

SUZUKI

GSF1200/GSF1200S

SERVICE MANUAL



FOREWORD

This manual contains an introductory description on the SUZUKI GSF1200/GSF1200S and procedures for its inspection/service and overhaul of its main components.

Other information considered as generally known is not included.

Read the GENERAL INFORMATION section to familiarize yourself with the motorcycle and its maintenance. Use this section as well as other sections to use as a guide for proper inspection and service.

This manual will help you know the motorcycle better so that you can assure your customers of fast and reliable service.

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

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

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

▲ WARNING

Inexperienced mechanics or mechanics without the proper tools and equipment may not be able to properly perform the services described in this manual.

Improper repair may result in injury to the mechanic and may render the motorcycle unsafe for the rider and passenger.

SUZUKI MOTOR CORPORATION

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Section 00

Precautions

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Precautions

Precautions

Warning / Caution / Note

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

▲ WARNING

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

▲ CAUTION

Indicates a potential hazard that could result in motorcycle damage.

NOTE

Indicates special information to make maintenance easier or instructions clearer.

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

General Precautions

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▲ WARNING

- Proper service and repair procedures are important for the safety of the service mechanic and the safety and reliability of the motorcycle.
- When 2 or more persons work together, pay attention to the safety of each other.
- When it is necessary to run the engine indoors, make sure that exhaust gas is forced outdoors.
- When working with toxic or flammable materials, make sure that the area you work in is well-ventilated and that you follow all of the material manufacturer's instructions.
- Never use gasoline as a cleaning solvent.

- To avoid getting burned, do not touch the engine, engine oil, oil cooler and exhaust system until they have cooled.
- After servicing the fuel, oil, exhaust or brake systems, check all lines and fittings related to the system for leaks.

▲ CAUTION

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

- Use a torque wrench to tighten fasteners to the specified torque. Wipe off grease and oil if a thread is smeared with them.
- After reassembling, check parts for tightness and proper operation.
- To protect the environment, do not unlawfully dispose of used motor oil, engine coolant and other fluids: batteries, and tires.
- To protect Earth's natural resources, properly dispose of used motorcycle and parts.

Precautions for Electrical Circuit Service

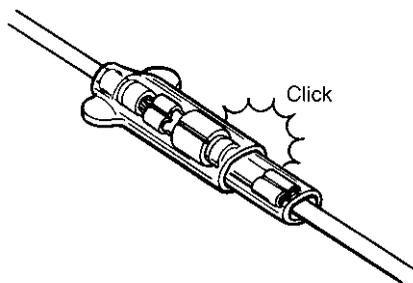
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When handling the electrical parts or servicing the ABS system, observe the following points for the safety of the system.

Electrical Parts

Connector / Coupler

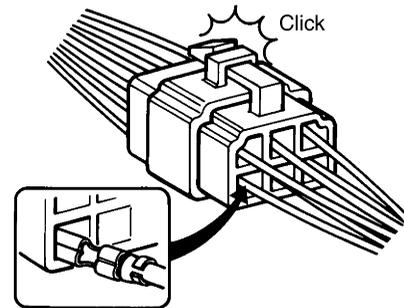
- When connecting a connector, be sure to push it in until a click is felt.



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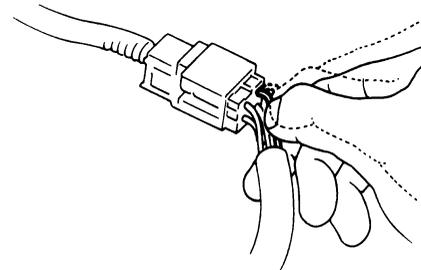
- With a lock type coupler, be sure to release the lock when disconnecting, and push it in fully till the lock works when connecting it.
- When disconnecting the coupler, be sure to hold the coupler body and do not pull the lead wires.
- Inspect each terminal on the connector/coupler for looseness or bending.

- Inspect each terminal for corrosion and contamination. The terminals must be clean and free of any foreign material which could impede proper terminal contact.



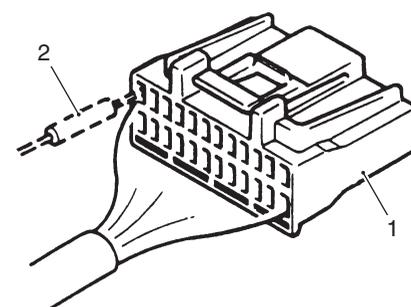
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- Inspect each lead wire circuit for poor connection by shaking it by hand lightly. If any abnormal condition is found, repair or replace.



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



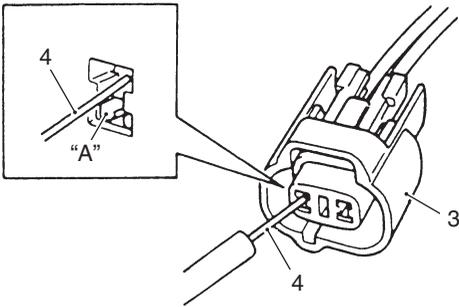
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1. Coupler	2. Probe
------------	----------

- When connecting meter probe from the terminal side of the coupler (connection from harness side not being possible), use extra care not to force and cause the male terminal to bend or the female terminal to open. Connect the probe as shown to avoid opening of female terminal. Never push in the probe where male terminal is supposed to fit.

00-3 Precautions:

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

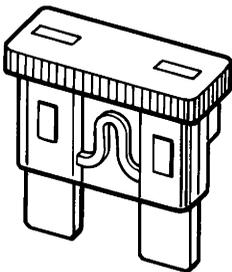


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3. Coupler	4. Probe	"A": Where male terminal fits
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Fuse

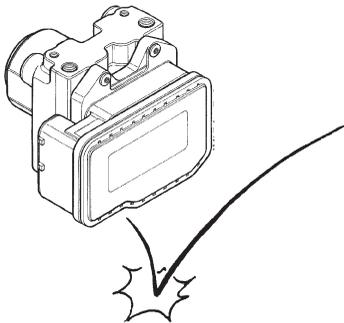
- When a fuse blows, always investigate the cause, correct it and then replace the fuse.
- Do not use a fuse of a different capacity.
- Do not use wire or any other substitute for the fuse.



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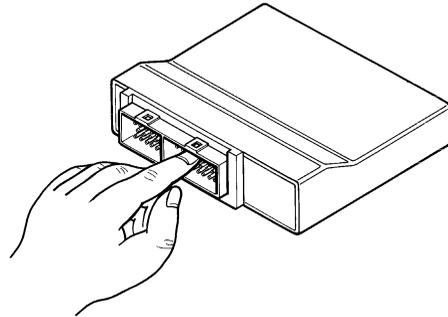
Ignitor unit / Various sensors / ABS control unit / HU

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



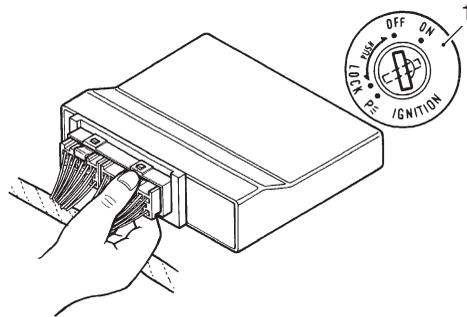
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- Be careful not to touch the electrical terminals of the Ignitor unit and ABS control unit/HU. The static electricity from your body may damage this part.



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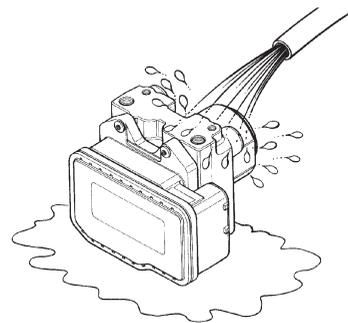
- When disconnecting and connecting the Ignitor unit and ABS control unit/HU couplers, make sure to turn OFF the ignition switch, or electronic parts may get damaged.



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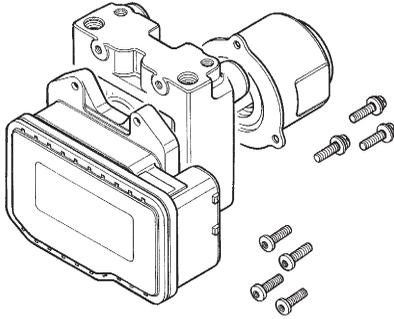
1. Ignition S/W

- Never allow dust or water to contact the ABS control unit/HU.



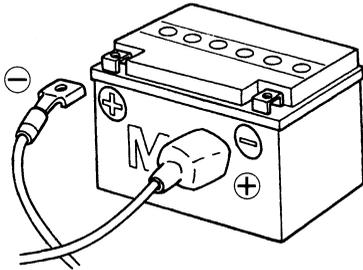
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- The ABS control unit/HU cannot be disassembled. Replace the whole unit with a new one.



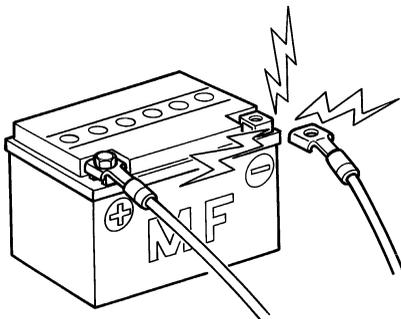
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- Battery connection in reverse polarity is strictly prohibited. Such a wrong connection will damage the components of the ABS control unit/HU instantly when reverse power is applied.



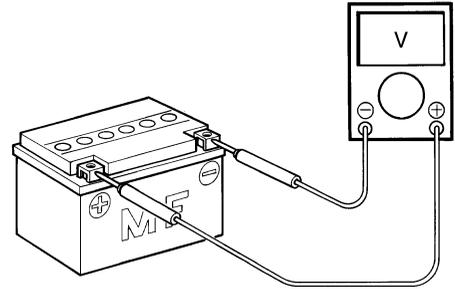
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- Removing any battery terminal of a running engine is strictly prohibited. The moment such removal is made, damaging counter electromotive force will be applied to the Ignition unit and ABS control unit/HU which may result in serious damage.



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



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

Electrical Circuit Inspection Procedure

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

Open circuit check

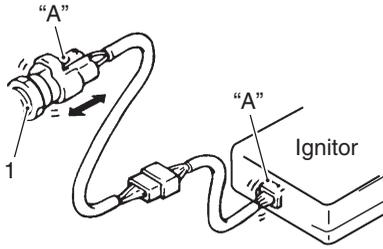
Possible causes for the open circuit are as follows. As the cause can exist in the connector/coupler or terminal, they need to be checked carefully.

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

When checking system circuits including an electronic control unit such as ignitor, ABS control unit/HU, etc., it is important to perform careful check, starting with items which are easier to check.

00-5 Precautions:

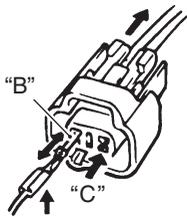
- 1) Disconnect the negative (-) cable from the battery.
- 2) Check each connector/coupler at both ends of the circuit being checked for loose connection. Also check for condition of the coupler lock if equipped.



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1. Sensor	"A": Check for loose connection
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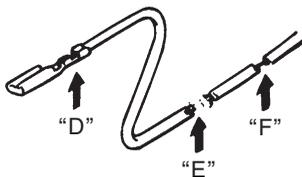
- 3) Using a test male terminal, check the female terminals of the circuit being checked for contact tension. Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted in the coupler and locked. If contact tension is not enough, rectify the contact to increase tension or replace. The terminals must be clean and free of any foreign material which could impede proper terminal contact.



I649G1000027-01

"B": Check contact tension by inserting and removing.
"C": Check each terminal for bend and proper alignment.

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

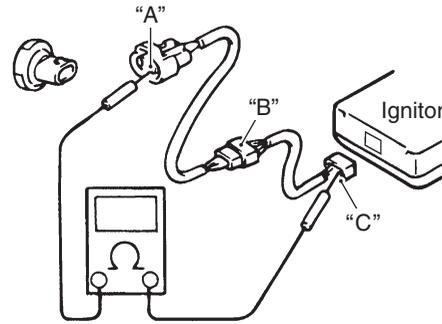


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"D": Looseness of crimping
"E": Open
"F": Thin wire (A few strands left)

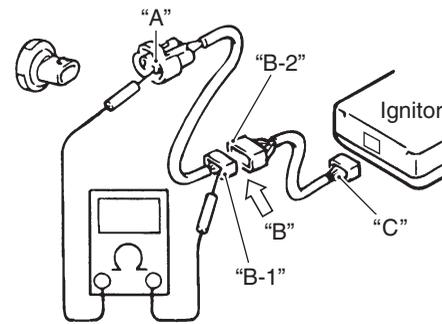
Continuity check

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



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- 2) Disconnect the coupler "B" and measure resistance between couplers "A" and "B-1". If no continuity is indicated, the circuit is open between couplers "A" and "B-1". If continuity is indicated, there is an open circuit between couplers "B-2" and "C" or an abnormality in coupler "B-2" or coupler "C".



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Voltage check

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

- 1) With all connectors/couplers connected and voltage applied to the circuit being checked, measure voltage between each terminal and body ground.
- 2) If measurements were taken as shown in figure at the right and results are as listed below, it means that the circuit is open between terminals "A" and "B".

Voltage between

"A" and body ground: Approx. 5 V

"B" and body ground: Approx. 5 V

"C" and body ground: 0 V

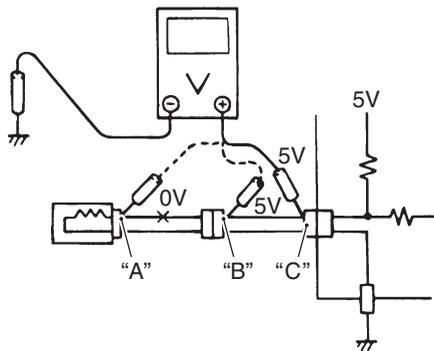
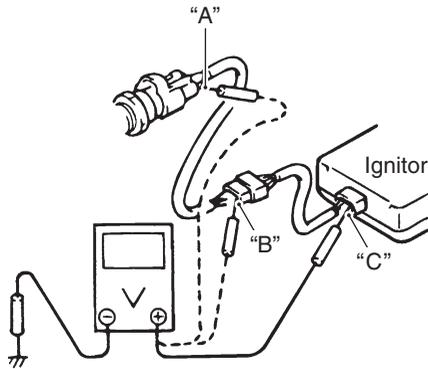
- 3) Also, if measured values are as listed below, a resistance (abnormality) exists which causes the voltage drop in the circuit between terminals "A" and "B".

Voltage between

"A" and body ground: Approx. 5 V

"B" and body ground: Approx. 5 V – 2 V voltage drop

"C" and body ground: 3 V – 2 V voltage drop



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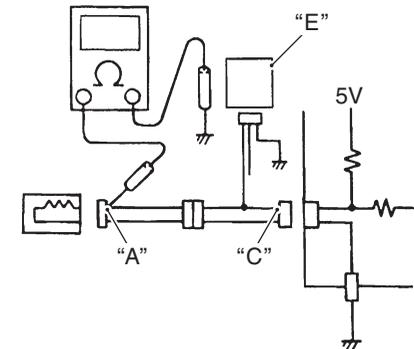
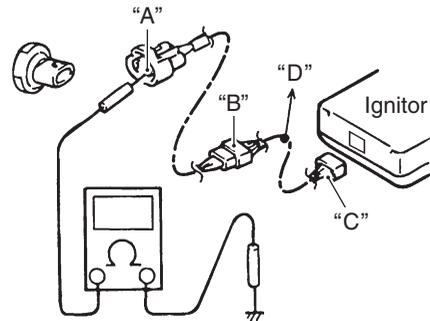
Short circuit check (Wire harness to ground)

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

NOTE

If the circuit to be checked branches to other parts as shown, disconnect all connectors/couplers of those parts. Otherwise, diagnosis will be misled.

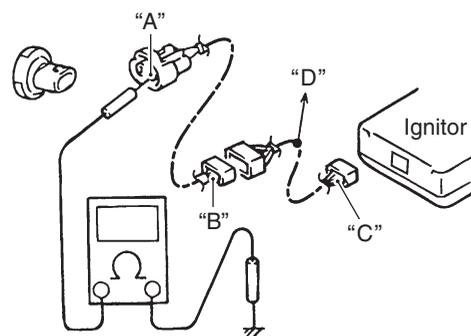
- 3) Measure resistance between terminal at one end of circuit ("A" terminal in figure) and body ground. If continuity is indicated, there is a short circuit to ground between terminals "A" and "C".



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"D": To other parts	"E": Other parts
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- 4) Disconnect the connector/coupler included in circuit (coupler "B") and measure resistance between terminal "A" and body ground. If continuity is indicated, the circuit is shorted to the ground between terminals "A" and "B".



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"D": To other parts

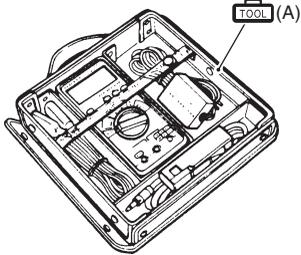
00-7 Precautions:

Using The Multi-Circuit Testers

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

Special tool

 (A): 09900-25008 (Multi-circuit tester set)



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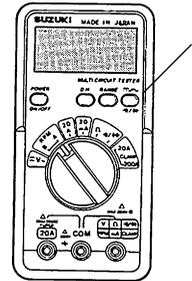
Using the testers

- Incorrectly connecting the (+) and (-) probes may cause the inside of the tester to burnout.
- If the voltage and current are not known, make measurements using the highest range.
- When measuring the resistance with the multi-circuit tester (1), ∞ will be shown as 10.00 M Ω and "1" flashes in the display.
- Check that no voltage is applied before making the measurement. If voltage is applied the tester may be damaged.

- After using the tester, turn the power off.

Special tool

 : 09900-25008 (Multi-circuit tester set)



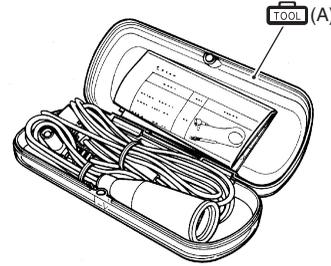
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NOTE

- When connecting the multi-circuit tester, use the needle pointed probe to the back side of the lead wire coupler and connect the probes of tester to them.
- Use the needle pointed probe to prevent the rubber of the water proof coupler from damage.

Special tool

 (A): 09900-25009 (Needle pointed probe set)



I649G1000025-02

Section 0

General Information

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General Information

General Description

Symbols

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

Symbol	Definition
	Torque control required. Data beside it indicates specified torque.
	Apply oil. Use engine oil unless otherwise specified.
	Apply molybdenum oil solution (Mixture of engine oil and SUZUKI MOLY PASTE in a ratio of 1:1).
	Apply SUZUKI SUPER GREASE "A" or equivalent. 99000-25010
	Apply SUZUKI MOLY PASTE or equivalent. 99000-25140
	Apply SUZUKI SILICONE GREASE or equivalent. 99000-25100
	Apply THERMO-GREASE or equivalent. 99000-59029
	Apply SUZUKI BOND "1207B" or equivalent. 99000-31140
	Apply SUZUKI BOND "1215" or equivalent. 99000-31110
	Apply THREAD LOCK SUPER "1303" or equivalent. 99000-32030
	Apply THREAD LOCK SUPER "1322" or equivalent. 99000-32110
	Apply THREAD LOCK "1342" or equivalent. 99000-32050
	Apply THREAD LOCK SUPER "1360" or equivalent. 99000-32130
	Use fork oil or equivalent. 99000-99001-SS8
	Apply or use brake fluid.
	Measure in voltage range.
	Measure in resistance range.
	Measure in current range.
	Measure in diode test range.
	Measure in continuity test range.
	Use special tool.
	Indication of service data.
	Do not reuse.
	Note on reassembly.

Abbreviations

B649G10101002

A:
ABDC: After Bottom Dead Center
ABS: Anti-lock Brake System
AC: Alternating Current
ACL: Air Cleaner, Air Cleaner Box
API: American Petroleum Institute
ATDC: After Top Dead Center
A/F: Air Fuel Mixture
B:
BBDC: Before Bottom Dead Center
BTDC: Before Top Dead Center
B+: Battery Positive Voltage
C:
CKP Sensor: Crankshaft Position Sensor (CKPS)
CKT: Circuit
CLP Switch: Clutch Lever Position Switch (Clutch Switch)
CO: Carbon Monoxide
CPU: Central Processing Unit
D:
DC: Direct Current
DMC: Dealer Mode Coupler
DOHC: Double Over Head Camshaft
DRL: Daytime Running Light
F:
FTPC Valve: Fuel Tank Pressure Control Valve
G:
GEN: Generator
GND: Ground
GP Switch: Gear Position Switch

H:
HC: Hydrocarbons
I:
IG: Ignition
J:
JASO: Japanese Automobile Standards Organization
L:
LCD: Liquid Crystal Display
LED: Light Emitting Diode (Malfunction Indicator Lamp)
LH: Left Hand
M:
Max: Maximum
MIL: Malfunction Indicator Lamp (LED)
Min: Minimum
N:
NOx: Nitrogen Oxides
O:
OHC: Over Head Camshaft
OPS: Oil Pressure Switch
P:
PCV: Positive Crankcase Ventilation (Crankcase Breather)
R:
RH: Right Hand
ROM: Read Only Memory
S:
SAE: Society of Automotive Engineers
T:
TP Sensor: Throttle Position Sensor (TPS)

0A-3 General Information:

Vehicle Side View

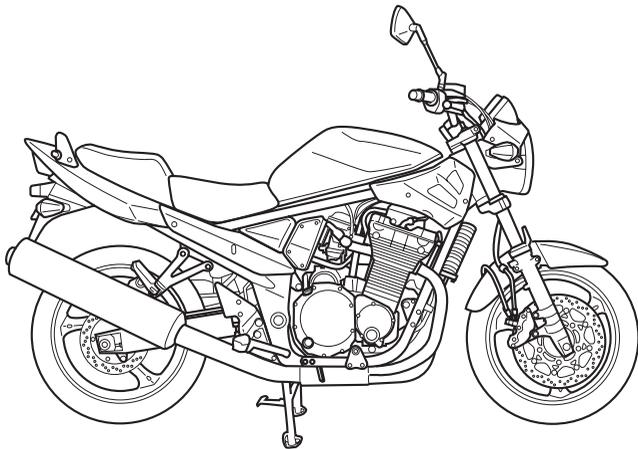
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NOTE

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

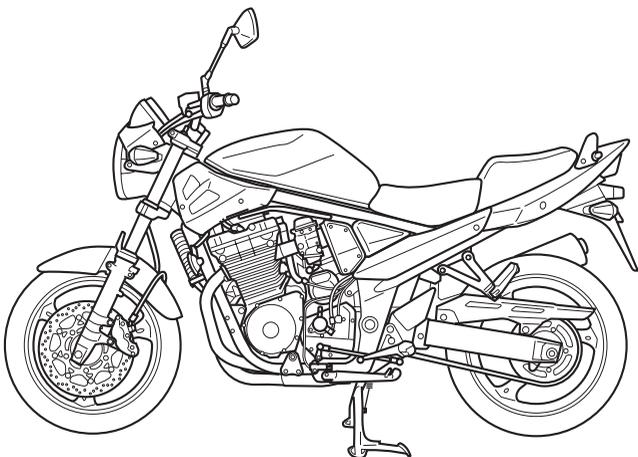
SUZUKI GSF1200 (2006-model)

Right Side



I649G1010008-01

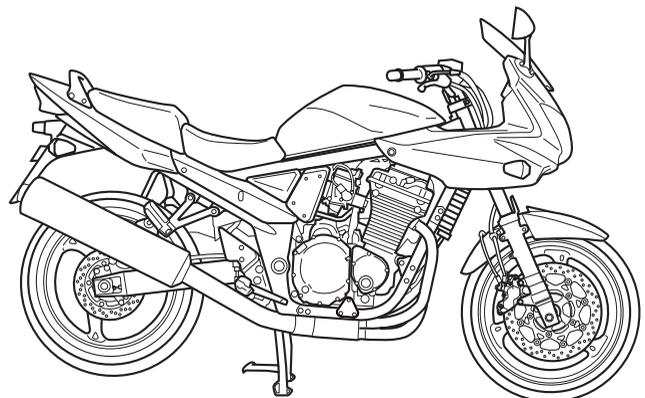
Left Side



I649G1010009-01

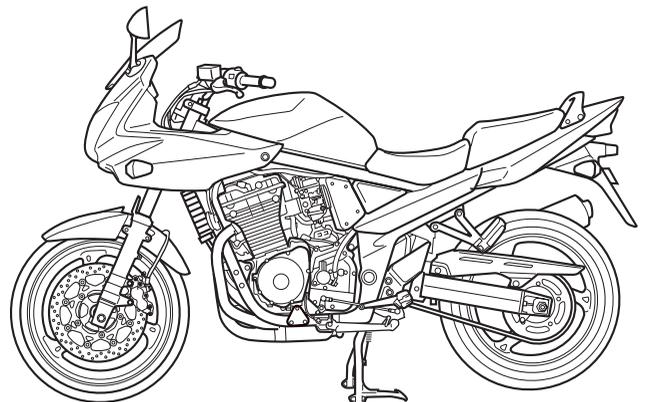
SUZUKI GSF1200S (2006-model)

Right Side



I649G1010005-06

Left Side

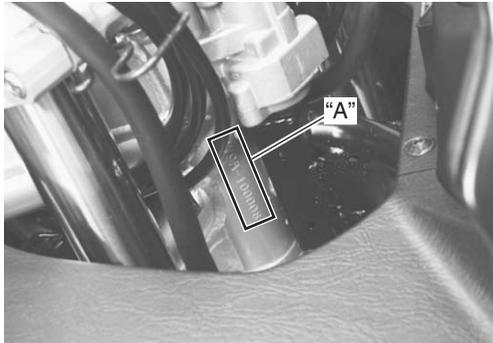


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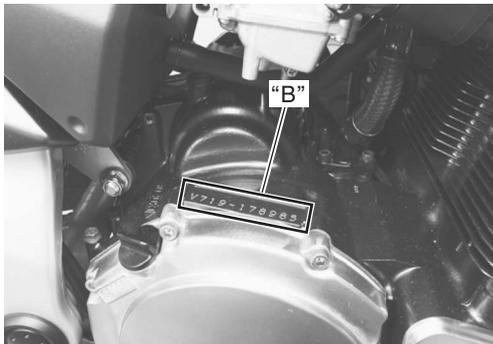
Vehicle Identification Number

B649G10101004

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



I649G1010001-02



I649G1010002-03

Fuel and Oil Recommendation

B649G10101005

Fuel (For USA)

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

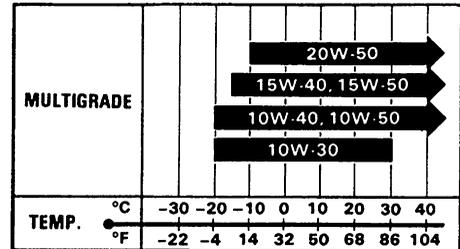
Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.

Fuel (For Other Countries)

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

Engine Oil

Oil quality is a major contributor to your engine's performance and life. Always select good quality engine oil. Use of SF/SG or SH/SJ in API with MA in JASO. Suzuki recommends the use of SAE 10W-40 engine oil. If SAE 10W-40 engine oil is not available, select an alternative according to the chart.



I310G1010005-01

Brake Fluid

Specification and classification: DOT4

⚠ WARNING

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

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

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

Front Fork Oil

Use fork oil SS8 or an equivalent fork oil.

BREAK-IN Procedures

B649G10101007

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.

1) Keep to these break-in engine speed limits:

Speed limits

Initial 800 km: Below 5 500 r/min

Up to 1 600 km: Below 8 000 r/min

Over 1 600 km: Below 11 000 r/min

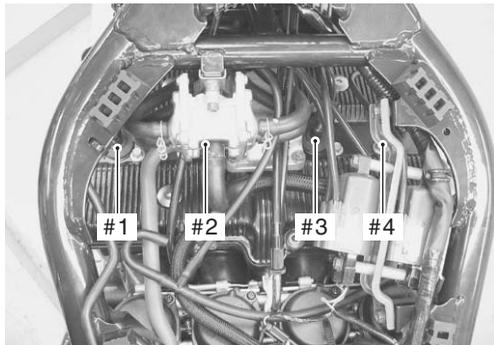
2) Upon reaching an odometer reading of 1 600 km (1 000 miles) you can subject the motorcycle to full throttle operation. However, do not exceed 11 000 r/min at any time.

0A-5 General Information:

Cylinder Identification

B649G10101008

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



I649G1010010-01

Country and Area Codes

B649G10101009

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

Code	Country or Area	Effective Frame No.
GSF1200 K6 (E-02)	U.K.	JS1CB112200100001 –
GSF1200 K6 (E-19)	E.U.	JS1CB112100100001 –
GSF1200S K6 (E-02)	U.K.	JS1CB111200100001 –
GSF1200S K6 (E-19)	E.U.	JS1CB111100100001 –
GSF1200S K6 (E-24)	Australia	JS1CB121300100001 –
GSF1200S K6 (E-28)	Canada	JS1GV79A 62100001 –

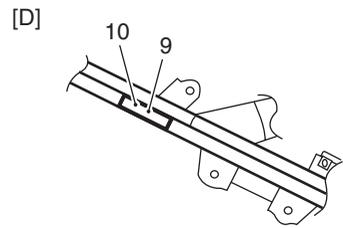
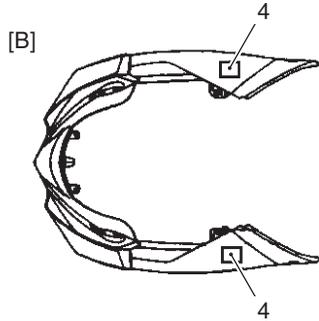
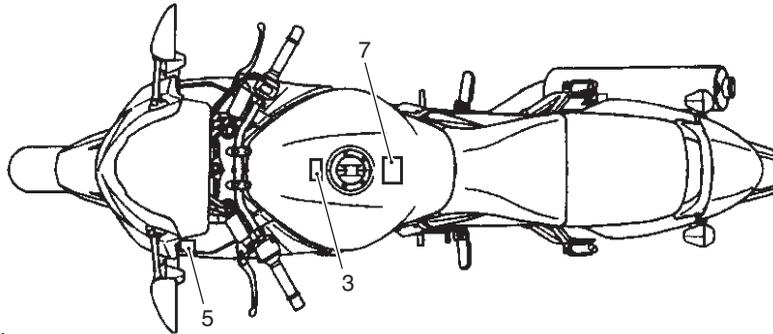
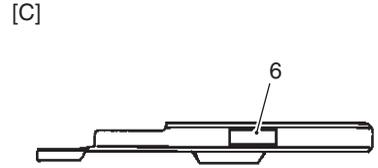
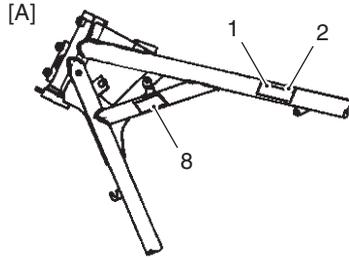
Wire Color Symbols

B649G10101010

Symbol	Wire Color	Symbol	Wire Color
B	Black	Bl/B	Blue with Black tracer
Bl	Blue	Br/B	Brown with Black tracer
Br	Brown	G/B	Green with Black tracer
Dbr	Dark brown	G/Bl	Green with Blue tracer
Dg	Dark green	G/Y	Green with Yellow tracer
G	Green	O/G	Orange with Green tracer
Lg	Light green	O/R	Orange with Red tracer
W	White	O/W	Orange with White tracer
Y	Yellow	O/Y	Orange with Yellow tracer
B/Bl	Black with Blue tracer	P/B	Pink with Black tracer
B/Br	Black with Brown tracer	R/B	Red with Black tracer
B/G	Black with Green tracer	R/W	Red with White tracer
B/O	Black with Orange tracer	W/B	White with Black tracer
B/R	Black with Red tracer	Y/B	Yellow with Black tracer
B/W	Black with White tracer	Y/W	Yellow with White tracer
B/Y	Black with Yellow tracer		

Warning, Caution and Information Labels Location

B649G10101011



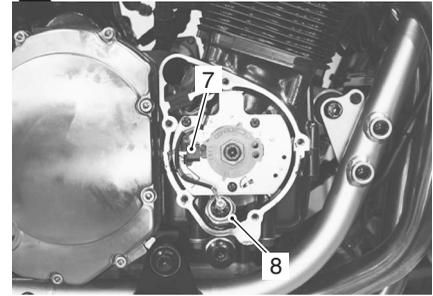
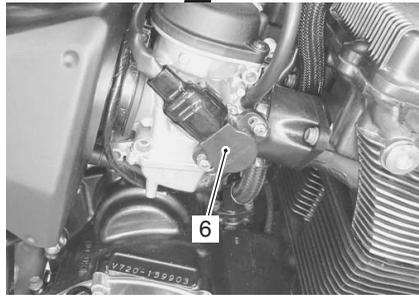
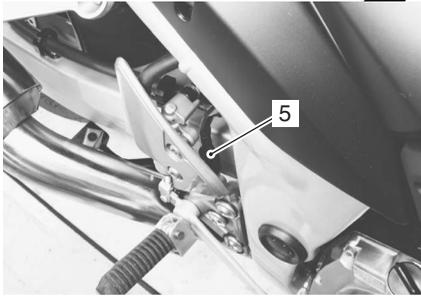
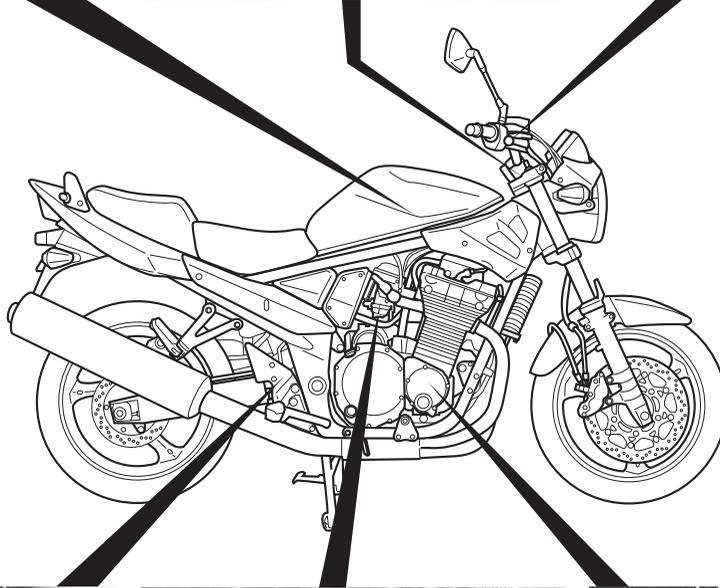
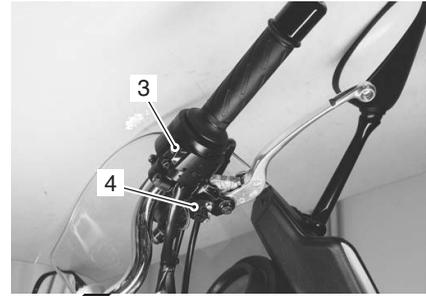
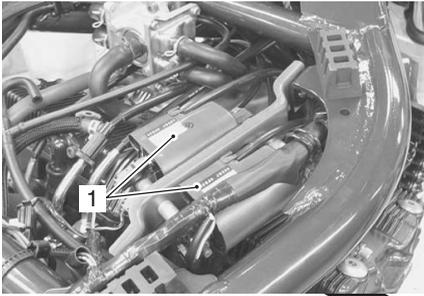
I649G1010011-04

	GSF1200	GSF1200S
1. Noise label	—	For E-24
2. Information label	—	For E-28
3. Fuel caution label	For E-02	For E-02, 24
4. Screen label	—	For E-02, 19, 24, 28
5. Warning steering label	—	For E-02, 19, 24, 28
6. Tire information label	For E-02, 19	For E-02, 19, 24, 28
7. General warning label	For E-02, 19	For E-02, 19, 24, 28
8. ICES Canada label	—	For E-28
9. I.D. plate	For E-02, 19	For E-02, 19, 24
10. Safety plate	—	For E-28
[A]: Frame head (Left side)		
[B]: Cowling body		
[C]: Chain cover		
[D]: Frame side tube (Right side)		

Component Location

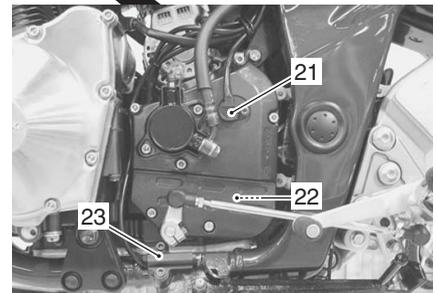
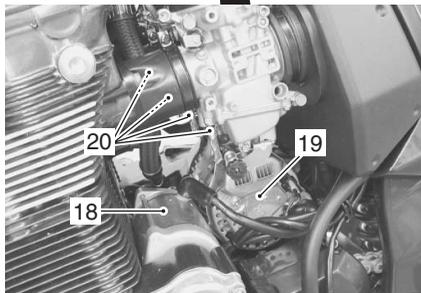
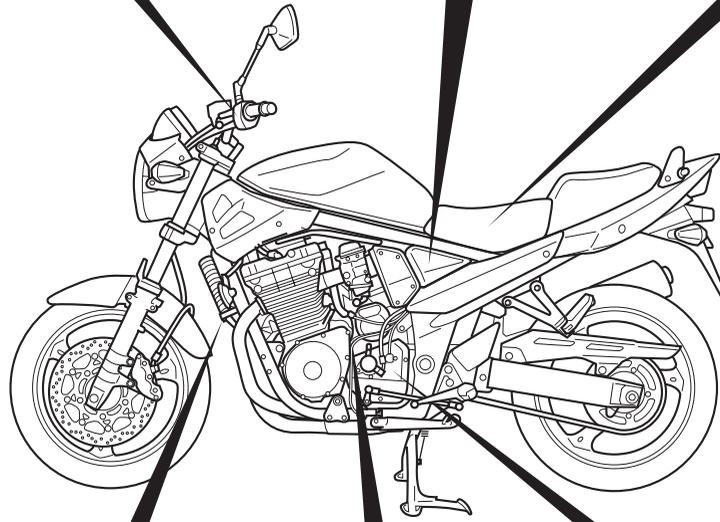
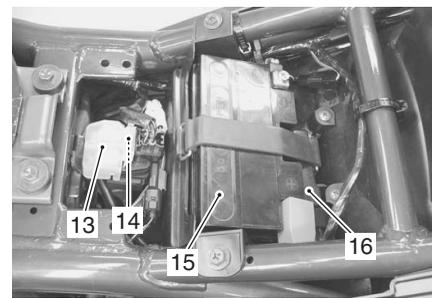
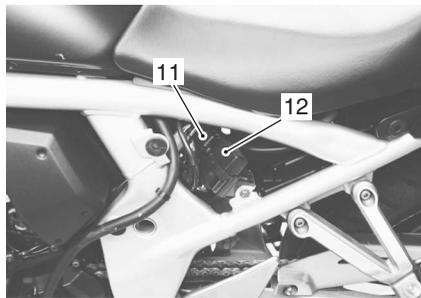
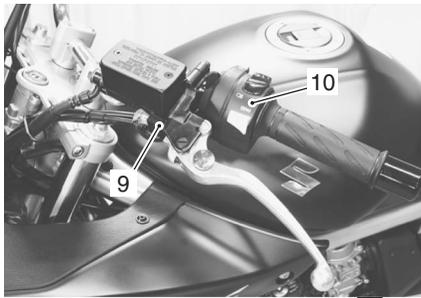
Electrical Components Location

B649G10103001



I649G1010003-05

1. Ignition coil	3. Handlebar switch (RH)	5. Rear brake light switch	7. CKP sensor
2. Ignition switch	4. Front brake light switch	6. Throttle position sensor	8. Oil pressure switch



9. Clutch lever position switch	14. Main fuse	19. Generator
10. Handlebar switch (LH)	15. Battery	20. Carburetor heater (For E-02, 19)
11. Fuse box	16. Ignitor	21. Speed sensor
12. Turn signal/Side-stand relay	17. Horn	22. Gear position switch
13. Starter relay	18. Starter motor	23. Side-stand switch

Specifications

Specifications

B649G10107001

NOTE

These specifications are subject to change without notice.

Dimensions and dry mass

Item	Specification	Remark
Overall length	2 130 mm (83.9 in)	
Overall width	790 mm (31.1 in)	
Overall height	1 095 mm (43.1 in)	GSF1200
	1 235 mm (48.6 in)	GSF1200S
Wheelbase	1480 mm (58.3 in)	
Ground clearance	135 mm (5.3 in)	
Seat height	785/805 mm (30.9/31.7 in)	Low/High
Dry mass	212 kg (467 lbs)	GSF1200
	215 kg (474 lbs)	GSF1200S

Engine

Item	Specification	Remark
Type	4-stroke, air-cooled, DOHC	
Number of cylinders	4	
Bore	79.0 mm (3.110 in)	
Stroke	59.0 mm (2.323 in)	
Displacement	1 157 cm ³ (70.6 cu. in)	
Compression ratio	9.5 : 1	
Carburetor	MIKUNI BSR36	
Air cleaner	Non-woven fabric element	
Starter system	Electric	
Lubrication system	Wet sump	
Idle speed	1 300 ± 100 r/min	E-28
	1 200 ± 100 r/min	Others

Drive train

Item	Specification	Remark
Clutch	Wet multi-plate type	
Transmission	5-speed constant mesh	
Gearshift pattern	1-down, 4-up	
Primary reduction ratio	1.565 (72/46)	
Gear ratios	Low	2.384 (31/13)
	2nd	1.631 (31/19)
	3rd	1.250 (25/20)
	4th	1.045 (23/22)
	Top	0.913 (21/23)
Final reduction ratio	3.000 (45/15)	
Drive chain	RK GB50GSVZ3, 116 links	

Chassis

Item	Specification	Remark
Front suspension	Telescopic, coil spring, oil damped	
Rear suspension	Link type, coil spring, oil damped	
Front suspension stroke	130 mm (5.1 in)	
Rear wheel travel	136 mm (5.4 in)	
Caster	35° (right & left)	
Trail	25° 20'	
Steering angle	104 mm (4.10 in)	
Turning radius	2.8 m (9.2 ft)	
Front brake	Disc brake, twin	
Rear brake	Disc brake	
Front tire size	120/70ZR17M/C (58W), tubeless	
Rear tire size	180/55ZR17M/C (73W), tubeless	

Electrical

Item	Specification	Remark
Ignition type	Electronic ignition (Transistorized)	
Ignition timing	7° B.T.D.C. at 1 300 r/min	E-28
	7° B.T.D.C. at 1 200 r/min	Others
Spark plug	NGK JR9B	
Battery	12 V 36 kC (10 Ah)/10 HR	
Generator	Three-phase A.C. generator	
Main fuse	30 A	
Fuse	10/10/15/15/10 A	
Headlight	12 V 60/55 W (H4)	GSF1200
	12 V 55 W (H7) + 12 V 55 W (H7)	GSF1200S
Position light	12 V 5 W	GSF1200
	12 V 5W x 2	GSF1200S
Turn signal light	12 V 21 W x 4	
Brake light/Taillight	12 V 21/5 W	
License plate light	12 V 5 W	
Speedometer light	LED	
Tachometer light	LED	
Neutral indicator light	LED	
High beam indicator light	LED	
Turn signal indicator light	LED	
Oil pressure indicator light	LED	

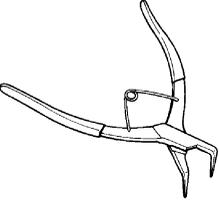
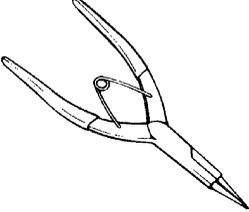
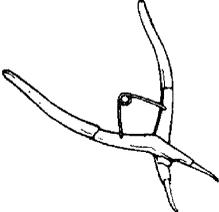
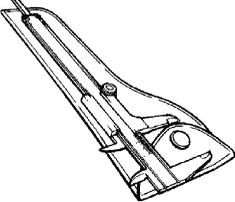
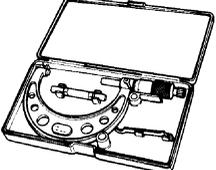
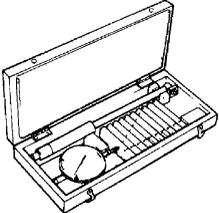
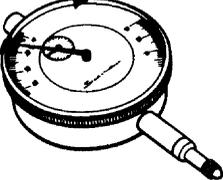
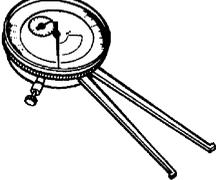
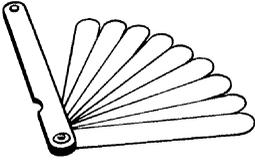
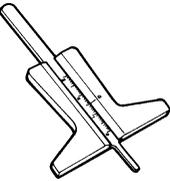
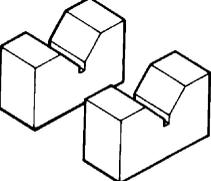
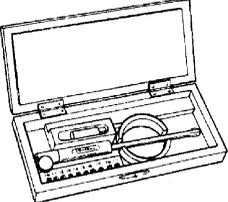
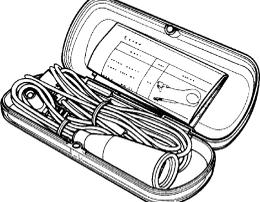
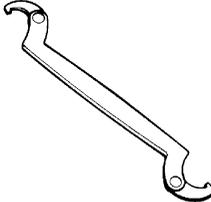
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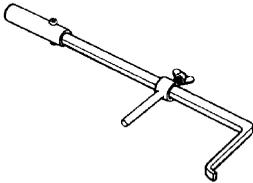
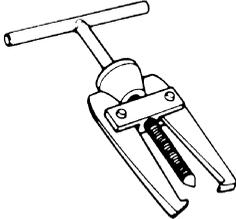
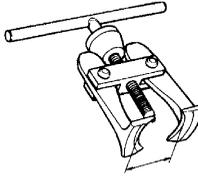
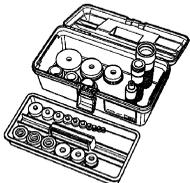
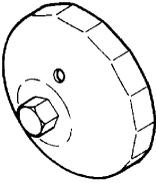
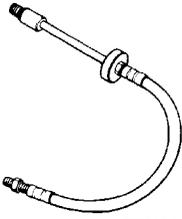
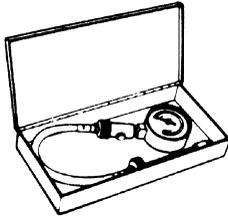
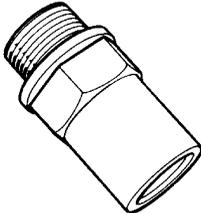
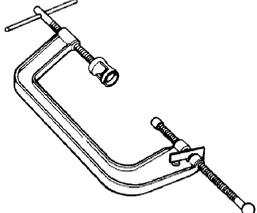
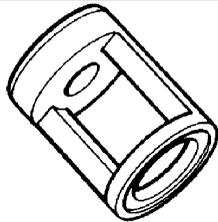
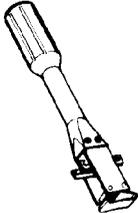
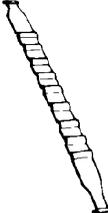
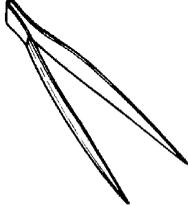
Item	Specification	Remark
Fuel tank	Including reserve 20.0 L (5.3/4.4 US/Imp gal)	
Engine oil	Reserve 4.4 L (1.2/1.0 US/Imp gal)	
	Oil change 3 300 ml (3.4/2.9 US/Imp qt)	
	With filter change 3 500 ml (3.6/3.0 US/Imp qt)	
	Overhaul 4 600 ml (4.9/4.0 US/Imp qt)	

Special Tools and Equipment

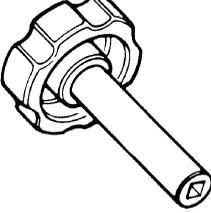
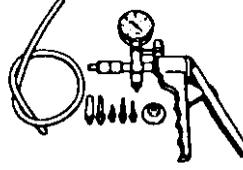
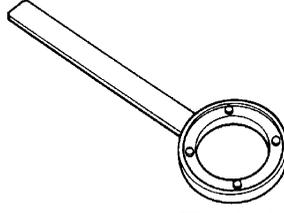
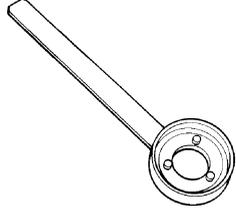
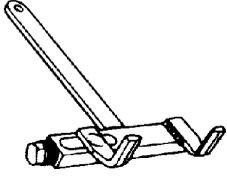
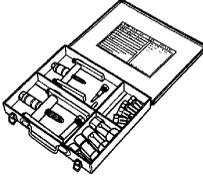
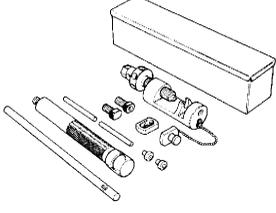
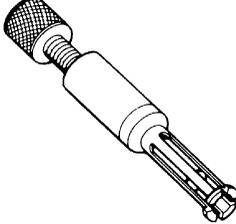
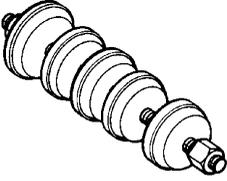
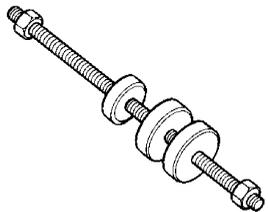
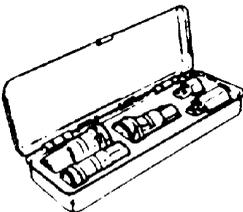
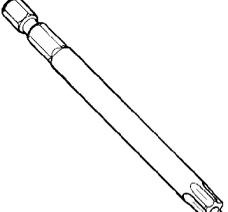
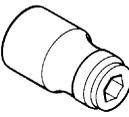
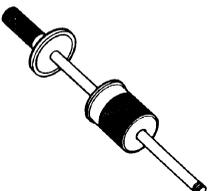
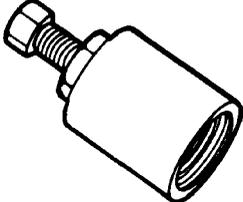
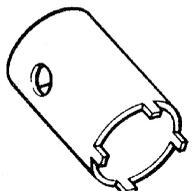
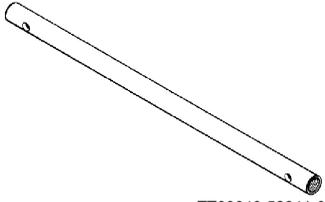
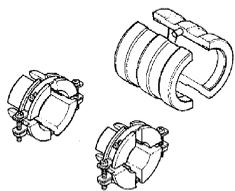
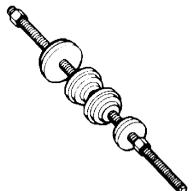
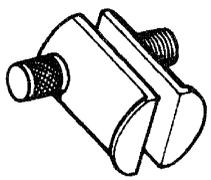
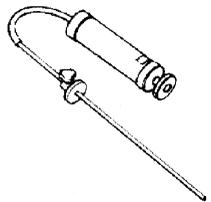
Special Tools

B649G10108001

 <p style="text-align: center;">TT09900-06106-01</p> <p>09900-06106 Snap ring pliers</p>	 <p style="text-align: center;">TT09900-06107-02</p> <p>09900-06107 Snap ring pliers</p>	 <p style="text-align: center;">TT09900-06108-02</p> <p>09900-06108 Snap ring pliers</p>	 <p style="text-align: center;">TT09900-20102-01</p> <p>09900-20102 Vernier calipers (1/20 mm, 200 mm)</p>
 <p style="text-align: center;">TT09900-20202-01</p> <p>09900-20202 Micrometer (1/100 mm, 25 – 50 mm)</p>	 <p style="text-align: center;">TT09900-20204-01</p> <p>09900-20204 Micrometer (1/100 mm, 75 – 100 mm)</p>	 <p style="text-align: center;">TT09900-20205-01</p> <p>09900-20205 Micrometer (1/1 000 mm, 0 – 25 mm)</p>	 <p style="text-align: center;">TT09900-20508-01</p> <p>09900-20508 Cylinder gauge set (1/100 mm, 40 – 80 mm)</p>
 <p style="text-align: center;">TT09900-20602-01</p> <p>09900-20602 Dial gauge (1/1 000 mm)</p>	 <p style="text-align: center;">TT09900-20605-01</p> <p>09900-20605 Dial calipers (1/100 mm, 10 – 34 mm)</p>	 <p style="text-align: center;">TT09900-20607-01</p> <p>09900-20607 Dial gauge (1/100 mm)</p>	 <p style="text-align: center;">TT09900-20701-01</p> <p>09900-20701 Magnetic stand</p>
 <p style="text-align: center;">TT09900-20803-01</p> <p>09900-20803 Thickness gauge</p>	 <p style="text-align: center;">TT09900-20805-01</p> <p>09900-20805 Tire depth gauge</p>	 <p style="text-align: center;">TT09900-21304-01</p> <p>09900-21304 V-block set (100 mm)</p>	 <p style="text-align: center;">TT09900-22301-01</p> <p>09900-22301 09900-22302 Plastigauge</p>
 <p style="text-align: center;">TT09900-22403-01</p> <p>09900-22403 Small bore gauge (18 – 35 mm)</p>	 <p style="text-align: center;">TT09900-25008-01</p> <p>09900-25008 Multi circuit tester set</p>	 <p style="text-align: center;">TT09900-25009-01</p> <p>09900-25009 Needle pointed probe set</p>	 <p style="text-align: center;">TT09910-60611-01</p> <p>09910-60611 Universal clamp wrench</p>

 <p>TT09913-50121-01</p> <p>09913-50121 Oil seal remover</p>	 <p>TT09913-60910-01</p> <p>09913-60910 Bearing remover</p>	 <p>TT09913-61510-01</p> <p>09913-61510 Bearing remover</p>	 <p>TT09913-70210-01</p> <p>09913-70210 Bearing installer set</p>
 <p>TT09915-40610-01</p> <p>09915-40610 Oil filter wrench</p>	 <p>TT09915-63210-01</p> <p>09915-63210 Compression gauge adaptor</p>	 <p>TT09915-64510-01</p> <p>09915-64510 Compression gauge set</p>	 <p>TT09915-74521-01</p> <p>09915-74521 Oil pressure gauge hose</p>
 <p>TT09915-74540-01</p> <p>09915-74540 Oil pressure gauge attachment</p>	 <p>TT09915-77331-01</p> <p>09915-77331 Meter (for high pressure)</p>	 <p>TT09916-10911-01</p> <p>09916-10911 Valve lapper set</p>	 <p>TT09916-14510-02</p> <p>09916-14510 Valve spring compressor</p>
 <p>TT09916-14910-01</p> <p>09916-14910 Valve lifter attachment</p>	 <p>TT09916-34542-01</p> <p>09916-34542 Reamer handle</p>	 <p>TT09916-34570-01</p> <p>09916-34570 Valve guide reamer (4.95 mm)</p>	 <p>TT09916-34580-01</p> <p>09916-34580 Valve guide reamer (10.8 mm)</p>
 <p>TT09916-44310-01</p> <p>09916-44310 Valve guide remover/ installer</p>	 <p>TT09916-74521-01</p> <p>09916-74521 Holder body</p>	 <p>TT09916-74550-01</p> <p>09916-74550 Band (73 – 85 mm)</p>	 <p>TT09916-84511-01</p> <p>09916-84511 Tweezers</p>

0A-13 General Information:

 <p>TT09917-14920-01</p> <p>09917-14920 Valve adjuster driver</p>	 <p>TT09917-47010-01</p> <p>09917-47010 Vacuum pump gauge</p>	 <p>TT09920-34820-01</p> <p>09920-34820 Clutch pressure plate holder</p>	 <p>TT09920-34840-01</p> <p>09920-34840 Starter clutch holder</p>
 <p>TT09920-53740-02</p> <p>09920-53740 Clutch sleeve hub holder</p>	 <p>TT09921-20240-01</p> <p>09921-20240 Bearing remover set</p>	 <p>TT09922-22711-01</p> <p>09922-22711 Drive chain cutting and joining tool</p>	 <p>TT09923-73210-01</p> <p>09923-73210 Bearing remover</p>
 <p>TT09924-84510-01</p> <p>09924-84510 Bearing installer set</p>	 <p>TT09924-84521-01</p> <p>09924-84521 Bearing installer set</p>	 <p>TT09930-10121-01</p> <p>09930-10121 Spark plug wrench set</p>	 <p>TT09930-11920-01</p> <p>09930-11920 Torx bit (JT 40H)</p>
 <p>TT09930-11940-01</p> <p>09930-11940 Bit holder</p>	 <p>TT09930-30102-01</p> <p>09930-30102 Sliding shaft</p>	 <p>TT09930-30721-01</p> <p>09930-30721 Rotor remover</p>	 <p>TT09940-14911-01</p> <p>09940-14911 Steering stem nut wrench</p>
 <p>TT09940-52841-01</p> <p>09940-52841 Inner rod holder</p>	 <p>TT09940-52861-01</p> <p>09940-52861 Front fork oil seal installer</p>	 <p>TT09940-92720-01</p> <p>09940-92720 Spring scale</p>	 <p>TT09941-34513-01</p> <p>09941-34513 Steering race installer</p>
 <p>TT09941-54911-01</p> <p>09941-54911 Bearing outer race remover</p>	 <p>TT09941-74911-01</p> <p>09941-74911 Steering bearing installer</p>	 <p>TT09943-74111-01</p> <p>09943-74111 Fork oil level gauge</p>	

Maintenance and Lubrication

Precautions

Precautions for Maintenance

B649G1020001

The "Periodic Maintenance Schedule Chart" lists the recommended intervals for all the required periodic service work necessary to keep the motorcycle operating at peak performance and economy. Maintenance intervals are expressed in terms of kilometers, miles and months for your convenience.

NOTE

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

General Description

Recommended Fluids and Lubricants

B649G10201001

Refer to "Fuel and Oil Recommendation: in Section 0A".

Scheduled Maintenance

Periodic Maintenance Schedule Chart

B649G10205001

NOTE

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

R = Replace

T = Tighten

Item	Interval					
	km	1 000	6 000	12 000	18 000	24 000
	mile	600	4 000	7 500	11 000	14 500
	months	2	12	24	36	48
Air cleaner element	—	I	I	R	I	I
Exhaust pipe bolts and muffler bolts	T	—	T	—	T	T
Valve clearance	I	—	I	—	I	I
Spark plugs	—	I	R	I	R	R
Fuel line	—	I	I	I	I	I
Engine oil	R	R	R	R	R	R
Engine oil filter	R	—	—	R	—	—
Throttle cable play	I	I	I	I	I	I
Engine idle speed	I	I	I	I	I	I
Throttle valve synchronization	—	—	I	—	I	I
PAIR (air supply) system	—	—	I	—	I	I
Clutch hose	—	I	I	I	I	I
Replace every 4 years.						
Clutch fluid	—	I	I	I	I	I
Replace every 2 years.						
Drive chain	I	I	I	I	I	I
Clean and lubricate every 1 000 km (600 mile).						
Brakes	I	I	I	I	I	I
Brake hose	—	I	I	I	I	I
Replace every 4 years.						
Brake fluid	—	I	I	I	I	I
Replace every 2 years.						
Tires	—	I	I	I	I	I
Steering	I	—	I	—	I	I
Front forks	—	—	I	—	I	I
Rear suspension	—	—	I	—	I	I
Chassis bolts and nuts	T	T	T	T	T	T

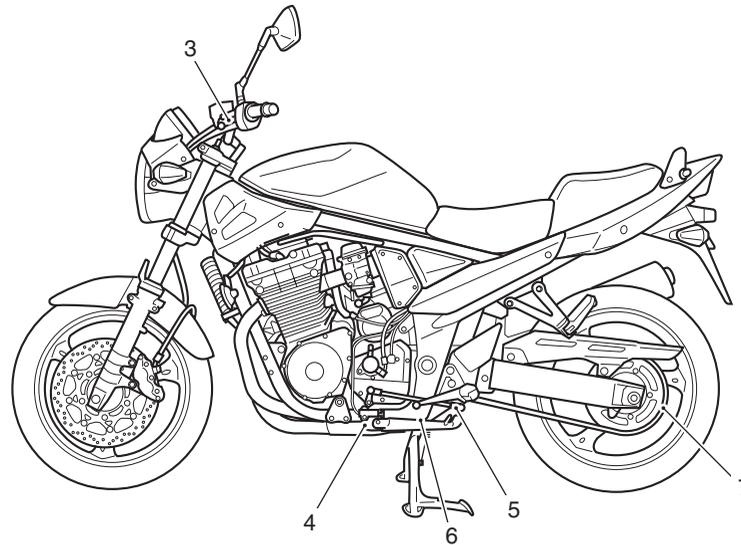
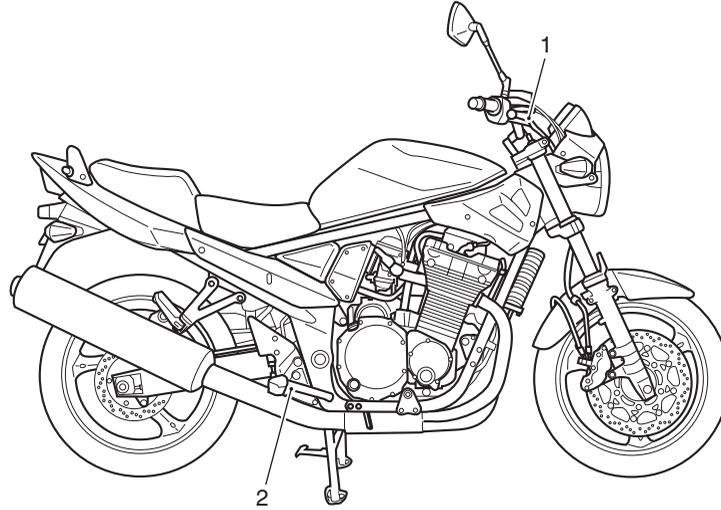
Lubrication Points

B649G10205002

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

NOTE

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



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

I649G1020001-03

Repair Instructions

Air Cleaner Element Removal and Installation

B649G10206001

Inspect air cleaner element

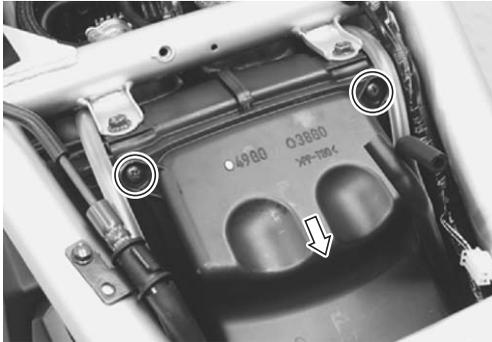
Every 6 000 km (4 000 miles, 12 months)

Replace air cleaner element

Every 18 000 km (11 000 miles, 36 months)

Removal

- 1) Remove the fuel tank. Refer to “Carburetor Assembly Removal and Installation: in Section 1G”.
- 2) Remove the two screws and slide the air cleaner cover backward.



I649G1020002-02

- 3) Remove the air cleaner element (1).



I649G1020003-02

Installation

Reinstall the cleaned or new air cleaner element in the reverse order of removal. Pay attention to the following points:

- When installing the air cleaner element into the air cleaner box, make sure that the mark points “A” up.



I649G1020004-02

- After cleaning or installing the air cleaner element, drain water from the air cleaner by removing the drain plug.



I649G1020005-01

Air Cleaner Element Inspection and Cleaning

B649G10206002

Refer to “Air Cleaner Element Removal and Installation:”.

Inspect air cleaner element

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

Replace air cleaner element

Every 18 000 km (11 000 miles, 36 months)

Inspection

Inspect the air cleaner element for clogging.

⚠ CAUTION

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



I649G1020006-01

Cleaning

Carefully use compressed air to clean the air cleaner element.

⚠ CAUTION

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



I649G1020007-01

Spark Plug Removal and Installation

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Inspect spark plug

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

Replace spark plug

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

Removal

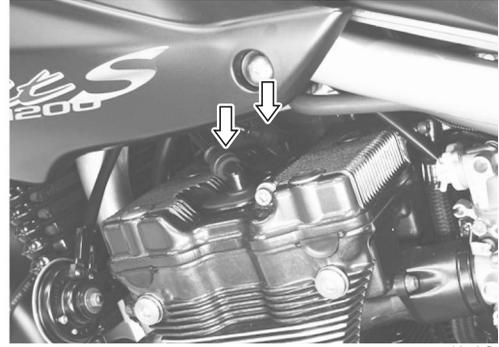
⚠ WARNING

The hot engine can burn you.
Wait until the engine is cool enough to touch.

⚠ CAUTION

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

1) Remove the spark plug caps.



I649G1020008-02

2) Remove the spark plugs with the spark plug wrench.

Special tool

TOOL (A): 09930-10121 (Spark plug wrench set)



I649G1020009-02

Installation

Install the spark plugs in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

Before tightening the spark plug to the specified torque, carefully turn the spark plug by finger into the threads of the cylinder head to prevent damage the aluminum threads.

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

Tightening torque

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

- Install the spark plug caps onto the spark plugs. Make sure that each spark plug cap is installed in the correct location and direction.

Spark Plug Inspection and Cleaning

B649G10206004

Refer to “Spark Plug Removal and Installation:”.

Inspect spark plug

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

Replace spark plug

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

Heat Range

Check spark plug heat range by observing electrode color.

If it is white or glazed appearing, replace the spark plug with colder type one.

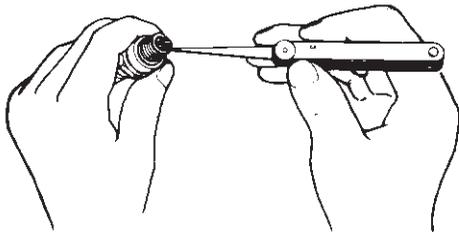
Heat range

	Standard	Cold type	Hot type
NGK	JR9B	JR10B	JR8B

Carbon Deposits

Check to see if there are carbon deposits on the spark plug.

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



I649G1020010-01

Spark Plug Gap

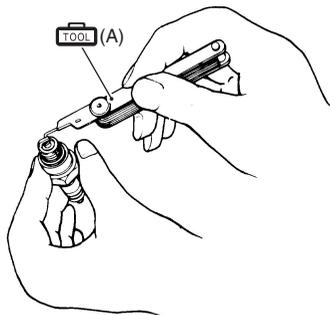
Measure the spark plug gap using a thickness gauge. Adjust the spark plug gap if necessary.

Spark plug gap

0.6 – 0.7 mm (0.024 – 0.028 in)

Special tool

TOOL (A): 09900–20803 (Thickness gauge)



I649G1020011-03

Electrodes Condition

Check to see the worn or burnt condition of the electrodes.

If it is extremely worn or burnt, replace the plug. And also replace the plug if it has a broken insulator, damaged thread.

Exhaust Pipe Bolt and Muffler Mounting Bolt Inspection

B649G10206021

Tighten exhaust pipe bolt and muffler mounting bolt Initially at 1 000 km (600 miles, 2 month) and every 12 000 km (7 500 miles, 24 months) thereafter.

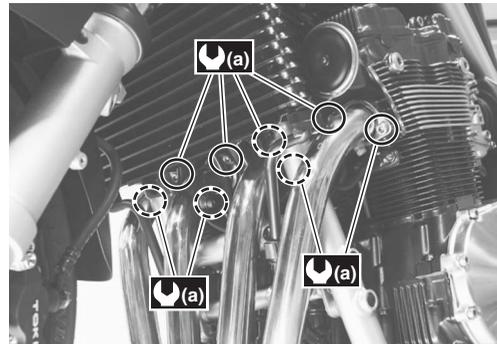
Check the exhaust pipe bolts, muffler mounting bolts and nut to the specified torque.

Tightening torque

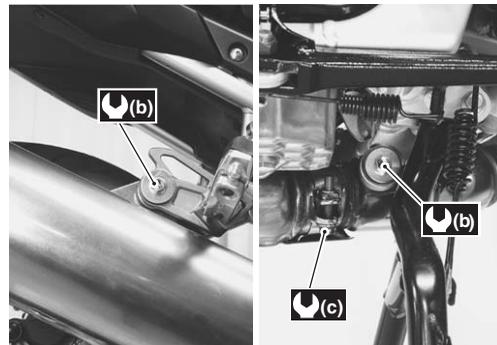
Exhaust pipe bolt (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)

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

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



I649G1020054-03



I649G1020053-02

Valve Clearance Inspection and Adjustment

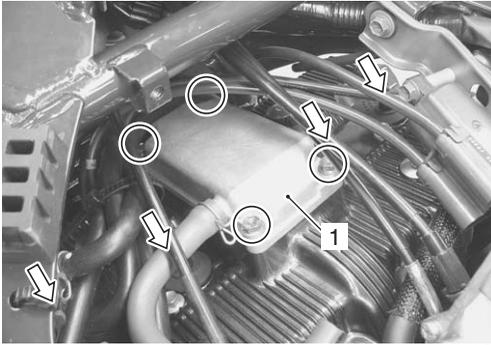
B649G10206005

Inspect valve clearance

Initially at 1 000 km (600 miles, 2 month) and every 12 000 km (7 500 miles, 24 months) thereafter.

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

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: in Section 1G".
- 2) Remove the frame head covers. (GSF1200) Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 3) Remove the PAIR valve. Refer to "PAIR System Removal and Installation: in Section 1B".
- 4) Remove all the spark plugs. Refer to "Spark Plug Removal and Installation: ".
- 5) Remove the breather cover (1).



I649G1020066-01

- 6) Remove the cylinder head cover. Refer to "Engine Top Side Disassembly: in Section 1D".

NOTE

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

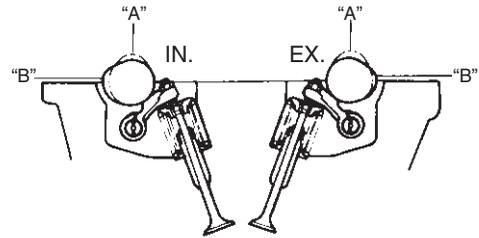
Valve clearance (When cold)

IN.: 0.10 – 0.15 mm (0.004 – 0.006 in)

EX.: 0.18 – 0.23 mm (0.007 – 0.009 in)

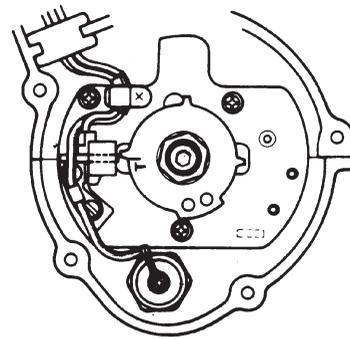
NOTE

- The camshafts must be at positions "A" or "B", in order to check or adjust the valve clearance. Clearance readings should not be taken with the camshafts in any other position than the ones shown.
- The valve clearance should only be checked when the engine is cold.

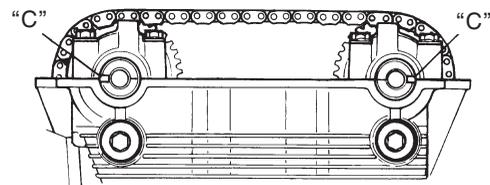


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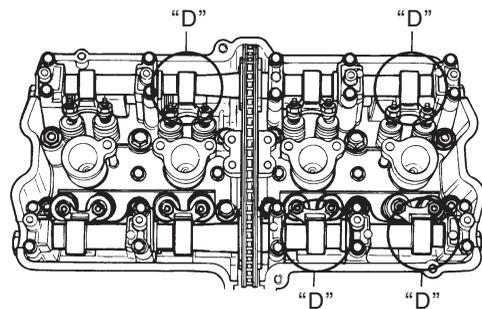
- 7) Remove the CKP sensor cover. Refer to "CKP Sensor Removal and Installation: in Section 1H".
- 8) Turn the crankshaft clockwise and align the "T" mark on the rotor with the center of the CKP sensor. Also, position the notches "C" on the right end of each camshaft as shown. Then, measure the following valve clearances "D".
 - Cylinder #1: Intake and exhaust valve clearances
 - Cylinder #2: Exhaust valve clearance
 - Cylinder #3: Intake valve clearance



I649G1020013-02



I649G1020014-02



I649G1020017-02

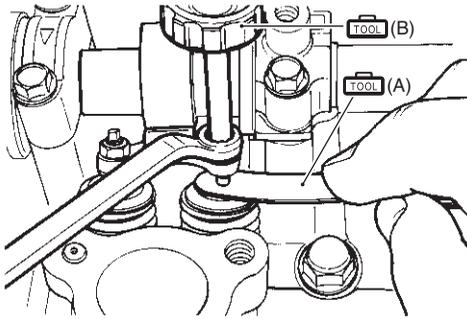
Camshaft position	Notch "C" position faces outside
Measuring position	"D"

0B-8 Maintenance and Lubrication:

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

⚠ CAUTION

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



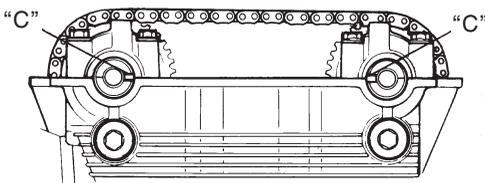
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Special tool

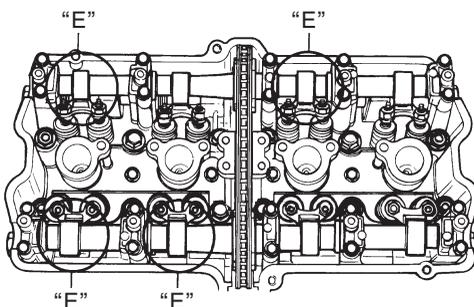
 (A): 09900-20803 (Thickness gauge)

 (B): 09917-14920 (Valve adjuster driver)

- 10) Turn the crankshaft clockwise 360° (one full rotation) and align the "T" mark on the rotor with the center of the CKP sensor. Also, position the notches "C" on the right end of each camshaft as shown. Then, measure the following valve clearances "E".
- Cylinder #2: Intake valve clearance
 - Cylinder #3: Exhaust valve clearance
 - Cylinder #4: Intake and exhaust valve clearances
- 11) Measure the valve clearances of the remaining valves "E" and adjust them if necessary.



I649G1020016-03



I649G1020018-02

Camshaft position	Notch "C" position faces inside
Measuring position	"E"

- 12) Turn the crankshaft and recheck the valve clearances.
- 13) After finishing the valve clearance adjustment, reinstall the following items.
- CKP sensor cover (Refer to "CKP Sensor Removal and Installation: in Section 1H".)
 - Cylinder head cover (Refer to "Engine Top Side Assembly: in Section 1D".)
 - Breather cover
 - Spark plugs and plug caps (Refer to "Spark Plug Removal and Installation: ".)
 - PAIR valve (Refer to "PAIR System Removal and Installation: in Section 1B".)
 - Frame head covers (for GSF1200) (Refer to "Exterior Parts Removal and Installation: in Section 9D".)
 - Fuel tank (Refer to "Fuel Tank Removal and Installation: in Section 1G".)
 - Seat (Refer to "Exterior Parts Removal and Installation: in Section 9D".)

Fuel Line Inspection

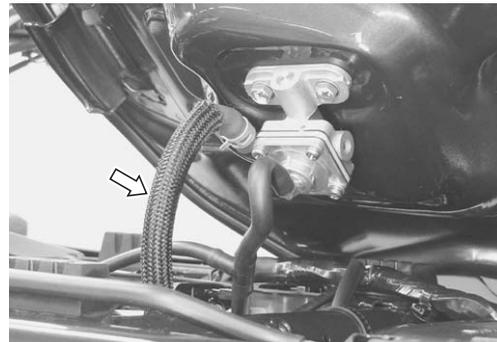
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Inspect fuel line

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

Inspect the fuel line in the following procedures:

- Remove the seat. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- Remove the fuel tank mounting bolts. Refer to "Fuel Tank Removal and Installation: in Section 1G".
- Lift up the fuel tank.
- Inspect the fuel hose for damage and fuel leakage. If any defects are found, the fuel hose must be replaced.



I649G1020065-01

Engine Oil and Filter Replacement

B649G10206007

Replace engine oil

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

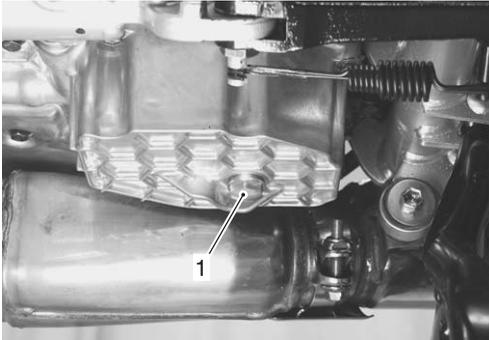
Replace oil filter

Initially at 1 000 km (600 miles, 2 month) and every 18 000 km (11 000 miles, 36 months) thereafter.

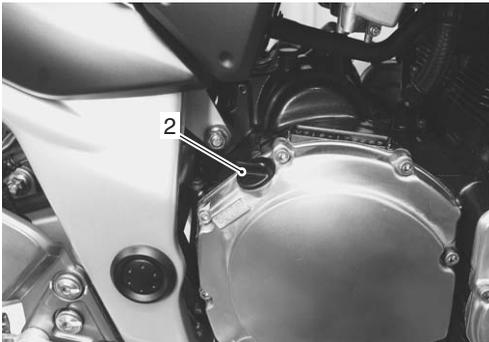
Oil should be changed while the engine is warm. Oil filter replacement at the above intervals, should be done together with the engine oil change.

Engine Oil Replacement

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



I649G1020019-01

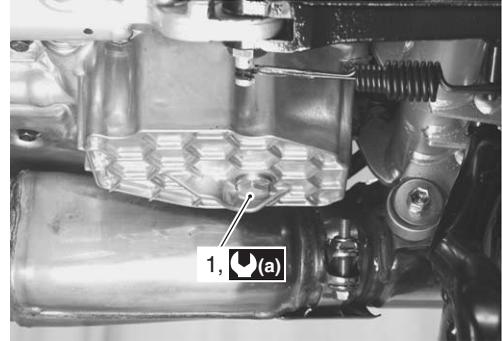


I649G1020020-01

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

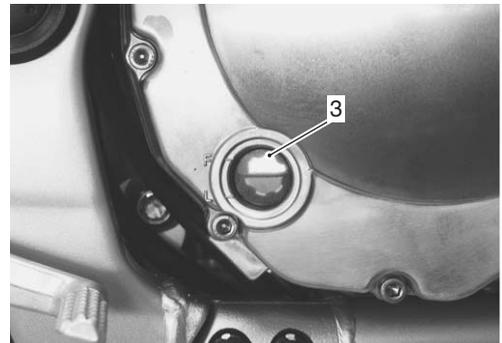
Tightening torque

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



I649G1020021-03

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



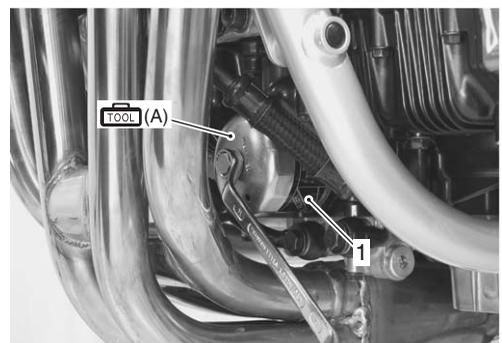
I649G1020022-01

Oil Filter Replacement

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

Special tool

 (A): 09915-40610 (Oil filter wrench)



I649G1020023-02

0B-10 Maintenance and Lubrication:

- 3) Apply engine oil lightly to the O-ring of new oil filter, before installation.

⚠ CAUTION

ONLY USE A GENUINE SUZUKI MOTORCYCLE OIL FILTER.

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

- 4) Install a new oil filter. Turn it by hand until you feel that the oil filter O-ring contacts the oil filter mounting surface. Then, tighten the oil filter two full turns (or to specified torque) using the special tool.

NOTE

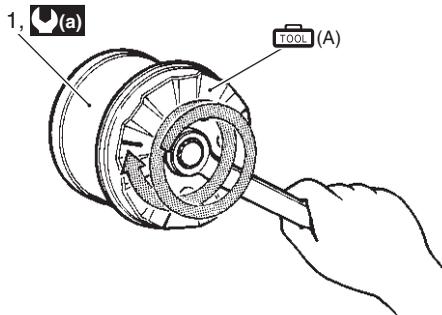
To properly tighten the oil filter, use the special tool. Never tighten the oil filter by hand only.

Special tool

TOOL (A): 09915-40610 (Oil filter wrench)

Tightening torque

Oil filter (a): 20 N·m (2.0 kgf·m, 14.5 lb-ft)



I649G1020024-03

- 5) Add new engine oil and check the oil level is as described in the engine oil replacement procedure.

Necessary amount of engine oil

Oil change: 3.3 L (3.4/2.9 US/Imp qt)

Oil and filter change: 3.5 L (3.6/3.0 US/Imp qt)

Engine overhaul: 4.6 L (4.9 /4.0 US/Imp qt)

Throttle Cable Play Inspection and Adjustment

B649G10206012

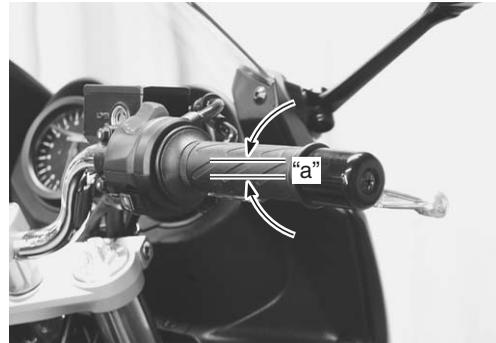
Inspect throttle cable play

Initially at 1 000 km (6 000 miles, 2 month) and every 6 000 km (4 000 miles, 12 months) thereafter.

Inspect and adjust the throttle cable play "a" as follows.

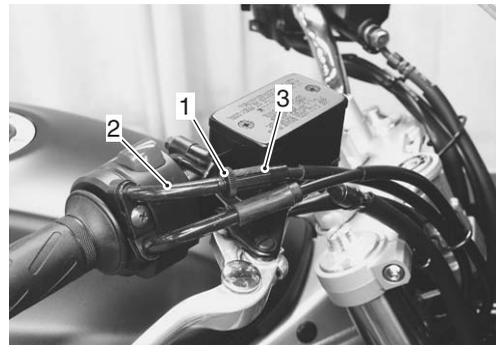
Throttle cable play "a"

2.0 – 4.0 mm (0.08 – 0.16 in)



I649G1020026-01

- 1) Loosen the lock-nut (1) of the throttle pulling cable (2).
- 2) Turn the adjuster (3) in or out until the throttle cable play "a" (at the throttle grip) is between 2 – 4 mm (0.08 – 0.16 in).
- 3) Tighten the lock-nut (1) while holding the adjuster (3).



I649G1020027-01

⚠ WARNING

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

Engine Idle Speed Inspection and Adjustment

B649G10206011

Inspect engine idle speed

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

NOTE

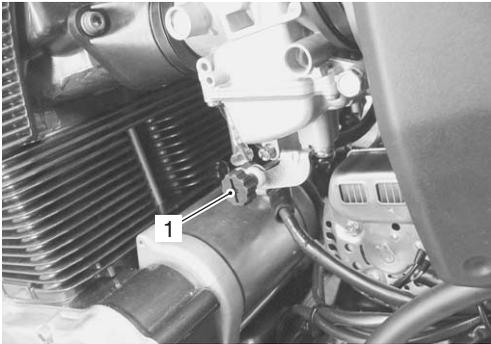
Make this adjustment when the engine is hot.

Start the engine, turn the throttle stop screw (1) and set the engine idle speed "a".

Engine idle speed "a"

1 300 ± 100 r/min (E-28)

1 200 ± 100 r/min (Others)



I649G1020025-02

Throttle Valve Synchronization

B649G10206013

Inspect throttle valve synchronization

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

Inspect the throttle valve synchronization periodically. Refer to "Carburetor Synchronization: in Section 1G".

PAIR System Inspection

B649G10206014

Inspect PAIR system

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

Inspect the PAIR (air supply) system periodically. Refer to "PAIR System Inspection: ".

Clutch System Inspection

B649G10206026

Inspect clutch hose and clutch fluid

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

Replace clutch hose

Every 4 years

Replace clutch fluid

Every 2 years

⚠ WARNING

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

Clutch Fluid Level Check

- 1) Keep the motorcycle upright and place the handlebars straight.
- 2) Check the clutch fluid level by observing the lower limit line on the clutch fluid reservoir. When the clutch fluid level is below the lower limit line, replenish with clutch fluid that meets the following specification.

BF: Brake fluid (DOT 4)

I649G1020028-01

Clutch Hose Inspection

- 1) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: in Section 1G".
- 3) Inspect the clutch hose for crack, damage or clutch fluid leakage. If it is defected, replace the clutch hose with a new one.



I649G1020031-01

- 4) After finishing the clutch hose inspection, reinstall the removed parts.

Clutch Hose Replacement

B649G10206031

Refer to "Clutch Hose Removal and Installation: in Section 5C".

Air Bleeding from Clutch Fluid Circuit

B649G10206032

Refer to "Air Bleeding from Clutch Fluid Circuit: ".

Clutch Fluid Replacement

B649G10206033

Refer to "Clutch Fluid Replacement: in Section 5C".

Drive Chain Inspection and Adjustment

B649G10206028

Inspect drive chain

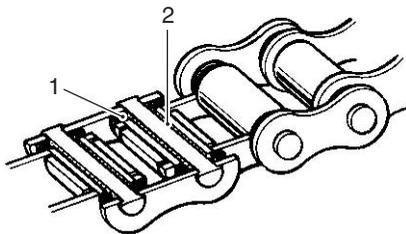
Initially at 1 000 km (600 miles, 2 month) and every 6 000 km (4 000 miles, 12 months) thereafter.

Drive Chain Visual Check

- 1) With the transmission in neutral, support the motorcycle using the center-stand and turn the rear wheel slowly by hand.
- 2) Visually check the drive chain for the possible defects listed as follows. If any defects are found, the drive chain must be replaced. Refer to "Drive Chain Replacement: in Section 3A".
 - Loose pins
 - Damaged rollers
 - Dry or rusted links
 - Kinked or binding links
 - Excessive wear
 - Improper chain adjustment
 - Missing O-ring seals

NOTE

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

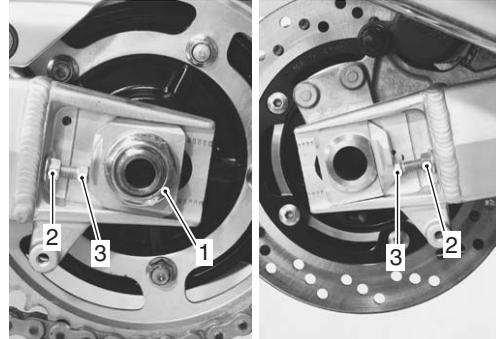


I649G1020032-01

1. O-ring seal	2. Grease
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Drive Chain Length Inspection

- 1) Remove the cotter pin. (For E-28)
- 2) Loosen the axle nut (1).
- 3) Loosen the chain adjuster lock-nuts (2).
- 4) Give tension to the drive chain fully by turning both chain adjuster bolts (3).

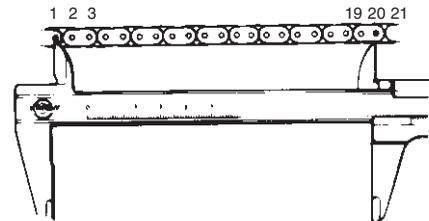


I649G1020033-01

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

Drive chain 20-pitch length

Service limit: 319.4 mm (12.57 in)



I649G1020034-01

- 6) After finishing the drive chain length inspection, adjust the drive chain slack.

Drive Chain Slack Adjustment

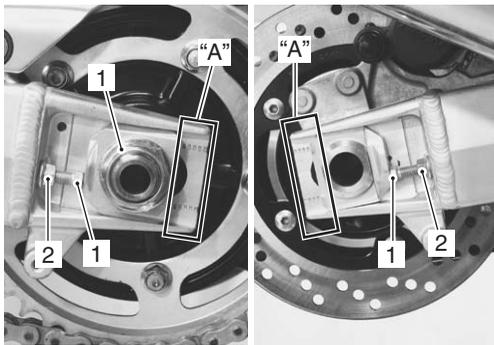
- 1) Place the motorcycle on its side-stand for accurate adjustment.
- 2) Loosen the axle nut (1).
- 3) Loosen the chain adjuster lock-nuts (2).
- 4) Loosen or tighten both chain adjuster bolts (3) until there is 20 – 30 mm (0.8 – 1.2 in) "a" of slack at the middle of the chain between the engine and rear sprockets as shown.

⚠ CAUTION

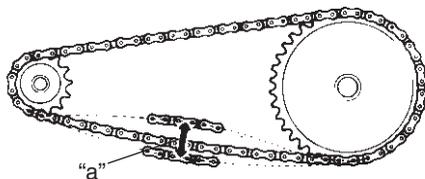
The reference marks "A" on both sides of the swingarm and the edge of each chain adjuster must be aligned to ensure that the front and rear wheels are correctly aligned.

Drive chain slack "a"

Standard 20 – 30 mm (0.8 – 1.2 in)



I649G1020035-02



I649G1020036-01

- 5) After adjusting the drive chain, tighten the axle nut (1) to the specified torque.
- 6) Tighten both chain adjuster lock-nuts (2) securely.

Tightening torque

Rear axle nut: 100 N·m (10.0 kgf·m, 72.5 lb·ft)

- 7) Install a new cotter pin. (For E-28)
- 8) Recheck the drive chain slack after tightening the axle nut.

Drive Chain Cleaning and Lubricating

B649G10206029

Clean and lubricate drive chain

Every 1 000 km (600 miles)

Clean and lubricate the drive chain in the following procedures:

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

⚠ CAUTION

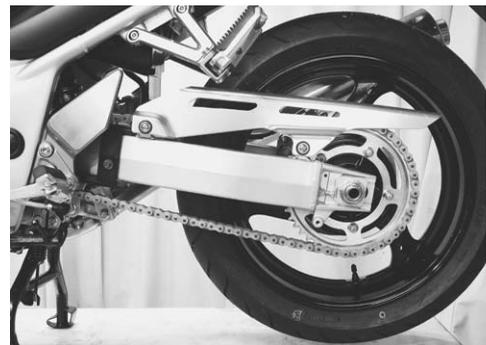
Do not use trichloroethylene, gasoline or any similar solvent.

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

- 2) After cleaning and drying the chain, oil it with a heavyweight motor oil.

⚠ CAUTION

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



I649G1020037-01

Brake System Inspection

B649G10206030

Inspect brake system

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

Inspect brake hose and brake fluid

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

Replace brake hose

Every 4 years

Replace brake fluid

Every 2 years

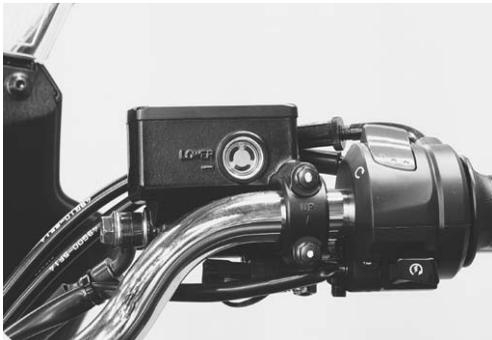
⚠ WARNING

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

Brake Fluid Level Check

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

BF: Brake fluid (DOT 4)



I649G1020038-01



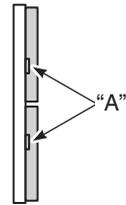
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Brake Pads Check

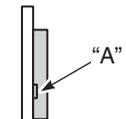
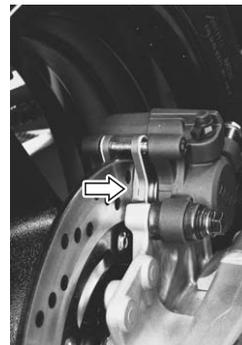
The extent of brake pad wear can be checked by observing the grooved limit line "A" on the pad. When the wear exceeds the grooved limit line, replace the pads with new ones. Refer to "Front Brake Pad Replacement: in Section 4B" and "Rear Brake Pad Replacement: in Section 4C".

⚠ CAUTION

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



I649G1020040-02



I649G1020041-02

Front Brake Hose Inspection

Inspect the brake hoses and hose joints for crack, damage or oil leakage. If any defects are found, replace the brake hose with a new one.



I649G1020047-01

Rear Brake Hose Inspection

Inspect the brake hose for crack, damage or brake oil leakage. If any defects are found, replace the brake hose with a new one.



I649G1020048-01

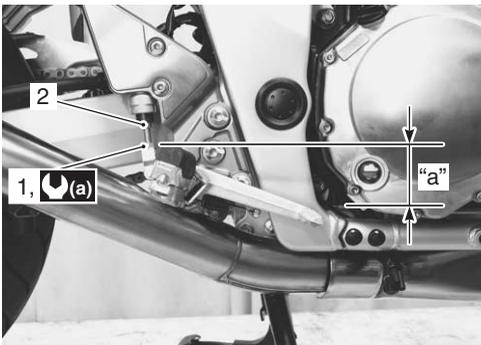
Brake Pedal Height Inspection and Adjustment

- 1) Inspect the brake pedal height “a” between the pedal top face and footrest. Adjust the brake pedal height if necessary.

Brake pedal height “a”
Standard: 60 mm (2.4 in)

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

Tightening torque
Rear master cylinder rod lock-nut (a): 18 N·m (1.8 kgf-m, 13.0 lb-ft)



I649G1020042-04

Rear Brake Light Switch Adjustment

B649G10206036

Refer to “Rear Brake Light Switch Inspection and Adjustment: in Section 4A”.

Brake Hose Replacement

B649G10206037

Refer to “Front Brake Hose Removal and Installation: in Section 4A” and “Rear Brake Hose Removal and Installation: in Section 4A”.

Air Bleeding from Brake Fluid Circuit

B649G10206034

Refer to “Air Bleeding from Brake Fluid Circuit: in Section 4A”.

Brake Fluid Replacement

B649G10206035

Refer to “Brake Fluid Replacement: in Section 4A”.

Tire Inspection

B649G10206017

Inspect tire

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

Tire Tread Condition

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

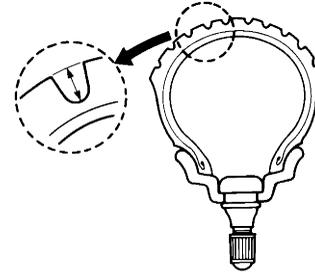
Special tool

 : 09900–20805 (Tire depth gauge)

Tire tread depth (Service limit)

Front: 1.6 mm (0.06 in)

Rear: 2.0 mm (0.08 in)



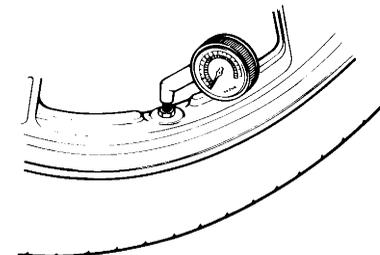
I310G1020068-01

Tire Pressure

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

Cold inflation tire pressure

	Solo riding			Dual riding		
	kPa	kgf/cm ²	psi	kPa	kgf/cm ²	psi
Front	250	2.50	36	250	250	36
Rear	250	2.50	36	250	250	36



I310G1020069-01

⚠ CAUTION

The standard tire fitted on this motorcycle is 120/70 ZR17 M/C (58W) for front and 180/55 ZR17 M/C (73W) for rear. The use of tires other than those specified may cause instability. It is highly recommended to use a SUZUKI Genuine Tire.

Tire type
DUNLOP

- Front: D218 FN
- Rear: D218 N

Steering System Inspection

B649G10206018

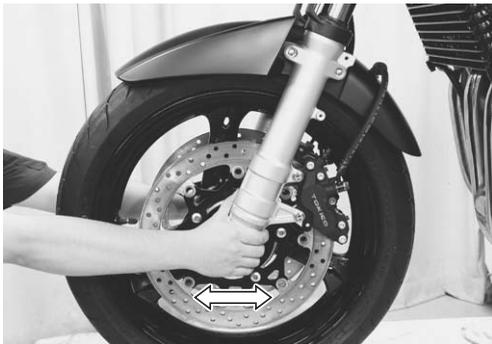
Inspect steering system

Initially at 1 000 km (600 miles, 2 month) and every 12 000 km (7 500 miles, 24 months) thereafter.

Steering should be adjusted properly for smooth turning of handlebars and safe running. Overtight steering prevents smooth turning of the handlebars and too loose steering will cause poor stability.

- 1) Check that there is no play in the front fork.
- 2) Support the motorcycle so that the front wheel is off the ground, with the wheel facing straight ahead, grasp the lower fork tubes near the axle and pull forward.

If play is found, readjust the steering. Refer to "Steering Tension Adjustment: in Section 6B".



I649G1020049-01

Front Fork Inspection

B649G10206019

Inspect front fork

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

Inspect the front forks for oil leakage, scoring or scratches on the outer surface of the inner tubes. Replace any defective parts, if necessary. Refer to "Front Fork Parts Inspection: in Section 2B".



I649G1020050-01

Rear Suspension Inspection

B649G10206020

Inspect rear suspension

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

Inspect the rear shock absorbers for oil leakage and check that there is no play in the swingarm. Replace any defective parts, if necessary. Refer to "Rear Shock Absorber Removal and Installation: in Section 2C", "Cushion Lever Removal and Installation: in Section 2C" and "Swingarm / Cushion Rod Removal and Installation: in Section 2C".



I649G1020051-01



I649G1020052-01

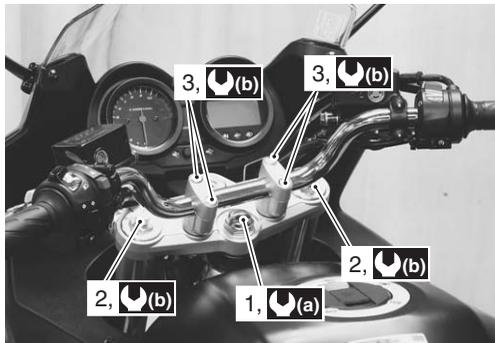
Chassis Bolt and Nut Inspection

B649G10206022

Tighten chassis bolt and nut

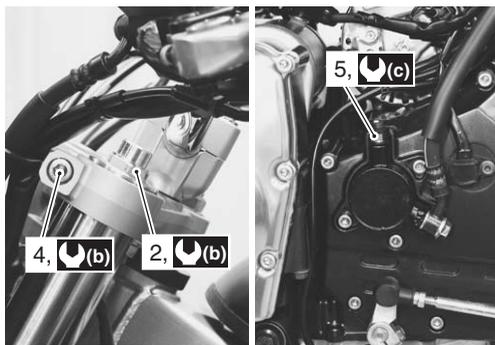
Initially at 1 000 km (600 miles, 2 month) and every 6 000 km (4 000 miles, 12 months) thereafter.

Check that all chassis bolts and nuts are tightened to their specified torque.



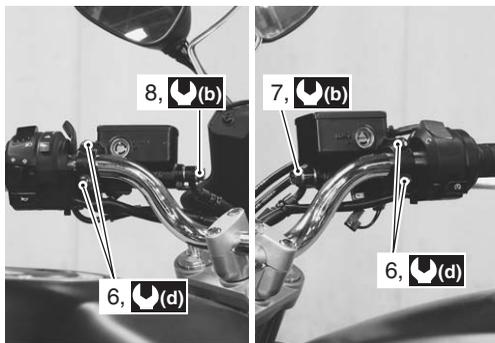
I649G1020055-04

1. Steering stem head nut	⚙️(a) : 65 N·m (6.5 kgf-m, 47.0 lb-ft)
2. Front fork cap bolt	⚙️(b) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)
3. Handlebar holder bolt	



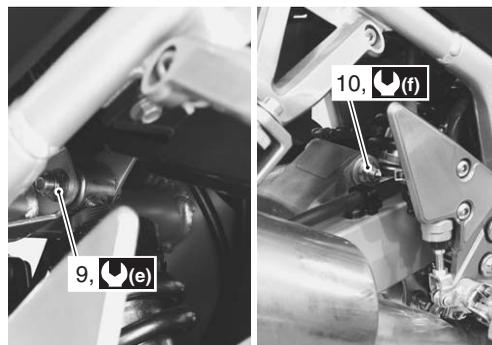
I649G1020056-05

2. Front fork cap bolt	⚙️(b) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)
4. Front fork upper clamp bolt	⚙️(c) : 8 N·m (0.8 kgf-m, 6.0 lb-ft)
5. Air bleeder valve (Clutch)	



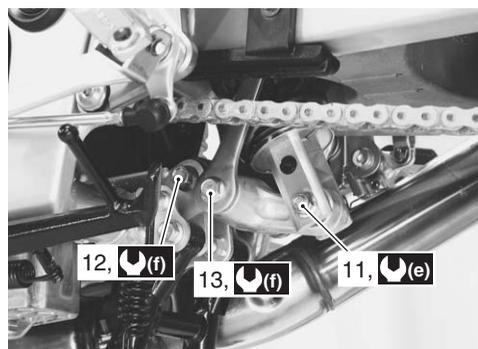
I649G1020057-03

6. Front brake/Clutch master cylinder mounting bolt	⚙️(b) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)
7. Brake hose union bolt (Front brake)	⚙️(d) : 10 N·m (1.0 kgf-m, 7.0 lb-ft)
8. Clutch hose union bolt	



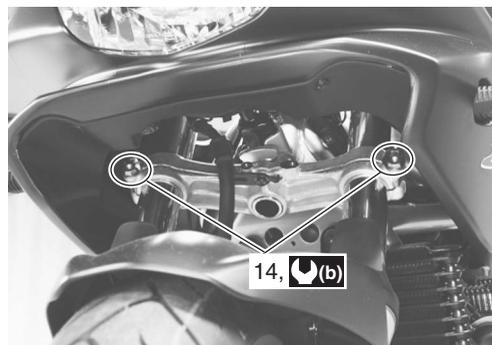
I649G1020058-03

9. Rear shock absorber mounting nut (Upper)	⚙️(e) : 50 N·m (5.0 kgf-m, 36.0 lb-ft)
10. Cushion rod mounting nut	⚙️(f) : 78 N·m (7.8 kgf-m, 56.5 lb-ft)



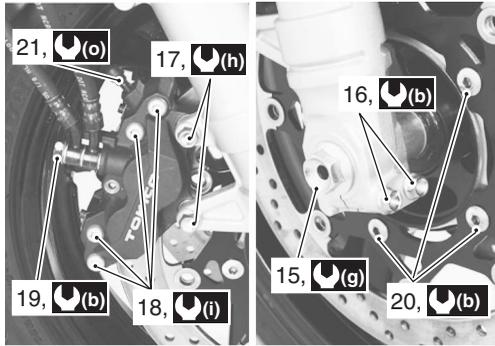
I649G1020059-03

11. Rear shock absorber mounting nut (Lower)	⚙️(e) : 50 N·m (5.0 kgf-m, 36.0 lb-ft)
12. Cushion lever mounting nut	⚙️(f) : 78 N·m (7.8 kgf-m, 56.5 lb-ft)
13. Cushion rod mounting nut	



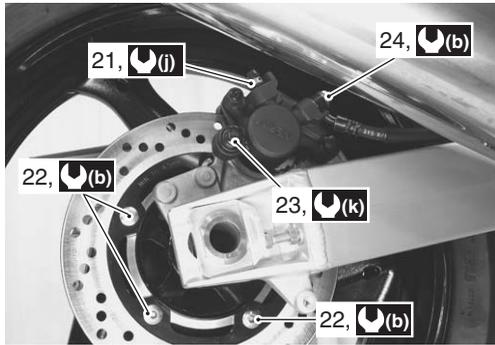
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14. Front fork lower clamp bolt	⚙️(b) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)
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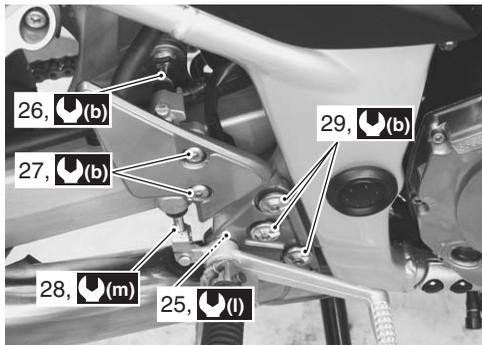
I649G1020061-04

15. Front axle bolt	21. Air bleeder valve (Brake)
16. Front axle pinch bolt	(b) : 23 N-m (2.3 kgf-m, 16.5 lb-ft)
17. Front brake caliper mounting bolt	(g) : 100 N-m (10.0 kgf-m, 72.5 lb-ft)
18. Front brake caliper housing bolt	(h) : 26 N-m (2.6 kgf-m, 19.0 lb-ft)
19. Brake hose union bolt (Front)	(i) : 21 N-m (2.1 kgf-m, 15.0 lb-ft)
20. Brake disc bolt (Front)	(o) : 7.5 N-m (0.75 kgf-m, 5.5 lb-ft)



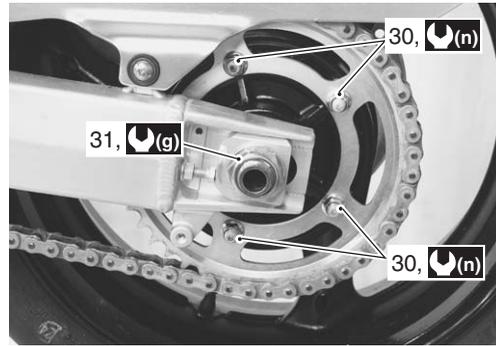
I649G1020062-03

21. Air bleeder valve (Brake)	(b) : 23 N-m (2.3 kgf-m, 16.5 lb-ft)
22. Brake disc bolt (Rear)	(i) : 6 N-m (0.6 kgf-m, 4.5 lb-ft)
23. Rear brake caliper mounting bolt	(k) : 22 N-m (2.2 kgf-m, 16.0 lb-ft)
24. Brake hose union bolt (Rear)	



I649G1020063-04

25. Front footrest bolt	29. Front footrest bracket mounting bolt
26. Brake hose union bolt (Rear)	(b) : 23 N-m (2.3 kgf-m, 16.5 lb-ft)
27. Rear brake master cylinder mounting bolt	(l) : 35 N-m (3.5 kgf-m, 25.5 lb-ft)
28. Rear brake master cylinder rod lock-nut	(m) : 18 N-m (1.8 kgf-m, 13.0 lb-ft)



I649G1020064-04

30. Rear sprocket nut	(g) : 100 N-m (10.0 kgf-m, 72.5 lb-ft)
31. Rear axle nut	(n) : 60 N-m (6.0 kgf-m, 43.5 lb-ft)

Compression Pressure Check

B649G10206023

Refer to "Compression Pressure Check: in Section 1D".

Oil Pressure Check

B649G10206024

Refer to "Oil Pressure Check: in Section 1E".

Specifications

Tightening Torque Specifications

B649G10207001

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Spark plug	11	1.1	8.0	⌚
Exhaust pipe bolt	23	2.3	16.5	⌚
Muffler mounting bolt	23	2.3	16.5	⌚
Muffler connecting bolt	23	2.3	16.5	⌚
Oil drain plug	23	2.3	16.5	⌚
Oil filter	20	2.0	14.5	⌚
Rear axle nut	100	10.0	72.5	⌚
Rear master cylinder rod lock-nut	18	1.8	13.0	⌚

NOTE

The specified tightening torque is also described in the following.
 “Chassis Bolt and Nut Inspection: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

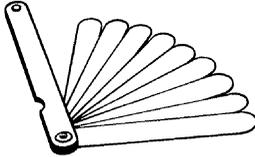
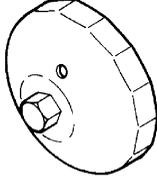
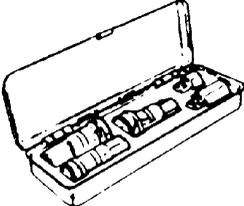
Recommended Service Material

B649G10208001

Material	SUZUKI recommended product or Specification	Note
Brake fluid	DOT 4	⌚ / ⌚

Special Tool

B649G10208002

09900-20803 Thickness gauge ⌚ / ⌚ 	09900-20805 Tire depth gauge ⌚ 
09915-40610 Oil filter wrench ⌚ / ⌚ 	09917-14920 Valve adjuster driver ⌚ 
09930-10121 Spark plug wrench set ⌚ 	

Service Data

Specifications

Service Data

B649G10307003

Valve + Guide

Unit: mm (in)

Item		Standard	Limit
Valve diameter	IN.	28.5 (1.12)	—
	EX.	25 (1.0)	—
Valve clearance (when cold)	IN.	0.10 – 0.15 (0.004 – 0.006)	—
	EX.	0.18 – 0.23 (0.007 – 0.009)	—
Valve guide to valve stem clearance	IN.	0.020 – 0.047 (0.0008 – 0.0019)	—
	EX.	0.040 – 0.067 (0.0016 – 0.0026)	—
Valve stem deflection	IN. & EX.	—	0.35 (0.014)
Valve guide I.D.	IN. & EX.	5.000 – 5.012 (0.1969 – 0.1973)	—
Valve stem O.D.	IN.	4.965 – 4.980 (0.1955 – 0.1961)	—
	EX.	4.945 – 4.960 (0.1947 – 0.1953)	—
Valve stem runout	IN. & EX.	—	0.05 (0.002)
Valve face thickness	IN. & EX.	—	0.5 (0.02)
Valve stem end length	IN. & EX.	—	2.5 (0.10)
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	—	35.0 (1.38)
	OUTER	—	37.8 (1.49)
Valve spring tension (IN. & EX.)	INNER	53 – 65 N (5.3 – 6.5 kgf, 11.7 – 14.3 lbs) at length 28 mm (1.10 in)	—
	OUTER	131 – 151 N (13.1 – 15.1 kgf, 28.9 – 33.3 lbs) at length 31.5 mm (1.24 in)	—

Camshaft + Cylinder Head

Unit: mm (in)

Item		Standard	Limit
Cam height	IN.	33.58 – 33.62 (1.3220 – 1.3236)	33.28 (1.3102)
	EX.	32.65 – 32.69 (1.2854 – 1.2870)	32.35 (1.2736)
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 pin (at arrow "3")		24th pin	—
Rocker arm I.D.	IN. & EX.	12.000 – 12.018 (0.4724 – 0.4731)	—
Rocker arm shaft O.D.	IN. & EX.	11.973 – 11.984 (0.4714 – 0.4718)	—
Cylinder head distortion		—	0.20 (0.008)

Cylinder + Piston + Piston Ring

Unit: mm (in)

Item	Standard			Limit
Compression pressure	1 250 kPa (12.5 kgf/cm ² , 178 psi)			875 kPa (8.75 kgf/cm ² , 124 psi)
Compression pressure difference	—			200 kPa (2 kgf/cm ² , 28 psi)
Piston-to-cylinder clearance	0.050 – 0.060 (0.0020 – 0.0024)			0.120 (0.0047)
Cylinder bore	79.000 – 79.015 (3.1102 – 3.1108)			79.080 (3.1134)
Piston diameter	78.945 – 78.960 (3.1081 – 3.1087) Measure 15 mm (0.6 in) from the skirt end.			78.880 (3.1055)
Cylinder distortion	—			0.20 (0.008)
Piston ring free end gap	1st	N	Approx. 10 (0.39)	8.0 (0.31)
	2nd	2N	Approx. 9.5 (0.37)	7.6 (0.30)
Piston ring end gap	1st	0.15 – 0.30 (0.006 – 0.012)		0.5 (0.020)
	2nd	0.30 – 0.45 (0.012 – 0.018)		0.7 (0.028)
Piston ring-to-groove clearance	1st	—		0.180 (0.007)
	2nd	—		0.150 (0.006)
Piston ring groove width	1st	1.01 – 1.03 (0.040 – 0.041)		—
	2nd	1.01 – 1.03 (0.040 – 0.041)		—
	Oil	2.01 – 2.03 (0.079 – 0.080)		—
Piston ring thickness	1st	0.975 – 0.990 (0.0384 – 0.0390)		—
	2nd	0.970 – 0.990 (0.038 – 0.039)		—
Piston pin bore	20.002 – 20.008 (0.7875 – 0.7877)			20.030 (0.7886)
Piston pin O.D.	19.992 – 20.000 (0.7871 – 0.7874)			19.980 (0.7866)

Conrod + Crankshaft

Unit: mm (in)

Item	Standard		Limit
Conrod small end I.D.	20.010 – 20.018 (0.7878 – 0.7881)		20.040 (0.7890)
Conrod big end side clearance	0.10 – 0.20 (0.004 – 0.008)		0.30 (0.012)
Conrod big end width	20.95 – 21.00 (0.825 – 0.827)		—
Crank pin width	21.10 – 21.15 (0.831 – 0.833)		—
Conrod big end oil clearance	0.032 – 0.056 (0.0013 – 0.0022)		0.080 (0.0031)
Crank pin O.D.	37.976 – 38.000 (1.4951 – 1.4961)		—
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	0.04 – 0.08 (0.0016 – 0.0031)		—
Crankshaft thrust bearing thickness	Left side	2.360 – 2.520 (0.0929 – 0.0992)	—
	Right side	2.420 – 2.440 (0.0953 – 0.0961)	—
Crankshaft runout	—		0.05 (0.002)

0C-3 Service Data:**Oil Pump**

Item	Standard	Limit
Oil pump reduction ratio	1.703 (72/46 x 37/34)	—
Oil pressure (at 60 °C, 140 °F)	Above 300 kPa (3.0 kgf/cm ² , 43 psi) Below 600 kPa (6.0 kgf/cm ² , 85 psi) at 3 000 r/min.	—

Clutch

Unit: mm (in)

Item	Standard	Limit
Clutch drive plate thickness	2.92 – 3.08 (0.115 – 0.121)	2.62 (0.103)
Clutch drive plate claw width	—	13.0 (0.51)
Clutch driven plate distortion	—	0.10 (0.004)
Clutch spring free height	—	3.1 (0.12)
Clutch master cylinder bore	14.000 – 14.043 (0.5511 – 0.5529)	—
Clutch master cylinder piston diam	13.957 – 13.984 (0.5495 – 0.5506)	—
Clutch release cylinder bore	38.18 – 38.23 (1.503 – 1.505)	—
Clutch release cylinder piston diam	38.08 – 38.13 (1.500 – 1.501)	—

Transmission + Drive Chain

Unit: mm (in) Except ratio

Item	Standard	Limit
Primary reduction ratio	1.565 (72/46)	—
Final reduction ratio	3.000 (45/15)	—
Gear ratios	1st (Low)	2.384 (31/13)
	2nd	1.631 (31/19)
	3rd	1.250 (25/20)
	4th	1.045 (23/22)
	5th (Top)	0.913 (21/23)
Gearshift-fork to gearshift-fork groove clearance	No.1, No.2 & No.3 0.1 – 0.3 (0.004 – 0.012)	0.50 (0.020)
Gearshift fork groove width	No.1, No.2 & No.3 5.0 – 5.1 (0.197 – 0.201)	—
Gearshift fork thickness	No.1, No.2 & No.3 4.8 – 4.9 (0.189 – 0.193)	—
Drive chain	Type	RK GB50GSVZ3
	Links	116 links
	20-pitch length	—
Drive chain slack	20 – 30 (0.8 – 1.2)	—
Gearshift lever height	55 (2.2)	—

Carburetor

Item	Specification	
	E-02, 19, 24	E-28
Carburetor type	MIKUNI BSR36	←
Bore size	36 mm (1.42 in)	←
I.D. No.	49G0	49G1
Idle r/min.	1 200 ± 100 r/min	1 300 ± 100 r/min
Float height	13.0 ± 1.0 mm (0.51 ± 0.04 in)	←
Main jet (M.J.)	#100	←
Jet needle (J.N.)	5C70-3rd	5C71
Needle jet (N.J.)	P-0M	←
Throttle valve (Th. V.)	#100	←
Pilot jet (P.J.)	#15	←
Pilot screw (P.S.)	PRE-SET (3-1/2 turns back)	←
Throttle cable play (pulling cable)	2.0 – 4.0 mm (0.08 – 0.16 in)	←
Starter (enricher) plunger cable play	0.5 – 1.0 mm (0.02 – 0.04 in)	←

Electrical

Unit: mm (in)

Item		Specification		Note	
Ignition timing		7° B.T.D.C. at 1 300 r/min.		E-28	
		7° B.T.D.C. at 1 200 r/min.		Others	
Firing order		1 · 2 · 4 · 3			
Spark plug		Type	NGK: JR9B		
		Gap	0.6 – 0.7 (0.024 – 0.028)		
Spark performance		Over 8 (0.3) at 1 atm.			
CKP sensor resistance		Approx. 130 – 200 Ω		Tester range: (x 100 Ω)	
CKP sensor peak voltage		1.0 V and more			
Ignition coil resistance		Primary	(+) tap – (-) tap Approx. 2 – 4 Ω		Tester range: (x 1 Ω)
		Secondary	Spark plug cap – Spark plug cap Approx. 30 – 40 kΩ		Tester range: (x 1 kΩ)
Ignition coil primary peak voltage		140 V and more			
Generator		Slip ring O.D.	Limit: 14.0 (0.55)		DENSO
		Brush length	Limit: 4.5 (0.18)		
Generator maximum output		More than 550 W at 5 000 r/min.			
Regulated voltage		13.5 – 15 V at 5 000 r/min.			
Starter motor brush length		Standard	12.5 (0.49)		
		Limit	6.0 (0.24)		
Starter relay resistance		3 – 6 Ω			
Battery	Type designation		FT12A-BS		
	Capacity		12 V 36.0 kC (10 Ah)/10 HR		
	Standard electrolyte S.G.		1.320 at 20 °C (68 °F)		
Fuse size	Headlight	HI	10 A		
		LO	10 A		
	Ignition		15 A		
	Signal		15 A		
	Meter		10 A		
	Main		30 A		

Wattage

Unit: W

Item		Specification	
		GSF1200	GSF1200S
Headlight	HI	60	55
	LO	55	55
Parking or position light		5	5 x 2
Brake light/Taillight		21/5	←
Turn signal light		21 x 4	←
Speedometer light		LED	←
Tachometer light		LED	←
Turn signal indicator light		LED x 2	←
High beam indicator light		LED	←
Neutral position indicator light		LED	←
Oil pressure indicator light		LED	←
License plate light		5	←

0C-5 Service Data:**Brake + Wheel**

Unit: mm (in)

Item	Standard		Limit	
Rear brake pedal height	60 (2.4)		—	
Brake disc thickness	Front	4.8 – 5.2 (0.189 – 0.205)	4.5 (0.18)	
	Rear	4.8 – 5.2 (0.189 – 0.205)	4.5 (0.18)	
Brake disc runout	—		0.30 (0.012)	
Master cylinder bore	Front	15.870 – 15.913 (0.6248 – 0.6264)	—	
	Rear	14.000 – 14.043 (0.5512 – 0.5529)	—	
Master cylinder piston diameter	Front	15.827 – 15.854 (0.6231 – 0.6242)	—	
	Rear	13.957 – 13.984 (0.5495 – 0.5506)	—	
Brake caliper cylinder bore	Front	Leading	30.230 – 30.306 (1.1902 – 1.1931)	—
		Trailing	33.960 – 34.036 (1.3370 – 1.3400)	—
	Rear	38.180 – 38.256 (1.5031 – 1.5061)		—
Brake caliper piston diameter	Front	Leading	30.150 – 30.200 (1.1870 – 1.1890)	—
		Trailing	33.884 – 33.934 (1.3340 – 1.3360)	—
	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)	
Wheel rim size	Front	17 M/C x MT3.50	—	
	Rear	17 M/C x MT5.50	—	

Suspension

Unit: mm (in)

Item	Standard		Limit	
Front fork stroke	130 (5.1)		—	
Front fork inner tube O.D.	43 (1.69)		—	
Front fork spring free length	392.8 (15.46)		384 (15.1)	
Front fork oil level	107 (4.2)		—	
Front fork spring adjuster	3rd groove from top		—	
Rear shock absorber spring adjuster	4th position		—	
Rear shock absorber damping force adjuster	Rebound	GSF1200	1-1/8 turns out from stiffest position	—
		GSF1200S	1-1/4 turns out from stiffest position	
Rear wheel travel	136 (5.4)		—	
Swingarm pivot shaft runout	—		0.3 (0.01)	

Tire

Item	Standard		Limit
Cold inflation tire pressure (Solo/Dual riding)	Front	250 kPa (2.50 kgf/cm ² , 36 psi)	—
	Rear	250 kPa (2.50 kgf/cm ² , 36 psi)	—
Tire size	Front	120/70 ZR17M/C (58 W)	—
	Rear	180/55 ZR17M/C (73 W)	—
Tire type	Front	DUNLOP D218FN	—
	Rear	DUNLOP D218N	—
Tire tread depth (Recommended depth)	Front	—	1.6 mm (0.06 in)
	Rear	—	2.0 mm (0.08 in)

Fuel + Oil

Item	Specification		Note
Fuel type	Use only unleaded gasoline of at least 87 pump octane or 91 octane (R/2 + M/2) or higher rated by the research method. Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.		E-28
	Gasoline used should be graded 91 octane or higher. An unleaded gasoline type is recommended.		The others countries
Fuel tank capacity	Including reserve	20 L (5.3/4.4 US/Imp gal)	
	Reserve only	4.4 L (1.2/1.0 US/Imp gal)	
Engine oil type	SAE 10W-40, API SF/SG or SH/SJ with JASO MA		
Engine oil capacity	Change	3 300 ml (3.4/2.9 US/Imp qt)	
	Filter change	3 500 ml (3.6/3.0 US/Imp qt)	
	Overhaul	4 600 ml (4.9/4.0 US/Imp qt)	
Front fork oil type	Fork oil SS-08 or equivalent fork oil		
Front fork oil capacity (each leg)	516 ml (17.4/18.2 US/Imp oz)		
Brake fluid type	DOT 4		

Tightening Torque Specifications

Engine

Item		N·m	kgf·m	lb·ft	
Cylinder head cover bolt (10 pcs)		14	1.4	10.0	
Cylinder head cover plug		15	1.5	11.0	
Cylinder head cover union bolt		20	2.0	14.5	
Cylinder head nut [M10]		38	3.8	27.5	
Cylinder head bolt [M6]		10	1.0	7.0	
Cylinder head plug		28	2.8	20.0	
Cylinder base nut		9	0.9	6.5	
Cylinder stud bolt		15	1.5	11.0	
Valve clearance adjuster lock-nut		10	1.0	7.0	
Rocker arm shaft set bolt		9	0.9	6.5	
Camshaft journal holder bolt		10	1.0	7.0	
Camshaft sprocket bolt		25	2.5	18.0	
Oil cooler hose union bolt		28	2.8	20.0	
Oil cooler hose connecting bolt		10	1.0	7.0	
Cooling hose mounting bolt		10	1.0	7.0	
Cam chain tension adjuster mounting bolt		7	0.7	5.0	
Cam chain tensioner spring holder bolt		38	3.8	27.5	
Conrod cap nut	Initial	25	2.5	18.0	
	Final	51	5.1	37.0	
Starter clutch mounting bolt		150	15.0	108.5	
CKP sensor rotor bolt		25	2.5	18.0	
Crankcase bolt/nut	[M6]	Initial	6	0.6	4.5
		Final	11	1.1	8.0
	[M8]	Initial	13	1.3	9.5
		Final	22	2.2	16.0
Main oil galley plug		40	4.0	29.0	
Oil pump mounting bolt		10	1.0	7.0	
Oil drain plug		23	2.3	16.5	
Oil pan bolt		14	1.4	10.0	
Speed sensor rotor bolt		20	2.0	14.5	
Clutch sleeve hub nut		150	15.0	108.5	
Exhaust pipe bolt		23	2.3	16.5	
Muffler mounting bolt		23	2.3	16.5	
Muffler connecting bolt		23	2.3	16.5	
Engine sprocket nut		115	11.5	83.0	
Engine mounting bolt	[L20 and 75]	55	5.5	40.0	
	[L140]	88	8.8	63.5	
	[L180]	85	8.5	61.5	
Generator driven gear nut		55	5.5	40.0	
Generator mounting bolt		25	2.5	18.0	
Oil cooler mounting bolt		10	1.0	7.0	
Oil pressure regulator		28	2.8	20.0	
Oil pressure switch		14	1.4	10.0	
Starter motor mounting bolt		6	0.6	4.5	
Starter motor housing bolt		6.5	0.65	4.7	
CKP sensor stator mounting screw		3	0.3	2.0	
Starter relay terminal nut		5	0.5	3.5	
Spark plug		11	1.1	8.0	
Cam chain guide bolt		6	0.6	4.5	
Gear shift arm stopper		19	1.9	13.5	
PAIR valve mounting bolt		10	1.0	7.0	
PAIR pipe mounting nut		10	1.0	7.0	
Fuel valve mounting bolt		4.4	0.44	3.2	
Carburetor heater		3	0.3	2.0	
Carburetor set shaft		5.0	0.5	3.5	
TP sensor screw		2.0	0.2	1.5	

Item	N·m	kgf·m	lb·ft
Fuel level gauge mounting bolt	10	1.0	7.0
Oil filter	20	2.0	14.5

Chassis

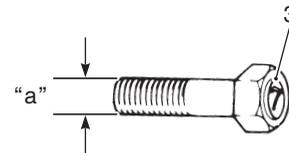
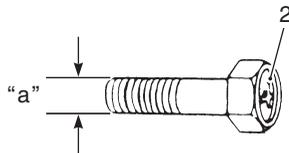
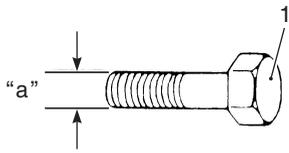
Item	N·m	kgf·m	lb·ft
Steering stem head nut	65	6.5	47.0
Steering stem nut	Tighten 45 N·m (4.5 kgf·m, 32.5 lb·ft) then turn back 1/2 – 1/4.		
Front fork upper clamp bolt	23	2.3	16.5
Front fork lower clamp bolt	23	2.3	16.5
Front fork cap bolt	23	2.3	16.5
Front fork damper rod bolt	20	2.0	14.5
Inner rod lock-nut	20	2.0	14.5
Front axle bolt	100	10.0	72.5
Front axle pinch bolt	23	2.3	16.5
Handlebar holder bolt	23	2.3	16.5
Handlebar holder set nut	45	4.5	32.5
Front brake/Clutch master cylinder holder bolt	10	1.0	7.0
Front brake caliper housing bolt	21	2.1	15.0
Front brake caliper mounting bolt	26	2.6	19.0
Brake (front & rear)/Clutch hose union bolt	23	2.3	16.5
Air bleeder valve (Front brake)	7.5	0.75	5.5
Air bleeder valve (Rear brake)	6.0	0.6	4.5
Air bleeder valve (Clutch)	8	0.8	6.0
Side-stand nut	40	4.0	29.0
Rear combination light mounting bolt	2.0	0.2	1.5
Brake disc bolt (front & rear)	23	2.3	16.5
Front footrest bolt	35	3.5	25.5
Front footrest bracket mounting bolt	23	2.3	16.5
Front brake pad mounting pin	16	1.6	11.5
Swingarm pivot nut	100	10.0	72.5
Rear shock absorber mounting nut (upper & lower)	50	5.0	36.0
Cushion lever mounting nut	78	7.8	56.5
Cushion rod mounting nut	78	7.8	56.5
Rear brake caliper mounting bolt	22	2.2	16.0
Rear brake caliper sliding pin	27	2.7	19.5
Rear brake pad mounting pin	18	1.8	13.0
Pad pin plug	2.5	0.25	1.8
Rear brake master cylinder mounting bolt	23	2.3	16.5
Rear brake master cylinder rod lock-nut	18	1.8	13.0
Rear axle nut	100	10.0	72.5
Rear sprocket nut	60	6.0	43.5
Frame down tube bolt	50	5.0	36.0
Engine mounting joint nut	70	7.0	50.5
Brake lever pivot bolt	1.0	0.1	0.723
Brake lever pivot bolt lock-nut	6.0	0.6	4.5
Clutch lever pivot bolt	1.0	0.1	0.723
Clutch lever pivot bolt lock-nut	6.0	0.6	4.5

0C-9 Service Data:

Tightening Torque Chart

For other bolts and nuts not listed in the preceding page, refer to this chart:

Bolt Diameter "a" (mm)	Conventional or "4" marked bolt			"7" marked bolt		
	N·m	kgf·m	lb·ft	N·m	kgf·m	lb·ft
4	1.5	0.15	1.0	2	0.2	1.5
5	3	0.3	2.0	5	0.5	3.5
6	6	0.6	4.5	10	1.0	7.0
8	13	1.3	9.5	23	2.3	16.5
10	29	2.9	21.0	50	5.0	36.0
12	45	4.5	32.5	85	8.5	61.5
14	65	6.5	47.0	135	13.5	97.5
16	105	10.5	76.0	210	21.0	152.0
18	160	16.0	115.5	240	24.0	173.5



I649G1030001-03

- | | | |
|----------------------|--------------------|--------------------|
| 1. Conventional bolt | 2. "4" marked bolt | 3. "7" marked bolt |
|----------------------|--------------------|--------------------|

Section 1

Engine

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Precautions

Precautions

Precautions for Engine

Refer to "General Precautions: in Section 00" and "Precautions for Electrical Circuit Service: in Section 00".

B649G1100001

Engine General Information and Diagnosis

Diagnostic Information and Procedures

Engine Symptom Diagnosis

B649G11104011

Condition	Possible cause	Correction / Reference Item
Engine will not start or is hard to start (Compression too low.)	Worn cylinder.	<i>Rebore or replace.</i>
	Worn piston ring.	<i>Replace.</i>
	Worn valve guide or improper valve seating.	<i>Repair or replace.</i>
	Loose spark plug.	<i>Tighten.</i>
	Broken, cracked or damaged piston.	<i>Replace.</i>
	Slow cranking starter motor.	<i>See electrical section.</i>
	Mistimed valves.	<i>Adjust.</i>
	Valve clearance out of adjustment.	<i>Adjust.</i>
Engine will not start or is hard to start (Plugs not sparking.)	Damaged spark plug.	<i>Replace.</i>
	Damaged spark plug cap.	<i>Replace.</i>
	Fouled spark plug.	<i>Clean or replace.</i>
	Wet spark plug.	<i>Clean and dry or replace.</i>
	Defective ignition coil.	<i>Replace.</i>
	Open or short in high-tension cord.	<i>Replace.</i>
	Defective CKP sensor.	<i>Replace.</i>
	Defective ignitor.	<i>Replace.</i>
Engine will not start or is hard to start (No fuel reaching the carburetor.)	Clogged fuel tank vent hose.	<i>Clean or replace.</i>
	Clogged or defective fuel valve.	<i>Clean or replace.</i>
	Defective needle valve.	<i>Replace with needle valve seat.</i>
	Clogged fuel hose.	<i>Clean or replace.</i>
	Clogged fuel filter.	<i>Clean or replace.</i>
Engine stalls often	Fouled spark plug.	<i>Clean or replace.</i>
	Defective CKP sensor.	<i>Replace.</i>
	Defective ignitor.	<i>Replace.</i>
	Clogged fuel hose.	<i>Clean.</i>
	Clogged carburetor jet.	<i>Clean.</i>
	Valve clearance out of adjustment.	<i>Adjust.</i>
Engine noisy (Excessive valve chatter.)	Excessive valve clearance.	<i>Adjust.</i>
	Weak or broken valve spring.	<i>Replace.</i>
	Worn rocker arm or rocker arm shaft.	<i>Replace.</i>
	Worn or burnt camshaft journal.	<i>Replace.</i>
Engine noisy (Noise seems to come from piston.)	Worn piston.	<i>Replace.</i>
	Worn cylinder.	<i>Rebore or replace.</i>
	Carbon build-up in combustion chamber.	<i>Clean.</i>
	Worn piston pin or piston pin bore.	<i>Replace.</i>
	Worn piston ring or ring groove.	<i>Replace.</i>
Engine noisy (Noise seems to come from timing chain.)	Stretched cam chain.	<i>Replace cam chain and sprockets.</i>
	Worn cam chain sprocket.	<i>Replace cam chain and sprockets.</i>
	Improperly working cam chain tensioner.	<i>Repair or replace.</i>
Engine noisy (Noise seems to come from clutch.)	Worn countershaft spline.	<i>Replace countershaft.</i>
	Worn clutch hub spline.	<i>Replace clutch hub.</i>
	Worn clutch plate teeth.	<i>Replace clutch plate.</i>
	Distorted clutch plate.	<i>Replace.</i>
	Worn clutch release bearing.	<i>Replace.</i>
	Weak clutch damper.	<i>Replace primary driven gear.</i>
Engine noisy (Noise seems to come from crankshaft.)	Worn or burnt crank pin bearing.	<i>Replace.</i>
	Worn or burnt journal bearing.	<i>Replace.</i>
	Excessive thrust clearance.	<i>Replace thrust bearing.</i>

1A-2 Engine General Information and Diagnosis:

Condition	Possible cause	Correction / Reference Item
Engine noisy (Noise seems to come from transmission.)	Worn or rubbing gear.	<i>Replace.</i>
	Worn countershaft spline.	<i>Replace countershaft.</i>
	Worn driveshaft spline.	<i>Replace driveshaft.</i>
	Worn or rubbing primary gear.	<i>Replace.</i>
	Worn bearing.	<i>Replace.</i>
Engine idle poorly	Valve clearance out of adjustment.	<i>Adjust.</i>
	Improper valve seating.	<i>Repair or replace.</i>
	Worn valve guide.	<i>Replace.</i>
	Worn rocker arm or rocker arm shaft.	<i>Replace.</i>
	Excessive spark plug gap.	<i>Adjust or replace.</i>
	Defective ignition coil.	<i>Replace.</i>
	Defective CKP sensor.	<i>Replace.</i>
	Defective ignitor.	<i>Replace.</i>
	Incorrect float chamber fuel level.	<i>Adjust float height.</i>
	Clogged carburetor jet.	<i>Clean.</i>
	Carburetors not synchronized.	<i>Synchronize.</i>
Engine runs poorly in high speed range	Weak valve spring.	<i>Replace.</i>
	Worn camshaft.	<i>Replace.</i>
	Insufficient spark plug gap.	<i>Regap or replace.</i>
	Mistimed valves.	<i>Adjust.</i>
	Ignition not advanced sufficiently due to poorly working timing advance circuit.	<i>Replace ignitor.</i>
	Defective ignition coil.	<i>Replace.</i>
	Defective CKP sensor.	<i>Replace.</i>
	Defective ignitor.	<i>Replace.</i>
	Low float chamber fuel level.	<i>Adjust float height.</i>
	Dirty air cleaner element.	<i>Clean or replace.</i>
	Clogged fuel hose, resulting in inadequate fuel supply to carburetor.	<i>Clean and prime.</i>
Engine lacks power	Insufficient valve clearance.	<i>Adjust.</i>
	Weak valve spring.	<i>Replace.</i>
	Mistimed valves.	<i>Adjust.</i>
	Worn cylinder.	<i>Rebore or replace.</i>
	Worn piston ring.	<i>Replace.</i>
	Improper valve seating.	<i>Repair or replace.</i>
	Fouled spark plug.	<i>Clean or replace.</i>
	Incorrect spark plug.	<i>Replace.</i>
	Clogged carburetor jet.	<i>Clean.</i>
	Incorrect float chamber fuel level.	<i>Adjust float height.</i>
	Dirty air cleaner element.	<i>Clean or replace.</i>
	Loose throttle valve synchronizing screw.	<i>Tighten.</i>
	Air leakage from intake pipe.	<i>Tighten or replace.</i>
	Excessive amount of engine oil.	<i>Check level and drain.</i>
Engine overheats	Carbon build-up on piston crown.	<i>Clean.</i>
	Insufficient amount of engine oil.	<i>Check level and add.</i>
	Defective oil pump.	<i>Replace.</i>
	Clogged oil circuit.	<i>Clean.</i>
	Float chamber fuel level too low.	<i>Adjust float height.</i>
	Air leakage from intake pipe.	<i>Tighten or replace.</i>
	Incorrect engine oil.	<i>Change.</i>
Dirty or heavy exhaust smoke	Excessive amount of engine oil.	<i>Check level and drain.</i>
	Worn cylinder.	<i>Rebore or replace.</i>
	Worn piston ring.	<i>Replace.</i>
	Worn valve guide.	<i>Replace.</i>
	Scored or scuffed cylinder wall.	<i>Rebore or replace.</i>
	Worn valve stem.	<i>Replace valve.</i>
	Defective valve stem oil seal.	<i>Replace.</i>
Worn oil ring side rail.	<i>Replace oil ring.</i>	

Emission Control Devices

Precautions

Precautions for Emission Control Devices

B649G1120001

Refer to "General Precautions: in Section 00".

General Description

Carburetor System Description

B649G11201005

GSF1200/S motorcycles are equipped with precision carburetors that control emission levels.

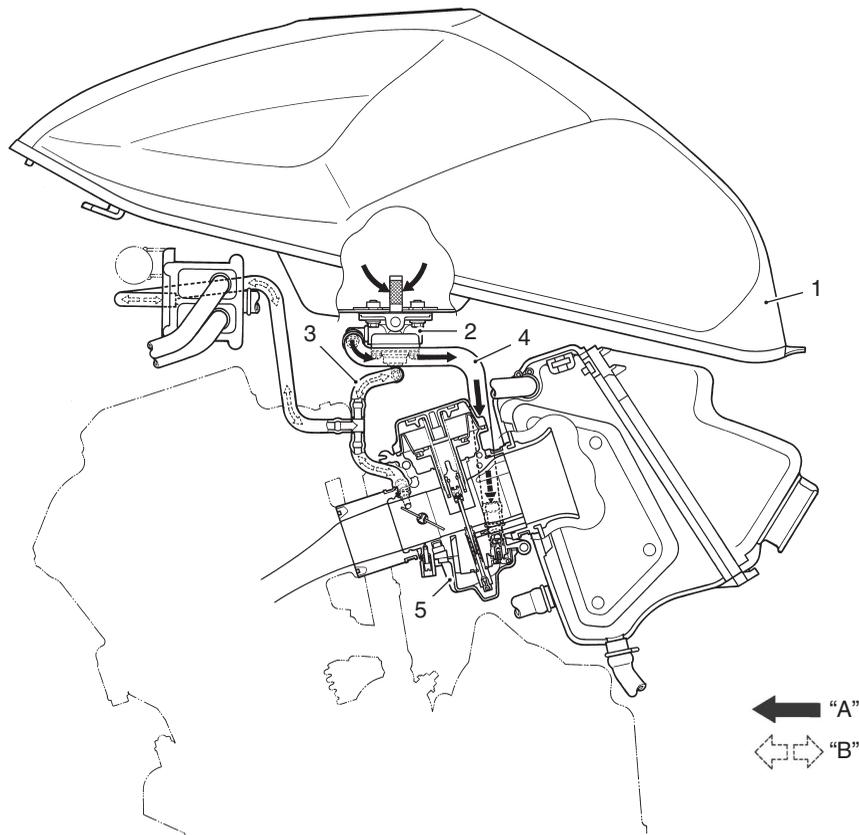
The carburetor specifications for the emission-controlled GSF1200/S are described in the service data.

These carburetors require special mixture control components and precision adjustments to function properly.

There are several carburetor mixture control components in each carburetor assembly. Three jets (main, needle and pilot) are machined to much closer tolerances than standard machined jets. If replacement of the jets is needed, be sure to replace them only with the same type of jets.

A jet needle with only one clip position, is also used. If jet needle replacement is necessary, only replace it with a jet needle of the same type. Suzuki recommends that Genuine Suzuki Parts be utilized whenever possible for the best possible performance and durability.

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 unable to effect repairs, contact the distributor's representative for further technical information and assistance.



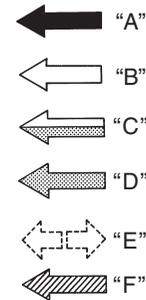
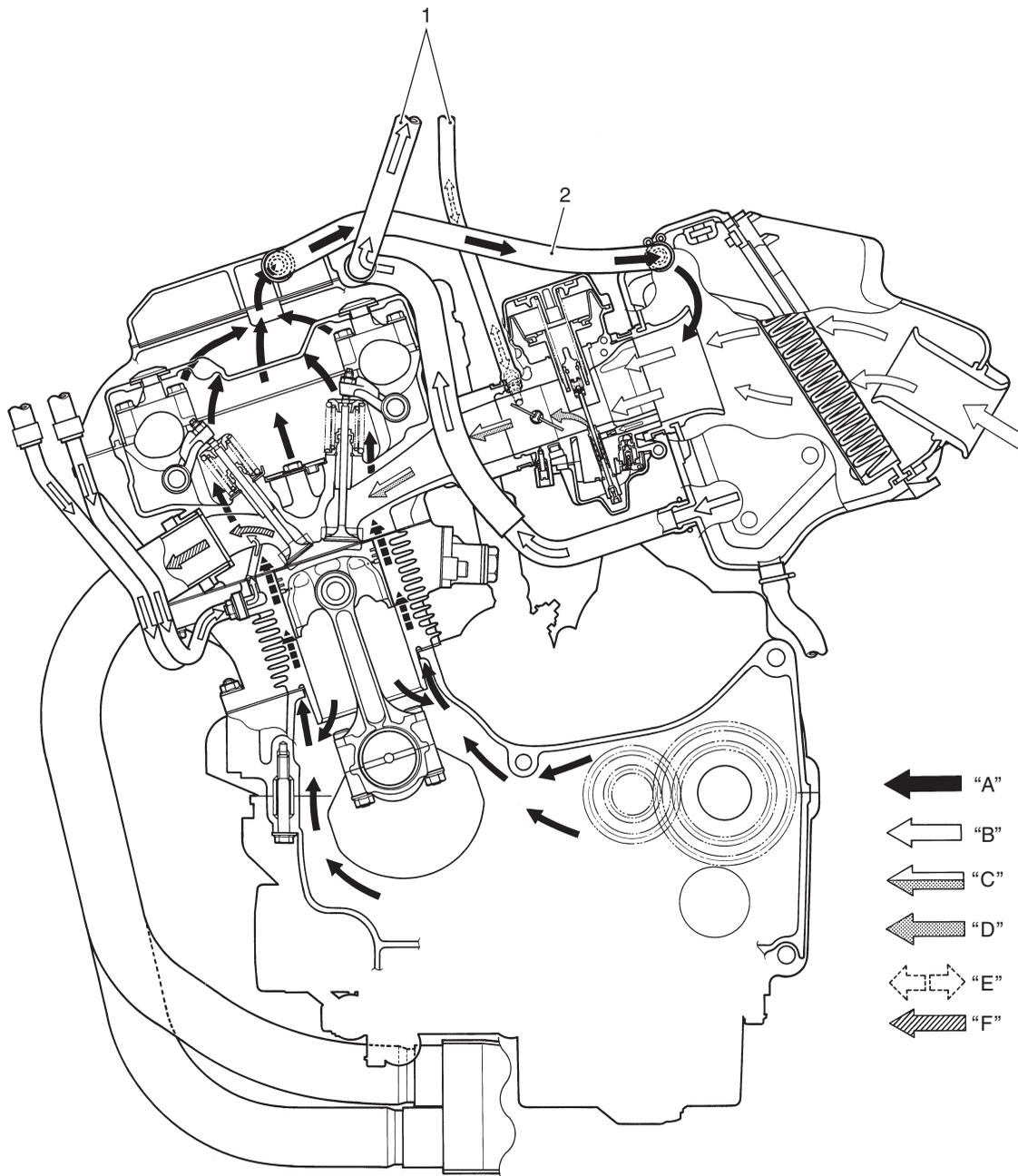
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1. Fuel tank	3. Vacuum hose	5. Carburetor	"B": Vacuum (Negative pressure)
2. Fuel valve	4. Fuel hose	"A": Fuel	

Crankcase Emission Control System Description

B649G11201006

The engine is equipped with a PCV system to prevent discharging crankcase emissions into the atmosphere. Blow-by gas in the engine is constantly drawn into the crankcase, which is returned to the combustion chamber through the PCV hose, air cleaner box and carburetors.



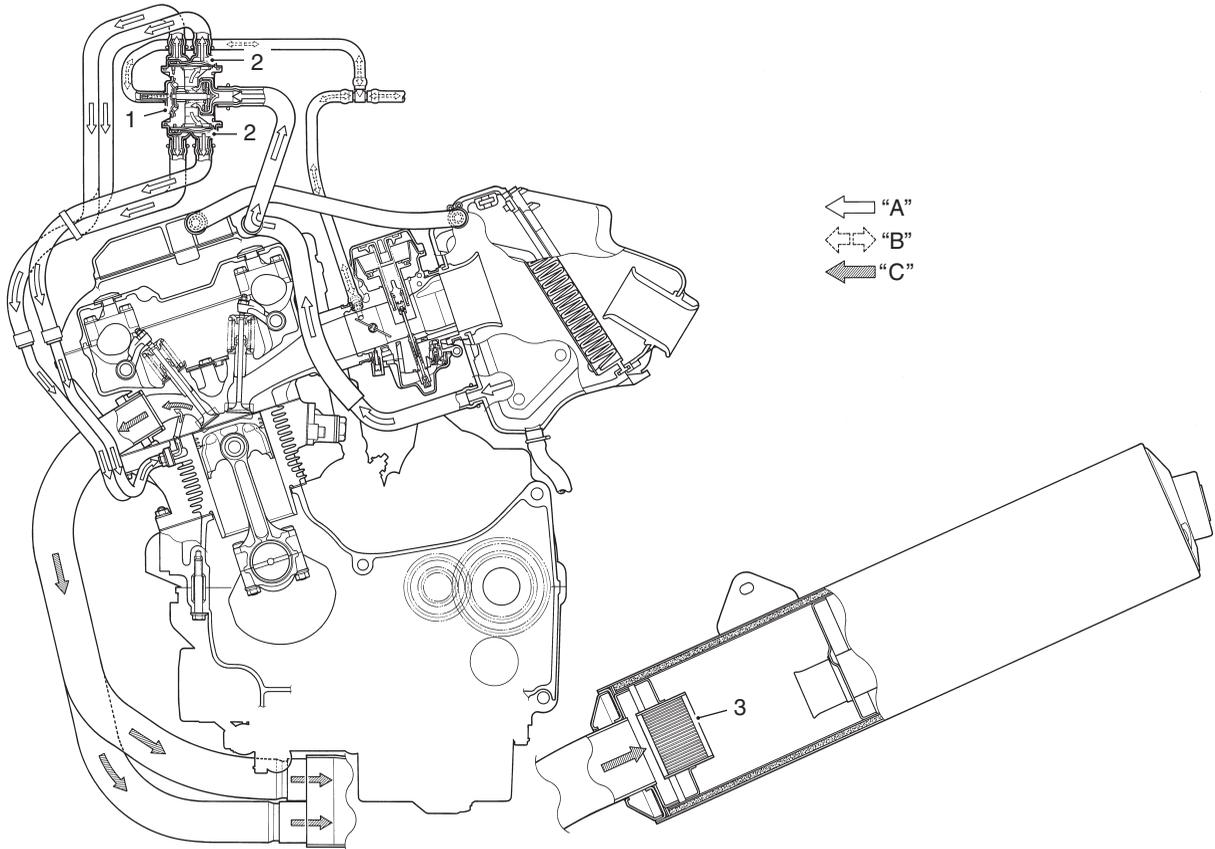
1. To PAIR control valve	"A": Blow-by gas	"C": Fuel/Air mixture	"E": Vacuum
2. PCV hose	"B": Fresh air	"D": Fuel emulsion	"F": Exhaust gas

I649G1120006-02

Exhaust Emission Control System Description

B649G11201008

The exhaust emission control system is composed of the PAIR system and three-way catalyst system. The fresh air is drawn into the exhaust port through the PAIR control valve and PAIR reed valve. The PAIR control valve is operated by the engine vacuum which is connected to the No.4 carburetor, and the fresh air flow is controlled according to the exhaust gas pulsation.



1. PAIR control valve	"A": Fresh air
2. PAIR reed valve	"B": Vacuum (Negative pressure)
3. Three-way catalyzer	"C": Exhaust gas

I649G1120015-02

Noise Emission Control System Description

B649G11201001

TAMPERING WITH THE NOISE CONTROL SYSTEM PROHIBITED: Local law or federal law prohibits the following acts or the causing thereof:

- The removal or rendering inoperative by any person, other than for purposes of maintenance, repair or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use.
- The use of the vehicle after such device or element of design has been removed or rendered inoperative by any person.

