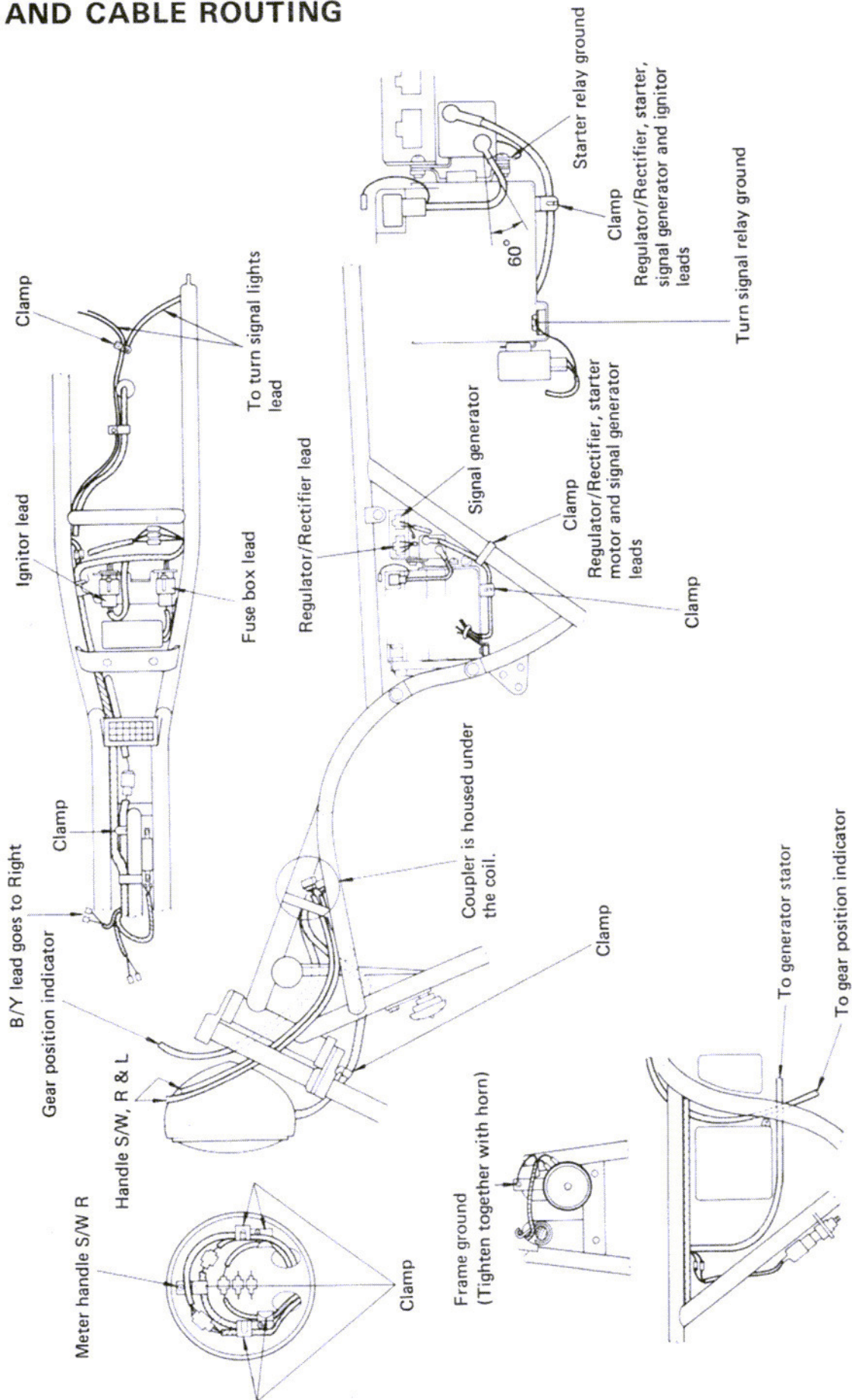
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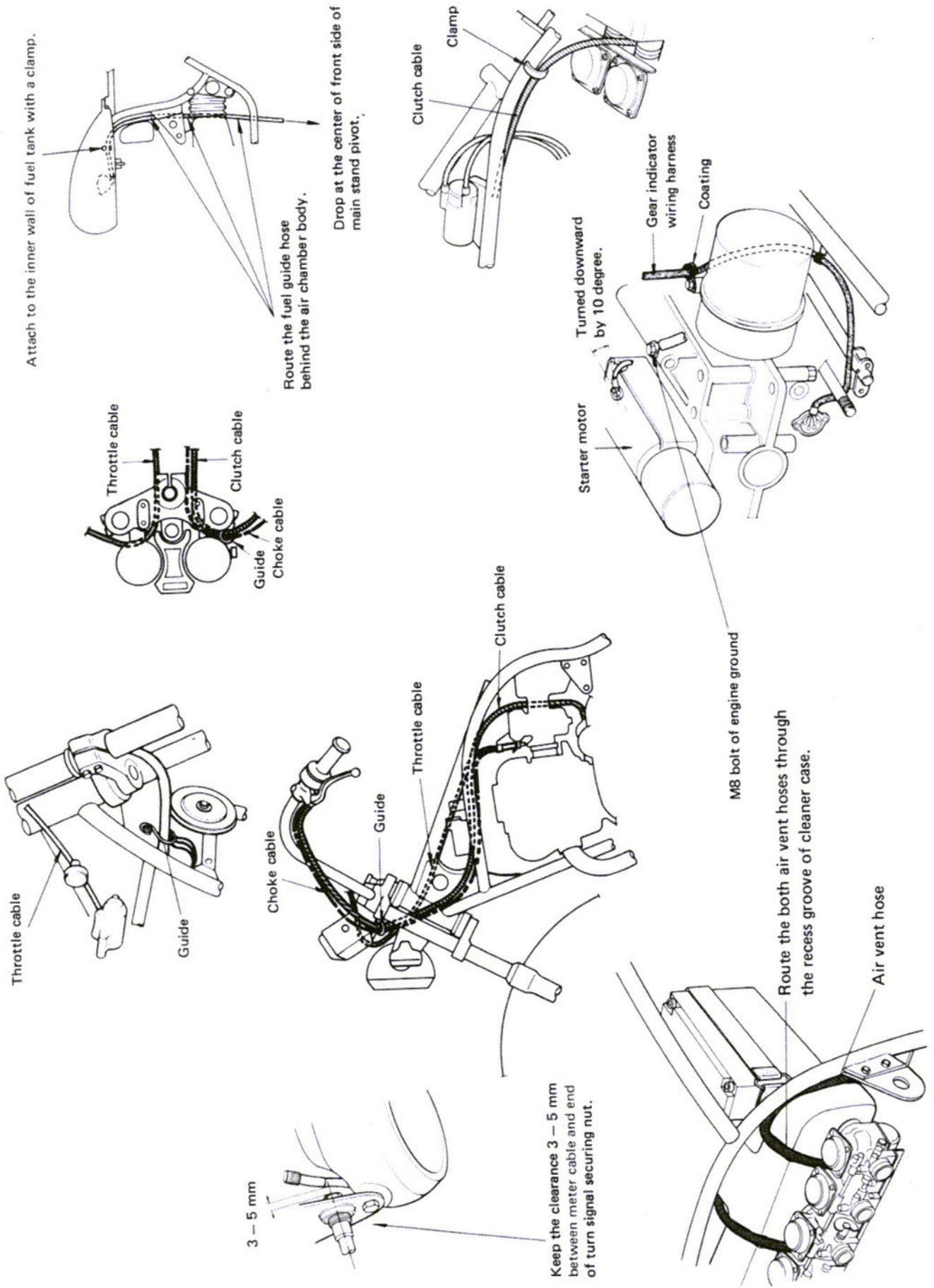
ITEM		SPECIFICATION
Headlight	HI	60
	LO	55
Tail/Brake light		8/23 (3/32)
Turn signal light		23 (32)
Speedometer light		3.4
Tachometer light		3.4
Turn signal indicator light		3.4
High beam indicator light		3.4
Neutral indicator light		3.4
Oil pressure indicator light		3.4
Gear position indicator light		1.4
Fuel meter light		* 1.7

WIRING DIAGRAM



WIRE AND CABLE ROUTING





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