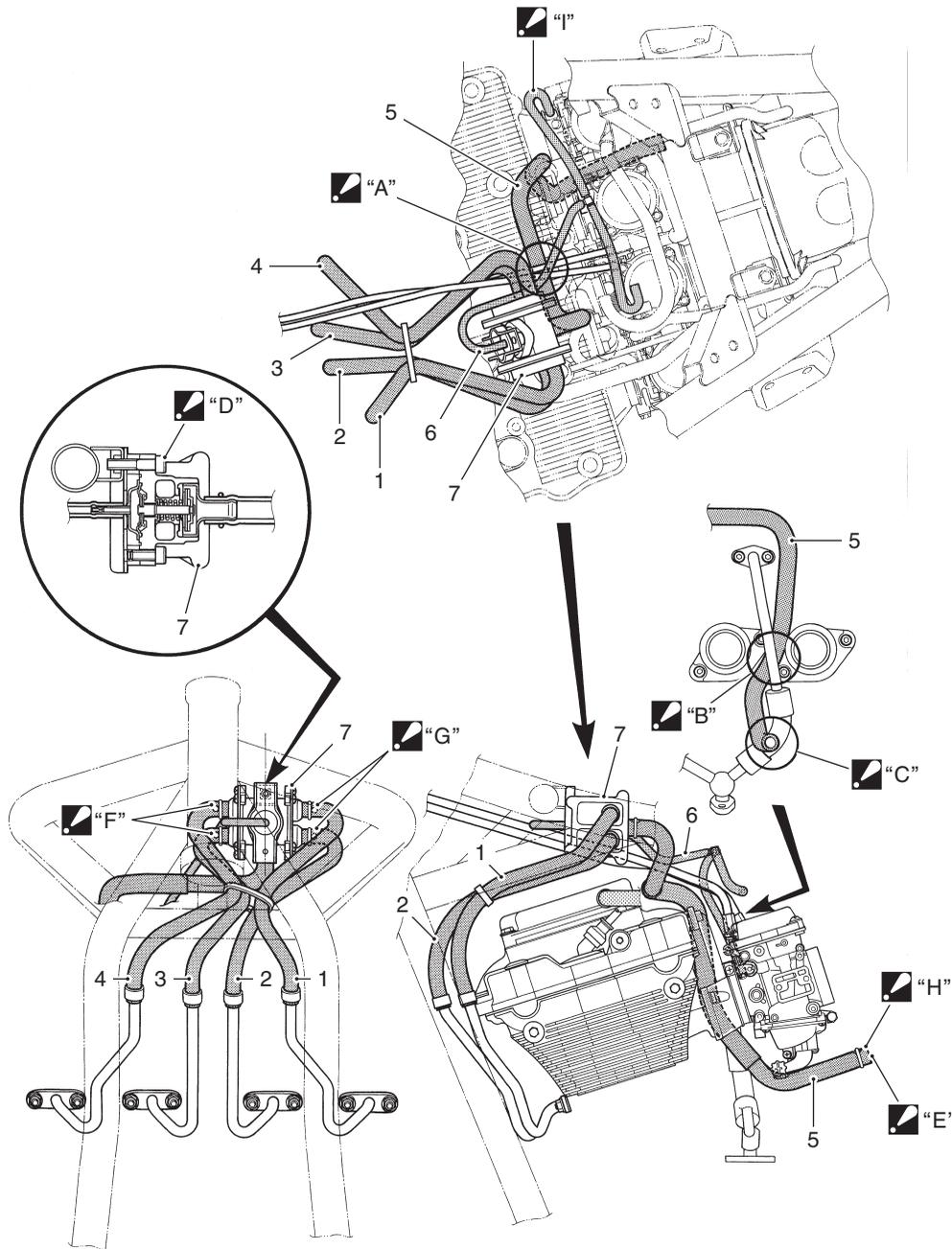
Among Those Acts Presumed to Constitute Tampering are the Acts Listed Below:

- Removing or puncturing the muffler, baffles, header pipes, screen type spark arrester (if equipped) or any other component which conducts exhaust gases.
- Removing or puncturing the air cleaner case, air cleaner cover, baffles or any other component which conducts intake air.
- Replacing the exhaust system or muffler with a system or muffler not marked with the same model specific code as the code listed on the Motorcycle Noise Emission Control Information label.

Schematic and Routing Diagram

PAIR System Hose Routing Diagram

B649G11202001



I649G1120008-04

1. PAIR hose No.1	7. PAIR control valve	█ "F": Marking (White) must face front side.
2. PAIR hose No.2	█ "A": Be careful not to contact the PAIR hoses with the throttle cables.	█ "G": Marking (White) must face rear side.
3. PAIR hose No.3	█ "B": Pass the PAIR hose (5) in front of the oil pipe.	█ "H": Marking (White) must face top side.
4. PAIR hose No.4	█ "C": Pass the PAIR hose (5) through inside of the oil pipe.	█ "I": Connect the vacuum hose to No.4 carburetor.
5. PAIR hose (Fresh air)	█ "D": Install the PAIR control valve along with its bracket.	
6. Vacuum hose	█ "E": Connect the PAIR hose (5) to the air cleaner box. (Fresh air from air cleaner box.)	

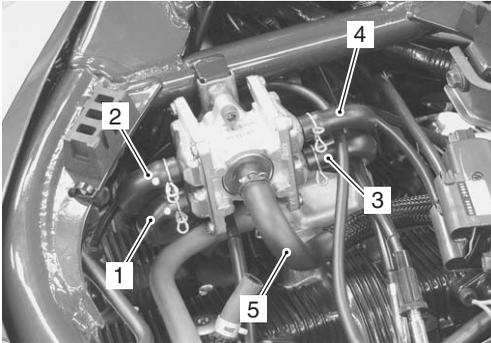
Repair Instructions

PAIR System Removal and Installation

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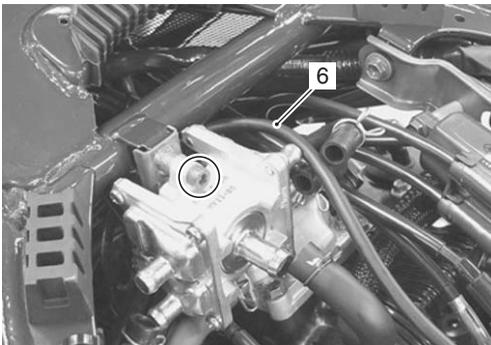
Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: in Section 1G".
- 2) Disconnect the following parts from the PAIR valve.
 - PAIR hose No.1 (1)
 - PAIR hose No.2 (2)
 - PAIR hose No.3 (3)
 - PAIR hose No.4 (4)
 - Air cleaner hose (5)



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- 3) Remove the PAIR valve mounting bolt and disconnect the vacuum hose (6).



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- 4) Remove the PAIR pipes/hoses from each cylinder.



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Installation

Install the PAIR valve in the reverse order of removal. Pay attention to the following points:

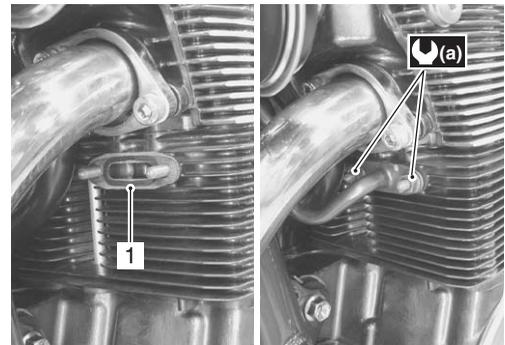
⚠ CAUTION

Use a new gasket (1) to prevent exhaust gas leakage.

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

Tightening torque

PAIR pipe mounting nut (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)

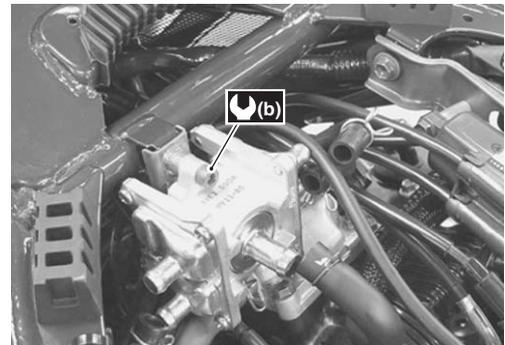


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- Tighten the PAIR valve mounting bolt to the specified torque.

Tightening torque

PAIR valve mounting bolt (b): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



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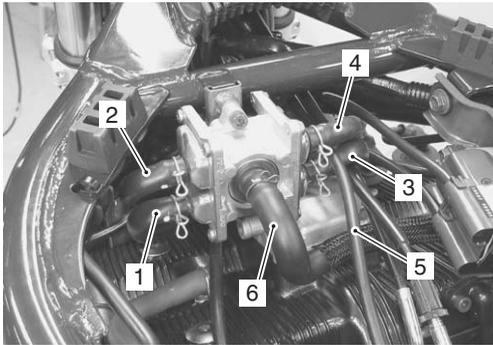
- Rout the hoses properly. Refer to "PAIR System Hose Routing Diagram: ".

PAIR System Inspection

B649G11206004

PAIR Hose and Pipe

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: in Section 1G".
- 2) Inspect the hoses and pipes for wear or damage.
- 3) Inspect that the hoses and pipes are properly connected. Refer to "PAIR System Hose Routing Diagram: ".
 - PAIR hose No.1 (1)
 - PAIR hose No.2 (2)
 - PAIR hose No.3 (3)
 - PAIR hose No.4 (4)
 - Vacuum hose (5)
 - Air cleaner hose (6)

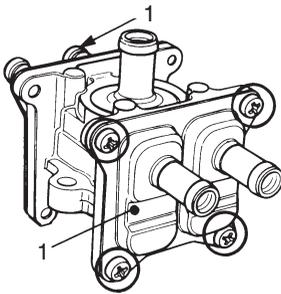


I649G1120014-03

- 4) Install the fuel tank. Refer to "Fuel Tank Removal and Installation: in Section 1G".

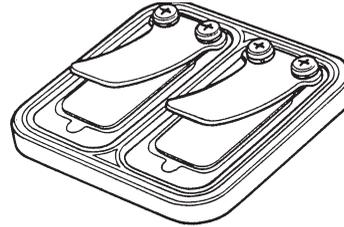
PAIR Reed Valve

- 1) Remove the PAIR valve. Refer to "PAIR System Removal and Installation: ".
- 2) Remove the PAIR valve covers (1).



I649G1120001-01

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

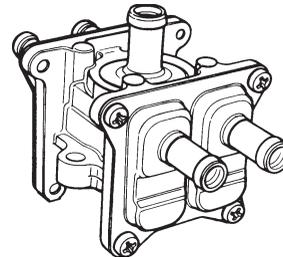


I649G1120002-01

- 5) Install the reed valve and PAIR valve covers.
- 6) Install the PAIR valve. Refer to "PAIR System Removal and Installation: ".

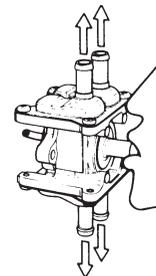
PAIR Valve

- 1) Remove the PAIR valve. Refer to "PAIR System Removal and Installation: ".
- 2) Inspect the PAIR valve's body for damage.



I649G1120003-01

- 3) Inspect the operation of the PAIR valve as follows.
 - a) Blow into the air inlet port of the PAIR valve as shown. If air does not flow out, replace the PAIR valve assembly with a new one.



I649G1120004-01

- b) Connect the vacuum pump gauge to the vacuum port of the PAIR valve as shown. Apply negative pressure slowly to the PAIR valve and blow into it as shown above. If air does not flow out at the specified pressure, the PAIR valve is OK. If the PAIR valve does not function as specified, replace it with a new one.

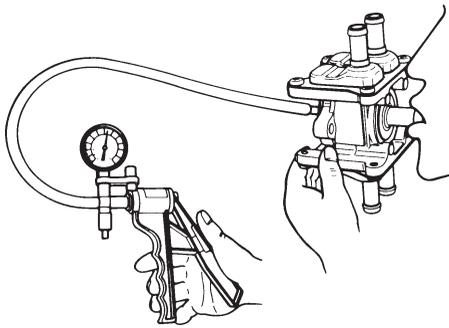
⚠ CAUTION

Only use a hand operated vacuum pump. High negative pressure will damage the PAIR valve.

Negative pressure range
44 – 65.3 kPa (330 – 490 mmHg)

Special tool

TOOL (A): 09917-47010 (Vacuum pump gauge)



I649G1120005-01

- 4) Install the PAIR valve. Refer to “PAIR System Removal and Installation: ”.

PCV Hose Inspection

B649G11206006

Inspect the PCV hose in the following procedures:

- 1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation: in Section 1G”.
- 2) Inspect the PCV hose (1) for wear and damage. If it is worn or damaged, replace the PCV hose with a new one.
- 3) Check that the hose (1) is securely connected.



I649G1120016-01

- 4) Install the fuel tank. Refer to “Fuel Tank Removal and Installation: in Section 1G”.

PCV Hose Removal and Installation

B649G11206007

Removal

- 1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation: in Section 1G”.
- 2) Remove the PCV hose (1).



I649G1120016-01

Installation

Install the PCV hose in the reverse order of removal.

Specifications

Tightening Torque Specifications

B649G11207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
PAIR pipe mounting nut	10	1.0	7.0	Ⓔ
PAIR valve mounting bolt	10	1.0	7.0	Ⓔ

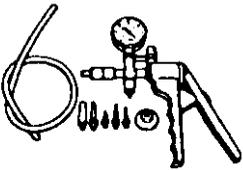
Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Special Tool

B649G11208001

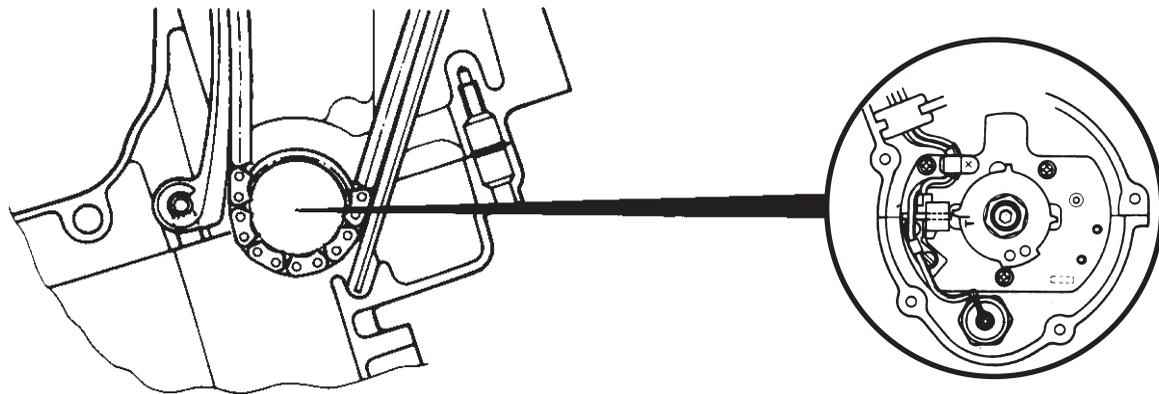
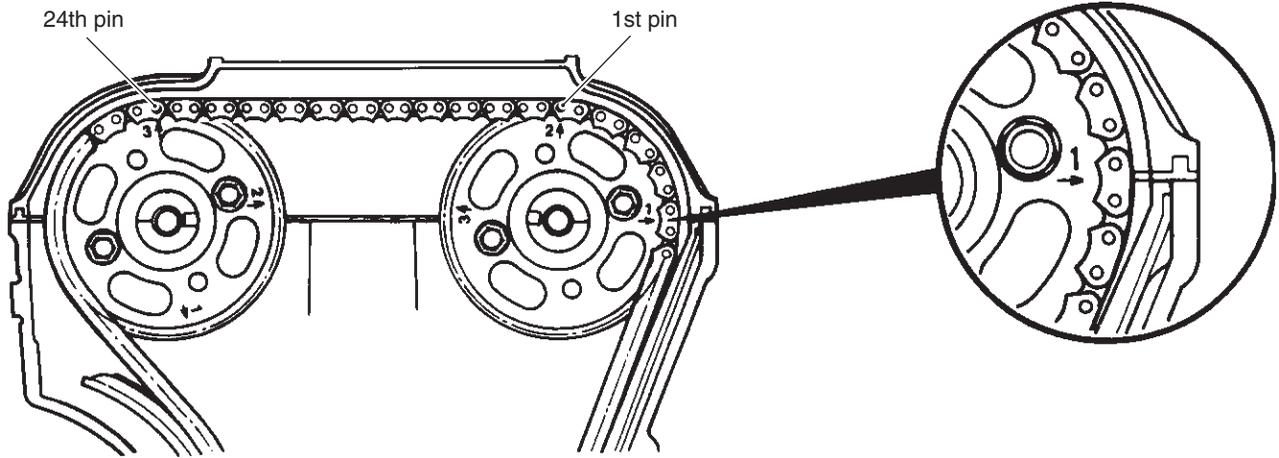
<p>09917-47010 Vacuum pump gauge Ⓔ</p>	
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Engine Mechanical

Schematic and Routing Diagram

Camshaft and Sprocket Assembly Diagram

B649G11402001



I649G1140075-03

Diagnostic Information and Procedures

Compression Pressure Check

B649G11404001

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

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

NOTE

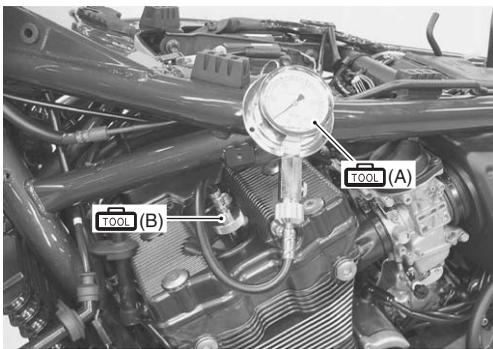
- Before checking the engine for compression pressure, make sure that the cylinder head nuts are tightened to the specified torque values and the valves are properly adjusted.
- Make sure that the battery is in fully-charged condition.

- 1) Warm up the engine.
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: in Section 1G".
- 3) Remove all of the spark plugs.
- 4) Remove the frame head cover, left and right. (GSF1200) Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 5) Install the compression gauge and adaptor in one of the spark plug holes. Make sure that the connection is tight.

Special tool

 (A): 09915-64510 (Compression gauge set)

 (B): 09915-63210 (Compression gauge adaptor)



I649G1140310-01

- 6) Keep the throttle grip in the fully-opened position.



I649G1140311-01

- 7) Press the starter button and crank the engine for a few seconds. Record the maximum gauge reading as the cylinder compression.
- 8) Repeat this procedure with the other cylinders.

Compression pressure specification

Standard	Limit	Difference
1 250 kPa (12.5 kgf/cm ² , 178 psi)	875 kPa (8.75 kgf/cm ² , 124 psi)	200 kPa (2 kgf/cm ² , 28 psi)

Low compression pressure can indicate any of the following conditions:

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

Overhaul the engine in the following cases:

- Compression pressure in one of the cylinders is less than 875 kPa (8.75 kgf/cm², 124 psi)
 - The difference in compression pressure between any two cylinders is more than 200 kPa (2 kgf/cm², 124 psi)
 - All compression pressure readings are below 1 000 kPa (10 kgf/cm², 142 psi) even when they measure more than 875 kPa (8.75 kgf/cm², 124 psi)
- 9) After checking the compression pressure, reinstall the removed parts.

Repair Instructions

Engine Components Removable with the Engine in Place

B649G11406001

Engine components which can be removed while the engine is installed on the frame are as follows. For the installing and removing procedures, refer to respective paragraphs describing each component.

Center of Engine

Item	Removal	Inspection	Installation
Exhaust pipe/Muffler	Refer to "Exhaust Pipe / Muffler Removal and Installation: in Section 1K".	Refer to "Exhaust System Inspection: in Section 1K".	Refer to "Exhaust Pipe / Muffler Removal and Installation: in Section 1K".
Cooling hoses	Refer to "Engine Cooling Hose Removal and Installation: in Section 1F".	Refer to "Engine Cooling System Inspection: in Section 1F".	Refer to "Engine Cooling Hose Removal and Installation: in Section 1F".
Oil filter	Refer to "Engine Oil and Filter Replacement: in Section 0B".	—	Refer to "Engine Oil and Filter Replacement: in Section 0B".
Oil cooler/Oil cooler hose	Refer to "Oil Cooler / Oil Cooler Hose Removal and Installation: in Section 1F".	Refer to "Engine Cooling System Inspection: in Section 1F".	Refer to "Oil Cooler / Oil Cooler Hose Removal and Installation: in Section 1F".
Oil pan	Refer to "Oil Pan / Oil Sump Filter / Oil Pressure Regulator Removal and Installation: in Section 1E".	Refer to "Oil Pan / Oil Sump Filter Cleaning: in Section 1E".	Refer to "Oil Pan / Oil Sump Filter / Oil Pressure Regulator Removal and Installation: in Section 1E".
Oil pressure regulator (For the oil pan)	Refer to "Oil Pan / Oil Sump Filter / Oil Pressure Regulator Removal and Installation: in Section 1E".	Refer to "Oil Pressure Regulator Inspection: in Section 1E".	Refer to "Oil Pan / Oil Sump Filter / Oil Pressure Regulator Removal and Installation: in Section 1E".
Oil sump filter	Refer to "Oil Pan / Oil Sump Filter / Oil Pressure Regulator Removal and Installation: in Section 1E".	Refer to "Oil Pan / Oil Sump Filter Cleaning: in Section 1E".	Refer to "Oil Pan / Oil Sump Filter / Oil Pressure Regulator Removal and Installation: in Section 1E".
Carburetors	Refer to "Carburetor Assembly Removal and Installation: in Section 1G".	Refer to "Carburetor Inspection and Cleaning: in Section 1G".	Refer to "Carburetor Assembly Removal and Installation: in Section 1G".
Cam chain tension adjuster	Refer to "Engine Top Side Disassembly: ".	Refer to "Cam Chain Tension Adjuster Inspection: ".	Refer to "Engine Top Side Assembly: ".
Cylinder head cover	Refer to "Engine Top Side Disassembly: ".	—	Refer to "Engine Top Side Assembly: ".
Camshafts	Refer to "Engine Top Side Disassembly: ".	Refer to "Camshaft Inspection: ".	Refer to "Engine Top Side Assembly: ".
Cylinder head	Refer to "Engine Top Side Disassembly: ".	Refer to "Cylinder Head Related Parts Inspection: ".	Refer to "Engine Top Side Assembly: ".
Cylinder	Refer to "Engine Top Side Disassembly: ".	Refer to "Cylinder Inspection: ".	Refer to "Engine Top Side Assembly: ".
Pistons	Refer to "Engine Top Side Disassembly: ".	Refer to "Piston and Piston Ring Inspection: ".	Refer to "Engine Top Side Assembly: ".
Starter motor	Refer to "Starter Motor Removal and Installation: in Section 1I".	Refer to "Starter Motor Inspection: in Section 1I".	Refer to "Starter Motor Removal and Installation: in Section 1I".
Generator	Refer to "Generator Removal and Installation: in Section 1J".	Refer to "Generator Parts Inspection: in Section 1J".	Refer to "Generator Removal and Installation: in Section 1J".
PAIR system	Refer to "PAIR System Removal and Installation: in Section 1B".	Refer to "PAIR System Inspection: in Section 1B".	Refer to "PAIR System Removal and Installation: in Section 1B".

1D-4 Engine Mechanical:**Engine Left Side**

Item	Removal	Inspection	Installation
Engine sprocket cover	Refer to "Engine Sprocket Removal and Installation: in Section 3A".	—	Refer to "Engine Sprocket Removal and Installation: in Section 3A".
Engine sprocket	Refer to "Engine Sprocket Removal and Installation: in Section 3A".	Refer to "Drive Chain Related Parts Inspection: in Section 3A".	Refer to "Engine Sprocket Removal and Installation: in Section 3A".
Driven chain	Refer to "Drive Chain Replacement: in Section 3A".	Refer to "Drive Chain Inspection and Adjustment: in Section 0B".	Refer to "Drive Chain Replacement: in Section 3A".
Gear position switch	Refer to "Gear Position Switch Removal and Installation: in Section 5B".	Refer to "Gear Position Switch Inspection: in Section 5B".	Refer to "Gear Position Switch Removal and Installation: in Section 5B".
Starter clutch cover	Refer to "Starter Clutch Removal and Installation: in Section 1I".	—	Refer to "Starter Clutch Removal and Installation: in Section 1I".
Starter idle gear	Refer to "Starter Clutch Removal and Installation: in Section 1I".	—	Refer to "Starter Clutch Removal and Installation: in Section 1I".
Starter clutch	Refer to "Starter Clutch Removal and Installation: in Section 1I".	Refer to "Starter Clutch Inspection: in Section 1I".	Refer to "Starter Clutch Removal and Installation: in Section 1I".

Engine Right Side

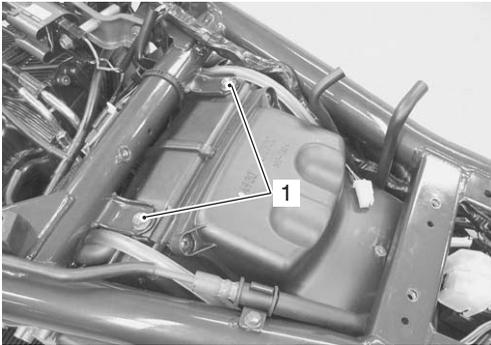
Item	Removal	Inspection	Installation
Clutch cover	Refer to "Clutch Removal: in Section 5C".	—	Refer to "Clutch Installation: in Section 5C".
Clutch plates	Refer to "Clutch Removal: in Section 5C".	Refer to "Clutch Parts Inspection: in Section 5C".	Refer to "Clutch Installation: in Section 5C".
Clutch sleeve hub	Refer to "Clutch Removal: in Section 5C".	—	Refer to "Clutch Installation: in Section 5C".
Generator/Oil pump drive gears	Refer to "Clutch Removal: in Section 5C".	—	Refer to "Clutch Installation: in Section 5C".
CKP sensor	Refer to "CKP Sensor Removal and Installation: in Section 1H".	Refer to "CKP Sensor Inspection: in Section 1H".	Refer to "CKP Sensor Removal and Installation: in Section 1H".
Oil pressure switch	Refer to "Oil Pressure Switch Removal and Installation: in Section 1E".	Refer to "Oil Pressure Indicator Inspection: in Section 9C".	Refer to "Oil Pressure Switch Removal and Installation: in Section 1E".
Oil pump driven gear	Refer to "Engine Bottom Side Disassembly: ".	—	Refer to "Engine Bottom Side Assembly: ".
Primary driven gear	Refer to "Clutch Removal: in Section 5C".	—	Refer to "Clutch Installation: in Section 5C".
Gearshift shaft	Refer to "Gearshift Shaft / Gearshift Cam Driven Gear Removal and Installation: in Section 5B".	Refer to "Gearshift Linkage Inspection: in Section 5B".	Refer to "Gearshift Shaft / Gearshift Cam Driven Gear Removal and Installation: in Section 5B".
Gearshift driven gear	Refer to "Gearshift Shaft / Gearshift Cam Driven Gear Removal and Installation: in Section 5B".	—	Refer to "Gearshift Shaft / Gearshift Cam Driven Gear Removal and Installation: in Section 5B".

Engine Assembly Removal

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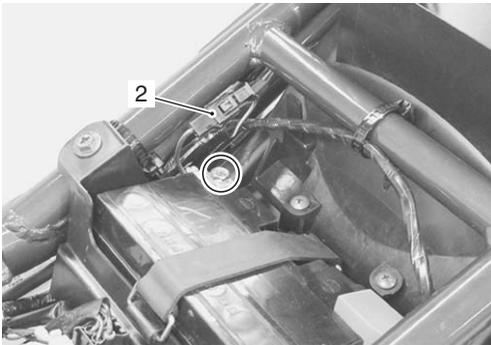
Before taking the engine out of the frame, wash the engine using a steam cleaner. Engine removal is sequentially explained in the following steps:

- 1) Drain engine oil. Refer to "Engine Oil and Filter Replacement: in Section 0B".
- 2) Remove the seat and frame covers. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 3) Remove the frame head covers. (GSF1200) Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 4) Remove the cowling. (GSF1200) Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 5) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: in Section 1G".
- 6) Remove the air cleaner box mounting bolts (1).



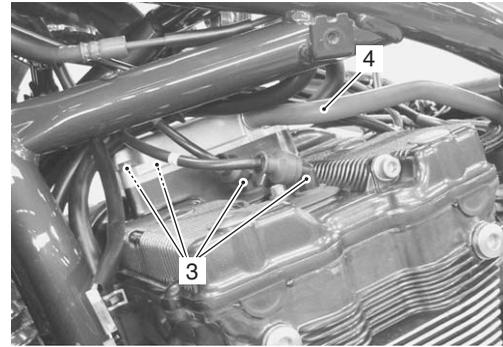
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- 7) Disconnect the battery (-) lead wire.
- 8) Disconnect the engine ground wire coupler (2).



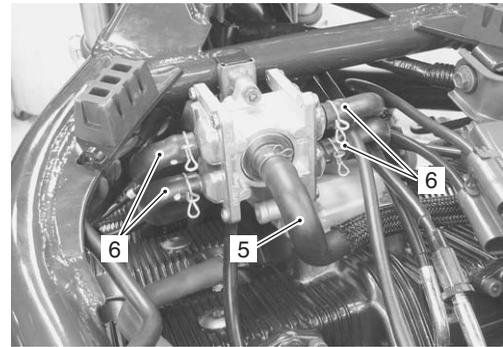
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- 9) Disconnect all of the spark plug caps (3).
- 10) Disconnect the breather (PCV) hose (4).



I649G1140005-04

- 11) Disconnect the PAIR valve hoses (5) and (6).



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5. Air cleaner hose

6. PAIR hoses

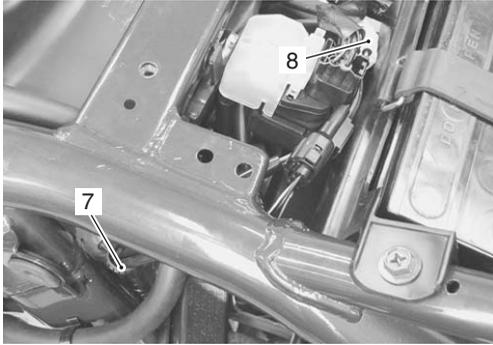
- 12) Remove the carburetor assembly. Refer to "Carburetor Assembly Removal and Installation: in Section 1G".



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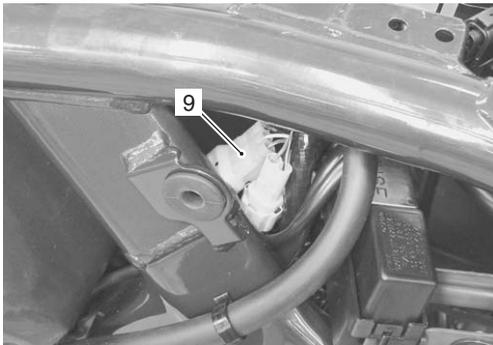
1D-6 Engine Mechanical:

- 13) Remove the wire harness clamp (7).
- 14) Disconnect the gear position switch lead wire couplers (8).



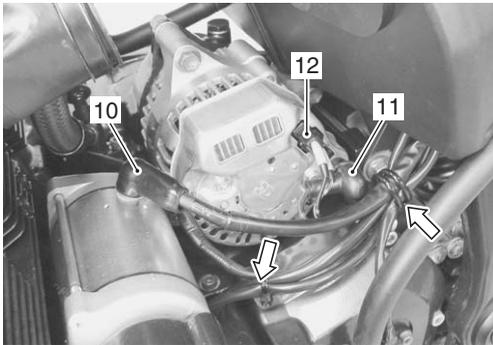
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- 15) Disconnect the CKP sensor lead wire coupler (9).



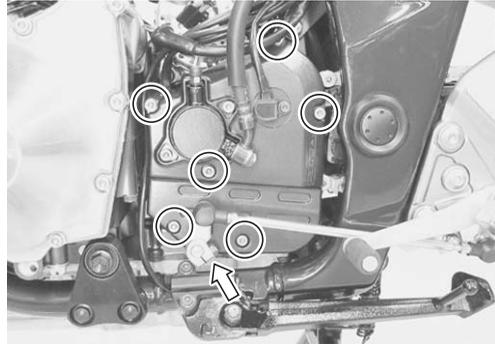
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- 16) Open the wire harness clamps.
- 17) Disconnect the starter motor lead wire (10).
- 18) Disconnect the generator lead wire (11) and coupler (12).



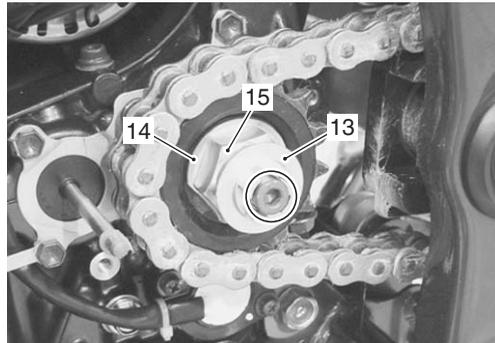
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- 19) Disengage the gearshift lever link by removing the bolt.
- 20) Remove the engine sprocket cover by removing the bolts.



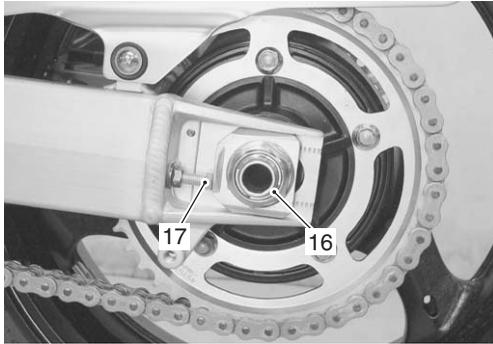
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- 21) Remove the speed sensor rotor (13) while depressing the rear brake pedal.
- 22) Flatten the lock washer (14).
- 23) Remove the engine sprocket nut (15) while depressing the rear brake pedal.
- 24) Remove the lock washer (14).



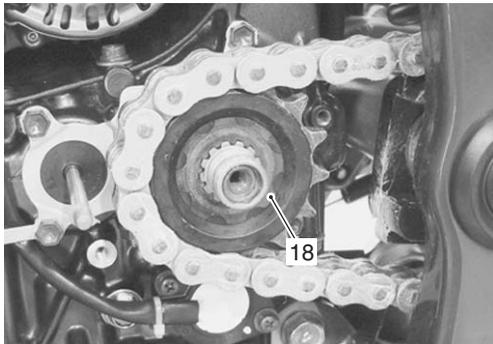
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- 25) Loosen the rear axle nut (16) and chain adjusters (17) to provide additional chain slack.



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- 26) Remove the engine sprocket (18).



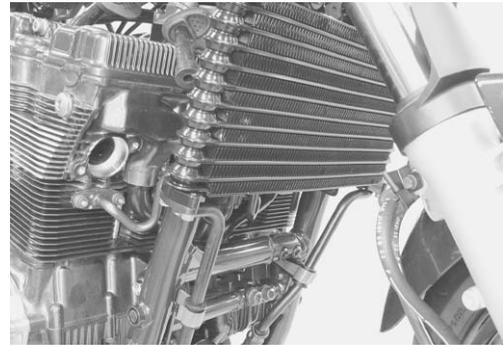
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- 27) Remove the muffler, exhaust pipe and exhaust pipe gaskets. Refer to "Exhaust Pipe / Muffler Removal and Installation: in Section 1K".



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- 28) Remove the oil cooler and oil cooler hoses. Refer to "Oil Cooler / Oil Cooler Hose Removal and Installation: in Section 1F".



I649G1140016-02

- 29) Support the engine with a proper jack.



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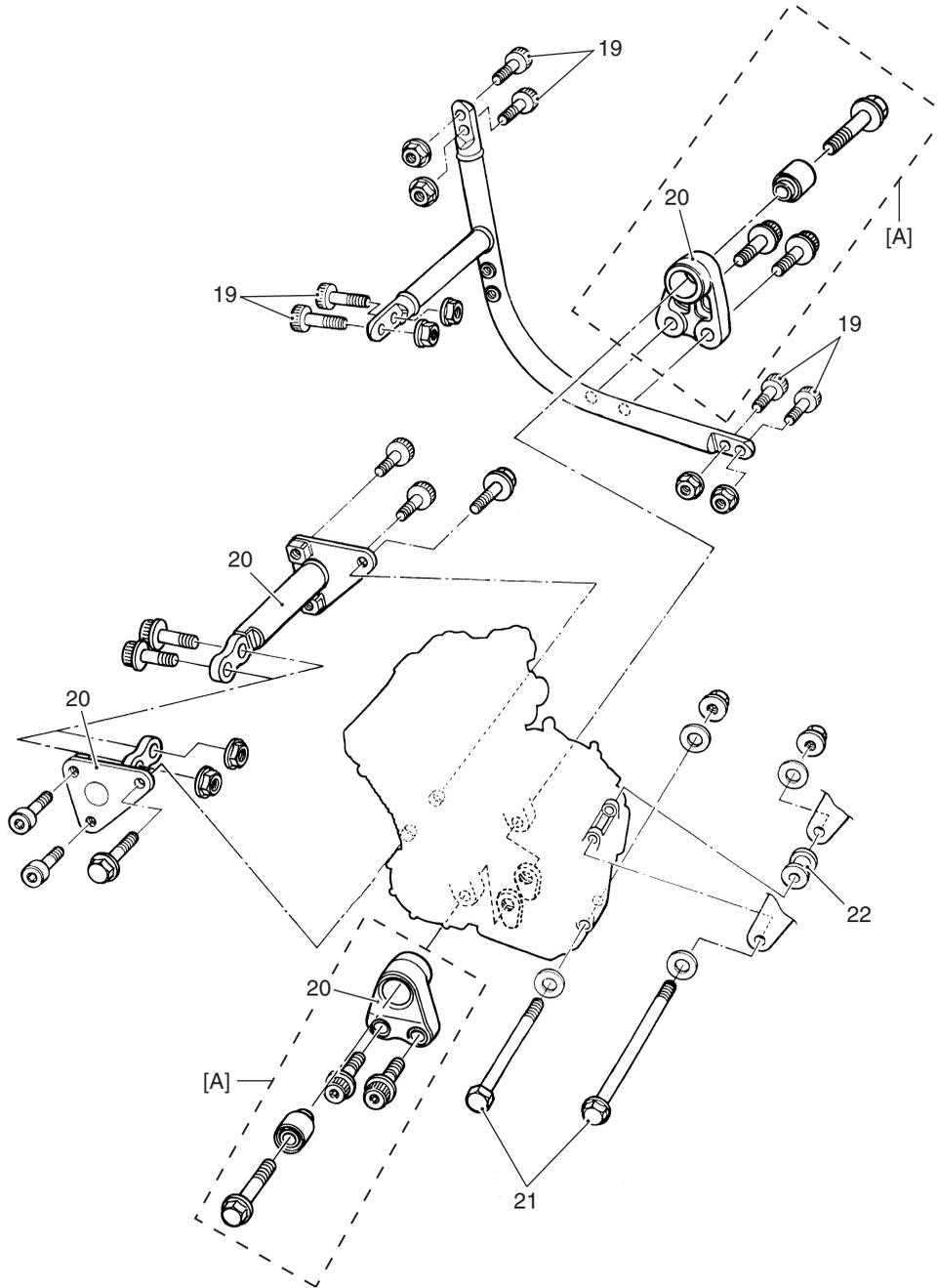
- 30) Remove the frame down tube mounting bolts (19) and nuts.
 31) Remove the engine mounting brackets (20) by removing their bolts and nuts.
 32) Remove the engine mounting bolts (21), nuts and spacer (22).

1D-8 Engine Mechanical:

33) Gradually lower the front side of the engine and remove the engine.

▲ WARNING

Care should be taken not to drop the engine accidentally when the engine mounting bolts and nuts are removed.



19. Frame down tube mounting bolt	22. Spacer
20. Engine mounting bracket	[A]: Only for E-28 model; The engine mounting brackets and its bolts are not equipped at the frame down tubes.
21. Engine mounting bolt	

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Engine Assembly Installation

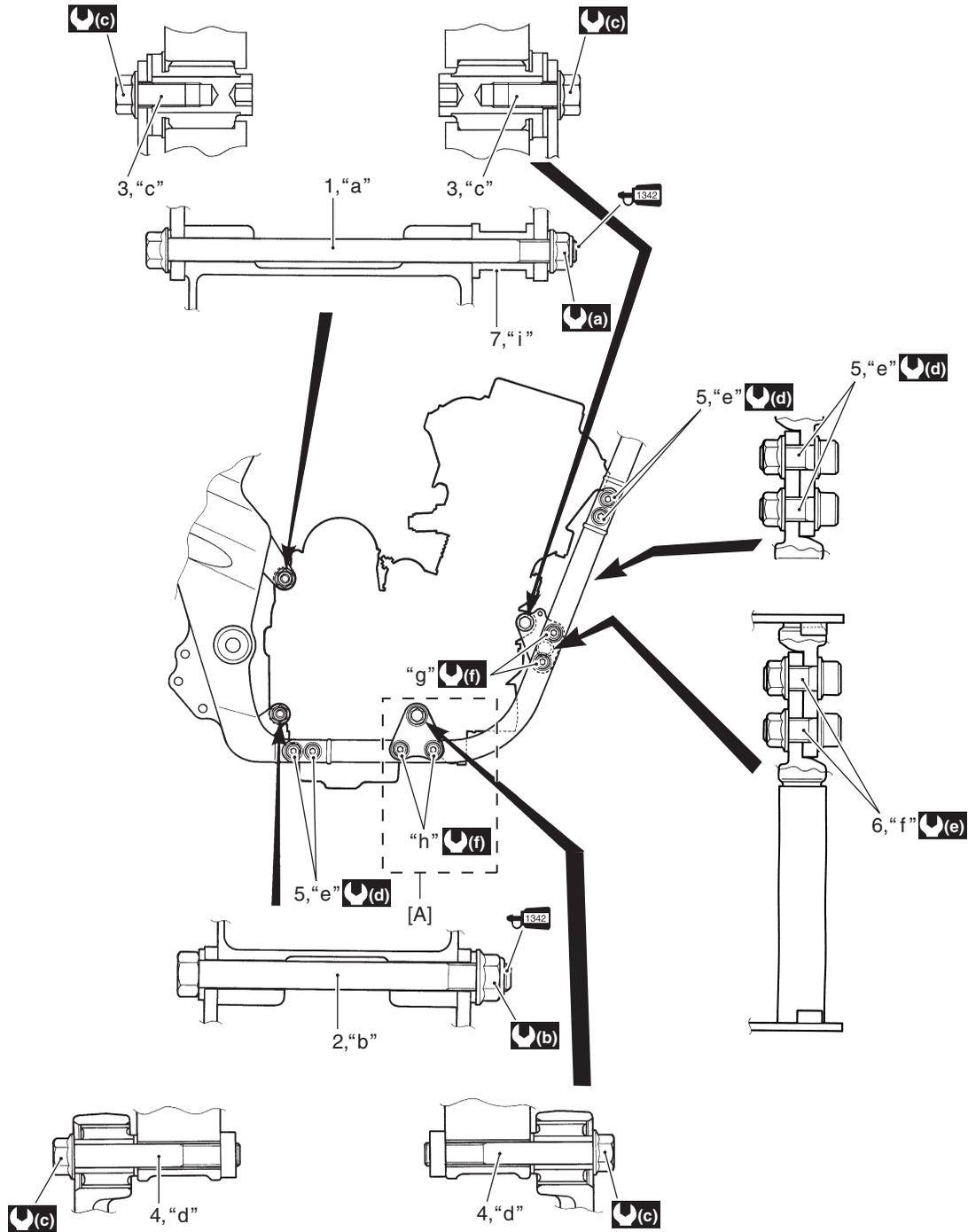
Reinstall the engine in the reverse order of engine removal. Pay attention to the following points:

- Insert the two long bolts (1), (2) from left side. Install the brackets, spacer, bolts and nuts properly, as shown in the following illustration.

NOTE

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

Be sure to use new nuts and tighten them to the specified torque.



1. Engine mounting bolt (Upper)	"b": 140 mm (5.5 in)	[A]: Only for E-28 model; The engine mounting bracket and its bolts are not equipped at the frame down tubes.
2. Engine mounting bolt (Lower)	"c": 20 mm (0.8 in)	(a) : 85 N·m (8.5 kgf-m, 61.5 lb-ft)
3. Engine mounting bolt (Front)	"d": 75 mm (3.0 in)	(b) : 88 N·m (8.8 kgf-m, 63.5 lb-ft)

1D-10 Engine Mechanical:

4. Engine mounting bolt (Center)	"e": 37 mm (1.5 in)	(c) : 55 N·m (5.5 kgf-m, 40.0 lb-ft)
5. Frame down tube bolt	"f": 30 mm (1.2 in)	(d) : 50 N·m (5.0 kgf-m, 36.0 lb-ft)
6. Engine mounting joint bolt	"g": 50 mm (2.0 in)	(e) : 70 N·m (7.0 kgf-m, 50.5 lb-ft)
7. Spacer	"h": 28 mm (1.1 in)	(f) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)
"a": 180 mm (7.1 in)	"i": 27 mm (1.1 in)	1342 : Apply a small quantity of the thread lock to thread part.

- Install the oil cooler/oil cooler hoses. Refer to "Oil Cooler / Oil Cooler Hose Removal and Installation: in Section 1F".
- Install the exhaust pipe/muffler. Refer to "Exhaust Pipe / Muffler Removal and Installation: in Section 1K".
- Install a new lock washer (8) and apply THREAD LOCK SUPER "1303" to the threads of the driveshaft.

1303 : Thread lock cement 99000-32030 (Thread Lock Cement Super 1303 or equivalent)

- Tighten the engine sprocket nut (9) to the specified torque and bend up the lock washer (8).

Tightening torque

Engine sprocket nut (g): 115 N·m (11.5 kgf-m, 83.0 lb-ft)

- Apply a small quantity of THREAD LOCK SUPER "1303" to the speed sensor rotor bolt (10).

1303 : Thread lock cement 99000-32030 (Thread Lock Cement Super 1303 or equivalent)

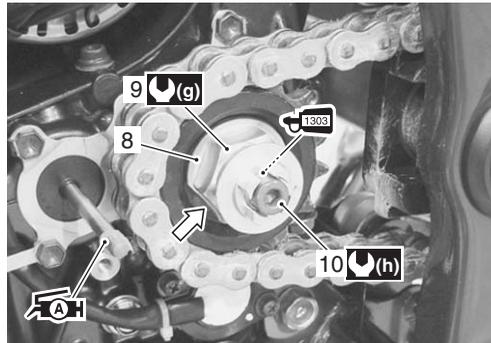
- Tighten the speed sensor rotor bolt (10) to the specified torque.

Tightening torque

Speed sensor rotor bolt (h): 20 N·m (2.0 kgf-m, 14.5 lb-ft)

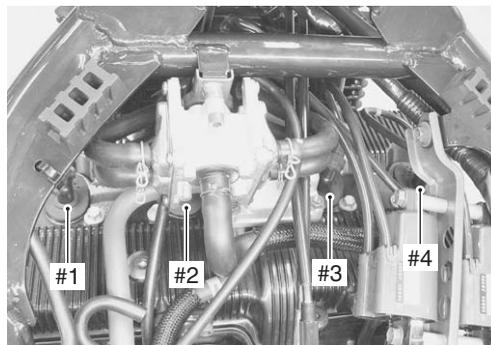
- Before installing the engine sprocket cover, apply a small quantity of SUZUKI SUPER GREASE "A" to the push rod.

AH : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



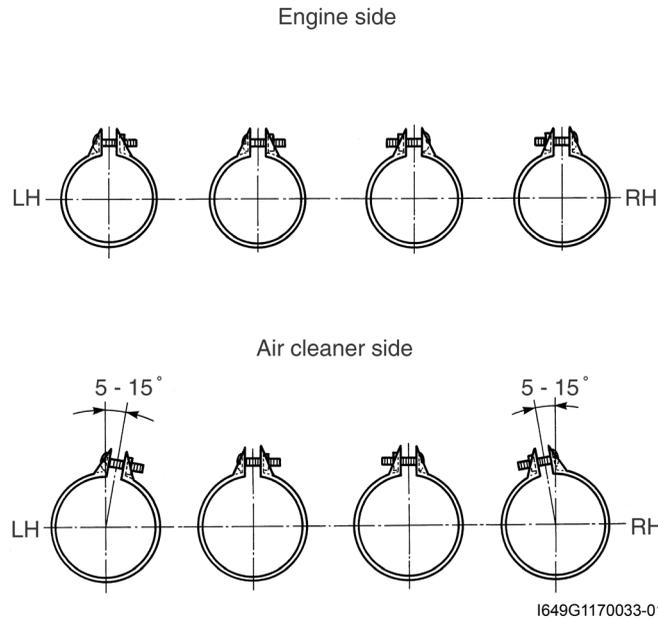
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- Install the spark plug caps onto the spark plugs. Make sure that each spark plug cap is installed in the correct location. The number on each spark plug cord refers to the appropriate cylinder.



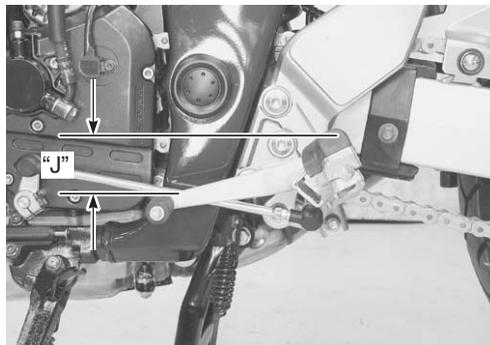
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- Position the carburetor clamps as shown.



- After remounting the engine, route the wire harness, cables and hoses properly. Refer to “Wiring Harness Routing Diagram: in Section 9A” and “Throttle Cable / Starter Cable Routing Diagram: in Section 1G”.
- Install the gearshift lever to the gearshift shaft in the correct position.

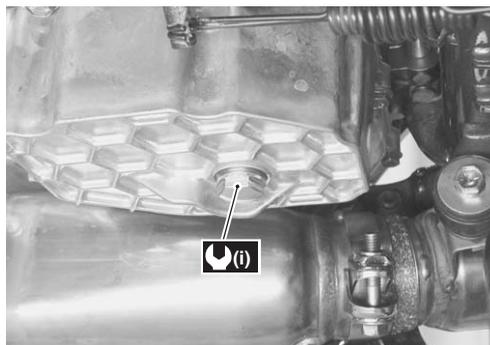
Gearshift lever height “J”
55 mm (2.2 in)



i649G1140029-02

- Tighten the oil drain plug to the specified torque.

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

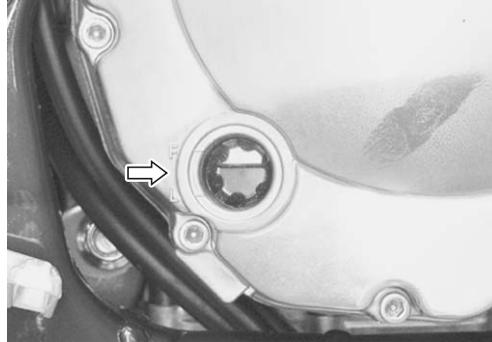


i649G1140030-03

1D-12 Engine Mechanical:

- Pour 4.6 L (4.9/4.0 US/Imp qt) of SF/SG or SH/SJ with JASO MA engine oil, with a viscosity rating of 10W-40, into the engine after overhauling it.
- Start up the engine and allow it run for several minutes at idle speed and then stop the engine. Wait three minutes and then check that the oil level remains between the marks on the oil level inspection window.

Oil change	3 300 ml (3.4/2.9 US/Imp qt)
Oil and filter change	3 500 ml (3.6/3.0 US/Imp qt)
Engine overhaul	4 600 ml (4.9/4.0 US/Imp qt)



I649G1140031-02

- Adjust the following items to specification.
 - Throttle cable play (Refer to “Throttle Cable Play Inspection and Adjustment: in Section 0B”.)
 - Engine idle speed (Refer to “Engine Idle Speed Inspection and Adjustment: in Section 0B”.)
 - Carburetor synchronization (Refer to “Carburetor Synchronization: in Section 1G”.)
 - Drive chain slack (Refer to “Drive Chain Inspection and Adjustment: in Section 0B”.)

Air Cleaner Element Removal and Installation

B649G11406065

Refer to “Air Cleaner Element Removal and Installation: in Section 0B”.

Air Cleaner Element Inspection and Cleaning

B649G11406066

Refer to “Air Cleaner Element Inspection and Cleaning: in Section 0B”.

Engine Top Side Disassembly

B649G11406004

It is unnecessary to remove the engine assembly from the frame when servicing the engine top side.

NOTE

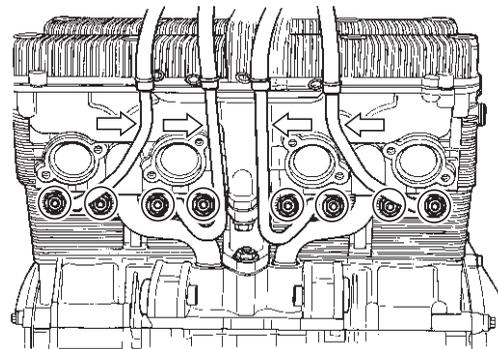
Before servicing the engine top side, remove the fuel tank, PAIR valve, carburetor assembly, exhaust pipes, muffler, oil cooler and etc. Refer to “Engine Assembly Removal: ”.

⚠ CAUTION

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

PAIR Pipe / Hose

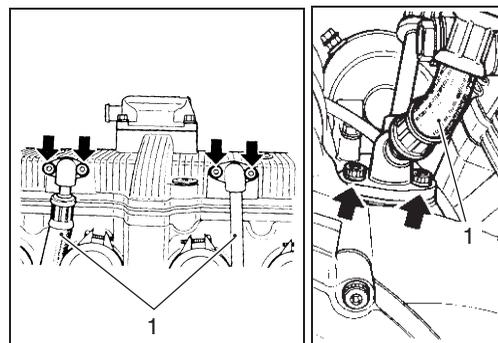
Remove each PAIR pipe and hose.



I649G1140032-01

Cooling Hose

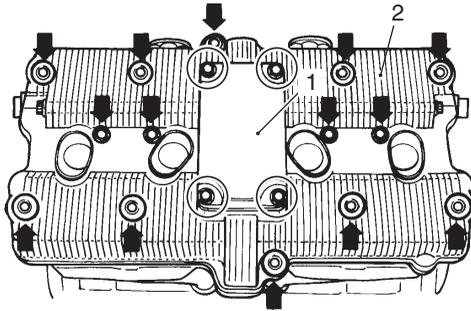
Remove the cooling hoses (1).



I649G1140034-03

Cylinder Head Cover

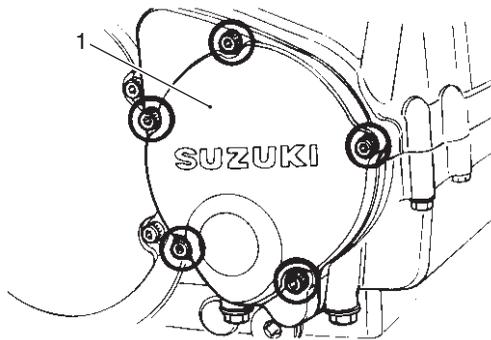
- 1) Remove the breather cover (1).
- 2) Remove the cylinder head cover (2) from the cylinder head.



I649G1140035-02

Camshaft

- 1) Remove the CKP sensor cover (1).



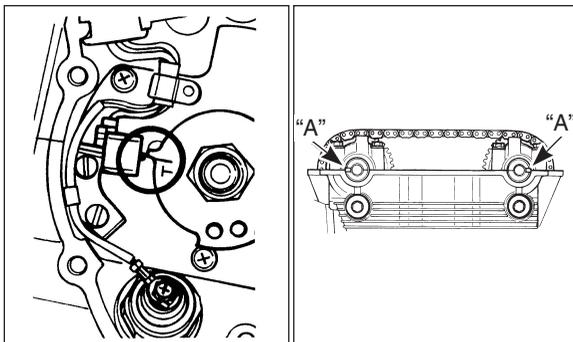
I649G1140036-01

- 2) Remove all of the spark plugs. Refer to "Spark Plug Removal and Installation: in Section 0B".

Special tool

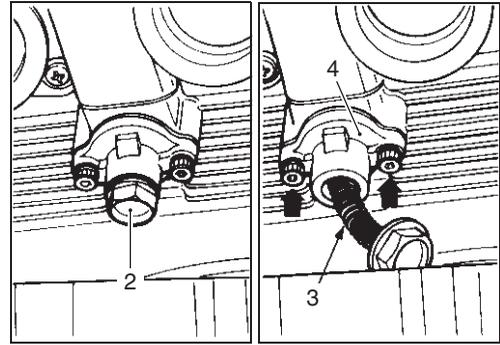
 : 09930-10121 (Spark plug wrench set)

- 3) Turn the crankshaft clockwise and align the "T" mark on the CKP rotor with the center of the CKP sensor. Also, position the notches "A" on the right end of each camshaft as shown.



I649G1140037-03

- 4) After removing the spring holder bolt (2) and spring (3), remove the cam chain tension adjuster (4).



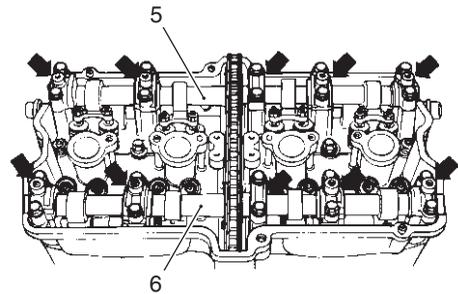
I649G1140039-02

- 5) Remove the camshaft journal holders.

NOTE

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

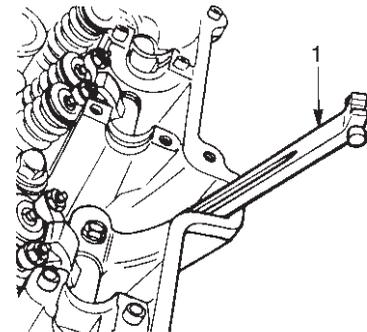
- 6) Remove the intake (5) and exhaust camshafts (6).



I649G1140040-02

Cylinder Head

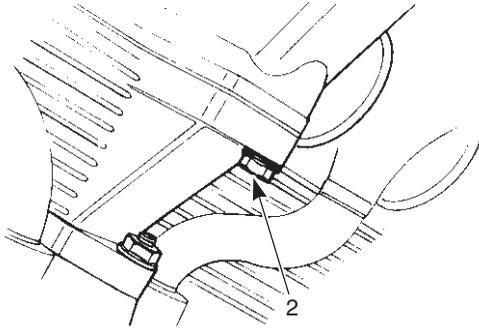
- 1) Remove the cam chain guide (1).



I649G1140041-01

1D-14 Engine Mechanical:

- 2) Remove the cylinder head bolt (2).



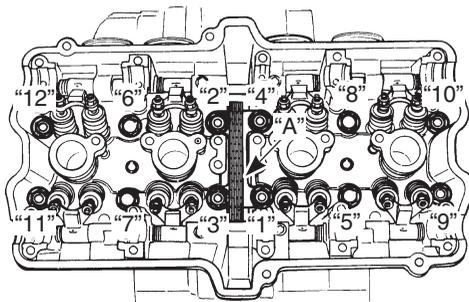
I649G1140042-02

- 3) The cylinder head can be removed after its twelve nuts (M10) are removed.

NOTE

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

- 4) Remove the cylinder head plate "A".

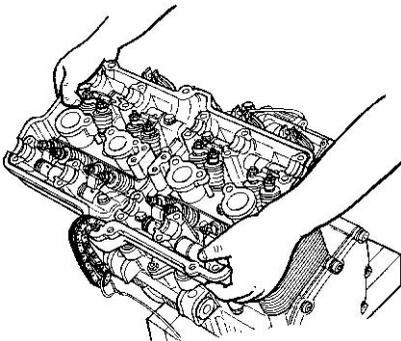


I649G1140354-01

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

⚠ CAUTION

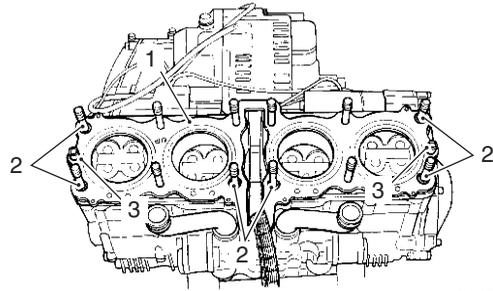
Be careful not to damage the fins when removing or handling the cylinder head.



I649G1140044-01

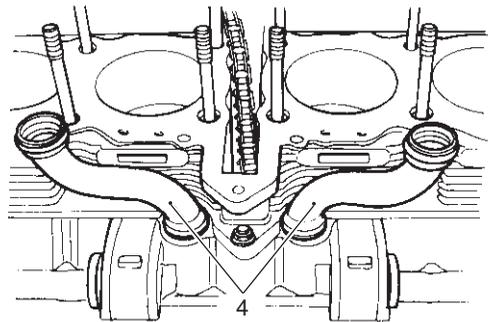
Cylinder

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



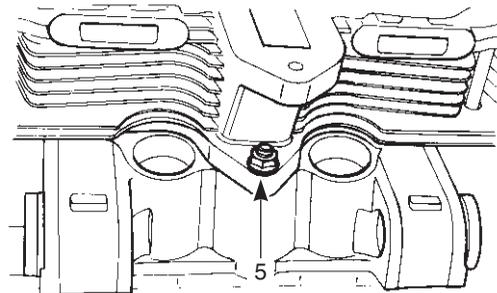
I649G1140355-02

- 2) Remove the left and right oil return pipes (4).



I649G1140046-02

- 3) Remove the cylinder base nut (5).

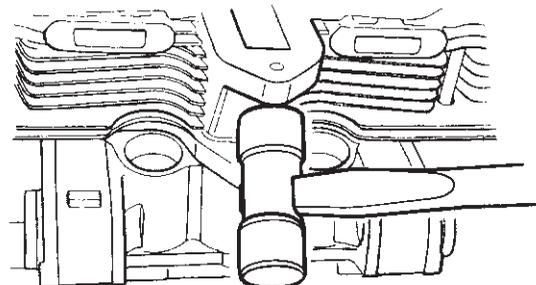


I649G1140047-02

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

⚠ CAUTION

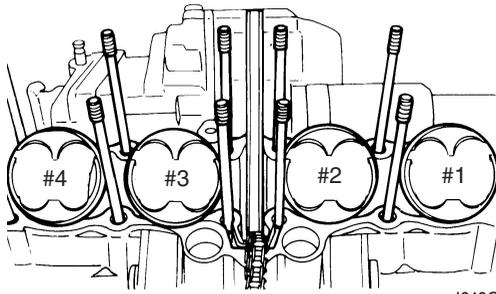
Be careful not to damage the fins when removing or handling the cylinder.



I649G1140048-01

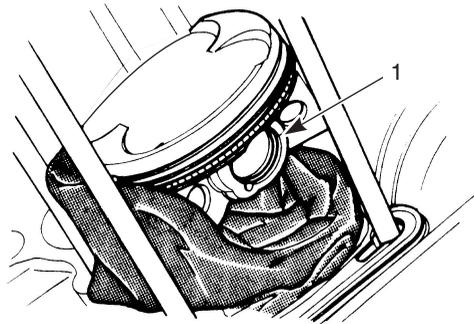
Piston

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



I649G1140347-01

- 2) Place a clean rag over the cylinder to prevent any parts from falling into the crankcase.
- 3) Remove the piston pin circlip (1).

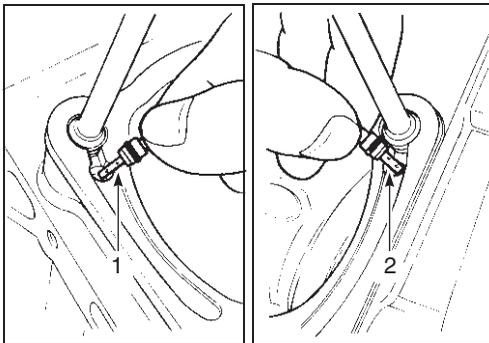


I649G1140050-02

- 4) Draw out each piston pin and remove the pistons.
- 5) Remove the cylinder gasket and dowel pins.

Oil Jet (For the Cylinder Head)

Remove the oil jets (1) and (2).

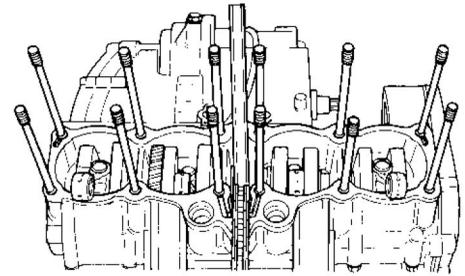


I649G1140051-01

Cylinder Stud Bolt

NOTE

Do not remove the cylinder stud bolts unless absolutely necessary.



I649G1140052-01

Engine Top Side Assembly

B649G11406046

Assemble the engine top side in the reverse order of disassembly. Pay attention to the following points:

Cylinder Stud Bolt

- Install each cylinder stud bolt as shown.

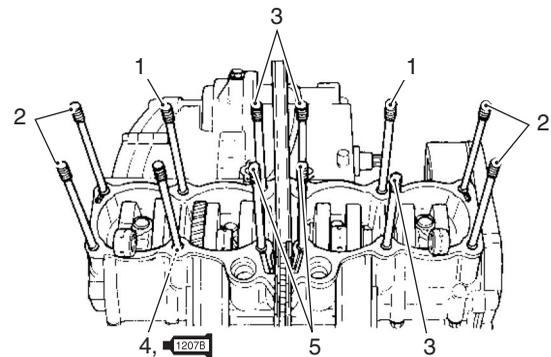
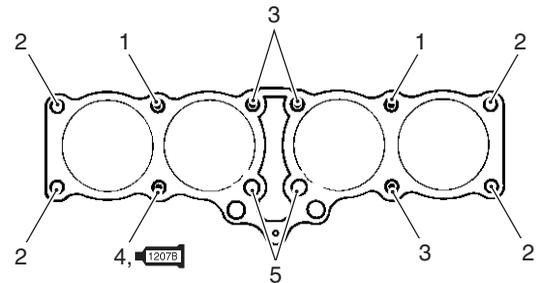
NOTE

Before installing the cylinder stud bolt (4), apply a light coat of the recommended bond to its threads.

■1207B : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)

Tightening torque

Cylinder stud bolt: 15 N·m (1.5 kgf·m, 11.0 lb-ft)



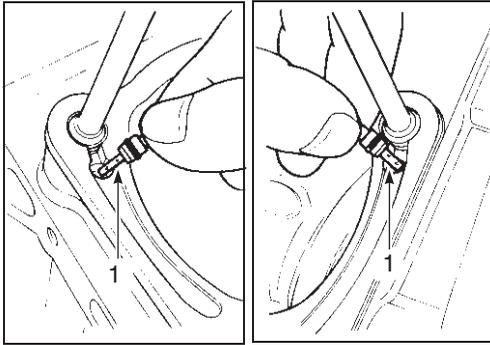
I649G1140054-04

Bolt	Color	Length
1	Silver	182 mm (7.2 in)
2	Black	189 mm (7.4 in)
3	Silver	189 mm (7.4 in)
4	Silver	189 mm (7.4 in)
5	Black	193 mm (7.6 in)

1D-16 Engine Mechanical:

Oil Jet (For the Cylinder Head)

- Make sure that the oil jets (1) in the upper crankcase are not clogged.



I649G1140055-02

Piston

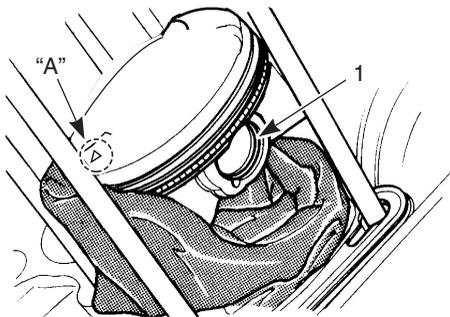
- Install the pistons and piston pins in their original cylinders. Refer to the scribe marks on each piston.
- Before installing the piston pins, apply molybdenum oil solution to their surfaces.

M/O: Molybdenum oil (Molybdenum oil solution)

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

NOTE

- Install the pistons with the arrow mark "A" facing towards the exhaust side.
- Be sure to use new circlips.



I649G1140057-02

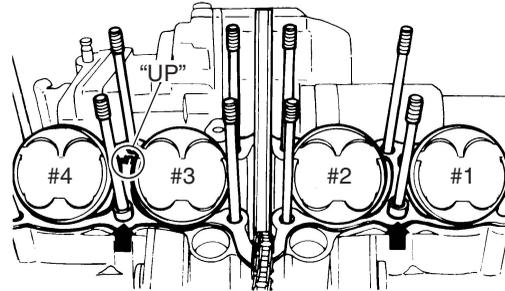
- Install the dowel pins and the new cylinder gasket.
- Before installing the cylinder, oil the big and small ends of each conrod and also the sliding surface of each piston.

⚠ CAUTION

Use a new gasket to prevent oil leakage.

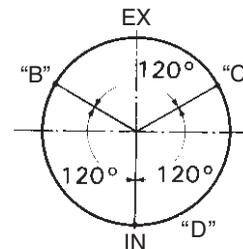
NOTE

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



I649G1140348-01

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



I649G1140059-03

"B": 2nd ring and lower side rail
"C": Upper side rail
"D": 1st ring and spacer

- Install each special tool as shown. Some light resistance must be overcome to lower the cylinder over the pistons.

Special tool

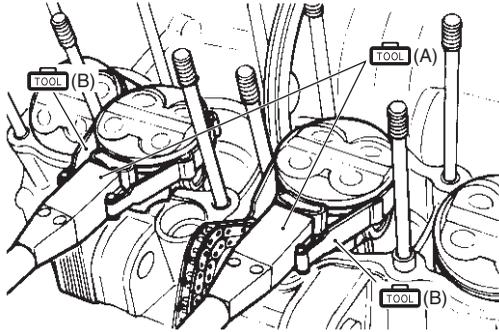
 (A): 09916-74521 (Holder body)

 (B): 09916-74550 (Band (bore 73 - 85 mm))

- With pistons #2 and #3 in place, install pistons #1 and #4, and then insert them into the respective cylinders.

NOTE

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



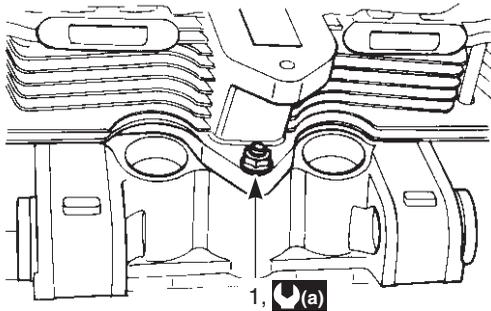
I649G1140060-02

Cylinder

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

Tightening torque

Cylinder base nut (a): 9 N·m (0.9 kgf-m, 6.5 lb-ft)

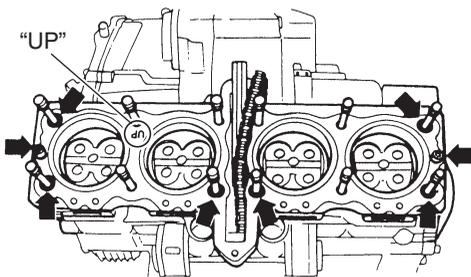


I649G1140061-02

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

NOTE

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



I649G1140062-02

CAUTION

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

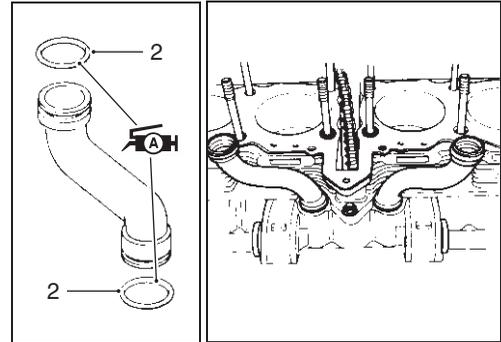
- Install the new O-rings (2) onto the oil return pipes and apply SUZUKI SUPER GREASE "A" to the O-rings.

CAUTION

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

⚠ Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)

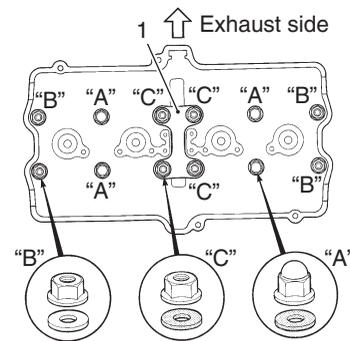
- Install the right and left oil return pipes.



I649G1140063-02

Cylinder Head

- Place the cylinder head onto the cylinder.
- Place the cylinder head plate (1) onto the cylinder head.
- Cylinder head nuts and washers must be installed in the correct position as shown.



I649G1140064-03

"A": Copper washer with cap nut (4 pcs)

"B": Steel washer with normal nut (4 pcs)

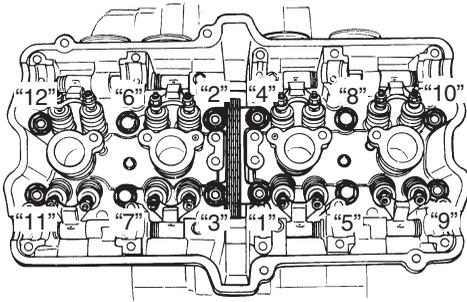
"C": Copper washer with normal nut (4 pcs)

1D-18 Engine Mechanical:

- Tighten the twelve nuts (M10) in ascending order and to the specified torque.

Tightening torque

Cylinder head nut: 38 N·m (3.8 kgf-m, 27.5 lb-ft)

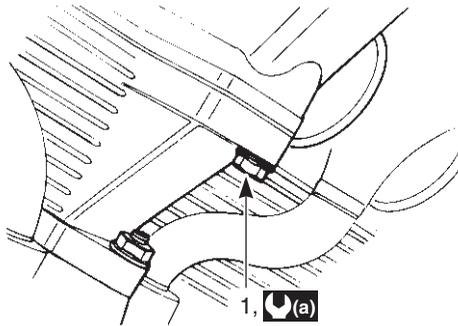


I649G1140065-02

- After firmly tightening the twelve nuts, install the cylinder head bolt (M6) (1) and tighten it to the specified torque.

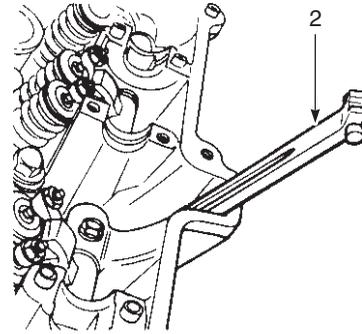
Tightening torque

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



I649G1140066-02

- Install the cam chain guide (2) as shown.

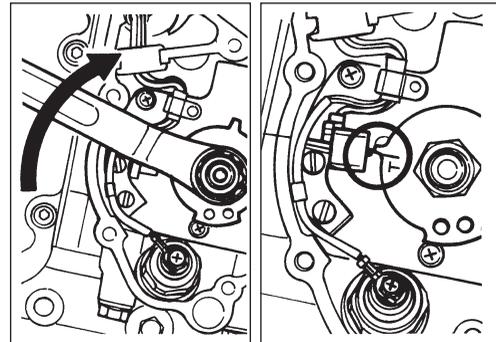


I649G1140067-01

- While holding down the cam chain, rotate the crankshaft clockwise and align the "T" mark on the CKP sensor rotor with the center of the CKP sensor.

⚠ CAUTION

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



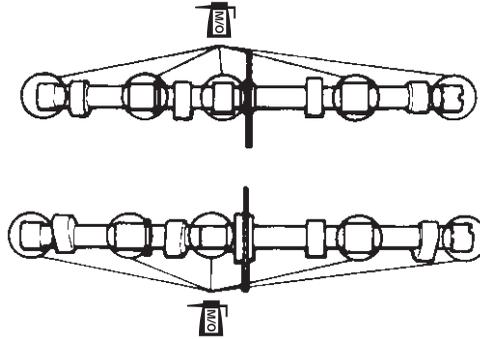
I649G1140068-02

Camshaft

NOTE

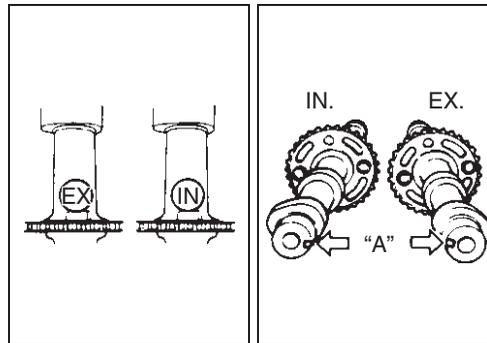
Before installing the camshafts onto the cylinder head, apply **SUZUKI MOLY PASTE** onto the camshaft journals and do not leave any dry spots. Also, apply engine oil onto the camshaft journal holders.

M/O: Molybdenum oil (Molybdenum oil solution)



I649G1140069-02

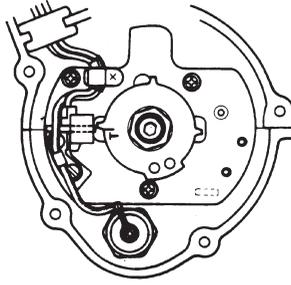
- The exhaust camshaft has the embossed letters “EX” and the intake camshaft has the embossed letters “IN”. Also, the right end of each camshaft has a notch “A”.



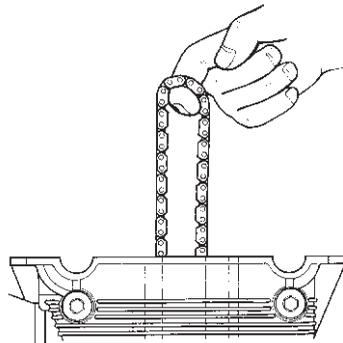
I649G1140070-02

1D-20 Engine Mechanical:

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



I649G1140071-02

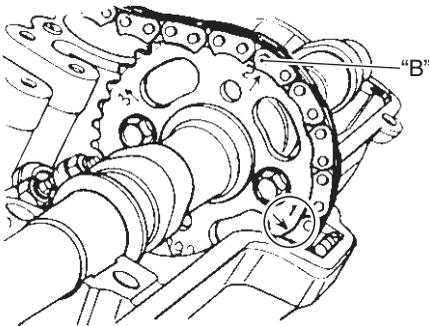


I649G1140072-01

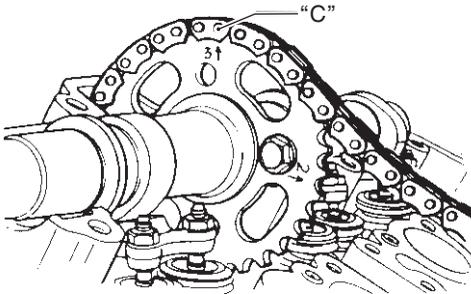
- The exhaust camshaft sprocket has an arrow marked “1”. Turn the exhaust camshaft so that the arrow is aligned with the gasket surface of the cylinder head.
- Engage the cam chain with the exhaust camshaft sprocket.
- The other arrow marked “2” should now be pointing straight up. Starting from the roller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

NOTE

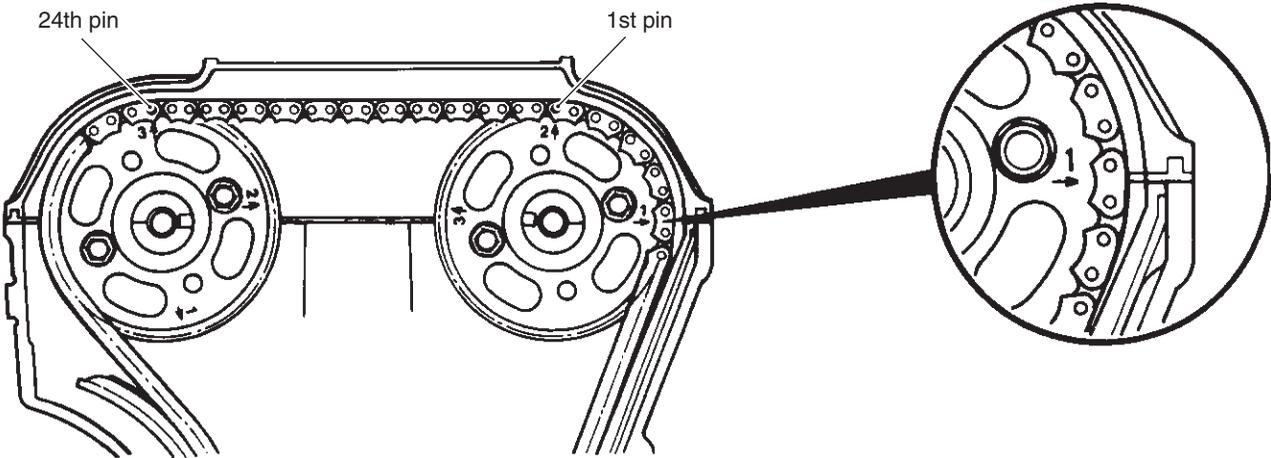
The cam chain should now be on all three sprockets. Be careful not to move the crankshaft until the camshaft journal holders and cam chain tensioner are secured.



I649G1140073-02

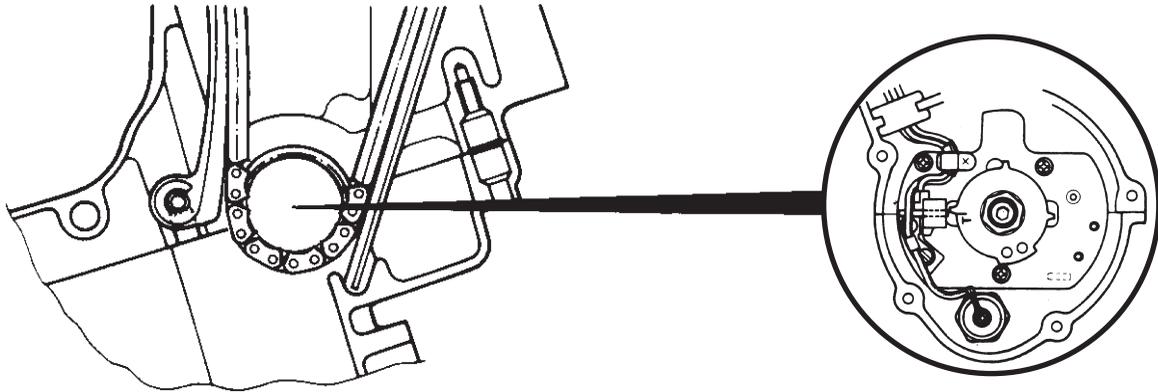


I649G1140074-02



24th pin

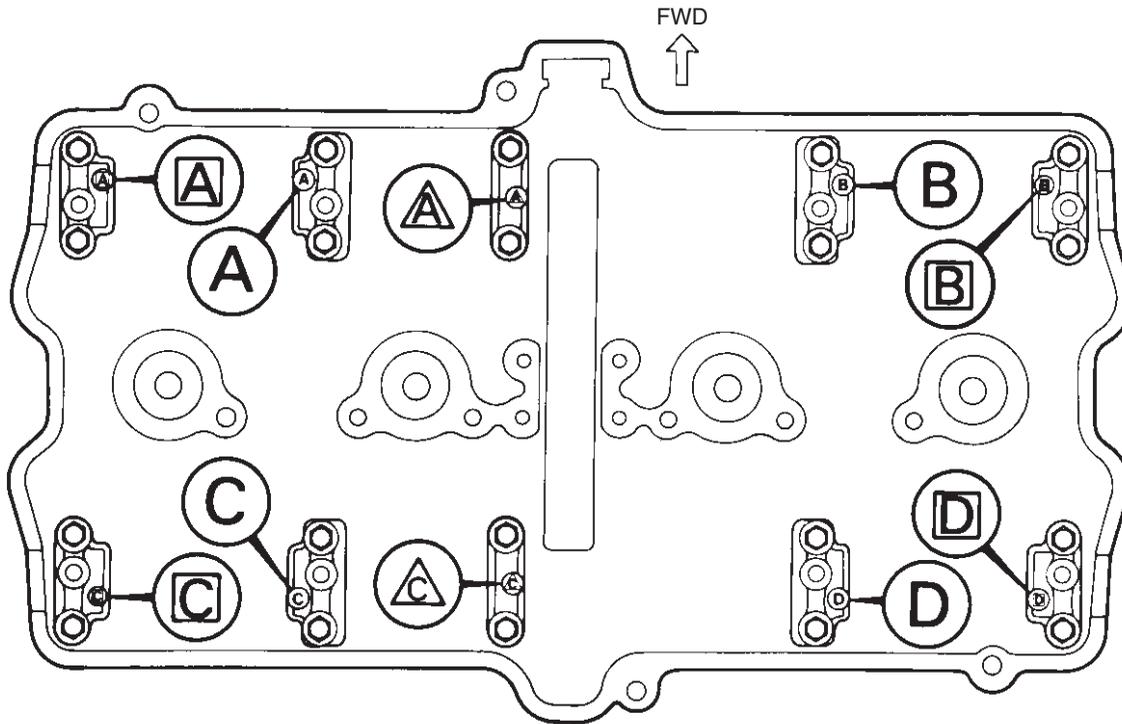
1st pin



I649G1140075-03

1D-22 Engine Mechanical:

- Each camshaft journal holder is identified with an embossed letter and install the dowel pins into each camshaft journal holder.



I649G1140076-01

- Have the camshaft journal holders seated (IN and EX) evenly by tightening the camshaft journal holder bolts sequentially and in a crisscross pattern.

⚠ CAUTION

The camshaft journal holder bolts are made of a special material and much superior in strength, compared with other types of high strength bolts. Take special care not to use other types of bolts.

NOTE

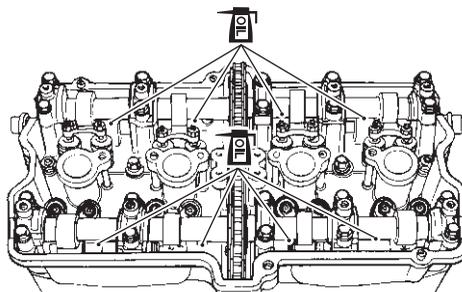
Damage to the cylinder head or camshaft journal holder thrust surfaces may result if the camshaft journal holders are not tightened evenly.

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

Tightening torque

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

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



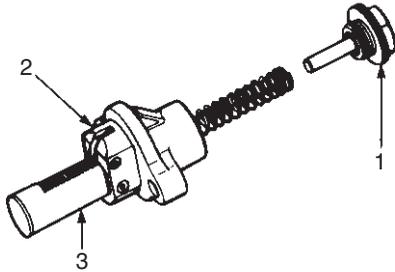
I649G1140077-01

Cam Chain Tension Adjuster

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

NOTE

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



I649G1140078-01

- Install a new gasket and the cam chain tension adjuster onto the cylinder as shown.

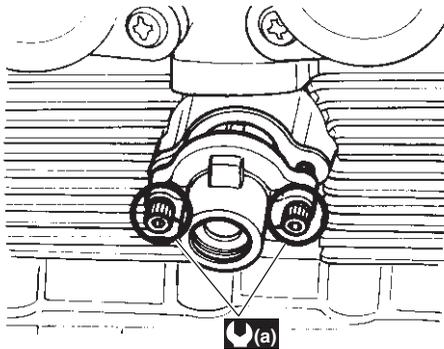
CAUTION

Use a new gasket to prevent oil leakage.

- Tighten the cam chain tension adjuster mounting bolts to the specified torque.

Tightening torque

Cam chain tension adjuster mounting bolt (a): 7 N·m (0.7 kgf-m, 5.0 lb-ft)



I649G1140079-02

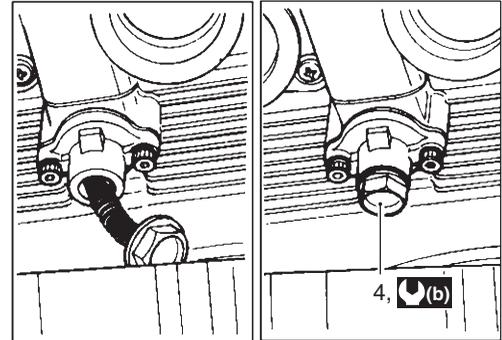
- Insert the spring into the cam chain tension adjuster and tighten the spring holder bolt (4) to the specified torque.

Tightening torque

Cam chain tension spring holder bolt (b): 38 N·m (3.8 kgf-m, 27.5 lb-ft)

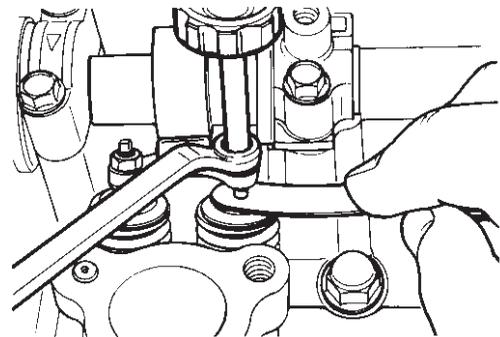
CAUTION

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



I649G1140080-02

- After installing the cam chain tension adjuster, rotate the crankshaft (some turns), and recheck the positions of the camshafts.
- Turn the crankshaft and check that all the moving parts (e.g., cam follower, camshaft) work properly.
- Be sure to check and adjust the valve clearance. Refer to "Valve Clearance Inspection and Adjustment: in Section 0B".

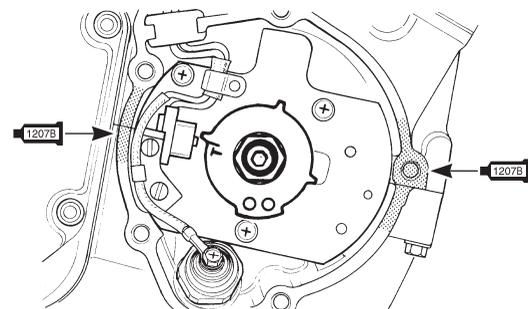


I649G1140082-01

CKP Sensor Cover

- Apply a bond lightly to the CKP sensor cover gasket mating surface as shown.

1207B : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)



I649G1140083-03

1D-24 Engine Mechanical:

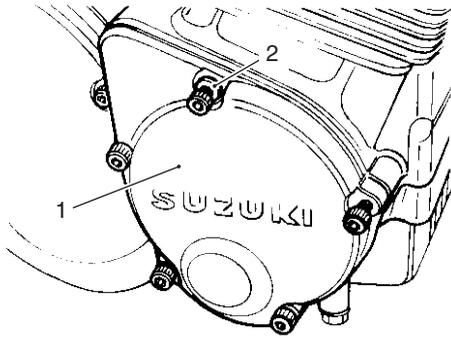
- Apply a small quantity of THREAD LOCK "1342" to the CKP sensor cover bolts.

1342 : Thread lock cement 99000-32050 (Thread Lock Cement 1342 or equivalent)

- Install a new gasket and the CKP sensor cover (1).
- Install a new gasket washer (2) onto the CKP sensor cover bolt as shown.

⚠ CAUTION

Replace the cover gasket and gasket washer (2) with new ones.



I649G1140084-03

Cylinder Head Cover

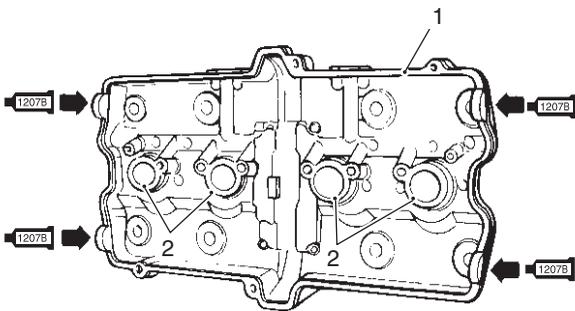
- Before installing the cylinder head cover gasket (1) onto the cylinder head cover, apply a bond to the groove in the cylinder head cover.

⚠ CAUTION

Replace the cylinder head cover gasket (1) and oil nozzle gaskets (2) with new ones.

- Apply a bond to the four camshaft end caps of the gasket as shown.

1207B : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)



I649G1140351-01

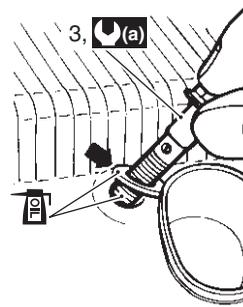
- Place the cylinder head cover onto the cylinder head.
- Install the four gaskets onto each cylinder head cover union bolt (3) and apply oil to thread and gasket before tighten them to the specified torque.

⚠ CAUTION

Replace the gaskets with new ones to prevent oil leakage.

Tightening torque

Cylinder head cover union bolt (a): 20 N·m (2.0 kgf-m, 14.5 lb-ft)



I649G1140086-04

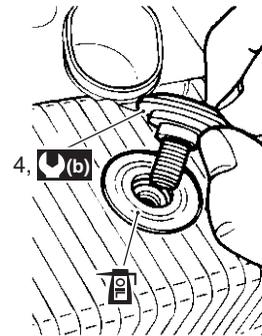
- Apply a small quantity of oil to the gaskets.
- Install the eight gaskets in the correct locations.
- Tighten the cylinder head cover bolts (4) to the specified torque.

⚠ CAUTION

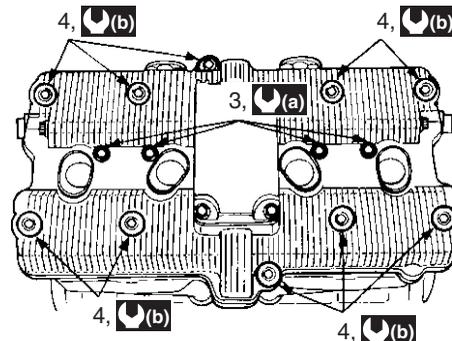
Replace the gaskets with new ones to prevent oil leakage.

Tightening torque

Cylinder head cover bolt (b): 14 N·m (1.4 kgf-m, 10.0 lb-ft)



I649G1140087-04



I649G1140356-01

- Install all of the spark plugs.

Cooling Hose

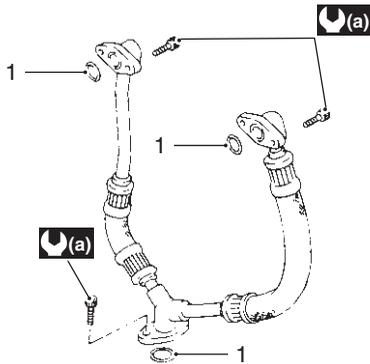
- Install the left and right cooling hoses and tighten their mounting bolts to the specified torque.

⚠ CAUTION

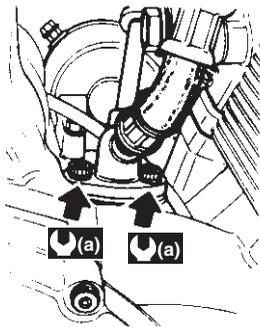
Replace the O-rings (1) with new ones to prevent oil leakage.

Tightening torque

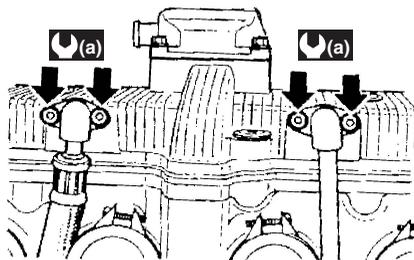
Cooling hose mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I649G1140089-02



I649G1140090-02



I649G1140091-02

PAIR Pipe / Hose

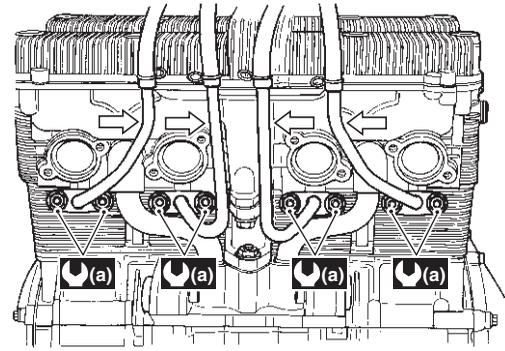
- Install the PAIR pipes and hoses and tighten their mounting nuts to the specified torque.

⚠ CAUTION

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

Tightening torque

PAIR pipe mounting nut (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I649G1140093-02

Valve Clearance Inspection and Adjustment

B649G11406067

Refer to "Valve Clearance Inspection and Adjustment: in Section 0B".

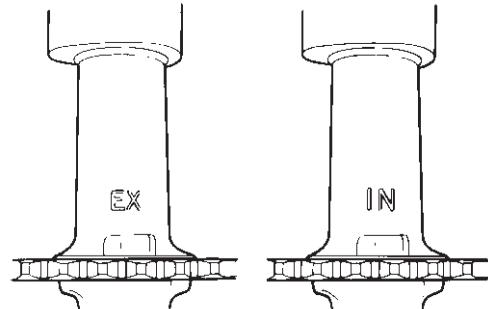
Camshaft Inspection

B649G11406048

Refer to "Engine Top Side Disassembly: ".
Refer to "Engine Top Side Assembly: ".

Camshaft Identification

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



I649G1140198-01

Cam Wear

Check the camshaft for wear or damage. Measure the cam height "a" with a micrometer. Replace a camshaft if the cams are worn to the service limit.

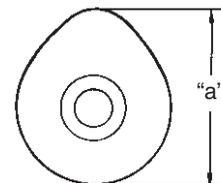
Special tool

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

Cam height "a"

Service limit: (IN) 33.28 mm (1.3102 in)

Service limit: (EX) 32.35 mm (1.2736 in)



I649G1140199-01

Camshaft Runout

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

Special tool

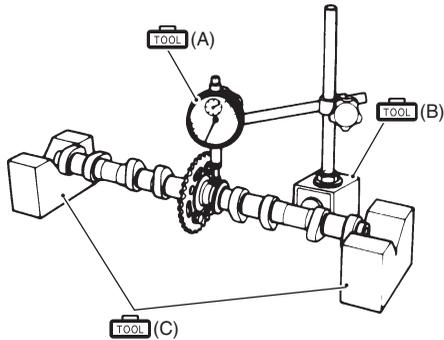
 (A): 09900-20606 (Dial gauge (1/100 mm))

 (B): 09900-20701 (Magnetic stand)

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

Camshaft runout (IN & EX)

Service limit: 0.10 mm (0.004 in)



I649G1140312-01

Camshaft Journal Wear

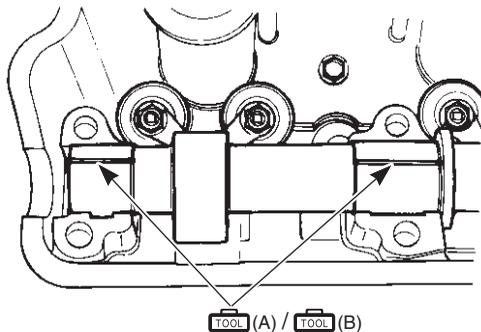
Inspect the camshaft journal wear in the following procedures:

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

Special tool

 (A): 09900-22301 (Plastigauge (0.025 - 0.076 mm))

 (B): 09900-22302 (Plastigauge (0.051 - 0.152 mm))



I649G1140200-03

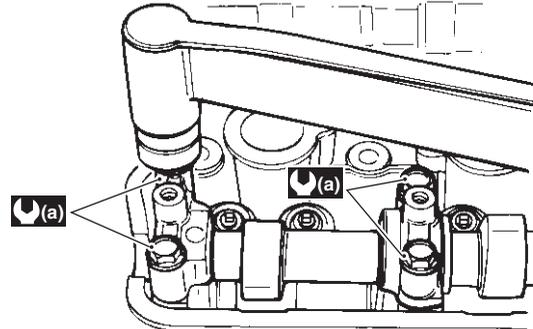
- 3) Install each camshaft journal holder to its original position. Refer to "Engine Top Side Assembly: ".
- 4) Tighten the camshaft journal holder bolts evenly and diagonally to the specified torque.

NOTE

Do not rotate the camshafts with the plastigauge in place.

Tightening torque

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

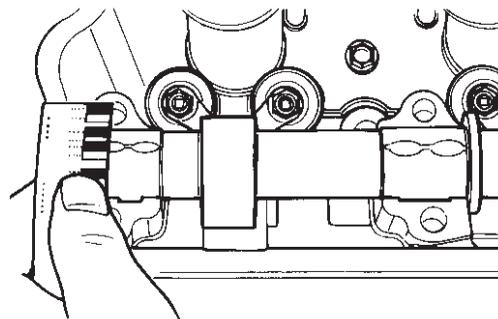


I649G1140201-02

- 5) Remove the camshaft journal holders and measure the width of the compressed plastigauge using the envelope scale.
- 6) This measurement should be taken at the widest part of the compressed plastigauge.

Camshaft journal oil clearance (IN & EX)

Service limit: 0.15 mm (0.0059 in)



I649G1140202-01

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

Special tool

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

 (D): 09900-22403 (Small bore gauge (18-35mm))

Camshaft journal holder I.D. (IN & EX)

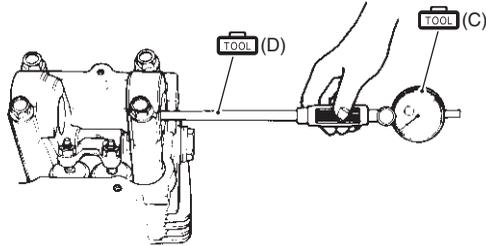
Standard: 22.012 – 22.025 mm (0.8666 – 0.8671 in)

Special tool

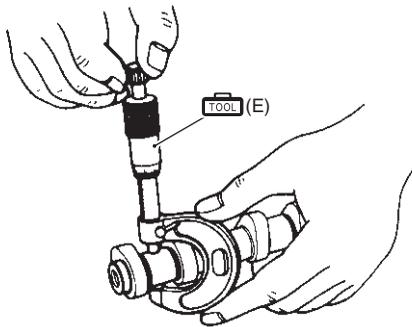
 (E): 09900–20205 (Micrometer (0-25mm))

Camshaft journal O.D. (IN & EX)

Standard: 21.959 – 21.980 mm (0.8645 – 0.8654 in)



I649G1140203-02



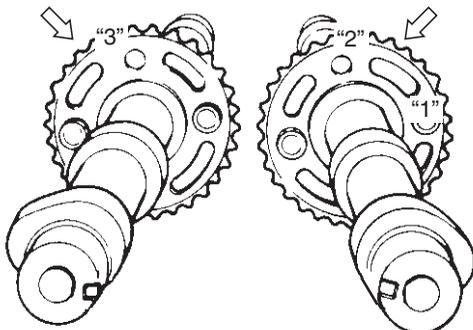
I649G1140204-02

Camshaft Sprocket Inspection

B649G11406049

Inspect the camshaft sprocket in the following procedures:

- 1) Remove the intake and exhaust camshafts. Refer to “Engine Top Side Disassembly: ”.
- 2) Inspect the teeth of each camshaft sprocket for wear or damage.
If they are worn or damaged, replace the sprockets and cam chain as a set.



I649G1140205-02

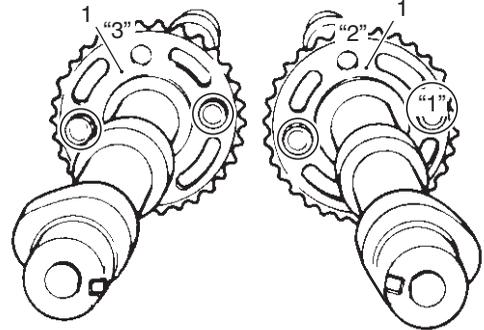
- 3) Install the camshafts. Refer to “Engine Top Side Assembly: ”.

Camshaft Sprocket Removal and Installation

B649G11406050

Removal

- 1) Remove the camshafts. Refer to “Engine Top Side Disassembly: ”.
- 2) Remove the camshaft sprockets (1).

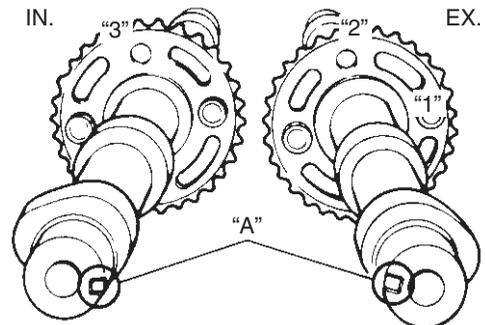


I649G1140206-02

Installation

NOTE

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



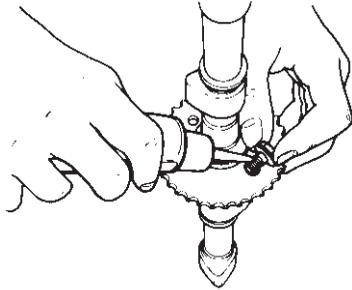
I649G1140207-02

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

 : Thread lock cement 99000-32030 (Thread Lock Cement Super 1303 or equivalent)

Tightening torque

Camshaft sprocket bolt: 25 N·m (2.5 kgf-m, 18.0 lb-ft)



I649G1140208-01

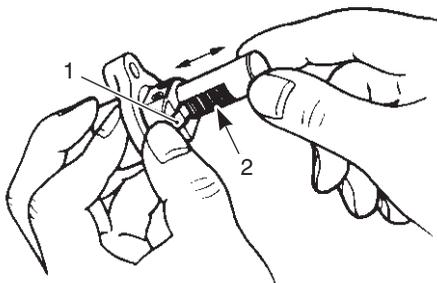
- 2) Install the camshafts. Refer to "Engine Top Side Assembly: ".

Cam Chain Tension Adjuster Inspection

B649G11406051

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

- 1) Remove the cam chain tension adjuster. Refer to "Engine Top Side Disassembly: ".
- 2) Unlock the ratchet mechanism (1) and move the push rod (2) in place to see if it slides smoothly. If it does not slide smoothly or the ratchet mechanism is worn or damaged, replace the cam chain tension adjuster with a new one.



I649G1140209-02

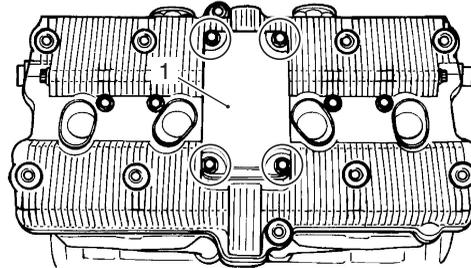
- 3) Install the cam chain tension adjuster. Refer to "Engine Top Side Assembly: ".

Cam Chain Guide Removal and Installation

B649G11406068

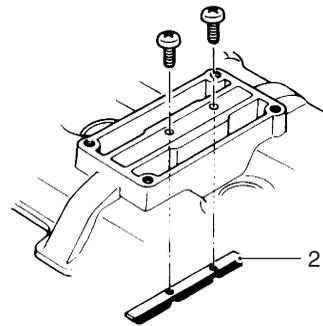
Removal

- 1) Remove the cylinder head cover. Refer to "Engine Top Side Disassembly: ".
- 2) Remove the breather cover (1).



I649G1140313-01

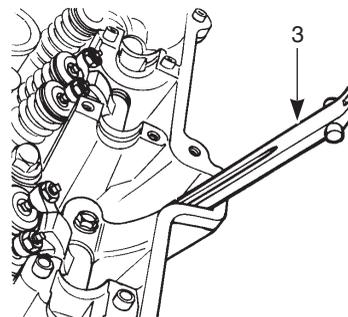
- 3) Remove the cam chain guide No.2 (2) from the cylinder head cover.



I649G1140314-01

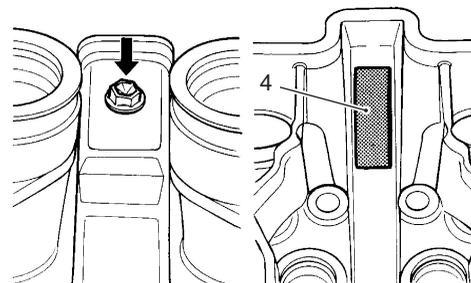
- 4) Remove the intake and exhaust camshafts. Refer to "Engine Top Side Disassembly: ".

- 5) Remove the cam chain guide No.1 (3).



I649G1140315-01

- 6) Remove the cam chain guide No.3 (4) by removing the mounting bolt.



I649G1140316-01

Installation

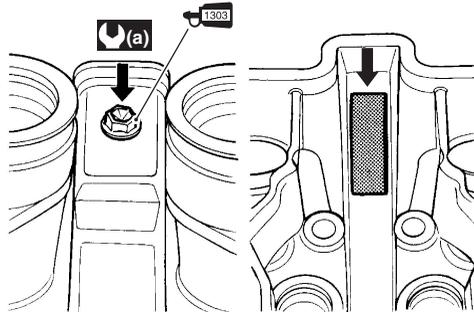
Install The cam chain guides in the reverse order of removal. Pay attention to the following points:

- Apply SUZUKI THREAD LOCK SUPER “1303” to thread part and tighten the mounting bolt to the specified torque.

 : Thread lock cement 99000-32030 (Thread Lock Cement Super 1303 or equivalent)

Tightening torque

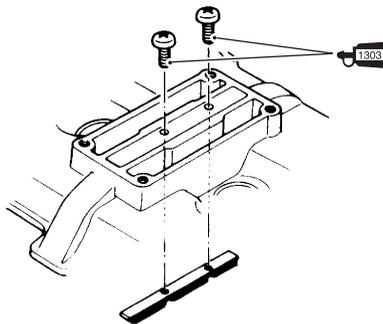
Cam chain guide bolt (a): 6 N·m (0.6 kgf·m, 4.5 lb·ft)



I649G1140317-01

- Apply SUZUKI THREAD LOCK SUPER “1303” to thread part.

 : Thread lock cement 99000-32030 (Thread Lock Cement Super 1303 or equivalent)



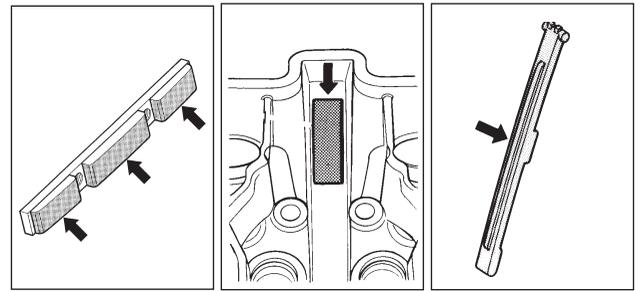
I649G1140318-01

Cam Chain Guide Inspection

B649G11406052

Inspect the cam chain guide in the following procedures:

- 1) Remove the cam chain guides. Refer to “Cam Chain Guide Removal and Installation: ”.
- 2) Check the contacting surface of the cam chain guide. If it is worn or damaged, replace it with a new one. Refer to “Engine Top Side Disassembly: ”, “Engine Top Side Assembly: ” and “Cam Chain Guide Removal and Installation: ”.



I649G1140210-02

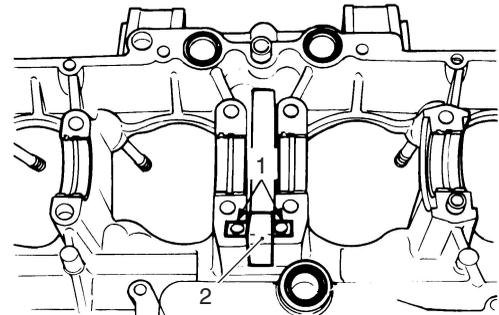
- 3) Install the cam chain guides. Refer to “Cam Chain Guide Removal and Installation: ”.

Cam Chain Tensioner Inspection

B649G11406053

Inspect the cam chain tensioner in the following procedures:

- 1) Separate the crankcases, upper and lower. Refer to “Engine Bottom Side Disassembly: ”.
- 2) Remove the crankshaft assembly from the upper crankcase. Refer to “Engine Bottom Side Disassembly: ”.
- 3) Remove the dampers (1) of the cam chain tensioner and cam chain tensioner (2).



I649G1140319-01

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



I649G1140211-01

- 5) Install the cam chain tensioner and its dampers.
- 6) Reinstall the crankshaft assembly. Refer to “Engine Bottom Side Assembly: ”.
- 7) Reassemble the crankcases, upper and lower. Refer to “Engine Bottom Side Assembly: ”.

Cylinder Head Disassembly and Assembly

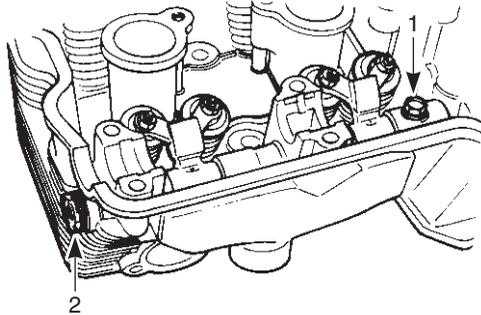
B649G11406054

Refer to "Engine Top Side Disassembly: ".

Refer to "Engine Top Side Assembly: ".

Disassembly

- 1) Remove the intake pipes.
- 2) Remove the rocker arm shaft set bolt (1) and cylinder head plug (2).

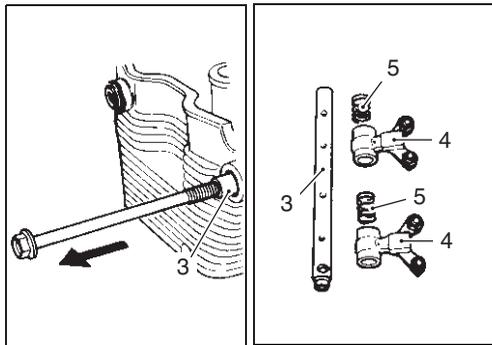


I649G1140212-02

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

NOTE

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



I649G1140213-02

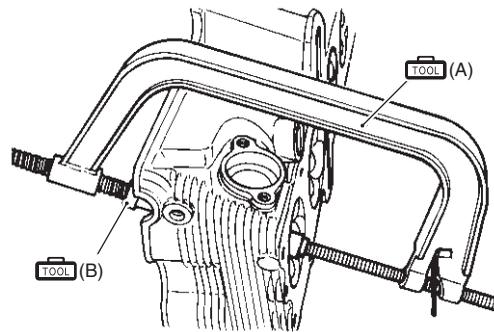
- 4) Using the special tools, compress the valve spring and remove the valve cotters (6) from the valve stem.

Special tool

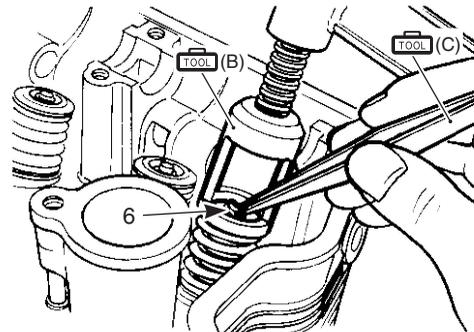
TOOL (A): 09916-14510 (Valve spring compressor)

TOOL (B): 09916-14910 (Valve lifter attachment)

TOOL (C): 09916-84511 (Tweezers)

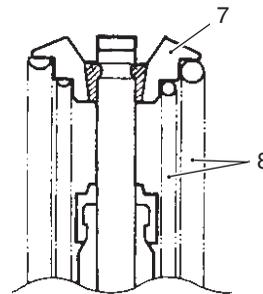


I649G1140214-02



I649G1140215-02

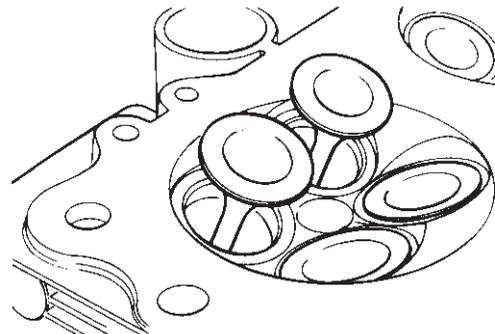
- 5) Remove the valve spring retainer (7) and the inner and outer valve springs (8).



I649G1140216-02

- 6) Remove the valve spring seat.

- 7) Remove the valve from the combustion chamber side.



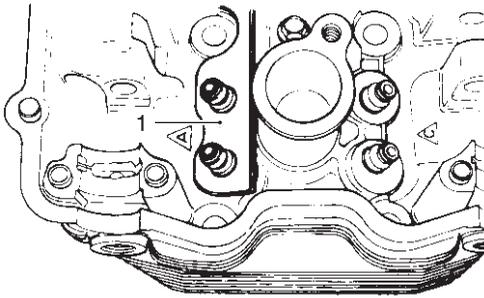
I649G1140217-01

- 8) Remove the oil seal.

- 9) Remove the plate from the cylinder head of exhaust side.

Assembly

- 1) Locate the plate (1) on the cylinder head of exhaust side.



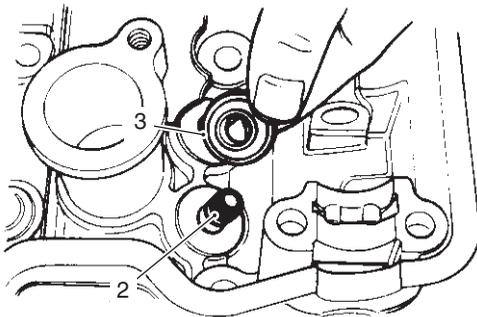
I649G1140218-02

- 2) Oil each oil seal (2) and press fit them into position using the valve guide installer.

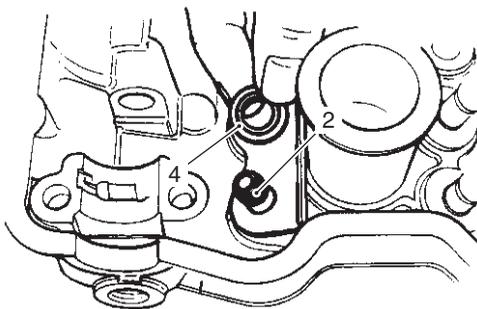
CAUTION

Do not reuse the oil seals.

- 3) Install each valve spring seat (3) (for intake side) and (4) (for exhaust side).



I649G1140219-02



I649G1140220-02



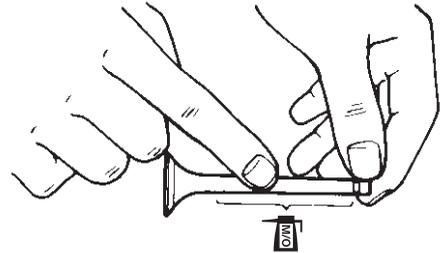
I649G1140221-02

- 4) Insert the valves with their stems coated with molybdenum oil solution. Coat the entire stem making sure that there are no gaps.

CAUTION

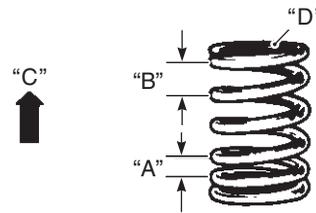
When inserting each valve, take care not to damage the lip of the oil seal.

M/O: Molybdenum oil (Molybdenum oil solution)



I649G1140222-01

- 5) Install the valve springs with the smaller pitch "A" facing the cylinder head.



I649G1140223-02

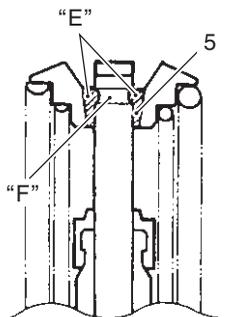
"A": Small pitch	"C": Up
"B": Larger pitch	"D": Paint mark

1D-32 Engine Mechanical:

- 6) Install the valve spring retainer, press down the springs using the valve lifter and then install the cotter halves on to the stem end. Then, release the valve lifter to allow the cotter (5) to wedge between the retainer and the valve stem. Be sure that the rounded lip "E" of the cotter fits snugly into the groove "F" in the stem end.

⚠ CAUTION

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



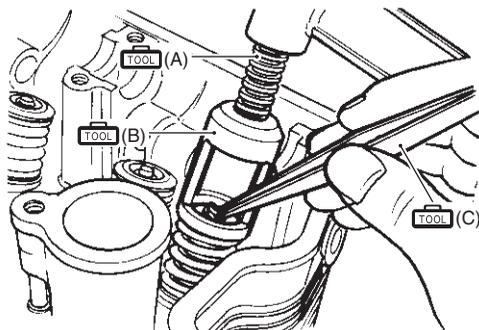
I649G1140224-01

Special tool

TOOL (A): 09916-14510 (Valve spring compressor)

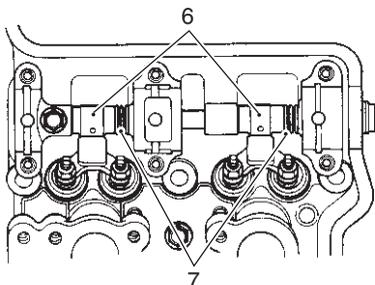
TOOL (B): 09916-14910 (Valve lifter attachment)

TOOL (C): 09916-84511 (Tweezers)



I649G1140225-02

- 7) Apply engine oil to the rocker arm shaft sufficiently.
8) Install the rocker arms (6), springs (7) and rocker arm shaft.



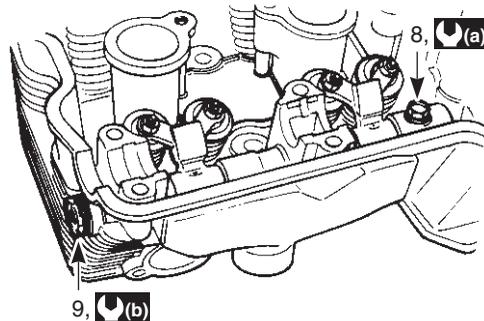
I649G1140226-02

- 9) Tighten the rocker arm shaft set bolt (8) and cylinder head plug (9) to the specified torque.

Tightening torque

Rocker arm shaft set bolt (a): 9 N·m (0.9 kgf-m, 6.5 lb-ft)

Cylinder head plug (b): 28 N·m (2.8 kgf-m, 20.0 lb-ft)



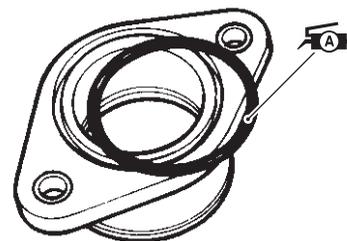
I649G1140227-02

- 10) Apply SUZUKI SUPER GREASE "A" to the O-ring of the intake pipe.

⚠ CAUTION

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

⚠H: Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



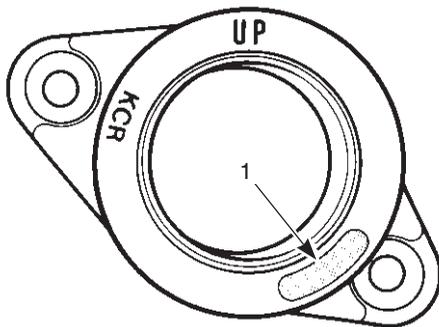
I649G1140228-01

11) Apply a small quantity of THREAD LOCK “1342” to the thread of the intake pipe bolt.

 : Thread lock cement 99000–32050 (Thread Lock Cement 1342 or equivalent)

NOTE

- When replacing the intake pipes, identify the different intake pipes according to each I.D. code (1).
 (1-32F0 for cylinder #1)
 (1-32F0 for cylinder #2)
 (3-32F0 for cylinder #3)
 (3-32F0 for cylinder #4)
- Make sure that the “UP” mark faces up.



I649G1140229-02

Cylinder Head Related Parts Inspection

B649G11406055

Refer to “Cylinder Head Disassembly and Assembly:”.

Cylinder Head Distortion

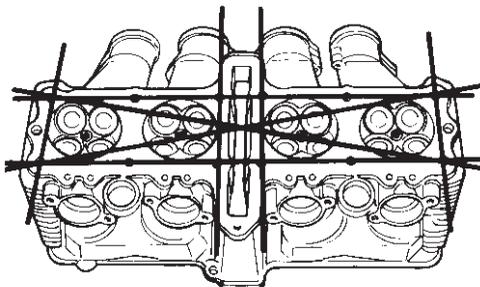
- 1) Decarbonize the combustion chambers.
- 2) Check the gasket surface of the cylinder head for distortion. Use a straightedge and thickness gauge. Take clearance readings at several places. If readings exceed the service limit, replace the cylinder head.

Special tool

 : 09900–20803 (Thickness gauge)

Cylinder head distortion

Service limit: 0.2 mm (0.008 in)



I649G1140230-01

Valve Stem Runout

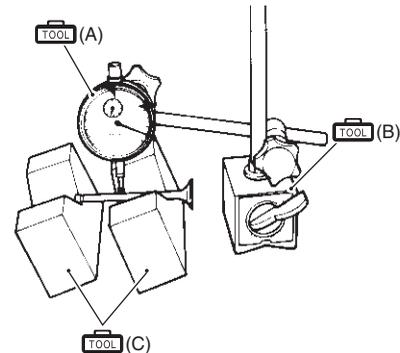
Support the valve using V-blocks, as shown, and check its runout using the dial gauge. If the runout exceeds the service limit, replace the valve.

Special tool

-  (A): 09900–20606 (Dial gauge (1/100 mm))
-  (B): 09900–20701 (Magnetic stand)
-  (C): 09900–21304 (V-block (100mm))

Valve stem runout

Service limit: 0.05 mm (0.002 in)



I649G1140231-02

Valve Head Radial Runout

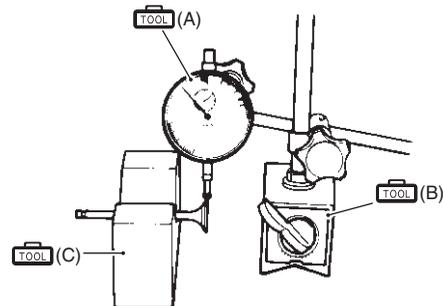
Place the dial gauge at a right angle to the valve head face and measure the valve head radial runout. If it measures more than the service limit, replace the valve.

Special tool

-  (A): 09900–20606 (Dial gauge (1/100 mm))
-  (B): 09900–20701 (Magnetic stand)
-  (C): 09900–21304 (V-block (100mm))

Valve head radial runout

Service limit: 0.03 mm (0.001 in)



I649G1140232-02

Valve Face Wear

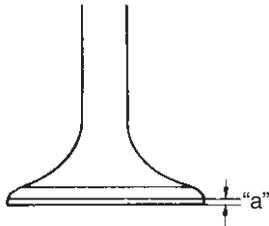
Visually inspect each valve face for wear. Replace any valve with an abnormally worn face. The thickness of the valve face decreases as the face wears. Measure the valve face "a". If it is out of specification replace the valve with a new one.

Special tool

 **TOOL (A): 09900-20102 (Vernier calipers)**

Valve face thickness "a"

Service limit: 0.5 mm (0.02 in)



I649G1140233-01

Valve Stem Deflection

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

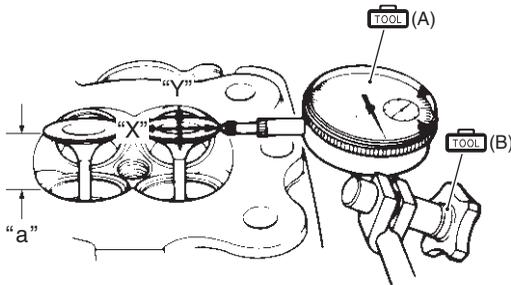
Special tool

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

 **TOOL (B): 09900-20701 (Magnetic stand)**

Valve stem deflection (IN & EX)

Service limit: 0.35 mm (0.014 in)



I649G1140234-02

Valve Stem Wear

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

Special tool

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

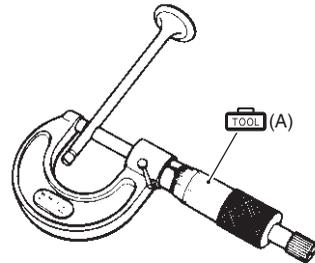
Valve stem O.D.

Standard (IN): 4.965 – 4.980 mm (0.1955 – 0.1961 in)

Standard (EX): 4.945 – 4.960 mm (0.1947 – 0.1953 in)

NOTE

If valve guides have to be removed for replacement after inspecting related parts, carry out the steps shown in valve guide replacement. Refer to "Valve Guide Replacement: ".



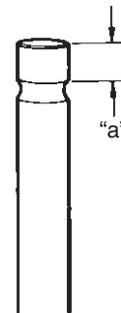
I649G1140235-02

Valve Stem End Condition

Inspect the valve stem end face for pitting and wear. If pitting or wear is present, resurface the valve stem end. Make sure that the length "a" is not less than the service limit. If this length becomes less than the service limit, replace the valve.

Valve stem end length "a"

Service limit: 2.5 mm (0.10 in)



I649G1140236-01

Valve Springs

The force of the coil spring keeps the valve seat tight. A weakened spring results in reduced engine power output and often accounts for the chattering noise coming from the valve mechanism.

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

Special tool

 **TOOL (A): 09900-20102 (Vernier calipers)**

Valve spring free length (IN & EX)

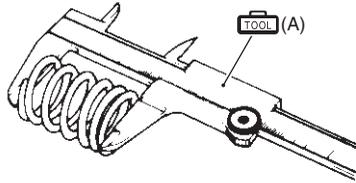
Service limit: INNER: 35.0 mm (1.38 in)

Service limit: OUTER: 37.8 mm (1.49 in)

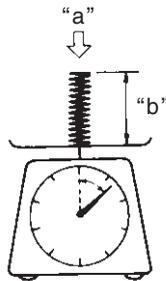
Valve spring tension (IN & EX)

Standard: INNER: 53 – 65 N, 5.3 – 6.5 kgf/28.0 mm (11.7 – 14.3 lbs/1.10 in)

Standard: OUTER: 131 – 151 N, 13.1 – 15.1 kgf/31.5 mm (28.9 – 33.3 lbs/1.24 in)



I649G1140237-02



I649G1140238-02

	Tension "a"	Length "b"
Inner spring	53 – 65 N (5.3 – 6.5 kgf, 11.7 – 14.3 lbs)	28.0 mm (1.10 in)
Outer spring	131 – 151 N (13.1 – 15.1 kgf, 28.9 – 33.3 lbs)	31.5 mm (1.24 in)

Rocker Arm Shaft Outside Diameter

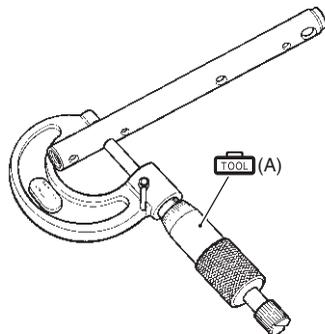
On the sliding surface, take two measurements, at right angle to each other. If the outside diameter measured is less than the standard value, replace the shaft.

Rocker arm shaft O.D.

Standard: 11.973 – 11.984 mm (0.4714 – 0.4718 in)

Special tool

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



I649G1140239-02

Rocker Arm Inside Diameter

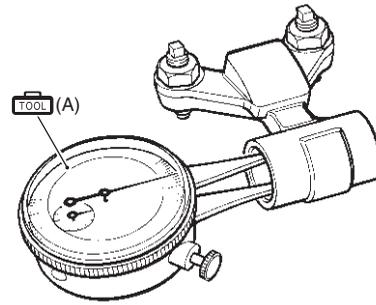
Measure the rocker arm inside diameter in two directions at right angle to each other. If the inside diameter measured exceeds the standard value, replace the rocker arm.

Rocker arm I.D.

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

Special tool

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



I649G1140240-02

Valve Seat Width

- 1) Visually check for valve seat width on each valve face. If the valve face has worn abnormally, replace the valve.
- 2) Coat the valve seat with a red lead (Prussian Blue) and set the valve in place.
- 3) Rotate the valve with light pressure.

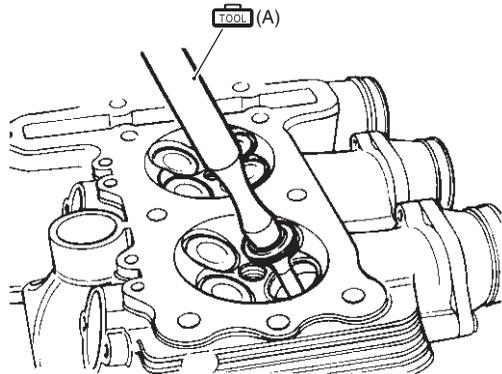
- 4) Check that the transferred red lead (blue) on the valve face is uniform all around and in center of the valve face.
If the seat width "a" measured exceeds the standard value, or seat width is not uniform reface the seat using the seat cutter. Refer to "Valve Seat Repair: ".

Special tool

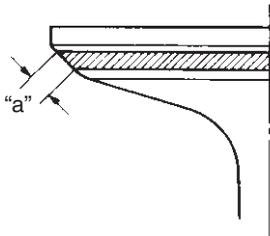
TOOL (A): 09916-10911 (Valve lapper set)

Valve seat width "a"

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



I649G1140245-02



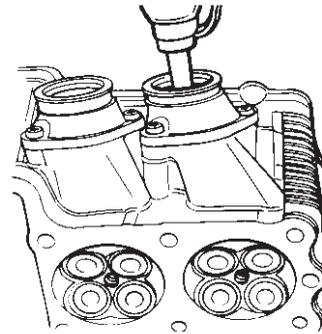
I649G1140246-01

Valve Seat Sealing Condition

- 1) Clean and assemble the cylinder head and valve components.
- 2) 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. Refer to "Valve Seat Repair: ".

▲ WARNING

Always use extreme caution when handling gasoline.



I649G1140257-01

NOTE

After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. Refer to "Valve Clearance Inspection and Adjustment: in Section 0B".

Valve Guide Replacement

B649G11406056

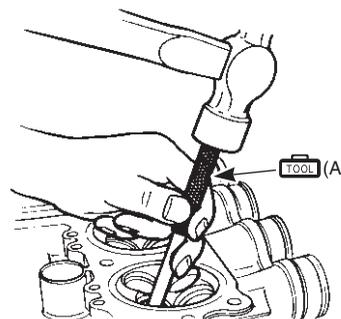
- 1) Remove the cylinder head. Refer to "Engine Top Side Disassembly: ".
- 2) Remove the valves. Refer to "Cylinder Head Disassembly and Assembly: ".
- 3) Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.

Special tool

TOOL (A): 09916-44310 (Valve guide remover / installer)

NOTE

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



I649G1140241-02

- 4) Refinish the valve guide holes in the cylinder head using the reamer and handle.

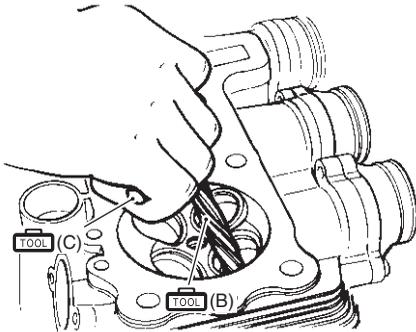
⚠ CAUTION

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

Special tool

 (B): 09916-34580 (Valve guide reamer (10.8 mm))

 (C): 09916-34542 (Reamer handle)



I649G1140242-02

- 5) Install a ring onto each valve guide. Be sure to use new rings.
 6) Cool down the new valve guides in a freezer for about one hour and heat the cylinder head to 100 – 150 °C (212 – 302 °F) with a hot plate.

⚠ CAUTION

Do not use a burner to heat the valve guide hole to prevent cylinder head distortion.

- 7) Apply engine oil to each valve guide (1) and valve guide hole.

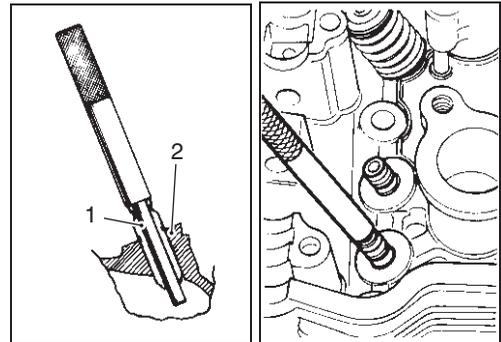
- 8) Drive the guide into the guide hole using the valve guide installer.

⚠ CAUTION

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

Special tool

 (A): 09916-44310 (Valve guide remover / installer)



I649G1140243-03

1. Valve guide	2. Cylinder head
----------------	------------------

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

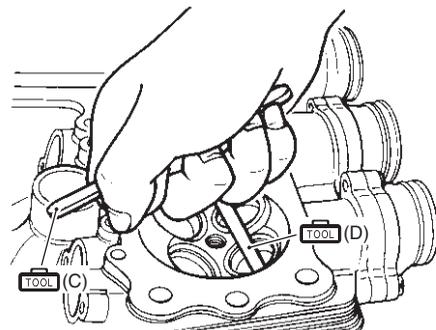
Special tool

 (C): 09916-34542 (Reamer handle)

 (D): 09916-34570 (Valve guide reamer (4.95 mm))

NOTE

- Be sure to cool down the cylinder head to ambient air temperature.
- Insert the reamer from the combustion chamber and always turn the reamer handle clockwise.



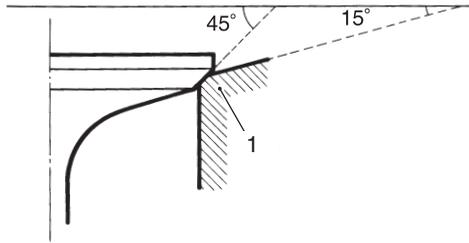
I649G1140244-02

- 10) Reassemble the cylinder head. Refer to "Cylinder Head Disassembly and Assembly: ".
 11) Install the cylinder head assembly. Refer to "Engine Top Side Assembly: ".

Valve Seat Repair

B649G11406069

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



I649G1140361-01

	Intake	Exhaust
Seat angle	15°/45°	15°/45°
Seat width	0.9 – 1.1 mm (0.035 – 0.043 in)	0.9 – 1.1 mm (0.035 – 0.043 in)
Valve diameter	30 mm (1.18 in)	27 mm (1.06 in)
Valve guide I.D.	5.000 – 5.012 mm (0.1969 – 0.1973 in)	5.000 – 5.012 mm (0.1969 – 0.1973 in)

CAUTION

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

NOTE

After servicing the valve seats, be sure to check the valve clearance after the cylinder head has been reinstalled. Refer to “Valve Clearance Inspection and Adjustment: in Section 0B”.

Cylinder Inspection

B649G11406058

Refer to “Engine Top Side Disassembly: ”.
Refer to “Engine Top Side Assembly: ”.

Cylinder Distortion

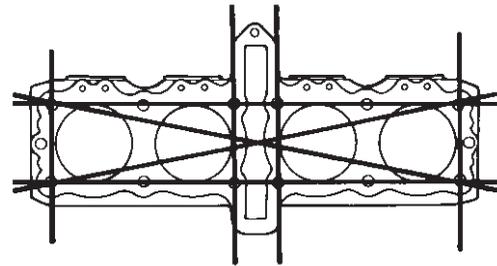
Check the gasket surface of the cylinder for distortion. Use a straightedge and thickness gauge. Take clearance readings at several places. If any reading exceeds the service limit, replace the cylinder.

Special tool

TOOL : 09900–20803 (Thickness gauge)

Cylinder distortion

Service limit: 0.2 mm (0.008 in)



I649G1140258-01

Cylinder Bore

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

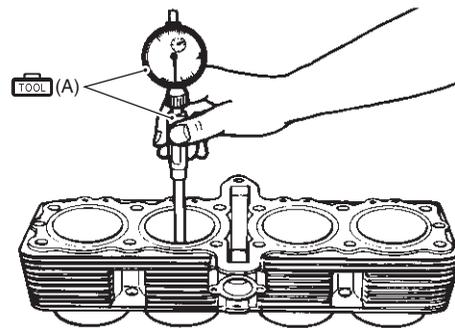
Special tool

TOOL (A): 09900–20508 (Cylinder gauge set)

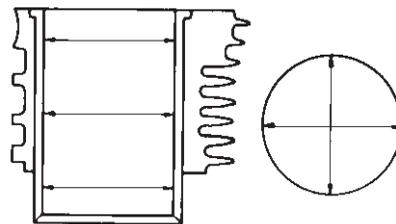
Cylinder bore

Standard: 79.000 – 79.015 mm (3.1102 – 3.1108 in)

Service limit: 79.080 mm (3.1134 in)



I649G1140259-02



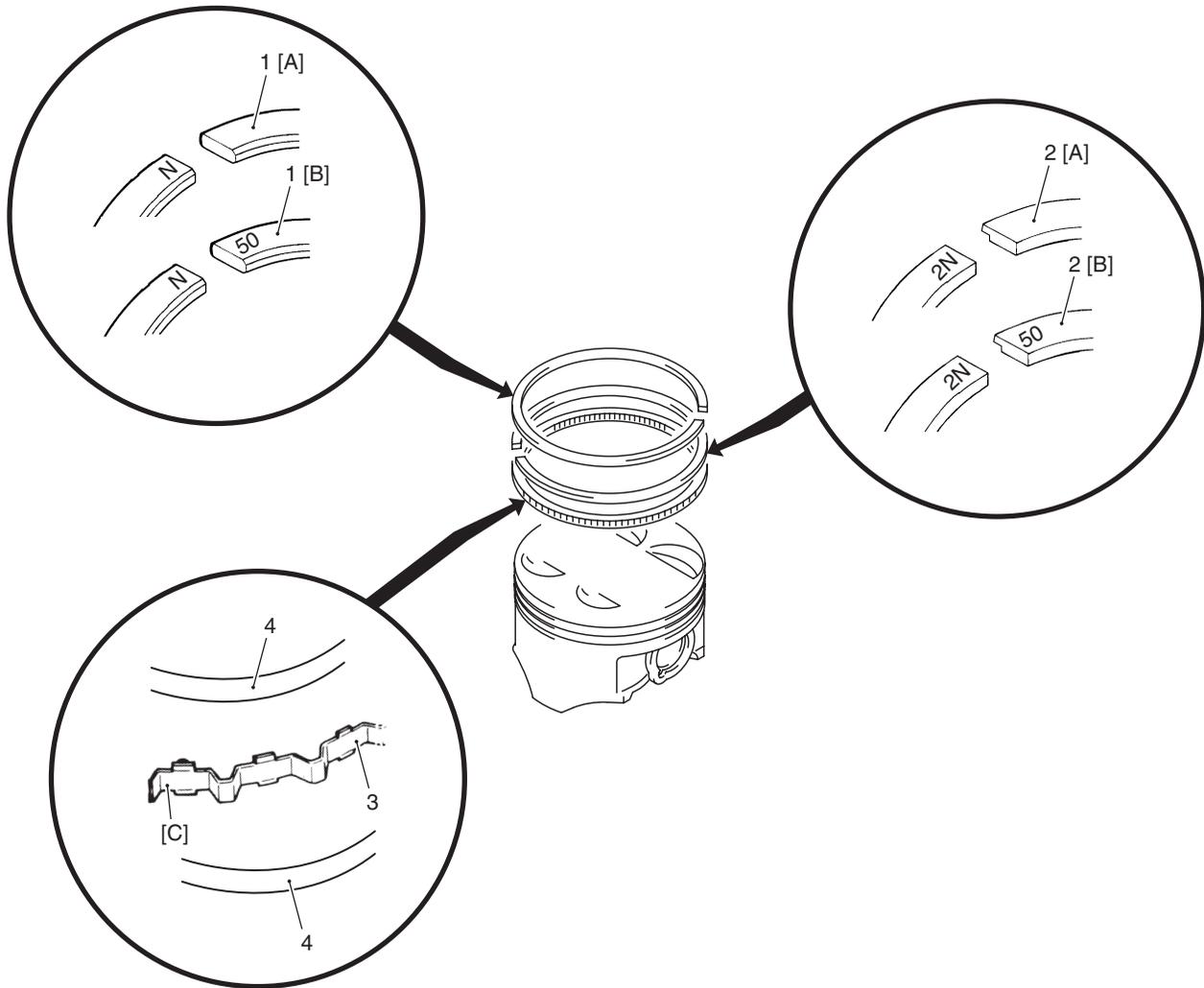
I649G1140260-01

Piston-to-cylinder Clearance

Refer to “Piston and Piston Ring Inspection: ”.

Piston Ring Components

B649G11406071



I649G1140362-02

1. 1st ring	[A]: Standard piston ring
2. 2nd ring	[B]: Oversize piston ring
3. Oil ring spacer	[C]: Color (Red is standard) (Blue is 0.5 mm oversize)
<input checked="" type="checkbox"/> 4. Side rail : Measure the outside diameter to identify the size.	

Piston Ring Removal and Installation

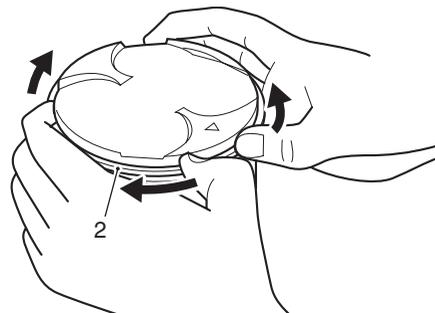
B649G11406070

Removal

- 1) Draw out the piston pin and remove the piston. Refer to "Engine Top Side Disassembly: ".
- 2) Carefully spread the ring opening with your thumbs and then push up the opposite side of the 1st ring (2) to remove it.

NOTE

Do not expand the piston ring excessively since it is apt to be broken down.



I649G1140320-01

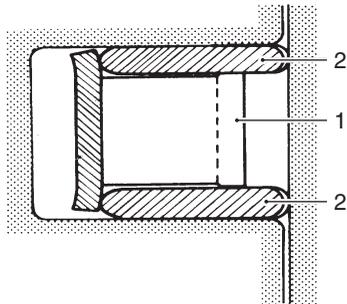
- 3) Remove the 2nd ring and oil ring in the same procedure.

Installation

NOTE

- When installing the piston ring, be careful not to damage the piston.
- Do not expand the piston ring excessively since it is apt to be broken down.

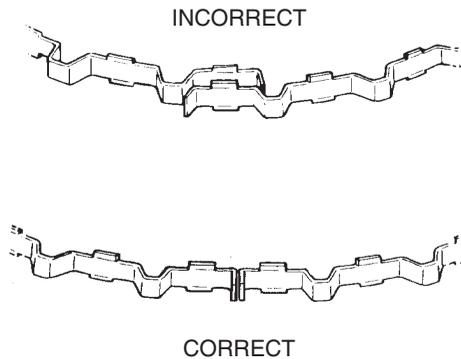
- 1) Install the piston rings in the order of the oil ring, second ring and top ring.
 - a) The first member to go into the of the oil ring groove is a spacer (1). After placing the spacer, fit the two side rails (2).



I649G1140321-01

CAUTION

When installing the spacer, be careful so that the both edges are not overlapped.

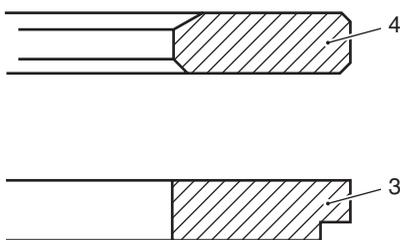


I649G1140322-01

- b) Install the 2nd ring (3) and 1st ring (4) to piston.

NOTE

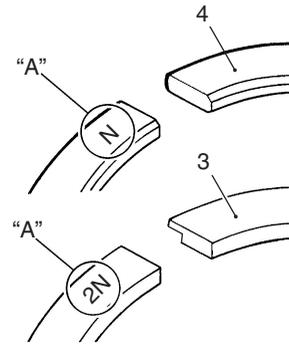
1st ring (4) and 2nd ring (3) differ in shape.



I649G1140323-02

NOTE

Face the side with the stamped mark "A" upward when assembling.



I649G1140357-01

- 2) After installing all the position ring, check that each ring rotates smoothly.
- 3) Install the piston and piston pin. Refer to "Engine Top Side Assembly: ".

Piston and Piston Ring Inspection

B649G11406059

Refer to "Piston Ring Removal and Installation: ".

Piston Diameter

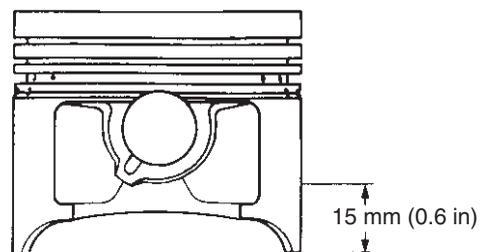
Measure the piston diameter using the micrometer at 15 mm (0.6 in) from the skirt end. If the piston diameter is less than the service limit, replace the piston.

Special tool

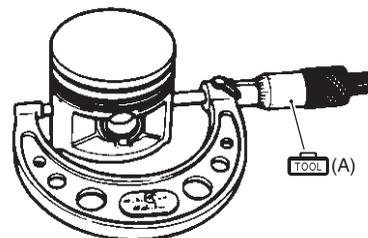
(A): 09900-20204 (Micrometer (75-100mm))

Piston diameter

Service limit: 78.880 mm (3.1055 in)



I649G1140261-02



I649G1140262-02

Piston-to-cylinder Clearance

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

Piston-to-cylinder clearance

Service limit: 0.12 mm (0.0047 in)

Piston Ring-to-groove Clearance

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

Special tool

 (A): 09900-20803 (Thickness gauge)

 (B): 09900-20205 (Micrometer (0-25mm))

Piston ring-to-groove clearance

Service limit: (1st): 0.18 mm (0.007 in)

Service limit: (2nd): 0.15 mm (0.006 in)

Piston ring groove width

Standard: (1st): 1.01 – 1.03 mm (0.040 – 0.041 in)

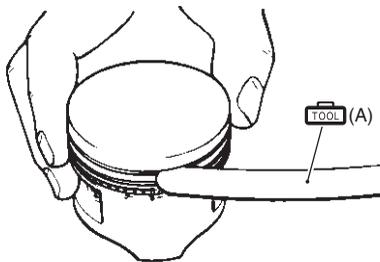
Standard: (2nd): 1.01 – 1.03 mm (0.040 – 0.041 in)

Standard: (Oil): 2.01 – 2.03 mm (0.079 – 0.080 in)

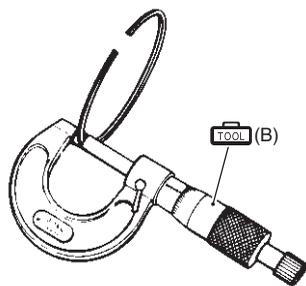
Piston ring thickness

Standard: (1st): 0.975 – 0.990 mm (0.0384 – 0.0390 in)

Standard: (2nd): 0.970 – 0.990 mm (0.038 – 0.039 in)



I649G1140263-02



I649G1140264-02

Piston Ring Free End Gap and Piston Ring End Gap

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

Special tool

 (A): 09900-20102 (Vernier calipers)

Piston ring free end gap

Service limit: (1st): 8.0 mm (0.31 in)

Service limit: (2nd): 7.6 mm (0.30 in)

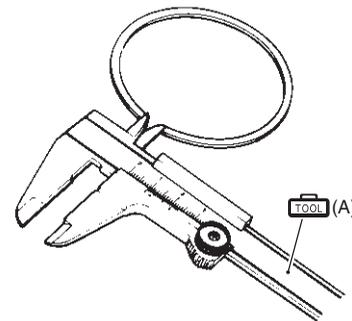
Special tool

 (B): 09900-20803 (Thickness gauge)

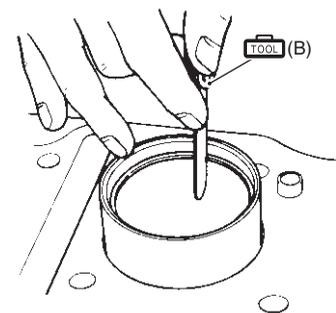
Piston ring end gap

Service limit: (1st): 0.5 mm (0.020 in)

Service limit: (2nd): 0.7 mm (0.028 in)



I649G1140265-02



I649G1140266-02

1D-42 Engine Mechanical:

Piston Pin and Pin Bore

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

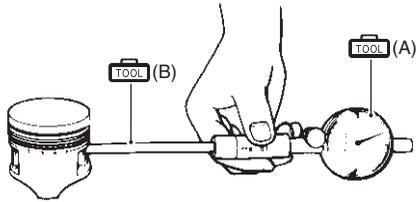
Special tool

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

 (B): 09900-22403 (Small bore gauge (18-35mm))

Piston pin bore I.D.

Service limit: 20.030 mm (0.7886 in)



I649G1140267-02

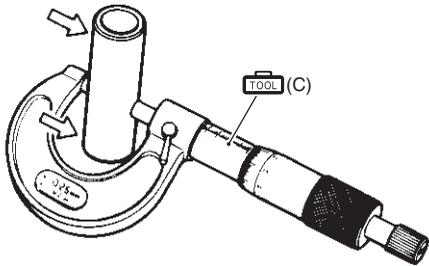
Measure the piston pin outside diameter at three positions using the micrometer. If any of the measurements are out of specification, replace the piston pin.

Special tool

 (C): 09900-20205 (Micrometer (0-25mm))

Piston pin O.D.

Service limit: 19.980 mm (0.7866 in)



I649G1140268-02

Engine Bottom Side Disassembly

B649G11406005

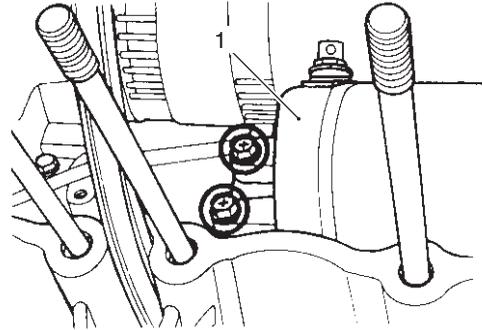
NOTE

The crankcase must be separated to service the crankshaft and conrod.

- 1) Remove the engine assembly. Refer to "Engine Assembly Removal: ".
- 2) Disassemble the engine top side. Refer to "Engine Top Side Disassembly: ".

Starter Motor

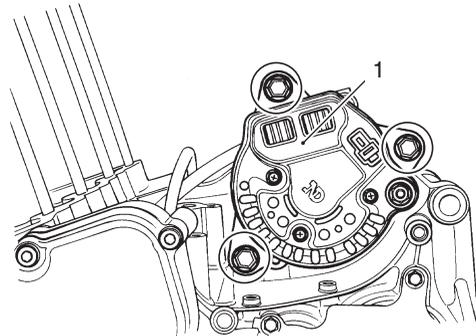
Remove the starter motor (1).



I649G1140094-01

Generator

Remove the generator (1).



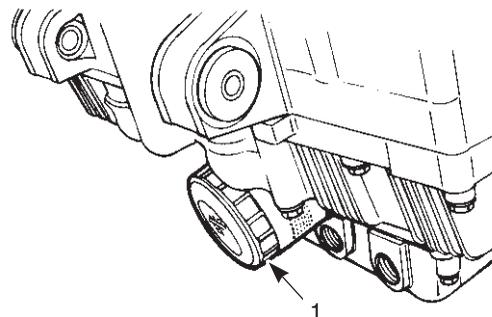
I649G1140095-02

Oil Filter

Remove the oil filter (1) using the special tool.

Special tool

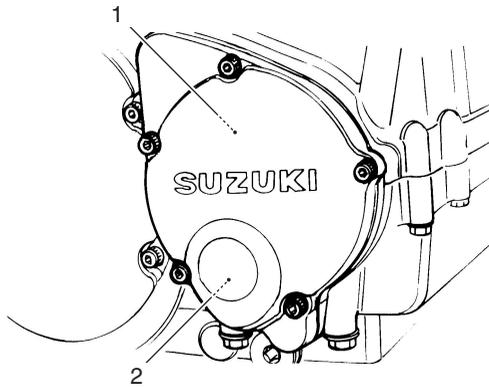
 : 09915-40610 (Oil filter wrench)



I649G1140033-02

CKP Sensor / Oil Pressure Switch

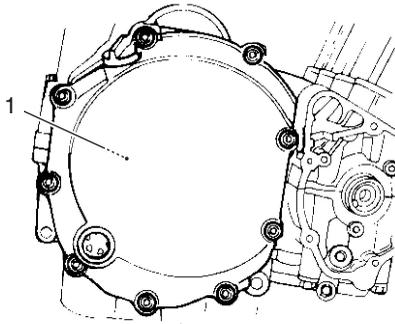
- 1) Remove the CKP sensor component parts (1). Refer to "CKP Sensor Removal and Installation: in Section 1H".
- 2) Disconnect the oil pressure switch lead wire and remove the oil pressure switch (2). Refer to "Oil Pressure Switch Removal and Installation: in Section 1E".



I649G1140096-02

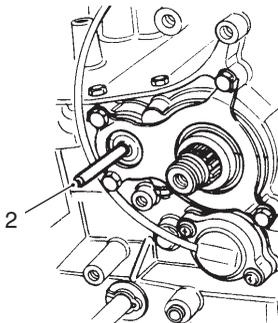
Clutch

- 1) Remove the clutch component parts (1). Refer to "Clutch Removal: in Section 5C".



I649G1140098-02

- 2) Draw out the clutch push rod (2).



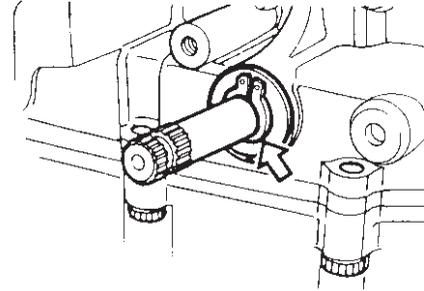
I649G1140099-02

Gearshift

- 1) Remove the snap ring and washer from the gearshift shaft.

Special tool

 : 09900-06107 (Snap ring pliers)

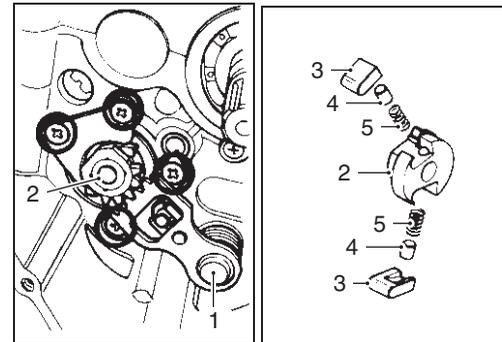


I649G1140109-01

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

NOTE

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



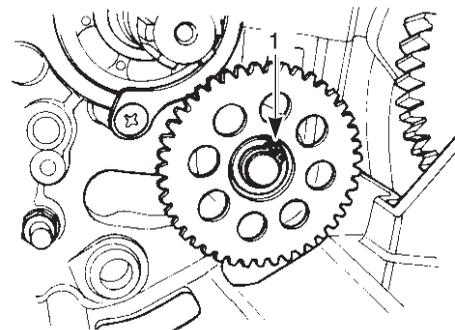
I649G1140110-02

Oil Pump Driven Gear

- 1) Remove the snap ring (1).

Special tool

 : 09900-06107 (Snap ring pliers)



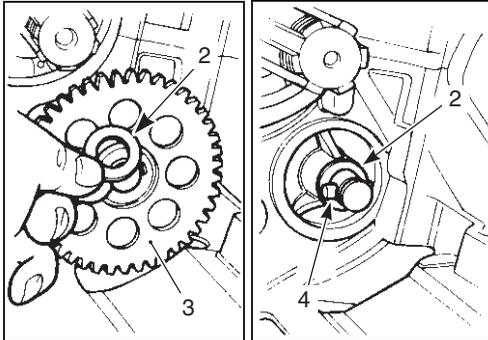
I649G1140111-01

1D-44 Engine Mechanical:

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

NOTE

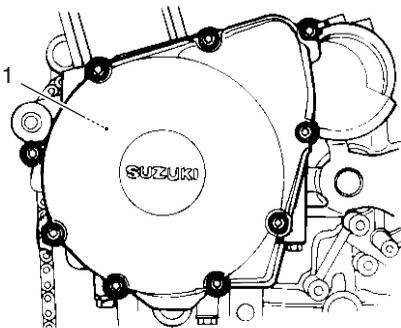
Be careful not to drop the circlip, pin and washers into the oil pan.



I649G1140112-02

Starter Clutch

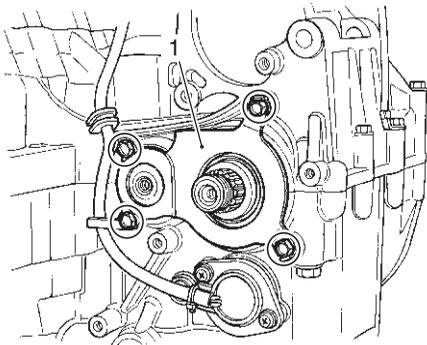
- 1) Remove the starter clutch component parts (1). Refer to "Starter Clutch Removal and Installation: in Section 11".



I649G1140113-03

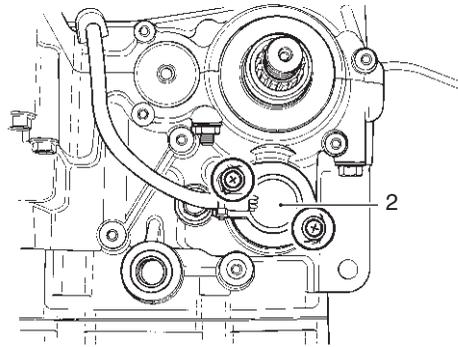
Gear Position Switch

- 1) Flatten the tabs on the oil seal retainer and remove the bolts.
- 2) Remove the oil seal retainer (1).



I649G1140116-01

- 3) Remove the gear position switch (2).

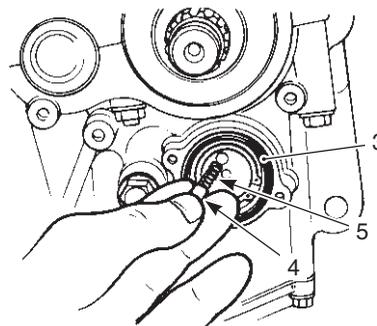


I649G1140117-01

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

NOTE

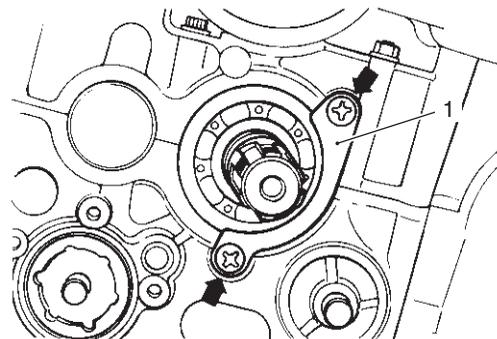
Do not lose the O-ring, switch contact and spring.



I649G1140118-01

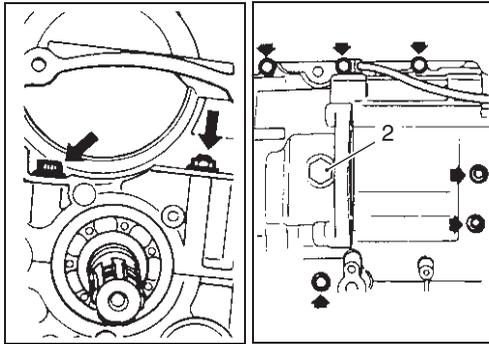
Crankcase

- 1) Remove the countershaft bearing retainer (1).



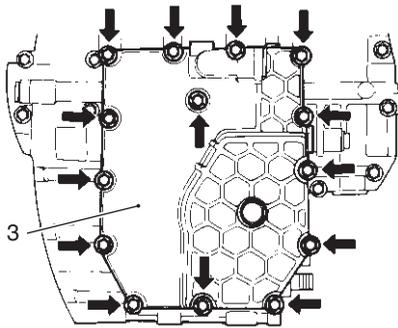
I649G1140119-01

- 2) Remove the plug (2).
- 3) Remove the upper crankcase bolts and nut.



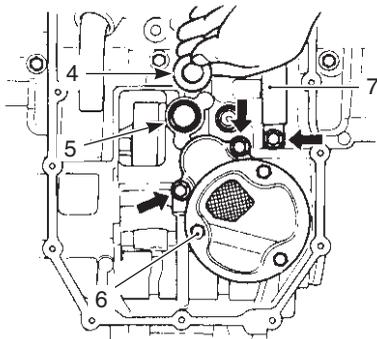
I649G1140120-02

- 4) Remove the oil pan (3).



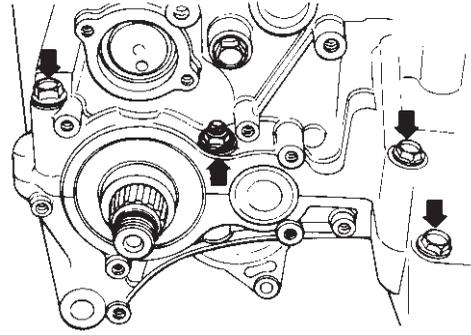
I649G1140121-03

- 5) Remove the shim (4) and O-ring (5).
- 6) Remove the oil sump filter (6).
- 7) Remove the oil return pipe (7).

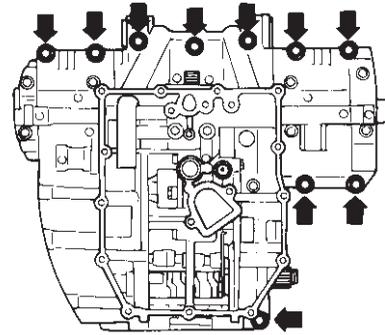


I649G1140122-03

- 8) Remove the lower crankcase bolts and nut.

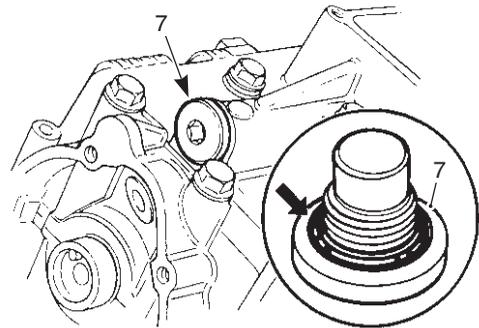


I649G1140123-01



I649G1140124-01

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



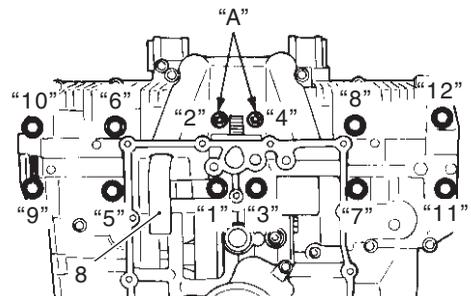
I649G1140125-02

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

NOTE

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

- 11) Remove the oil return pipe (8).



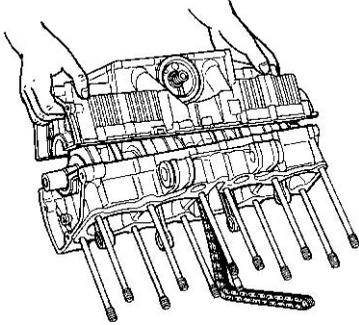
I649G1140126-03

1D-46 Engine Mechanical:

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

⚠ CAUTION

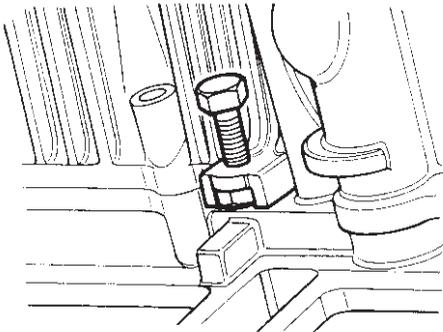
Do not allow the crankshaft journal bearings to drop out of the lower crankcase.



I649G1140127-01

NOTE

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



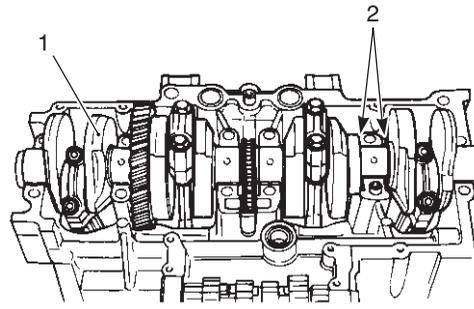
I649G1140128-01

Crankshaft

- 1) Remove the crankshaft assembly (1) from the upper crankcase.
- 2) Remove the thrust bearings (2).

NOTE

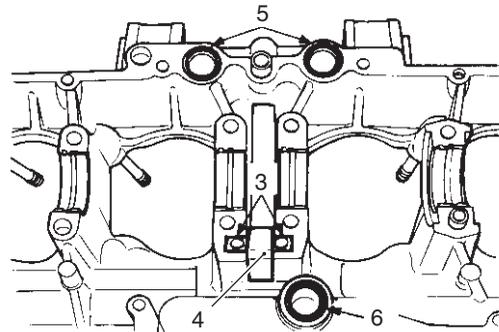
The crankshaft thrust bearings (2) are located between the crankshaft assembly and upper crankcase.



I649G1140129-01

Cam Chain Tensioner

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



I649G1140130-01

Crankshaft Journal Bearing / Oil Jet (For the Piston Cooling)

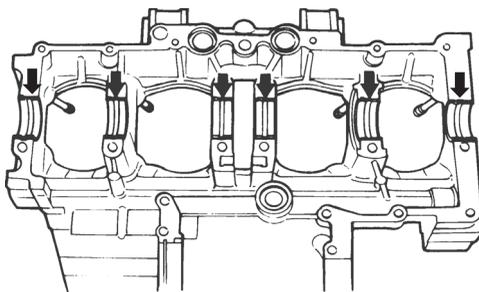
1) Remove the crankshaft journal bearings.

⚠ CAUTION

- When removing the crankshaft journal bearings, be careful not to scratch the crankcase and the crankshaft journal bearings.
- Do not touch the bearing surfaces with your hands. Grasp the bearings by their edges.

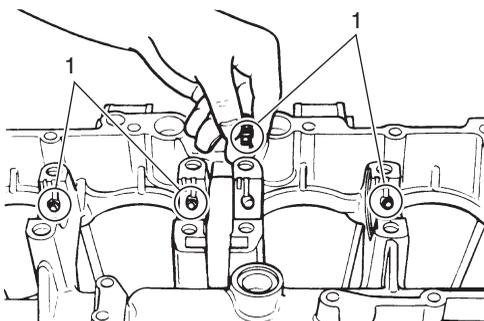
NOTE

- Do not remove the crankshaft journal bearings unless absolutely necessary.
- Make a note of where the crankshaft journal bearings are removed from so that they can be reinstalled in their original positions.



I649G1140325-01

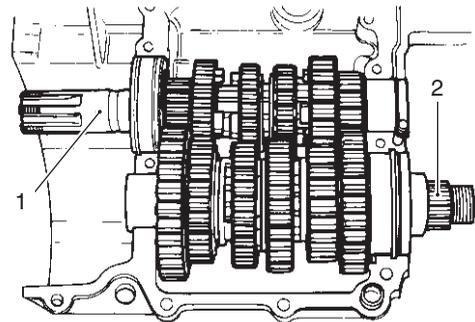
2) Remove the oil jets (1) (for the piston cooling).



I649G1150018-02

Transmission

1) Remove the countershaft assembly (1) and driveshaft assembly (2).

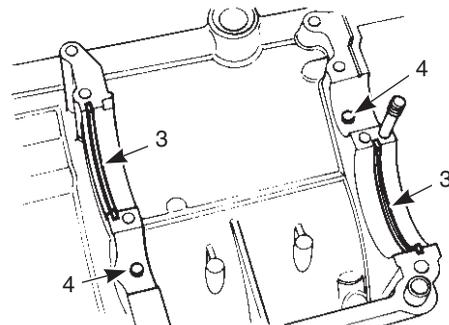


I649G1140132-02

2) Remove the C-rings (3) and bearing pins (4).

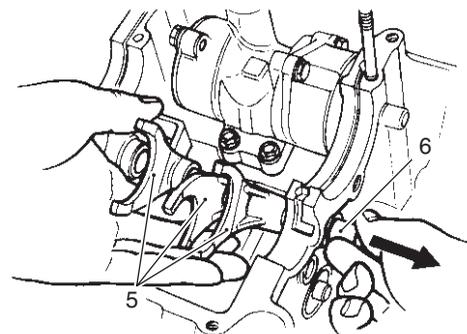
NOTE

Do not lose the C-rings and bearing pins.



I649G1140133-02

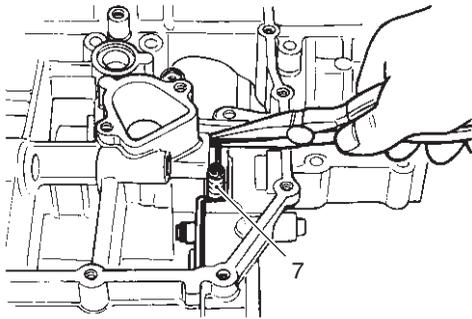
3) Hold the gearshift forks (5) and draw out the gearshift fork shaft (6) from the lower crankcase.



I649G1140134-01

1D-48 Engine Mechanical:

- 4) Unhook the gearshift cam stopper spring (7) from the lower crankcase.

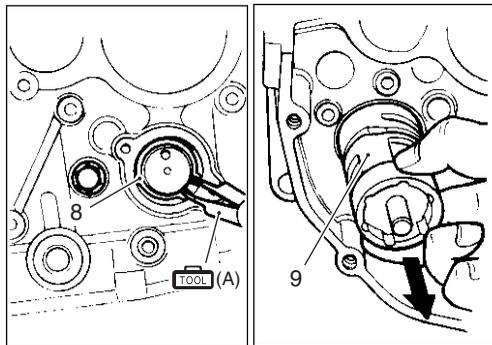


I649G1140135-01

- 5) Remove the snap ring (8) from the gearshift cam, then draw out the gearshift cam (9) from the opposite side.

Special tool

 (A): 09900-06107 (Snap ring pliers)



I649G1140136-04

- 6) Remove the snap ring (10) and gearshift cam stopper (11).

Special tool

 : 09900-06107 (Snap ring pliers)

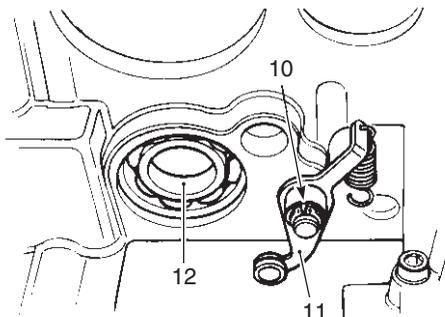
NOTE

Rotate the bearing (12) in the crankcase by hand to inspect for abnormal noise and smooth rotation.

Replace the bearing if there is anything unusual.

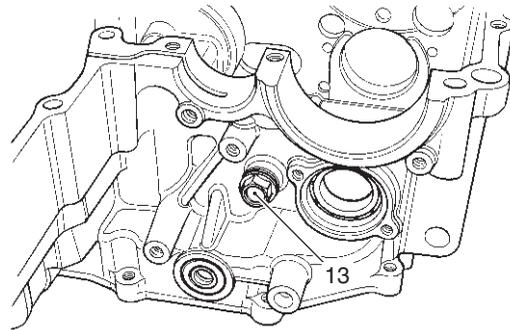
Special tool

 : 09900-06106 (Snap ring pliers)



I649G1140137-01

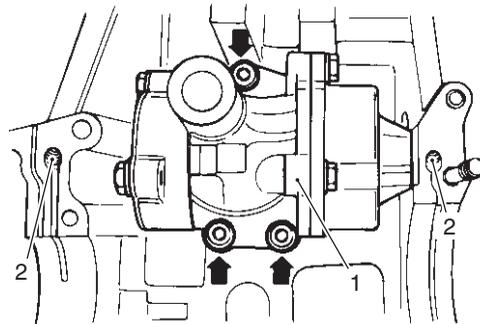
- 7) Remove the gearshift cam stopper bolt (13).



I649G1140138-01

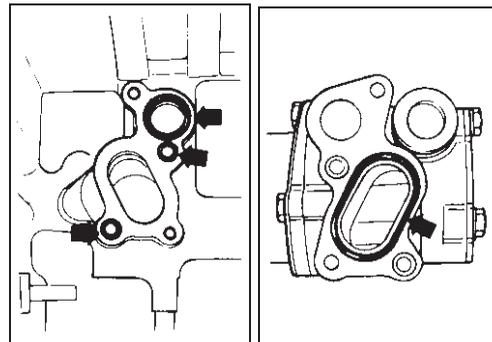
Oil Pump / Oil Jet (For The Transmission)

- 1) Remove the oil pump (1).
2) Remove the oil jets (for the transmission) (2).



I649G1140139-02

- 3) Remove the O-rings and dowel pins.



I649G1140140-01

Engine Bottom Side Assembly

B649G11406047

Assembly the engine bottom side in the reverse of disassembly. Pay attention to the following points:

NOTE

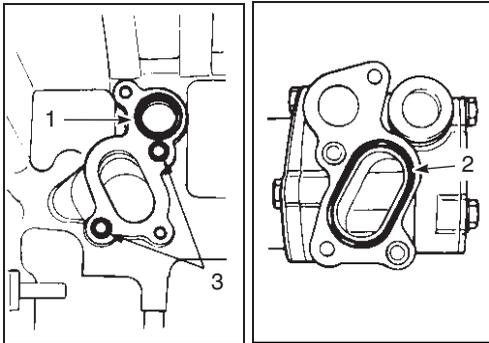
Apply engine oil to each running and sliding part before reassembling.

Oil Pump

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

⚠ CAUTION

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



I649G1140141-01

- Apply a small quantity of THREAD LOCK “1342” to the oil pump mounting bolts.

1342 : Thread lock cement 99000–32050 (Thread Lock Cement 1342 or equivalent)

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

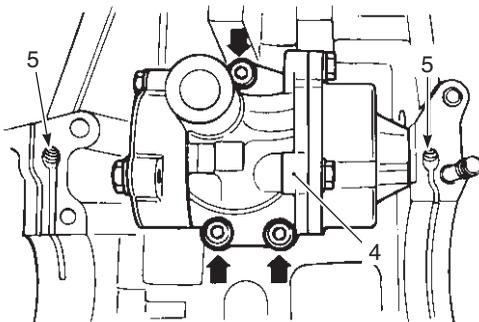
Tightening torque

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

- Install the oil jets (for the transmission) (5).

NOTE

Apply engine oil to the O-rings. Make sure that the oil jets in the lower crankcase are not clogged.



I649G1140142-01

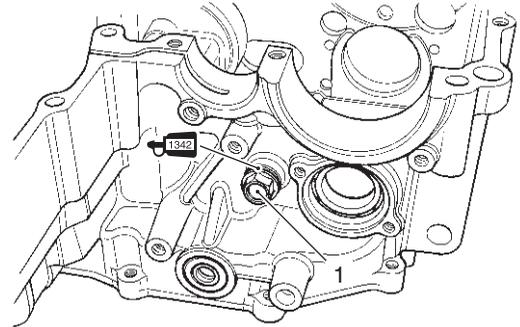
Transmission

- Install the gearshift cam stopper bolt (1).

NOTE

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

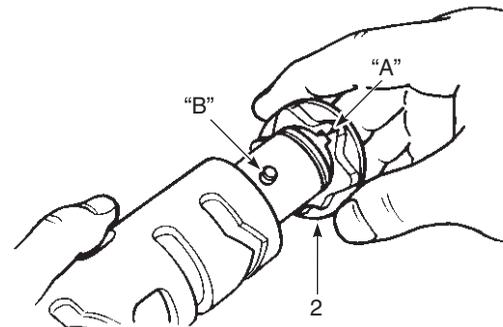
1342 : Thread lock cement 99000–32050 (Thread Lock Cement 1342 or equivalent)



I649G1140143-03

NOTE

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



I649G1140144-02

1D-50 Engine Mechanical:

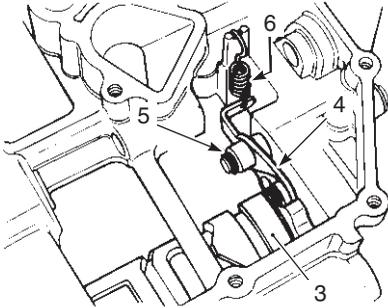
- Install the gearshift cam (3) and its related parts.
 - Gearshift cam stopper (4)
 - Snap ring (5)
 - Spring (6)
 - Snap ring (7)

⚠ CAUTION

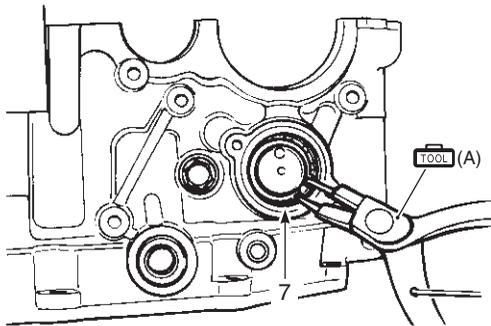
Always use new snap rings ((5) and (7)).

Special tool

 (A): 09900-06106 (Snap ring pliers)

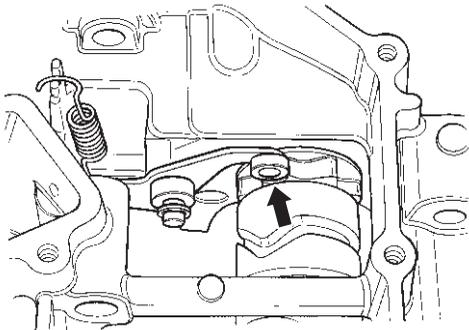


I649G1140145-01



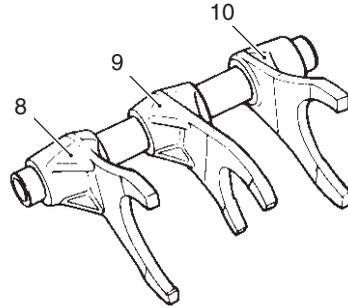
I649G1140146-02

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



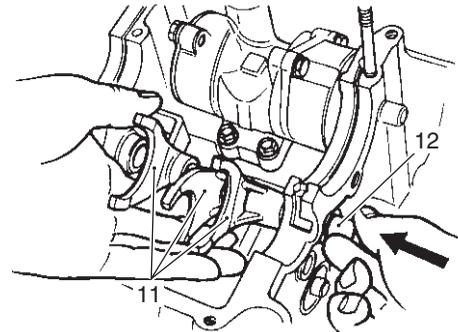
I649G1140147-01

- Install the gearshift forks into the crankcase in the correct position and direction.
 - For the 6th (Top) driven gear (8)
 - For the 3rd/4th drive gear (9)
 - For the 5th driven gear (10)



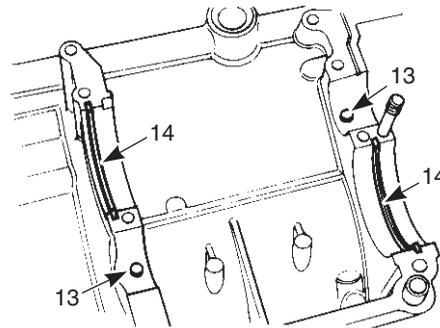
I649G1140148-02

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



I649G1140149-01

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

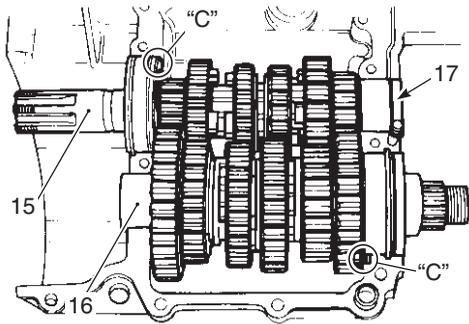


I649G1140150-02

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

NOTE

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



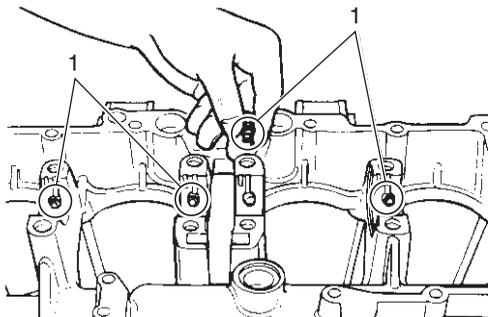
I649G1140151-02

Oil Jet

- Install the oil jets (4 pcs) to the upper crankcase.

NOTE

Apply engine oil to the O-ring. Before installing the crankshaft journal bearings, make sure that the oil jets (1) in the upper crankcase are not clogged.



I649G1140152-04

Crankshaft Journal Bearing

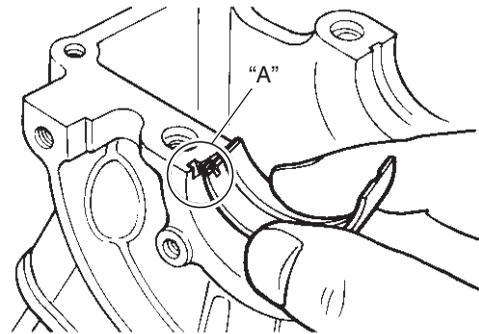
- When installing the crankshaft journal bearings into the upper and lower crankcases, be sure to install the tab "A" first, and then press in the opposite side of the bearing.

⚠ CAUTION

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

NOTE

Inspect and select the crankshaft journal bearing if necessary. Refer to "Crankshaft Journal Bearing Inspection and Selection: ".



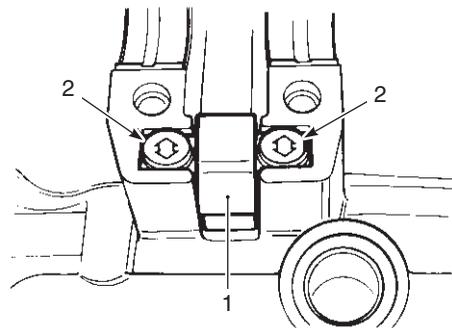
I649G1140153-02

Cam Chain Tensioner

- Install the cam chain tensioner (1) and two dampers (2) properly.

NOTE

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



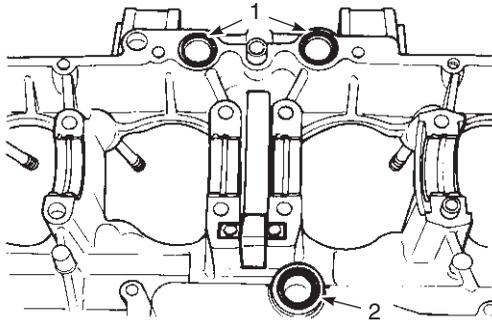
I649G1140154-02

Crankshaft

- Install the O-rings ((1) and (2)).

⚠ CAUTION

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



I649G1140155-02

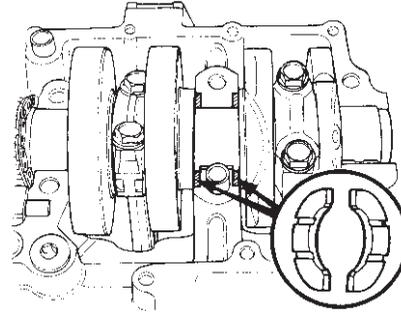
- Before installing the crankshaft assembly, apply molybdenum oil solution to each crankshaft journal bearing.

M/O: Molybdenum oil (Molybdenum oil solution)

- Install the crankshaft assembly along with the cam chain into the upper crankcase.
- Insert the right-and left-thrust bearings with the oil grooves facing towards the crankshaft web.

NOTE

Inspect and select the crankshaft thrust clearance if necessary. Refer to “Crankshaft Thrust Clearance Inspection and Selection: ”.



I649G1140156-01

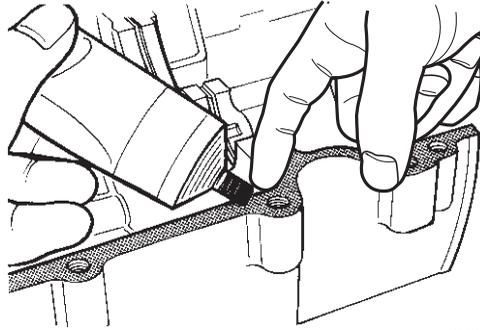
Crankcase

- Clean the mating surfaces of the crankcases.
- Install the dowel pins in the upper crankcase.
- Apply a bond to the mating surface of the lower crankcase as follows.

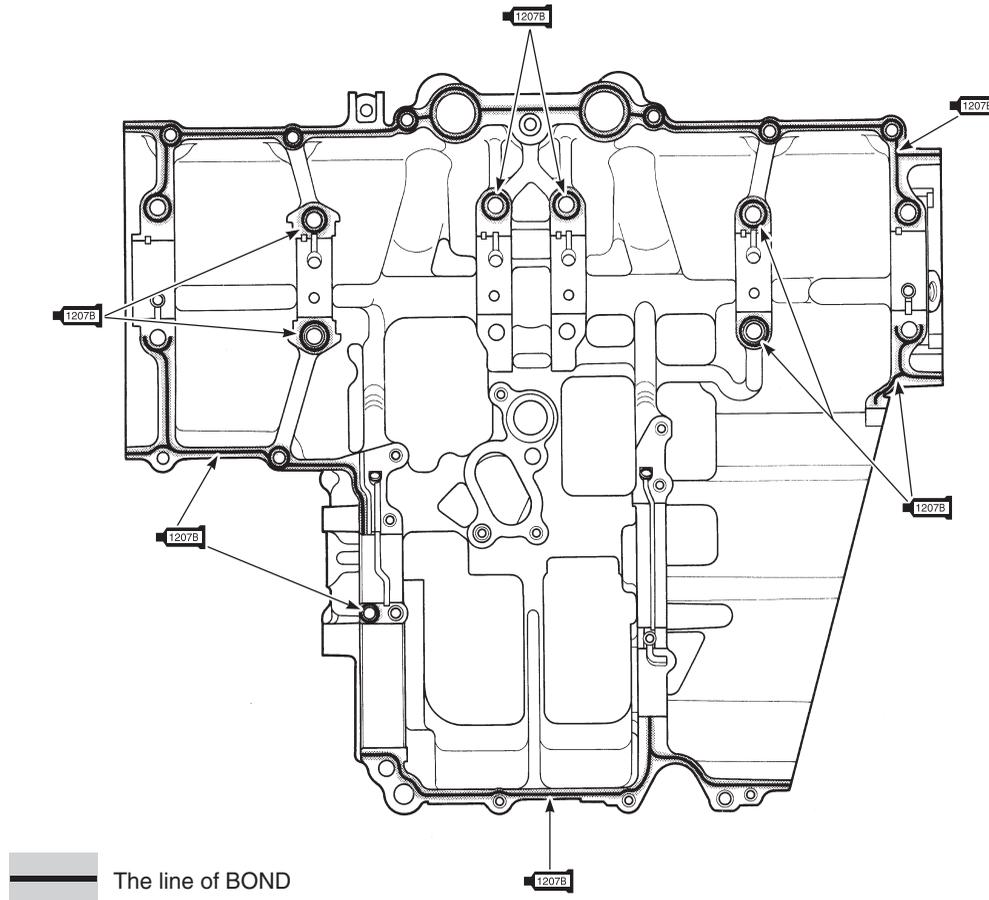
1207B : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)

NOTE

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



I649G1140157-01



I649G1140158-02

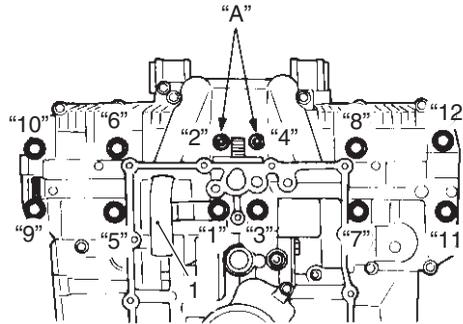
1D-54 Engine Mechanical:

- Match the upper and lower crankcases.
- Install the right oil return pipe (1) with the bolt "1".
- Install the copper washers onto bolts "9" and "11".
- Install the two allen bolts at position "A".
- Install the ten crankcase bolts (M8).
- Tighten the crankcase bolts (Crankshaft tightening bolts) in ascending order. Tighten each bolt a little at a time to equalize the pressure.

Tightening torque

Crankcase bolt (M8) (Initial): 13 N·m (1.3 kgf-m, 9.5 lb-ft)

Crankcase bolt (M8) (Final): 22 N·m (2.2 kgf-m, 16.0 lb-ft)



I649G1140159-04

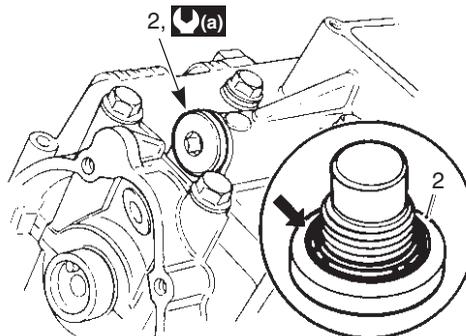
- Tighten the main oil gallery plug (2) to the specified torque.

⚠ CAUTION

Replace the O-ring with a new one.

Tightening torque

Main oil gallery plug (a): 40 N·m (4.0 kgf-m, 29.0 lb-ft)



I649G1140326-02

- Install the engine ground wire (3) to the correct position as shown.
- Tighten the lower and upper crankcase bolts (M6) and nuts to the specified torque.

Tightening torque

Crankcase bolt and nut (M6) (Initial): 6 N·m (0.6 kgf-m, 4.5 lb-ft)

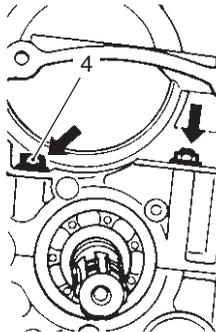
Crankcase bolt and nut (M6) (Final): 11 N·m (1.1 kgf-m, 8.0 lb-ft)

NOTE

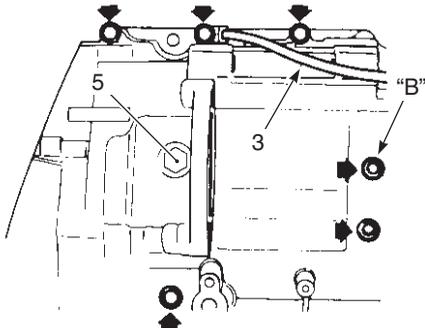
- Install the copper washer at position "B".
 - After tightening the upper crankcase bolt (4), install the plug (5).
 - Install the gasket washer at position "C".
-

⚠ CAUTION

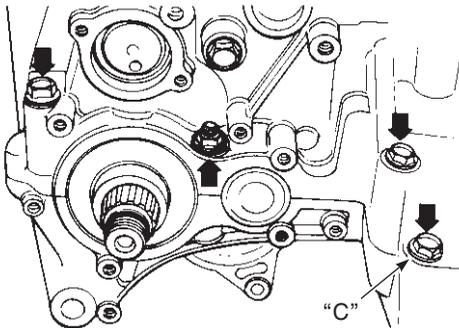
Use a new gasket washer to prevent oil leakage.



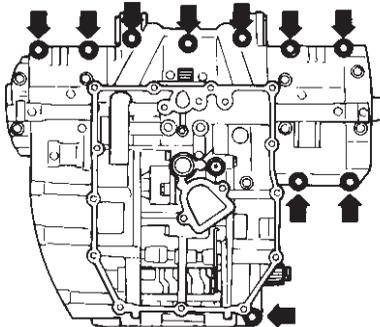
I649G1140349-01



I649G1140363-01



I649G1140364-01



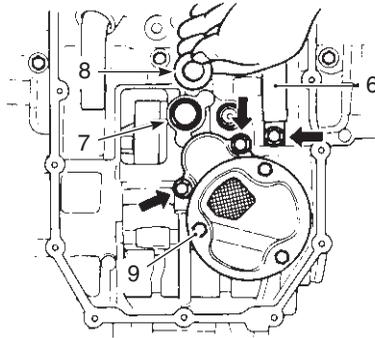
I649G1140358-01

1D-56 Engine Mechanical:

- Install the left oil return pipe (6).
- Install a new O-ring (7) and shim (8).
- Install a new gasket and the oil sump filter (9).

⚠ CAUTION

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



I649G1140165-02

- Install a new gasket and the oil pan.

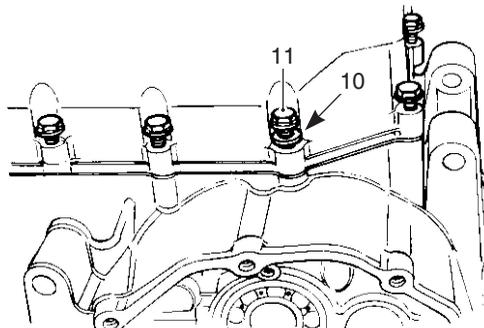
⚠ CAUTION

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

- Install a new gasket washer (10) to the oil pan bolt (11) as shown.

⚠ CAUTION

Use a new gasket washer to prevent oil leakage.

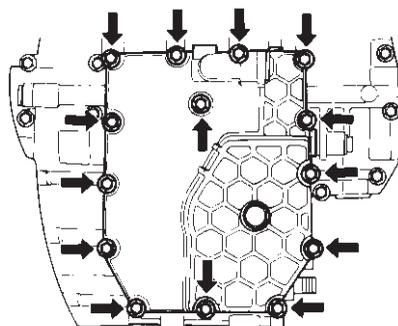


I649G1140359-01

- Tighten the oil pan bolts to the specified torque.

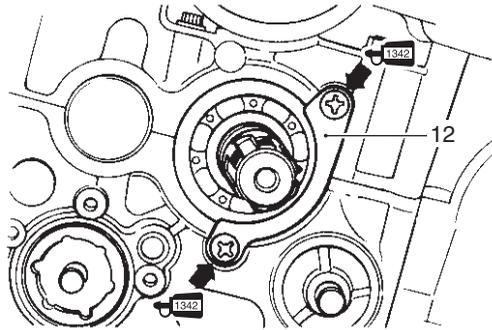
Tightening torque

Oil pan bolt: 14 N·m (1.4 kgf-m, 10 lb-ft)



I649G1140360-01

- Apply a small quantity of THREAD LOCK “1342” to the two screws.
-  : Thread lock cement 99000–32050 (Thread Lock Cement 1342 or equivalent)
- Install the countershaft bearing retainer (12).



I649G1140168-02

Gear Position Switch

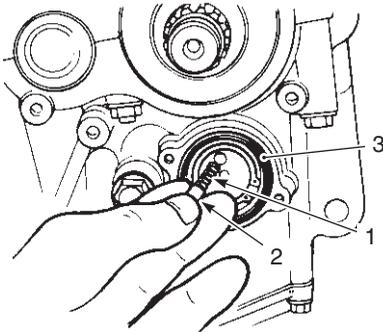
- Install the gear position switch.

NOTE

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

⚠ CAUTION

Replace the O-ring with a new one.

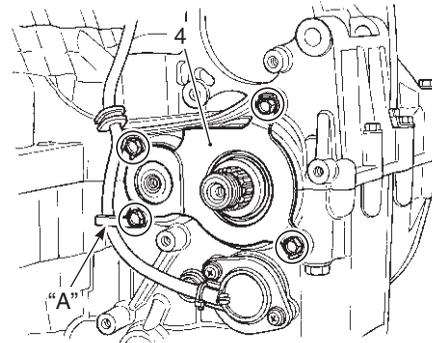


I649G1140169-01

- Install the oil seal retainer (4) with the four bolts and then bend up the tabs on the retainer.

NOTE

Route the gear position switch lead wire to the inside of the oil seal retainer’s tab “A” as shown.



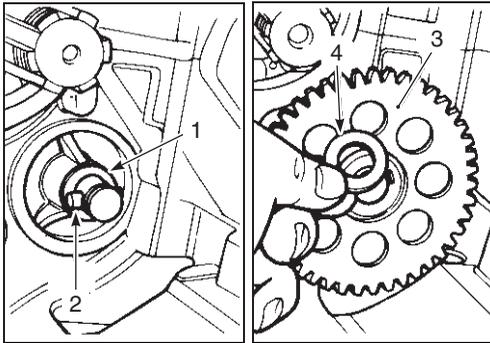
I649G1140170-01

Starter Clutch

- Install the starter clutch component parts. Refer to “Starter Clutch Removal and Installation: in Section 11”.

Oil Pump Driven Gear

- Install the washer (1), pin (2), oil pump driven gear (3) and washer (4).

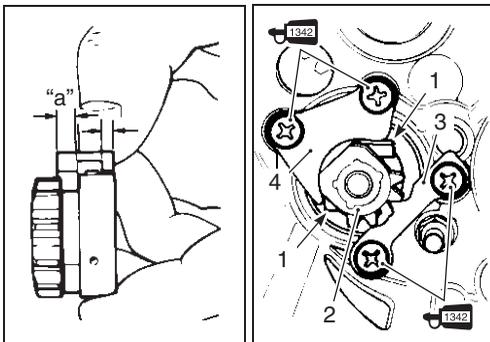


I649G1140178-01

Gearshift

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

 : Thread lock cement 99000-32050 (Thread Lock Cement 1342 or equivalent)

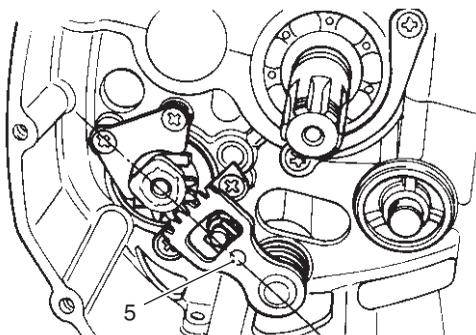


I649G1140352-01

- Install the gearshift shaft (5).

NOTE

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



I649G1140176-01

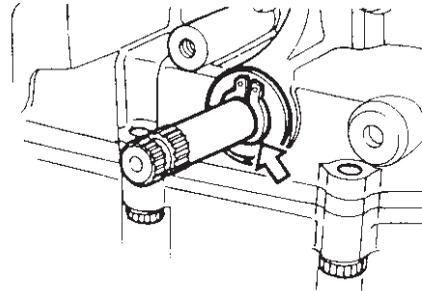
- Install the washer and fix the gearshift shaft with the snap ring.

⚠ CAUTION

Replace the snap ring with a new one.

Special tool

 : 09900-06107 (Snap ring pliers)



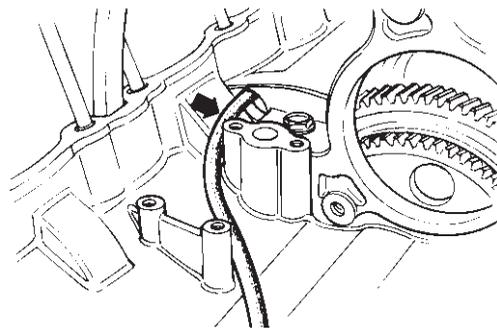
I649G1140177-01

Clutch

- Install the clutch component parts. Refer to "Clutch Installation: in Section 5C".

CKP Sensor / Oil Pressure Switch

- Install the CKP sensor component parts. Refer to "CKP Sensor Removal and Installation: in Section 1H".
- Install the oil pressure switch and connect the oil pressure switch lead wire. Refer to "Oil Pressure Switch Removal and Installation: in Section 1E".
- Pass the CKP sensor lead wire through the upper crankcase as shown.



I649G1140195-01

Oil Filter

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

NOTE

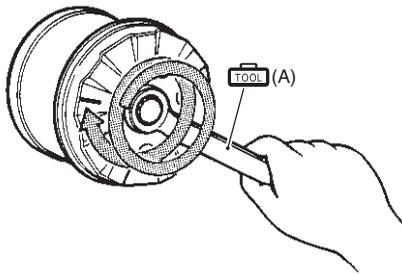
- Before installing the oil filter, apply a light coat of engine oil onto its O-ring.
- To properly tighten the oil filter, use the special tool. Never tighten the oil filter by hand only.

Special tool

 (A): 09915-40610 (Oil filter wrench)

Tightening torque

Oil filter: 20 N·m (2.0 kgf-m, 14.5 lb-ft)



I649G1140327-01

Generator

- Apply a grease to the generator O-ring.

⚠ CAUTION

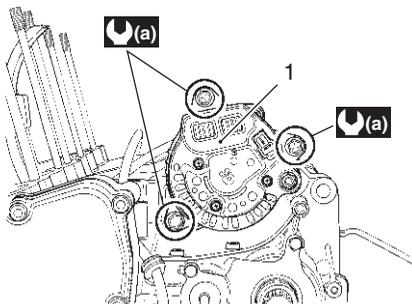
Replace the O-ring with a new one.

 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)

- Install the generator (1).

Tightening torque

Generator mounting bolt (a): 25 N·m (2.5 kgf-m, 18.0 lb-ft)



I649G1140196-02

Starter Motor

- Apply a grease to the starter motor O-ring.

⚠ CAUTION

Replace the O-ring with a new one.

 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)

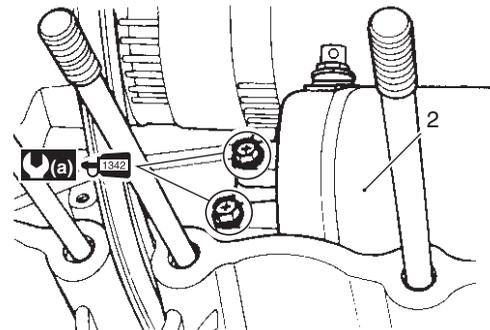
- Install the starter motor with the bolts and tighten them to the specified torque.

Tightening torque

Starter motor mounting bolt (a): 6 N·m (0.6 kgf-m, 4.5 lb-ft)

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

 : Thread lock cement 99000-32050 (Thread Lock Cement 1342 or equivalent)



I649G1140328-01

Engine Top Side

- Reassemble the engine top side. Refer to "Engine Top Side Assembly: ".

Engine Remount

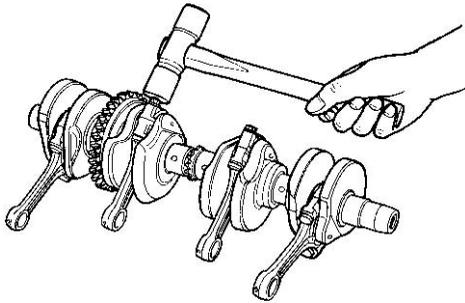
- Reinstall the engine assembly. Refer to "Engine Assembly Installation: ".

Conrod Removal and Installation

B649G11406060

Removal

- 1) Remove the crankshaft assembly from the crankcase. Refer to "Engine Bottom Side Disassembly: ".
- 2) Loosen the bearing cap nuts and tap the bearing cap nut lightly using a plastic mallet to remove the bearing cap.
- 3) Remove the conrods and mark them to identify their respective cylinders.



I649G1140273-01

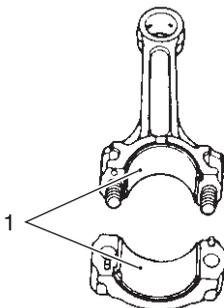
- 4) Remove the bearings (1).

NOTE

- Do not remove the bearings (1) unless absolutely necessary.
- Make a note of where the bearings are removed from so that they can be reinstalled in their original positions.

CAUTION

When removing the bearings, be careful not to scratch the conrods and the bearings.



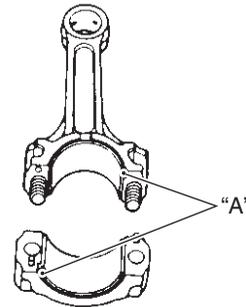
I649G1140274-01

Installation

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

NOTE

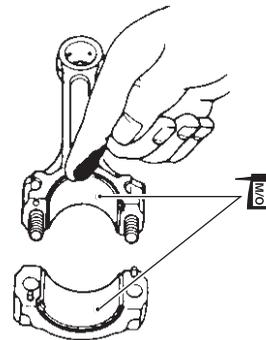
Inspect and select the conrod crank pin bearing if necessary. Refer to "Conrod Crank Pin Bearing Inspection and Selection: ".



I649G1140275-01

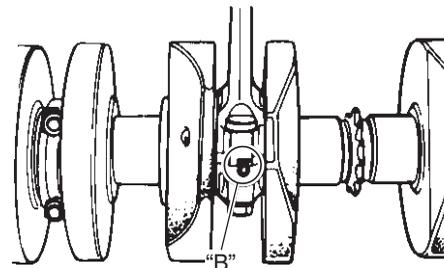
- 2) Apply molybdenum oil solution to the crank pin and bearing surface.

M/O: Molybdenum oil (Molybdenum oil solution)



I649G1140276-02

- 3) When mounting the conrod on the crankshaft, make sure that the numbers "B" on the conrod faces towards the intake side.



I649G1140277-02

- 4) Tighten the conrod cap nuts to the specified torque.

Tightening torque

Conrod cap nut (Initial): 25 N·m (2.5 kgf·m, 18.0 lb-ft)

Conrod cap nut (Final): 51 N·m (5.1 kgf·m, 37.0 lb-ft)

- 5) Check that the conrod moves smoothly.
- 6) Install the crankshaft assembly to the crankcase. Refer to "Engine Bottom Side Assembly: ".

Conrod and Crankshaft Inspection

B649G11406064

Refer to "Conrod Removal and Installation: ".

Conrod Small End I.D.

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

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

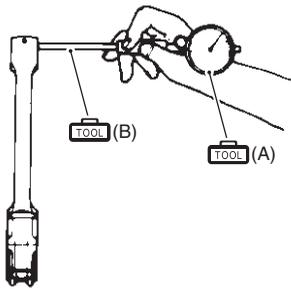
Special tool

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

TOOL (B): 09900-22403 (Small bore gauge (18-35mm))

Conrod small end I.D.

Service limit: 20.040 mm (0.7890 in)



I649G1140329-01

Conrod Big End Side Clearance

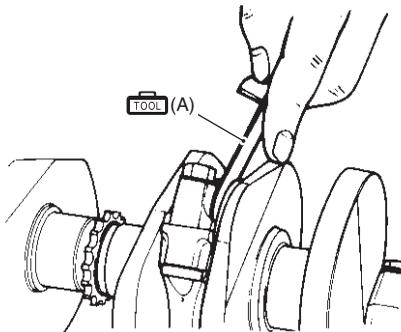
- 1) Check the conrod big end side clearance using the thickness gauge.

Special tool

TOOL (A): 09900-20803 (Thickness gauge)

Conrod big end side clearance

Service limit: 0.3 mm (0.012 in)



I649G1140330-01

- 2) If the clearance exceeds the limit, remove the conrod and measure the conrod big end width and crank pin width. Refer to "Conrod Removal and Installation: ". If any of the measurements are out of specification, replace the conrod or crankshaft.

Special tool

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

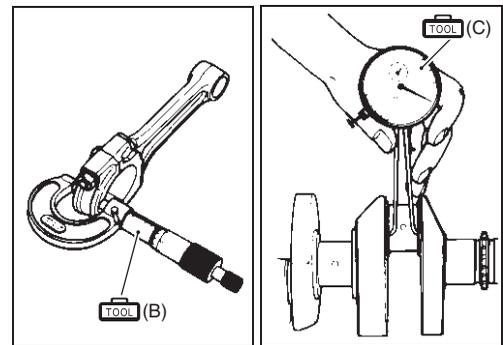
TOOL (C): 09900-20605 (Dial calipers (1/100 mm, 10 - 34 mm))

Conrod big end width

Standard: 20.95 – 21.00 mm (0.825 – 0.827 in)

Crank pin width

Standard: 21.10 – 21.15 mm (0.831 – 0.833 in)



I649G1140331-01

Crankshaft Runout

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

Special tool

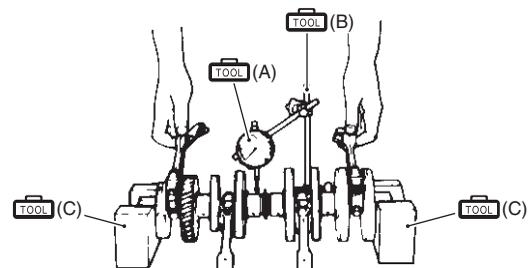
TOOL (A): 09900-20606 (Dial gauge (1/100 mm))

TOOL (B): 09900-20701 (Magnetic stand)

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

Crankshaft runout

Service limit: 0.05 mm (0.002 in)



I649G1140332-01

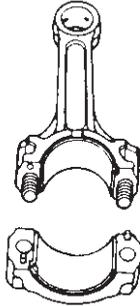
Conrod Crank Pin Bearing Inspection and Selection

B649G11406061

Refer to "Conrod Removal and Installation: ".

Inspection

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

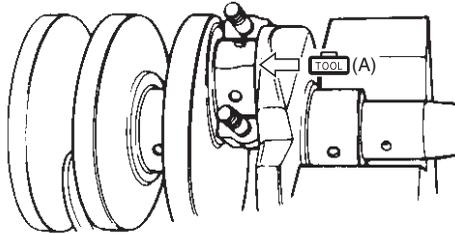


I649G1140278-01

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

Special tool

TOOL (A): 09900-22301 (Plastigauge (0.025 - 0.076 mm))



I649G1140333-02

- 3) Tighten the conrod cap nuts to the specified torque, in two stages.

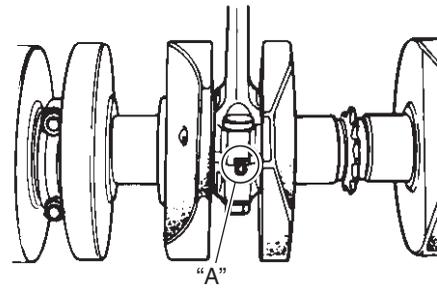
NOTE

- When installing the bearing cap to the crank pin, make sure that the number "A" on the conrod faces towards the intake side.
- Never rotate the crankshaft or conrod when a piece of plastigauge is installed.

Tightening torque

Conrod cap nut (Initial): 25 N·m (2.5 kgf·m, 18.0 lb·ft)

Conrod cap nut (Final): 51 N·m (5.1 kgf·m, 37.0 lb·ft)



I649G1140280-02

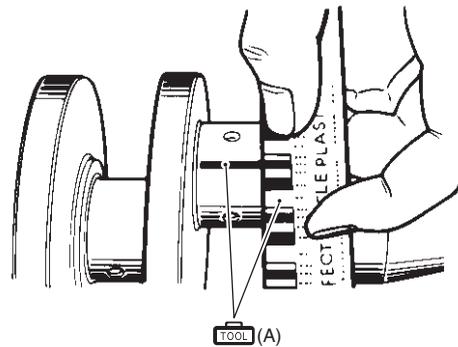
- 4) Remove the bearing caps and measure the width of the compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge. If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

Conrod big end oil clearance

Standard: 0.032 – 0.056 mm (0.0013 – 0.0022 in)

Conrod big end oil clearance

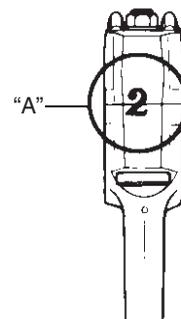
Service limit: 0.080 mm (0.0031 in)



I649G1140334-01

Selection

- 1) Check the corresponding conrod I.D. code numbers ([1] or [2]) "A".

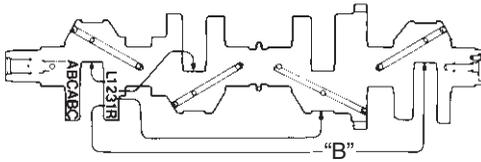


I649G1140282-02

Conrod I.D. specification

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

- 2) Check the corresponding crank pin O.D. code numbers ([1], [2] or [3]) "B".



I649G1140283-01

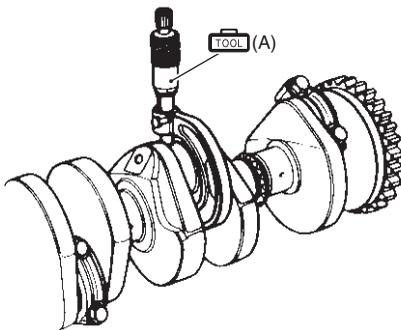
- 3) Measure the conrod crank pin O.D. with the special tool. If any of the measurements are out of specification, replace the crankshaft.

Crank pin O.D. specification

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

Special tool

 (A): 09900-20202 (Micrometer (25-50mm))



I649G1140335-02

- 4) Select the specified bearings from the bearing selection table.

⚠ CAUTION

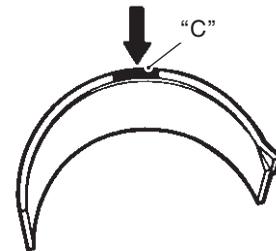
The bearings should be replaced as a set.

Bearing selection table

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

Bearing thickness specification

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



"C": Color code

I649G1140336-01

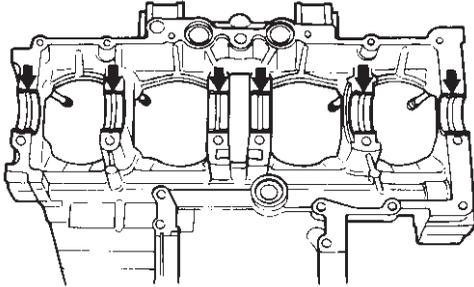
Crankshaft Journal Bearing Inspection and Selection

B649G11406062

Refer to "Engine Bottom Side Disassembly: ".
Refer to "Engine Bottom Side Assembly: ".

Inspection

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



I649G1140286-01

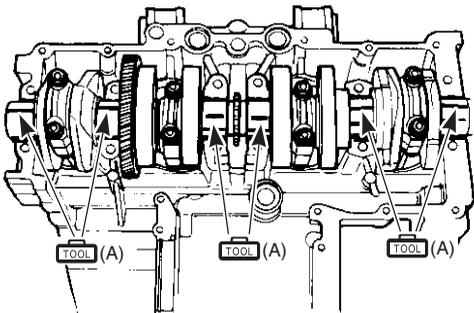
- 2) Install the plastigauge onto each crankshaft journal as shown.

Special tool

TOOL (A): 09900-22301 (Plastigauge (0.025 - 0.076 mm))

NOTE

Do not place the plastigauge on the oil hole.



I649G1140337-01

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

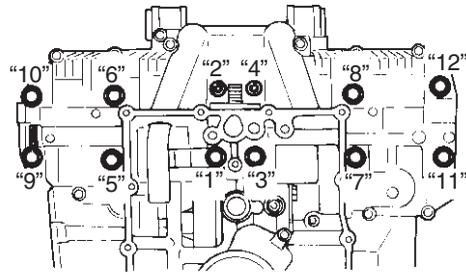
NOTE

Do not rotate the crankshaft when a piece of plastigauge is installed.

Tightening torque

Crankcase bolt (M8) (Initial): 13 N·m (1.3 kgf·m, 9.5 lb·ft)

Crankcase bolt (M8) (Final): 22 N·m (2.2 kgf·m, 16.0 lb·ft)



I649G1140288-02

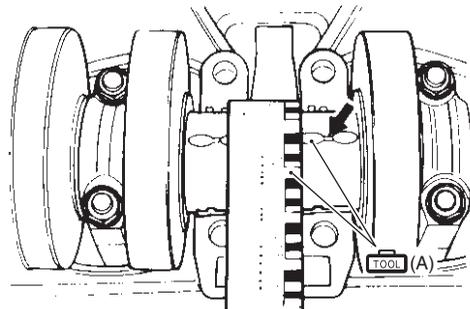
- 4) Remove the lower crankcase and measure the width of compressed plastigauge using the envelope scale. This measurement should be taken at the widest part of the compressed plastigauge. If the oil clearance exceeds the service limit, select the specified bearings from the bearing selection table.

Crankshaft journal oil clearance

Standard: 0.020 – 0.044 mm (0.0008 – 0.0017 in)

Crankshaft journal oil clearance

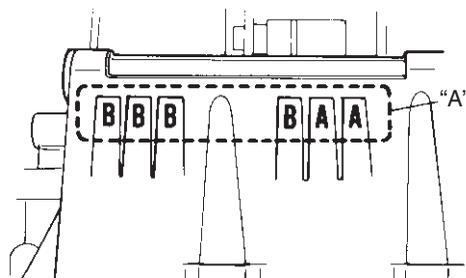
Service limit: 0.080 mm (0.0031 in)



I649G1140338-01

Selection

- 1) Check the corresponding crankcase journal I.D. codes ([A] or [B]) "A", which are stamped on the rear of the upper crankcase.

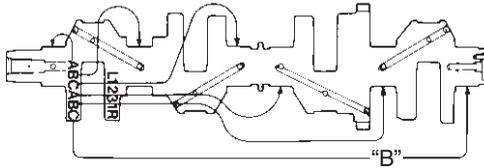


I649G1140290-01

Crankcase journal I.D. specification

Code "A"	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)

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



I649G1140339-01

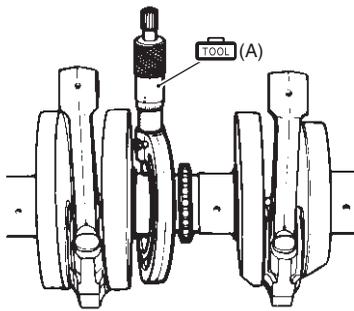
- 3) Measure the crankshaft O.D. with the special tool. If any of the measurements are out of specification, replace the crankshaft.

Crankshaft journal O.D. specification

Code "B"	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)

Special tool

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



I649G1140340-02

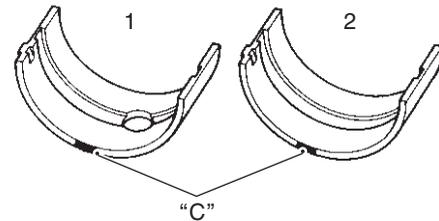
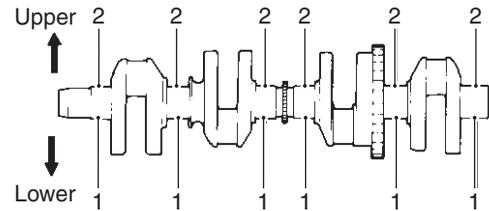
- 4) Select the specified bearings from the bearing selection table.

Bearing selection table

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

Bearing thickness specification

Color (Part No.)	Thickness
Green (12229-06B00-0A0) (1) (12229-06B10-0A0) (2)	1.486 – 1.490 mm (0.0585 – 0.0587 in)
Black (12229-06B00-0B0) (1) (12229-06B10-0B0) (2)	1.490 – 1.494 mm (0.0587 – 0.0588 in)
Brown (12229-06B00-0C0) (1) (12229-06B10-0C0) (2)	1.494 – 1.498 mm (0.0588 – 0.0590 in)
Yellow (12229-06B00-0D0) (1) (12229-06B10-0D0) (2)	1.498 – 1.502 mm (0.0590 – 0.0591 in)



I649G1140341-02

1. Grooved bearing with oil hole (For lower crankcase)
2. Grooved bearing (For upper crankcase)
"C": Color code

Crankshaft Thrust Clearance Inspection and Selection

B649G11406063

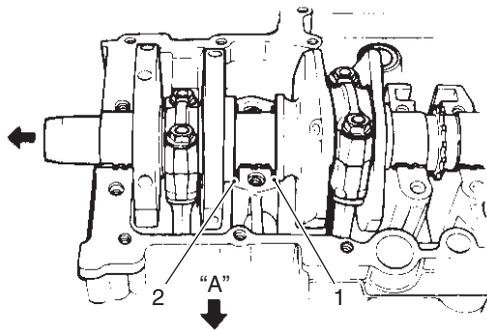
Refer to "Engine Bottom Side Disassembly: ".
 Refer to "Engine Bottom Side Assembly: ".

Inspection

- 1) With the crankshaft's right-side and left-side thrust bearings inserted into the upper crankcase.
- 2) Measure the thrust clearance "a" between the left-side thrust bearing and crankshaft using the thickness gauge. If the thrust clearance exceeds the standard range, adjust the thrust clearance.

NOTE

Pull the crankshaft to the left (starter clutch side) so that there is no clearance on the right-side thrust bearing.

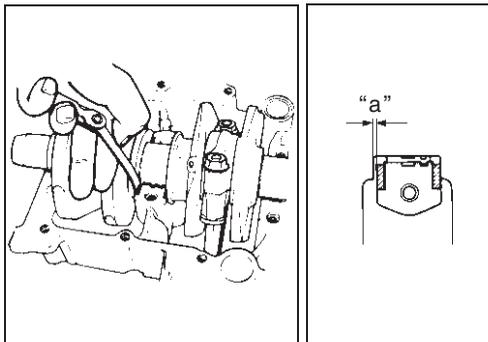


I649G1140294-02

1. Right side thrust bearing
2. Left side thrust bearing
"A": Front side

Crankshaft thrust clearance "a"

Standard: 0.04 – 0.08 mm (0.0016 – 0.0031 in)



I649G1140342-01

Selection

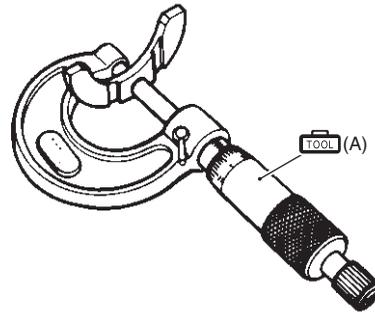
- 1) Remove the right-side thrust bearing and measure its thickness using the micrometer. If the thickness of the right-side thrust bearing is below standard, replace it with a new bearing and measure the thrust clearance again, as described above.

Special tool

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

Right-side thrust bearing thickness

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

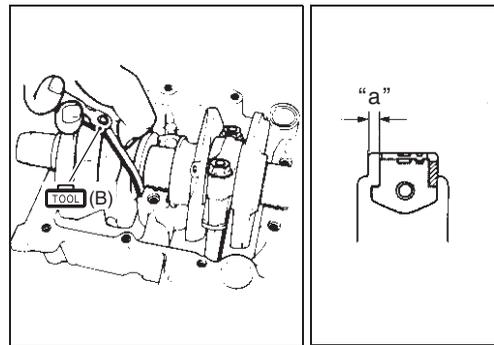


I649G1140343-01

- 2) If the right-side thrust bearing is within the standard range, reinsert the right-side thrust bearing and remove the left-side thrust bearing.
- 3) With the left-side thrust bearing removed, measure the clearance "a" using the thickness gauge as shown.

Special tool

TOOL (B): 09900-20803 (Thickness gauge)



I649G1140344-03

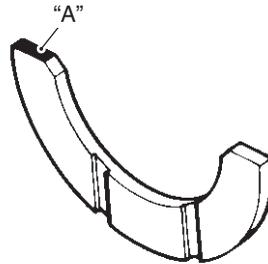
4) Select a left-side thrust bearing from the selection table.

NOTE

Right-side thrust bearing has the same specification as the GREEN (12228-48B00-0E0) of left-side thrust bearing.

Left-side thrust bearing selection table

Clearance before inserting the left-side thrust bearing	Color "A" (Part No.)	Thrust bearing thickness	Thrust clearance
2.42 – 2.44 mm (0.0953 – 0.0961 in)	Black (12228-48B00-0H0)	2.36 – 2.38 mm (0.0929 – 0.0937 in)	0.04 – 0.08 mm (0.0016 – 0.0031 in)
2.44 – 2.46 mm (0.0961 – 0.0969 in)	Orange (12228-48B00-0G0)	2.38 – 2.40 mm (0.0937 – 0.0945 in)	
2.46 – 2.48 mm (0.0969 – 0.0976 in)	Blue (12228-48B00-0F0)	2.40 – 2.42 mm (0.0945 – 0.0953 in)	
2.48 – 2.50 mm (0.0976 – 0.0984 in)	Green (12228-48B00-0E0)	2.42 – 2.44 mm (0.0953 – 0.0961 in)	
2.50 – 2.52 mm (0.0984 – 0.0992 in)	Yellow (12228-48B00-0D0)	2.44 – 2.46 mm (0.0961 – 0.0969 in)	
2.52 – 2.54 mm (0.0992 – 0.1000 in)	Red (12228-48B00-0C0)	2.46 – 2.48 mm (0.0969 – 0.0976 in)	
2.54 – 2.56 mm (0.1000 – 0.1008 in)	Brown (12228-48B00-0B0)	2.48 – 2.50 mm (0.0976 – 0.0984 in)	
2.56 – 2.57 mm (0.1008 – 0.1012 in)	Pink (12228-48B00-0A0)	2.50 – 2.52 mm (0.0984 – 0.0992 in)	0.04 – 0.07 mm (0.0016 – 0.0028 in)



1649G1140345-01

"A": Color code

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

Specifications

Service Data

B649G11407002

Valve + Guide

Unit: mm (in)

Item	Standard		Limit
	IN.	EX.	
Valve diameter	IN.	28.5 (1.12)	—
	EX.	25 (1.0)	—
Valve clearance (when cold)	IN.	0.10 – 0.15 (0.004 – 0.006)	—
	EX.	0.18 – 0.23 (0.007 – 0.009)	—
Valve guide to valve stem clearance	IN.	0.020 – 0.047 (0.0008 – 0.0019)	—
	EX.	0.040 – 0.067 (0.0016 – 0.0026)	—
Valve stem deflection	IN. & EX.	—	0.35 (0.014)
Valve guide I.D.	IN. & EX.	5.000 – 5.012 (0.1969 – 0.1973)	—
Valve stem O.D.	IN.	4.965 – 4.980 (0.1955 – 0.1961)	—
	EX.	4.945 – 4.960 (0.1947 – 0.1953)	—
Valve stem runout	IN. & EX.	—	0.05 (0.002)
Valve face thickness	IN. & EX.	—	0.5 (0.02)
Valve stem end length	IN. & EX.	—	2.5 (0.10)
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	—	35.0 (1.38)
	OUTER	—	37.8 (1.49)
Valve spring tension (IN. & EX.)	INNER	53 – 65 N (5.3 – 6.5 kgf, 11.7 – 14.3 lbs) at length 28 mm (1.10 in)	—
	OUTER	131 – 151 N (13.1 – 15.1 kgf, 28.9 – 33.3 lbs) at length 31.5 mm (1.24 in)	—

Camshaft + Cylinder Head

Unit: mm (in)

Item	Standard		Limit
	IN.	EX.	
Cam height	IN.	33.58 – 33.62 (1.3220 – 1.3236)	33.28 (1.3102)
	EX.	32.65 – 32.69 (1.2854 – 1.2870)	32.35 (1.2736)
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 pin (at arrow "3")	24th pin		—
Rocker arm I.D.	IN. & EX.	12.000 – 12.018 (0.4724 – 0.4731)	—
Rocker arm shaft O.D.	IN. & EX.	11.973 – 11.984 (0.4714 – 0.4718)	—
Cylinder head distortion	—		0.20 (0.008)

Cylinder + Piston + Piston Ring

Unit: mm (in)

Item	Standard			Limit
Compression pressure	1 250 kPa (12.5 kgf/cm ² , 178 psi)			875 kPa (8.75 kgf/cm ² , 124 psi)
Compression pressure difference	—			200 kPa (2 kgf/cm ² , 28 psi)
Piston-to-cylinder clearance	0.050 – 0.060 (0.0020 – 0.0024)			0.120 (0.0047)
Cylinder bore	79.000 – 79.015 (3.1102 – 3.1108)			79.080 (3.1134)
Piston diameter	78.945 – 78.960 (3.1081 – 3.1087) Measure 15 mm (0.6 in) from the skirt end.			78.880 (3.1055)
Cylinder distortion	—			0.20 (0.008)
Piston ring free end gap	1st	N	Approx. 10 (0.39)	8.0 (0.31)
	2nd	2N	Approx. 9.5 (0.37)	7.6 (0.30)
Piston ring end gap	1st	0.15 – 0.30 (0.006 – 0.012)		0.5 (0.020)
	2nd	0.30 – 0.45 (0.012 – 0.018)		0.7 (0.028)
Piston ring-to-groove clearance	1st	—		0.180 (0.007)
	2nd	—		0.150 (0.006)
Piston ring groove width	1st	1.01 – 1.03 (0.040 – 0.041)		—
	2nd	1.01 – 1.03 (0.040 – 0.041)		—
	Oil	2.01 – 2.03 (0.079 – 0.080)		—
Piston ring thickness	1st	0.975 – 0.990 (0.0384 – 0.0390)		—
	2nd	0.970 – 0.990 (0.038 – 0.039)		—
Piston pin bore	20.002 – 20.008 (0.7875 – 0.7877)			20.030 (0.7886)
Piston pin O.D.	19.992 – 20.000 (0.7871 – 0.7874)			19.980 (0.7866)

Conrod + Crankshaft

Unit: mm (in)

Item	Standard		Limit
Conrod small end I.D.	20.010 – 20.018 (0.7878 – 0.7881)		20.040 (0.7890)
Conrod big end side clearance	0.10 – 0.20 (0.004 – 0.008)		0.30 (0.012)
Conrod big end width	20.95 – 21.00 (0.825 – 0.827)		—
Crank pin width	21.10 – 21.15 (0.831 – 0.833)		—
Conrod big end oil clearance	0.032 – 0.056 (0.0013 – 0.0022)		0.080 (0.0031)
Crank pin O.D.	37.976 – 38.000 (1.4951 – 1.4961)		—
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	0.04 – 0.08 (0.0016 – 0.0031)		—
Crankshaft thrust bearing thickness	Left side	2.360 – 2.520 (0.0929 – 0.0992)	—
	Right side	2.420 – 2.440 (0.0953 – 0.0961)	—
Crankshaft runout	—		0.05 (0.002)

Tightening Torque Specifications

Fastening part	Tightening torque			Note
	N-m	kgf-m	lb-ft	
Engine sprocket nut	115	11.5	83.0	🔩
Speed sensor rotor bolt	20	2.0	14.5	🔩
Oil drain plug	23	2.3	16.5	🔩
Cylinder stud bolt	15	1.5	11.0	🔩
Cylinder base nut	9	0.9	6.5	🔩
Cylinder head nut	38	3.8	27.5	🔩
Cylinder head bolt	10	1.0	7.0	🔩
Camshaft journal holder bolt	10	1.0	7.0	🔩 / 🔩
Cam chain tension adjuster mounting bolt	7	0.7	5.0	🔩
Cam chain tension spring holder bolt	38	3.8	27.5	🔩
Cylinder head cover union bolt	20	2.0	14.5	🔩
Cylinder head cover bolt	14	1.4	10.0	🔩
Cooling hose mounting bolt	10	1.0	7.0	🔩
PAIR pipe mounting nut	10	1.0	7.0	🔩
Camshaft sprocket bolt	25	2.5	18.0	🔩
Cam chain guide bolt	6	0.6	4.5	🔩
Rocker arm shaft set bolt	9	0.9	6.5	🔩
Cylinder head plug	28	2.8	20.0	🔩
Oil pump mounting bolt	10	1.0	7.0	🔩
Crankcase bolt (M8) (Initial)	13	1.3	9.5	🔩 / 🔩
Crankcase bolt (M8) (Final)	22	2.2	16.0	🔩 / 🔩
Main oil gallery plug	40	4.0	29.0	🔩
Crankcase bolt and nut (M6) (Initial)	6	0.6	4.5	🔩
Crankcase bolt and nut (M6) (Final)	11	1.1	8.0	🔩
Oil pan bolt	14	1.4	10	🔩
Oil filter	20	2.0	14.5	🔩
Generator mounting bolt	25	2.5	18.0	🔩
Starter motor mounting bolt	6	0.6	4.5	🔩
Conrod cap nut (Initial)	25	2.5	18.0	🔩 / 🔩
Conrod cap nut (Final)	51	5.1	37.0	🔩 / 🔩

NOTE

The specified tightening torque is also described in the following.
 “Engine Assembly Installation: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

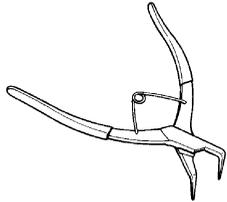
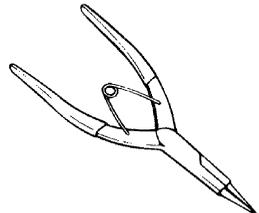
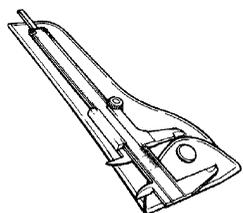
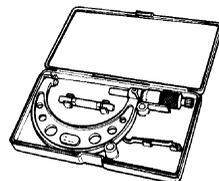
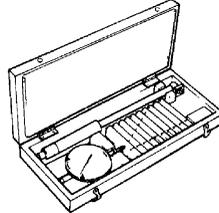
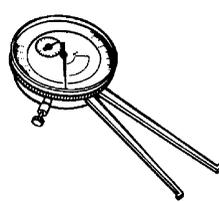
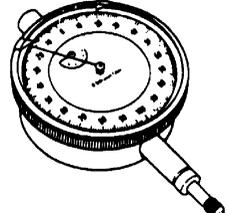
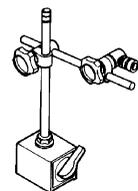
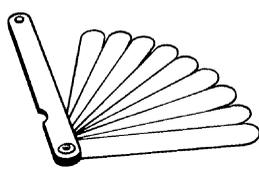
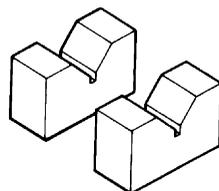
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000-25010	🔩 / 🔩 / 🔩 / 🔩 / 🔩
Molybdenum oil	Molybdenum oil solution	—	🔩 / 🔩 / 🔩 / 🔩 / 🔩
Sealant	SUZUKI Bond 1207B or equivalent	P/No.: 99000-31140	🔩 / 🔩 / 🔩 / 🔩
Thread lock cement	Thread Lock Cement Super 1303 or equivalent	P/No.: 99000-32030	🔩 / 🔩 / 🔩 / 🔩 / 🔩
	Thread Lock Cement 1342 or equivalent	P/No.: 99000-32050	🔩 / 🔩 / 🔩 / 🔩 / 🔩 / 🔩 / 🔩 / 🔩

NOTE

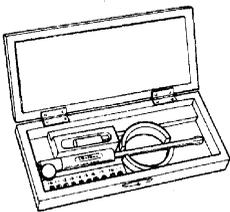
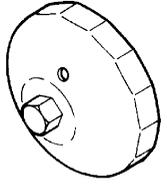
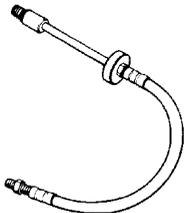
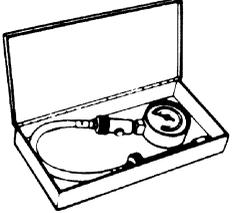
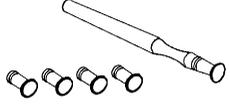
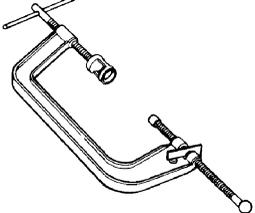
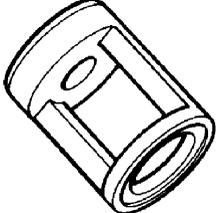
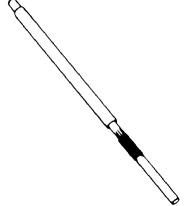
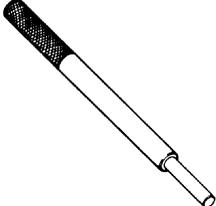
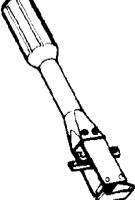
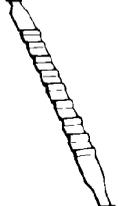
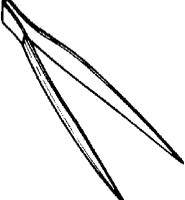
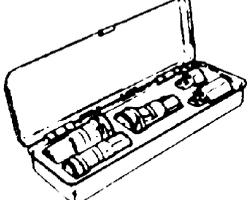
Required service material is also described in the following.
 "Engine Assembly Installation: "

Special Tool

B649G11408002

<p>09900-06106 Snap ring pliers ☞ / ☞</p> 	<p>09900-06107 Snap ring pliers ☞ / ☞ / ☞ / ☞ / ☞</p> 
<p>09900-20102 Vernier calipers (1/20 mm, 200 mm) ☞ / ☞ / ☞</p> 	<p>09900-20202 Micrometer (1/100 mm, 25 - 50mm) ☞ / ☞ / ☞</p> 
<p>09900-20204 Micrometer (75-100mm) ☞</p> 	<p>09900-20205 Micrometer (0-25mm) ☞ / ☞ / ☞ / ☞ / ☞ / ☞ / ☞ / ☞</p> 
<p>09900-20508 Cylinder gauge set ☞</p> 	<p>09900-20602 Dial gauge (1/1000mm, 1mm) ☞ / ☞ / ☞</p> 
<p>09900-20605 Dial calipers (1/100 mm, 10 - 34 mm) ☞ / ☞</p> 	<p>09900-20606 Dial gauge (1/100 mm) ☞ / ☞ / ☞ / ☞ / ☞</p> 
<p>09900-20701 Magnetic stand ☞ / ☞ / ☞ / ☞ / ☞</p> 	<p>09900-20803 Thickness gauge ☞ / ☞ / ☞ / ☞ / ☞ / ☞ / ☞</p> 
<p>09900-21304 V-block (100mm) ☞ / ☞ / ☞ / ☞</p> 	<p>09900-22301 Plastigauge (0.025 - 0.076 mm) ☞ / ☞ / ☞</p> 

1D-72 Engine Mechanical:

<p>09900-22302 Plastigauge (0.051 - 0.152 mm) ☞</p>		<p>09900-22403 Small bore gauge (18-35mm) ☞ / ☞ / ☞</p>	
<p>09915-40610 Oil filter wrench ☞ / ☞</p>		<p>09915-63210 Compression gauge adaptor ☞</p>	
<p>09915-64510 Compression gauge set ☞</p>		<p>09916-10911 Valve lapper set ☞</p>	
<p>09916-14510 Valve spring compressor ☞ / ☞</p>		<p>09916-14910 Valve lifter attachment ☞ / ☞</p>	
<p>09916-34542 Reamer handle ☞ / ☞</p>		<p>09916-34570 Valve guide reamer (4.95 mm) ☞</p>	
<p>09916-34580 Valve guide reamer (10.8 mm) ☞</p>		<p>09916-44310 Valve guide remover / installer ☞ / ☞</p>	
<p>09916-74521 Holder body ☞</p>		<p>09916-74550 Band (bore 73 - 85 mm) ☞</p>	
<p>09916-84511 Tweezers ☞ / ☞</p>		<p>09930-10121 Spark plug wrench set ☞</p>	

Engine Lubrication System

Precautions

Precautions for Engine Oil

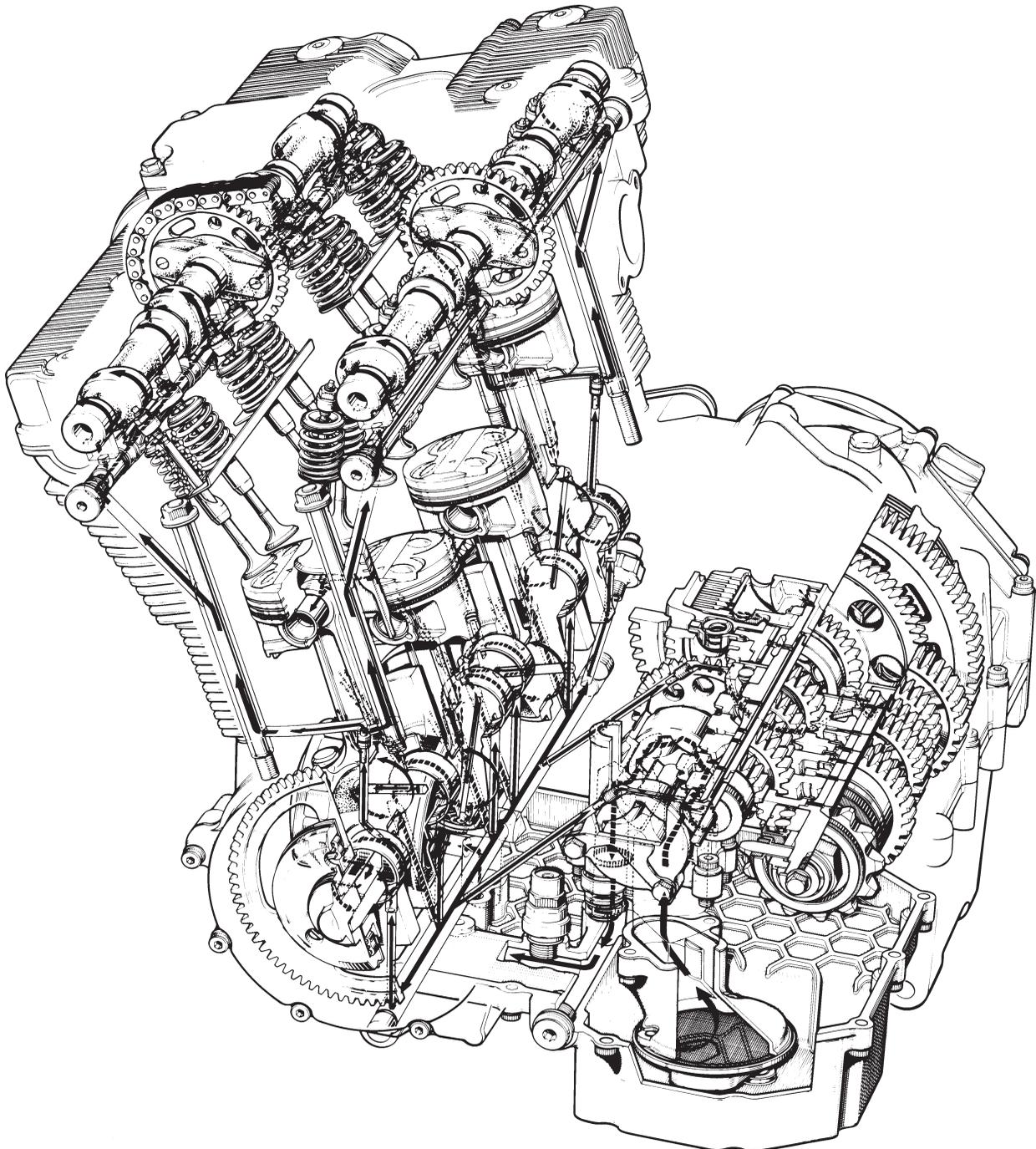
Refer to "Fuel and Oil Recommendation: in Section 0A".

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Schematic and Routing Diagram

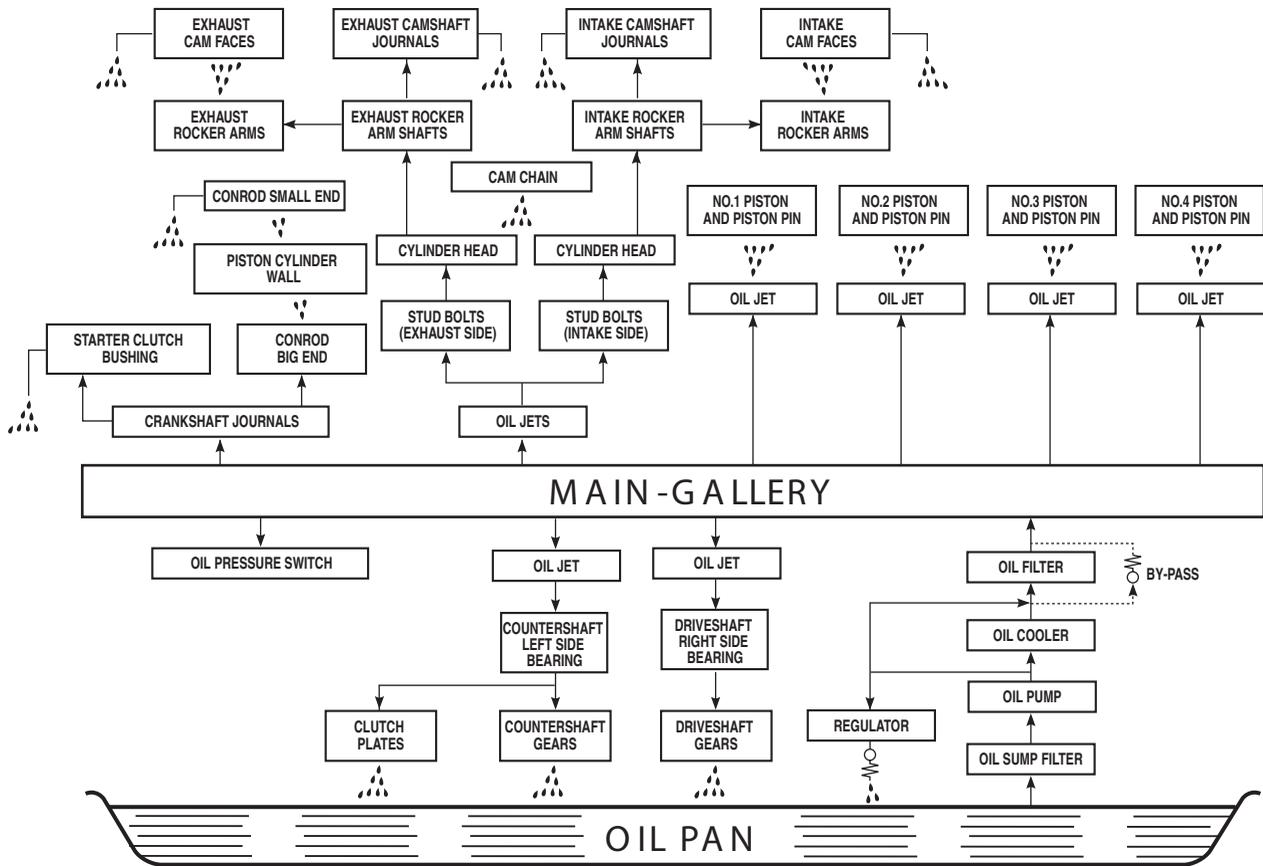
Engine Lubrication Circuit Diagram

B649G1150202



Engine Lubrication System Chart Diagram

B649G11502001



I649G1150001-01

Diagnostic Information and Procedures

Engine Lubrication Symptom Diagnosis

B649G11504004

Condition	Possible cause	Correction / Reference Item
Engine overheats.	Insufficient amount of engine oil.	Check level and add.
	Defective oil pump.	Replace.
	Clogged oil circuit.	Clean.
	Clogged oil cooler	Clean or replace.
	Dirty or bent oil cooler fins	Clean or repair.
	Incorrect engine oil.	Change.
Exhaust smoke is dirty or thick.	Excessive amount of engine oil.	Check level and drain.
Engine lacks power.	Excessive amount of engine oil.	Check level and drain.

Oil Pressure Check

B649G11504003

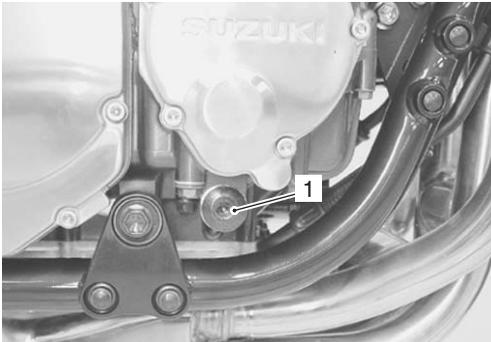
Check the engine oil pressure periodically. This will give a good indication of the condition of the moving parts.

NOTE

Before checking the oil pressure, check the following.

- Oil level (Refer to “Engine Oil and Filter Replacement: in Section 0B”)
- Oil leaks (If leak is found, repair it.)
- Oil quality (If oil is discolored or deteriorated, replace it.)

- 1) Start the engine and check if the oil pressure indicator light is turned on. If the light stays on, check the oil pressure indicator light circuit. If the circuit is OK, check the oil pressure in the following manner.
- 2) Remove the main oil gallery plug (1).

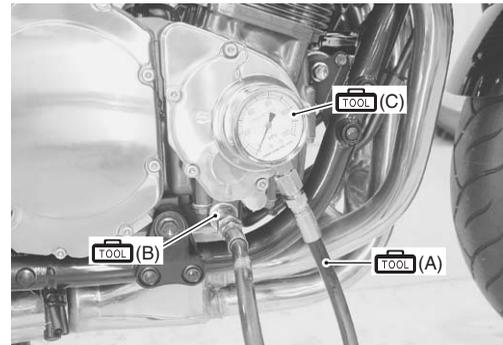


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- 3) Install the oil pressure gauge and attachment into the main oil gallery.

Special tool

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



I649G1150023-01

- 4) Warm up the engine as follows:
 Summer: 10 min. at 2 000 r/min.
 Winter: 20 min. at 2 000 r/min.
- 5) After warm up, increase the engine speed to 3 000 r/min. (Observe the tachometer), and read the oil pressure gauge.
 If the oil pressure is lower or higher than the specification, the following causes may be considered.

Oil pressure specification

- Above 300 kPa (3.0 kgf/cm², 43 psi) at 3 000 r/min., oil temp. at 60 °C (140 °F)
- Below 600 kPa (6.0 kgf/cm², 85 psi) at 3 000 r/min., oil temp. at 60 °C (140 °F)

High oil pressure	Low oil pressure
<ul style="list-style-type: none"> • Engine oil viscosity is too high • Clogged oil passage • Combination of the above items 	<ul style="list-style-type: none"> • Clogged oil filter • Oil leakage from the oil passage • Damaged O-ring • Defective oil pump • Combination of the above items

1E-4 Engine Lubrication System:

- 6) Stop the engine and remove the oil pressure gauge and attachment.
- 7) Reinstall the main oil gallery plug and tighten it to the specified torque.

⚠ CAUTION

Use a new O-ring to prevent oil leakage.

Tightening torque

Main oil gallery plug: 40 N·m (4.0 kgf-m, 29.0 lb-ft)

- 8) Check the engine oil level. Refer to “Engine Oil and Filter Replacement: in Section 0B”.

Repair Instructions

Engine Oil and Filter Replacement

B649G11506001

Refer to “Engine Oil and Filter Replacement: in Section 0B”.

Oil Cooler / Oil Cooler Hose Removal and Installation

B649G11506002

Refer to “Oil Cooler / Oil Cooler Hose Removal and Installation: in Section 1F”.

Oil Cooler / Oil Cooler Hose Inspection

B649G11506003

Refer to “Engine Cooling System Inspection: in Section 1F”.

Oil Cooler Cleaning

B649G11506022

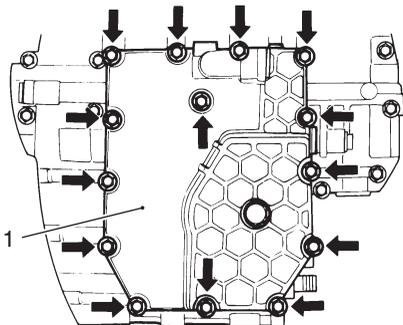
Refer to “Oil Cooler Cleaning: in Section 1F”.

Oil Pan / Oil Sump Filter / Oil Pressure Regulator Removal and Installation

B649G11506023

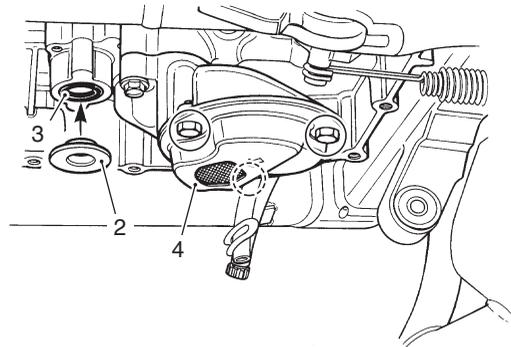
Removal

- 1) Drain engine oil. Refer to “Engine Oil and Filter Replacement: in Section 0B”.
- 2) Remove the exhaust pipe and muffler. Refer to “Exhaust Pipe / Muffler Removal and Installation: in Section 1K”.
- 3) Remove the oil cooler hose union bolts. Refer to “Oil Cooler / Oil Cooler Hose Removal and Installation: in Section 1F”.
- 4) Remove the oil pan (1).



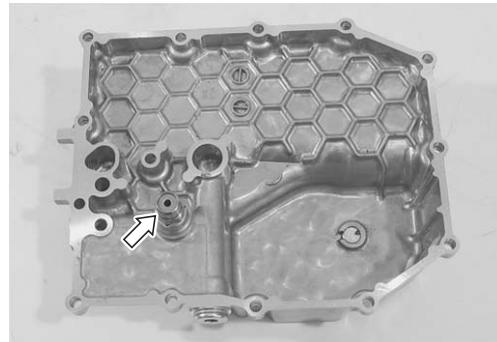
I649G1150003-02

- 5) Remove the shim (2) and O-ring (3).
- 6) Remove the oil sump filter (4).



I649G1150004-02

- 7) Remove the oil pressure regulator from the oil pan.



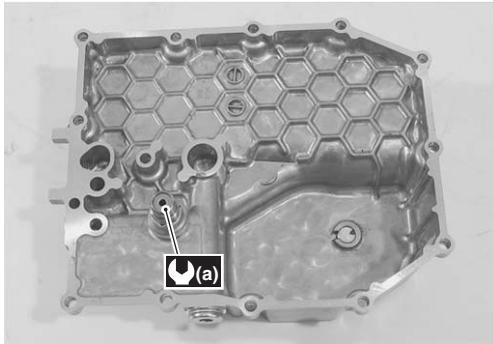
I649G1150005-03

Installation

- 1) Tighten the oil pressure regulator to the specified torque.

Tightening torque

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



I649G1150006-03

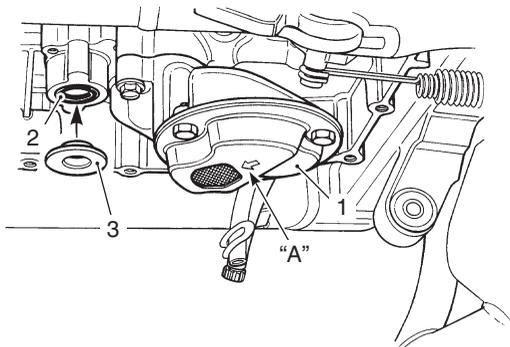
- 2) Install the oil sump filter (1).
- 3) Install a new O-ring (2) and shim (3).

CAUTION

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

NOTE

- When installing the oil sump filter, make sure that the arrow mark "A" points towards the front of the motorcycle.
- Do not loose the O-ring (2) and shim (3).



I649G1150007-01

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

CAUTION

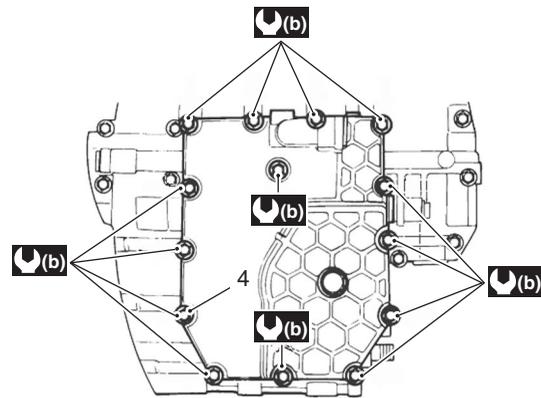
Replace the oil pan gasket and gasket washer with new ones to prevent oil leakage.

NOTE

Install a new gasket washer (4) to the oil pan bolt as shown.

Tightening torque

Oil pan bolt (b): 14 N·m (1.4 kgf-m, 10.0 lb-ft)



I649G1150008-01

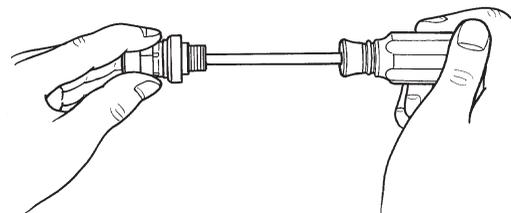
- 5) Install the oil cooler hose. Refer to "Oil Cooler / Oil Cooler Hose Removal and Installation: in Section 1F".
- 6) Install the exhaust pipe and muffler. Refer to "Exhaust Pipe / Muffler Removal and Installation: in Section 1K".
- 7) Pour engine oil. Refer to "Engine Oil and Filter Replacement: in Section 0B".

Oil Pressure Regulator Inspection

B649G11506024

Inspect the oil pressure regulator in the following procedures:

- 1) Remove the oil pressure regulator. Refer to "Oil Pan / Oil Sump Filter / Oil Pressure Regulator Removal and Installation: ".
- 2) Check the operation of the oil pressure regulator by pushing on the piston with an appropriately shaped tool. If the piston does not operate, replace the oil pressure regulator with a new one.



I649G1150009-01

1E-6 Engine Lubrication System:

- 3) Install the oil pressure regulator. Refer to "Oil Pan / Oil Sump Filter / Oil Pressure Regulator Removal and Installation: ".

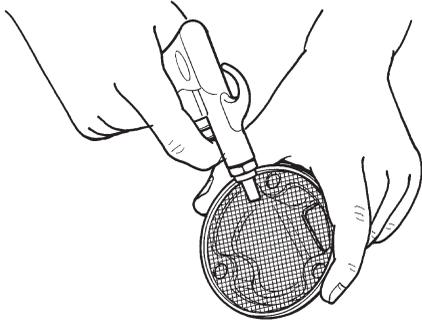
Oil Pan / Oil Sump Filter Cleaning

B649G11506025

Refer to "Oil Pan / Oil Sump Filter / Oil Pressure Regulator Removal and Installation: ".

Oil Sump Filter

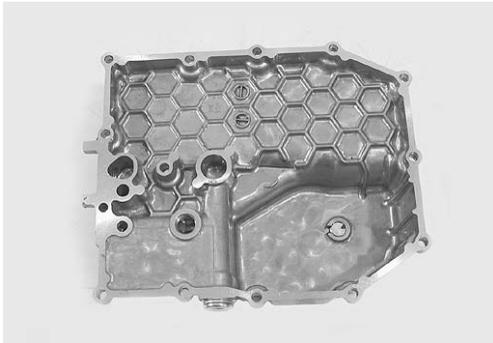
Clean the oil sump filter using compressed air.



I649G1150010-01

Oil Pan

Wash the oil pan with kerosene.



I649G1150011-02

Oil Pressure Switch Removal and Installation

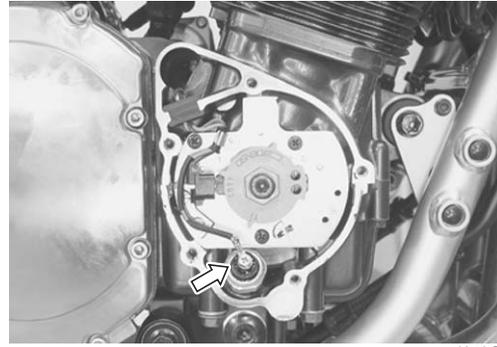
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Refer to "Electrical Components Location: in Section 0A".

Removal

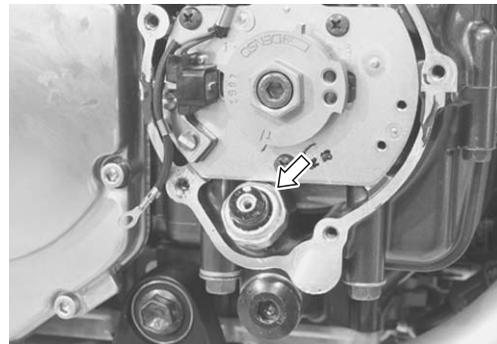
- 1) Drain engine oil. Refer to "Engine Oil and Filter Replacement: in Section 0B".
- 2) Remove the CKP sensor cover. Refer to "CKP Sensor Removal and Installation: in Section 1H".

- 3) Disconnect the oil pressure switch lead wire.



I649G1150012-01

- 4) Remove the oil pressure switch.



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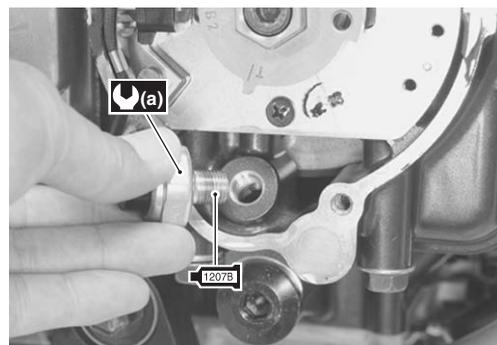
Installation

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

1207B : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)

Tightening torque

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



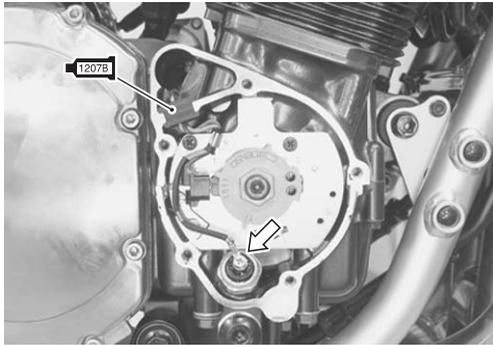
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- 2) Connect the oil pressure switch lead wire.

NOTE

The **SUZUKI BOND** should be applied to the groove of the CKP sensor lead wire grommet (1).

■1207B : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)



I649G1150015-01

- 3) Install the CKP sensor cover. Refer to "CKP Sensor Removal and Installation: in Section 1H".
- 4) Pour engine oil. Refer to "Engine Oil and Filter Replacement: in Section 0B".

Oil Pressure Switch Inspection

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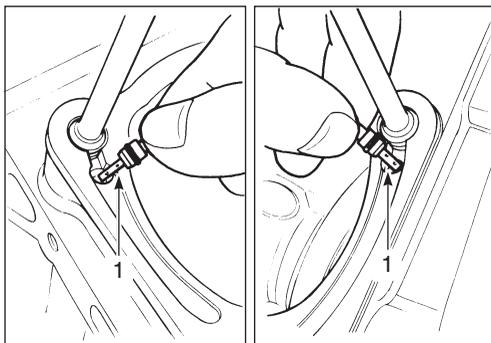
Refer to "Oil Pressure Indicator Inspection: in Section 9C".

Oil Jet (For the Cylinder Head) Removal and Installation

B649G11506027

Removal

- 1) Remove the cylinder. Refer to "Engine Top Side Disassembly: in Section 1D".
- 2) Remove the oil jets (1) (for the cylinder head).



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Installation

Installation is in the reverse order of removal. Refer to "Engine Top Side Assembly: in Section 1D". Pay attention to the following points:

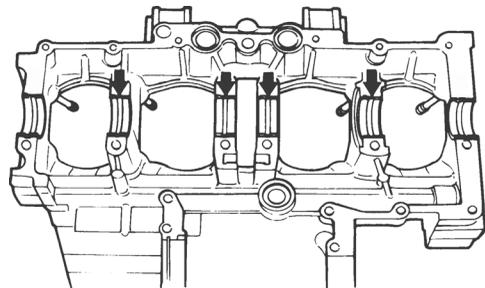
NOTE

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

Oil Jet (For the Piston Cooling and Transmission) Removal and Installation

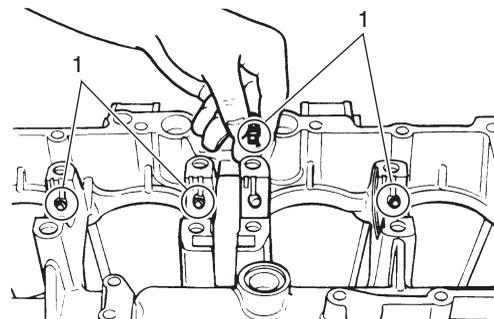
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- 1) Remove the engine assembly. Refer to "Engine Assembly Removal: in Section 1D".
- 2) Separate the crankcase, left and right. Refer to "Engine Top Side Disassembly: in Section 1D" and "Engine Bottom Side Disassembly: in Section 1D".
- 3) Remove the crankshaft assembly. Refer to "Engine Bottom Side Disassembly: in Section 1D".
- 4) Remove the crankshaft journal bearings.



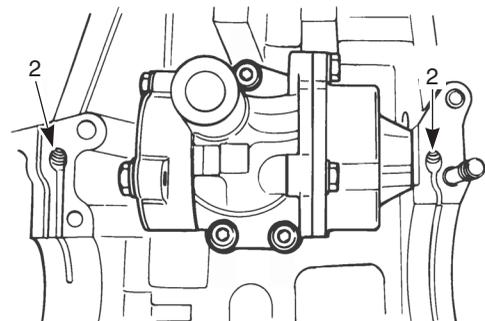
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- 5) Remove the oil jets (1) (for the piston cooling).



I649G1150018-02

- 6) Remove the oil jets (2) (for the transmission).



I649G1150019-01

1E-8 Engine Lubrication System:

Installation

Installation is in the reverse order of removal.
Pay attention to the following point:

NOTE

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

Oil Jet Inspection

B649G11506029

Inspect the oil jet in the following procedures:

- 1) Remove the oil jets. Refer to "Oil Jet (For the Cylinder Head) Removal and Installation: " and "Oil Jet (For the Piston Cooling and Transmission) Removal and Installation: ".
- 2) Make sure that the oil jets are not clogged. If they are clogged, clean their oil passage using a wire of the proper size and compressed air.



I649G1150020-01

- 3) Install the oil jets. Refer to "Oil Jet (For the Cylinder Head) Removal and Installation: " and "Oil Jet (For the Piston Cooling and Transmission) Removal and Installation: ".

Oil Pump Removal and Installation

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Refer to "Oil Pump / Oil Pressure Regulator Removal and Installation: in Section 1F".

Oil Pump Inspection

B649G11506031

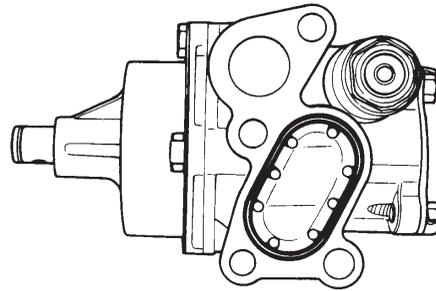
Inspect the oil pump in the following procedures:

- 1) Remove the oil pump. Refer to "Oil Pump / Oil Pressure Regulator Removal and Installation: in Section 1F".
- 2) Rotate the oil pump by hand and check that it moves smoothly. If it does not move smoothly, replace the oil pump assembly.

⚠ CAUTION

Do not attempt to disassemble the oil pump assembly.

The oil pump is available only as an assembly.



I649G1150021-01

- 3) Install the oil pump. Refer to "Oil Pump / Oil Pressure Regulator Removal and Installation: in Section 1F".

Specifications

Service Data

B649G11507002

Oil Pump

Item	Standard	Limit
Oil pump reduction ratio	1.703 (72/46 x 37/34)	—
Oil pressure (at 60 °C, 140 °F)	Above 300 kPa (3.0 kgf/cm ² , 43 psi) Below 600 kPa (6.0 kgf/cm ² , 85 psi) at 3 000 r/min.	—

Oil

Item	Specification	Note
Engine oil type	SAE 10W-40, API SF/SG or SH/SJ with JASO MA	
Engine oil capacity	Change	3 300 ml (3.4/2.9 US/Imp qt)
	Filter change	3 500 ml (3.6/3.0 US/Imp qt)
	Overhaul	4 600 ml (4.9/4.0 US/Imp qt)

Tightening Torque Specifications

B649G11507003

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Main oil gallery plug	40	4.0	29.0	
Oil pressure regulator	28	2.8	20.0	
Oil pan bolt	14	1.4	10.0	
Oil pressure switch	14	1.4	10.0	

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

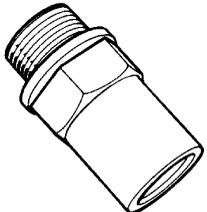
Recommended Service Material

B649G11508001

Material	SUZUKI recommended product or Specification	Note
Sealant	SUZUKI Bond 1207B or equivalent P/No.: 99000-31140	 / 

Special Tool

B649G11508002

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

Engine Cooling System

Precautions

Engine Cooling System Warning

B649G1160001

▲ WARNING

**To avoid the danger of being burned, do not touch the oil cooling system when the system is hot.
Any service on the oil cooling system should be performed when the system is cool.**

Precautions for Engine Oil

B649G1160002

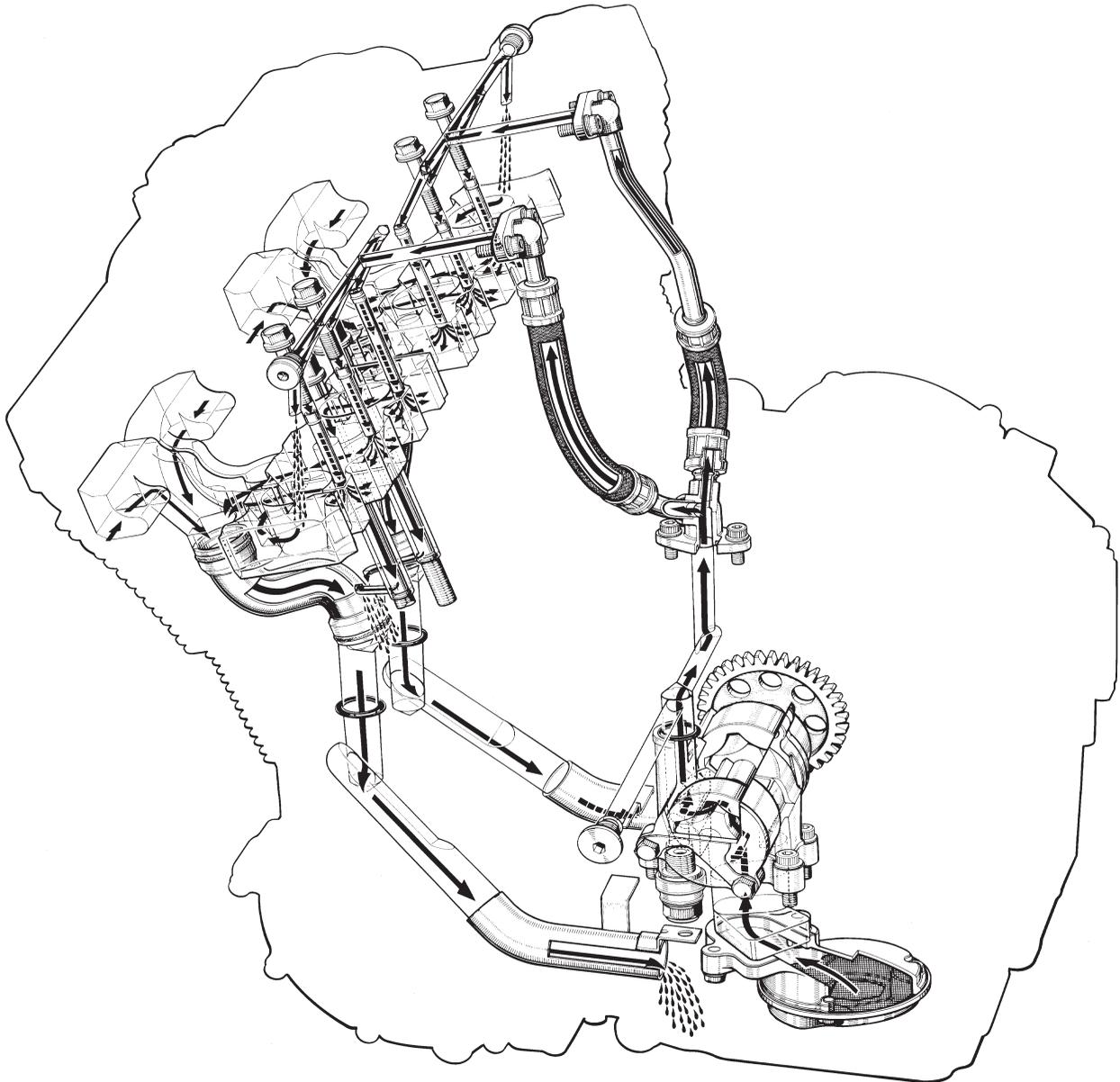
Refer to "Fuel and Oil Recommendation: in Section 0A".

General Description

Engine Cooling System Description

B649G11601005

- To cool the engine, engine oil is jet-sprayed to the combustion chamber area of the cylinder head where temperature is the highest.
- Oil discharged from the oil pump is sent to the cylinder head cover through the cooling hoses located in the center area of upper crankcase and enters the drilled passage in the cylinder head cover. Oil is then jet-sprayed from the jet nozzle into the oil chamber on the upper area of combustion chamber. With oil splash guarded by the oil chamber plate, jetted oil is guided to the cylinder head return port and returns to the oil pan through the oil return pipe that is located externally on the engine.

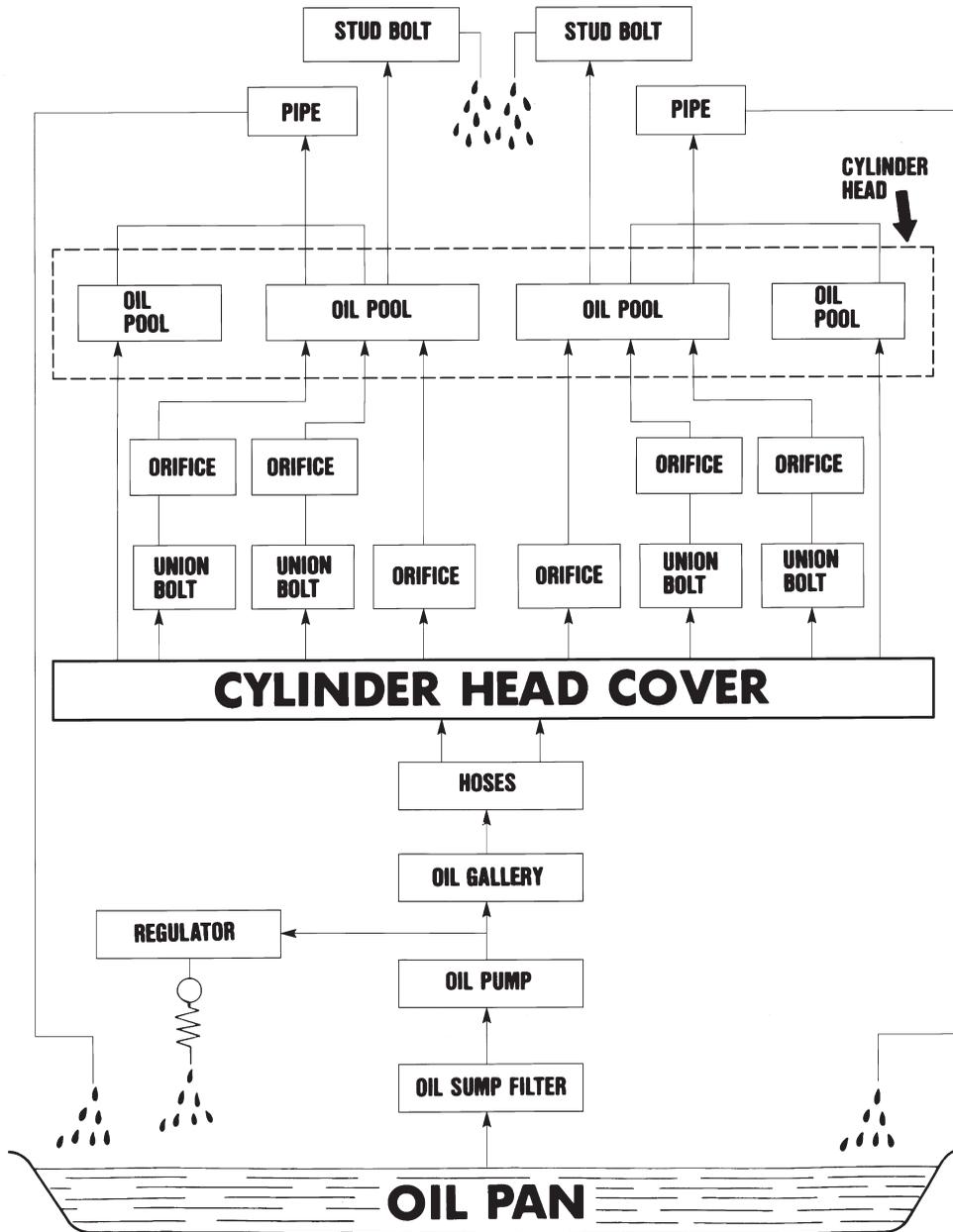


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Schematic and Routing Diagram

Cylinder Head Cooling System Chart Diagram

B649G11602003



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Diagnostic Information and Procedures

Engine Cooling Symptom Diagnosis

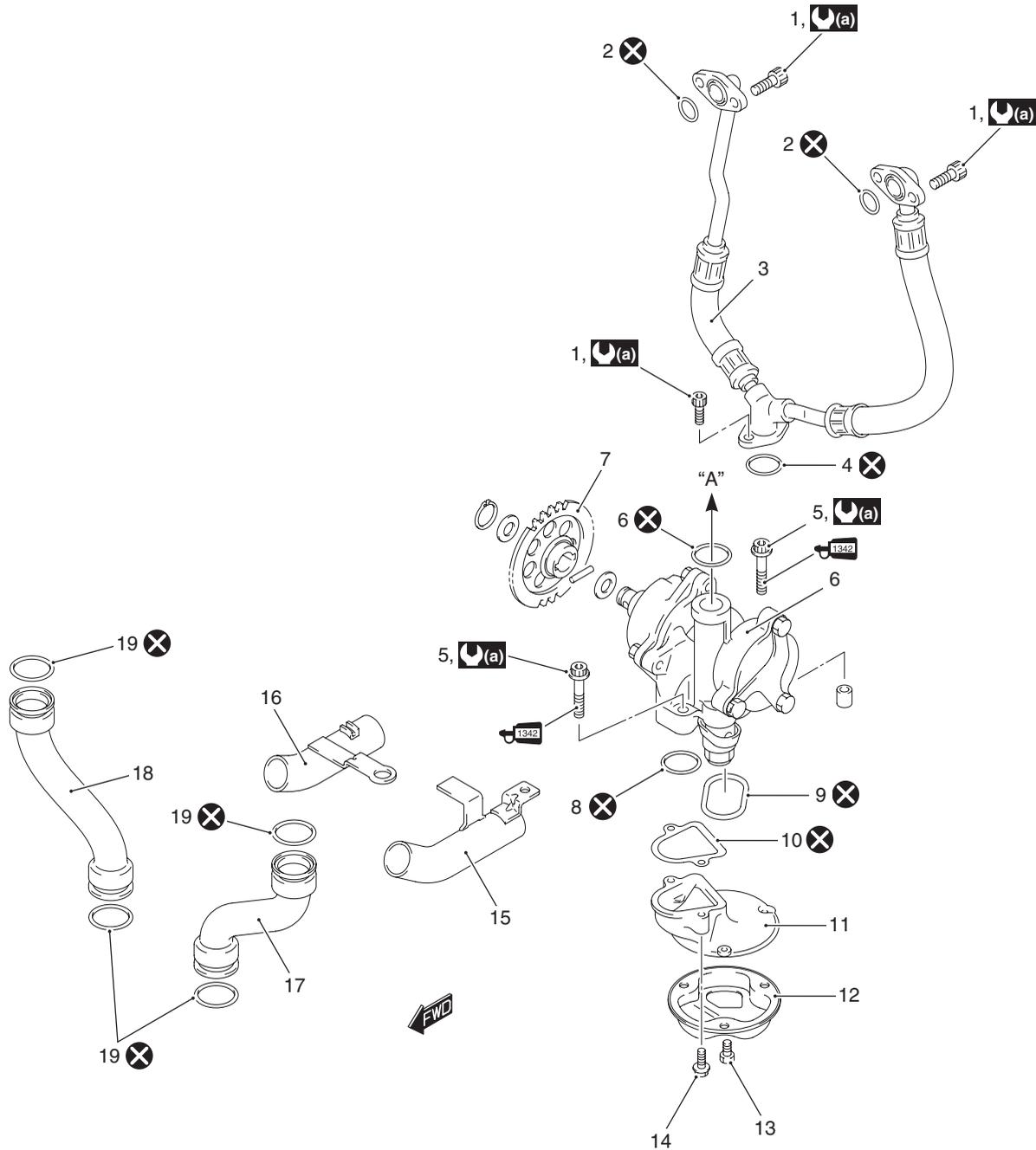
B649G11604003

Condition	Possible cause	Correction / Reference Item
Engine overheats.	Carbon build-up on piston crown.	<i>Clean.</i>
	Insufficient amount of engine oil.	<i>Check level and add.</i>
	Defective oil pump.	<i>Replace.</i>
	Clogged oil circuit.	<i>Clean.</i>
	Clogged oil cooler	<i>Clean or replace.</i>
	Dirty or bent oil cooler fins	<i>Clean or repair.</i>
	Loose oil nozzle	<i>Replace.</i>
	Incorrect engine oil.	<i>Change.</i>

Repair Instructions

Engine Cooling System Components

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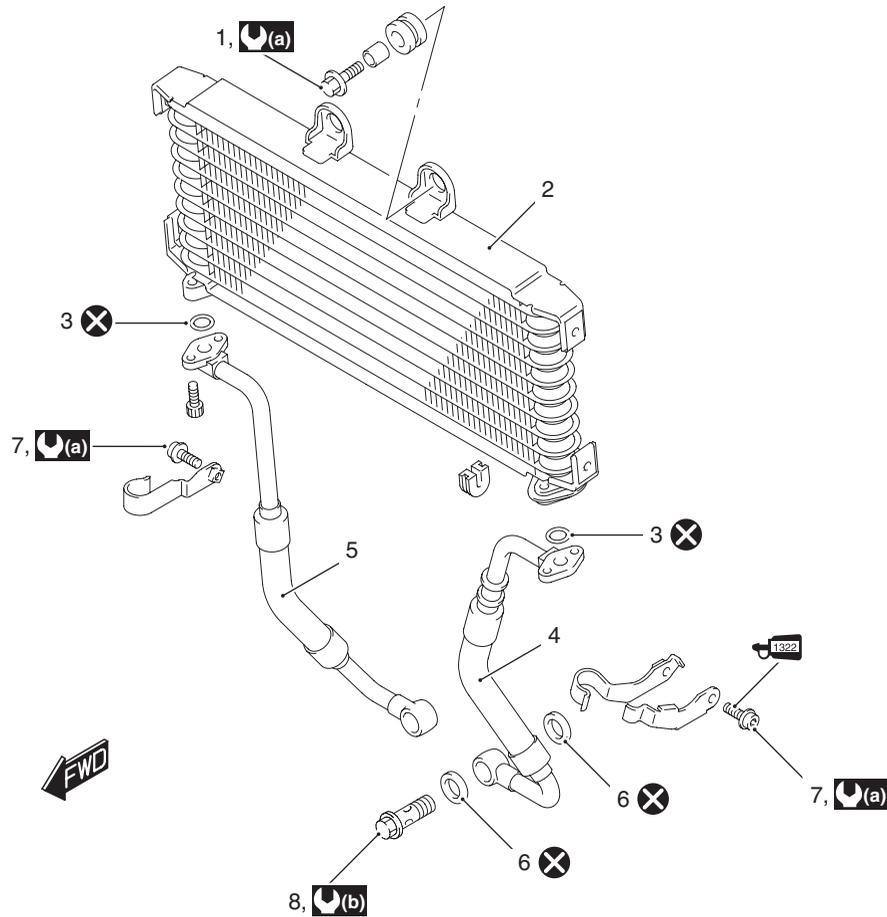


I649G1160027-02

1. Cooling oil hose mounting bolt	9. O-ring	17. Upper oil return pipe (LH)
2. O-ring	10. Gasket	18. Upper oil return pipe (RH)
3. Cooling oil hoses	11. Oil sump filter protector	19. O-ring
4. O-ring	12. Oil sump filter	"A": For cylinder head cooling.
5. Oil pump mounting bolt	13. Oil sump filter mounting bolt	(a) : 10 N·m (1.0 kgf-m, 7.0 lb-ft)
6. Oil pump	14. Oil sump filter protector mounting bolt	1342 : Apply THREAD LOCK "1342" to thread part
7. Oil pump driven gear	15. Lower oil return pipe (LH)	⊗ : Do not reuse.
8. O-ring	16. Lower oil return pipe (RH)	

Oil Cooler and Oil Cooler Hose Components

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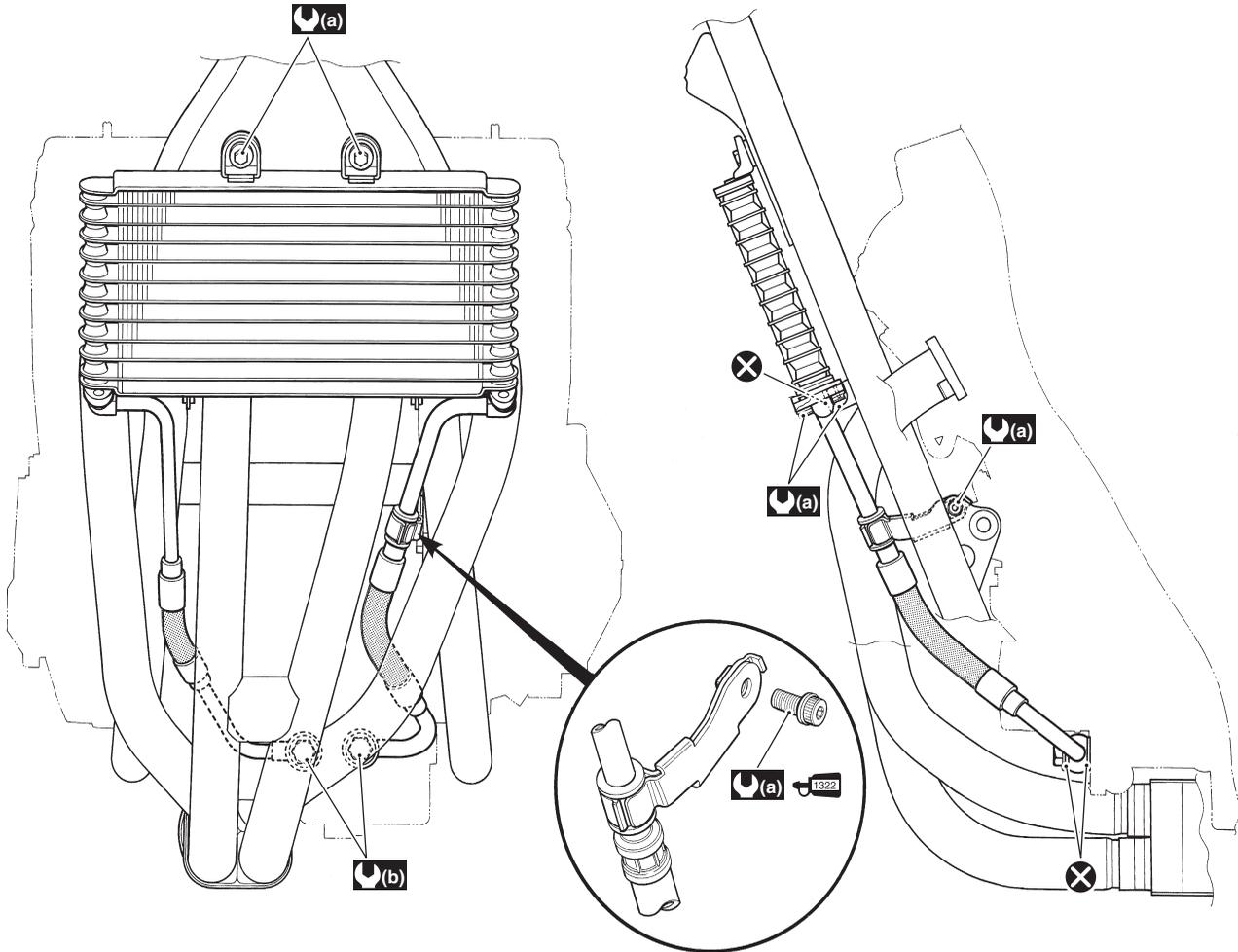


I649G1160028-01

1. Oil cooler mounting bolt	5. Oil cooler hose (RH)	: 10 N·m (1.0 kgf·m, 7.0 lb·ft)
2. Oil cooler	6. Gasket washer	: 28 N·m (2.8 kgf·m, 20.0 lb·ft)
3. O-ring	7. Oil cooler bracket bolt	: Apply THREAD LOCK "1322" to thread part
4. Oil cooler hose (LH)	8. Oil cooler hose union bolt	: Do not reuse.

Oil Cooler and Oil Cooler Hose Construction

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I649G1160003-04

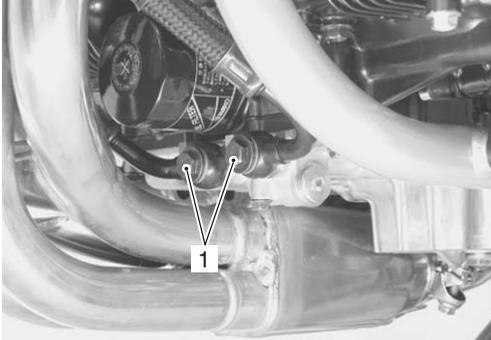
(a) : 10 N·m (1.0 kgf-m, 7.0 lb-ft)	1322 : Apply THREAD LOCK "1322" to thread part
(b) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)	(X) : Do not reuse.

Oil Cooler / Oil Cooler Hose Removal and Installation

B649G11606030

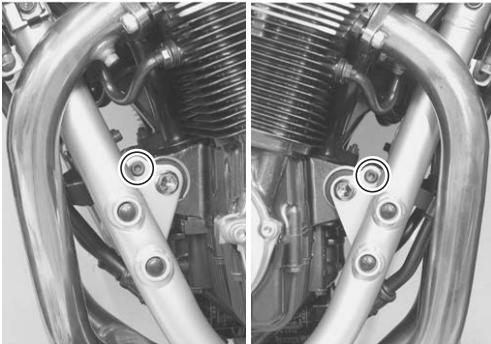
Removal

- 1) Drain engine oil. Refer to "Engine Oil and Filter Replacement: in Section 0B".
- 2) Remove the oil cooler hose union bolts (1) and gasket washers.



I649G1160019-01

- 3) Remove the oil cooler hose bracket bolts, left and right.



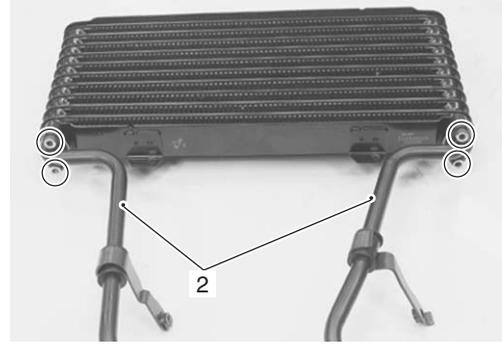
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- 4) Remove the oil cooler assembly by removing its mounting bolts.



I649G1160021-01

- 5) Remove the oil cooler hoses (2) and O-rings from the oil cooler.



I649G1160022-01

Installation

Installation is in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

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

- Tighten the oil cooler hose connecting bolts to the specified torque.

Tightening torque

Oil cooler hose connecting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)

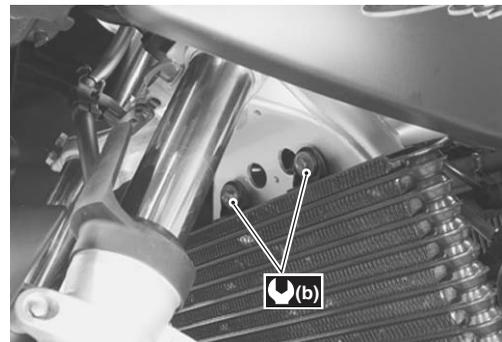


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- Tighten the oil cooler mounting bolts to the specified torque.

Tightening torque

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



I649G1160024-01

1F-9 Engine Cooling System:

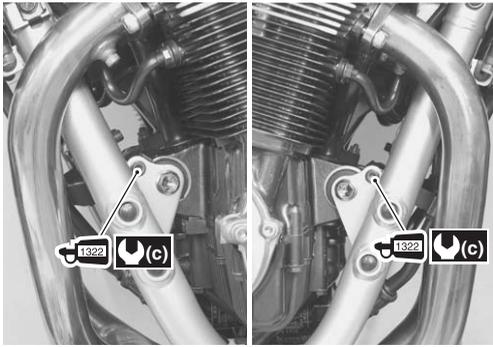
- Apply THREAD LOCK SUPER “1322” to the oil cooler hose bracket bolts.

 : Thread lock cement 99000–32110 (Thread Lock Cement Super 1322 or equivalent)

- Tighten the oil cooler hose bracket bolts to specified torque.

Tightening torque

Oil cooler hose bracket bolt (c): 10 N·m (1.0 kgf-m, 7.0 lb-ft)

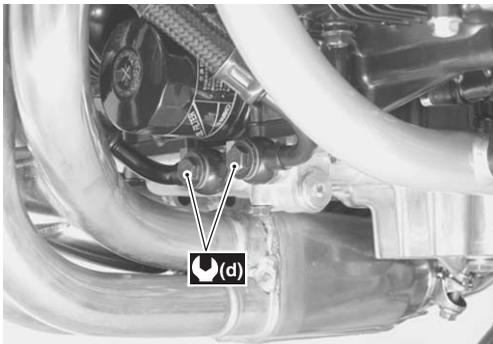


I649G1160025-01

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

Tightening torque

Oil cooler hose union bolt (d): 28 N·m (2.8 kgf-m, 20.0 lb-ft)



I649G1160026-01

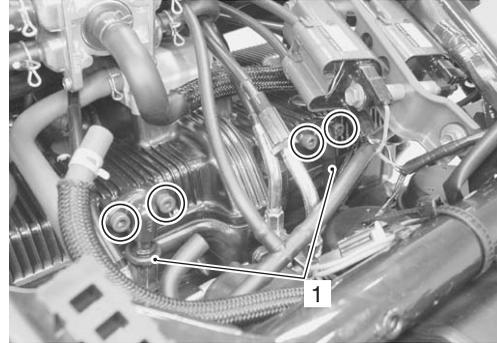
- Pour engine oil and check the oil level. Refer to “Engine Oil and Filter Replacement: in Section 0B”.

Engine Cooling Hose Removal and Installation

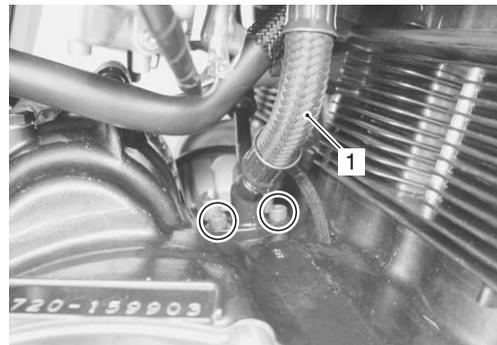
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Removal

- 1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation: in Section 1G”.
- 2) Remove the cooling hoses (1).



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I649G1160005-02

Installation

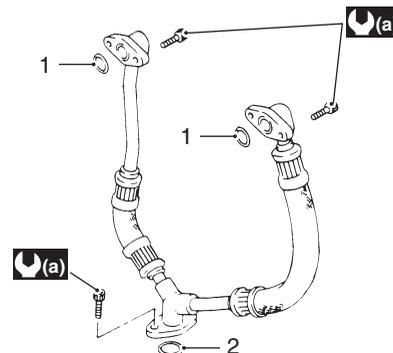
CAUTION

Replace the O-rings ((1) and (2)) with new ones to prevent oil leakage.

- 1) Install the left and right cooling hoses and tighten their mounting bolts to the specified torque.

Tightening torque

Engine Cooling hose mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I649G1160006-04

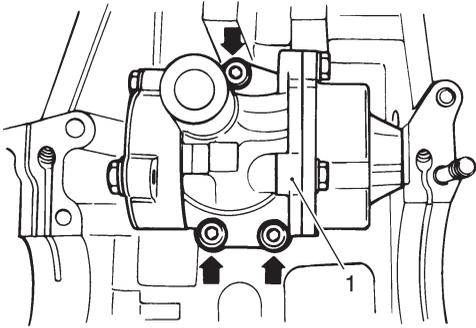
- 2) Install the fuel tank. Refer to “Fuel Tank Removal and Installation: in Section 1G”.

Oil Pump / Oil Pressure Regulator Removal and Installation

B649G11606031

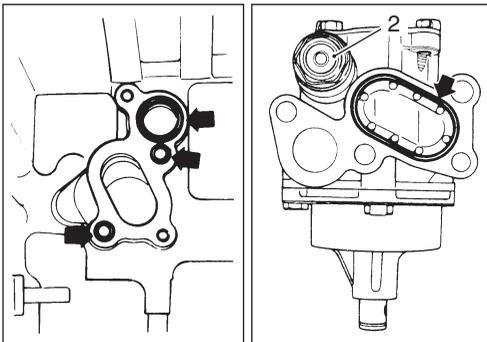
Removal

- 1) Separate the crankcases, upper and lower. Refer to "Engine Bottom Side Disassembly: in Section 1D".
- 2) Remove the oil pump (1).



I649G1160007-01

- 3) Remove the O-rings and dowel pins.
- 4) Remove the oil pressure regulator (2) from the oil pump.



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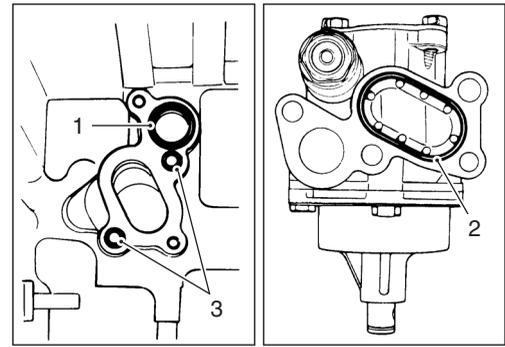
Installation

Install the oil pump and oil pressure regulator in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

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

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

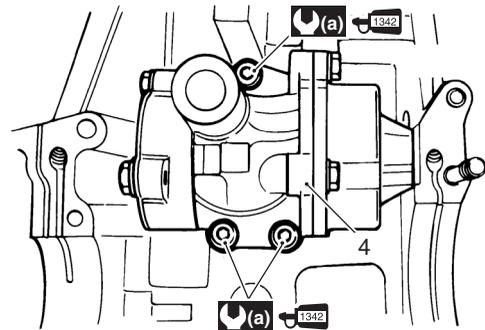


I649G1160009-01

- Apply a small quantity of THREAD LOCK "1342" to the bolts.
- Install the oil pump (4) into the lower crankcase and tighten the bolts to the specified torque.

Tightening torque

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



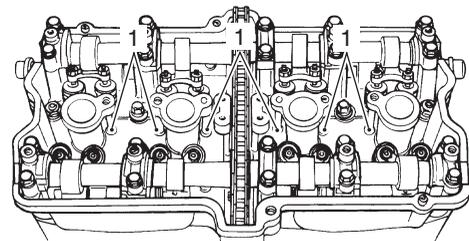
I649G1160010-02

Oil Nozzle Removal and Installation

B649G11606032

Removal

- 1) Remove the cylinder head cover. Refer to "Engine Top Side Disassembly: in Section 1D".
- 2) Remove the oil nozzles (1).



I649G1160011-01

1F-11 Engine Cooling System:

Installation

Install the oil nozzle in the reverse order of removal. Pay attention to the following point:

- When installing the cylinder head cover, refer to “Engine Top Side Assembly: in Section 1D”.

Oil Return Pipe (Cylinder Side) Removal and Installation

B649G11606033

Refer to “Engine Top Side Disassembly: in Section 1D” and “Engine Top Side Assembly: in Section 1D”.

Oil Return Pipe (Crankcase Side) Removal and Installation

B649G11606034

Refer to “Engine Bottom Side Disassembly: in Section 1D” and “Engine Bottom Side Assembly: in Section 1D”.

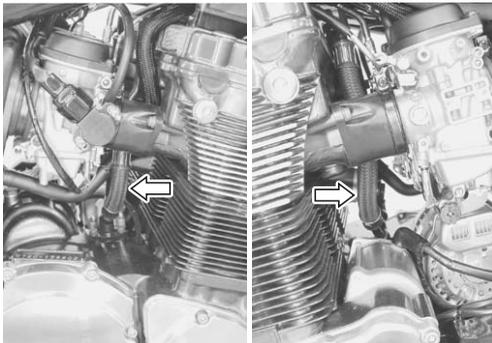
Engine Cooling System Inspection

B649G11606035

Cooling Hose

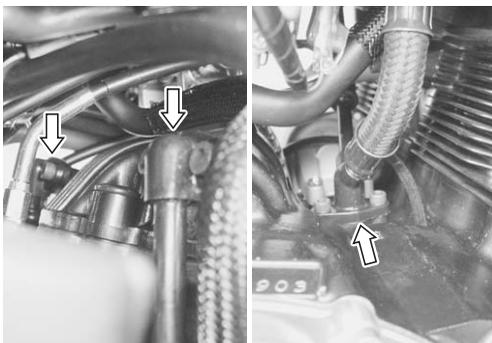
Inspect the cooling hoses for damage or oil leakage of hose connection.

If any damage is found or oil leakage, replace the cooling hose assembly with a new one.



I649G1160012-01

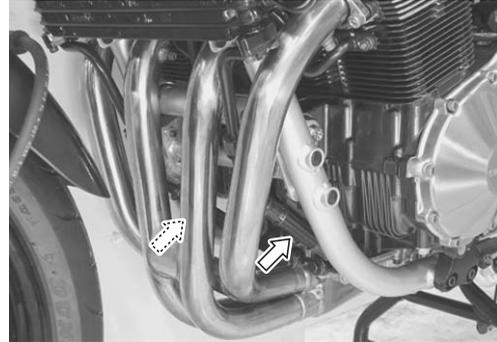
Inspect the cooling hoses are connected securely. If any leakage from the connecting section should be corrected by proper tightening or replace the O-ring with a new one.



I649G1160013-01

Oil Cooler Hose

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



I649G1160014-01

Oil Cooler

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

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



I649G1160015-01

Oil Pump

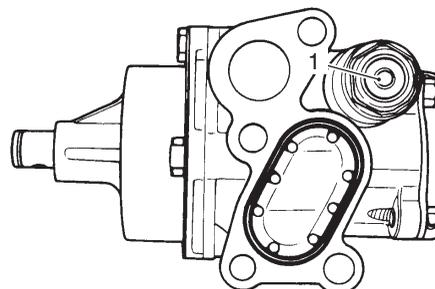
Refer to “Oil Pump Inspection: in Section 1E”.

Oil Pressure Check

Refer to “Oil Pressure Check: in Section 1E”.

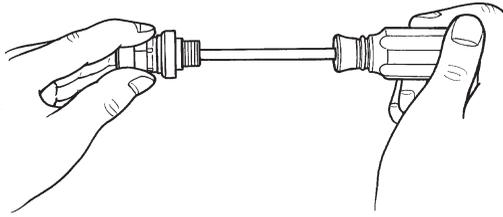
Oil Pressure Regulator

- 1) Remove the oil pump. Refer to “Oil Pump / Oil Pressure Regulator Removal and Installation: ”.
- 2) Inspect the oil pressure regulator (1) mounted on the oil pump assembly.



I649G1160016-01

- 3) Remove the oil pressure regulator from the oil pump.
- 4) Check the operation of the oil pressure regulator by pushing on the piston with an appropriately sharpened tool. If the piston does not operate, replace the oil pressure regulator with a new one.



I649G1160017-01

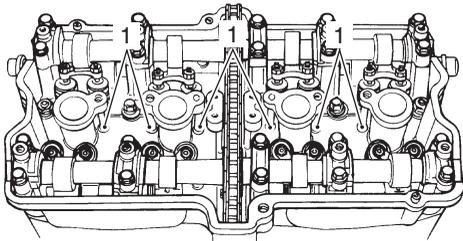
- 5) Install the oil pressure regulator and oil pump. Refer to "Oil Pump / Oil Pressure Regulator Removal and Installation: "

Tightening torque

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

Oil Nozzle

- 1) Remove the cylinder head cover. Refer to "Engine Top Side Disassembly: in Section 1D".
- 2) Inspect the oil nozzles (1) are installed properly. They press-fitted in the cylinder head. If it is loosened, replace the oil nozzle with a new one and its gasket with a new one. Refer to "Oil Nozzle Removal and Installation: "



I649G1160011-01

- 3) Install the cylinder head cover. Refer to "Engine Top Side Assembly: in Section 1D".

Oil Cooler Cleaning

B649G11606036

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

⚠ CAUTION

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



I649G1160018-01

Specifications

Service Data

B649G11607002

Oil Pump

Item	Standard	Limit
Oil pump reduction ratio	1.703 (72/46 x 37/34)	—
Oil pressure (at 60 °C, 140 °F)	Above 300 kPa (3.0 kgf/cm ² , 43 psi) Below 600 kPa (6.0 kgf/cm ² , 85 psi) at 3 000 r/min.	—

Oil

Item	Specification	Note
Engine oil type	SAE 10W-40, API SF/SG or SH/SJ with JASO MA	
Engine oil capacity	Change	3 300 ml (3.4/2.9 US/Imp qt)
	Filter change	3 500 ml (3.6/3.0 US/Imp qt)
	Overhaul	4 600 ml (4.9/4.0 US/Imp qt)

Tightening Torque Specifications

B649G11607003

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb-ft	
Oil cooler hose connecting bolt	10	1.0	7.0	
Oil cooler mounting bolt	10	1.0	7.0	
Oil cooler hose bracket bolt	10	1.0	7.0	
Oil cooler hose union bolt	28	2.8	20.0	
Engine Cooling hose mounting bolt	10	1.0	7.0	
Oil pump mounting bolt	10	1.0	7.0	
Oil pressure regulator	28	2.8	20.0	

NOTE

The specified tightening torque is also described in the following.

“Engine Cooling System Components: ”

“Oil Cooler and Oil Cooler Hose Components: ”

“Oil Cooler and Oil Cooler Hose Construction: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G11608001

Material	SUZUKI recommended product or Specification	Note
Thread lock cement	Thread Lock Cement 1342 or equivalent	P/No.: 99000–32050 
	Thread Lock Cement Super 1322 or equivalent	P/No.: 99000–32110 

NOTE

Required service material is also described in the following.

“Engine Cooling System Components: ”

“Oil Cooler and Oil Cooler Hose Components: ”

“Oil Cooler and Oil Cooler Hose Construction: ”

Fuel System

Precautions

Precautions for Fuel System

B649G11700001

⚠ WARNING

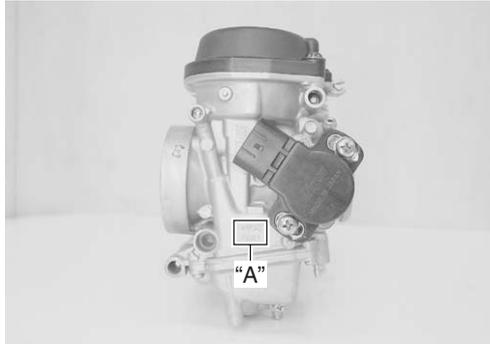
**Gasoline is highly flammable and explosive. Extreme care must be taken.
Keep heat, sparks and flames away from gasoline.**

General Description

I.D. No. Location

B649G11701001

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



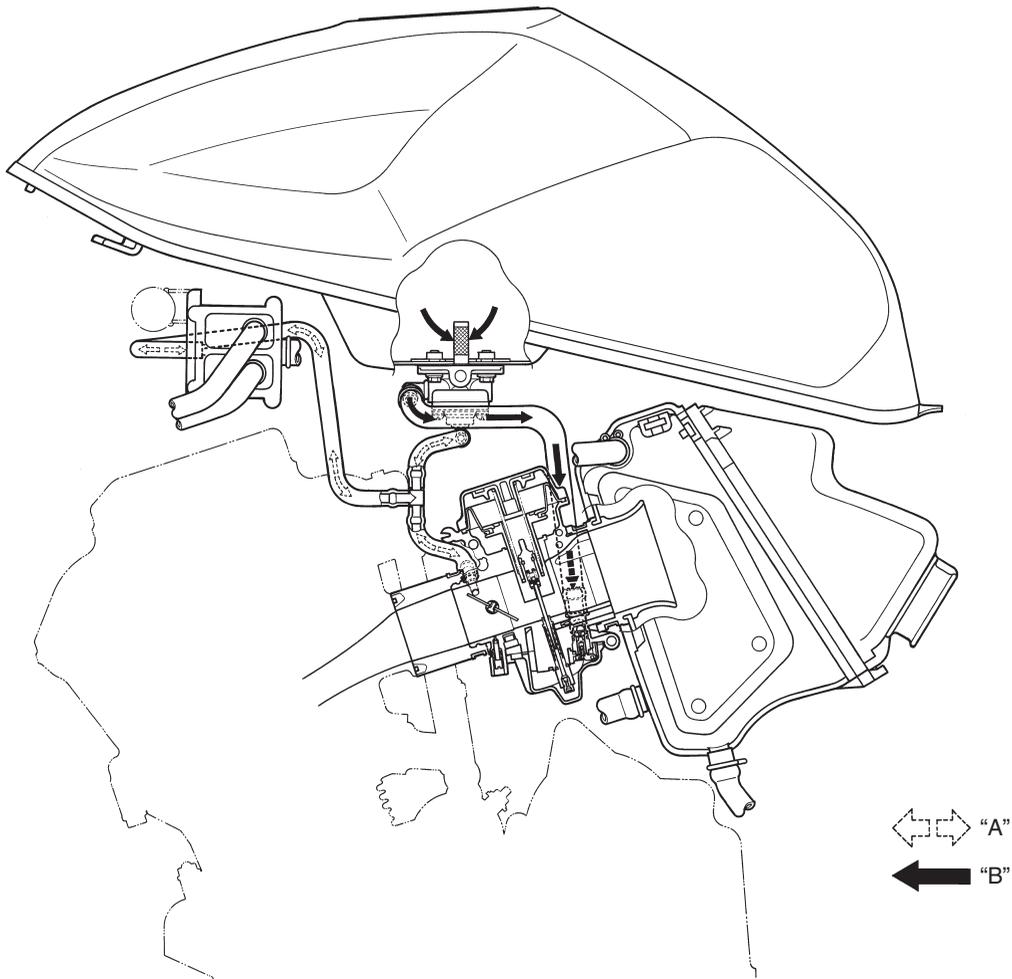
I649G1170001-01

Fuel System Description

B649G11701002

Fuel System

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



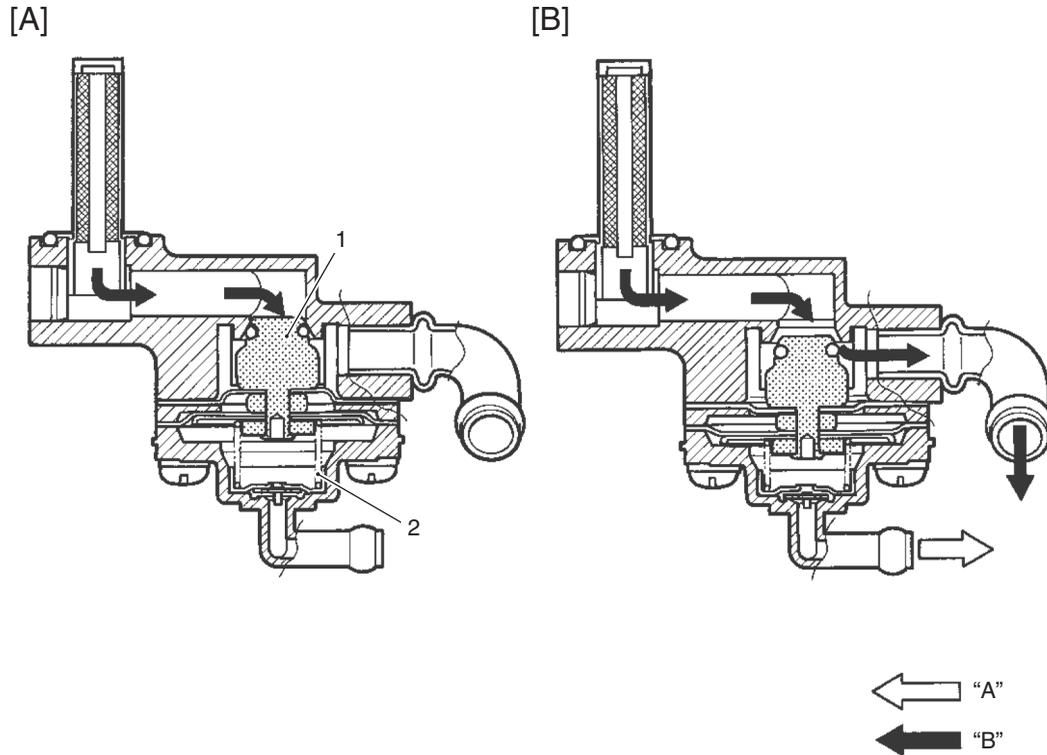
"A": Vacuum	"B": Fuel
-------------	-----------

I649G1170002-02

Fuel Valve

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

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



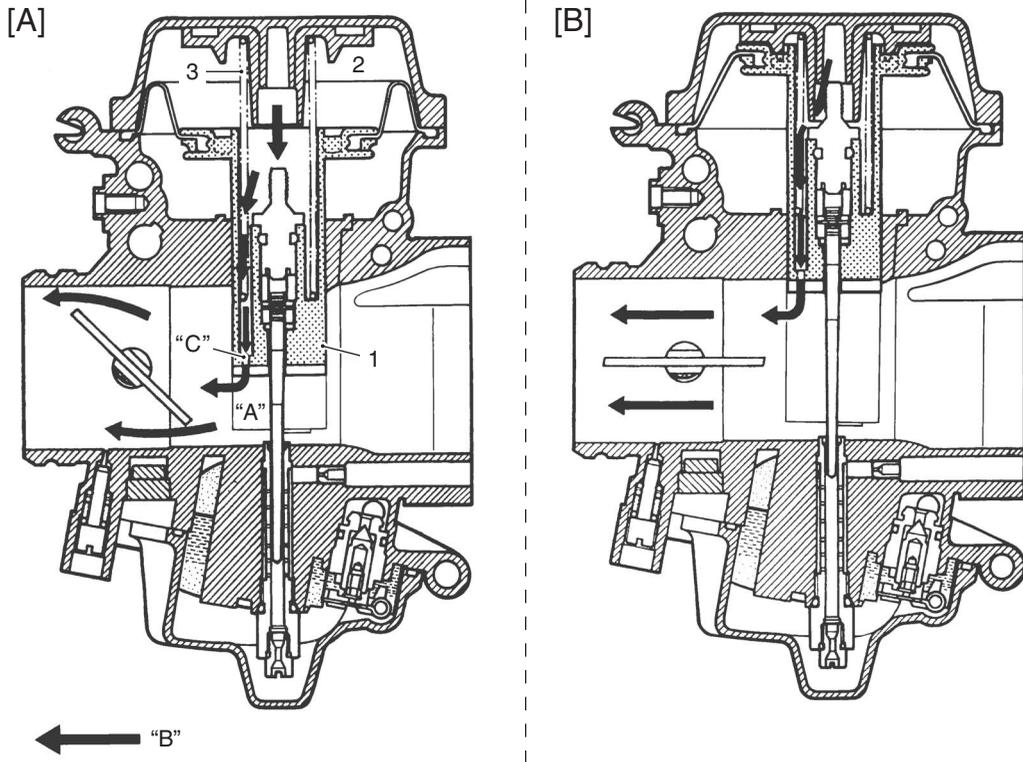
1. Fuel valve	"A": Vacuum	[A]: "Fuel stop" condition
2. Spring	"B": Fuel	[B]: "Fuel flow" condition

1G-4 Fuel System:

Diaphragm and Piston Operation

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

Rising negative pressure overcomes the spring (3) force, causing the piston valve (1) to rise into the diaphragm chamber and prevent the air velocity from increasing. Thus, air velocity in the venturi passage is kept relatively constant for improved fuel atomization and the precise air/fuel mixture.

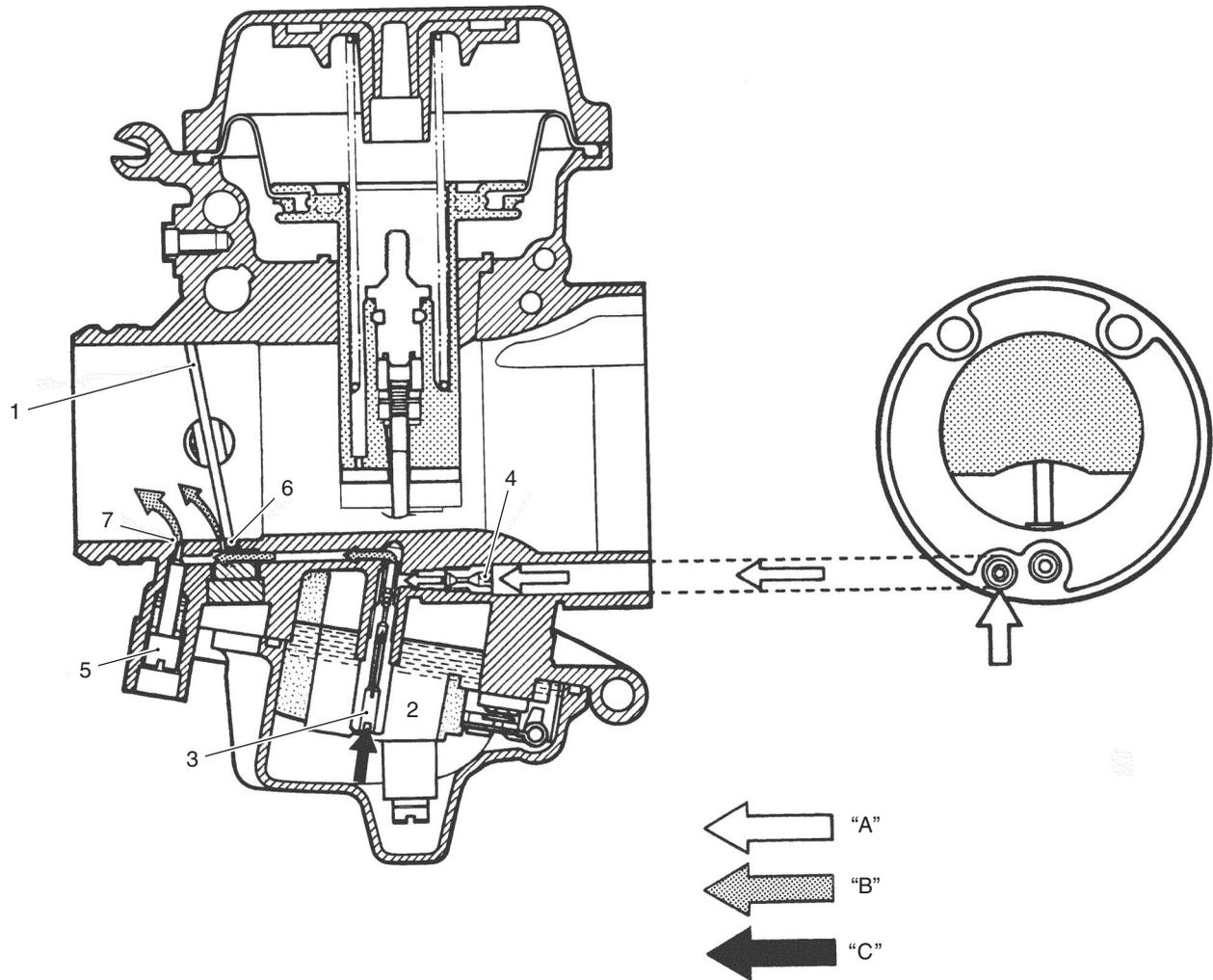


I649G1170004-03

1. Piston valve	3. Spring	"B": Negative pressure	[A]: Lower position of piston valve
2. Diaphragm chamber	"A": Venturi	"C": Orifice	[B]: Upper position of piston valve

Slow System

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



I649G1170005-01

1. Throttle valve	3. Pilot jet	5. Pilot screw	7. Pilot outlet port	"B": Fuel/Air mixture
2. Float chamber	4. Pilot air jet	6. Bypass ports	"A": Air	"C": Fuel

1G-6 Fuel System:

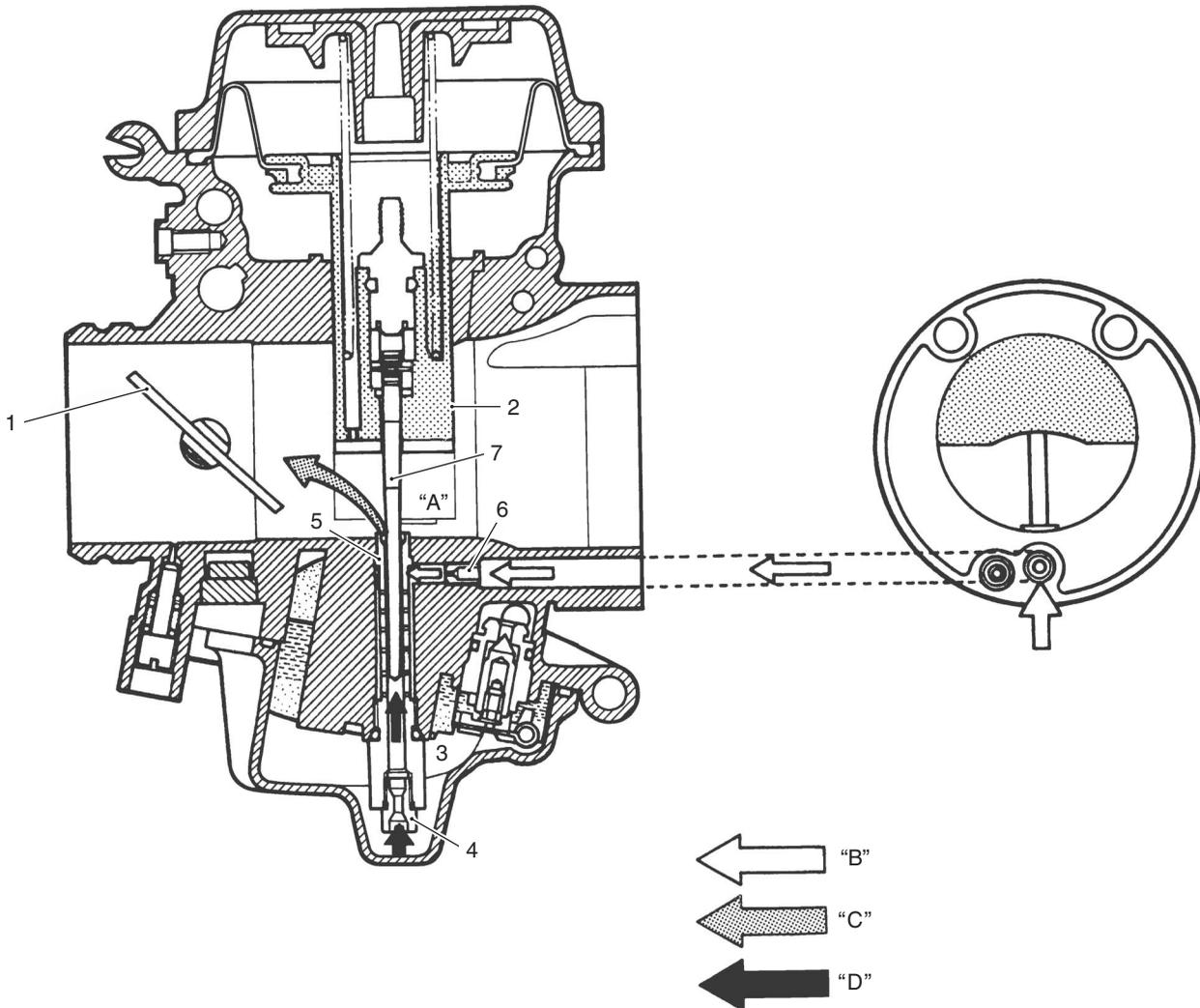
Main System

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

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

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

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



1. Throttle valve	4. Main jet	7. Jet needle	"C": Fuel/Air mixture
2. Piston valve	5. Needle jet	"A": Venturi	"D": Fuel
3. Float chamber	6. Main air jet	"B": Air	

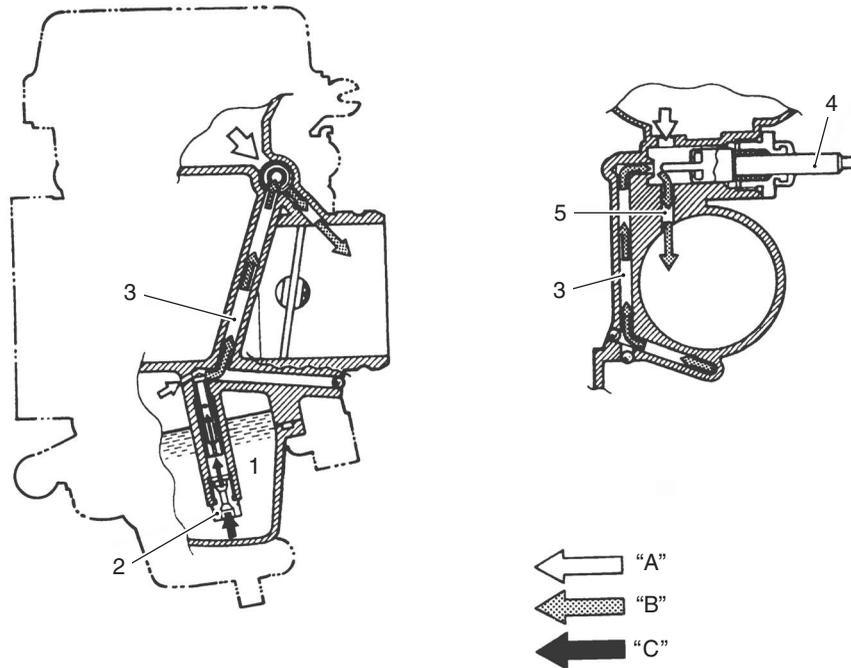
I649G1170006-01

Starter (Enricher) System

Pulling the starter (enricher) plunger causes fuel to be drawn into the starter circuit from the float chamber (1). The starter jet (2) meters this fuel. The fuel then flows into the fuel pipe (3) and mixes with the air coming from the float chamber (1). The mixture, rich in fuel, reaches the starter plunger (4) and mixes again with the air coming through a passage extending from behind the diaphragm. The two successive mixtures of the fuel with the air provide the proper air/fuel mixture for starting. This occurs when the mixture is sprayed through the starter outlet port (5) into the main bore.

NOTE

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



1. Float chamber	3. Fuel pipe	5. Starter outlet port	"B": Fuel/Air mixture
2. Starter jet	4. Starter plunger	"A": Air	"C": Fuel

I649G1170007-01

1G-8 Fuel System:

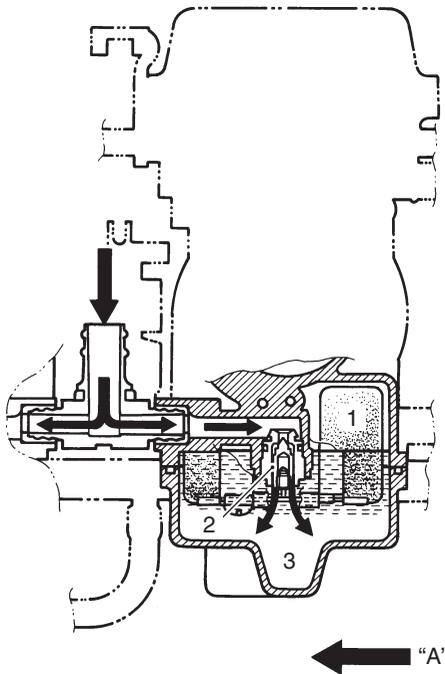
Float System

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

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

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

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



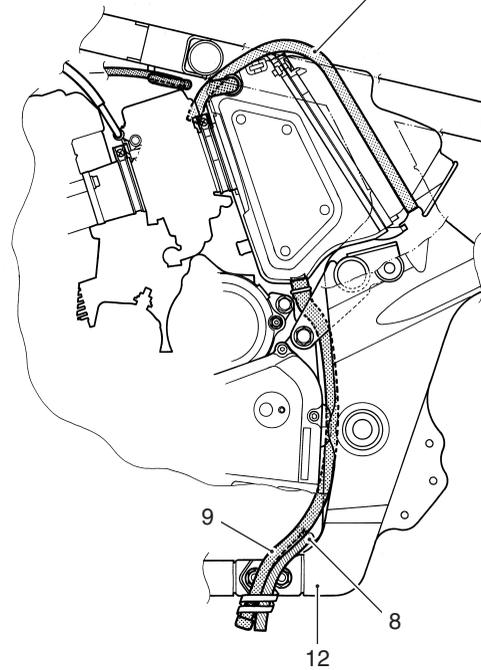
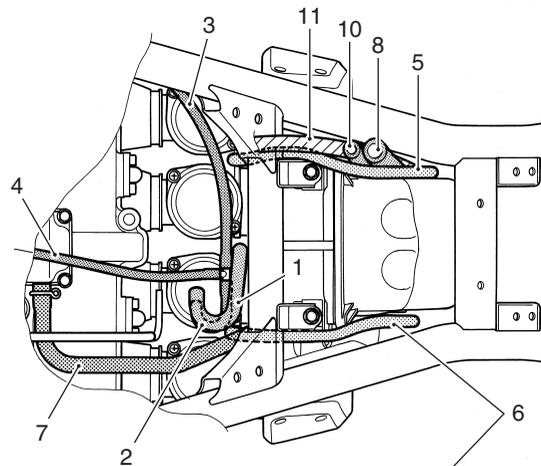
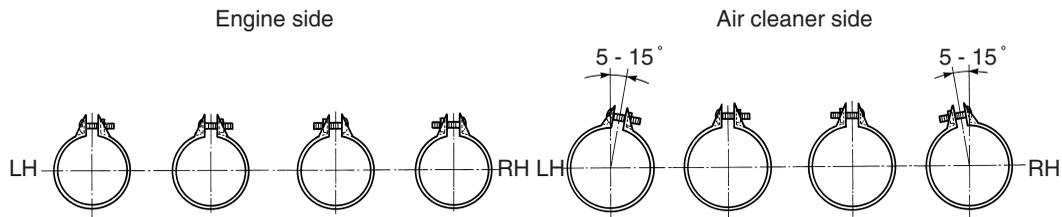
I649G1170008-01

1. Float	3. Float chamber
2. Needle valve	"A": Fuel

Schematic and Routing Diagram

Carburetor Hose Routing Diagram

B649G11702002

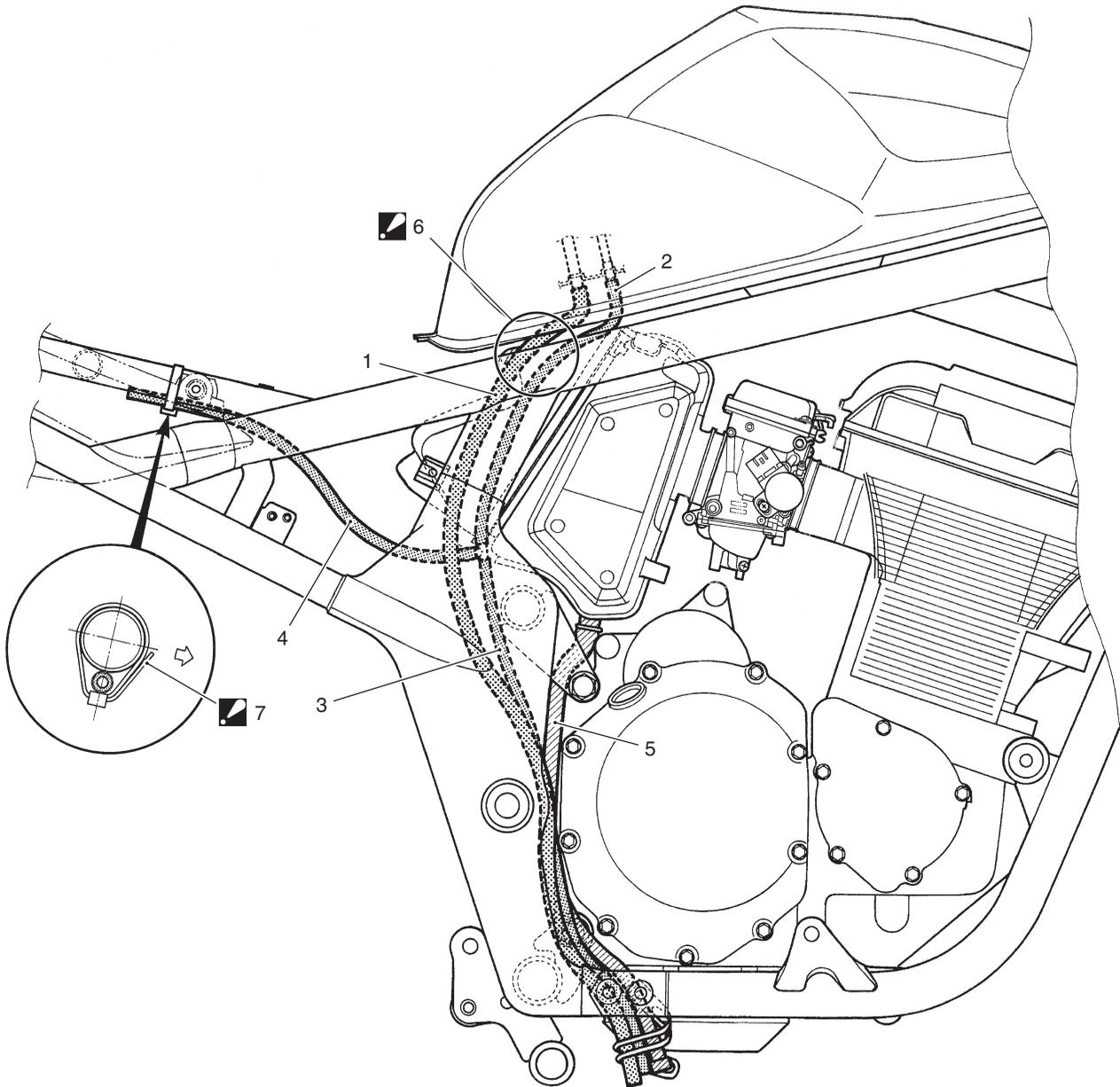


I649G1170009-02

1. Fuel hose (Connected to the carburetor and fuel valve)	5. Air vent hose (RH)	9. Air cleaner box drain hose
2. Vacuum hose (To fuel valve)	6. Air vent hose (LH)	10. Fuel tank breather hose
3. Vacuum hose (To #4 carburetor)	7. PCV hose	11. Wiring harness
4. Vacuum hose (To PAIR valve)	8. Fuel tank drain hose	12. Inside wall of the right frame

Fuel Tank Drain Hose and Breather Hose Routing Diagram

B649G11702005

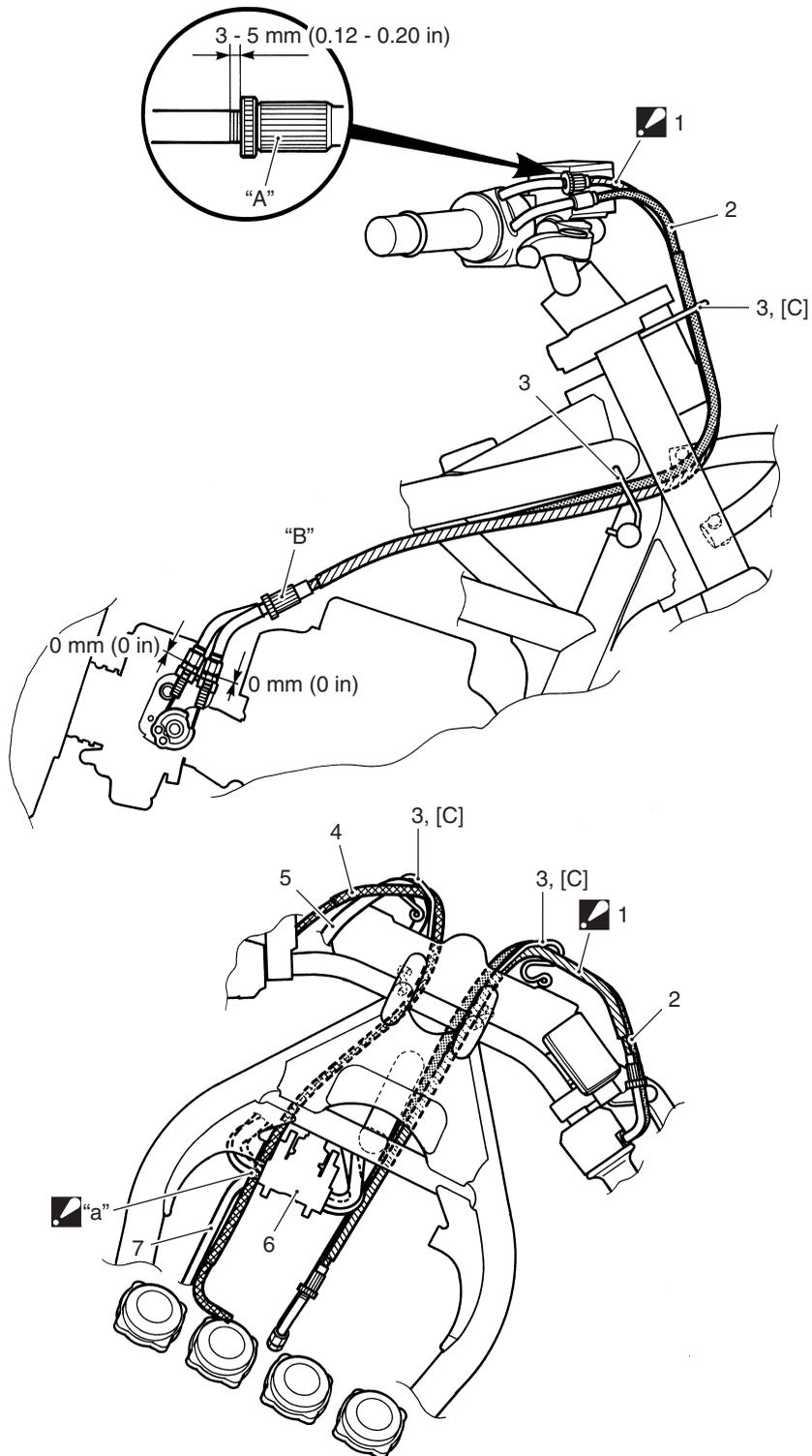


1. Fuel tank drain hose	5. Air cleaner drain hose
2. Fuel tank breather hose No.1	6. Hoses : Be careful not to bind the fuel tank drain hose and fuel tank breather hose with the other hoses and wire harness.
3. Fuel tank breather hose No.2	7. Clamp : Clamp end should face down side. Tip of clamp should face outside.
4. Fuel tank breather hose No.3	

I649G1170010-02

Throttle Cable / Starter Cable Routing Diagram

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I649G1170011-06

<p>1. No.1 throttle cable : After connecting the No.1 throttle cable, set the No.1 throttle thread length to 3 – 5 mm (0.12 – 0.20 in) by the cable adjuster “A”, then adjust the throttle cable play by the cable adjuster “B” to the specified cable play at the throttle grip.</p>	<p>6. PAIR valve</p>
<p>2. No.2 throttle cable</p>	<p>7. PCV hose</p>
<p>3. Cable guide</p>	<p>[C]: Only for GSF1200S</p>
<p>4. Starter (Enricher) cable</p>	<p>“a”: Pass the starter (Enricher) cable through between the PAIR hoses.</p>
<p>5. Clutch hose</p>	

Diagnostic Information and Procedures

Carburetor Symptom Diagnosis

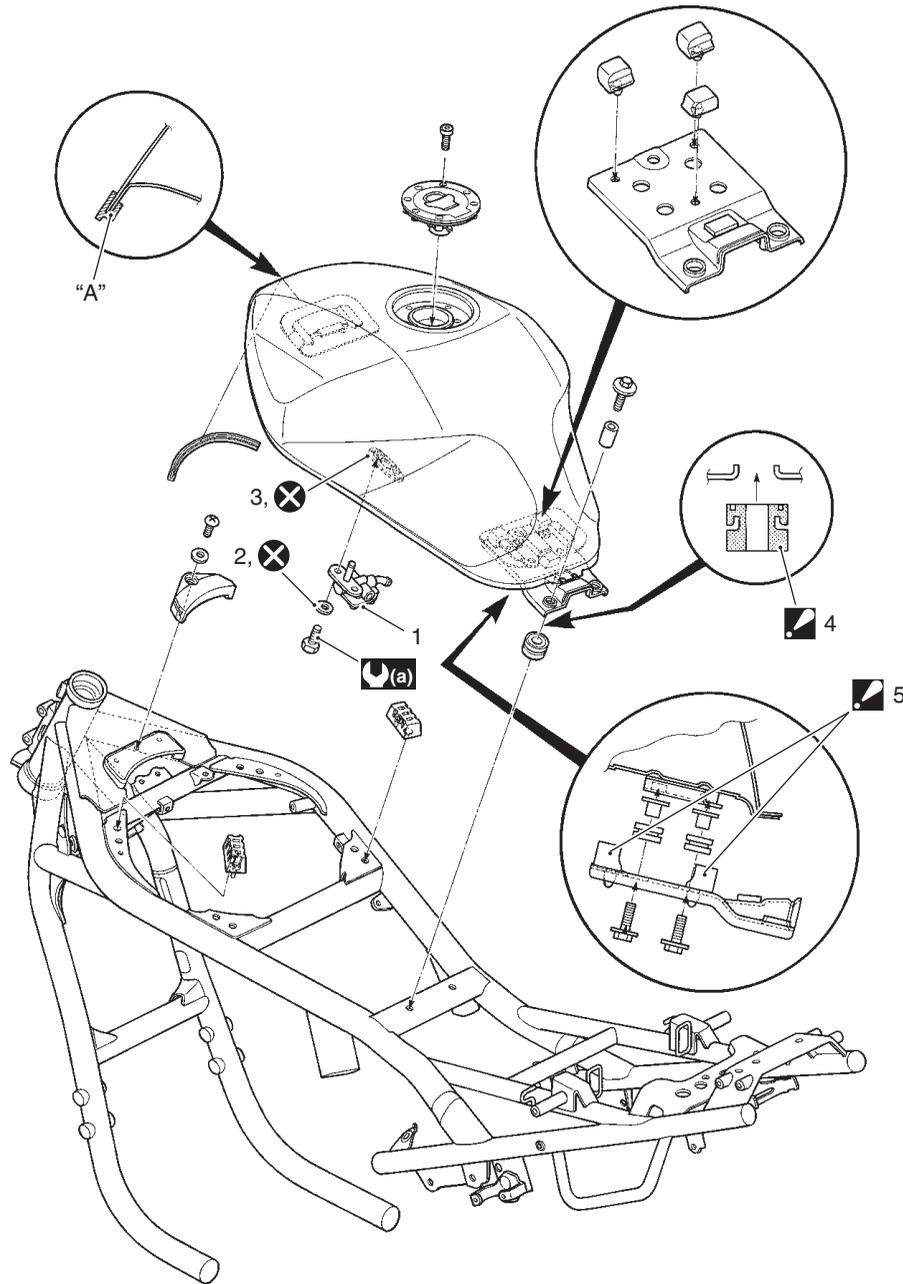
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Condition	Possible cause	Correction / Reference Item
Starting difficulty.	Clogged starter jet.	<i>Clean.</i>
	Clogged starter jet passage.	<i>Clean.</i>
	Air leaking from joint between starter body and carburetor.	<i>Tighten, adjust or replace gasket.</i>
	Air leaking from carburetor joint or vacuum hose joint.	<i>Tighten or replace defective part.</i>
	Improperly working starter (enricher) plunger.	<i>Adjust.</i>
Idling or low-speed trouble.	Clogged or loose pilot jet.	<i>Clean or tighten.</i>
	Clogged or loose pilot air jet.	<i>Clean or tighten.</i>
	Air leaking from carburetor joint, vacuum pipe joint, or starter.	<i>Tighten or replace defective part.</i>
	Clogged pilot outlet port.	<i>Clean.</i>
	Clogged bypass port.	<i>Clean.</i>
	Starter (enricher) plunger not fully closed.	<i>Adjust.</i>
Medium-or high speed trouble	Clogged main jet.	<i>Clean.</i>
	Clogged main air jet.	<i>Clean.</i>
	Clogged needle jet.	<i>Clean.</i>
	Improperly working throttle valve.	<i>Adjust.</i>
	Clogged fuel filter.	<i>Clean or replace.</i>
Overflow and fuel level fluctuations.	Worn or damaged needle valve.	<i>Replace.</i>
	Broken needle valve spring.	<i>Replace.</i>
	Improperly working float.	<i>Adjust or replace.</i>
	Foreign matter on the needle valve.	<i>Clean or replace with needle valve seat.</i>
	Incorrect float chamber fuel level.	<i>Adjust float height.</i>

Repair Instructions

Fuel Tank Construction

B649G11706018



I649G1170013-03

1. Fuel valve	5. Rear bracket cushion : Be careful not to mistake the assembling position and direction.
2. Gasket washer	"A": Apply adhesive agent to the cushion rubber.
3. Gasket	: 4.4 N·m (0.44 kg-f, 3.2 lb-ft)
4. Fuel tank rear cushion : Be careful not to mistake the assembling position and direction.	: Do not reuse.

Fuel Tank Removal and Installation

B649G11706019

Removal

⚠ WARNING

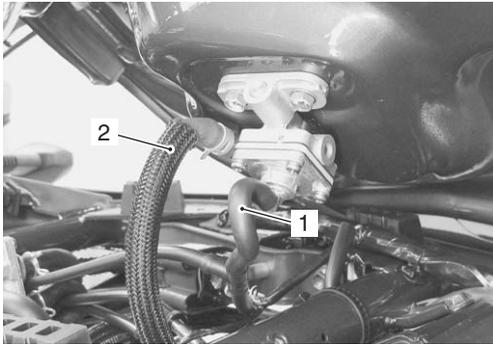
Gasoline is highly flammable and explosive. Keep heat, sparks and flames away from gasoline.

- 1) Remove the seat. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Remove the fuel tank mounting bolts.



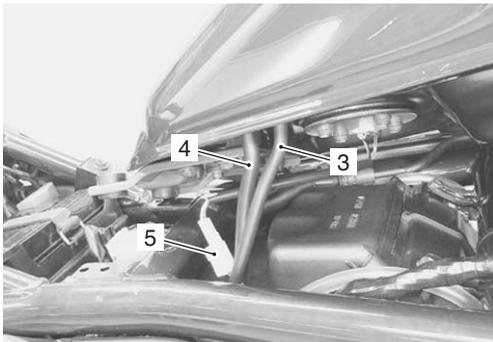
I649G1170014-01

- 3) Disconnect the vacuum hose (1) and fuel hose (2).



I649G1170015-01

- 4) Disconnect the fuel tank air breather hose (3) and water drain hose (4).
- 5) Disconnect the fuel level gauge lead wire coupler (5).
- 6) Remove the fuel tank.



I649G1170016-01

Installation

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

⚠ CAUTION

Be careful not to bend the hoses.

Fuel Valve Removal and Installation

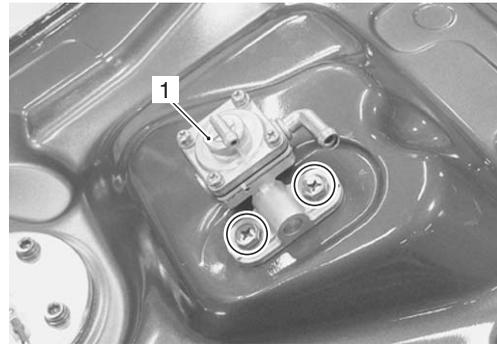
B649G11706020

Removal

⚠ WARNING

Gasoline is very explosive. Extreme care must be taken.

- 1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation: ”.
- 2) Remove the fuel valve (1).



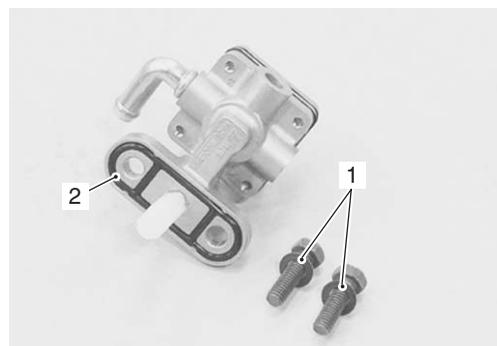
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Installation

Install the fuel valve in the reverse order of removal. Pay attention to the following points:

⚠ WARNING

Replace the gasket washers (1) and gasket (2) with new ones to prevent fuel leakage.

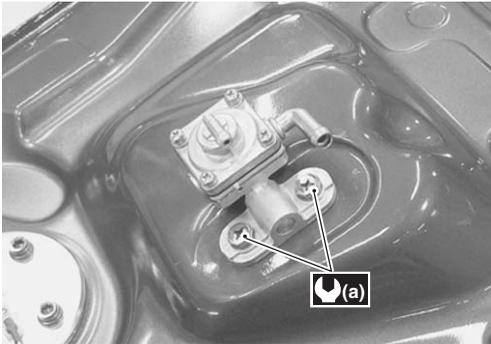


I649G1170019-01

- Tighten the fuel valve mounting bolts to the specified torque.

Tightening torque

Fuel valve mounting bolt (a): 4.4 N·m (0.44 kgf-m, 3.2 lb-ft)



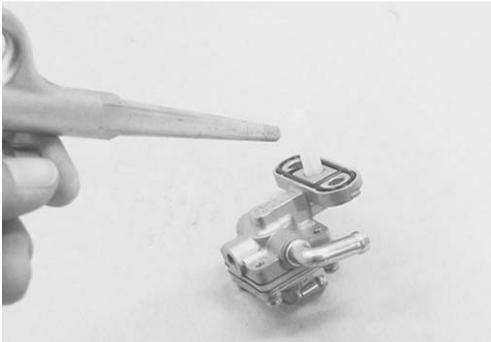
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Fuel Filter Inspection and Cleaning

B649G11706021

Inspect and clean the fuel filter in the following procedures:

- 1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation: ”.
- 2) Remove the fuel valve. Refer to “Fuel Valve Removal and Installation: ”.
- 3) Check the fuel filter for sediment or rust.
If the fuel filter is dirty with sediment or rust, fuel will not flow smoothly and loss in engine power may result. Clean the fuel filter with compressed air.



I649G1170020-01

- 4) Reinstall the fuel valve. Refer to “Fuel Valve Removal and Installation: ”.
- 5) Reinstall the fuel tank. Refer to “Fuel Tank Removal and Installation: ”.

Fuel Level Gauge Removal and Installation

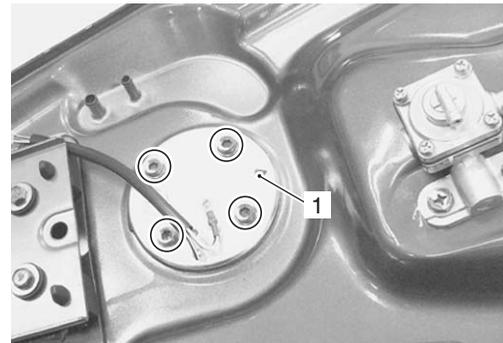
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Removal

⚠ WARNING

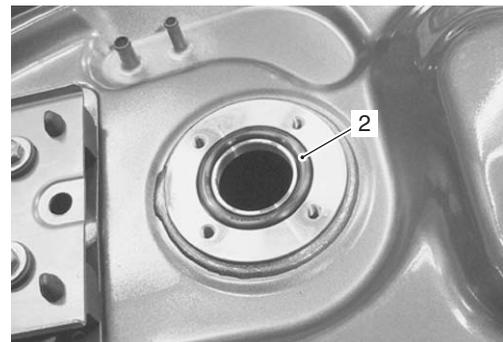
Gasoline is very explosive. Extreme care must be taken.

- 1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation: ”.
- 2) Remove the fuel level gauge (1).



I649G1170021-01

- 3) Remove the O-ring (2).



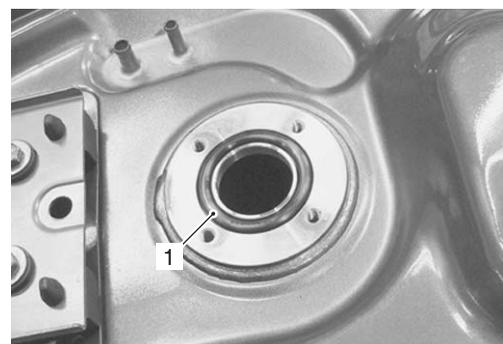
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Installation

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

⚠ WARNING

Replace the O-ring (1) with a new one to prevent fuel leakage.



I649G1170024-02

1G-16 Fuel System:

- Set the triangle mark forward and tighten the fuel level gauge mounting bolts securely.

Tightening torque

Fuel level gauge mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I649G1170023-01

Fuel Level Gauge Inspection

B649G11706023

Refer to "Fuel Level Gauge Inspection: in Section 9C".

Throttle Cable Removal and Installation

B649G11706024

Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: ".
- 2) Remove the right handlebar switch box. Refer to "Handlebars Removal and Installation: in Section 6B".
- 3) Remove the throttle cables as shown in the cable routing diagram. Refer to "Throttle Cable / Starter Cable Routing Diagram: ".

Installation

Install the throttle cables in the reverse order of removal. Pay attention to the following points:

- Install the throttle cables as shown in the cable routing diagram. Refer to "Throttle Cable / Starter Cable Routing Diagram: ".
- Apply SUZUKI SUPER GREASE "A" to the throttle cables and cable pulley.

: Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1170025-02

- After installing, check the throttle cable play and proper operation.

Throttle Cable Inspection

B649G11706025

Check that the throttle grip moves smoothly from full open to full close. If it does not smoothly, lubricate the throttle cables.

Throttle Cable Play Inspection and Adjustment

B649G11706012

Refer to "Throttle Cable Play Inspection and Adjustment: in Section 0B".

Starter Cable Removal and Installation

B649G11706026

Removal

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: ".
- 2) Remove the left handlebar switch box. Refer to "Handlebars Removal and Installation: in Section 6B".
- 3) Remove the starter cable as shown in the cable routing diagram. Refer to "Throttle Cable / Starter Cable Routing Diagram: ".

Installation

Install the starter cable in the reverse order of removal. Pay attention to the following points:

- Install the starter cable as shown in the cable routing diagram. Refer to "Throttle Cable / Starter Cable Routing Diagram: ".
- Apply SUZUKI SUPER GREASE "A" to the starter cable and cable pulley.

: Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1170026-02

- After installing, check the proper operation.

Starter Cable Inspection

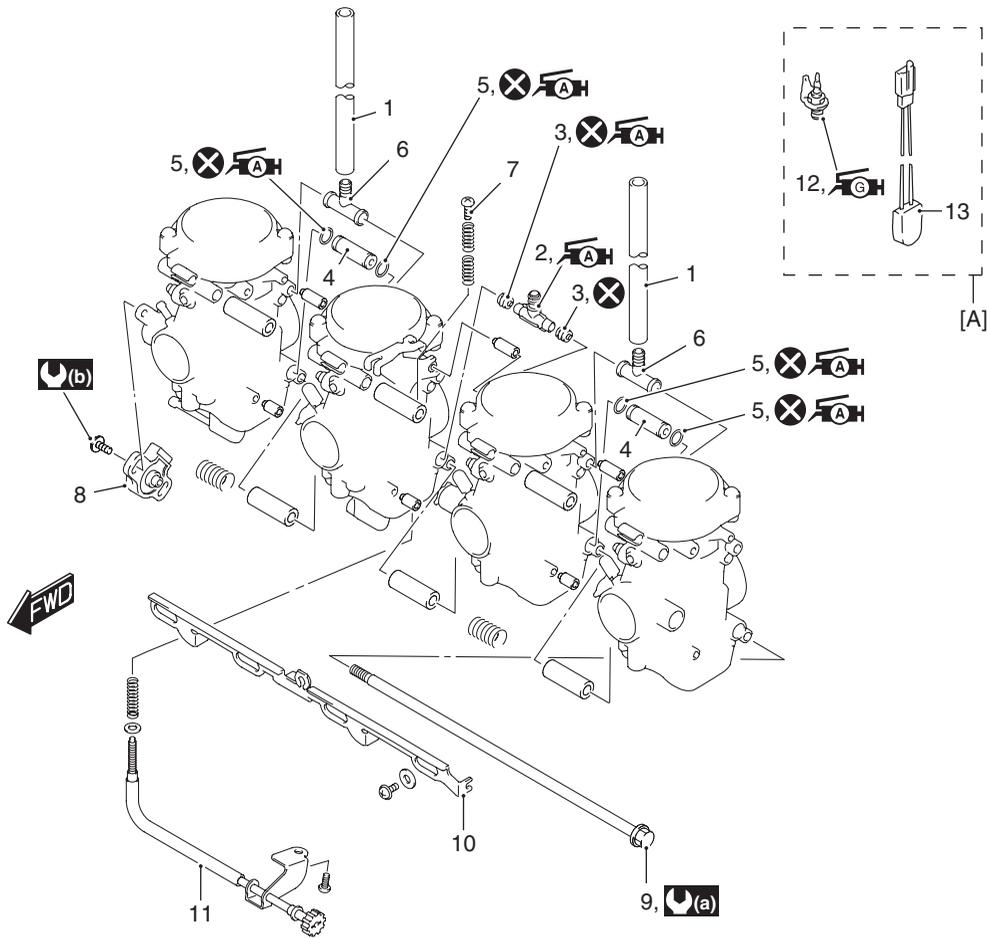
B649G11706027

Check that the starter knob moves smoothly from full open to full close. If it does not smoothly, lubricate the starter cable.

Carburetor Components

B649G11706001

Carburetor Related Parts

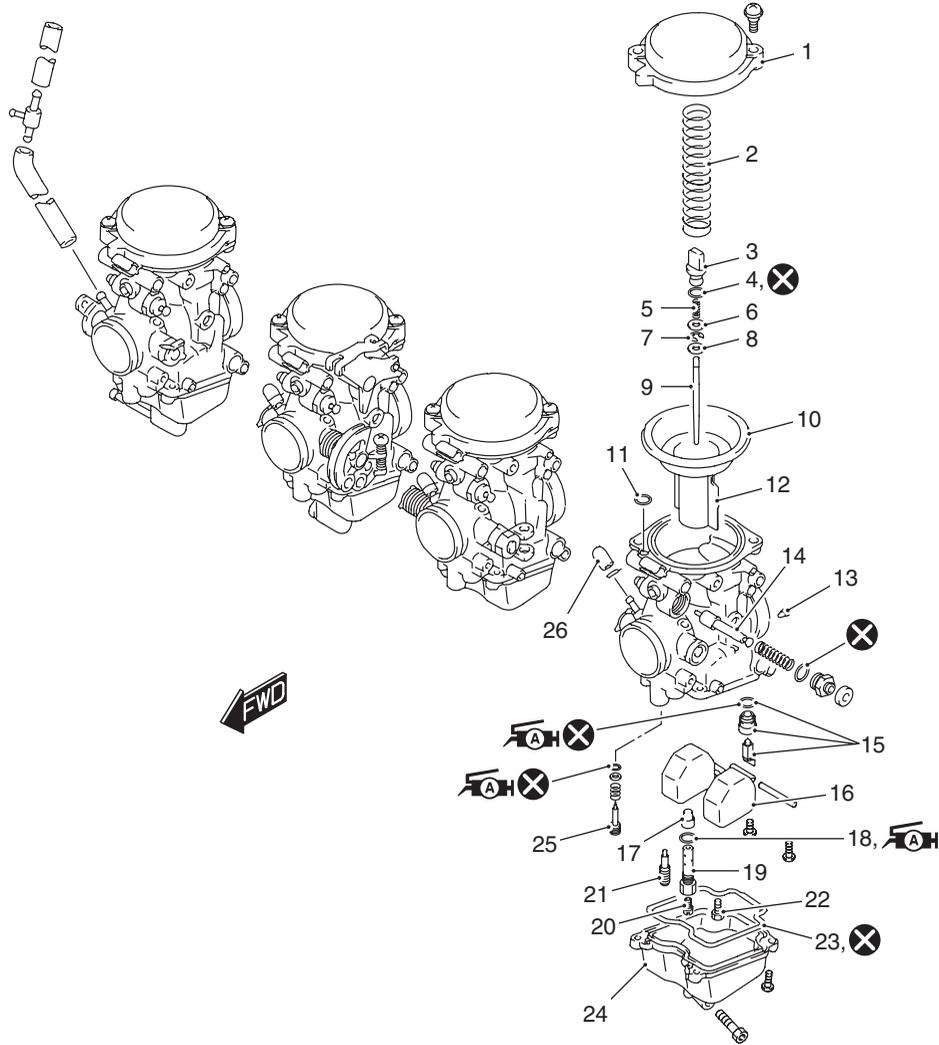


I649G1170027-02

1. Air vent hose	8. Throttle position sensor	(a) : 5.0 N·m (0.5 kgf·m, 3.5 lb·ft)
2. Fuel joint pipe (No.1)	9. Carburetor set shaft	(b) : 2.0 N·m (0.2 kgf·m, 1.5 lb·ft)
3. Seal	10. Starter (Enricher) plate	AH : Apply grease.
4. Fuel joint pipe (No.2)	11. Throttle stop screw	GH : Apply thermo-grease.
5. O-ring	12. Carburetor heater	X : Do not reuse.
6. Air vent joint pipe	13. Thermo-switch	
7. Throttle valve synchronizing screw	[A]: For E-02, 19	

1G-18 Fuel System:

Carburetor Parts



I649G1170077-01

1. Top cap	8. Spacer	15. Needle valve assembly	22. Starter jet
2. Spring	9. Jet needle	16. Float	23. Gasket (O-ring)
3. Jet needle stopper	10. Diaphragm	17. Needle jet	24. Float chamber
4. O-ring	11. O-ring	18. O-ring	25. Pilot screw
5. Spring	12. Piston valve	19. Main jet holder	26. Vacuum inlet cap
6. Washer	13. Pilot air jet	20. Main jet	AH : Apply grease.
7. E-ring	14. Starter (Enricher) plunger	21. Pilot jet	X : Do not reuse.

Carburetor Assembly Removal and Installation

B649G11706002

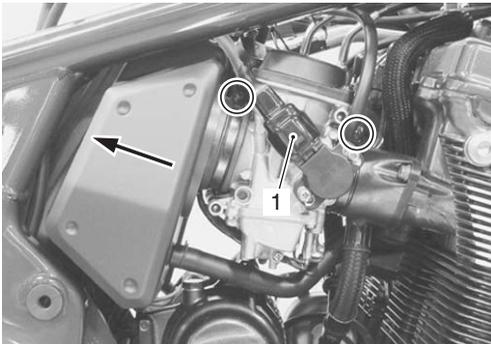
Removal

- 1) Remove the seat and frame covers. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: ".
- 3) Remove the air cleaner box mounting bolts.

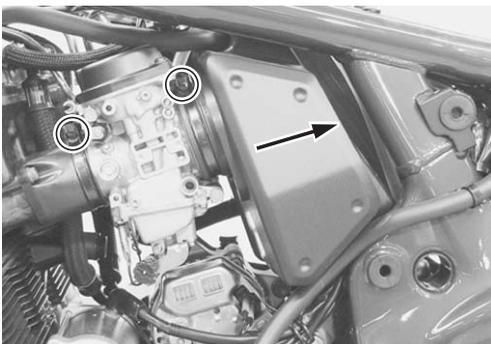


I649G1170028-01

- 4) Disconnect the TP sensor coupler (1).
- 5) Loosen the respective carburetor clamp screws.
- 6) Move the air cleaner box backward.

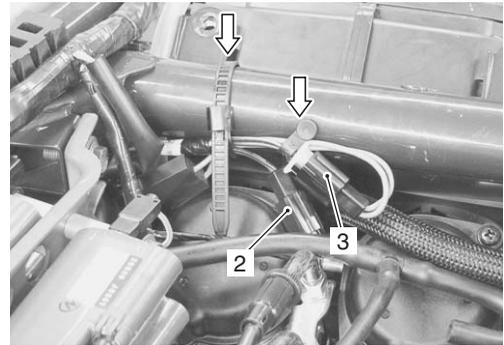


I649G1170029-02



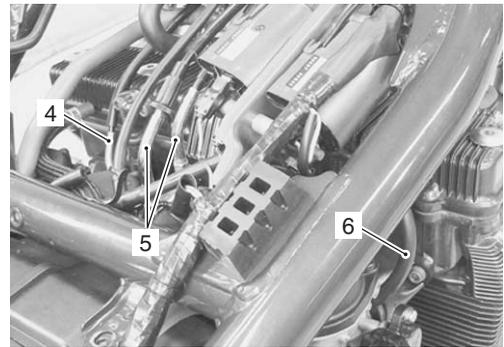
I649G1170030-02

- 7) Disconnect the carburetor heater lead wire coupler (2). (For E-02, 19)
- 8) Remove the thermo-switch (3). (For E-02, 19)



I649G1170031-02

- 9) Disconnect the starter cable (4) and throttle cables (5).
- 10) Disconnect the vacuum hose (6).
- 11) Remove the carburetor assembly.



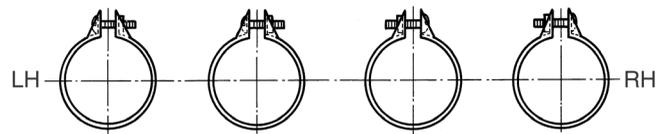
I649G1170032-01

Installation

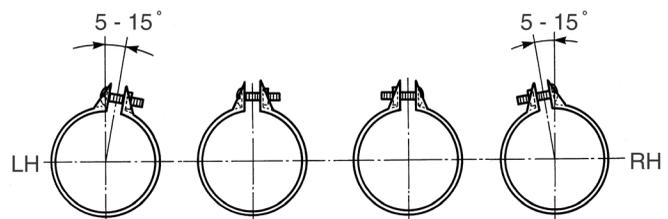
Install the carburetor assembly in the reverse order of removal. Pay attention to the following points:

- Position the carburetor clamps as shown.

Engine side



Air cleaner side



I649G1170033-01

1G-20 Fuel System:

- After all of the work has been completed, install the carburetor assembly onto the engine and perform the following adjustments.
 - Engine idle speed. Refer to “Engine Idle Speed Inspection and Adjustment: in Section 0B”.
 - Throttle cable play. Refer to “Throttle Cable Play Inspection and Adjustment: in Section 0B”.
 - Carburetor synchronization. Refer to “Carburetor Synchronization: ”.

Carburetor Disassembly

B649G11706003

Refer to “Carburetor Assembly Removal and Installation: ”.

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

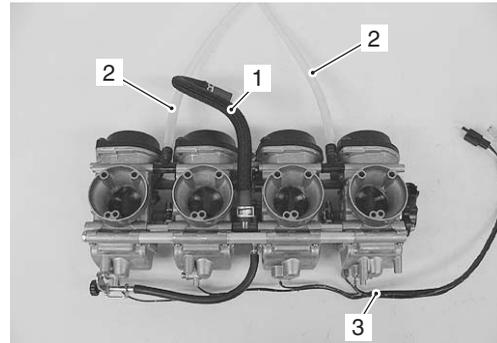
⚠ CAUTION

- **Avoid removing the throttle position sensor from the carburetor body unless absolutely necessary.**
- **The TP sensor is preset at the factory. Prior to disassembly, mark the throttle position sensor’s original position with paint or a scribe for accurate reinstallation.**



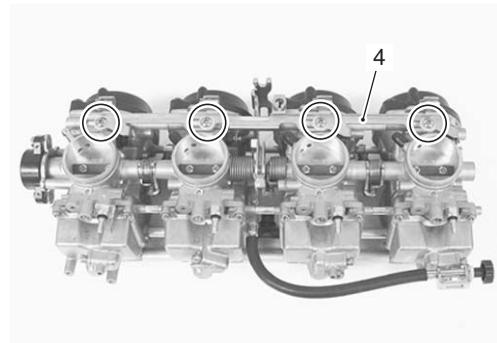
I649G1170034-02

- 1) Disconnect the fuel hose (1).
- 2) Disconnect the air vent hoses (2).
- 3) Disconnect the carburetor heater terminal lead wires (3). (For E-02, 19)



I649G1170035-02

- 4) Remove the starter (enricher) plate (4) by removing the fitting screws.



I649G1170036-01

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

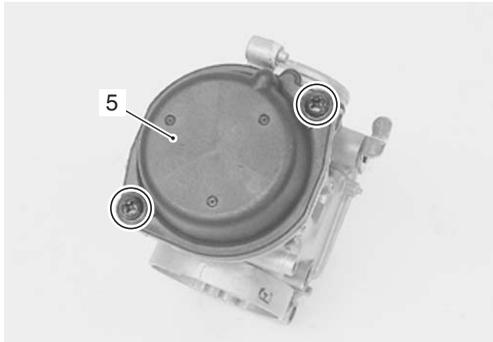


I649G1170037-01

7) Remove the top cap (5).

⚠ CAUTION

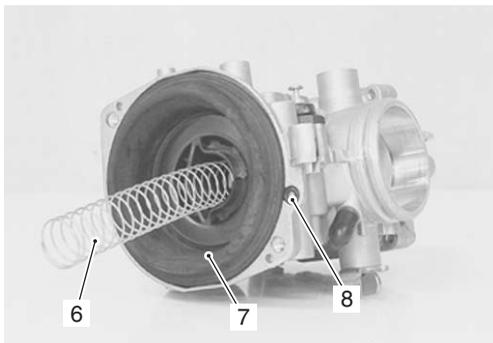
Do not use compressed air on the carburetor body, before removing the diaphragm; this may damage the diaphragm.



I649G1170038-01

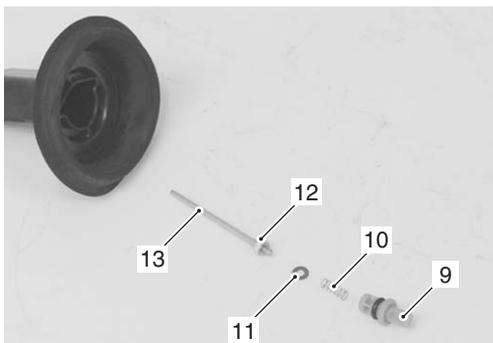
8) Remove the spring (6) and the piston valve along with its diaphragm (7).

9) Remove the O-ring (8).



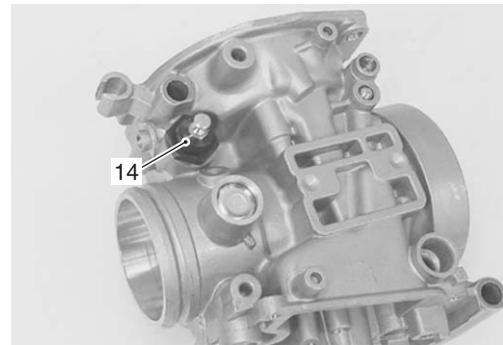
I649G1170039-01

10) Remove the jet needle stopper (9), spring (10), washer (11), spacer (12) and jet needle (13).



I649G1170040-01

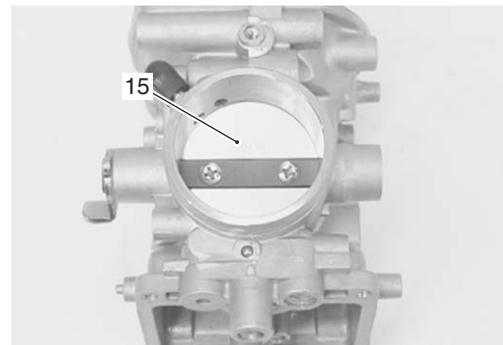
11) Remove the starter (enricher) plunger assembly (14).



I649G1170041-01

⚠ CAUTION

Never remove the throttle valve (15).

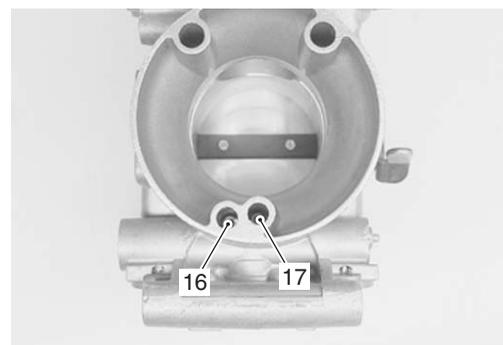


I649G1170042-01

12) Remove the pilot air jet (16).

⚠ CAUTION

Do not remove the main air jet (17). It is press fitted at the factory and attempting to remove it will cause damage.

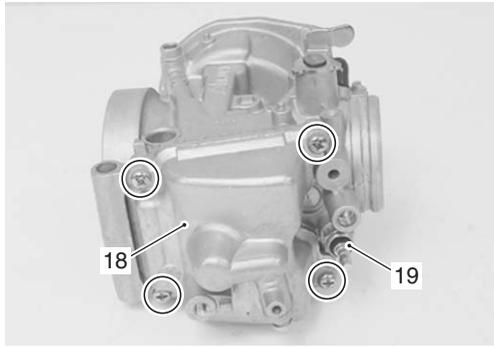


I649G1170043-01

1G-22 Fuel System:

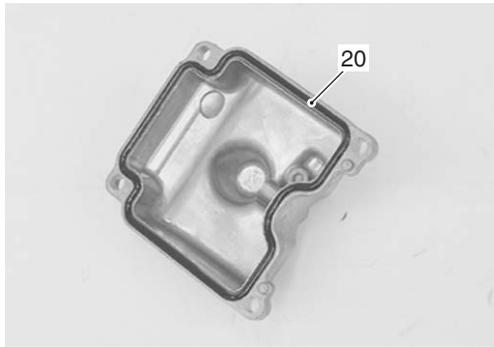
13) Remove the float chamber (18).

14) Remove the carburetor heater (19). (For E-02, 19)



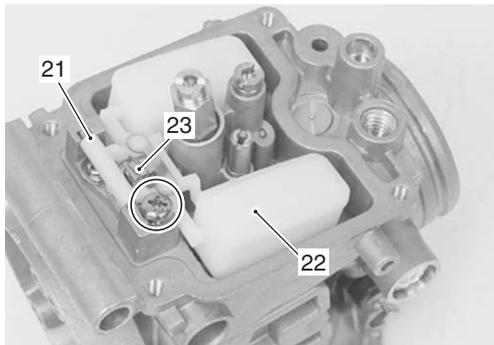
I649G1170044-02

15) Remove the O-ring (20).



I649G1170045-02

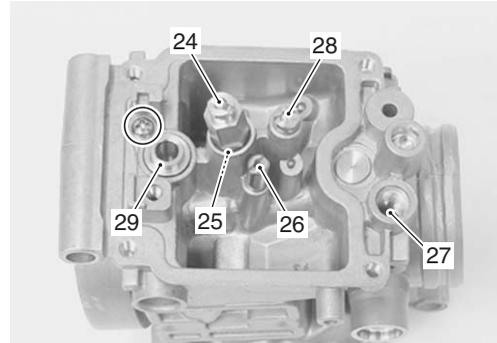
16) Remove the float pin (21) and then remove the float (22) and needle valve (23).



I649G1170047-02

17) Remove the following parts.

- Main jet (24)
- Needle jet (25)
- Pilot jet (26)
- Pilot screw (27) (with tampering plug type)
- Starter (enricher) jet (28)
- Valve seat (29)



I649G1170048-03

NOTE

Before removing the pilot screw (27), its setting must be determined.

Slowly turn the pilot screw clockwise and count the number of turns until it is lightly seated. Make a note of how many turns were made.

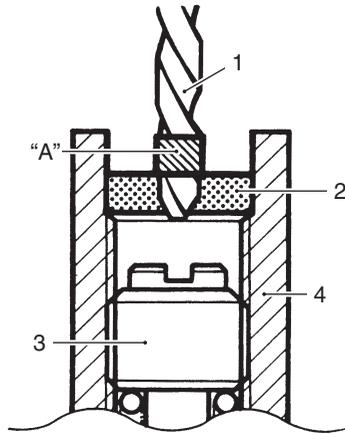
When reassembling the pilot screw, you will want to set it to its original position.

Pilot Screw Removal (For with Tampering Plug Type)

Because harsh cleaning solvents can damage the O-ring seals in the pilot system, the pilot system components should be removed before cleaning.

- 1) Use a 1/8 size drill bit (1) with a drill-stop "A" to remove the pilot screw plug (2).
- 2) Set the drill-stop "A" 6 mm from the end of the bit to prevent drilling into the pilot screw (3).

3) Carefully drill through the plug (2).



I649G1170046-01

1. Drill bit	4. Carburetor body
2. Tampering plug	"A": Drill-stop
3. Pilot screw	

- 4) Thread a self-tapping sheet metal screw into the plug (2).
- 5) Pull on the screw head with pliers to remove the plug.
- 6) Carefully clean any metal shavings from the area.
- 7) Slowly turn the pilot screw clockwise and count the number of turns until the screw is lightly seated. Make a note of how many turns were made so the screw can be reset correctly after cleaning.
- 8) Remove the pilot screw along with the spring, washer, and O-ring.

Carburetor Assembly

B649G11706011

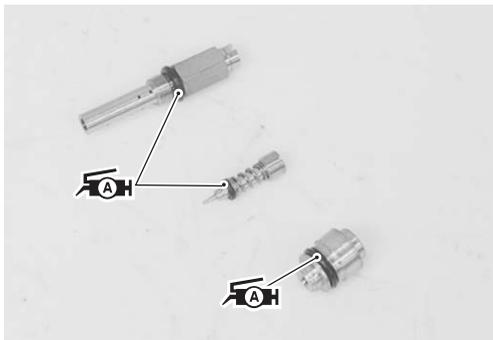
Reassemble the carburetors in the reverse order of disassembly. Pay attention to the following points:

- Apply thin coat of the grease to each new O-ring.

CAUTION

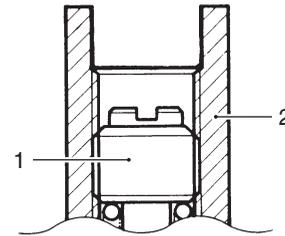
Replace the O-rings with new ones.

⚠️: Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1170049-01

- After cleaning, reinstall the pilot screw to the original setting by turning the screw (1) in until it lightly seats, and then backing it out the same number of turns counted during disassembly.



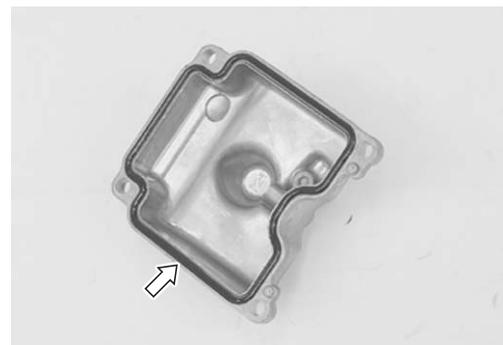
I649G1170050-01

1. Pilot screw	2. Carburetor body
----------------	--------------------

- Install a new plug by tapping it into place with a punch. (For with tampering plug type)
- Check the float height. Refer to "Float Height Inspection and Adjustment: ".
- Install a new O-ring to its groove properly.

CAUTION

Replace the O-ring with a new one.



I649G1170051-01

- Apply thermo-grease to the threads and tighten the carburetor heater. (For E-02, 19)

⚠️: Grease 99000-59029 (THERMO-GREASE or equivalent)

Tightening torque

Carburetor heater: 3.0 N·m (0.3 kgf-m, 2.0 lb-ft)



I649G1170052-01

1G-24 Fuel System:

- Before installing the top cap, install the new O-ring.

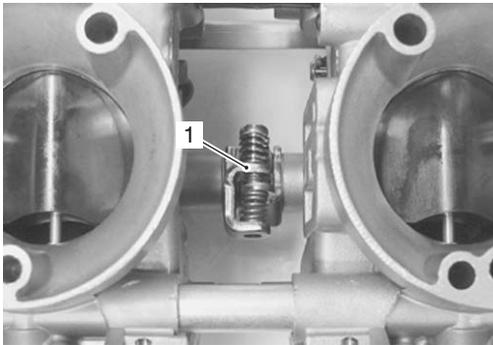
⚠ CAUTION

Replace the O-ring with a new one.

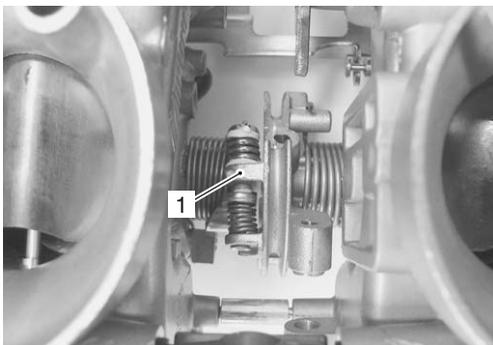


I649G1170053-01

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



I649G1170054-01



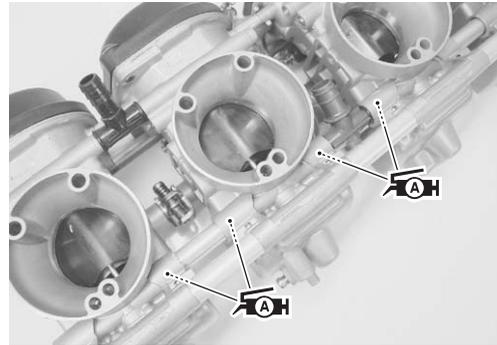
I649G1170055-01

- Apply thin coat of the grease to the fuel joint pipe O-rings and seals.

⚠ : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)

⚠ CAUTION

Replace the O-rings and seals with new ones.

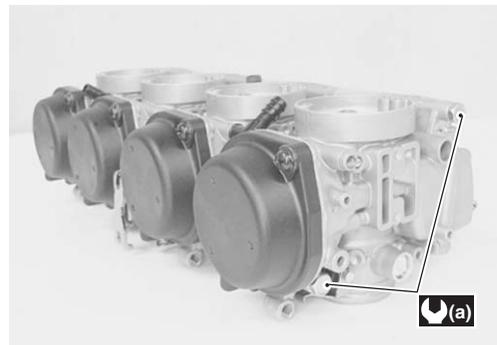


I649G1170056-02

- Place the carburetor assembly on the surface plate (engine side downward) and tighten the upper and lower carburetor set shafts to the specified torque.

Tightening torque

Carburetor set shaft (a): 5.0 N·m (0.5 kgf-m, 3.5 lb-ft)



I649G1170057-01

Float Height Inspection and Adjustment

B649G11706004

Inspect and adjust the float height in the following procedures:

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: ".
- 2) Remove the carburetor assembly. Refer to "Carburetor Assembly Removal and Installation: ".
- 3) Remove the float chamber. Refer to "Carburetor Disassembly: ".
- 4) To check the float height, tilt the carburetor as shown.

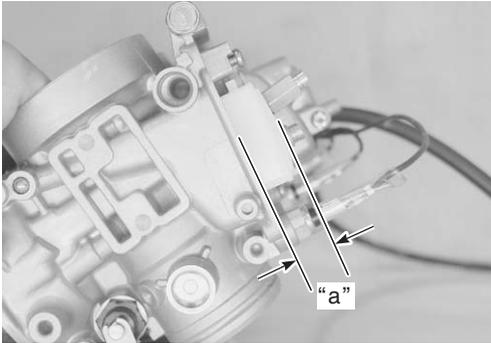
- 5) Measure the float height "a" while the float arm is just contacting the needle valve using vernier calipers. Bend the tongue "A" as necessary to bring the float height "a" to the specified level.

Special tool

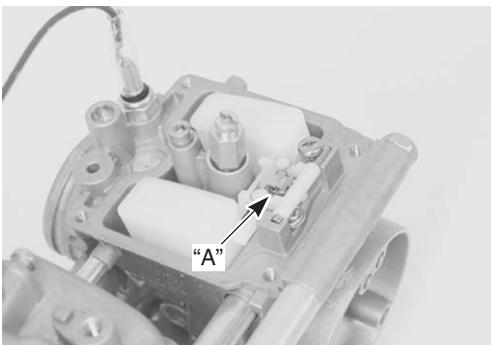
 : 09900-20102 (Vernire calipers)

Float height "a"

13.0 ± 1.0 mm (0.51 ± 0.04 in)



I649G1170058-01



I649G1170059-01

- 6) Reinstall the float chamber. Refer to "Carburetor Assembly: ".
- 7) Reinstall the carburetor assembly. Refer to "Carburetor Assembly Removal and Installation: ".

Carburetor Inspection and Cleaning

B649G11706005

Refer to "Carburetor Assembly: " and "Carburetor Disassembly: ".

Carburetor Parts

Check the following items for any damage or clogging. If they are clogged, clean the fuel passage.

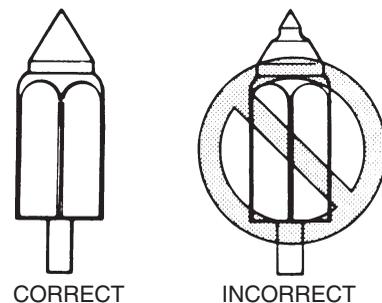
- Pilot jet
- Main jet
- Main air jet
- Pilot air jet
- Needle jet air bleeding hole
- Float
- Jet needle
- Valve seat

- Piston valve
- Starter (enricher) jet
- Gasket and O-ring
- Throttle shaft oil seal
- Diaphragm
- Pilot outlet and by-pass ports

Needle Valve

Check the needle valve for damage or worn.

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



I649G1170060-01

Throttle Valve

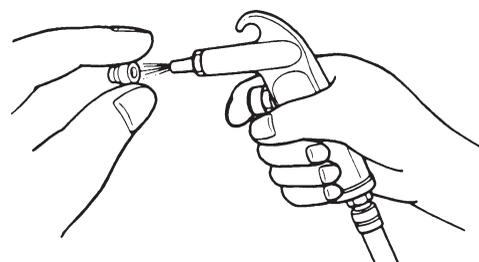
Check the throttle valve moves smoothly from full open to full close. If it does not smoothly, clean the carburetor.

Cleaning

▲ WARNING

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

- 1) Clean all jets with a spray-type carburetor cleaner and dry them using compressed air.



I649G1170063-01

1G-26 Fuel System:

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

⚠ CAUTION

Do not use a wire to clean the jets or passageways. A wire can damage the jets and passageways. If the components cannot be cleaned with a spray cleaner it may be necessary to use a dip-type cleaning solution and allow them to soak.

Carburetor Heater Inspection (For E-02, 19)

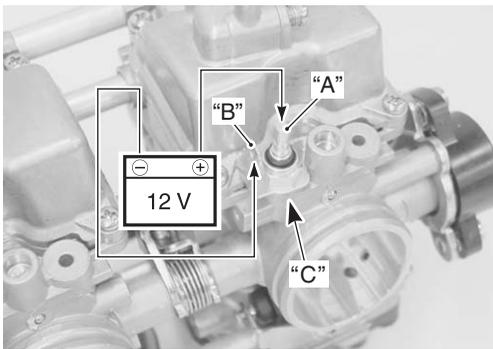
B649G11706006

Carburetor Heater

- 1) Remove the carburetor assembly. Refer to “Carburetor Assembly Removal and Installation:”.
- 2) Disconnect the carburetor heater terminal lead wires.
- 3) Connect the positive (+) terminal of a 12 V battery to the terminal “A” of the carburetor heater and the battery negative (–) terminal to the terminal “B”.
- 4) Check that the heater section “C” is heated in 5 minutes after the battery has been connected. If the carburetor heater is not heated up, replace the carburetor heater with a new one.

⚠ WARNING

Do not touch the carburetor heater directly to prevent burn.



I649G1170078-01

- 5) Reinstall the carburetor assembly. Refer to “Carburetor Assembly Removal and Installation:”.

Thermo-switch (For E-02, 19)

- 1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation:”.
- 2) Remove the thermo-switch. Refer to “Carburetor Assembly Removal and Installation:”.
- 3) Cool the thermo-switch (1) with ice water and check for continuity.

Special tool

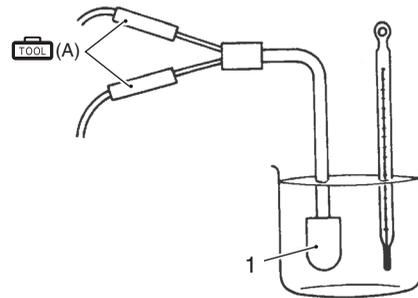
TOOL (A): 09900–25008 (Multi-circuit tester set)

Tester knob indication

Continuity test (•))

Thermo-switch continuity

Below 8 – 14 °C	Yes
Above 15 – 21 °C	No



I649G1170079-01

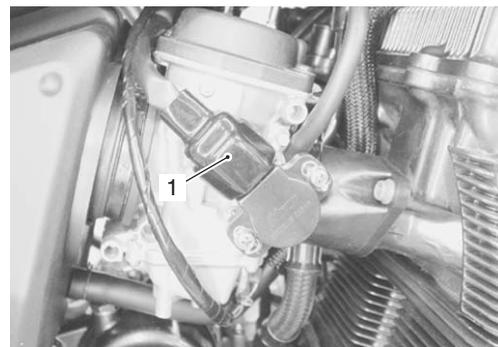
- 4) Install the thermo-switch.
- 5) Reinstall the fuel tank. Refer to “Fuel Tank Removal and Installation:”.

TP Sensor Inspection

B649G11706008

Inspect the TP sensor in the following procedures:

- 1) Disconnect the TP sensor coupler (1).



I649G1170065-01

- 2) Measure the resistance between the terminals “A” to “C” as shown.
If the resistance is not within the specified value, replace the TP sensor. Refer to “TP Sensor Replacement: ”.

Special tool

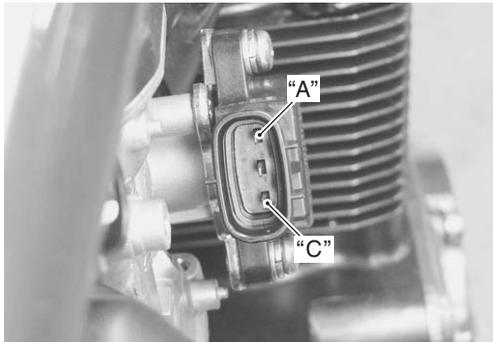
 (A): 09900–25008 (Multi-circuit tester set)

Tester knob indication

Resistance (Ω)

Throttle position sensor resistance

3.5 – 6.5 k Ω



I649G1170064-01

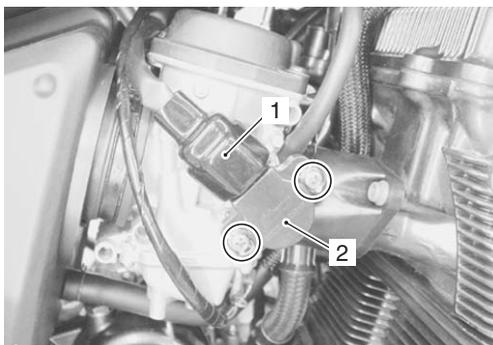
- 3) Connect the TP sensor coupler.

TP Sensor Replacement

B649G11706009

Replace the TP sensor as described following procedures:

- 1) Disconnect the TP sensor coupler (1) and remove the TP sensor (2).



I649G1170066-01

- 2) Temporary install the TP sensor.
- 3) Measure the resistance between the TP sensor terminals “A” to “C” as shown.

Special tool

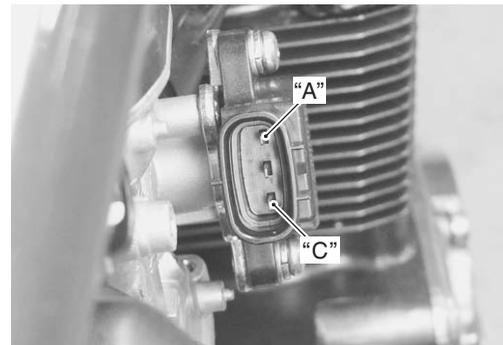
 (A): 09900–25008 (Multi-circuit tester set)

Tester knob indication

Resistance (Ω)

Throttle position sensor resistance “A” to “C”

3.5 – 6.5 k Ω



I649G1170064-01

- 4) Fully open the throttle valve with the throttle lever.
- 5) Measure the resistance between the TP sensor terminals “A” to “B” as shown.

Special tool

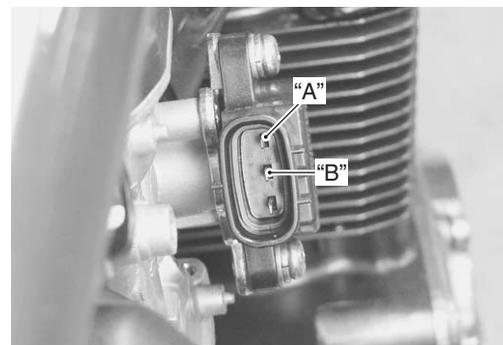
 (A): 09900–25008 (Multi-circuit tester set)

Tester knob indication

Resistance (Ω)

Throttle position sensor resistance “A” to “B”

2.66 – 4.94 k Ω



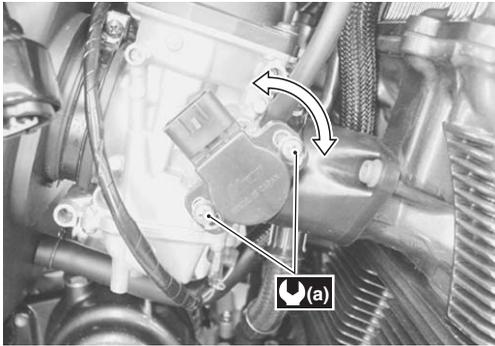
I649G1170076-01

1G-28 Fuel System:

- 6) Under above condition, position the TP sensor until resistance is $2.66 - 4.94 \text{ k}\Omega$.
- 7) When the resistance is within specification, tighten the TP sensor mounting screws.

Tightening torque

TP sensor screw (a): $2.0 \text{ N}\cdot\text{m}$ ($0.2 \text{ kgf}\cdot\text{m}$, $1.5 \text{ lb}\cdot\text{ft}$)



I649G1170067-01

- 8) Connect the TP sensor coupler.

Carburetor Synchronization

B649G11706010

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

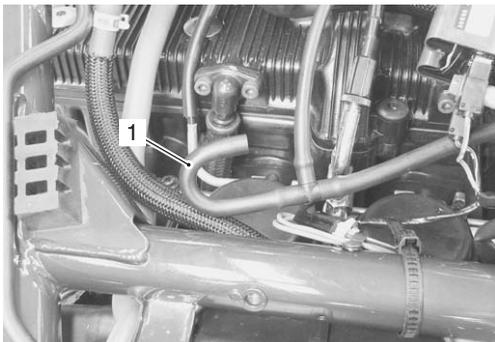
Use of Digital Vacuum Tester

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: ".
- 2) Connect a remote fuel bottle to the fuel hose.



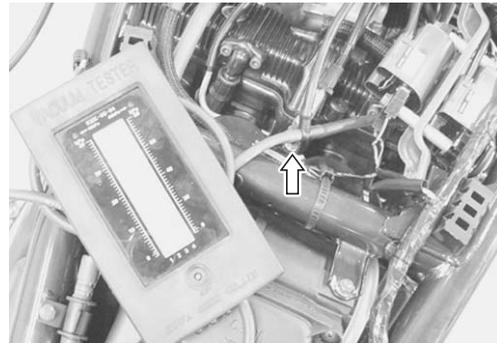
I649G1170068-01

- 3) Remove the vacuum hose (1) (for fuel valve) and install a proper cap to the three way joint.



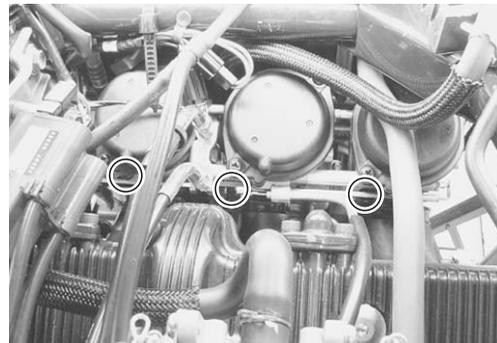
I649G1170069-01

- 4) Start up the engine and run it in idling condition for warming up.
- 5) Stop the warmed-up engine.
- 6) Remove a proper cap and connect the digital vacuum tester hose to the three way joint.



I649G1170070-01

- 7) Remove the vacuum inlet caps from the carburetors (for cylinders #1, #2 and #3).



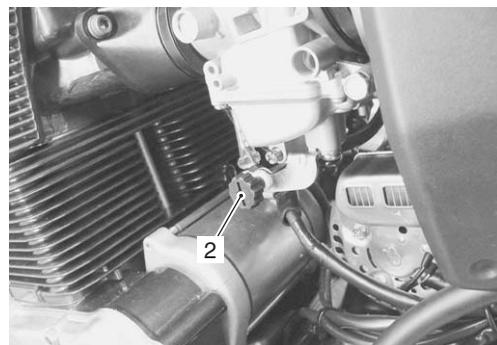
I649G1170071-01

- 8) Connect the vacuum tester hoses to these vacuum inlets.
- 9) Connect a tachometer and start up the engine.
- 10) Check or bring the engine rpm to engine idle speed by the throttle stop screw (2).

Engine idle speed

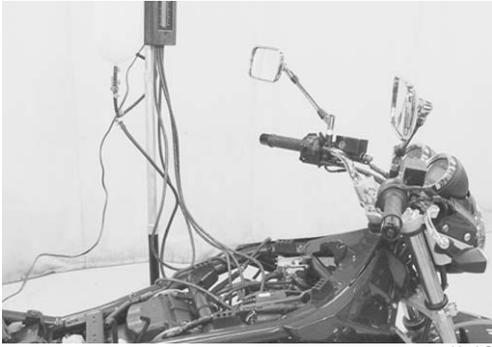
$1\ 300 \pm 100 \text{ r/min}$ (E-28)

$1\ 200 \pm 100 \text{ r/min}$ (Others)



I649G1170072-01

- 11) Check the vacuum of the four cylinders.



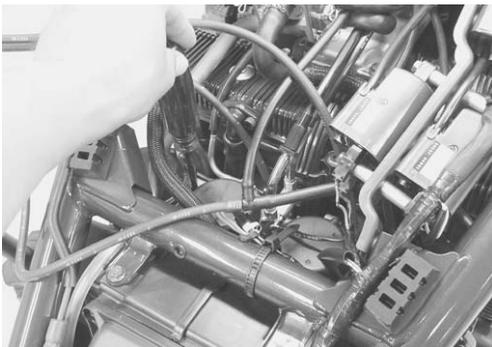
I649G1170073-01

- 12) If the columns of vacuum indicator are not at the same level, adjust the throttle valves synchronizing screws "1", "2" and "3".

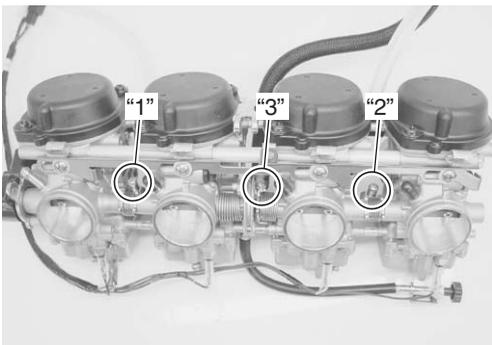
NOTE

During balancing the throttle valves, always set the engine idle speed, using throttle stop screw.

Adjusting order
"1" – "2" – "3"



I649G1170074-01



I649G1170075-01

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

Engine idle speed

1 300 ± 100 r/min (E-28)

1 200 ± 100 r/min (Others)

- 14) Remove the digital vacuum tester, tachometer and fuel bottle.
15) Reinstall the vacuum hose (for fuel valve) and vacuum inlet caps.
16) Reinstall the fuel tank. Refer to "Fuel Tank Removal and Installation: ".

Engine Idle Speed Inspection

B649G11706013

Refer to "Engine Idle Speed Inspection and Adjustment: in Section 0B".

Fuel Line Inspection

B649G11706014

Refer to "Fuel Line Inspection: in Section 0B".

Air Cleaner Element Removal and Installation

B649G11706015

Refer to "Air Cleaner Element Removal and Installation: in Section 0B".

Air Cleaner Element Inspection and Cleaning

B649G11706016

Refer to "Air Cleaner Element Inspection and Cleaning: in Section 0B".

Specifications

Service Data

B649G11707004

Carburetor

Item	Specification	
	E-02, 19, 24	E-28
Carburetor type	MIKUNI BSR36	←
Bore size	36 mm (1.42 in)	←
I.D. No.	49G0	49G1
Idle r/min.	1 200 ± 100 r/min	1 300 ± 100 r/min
Float height	13.0 ± 1.0 mm (0.51 ± 0.04 in)	←
Main jet (M.J.)	#100	←
Jet needle (J.N.)	5C70 – 3rd	5C71
Needle jet (N.J.)	P-0M	←
Throttle valve (Th. V.)	#100	←
Pilot jet (P.J.)	#15	←
Pilot screw (P.S.)	PRE-SET (3-1/2 turns back)	←
Throttle cable play (Pulling cable)	2.0 – 4.0 mm (0.08 – 0.16 in)	←
Starter (enricher) plunger cable play	0.5 – 1.0 mm (0.02 – 0.04 in)	←

Oil

Item	Specification	Note
Fuel type	Use only unleaded gasoline of at least 87 pump octane or 91 octane (R/2 + M/2) or higher rated by the research method. Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.	E-28
	Gasoline used should be graded 91 octane or higher. An unleaded gasoline type is recommended.	The others countries
Fuel tank capacity	Including reserve	20 L (5.3/4.4 US/Imp gal)
	Reserve only	4.4 L (1.2/1.0 US/Imp gal)
Brake fluid type	DOT 4	

Tightening Torque Specifications

B649G11707005

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Fuel valve mounting bolt	4.4	0.44	3.2	☞
Fuel level gauge mounting bolt	10	1.0	7.0	☞
Carburetor heater	3.0	0.3	2.0	☞
Carburetor set shaft	5.0	0.5	3.5	☞
TP sensor screw	2.0	0.2	1.5	☞

NOTE

The specified tightening torque is also described in the following.

“Fuel Tank Construction: ”

“Carburetor Components: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G11708001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000-25010	🌀 / 🌀 / 🌀 / 🌀
	THERMO-GREASE or equivalent	P/No.: 99000-59029	🌀

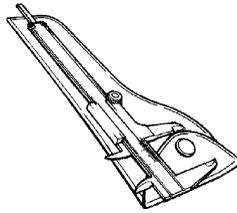
NOTE

Required service material is also described in the following.
 "Carburetor Components: "

Special Tool

B649G11708002

<p>09900-20102 Vernier calipers (1/20 mm, 200 mm)</p> <p>🌀</p>	<p>09900-25008 Multi-circuit tester set</p> <p>🌀 / 🌀 / 🌀 / 🌀</p>
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Ignition System

Schematic and Routing Diagram

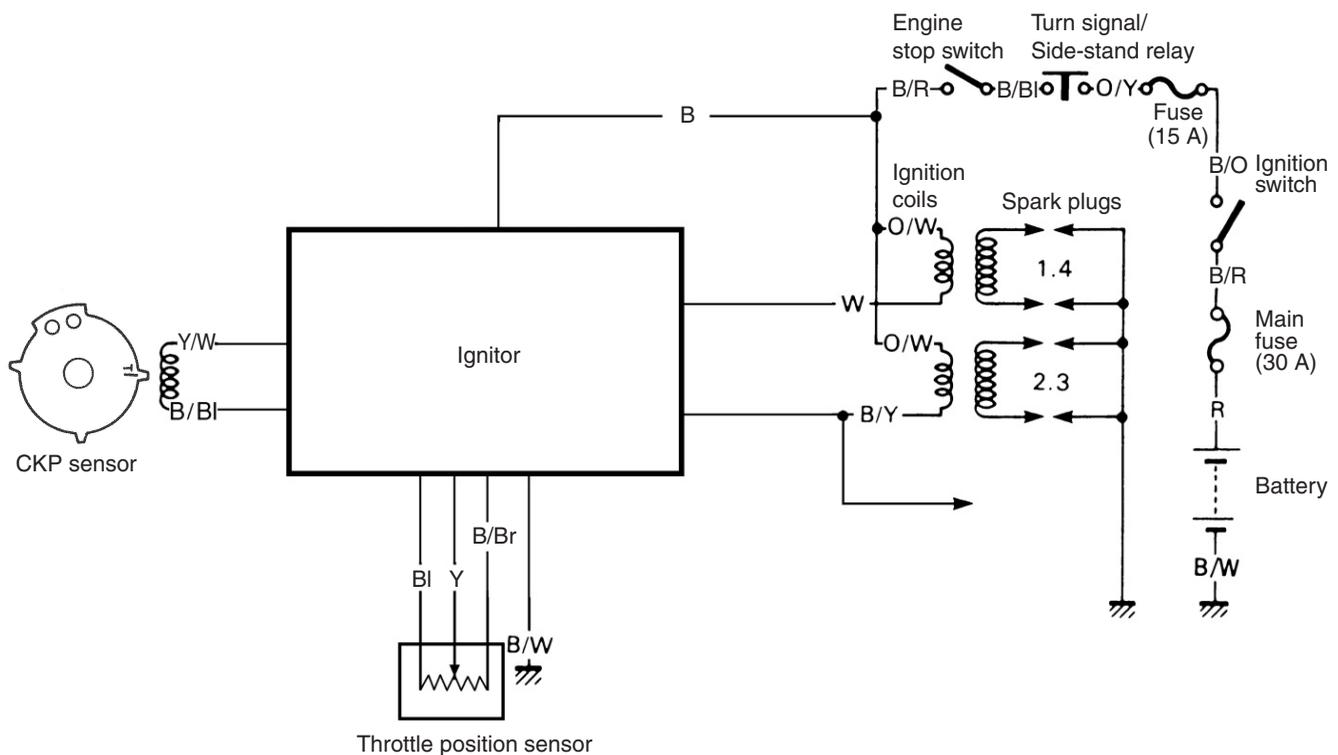
Ignition System Diagram

B649G11802001

The fully transistorized ignition system consists of the following components: a CKP sensor (which is made up of the CKP sensor rotor and CKP sensor), ignitor, throttle position sensor, two ignition coils and four spark plugs. The ignition timing is programmed and stored in the ignitor's ROM (Read Only Memory). The CKP sensor is mounted on the right end of the crankshaft. The induced signal in the CKP sensor is sent to the wave-form arrangement circuit and the CPU receives this signal and calculates the best ignition timing, throttle position sensed by throttle position sensor and data stored in the ROM. The CPU outputs the signal to the transistor of the ignition coil output circuit which is connected to the primary windings of the ignition coils which is turned "off" and "on" accordingly. Thus, it induces the secondary current in the ignition coil's secondary windings and produces the spark between the spark plug gaps. The ignition cutoff circuit is incorporated in the ignitor to prevent the engine from overrevving. If the engine speed reaches 10 900 r/min, this circuit will cutoff the ignition primary current for the #1 and #4 spark plugs.

⚠ CAUTION

The engine is capable of running at over 10 900 r/min without a load, even if the ignition cutoff circuit is in effect; however, this may cause engine damage. Therefore, never run the engine over 10 900 r/min without a load.



I649G1180001-02

Diagnostic Information and Procedures

Ignition System Symptom Diagnosis

B649G11804005

Condition	Possible cause	Correction / Reference Item
Spark plug not sparking	Damaged spark plug.	<i>Replace.</i>
	Damaged spark plug cap.	<i>Replace.</i>
	Fouled spark plug.	<i>Clean or replace.</i>
	Wet spark plug.	<i>Clean and dry or replace.</i>
	Defective ignition coil.	<i>Replace.</i>
	Open or short in high-tension cord.	<i>Replace.</i>
	Defective CKP sensor.	<i>Replace.</i>
	Defective ignitor.	<i>Replace.</i>
Engine stalls easily. (No spark)	Fouled spark plug.	<i>Clean or replace.</i>
	Defective CKP sensor.	<i>Replace.</i>
	Defective ignitor.	<i>Replace.</i>
Spark plug is wet or quickly becomes fouled with carbon.	Excessively rich air/fuel mixture.	<i>Adjust carburetor.</i>
	Excessively high idling speed.	<i>Adjust carburetor.</i>
	Incorrect gasoline.	<i>Change.</i>
	Dirty air cleaner element.	<i>Clean or replace.</i>
	Incorrect spark plug (Cold type).	<i>Change to hot type spark plug.</i>
Spark plug quickly becomes fouled with oil or carbon.	Worn piston ring.	<i>Replace.</i>
	Worn piston.	<i>Replace.</i>
	Worn cylinder.	<i>Rebore or replace.</i>
	Excessive valve-stem to valve-guide clearance.	<i>Replace.</i>
	Worn valve stem oil seal.	<i>Replace.</i>
Spark plug electrodes overheat or burn.	Incorrect spark plug (Hot type).	<i>Change to cold type spark plug.</i>
	Overheated engine.	<i>Tune-up.</i>
	Loose spark plug.	<i>Tighten.</i>
	Excessively lean air/fuel mixture.	<i>Adjust carburetor.</i>

1H-3 Ignition System:

No Spark or Poor Spark

B649G11804001

Troubleshooting

NOTE

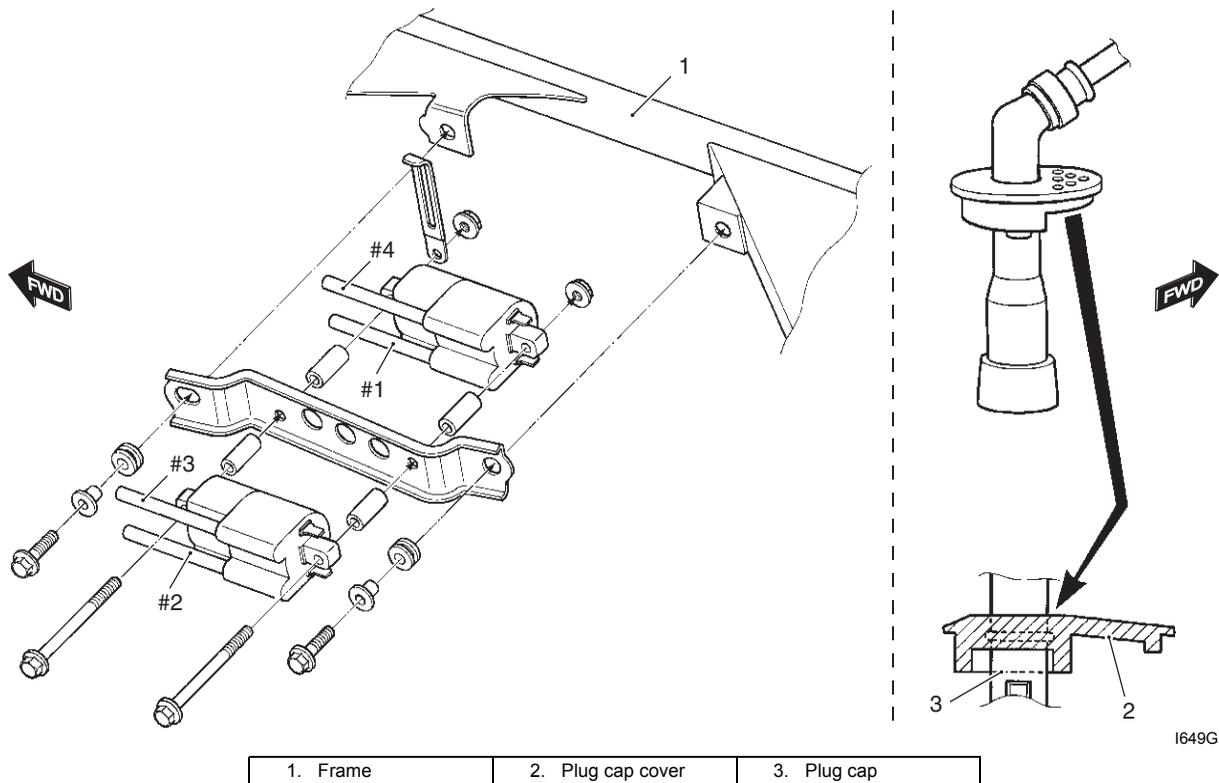
Check that the transmission is in neutral and the engine stop switch is in the "RUN" position. Grasp the clutch lever. Check that the fuse is not blown and the battery is fully-charged before diagnosing.

Step	Action	Yes	No
1	Check the ignition system couplers for poor connections. <i>Is there connection in the ignition system couplers?</i>	Go to step 2.	Poor connection of couplers.
2	Measure the battery voltage between input lead wires (G/B and B/W) at the ignitor with the ignition switch in the "ON" position. <i>Is the voltage OK?</i>	Go to Step 3.	<ul style="list-style-type: none">Faulty ignition switch.Faulty turn signal/ side-stand relay.Faulty engine stop switch.Broken wire harness or poor connection of related circuit couplers.
3	Measure the ignition coil primary peak voltage. Refer to "Ignition Coil Inspection: ". NOTE This ignition coil primary peak voltage inspection method is applicable only with the multi-circuit tester and the peak volt adaptor. <i>Is the peak voltage OK?</i>	Go to step 4.	Go to step 5.
4	Inspect the spark plugs. Refer to "Spark Plug Inspection and Cleaning: in Section 0B". <i>Is the spark plug OK?</i>	Go to Step 5.	Faulty spark plug(-s).
5	Inspect the ignition coil. Refer to "Ignition Coil Inspection: ". <i>Is the ignition coil(-s) OK?</i>	Go to step 6.	Faulty ignition coil(-s).
6	Measure the CKP sensor peak voltage and its resistance. Refer to "CKP Sensor Inspection: ". NOTE The CKP sensor peak voltage inspection is applicable only with the multi-circuit tester and peak volt adaptor. <i>Is the peak voltage and resistance OK?</i>	<ul style="list-style-type: none">Faulty ignitor.Poor connection of ignition couplers.	<ul style="list-style-type: none">Faulty CKP sensor.Metal particles or foreign material being stuck on the CKP sensor and rotor tip.

Repair Instructions

Ignition Coil and Spark Plug Cap Components

B649G11806007



I649G1180002-04

Spark Plug Removal and Installation

B649G11806017

Refer to "Spark Plug Removal and Installation: in Section 0B".

Spark Plug Inspection and Cleaning

B649G11806018

Refer to "Spark Plug Inspection and Cleaning: in Section 0B".

Ignition Coil Inspection

B649G11806008

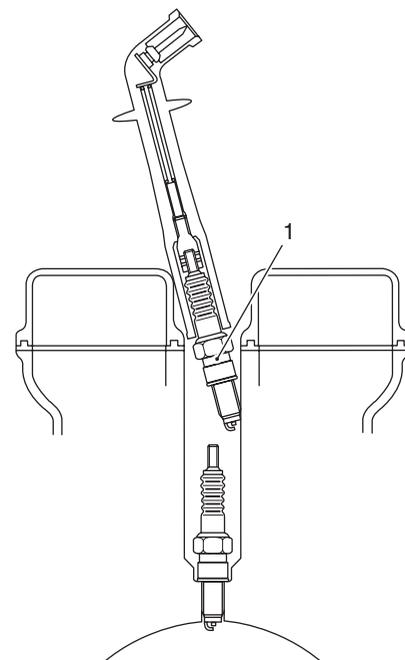
Refer to "Electrical Components Location: in Section 0A".

Ignition Coil Primary Peak Voltage

- 1) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: in Section 1G".
- 2) Disconnect all the spark plug caps.
- 3) Connect new spark plugs (1) to each spark plug cap and ground them on the cylinder.

NOTE

Be sure that all the spark plugs are connected properly and the battery used is in fully-charged condition.



I649G1180003-01

1H-5 Ignition System:

- 4) Connect the multi-circuit tester with the peak voltage adaptor as follows.

⚠ CAUTION

Before using the multi-circuit tester and peak voltage adaptor, refer to the appropriate instruction manual.

NOTE

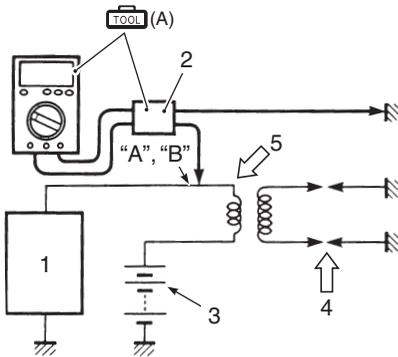
Do not disconnect the ignition coil primary lead wire.

Special tool

 (A): 09900-25008 (Multi-circuit tester set)

Tester knob indication: Voltage (---)

Ignition coil (For #1 and #4 cylinders):	(+) Probe W terminal "A"	(-) Probe Ground
Ignition coil (For #2 and #3 cylinders):	B/Y terminal "B"	Ground



I649G1180004-01

1. Ignitor	5. Ignition coil
2. Peak voltage adaptor	"A": W terminal (For #1, #4)
3. Battery	"B": B/Y terminal (For #2, #3)
4. New spark plug	



I649G1180005-01

- 5) Measure the ignition coil primary peak voltage in the following procedure.

- Shift the transmission into neutral, turn the ignition switch to the "ON" position and grasp the clutch lever.
- Press the starter button and allow the engine to crank for a few seconds, and then measure the ignition coil primary peak voltage.

⚠ WARNING

Do not touch the tester probes and spark plugs to prevent an electric shock while testing.

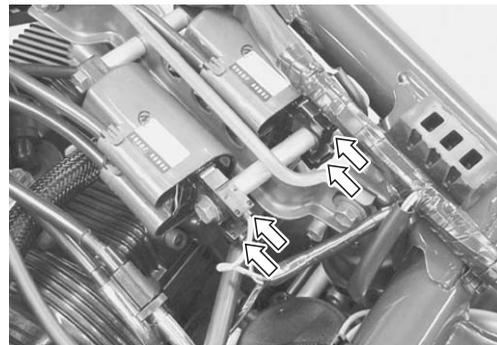
- 6) Repeat the above procedure a few times and measure the highest ignition coil primary peak voltage. If the voltages are lower than standard values, inspect the ignition coil and the CKP sensor.

Ignition coil primary peak voltage 140 V and more

- 7) After measuring the ignition coil primary peak voltage, reinstall the removed parts.

Ignition Coil Resistance

- Remove the fuel tank. Refer to "Fuel Tank Removal and Installation: in Section 1G".
- Disconnect all the spark plug caps.
- Disconnect all the ignition coil lead wires.



I649G1180006-01

- 4) Measure the ignition coil resistance in both the primary and secondary windings. If the windings are in sound condition, their resistance should be close to the specified values.

Special tool

 : 09900-25008 (Multi-circuit tester set)

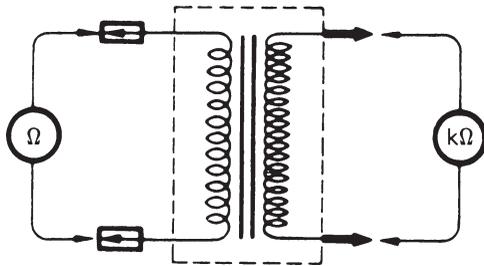
Ignition coil resistance

Primary: Approx. 2 – 4 Ω ((+) tap – (-) tap)

Secondary: Approx. 30 – 40 k Ω (Spark plug cap – Spark plug cap)

Tester knob indication

Resistance (Ω)



I649G1180007-01

- 5) After measure the ignition coil resistance, reinstall the removed parts.

Ignition Coil Assembly Removal and Installation

B649G11806009

Refer to “Electrical Components Location: in Section 0A”.

Removal

- 1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation: in Section 1G”.
- 2) Disconnect all of the spark plug caps.
- 3) Remove the ignition coil assembly as shown in the ignition coil and spark plug cap components. Refer to “Ignition Coil and Spark Plug Cap Components: ”.

Installation

Install the ignition coil assembly in the reverse order of removal. Pay attention to the following point:

- Connect all of the spark plug caps securely.

Spark Plug Removal and Installation

B649G11806016

Refer to “Spark Plug Inspection and Cleaning: in Section 0B”.

Spark Plug Inspection

B649G11806010

Refer to “Spark Plug Inspection and Cleaning: in Section 0B”.

CKP Sensor Inspection

B649G11806011

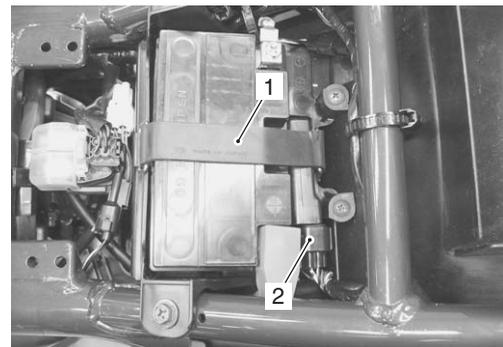
Refer to “Electrical Components Location: in Section 0A”.

CKP Sensor Peak Voltage

- 1) Remove the seat.
- 2) Remove the battery band (1) and disconnect the ignitor coupler (2).

NOTE

Make sure that all of the couplers are connected properly and the battery is fully-charged.



I649G1180008-02

1H-7 Ignition System:

- 3) Connect the multi-circuit tester with the peak volt adaptor as follows.

⚠ CAUTION

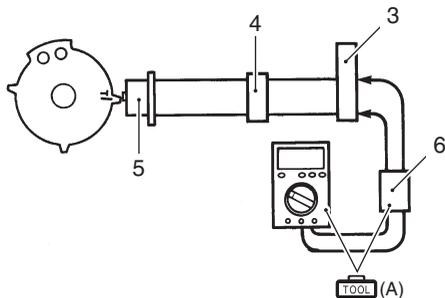
Before using the multi-circuit tester and peak voltage adaptor, refer to the appropriate instruction manual.

Special tool

TOOL (A): 09900-25008 (Multi-circuit tester set)

Tester knob indication: Voltage (---)

Ignitor coupler	(+) Probe B/BI	(-) Probe Y/W
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I649G118009-02

3. Ignitor coupler	5. CKP sensor
4. CKP sensor coupler	6. Peak voltage adaptor



I649G1180010-02

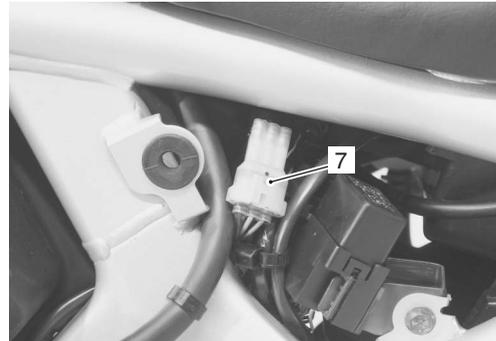
- 4) Measure the CKP sensor peak voltage in the following procedure.
- Shift the transmission into neutral, turn the ignition switch to the "ON" position and grasp the clutch lever.
 - Press the starter button and allow the engine to crank for a few seconds, and then measure the CKP sensor peak voltage.
- 5) Repeat the above procedure a few times and measure the highest CKP sensor peak voltage.

CKP sensor peak voltage

1.0 V and more (B/BI – Y/W)

- 6) If the peak voltage measured on the ignitor coupler is lower than the standard value, measure the peak voltage on the CKP sensor coupler as follows.

- Remove the left frame cover. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- Disconnect the CKP sensor coupler (7).



I649G1180011-01

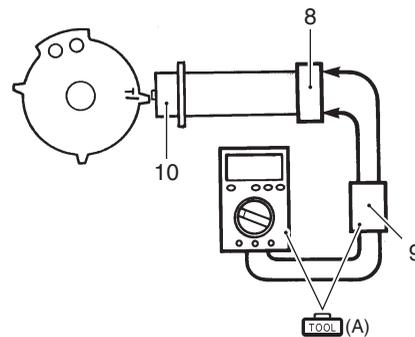
- Connect the multi-circuit tester with the peak voltage adaptor.

Special tool

TOOL (A): 09900-25008 (Multi-circuit tester set)

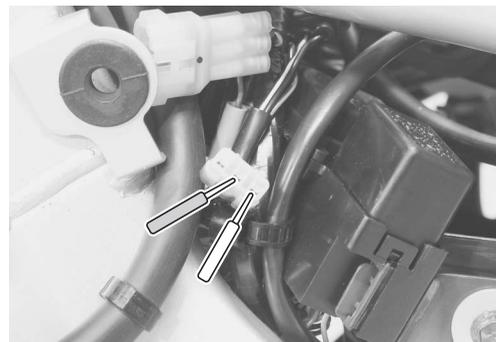
Tester knob indication: Voltage (---)

CKP sensor coupler	(+) Probe BI	(-) Probe Y
--------------------	-----------------	----------------



I649G1180012-02

8. CKP sensor coupler
9. Peak voltage adaptor
10. CKP sensor



I649G1180013-01

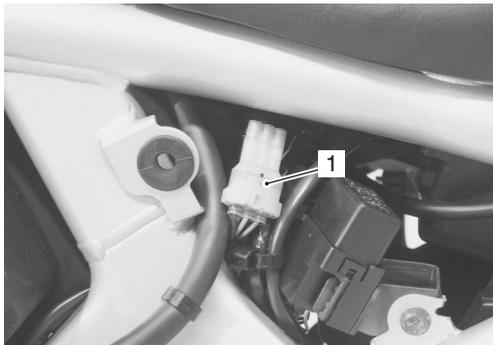
- d) Measure the CKP sensor peak voltage in the same manner as on the ignitor coupler. If the peak voltage on the CKP sensor lead wire couplers is within specification, but on the ignitor coupler is out of specification, the wire harness must be replaced. If both peak voltages are out of specification, the CKP sensor must be replaced and rechecked.

CKP sensor peak voltage
1.0 V and more (BI – Y)

- 7) After measuring the CKP sensor peak voltage, reinstall the removed parts.

CKP Sensor Resistance

- 1) Remove the left frame cover. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
 2) Disconnect the CKP sensor coupler (1).

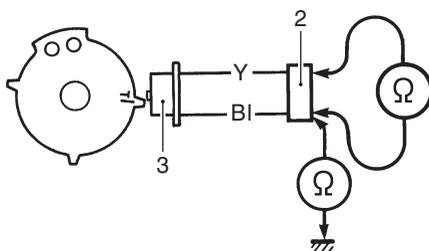


I649G1180014-01

- 3) Measure the resistance between the lead wires and ground. If the resistance is not within the specified value, the CKP sensor must be replaced. Refer to “CKP Sensor Removal and Installation: ”.

Tester knob indication
Resistance (Ω)

CKP sensor resistance
Approx. 130 – 200 Ω (Blue – Yellow)
 $\infty \Omega$ (Blue – Ground)



I649G1180015-01

2. CKP sensor coupler	3. CKP sensor
-----------------------	---------------

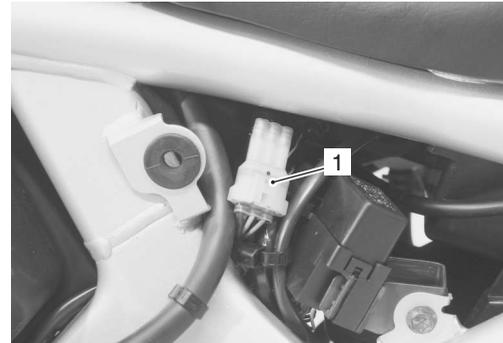
- 4) After measuring the CKP sensor resistance, reinstall the removed parts.

CKP Sensor Removal and Installation

B649G11806012

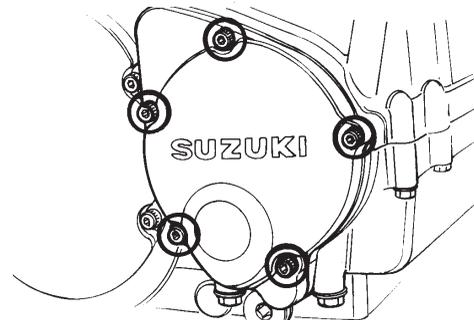
Removal

- 1) Remove the left frame cover. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
 2) Disconnect the CKP sensor coupler (1).



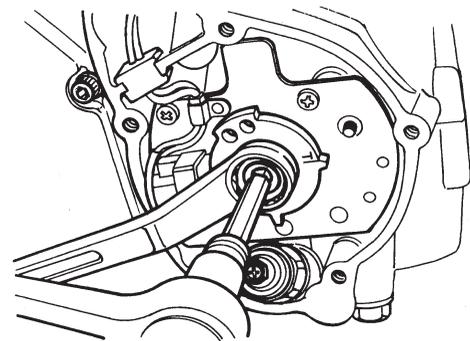
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- 3) Remove the CKP sensor cover.



I649G1180016-01

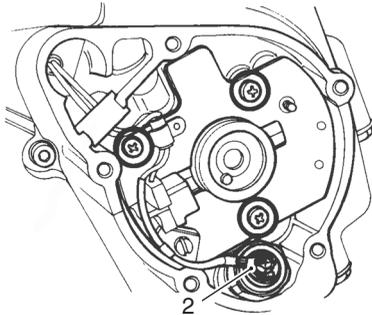
- 4) Remove the CKP sensor rotor by removing the bolt.



I649G1180017-01

1H-9 Ignition System:

- 5) Disconnect the oil pressure switch lead wire (2).
- 6) Remove the CKP sensor. Refer to "Wiring Harness Routing Diagram: in Section 9A".



I649G1180018-01

Installation

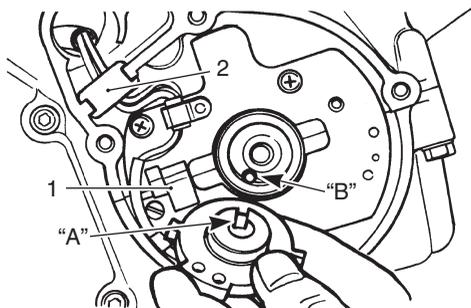
Install the CKP sensor in the reverse order of removal. Pay attention to the following points:

- Install the CKP sensor (1).
- Be sure to fit the slot "A" on the back surface of the CKP sensor rotor over the locating pin "B" on the end of crankshaft.

NOTE

The **SUZUKI BOND** should be applied to the groove of the CKP sensor lead wire grommet (2).

1207B : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)

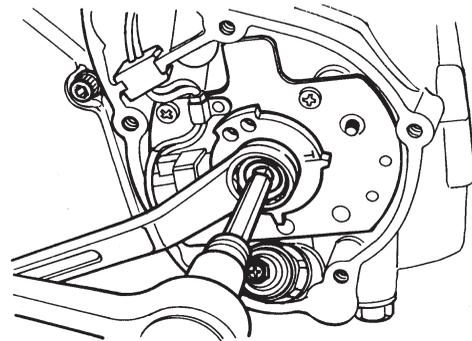


I649G1180019-02

- Hold the nut and tighten the CKP sensor rotor bolt to the specified torque.

Tightening torque

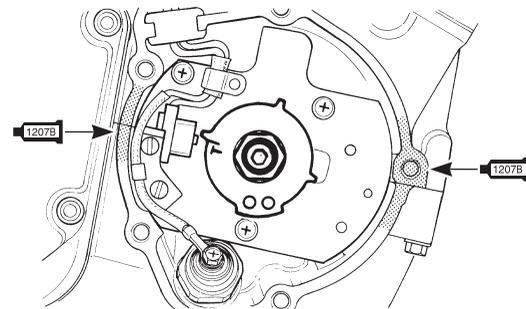
CKP sensor rotor bolt: 25 N·m (2.5 kgf-m, 18.0 lb-ft)



I649G1180020-01

- Connect the oil pressure switch lead wire.
- Route the CKP sensor lead wire. Refer to "Wiring Harness Routing Diagram: in Section 9A".
- Apply a bond lightly to the CKP sensor cover gasket mating surface as shown.

1207B : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)



I649G1140083-03

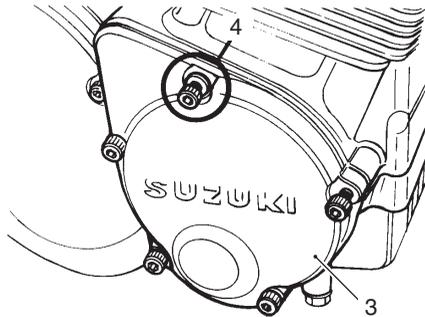
- Install a new gasket and the CKP sensor cover (3).
- Install a new gasket washer onto the CKP sensor cover bolt (4) as shown.

⚠ CAUTION

Replace the cover gasket and gasket washer to prevent oil leakage.

- Apply a small quantity of THREAD LOCK “1342” to the CKP sensor cover bolts.

1342 : Thread lock cement 99000-32050 (Thread Lock Cement 1342 or equivalent)



I649G1180021-02

Engine Stop Switch Inspection

B649G11806013

Inspect the engine stop switch in the following procedures:

- 1) Remove the right frame head cover. (GSF1200)
Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Disconnect the right handlebar switch coupler (1).



I649G1180023-02

- 3) Inspect the engine stop switch for continuity with a tester.
If any abnormality is found, replace the right handlebar switch assembly with a new one. Refer to “Handlebars Removal and Installation: in Section 6B”.

Special tool

1001 : 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity (•)))

Color	B/BI	B/R
Position		
OFF (⊗)		
RUN (⊙)	○	○

I649G1180022-01

- 4) After finishing the engine stop switch inspection, reinstall the removed parts.

Ignition Switch Inspection

B649G11806014

Refer to “Ignition Switch Inspection: in Section 9C”.

Ignition Switch Removal and Installation

B649G11806015

Refer to “Ignition Switch Removal and Installation: in Section 9C”.

Specifications

Service Data

B649G11807002

Electrical

Unit: mm (in)

Item	Specification		Note
Ignition timing	7° B.T.D.C. at 1 300 r/min.		E-28
	7° B.T.D.C. at 1 200 r/min.		Others
Firing order	1 · 2 · 4 · 3		
Spark plug	Type	NGK: JR9B	
	Gap	0.6 – 0.7 (0.024 – 0.028)	
Spark performance	Over 8 (0.3) at 1 atm.		
CKP sensor resistance	Approx. 130 – 200 Ω		Tester range: (x 100 Ω)
CKP sensor peak voltage	1.0 V and more		
Ignition coil resistance	Primary	(+) tap – (–) tap Approx. 2 – 4 Ω	Tester range: (x 1 Ω)
	Secondary	Spark plug cap – Spark plug cap Approx. 30 – 40 kΩ	Tester range: (x 1 kΩ)
Ignition coil primary peak voltage	140 V and more		

Tightening Torque Specifications

B649G11807003

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
CKP sensor rotor bolt	25	2.5	18.0	

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

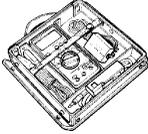
Recommended Service Material

B649G11808001

Material	SUZUKI recommended product or Specification		Note
Sealant	SUZUKI Bond 1207B or equivalent	P/No.: 99000–31140	 / 
Thread lock cement	Thread Lock Cement 1342 or equivalent	P/No.: 99000–32050	

Special Tool

B649G11808002

09900–25008 Multi-circuit tester set  /  /  /  / 	
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Starting System

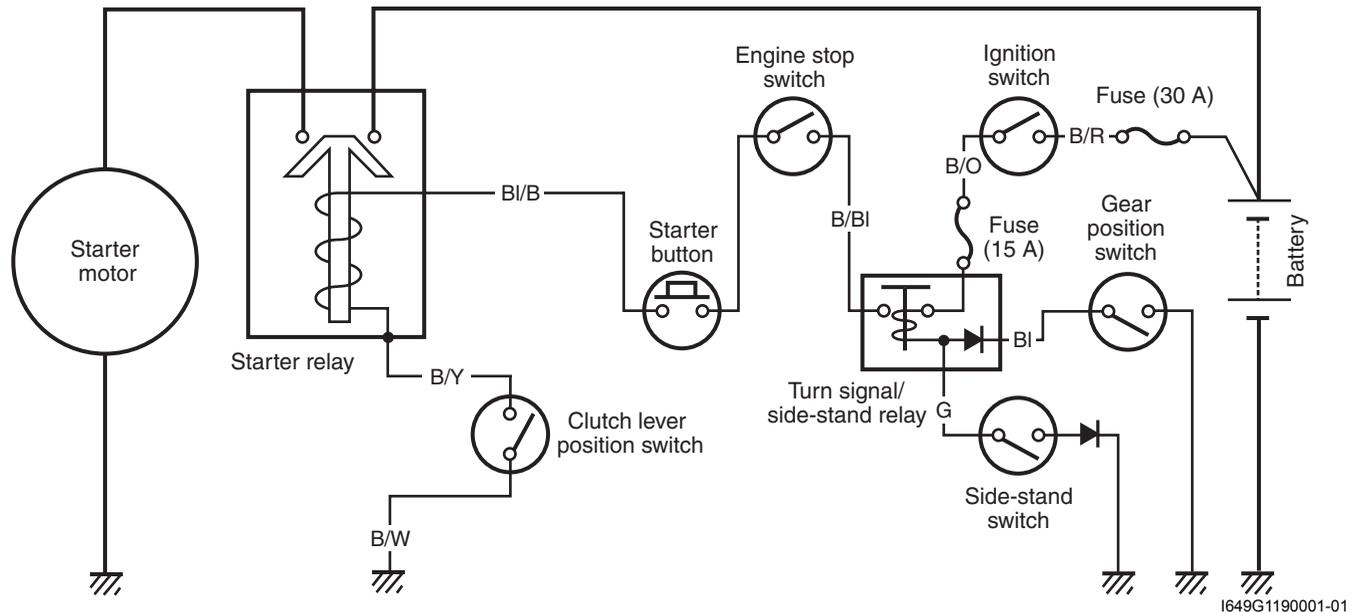
General Description

Starting System Diagram

B649G11901001

Refer to "Wire Color Symbols: in Section 0A".

The starter system consists of the following components: the starter motor, starter relay, clutch lever position switch, turn signal/side-stand relay, side-stand switch, gear position switch, starter button, engine stop switch, ignition switch and battery. Pressing the starter button (on the right handlebar switch) energizes the starter relay, causing the contact points to close, thus completing the circuit from the starter motor to the battery. The starter motor draws about 80 A to start the engine.

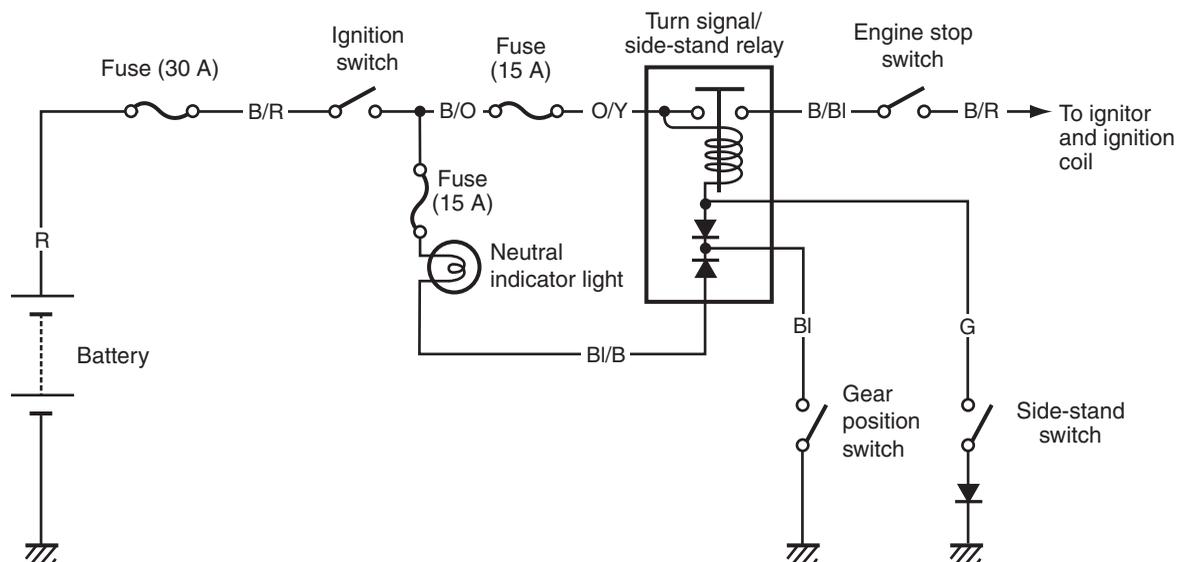


Side-stand / Ignition Interlock System Description

B649G11901002

Refer to "Wire Color Symbols: in Section 0A".

This side-stand/ignition interlock system prevents the motorcycle from being started with the side-stand down. The system is operated by an electric circuit provided between the battery and ignition coil.

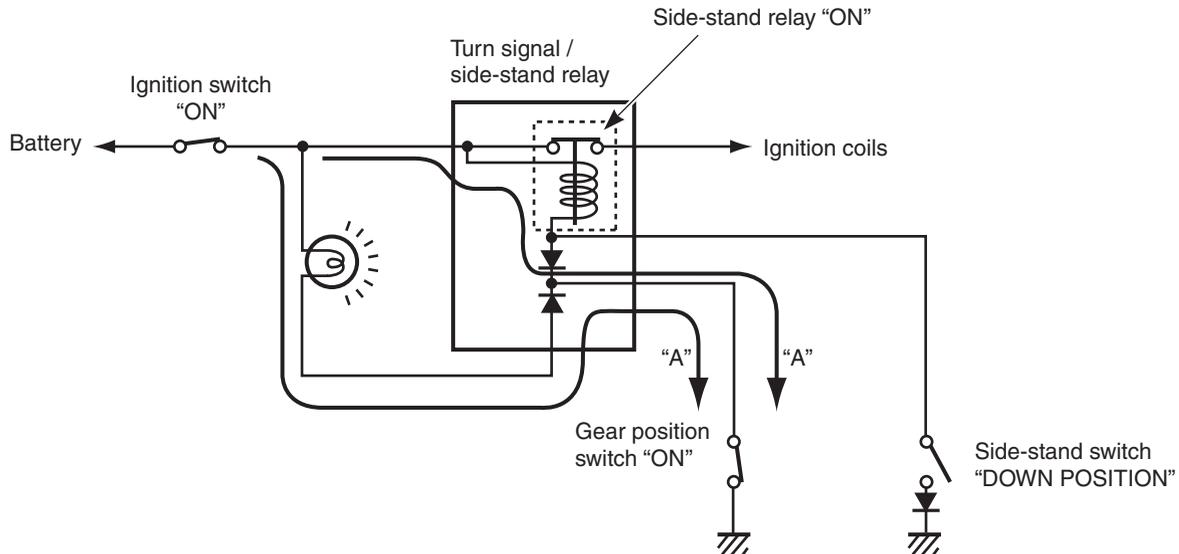


11-2 Starting System:

The circuit consists of the turn signal/side-stand relay, neutral indicator light and switches. The ignition coils will send voltage to the spark plugs dependant on what gear the transmission is in and whether the side-stand is either up or down. The gear position and side-stand switches work together in this system. The ignition coils work only in two situations as follows.

- **Transmission: Neutral (ON) / Side-stand: Down (OFF)**

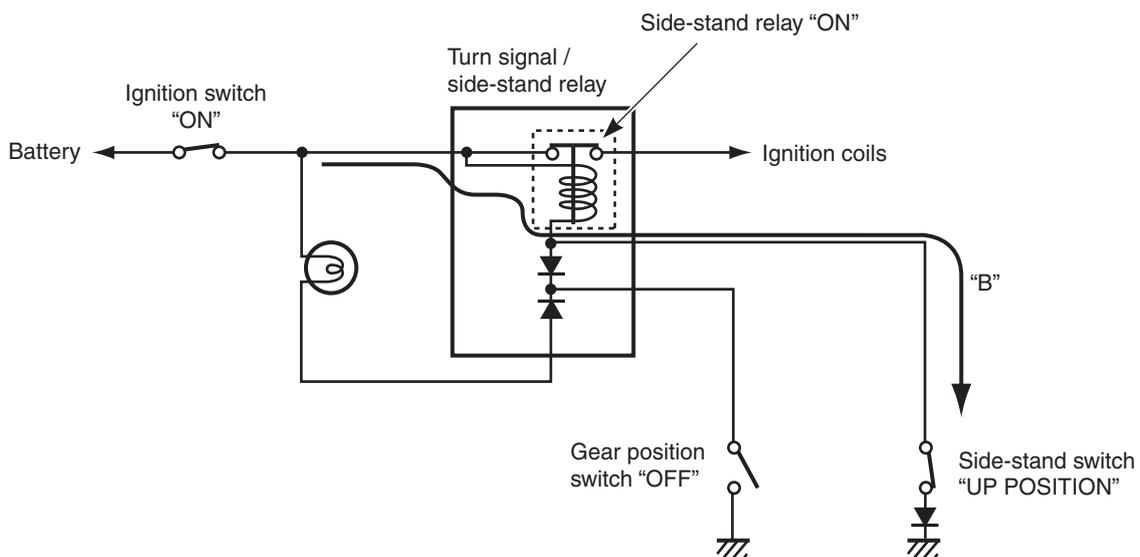
The current flow "A" switches "on" the side-stand relay and the ignition coils send voltage to the spark plugs even when the side-stand is kept down.



I649G1190003-01

- **Side-stand: Up (ON)**

The current flow "B" switches "on" the side-stand relay and the ignition coils send voltage to the spark plugs. The engine can be started in any gear.



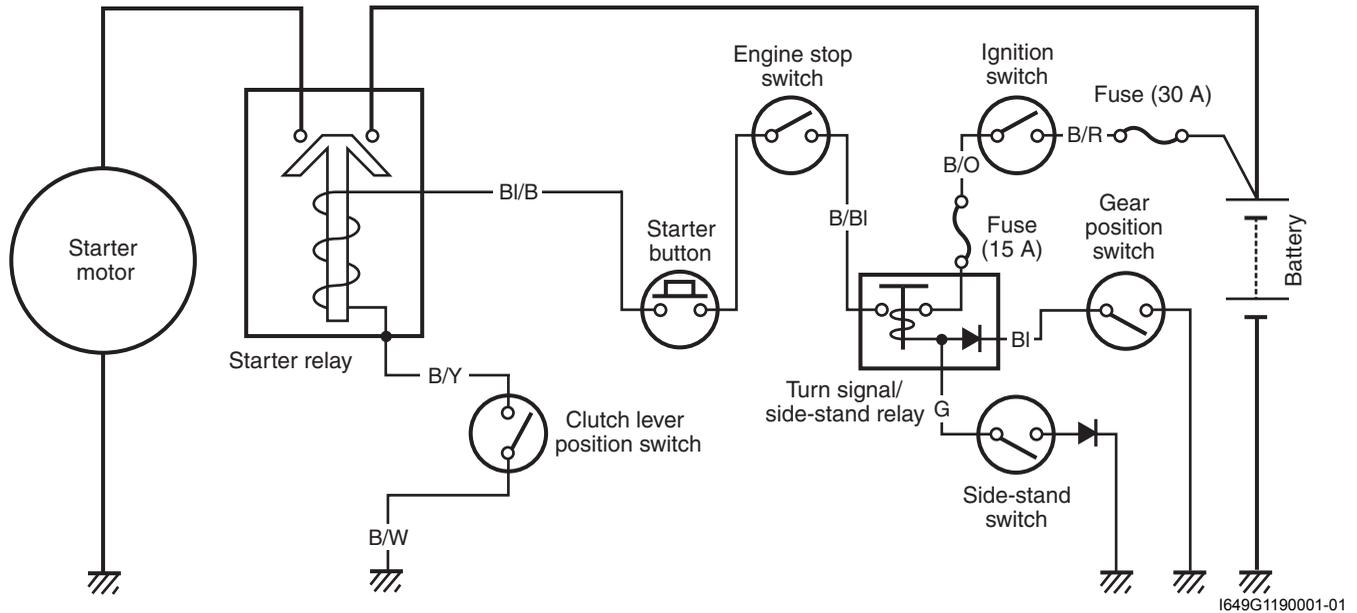
I649G1190004-01

Schematic and Routing Diagram

Starting System Diagram

B649G11902001

Refer to "Wire Color Symbols: in Section 0A".



Component Location

Starting System Components Location

B649G11903001

Refer to "Electrical Components Location: in Section 0A".

Diagnostic Information and Procedures

Starting System Symptom Diagnosis

B649G11904004

Condition	Possible cause	Correction / Reference Item
Engine does not turn though the starter motor runs	Faulty starter clutch	<i>Replace.</i>
Starter button is not effective	Run down battery.	<i>Repair or replace.</i>
	Defective switch contacts.	<i>Replace.</i>
	Brushes not seating properly on starter motor commutator.	<i>Repair or replace.</i>
	Defective starter relay or starter interlock switch.	<i>Replace.</i>
	Defective main fuse.	<i>Replace.</i>

11-4 Starting System:

Starter motor will not run

B649G11904001

NOTE

Make sure the fuses are not blown and the battery is fully-charged before diagnosing.

Troubleshooting

Step	Action	Yes	No
1	1) Shift the transmission into neutral. 2) Grasp the clutch lever, turn on the ignition switch with the engine stop switch in the "RUN" position and listen for a click from the starter relay when the starter button is pushed. <i>Is a click sound heard?</i>	Go to step 2.	Go to step 3.
2	Check if the starter motor runs when its terminal is connected to the battery (+) terminal. (Do not use thin "wire" because a large amount of current flows.) <i>Does the starter motor run?</i>	<ul style="list-style-type: none">Faulty starter relayLoose or disconnected starter motor lead wire	Faulty starter motor.
3	Measure the starter relay voltage at the starter relay connectors (between B/BI (+) and B/Y (-)) when the starter button is pushed. <i>Is a voltage OK?</i>	Go to Step 4.	<ul style="list-style-type: none">Faulty ignition switchFaulty engine stop switchFaulty clutch lever position switchFaulty gear position switchFaulty turn signal/ side-stand relayFaulty starter buttonPoor contact of connectorOpen circuit in wire harness
4	Check the starter relay. Refer to "Starter Relay Inspection: ". <i>Is the starter relay OK?</i>	Poor contact of the starter relay.	Faulty starter relay.

Starter Motor Runs but Does not Crank the Engine

B649G11904003

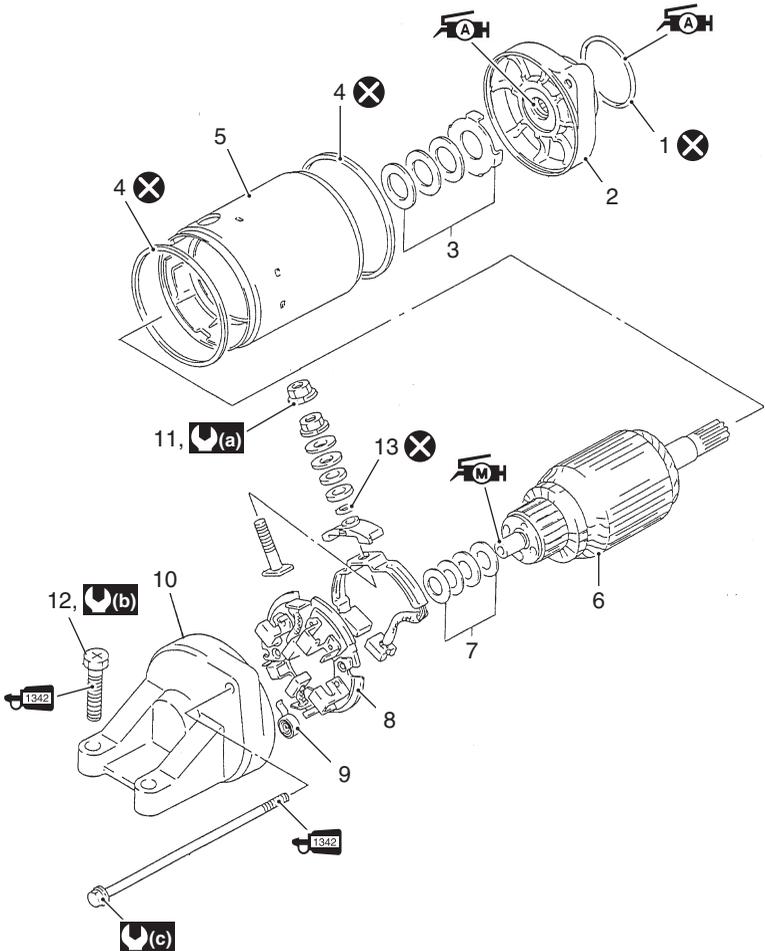
The starter motor runs when the transmission is in neutral, but does not run when the transmission is in any position other than neutral, with the side-stand up.

Step	Action	Yes	No
1	Check the side-stand switch. Refer to "Side-stand / Ignition Interlock System Parts Inspection: ". <i>Is the side-stand switch OK?</i>	Go to Step 2.	Faulty side-stand switch.
2	Check the starter clutch. Refer to "Starter Clutch Inspection: ". <i>Is the starter clutch OK?</i>	<ul style="list-style-type: none">Open circuit in wire harnessPoor contact of connector	Faulty starter clutch.

Repair Instructions

Starter Motor Components

B649G11906013



I649G1190005-03

1. O-ring	6. Armature	11. Starter motor lead wire nut	: 6.5 N·m (0.65 kgf·m, 4.7 lb·ft)
2. Housing end (Inside)	7. Washer set	12. Starter motor mounting bolt	: Apply grease to sliding surface.
3. Washer set	8. Brush holder	13. O-ring	: Apply moly paste to sliding surface.
4. O-ring	9. Brush spring	: 5 N·m (0.5 kgf·m, 3.5 lb·ft)	: Apply thread lock to thread part.
5. Starter motor case	10. Housing end (Outside)	: 6 N·m (0.6 kgf·m, 4.5 lb·ft)	: Do not reuse.

11-6 Starting System:

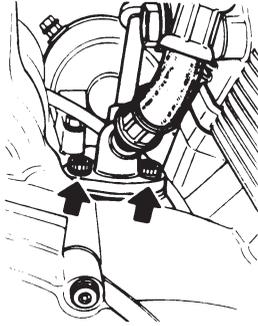
Starter Motor Removal and Installation

B649G11906001

Refer to “Electrical Components Location: in Section 0A”.

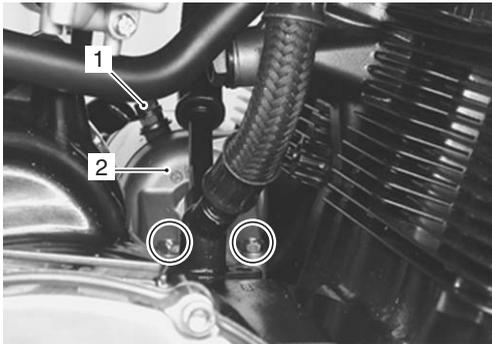
Removal

- 1) Disconnect the battery (–) lead wire. Refer to “Battery Removal and Installation: in Section 1J”.
- 2) Remove the cooling hose mounting bolts.



I649G1190006-01

- 3) Disconnect the starter motor lead wire (1).
- 4) Remove the starter motor (2) by removing its mounting bolts.



I649G1190007-01

Installation

Install the starter motor in the reverse order of removal. Pay attention to the following points:

- Apply SUZUKI SUPER GREASE “A” to the starter motor O-ring.

 **Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)**

CAUTION

Replace the O-ring with a new one.



I649G1190008-01

- Apply a small quantity of THREAD LOCK “1342” to the starter motor mounting bolts and tighten them to the specified torque.

 **Thread lock cement 99000–32050 (Thread Lock Cement 1342 or equivalent)**

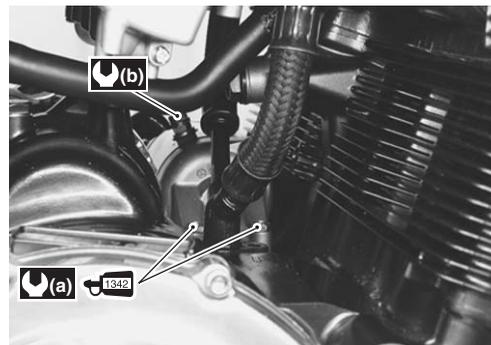
Tightening torque

Starter motor mounting bolt (a): 6 N·m (0.6 kgf·m, 4.5 lb-ft)

- Connect the starter motor lead wire.

Tightening torque

Starter motor lead wire nut (b): 5 N·m (0.5 kgf·m, 3.5 lb-ft)



I649G1190009-04

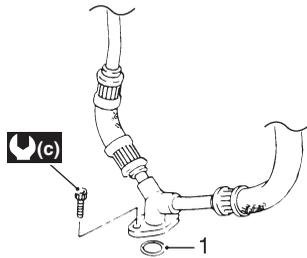
- Install the cooling hose and tighten its mounting bolts to the specified torque.

⚠ CAUTION

Replace the O-ring (1) with a new one to prevent oil leakage.

Tightening torque

Cooling hose mounting bolt (c): 10 N·m (1.0 kgf·m, 7.0 lb-ft)



I649G1190010-03

Starter Motor Disassembly and Assembly

B649G11906002

Refer to "Starter Motor Removal and Installation: ".

Disassembly

Disassemble the starter motor as shown in the starter motor components diagram. Refer to "Starter Motor Components: ".

Assembly

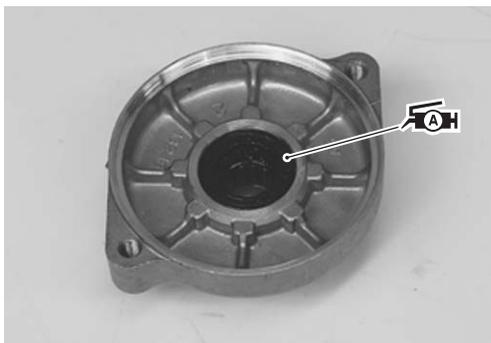
Reassemble the starter motor in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

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

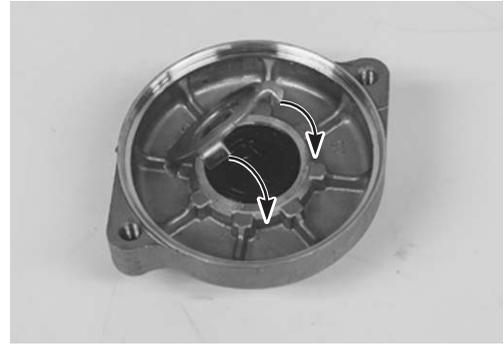
- Apply SUZUKI SUPER GREASE "A" to the lip of the oil seal.

🔧 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1190011-01

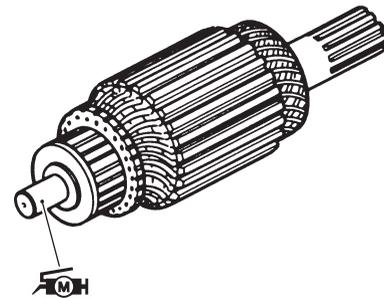
- Fit the washer to the housing end correctly as shown.



I649G1190012-02

- Apply a small quantity of SUZUKI MOLY PASTE to the armature shaft.

🔧 : Moly paste 99000-25140 (SUZUKI Moly paste or equivalent)



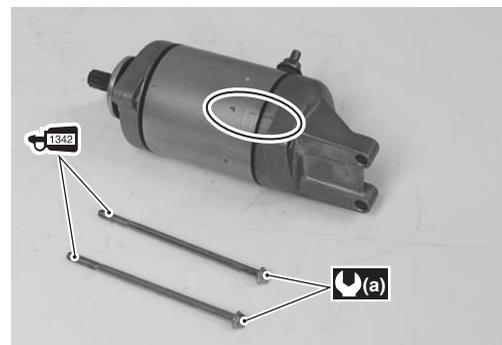
I649G1190013-02

- Align the match mark on the starter motor case with the match mark on the housing end.
- Apply a small quantity of THREAD LOCK "1342" to the starter motor housing bolts and tighten them to the specified torque.

🔧 : Thread lock cement 99000-32050 (Thread Lock Cement 1342 or equivalent)

Tightening torque

Starter motor housing bolt (a): 6.5 N·m (0.65 kgf·m, 4.7 lb-ft)



I649G1190014-02

11-8 Starting System:

Starter Motor Inspection

B649G11906003

Refer to "Starter Motor Disassembly and Assembly: ".

Carbon Brush

Inspect the carbon brushes for abnormal wear, cracks or smoothness in the brush holder.

If either carbon brush is defective, replace the brush holder set with a new one.

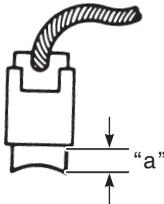
Measure the length "a" of the carbon brushes using a vernier calipers. If the measurement is less than the service limit, replace the brush holder set with a new one.

Brush length "a"

Service limit: 6.0 mm (0.24 in)

Special tool

 : 09900-20102 (Vernire calipers)



I649G1190015-01

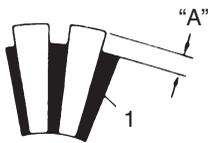
Commutator

Inspect the commutator for discoloration, abnormal wear or undercut "A".

If the commutator is abnormally worn, replace the armature.

If the commutator surface is discolored, polish it with #400 sandpaper and wipe it using a clean, dry cloth.

If there is no undercut, scrape out the insulator (1) with a saw blade.



I649G1190016-01

Armature Coil

Measure for continuity between each segment. Measure for continuity between each segment and the armature shaft.

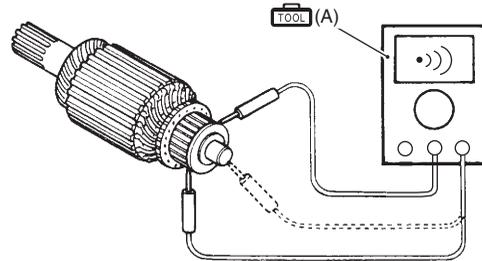
If there is no continuity between the segments or there is continuity between the segments and shaft, replace the armature with a new one.

Special tool

 (A): 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity set (•))

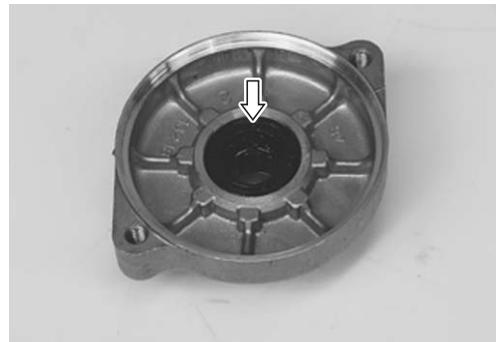


I649G1190017-02

Oil Seal

Check the seal lip for damage or leakage.

If any damage is found, replace the housing end (Inside).



I649G1190018-01

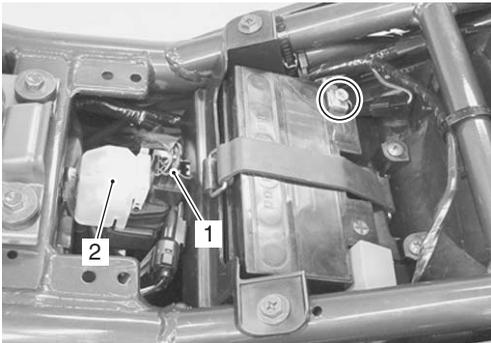
Starter Relay Removal and Installation

B649G11906014

Refer to "Electrical Components Location: in Section 0A".

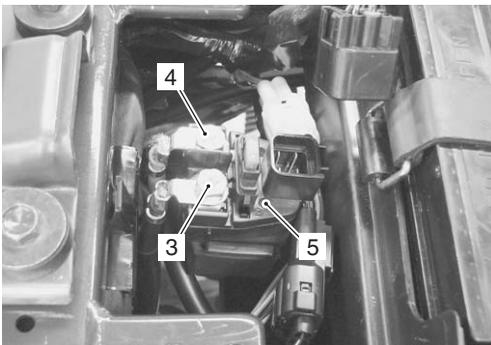
Removal

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the battery (-) lead wire from the battery.
- 3) Disconnect the starter relay coupler (1) and remove the starter relay cover (2).



I649G1190019-02

- 4) Disconnect the starter motor lead wire (3), battery (+) lead wire (4).
- 5) Remove the starter relay (5).



I649G1190020-02

Installation

Install the starter relay in the reverse order of removal.

Starter Relay Inspection

B649G11906015

Inspect the starter relay in the following procedures:

- 1) Remove the starter relay. Refer to "Starter Relay Removal and Installation: ".
- 2) Apply 12 V to "A" and "B" terminals and check for continuity between the positive and negative terminals using the multi-circuit tester. If the starter relay clicks and continuity is found, the relay is ok.

⚠ CAUTION

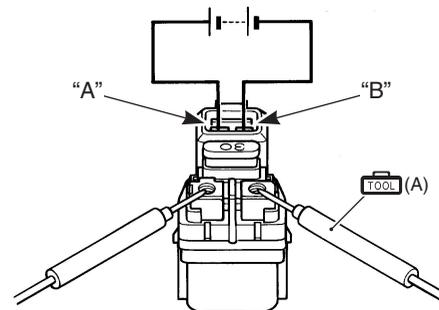
Do not apply battery voltage to the starter relay for five seconds and more, since the relay coil may overheat and get damaged.

Special tool

 (A): 09900-25008 (Multi-circuit tester set)

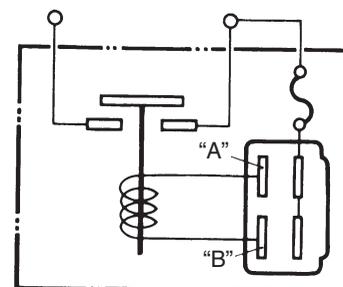
Tester knob indication

Continuity test (•))



I649G1190021-03

To starter motor ⊖ ⊕ To battery



I649G1190022-01

11-10 Starting System:

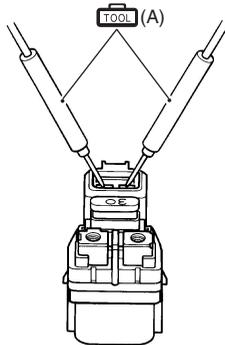
- 3) Measure the relay coil resistance between the terminals using the multi-circuit tester. If the resistance is not within the specified value, replace the starter relay with a new one.

Special tool

 (A): 09900-25008 (Multi-circuit tester set)

Starter relay resistance

3 – 6 Ω



I649G1190023-02

- 4) Install the starter relay. Refer to “Starter Relay Removal and Installation: ”.

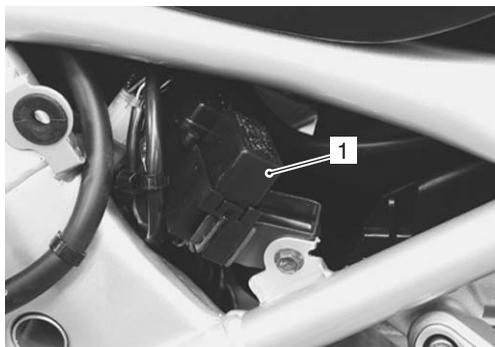
Turn Signal / Side-stand Relay Removal and Installation

B649G11906016

Refer to “Electrical Components Location: in Section 0A”.

Removal

- 1) Remove the left frame cover. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Remove the turn signal/side-stand relay (1).



I649G1190024-01

Installation

Install the turn signal/side-stand relay in the reverse order of removal.

Side-stand / Ignition Interlock System Parts Inspection

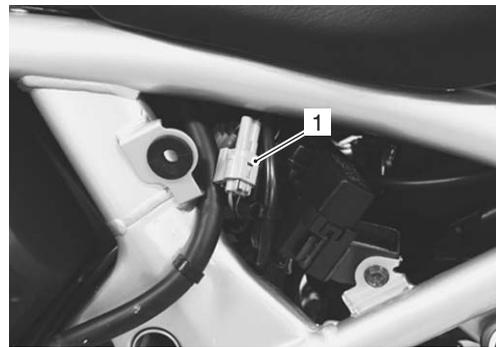
B649G11906017

Refer to “Electrical Components Location: in Section 0A”.

Check the interlock system for proper operation. If the interlock system does not operate properly, check each component for damage or abnormalities. If any abnormality is found, replace the component with a new one.

Side-stand Switch

- 1) Remove the left frame cover. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Disconnect the side-stand switch coupler (1).



I649G1190026-01

- 3) Measure the voltage between Green and Black/White lead wires.

Special tool

 : 09900-25008 (Multi-circuit tester set)

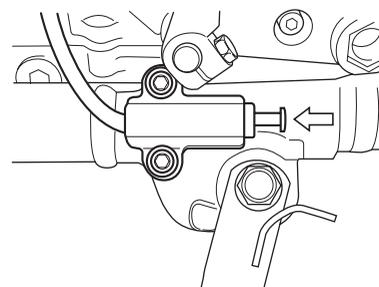
Tester knob indication

Diode test ()

	G (+ probe)	B/W (- probe)
ON (Side-stand up)	0.4 – 0.6 V	
OFF (Side-stand down)	1.4 V and more (Tester's battery voltage)	

NOTE

If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.

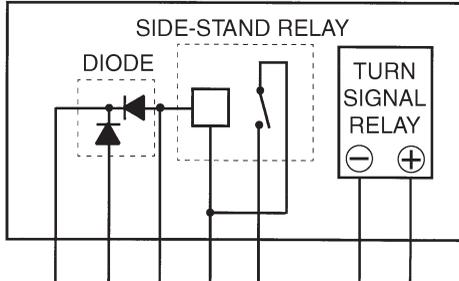


I649G1190025-02

- 4) Connect the side-stand switch coupler.
- 5) Install the left frame cover. Refer to "Exterior Parts Removal and Installation: in Section 9D".

Turn Signal / Side-stand Relay

The turn signal/side-stand relay is composed of the turn signal relay, side-stand relay and diode.



I649G1190027-01

Side-stand relay

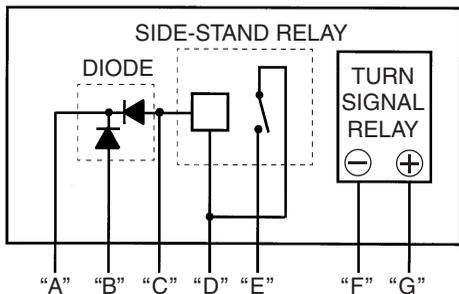
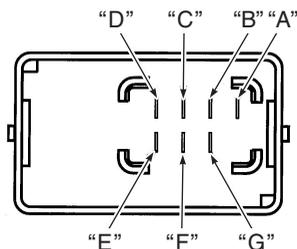
- 1) Remove the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation: ".
- 2) Check the insulation between "D" and "E" terminals using the multi-circuit tester.
- 3) Apply 12 V to terminals "D" and "C" ((+ to "D" and (-) to "C") and check the continuity between "D" and "E". If there is no continuity, replace the turn signal/side-stand relay with a new one. Refer to "Turn Signal / Side-stand Relay Removal and Installation: ".

Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity test (•))



I649G1190028-01

- 4) Install the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation: ".

Diode inspection

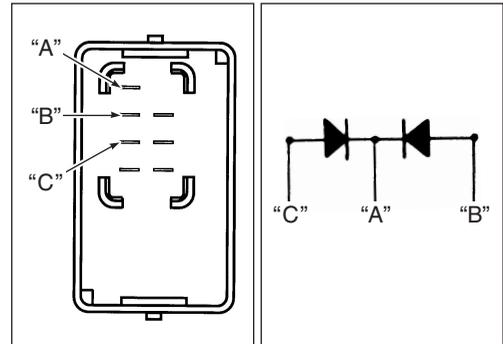
- 1) Remove the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation: ".
- 2) Measure the voltage between the terminals using the multi-circuit tester.

Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication

Diode test (←→)



I649G1190029-01

		⊕ Probe of tester to:	
		"B", "C"	"A"
Ⓜ Probe of tester to:	"B", "C"	—	1.4 V and more (Tester's battery voltage)
	"A"	0.4 – 0.6 V	—

I649G1190046-03

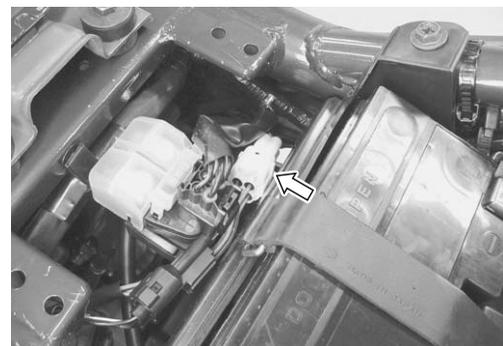
NOTE

If the multi circuit tester reads 1.4 V and below when the tester probes are not connected, replace its battery.

- 3) Install the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation: ".

Gear Position Switch

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the gear position switch coupler.



I649G1190030-02

11-12 Starting System:

- 3) Check the continuity between Blue and Black/White lead wires with the transmission in "NEUTRAL".

⚠ CAUTION

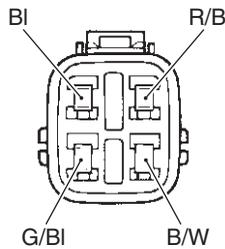
When disconnecting and connecting the gear position switch coupler, make sure to turn off the ignition switch, or electronic parts may get damaged.

Special tool

 : 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity test (•))



I649G1190048-01

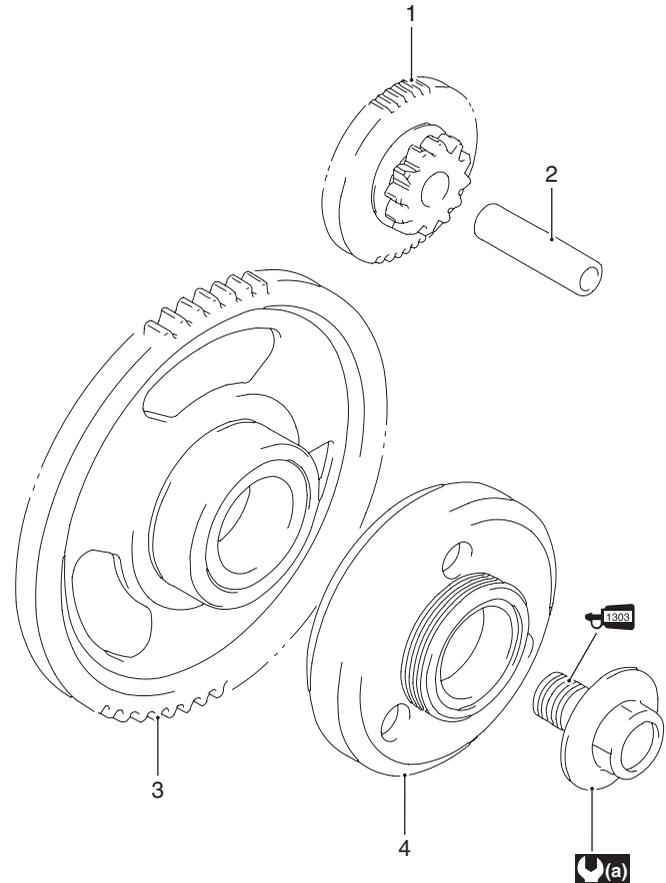
	BI	B/W
ON (Neutral)	○	○
OFF (Except neutral)		

I649G1190045-02

- 4) Connect the gear position switch coupler to the wiring harness.
- 5) Install the seat. Refer to "Exterior Parts Removal and Installation: in Section 9D".

Starter Clutch Components

B649G11906018



I649G1190049-01

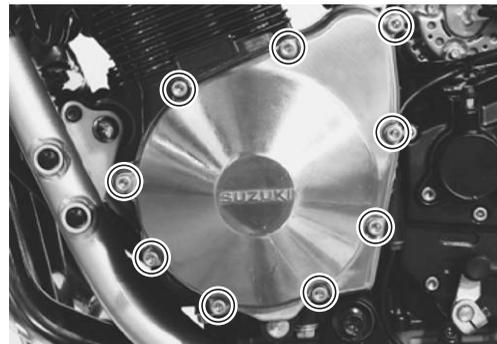
1. Starter idle gear	4. Starter clutch
2. Shaft	 (a) : 150 N·m (15.0 kgf·m, 108.5 lb·ft)
3. Starter driven gear	 1303 : Apply thread lock to thread part.

Starter Clutch Removal and Installation

B649G11906019

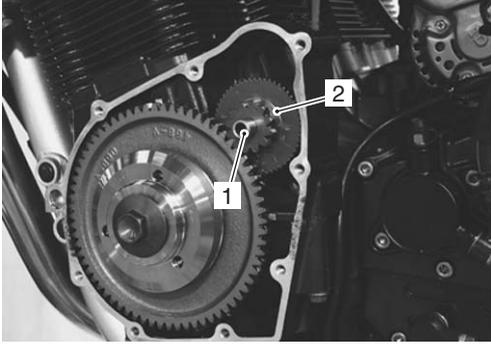
Removal

- 1) Remove the starter motor. Refer to "Starter Motor Removal and Installation: ".
- 2) Drain engine oil.
- 3) Remove the starter clutch cover.



I649G1190032-03

- 4) Remove the idle gear shaft (1) and starter idle gear (2).



I649G1190033-01

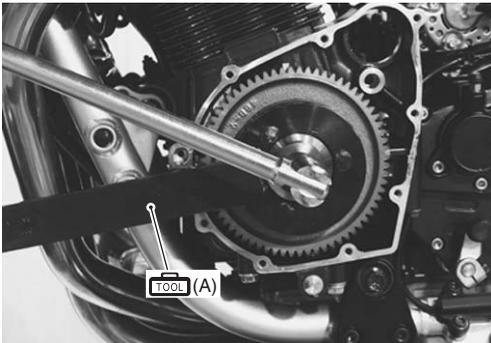
- 5) Hold the starter clutch assembly using the special tool and then loosen the starter clutch mounting bolt.

Special tool

 (A): 09920-34840 (Starter clutch holder)

NOTE

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

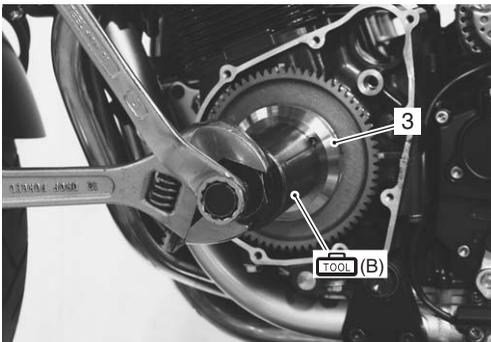


I649G1190034-02

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

Special tool

 (B): 09930-30721 (Rotor remover)



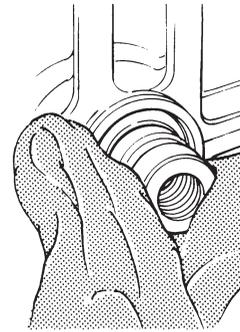
I649G1190035-02

- 7) Remove the starter clutch from the starter driven gear.

Installation

Install the starter clutch assembly in the reverse order of removal. Pay attention to the following points:

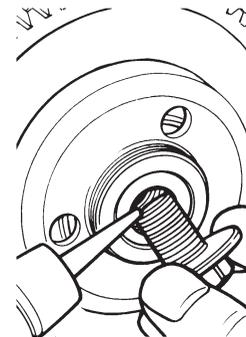
- Remove the grease from the tapered portion of the starter clutch and crankshaft. Use a nonflammable cleaning solvent to wipe off any oil or grease and make sure that the surfaces are completely dry.



I649G1190036-01

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

 : Thread lock cement 99000-32030 (Thread Lock Cement Super 1303 or equivalent)



I649G1190037-01

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

Special tool

 (A): 09920-34840 (Starter clutch holder)

Tightening torque

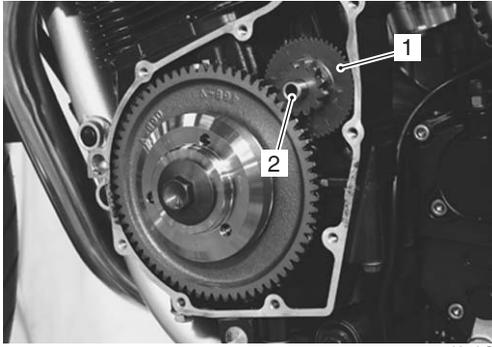
Starter clutch mounting bolt (a): 150 N·m (15.0 kgf-m, 108.5 lb-ft)



I649G1190038-03

11-14 Starting System:

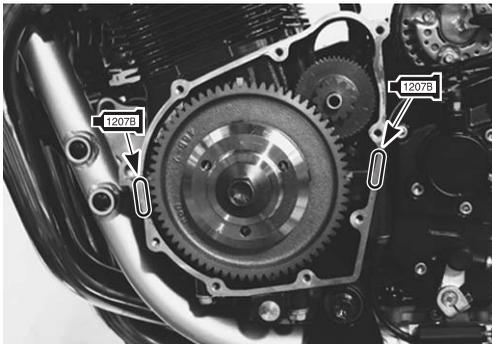
- Install the starter idle gear (1) and its shaft (2).



I649G1190039-01

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

1207B : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)



I649G1190040-02

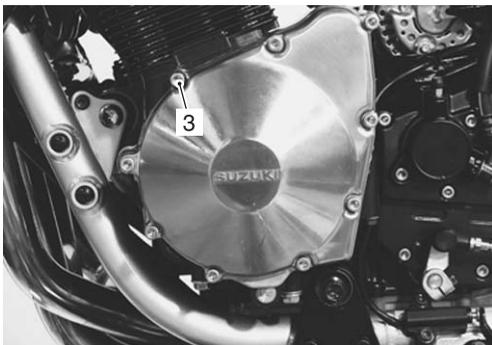
- Install the dowel pin, new gasket and starter clutch cover, and tighten the cover bolts securely.

NOTE

Install the gasket washer to the starter clutch cover bolt (3) as shown.

CAUTION

Use a new gasket washer to prevent oil leakage.



I649G1190041-01

Starter Clutch Inspection

B649G11906020

Refer to "Starter Clutch Removal and Installation: ".

Starter Clutch

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



I649G1190042-01

Starter Driven Gear Bearing

Inspect the starter driven gear bearing for wear or damage.



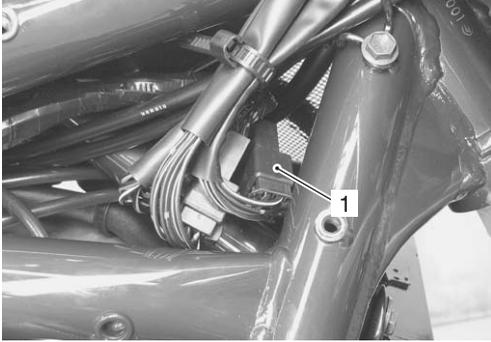
I649G1190043-01

Starter Button Inspection

B649G11906021

Inspect the starter button in the following procedures:

- 1) Remove the right frame head cover. (GSF1200)
Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the right handlebar switch coupler (1).



I649G1190047-02

- 3) Inspect the starter button for continuity with a tester.
If any abnormality is found, replace the right handle switch assembly with a new one. Refer to "Handlebars Removal and Installation: in Section 6B".

Special tool

 : 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity (•)))

Color Position	B/R	B/B
•		
PUSH		

I649G1190044-01

- 4) After finishing the starter button inspection, reinstall the removed parts.

Specifications

Service Data

B649G11907002

Unit: mm (in)

Item	Specification		Note
	Standard		
Starter motor brush length		12.5 (0.49)	
	Limit	6.0 (0.24)	
Starter relay resistance	3 – 6 Ω		

Tightening Torque Specifications

B649G11907003

Fastening part	Tightening torque			Note
	N-m	kgf-m	lb-ft	
Starter motor mounting bolt	6	0.6	4.5	
Starter motor lead wire nut	5	0.5	3.5	
Cooling hose mounting bolt	10	1.0	7.0	
Starter motor housing bolt	6.5	0.65	4.7	
Starter clutch mounting bolt	150	15.0	108.5	

NOTE

The specified tightening torque is also described in the following.

“Starter Motor Components: ”

“Starter Clutch Components: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G11908001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000-25010	☞ / ☞
Moly paste	SUZUKI Moly paste or equivalent	P/No.: 99000-25140	☞
Sealant	SUZUKI Bond 1207B or equivalent	P/No.: 99000-31140	☞
Thread lock cement	Thread Lock Cement Super 1303 or equivalent	P/No.: 99000-32030	☞
	Thread Lock Cement 1342 or equivalent	P/No.: 99000-32050	☞ / ☞

NOTE

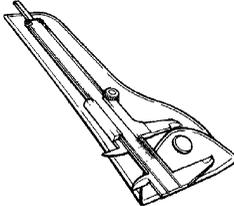
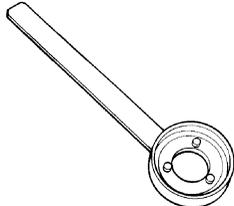
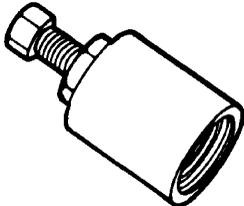
Required service material is also described in the following.

“Starter Motor Components: ”

“Starter Clutch Components: ”

Special Tool

B649G11908002

09900-20102 Vernier calipers (1/20 mm, 200 mm) ☞		09900-25008 Multi-circuit tester set ☞ / ☞ / ☞ / ☞ / ☞ / ☞ / ☞ / ☞ / ☞ ☞	
09920-34840 Starter clutch holder ☞ / ☞		09930-30721 Rotor remover ☞	

Charging System

General Description

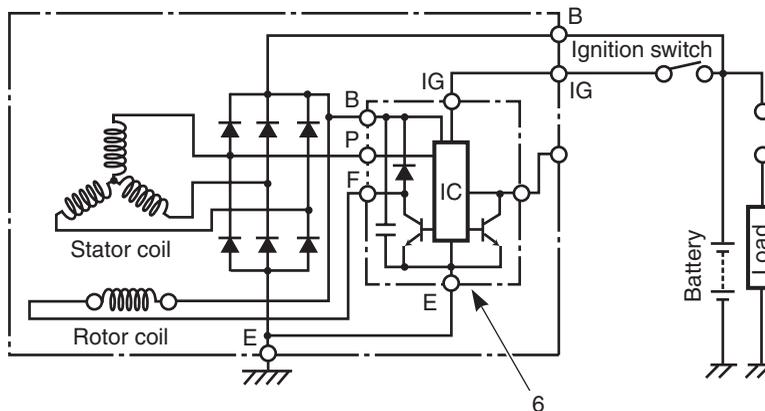
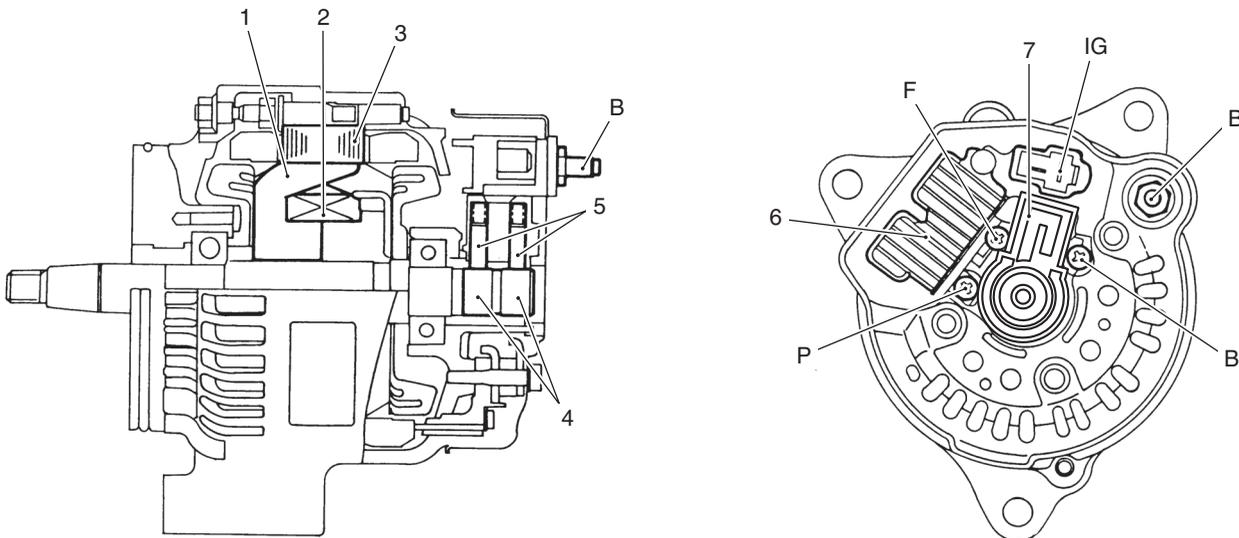
Charging System Description (Generator with IC Regulator)

B649G11A01001

The generator features a solid-state regulator that is mounted inside the generator. All regulator components are enclosed into a solid mold, and this unit is attached to the brush holder frame. The regulator voltage setting cannot be adjusted.

Two brushes carry current through the two slip rings to the rotor coil which is mounted on the rotor.

The stator windings are assembled on the inside of a laminated core that forms part of the generator housing. A rectifier bridge, which is connected to the stator windings, contains eight diodes, and electrically changes the stator A.C. voltage to D.C. voltage which appears at the generator output terminal.



I649G11A0001-01

1. Rotor	4. Slip rings	7. Brush holder	F: Rotor coil terminal
2. Rotor coil	5. Brushes	B: Battery terminal	IG: Ignition terminal
3. Stator coil	6. IC regulator	E: Ground	P: Stator coil terminal

Component Location

Charging System Components Location

B649G11A03001

Refer to "Electrical Components Location: in Section 0A".

Diagnostic Information and Procedures

Charging System Symptom Diagnosis

B649G11A04009

Condition	Possible cause	Correction / Reference Item
Generator does not charge	Open- or short-circuited lead wires, or loose lead connections.	<i>Repair, replace or connect properly.</i>
	Short-circuited, grounded or open generator coils.	<i>Replace.</i>
	Short-circuited or punctured IC regulator or rectifier.	<i>Replace.</i>
Generator does charge, but charging rate is below the specification	Lead wires tend to get short- or open-circuited or loosely connected at terminals.	<i>Repair or retighten.</i>
	Grounded or open-circuited stator coils or generator.	<i>Replace.</i>
	Defective IC regulator or rectifier	<i>Replace.</i>
	Defective cell plates in the battery.	<i>Replace the battery.</i>
Generator overcharges	Internal short-circuit in the battery.	<i>Replace the battery.</i>
	Damaged or defective IC regulator or rectifier.	<i>Replace.</i>
	Poorly grounded IC regulator.	<i>Clean and tighten ground connection.</i>
	Poor contact of generator lead wire coupler.	<i>Repair or connect properly.</i>
Unstable charging	Lead wire insulation frayed due to vibration, resulting in intermittent short-circuiting.	<i>Repair or replace.</i>
	Internally short-circuited generator.	<i>Replace.</i>
	Defective IC regulator or rectifier.	<i>Replace.</i>
"Sulfation", acidic white powdery substance or spots on surfaces of cell plates	Cracked battery case.	<i>Replace the battery.</i>
	Battery has been left in a run-down condition for a long time.	<i>Replace the battery.</i>
Battery runs down quickly	Trouble in charging system.	<i>Check the generator, IC regulator or rectifier circuit connections and make necessary adjustments to obtain specified charging operation.</i>
	Cell plates have lost much of their active materials a result of overcharging.	<i>Replace the battery and correct the charging system.</i>
	Internal short-circuit in the battery.	<i>Replace the battery.</i>
	Too low battery voltage.	<i>Recharge the battery fully.</i>
	Too old battery.	<i>Replace the battery.</i>
Battery "sulfation"	Incorrect charging rate. (When not in use battery should be checked at least once a month to avoid sulfation.)	<i>Replace the battery.</i>
	The battery was left unused in a cold climate for too long.	<i>Replace the battery if badly sulfated.</i>

1J-3 Charging System:

Battery Runs Down Quickly

B649G11A04001

Troubleshooting

Step	Action	Yes	No
1	Check accessories which use excessive amounts of electricity. <i>Are accessories being installed?</i>	Remove accessories.	Go to Step 2.
2	Check the battery for current leakage. Refer to "Battery Current Leakage Inspection: ". <i>Is the battery for current leakage OK?</i>	Go to Step 3.	<ul style="list-style-type: none">• Short circuit of wire harness• Loose or disconnected wires• Faulty battery
3	Measure the charging voltage between the battery terminals. Refer to "Regulated Voltage Inspection: ". <i>Is the charging voltage OK?</i>	<ul style="list-style-type: none">• Faulty battery• Abnormal driving condition	Go to Step 4.
4	Measure the continuity of the stator coil and rotor coil. Refer to "Generator Parts Inspection: ". <i>Is the continuity of the stator coil and rotor coil OK?</i>	Go to Step 5.	<ul style="list-style-type: none">• Faulty stator coil• Disconnected lead wires
5	Inspect the slip rings and brushes. Refer to "Generator Parts Inspection: ". <i>Is the slip rings and brushes OK?</i>	Go to Step 6.	Faulty slip ring(-s) and/or brush(-es)
6	Inspect the rectifier and IC regulator. Refer to "Generator Parts Inspection: ". <i>Is the rectifier and IC regulator OK?</i>	Go to Step 7.	Faulty rectifier and/or IC regulator
7	Inspect wirings. <i>Is the wirings OK?</i>	Faulty battery	<ul style="list-style-type: none">• Short circuit of wire harness• Poor contact of couplers

Repair Instructions

Battery Current Leakage Inspection

B649G11A06001

Inspect the battery current leakage in the following procedures:

- 1) Turn the ignition switch to the OFF position.
- 2) Remove the seat. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 3) Disconnect the battery (-) lead wire.
- 4) Measure the current between (-) battery terminal and the (-) battery lead wire using the multi-circuit tester. If the reading exceeds the specified value, leakage is evident.

⚠ CAUTION

- Because the current leak might be large, turn the tester to high range first to avoid tester damage.
- Do not turn the ignition switch to the ON position when measuring current.

Special tool

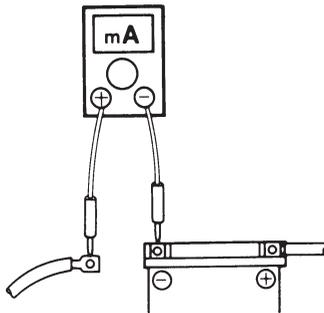
 (A): 09900-25008 (Multi-circuit tester set)

Tester knob indication

Current (---, 20 mA)

Battery current (Leak)

Under 1 mA



I649G11A0002-01

NOTE

When checking for excessive current leakage, remove the couplers and connectors, one by one, so as to locate the position of trouble.

- 5) Install the seat. Refer to "Exterior Parts Removal and Installation: in Section 9D".

Regulated Voltage Inspection

B649G11A06002

NOTE

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

Inspect the regulated voltage in the following procedures:

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Start the engine and keep it running at 5 000 r/min with the dimmer switch turned HI position.
- 3) Measure the DC voltage between the (+) and (-) battery terminals using the multi-circuit tester. If the voltage is not within the specified value, inspect the stator coil, rectifier and IC regulator mounted in the generator. Refer to "Generator Parts Inspection: ".

Special tool

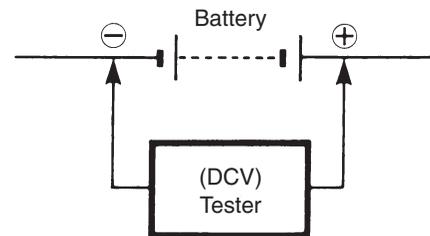
 (A): 09900-25008 (Multi-circuit tester set)

Tester knob indication

Voltage (---)

Regulated voltage (Charging output)

Standard: 13.5 – 15.0 V at 5 000 r/min



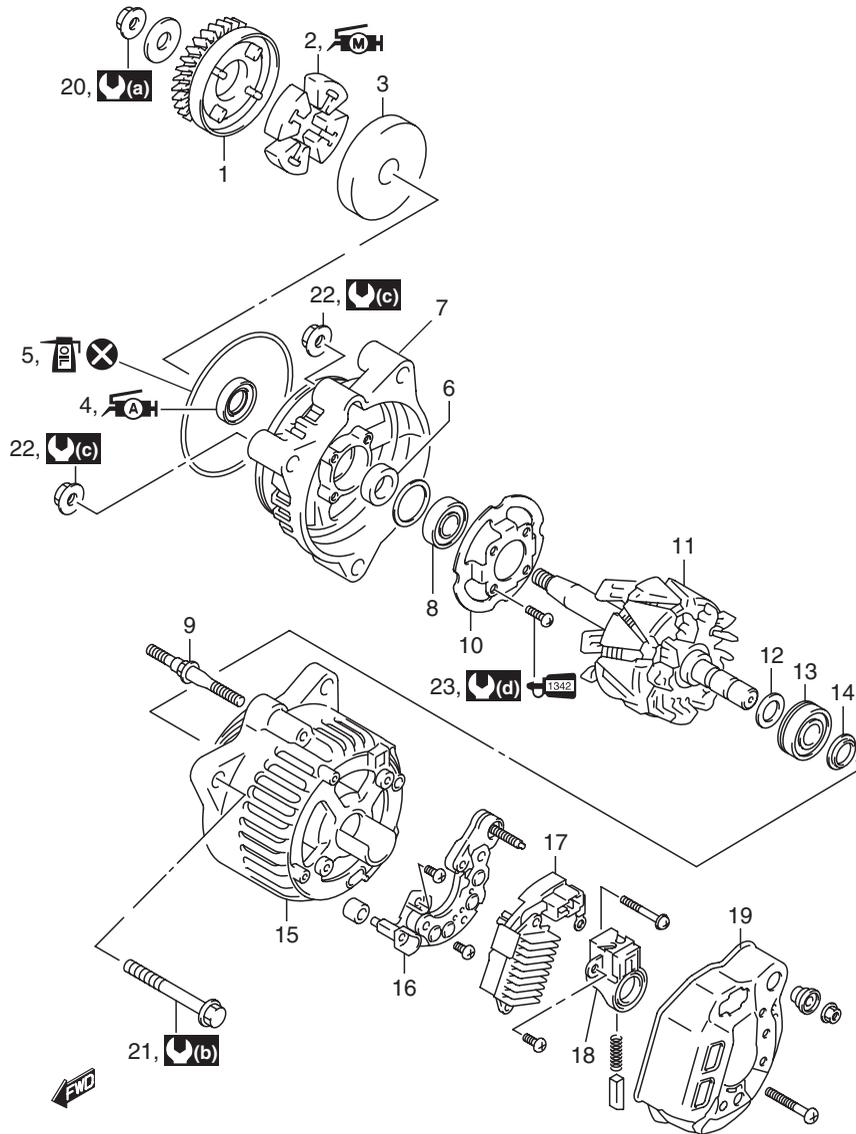
I649G11A0003-01

- 4) Install the seat. Refer to "Exterior Parts Removal and Installation: in Section 9D".

1J-5 Charging System:

Generator Components

B649G11A06010



I649G11A0004-07

1. Generator driven gear	9. Stud bolt	17. IC regulator	: 25 N-m (2.5 kgf-m, 18.0 lb-ft)
2. Damper (4 pcs.)	10. Retainer	18. Brush holder	: 4.5 N-m (0.45 kgf-m, 3.25 lb-ft)
3. Damper housing	11. Rotor	19. Generator end cover	: 2.5 N-m (0.25 kgf-m, 1.80 lb-ft)
4. Oil seal	12. Bearing cover #2	20. Generator driven gear nut	: Apply oil.
5. O-ring	13. Slip ring side bearing	21. Generator mounting bolt	: Apply grease to oil seal lip.
6. Spacer	14. Bearing cover #1	22. Generator housing nut	: Apply moly paste.
7. Generator end housing	15. Generator housing	23. Bearing retainer screw	: Apply thread lock to thread part.
8. Bearing	16. Rectifier	: 55 N-m (5.5 kgf-m, 40.0 lb-ft)	: Do not reuse.

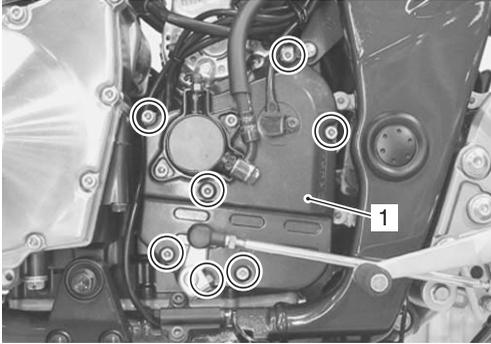
Generator Removal and Installation

B649G11A06003

Refer to “Electrical Components Location: in Section 0A”.

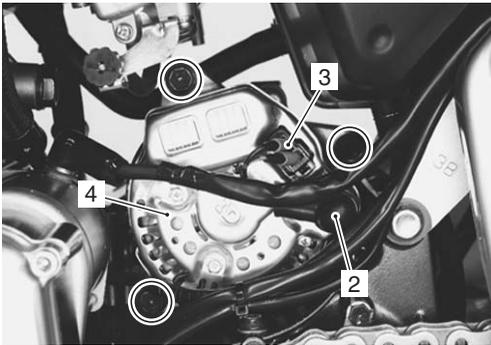
Removal

- 1) Disconnect the battery (–) lead wire. Refer to “Battery Removal and Installation: ”.
- 2) Disengage the gearshift lever link by removing bolt.
- 3) Remove the engine sprocket cover (1).



I649G11A0005-02

- 4) Disconnect the generator lead wire (2) and coupler (3).
- 5) Remove the generator (4).



I649G11A0006-02

Installation

Installation is in the reverse order of removal.

Pay attention to the following points:

- Tighten the generator mounting bolts to the specified torque.

Tightening torque

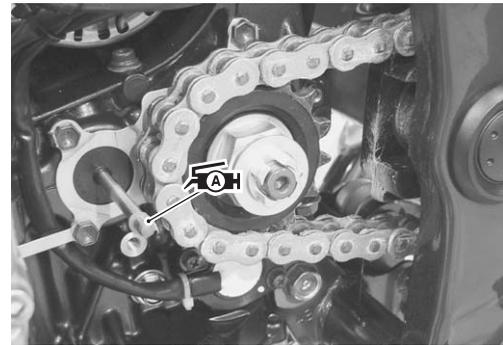
Generator mounting bolt (a): 25 N·m (2.5 kgf·m, 18.0 lb·ft)



I649G11A0007-01

- Route the wire harness properly. Refer to “Wiring Harness Routing Diagram: in Section 9A”.
- Before installing the engine sprocket cover, apply a small quantity of SUZUKI SUPER GREASE “A” to the clutch push rod.

 **Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)**

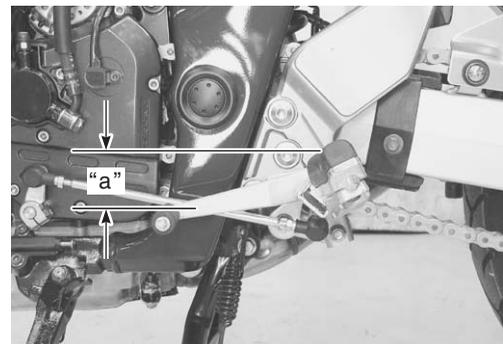


I649G11A0008-02

- Install the gearshift lever to the gearshift shaft in the correct position.

Gearshift lever height “a”

Standard: 55 mm (2.2 in)



I649G11A0009-02

1J-7 Charging System:

Generator Disassembly and Assembly

B649G11A06011

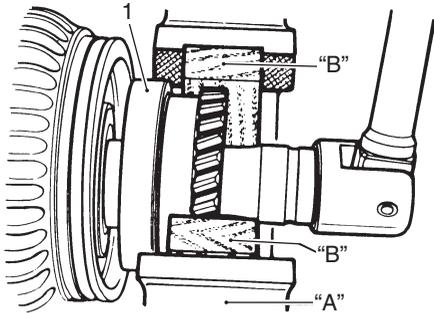
Refer to "Generator Removal and Installation: ".

Disassembly

- 1) Hold the generator driven gear using a vise "A" and two pieces of wood "B" as shown. Then, remove the generator driven gear nut.

⚠ CAUTION

Do not hold the damper housing (1) using the vise "A" or the damper housing will be damaged.

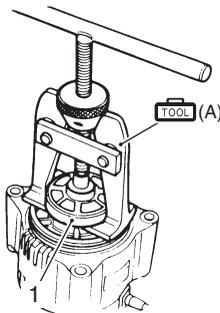


I649G11A0010-02

- 2) Remove the damper housing (1) using the special tool.

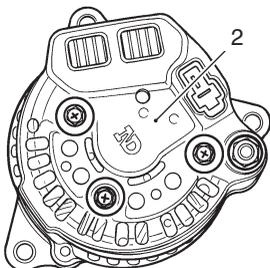
Special tool

 (A): 09913-61510 (Bearing puller)



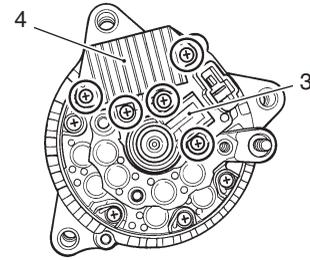
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- 3) Remove the generator end cover (2).



I649G11A0012-01

- 4) Remove the brush holder (3) and IC regulator (4).

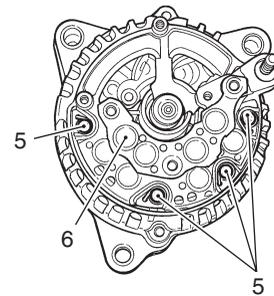


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- 5) Remove the stator coil lead wires mounting screws (5).
- 6) Remove the rectifier (6).

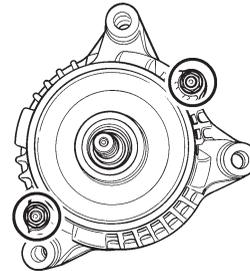
NOTE

Straighten the stator coil lead wires using long-nose pliers, then remove the rectifier.



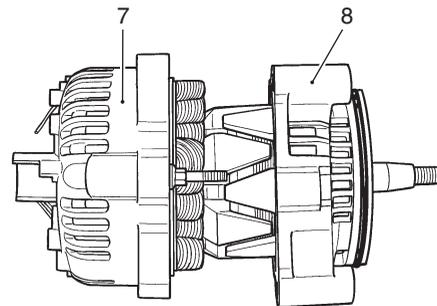
I649G11A0014-01

- 7) Remove the generator housing nuts.



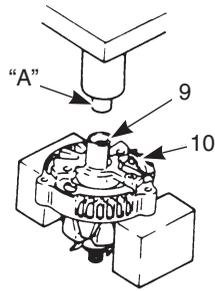
I649G11A0015-01

- 8) Separate the generator housing (7) from the generator end housing (8).



I649G11A0016-01

9) Remove the rotor (9) from the generator end housing (10) using a hand press "A" as shown.



I649G11A0017-03

10) Remove the expander ring.

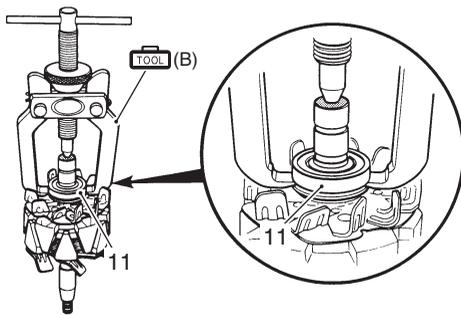
11) Remove the rotor bearing (11) using the special tool.

Special tool

TOOL (B): 09913-60910 (Bearing remover)

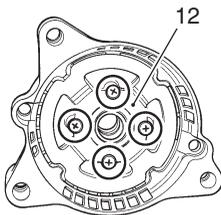
NOTE

If there is no abnormal condition the rotor bearing removal (11) is not necessary.



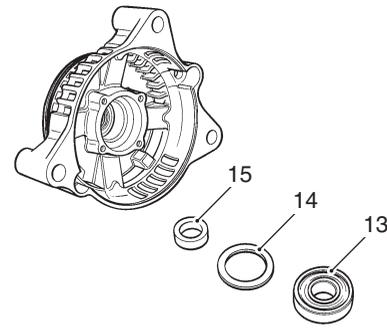
I649G11A0018-03

12) Remove the bearing retainer (12).



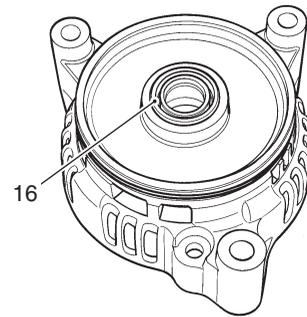
I649G11A0019-02

13) Remove the bearing (13), washer (14) and spacer (15).



I649G11A0020-02

14) Remove the oil seal (16).



I649G11A0021-02

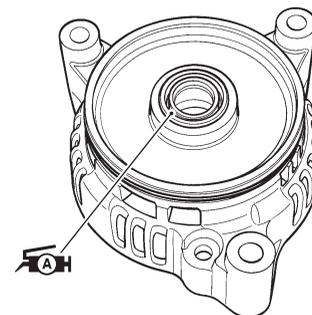
Assembly

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

⚠ CAUTION

- The removed bearing(-s) and oil seal should be replaced with new one(-s).
 - Replace the O-ring with a new one.
-
- Apply SUZUKI SUPER GREASE "A" to the lip of the oil seal.

⚠ : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G11A0022-01

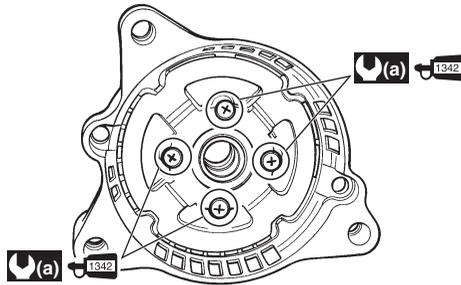
1J-9 Charging System:

- Apply a small quantity of THREAD LOCK "1342" to the bearing retainer screws and tighten them to the specified torque.

 : Thread lock cement 99000-32050 (Thread Lock Cement 1342 or equivalent)

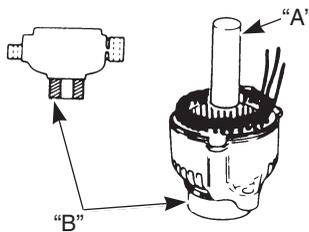
Tightening torque

Bearing retainer screw (a): 2.5 N·m (0.25 kgf·m, 1.8 lb·ft)



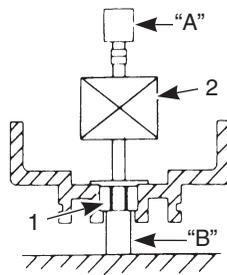
I649G11A0023-02

- Install the bearing and rotor using a hand-press "A".



I649G11A0024-02

"A": Hand-press	"B": Jig
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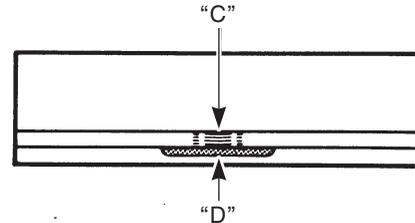


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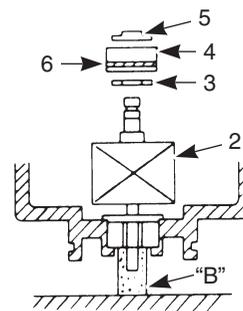
"A": Hand-press	1. Bearing
"B": jig	2. Rotor

NOTE

Before reinstalling the slip ring side bearing onto the generator end housing, turn the expander ring and align the expander ring lug "C" with the center of the chamfered edge "D" of the bearing outer race.



I649G11A0026-02



I649G11A0027-02

2. Rotor	5. Bearing cover #1
3. Bearing cover #2	6. Expander ring
4. Slip ring side bearing	"B": Jig

- Tighten the generator housing nuts (7) to the specified torque.

Tightening torque

Generator housing nut (b): 4.5 N·m (0.45 kgf·m, 3.25 lb·ft)

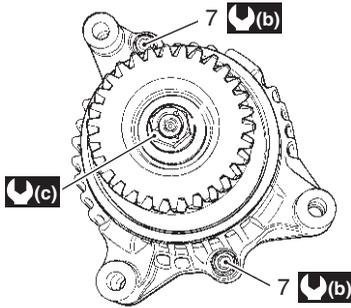
- Tighten the generator driven gear nut to the specified torque.

Tightening torque

Generator driven gear nut (c): 55 N·m (5.5 kgf-m, 4.0 lb-ft)

NOTE

After tightening the generator driven gear nut to the specified torque, stake the nut using a punch.



I649G11A0028-01

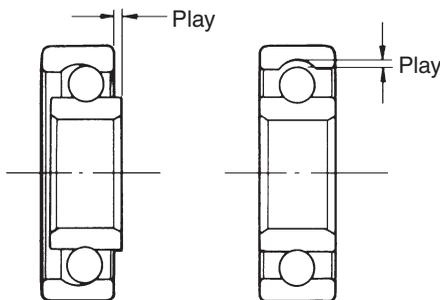
Generator Parts Inspection

B649G11A06012

Refer to "Generator Disassembly and Assembly: ".

Rotor Bearing

Inspect the rotor bearings for abnormal noise. Also, rotate the rotor bearings by hand and make sure that they rotate smoothly. If there is unusual, replace the bearing with a new one.



I649G11A0029-01

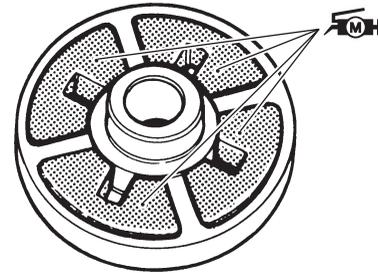
Generator Driven Gear Damper

Inspect the generator driven gear dampers for wear and damage. If any defects are found, replace the generator driven gear dampers as a set.

NOTE

When installing the generator driven gear dampers, apply SUZUKI MOLY PASTE to the damper surface.

: Moly paste 99000-25140 (SUZUKI Moly paste or equivalent)



I649G11A0030-01

Stator Coil Continuity Check

Measure the continuity between the lead wires of the stator coil using a tester.

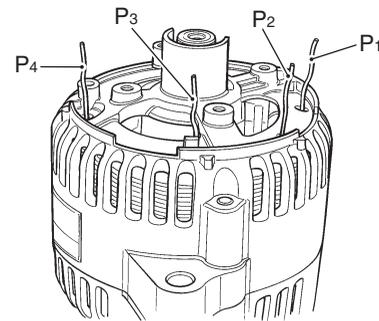
If there is no continuity, replace the stator. Also, check that the stator is properly insulated.

Special tool

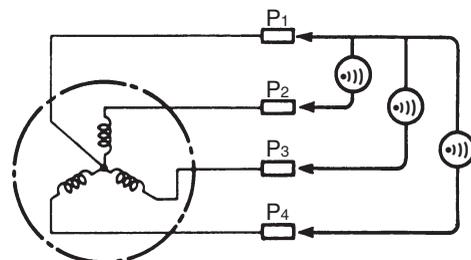
(A): 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity test (•••)



I649G11A0031-01



I649G11A0032-01

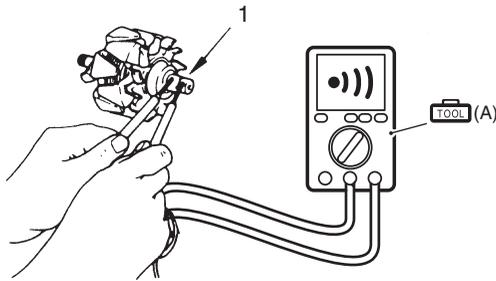
1J-11 Charging System:

Rotor Coil Continuity Check

Measure the continuity between the two slip rings (1) on the rotor coil using a tester.

If there is no continuity, replace the rotor.

Also check that the rotor is properly insulated.



I649G11A0033-02

Slip Rings

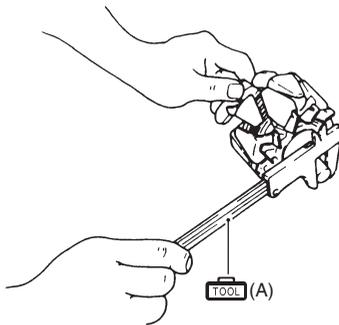
If the slip rings are dirty, polish them with #400 sandpaper and wipe them using a clean, dry cloth. Then, measure the slip ring O.D. using vernier calipers. If it is less than the service limit, replace the slip rings with new ones.

Special tool

(A): 09900-20102 (Vernire calipers)

Slip ring O.D.

Service limit: 14.0 mm (0.55 in)



I649G11A0034-02

Carbon Brush

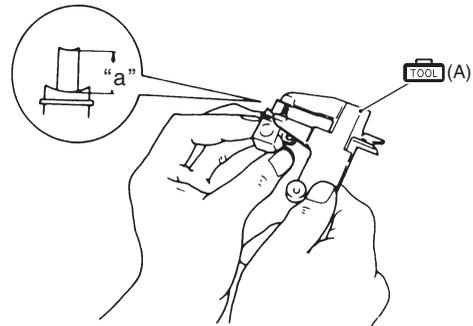
Measure the length "a" of the carbon brushes as shown. If the measurement is less than the service limit, replace the carbon brushes with new ones.

Brush length "a"

Service limit: 4.5 mm (0.18 mm)

Special tool

(A): 09900-20102 (Vernire calipers)



I649G11A0035-02

Rectifier

Measure the voltage among the terminal (1) and the other terminals (P₁, P₂, P₃ and P₄). Put the tester lead on the terminal (1) and the other lead to P₁, P₂, P₃ and P₄ terminals. Observe the reading and then switch the leads.

Perform other side tests among the terminal (2) and the other terminals (P₁, P₂, P₃ and P₄), as described below. If the voltage measured is excessively out of specification, replace the rectifier.

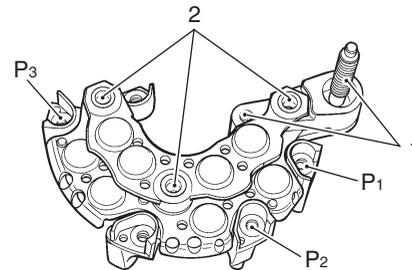
Special tool

(A): 09900-25008 (Multi-circuit tester set)

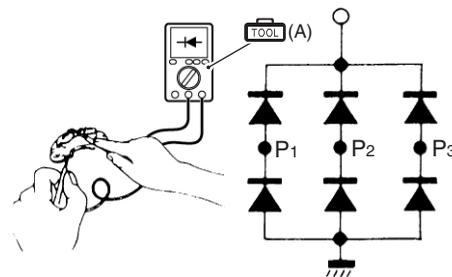
Tester knob indication

Diode test (→←)

Terminal - Terminal	Voltage
(1) (+) - (-) P ₁ , P ₂ , P ₃	1.4 - 1.5 V
(1) (-) - (+) P ₁ , P ₂ , P ₃	0.4 - 0.5 V
(2) (+) - (-) P ₁ , P ₂ , P ₃	0.4 - 0.5 V
(2) (-) - (+) P ₁ , P ₂ , P ₃	1.4 - 1.5 V



I649G11A0036-02



I649G11A0037-02

IC Regulator

Measure the voltage between terminal “F” and terminal “B”.

If the voltage measured is excessively out of specification, replace the IC regulator.

Special tool

 (A): 09900–25008 (Multi-circuit tester set)

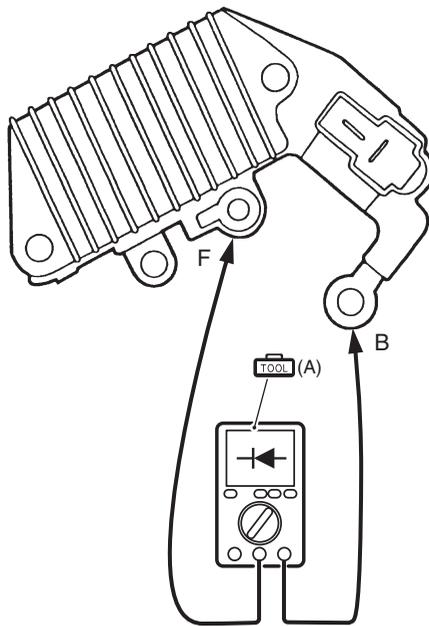
Tester knob indication

Diode test ()

Terminal – Terminal	Voltage
B (+) – (-) F	Approx. 1.4 V
B (-) – (+) F	Approx. 0.5 V

NOTE

If the tester reads under 1.4 V, replace its battery when the tester probes are not connected.

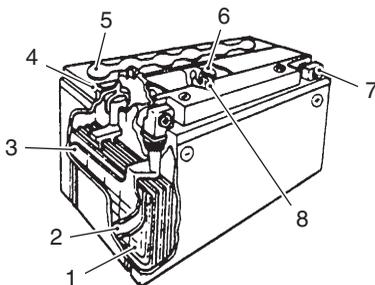


I649G11A0038-02

B: Battery terminal	F: Rotor coil terminal
---------------------	------------------------

Battery Components

B649G11A06018



I649G11A0046-02

1. Anode plates	5. Stopper
2. Separator (Fiberglass plate)	6. Filter
3. Cathode plates	7. Terminal
4. Upper cover breather	8. Safety valve

Battery Charging

B649G11A06013

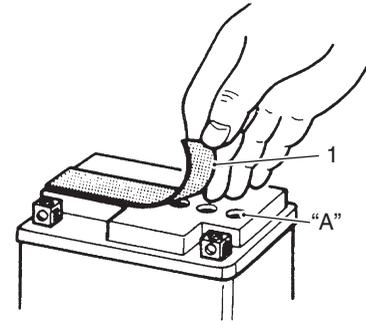
Initial Charging

Filling electrolyte

NOTE

When filling electrolyte, the battery must be removed from the vehicle and must be put on the level ground.

- 1) Remove the aluminum tape (1) which seals the battery filler holes “A”.

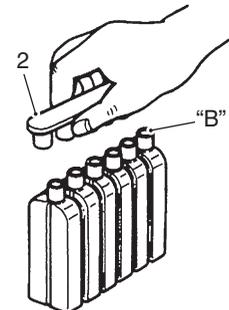


I649G11A0039-02

- 2) Remove the caps (2) from the electrolyte container.

NOTE

- Do not remove or pierce the sealed areas “B” of the electrolyte container.
- After filling the electrolyte completely, use the removed cap (2) as sealing caps of battery-filler holes.



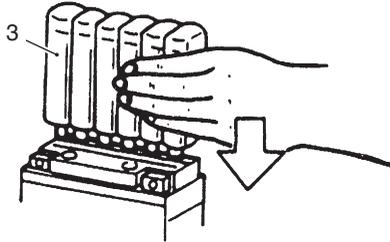
I649G11A0040-02

1J-13 Charging System:

- 3) Insert the nozzles of the electrolyte container (3) into the electrolyte filler holes of the battery.
- 4) Hold the electrolyte container firmly so that it does not fall.

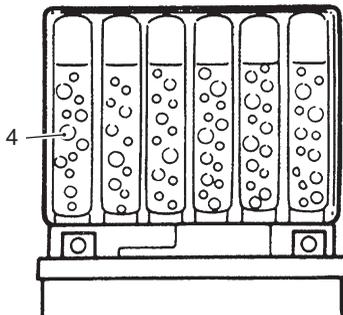
NOTE

Do not allow any of the electrolyte to spill.



I649G11A0041-02

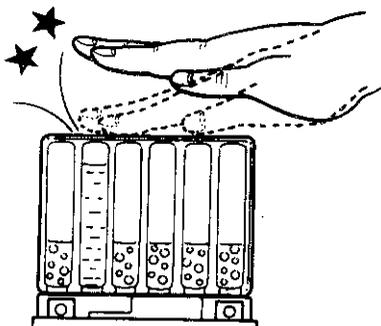
- 5) Make sure that air bubbles (4) rise to the top of each electrolyte container, and leave in this position for about more than 20 minutes.



I649G11A0042-02

NOTE

If no air bubbles are coming up from a filler port, tap the bottom of the electrolyte container two or three times. Never remove the container from the battery.

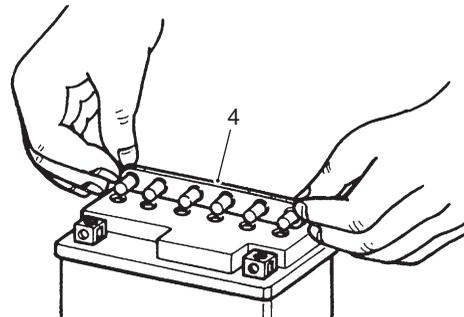


I310G11A0024-01

- 6) After confirming that the electrolyte has entered the battery completely, remove the electrolyte containers from the battery.
- 7) Wait for about 20 minutes.
- 8) Insert the caps (4) into the filler holes, pressing in firmly so that the top of the caps do not protrude above the upper surface of the battery's top cover.

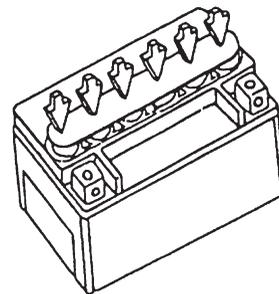
⚠ CAUTION

- Once install the caps to the battery, do not remove the caps.
- Do not tap the caps with a hammer when installing them.

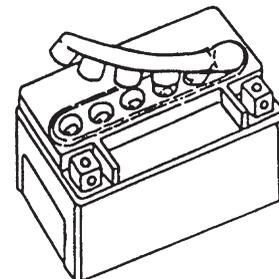


I649G11A0043-02

Correct



Incorrect



I649G11A0047-01

Charging

For initial charging, use the charger specially designed for MF battery.

⚠ CAUTION

- For charging the battery, make sure to use the charger specially designed for MF battery. Otherwise, the battery may be overcharged resulting in shortened service life.
- Do not remove the cap during charging.
- Position the battery with the cap facing upward during charging.

Battery Recharging

⚠ CAUTION

- Do not remove the caps on the battery top while recharging.

NOTE

When the motorcycle is not used for a long period, check the battery every 1 month to prevent the battery discharge.

- 1) Remove the battery from the motorcycle. Refer to "Battery Removal and Installation: ".
- 2) Measure the battery voltage using the multi-circuit tester.
If the voltage reading is less than the 12 V (DC), recharge the battery with a battery charger.

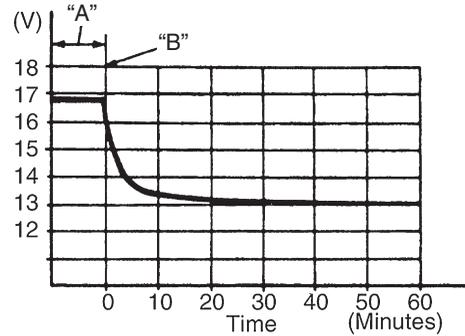
Recharging time

1.2 A for 5 to 10 hours or 5 A for 1 hour.

⚠ CAUTION

Be careful not to permit the charging current to exceed 5 A at any time.

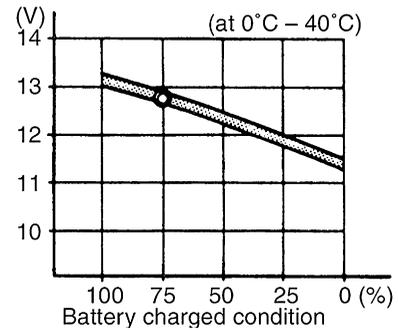
- 3) After recharging, wait at least 30 minutes and then measure the battery voltage using the multi-circuit tester.
If the battery voltage is less than 12.5 V, recharge the battery again.
If the battery voltage is still less than 12.5 V after recharging, replace the battery with a new one.



I649G11A0045-01

"A": Charging period	"B": Stop charging
----------------------	--------------------

- 4) Install the battery to the motorcycle. Refer to "Battery Removal and Installation: ".



I310G11A0030-01

1J-15 Charging System:

Battery Removal and Installation

B649G11A06014

Refer to “Electrical Components Location: in Section 0A”.

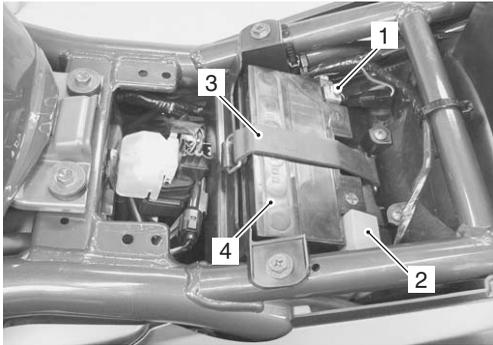
Removal

- 1) Remove the seat. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Disconnect the battery (–) lead wire (1).
- 3) Disconnect the battery (+) lead wire (2).

NOTE

Be sure to disconnect the battery (–) lead wire (1) first, then disconnect the battery (+) lead wire (2).

- 4) Remove the rubber band (3).
- 5) Remove the battery (4) from the motorcycle.



I649G11A0044-02

Installation

Install the battery in the reverse order of removal. Pay attention to following points:

⚠ CAUTION

Never use anything except the specified battery.

- Tighten the battery lead wire mounting bolts securely.

Battery Visual Inspection

B649G11A06017

Inspect the battery in the following procedures:

- 1) Remove the seat. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Visually inspect the surface of the battery container. If any signs of cracking or electrolyte leakage from the sides of the battery have occurred, replace the battery with a new one. If the battery terminals are found to be coated with rust or an acidic white powdery substance, clean the battery terminals with sandpaper.
- 3) Install the seat. Refer to “Exterior Parts Removal and Installation: in Section 9D”.

Specifications

Service Data

B649G11A07001

Battery

⚠ CAUTION

Never use anything except the specified battery.

Item	Specification	Note
Type designation	FT12A-BS	
Capacity	12V, 36.0 kC (10 Ah)/10HR	
Standard electrolyte S.G.	1.320 at 20 °C (68 °F)	

Generator

Item	Specification	Note
Generator maximum output	More than 550 W at 5 000 r/min.	
Regulated voltage	13.5 – 15 V at 5 000 r/min.	
Generator	Slip ring O.D.	Limit: 14.0 (0.55)
	Brush length	Limit: 4.5 (0.18)
		DENSO

Tightening Torque Specifications

B649G11A07002

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Generator mounting bolt	25	2.5	18.0	☞
Bearing retainer screw	2.5	0.25	1.8	☞
Generator housing nut	4.5	0.45	3.25	☞
Generator driven gear nut	55	5.5	4.0	☞

NOTE

The specified tightening torque is also described in the following.

“Generator Components: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G11A08001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000-25010	☞ / ☞
Moly paste	SUZUKI Moly paste or equivalent	P/No.: 99000-25140	☞
Thread lock cement	Thread Lock Cement 1342 or equivalent	P/No.: 99000-32050	☞

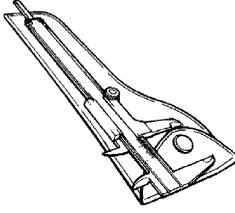
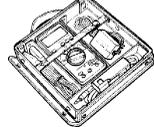
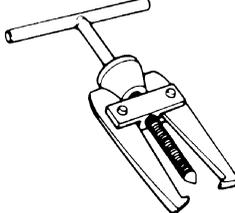
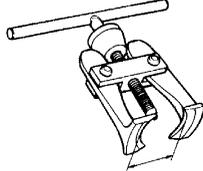
NOTE

Required service material is also described in the following.

“Generator Components: ”

Special Tool

B649G11A08002

<p>09900-20102 Vernier calipers (1/20 mm, 200 mm) ☞ / ☞</p> 	<p>09900-25008 Multi-circuit tester set ☞ / ☞ / ☞ / ☞ / ☞</p> 
<p>09913-60910 Bearing remover ☞</p> 	<p>09913-61510 Bearing puller ☞</p> 

Exhaust System

Precautions

Precautions for Exhaust System

B649G11B00001

⚠ WARNING

To avoid the danger of being burned, do not touch the exhaust system when the system is hot. Any service on the exhaust system should be performed when the system is cool.

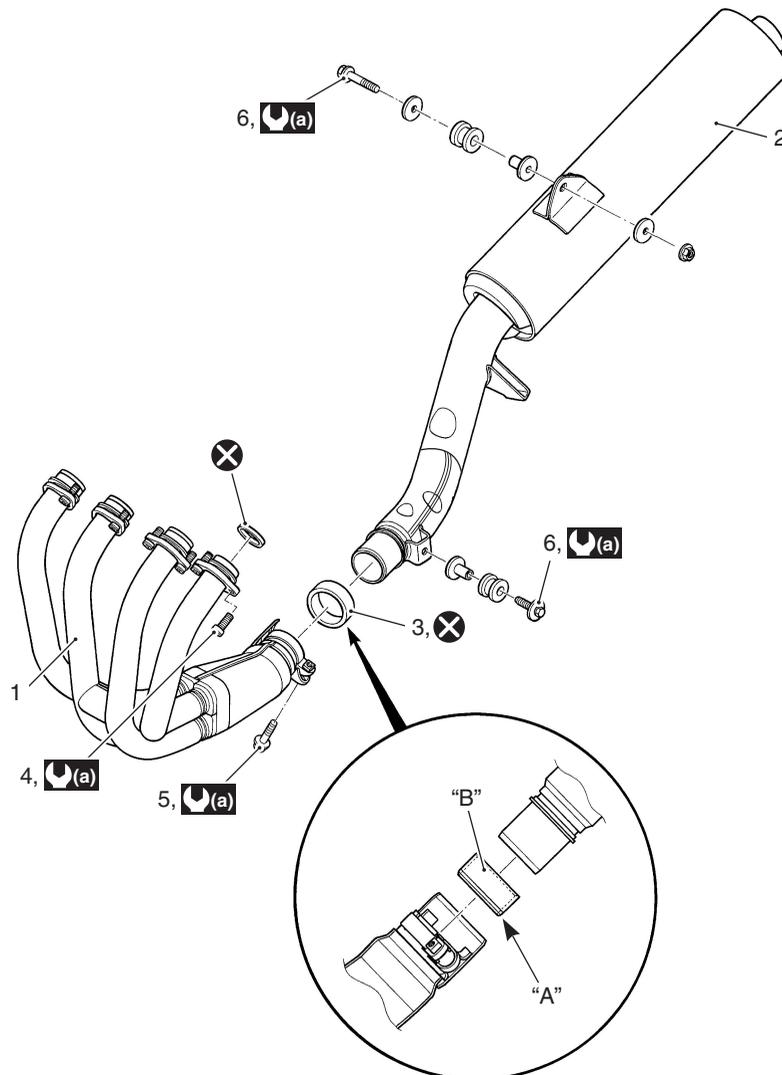
⚠ CAUTION

Make sure that the exhaust pipe and muffler have enough clearance from the rubber parts and plastic parts to avoid melting.

Repair Instructions

Exhaust System Construction

B649G11B06004



I649G11B0001-05

1. Exhaust pipe	4. Exhaust pipe bolt	"A": Chamfer	⊗ : Do not reuse.
2. Muffler	5. Muffler connecting bolt	"B": Apply exhaust gas sealer.	
3. Muffler connector	6. Muffler mounting bolt	(a) : 23 N·m (2.3 kgf·m, 16.5 lb·ft)	

1K-2 Exhaust System:

Exhaust Pipe / Muffler Removal and Installation

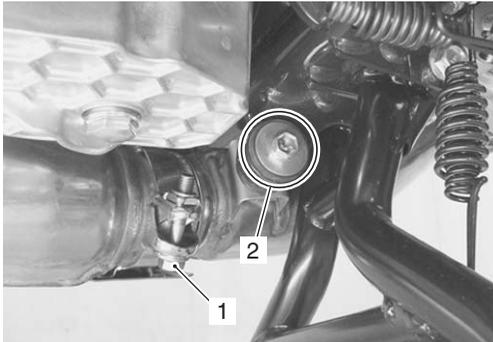
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Removal

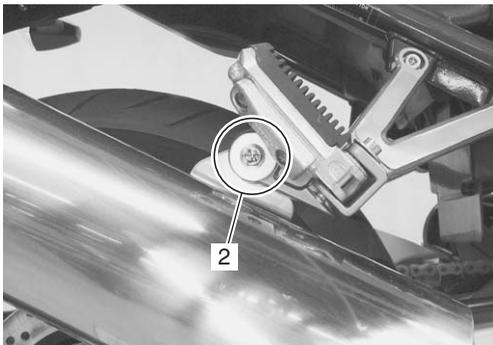
- 1) Loosen the muffler connecting bolt (1).
- 2) Remove the muffler by removing the mounting bolts (2).

NOTE

Support the muffler to prevent it from falling.



I649G11B0002-02

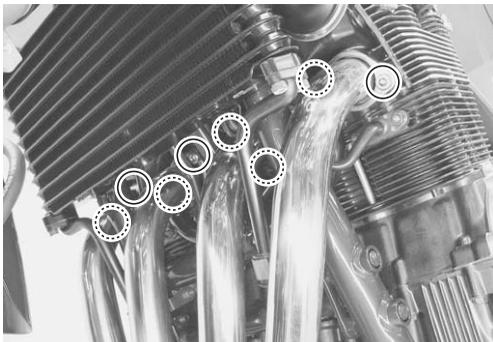


I649G11B0003-02

- 3) Remove the exhaust pipe by removing the bolts.

NOTE

Support the exhaust pipe to prevent it from falling.



I649G11B0004-01

Installation

Installation is in the reverse order of removal. Pay attention to the following points:

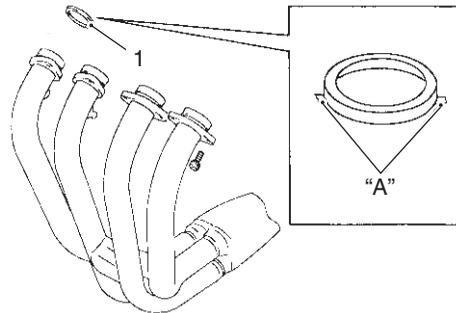
⚠ CAUTION

Replace the gaskets with new ones.

- Install the exhaust pipe gaskets (1).

⚠ CAUTION

Be sure to face the tabs "A" on the exhaust pipe gaskets (1) to the engine side when installing them.

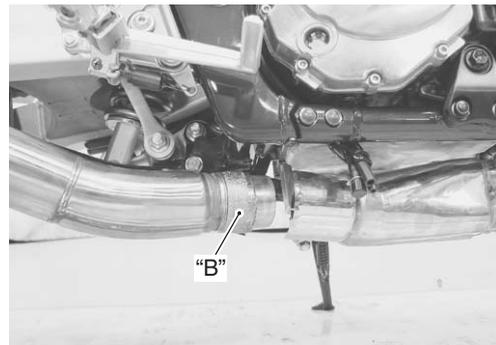


I649G11B0005-01

NOTE

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

: Exhaust gas sealer (PERMATEX 1372 (commercial available))



I649G11B0006-02

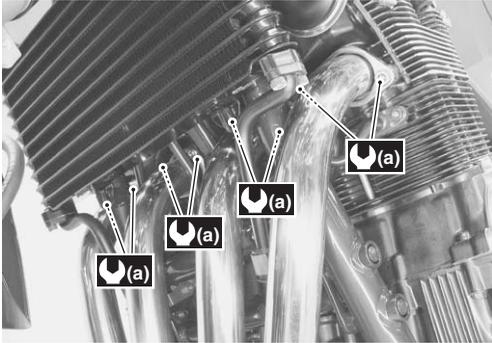
- Tighten the exhaust pipe bolts, muffler connecting bolt and muffler mounting bolts to the specified torque.

Tightening torque

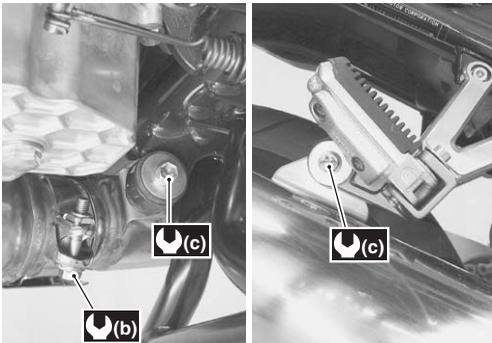
Exhaust pipe bolt (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)

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

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



I649G11B0007-02



I649G11B0008-01

Exhaust System Inspection

B649G11B06006

Inspect the exhaust pipe connection and muffler connection for exhaust gas leakage and mounting condition. If any defect is found, replace the exhaust pipe or muffler with a new one.

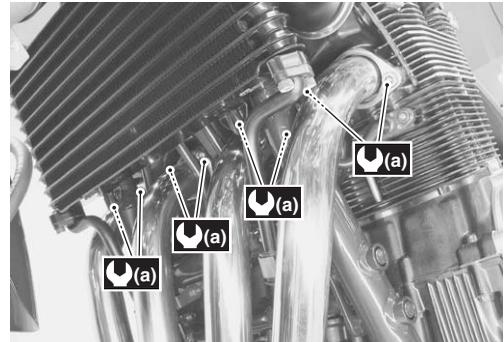
Check the exhaust pipe bolts, muffler connecting bolt and muffler mounting bolts are tightened to their specified torque.

Tightening torque

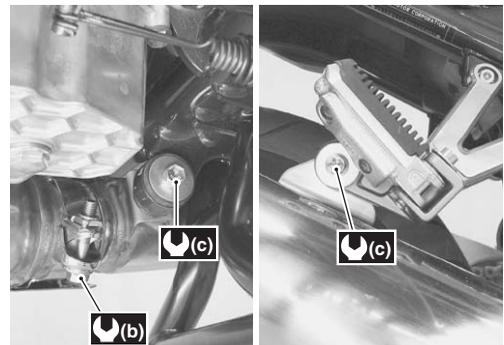
Exhaust pipe bolt (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)

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

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



I649G11B0007-02



I649G11B0008-01

Specifications

Tightening Torque Specifications

B649G11B07001

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Exhaust pipe bolt	23	2.3	16.5	⌀ / ⌀
Muffler connecting bolt	23	2.3	16.5	⌀ / ⌀
Muffler mounting bolt	23	2.3	16.5	⌀ / ⌀

NOTE

The specified tightening torque is also described in the following.
 “Exhaust System Construction: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G11B08001

Material	SUZUKI recommended product or Specification	Note
Exhaust gas sealer	PERMATEX 1372 (commercial available)	⌀

Section 2

Suspension

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Rear Shock Absorber Disposal.....	2C-4	Air Valve Removal and Installation	2D-16
Cushion Lever Removal and Installation.....	2C-5	Wheel Balance Check and Adjustment.....	2D-17
Cushion Lever Inspection	2C-5	Specifications	2D-18
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Swingarm / Cushion Rod Removal		Special Tools and Equipment	2D-19
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Precautions

Precautions

Precautions for Suspension

B649G1200001

Refer to "General Precautions: in Section 00".

⚠ WARNING

All suspensions, bolts and nuts are an important part in that it could affect the performance of vital parts. They must be tightened to the specified torque periodically and if the suspension effect is lost, replace it with a new one.

⚠ CAUTION

Never attempt to heat, quench or straighten any suspension part. Replace it with a new one, or damage to the part may result.

Suspension General Diagnosis

Diagnostic Information and Procedures

Suspension and Wheel Symptom Diagnosis

B649G12104009

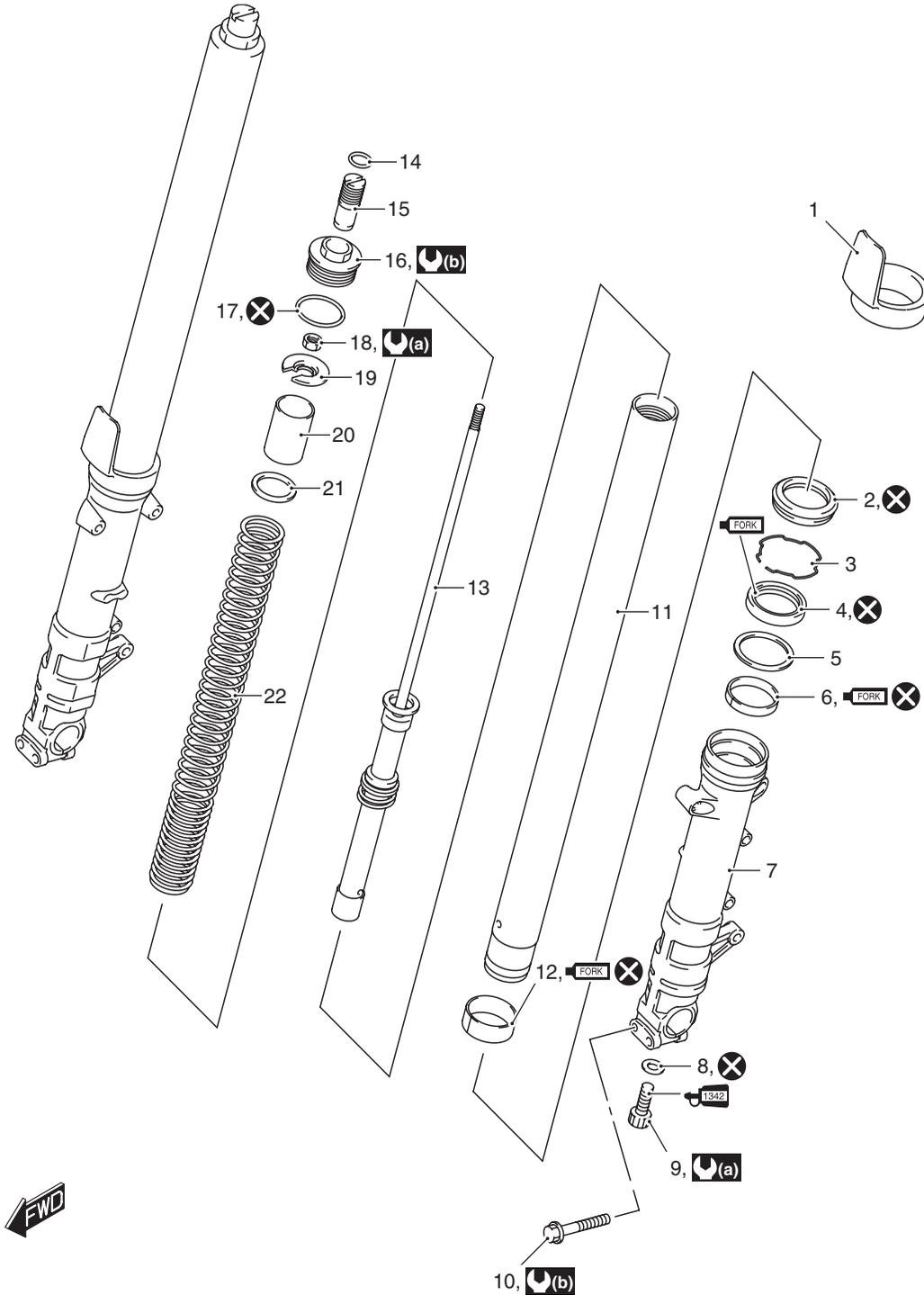
Condition	Possible cause	Correction / Reference Item
Wobbly front wheel	Distorted wheel rim.	<i>Replace.</i>
	Worn front wheel bearings.	<i>Replace.</i>
	Defective or incorrect tire.	<i>Replace.</i>
	Loose front axle nut.	<i>Tighten.</i>
	Loose front axle pinch bolt.	<i>Tighten.</i>
	Incorrect fork oil level.	<i>Adjust.</i>
Front suspension too soft	Weak spring.	<i>Replace.</i>
	Insufficient fork oil.	<i>Check level and add.</i>
Front suspension too stiff	Excessively viscous fork oil.	<i>Replace.</i>
	Excessive fork oil.	<i>Check level and drain.</i>
Front suspension too noisy	Insufficient fork oil.	<i>Check level and add.</i>
	Loose front suspension fastener.	<i>Tighten.</i>
Wobbly rear wheel	Distorted wheel rim.	<i>Replace.</i>
	Worn rear wheel bearing.	<i>Replace.</i>
	Defective or incorrect tire.	<i>Replace.</i>
	Worn swingarm bearing.	<i>Replace.</i>
	Worn Rear suspension bushing.	<i>Replace.</i>
	Loose rear suspension fastener.	<i>Tighten.</i>
Rear suspension too soft	Weak rear shock absorber spring.	<i>Replace.</i>
	Rear shock absorber leaks oil.	<i>Replace.</i>
	Improperly suspension setting.	<i>Adjust.</i>
Rear suspension too stiff	Improper suspension setting.	<i>Adjust.</i>
	Bent rear shock absorber shaft.	<i>Replace.</i>
	Bent swingarm.	<i>Replace.</i>
	Worn swingarm and rear suspension related bearings.	<i>Replace.</i>
Rear suspension too noisy	Loose rear suspension fastener.	<i>Tighten.</i>
	Worn rear suspension bushing.	<i>Replace.</i>
	Worn swingarm bearing.	<i>Replace.</i>

Front Suspension

Repair Instructions

Front Fork Components

B649G12206001



I649G1220038-04

1. Front fork protector	8. Gasket	15. Spring adjuster	22. Spring
2. Dust seal	9. Damper rod bolt	16. Front fork cap bolt	: 20 N-m (2.0 kgf-m, 14.5 lb-ft)
3. Oil seal stopper ring	10. Front axle pinch bolt	17. O-ring	: 23 N-m (2.3 kgf-m, 16.5 lb-ft)
4. Oil seal	11. Inner tube	18. Inner rod lock-nut	: Apply thread lock to thread part.
5. Oil seal retainer	12. Inner tube slide metal	19. Spring seat	: Apply fork oil.
6. Outer tube slide metal	13. Damper rod (Inner rod cylinder)	20. Spacer	: Do not reuse.
7. Outer tube	14. O-ring	21. Washer	

Front Fork Removal and Installation

B649G12206002

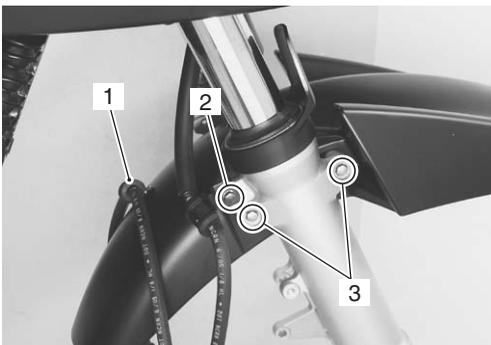
Removal

- 1) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: in Section 2D".

CAUTION

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

- 2) Disconnect the brake hose clamp (1) from the front fender.
- 3) Remove the brake hose clamp bolt (2).
- 4) Remove the front fender by removing the bolts (3), left and right.

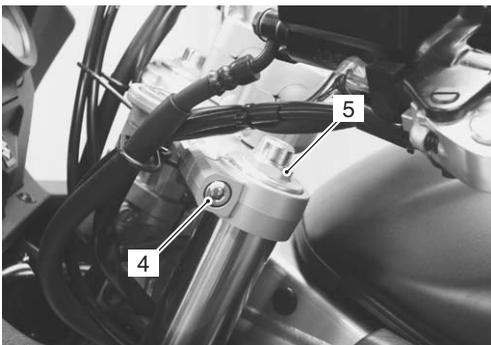


I649G1220001-01

- 5) Loosen the front fork upper clamp bolt (4).

NOTE

Slightly loosen the front fork cap bolt (5) to facilitate later disassembly.

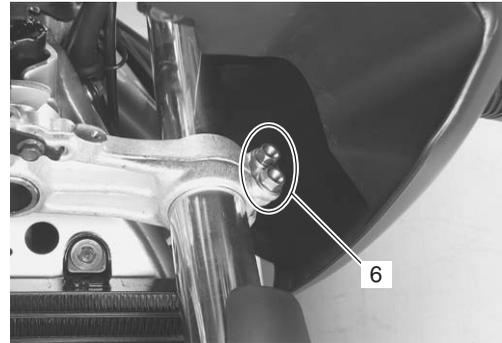


I649G1220002-01

- 6) Loosen the front fork lower clamp bolts (6) and remove the front fork.

NOTE

Hold the front fork by the hand to prevent sliding out of the steering stem.



I649G1220003-01

Installation

- 1) Set the front fork to the front fork lower bracket temporarily by tightening the lower clamp bolts.



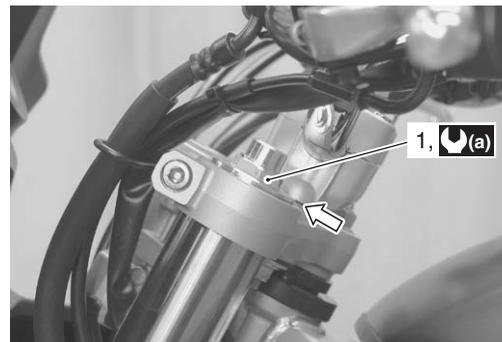
I649G1220004-01

- 2) Tighten the front fork cap bolt (1) to the specified torque with the special tool.

Tightening torque

Front fork cap bolt (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)

- 3) Loosen the lower clamp bolts and set the top end of the inner tube to the upper surface of the steering stem upper bracket.



I649G1220005-02

2B-3 Front Suspension:

- 4) Tighten the front fork lower clamp bolts.

Tightening torque

Front fork lower clamp bolt (b): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I649G1220006-02

- 5) Tighten the front fork upper fork clamp bolt.

Tightening torque

Front fork upper clamp bolt (c): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I649G1220007-02

- 6) Set the front fender plate nut to the front fender.

NOTE

Face the triangle mark on the front fender brace to the front side "A".



I649G1220008-02

- 7) Remount the front fender along with the fender plate nut.

- 8) Install the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: in Section 2D".

NOTE

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

⚠ WARNING

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



I649G1220009-01

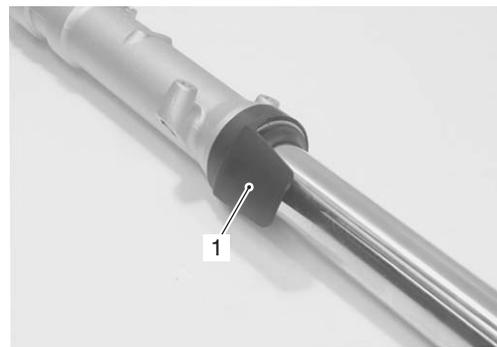
Front Fork Disassembly and Assembly

B649G12206003

Refer to "Front Fork Removal and Installation: ".

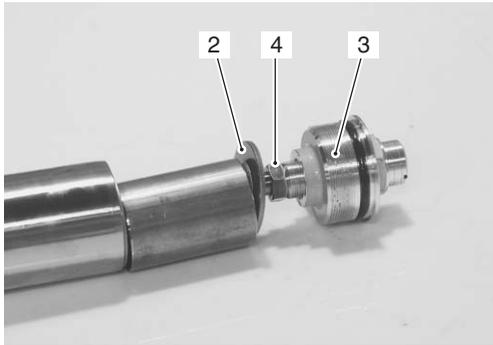
Disassembly

- 1) Remove the front fork protector (1).



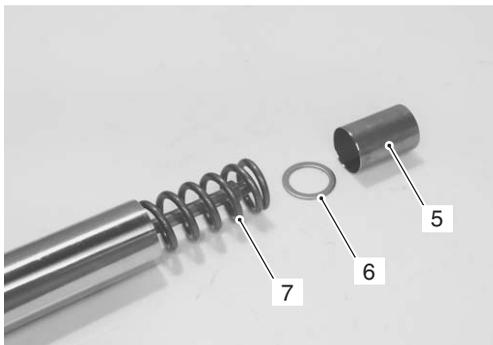
I649G1220039-01

- 2) Remove the spring seat (2).
- 3) Remove the front fork cap bolt with spring adjuster (3) by loosening the inner rod lock-nut (4).



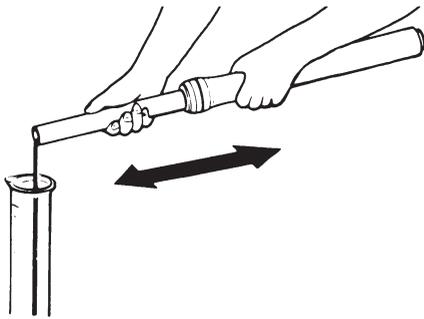
I649G1220040-01

- 4) Remove the spacer (5), washer (6) and spring (7).



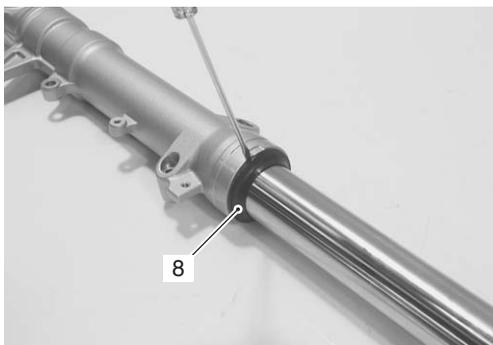
I649G1220041-01

- 5) Invert the fork and stroke it several times to drain out fork oil.
- 6) Hold the fork inverted for a few minutes to drain oil.



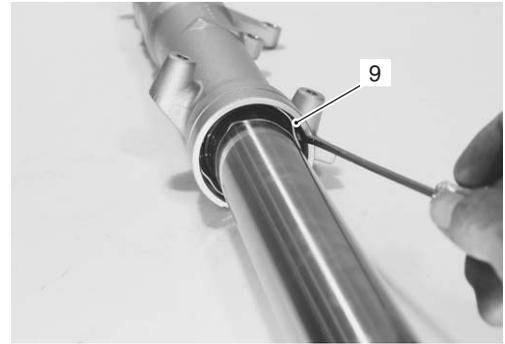
I649G1220012-01

- 7) Remove the dust seal (8).



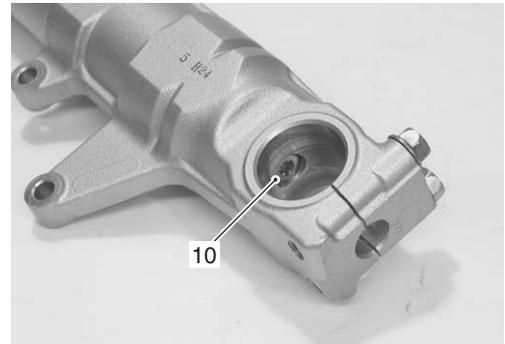
I649G1220013-02

- 8) Remove the oil seal stopper ring (9).



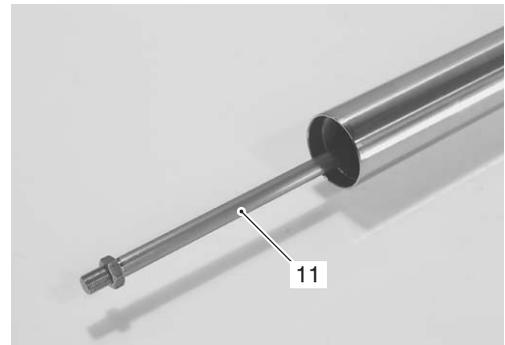
I649G1220014-02

- 9) Remove the damper rod bolt (10).



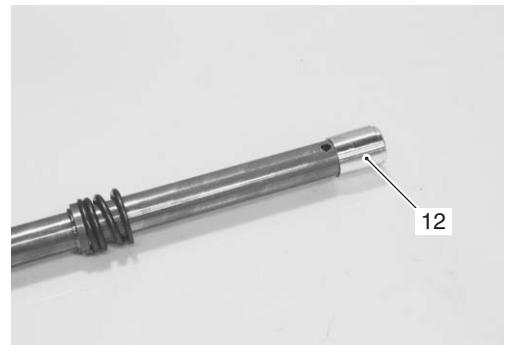
I649G1220015-02

- 10) Remove the inner rod cylinder (11).



I649G1220016-02

- 11) Remove the oil lock piece (12).



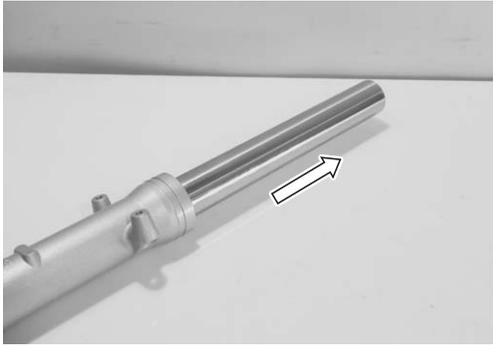
I649G1220017-02

2B-5 Front Suspension:

- 12) Remove the oil seal by slowly pulling out the inner tube.

NOTE

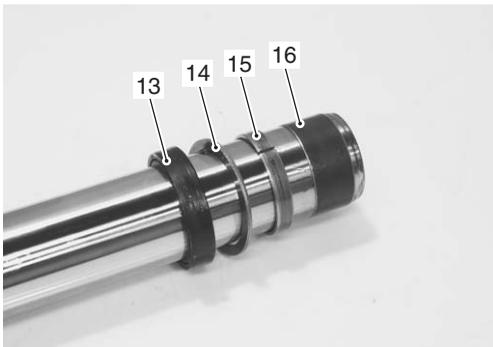
Be careful not to damage the inner tube.



I649G1220018-01

- 13) Remove the following parts.

- Oil seal (13)
- Oil seal retainer (14)
- Outer tube slide metal (15)
- Inner tube slide metal (16)



I649G1220019-04

Assembly

Assemble the front fork in the reverse order of disassembly. Pay attention to the following points:

⚠ CAUTION

The outer and inner tube's slide metals must be replaced along with the oil seal and dust seal when assembling the front fork.

Inner tube

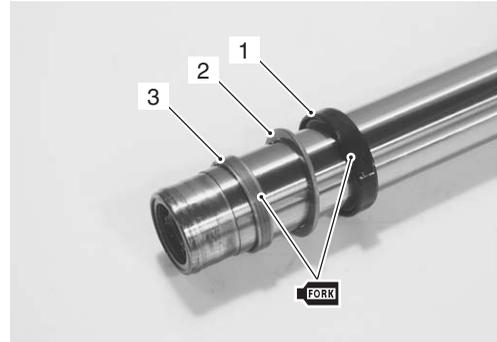
- Install the following parts onto the inner tube.
 - Oil seal (1)
 - Oil seal retainer (2)
 - Outer tube slide metal (3)

⚠ CAUTION

When installing the oil seal to inner tube, be careful not to damage the oil seal lip.

- Apply fork oil to the outer slide metal and oil seal lip.

FORK : Oil 99000-99001-SS8 (SUZUKI FORK OIL SS-08 or equivalent)



I649G1220020-01

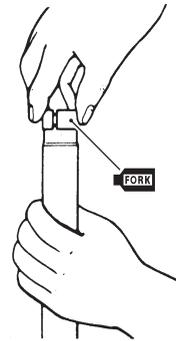
- Hold the inner tube vertically, clean the metal groove and install the inner tube slide metal by hand.

⚠ CAUTION

Do not damage the Teflon coated surface of the inner tube's slide metal when mounting it.

- Apply fork oil to the inner tube slide metal.

FORK : Oil 99000-99001-SS8 (SUZUKI FORK OIL SS-08 or equivalent)

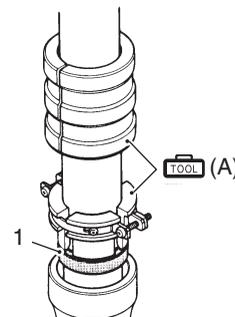


I649G1220021-01

- Insert the inner tube into the outer tube and install the oil seal (1) using the special tool.

Special tool

TOOL (A) : 09940-52861 (Front fork oil seal installer)



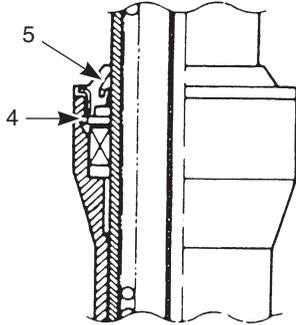
I649G1220022-04

- Install the oil seal stopper ring (4).

⚠ CAUTION

Make sure that the oil seal stopper ring is fitted securely.

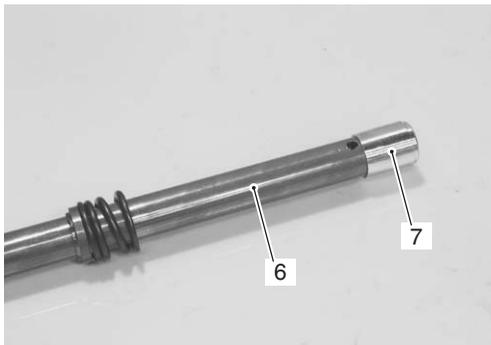
- Install the dust seal (5).



I649G1220023-02

Damper rod bolt

- Insert the inner rod/damper rod (cartridge) (6) and the oil lock piece (7) into the inner tube.



I649G1220024-01

- Apply THREAD LOCK “1342” to the damper rod bolt and tighten it to the specified torque with a 6-mm hexagon wrench and special tools.

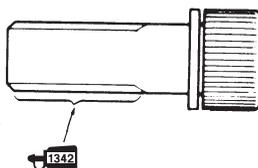
⚠ CAUTION

Use a new damper rod bolt gasket to prevent oil leakage.

1342 : Thread lock cement 99000-32050 (Thread Lock Cement 1342 or equivalent)

Tightening torque

Front fork damper rod bolt: 20 N·m (2.0 kgf·m, 14.5 lb·ft)



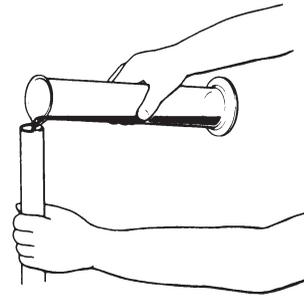
I649G1220025-01

Fork oil

- Place the front fork vertically without spring.
- Compress it fully.
- Pour specified front fork oil up to the top level of the inner tube.

FORK : Oil 99000-99001-SS8 (SUZUKI FORK OIL SS-08 or equivalent)

Capacity (each leg)
516 ml (17.4/18.2 US/Imp oz)



I649G1220026-01

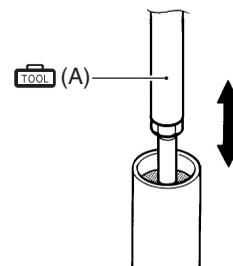
- Move the inner rod slowly with the special tool more than ten times until bubbles do not come out from the oil.

NOTE

Refill front fork oil up to the top of the inner tube to find bubbles while bleeding air.

Special tool

TOOL (A): 09940-52841 (Inner rod holder)



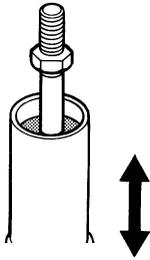
I649G1220027-04

2B-7 Front Suspension:

- Refill specified front fork oil up to the top level of the inner tube again. Move the inner tube up and down several strokes until bubbles do not come out from the oil.
- Keep the front fork vertically and wait 5 – 6 minutes.

NOTE

- Always keep oil level over the cartridge top end, or air may enter the cartridge during this procedure.
- Take extreme attention to pump out air completely.



I649G1220028-02

- Hold the front fork vertically and adjust fork oil level with the special tool.

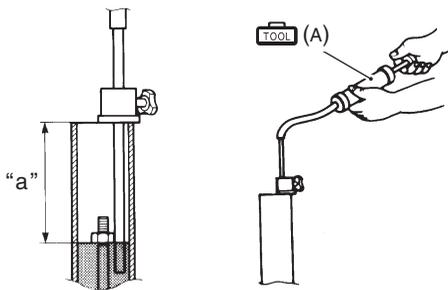
NOTE

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

Special tool

 (A): 09943-74111 (Fork oil level gauge)

Fork oil level "a"
107 mm (4.2 in)



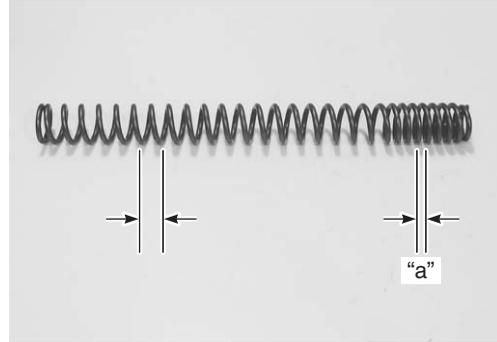
I649G1220029-02

Fork spring

- Install the fork spring as shown.

NOTE

The smaller pitch "a" should face to the bottom side of the front fork.



I649G1220030-02

Inner rod and lock-nut

- Install the special tool and pull up the inner rod.

Special tool

 (A): 09940-52841 (Inner rod holder)



I649G1220031-03

- Install the front fork cap (1).

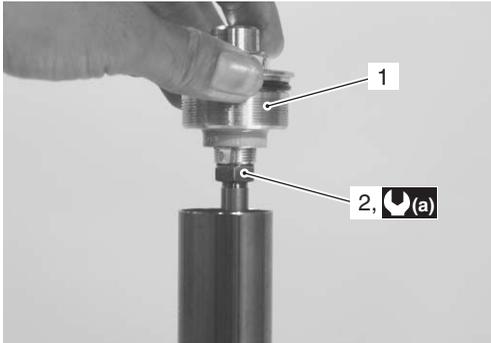
NOTE

Before installing the front fork cap, turn the inner rod lock-nut (2) completely to the lower position as shown.

- Tighten the lock-nut (2) to the specified torque.

Tightening torque

Inner rod lock-nut (a): 20 N·m (2.0 kgf-m, 14.5 lb-ft)



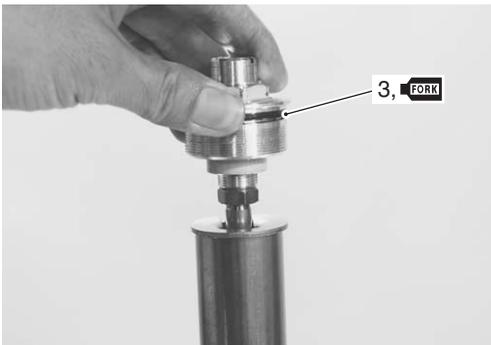
I649G1220032-01

CAUTION

Use a new O-ring (3) to prevent oil leakage.

- Apply fork oil lightly to the O-ring (3).

FORK : Oil 99000-99001-SS8 (SUZUKI FORK OIL SS-08 or equivalent)



I649G1220033-01

- Install the front fork protector (4).

NOTE

Fit the projection of the front fork protector to the depression of the front fork outer tube.



I649G1220034-01

Front Fork Inspection

B649G12206005

Refer to "Front Fork Inspection: in Section 0B".

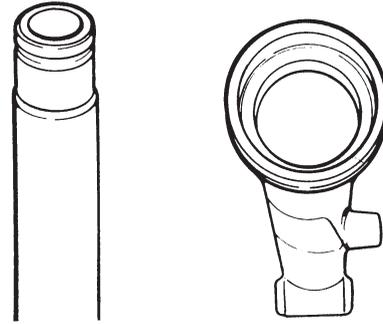
Front Fork Parts Inspection

B649G12206004

Refer to "Front Fork Disassembly and Assembly: ".

Inner and Outer Tubes

Inspect the inner tube sliding surface and outer tube sliding surface for scuffing.



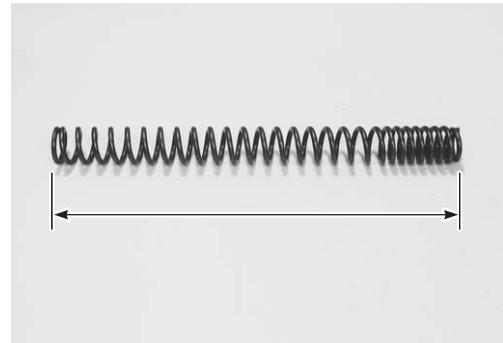
I649G1220035-02

Fork Spring

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

Front fork spring free length

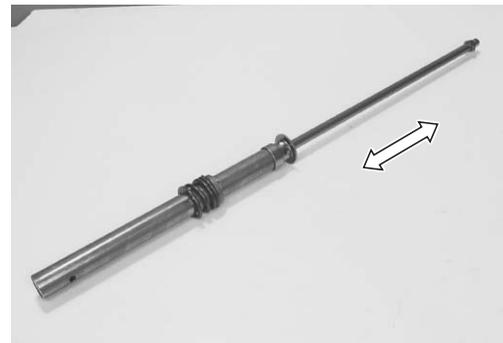
Service limit: 384 mm (15.1 in)



I649G1220036-01

Damper Rod

Move the inner rod by hand to inspect it if operating smoothly.



I649G1220037-01

Specifications

Service Data

B649G12207004

Front Fork

Unit: mm (in)

Item	Standard	Limit
Front fork stroke	130 (5.1)	—
Front fork inner tube O.D.	43 (1.69)	—
Front fork spring free length	392.8 (15.46)	384 (15.1)
Front fork oil level	107 (4.2)	—
Front fork spring adjuster	3rd groove from top	—

Oil

Item	Specification	Note
Front fork oil type	Fork oil SS-08 or equivalent fork oil	
Front fork oil capacity (each leg)	516 ml (17.4/18.2 US/Imp oz)	

Tightening Torque Specifications

B649G12207005

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Front fork cap bolt	23	2.3	16.5	
Front fork lower clamp bolt	23	2.3	16.5	
Front fork upper clamp bolt	23	2.3	16.5	
Front fork damper rod bolt	20	2.0	14.5	
Inner rod lock-nut	20	2.0	14.5	

NOTE

The specified tightening torque is also described in the following.

“Front Fork Components: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G12208001

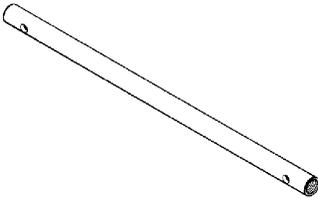
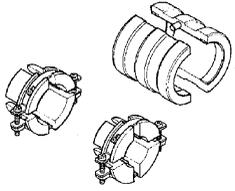
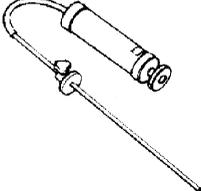
Material	SUZUKI recommended product or Specification		Note
Oil	SUZUKI FORK OIL SS-08 or equivalent	P/No.: 99000-99001-SS8	🔧 / 🔧 / 🔧 / 🔧
Thread lock cement	Thread Lock Cement 1342 or equivalent	P/No.: 99000-32050	🔧

NOTE

Required service material is also described in the following.
 “Front Fork Components: ”

Special Tool

B649G12208002

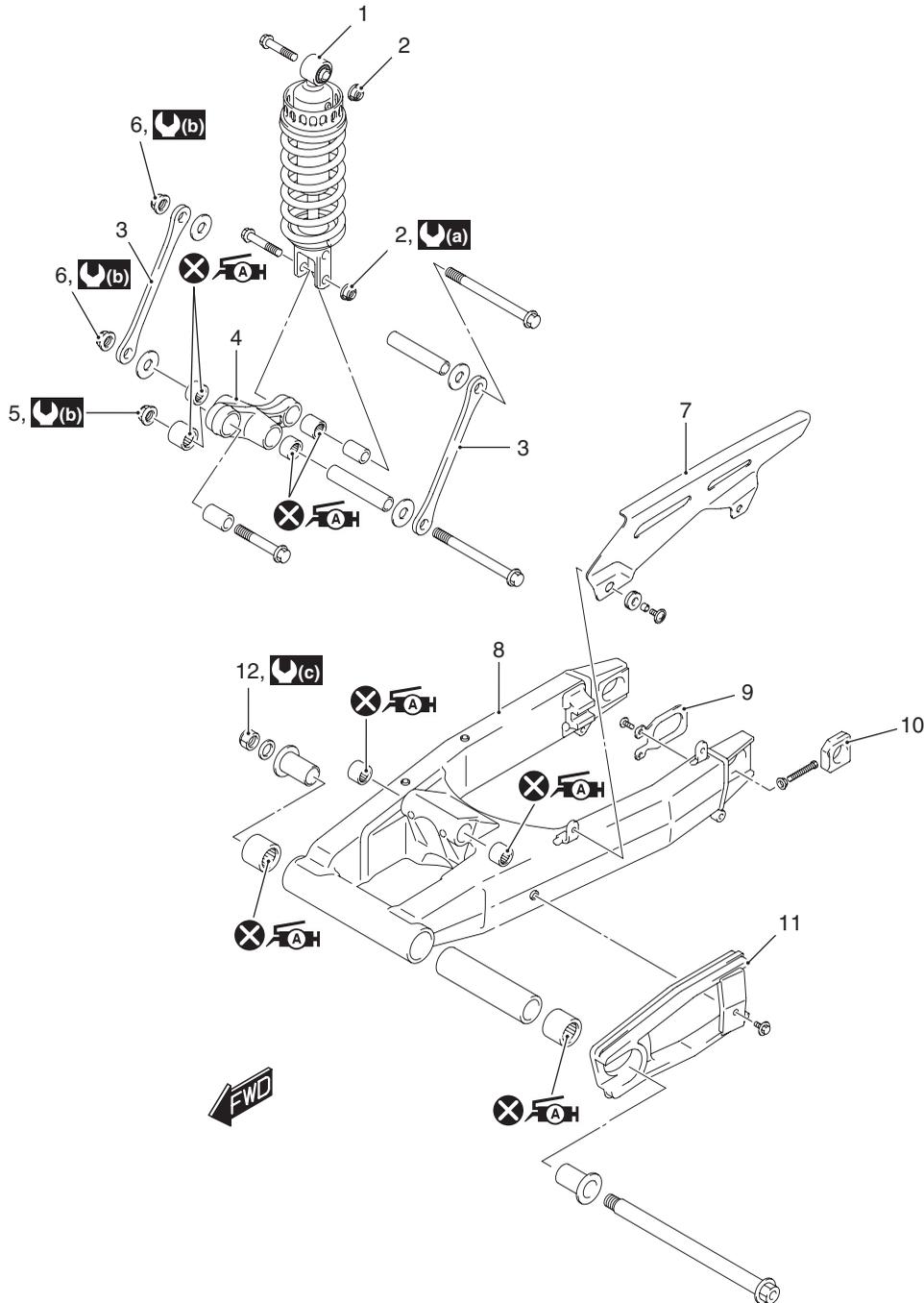
<p>09940-52841 Inner rod holder 🔧 / 🔧</p> 	<p>09940-52861 Front fork oil seal installer 🔧</p> 
<p>09943-74111 Fork oil level gauge 🔧</p> 	

Rear Suspension

Repair Instructions

Rear Suspension Components

B649G12306001

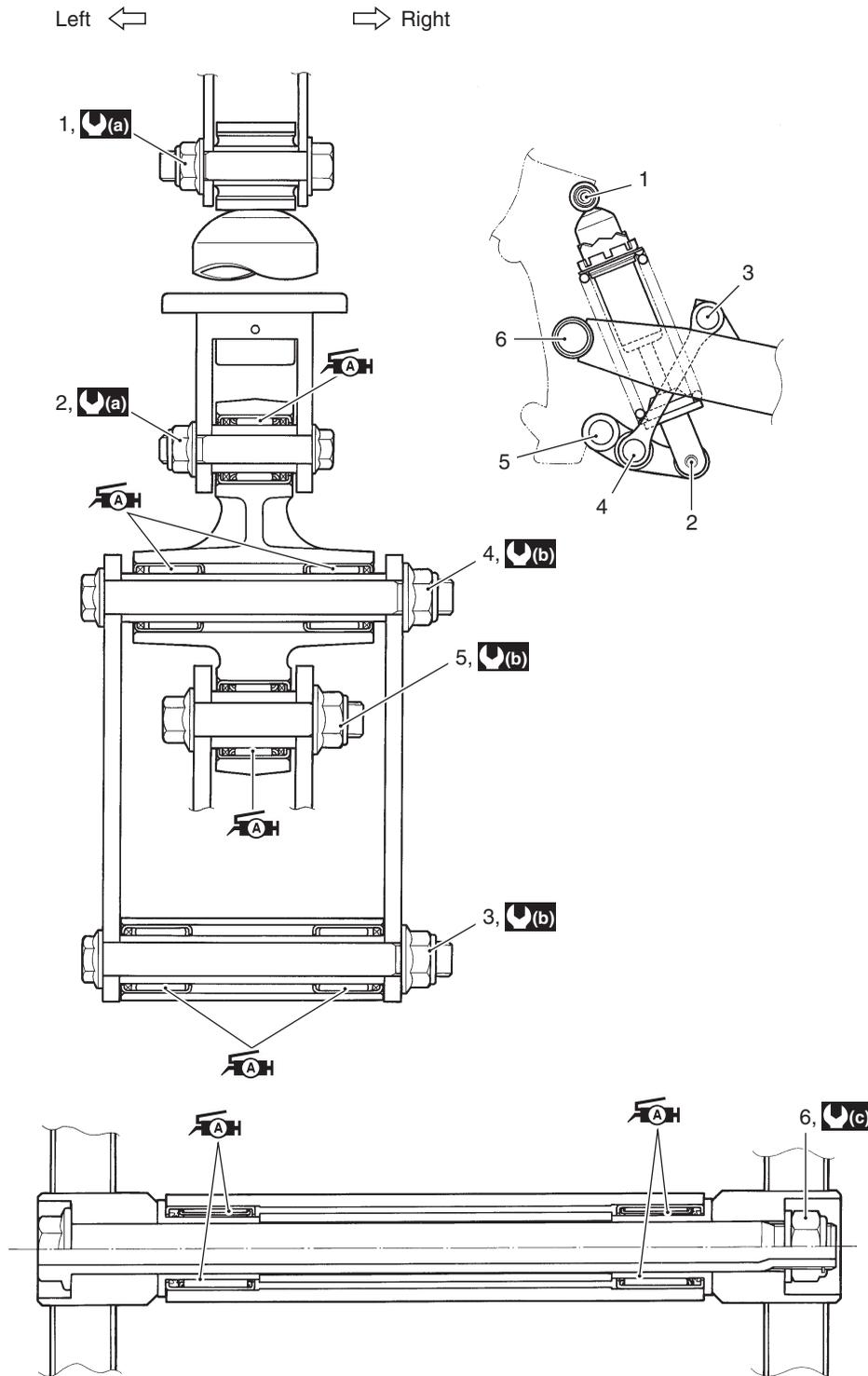


I649G1230043-01

1. Rear shock absorber	6. Cushion rod mounting nut	11. Chain buffer	: Apply grease to bearing.
2. Rear shock absorber mounting nut	7. Chain case	12. Swingarm pivot nut	: Do not reuse.
3. Cushion rod	8. Swingarm	: 50N-m (5.0 kgf-m, 36.0 lb-ft)	
4. Cushion lever	9. Plate	: 78N-m (7.8 kgf-m, 56.5 lb-ft)	
5. Cushion lever mounting nut	10. Chain adjuster	: 100N-m (10.0 kgf-m, 72.5 lb-ft)	

Rear Suspension Assembly Construction

B649G12306019



I649G1230040-04

1. Rear shock absorber mounting nut (Upper)	4. Cushion rod (Lower)	: 50 N·m (5.0 kgf·m 36.0 lb-ft)	: Apply grease to bearing.
2. Rear shock absorber mounting nut (Lower)	5. Cushion lever mounting nut	: 78 N·m (7.8 kgf·m 56.5 lb-ft)	
3. Cushion rod (Upper)	6. Swingarm pivot nut	: 100 N·m (10.0 kgf·m 72.5 lb-ft)	

2C-3 Rear Suspension:

Rear Shock Absorber Removal and Installation

B649G12306002

Removal

- 1) Place the motorcycle on the center stand and support the motorcycle with a jack to be no load for the rear shock absorber.
- 2) Remove the left frame cover. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 3) Remove the shock absorber lower mounting bolt and nut, and cushion lever mounting bolt and nut.



I649G1230045-01

- 4) Remove the shock absorber upper mounting bolt and nut.



I649G1230002-01

- 5) Remove the shock absorber.



I649G1230003-01

Installation

Install the rear shock absorber in the reverse order of removal. Pay attention to the following points:

- Temporary install the rear shock absorber and cushion lever.

- Tighten the rear shock absorber upper/lower mounting bolts and nuts.

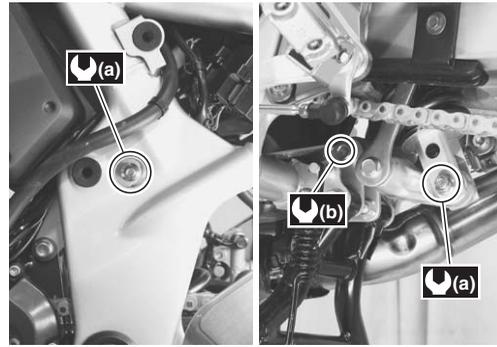
Tightening torque

Rear shock absorber mounting nut (a): 50 N·m (5.0 kgf-m, 36.0 lb-ft)

- Tighten the cushion lever mounting bolt and nut.

Tightening torque

Cushion lever mounting nut (b): 78 N·m (7.8 kgf-m, 56.5 lb-ft)



I649G1230004-02

Rear Suspension Inspection

B649G12306021

Refer to "Rear Suspension Inspection: in Section 0B".

Rear Shock Absorber Inspection

B649G12306003

Inspect the rear shock absorber in the following procedures:

- 1) Remove the rear shock absorber. Refer to "Rear Shock Absorber Removal and Installation: ".
- 2) Inspect the rear shock absorber for damage and oil leakage, and absorber bushing for wear and damage. If any defect is found, replace the rear shock absorber with a new one.

⚠ CAUTION

Do not attempt to disassemble the rear shock absorber. It is unserviceable.



I649G1230005-01

- 3) Install the rear shock absorber. Refer to "Rear Shock Absorber Removal and Installation: ".

Rear Suspension Adjustment

B649G12306005

After installing the rear suspension, adjust the spring pre-load and damping force as follows.

Spring Pre-load Adjustment

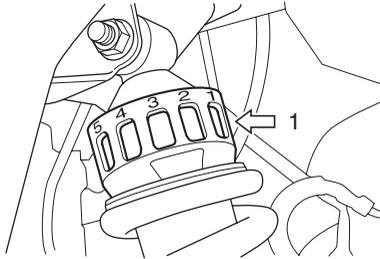
Turn the spring tension ring (1) to the desired position.

NOTE

Position 1 provides the softest spring tension and position 7 provides the stiffest.

STD position

4th position



I649G1230006-02

Damping Force Adjustment

Turn the damping force adjuster (1) to the desired position.

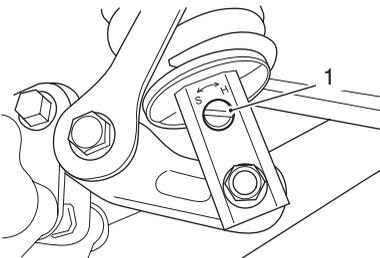
NOTE

Turn the adjuster clockwise to stiffen the damping force and turn it counterclockwise to soften the damping force.

STD position

1 – 1/8 turns out from stiffest position (GSF1200)

1 – 1/4 turns out from stiffest position (GSF1200S)



I649G1230007-01

Rear Shock Absorber Disposal

B649G12306013

Refer to "Rear Shock Absorber Removal and Installation: ".

The rear shock absorber unit contains high-pressure nitrogen gas.

⚠ WARNING

- Mishandling can cause explosion.
- Keep away from fire and heat. High gas pressure caused by heat can cause an explosion.
- Release gas pressure before disposing.

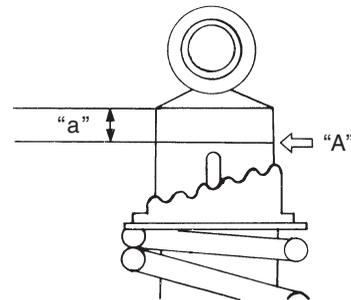
Gas Pressure Release

Make sure to observe the following precautions.

⚠ WARNING

- Never apply heat or disassemble the damper unit since it can explode or oil can splash hazardously.
- When discarding the rear cushion unit, be sure to release gas pressure from the unit following the procedures.

- 1) Mark the drill center at the location "A" using a center punch.



I649G1230008-01

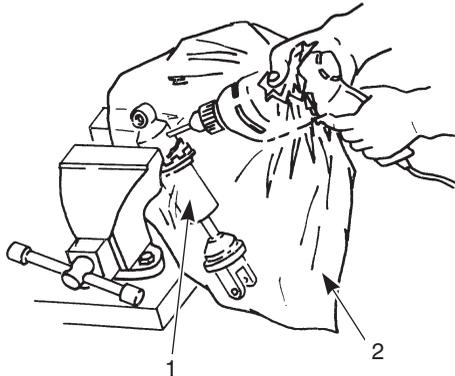
"a": 10 mm (0.39 in)	"A": Mark the drill hole
----------------------	--------------------------

2C-5 Rear Suspension:

- 2) Wrap rear shock absorber (1) with a vinyl bag (2) and fix it on a vise as shown.
- 3) Drill a 2 – 3 mm (0.08 – 0.12 in) hole at the marked drill center using a drilling machine and let out gas while taking care not to get the vinyl bag entangled with the drill bit.

▲ WARNING

- Be sure to wear protective glasses since drilling chips and oil may fly off with blowing gas when the drill bit has penetrated through the body.
- Make sure to drill at the specified position. Otherwise, pressurized oil may spout out forcefully.



I649G1230009-02

Cushion Lever Removal and Installation

B649G12306020

Removal

- 1) Place the motorcycle on the center stand and support the motorcycle with a jack to be no load for the cushion lever.
- 2) Remove the cushion lever by removing its related bolts and nuts.



I649G1230046-01

Installation

Install the cushion lever in the reverse order of removal. Pay attention to the following point:

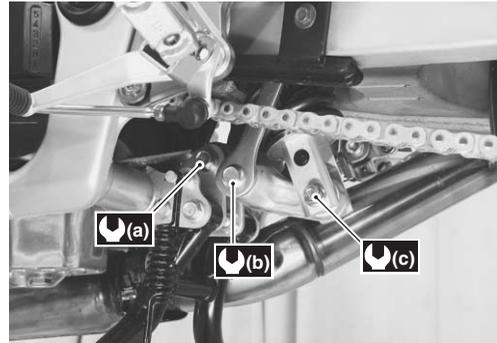
- Tighten each nut to the specified torque.

Tightening torque

Cushion lever mounting nut (a): 78 N·m (7.8 kgf-m, 56.5 lb-ft)

Cushion rod mounting nut (b): 78 N·m (7.8 kgf-m, 56.5 lb-ft)

Rear shock absorber mounting nut (c): 50 N·m (5.0 kgf-m, 36.0 lb-ft)



I649G1230041-01

Cushion Lever Inspection

B649G12306014

Refer to "Cushion Lever Removal and Installation: ".

Spacer

- 1) Remove the spacers from the cushion lever.
- 2) Inspect the spacers for any flaws or other damage. If any defects are found, replace the spacers with new ones.



I649G1230010-01

Cushion Lever Bearing

- 1) Insert the spacers into bearings.
- 2) Check the play by moving the spacers up and down. If excessive play is noted, replace the bearing with a new one. Refer to "Cushion Lever Bearing Removal and Installation: ".



I649G1230011-01

Cushion Lever

Inspect the cushion lever for damage. If any defect is found, replace the cushion lever with a new one.



I649G1230012-01

Cushion Rod

Refer to "Swingarm Related Parts Inspection: ".

Cushion Lever Bearing Removal and Installation

B649G12306015

Removal

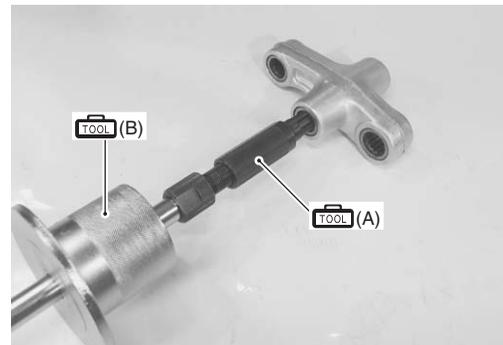
- 1) Remove the cushion lever. Refer to "Rear Shock Absorber Removal and Installation: ".
- 2) Remove the cushion lever bearings using the special tools.

Special tool

 (A): 09923-73210 (Bearing remover)

 (B): 09930-30102 (Sliding shaft)

 (C): 09913-70210 (Bearing installer set)



I649G1230013-02



I649G1230014-02



I649G1230015-02

2C-7 Rear Suspension:

Installation

CAUTION

The removed bearings must be replaced with new ones.

- 1) Press the bearings into the cushion lever with the special tool.

NOTE

When installing the bearing, stamped mark on the bearing must face outside.

Special tool

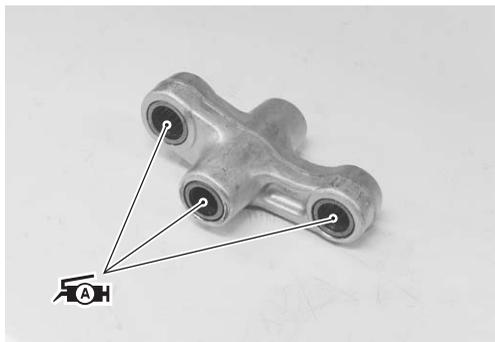
 (A): 09924-84521 (Bearing installer set)



I649G1230016-02

- 2) Apply SUZUKI SUPER GREASE "A" to the bearings.

 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1230017-01

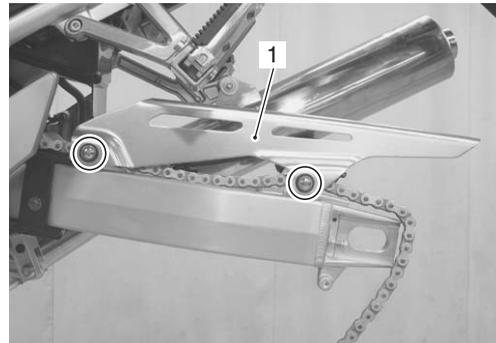
- 3) Install the cushion lever. Refer to "Rear Shock Absorber Removal and Installation: ".

Swingarm / Cushion Rod Removal and Installation

B649G12306016

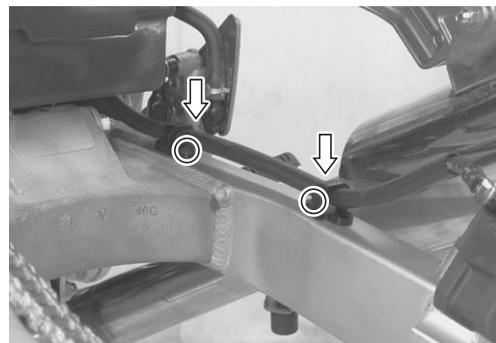
Removal

- 1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation: in Section 2D".
- 2) Remove the drive chain cover (1).



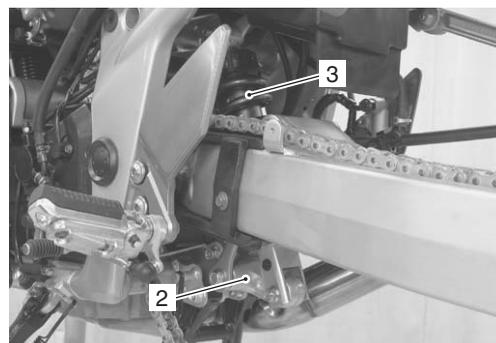
I649G1230018-01

- 3) Remove the brake hose clamps.



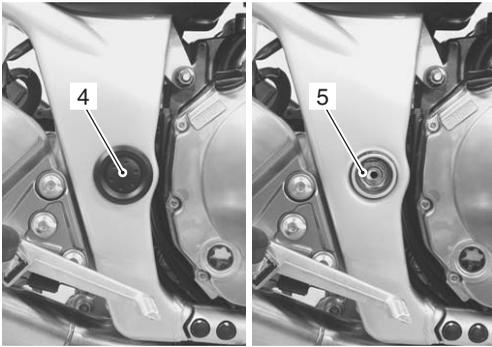
I649G1230019-01

- 4) Remove the cushion lever (2) and rear shock absorber (3). Refer to "Rear Shock Absorber Removal and Installation: " and "Cushion Lever Removal and Installation: ".



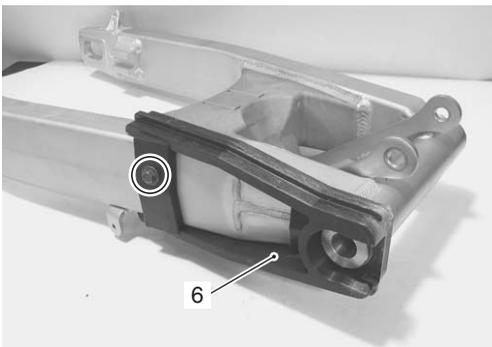
I649G1230020-01

- 5) Remove the pivot shaft end caps (4), left and right.
- 6) Remove the swingarm by removing the pivot shaft and nut (5).



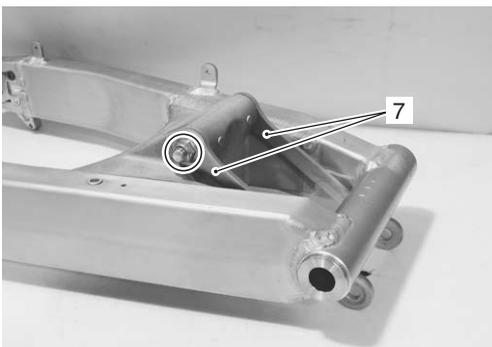
I649G1230021-01

- 7) Remove the chain buffer (6).



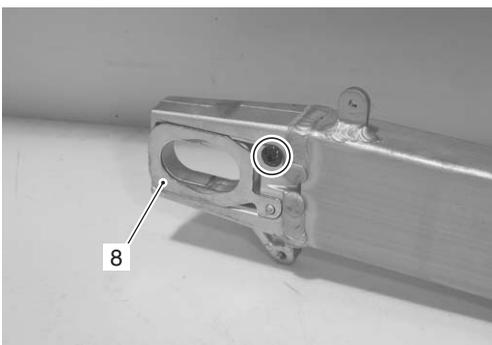
I649G1230022-01

- 8) Remove the cushion rods (7).



I649G1230023-01

- 9) Remove the plate (8).



I649G1230024-01

Installation

Install the swingarm in the reverse order of removal. Pay attention to the following points:

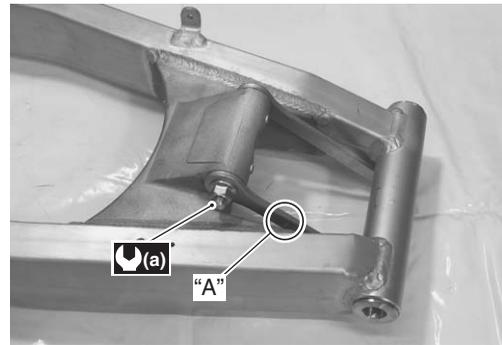
- Tighten the cushion rod mounting nut and to the specified torque.

NOTE

The stamped marks "A" on the cushion rod should be face out side.

Tightening torque

Cushion rod mounting nut (a): 78 N·m (7.8 kgf-m, 56.5 lb-ft)



I649G1230025-01

- Tighten the swingarm pivot nut to the specified torque.

Tightening torque

Swingarm pivot nut (b): 100 N·m (10.0 kgf-m, 72.5 lb-ft)



I649G1230026-01

2C-9 Rear Suspension:

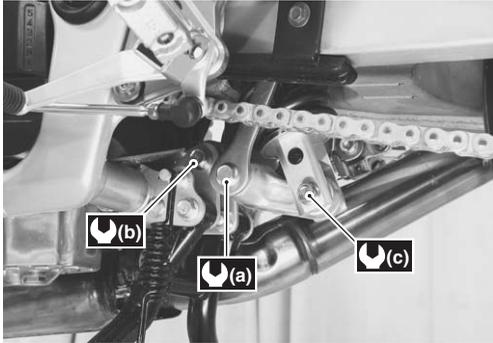
- Tighten the cushion lever, cushion rod lower and rear shock absorber lower mounting nut to the specified torque.

Tightening torque

Cushion rod mounting nut (a): 78 N·m (7.8 kgf-m, 56.5 lb-ft)

Cushion lever mounting nut (b): 78 N·m (7.8 kgf-m, 56.5 lb-ft)

Rear shock absorber mounting nut (c): 50 N·m (5.0 kgf-m, 36.0 lb-ft)

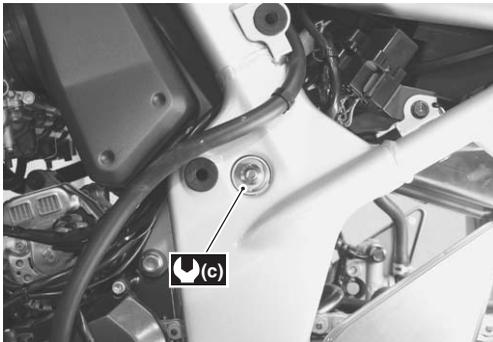


I649G1230027-02

- Tighten the rear shock absorber upper mounting nut to the specified torque.

Tightening torque

Rear shock absorber mounting nut (c): 50 N·m (5.0 kgf-m, 36.0 lb-ft)



I649G1230028-03

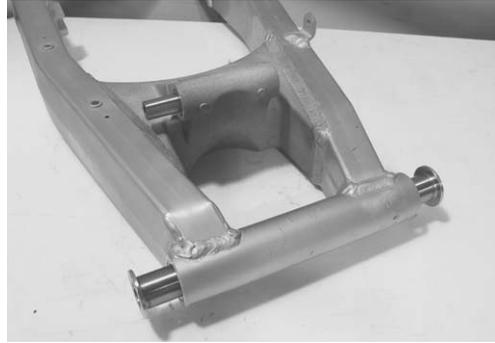
Swingarm Related Parts Inspection

B649G12306017

Refer to "Swingarm / Cushion Rod Removal and Installation: ".

Spacers

- 1) Remove the spacers from the swingarm.
- 2) Inspect the spacers for wear and damage. If any defects are found, replace the spacers with new ones.



I649G1230029-01

Chain Buffer

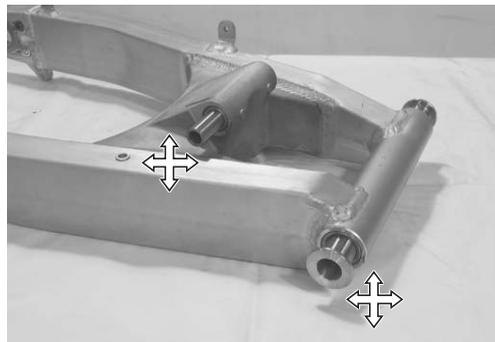
Inspect the chain buffer for wear and damage. If any defect is found, replace the chain buffer with a new one.



I649G1230030-01

Swingarm Bearing and Cushion Rod Bearing

- 1) Insert the spacers into bearings.
- 2) Check the play by moving the spacers up and down. If excessive play is noted, replace the bearing with a new one. Refer to "Swingarm Bearing Removal and Installation: ".



I649G1230031-01

Swingarm

Inspect the swingarm for damage. If any defect is found, replace the swingarm with a new one.



I649G1230032-02

Cushion Rod

Inspect the cushion rods for damage and bend. If any defects are found, replace the cushion rods with new ones.



I649G1230033-01

Swingarm Pivot Shaft

Measure the swingarm pivot shaft runout using the dial gauge. If the runout exceeds the service limit, replace the pivot shaft.

Special tool

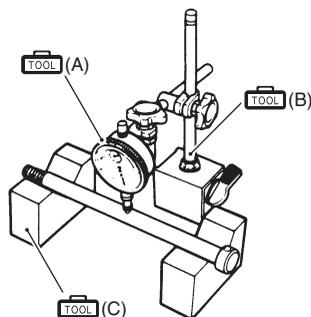
(A): 09900-20606 (Dial gauge (1/100 mm))

(B): 09900-20701 (Magnetic stand)

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

Swingarm pivot shaft runout

Service limit: 0.3 mm (0.01 in)



I649G1230034-02

Swingarm Bearing Removal and Installation

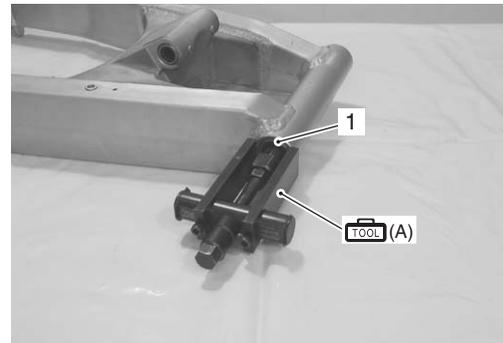
B649G12306018

Removal

- 1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation: in Section 2D".
- 2) Remove the swingarm. Refer to "Swingarm / Cushion Rod Removal and Installation: ".
- 3) Draw out the swingarm pivot bearings (1) using the special tool.

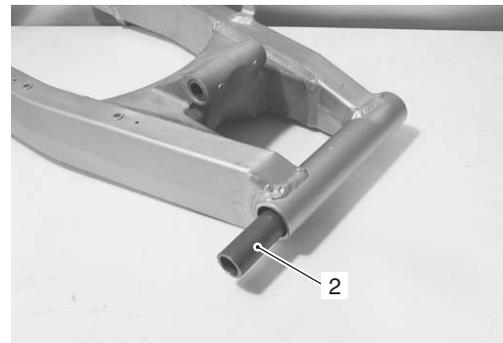
Special tool

(A): 09921-20240 (Bearing remover set)



I649G1230035-03

- 4) Remove the center spacer (2).



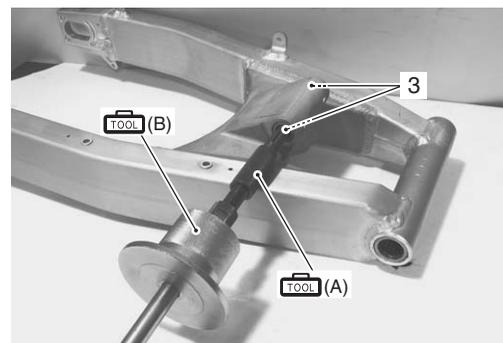
I649G1230036-01

- 5) Remove the swingarm cushion rod bearings (3) using the special tools.

Special tool

(A): 09923-73210 (Bearing remover)

(B): 09930-30102 (Sliding shaft)



I649G1230037-03

2C-11 Rear Suspension:

Installation

CAUTION

The removed bearings must be replaced with new ones.

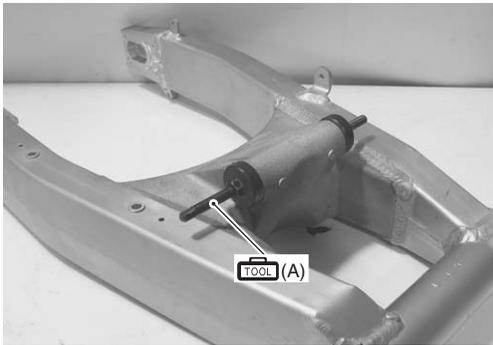
- 1) Press the swingarm cushion rod bearings with the special tool.

NOTE

When installing the bearing, stamped mark on the bearing must face outside.

Special tool

 (A): 09924-84521 (Bearing installer set)



I649G1230038-02

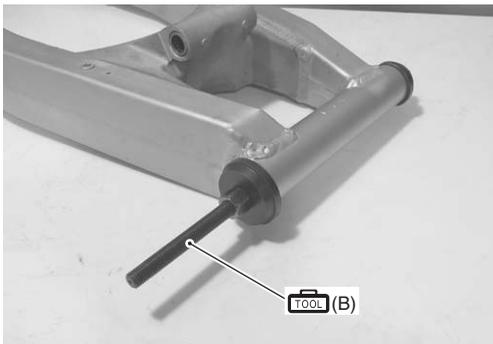
- 2) Install the center spacer.
- 3) Press the bearings into the swingarm pivot with the special tool.

NOTE

When installing the bearing, stamped mark on the bearing must face outside

Special tool

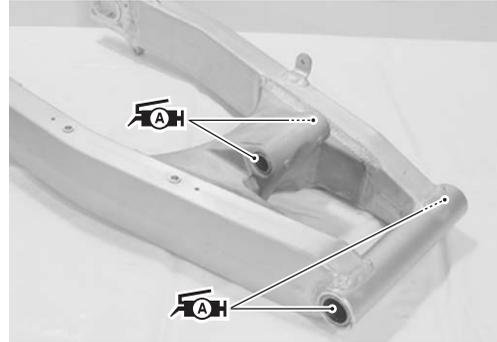
 (B): 09941-34513 (Steering race installer)



I649G1230039-03

- 4) Apply SUZUKI SUPER GREASE "A" to the bearings.

 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1230044-01

- 5) Install the swingarm. Refer to "Swingarm / Cushion Rod Removal and Installation: ".
- 6) Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation: in Section 2D".

Specifications

Service Data

B649G12307002

Unit: mm (in)

Item	Standard		Limit
Rear shock absorber spring adjuster	4th position		—
Rear shock absorber damping force adjuster	Rebound	GSF1200	1-1/8 turns out from stiffest position
		GSF1200S	1-1/4 turns out from stiffest position
Rear wheel travel	136 (5.4)		—
Swingarm pivot shaft runout	—		0.3 (0.01)

Tightening Torque Specifications

B649G12307003

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Rear shock absorber mounting nut	50	5.0	36.0	⌀ / ⌀ / ⌀ / ⌀
Cushion lever mounting nut	78	7.8	56.5	⌀ / ⌀ / ⌀
Cushion rod mounting nut	78	7.8	56.5	⌀ / ⌀ / ⌀
Swingarm pivot nut	100	10.0	72.5	⌀

NOTE

The specified tightening torque is also described in the following.

“Rear Suspension Components: ”

“Rear Suspension Assembly Construction: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G12308001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000-25010	☞ / ☞

NOTE

Required service material is also described in the following.

“Rear Suspension Components: ”

“Rear Suspension Assembly Construction: ”

Special Tool

B649G12308002

09900-20606 Dial gauge (1/100 mm) ☞		09900-20701 Magnetic stand ☞	
09900-21304 V-block (100mm) ☞		09913-70210 Bearing installer set ☞	
09921-20240 Bearing remover set ☞		09923-73210 Bearing remover ☞ / ☞	
09924-84521 Bearing installer set ☞ / ☞		09930-30102 Sliding shaft ☞ / ☞	
09941-34513 Steering race installer ☞			

Wheels and Tires

Precautions

Precautions for Wheel and Tire

B649G1240001

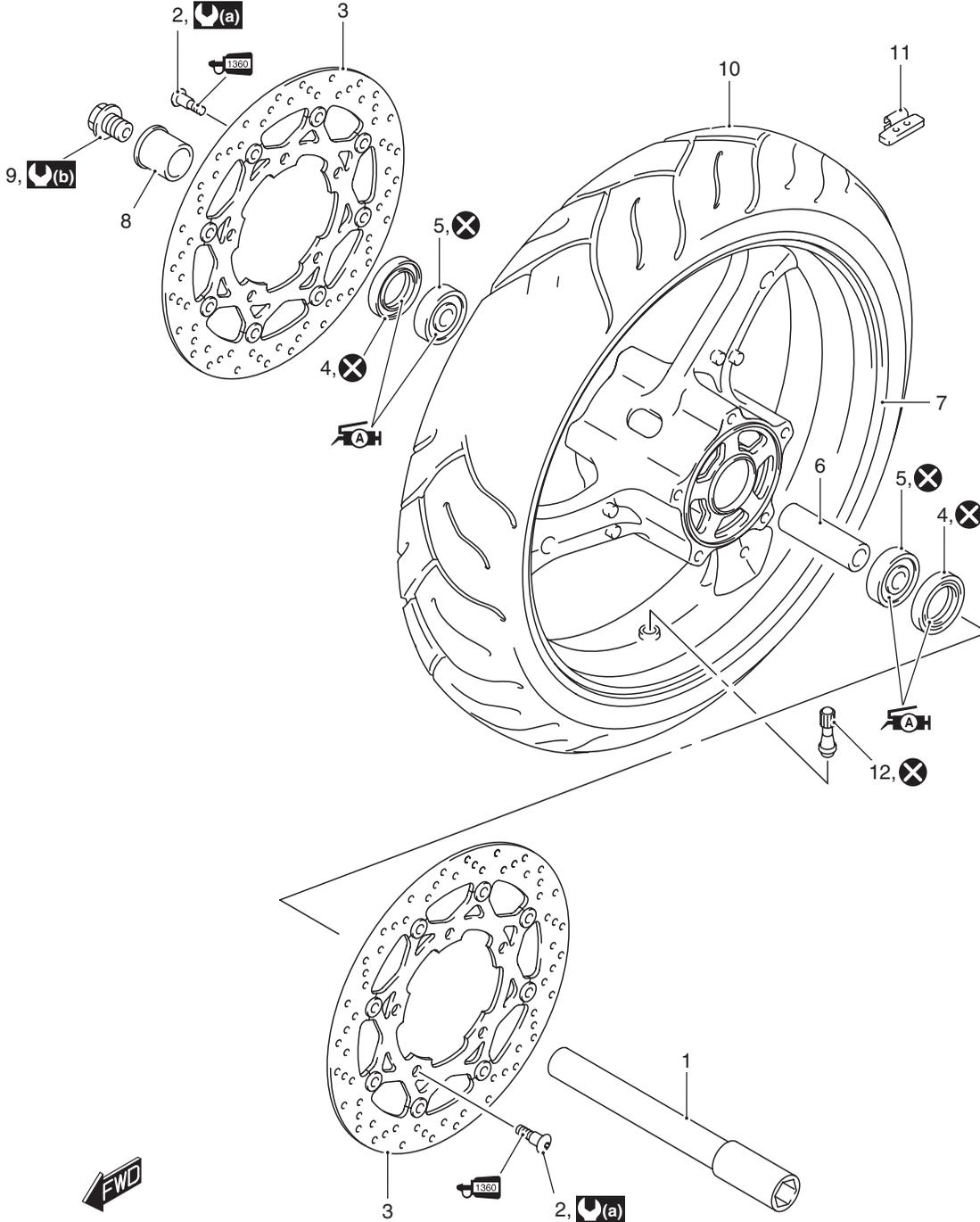
⚠ WARNING

-
- Proper tire pressure and proper tire loading are important factors. Over loading tire can lead to tire failure and loss of motorcycle control.
 - Under-inflated tires make smooth cornering difficult, and can result in rapid tire wear.
 - Over-inflated tires have a smaller amount of tire in contact with the load, which can contribute to skidding and loss of control.
 - Replace the wheel when wheel runout exceed the service limit or if find damage such as distortion, crack, nick or scratch.
 - When tire replacement is necessary, the original equipment type tire should be used.
 - Do not mix different types of tires on the same vehicle such as radial and bias-belted tires except in emergencies, because handling may be seriously affected and may result in loss of control.
 - Replacement wheel must be equivalent to the original equivalent wheel.
-

Repair Instructions

Front Wheel Components

B649G12406003

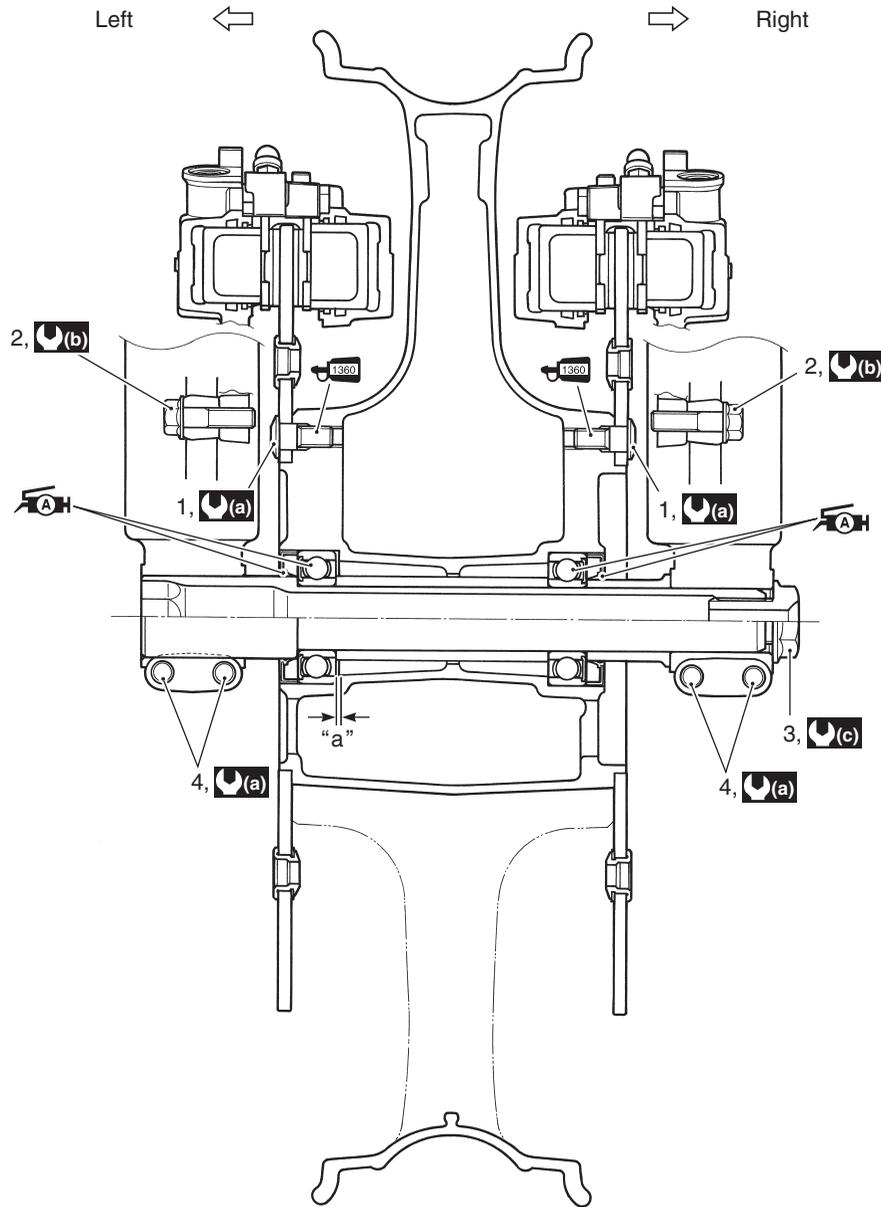


I649G1240052-02

1. Front axle	6. Spacer	11. Wheel balancer	: Apply thread lock to thread part.
2. Brake disc bolt	7. Front wheel	12. Air valve	: Do not reuse.
3. Brake disc	8. Collar	: 23 N-m (2.3 kgf-m, 16.5 lb-ft)	
4. Dust seal	9. Front axle bolt	: 100 N-m (10.0 kgf-m, 72.5 lb-ft)	
5. Bearing	10. Tire	: Apply grease.	

Front Wheel Assembly Construction

B649G12406027



I649G1240050-04

1. Brake disc bolt	"a": Clearance	AH : Apply grease.
2. Brake caliper mounting bolt	(a) : 23 N·m (2.3 kgf·m, 16.5 lb-ft)	1360 : Apply thread lock to thread part.
3. Front axle bolt	(b) : 26 N·m (2.6 kgf·m, 19 lb-ft)	
4. Front axle pinch bolt	(c) : 100 N·m (10.0 kgf·m, 72.5 lb-ft)	

2D-4 Wheels and Tires:

Front Wheel Assembly Removal and Installation

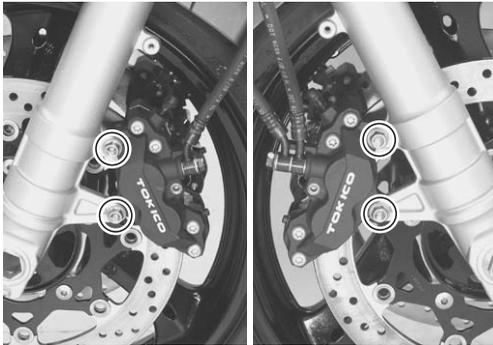
B649G12406005

Removal

- 1) Support the motorcycle with a jack or a wooden block.
- 2) Remove the brake calipers. Refer to "Front Brake Caliper Removal and Installation: in Section 4B".

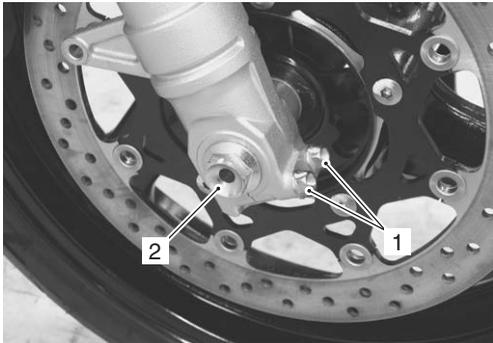
⚠ CAUTION

Do not operate the brake lever while removing the caliper.



I649G1240001-01

- 3) Loosen two axle pinch bolts (1) on the right front fork leg.
- 4) Remove the front axle bolt (2).



I649G1240002-01

- 5) Raise the front wheel off the ground and support the motorcycle with a jack or a wooden block.

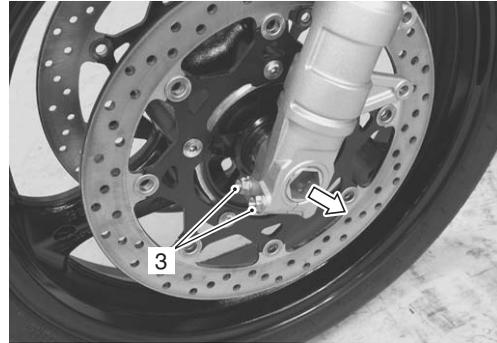
⚠ CAUTION

Do not carry out the work with the motorcycle resting on the side-stand. Do not support the motorcycle with the exhaust pipe. Make sure that the motorcycle is supported securely.

- 6) Loosen two axle pinch bolts (3) on the left front fork leg.
- 7) Draw out the front axle and remove the front wheel.

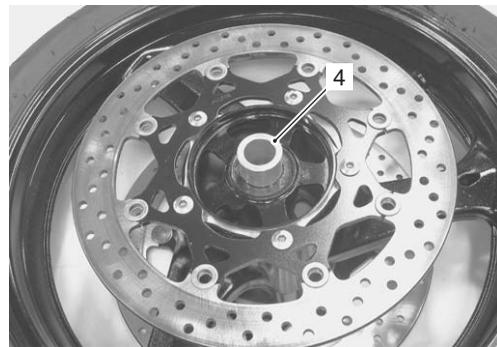
NOTE

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



I649G1240003-01

- 8) Remove the collar (4).



I649G1240004-01

Installation

- 1) Install the collar (1) into the right side of the wheel.



I649G1240008-01

- 2) Install the front wheel with the front axle and tighten the front axle bolt temporarily.

⚠ WARNING

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



I649G1240009-01

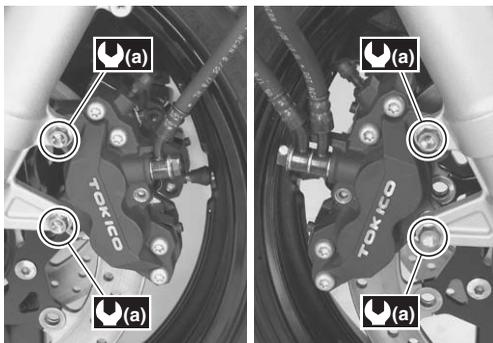
- 3) Tighten the brake caliper mounting bolts to the specified torque.

Tightening torque

Front brake caliper mounting bolt (a): 26 N·m (2.6 kgf-m, 19.0 lb-ft)

⚠ WARNING

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



I649G1240007-03

- 4) Hold the front axle with the special tool and tighten the front axle bolt (1) to the specified torque.

Special tool

 (A): 09900-18740 (Hexagon socket (24 mm))

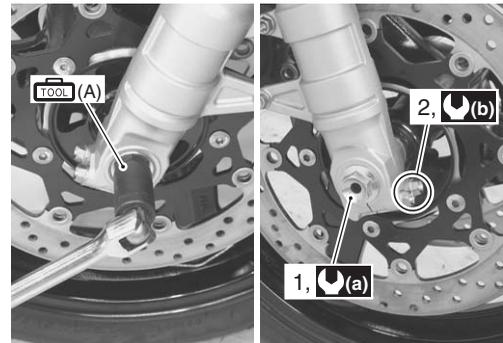
Tightening torque

Front axle bolt (a): 100 N·m (10.0 kgf-m, 72.5 lb-ft)

- 5) Tighten two axle pinch bolts (2) on the right fork leg to the specified torque.

Tightening torque

Front axle pinch bolt (b): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I649G1240010-03

- 6) Move the front fork up and down 4 or 5 times.



I649G1240011-01

- 7) Tighten two axle pinch bolts on the left front fork leg to the specified torque.

Tightening torque

Front axle pinch bolt (c): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I649G1240012-01

2D-6 Wheels and Tires:

Front Wheel Related Parts Inspection

B649G12406019

Refer to "Front Wheel Assembly Removal and Installation: "

Tire

Refer to "Tire Inspection: in Section 0B".

Front Brake Disc

Refer to "Front Brake Disc Inspection: in Section 4B".

Dust Seal

Inspect the dust seal lips for wear or damage. If any defects are found, replace the dust seal with the new ones. Refer to "Rear Wheel Dust Seal / Bearing / Removal and Installation: "



I649G1240013-01

Axle Shaft

Using a dial gauge, check the axle shaft for runout. If the runout exceeds the limit, replace the axle shaft.

Special tool

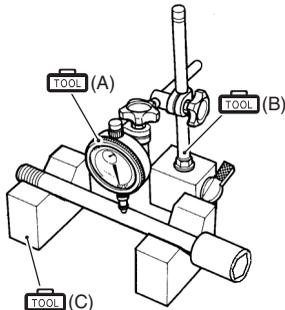
TOOL (A): 09900-20607 (Dial gauge (1/100mm, 10mm))

TOOL (B): 09900-20701 (Magnetic stand)

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

Axle shaft runout

Service limit: 0.25 mm (0.010 in)



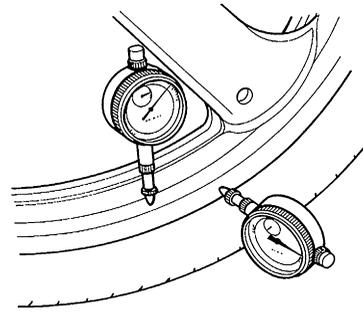
I649G1240054-01

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 loosened wheel bearings and can be reduced by replacing the bearings. If bearing replacement fails to reduce the runout, replace the wheel.

Wheel runout

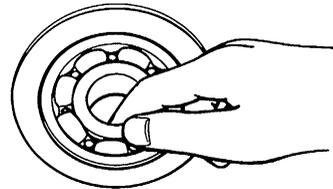
Service limit (Axial and Radial): 2.0 mm (0.08 in)



I649G1240014-01

Wheel Bearing

Inspect the play of the wheel bearings by finger while they are in the wheel. Rotate the inner race by finger to inspect for abnormal noise and smooth rotation. Replace the bearing in the following procedure if there is anything unusual. Refer to "Front Wheel Dust Seal / Bearing Removal and Installation: "



I649G1240015-01

Front Wheel Dust Seal / Bearing Removal and Installation

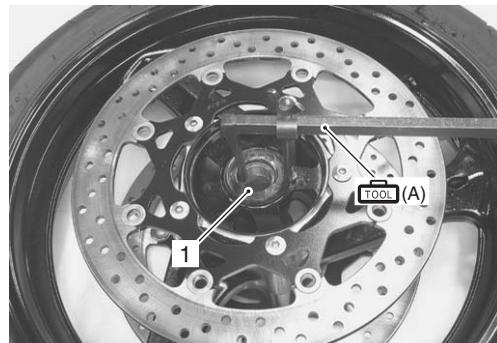
B649G12406020

Removal

- 1) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: "
- 2) Remove the dust seals (1), left and right.

Special tool

TOOL (A): 09913-50121 (Oil seal remover)

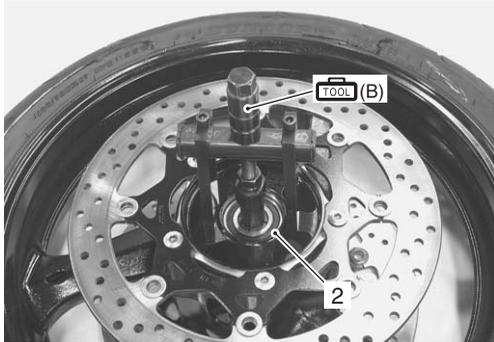


I649G1240016-02

3) Remove the bearings (2) using the special tool.

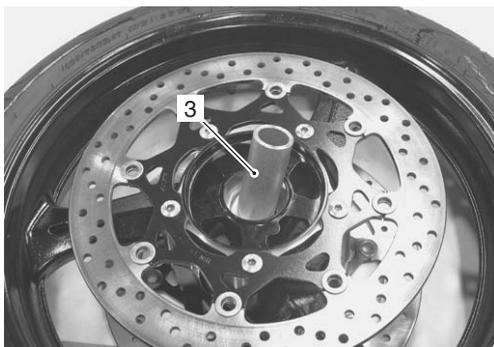
Special tool

 (B): 09921-20240 (Bearing remover set)



I649G1240017-02

4) Remove the spacer (3).



I649G1240018-01

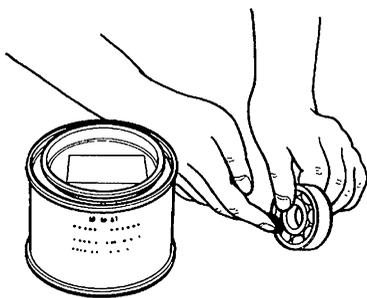
Installation

CAUTION

The removed dust seals and bearings must be replaced with new ones.

1) Apply SUZUKI SUPER GREASE "A" to the wheel bearings.

 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1240019-01

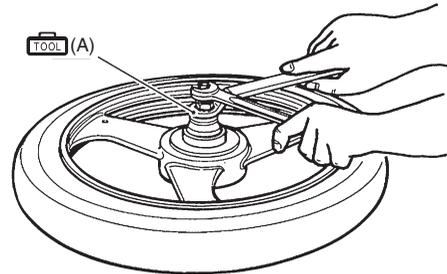
2) First install the right wheel bearing, then install the spacer (1) and left wheel bearing.

Special tool

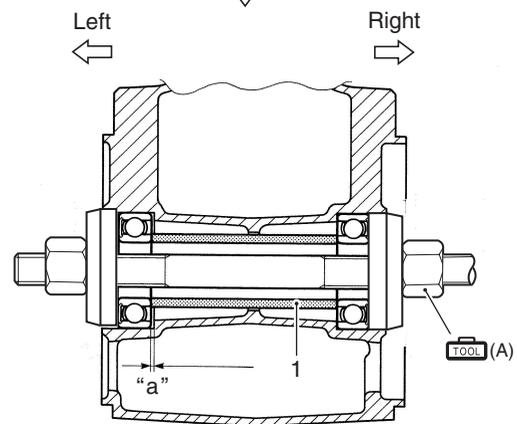
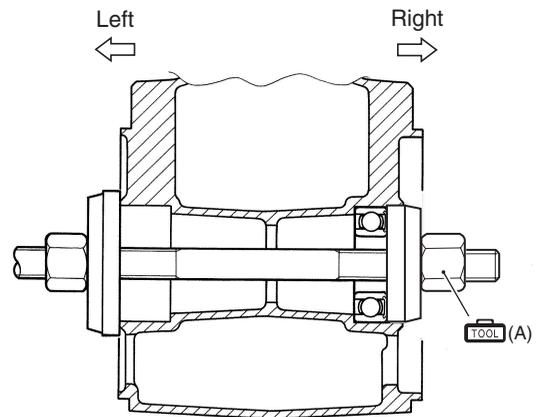
 (A): 09924-84510 (Bearing installer set)

CAUTION

The sealed cover of the bearing must face outside.



I649G1240020-02



I649G1240021-05

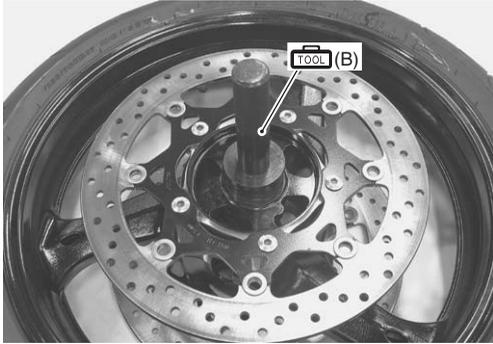
1. Spacer	"a": Clearance
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2D-8 Wheels and Tires:

- 3) Install the dust seals with the special tool.

Special tool

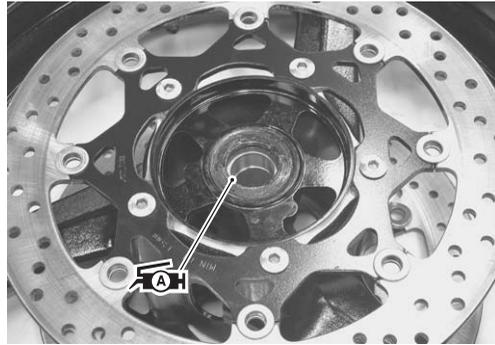
 (B): 09913-70210 (Bearing installer set)



I649G1240022-02

- 4) Apply SUZUKI SUPER GREASE "A" to the lip of dust seals.

 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)

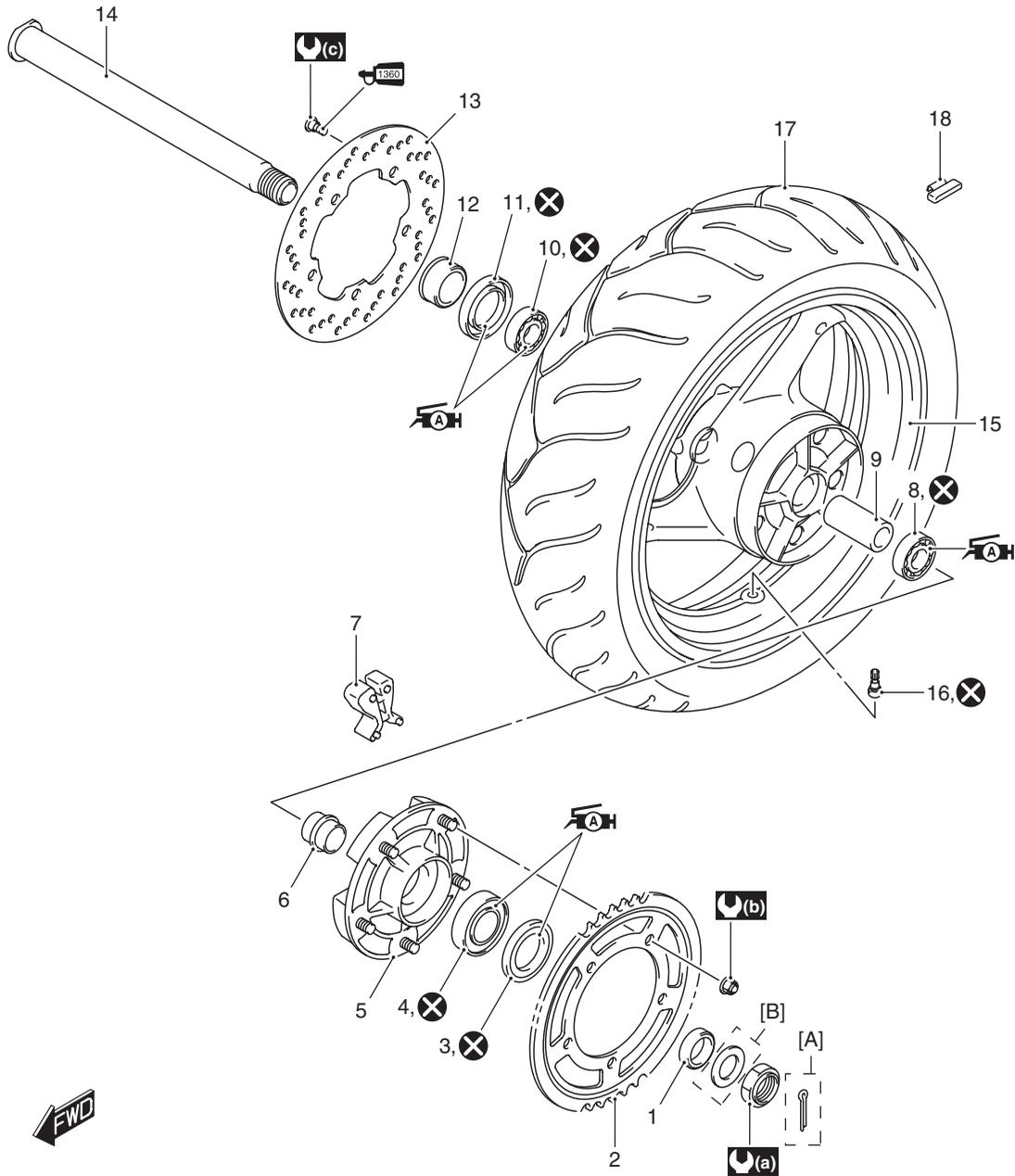


I649G1240023-02

- 5) Install the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: ".

Rear Wheel Components

B649G12406004

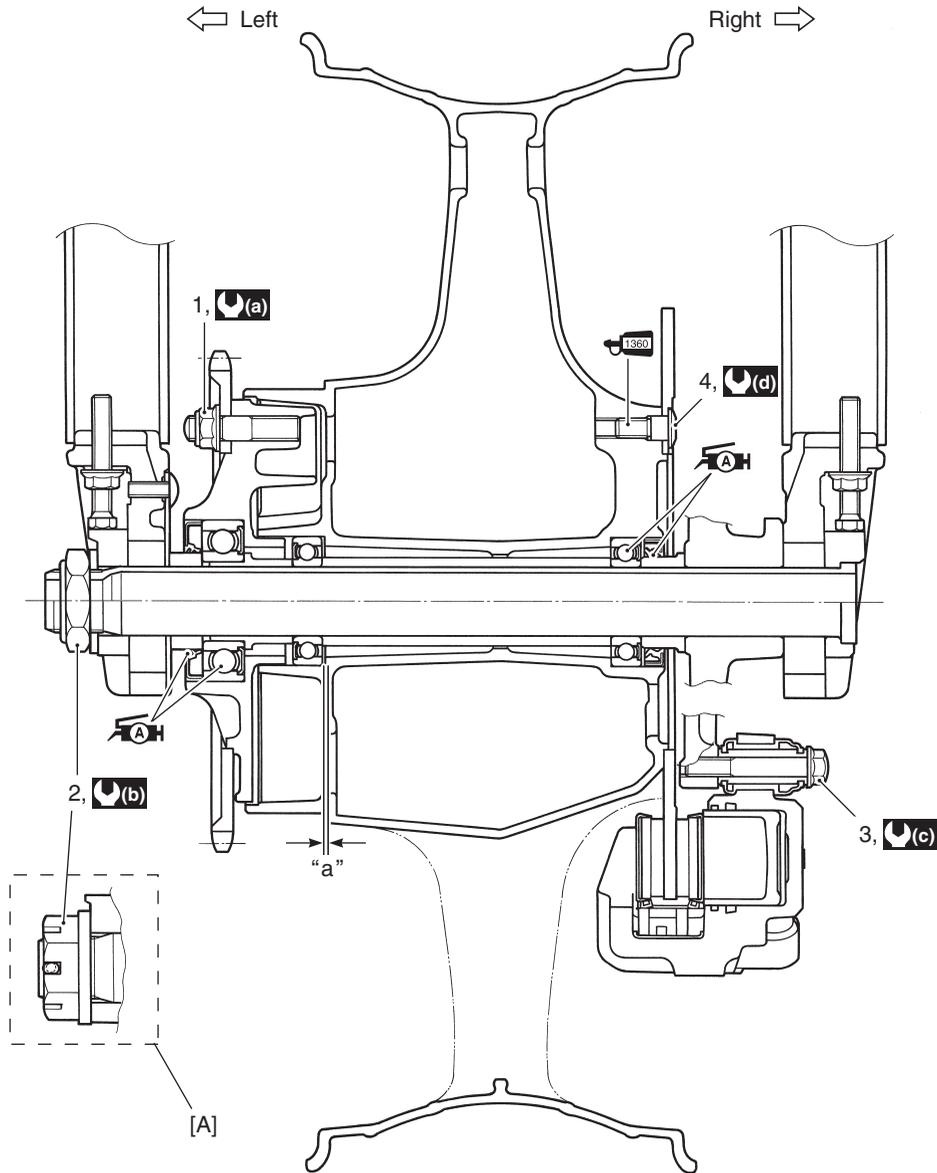


I649G1240053-03

1. Spacer	8. Bearing	15. Rear wheel	: 60 N·m (6.0 kgf·m, 43.5 lb-ft)
2. Rear sprocket	9. Spacer	16. Air valve	: 23 N·m (2.3 kgf·m, 16.5 lb-ft)
3. Dust seal	10. Bearing	17. Tire	: Apply grease.
4. Bearing	11. Dust seal	18. Wheel balancer	: Apply thread lock to thread part.
5. Sprocket mounting drum	12. Collar	[A]: Only for E-28	: Do not reuse.
6. Retainer	13. Rear brake disc	[B]: Except for E-28	
7. Wheel damper	14. Rear axle	: 100 N·m (10.0 kgf·m, 72.5 lb-ft)	

Rear Wheel Assembly Construction

B649G12406028



I649G1240051-04

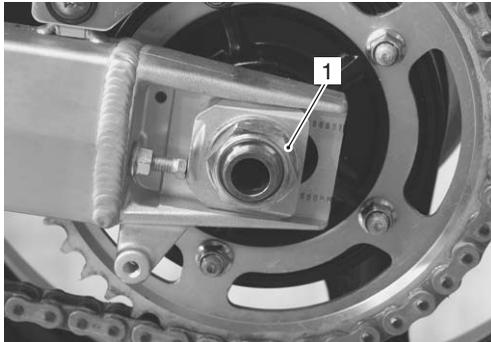
1. Rear sprocket nut	4. Brake disc bolt	(a) : 60 N·m (6.0 kgf-m, 43.5 lb-ft)	(d) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)
2. Rear axle nut	"a": Clearance	(b) : 100 N·m (10.0 kgf-m, 72.5 lb-ft)	(A) : Apply grease.
3. Brake caliper mounting bolt	[A]: Only for E-28	(c) : 22 N·m (2.2 kgf-m, 16.0 lb-ft)	(1360) : Apply thread lock to thread part.

Rear Wheel Assembly Removal and Installation

B649G12406010

Removal

- 1) Support the motorcycle with the center stand.
- 2) Remove the cotter pin. (For E-28)
- 3) Remove the rear axle nut (1) and draw out the rear axle.



I649G1240024-02

- 4) Remove the rear axle and disengage the drive chain from the rear sprocket.
- 5) Remove the rear wheel assembly.

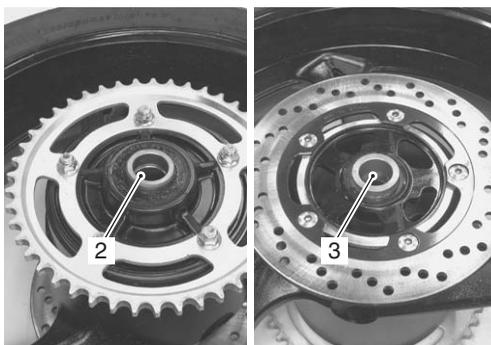
⚠ CAUTION

Do not operate the rear brake pedal with the rear wheel removed.



I649G1240025-01

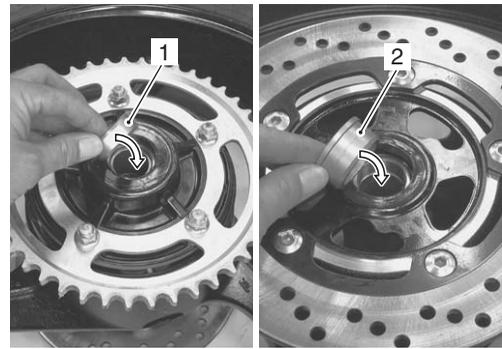
- 6) Remove the spacer (2) and collar (3).



I649G1240026-01

Installation

- 1) Install the spacer (1) and collar (2).



I649G1240027-01

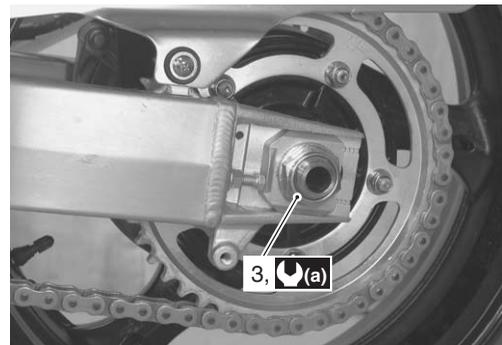
- 2) Install the rear wheel with the rear axle and tighten the rear axle nut temporarily.
- 3) Adjust the drive chain slack after installing the rear wheel. Refer to "Drive Chain Inspection and Adjustment: in Section 0B".
- 4) Tighten the rear axle nut (3) to the specified torque.

Tightening torque

Rear axle nut (a): 100 N·m (10.0 kgf·m, 72.5 lb-ft)

⚠ WARNING

After remounting the rear wheel, pump the brake pedal a few times to check for proper brake operation.



I649G1240028-02

- 5) Install a new cotter pin. (For E-28)

2D-12 Wheels and Tires:

Rear Wheel Related Parts Inspection

B649G12406021

Refer to "Rear Wheel Assembly Removal and Installation: ".

Tire

Refer to "Tire Inspection: in Section 0B".

Rear Brake Disc

Refer to "Rear Brake Disc Inspection: in Section 4C".

Wheel Damper

Refer to "Drive Chain Related Parts Inspection: in Section 3A".

Sprocket

Refer to "Drive Chain Related Parts Inspection: in Section 3A".

Dust Seal

Inspect the dust seal lip for wear or damage. If any defects is found, replace the dust seal with a new one. Refer to "Rear Wheel Dust Seal / Bearing / Removal and Installation: ".



I649G1240029-01

Axle Shaft

Using a dial gauge, check the rear axle for runout. If the runout exceeds the limit, replace the axle shaft.

Axle shaft runout

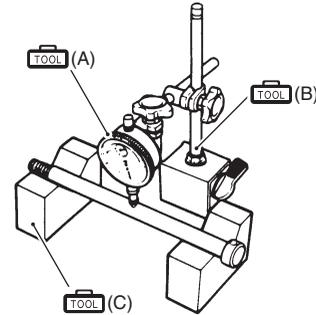
Service limit: 0.25 mm (0.010 in)

Special tool

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

TOOL (B): 09900-20701 (Magnetic stand)

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



I649G1230034-02

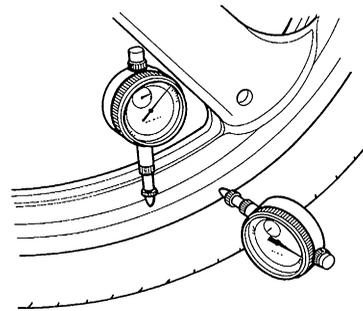
Wheel

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

Wheel runout

Service limit (Axial and Radial): 2.0 mm (0.08 in)

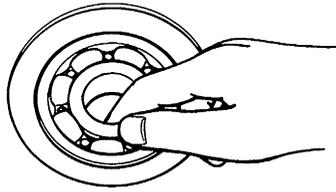
Wheel clean and check. Refer to "Wheel / Tire / Air Valve Inspection and Cleaning: ".



I649G1240014-01

Bearing

Inspect the play of the wheel bearings by hand while they are in the wheel. Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual. Refer to "Rear Wheel Dust Seal / Bearing / Removal and Installation: ".



I649G1240015-01

Rear Wheel Dust Seal / Bearing / Removal and Installation

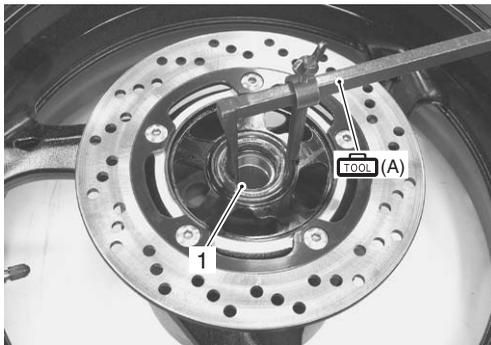
B649G12406022

Removal

- 1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation: ".
- 2) Remove the rear sprocket mounting drum assembly from the rear wheel. Refer to "Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation: in Section 3A".
- 3) Remove the dust seal (1).

Special tool

 (A): 09913-50121 (Oil seal remover)



I649G1240031-01

- 4) Remove the bearings (2) using the special tool.

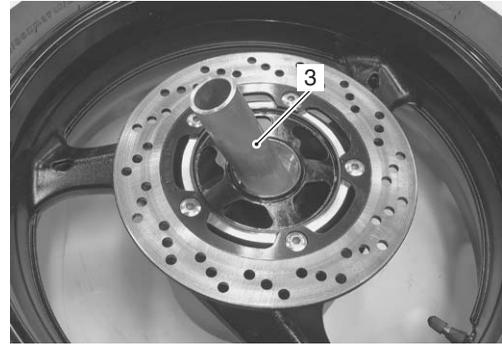
Special tool

 (B): 09921-20240 (Bearing remover set)



I649G1240032-01

- 5) Remove the spacer (3).



I649G1240033-01

Installation

CAUTION

The removed dust seal and bearings must be replaced with new ones.

- 1) Apply SUZUKI SUPER GREASE "A" to the wheel bearings.

 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1240019-01

2D-14 Wheels and Tires:

- 2) First install the right wheel bearing, then install the left wheel bearing with the special tools.

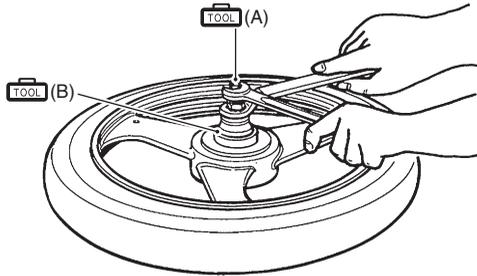
Special tool

TOOL (A): 09941-34513 (Steering race installer)

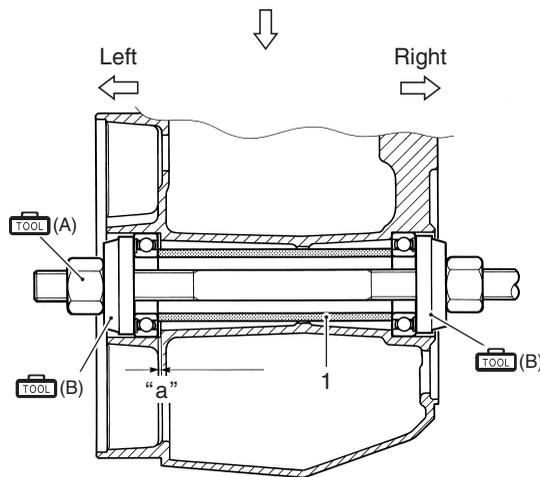
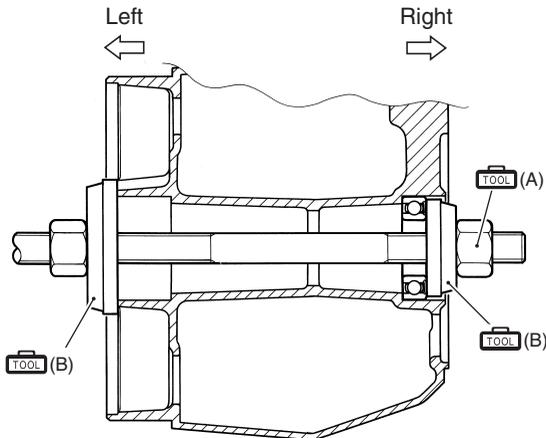
TOOL (B): 09924-84510 (Bearing installer set)

⚠ CAUTION

The sealed cover of the bearing must face outside.



I649G1240030-01



I649G1240034-02

1. Spacer	"a": Clearance
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- 3) Install a new dust seal with the special tool.

Special tool

TOOL (C): 09913-70210 (Bearing installer set)



I649G1240035-01

- 4) Apply SUZUKI SUPER GREASE "A" to the dust seal lip.

FAH: Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1240036-02

- 5) Install the sprocket mounting drum assembly. Refer to "Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation: in Section 3A".
- 6) Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation: ".

Tire Removal and Installation

B649G12406023

Removal

The most critical factor of a tubeless tire is the seal between the wheel rim and the tire bead. For this reason, it is recommended to use a tire changer that can satisfy this sealing requirement and can make the operation efficient as well as functional.

- 1) Remove the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: " and "Rear Wheel Assembly Removal and Installation: ".
- 2) Remove the mounting drum from the rear wheel. (For rear wheel)
Refer to "Rear Wheel Assembly Removal and Installation: ".

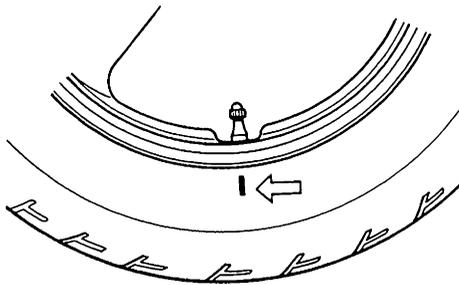
- 3) Remove the valve core.
- 4) Remove the tire using the tire charger.

⚠ CAUTION

For operating procedures, refer to the instructions supplied by the tire changer manufacturer.

NOTE

When removing the tire in case of repair or inspection, mark the tire with a chalk to indicate the tire position relative to the valve position. Even though the tire is refitted to the original position after repairing puncture, the tire may have to be balanced again since such a repair can cause imbalance.



I649G1240037-01

Installation

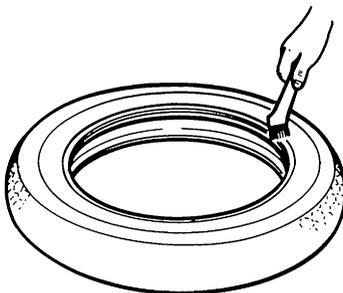
⚠ CAUTION

- Do not reuse the valve which has been once removed.

- 1) Apply tire lubricant to the tire bead.

⚠ CAUTION

- Never use oil, grease or gasoline on the tire bead in place of tire lubricant.



I649G1240038-01

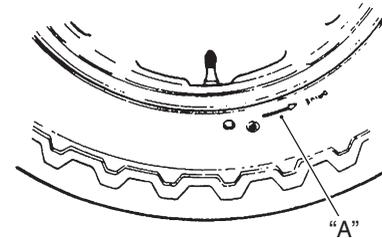
- 2) Install the tire onto the wheel.

⚠ CAUTION

For installation procedure of tire onto the wheel, follow the instructions given by the tire changer manufacturer.

NOTE

- When installing the tire, the arrow "A" on the side wall should point to the direction of wheel rotation.
- Align the chalk mark put on the tire at the time of removal with the valve position.



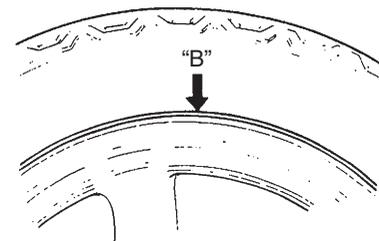
I649G1240039-01

- 3) Bounce the tire several times while rotating. This makes the tire bead expand outward to contact the wheel, thereby facilitating air inflation.
- 4) Inflate the tire.

⚠ WARNING

- Do not inflate the tire to more than 400 kPa (4.0 kgf/cm²). If inflated beyond this limit, the tire can burst and possibly cause injury. Do not stand directly over the tire while inflating.
- In the case of preset pressure air inflator, pay special care for the set pressure adjustment.

- 5) In this condition, check the "grim line" "B" cast on the tire side walls. The line must be equidistant from the wheel rim all around.
- 6) If the distance between the rim line and wheel rim varies, this indicates that the bead is not properly seated. If this is the case, deflate the tire completely and unseat the bead for both sides. Coat the bead with lubricant and fit the tire again.



I649G1240040-01

2D-16 Wheels and Tires:

- 7) When the bead has been fitted properly, install the valve core and adjust the pressure to specification.
- 8) As necessary, adjust the tire balance. Refer to "Wheel Balance Check and Adjustment: ".

Cold inflation tire pressure

	Front	Rear
Solo riding	250 kPa (2.50 kgf/cm ²)	250 kPa (2.50 kgf/cm ²)
Dual riding	250 kPa (2.50 kgf/cm ²)	250 kPa (2.50 kgf/cm ²)

- 9) Install the mounting drum to the rear wheel. (For rear wheel) Refer to "Rear Wheel Assembly Removal and Installation: ".
- 10) Install the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: " and "Rear Wheel Assembly Removal and Installation: ".

Wheel / Tire / Air Valve Inspection and Cleaning

B649G12406024

Refer to "Tire Removal and Installation: ".

Wheel

Wipe the wheel clean and check for the following points:

- Distortion and crack
- Any flaws and scratches at the bead seating area.
- Wheel rim runout. Refer to "Front Wheel Assembly Removal and Installation: " and "Rear Wheel Assembly Removal and Installation: ".



I649G1240041-01

Tire

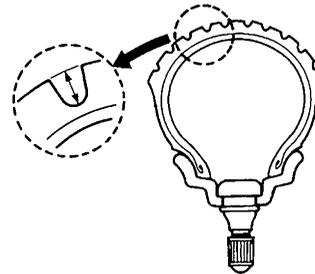
Tire must be checked for the following points:

- Nick and rupture on side wall
- Tire tread depth (Refer to "Tire Inspection: in Section 0B".)
- Tread separation
- Abnormal, uneven wear on tread
- Surface damage on bead

- Localized tread wear due to skidding (Flat spot)
- Abnormal condition of inner liner



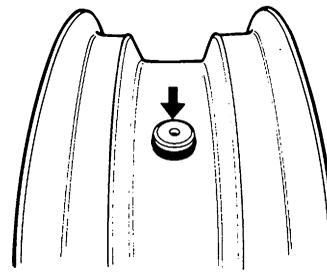
I649G1240042-01



I649G1240043-01

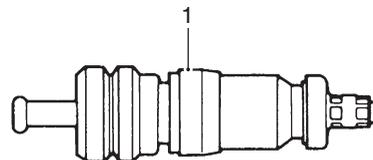
Air Valve

Inspect the air valve for peeling and damage. If any defect is found, replace the air valve with a new one. Refer to "Air Valve Removal and Installation: ".



I649G1240044-01

Inspect the valve core seal (1) for wear and damage. If any defect is found, replace the valve core with a new one. Refer to "Air Valve Removal and Installation: ".



I649G1240045-01

1. Seal

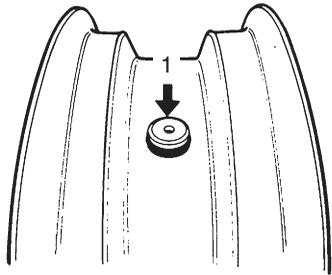
Air Valve Removal and Installation

B649G12406025

Removal

- 1) Remove the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: " and "Rear Wheel Assembly Removal and Installation: ".

- 2) Remove the tire. Refer to "Tire Removal and Installation: ".
- 3) Remove the air valve (1) from the wheel.

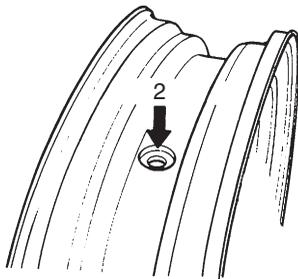


I649G1240046-01

Installation

Install the air valve in the reverse order of removal. Pay attention to the following points:

- Any dust or rust around the valve hole (2) must be cleaned off.



I649G1240047-01

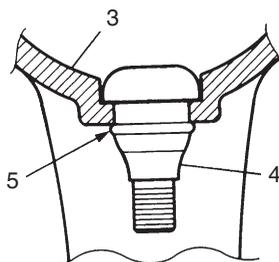
- Install the air valve (4) in the wheel (3).

CAUTION

- Be careful not to damage the lip (5) of valve.
- Replace the air valve with a new one.

NOTE

To properly install the valve into the valve hole, apply a special tire lubricant or neutral soapy liquid to the valve.



I649G1240048-01

3. Wheel	4. Valve	5. Valve lip
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Wheel Balance Check and Adjustment

B649G12406026

Check and adjust the wheel balance in the following procedures:

- 1) Removal the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: " and "Rear Wheel Assembly Removal and Installation: ".
- 2) Remove the mounting drum from the rear wheel. (For rear wheel)
Refer to "Rear Wheel Assembly Removal and Installation: ".
- 3) Check the wheel balance using the balancer and adjust the wheel balance if necessary.

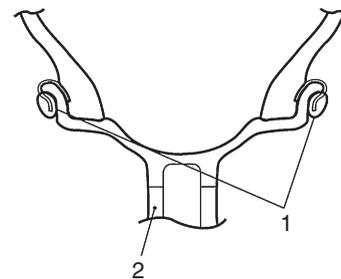
CAUTION

For operating procedures, refer to the instructions supplied by the wheel balancer manufacturer.

- 4) When installing the balancer weights (1) to the wheel (2), set the two balancer weights on both sides of wheel rim.

CAUTION

Weight difference between the two balancer weights must be less than 10 g.



I649G1240049-01

- 5) Recheck the wheel balance.
- 6) Install the mounting drum to the rear wheel. (For rear wheel)
Refer to "Rear Wheel Assembly Removal and Installation: ".
- 7) Install the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: " and "Rear Wheel Assembly Removal and Installation: ".

Specifications

Service Data

B649G12407002

Wheel

Unit: mm (in)

Item	Standard		Limit
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)
Wheel rim size	Front	17 M/C x MT3.50	—
	Rear	17 M/C x MT5.50	—

Tire

Item	Standard		Limit
Cold inflation tire pressure (Solo/Dual riding)	Front	250 kPa (2.50 kgf/cm ² , 36 psi)	—
	Rear	250 kPa (2.50 kgf/cm ² , 36 psi)	—
Tire size	Front	120/70 ZR17M/C (58 W)	—
	Rear	180/55 ZR17M/C (73 W)	—
Tire type	Front	DUNLOP D218FN	—
	Rear	DUNLOP D218N	—
Tire tread depth (Recommended depth)	Front	—	1.6 mm (0.06 in)
	Rear	—	2.0 mm (0.08 in)

Tightening Torque Specifications

B649G12407003

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb-ft	
Front brake caliper mounting bolt	26	2.6	19.0	
Front axle bolt	100	10.0	72.5	
Front axle pinch bolt	23	2.3	16.5	 / 
Rear axle nut	100	10.0	72.5	

NOTE

The specified tightening torque is also described in the following.

“Front Wheel Components: ”

“Front Wheel Assembly Construction: ”

“Rear Wheel Components: ”

“Rear Wheel Assembly Construction: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G12408001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000-25010	🔧 / 🛠 / 🛠 / 🛠

NOTE

Required service material is also described in the following.

“Front Wheel Components: ”

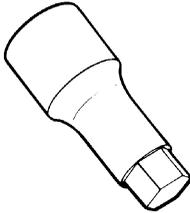
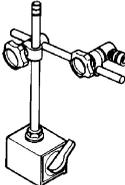
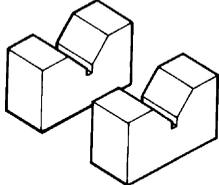
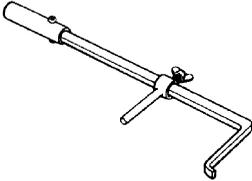
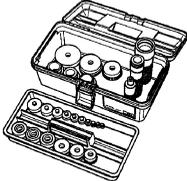
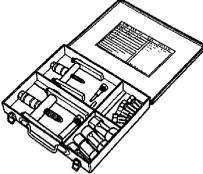
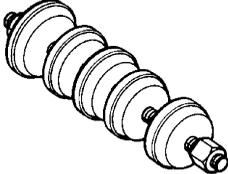
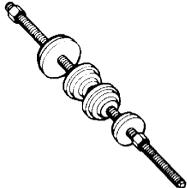
“Front Wheel Assembly Construction: ”

“Rear Wheel Components: ”

“Rear Wheel Assembly Construction: ”

Special Tool

B649G12408002

09900-18740 Hexagon socket (24 mm) 🔧		09900-20607 Dial gauge (1/100mm, 10mm) 🔧 / 🛠	
09900-20701 Magnetic stand 🔧 / 🛠		09900-21304 V-block (100mm) 🔧 / 🛠	
09913-50121 Oil seal remover 🔧 / 🛠		09913-70210 Bearing installer set 🔧 / 🛠	
09921-20240 Bearing remover set 🔧 / 🛠		09924-84510 Bearing installer set 🔧 / 🛠	
09941-34513 Steering race installer 🔧			

Section 3

Driveline / Axle

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Repair Instructions	3A-1	Tightening Torque Specifications.....	3A-9
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Precautions

Precautions

Precautions for Driveline / Axle

B649G1300001

Refer to “General Precautions: in Section 00”.

⚠ WARNING

Never inspect or adjust the drive chain while the engine is running.

⚠ CAUTION

-
- Do not use trichloroethylene, gasoline or any similar solvent. These fluids will damage the O-rings of the drive chain.
 - Clean the drive chain with a spray-type chain cleaner and blow dry with compressed air. If the drive chain cannot be cleaned with a spray cleaner, it may be necessary to use a kerosine. Always follow the chemical manufacturer’s instructions on proper use, handling and storage.
 - Lubricate the drive chain with a heavy weight motor oil. Wipe off any excess oil or chain lubricant. Do not use any oil sold commercially as “drive chain oil”. Such oil can damage the O-rings.
 - The standard drive chain is RK GB50GSVZ3. Suzuki recommends to use this standard drive chain as a replacement.
-

Drive Chain / Drive Train / Drive Shaft

Diagnostic Information and Procedures

Drive Chain and Sprocket Symptom Diagnosis

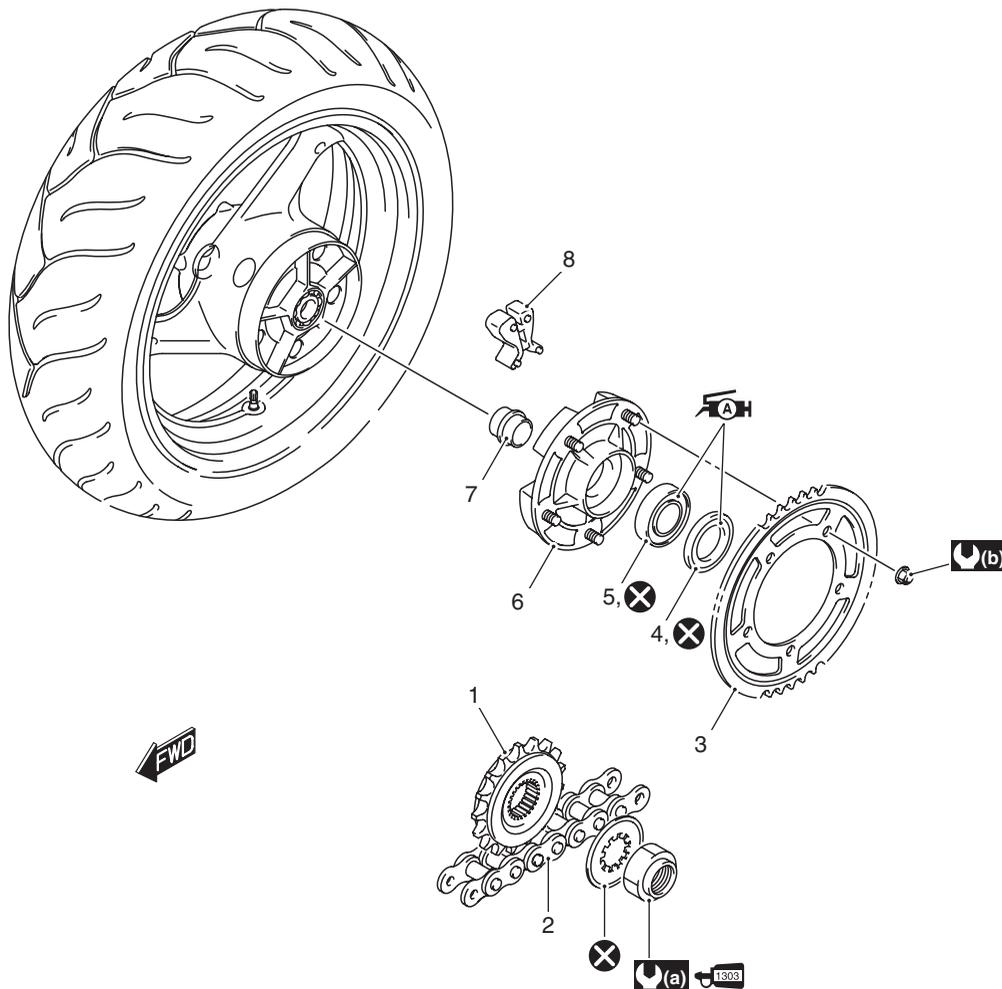
B649G13104003

Condition	Possible cause	Correction / Reference Item
Noisy Drive Chain	Worn sprocket.	<i>Replace.</i>
	Worn drive chain.	<i>Replace.</i>
	Stretched drive chain.	<i>Replace.</i>
	Too large drive chain slack.	<i>Adjust.</i>
	Drive chain out of adjustment.	<i>Adjust.</i>

Repair Instructions

Drive Chain Related Components

B649G13106001



I649G1310001-02

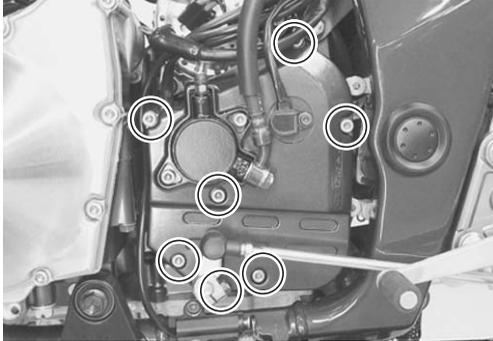
1. Engine sprocket	6. Sprocket mounting drum	: Apply grease.
2. Drive chain	7. Retainer	: Apply thread lock to thread part.
3. Rear sprocket	8. Wheel damper	: Do not reuse.
4. Dust seal	: 115 N·m (11.5 kgf·m, 83.0 lb·ft)	
5. Bearing	: 60 N·m (6.0 kgf·m, 43.5 lb·ft)	

Engine Sprocket Removal and Installation

B649G13106008

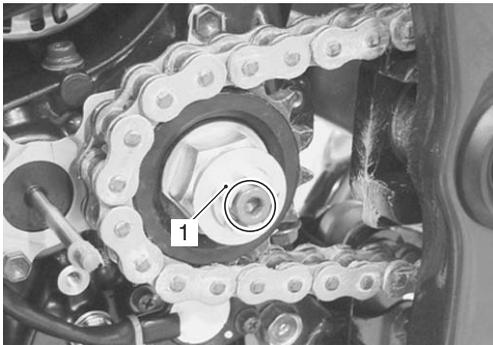
Removal

- 1) Disengage the gearshift lever link by removing the bolt.
- 2) Remove the engine sprocket cover along with the clutch release cylinder and speed sensor.



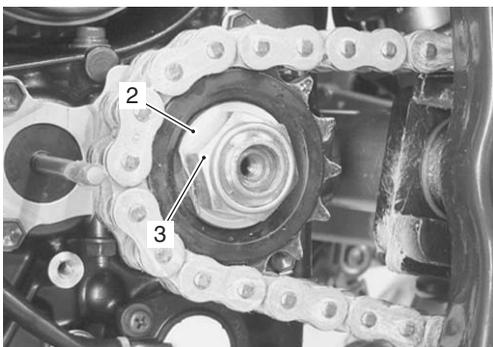
I649G1310002-02

- 3) Remove the speed sensor rotor (1) by removing its bolt while depressing the rear brake pedal.



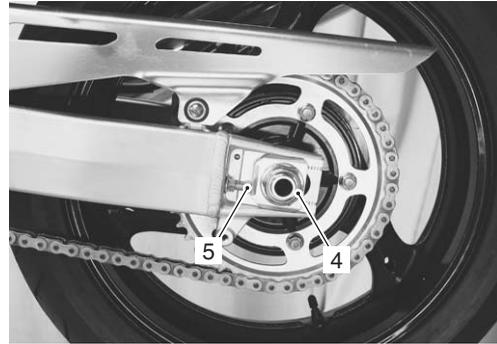
I649G1310003-03

- 4) Flatten the lock washer (2).
- 5) Remove the engine sprocket nut (3) while depressing the rear brake pedal.
- 6) Remove the lock washer (2).



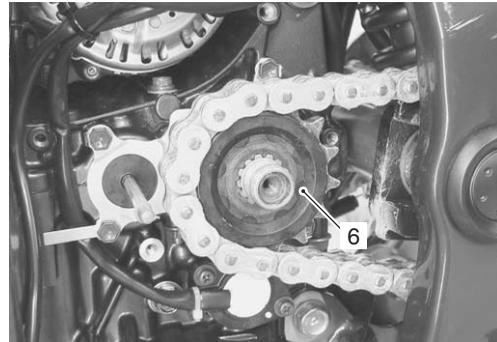
I649G1310004-02

- 7) Loosen the rear axle nut (4) and chain adjusters (5) to provide additional chain slack.



I649G1310005-02

- 8) Remove the engine sprocket (6).



I649G1310006-02

Installation

Install the engine sprocket in the reverse order of removal. Pay attention to the following points:

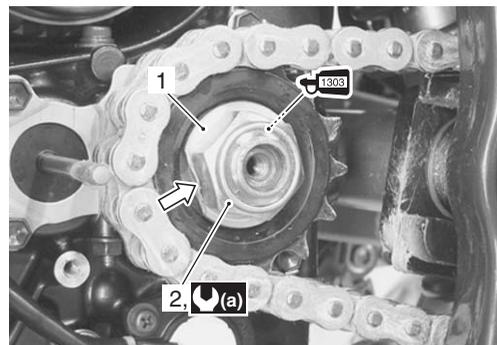
- Install a new lock washer (1) and apply **THREAD LOCK SUPER "1303"** to the driveshaft.

 : **Thread lock cement 99000-32030 (Thread Lock Cement Super 1303 or equivalent)**

- Tighten the engine sprocket nut (2) to the specified torque and bend up the lock washer.

Tightening torque

Engine sprocket nut (a): 115 N·m (11.5 kgf-m, 83.0 lb-ft)



I649G1310007-04

- Apply a small quantity of THREAD LOCK “1342” to the speed sensor rotor bolt (3).

 : Thread lock cement 99000–32050 (Thread Lock Cement 1342 or equivalent)

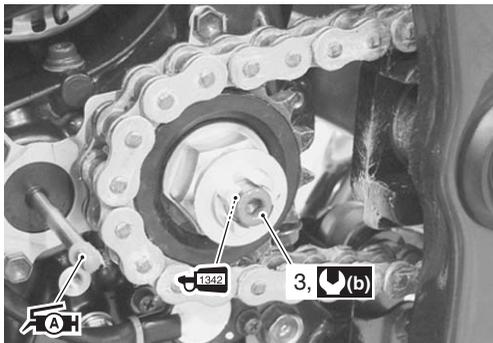
- Tighten the speed sensor rotor bolt (3) to the specified torque.

Tightening torque

Speed sensor rotor bolt (b): 20 N·m (2.0 kgf·m, 14.5 lb-ft)

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

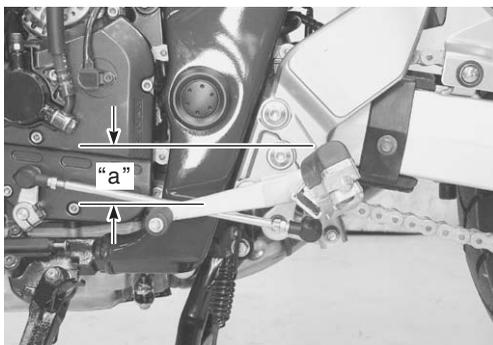
 : Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1310008-03

- Install the gearshift lever to the gearshift shaft in the correct position.

Gearshift lever height “a”
Standard: 55 mm (2.2 in)



I649G1310009-02

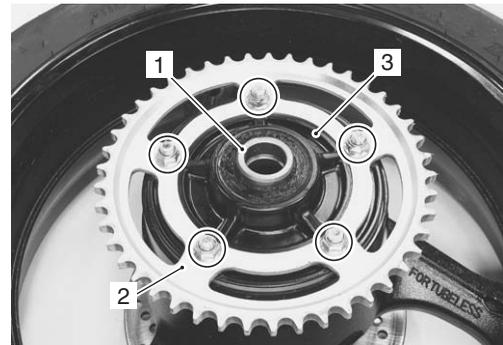
- Adjust the drive chain slack. Refer to “Drive Chain Inspection and Adjustment: in Section 0B”.

Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation

B649G13106009

Removal

- 1) Remove the rear wheel assembly by disengaging the drive chain. Refer to “Rear Wheel Assembly Removal and Installation: in Section 2D”.
- 2) Remove the spacer (1).
- 3) Remove the rear sprocket nuts and separate the rear sprocket (2) from its mounting drum (3).
- 4) Draw out the mounting drum (3) from the wheel hub.



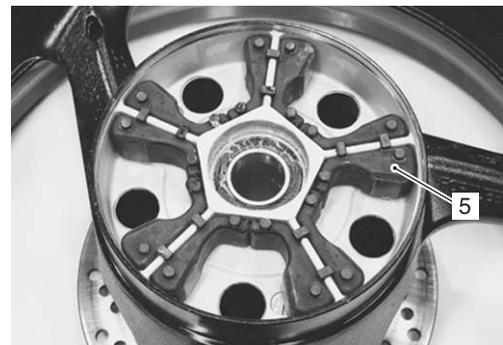
I649G1310010-02

- 5) Remove the retainer (4).



I649G1310011-01

- 6) Remove the wheel dampers (5).



I649G1310012-01

3A-4 Drive Chain / Drive Train / Drive Shaft:

Installation

Install the rear sprocket and rear sprocket mounting drum in the reverse order of removal. Pay attention to the following points:

- Apply grease to the contacting surface between the rear wheel hub and the mounting drum.

 **Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)**

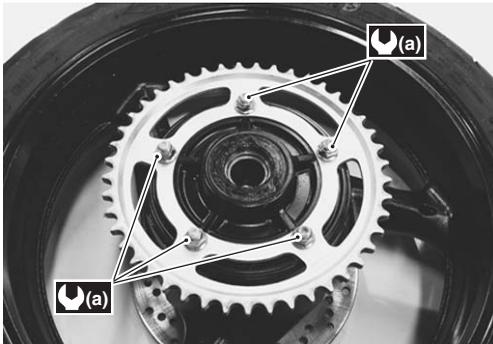


I649G1310013-01

- Tighten the rear sprocket nuts to the specified torque.

Tightening torque

Rear sprocket nut (a): 60 N·m (6.0 kgf·m, 43.5 lb-ft)



I649G1310014-02

- Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation: in Section 2D".

Drive Chain Related Parts Inspection

B649G13106010

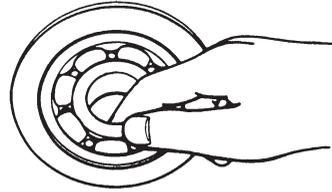
Refer to "Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation: "

Dust Seal

Inspect the sprocket mounting drum dust seal for wear or damage. If any damage is found, replace the dust seal with a new one.

Bearing

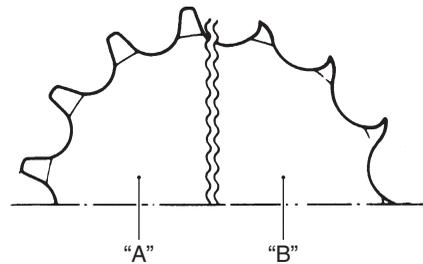
Inspect the play of the sprocket mounting drum bearings by hand while they are in the wheel and drum. Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



I649G1310015-01

Engine Sprocket and Rear Sprocket

Inspect the sprocket teeth for wear. If they are worn as shown, replace the engine sprocket, rear sprocket and drive chain as a set.



I649G1310016-01

"A": Normal wear	"B": Excessive wear
------------------	---------------------

Wheel Damper

Inspect the dampers for wear and damage. Replace the damper if there is anything unusual.



I649G1310017-01

Drive Chain

Refer to "Drive Chain Inspection and Adjustment: in Section 0B".

Sprocket Mounting Drum Dust Seal / Bearing Removal and Installation

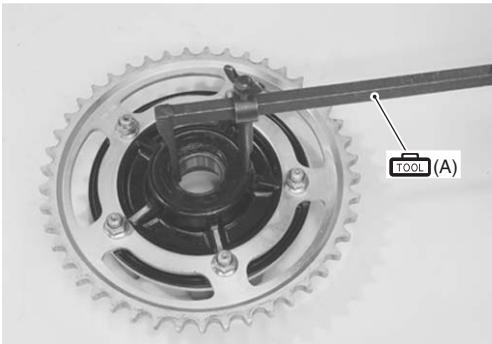
B649G13106011

Removal

- 1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation: in Section 2D".
- 2) Remove the mounting drum from the rear wheel hub.
- 3) Remove the spacer and retainer. Refer to "Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation: ".
- 4) Remove the sprocket mounting drum dust seal using the special tool.

Special tool

 (A): 09913-50121 (Oil seal remover)



I649G1310018-02

- 5) Remove the sprocket mounting drum bearing using the special tool.

Special tool

 (B): 09913-70210 (Bearing installer set)



I649G1310019-02

Installation

CAUTION

The removed dust seal and bearing must be replaced with new ones.

- 1) Apply grease to the bearing before installing.

 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)

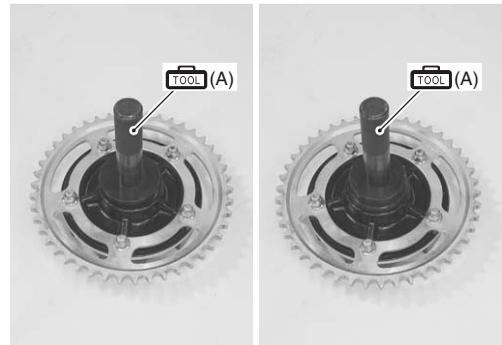


I649G1310020-01

- 2) Install the bearing and dust seal to the sprocket mounting drum using the special tool.

Special tool

 (A): 09913-70210 (Bearing installer set)



I649G1310022-02

- 3) Apply grease to the dust seal lip.

 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1310021-01

- 4) Install the spacer and retainer.
- 5) Install the mounting drum to rear wheel hub. Refer to "Rear Sprocket / Rear Sprocket Mounting Drum Removal and Installation: ".
- 6) Install the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation: in Section 2D".

3A-6 Drive Chain / Drive Train / Drive Shaft:

Drive Chain Replacement

B649G13106012

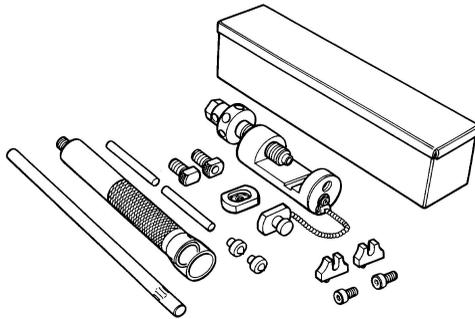
Use the special tool in the following procedures, to cut and rejoin the drive chain.

NOTE

When using the special tool, apply a small quantity of grease to the threaded parts of the special tool.

Special tool

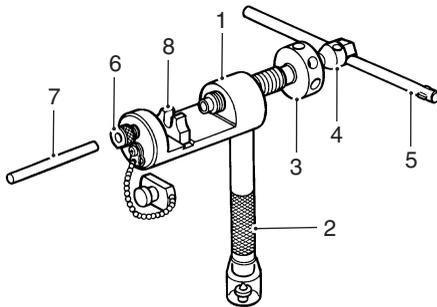
TOOL : 09922-22711 (Drive chain cutting and joining tool)



I649G1310023-01

Drive Chain Cutting

1) Set up the special tool as shown in the illustration.

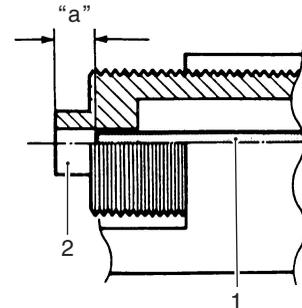


I649G1310024-01

1. Tool body	5. Bar
2. Grip handle	6. Adjuster bolt (With through hole)
3. Pressure bolt [A]	7. Pin remover
4. Pressure bolt [B]	8. Chain holder (Engraved mark 500) with reamer bolt M5 x 10

NOTE

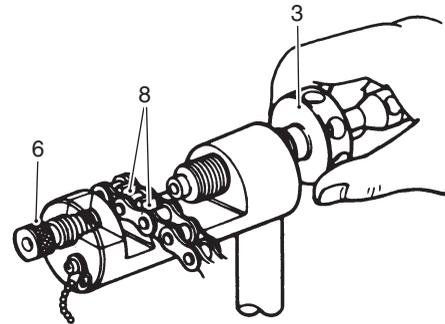
The tip of pin remover (1) should be positioned inside "a" approximately 5 mm (0.2 in) from the end face of pressure bolt [A] (2) as shown in the illustration.



I649G1310025-01

"a": 5 mm (0.2 in)

- Place the drive chain link being disjoined on the holder part (8) of the tool.
- Turn in both the adjuster bolt (6) and pressure bolt [A] (3) so that each of their end hole fits over the chain joint pin properly.
- Tighten the pressure bolt [A] (3) with the bar.



I649G1310026-01

- Turn in the pressure bolt [B] (4) with the bar (5) and force out the drive chain joint pin (9).

⚠ CAUTION

Continue turning in the pressure bolt [B] (4) until the joint pin has been completely pushed out of the chain.

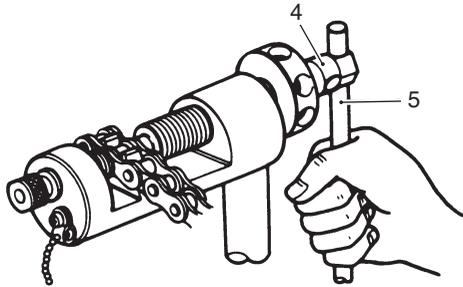
NOTE

After the joint pin (9) is removed, loosen the pressure bolt [B] (4) and then pressure bolt [A] (3).

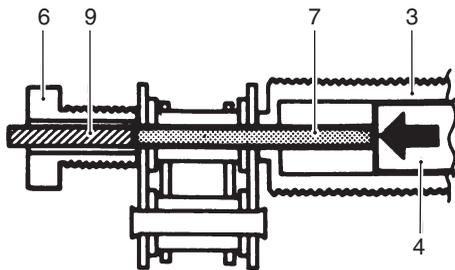
6) Remove the joint pin (9) of the other side of joint plate.

CAUTION

Never reuse joint pins, O-rings and plates.



I649G1310027-01



I649G1310028-01

Drive Chain Connecting

WARNING

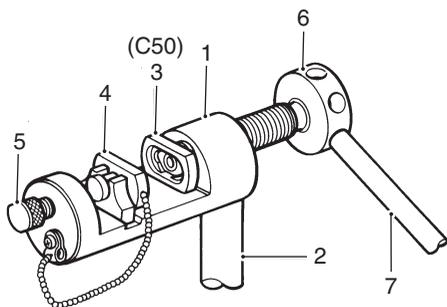
Do not use joint clip type of drive chain. The joint clip may have a chance to drop which may cause severe damage to motorcycle and severe injury.

CAUTION

Replace the joint pins (8), O-rings (9) and plates (10) with new ones.

Joint plate installation

1) Set up the special tool as shown in the illustration.



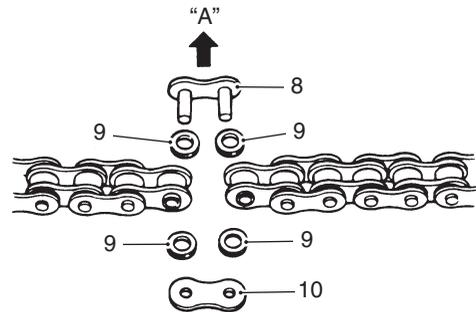
I649G1310029-01

1. Tool body	5. Adjuster bolt (Without hole)
2. Grip handle	6. Pressure bolt [A]
3. Joint plate holder (Engraved mark "C50")	7. Bar
4. Wedge holder & wedge pin	

- 2) Apply grease to the joint pins (8), O-rings (9) and plates (10).
- 3) Connect both ends of the drive chain with the joint pin (8) inserted from the wheel side "A" as installed on the motorcycle.

Joint set part number

RK: 27620 – 24F00



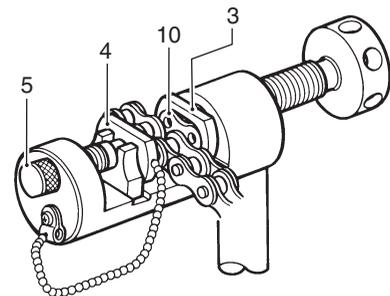
I649G1310030-01

4) Apply grease on the recessed portion of the joint plate holder (3) and set the joint plate (10).

NOTE

When positioning the joint plate (10) on the tool, its stamp mark must face the joint plate holder (3) side.

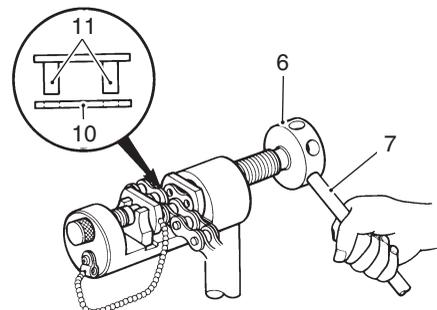
5) Set the drive chain on the tool as illustrated and turn in the adjuster bolt (5) to secure the wedge holder & wedge pin (4).



I649G1310031-01

6) Turn in the pressure bolt [A] (6) and align two joint pins (11) properly with the respective holes of the joint plate (10).

7) Turn in the pressure bolt [A] (6) further using the bar (7) to press the joint plate over the joint pins.



I649G1310032-01

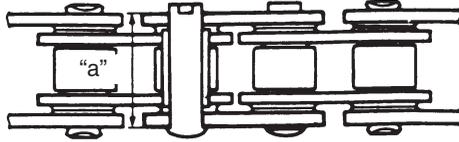
3A-8 Drive Chain / Drive Train / Drive Shaft:

- 8) Continue pressing the joint plate until the distance between the two joint plates come to the specification.

Joint plate distance specification "a"
21.85 – 22.15 mm (0.860 – 0.872 in)

⚠ CAUTION

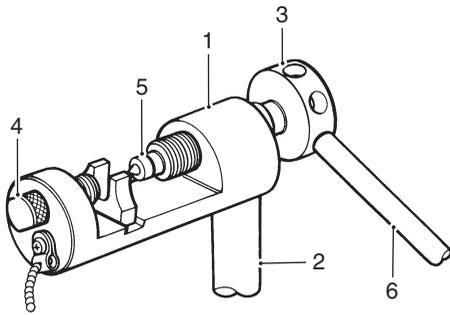
Should pressing of the joint plate be made excessively beyond the specified dimension, the work should be redone using the new joint parts.



I649G1310033-02

Joint pin staking

- 1) Set up the special tool as shown in the illustration.



I649G1310034-01

1. Tool body	4. Adjuster bolt (Without hole)
2. Grip handle	5. Staking pin (Stowed inside grip handle behind rubber cap)
3. Pressure bolt "A"	6. Bar

NOTE

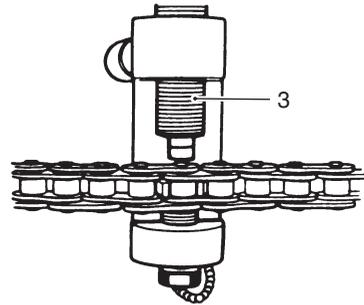
Before staking the joint pin, apply a small quantity of grease to the staking pin (5).

- 2) Stake the joint pin by turning (approximately 7/8 turn) the pressure bolt [A] (3) with the bar until the pin end diameter becomes the specified dimension.

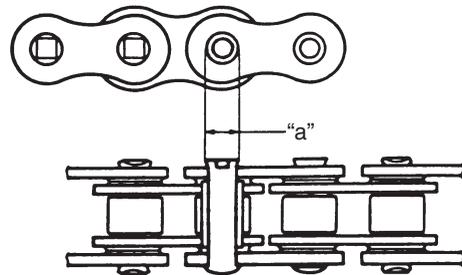
⚠ CAUTION

- After joining of the chain has been completed, check to make sure that the link is smooth and no abnormal condition is found.
- Should any abnormal condition be found, reassemble the chain link using the new joint parts.

Pin end diameter specification "a"
RK: 5.45 – 5.85 mm (0.215 – 0.230 in)



I649G1310035-01



I649G1310036-02

- 3) Adjust the drive chain slack, after connecting it. Refer to "Drive Chain Inspection and Adjustment: in Section 0B".

Specifications

Service Data

B649G13107002

Drive Chain

Unit: mm (in)

Item	Standard		Limit
Final reduction ratio	3.000 (45/15)		—
Drive chain	Type	RK GB50GSVZ3	—
	Links	116 links	—
	20-pitch length	—	319.4 (12.57)
Drive chain slack	20 – 30 (0.8 – 1.2)		—

Tightening Torque Specifications

B649G13107003

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Engine sprocket nut	115	11.5	83.0	☞
Speed sensor rotor bolt	20	2.0	14.5	☞
Rear sprocket nut	60	6.0	43.5	☞

NOTE

The specified tightening torque is also described in the following.
 “Drive Chain Related Components: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G13108001

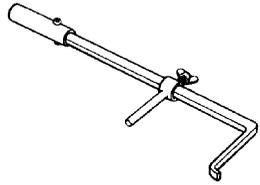
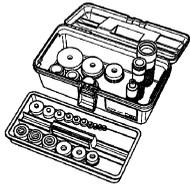
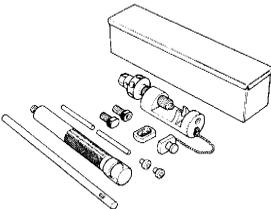
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000-25010	☞ / ☞ / ☞ / ☞
Thread lock cement	Thread Lock Cement Super 1303 or equivalent	P/No.: 99000-32030	☞
	Thread Lock Cement 1342 or equivalent	P/No.: 99000-32050	☞

NOTE

Required service material is also described in the following.
 “Drive Chain Related Components: ”

Special Tool

B649G13108002

<p>09913-50121 Oil seal remover ☞</p> 	<p>09913-70210 Bearing installer set ☞ / ☞</p> 
<p>09922-22711 Drive chain cutting and joining tool ☞</p> 	

Section 4

Brake

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Precautions

Precautions

Precautions for Brake System

B649G1400001

Refer to “General Precautions: in Section 00”.

Brake Fluid Information

B649G1400002

⚠ WARNING

- This brake system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid, such as silicone-based or petroleum-based.
 - Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or which has been stored for long periods of time.
 - When storing brake fluid, seal the container completely and keep it away from children.
 - When replenishing brake fluid, take care not to get dust into the fluid.
 - When washing brake components, use new brake fluid. Never use cleaning solvent.
 - A contaminated brake disc or brake pad reduces braking performance. Discard contaminated pads and clean the disc with high quality brake cleaner or neutral detergent.
-

⚠ CAUTION

Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The brake fluid reacts chemically with paint, plastics and rubber materials, etc., and will damage them severely.

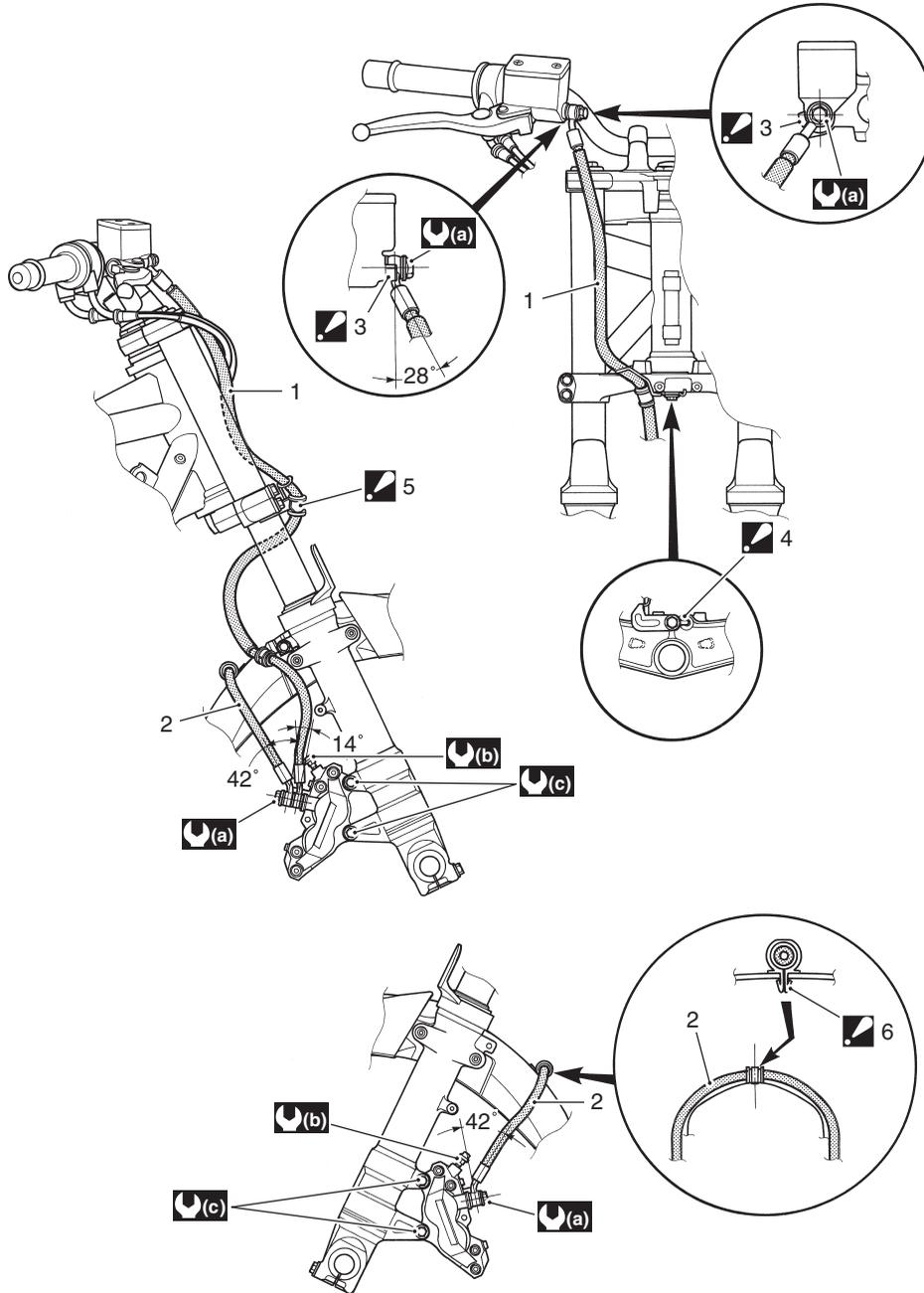
Brake Control System and Diagnosis

Schematic and Routing Diagram

Front Brake Hose Routing Diagram

GSF1200

B649G14102001

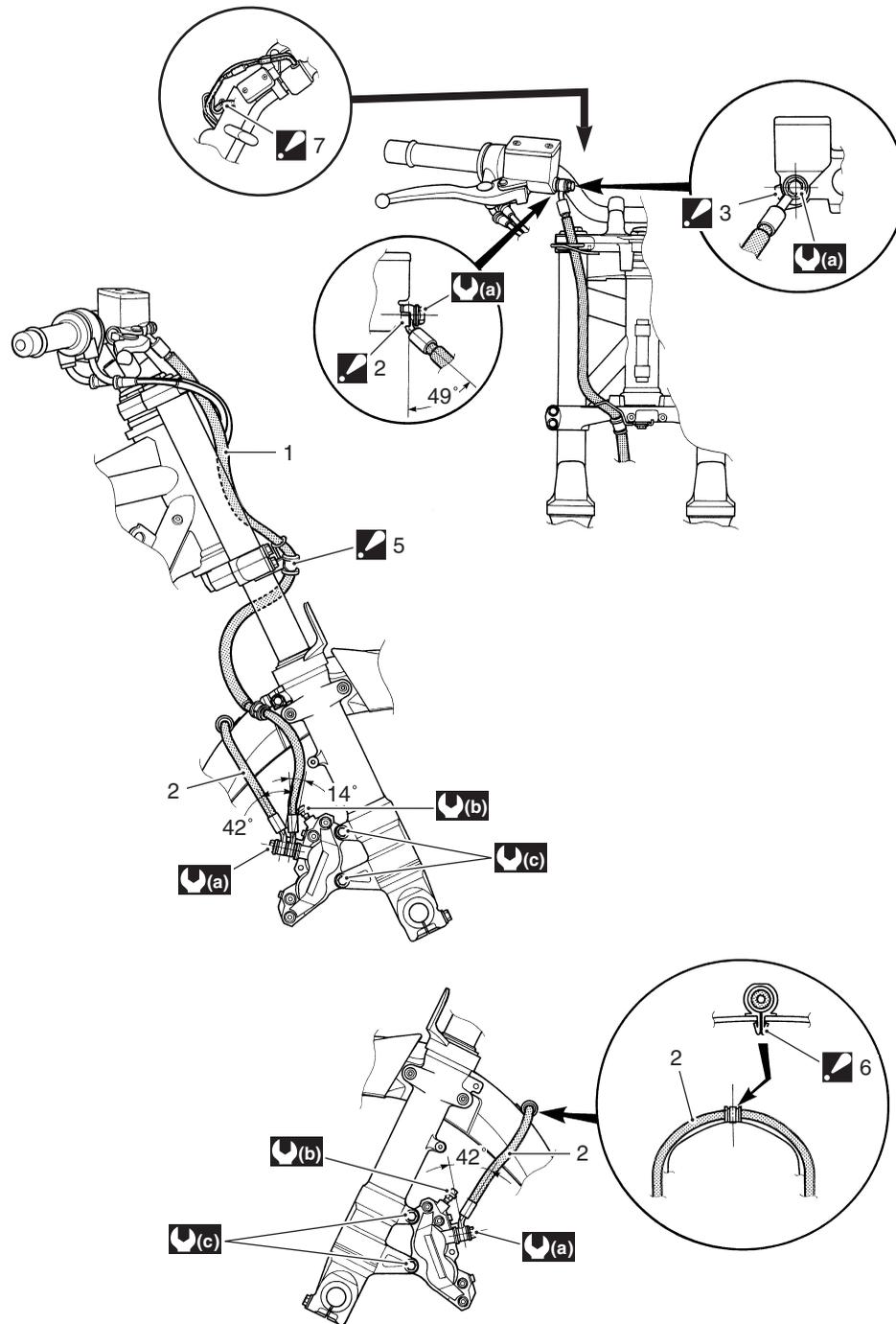


I649G1410001-04

1. Front brake hose No.1	6: Clamp : Insert the clamp to the hole of the front fender fully.
2. Front brake hose No.2	(a) : 23 N·m (2.3 kgf·m, 16.5 lb-ft)
3: Stopper : After the brake hose union has contacted the stopper, tighten the union bolt.	(b) : 7.5 N·m (0.75 kgf·m, 5.5 lb-ft)
4: Clamp : After positioning the clamp with the stopper, tighten the clamp bolt.	(c) : 26 N·m (2.6 kgf·m, 19.0 lb-ft)
5: Brake hose : Clamp the brake hose firmly.	

4A-2 Brake Control System and Diagnosis:

GSF1200S

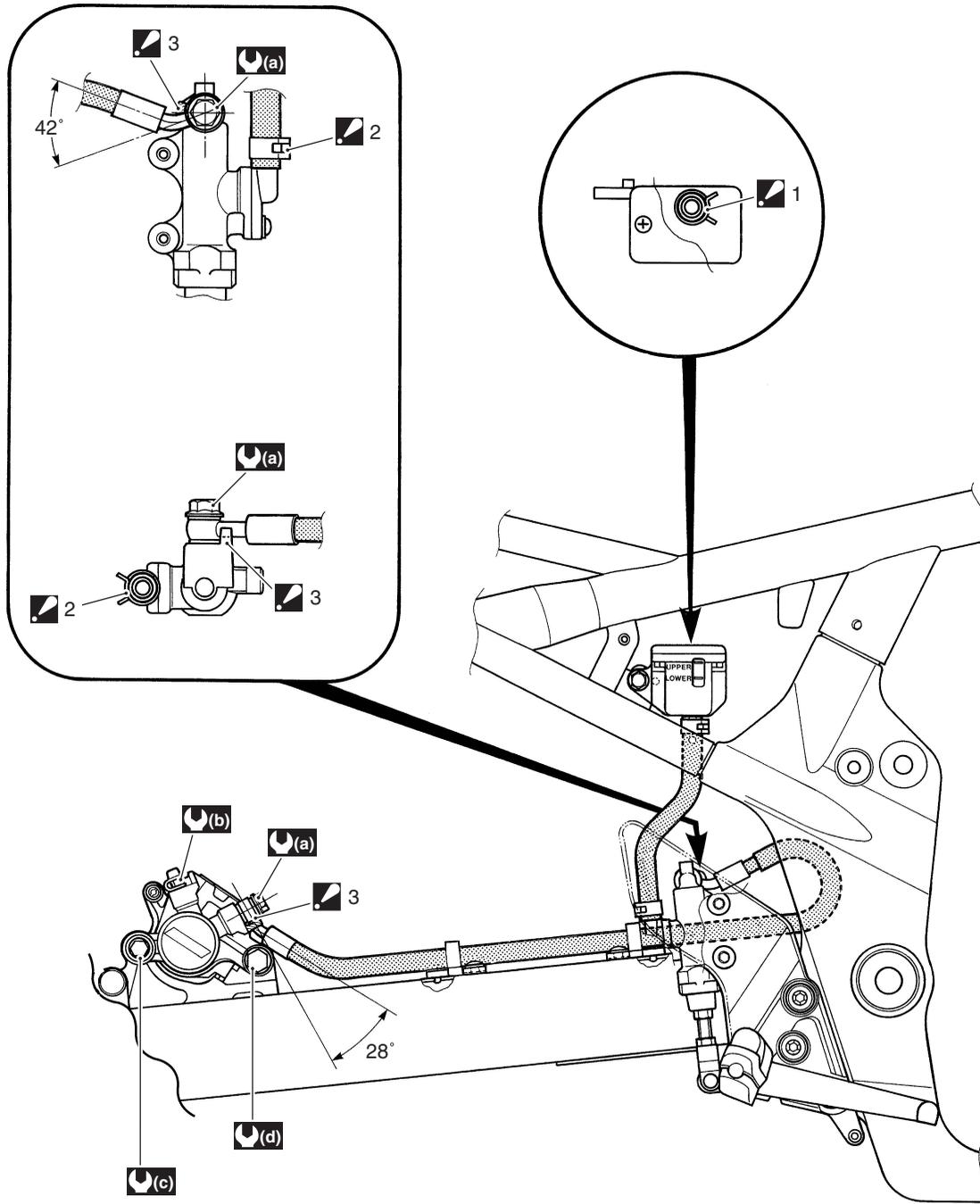


I649G1410002-04

1. Front brake hose No.1	6: Clamp : Insert the clamp to the hole of the front fender fully.
2. Front brake hose No.2	7: Front brake hose No.1 : Pass the front brake hose No.1 to the brake hose guide.
3: Stopper : After the brake hose union has contacted the stopper, tighten the union bolt.	(a) : 23 N·m (2.3 kgf·m, 16.5 lb-ft)
4: Clamp : After positioning the clamp with the stopper, tighten the clamp bolt.	(b) : 7.5 N·m (0.75 kgf·m, 5.5 lb-ft)
5: Brake hose : Clamp the brake hose firmly.	(c) : 26 N·m (2.6 kgf·m, 19.0 lb-ft)

Rear Brake Hose Routing Diagram

B649G14102002



I649G1410003-05

<p>1. Brake hose clamp : Brake hose clamp ends should face forward.</p>	<p>(b) : 6 N·m (0.6 kgf·m, 4.5 lb-ft)</p>
<p>2. Brake hose clamp : Brake hose clamp ends should face backward.</p>	<p>(c) : 22 N·m (2.2 kgf·m, 16.0 lb-ft)</p>
<p>3. Stopper : After the brake hose union has contacted the stopper, tighten the union bolt.</p>	<p>(d) : 27 N·m (2.7 kgf·m, 19.5 lb-ft)</p>
<p>(a) : 23 N·m (2.3 kgf·m, 16.5 lb-ft)</p>	

Diagnostic Information and Procedures

Brake Symptom Diagnosis

B649G14104001

Condition	Possible cause	Correction / Reference Item
Insufficient brake power	Leakage of brake fluid from hydraulic system.	<i>Repair or replace.</i>
	Worn pads.	<i>Replace.</i>
	Oil adhesion on friction surface of pads.	<i>Clean disc and pads.</i>
	Worn disc.	<i>Replace.</i>
	Air in hydraulic system.	<i>Bleed air.</i>
	Not enough brake fluid in the reservoir.	<i>Replenish.</i>
Brake squeaking	Carbon adhesion on pad surface.	<i>Repair surface with sandpaper.</i>
	Tilted pad.	<i>Correct pad fitting or replace.</i>
	Damaged wheel bearing.	<i>Replace.</i>
	Loose front-wheel axle or rear-wheel axle.	<i>Tighten to specified torque.</i>
	Worn pads.	<i>Replace.</i>
	Foreign material in brake fluid.	<i>Replace brake fluid.</i>
	Clogged return port of master cylinder.	<i>Disassemble and clean master cylinder.</i>
Excessive brake lever stroke	Air in hydraulic system.	<i>Bleed air.</i>
	Insufficient brake fluid.	<i>Replenish fluid to specified level; bleed air.</i>
	Improper quality of brake fluid.	<i>Replace with correct fluid.</i>
Leakage of brake fluid	Insufficient tightening of connection joints.	<i>Tighten to specified torque.</i>
	Cracked hose.	<i>Replace.</i>
	Worn piston and/or cup.	<i>Replace piston and/or cup.</i>
Brake drags	Rusty part.	<i>Clean and lubricate.</i>
	Insufficient brake lever or brake pedal pivot lubrication.	<i>Lubricate.</i>

Repair Instructions

Brake Pedal Height Inspection and Adjustment

B649G14106017

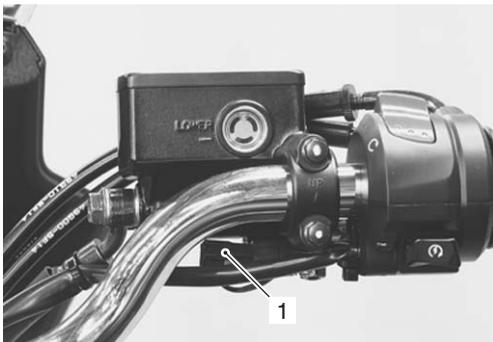
Refer to "Brake System Inspection: in Section 0B".

Front Brake Light Switch Inspection

B649G14106018

Inspect the front brake light switch in the following procedures:

- 1) Disconnect the front brake light switch lead coupler (1).



I649G1410005-01

- 2) Inspect the switch for continuity with a tester. If any abnormality is found, replace the front brake light switch with a new one. Refer to "Front Master Cylinder / Brake Lever Disassembly and Assembly: ".

Special tool

TOOL : 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity (•)))

Color Position	Terminal (B/G)	Terminal (B)
OFF		
ON	○	○

I649G1410004-02

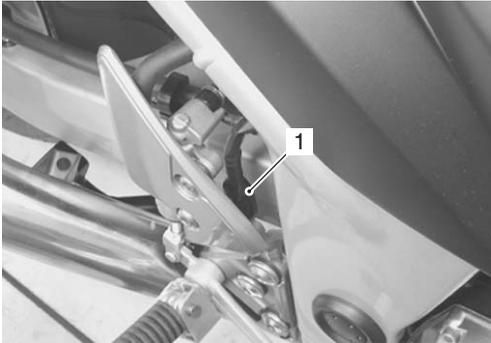
- 3) Connect the front brake light switch lead coupler.

Rear Brake Light Switch Inspection

B649G14106019

Inspect the rear brake light switch in the following procedures:

- 1) Disconnect the rear brake light switch lead coupler (1).



I649G1410007-03

- 2) Inspect the switch for continuity with a tester. If any abnormality is found, replace the rear brake light switch with a new one.

Special tool

 : 09900-25008 (Multi-circuit tester set)

Tester knob indication
Continuity

Rear brake light switch

Color Position	Terminal (O/G)	Terminal (W/B)
ON	○————○	○————○
OFF	○————○	○————○

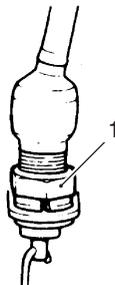
I649G1410006-02

- 3) Connect the rear brake light switch lead coupler.

Rear Brake Light Switch Inspection and Adjustment

B649G14106020

Check the rear brake light switch so that the brake light will come on just before pressure is felt when the brake pedal is depressed. If the brake light switch adjustment is necessary, turn the adjuster nut (1) in or out while holding the brake pedal.



I649G1410040-02

Brake Fluid Level Check

B649G14106021

Refer to “Brake System Inspection: in Section 0B”.

Brake Hose Inspection

B649G14106022

Refer to “Brake System Inspection: in Section 0B”.

Air Bleeding from Brake Fluid Circuit

B649G14106023

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

⚠ CAUTION

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

Front Brake

- 1) Fill the master cylinder reservoir to the top of the inspection window. Place the reservoir cap to prevent dirt from entering.
- 2) Attach a hose to the air bleeder valve, and insert the free end of the hose into a receptacle.



I649G1020044-01

- 3) Squeeze and release the brake lever several times in rapid succession and squeeze the lever fully without releasing it.



I649G1410010-01

4A-6 Brake Control System and Diagnosis:

- 4) Loosen the air bleeder valve by turning it a quarter of a turn so that the brake fluid runs into the receptacle, this will remove the tension of the brake lever causing it to touch the handlebar grip.
- 5) Close the air bleeder valve, pump and squeeze the lever, and open the valve.
- 6) Repeat this process until the fluid flowing into the receptacle no longer contains air bubbles.

NOTE

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

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

Tightening torque

Air bleeder valve (Front brake): 7.5 N·m (0.75 kgf-m, 5.5 lb-ft)

- 9) Install the reservoir cap.

Rear Brake

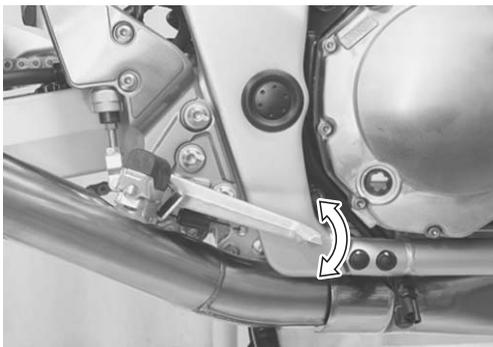
Bleed air from the rear brake system as the same manner of front brake.

NOTE

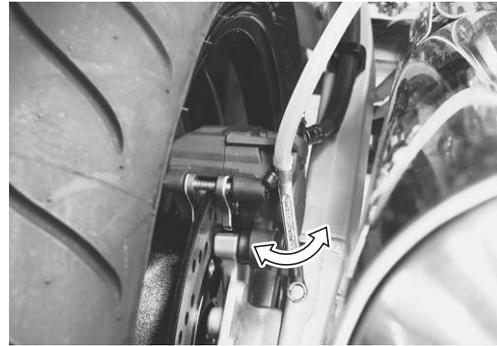
The only difference of bleeding operation from the front brake is that the rear master cylinder is actuated by a pedal.

Tightening torque

Air bleeder valve (Rear brake): 6.0 N·m (0.6 kgf-m, 4.5 lb-ft)



I649G1410013-01



I649G1410012-01

Brake Fluid Replacement

B649G14106024

⚠ CAUTION

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

Front Brake

- 1) Place the motorcycle on a level surface and keep the handlebars straight.
- 2) Remove the brake fluid reservoir cap and diaphragm.
- 3) Suck up the old brake fluid as much as possible.

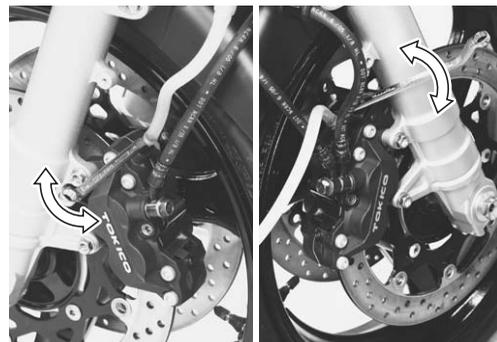


I649G1410008-01

- 4) Fill the reservoir with new brake fluid.

BF: Brake fluid (DOT 4)

- 5) Connect a clear hose to the air bleeder valve and insert the other end of the hose into a receptacle.



I649G1410009-01

- Loosen the air bleeder valve and pump the brake lever until the old brake fluid flows out of the brake system.

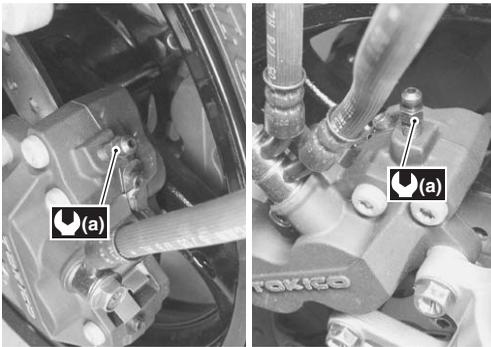


I649G1410010-01

- Close the air bleeder valve and disconnect the clear hose.
- Fill the reservoir with new brake fluid to the upper line of the reservoir.

Tightening torque

Air bleeder valve (Front brake) (a): 7.5 N·m (0.75 kgf-m, 5.5 lb-ft)



I649G1410042-01

Rear Brake

- Place the motorcycle on a level surface.
- Remove the right frame cover. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- Remove the brake fluid reservoir cap and diaphragm.
- Suck up the old brake fluid as much as possible.

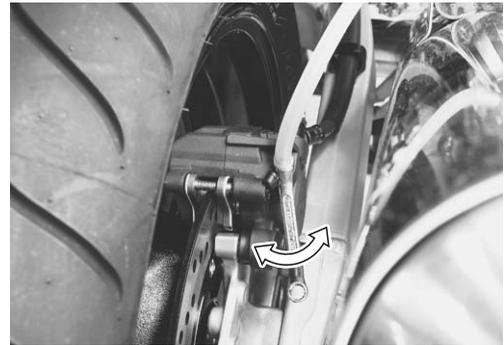


I649G1410011-01

- Fill the reservoir with new brake fluid.

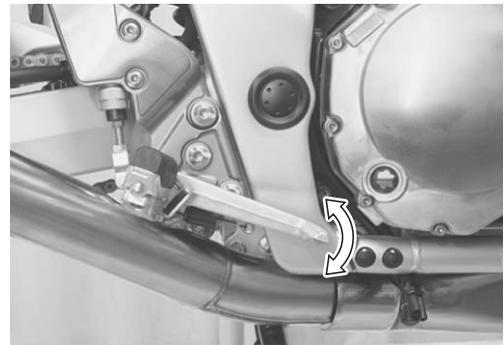
BF: Brake fluid (DOT 4)

- Connect a clear hose to the air bleeder valve and insert the other end of the hose into a receptacle.



I649G1410012-01

- Loosen the air bleeder valve and pump the brake pedal until the old brake fluid flows out of the brake system.

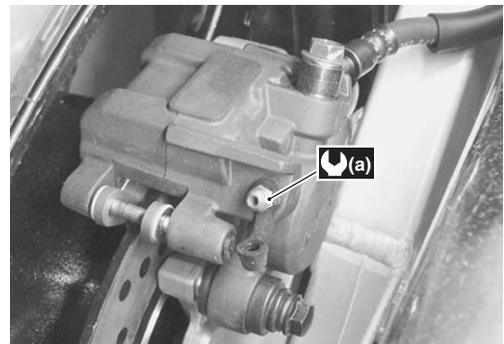


I649G1410013-01

- Close the air bleeder valve and disconnect the clear hose.
- Fill the reservoir with new brake fluid to the upper line of the reservoir.

Tightening torque

Air bleeder valve (Rear brake) (a): 6.0 N·m (0.6 kgf-m, 4.5 lb-ft)



I649G1410043-01

4A-8 Brake Control System and Diagnosis:

Front Brake Hose Removal and Installation

B649G14106025

Removal

- 1) Drain brake fluid. Refer to “Brake Fluid Replacement:”.
- 2) Remove the front brake hoses as shown in the front brake hose routing diagram. Refer to “Front Brake Hose Routing Diagram:”.

Installation

CAUTION

The seal washers should be replaced with the new ones to prevent fluid leakage.

- 1) Install the front brake hose as shown in the front brake hose routing diagram. Refer to “Front Brake Hose Routing Diagram:”.
- 2) Bleed air from the front brake system. Refer to “Air Bleeding from Brake Fluid Circuit:”.

Rear Brake Hose Removal and Installation

B649G14106026

Removal

- 1) Remove right frame cover. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Drain bracket fluid. Refer to “Brake Fluid Replacement:”.
- 3) Remove the rear brake hose as shown in the rear brake hose routing diagram. Refer to “Rear Brake Hose Routing Diagram:”.

Installation

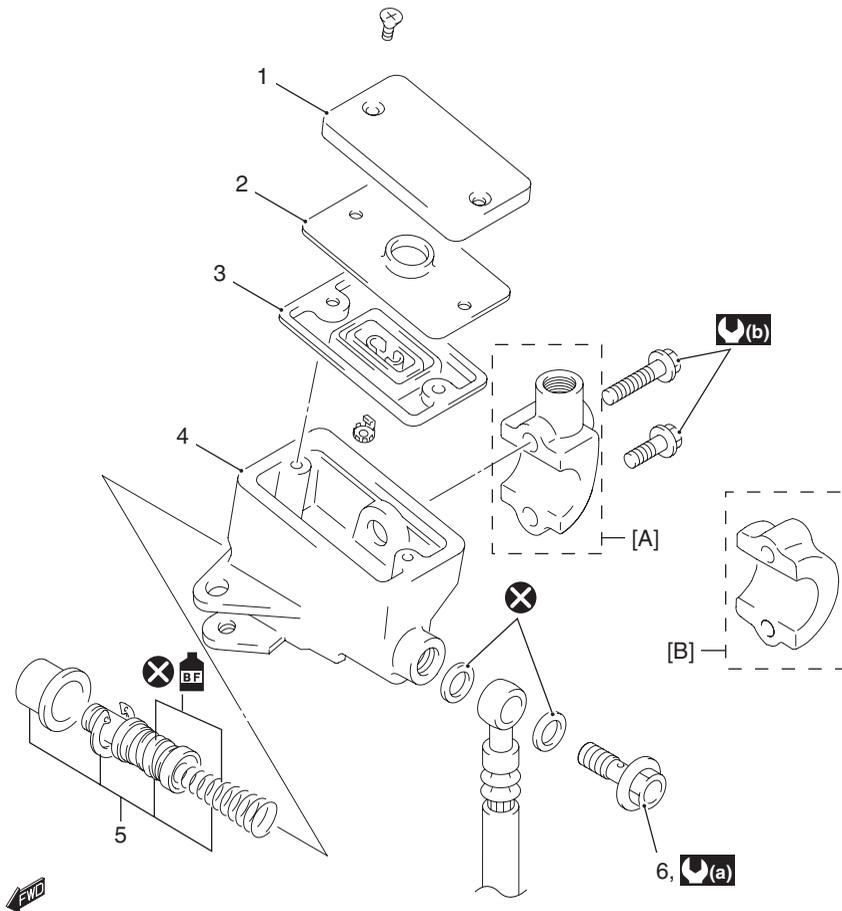
CAUTION

The seal washers should be replaced with the new ones to prevent fluid leakage.

- 1) Install the rear brake hose as shown in the rear brake hose routing diagram. Refer to “Rear Brake Hose Routing Diagram:”.
- 2) Bleed air from the rear brake system. Refer to “Air Bleeding from Brake Fluid Circuit:”.

Front Brake Master Cylinder Components

B649G14106027



I649G1410014-04

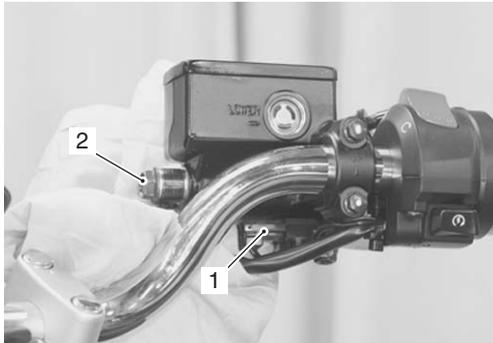
1. Reservoir cap	4. Master cylinder	[A]: For GSF1200	(b) : 10 N·m (1.0 kgf·m, 7.0 lb·ft)
2. Plate	5. Piston/Cup set	[B]: For GSF1200S	BF : Apply brake fluid.
3. Diaphragm	6. Brake hose union bolt	(a) : 23 N·m (2.3 kgf·m, 16.5 lb·ft)	X : Do not reuse.

Front Brake Master Cylinder Assembly Removal and Installation

B649G14106028

Removal

- 1) Drain brake fluid. Refer to "Brake Fluid Replacement: ".
- 2) Disconnect the front brake light switch lead coupler (1).
- 3) Place a rag underneath the brake hose union bolt (2) on the master cylinder to catch any spilt brake fluid.
- 4) Remove the brake hose union bolt (2) and disconnect the brake hose.



I649G1410015-01

- 5) Remove the right rear view mirror. (GSF1200)
- 6) Remove the master cylinder assembly.



I649G1410016-01

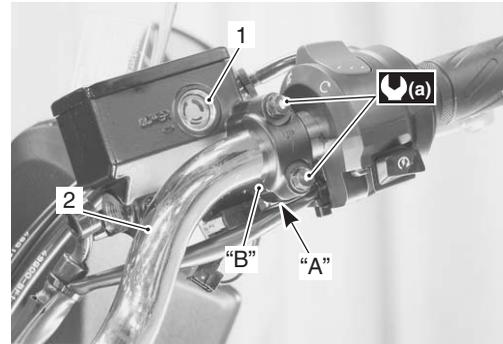
Installation

Install the front brake master cylinder in the reverse order of removal. Pay attention to the following points:

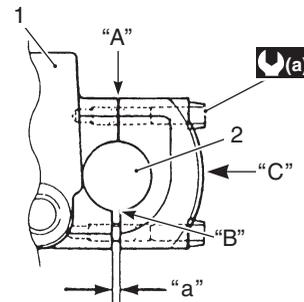
- When installing the master cylinder (1) onto the handlebars (2), align the master cylinder holder's mating surface "A" with the punch mark "B" on the handlebars (2) and tighten the upper holder bolt first.

Tightening torque

Master cylinder holder bolt (Upper and Lower)
(a): 10 N·m (1.0 kgf·m, 7.0 lb·ft)



I649G1410017-02



I649G1410018-02

"a": Clearance	"c": Up mark
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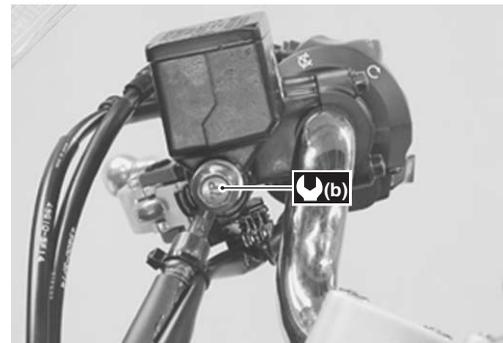
- After setting the brake hose union to the stopper, tighten the union bolt to the specified torque.

⚠ CAUTION

The seal washers should be replaced with the new ones to prevent fluid leakage.

Tightening torque

Brake hose union bolt (b): 23 N·m (2.3 kgf·m, 16.5 lb·ft)



I649G1410019-01

- Bleed air from the brake system. Refer to "Air Bleeding from Brake Fluid Circuit: ".

4A-10 Brake Control System and Diagnosis:

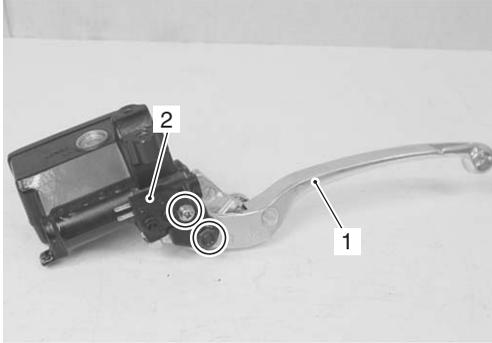
Front Master Cylinder / Brake Lever Disassembly and Assembly

B649G14106029

Refer to "Front Brake Master Cylinder Assembly Removal and Installation: ".

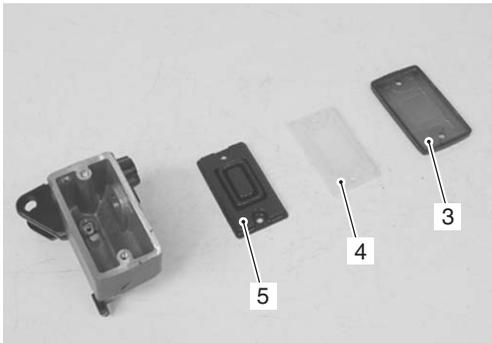
Disassembly

- 1) Remove the brake lever (1) and brake light switch (2).



I649G1410020-01

- 2) Remove the reservoir cap (3), plate (4) and diaphragm (5).

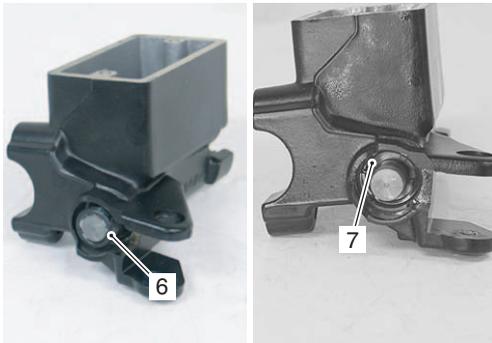


I649G1410021-01

- 3) Pull out the dust boot (6) and remove the snap ring (7).

Special tool

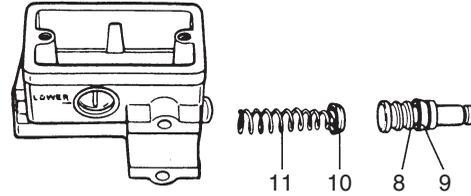
 : 09900-06108 (Snap ring pliers)



I649G1410022-01

- 4) Remove the following parts from the master cylinder.

- Piston (8)
- Secondary cup (9)
- Primary cup (10)
- Spring (11)



I649G1410023-01

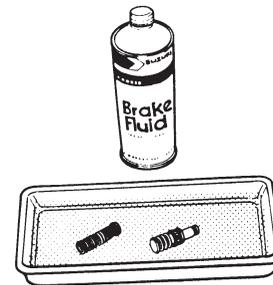
Assembly

Assemble the master cylinder in the reverse order of disassembly. Pay attention to the following points:

CAUTION

- Wash the master cylinder components with new brake fluid before reassembly.
- Do not wipe the brake fluid off after washing the components.
- When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.
- Apply brake fluid to the master cylinder bore and all of the master cylinder component to be inserted into the bore.

BF: Brake fluid (DOT 4)



I649G1410024-01

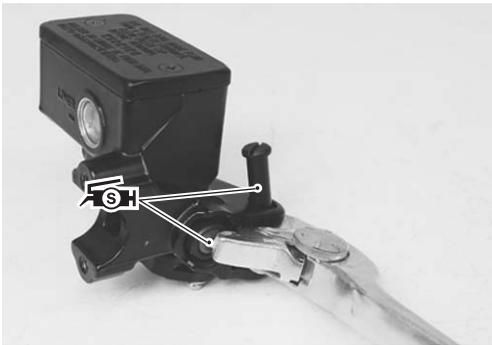
- When installing the brake light switch, align the projection on the switch with the hole in the master cylinder.



I649G1410025-01

- Apply SUZUKI SILICONE GREASE to the brake lever pivot bolt.
- Apply SUZUKI SILICONE GREASE to the contact point between piston and brake lever.

 **Grease 99000-25100 (SUZUKI Silicone Grease or equivalent)**



I649G1410026-02

Tightening torque

Brake lever pivot bolt: 1.0 N·m (0.1 kgf-m, 0.72 lb-ft)
Brake lever pivot bolt lock-nut: 6.0 N·m (0.6 kgf-m, 4.5 lb-ft)

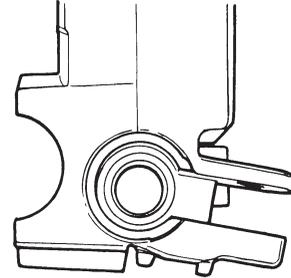
Front Master Cylinder Parts Inspection

B649G14106030

Refer to “Front Master Cylinder / Brake Lever Disassembly and Assembly: ”.

Master Cylinder

Inspect the master cylinder bore for any scratches or other damage.



I649G1410027-01

Piston

Inspect the piston surface for any scratches or other damage.

Rubber Parts

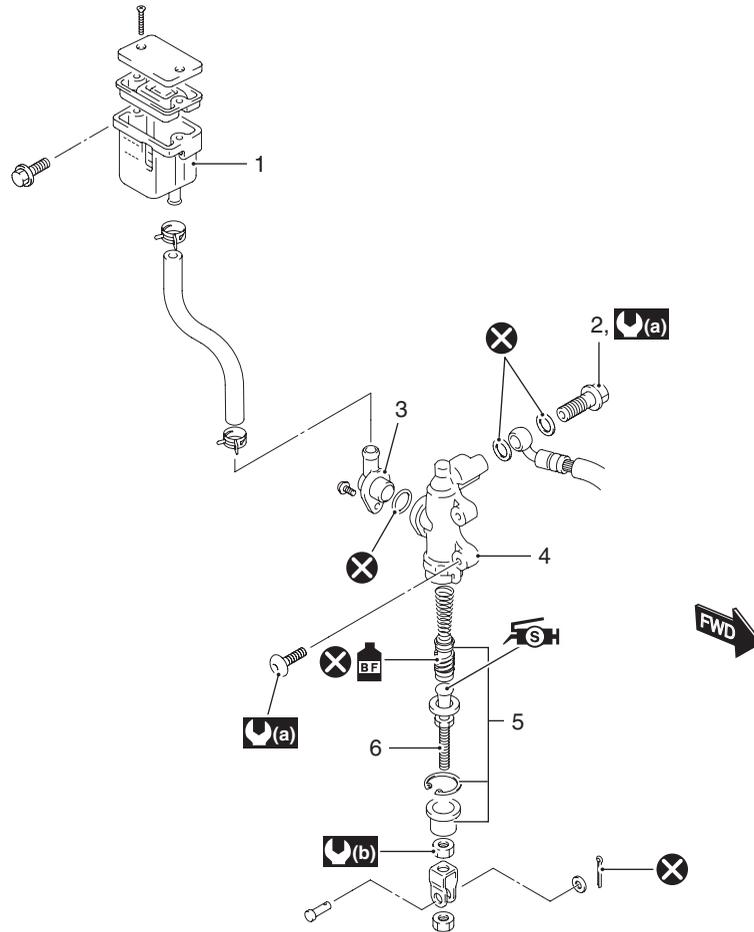
Inspect the primary cup, secondary cup and dust boot for wear or damage.



I649G1410028-01

Rear Brake Master Cylinder Components

B649G14106031



I649G1410029-05

1. Reservoir tank	4. Master cylinder	(a) : 23 N·m (2.3 kgf·m, 16.5 lb-ft)	BF : Apply brake fluid.
2. Brake hose union bolt	5. Piston/Cup set	(b) : 18 N·m (1.8 kgf·m, 13.0 lb-ft)	X : Do not reuse.
3. Brake hose connector	6. Push rod	SH : Apply silicone grease.	

Rear Brake Master Cylinder Assembly Removal and Installation

B649G14106032

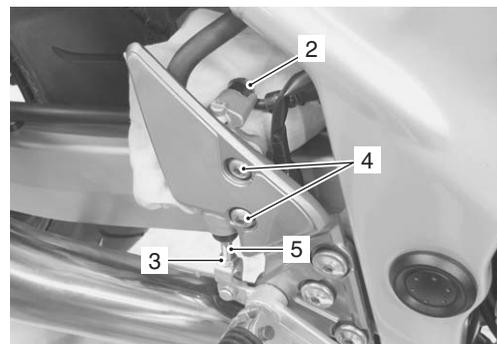
Removal

- 1) Remove the right frame cover. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Drain brake fluid. Refer to “Brake Fluid Replacement:”.
- 3) Remove the reservoir mounting bolt (1).



I649G1410030-01

- 4) Place a rag underneath the brake hose union bolt (2) on the master cylinder to catch any spilt brake fluid.
- 5) Remove the brake hose union bolt (2) and disconnect the brake hose.
- 6) Loosen the lock-nut (3).
- 7) Remove the master cylinder mounting bolts (4).
- 8) Remove the master cylinder along with the reservoir by turning the push rod (5).



I649G1410031-01

Installation

Install the rear brake master cylinder in the reverse order of removal. Pay attention to the following points:

CAUTION

The seal washers should be replaced with the new ones to prevent fluid leakage.

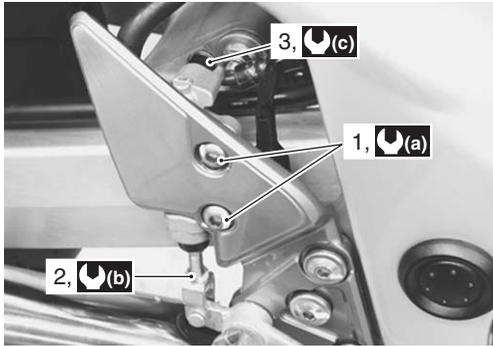
- Tighten the master cylinder mounting bolts (1) to the specified torque.
- Tighten the lock-nut (2) to the specified torque.
- After setting the brake hose union to the stopper, tighten the union bolt (3) to the specified torque.

Tightening torque

Rear master cylinder mounting bolt (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)

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

Brake hose union bolt (c): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I649G1410032-01

- Bleed air from the system after reassembling the master cylinder. Refer to “Brake System Inspection: in Section 0B”.
- Adjust the brake pedal height. Refer to “Brake System Inspection: in Section 0B”.

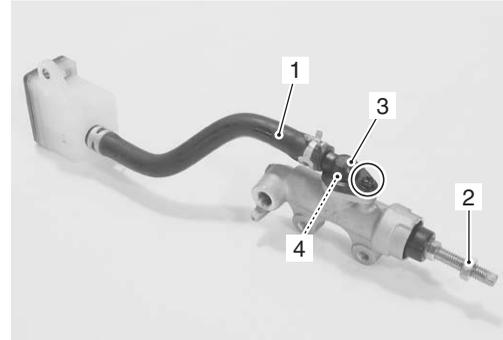
Rear Brake Master Cylinder Disassembly and Assembly

B649G14106033

Refer to “Rear Brake Master Cylinder Assembly Removal and Installation: ”.

Disassembly

- 1) Disconnect the reservoir hose (1).
- 2) Remove the lock-nut (2).
- 3) Remove the brake hose connector (3) and O-ring (4).

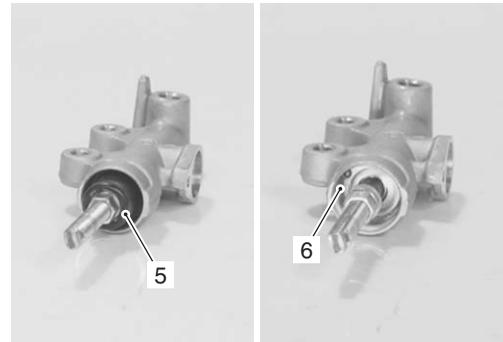


I649G1410033-02

- 4) Pull out the dust boot (5) and remove the snap ring (6).

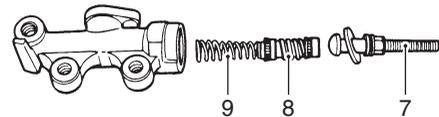
Special tool

 : 09900-06108 (Snap ring pliers)



I649G1410034-01

- 5) Remove the push rod (7), piston/cup set (8) and spring (9).



I649G1410035-01

4A-14 Brake Control System and Diagnosis:

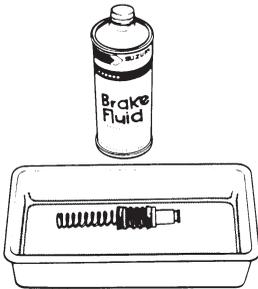
Assembly

Assemble the master cylinder in the reverse order of disassembly. Pay attention to the following points:

⚠ CAUTION

- Wash the master cylinder components with new brake fluid before reassembly.
- Do not wipe the brake fluid off after washing the components.
- When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.
- Apply brake fluid to the master cylinder bore and all of the master cylinder component to be inserted into the bore.

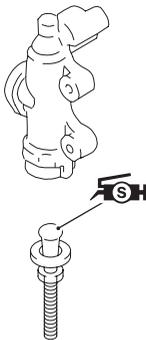
BF: Brake fluid (DOT 4)



I649G1410036-01

- Apply SUZUKI SILICONE GREASE to the push rod end.

 **Grease 99000-25100 (SUZUKI Silicone Grease or equivalent)**

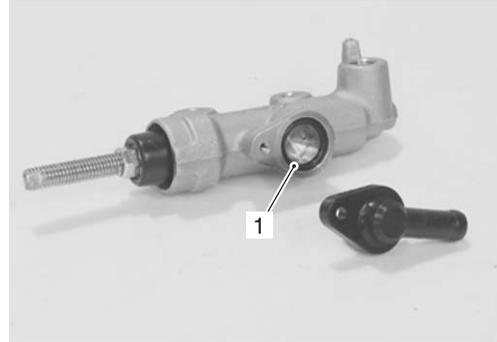


I649G1410041-02

- Install the O-ring (1).

⚠ CAUTION

Replace the O-ring (1) with a new one.



I649G1410037-01

Rear Brake Master Cylinder Parts Inspection

B649G14106034

Refer to "Rear Brake Master Cylinder Disassembly and Assembly: ".

Master Cylinder

Inspect the master cylinder bore for any scratches or other damage.



I649G1410038-01

Piston

Inspect the piston surface for any scratches or other damage.

Rubber Parts

Inspect the primary cup, secondary cup and dust boot for wear or damage.



I649G1410039-01

Specifications

Service Data

B649G14107004

Brake

Unit: mm (in)

Item	Standard		Limit
Rear brake pedal height	60 (2.4)		—
Master cylinder bore	Front	15.870 – 15.913 (0.6248 – 0.6264)	—
	Rear	14.000 – 14.043 (0.5512 – 0.5529)	—
Master cylinder piston diameter	Front	15.827 – 15.854 (0.6231 – 0.6242)	—
	Rear	13.957 – 13.984 (0.5495 – 0.5506)	—

Oil

Item	Specification	Note
Brake fluid type	DOT 4	

Tightening Torque Specifications

B649G14107005

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Air bleeder valve (Front brake)	7.5	0.75	5.5	☞ / ☞
Air bleeder valve (Rear brake)	6.0	0.6	4.5	☞ / ☞
Master cylinder holder bolt (Upper and Lower)	10	1.0	7.0	☞
Brake hose union bolt	23	2.3	16.5	☞ / ☞
Brake lever pivot bolt	1.0	0.1	0.72	☞
Brake lever pivot bolt lock-nut	6.0	0.6	4.5	☞
Rear master cylinder mounting bolt	23	2.3	16.5	☞
Rear master cylinder rod lock-nut	18	1.8	13.0	☞

NOTE

The specified tightening torque is also described in the following.

“Front Brake Hose Routing Diagram: ”

“Rear Brake Hose Routing Diagram: ”

“Front Brake Master Cylinder Components: ”

“Rear Brake Master Cylinder Components: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G14108001

Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	④ / ④ / ④ / ④
Grease	SUZUKI Silicone Grease or equivalent	P/No.: 99000-25100	④ / ④

NOTE

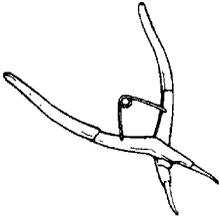
Required service material is also described in the following.

“Front Brake Master Cylinder Components: ”

“Rear Brake Master Cylinder Components: ”

Special Tool

B649G14108002

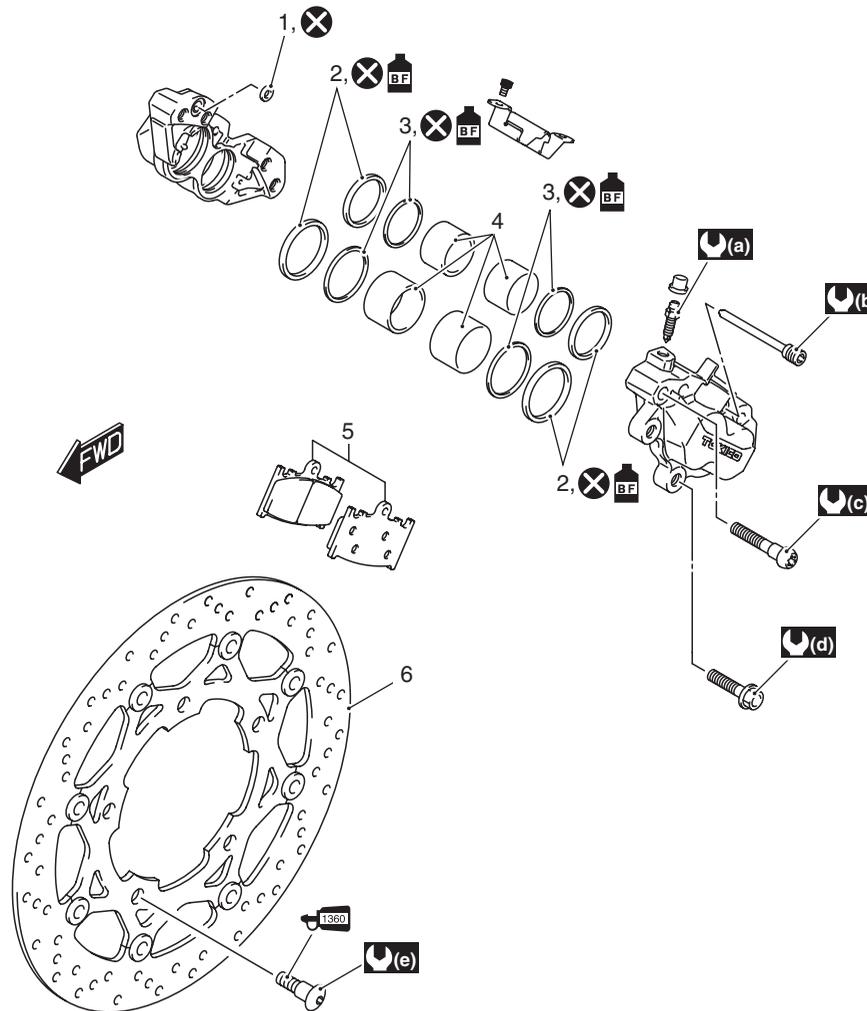
<p>09900-06108 Snap ring pliers ④ / ④</p> <div style="text-align: center;">  </div>	<p>09900-25008 Multi-circuit tester set ④ / ④</p> <div style="text-align: center;">  </div>
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Front Brakes

Repair Instructions

Front Brake Components

B649G14206011



I649G1420001-04

1. O-ring	6. Front brake disc	(e) : 23 N·m (2.3 kgf·m, 16.5 lb·ft)
2. Piston seal	(a) : 7.5 N·m (0.75 kgf·m, 5.5 lb·ft)	: Apply thread lock to thread part.
3. Dust seal	(b) : 16 N·m (1.6 kgf·m, 11.5 lb·ft)	: Apply brake fluid.
4. Piston	(c) : 21 N·m (2.1 kgf·m, 15.0 lb·ft)	: Do not reuse.
5. Front brake pad set	(d) : 26 N·m (2.6 kgf·m, 19.0 lb·ft)	

4B-2 Front Brakes:

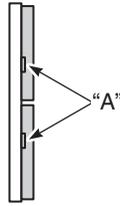
Front Brake Pad Inspection

B649G14206012

The extent of brake pad wear can be checked by observing the grooved limit line "A" on the pad. When the wear exceeds the grooved limit line, replace the pads with new ones. Refer to "Front Brake Pad Replacement:".

⚠ CAUTION

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

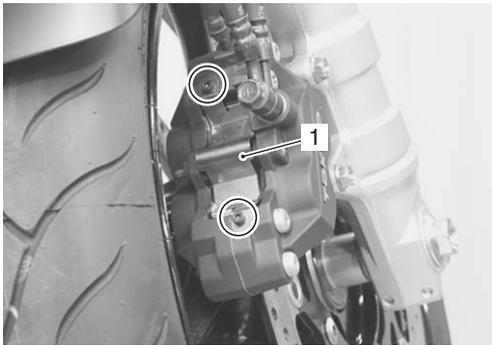


I649G1020040-02

Front Brake Pad Replacement

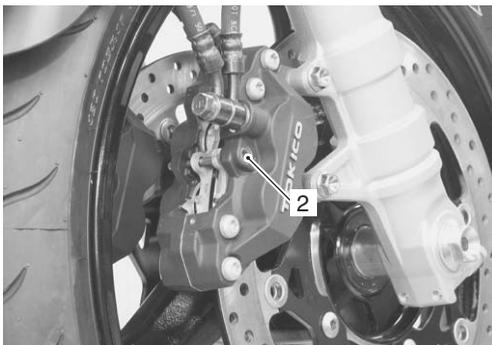
B649G14206013

- 1) Remove the spring (1).



I649G1420002-01

- 2) Remove the brake pads by removing the pad mounting pin (2).



I649G1420003-01

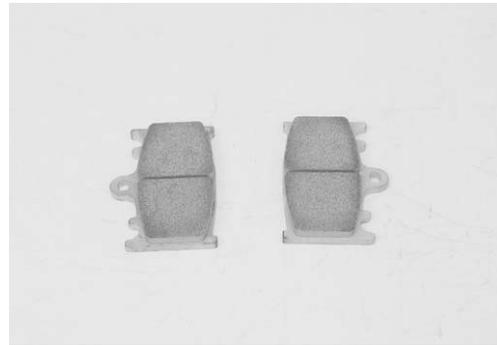
⚠ CAUTION

Do not operate the brake lever while dismantling the pads.

- 3) Clean up the caliper especially around the caliper piston.
- 4) Install the new brake pads.

⚠ CAUTION

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

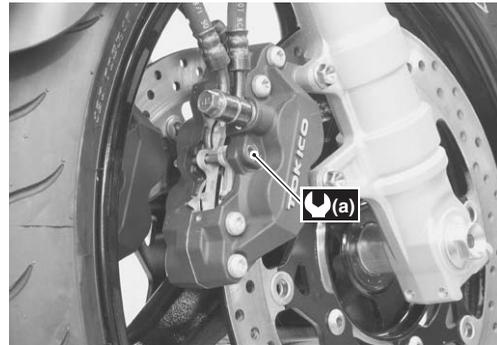


I649G1420004-01

- 5) Tighten the pad mounting pin to the specified torque.

Tightening torque

Front brake pad mounting pin (a): 16 N·m (1.6 kgf·m, 11.5 lb-ft)



I649G1420005-01

NOTE

After replacing the brake pads, pump the brake lever several times to check for proper brake operation and then check the brake fluid level.

Front Brake Caliper Removal and Installation

B649G14206014

Removal

- 1) Drain brake fluid. Refer to “Brake Fluid Replacement: in Section 4A”.
- 2) Remove the brake hoses from the caliper by removing the union bolt (1) and catch the brake fluid in a suitable receptacle.

NOTE

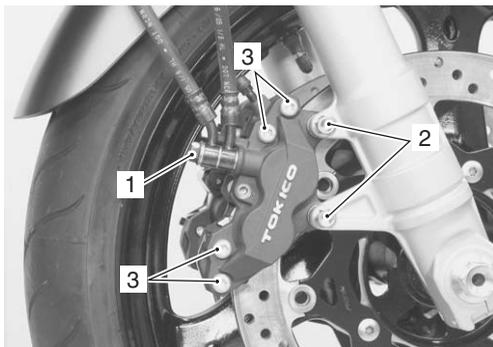
- Place a rag underneath the union bolt on the brake caliper to catch any spilt brake fluid.
- Slightly loosen the brake caliper housing bolts (3) to facilitate later disassembly, if necessary.

Special tool

 : 09930-11920 (Torx bit (JT 40H))

 : 09930-11940 (Bit holder)

- 3) Remove the brake caliper by removing the caliper mounting bolts (2).



I649G1420006-02

Installation

Install the brake caliper in the reverse order of removal. Pay attention to the following points:

CAUTION

The seal washers should be replaced with the new ones to prevent fluid leakage.

- Tighten each bolt to the specified torque.

Tightening torque

Front brake caliper mounting bolt (a): 26 N·m (2.6 kgf-m, 19.0 lb-ft)

Front brake caliper housing bolt (b): 21 N·m (2.1 kgf-m, 15.0 lb-ft)

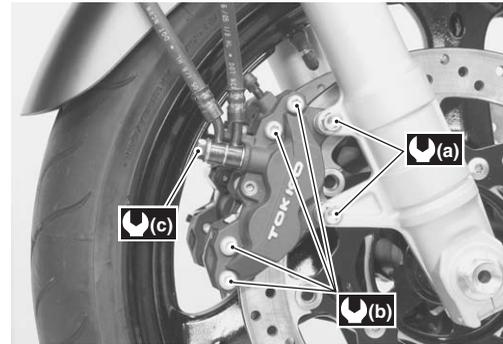
- After setting the brake hose union to the stopper, tighten the union bolt to the specified torque.

CAUTION

The seal washers should be replaced with the new ones to prevent fluid leakage.

Tightening torque

Front brake hose union bolt (c): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I649G1420007-01

- Bleed air from the brake system after installing the caliper. Refer to “Brake System Inspection: in Section 0B”.
- Check the brake fluid leakage and brake operation.

WARNING

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

Front Brake Caliper Disassembly and Assembly

B649G14206015

Refer to “Front Brake Caliper Removal and Installation: ”.

Disassembly

- 1) Remove the brake pads. Refer to “Front Brake Pad Replacement: ”.

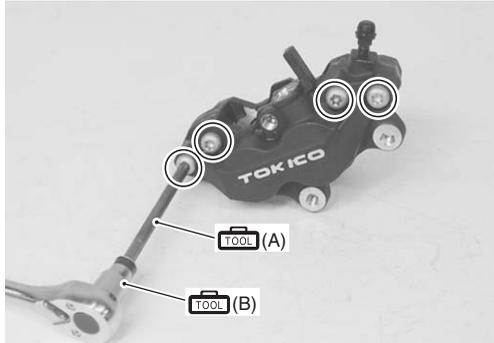
4B-4 Front Brakes:

- 2) Separate the caliper halves to remove the caliper housing bolts.

Special tool

 (A): 09930-11920 (Torx bit (JT 40H))

 (B): 09930-11940 (Bit holder)



I649G1420021-01

- 3) Remove the O-ring.



I649G1420009-01

- 4) Place a rag over the pistons to prevent it from popping out and then force out the pistons using compressed air.

CAUTION

Do not use high pressure air to prevent piston damage.



I649G1420010-01

- 5) Remove the dust seals and piston seals.



I649G1420011-01

Assembly

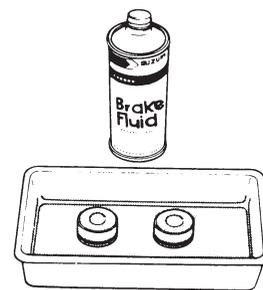
Assemble the caliper in the reverse order of disassembly. Pay attention to the following points:

- Wash the caliper bores and pistons with specified brake fluid. Particularly wash the dust seal grooves and piston seal grooves.

BF: Brake fluid (DOT 4)

CAUTION

- Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.
- Do not wipe the brake fluid off after washing the components.
- When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.



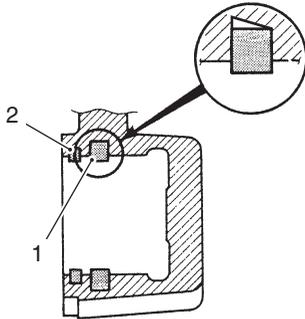
I649G1420012-01

- Apply the brake fluid to piston seals (1) and dust seals (2).

CAUTION

- Replace the piston seals (1) and dust seals (2) with new ones

BF: Brake fluid (DOT 4)

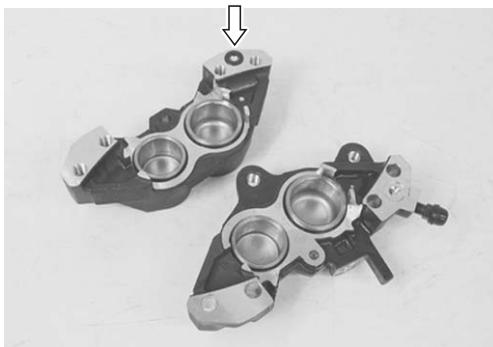


I649G1420013-01

- Install the piston seals as shown.
- Install a new O-ring and reassemble caliper halves.

CAUTION

Replace the O-ring with a new one.



I649G1420014-01

- Temporarily tighten the brake caliper housing bolts.

CAUTION

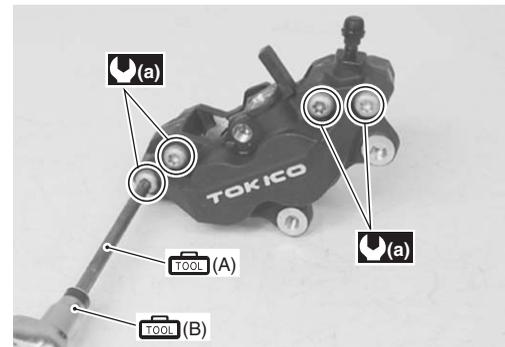
After installing the brake caliper to the front fork, tighten the brake caliper housing bolts to the specified torque. Refer to "Front Brake Caliper Removal and Installation: ".

Special tool

- ▣ (A): 09930-11920 (Torx bit (JT 40H))
- ▣ (B): 09930-11940 (Bit holder)

Tightening torque

Front brake caliper housing bolt (a): 21 N·m (2.1 kgf-m, 15.0 lb-ft)



I649G1420008-03

- Install the brake pads. Refer to "Front Brake Pad Replacement: ".

Front Brake Caliper Parts Inspection

B649G14206016

Refer to "Front Brake Caliper Disassembly and Assembly: ".

Brake Caliper Cylinder

Inspect the brake caliper cylinder wall for nicks, scratches or other damage. If any damage is found, replace the caliper with a new one.



I649G1420015-01

Brake Caliper Piston

Inspect the brake caliper piston surface for any scratches or other damage. If any damage is found, replace the piston with a new one.



I649G1420016-01

Front Brake Disc Removal and Installation

B649G14206017

Removal

- 1) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: in Section 2D".
- 2) Remove the front brake disc.



I649G1420017-01

Installation

Install the front brake disc in the reverse order of removal. Pay attention to the following points:

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

: Thread lock cement 99000-32130 (Thread Lock Cement Super 1360 or equivalent)

Tightening torque

Brake disc bolt (a): 23 N·m (2.3 kgf·m, 16.5 lb·ft)



I649G1420018-02

Front Brake Disc Inspection

B649G14206018

Brake Disc Thickness

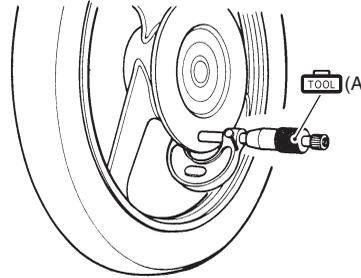
Check the brake disc for damage or cracks and measure the thickness using the micrometer. Replace the brake disc if the thickness is less than the service limit or if defect is found.

Special tool

(A): 09900-20205 (Micrometer (0-25mm))

Brake disc thickness

Service limit (Front): 4.5 mm (0.18 in)



I649G1420019-02

Brake Disc Runout

- 1) Remove the front brake caliper. Refer to "Front Brake Caliper Removal and Installation: ".
- 2) Measure the runout using the dial gauge. Replace the disc if the runout exceeds the service limit.

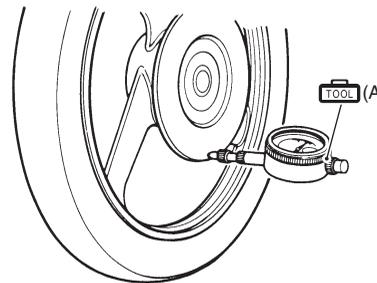
Special tool

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

: 09900-20701 (Magnetic stand)

Brake disc runout

Service limit: 0.30 mm (0.012 in)



I649G1420020-02

- 3) Install the front brake caliper. Refer to "Front Brake Caliper Removal and Installation: ".

Specifications

Service Data

B649G14207004

Brake

Unit: mm (in)

Item	Standard		Limit
Brake disc thickness	Front	4.8 – 5.2 (0.189 – 0.205)	4.5 (0.18)
Brake disc runout		—	0.30 (0.012)
Brake caliper cylinder bore	Front	Leading	30.230 – 30.306 (1.1902 – 1.1931)
		Trailing	33.960 – 34.036 (1.3370 – 1.3400)
Brake caliper piston diameter	Front	Leading	30.150 – 30.200 (1.1870 – 1.1890)
		Trailing	33.884 – 33.934 (1.3340 – 1.3360)

Oil

Item	Specification	Note
Brake fluid type	DOT 4	

Tightening Torque Specifications

B649G14207005

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Front brake pad mounting pin	16	1.6	11.5	☞
Front brake caliper mounting bolt	26	2.6	19.0	☞
Front brake caliper housing bolt	21	2.1	15.0	☞ / ☞
Front brake hose union bolt	23	2.3	16.5	☞
Brake disc bolt	23	2.3	16.5	☞

NOTE

The specified tightening torque is also described in the following.
 “Front Brake Components: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G14208001

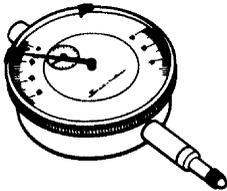
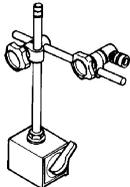
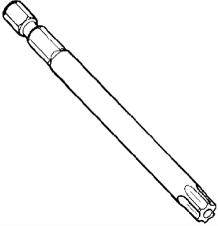
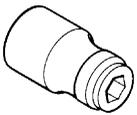
Material	SUZUKI recommended product or Specification	Note
Brake fluid	DOT 4	☞ / ☞
Thread lock cement	Thread Lock Cement Super 1360 or equivalent	☞

NOTE

Required service material is also described in the following.
 “Front Brake Components: ”

Special Tool

B649G14208002

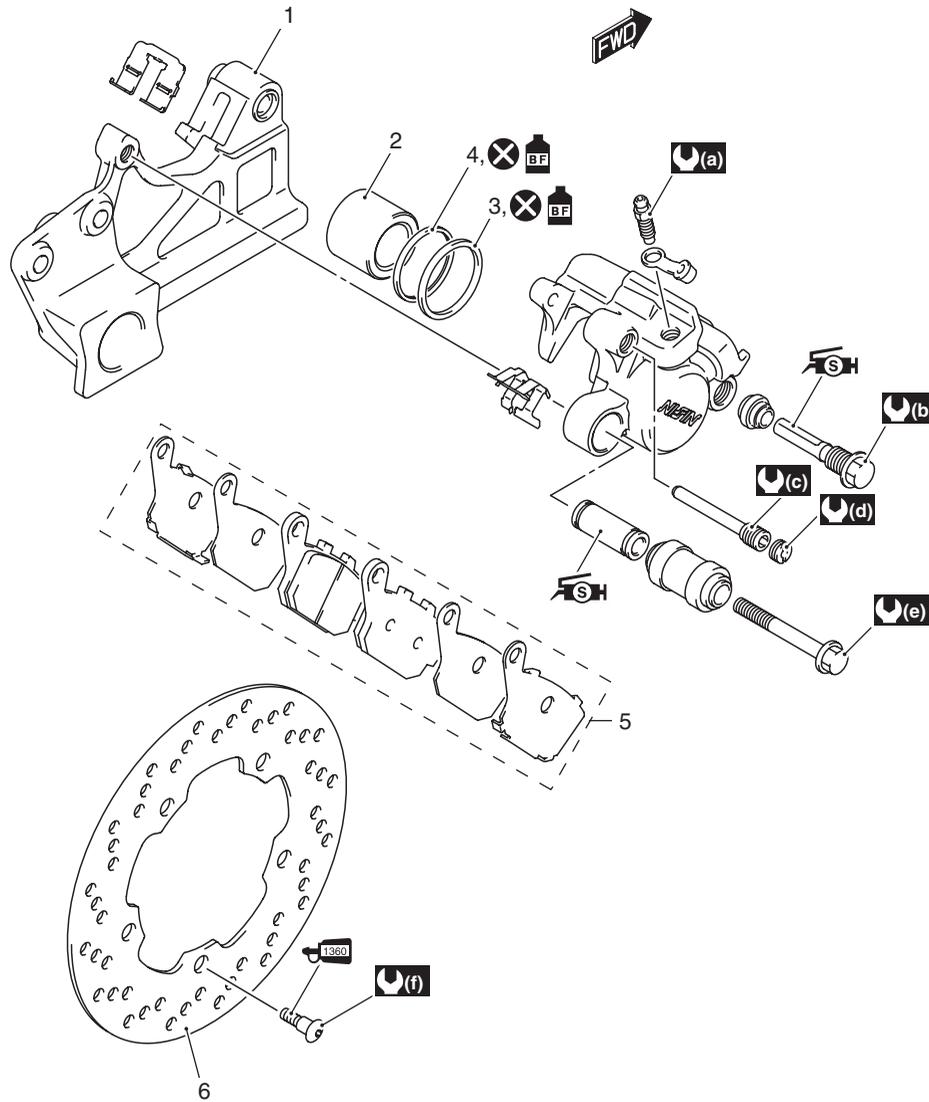
09900-20205 Micrometer (0-25mm) ☞		09900-20607 Dial gauge (1/100mm, 10mm) ☞	
09900-20701 Magnetic stand ☞		09930-11920 Torx bit (JT 40H) ☞ / ☞ / ☞	
09930-11940 Bit holder ☞ / ☞ / ☞			

Rear Brakes

Repair Instructions

Rear Brake Components

B649G14306011



I649G1430001-04

1. Rear caliper bracket	(a) : 6.0 N·m (0.6 kgf-m, 4.5 lb-ft)	: Apply silicone grease to sliding surface.
2. Piston	(b) : 27 N·m (2.7 kgf-m, 19.5 lb-ft)	: Apply thread lock to thread part.
3. Piston seal	(c) : 18 N·m (1.8 kgf-m, 13.0 lb-ft)	: Apply brake fluid.
4. Dust seal	(d) : 2.5 N·m (0.25 kgf-m, 1.8 lb-ft)	: Do not reuse.
5. Rear brake pad/Shim set	(e) : 22 N·m (2.2 kgf-m, 16.0 lb-ft)	
6. Rear brake disc	(f) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)	

4C-2 Rear Brakes:

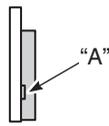
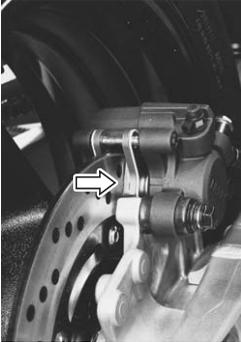
Rear Brake Pad Inspection

B649G14306012

The extent of brake pad wear can be checked by observing the grooved limit line "A" on the pad. When the wear exceeds the grooved limit line, replace the pads with new ones. Refer to "Rear Brake Pad Replacement:".

⚠ CAUTION

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

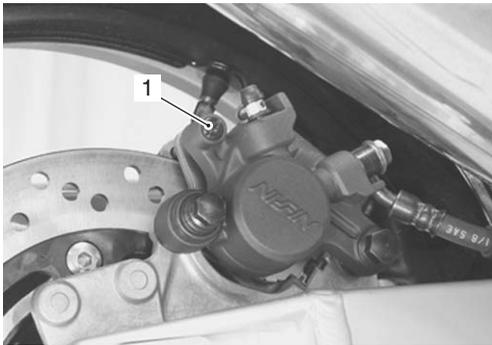


I649G1020041-02

Rear Brake Pad Replacement

B649G14306013

- 1) Remove the plug (1).

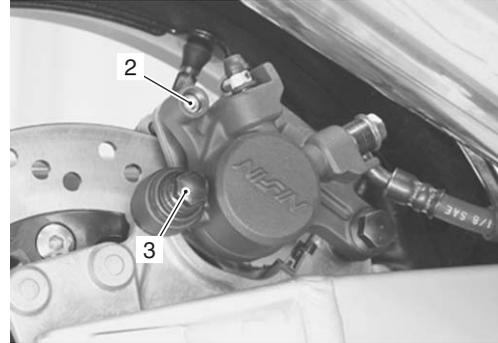


I649G1430002-01

- 2) Loosen the pad mounting pin (2).
- 3) Remove the caliper mounting bolt (3).

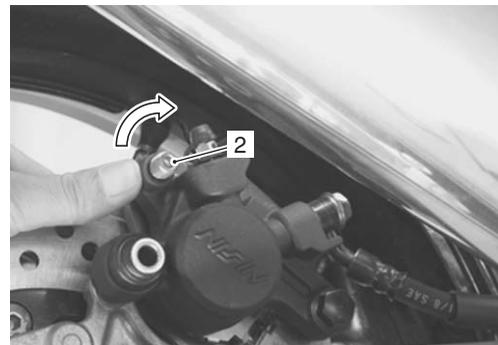
⚠ CAUTION

Do not operate the brake pedal while dismantling the pads.



I649G1430003-01

- 4) Remove the pad mounting pin (2) and brake pads with the rear caliper pivoted up.

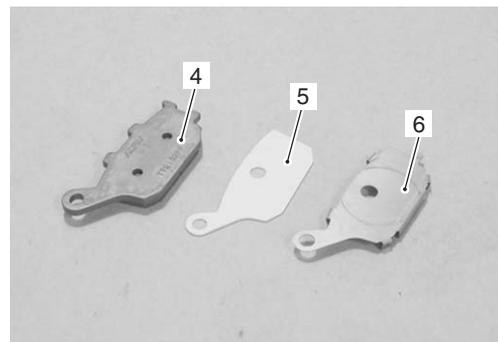


I649G1430004-01

- 5) Clean up the caliper especially around the caliper piston.
- 6) Assemble the new brake pad (4), insulator (5) and shim (6).

⚠ CAUTION

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



I649G1430005-01

7) Install the new brake pads.

NOTE

Make sure that the detent of the pad is seated onto the retainer on the caliper bracket.



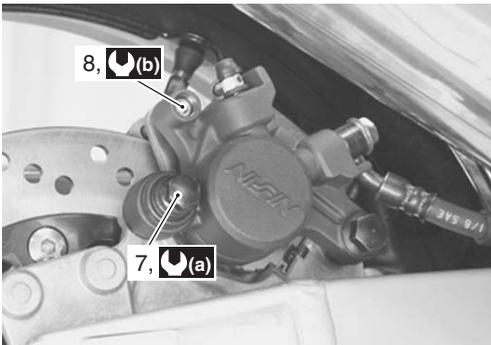
I649G1430006-01

8) Tighten the caliper mounting bolt (7) and pad mounting pin (8) to the specified torque.

Tightening torque

Rear brake caliper mounting bolt (a): 22 N·m (2.2 kgf-m, 16.0 lb-ft)

Rear brake pad mounting pin (b): 18 N·m (1.8 kgf-m, 13.0 lb-ft)



I649G1430007-03

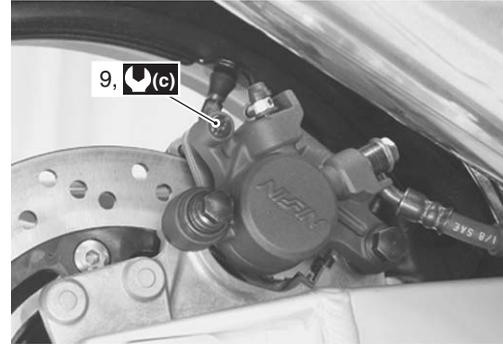
9) Install the plug (9) to the specified torque.

Tightening torque

Pad pin plug (c): 2.5 N·m (0.25 kgf-m, 1.8 lb-ft)

NOTE

After replacing the brake pads, pump the brake pedal few times to check for proper brake operation and then check the brake fluid level.



I649G1430008-03

Rear Brake Caliper Removal and Installation

B649G14306014

Removal

- 1) Drain brake fluid. Refer to "Brake Fluid Replacement: in Section 4A".
- 2) Remove the brake hose from the caliper by removing the union bolt (1) and catch the brake fluid in a suitable receptacle.

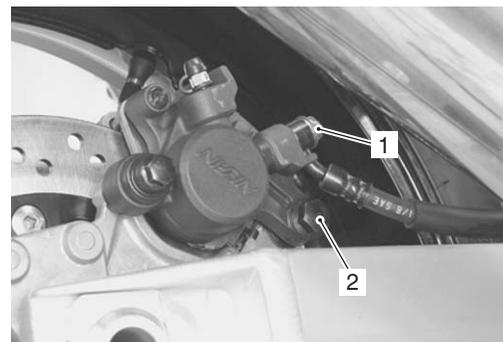
NOTE

Place a rag underneath the union bolt on the brake caliper to catch any spilt brake fluid.

- 3) Remove the brake pads. Refer to "Rear Brake Pad Replacement: ".

NOTE

Slightly loosen the sliding pin (2) to facilitate later disassembly, if necessary.



I649G1430009-01

4C-4 Rear Brakes:

- Pivot the caliper up and remove the caliper from the caliper bracket.

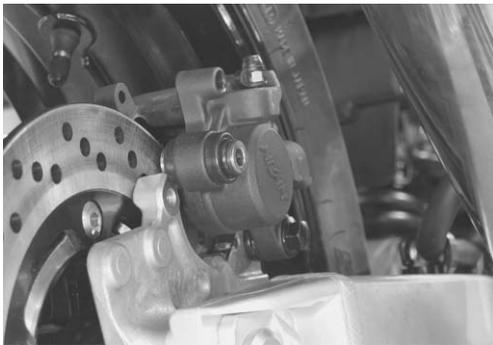


I649G1430010-01

Installation

Install the brake caliper in the reverse order of removal. Pay attention to the following points:

- Set the caliper to the caliper bracket.



I649G1430011-01

- Install the brake pads and tighten the caliper mounting bolt. Refer to "Rear Brake Pad Replacement: ".
- Tighten the sliding pin (1) to the specified torque.

Tightening torque

Rear brake caliper sliding pin (a): 27 N·m (2.7 kgf·m, 19.5 lb-ft)

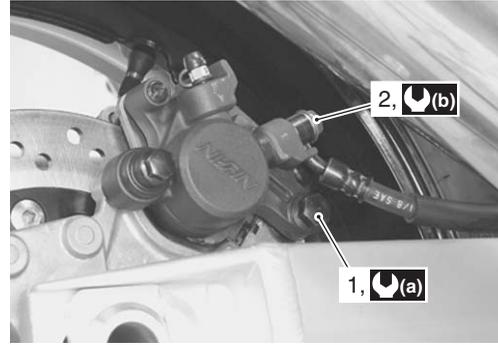
- After setting the brake hose union to the stopper, tighten the union bolt (2) to the specified torque.

⚠ CAUTION

The seal washers should be replaced with the new ones to prevent fluid leakage.

Tightening torque

Brake hose union bolt (b): 23 N·m (2.3 kgf·m, 16.5 lb-ft)



I649G1430012-01

- Bleed air from the brake system after installing the caliper. Refer to "Brake System Inspection: in Section 0B".
- Check the brake fluid leakage and brake operation.

⚠ WARNING

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

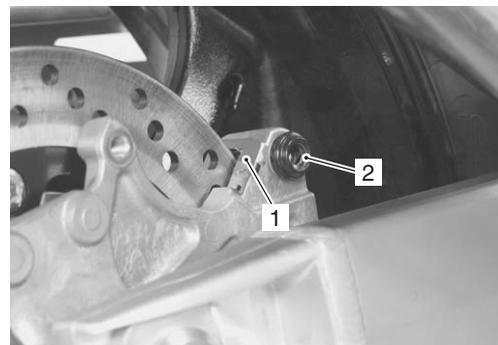
Rear Brake Caliper Disassembly and Assembly

B649G14306015

Refer to "Rear Brake Caliper Removal and Installation: ".

Disassembly

- Remove the pad spring (1) and rubber boot (2).



I649G1430013-01

2) Remove the pad spring (3).



I649G1430014-01

3) Remove the spacer (4) and rubber boot (5) from the caliper.

4) Remove the slide pin (6).



I649G1430015-02

5) Place a rag over the piston to prevent it from popping out and then force out the piston using compressed air.

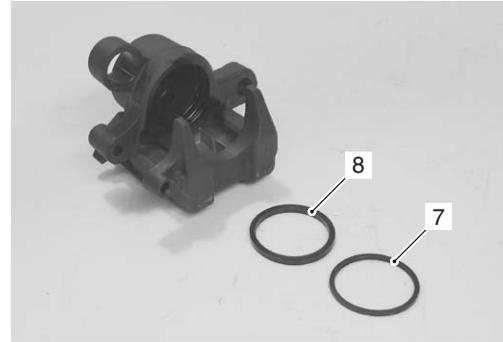
⚠ CAUTION

Do not use high pressure air to prevent piston damage.



I649G1430016-01

6) Remove the dust seal (7) and piston seal (8).



I649G1430017-01

Assembly

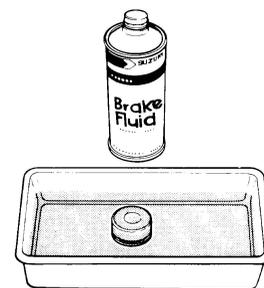
Assemble the caliper in the reverse order of disassembly. Pay attention to the following points:

- Wash the caliper bore and piston with specified brake fluid. Particularly wash the dust seal groove and piston seal groove.

BF: Brake fluid (DOT 4)

⚠ CAUTION

- Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.
- Do not wipe the brake fluid off after washing the components.
- When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.



I649G1430018-01

4C-6 Rear Brakes:

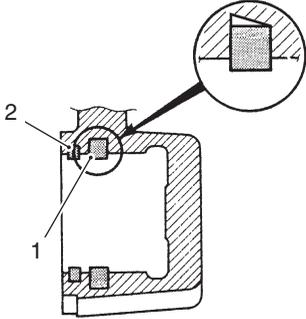
- Apply the brake fluid to piston seal (1) and dust seal (2).

CAUTION

Replace the piston seal (1) and dust seal (2) with new ones.

BF: Brake fluid (DOT 4)

- Install the piston seals as shown.



I649G1420013-01

- Apply SUZUKI SILICONE GREASE to the inside of the boot.

⚠️: Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)

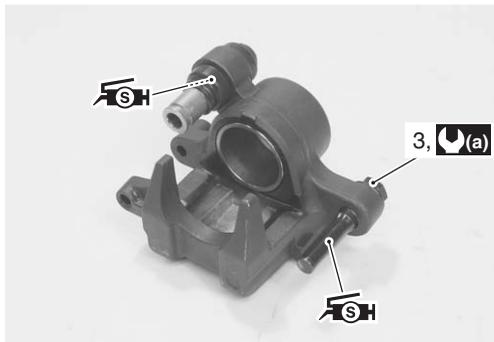
- Temporarily tighten the sliding pin (3) and apply SUZUKI SILICONE GREASE to the sliding pin.

⚠️: Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)

- After mounting the caliper, tighten the sliding pin (3) to the specified torque. Refer to “Rear Brake Caliper Removal and Installation: ”.

Tightening torque

Rear brake caliper sliding pin (a): 27 N·m (2.7 kgf·m, 19.5 lb-ft)



I649G1430019-02

Rear Brake Caliper Parts Inspection

B649G14306016

Refer to “Rear Brake Caliper Disassembly and Assembly: ”.

Brake Caliper Cylinder

Inspect the brake caliper cylinder wall for nicks, scratches or other damage. If any damage is found, replace the caliper with a new one.



I649G1430020-01

Brake Caliper Piston

Inspect the brake caliper piston surface for any scratches or other damage. If any damage is found, replace the piston with a new one.



I649G1430021-01

Brake Caliper Sliding Pin

Inspect the brake caliper sliding pin for wear and other damage. If any damage is found, replace the sliding pin with a new one.



I649G1430022-01

Boot and Spacer

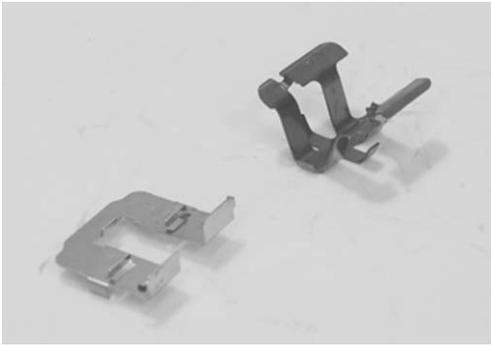
Inspect the boots and spacer for damage and wear. If any defects are found, replace them with new ones.



I649G1430023-01

Brake Pad Spring

Inspect the brake pad springs for damage and excessive bend. If any defects are found, replace them with new ones.



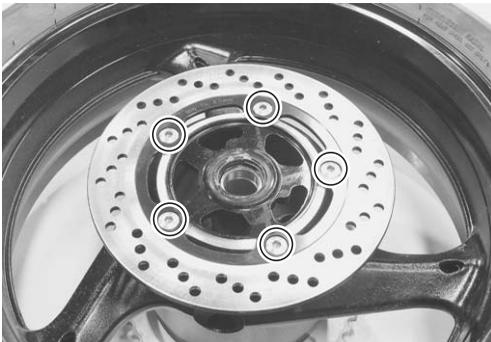
I649G1430024-01

Rear Brake Disc Removal and Installation

B649G14306017

Removal

- 1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation: in Section 2D".
- 2) Remove the rear brake disc.



I649G1430025-01

Installation

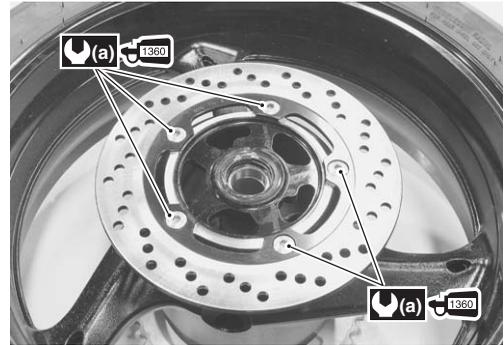
Install the rear brake disc in the reverse order of removal. Pay attention to the following points:

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

 : Thread lock cement 99000-32130 (Thread Lock Cement Super 1360 or equivalent)

Tightening torque

Brake disc bolt (a): 23 N·m (2.3 kgf·m, 16.5 lb·ft)



I649G1430026-02

Rear Brake Disc Inspection

B649G14306018

Brake Disc Thickness

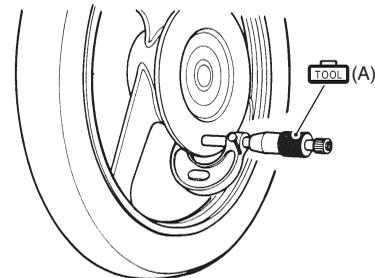
Check the brake disc for damage or cracks and measure the thickness using the micrometer. Replace the brake disc if the thickness is less than the service limit or if defect is found.

Special tool

 (A): 09900-20205 (Micrometer (0-25mm))

Brake disc thickness

Service limit (Rear): 4.5 mm (0.18 in)



I649G1430027-02

4C-8 Rear Brakes:

Brake Disc Runout

- 1) Remove the rear brake caliper. Refer to “Rear Brake Caliper Removal and Installation: ”.
- 2) Measure the runout using the dial gauge.
Replace the disc if the runout exceeds the service limit.

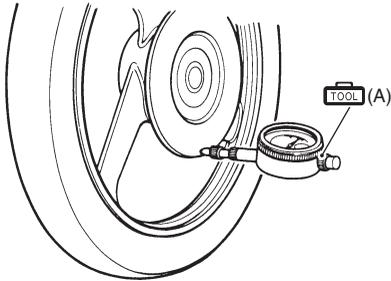
Special tool

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

 (B): 09900-20701 (Magnetic stand)

Brake disc runout

Service limit: 0.30 mm (0.012 in)



I649G1430028-02

- 3) Install the rear brake caliper. Refer to “Rear Brake Caliper Removal and Installation: ”.

Specifications

Service Data

B649G14307004

Brake

Unit: mm (in)

Item	Standard		Limit
Brake disc thickness	Rear	4.8 – 5.2 (0.189 – 0.205)	4.5 (0.18)
Brake disc runout		—	0.30 (0.012)
Brake caliper cylinder bore	Rear	38.180 – 38.256 (1.5031 – 1.5061)	—
Brake caliper piston diameter	Rear	38.098 – 38.148 (1.4999 – 1.5019)	—

Oil

Item	Specification	Note
Brake fluid type	DOT 4	

Tightening Torque Specifications

B649G14307005

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Rear brake caliper mounting bolt	22	2.2	16.0	☞
Rear brake pad mounting pin	18	1.8	13.0	☞
Pad pin plug	2.5	0.25	1.8	☞
Rear brake caliper sliding pin	27	2.7	19.5	☞ / ☞
Brake hose union bolt	23	2.3	16.5	☞
Brake disc bolt	23	2.3	16.5	☞

NOTE

The specified tightening torque is also described in the following.

“Rear Brake Components: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G14308001

Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞ / ☞
Grease	SUZUKI Silicone Grease or equivalent	P/No.: 99000-25100	☞ / ☞
Thread lock cement	Thread Lock Cement Super 1360 or equivalent	P/No.: 99000-32130	☞

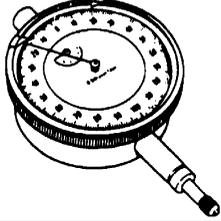
NOTE

Required service material is also described in the following.

“Rear Brake Components: ”

Special Tool

B649G14308002

<p>09900-20205 Micrometer (0-25mm)</p> <p>☞</p> 	<p>09900-20606 Dial gauge (1/100 mm)</p> <p>☞</p> 
<p>09900-20701 Magnetic stand</p> <p>☞</p> 	

Section 5

Transmission / Transaxle

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Precautions

Precautions

Precautions for Transmission / Transaxle

Refer to "General Precautions: in Section 00".

B649G1500001

Manual Transmission

Diagnostic Information and Procedures

Manual Transmission Symptom Diagnosis

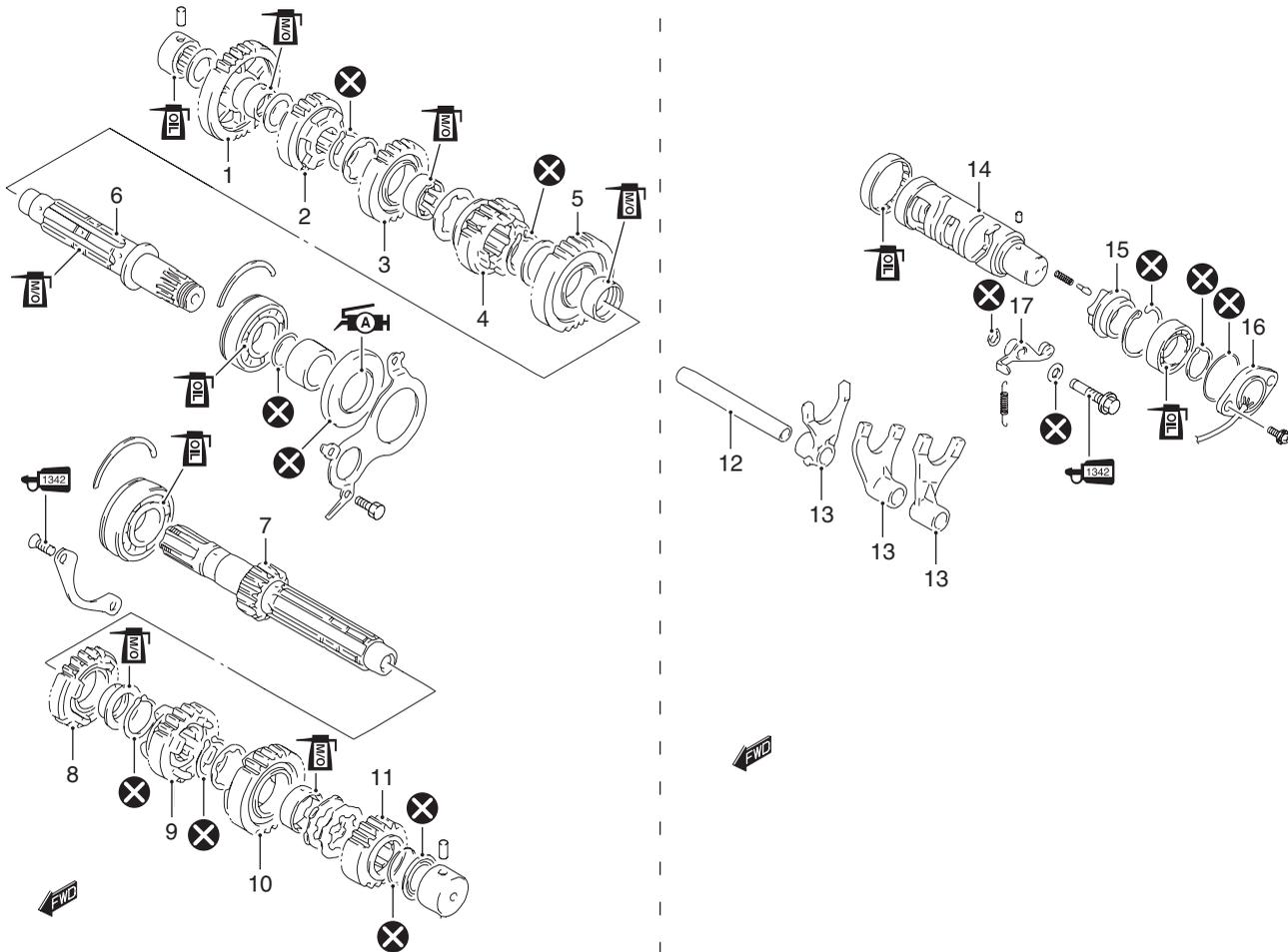
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Condition	Possible cause	Correction / Reference Item
Engine is noisy (Noise seems to come from the transmission).	Worn or rubbing gear.	<i>Replace.</i>
	Worn countershaft spline.	<i>Replace countershaft.</i>
	Worn driveshaft spline.	<i>Replace driveshaft.</i>
	Worn or rubbing primary gear.	<i>Replace.</i>
	Worn bearing.	<i>Replace.</i>
Transmission will not shift.	Broken gearshift cam.	<i>Replace.</i>
	Distorted gearshift fork.	<i>Replace.</i>
	Worn gearshift pawl.	<i>Replace.</i>
Transmission will not shift back.	Broken gearshift shaft return spring.	<i>Replace.</i>
	Rubbing or stuck gearshift shaft.	<i>Repair or replace.</i>
	Worn or distorted gearshift fork.	<i>Replace.</i>
Transmission jumps out of gear.	Worn gear.	<i>Replace.</i>
	Worn or distorted gearshift fork.	<i>Replace.</i>
	Weakened gearshift stopper spring.	<i>Replace.</i>
	Worn gearshift pawl.	<i>Replace.</i>

Repair Instructions

Transmission Components

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1. 1st (Low) driven gear	9. 3rd drive gear	17. Gearshift cam stopper
2. 4th driven gear	10. 5th (Top) drive gear	: Apply oil.
3. 3rd driven gear	11. 2nd drive gear	: Apply molybdenum oil solution.
4. 5th (Top) driven gear	12. Gearshift fork shaft	: Apply grease to oil seal lip.
5. 2nd driven gear	13. Gearshift fork	: Apply thread lock to thread part.
6. Driveshaft	14. Gearshift cam	: Apply thread lock to thread part.
7. Countershaft/1st (Low) drive gear	15. Gearshift cam stopper plate	: Do not reuse.
8. 4th drive gear	16. Gear position switch	

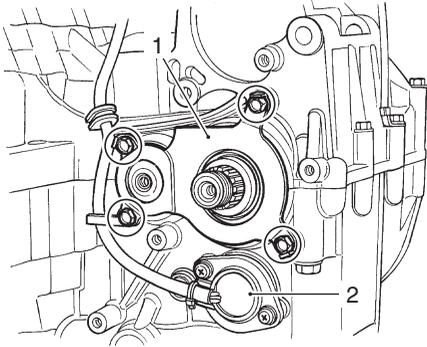
Transmission Removal

B649G15206027

- 1) Remove the engine assembly from the frame. Refer to "Engine Assembly Removal: in Section 1D".
- 2) Remove the generator. Refer to "Generator Removal and Installation: in Section 1J".
- 3) Remove the starter motor. Refer to "Starter Motor Removal and Installation: in Section 1I".
- 4) Remove the oil filter. Refer to "Engine Oil and Filter Replacement: in Section 0B".
- 5) Remove the cam chain tensioner. Refer to "Engine Top Side Disassembly: in Section 1D".

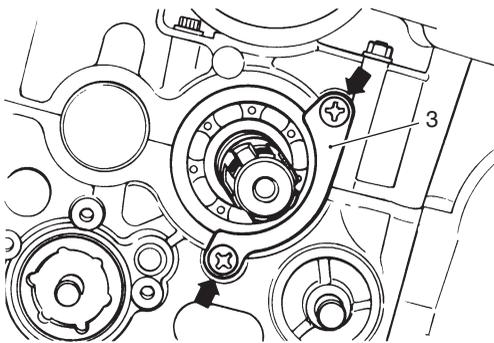
- 6) Remove the CKP sensor component parts and disconnect the oil pressure switch lead wire. Refer to "CKP Sensor Removal and Installation: in Section 1H" and "CKP Sensor Removal and Installation: in Section 1H".
- 7) Remove the clutch component parts. Refer to "Clutch Removal: in Section 5C".
- 8) Remove the gearshift shaft and gearshift driven gear. Refer to "Gearshift Shaft / Gearshift Cam Driven Gear Removal and Installation: ".
- 9) Remove the starter clutch component parts. Refer to "Starter Clutch Removal and Installation: in Section 1I".

- 10) Remove the oil seal retainer (1) and gear position switch assembly (2). Refer to "Gear Position Switch Removal and Installation: ".



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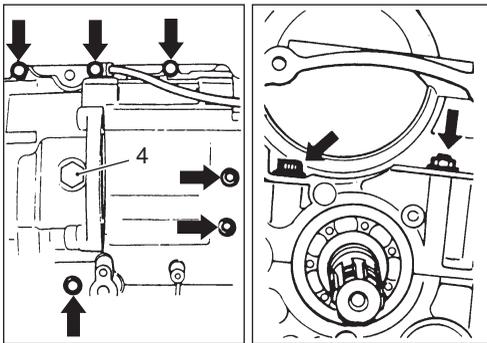
- 11) Remove the countershaft bearing retainer (3).



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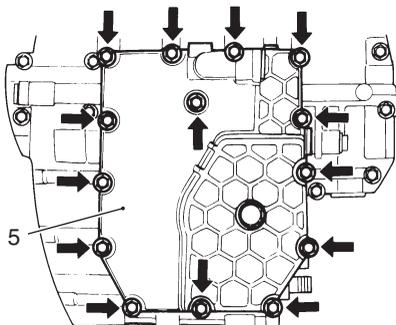
- 12) Remove the plug (4).

- 13) Remove the upper crankcase bolts and nut.



I649G1520003-01

- 14) Remove the oil pan (5).

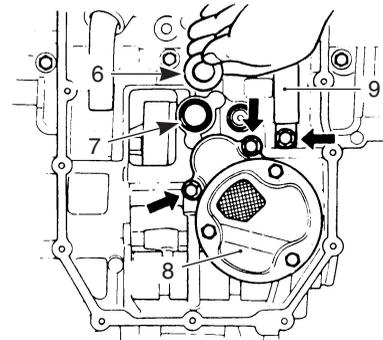


I649G1520004-01

- 15) Remove the shim (6) and O-ring (7).

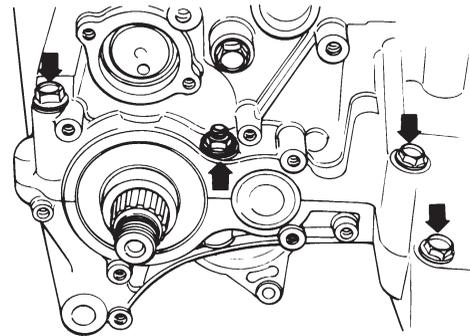
- 16) Remove the oil sump filter (8).

- 17) Remove the oil return pipe (9).

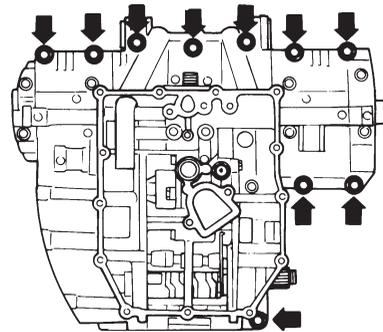


I649G1520005-02

- 18) Remove the lower crankcase bolts and nut.

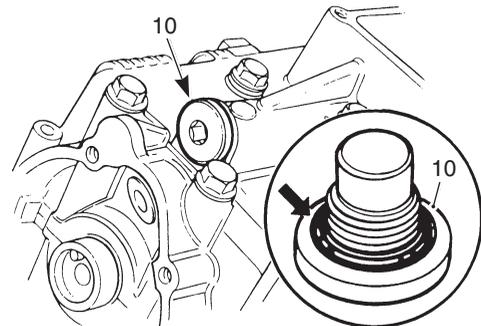


I649G1520006-01



I649G1520007-01

- 19) Remove the main oil gallery plug (10) and O-ring.



I649G1520008-02

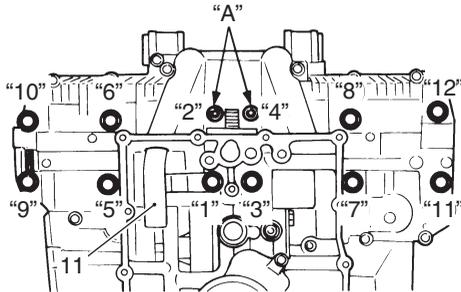
5B-4 Manual Transmission:

20) Loosen the crankcase bolts (crankshaft tightening bolts) in descending numerical order and then remove them.

NOTE

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

21) Remove the oil return pipe (11).

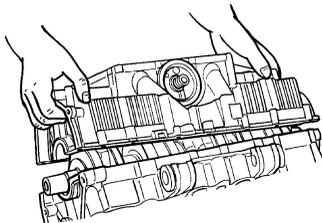


I649G1520009-02

22) Separate the crankcases, upper and lower.

CAUTION

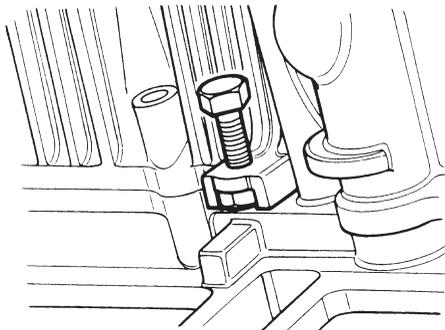
- Make sure that all of the bolts are removed.
- Do not allow the crankshaft journal bearings to drop out of the lower crankcase.



I649G1520010-03

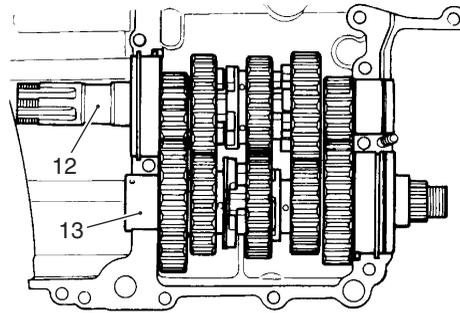
NOTE

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



I649G1520011-01

23) Remove the countershaft assembly (12) and driveshaft assembly (13).

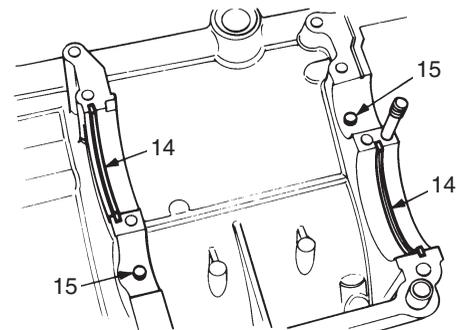


I649G1520079-01

24) Remove the C-rings (14) and bearing pins (15).

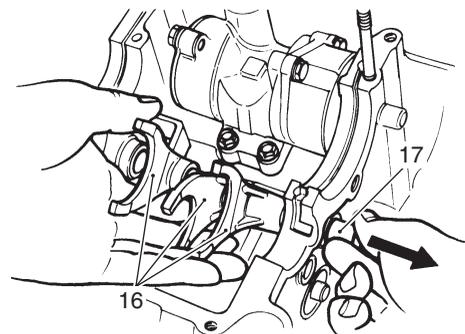
NOTE

Do not lose the C-rings and bearing pins.



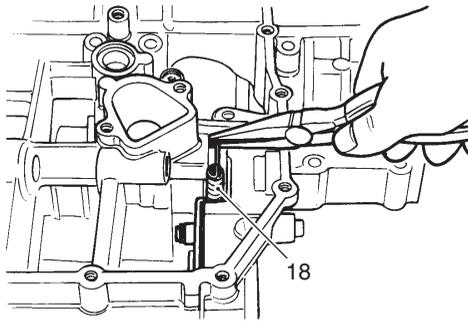
I649G1520013-01

25) Hold the gearshift forks (16) and draw out the gearshift fork shaft (17) from the lower crankcase.



I649G1520014-01

26) Unhook the gearshift cam stopper spring (18) from the lower crankcase.

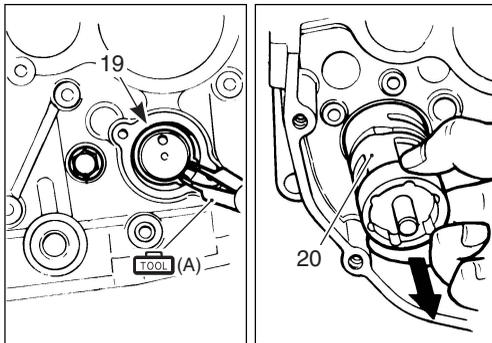


I649G1520015-01

27) Remove the snap ring (19) from the gearshift cam, then draw out the gearshift cam (20) from the opposite side.

Special tool

 (A): 09900-06107 (Snap ring pliers)

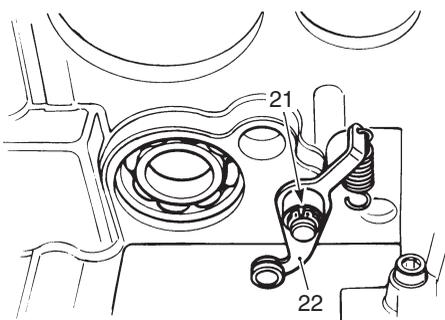


I649G1520016-02

28) Remove the snap ring (21) and gearshift cam stopper (22).

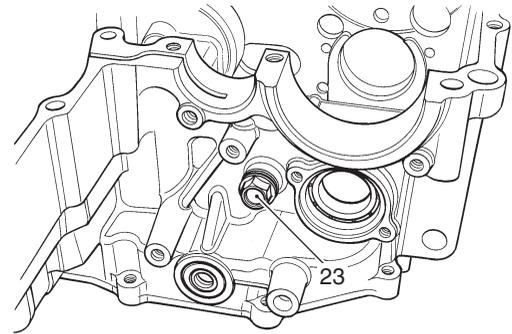
Special tool

 : 09900-06107 (Snap ring pliers)



I649G1520017-01

29) Remove the gearshift cam stopper bolt (23).



I649G1520018-01

Transmission Installation

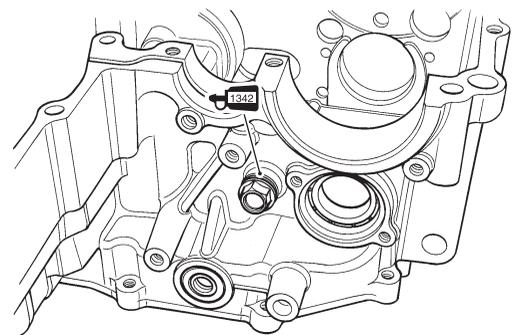
B649G15206028

Install the transmission in the reverse order of removal. Pay attention to the following points:

Gearshift Cam

- Apply a small quantity of THREAD LOCK “1342” to the gearshift cam stopper bolt and tighten it.

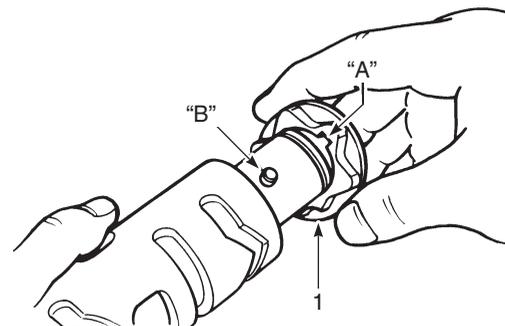
 : Thread lock cement 99000-32050 (Thread Lock Cement 1342 or equivalent)



I649G1520019-02

NOTE

When installing the gearshift cam stopper plate (1), align the pin groove “A” with the pin “B” as shown.



I649G1520020-01

5B-6 Manual Transmission:

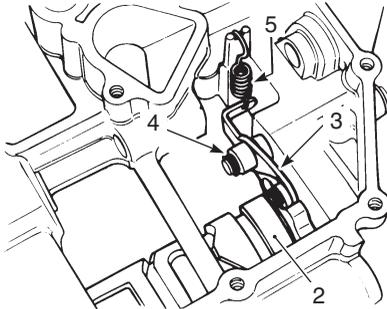
- Install the gearshift cam (2) and its related parts.

⚠ CAUTION

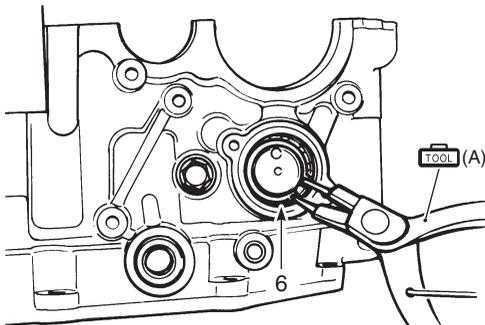
Always use new snap rings ((4) and (6)).

Special tool

 (A): 09900-06107 (Snap ring pliers)



I649G1520021-01



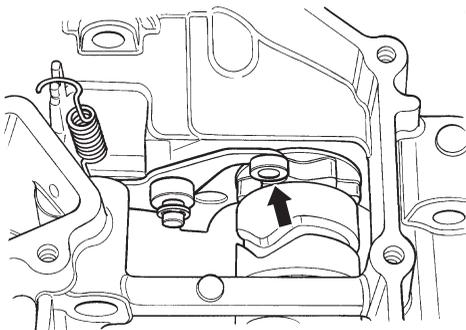
I649G1520022-02

2. Gearshift cam	5. Spring
3. Gearshift cam stopper	6. Snap ring
4. Snap ring	

- Position the gearshift cam in the neutral position as shown.

NOTE

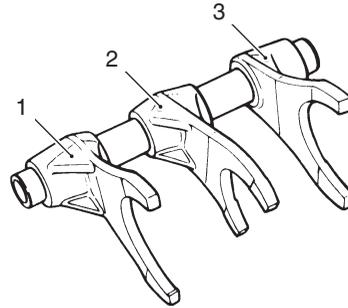
This will allow the gearshift forks and transmission gears to be installed easily.



I649G1520023-01

Gearshift Fork

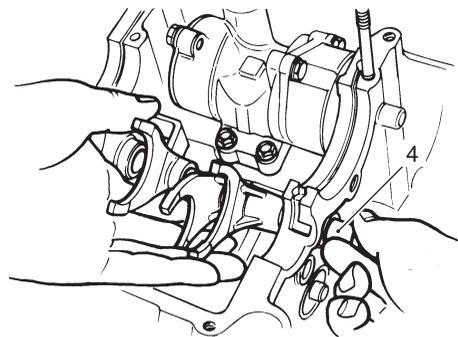
- Install the gearshift forks into the crankcase in the correct position and direction.



I649G1520024-01

1. For the 4th driven gear
2. For the 3rd drive gear
3. For the 5th (Top) driven gear

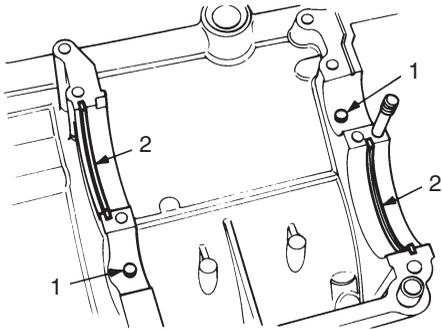
- Hold the gearshift forks by hand when installing the gearshift fork shaft (4).



I649G1520025-02

Countershaft and Driveshaft

- Install the bearing pins (1) and C-rings (2) into the upper crankcase.

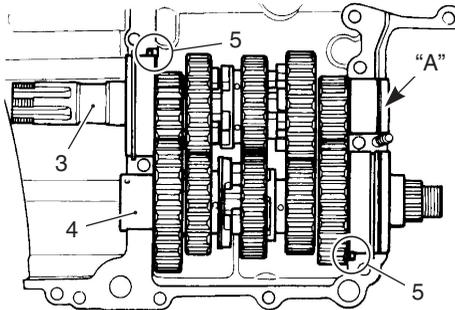


I649G1520026-01

- Install the countershaft assembly (3) and driveshaft assembly (4) into the upper crankcase.
- Install the countershaft end cap in the proper position "A".

NOTE

- **Be sure to install the bearing dowel pins (5) in their respective positions.**
- **Make sure that the countershaft assembly turns freely while holding the driveshaft assembly. If it does not turn freely, turn the gearshift cam to the neutral position.**



I649G1520027-02

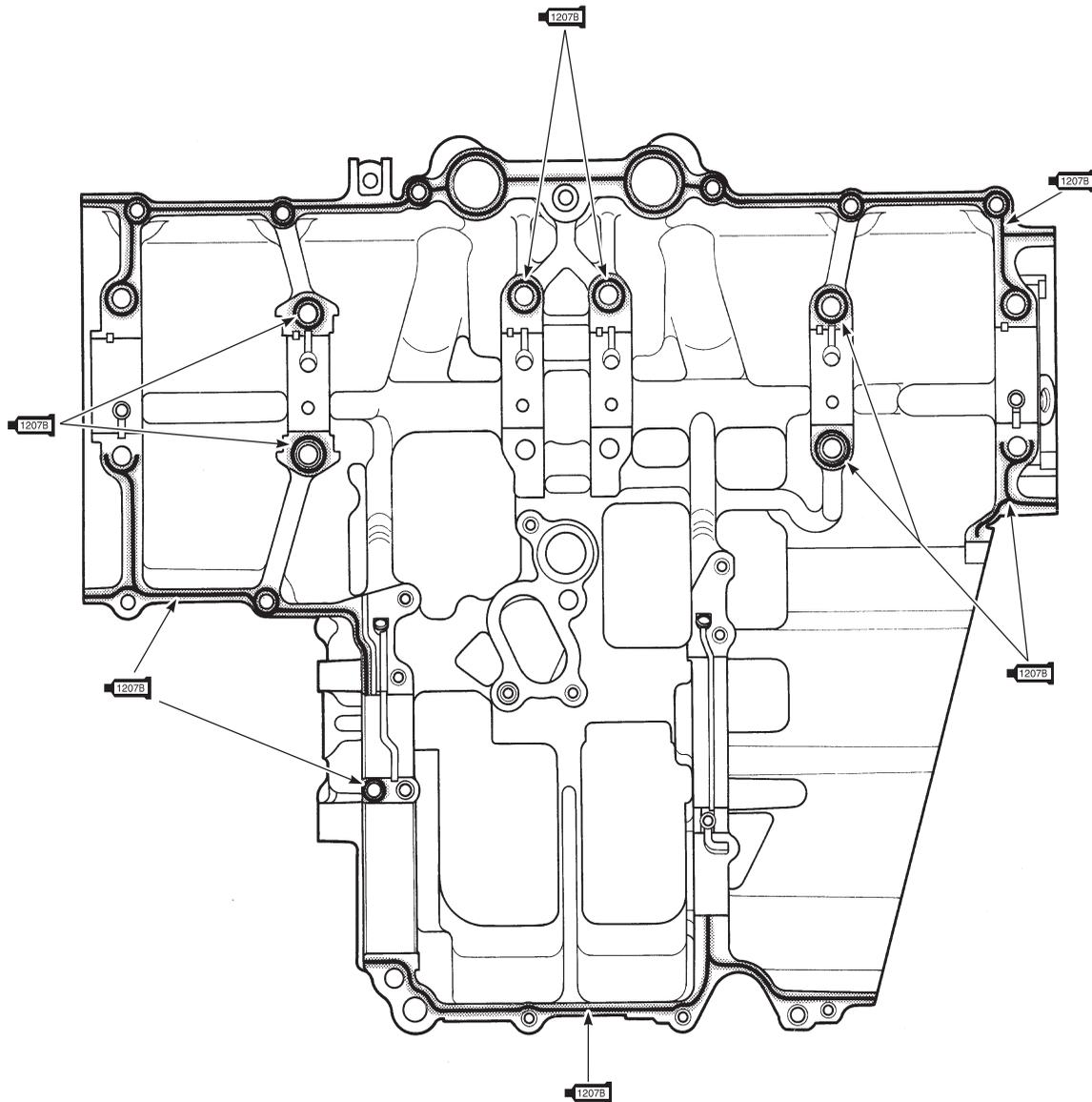
Crankcase

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

 : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)

NOTE

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

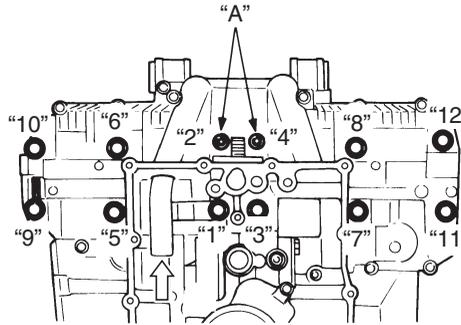


- Install the right oil return pipe along with the bolt “1”.
- Install the copper washers to the bolts “9” and “11”.
- Install the two allen bolts at position “A”.
- Install the ten crankcase bolts (M8).
- Tighten the crankcase bolts (Crankshaft tightening bolts) in ascending order. Tighten each bolt a little at a time to equalize the pressure.

Tightening torque

Crankcase bolt (M8) (Initial): 13 N·m (1.3 kgf-m, 9.5 lb-ft)

Crankcase bolt (M8) (Final): 22 N·m (2.2 kgf-m, 16.0 lb-ft)



I649G1520029-02

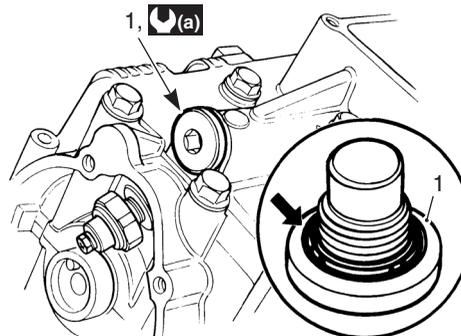
- Tighten the main oil gallery plug (1) to the specified torque.

⚠ CAUTION

Replace the O-ring with a new one.

Tightening torque

Main oil gallery plug (a): 40 N·m (4.0 kgf-m, 29.0 lb-ft)



I649G1520030-03

- Tighten the lower and upper crankcase bolts (M6) and nuts to the specified torque.

Tightening torque

Crankcase bolt and nut (M6) (Initial): 6 N·m (0.6 kgf-m, 4.5 lb-ft)

Crankcase bolt and nut (M6) (Final): 11 N·m (1.1 kgf-m, 8.0 lb-ft)

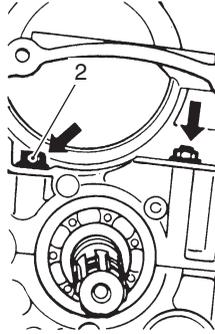
NOTE

- Install the copper washer at position “B”.
- After tightening the upper crankcase bolt (2), install the plug (3).
- Install the engine ground wire (4) to the correct position as shown.
- Install the gasket washer at position “C”.

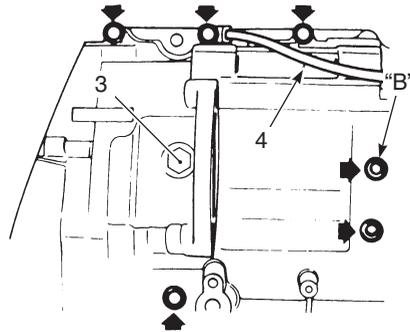
5B-10 Manual Transmission:

⚠ CAUTION

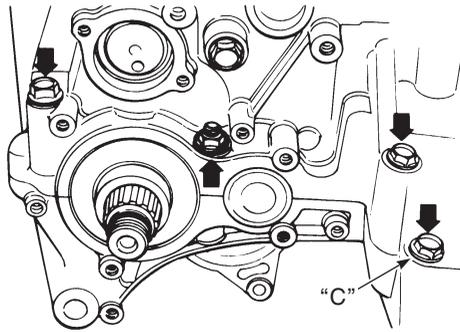
Use a new gasket washer to prevent oil leakage.



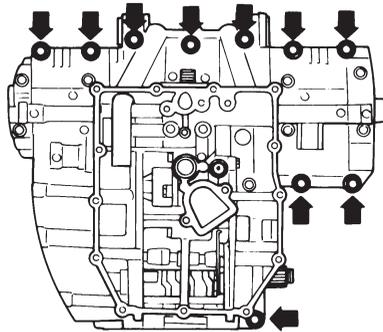
I649G1520033-02



I649G1520032-02



I649G1520034-01



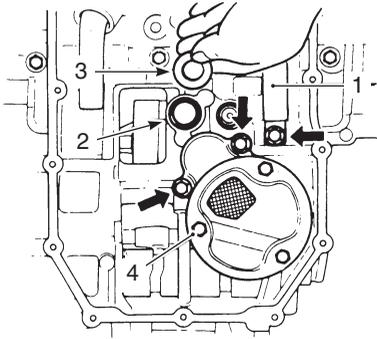
I649G1520031-01

Left Oil Return Pipe and Oil Sump Filter

- Install the left oil return pipe (1).
- Install a new O-ring (2) and shim (3).
- Install a new gasket and the oil sump filter (4).

⚠ CAUTION

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



I649G1520035-01

Oil Pan

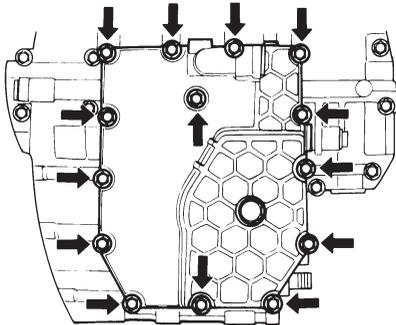
- Install a new gasket and the oil pan. Tighten the oil pan bolts to the specified torque.

Tightening torque

Oil pan bolt: 14 N·m (1.4 kgf-m, 10.0 lb-ft)

⚠ CAUTION

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



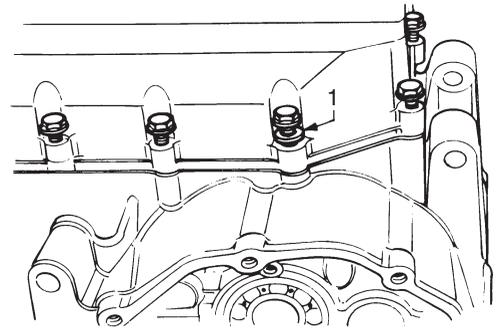
I649G1520036-01

NOTE

Install a new gasket washer (1) to the oil pan bolt as shown.

⚠ CAUTION

Use a new gasket washer (1) to prevent oil leakage.



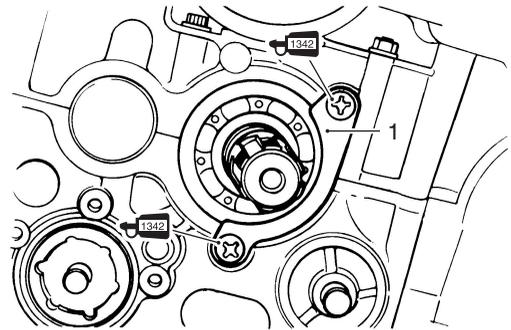
I649G1520037-01

Bearing Retainer

- Apply a small quantity of THREAD LOCK “1342” to the two screws.

1342 : Thread lock cement 99000-32050 (Thread Lock Cement 1342 or equivalent)

- Install the countershaft bearing retainer (1).



I649G1520038-02

Gear Position Switch

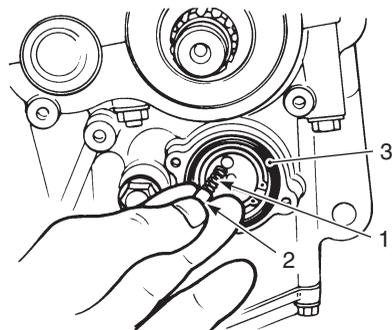
- Install the gear position switch.

NOTE

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

⚠ CAUTION

Replace the O-ring (3) with a new one.



I649G1520039-02

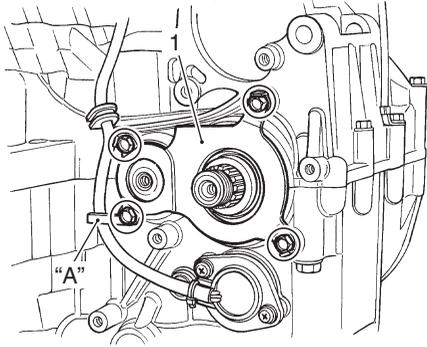
5B-12 Manual Transmission:

Oil Seal Retainer

- Install the oil seal retainer (1) with the four bolts and then bend up the tabs on the retainer.

NOTE

Route the gear position switch lead wire to the inside of the oil seal retainer's tab "A" as shown.



I649G1520040-01

- Install the starter clutch component parts. Refer to "Starter Clutch Removal and Installation: in Section 1I".

- Install the gearshift shaft and gearshift driven gear. Refer to "Gearshift Shaft / Gearshift Cam Driven Gear Removal and Installation: ".
- Install the clutch component parts. Refer to "Clutch Installation: in Section 5C".
- Install the CKP sensor component parts and connect the oil pressure switch lead wire. Refer to "CKP Sensor Removal and Installation: in Section 1H" and "Oil Pressure Switch Removal and Installation: in Section 1E".
- Install the cam chain tensioner. Refer to "Engine Bottom Side Assembly: in Section 1D".

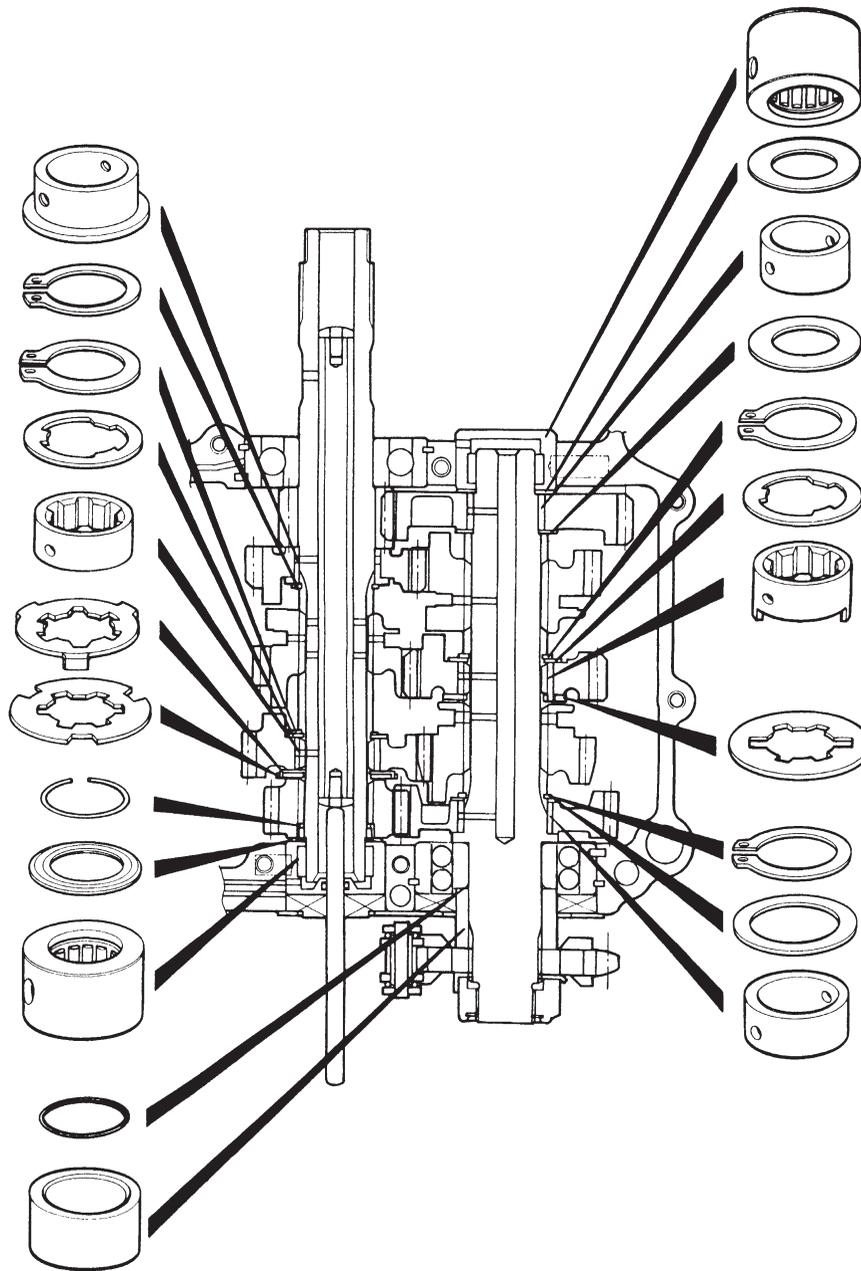
⚠ CAUTION

Be sure to check the camshaft position.

- Install a new oil filter. Refer to "Engine Oil and Filter Replacement: in Section 0B".
- Install the starter motor. Refer to "Starter Motor Removal and Installation: in Section 1I".
- Install the generator. Refer to "Generator Removal and Installation: in Section 1J".
- Remount the engine assembly. Refer to "Engine Assembly Installation: in Section 1D".

Transmission Construction

B649G15206030



I649G1520042-02

Countershaft Gear and Driveshaft Gear Disassembly

B649G15206031

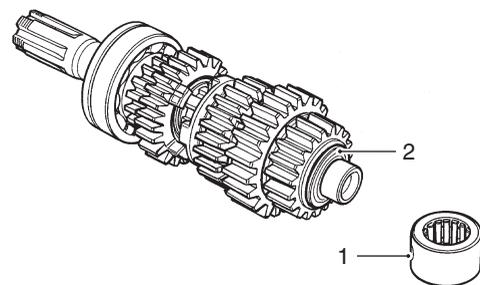
Refer to "Transmission Removal: " and "Transmission Installation: ".

Countershaft Gear Disassembly

⚠ CAUTION

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

1) Remove the left end bearing (1) and oil seal (2).



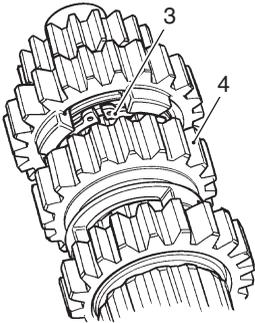
I649G1520043-01

5B-14 Manual Transmission:

- 2) Remove the 5th (Top) drive gear snap ring (3) from its groove and slide it towards the 3rd drive gear (4).

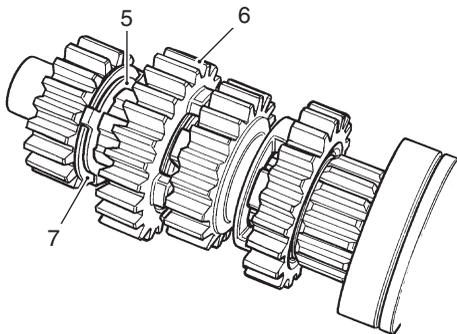
Special tool

 : 09900-06107 (Snap ring pliers)



I649G1520044-01

- 3) Slide the lock washer (5) towards the 5th (Top) drive gear (6), then turn the lock washer (7) and slide it towards the 5th (top) drive gear (6).



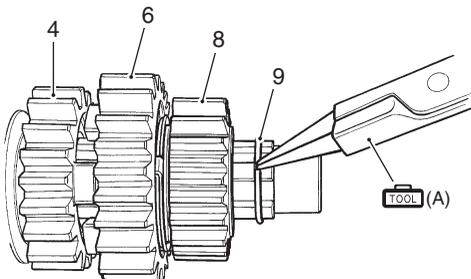
I649G1520045-01

- 4) Slide the 2nd drive gear (8) towards the 5th (Top) drive gear (6), then remove the circlip (9).

Special tool

 (A): 09900-06107 (Snap ring pliers)

- 5) Remove the 3rd drive gear (4), 5th (Top) drive gear (6) and 2nd drive gear (8).

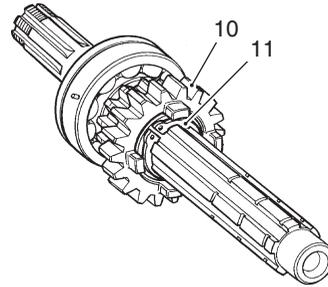


I649G1520046-02

- 6) Remove the snap ring (11) and 4th drive gear (10).

Special tool

 : 09900-06107 (Snap ring pliers)



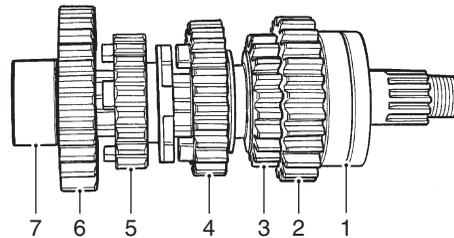
I649G1520047-01

Driveshaft Gear Disassembly

CAUTION

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

- Disassemble the driveshaft gear as shown in the illustration.



I649G1520048-01

1. Bearing	5. 4th driven gear
2. 2nd driven gear	6. Low driven gear
3. 5th (Top) driven gear	7. Bearing
4. 3rd driven gear	

Countershaft Gear and Driveshaft Gear Assembly

B649G15206040

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

NOTE

When reassembling the transmission gears, attention must be given to the locations and positions of washers and snap rings. The cross sectional view shows the correct position of the gears, bushings, washers and snap rings. Refer to "Transmission Construction: ".

CAUTION

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

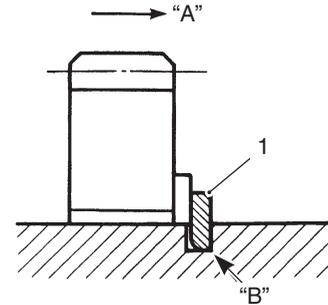
NOTE

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

 Moly paste 99000-25140 (SUZUKI Moly paste or equivalent)

 Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)

- When installing a new snap ring (1), pay attention to its direction. Fit it to the side where the thrust is as shown in the illustration.

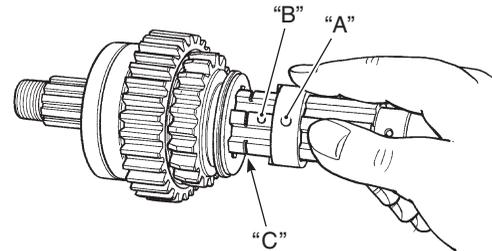


I649G1520049-01

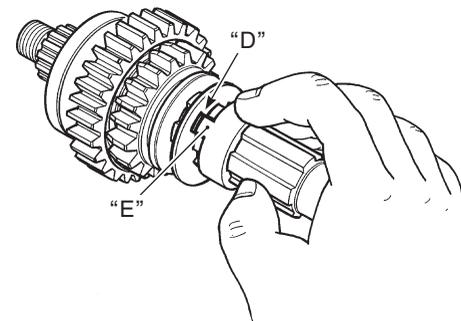
"A": Thrust	"B": Sharp edge	1. Snap ring
-------------	-----------------	--------------

Driveshaft Gear Assembly

- Align the bushing oil hole "A" with the shaft oil hole "B".
- With the lock washer turned in its groove "C", align the cutout "D" of the lock washer with the tab "E" on the gear bushing.

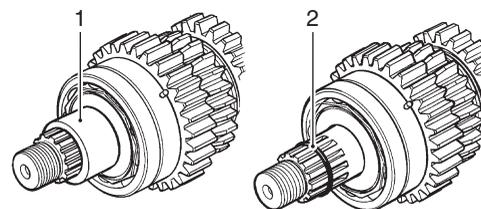


I649G1520050-01



I649G1520051-01

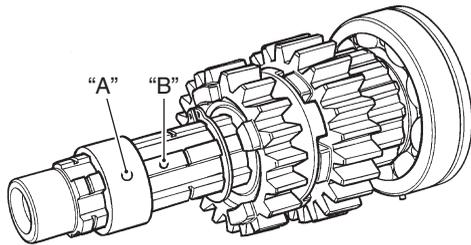
- Install the spacer (1) after installing the O-ring (2).



I649G1520052-01

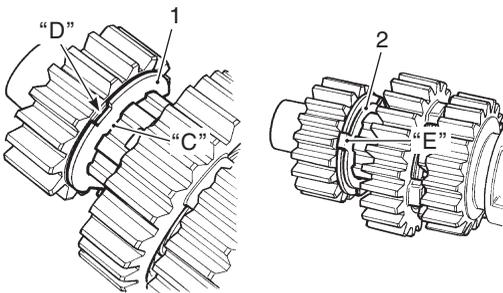
Countershaft Gear Assembly

- Align the bushing oil hole "A" with the shaft oil hole "B".



I649G1520053-01

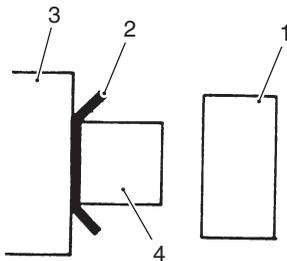
- With the lock washer (1) turned in its groove "C", align the cutout "D" of the lock washer (1) with the tab "E" on the lock washer (2).



I649G1520054-02

CAUTION

Install the oil seal as shown in the illustration.



I649G1520055-01

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

Transmission Related Parts Inspection

B649G15206032

Refer to "Transmission Removal:", "Transmission Installation:" and "Countershaft Gear and Driveshaft Gear Disassembly:".

Gearshift Fork to Groove Clearance

NOTE

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

Using a thickness gauge, check the gearshift fork clearance in the groove of its gear. If the clearance checked is noted to exceed the limit specified, replace the fork or its gear, or both.

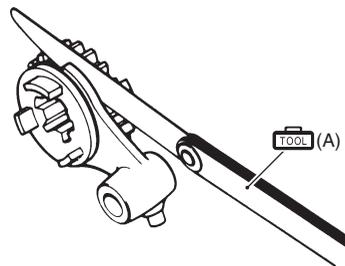
Special tool

TOOL (A): 09900-20803 (Thickness gauge)

Gearshift fork to gearshift fork groove clearance

Standard: 0.10 – 0.30 mm (0.004 – 0.012 in)

Service limit: 0.50 mm (0.020 in)



I649G1520056-02

Gearshift Fork Groove Width

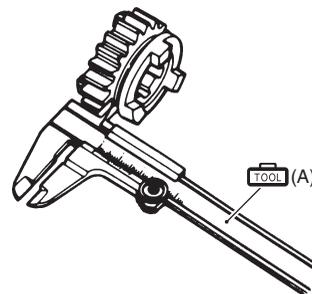
Measure the gearshift fork groove width using the vernier calipers.

Special tool

TOOL (A): 09900-20102 (Vernier calipers)

Gearshift fork groove width

Standard (No.1, No.2 & No.3): 5.00 – 5.10 mm (0.197 – 0.201 in)



I649G1520057-02

Gearshift Fork Thickness

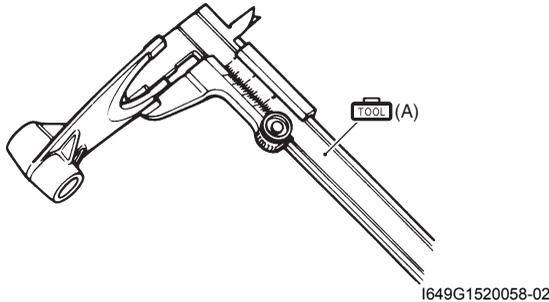
Measure the gearshift fork thickness using the vernier calipers.

Special tool

 (A): 09900-20102 (Vernier calipers)

Gearshift fork thickness

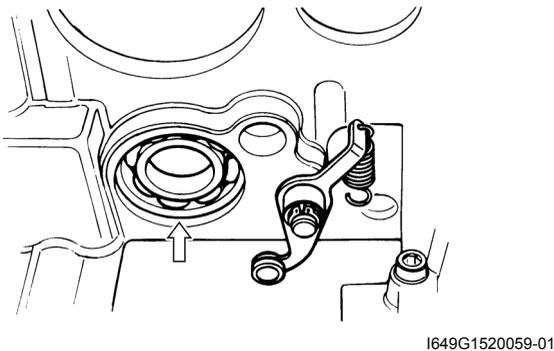
Standard (No.1, No.2 & No.3): 4.80 – 4.90 mm (0.189 – 0.193 in)



Gearshift Cam Bearing

Inspect the gearshift cam bearings, left and right for abnormal noise and smooth rotation.

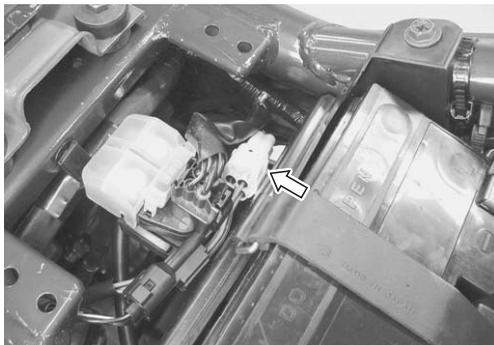
Replace the bearing if there is anything unusual.



Gear Position Switch Inspection

B649G15206033

- 1) Remove the seat. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Disconnect the gear position switch coupler.



- 3) Check the continuity between Blue and Black/White lead wires with the transmission in “NEUTRAL”.

⚠ CAUTION

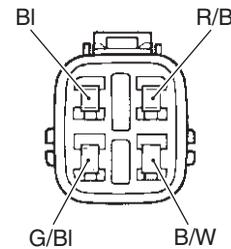
When disconnecting and connecting the gear position switch coupler, make sure to turn off the ignition switch, or electronic parts may get damaged.

Special tool

 : 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity test (●)



I649G1190048-01

	BI	B/W
ON (Neutral)	●	●
OFF (Except neutral)		

I649G1190045-02

- 4) Connect the gear position switch coupler to the wiring harness.
- 5) Install the seat. Refer to “Exterior Parts Removal and Installation: in Section 9D”.

Gear Position Switch Removal and Installation

B649G15206034

Refer to “Electrical Components Location: in Section 0A”.

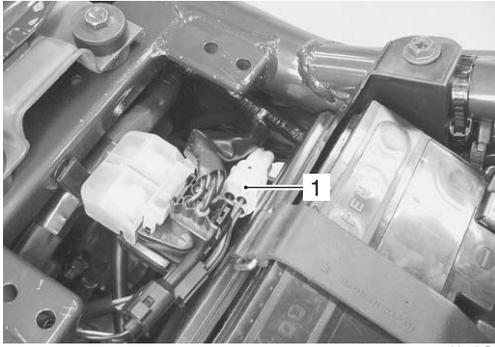
Refer to “Wiring Harness Routing Diagram: in Section 9A”.

Removal

- 1) Remove the seat. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Remove the left flame cover. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 3) Remove the engine sprocket cover. Refer to “Engine Sprocket Removal and Installation: in Section 3A”.

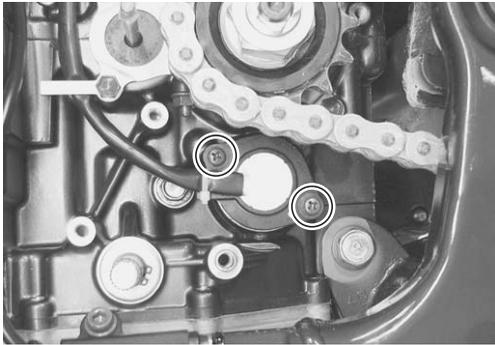
5B-18 Manual Transmission:

- 4) Disconnect the gear position switch coupler (1).



I649G1520080-01

- 5) Remove the gear position switch.

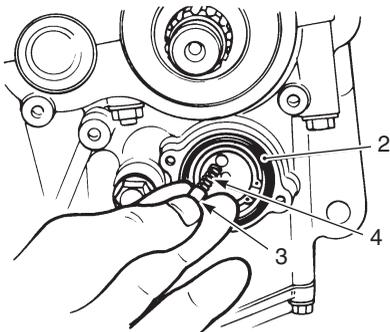


I649G1520061-02

- 6) Remove the O-ring (2), switch contact (3) and spring (4).

NOTE

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



I649G1520062-01

- 7) Remove the gear position switch lead wire as shown in the wiring harness routing diagram. Refer to "Wiring Harness Routing Diagram: in Section 9A".

Installation

Install the gear position switch in the reverse order of removal. Pay attention to the following points:

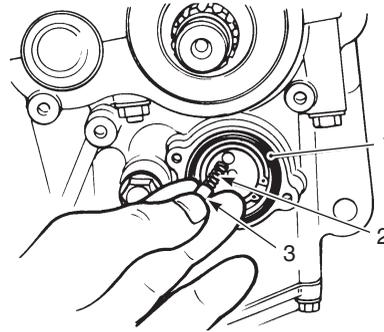
⚠ CAUTION

Replace the O-ring (1) with a new one.

- Install the gear position switch.

NOTE

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

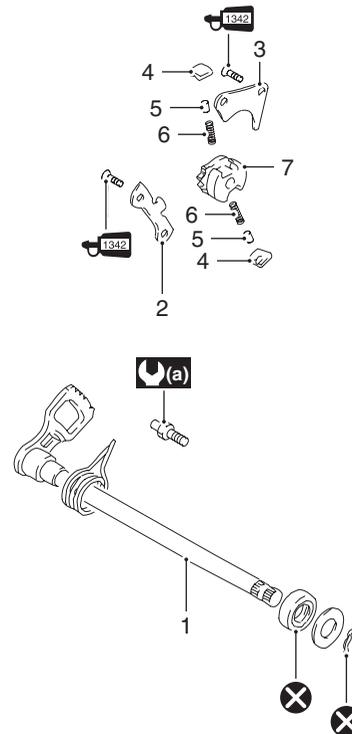


I649G1520084-01

- Route the gear position switch lead wire. Refer to "Wiring Harness Routing Diagram: in Section 9A".

Gearshift Shaft / Gearshift Cam Driven Gear Components

B649G15206038



I649G1520081-01

1. Gearshift shaft	6. Spring
2. Cam guide	7. Gearshift cam driven gear
3. Pawl lifter	⚙(a) : 19 N·m (1.9 kgf-m, 13.5 lb-ft)
4. Pawl	🔧1342 : Apply thread lock to thread part.
5. Pin	⊗ : Do not reuse.

Gearshift Shaft / Gearshift Cam Driven Gear Removal and Installation

B649G15206035

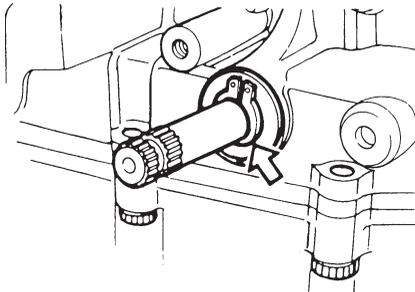
It is unnecessary to remove the engine assembly from the frame when servicing the gearshift linkage.

Removal

- 1) Remove the engine sprocket cover. Refer to "Engine Sprocket Removal and Installation: in Section 3A".
- 2) Remove the primary driven gear. Refer to "Clutch Removal: in Section 5C".
- 3) Remove the snap ring and washer from the gearshift shaft.

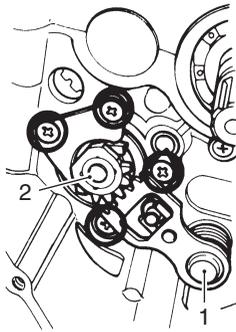
Special tool

 : 09900-06107 (Snap ring pliers)



I649G1520064-01

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

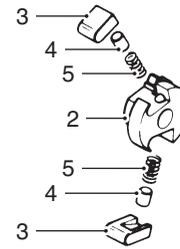


I649G1520065-01

NOTE

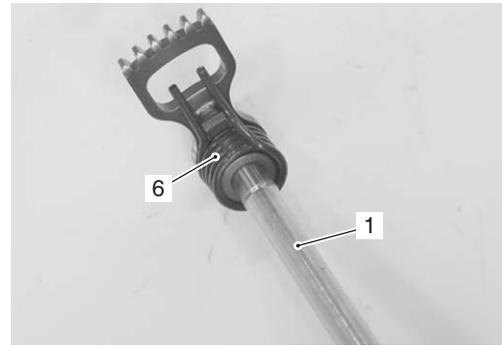
When removing the gearshift cam driven gear (2), do not lose the gearshifting pawl (3), pin (4) and spring (5).

- 5) Remove the gearshifting pawls (3), pins (4) and springs (5) from the gearshift cam driven gear (2).



I649G1520066-02

- 6) Remove the return spring (6) from the gearshift shaft (1).



I649G1520067-02

Installation

Install the gearshift shaft and gearshift cam driven gear in the reverse order of removal. Pay attention to the following points:

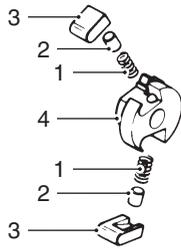
- When installing the gearshift shaft return spring, position the stopper between the ends of the gearshift shaft return spring.



I649G1520068-01

5B-20 Manual Transmission:

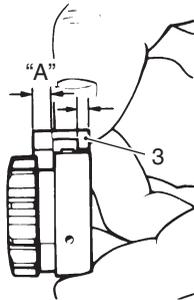
- Fit the springs (1), pins (2) and pawls (3) to the gearshift cam driven gear (4).



I649G1520069-01

NOTE

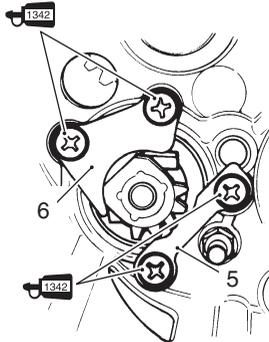
Wider side "A" of pawl should be positioned outside.



I649G1520070-01

- Install the cam guide (5) and pawl lifter (6).
- Apply a small quantity of THREAD LOCK "1342" to the screws.

 : Thread lock cement 99000-32050 (Thread Lock Cement 1342 or equivalent)

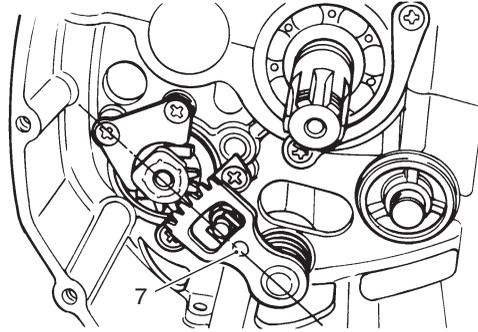


I649G1520071-01

- Install the gearshift shaft (7).

NOTE

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



I649G1520072-01

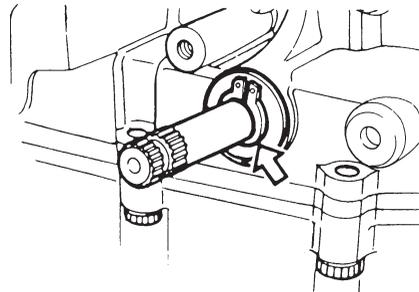
- Install the washer and fix the gearshift shaft with the snap ring.

⚠ CAUTION

Never reuse a snap ring.

Special tool

 : 09900-06107 (Snap ring pliers)



I649G1520073-01

Gearshift Linkage Inspection

B649G15206036

Refer to “Gearshift Shaft / Gearshift Cam Driven Gear Removal and Installation: ”.

Gearshift Shaft (Gearshift Arm)

Check the gearshift shaft (Gearshift arm) for bends or wear.

Check the return spring on the gearshift arm for damage or fatigue.

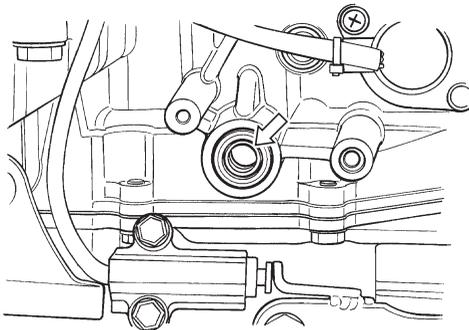
If any defects are found, replace the defective part(-s).



I649G1520074-01

Gearshift Shaft Oil Seal

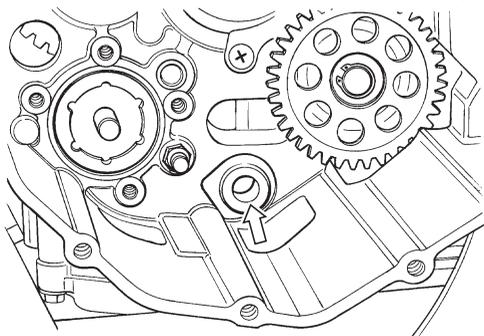
Inspect the gearshift shaft oil seal's lip for damage or wear. If any defect is found, replace the oil seal with a new one.



I649G1520075-01

Gearshift Shaft Hole

Check the gearshift shaft hole for damage or wear.



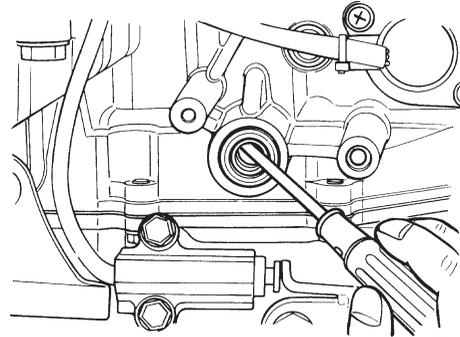
I649G1520076-01

Gearshift Shaft Oil Seal Removal and Installation

B649G15206037

Removal

- 1) Remove the gearshift shaft. Refer to “Gearshift Shaft / Gearshift Cam Driven Gear Removal and Installation: ”.
- 2) Remove the gearshift shaft oil seal from the lower crankcase.



I649G1520077-01

Installation

Install the oil seal in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

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

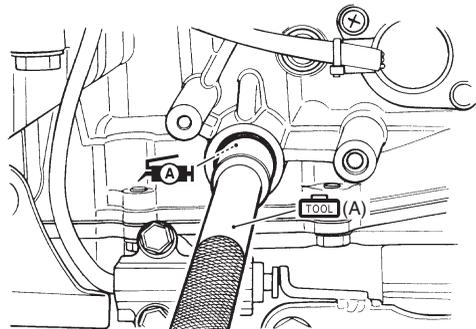
- Install the oil seal using the special tool.

Special tool

 (A): 09913-70210 (Bearing installer set)

- Apply SUZUKI SUPER GREASE “A” onto the oil seal lip.

 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1520078-02

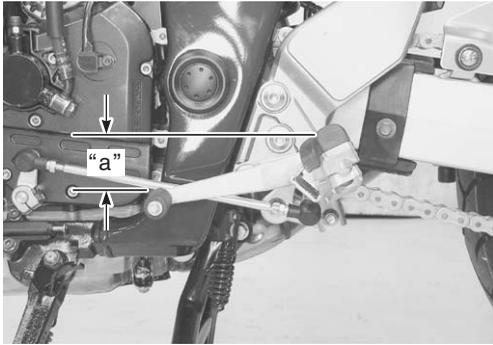
Gearshift Lever Height Inspection and Adjustment

B649G15206039

Inspect and adjust the gearshift lever height in the following procedures:

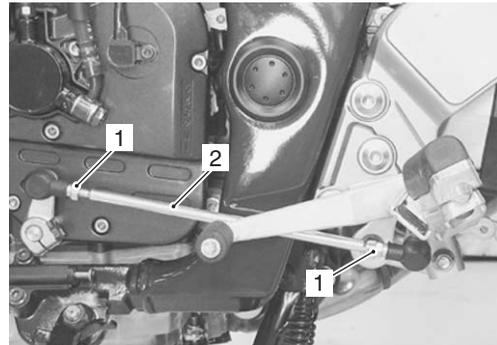
- 1) Inspect the gearshift lever height "a" between the pedal top face and footrest. Adjust the gearshift lever height if necessary.

Gearshift lever height "a"
Standard 55 mm (2.2 in)



I649G1520082-01

- 2) Loosen the lock-nuts (1).
- 3) Turn the gearshift link rod (2) until the gearshift lever is 55 mm (2.2 in) below the top of the footrest.
- 4) Tighten the lock-nuts securely.



I649G1520083-01

Specifications

Service Data

B649G15207002

Transmission + Drive Chain

Unit: mm (in) Except ratio

Item		Standard	Limit
Primary reduction ratio		1.565 (72/46)	—
Final reduction ratio		3.000 (45/15)	—
Gear ratios	1st (Low)	2.384 (31/13)	—
	2nd	1.631 (31/19)	—
	3rd	1.250 (25/20)	—
	4th	1.045 (23/22)	—
	5th (Top)	0.913 (21/23)	—
Gearshift-fork to gearshift-fork groove clearance	No.1, No.2 & No.3	0.1 – 0.3 (0.004 – 0.012)	0.50 (0.020)
Gearshift fork groove width	No.1, No.2 & No.3	5.0 – 5.1 (0.197 – 0.201)	—
Gearshift fork thickness	No.1, No.2 & No.3	4.8 – 4.9 (0.189 – 0.193)	—
Gearshift lever height		55 (2.2)	—

Tightening Torque Specifications

B649G15207003

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Crankcase bolt (M8) (Initial)	13	1.3	9.5	☞
Crankcase bolt (M8) (Final)	22	2.2	16.0	☞
Main oil gallery plug	40	4.0	29.0	☞
Crankcase bolt and nut (M6) (Initial)	6	0.6	4.5	☞
Crankcase bolt and nut (M6) (Final)	11	1.1	8.0	☞
Oil pan bolt	14	1.4	10.0	☞

NOTE

The specified tightening torque is also described in the following.

“Gearshift Shaft / Gearshift Cam Driven Gear Components: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G15208001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000-25010	☞ / ☞
Moly paste	SUZUKI Moly paste or equivalent	P/No.: 99000-25140	☞
Sealant	SUZUKI Bond 1207B or equivalent	P/No.: 99000-31140	☞
Thread lock cement	Thread Lock Cement 1342 or equivalent	P/No.: 99000-32050	☞ / ☞ / ☞

NOTE

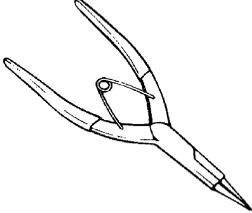
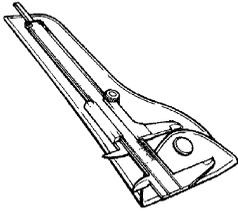
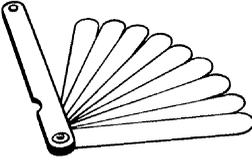
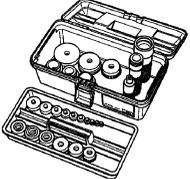
Required service material is also described in the following.

“Transmission Components: ”

“Gearshift Shaft / Gearshift Cam Driven Gear Components: ”

Special Tool

B649G15208002

<p>09900-06107 Snap ring pliers</p> <p>☞ / ☞ / ☞ / ☞ / ☞ / ☞ / ☞ / ☞ / ☞</p> 	<p>09900-20102 Vernier calipers (1/20 mm, 200 mm)</p> <p>☞ / ☞</p> 
<p>09900-20803 Thickness gauge</p> <p>☞</p> 	<p>09900-25008 Multi-circuit tester set</p> <p>☞</p> 
<p>09913-70210 Bearing installer set</p> <p>☞</p> 	

Clutch

Precautions

Precautions for Clutch System

B649G15300001

Refer to "General Precautions: in Section 00".

Clutch Fluid (Brake Fluid) Information

B649G15300002

⚠ WARNING

- This clutch system is filled with an ethylene glycol-based DOT 4 brake fluid. Do not use or mix different types of fluid such as silicone-based or petroleum-based.
- Do not use any brake fluid taken from old, used or unsealed containers. Never reuse brake fluid left over from the last servicing or stored for long periods.
- When storing brake fluid, seal the container completely and keep away from children.
- When replenishing brake fluid, take care not to get dust into fluid.
- When washing clutch components, use fresh brake fluid. Never use cleaning solvent.

⚠ CAUTION

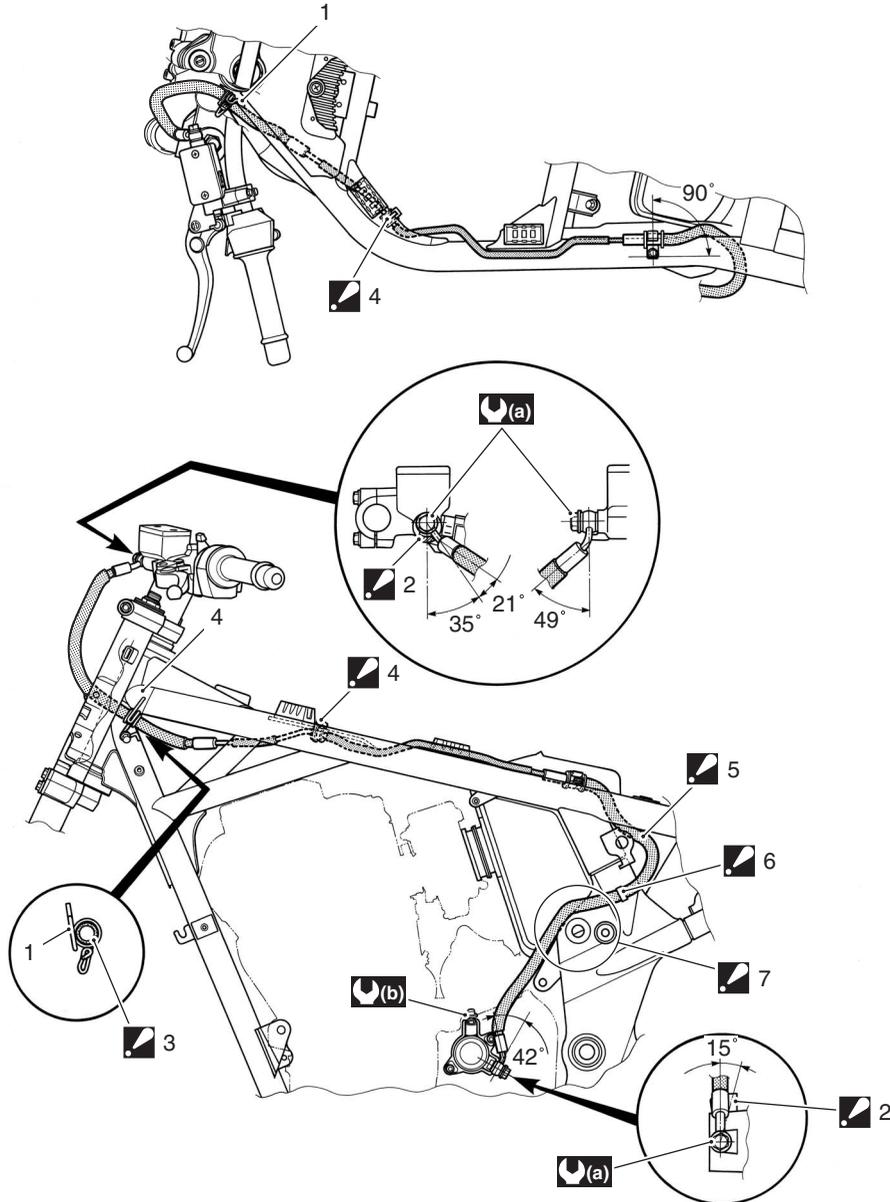
Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The brake fluid reacts chemically with paint, plastics and rubber materials, etc., and will damage them severely.

Schematic and Routing Diagram

Clutch Hose Routing Diagram

GSF1200

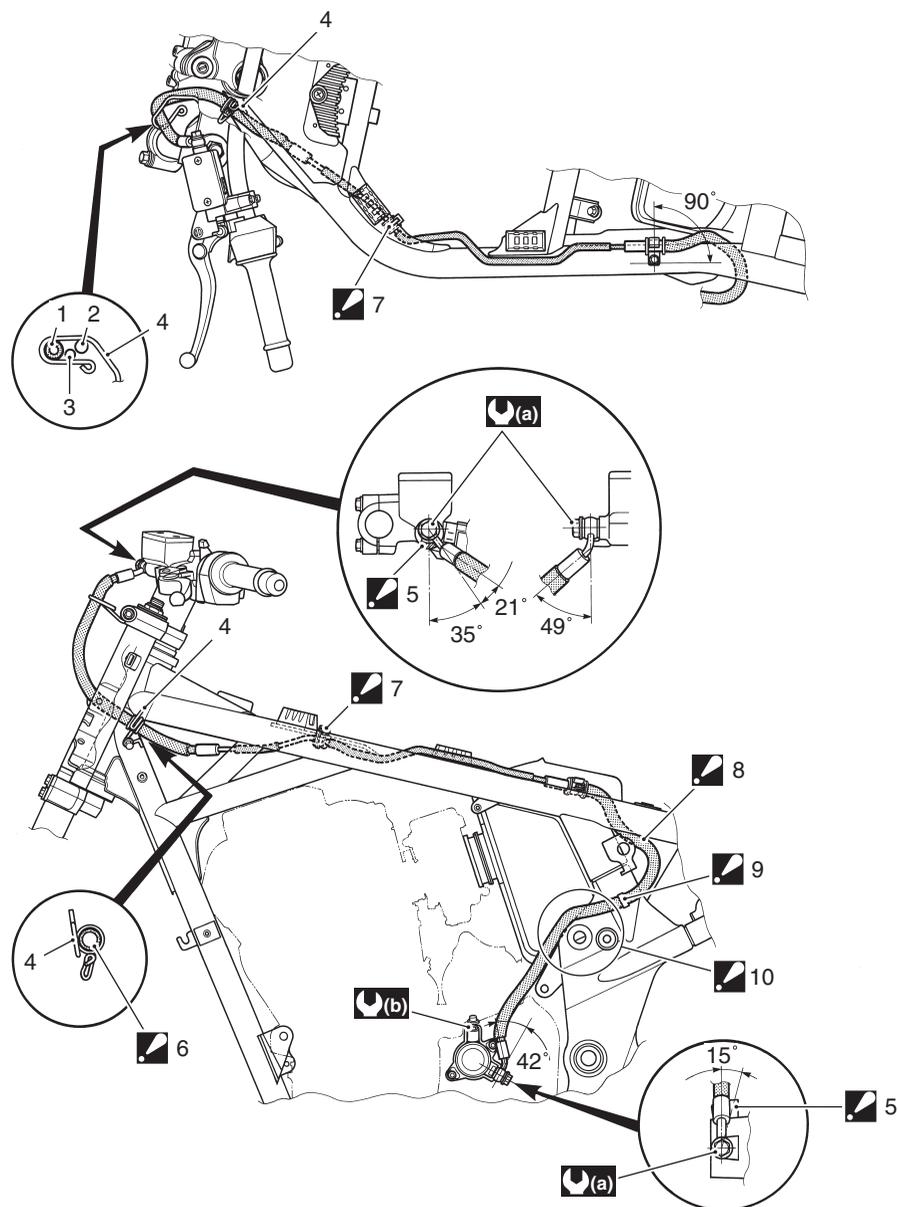
B649G15302001



I649G1530001-04

1. Clutch hose guide	6. Fixed clamp : Align the white paint mark on the clutch hose to the fixed clamp.
2. Stopper : After the clutch hose union has contacted the stopper, tighten the union bolt.	7. Clutch hose : Pass the clutch hose through outside of the wire harness.
3. Grommet : Install the grommet of the clutch hose to the clutch hose guide properly.	(a) : 23 N-m (2.3 kgf-m, 16.5 lb-ft)
4. Clutch hose clamp : Insert the clutch hose clamp end to the hole of the frame fully.	(b) : 8 N-m (0.8 kgf-m, 6.0 lb-ft)
5. Clutch hose : Pass through the clutch hose between the frame and fuel tank rail. Be careful not to contact the clutch hose and frame cover bracket.	

GSF1200S



I649G1530002-04

1. Clutch hose	7. Clutch hose clamp : Insert the clutch hose clamp end to the hole of the frame fully.
2. Wire harness	8. Clutch hose : Pass through the clutch hose between the frame and fuel tank rail. Be careful not to contact the clutch hose and frame cover bracket.
3. Starter cable	9. Fixed clamp : Align the white paint mark on the clutch hose to the fixed clamp.
4. Clutch hose guide	10. Clutch hose : Pass the clutch hose through outside of the wire harness.
5. Stopper : After the clutch hose union has contacted the stopper, tighten the union bolt.	(a) : 23 N·m (2.3 kgf·m, 16.5 lb·ft)
6. Grommet : Install the grommet of the clutch hose to the clutch hose guide properly.	(b) : 8 N·m (0.8 kgf·m, 6.0 lb·ft)

Diagnostic Information and Procedures

Clutch System Symptom Diagnosis

B649G15304003

Condition	Possible cause	Correction / Reference Item
Engine is noisy (Noise seems to come from the clutch).	Worn countershaft spline.	Replace countershaft.
	Worn clutch hub spline.	Replace clutch hub.
	Worn clutch plate teeth.	Replace clutch plate.
	Distorted clutch plate.	Replace.
	Worn clutch release bearing.	Replace.
	Weak clutch damper.	Replace primary driven gear.
Clutch slips.	Weak or broken clutch spring.	Replace.
	Worn or distorted clutch pressure plate.	Replace.
	Distorted clutch plate.	Replace.
Clutch drags.	Leakage of clutch fluid.	Repair or replace.
	Worn or damaged clutch cylinder/ release cylinder.	Replace.
	Some clutch springs are weak, while others are not.	Replace.
	Worn or distorted clutch pressure plate.	Replace.
	Distorted clutch plate.	Replace.

Repair Instructions

Clutch Lever Position Switch Inspection

B649G15306007

Inspect the clutch lever position switch in the following procedures:

- 1) Disconnect the clutch lever position switch lead wires.



I649G1530003-01

- 2) Inspect the switch for continuity with a tester. If any abnormality is found, replace the switch with a new one.

Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity (•)))

Clutch lever position switch

Color Position	Terminal (B/Y)	Terminal (B/W)
FREE		
•	○	○

I649G1530004-02

- 3) Connect the clutch lever position switch lead wires.

Clutch Fluid Level Check

B649G15306008

Refer to "Clutch System Inspection: in Section 0B".

Clutch Hose Inspection

B649G15306009

Refer to "Clutch System Inspection: in Section 0B".

Air Bleeding from Clutch Fluid Circuit

B649G15306010

⚠ CAUTION

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

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

- 1) Keep the motorcycle upright and place the handlebars straight.
- 2) Fill up the master cylinder reservoir to the upper end of the inspection window. Replace the reservoir cap to prevent entry of dirt.

- 3) Attach a pipe to the bleeder valve and insert the free end of the pipe into a receptacle.



I649G1020029-01

- 4) Squeeze and release the clutch lever several times in rapid succession, and squeeze the lever fully without releasing it.



I649G1020030-02

- 5) Loosen the bleeder valve by turning it a quarter of a turn so that the fluid runs into the receptacle; this will remove the tension of the clutch lever causing it to touch the handlebar grip.
- 6) Close the valve, pump and squeeze the lever, and open the valve.
- 7) Repeat this process until the fluid flowing into the receptacle no longer contains air bubbles.
- 8) Close the bleeder valve, and disconnect the pipe.

Tightening torque

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

- 9) Fill the reservoir with brake fluid to the upper end of the inspection window.
- 10) Install the reservoir cap.

Clutch Fluid Replacement

B649G15306011

⚠ CAUTION

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

- 1) Place the motorcycle on a level surface and keep the handlebars straight.
- 2) Remove the clutch fluid reservoir cap and diaphragm.
- 3) Suck up the old clutch fluid as much as possible.



I649G1530060-01

- 4) Fill the reservoir with new clutch fluid.

BF: Brake fluid (DOT 4)

- 5) Connect a clear hose to the air bleeder valve and insert the other end of hose into a receptacle.



I649G1020029-01

- 6) Loosen the air bleeder valve and pump the clutch lever until old clutch fluid flows out of the bleeder system.



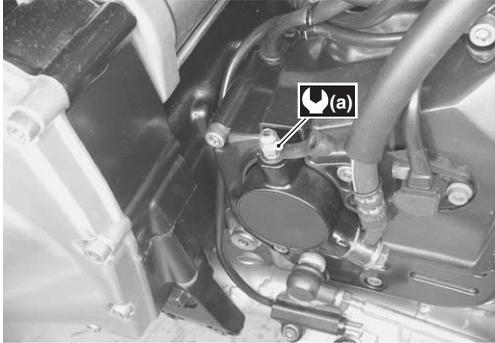
I649G1020030-02

5C-6 Clutch:

- 7) Close the air bleeder valve and disconnect a clear hose.
- 8) Fill the reservoir with new fluid to the upper mark of the reservoir.
- 9) Install the reservoir cap.

Tightening torque

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



I649G1530063-01

Clutch Hose Removal and Installation

B649G15306012

Removal

- 1) Drain clutch fluid. Refer to “Clutch Fluid Replacement:”.
- 2) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation: in Section 1G”.
- 3) Remove the clutch hose as shown in the clutch hose routing diagram. Refer to “Clutch Hose Routing Diagram:”.

Installation

- 1) Install the clutch hose as shown in the clutch hose routing diagram. Refer to “Clutch Hose Routing Diagram:”.
- 2) Install the fuel tank. Refer to “Fuel Tank Removal and Installation: in Section 1G”.
- 3) Bleed air from the clutch system. Refer to “Air Bleeding from Clutch Fluid Circuit:”.

5C-8 Clutch:

Clutch Master Cylinder Assembly Removal and Installation

B649G15306016

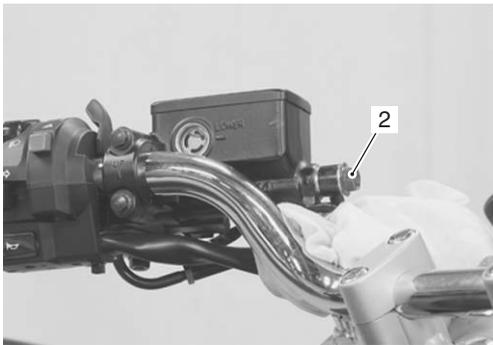
Removal

- 1) Drain clutch fluid. Refer to "Clutch Fluid Replacement: ".
- 2) Disconnect the clutch lever position switch lead wires (1).



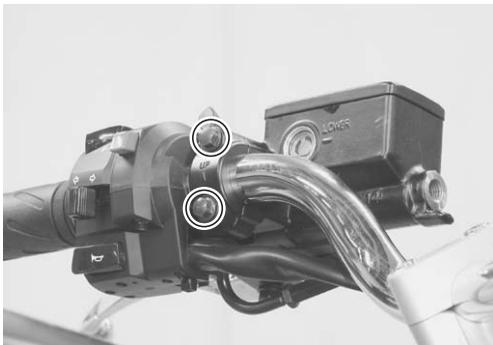
I649G1530006-01

- 3) Place a rag underneath the brake hose union bolt (2) on the master cylinder to catch any spilt brake fluid.
- 4) Remove the clutch hose union bolt (2) and disconnect the clutch hose.



I649G1530007-01

- 5) Remove the left rear view mirror. (GSF1200)
- 6) Remove the master cylinder assembly.



I649G1530008-01

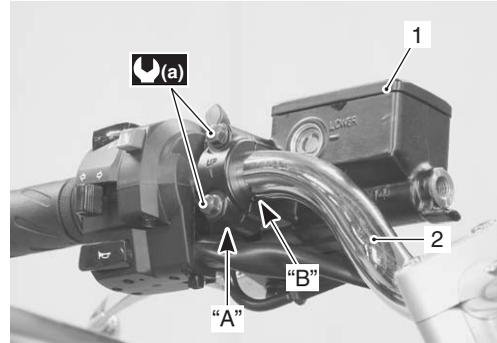
Installation

Install the clutch master cylinder in the reverse order of removal. Pay attention to the following points:

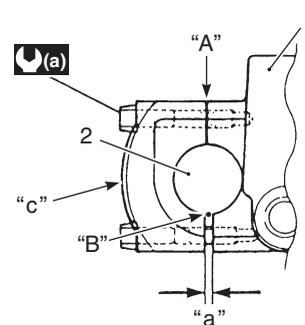
- When installing the master cylinder (1) onto the handlebars (2), align the master cylinder holder's mating surface "A" with the punch mark "B" on the handlebars (2) and tighten the upper holder bolt first.

Tightening torque

Clutch master cylinder holder bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I649G1530064-01



I649G1530010-01

"a": Clearance

"c": "UP" mark

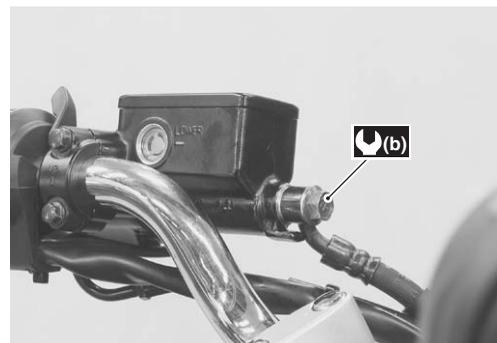
- After setting the clutch hose union to the stopper, tighten the union bolt to the specified torque.

⚠ CAUTION

The seal washers should be replaced with the new ones to prevent fluid leakage.

Tightening torque

Clutch hose union bolt (b): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I649G1530011-01

- Bleed air from the clutch system. Refer to "Clutch System Inspection: in Section 0B".

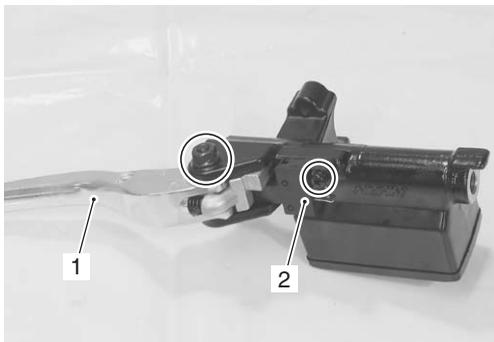
Clutch Master Cylinder / Clutch Lever Disassembly and Assembly

B649G15306015

Refer to "Clutch Master Cylinder Assembly Removal and Installation: ".

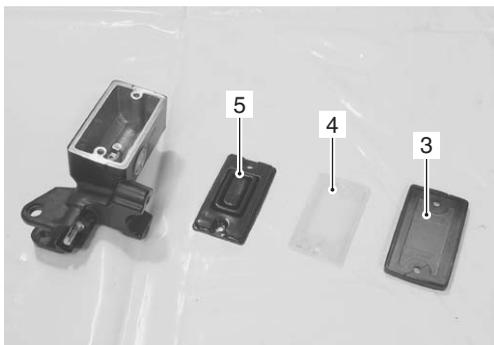
Disassembly

- 1) Remove the clutch lever (1) and clutch lever position switch (2).



I649G1530012-01

- 2) Remove the reservoir cap (3), plate (4) and diaphragm (5).



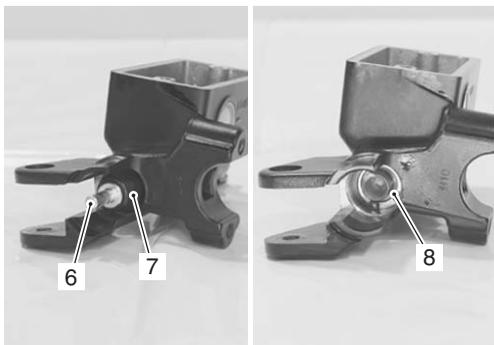
I649G1530013-01

- 3) Pull out the push rod (6) and dust boot (7).

- 4) Remove the snap ring (8).

Special tool

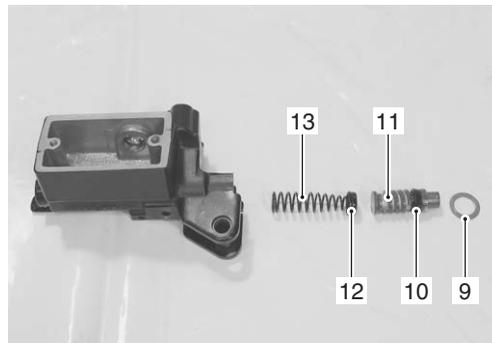
 : 09900-06108 (Snap ring pliers)



I649G1530014-01

- 5) Remove the following parts from the master cylinder.

- Washer (9)
- Secondary cup (10)
- Piston (11)
- Primary cup (12)
- Spring (13)



I649G1530015-01

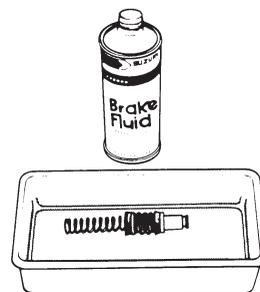
Assembly

Assemble the master cylinder in the reverse order of disassembly. Pay attention to the following points:

CAUTION

- Wash the master cylinder components with new clutch fluid before reassembly.
- Do not wipe the clutch fluid off after washing the components.
- When washing the components, use the specified clutch fluid (Brake fluid). Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.
- Apply brake fluid to the master cylinder bore and all of the master cylinder component to be inserted into the bore.

BF: Brake fluid (DOT 4)

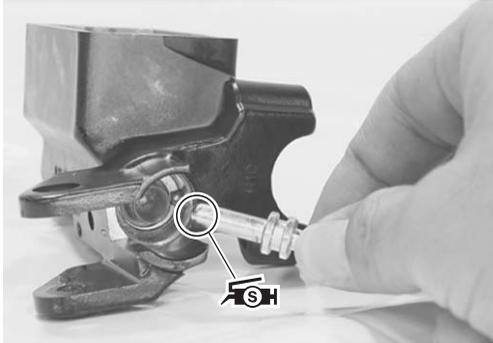


I649G1530016-01

5C-10 Clutch:

- Apply SUZUKI SILICONE GREASE to the push rod end.

 **Grease 99000-25100 (SUZUKI Silicone Grease or equivalent)**



I649G1530017-02

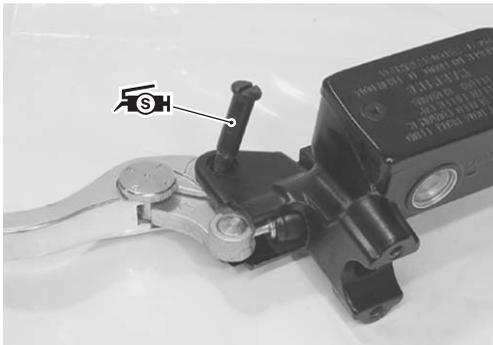
- When installing the clutch lever position switch, align the projection on the switch with the hole in the master cylinder.



I649G1530018-01

- Apply SUZUKI SILICONE GREASE to the clutch lever pivot bolt when installing.

 **Grease 99000-25100 (SUZUKI Silicone Grease or equivalent)**



I649G1530019-02

Tightening torque

Clutch lever pivot bolt: 1.0 N·m (0.1 kgf-m, 0.72 lb-ft)

Clutch lever pivot bolt lock-nut: 6.0 N·m (0.6 kgf-m, 4.5 lb-ft)

Clutch Master Cylinder Parts Inspection

B649G15306017

Refer to "Clutch Master Cylinder / Clutch Lever Disassembly and Assembly: ".

Master Cylinder

Inspect the master cylinder bore for any scratches or other damage.



I649G1530020-01

Piston

Inspect the piston surface for any scratches or other damage.

Rubber Parts

Inspect the primary cup, secondary cup and dust boot for wear or damage.



I649G1530021-01

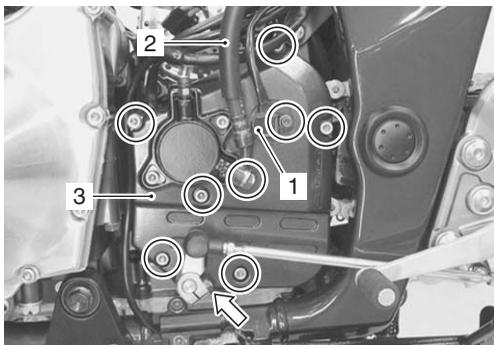
Clutch Release Cylinder / Push Rod Removal and Installation

B649G15306018

Removal

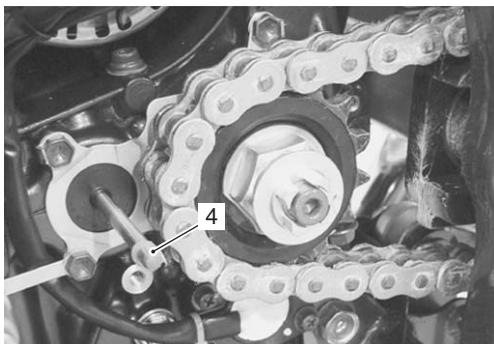
- 1) Drain clutch fluid. Refer to "Clutch Fluid Replacement: ".
- 2) Disengage the gearshift lever link by removing the bolt.
- 3) Remove the speed sensor (1).
- 4) Remove the clutch hose union bolt and disconnect the clutch hose (2).

- 5) Remove the engine sprocket cover (3) by removing the bolts.



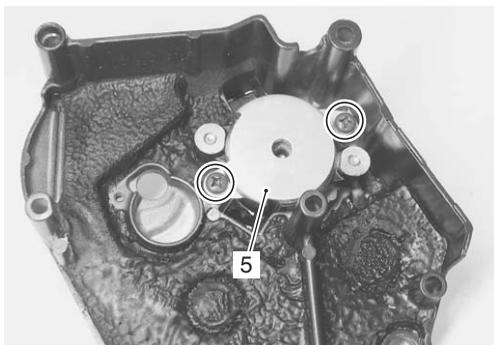
I649G1530022-04

- 6) Remove the push rod (4).



I649G1530023-02

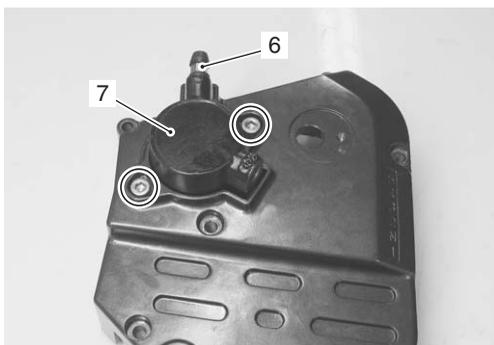
- 7) Remove the piston retainer (5).



I649G1530024-01

- 8) Remove the air bleeder valve (6).

- 9) Remove the clutch release cylinder (7) by removing the mounting bolts.



I649G1530025-01

Installation

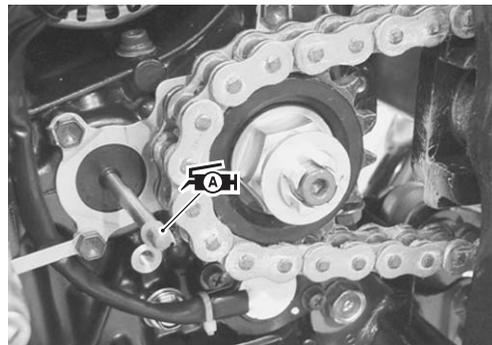
Install the clutch release cylinder in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

The seal washers should be replaced with the new ones to prevent fluid leakage.

- Apply a small quantity of SUZUKI SUPER GREASE "A" to the push rod.

 **Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)**



I649G1530061-01

- Install the clutch hose as shown in the clutch hose routing diagram. Refer to "Clutch Hose Routing Diagram: ".
- Bleed air from the clutch system. Refer to "Air Bleeding from Clutch Fluid Circuit: ".

Clutch Release Cylinder Disassembly and Assembly

B649G15306019

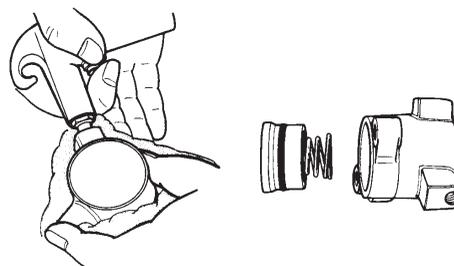
Refer to "Clutch Release Cylinder / Push Rod Removal and Installation: ".

Disassembly

- 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.



I649G1530026-01

5C-12 Clutch:

Assembly

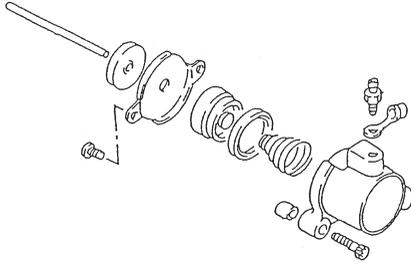
Assemble the clutch cylinder in the reverse order of disassembly. Pay attention to the following points:

- Wash the cylinder bore and piston with specified brake fluid.

BF: Brake fluid (DOT 4)

⚠ CAUTION

- **Wash the cylinder components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.**
- **Do not wipe the brake fluid off after washing the components.**
- **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.**



I649G1530027-01

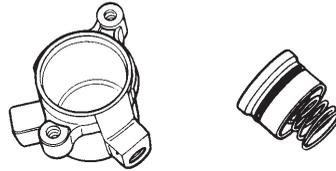
- Bleed air from the clutch system. Refer to “Air Bleeding from Clutch Fluid Circuit: ”.

Clutch Release Cylinder Inspection

B649G15306020

Refer to “Clutch Release Cylinder Disassembly and Assembly: ”.

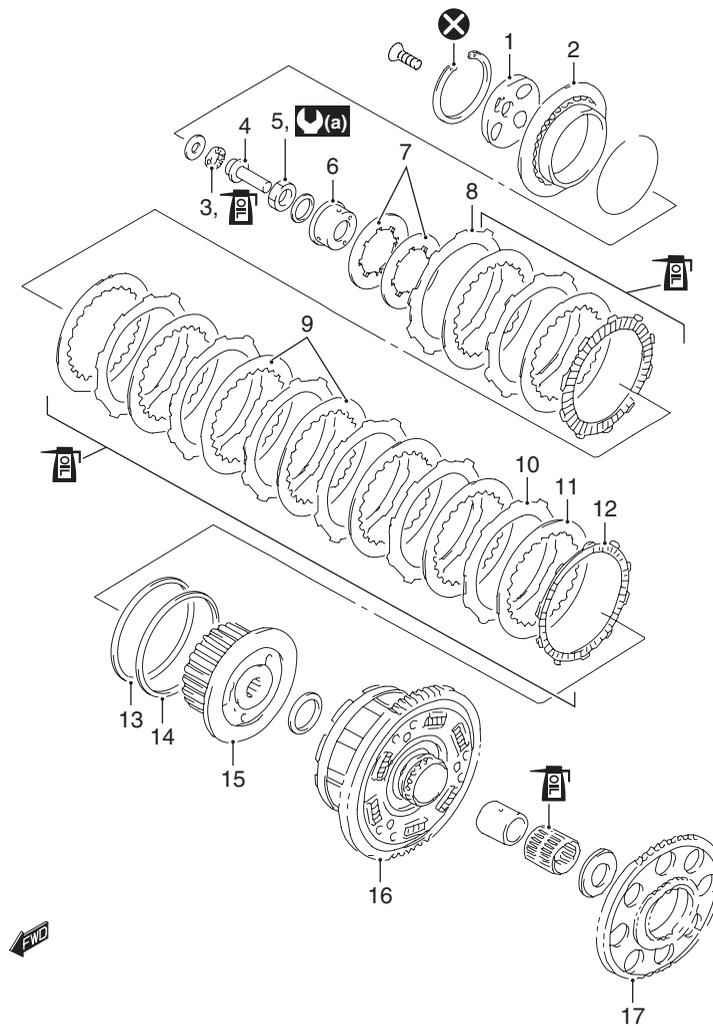
- Inspect the clutch cylinder bore wall for nicks, scratches or other damage.
- Inspect the piston surface for any scratches or other damage.



I649G1530028-01

Clutch Components

B649G15306021

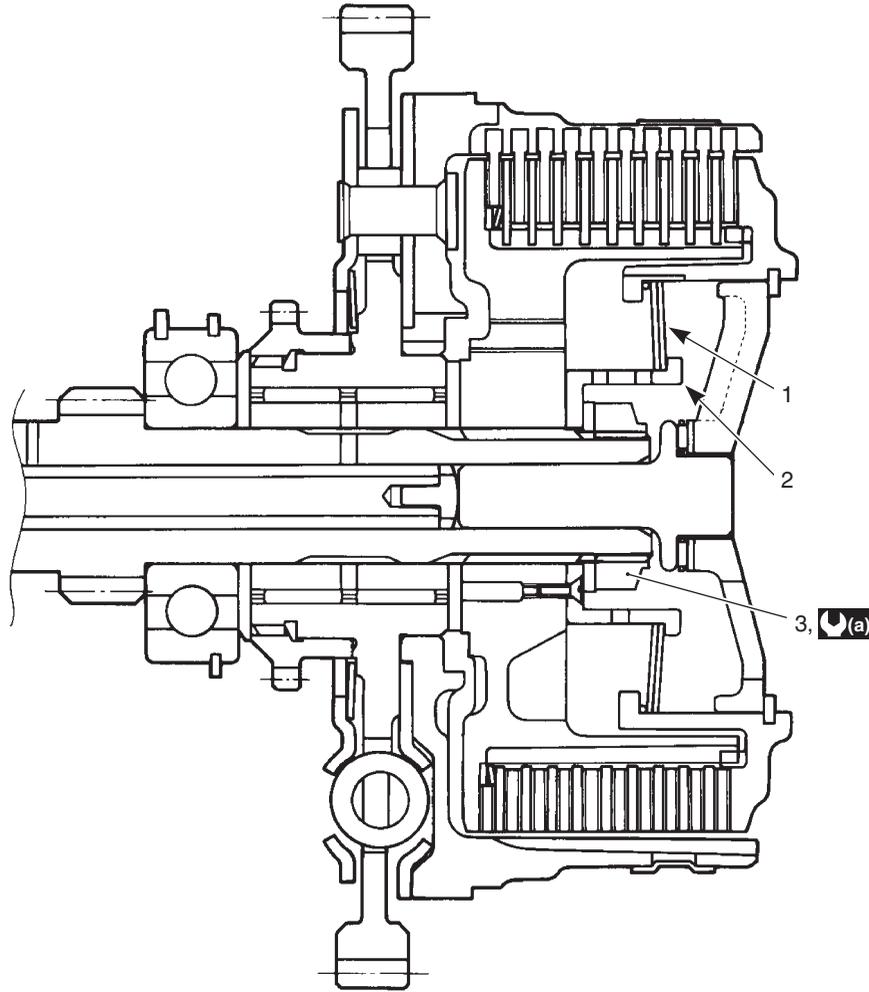


I649G1530062-01

1. Clutch pressure plate lifter	8. No.2 drive plate	15. Clutch sleeve hub
2. Clutch pressure plate	9. No.2 driven plate (1 – 4 pcs) : The No.1 and No.2 driven plats are 9 in total.	16. Primary driven gear assembly
3. Bearing	10. No.1 drive plate	17. Generator/Oil pump drive gears
4. Clutch push piece	11. No.1 driven plate (5 – 8 pcs) : The No.1 and No.2 driven plats are 9 in total.	(a) : 150 N·m (15.0 kgf·m, 108.5 lb·ft)
5. Clutch sleeve hub nut	12. No.3 drive plate	Oil can icon : Apply oil.
6. Clutch diaphragm spring holder	13. Spring washer	Do not reuse icon : Do not reuse.
7. Clutch diaphragm spring	14. Spring washer seat	

Clutch Assembly Diagram

B649G15306022



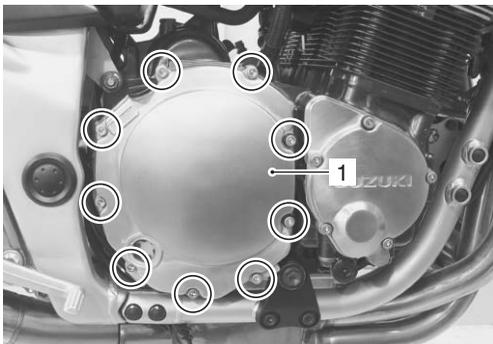
1. Diaphragm springs	3. Clutch sleeve hub nut
2. Diaphragm spring holder	(a) : 150 N·m (15.0 kgf·m, 108.5 lb-ft)

I649G1530029-01

Clutch Removal

B649G15306023

- 1) Drain engine oil. Refer to "Engine Oil and Filter Replacement: in Section 0B".
- 2) Remove the clutch cover (1).

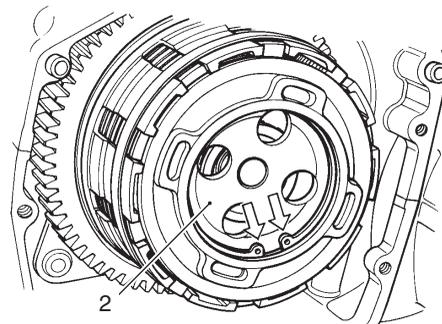


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- 3) Remove the clutch pressure plate lifter (2) by removing the snap ring.

Special tool

TOOL : 09900-06108 (Snap ring pliers)

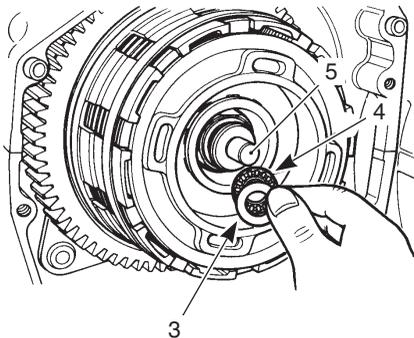


I649G1530031-01

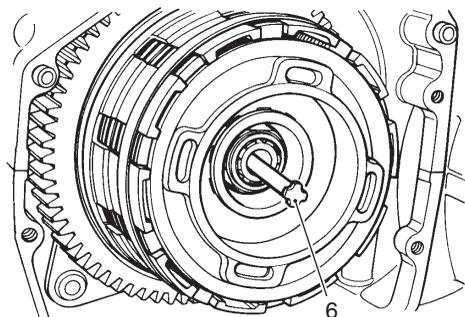
- 4) Remove the thrust washer (3), bearing (4) and clutch push piece (5), and pull out the clutch push rod (6).

NOTE

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



I649G1530032-01

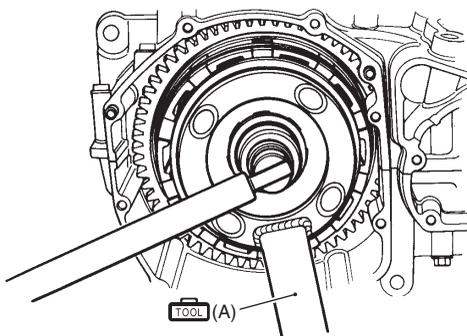


I649G1530033-01

- 5) Hold the clutch pressure plate with the special tool and loosen the clutch sleeve hub nut.

Special tool

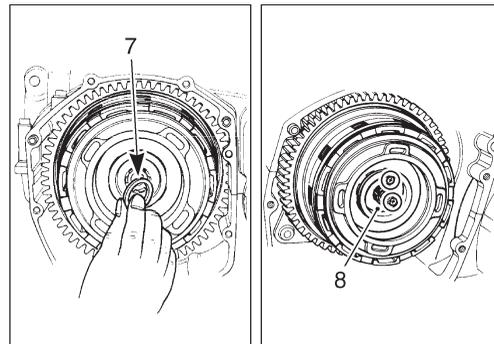
 (A): 09920-34820 (Clutch pressure plate holder)



I649G1530034-01

- 6) After removing the clutch sleeve hub nut, remove the lock washer (7).

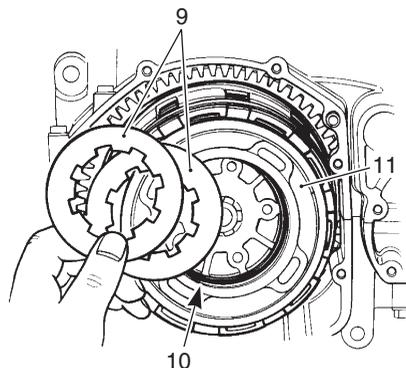
- 7) Remove the clutch diaphragm spring holder (8) by removing the screws.



I649G1530035-03

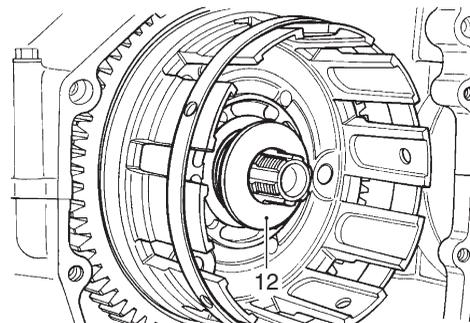
- 8) Remove the clutch diaphragm springs (9), clutch diaphragm spring seat (10) and clutch pressure plate (11).

- 9) Remove the clutch drive and driven plates along with the clutch sleeve hub.



I649G1530036-01

- 10) Remove the thrust washer (12).



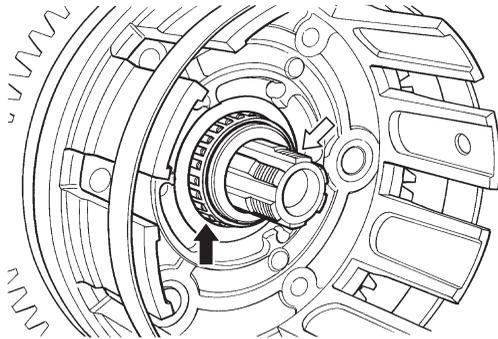
I649G1530037-01

5C-16 Clutch:

- 11) Remove the spacer and bearing.
- 12) Remove the primary driven gear assembly with the generator/oil pump drive gears.

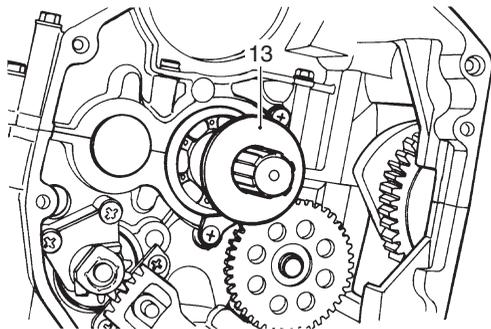
NOTE

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



I649G1530038-01

- 13) Remove the thrust washer (13).



I649G1530039-01

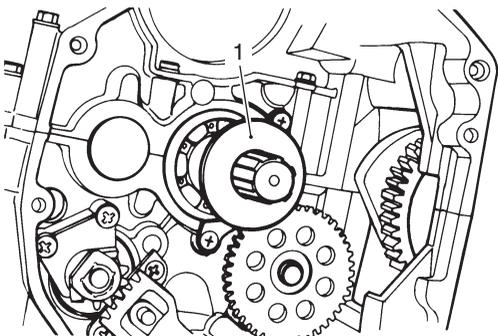
Clutch Installation

B649G15306024

- 1) Install the thrust washer (1) onto the countershaft.

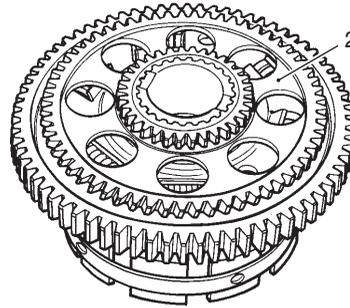
NOTE

The flat surface of the thrust washer should face out.



I649G1530040-01

- 2) Install the generator/oil pump drive gears (2) onto the primary driven gear assembly as shown.



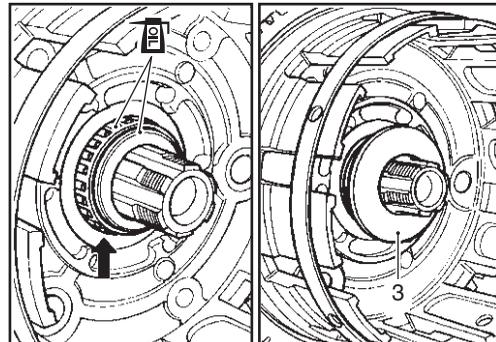
I649G1530041-01

- 3) Install the primary driven gear assembly onto the countershaft, and apply engine oil onto the needle bearing and spacer.

NOTE

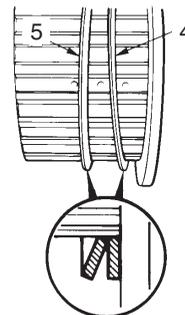
- If it is difficult to install the primary driven gear, rotate the crankshaft.
- Be sure to engage the oil pump driven gear, generator driven gear and primary driven gear with their respective drive gears.

- 4) Install the thrust washer (3) onto the countershaft.



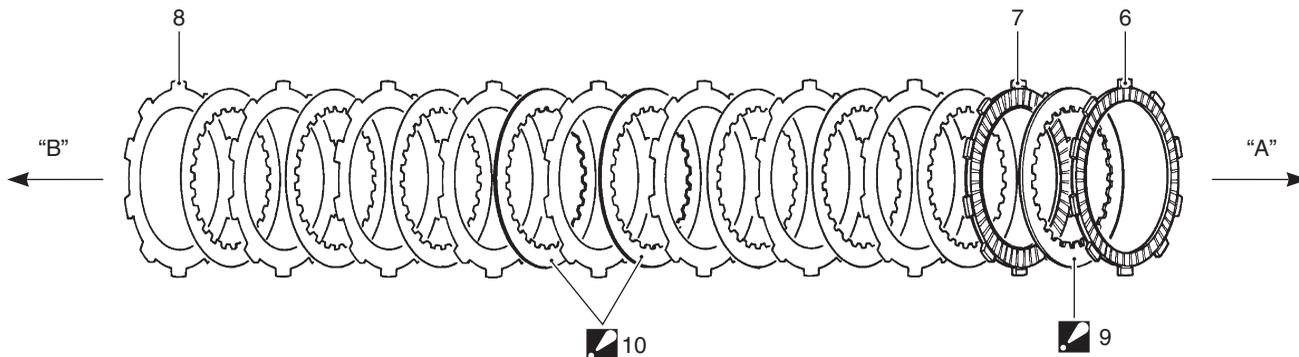
I649G1530042-01

- 5) Install the spring washer seat (4) and spring washer (5) onto the clutch sleeve hub correctly.
- 6) Install the clutch sleeve hub onto the countershaft.



I649G1530043-01

7) Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order, No.3 drive plate (6) first.



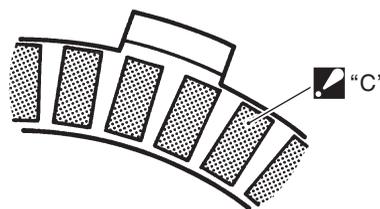
I649G1530044-02

6. No.3 drive plate	10. No.2 driven plate (1 – 4 pcs) : The No.1 and No.2 driven plates are 9 in total.
7. No.1 drive plate	"A": Direction of inside
8. No.2 drive plate	"B": Pressure plate side
9. No.1 driven plate (5 – 8 pcs) : The No.1 and No.2 driven plates are 9 in total.	

NOTE

For drive plate

Three kinds of the drive plate (No. 1, No. 2 and No. 3) are equipped in the clutch system, they can be distinguished by the inside diameter and clutch facing "C".



I649G1530045-01

<p>Clutch facing</p> <p>: No.1 and No.2 drive plates resemble each other very closely in external appearance. Make sure to check the numbers of clutch facing, before installing them.</p>
--

Drive plate	I.D.	Clutch facing "C"
No.1	101 mm (4.0 in)	40 pcs
No.2	101 mm (4.0 in)	48 pcs
No.3	108 mm (4.3 in)	48 pcs

NOTE

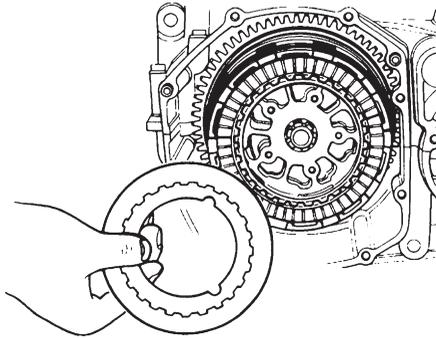
For driven plate

Two kinds of the driven plate (No. 1 and No. 2) are equipped in the clutch system, they can be distinguished by the thickness. The No. 1 and No. 2 driven plates are 9 in total. The driven plate No. 2 should be used within 4 pcs. The driven plate No. 2 should be installed between third to seventh position from the pressure plate.

5C-18 Clutch:

Driven plate	Thickness
No.1	1.6 mm (0.06 in)
No.2	2 mm (0.08 in)

- 8) Put the clutch pressure plate onto the clutch sleeve hub securely.

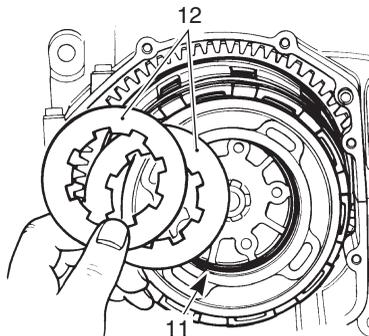


I649G1530046-01

- 9) Put the clutch diaphragm spring seat (11) and clutch diaphragm springs (12) onto the clutch pressure plate properly.

NOTE

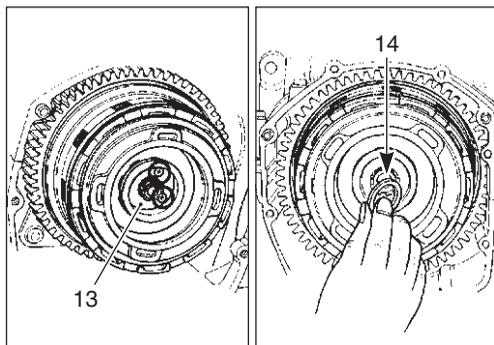
Pay attention to the direction of the clutch diaphragm springs. Refer to "Clutch Assembly Diagram: ".



I649G1530047-03

- 10) Install the diaphragm spring holder (13) with the screws.

- 11) Install the lock washer (14).



I649G1530048-02

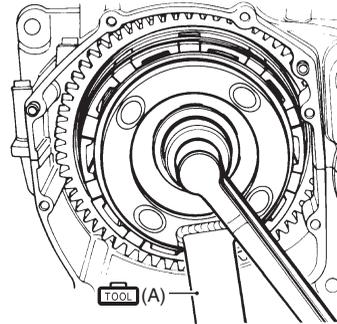
- 12) Tighten the clutch sleeve hub nut to the specified torque by using the torque wrench and clutch pressure plate holder.

Special tool

 (A): 09920-34820 (Clutch pressure plate holder)

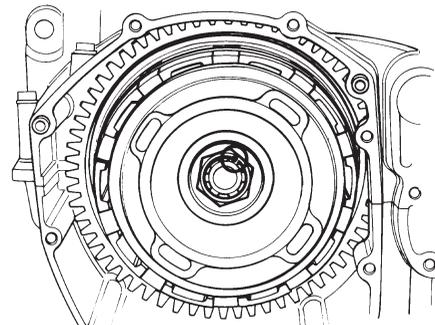
Tightening torque

Clutch sleeve hub nut: 150 N·m (15.0 kgf-m, 108.5 lb-ft)



I649G1530049-01

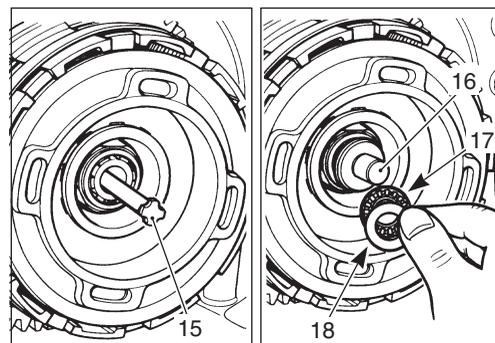
- 13) Lock the clutch sleeve hub nut with a center punch.



I649G1530050-01

- 14) Insert the clutch push rod (15) into the countershaft.

- 15) Install the clutch push piece (16), bearing (17) and thrust washer (18) to the countershaft.



I649G1530051-02

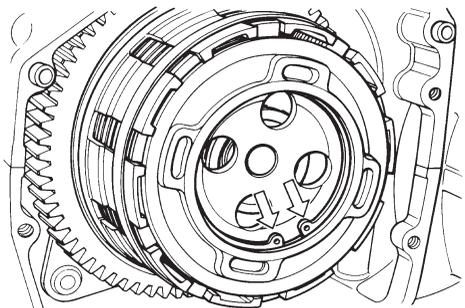
- 16) Fix the clutch pressure plate lifter with the snap ring.

Special tool

 : 09900-06108 (Snap ring pliers)

NOTE

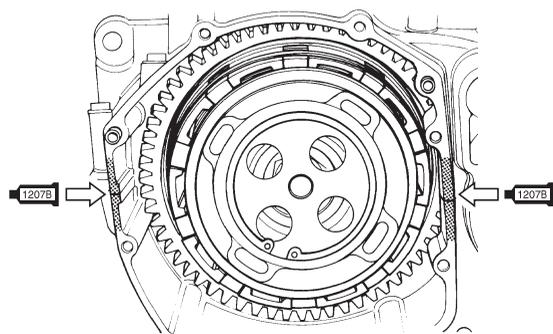
When fitting the circlip, make sure that the sharp edge of the snap ring faces outside.



I649G1530052-01

- 17) Apply a light coat of the SUZUKI BOND "1207B" to the clutch cover gasket mating surface as shown.

 : Sealant 99000-31140 (SUZUKI Bond 1207B or equivalent)



I649G1530053-02

- 18) Install the dowel pins, a new gasket and the clutch cover.

CAUTION

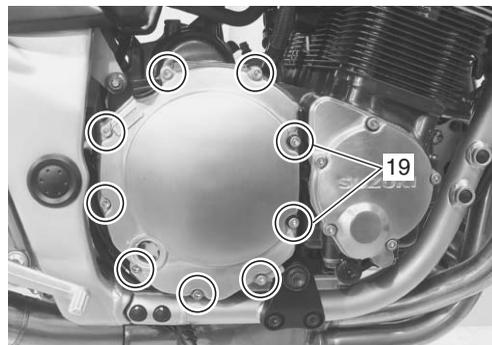
Use only new gasket to prevent oil leakage.

- 19) Install the two gasket washers onto the clutch cover bolts (19) as shown.

CAUTION

Use only new gasket washers to prevent oil leakage.

- 20) Tighten the clutch cover bolts securely.



I649G1530054-02

- 21) Pour Engine oil. Refer to "Engine Oil and Filter Replacement: in Section 0B".

Clutch Parts Inspection

B649G15306025

Refer to "Clutch Removal: " and "Clutch Installation: ".

Clutch Diaphragm Spring

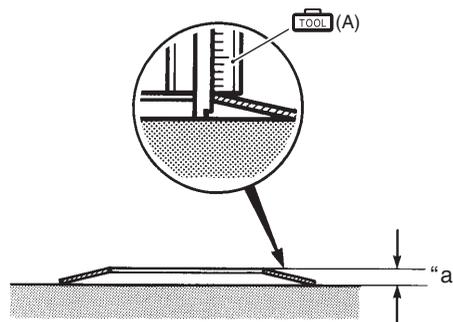
Measure the free height "a" of each diaphragm spring with a vernier calipers. If each diaphragm spring height is not within the specified limit, replace it with a new one.

Special tool

 (A): 09900-20102 (Vernier calipers)

Clutch spring free height "a"

Service limit: 3.1 mm (0.12 in)



I649G1530055-02

5C-20 Clutch:

Clutch Drive and Driven Plate

NOTE

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

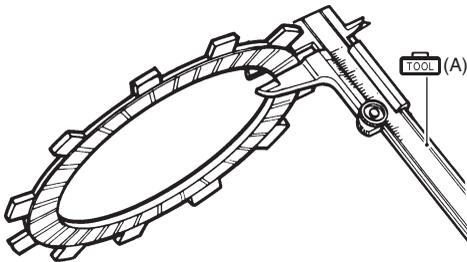
Measure the thickness of drive plates with a vernier calipers. If the drive plate thickness is found to have reached the limit, replace it with a new one.

Special tool

 (A): 09900-20102 (Vernire calipers)

Clutch drive plate thickness

Service limit (No.1, No.2 and No.3 drive plates): 2.62 mm (0.103 in)



I649G1530056-02

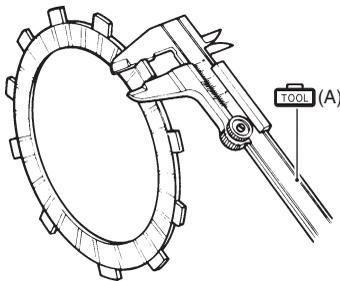
Measure the claw width of drive plates with a vernier calipers. Replace the drive plates found to have worn down to the limit.

Special tool

 (A): 09900-20102 (Vernire calipers)

Clutch drive plate claw width

Service limit (No.1, No.2 and No.3 drive plates): 13.0 mm (0.51 in)



I649G1530057-02

Measure each driven plate for distortion with a thickness gauge and surface plate.

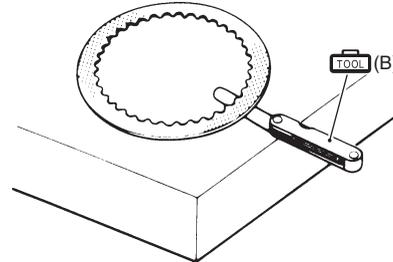
Replace driven plates which exceed the limit.

Special tool

 (B): 09900-20803 (Thickness gauge)

Clutch driven plate distortion

Service limit: 0.10 mm (0.004 in)



I649G1530058-02

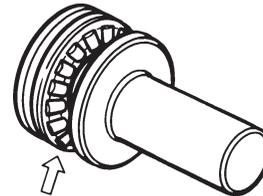
Clutch Release Bearing

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

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

NOTE

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



I649G1530059-01

Specifications

Service Data

B649G15307004

Clutch

Unit: mm (in)

Item	Standard	Limit
Clutch drive plate thickness	2.92 – 3.08 (0.115 – 0.121)	2.62 (0.103)
Clutch drive plate claw width	—	13.0 (0.51)
Clutch driven plate distortion	—	0.10 (0.004)
Clutch spring free height	—	3.1 (0.12)
Clutch master cylinder bore	14.000 – 14.043 (0.5511 – 0.5529)	—
Clutch master cylinder piston diam	13.957 – 13.984 (0.5495 – 0.5506)	—
Clutch release cylinder bore	38.18 – 38.23 (1.503 – 1.505)	—
Clutch release cylinder piston diam	38.08 – 38.13 (1.500 – 1.501)	—

Oil

Item	Specification	Note
Brake fluid type	DOT 4	

Tightening Torque Specifications

B649G15307005

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Air bleeder valve (Clutch)	8	0.8	6.0	⌀ / ⌀
Clutch master cylinder holder bolt	10	1.0	7.0	⌀
Clutch hose union bolt	23	2.3	16.5	⌀
Clutch lever pivot bolt	1.0	0.1	0.72	⌀
Clutch lever pivot bolt lock-nut	6.0	0.6	4.5	⌀
Clutch sleeve hub nut	150	15.0	108.5	⌀

NOTE

The specified tightening torque is also described in the following.

“Clutch Hose Routing Diagram: ”

“Clutch Control System Components: ”

“Clutch Components: ”

“Clutch Assembly Diagram: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G15308001

Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞ / ☞ / ☞
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000-25010	☞
	SUZUKI Silicone Grease or equivalent	P/No.: 99000-25100	☞ / ☞
Sealant	SUZUKI Bond 1207B or equivalent	P/No.: 99000-31140	☞

NOTE

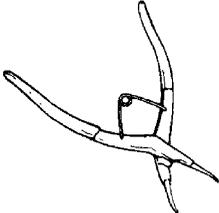
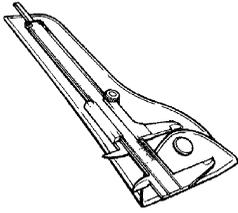
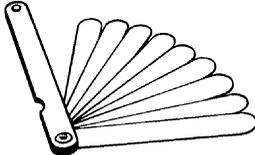
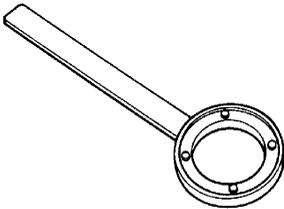
Required service material is also described in the following.

“Clutch Control System Components: ”

“Clutch Components: ”

Special Tool

B649G15308002

<p>09900-06108 Snap ring pliers</p> <p>☞ / ☞ / ☞</p> 	<p>09900-20102 Vernier calipers (1/20 mm, 200 mm)</p> <p>☞ / ☞ / ☞</p> 
<p>09900-20803 Thickness gauge</p> <p>☞</p> 	<p>09900-25008 Multi-circuit tester set</p> <p>☞</p> 
<p>09920-34820 Clutch pressure plate holder</p> <p>☞ / ☞</p> 	

Section 6

Steering

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Precautions

Precautions

Precautions for Steering

Refer to “General Precautions: in Section 00”.

B649G1600001

Steering General Diagnosis

Diagnostic Information and Procedures

Steering Symptom Diagnosis

B649G16104003

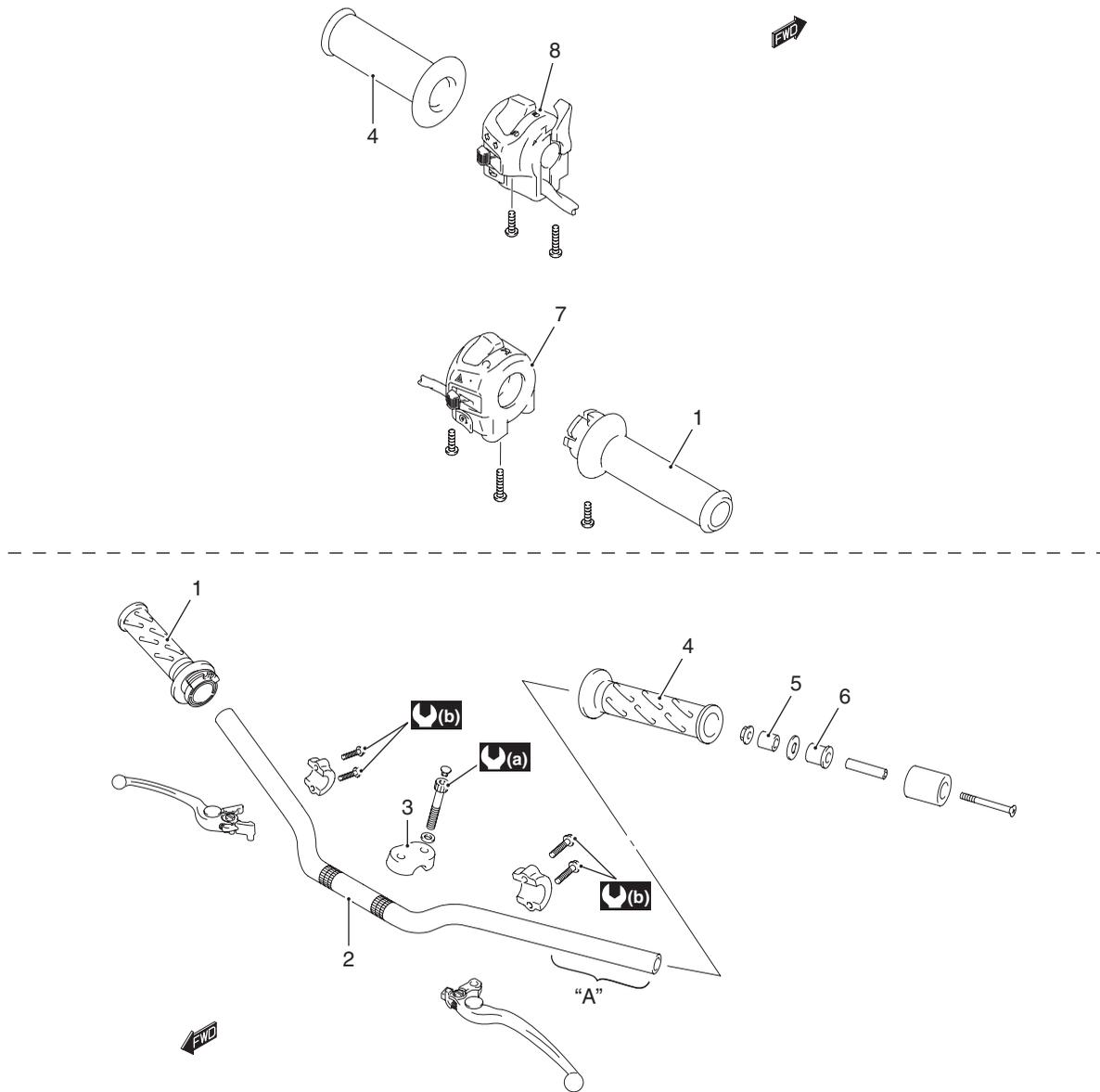
Condition	Possible cause	Correction / Reference Item
Heavy Steering	Over tightened steering stem nut.	<i>Adjust.</i>
	Broken bearing in steering stem.	<i>Replace.</i>
	Distorted steering stem.	<i>Replace.</i>
	Not enough pressure in tires.	<i>Adjust.</i>
Wobbly Handlebars	Loss of balance between right and left front forks.	<i>Replace fork or adjust fork oil level or replace spring.</i>
	Distorted front fork.	<i>Repair or replace.</i>
	Distorted front axle or crooked tire.	<i>Replace.</i>
	Loose steering stem nut.	<i>Adjust.</i>
	Worn or incorrect tire or wrong tire pressure.	<i>Adjust or replace.</i>
	Worn bearing/race in steering stem.	<i>Replace.</i>

Steering / Handlebar

Repair Instructions

Handlebars Components

B649G16206001



1. Throttle grip	5. Handle expander	"A": Apply handle grip bond.
2. Handlebars	6. Handle balancer expander	(a) : 23 N·m (2.3 kgf·m, 16.5 lb-ft)
3. Handlebar holder (Upper)	7. Right handlebar switch box	(b) : 10 N·m (1.0 kgf·m, 7.0 lb-ft)
4. Grip rubber	8. Left handlebar switch box.	

I649G1620001-04

Handlebars Removal and Installation

B649G16206008

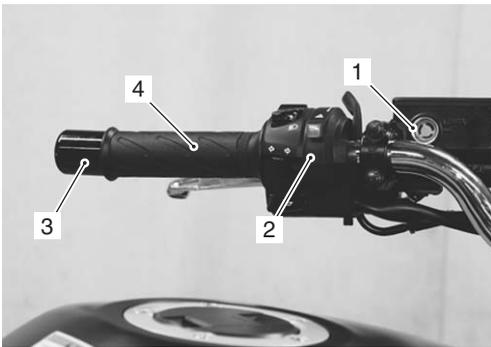
Removal

- 1) Remove the following parts from the left handlebar.
 - a) Rear view mirror (GSF1200)
 - b) Clutch master cylinder/clutch lever (1)

⚠ CAUTION

Do not turn the clutch master cylinder upside down.

- c) Left handlebar switch box (2)
- d) Handlebar balancer (3)
- e) Grip rubber (4)



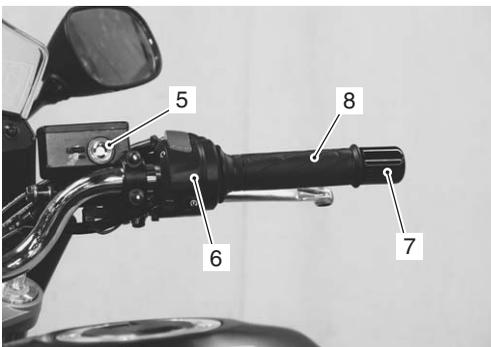
I649G1620002-01

- 2) Remove the following parts from the right handlebar.
 - a) Rear view mirror (GSF1200)
 - b) Front brake master cylinder/Front brake lever (5)

⚠ CAUTION

Do not turn the front brake master cylinder upside down.

- c) Right handlebar switch box (6)
- d) Handlebar balancer (7)
- e) Throttle grip (8)



I649G1620003-02

- 3) Remove the caps and handlebar holder bolts.

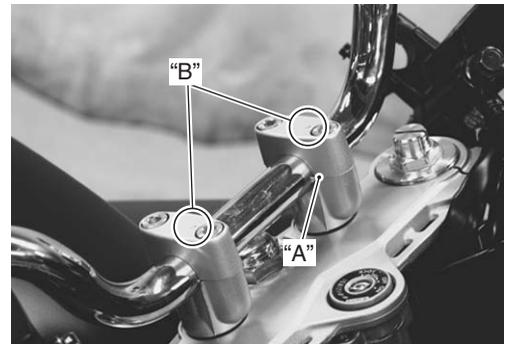


I649G1620004-01

Installation

Install the handlebars in the reverse order of removal. Pay attention to the following points:

- Set the handlebars so that its punch mark "A" aligns with the mating surface of the left handlebar holder.
- Set the handlebar holders with their punch marks "B" forward.



I649G1620005-02

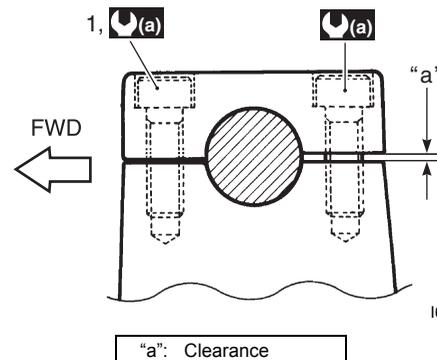
- Tighten the handlebar holder bolts.

NOTE

First tighten the handlebar holder bolts (1) (front ones) to the specified torque.

Tightening torque

Handlebar holder bolt (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



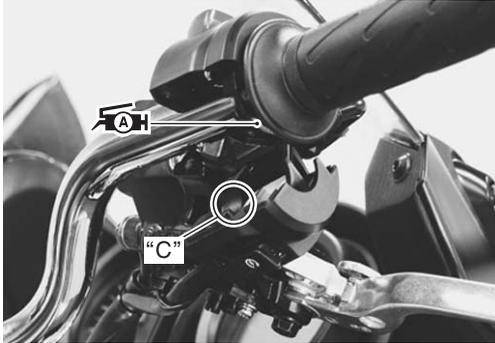
I649G1620006-01

6B-3 Steering / Handlebar:

- Apply SUZUKI SUPER GREASE to the throttle cables and cable pulley.

 **Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)**

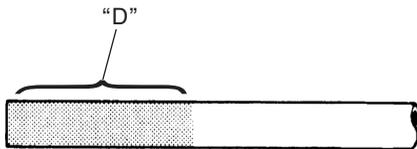
- Insert the projection “C” of the right handlebar switch box into the hole of the handlebars.
- Install the front brake master cylinder. Refer to “Front Brake Master Cylinder Assembly Removal and Installation: in Section 4A”.
- Adjust the throttle cable play. Refer to “Throttle Cable Play Inspection and Adjustment: in Section 0B”.



I649G1620007-01

- Apply a handle grip bond “D” onto the left handlebar before installing the handlebar grip.

: Handle grip bond (Handle grip bond (commercial available))

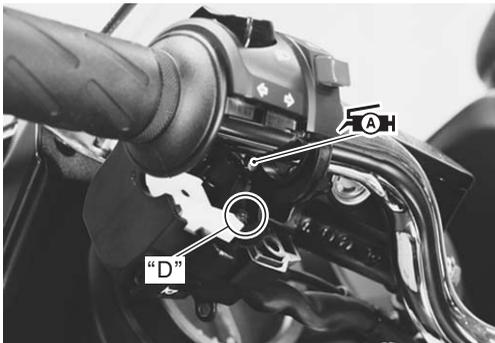


I649G1620008-02

- Apply SUZUKI SUPER GREASE to the starter cable and cable pulley.

 **Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)**

- Insert the projection “D” of the left handlebar switch box into the hole of the handlebars.



I649G1620009-01

- Install the clutch master cylinder. Refer to “Clutch Master Cylinder Assembly Removal and Installation: in Section 5C”.
- After installing the steering, the following adjustments are required before driving.
 - Cable routing (Refer to “Throttle Cable / Starter Cable Routing Diagram: in Section 1G”.)
 - Throttle cable play (Refer to “Throttle Cable Play Inspection and Adjustment: in Section 0B”.)

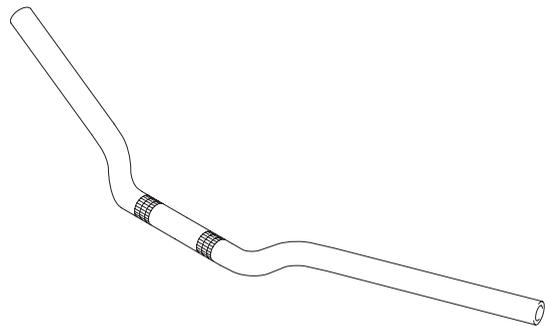
Handlebars Inspection

B649G16206009

Refer to “Handlebars Removal and Installation: ”.

Inspect the handlebars for distortion and damage.

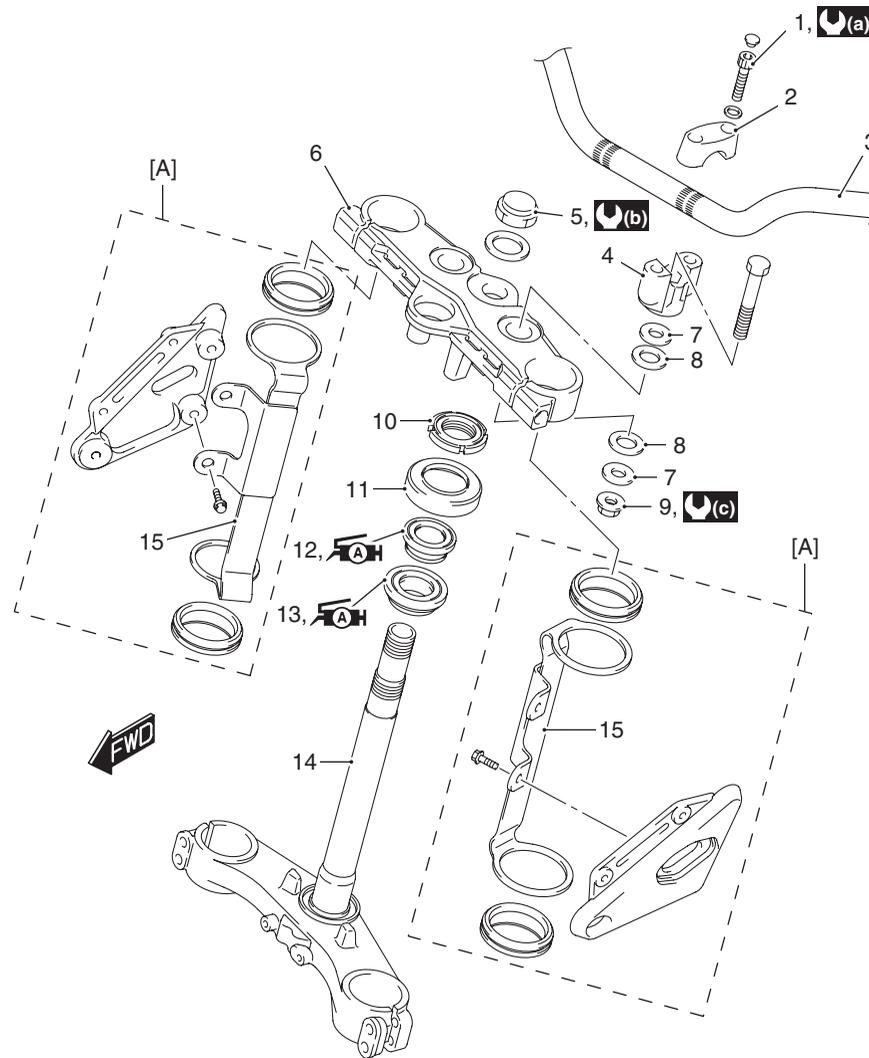
If any defect is found, replace the handlebars with a new one.



I649G1620010-02

Steering Components

B649G16206010



I649G1620041-01

1. Handlebar holder bolt	8. Rubber seat	15. Headlight housing bracket
2. Handlebar holder (Upper)	9. Handlebar holder set nut	[A]: For GSF1200
3. Handlebars	10. Steering stem nut	: 23 N·m (2.3 kgf·m, 16.5 lb-ft)
4. Handlebar holder (Lower)	11. Dust seal	: 65 N·m (6.5 kgf·m, 47.0 lb-ft)
5. Steering stem head nut	12. Steering stem upper bearing	: 45 N·m (4.5 kgf·m, 32.5 lb-ft)
6. Steering stem upper bracket	13. Steering stem lower bearing	: Apply grease to bearing.
7. Washer	14. Steering stem lower bracket	

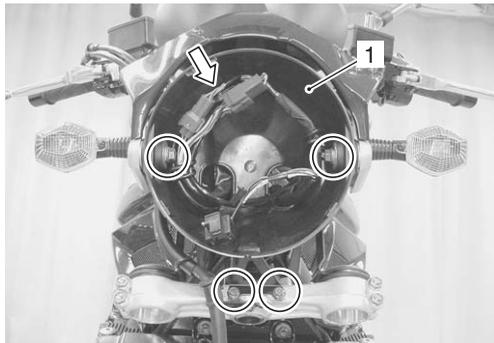
Steering Removal and Installation

B649G16206012

Removal

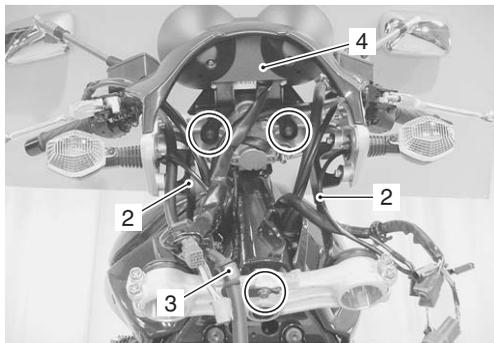
GSF1200

- 1) Support the motorcycle with a jack or a wooden block.
- 2) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: in Section 2D".
- 3) Remove the front forks. Refer to "Front Fork Removal and Installation: in Section 2B".
- 4) Remove the headlight. Refer to "Headlight Removal and Installation: in Section 9B".
- 5) Disconnect the couplers.
- 6) Remove the headlight housing (1).



I649G1620012-03

- 7) Remove the headlight housing brackets (2).
- 8) Remove the brake hose clamp (3).
- 9) Remove the combination meter unit (4).



I649G1620013-02

- 10) Remove the ignition switch (5) using the special tools.

Special tool

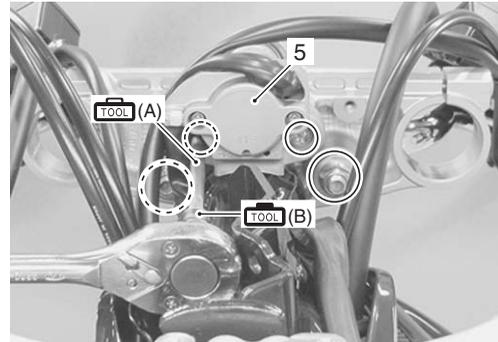
 (A): 09930-11920 (Torx bit (JT 40H))

 (B): 09930-11940 (Bit holder)

- 11) Dismount the handlebars by removing the handlebar holder set nuts.

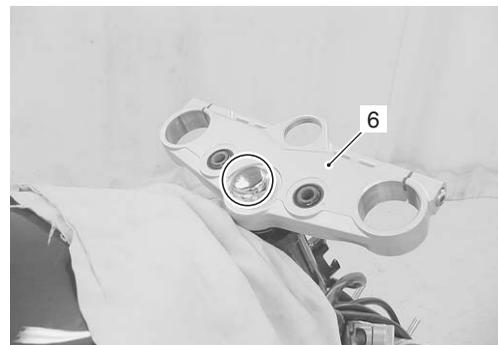
NOTE

Place a rag on the fuel tank to prevent the fuel tank scratched.



I649G1620014-04

- 12) Remove the steering stem head nut and washer.
- 13) Remove the steering stem upper bracket (6).



I649G1620015-02

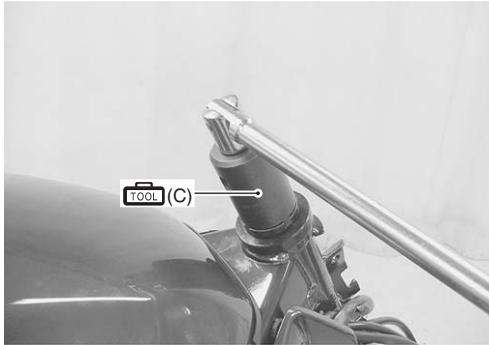
14) Remove the steering stem nut using the special tool.

NOTE

When loosening the stem nuts, hold the steering stem lower bracket to prevent it from falling.

Special tool

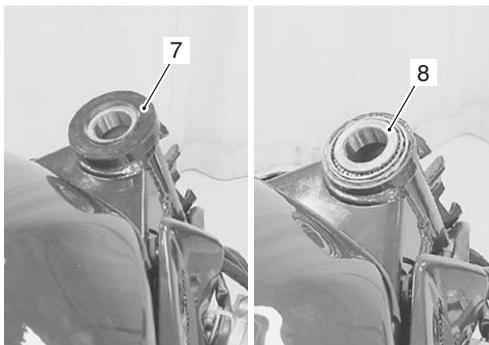
 (C): 09940-14911 (Steering stem nut wrench)



I649G1620016-02

15) Remove the steering stem lower bracket.

16) Remove the dust seal (7) and steering stem upper bearing (8).

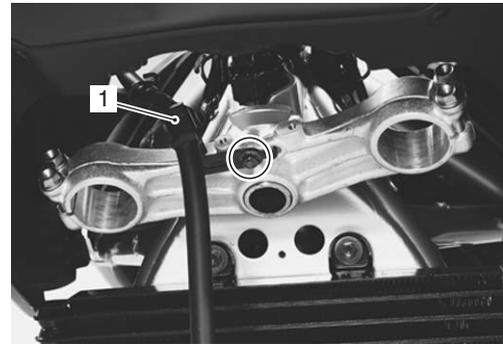


I649G1620017-02

GSF1200S

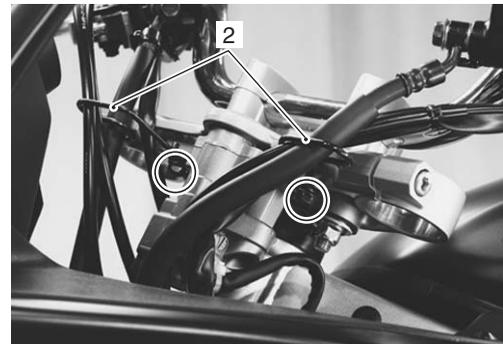
- 1) Support the motorcycle with a jack or a wooden block.
- 2) Remove the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation: in Section 2D".
- 3) Remove the front forks. Refer to "Front Fork Removal and Installation: in Section 2B".

4) Remove the brake hose clamp (1).



I649G1620018-01

5) Remove the cable guides (2).



I649G1620019-01

6) Remove the ignition switch using the special tools.

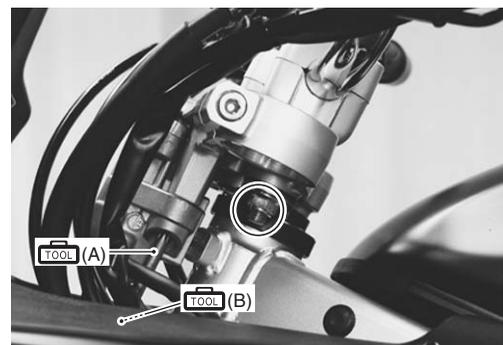
Special tool

 (A): 09930-11920 (Torx bit (JT 40H))
 (B): 09930-11940 (Bit holder)

7) Dismount the handlebars by removing the handlebar holder set nuts.

NOTE

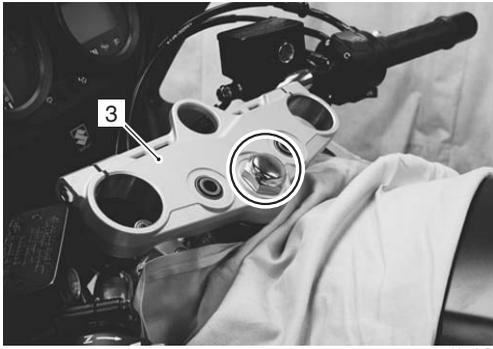
Place a rag on the fuel tank to prevent the fuel tank scratched.



I649G1620020-02

6B-7 Steering / Handlebar:

- 8) Remove the steering stem head nut and washer.
- 9) Remove the steering stem upper bracket (3).



I649G1620021-01

- 10) Remove the steering stem nut using the special tool.

NOTE

When loosening the stem nuts, hold the steering stem lower bracket to prevent it from falling.

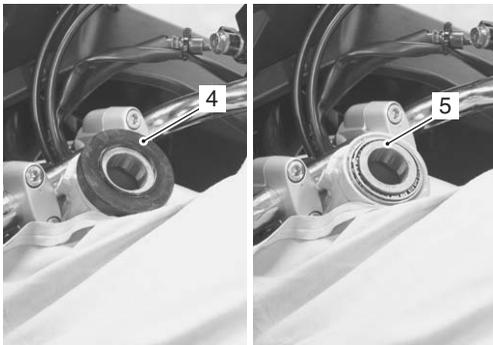
Special tool

 (C): 09940-14911 (Steering stem nut wrench)



I649G1620022-02

- 11) Remove the steering stem lower bracket.
- 12) Remove the dust seal (4) and steering stem upper bearing (5).



I649G1620023-01

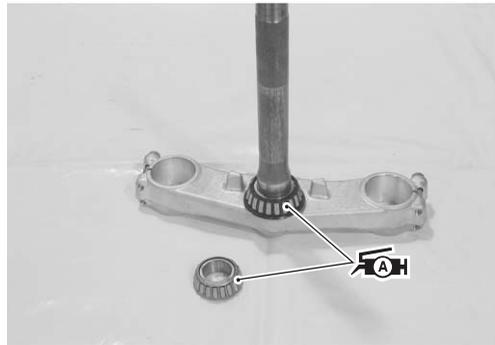
Installation

Install the steering in the reverse order of removal. Pay attention to the following points:

Bearing

- Apply SUZUKI SUPER GREASE to the bearings, races and dust seals before remounting the steering stem.

: Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1620024-01

Steering stem nut

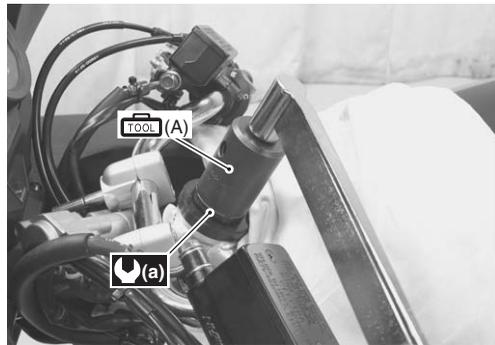
- Tighten the steering stem nut to the specified torque using the special tool.

Special tool

 (A): 09940-14911 (Steering stem nut wrench)

Tightening torque

Steering stem nut (a): 45 N·m (4.5 kgf-m, 32.5 lb-ft) then turn back 1/2 – 1/4.

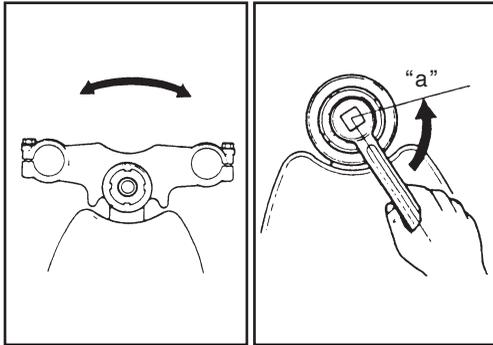


I649G1620025-02

- Turn the steering stem lower bracket about five or six times to the left and right so that the angular ball bearings seat properly.
- Loosen the steering stem nut 1/4 – 1/2 turn “a”.

NOTE

This adjustment will vary from motorcycle to motorcycle.



I649G1620026-01

Steering stem upper bracket

Install the front forks and steering stem upper bracket in the following steps:

- 1) Temporarily install the upper bracket, washer and steering stem head nut (1).
- 2) Set the headlight housing brackets. (GSF1200)
- 3) Temporarily install the front forks.
- 4) Tighten the steering stem head nut (1).

Tightening torque

Steering stem head nut (a): 65 N·m (6.5 kgf·m, 47.0 lb-ft)



I649G1620027-01

- 5) Tighten the front fork upper and lower clamp bolts. Refer to “Front Fork Removal and Installation: in Section 2B”.

Ignition switch

- Apply THREAD LOCK SUPER “1322” to the ignition switch mounting bolts.
 - : Thread lock cement 99000–32110 (Thread Lock Cement Super 1322 or equivalent)
- Install the ignition switch.

Special tool

- : 09930–11920 (Torx bit (JT 40H))
- : 09930–11940 (Bit holder)



I649G1620028-01

Handlebars

- Tighten the handlebar holder set nuts to the specified torque.

Tightening torque

Handlebar holder set nut (a): 45 N·m (4.5 kgf·m, 32.5 lb-ft)



I649G1620029-01

Inspection After Installation

- Check the steering tension. Refer to “Steering Tension Adjustment: ”.

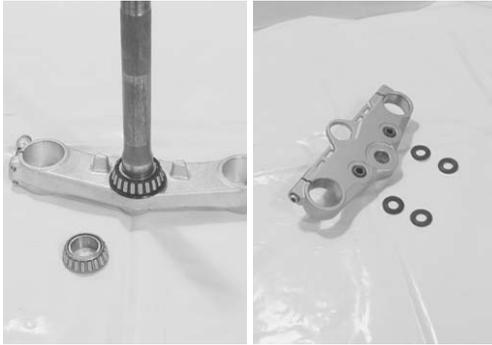
6B-9 Steering / Handlebar:

Steering Related Parts Inspection

B649G16206013

Refer to "Steering Removal and Installation: ".
Inspect the removed parts for the following abnormalities.

- Distortion of the steering stem
 - Bearing wear or damage
 - Abnormal bearing noise
 - Race wear or damage
 - Rubber seat and damper bushing wear or damage
- If any abnormal points are found, replace defective parts with new ones.



I649G1620030-01



I649G1620031-01

Steering System Inspection

B649G16206017

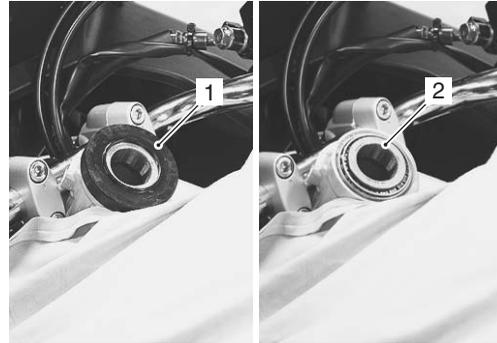
Refer to "Steering System Inspection: in Section 0B".

Steering Stem Bearing Removal and Installation

B649G16206014

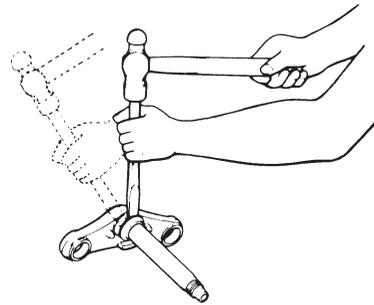
Removal

- 1) Remove the steering stem lower bracket. Refer to "Steering Removal and Installation: ".
- 2) Remove the dust seal (1) and steering stem upper bearing (2).



I649G1620032-01

- 3) Remove the steering stem lower bearing and inner race using a chisel.



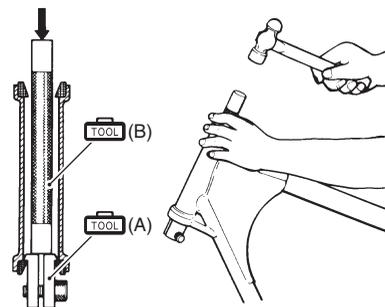
I649G1620033-01

- 4) Remove the steering stem upper and lower bearing races using the special tools.

Special tool

TOOL (A): 09941-54911 (Bearing outer race remover)

TOOL (B): 09941-74911 (Steering bearing installer)



I649G1620034-02

Installation

Install the steering stem bearings in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

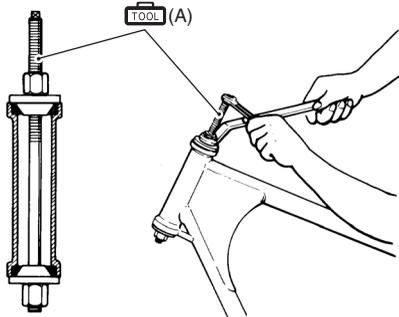
The removed bearings and races should be replaced with new ones.

Outer race

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

Special tool

 (A): 09941-34513 (Steering race installer)



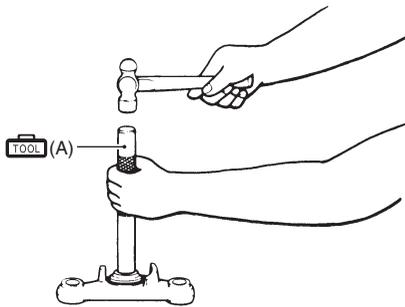
I649G1620035-02

Inner race

- Press in the lower inner race and bearing using the special tool.

Special tool

 (A): 09941-74911 (Steering bearing installer)

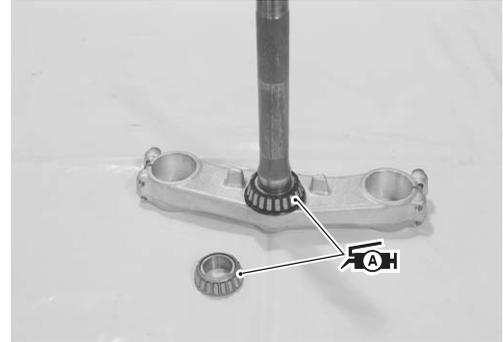


I649G1620036-02

Bearing

- Apply SUZUKI SUPER GREASE to the bearings, races and dust seals before remounting the steering stem.

 : Grease 99000-25010 (SUZUKI SUPER GREASE A or equivalent)



I649G1620037-01

- Install the steering. Refer to "Steering Removal and Installation: ".

Steering Tension Adjustment

B649G16206016

Check the steering movement in the following procedures:

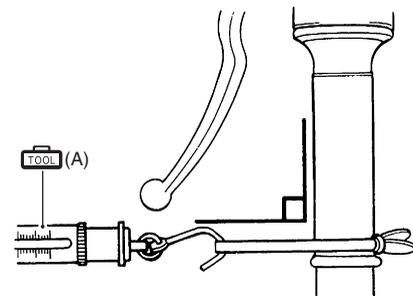
- By supporting the motorcycle with a jack, lift the front wheel unit is off the floor 20 – 30 mm (0.8 – 1.2 in).
- Check to make sure that the cables and wire harnesses are properly routed.
- With the front wheel in the straight ahead state, hitch the spring scale (special tool) on one handlebar grip end as shown in the figure and read the graduation when the handlebar starts moving.

Initial force

200 – 500 grams

Special tool

 (A): 09940-92720 (Spring scale)



I649G1620040-01

6B-11 Steering / Handlebar:

- 4) Do the same on the other grip end.
- 5) If the initial force read on the scale when the handlebar starts turning is either too heavy or too light, adjust it till it satisfies the specification.
 - a) First, loosen the front fork upper and lower clamp bolts, steering stem head nut and steering stem nut, and then adjust the steering stem nut by loosening or tightening it.

Special tool

 (B): 09910-60611 (Universal clamp wrench)



I649G1620042-01

- b) Tighten the steering stem nut, stem head nut and front fork upper and lower clamp bolts to the specified torque and recheck the initial force with the spring scale according to the previously described procedure.
- c) If the initial force is found within the specified range, adjustment has been completed.

NOTE

Hold the front fork legs, move them back and forth and make sure that the steering is not loose.

Specifications

Tightening Torque Specifications

B649G16207001

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Handlebar holder bolt	23	2.3	16.5	☞
Steering stem nut	45	4.5	32.5	then turn back 1/2 – 1/4. ☞
Steering stem head nut	65	6.5	47.0	☞
Handlebar holder set nut	45	4.5	32.5	☞

NOTE

The specified tightening torque is also described in the following.

“Handlebars Components: ”

“Steering Components: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G16208001

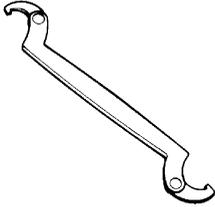
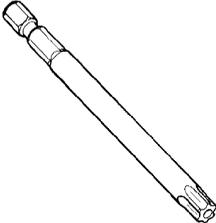
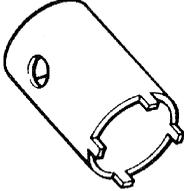
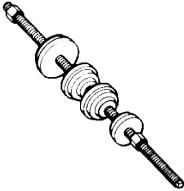
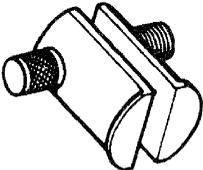
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000-25010	☞ / ☞ / ☞ / ☞
Handle grip bond	Handle grip bond (commercial available)	—	☞
Thread lock cement	Thread Lock Cement Super 1322 or equivalent	P/No.: 99000-32110	☞

NOTE

Required service material is also described in the following.
 “Steering Components: ”

Special Tool

B649G16208002

09910-60611 Universal clamp wrench ☞		09930-11920 Torx bit (JT 40H) ☞ / ☞ / ☞	
09930-11940 Bit holder ☞ / ☞ / ☞		09940-14911 Steering stem nut wrench ☞ / ☞ / ☞	
09940-92720 Spring scale ☞		09941-34513 Steering race installer ☞	
09941-54911 Bearing outer race remover ☞		09941-74911 Steering bearing installer ☞ / ☞	

Section 9

Body and Accessories

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Precautions

Precautions

Precautions for Electrical System

Refer to “General Precautions: in Section 00” and “Precautions for Electrical Circuit Service: in Section 00”.

B649G19000001

Component Location

Electrical Components Location

Refer to “Electrical Components Location: in Section 0A”.

B649G19003001

Wiring Systems

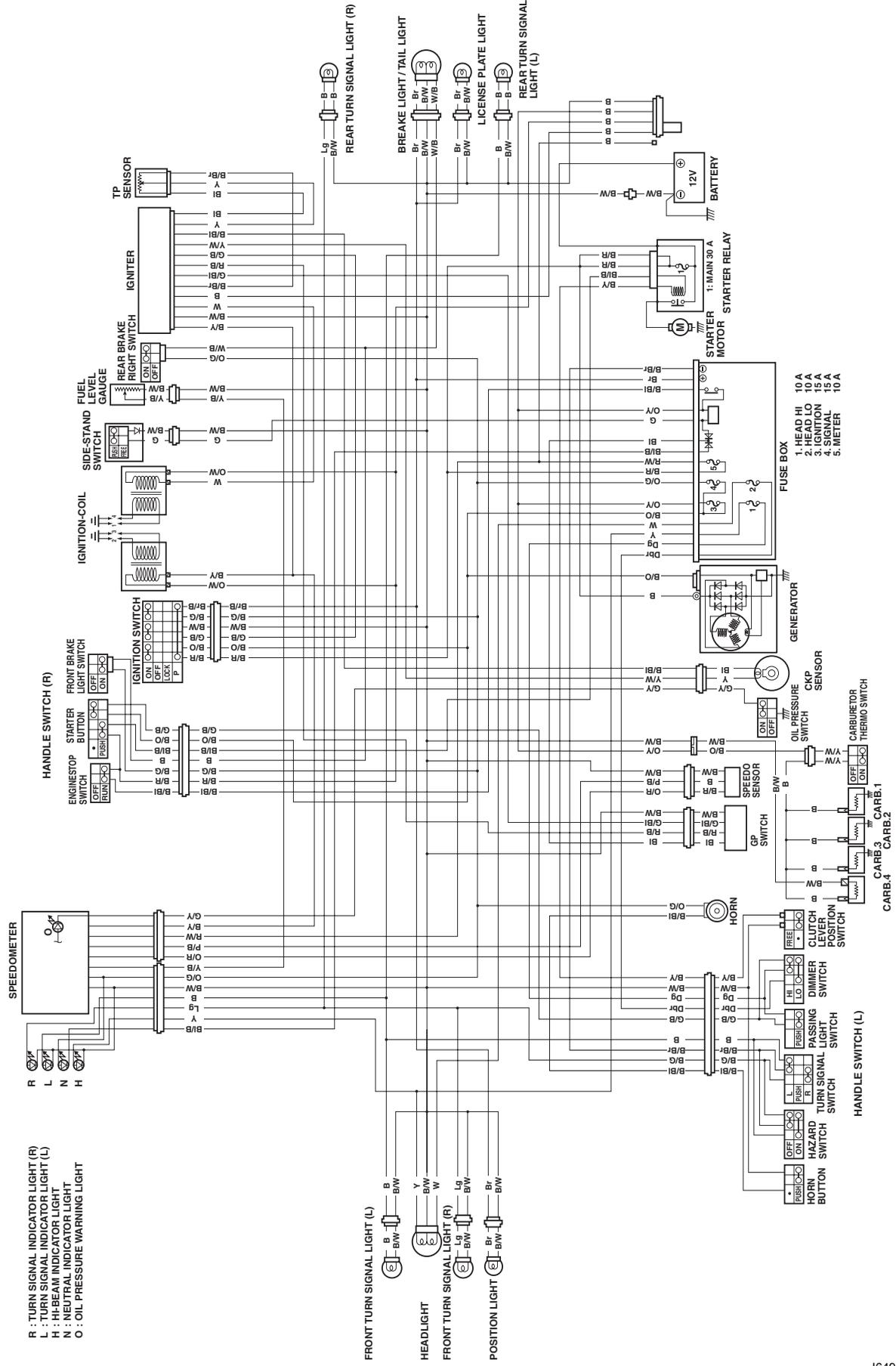
Schematic and Routing Diagram

Wiring Diagram

Refer to "Wire Color Symbols: in Section 0A".

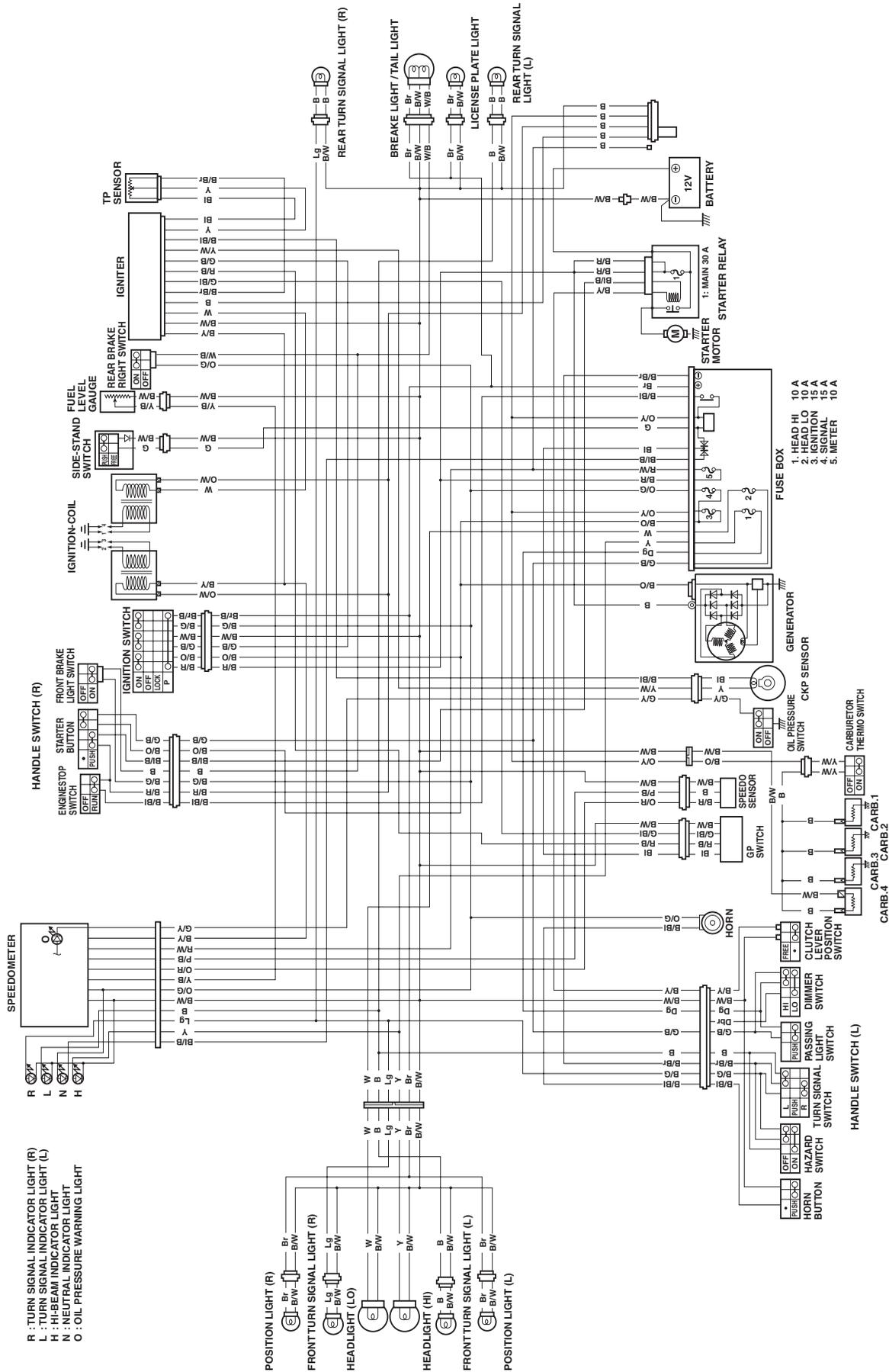
B649G19102004

GSF1200 (For E02, 19)

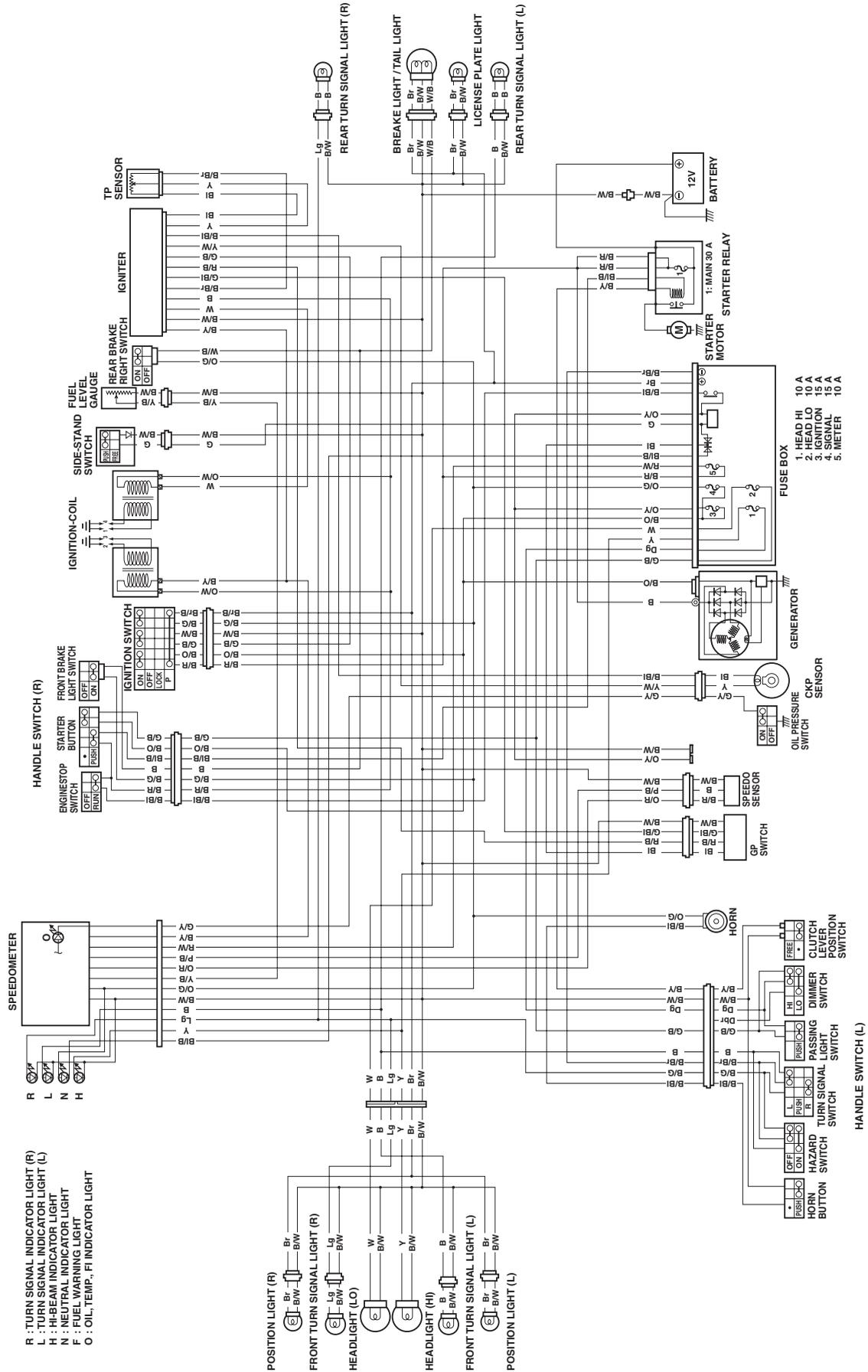


9A-3 Wiring Systems:

GSF1200S (For E-02, 19)

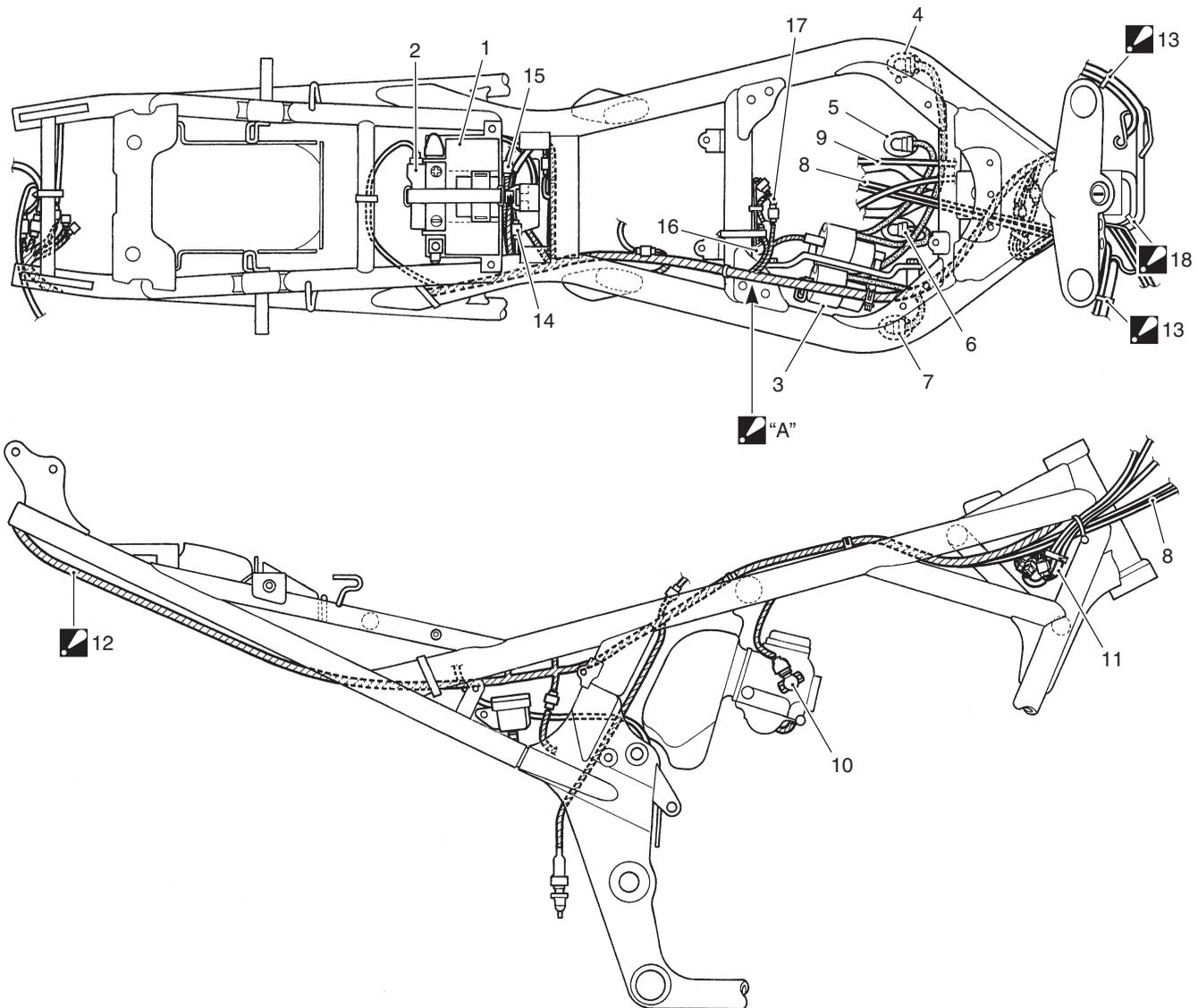


GSF1200S (For E-24, 28)



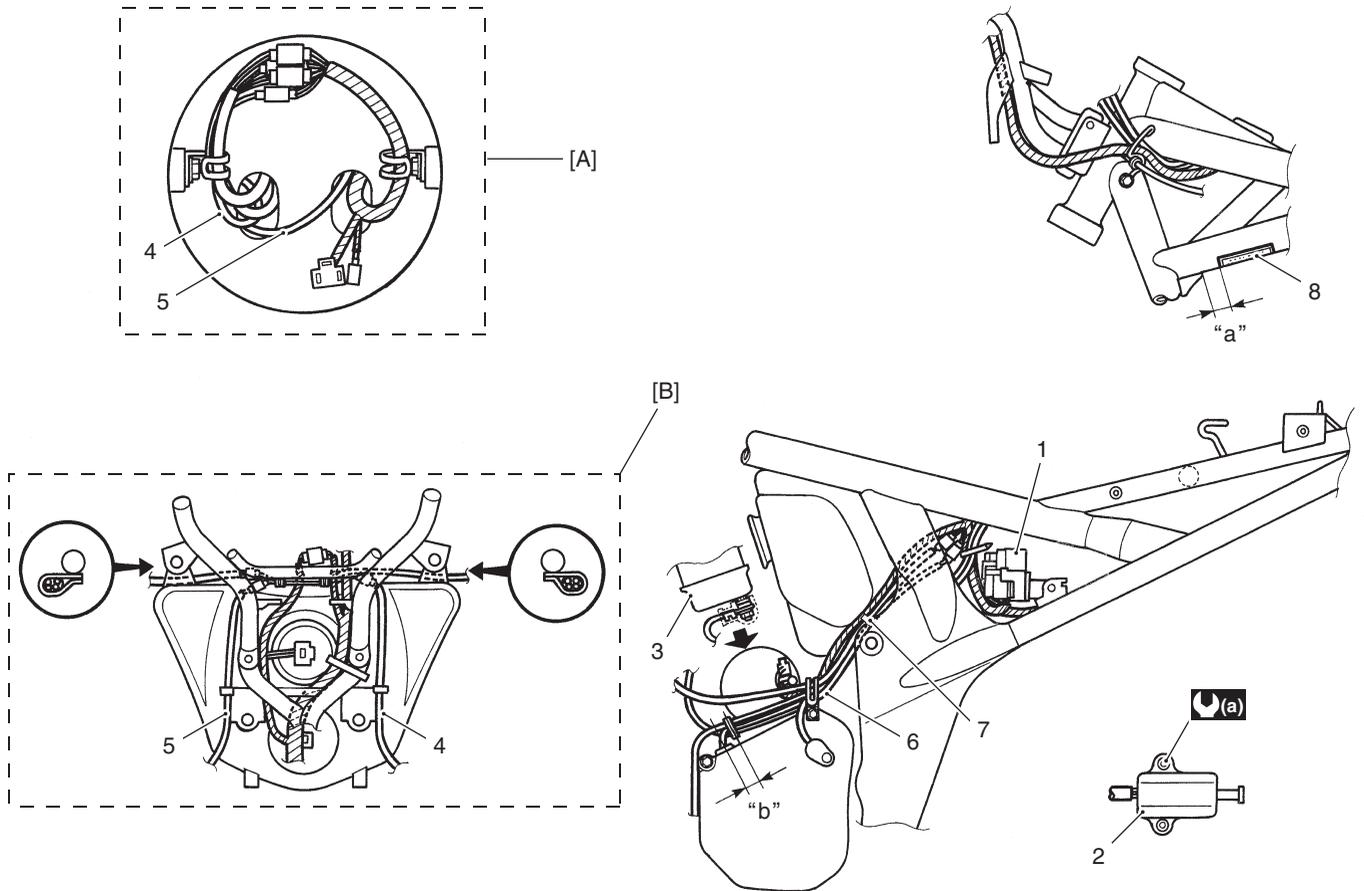
Wiring Harness Routing Diagram

B649G19102001



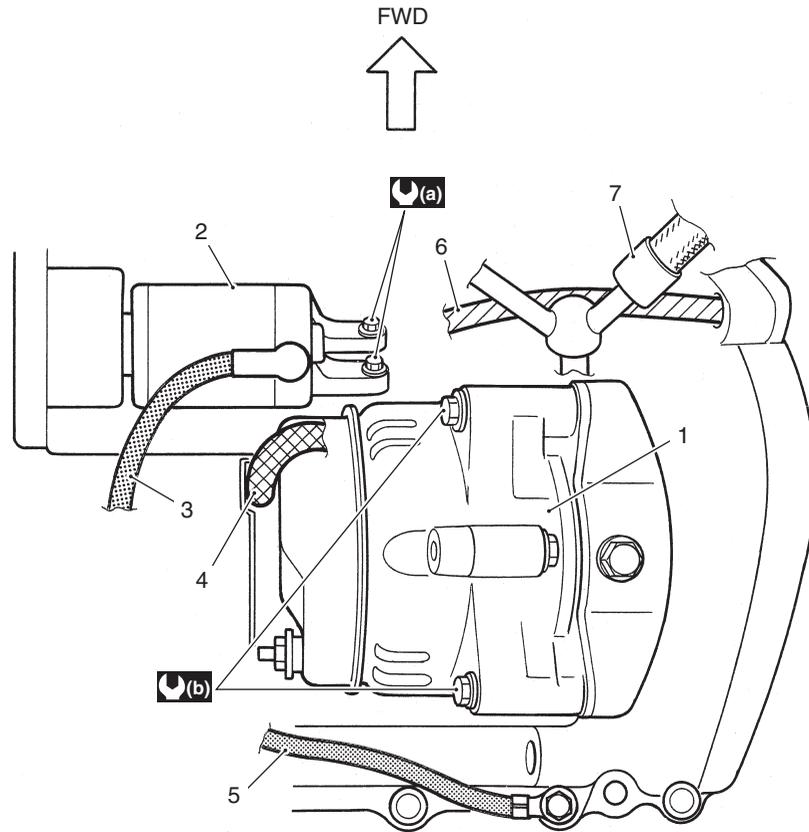
I649G1910904-05

1. Battery	8. Throttle cables	15. Speed sensor switch coupler
2. Ignitor unit	9. Starter cable	16. Thermo-switch (For E02, 19)
3. Ignition coil	10. TPS	17. Carburetor heater lead wire (For E02, 19)
4. Spark plug cap No.1	11. Handlebar switch coupler LH and RH/Ignition switch coupler	18. Wire clamp : Cut the tip of wire clamp.
5. Spark plug cap No.2	12. Wiring harness : Be careful not to pinch the wiring harness with the frame and fender.	"A": Be careful not to twist the wiring harness when setting the TPS lead wire.
6. Spark plug cap No.3	13. Wire clamp : Cut the tip of wire clamp.	
7. Spark plug cap No.4	14. Gear position switch coupler	



I649G1910905-05

1. Starter relay	6. CKP sensor lead/Side-stand lead/Gear position lead/Starter motor lead/Speed sensor lead/Wiring harness	[A]: For GSF1200/GSF1200A
2. Side-stand switch	7. Starter motor lead/Clutch hose	[B]: For GSF1200S/GSF1200SA
3. Starter motor	8. Ices label (Only for E-28)	⚙️(a) : 14 N·m (1.4 kgf·m, 10.0 lb·ft)
4. Turn signal lead (For RH)	"a": 10 mm (0.4 in)	
5. Turn signal lead (For LH)	"b": Max. 10 mm (0.4 in)	



I649G1910906-03

1. Generator	4. Gear position switch	7. Cooling hose
2. Starter motor	5. Engine ground wire	(a) : 6 N·m (0.6 kgf-m, 4.5 lb-ft)
3. Starter motor lead wire	6. CKP sensor lead wire	(b) : 25 N·m (2.5 kgf-m, 18.0 lb-ft)

Specifications

Service Data

B649G19107002

Electrical

Item		Specification	Note
Fuse size	Headlight	HI	10 A
		LO	10 A
	Ignition	15 A	
	Signal	15 A	
	Meter	10 A	
	Main	30 A	

Tightening Torque Specifications

B649G19107003

NOTE

The specified tightening torque is also described in the following.
 “Wiring Harness Routing Diagram: ”

Reference:

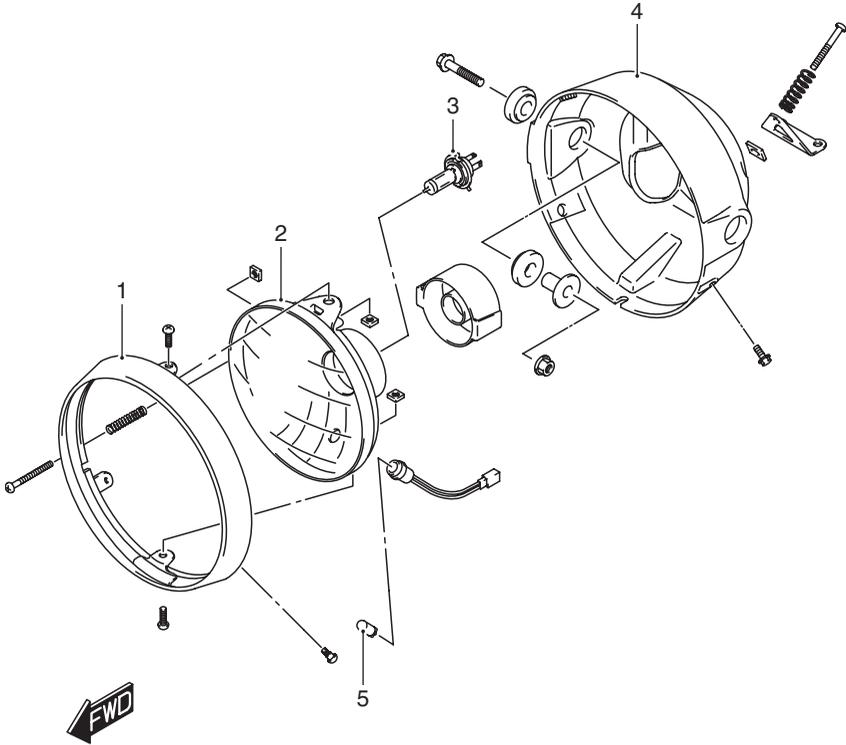
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Lighting Systems

Repair Instructions

Headlight Components GSF1200

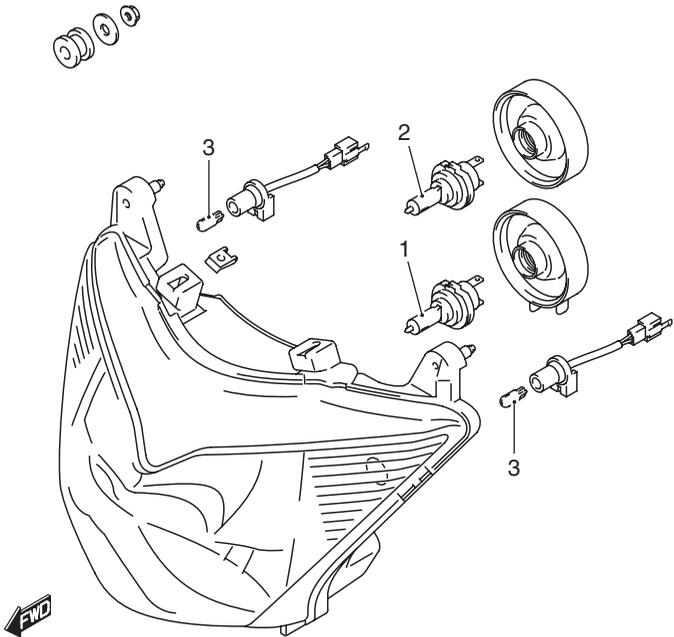
B649G19206001



1. Headlight rim	4. Headlight housing
2. Headlight unit	5. Position light bulb (12 V 5 W)
3. Headlight bulb (12 V 60/55 W, H4)	

I649G1920001-02

GSF1200S



1. Headlight high beam bulb (12 V 55 W, H7)	2. Headlight low beam bulb (12 V 55 W, H7)	3. Position light bulb (12 V 5 W x 2)
---	--	---------------------------------------

I649G1920002-03

Headlight Removal and Installation

B649G19206014

Removal

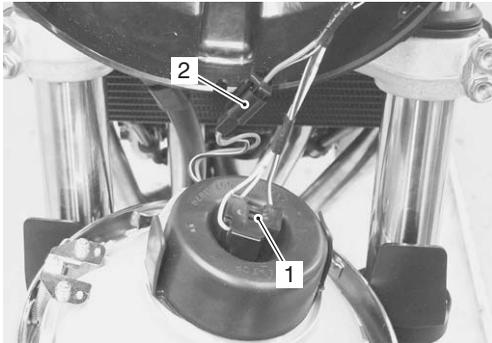
GSF1200

- 1) Removal the headlight mounting screws.



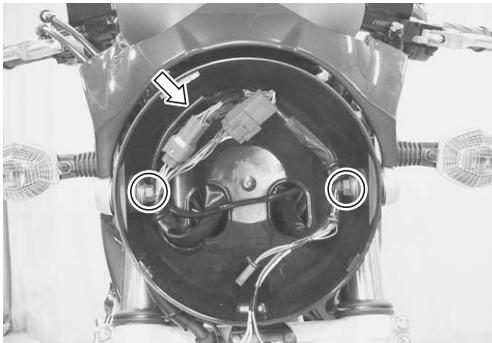
I649G1920003-01

- 2) Disconnect the headlight coupler (1) and position light coupler (2).



I649G1920004-01

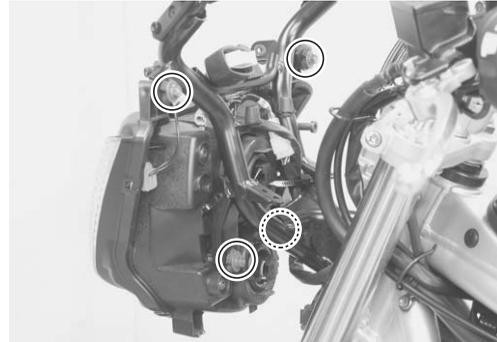
- 3) Disconnect the respective couplers and remove the headlight housing.



I649G1920005-01

GSF1200S

- 1) Remove the cowling. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Disconnect the headlight and position light couplers.
- 3) Remove the headlight assembly.



I649G1920006-01

Installation

Installation is in the reverse order of removal. Pay attention to the following point:

- After installing, be sure to inspect the headlight beam. Refer to “Headlight Beam Adjustment: ”.

Headlight Bulb Replacement

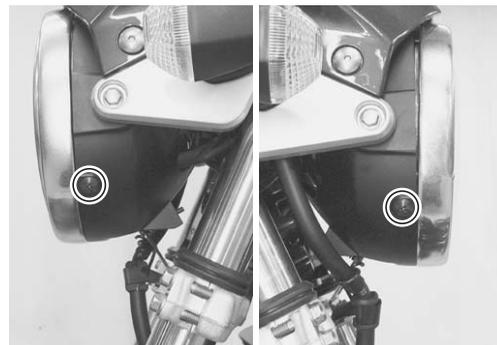
B649G19206002

⚠ CAUTION

If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

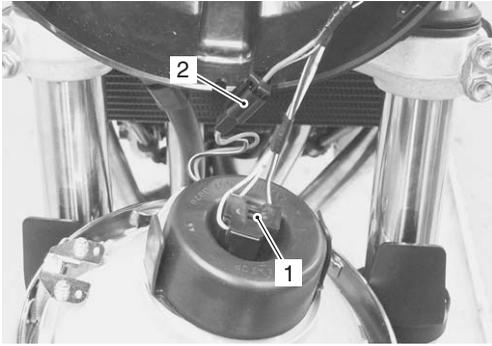
GSF1200

- 1) Remove the headlight mounting screws.



I649G1920003-01

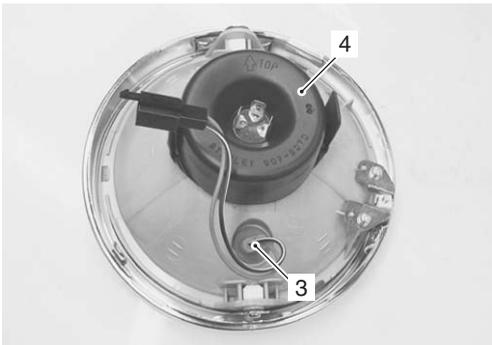
- 2) Disconnect the headlight coupler (1) and position light coupler (2).



I649G1920004-01

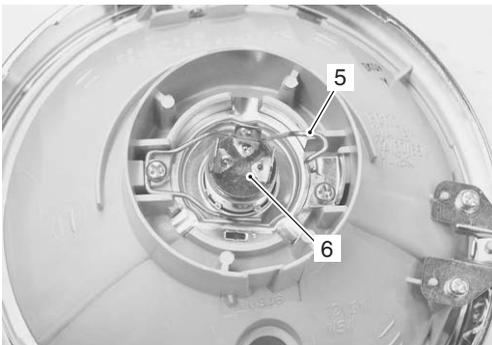
- 3) Remove the position light socket (3) and replace the position light bulb.

- 4) Remove the bulb socket rubber cap (4).



I649G1920007-01

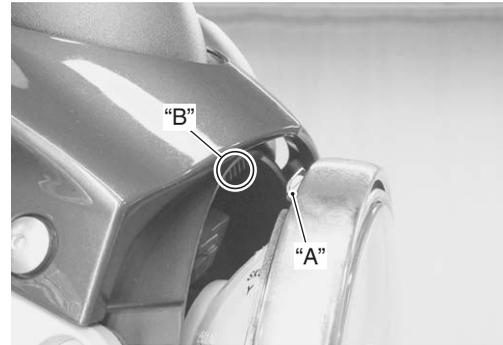
- 5) Replace the headlight bulb (6) by unhooking the bulb holder spring (5).



I649G1920008-01

- 6) Reassemble the headlight.

- 7) Install the headlight assembly so that the hook "A" on the headlight bezel engages with "B" of the housing.

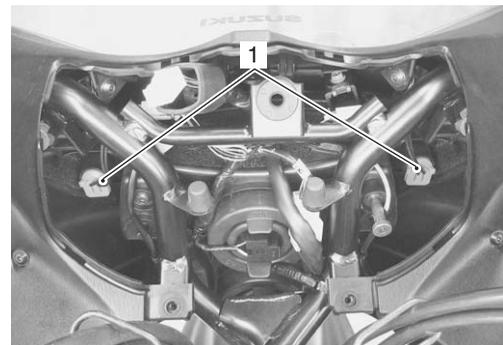


I649G1920009-01

GSF1200S

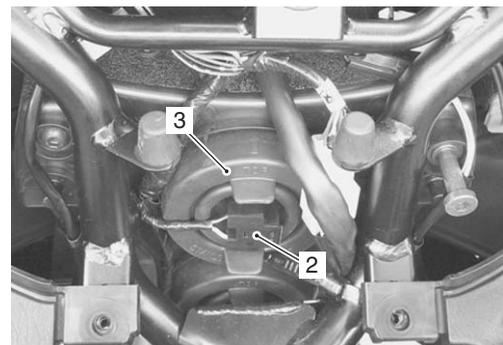
- 1) Remove the combination meter assembly. Refer to "Combination Meter Removal and Installation: in Section 9C".

- 2) Remove the position light sockets (1) and replace the position light bulbs.



I649G1920010-01

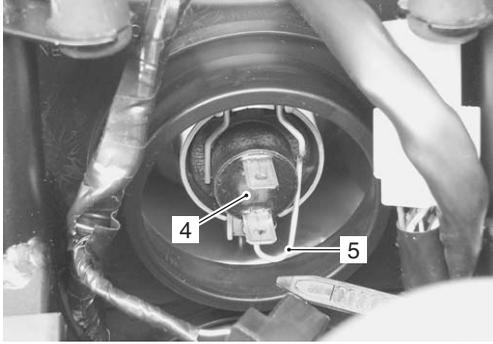
- 3) Disconnect the headlight (Low beam) coupler (2) and remove the bulb socket rubber cap (3).



I649G1920011-01

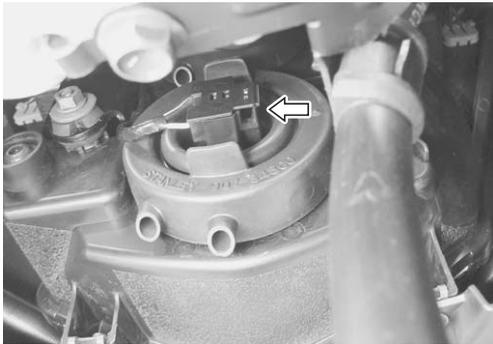
9B-4 Lighting Systems:

- 4) Replace the headlight bulb (Low beam) (4) by unhooking the bulb holder spring (5).



I649G1920012-01

- 5) Replace the headlight bulb (High beam) in the same way as that of the low beam one.



I649G1920013-01

- 6) Reinstall the removed parts.

Headlight Beam Adjustment

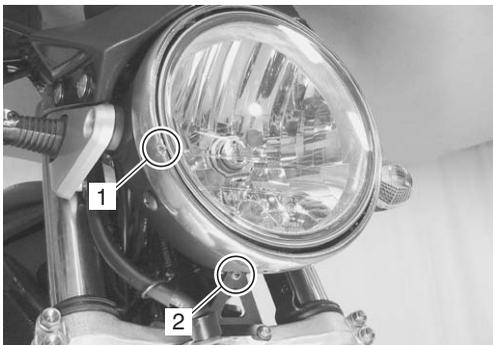
B649G19206003

GSF1200

Adjust the headlight beam, both horizontally and vertically.

NOTE

To adjust the headlight beam, adjust the beam horizontally first, then vertically.



I649G1920014-01

1. Horizontal adjuster

2. Vertical adjuster

GSF1200S

- 1) Insert 5 mm hexagon wrench as shown and adjust the Low and High headlight beam horizontally.

NOTE

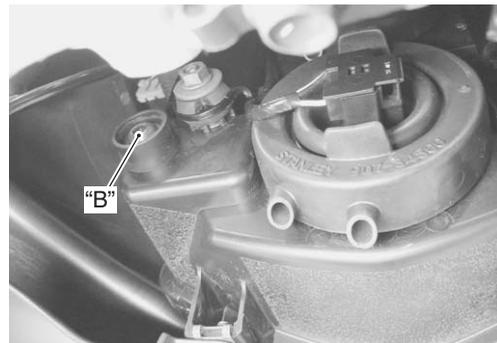
To adjust the headlight beam, adjust the beam horizontally first, then vertically.



I649G1920015-01

"A": Horizontal adjuster (For both Low and Hi beam)

- 2) Adjust the Low and High headlight beam vertically from the lower side.

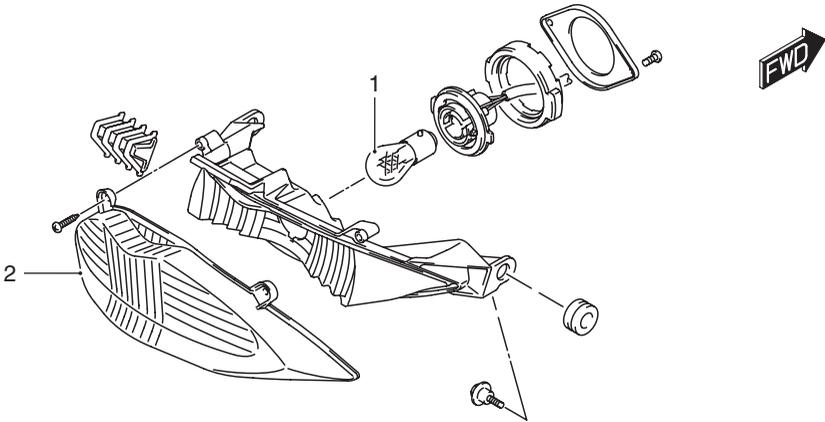


I649G1920016-01

"B": Vertical adjuster (For both Low and High beam)

Rear Combination Light Components

B649G19206004

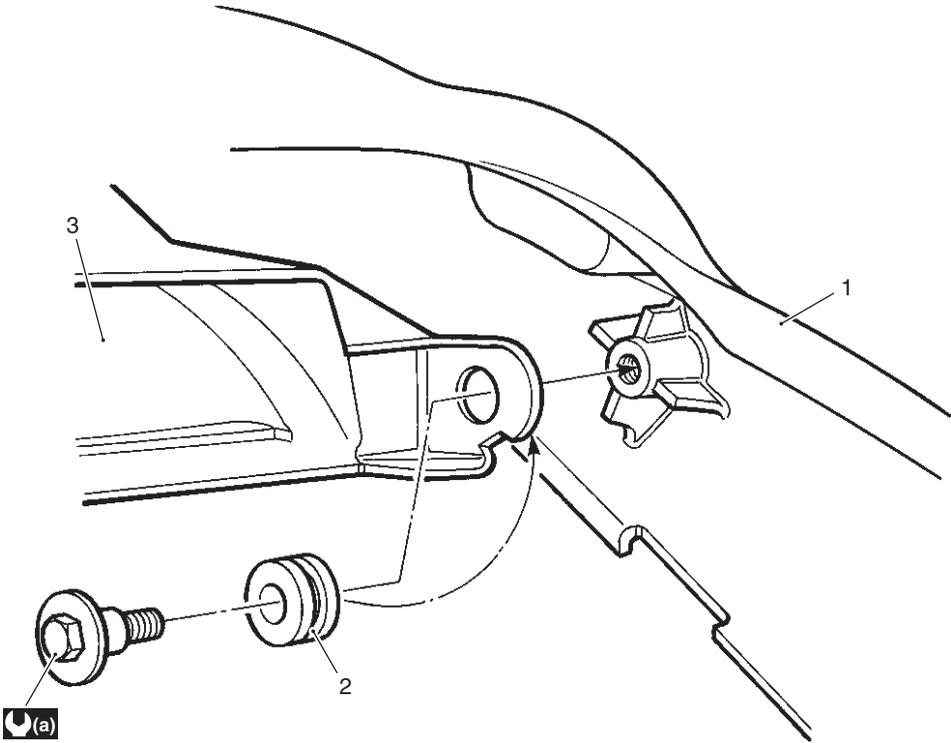


I649G1920017-02

1. Brake light/Taillight bulb (12 V 21/5 W)	2. Lens
---	---------

Rear Combination Light Construction

B649G19206015



I649G1920018-01

1. Seat tail cover	3. Rear combination light
2. Cushion	(a) : 2.0 N·m (0.2 kgf-m, 1.5 lb-ft)

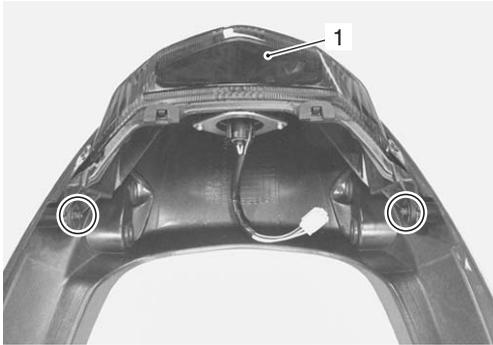
9B-6 Lighting Systems:

Rear Combination Light Removal and Installation

B649G19206016

Removal

- 1) Remove the seat tail cover. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Remove the rear combination light (1) from the seat tail cover.



I649G1920019-01

Installation

Install the rear combination right in the reverse order of removal. Pay attention to the following point:

- Tighten the rear combination light mounting bolts to the specified torque.

Tightening torque

Rear combination light mounting bolt: 2.0 N·m (0.2 kgf-m, 1.5 lb-ft)

Brake Light Bulb / Taillight Bulb Replacement

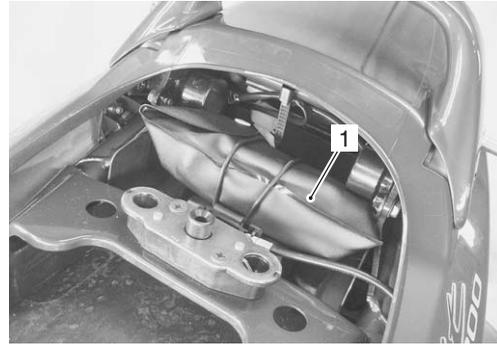
B649G19206017

⚠ CAUTION

If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

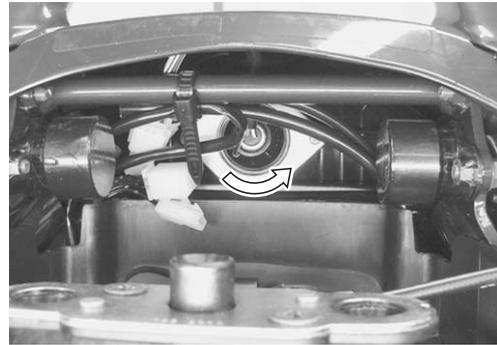
- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation: in Section 9D".

- 2) Remove the tool set (1).



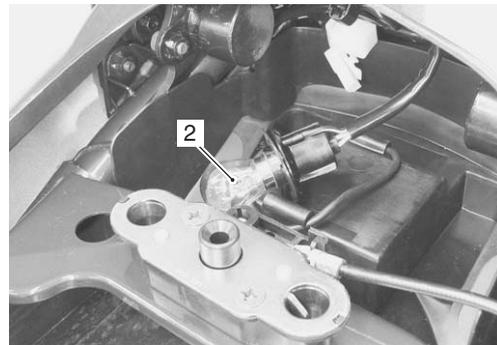
I649G1920020-01

- 3) Remove the bulb socket by turning it counterclockwise.



I649G1920021-01

- 4) Replace the bulb (2).

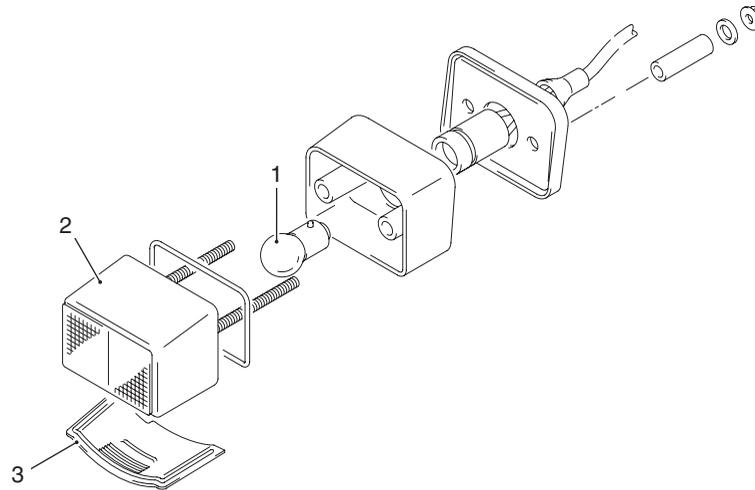


I649G1920022-01

- 5) Reinstall the removed parts.

License Plate Light Components

B649G19206018



I649G1920023-02

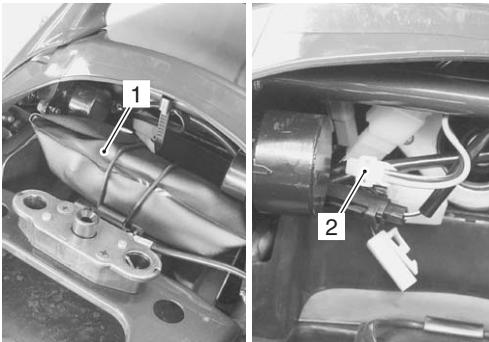
1. License plate light bulb (12 V 5 W)	2. Lens cover	3. Lens
--	---------------	---------

License Plate Light Removal and Installation

B649G19206019

Removal

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Remove the tool set (1) and disconnect the license plate light coupler (2).



I649G1920024-01

- 3) Remove the license plate light by removing the nuts.



I649G1920025-01

Installation

Install the license plate light in the reverse order of removal.

License Plate Light Bulb Replacement

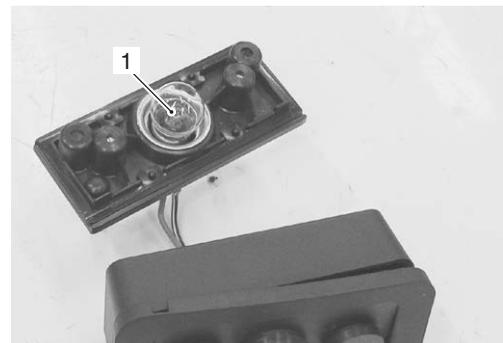
B649G19206020

- 1) Remove the license plate light. Refer to "License Plate Light Removal and Installation: ".
- 2) Remove the lens by removing the screws.



I649G1920026-01

- 3) Replace the bulb (1).

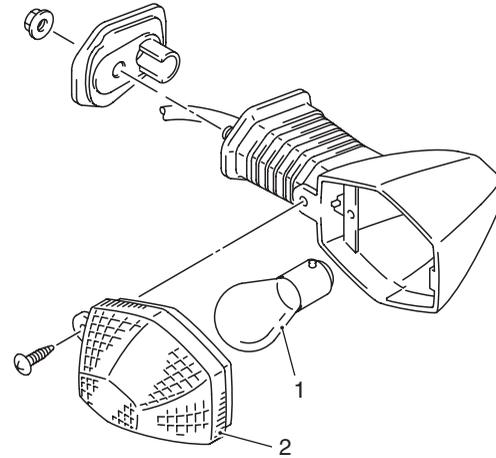
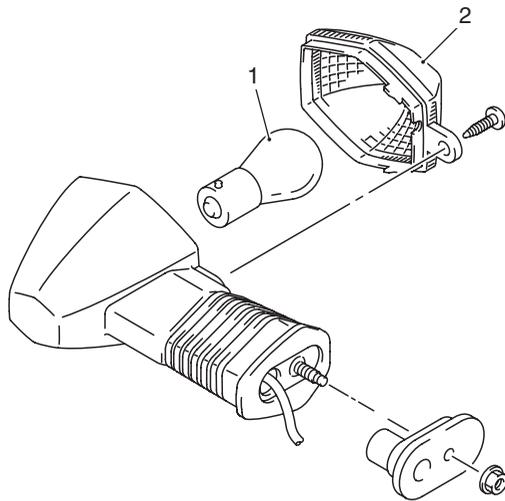


I649G1920027-01

- 4) Reinstall the removed parts.

Turn Signal Light Components

B649G19206021



I649G1920028-03

1. Turn signal light bulb (12 V 21 W x 4)	2. Lens
---	---------

Front Turn Signal Light Removal and Installation

B649G19206022

Removal

GSF1200

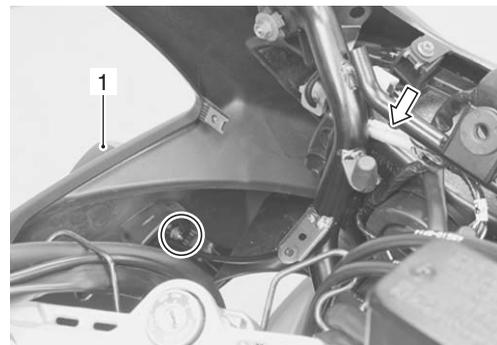
- 1) Remove the headlight housing. Refer to "Headlight Removal and Installation: ".
- 2) Remove the front turn signal light (1) by removing the nut.



I649G1920030-01

GSF1200S

- 1) Remove the wind screen and upper panel. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the turn signal light coupler.
- 3) Remove the front turn signal light (1) by removing the nut.



I649G1920029-01

Installation

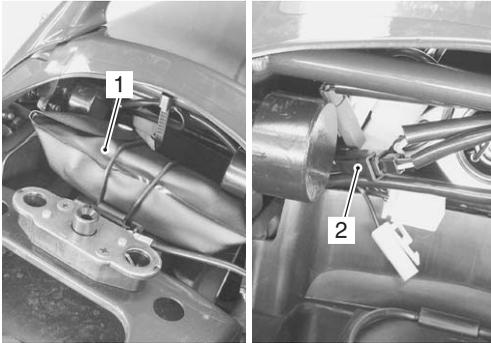
Install the front turn signal light in the reverse order of removal.

Rear Turn Signal Light Removal and Installation

B649G19206023

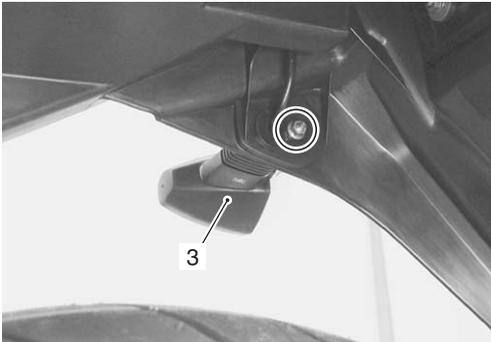
Removal

- 1) Remove the seat. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Remove the tool set (1) and disconnect the turn signal light coupler (2).



I649G1920031-01

- 3) Remove the turn signal light (3) by removing the nut.



I649G1920032-01

Installation

Install the rear turn signal light in the reverse order of removal.

Turn Signal Light Bulb Replacement

B649G19206024

⚠ CAUTION

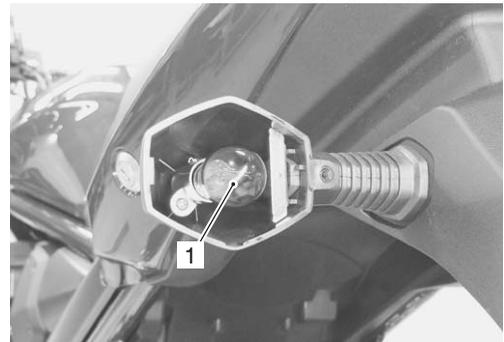
If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.

- 1) Remove the lens by removing the screw.



I649G1920033-01

- 2) Replace the bulb (1).

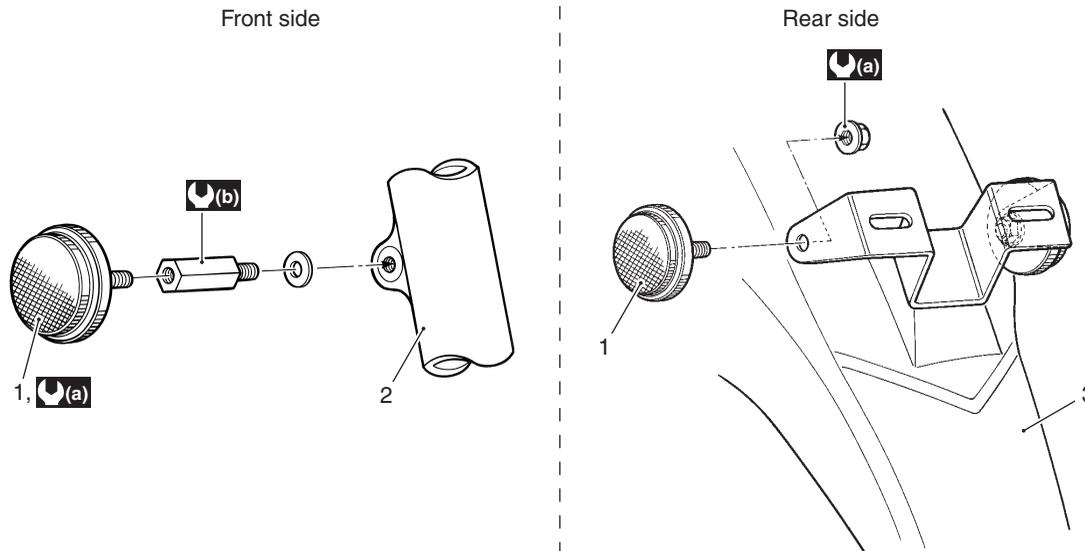


I649G1920034-01

- 3) Install the lens.

Reflex Reflector Construction (For E-24, 28)

B649G19206025



I649G1920035-04

1. Reflex reflector	3. Rear fender	(b) : 4.5 N·m (0.45 kgf-m, 3.25 lb-ft)
2. Front fork	(a) : 1.8 N·m (0.18 kgf-m, 1.3 lb-ft)	

Turn Signal / Side-stand Relay Inspection

B649G19206026

Refer to “Electrical Components Location: in Section 0A”.

NOTE

Make sure that the battery is fully charged.

Before removing the turn signal/side-stand relay, check the operation of the turn signal light.
 If the turn signal light does not illuminate, inspect the bulb, turn signal switch and circuit connection.
 If the bulb, turn signal switch and circuit connection are OK, the turn signal relay may be faulty; therefore, replace the turn signal/side-stand relay with a new one.
 Refer to “Turn Signal / Side-stand Relay Removal and Installation: ”.

Turn Signal / Side-stand Relay Removal and Installation

B649G19206027

Removal

- 1) Remove the left frame cover. Refer to “Exterior Parts Removal and Installation: in Section 9D”.
- 2) Remove the turn signal/side-stand relay (1).



I649G1190024-01

Installation

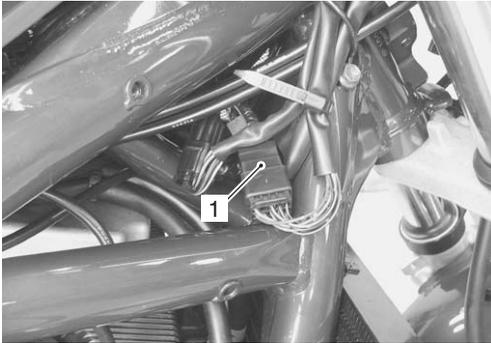
Install the turn signal/side-stand relay in the reverse order of removal.

Hazard Switch Inspection

B649G19206028

Inspect the hazard switch in the following procedures:

- 1) Remove the right frame head cover. (GSF1200)
Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the left handlebar switch coupler (1).



I649G1920036-01

- 3) Inspect the hazard switch for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation: in Section 6B".

Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity (•)))

Color Position	B	B/Br	B/G
OFF		○ — ○	○ — ○
ON	○ — ○		○ — ○

I649G1920040-01

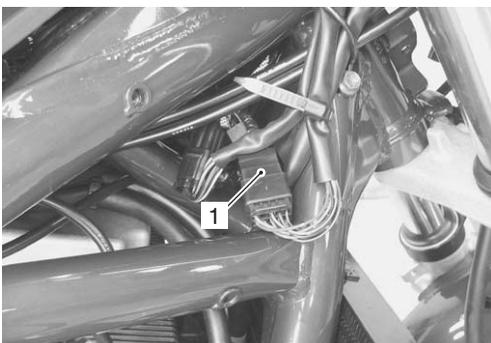
- 4) After finishing the hazard switch inspection, reinstall the removed parts.

Turn Signal Switch Inspection

B649G19206029

Inspect the turn signal switch in the following procedures:

- 1) Remove the right frame head cover. (GSF1200)
Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the left handlebar switch coupler (1).



I649G1920036-01

- 3) Inspect the turn signal switch for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation: in Section 6B".

Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity (•)))

Color Position	B/G	B/Br	B
L		○ — ○	○ — ○
PUSH			
R	○ — ○	○ — ○	

I649G1920037-01

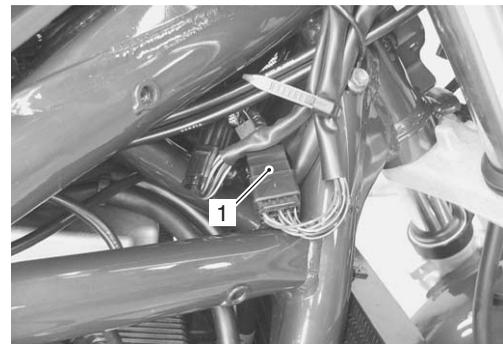
- 4) After finishing the turn signal switch inspection, reinstall the removed parts.

Passing Light Switch Inspection

B649G19206030

Inspect the passing light switch in the following procedures:

- 1) Remove the right frame head cover. (GSF1200)
Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the left handlebar switch coupler (1).



I649G1920036-01

- 3) Inspect the passing light switch for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation: in Section 6B".

Special tool

: 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity (•)))

Color Position	G/B	Dg
•		
PUSH	○ — ○	○ — ○

I649G1920038-01

9B-12 Lighting Systems:

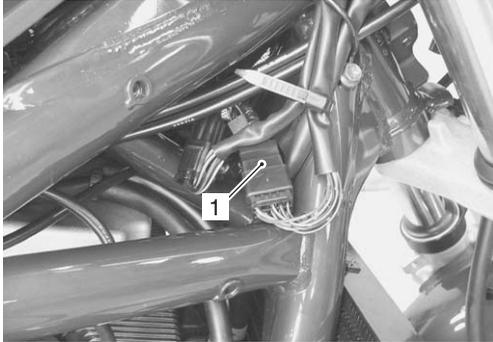
- 4) After finishing the passing light switch inspection, reinstall the removed parts.

Dimmer Switch Inspection

B649G19206031

Inspect the dimmer switch in the following procedures:

- 1) Remove the right frame head cover. (GSF1200)
Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the left handlebar switch coupler (1).



I649G1920036-01

- 3) Inspect the dimmer switch for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation: in Section 6B".

Special tool

 : 09900-25008 (Multi-circuit tester set)

Tester knob indication

Continuity (•))

Color Position	Dbr	Dg	G/B
HI		○ — ○	○ — ○
LO	○ —	—	○ —

I649G1920039-01

- 4) After finishing the dimmer switch inspection, reinstall the removed parts.

Specifications

Service Data

B649G19207002

Wattage

Unit: W

Item	Specification		
	GSF1200	GSF1200S	
Headlight	HI	60	55
	LO	55	55
Parking or position light	5	5 x 2	
Brake light/Taillight	21/5	←	
Turn signal light	21 x 4	←	
License plate light	5	←	

Tightening Torque Specifications

B649G19207003

Fastening part	Tightening torque			Note
	N·m	kgf·m	lb·ft	
Rear combination light mounting bolt	2.0	0.2	1.5	☞

NOTE

The specified tightening torque is also described in the following.

“Rear Combination Light Construction: ”

“Reflex Reflector Construction (For E-24, 28): ”

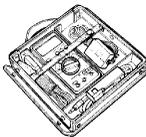
Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Special Tool

B649G19208001

09900-25008 Multi-circuit tester set ☞ / ☞ / ☞ / ☞	
--	---

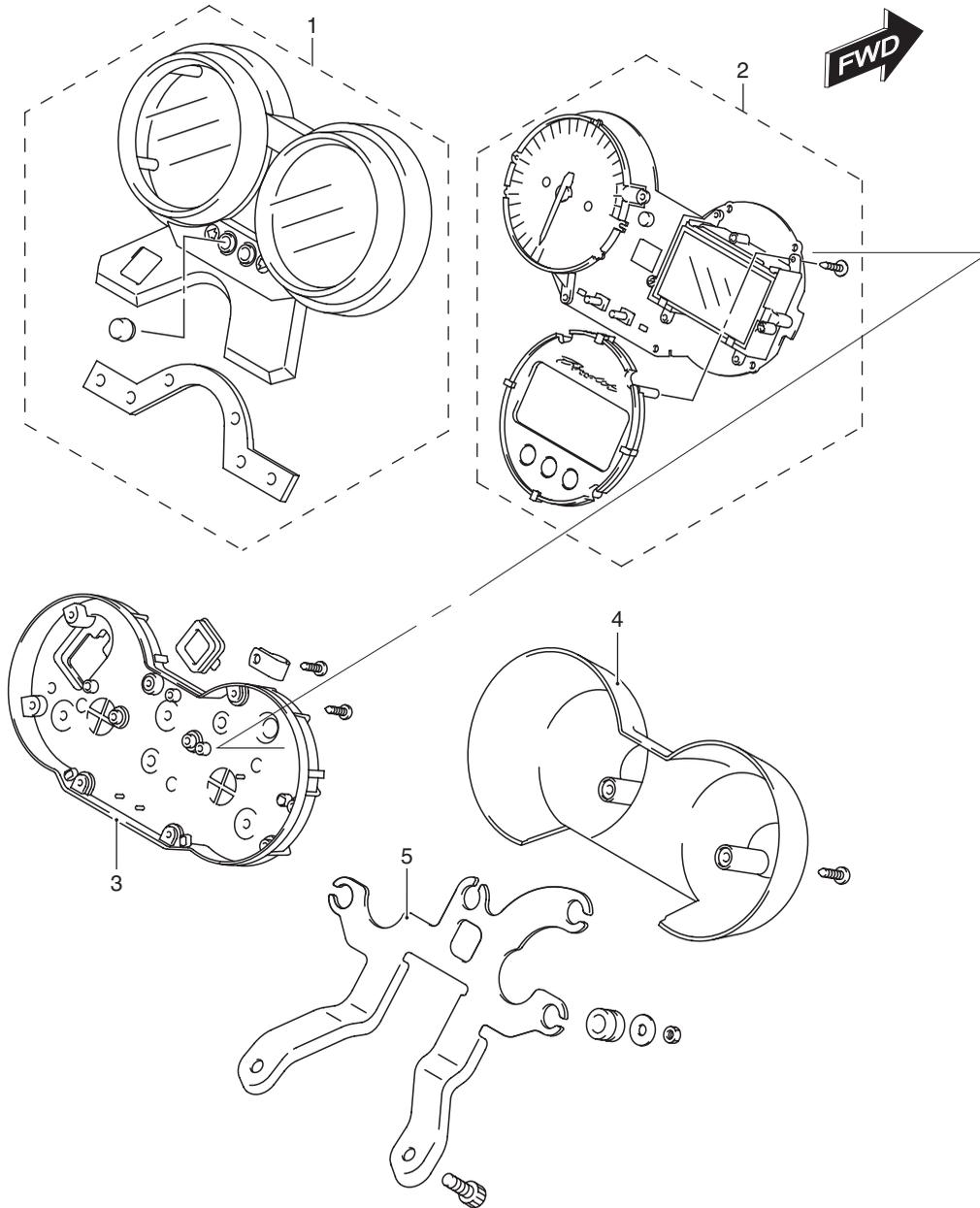
Combination Meter / Fuel Meter / Horn

Repair Instructions

Combination Meter Components

GSF1200

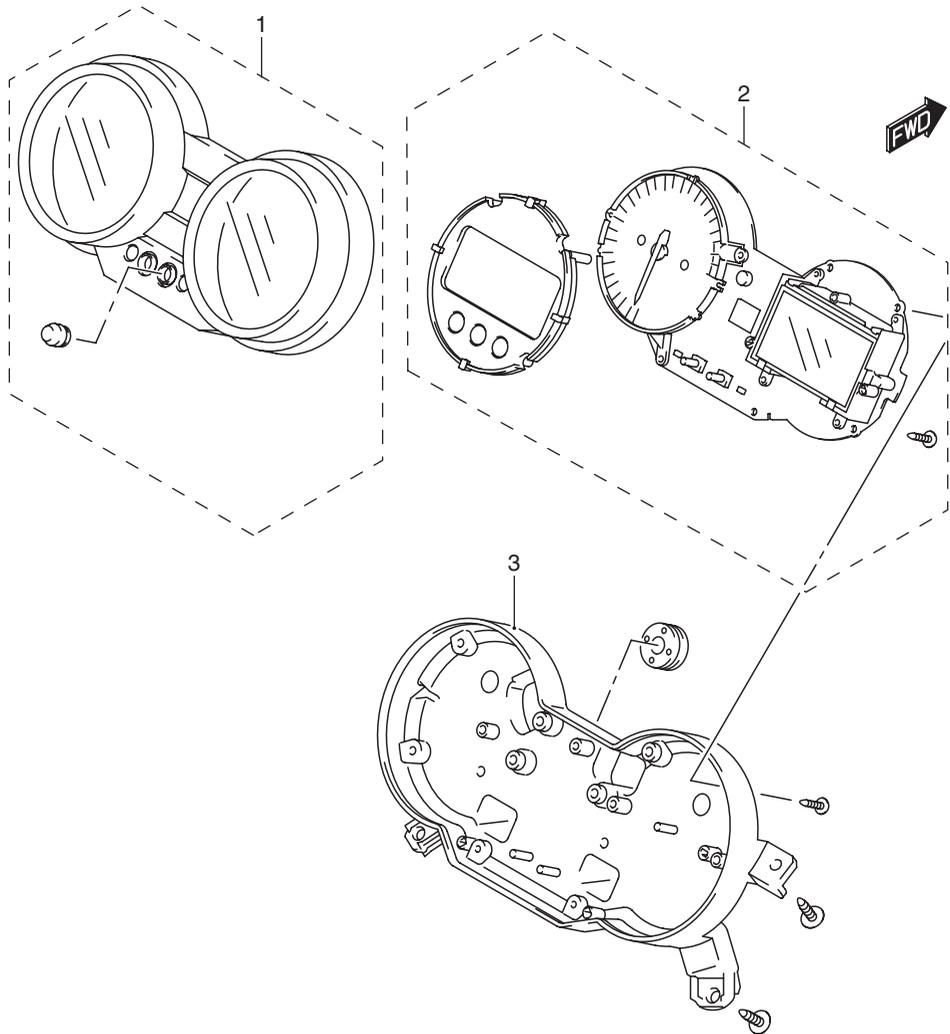
B649G19306014



1. Upper case assembly	3. Lower case	5. Bracket
2. Combination meter	4. Cover	

I649G1930001-04

GSF1200S



1. Upper case assembly	2. Combination meter	3. Lower case
------------------------	----------------------	---------------

I649G1930002-02

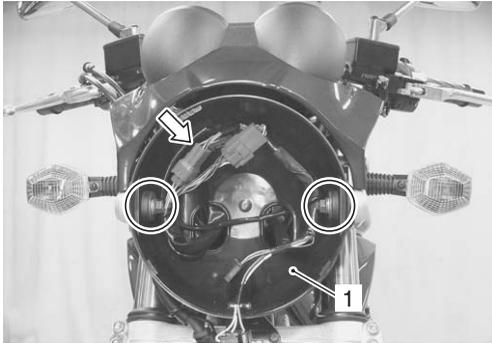
Combination Meter Removal and Installation

B649G19306001

Removal

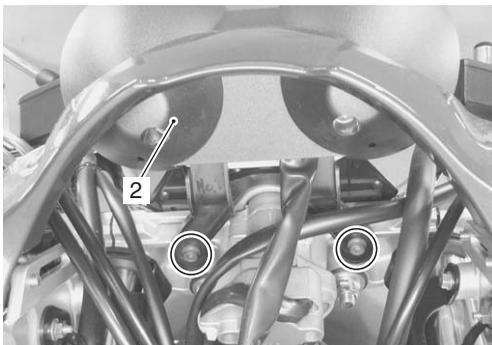
GSF1200

- 1) Remove the headlight. Refer to "Headlight Removal and Installation: in Section 9B".
- 2) Disconnect the respective couplers and remove the headlight housing (1).



I649G1930003-01

- 3) Remove the combination meter assembly (2).



I649G1930004-01

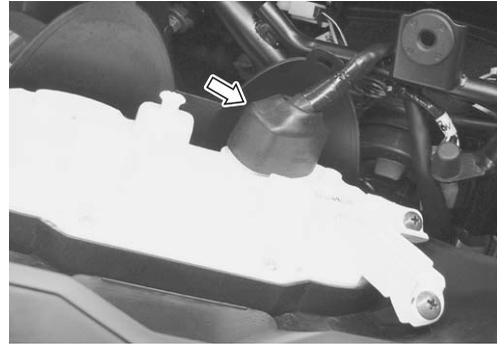
GSF1200S

- 1) Remove the meter panel screws.



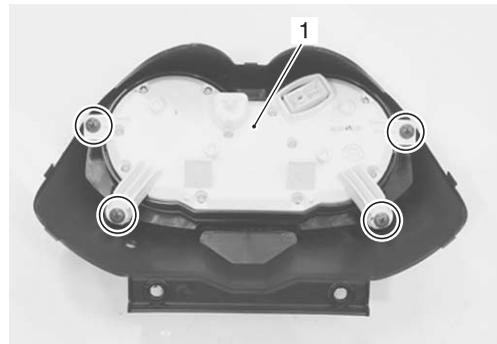
I649G1930005-01

- 2) Disconnect the combination meter coupler and remove the combination meter assembly.



I649G1930006-01

- 3) Remove the combination meter (1).



I649G1930007-01

Installation

Install the combination meter in the reverse order of removal.

Combination Meter Disassembly and Assembly

B649G19306002

Refer to "Combination Meter Removal and Installation: ".

Disassembly

Disassemble the combination meter as shown in the combination meter components. Refer to "Combination Meter Components: ".

Assembly

Assemble the combination meter as shown in the combination meter components. Refer to "Combination Meter Components: ".

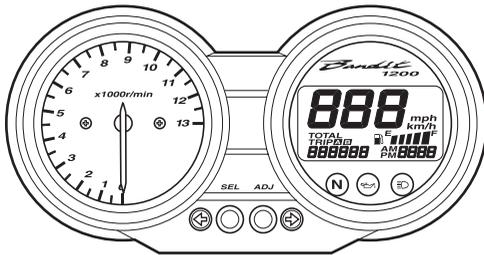
Combination Meter LED Check

B649G19306015

Check that the LEDs (Oil pressure indicator light and Meter panel illumination) immediately light up when the ignition switch is turned to ON.

Check that other LEDs (Neutral indicator light, High-beam indicator light and Turn signal indicator lights) light up/go off by operating each switch.

If abnormal condition is found, replace the combination meter unit with a new one after checking its wire harness/coupler.



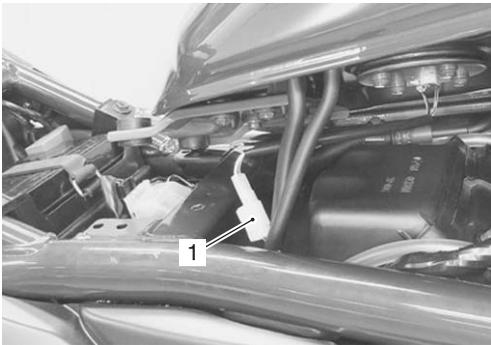
I649G1930008-01

Fuel Level Indicator Inspection

B649G19306016

Inspect the fuel level indicator in the following procedures:

- 1) Disconnect the fuel level gauge wire coupler (1) and remove the fuel tank. Refer to "Fuel Tank Removal and Installation: in Section 1G".

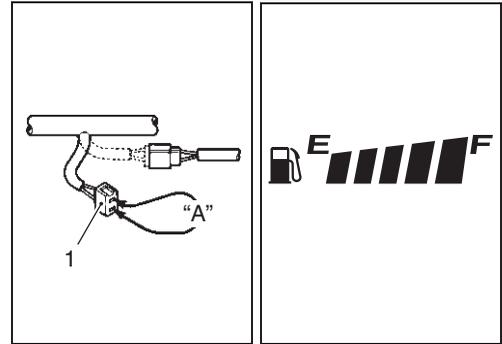


I649G1930009-01

- 2) Connect a jumper wire "A" between the Y/B and B/W lead wires from the wire harness.
- 3) Turn the ignition switch to ON.
- 4) Check if the fuel level indicator (LCD) indicates full position.

NOTE

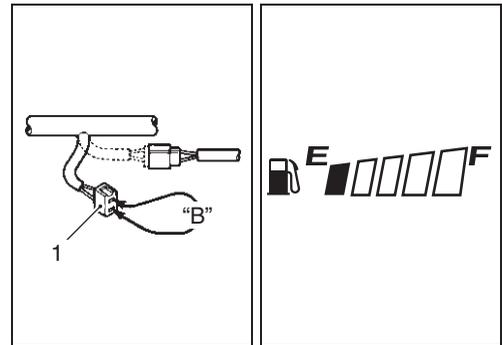
It takes approx. 30 seconds that the fuel level indicator indicates the detected fuel level.



I649G1930010-01

1. Fuel gauge wire coupler

- 5) Turn the ignition switch to OFF and disconnect a jumper wire "A".
- 6) Connect a 180 Ω resistor "B" between the Y/B and B/W lead wires from the wire harness. The fuel level indicator is operating correctly if the LCD bars decrease to empty when the ignition switch is turned to ON.

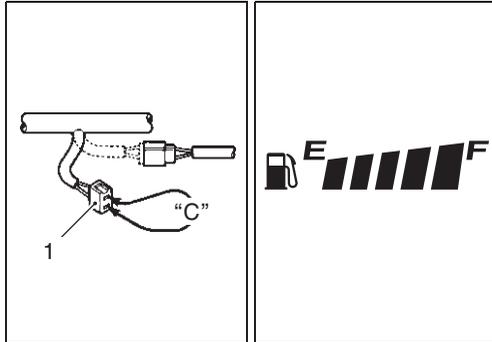


I649G1930011-01

1. Fuel gauge wire coupler

9C-5 Combination Meter / Fuel Meter / Horn:

- 7) Replace the 180 Ω resistor "B" with a 5 Ω one "C".
- 8) The fuel level indicator is operating correctly if the LCD bars increase to five (full) when the ignition switch is turned to ON.
If either test detects a malfunctioning fuel level indicator, replace the combination meter unit with a new one.



I649G1930012-01

1. Fuel gauge wire coupler

Fuel Level Gauge Inspection

B649G19306017

Inspect the fuel level gauge in the following procedures:

- 1) Remove the fuel level gauge. Refer to "Fuel Level Gauge Removal and Installation: in Section 1G".
- 2) Measure the resistance at each fuel level gauge float position. If the resistance is incorrect, replace fuel level gauge with a new one.

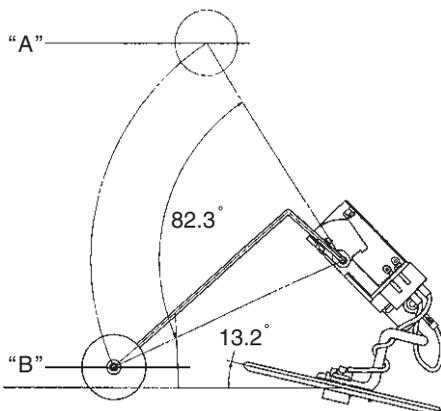
Special tool

 : 09900-25008 (Multi-circuit tester set)

Tester knob indication

Resistance (Ω)

Float position	Resistance
"A" (Full)	3 – 5 Ω
"B" (Empty)	179 – 185 Ω



I649G1930013-02

- 3) Install the fuel level gauge. Refer to "Fuel Level Gauge Removal and Installation: in Section 1G".

Speedometer Inspection

B649G19306018

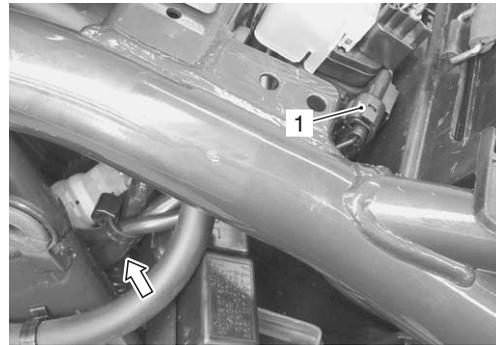
If the speedometer, odometer or tripmeter does not function properly, inspect the speed sensor and the coupler connections. If the speed sensor and coupler connections are OK, replace the combination meter unit with a new one. Refer to "Combination Meter Removal and Installation: ".

Speed Sensor Removal and Installation

B649G19306019

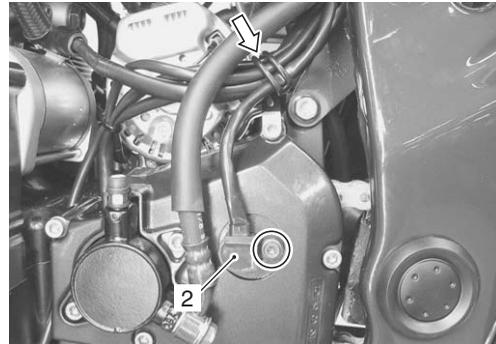
Removal

- 1) Remove the seat. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the speed sensor coupler (1) and clamp.



I649G1930014-01

- 3) Remove the speed sensor (2).



I649G1930015-01

Installation

Install the speed sensor in the reverse order of removal. Pay attention to the following point:

- Route the speed sensor lead wire. Refer to "Wiring Harness Routing Diagram: in Section 9A".

Speed Sensor Inspection

B649G19306020

Inspect the speed sensor in the following procedures:

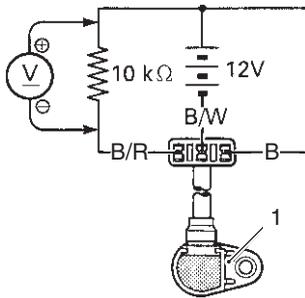
- 1) Remove the speed sensor. Refer to “Speed Sensor Removal and Installation:”.
- 2) Connect a 12 V battery (between B and B/W), 10 kΩ resistor (between B/R and B) and multi-circuit tester (tester (+) probe to B and tester (-) probe to B/R) as shown.

Special tool

 : 09900-25008 (Multi-circuit tester set)

Tester knob indication

Voltage (---)



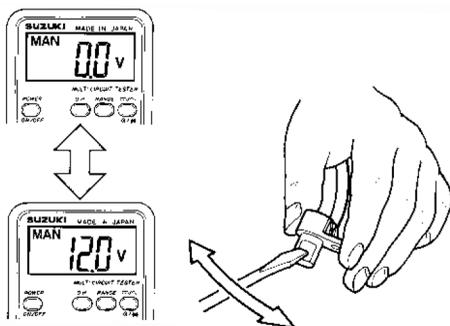
I649G1930016-01

1. Speed sensor

- 3) Move a screwdriver back and forth across the pick-up surface of the speed sensor. The voltage readings should cycle as follows (0 V → 12 V or 12 V → 0 V). If the voltage reading does not change, replace the speed sensor with a new one.

NOTE

While testing, the highest voltage reading should be the same as the battery voltage (12 V).



I649G1930017-01

Oil Pressure Indicator Inspection

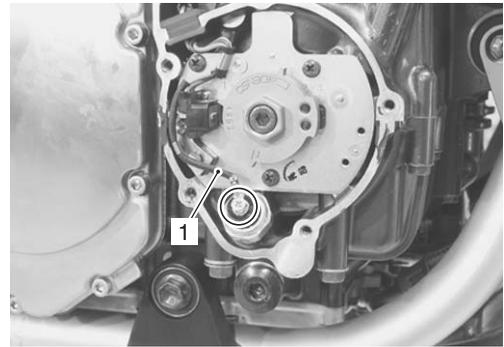
B649G19306021

Inspect the oil pressure indicator in the following procedures:

NOTE

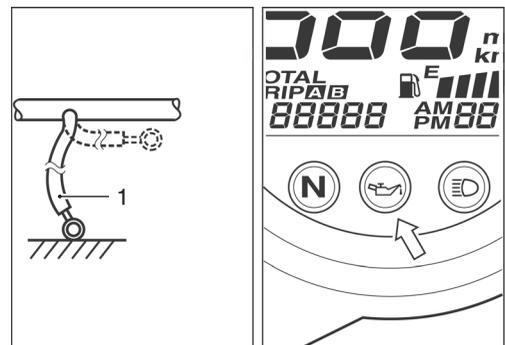
Before inspecting the oil pressure switch, check if the engine oil level is correct. Refer to “Engine Oil and Filter Replacement: in Section 0B”.

- 1) Remove the CKP sensor cover. Refer to “CKP Sensor Removal and Installation: in Section 1H”.
- 2) Disconnect the oil pressure G/Y lead wire (1) from the oil pressure switch.



I649G1930018-01

- 3) Turn the ignition switch to ON.
- 4) Check if the oil pressure indicator light will light up when grounding the G/Y lead wire (1). If the oil pressure indicator does not light up, replace the combination meter unit with a new one after checking connection of couplers.



I649G1930019-02

Oil Pressure Switch Removal and Installation

B649G19306022

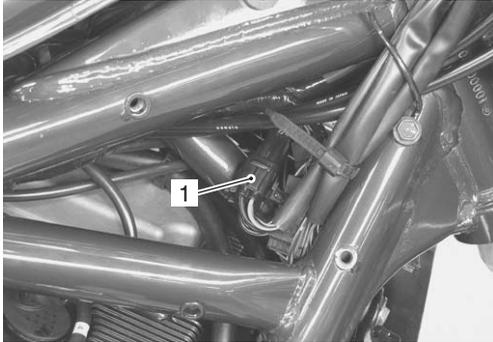
Refer to "Oil Pressure Switch Removal and Installation: in Section 1E".

Ignition Switch Inspection

B649G19306023

Inspect the ignition switch in the following procedures:

- 1) Remove the right frame head cover (GSF1200).
Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the ignition switch coupler (1).



I649G1930021-01

- 3) Inspect the ignition switch for continuity with a tester. If any abnormality is found, replace the ignition switch with a new one.

Position \ Color	Color					
	B/R	B/O	G/B	B/W	B/G	Br/B
ON	○—○	○—○	○—○	○—○	○—○	○—○
OFF						
LOCK						
P	○					○

I649G1180025-01

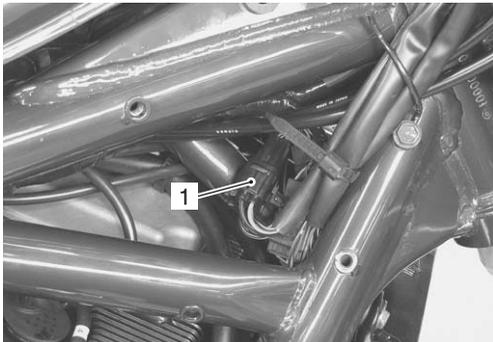
- 4) After finishing the ignition switch inspection, reinstall the removed parts.

Ignition Switch Removal and Installation

B649G19306024

Removal

- 1) Remove the right frame head cover (GSF1200).
Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the ignition switch coupler (1).

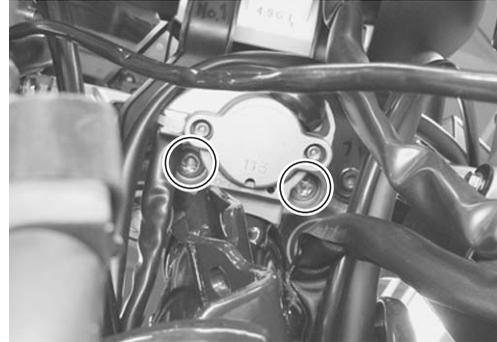


I649G1930021-01

- 3) Remove the headlight housing (GSF1200).
- 4) Remove the ignition switch using the special tools.

Special tool

- : 09930-11920 (Torx bit (JT 40H))
- : 09930-11940 (Bit holder)



I649G1930022-01

Installation

Install the ignition switch in the reverse order of removal. Pay attention to the following point:

CAUTION

When reusing the ignition switch bolt, clean thread and apply the THREAD LOCK.

: Thread lock cement 99000-32110 (Thread Lock Cement Super 1322 or equivalent)

Horn Inspection

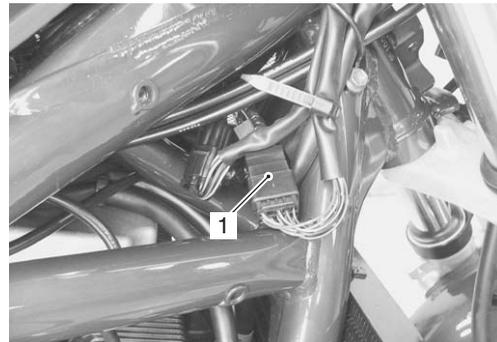
B649G19306026

NOTE

If the horn sound condition is normal, it is not necessary to inspect the horn button continuity.

Horn Button Inspection

- 1) Remove the right frame head cover. Refer to "Exterior Parts Removal and Installation: in Section 9D".
- 2) Disconnect the left handlebar switch coupler (1).



I649G1930020-01

- 3) Inspect the horn button for continuity with a tester. If any abnormality is found, replace the left handlebar switch assembly with a new one. Refer to "Handlebars Removal and Installation: in Section 6B".

Special tool

 : 09900-25008 (Multi-circuit tester set)

Tester knob indication

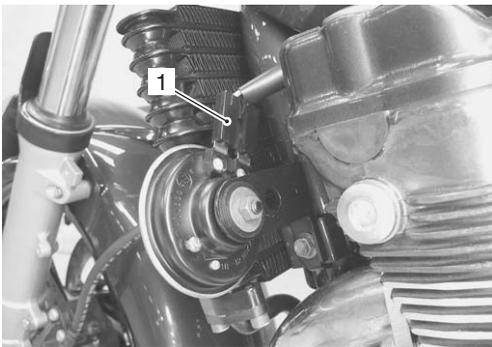
Continuity (•)))

Color Position	B/BI	B/W
•		
PUSH		

I310G1930024-01

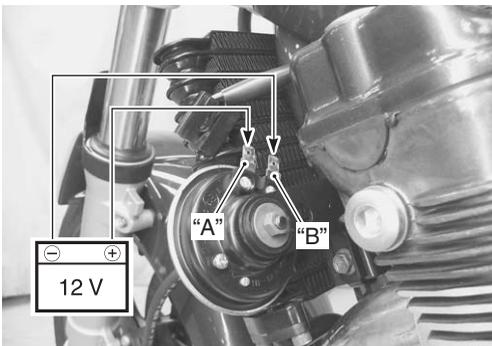
Horn Inspection

- 1) Disconnect the horn coupler (1).



I649G1930023-01

- 2) Connect a 12 V battery to terminal "A" and terminal "B". If the sound is not heard from the horn, replace the horn with a new one.



I649G1930026-01

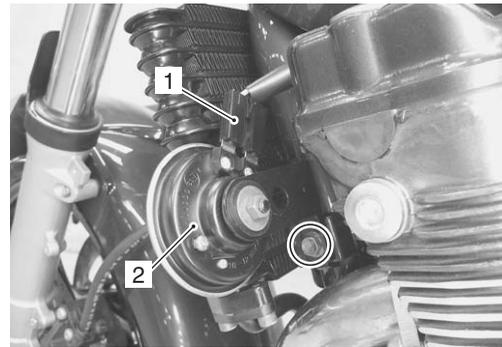
- 3) Connect the horn coupler.

Horn Removal and Installation

B649G19306028

Removal

- 1) Disconnect the horn coupler (1).
- 2) Remove the horn (2) by removing the mounting bolt.



I649G1930025-01

Installation

Install the horn in the reverse order of removal.

Specifications

Service Data

B649G19307001

Wattage

Unit: W

Item	Specification	
	GSF1200	GSF1200S
Speedometer light	LED	←
Tachometer light	LED	←
Turn signal indicator light	LED x 2	←
High beam indicator light	LED	←
Neutral position indicator light	LED	←
Oil pressure indicator light	LED	←

Special Tools and Equipment

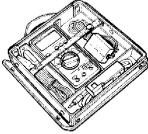
Recommended Service Material

B649G19308001

Material	SUZUKI recommended product or Specification	Note
Thread lock cement	Thread Lock Cement Super 1322 or equivalent	P/No.: 99000-32110

Special Tool

B649G19308002

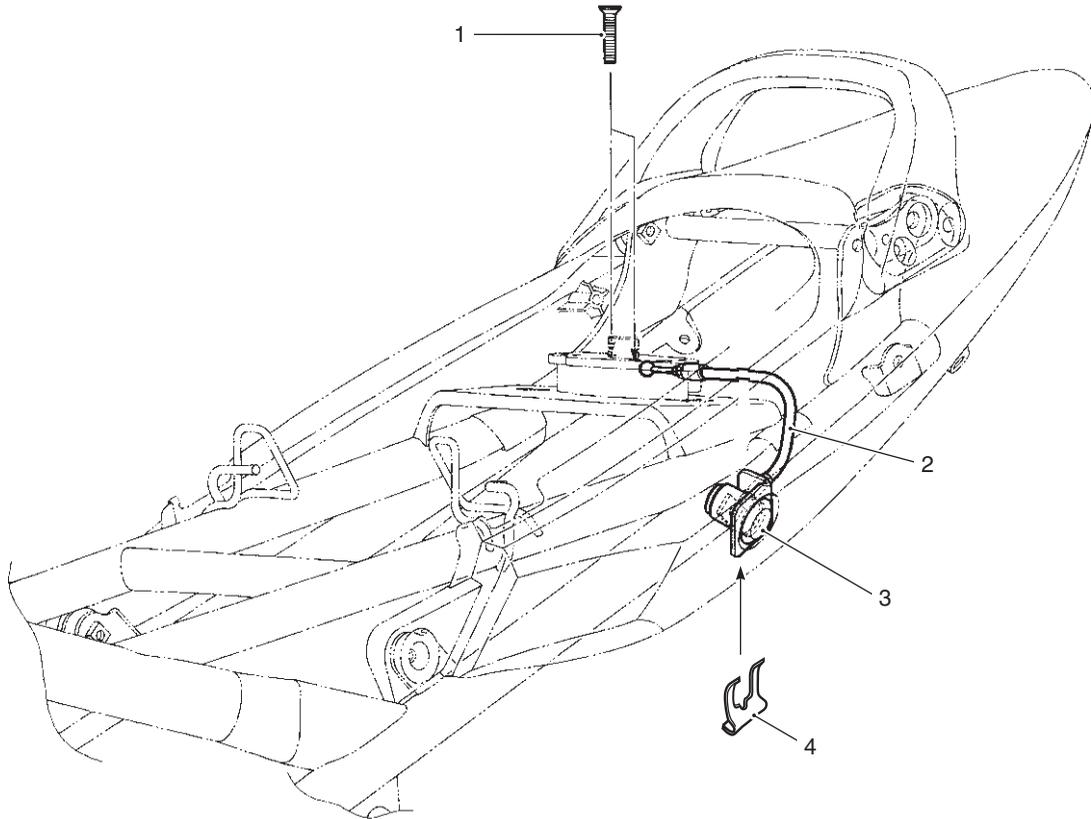
<p>09900-25008 Multi-circuit tester set ☞ / ☞ / ☞</p> 	<p>09930-11920 Torx bit (JT 40H) ☞</p> 
<p>09930-11940 Bit holder ☞</p> 	

Exterior Parts

Schematic and Routing Diagram

Seat Lock Cable Routing Diagram

B649G19402002



I649G1940001-01

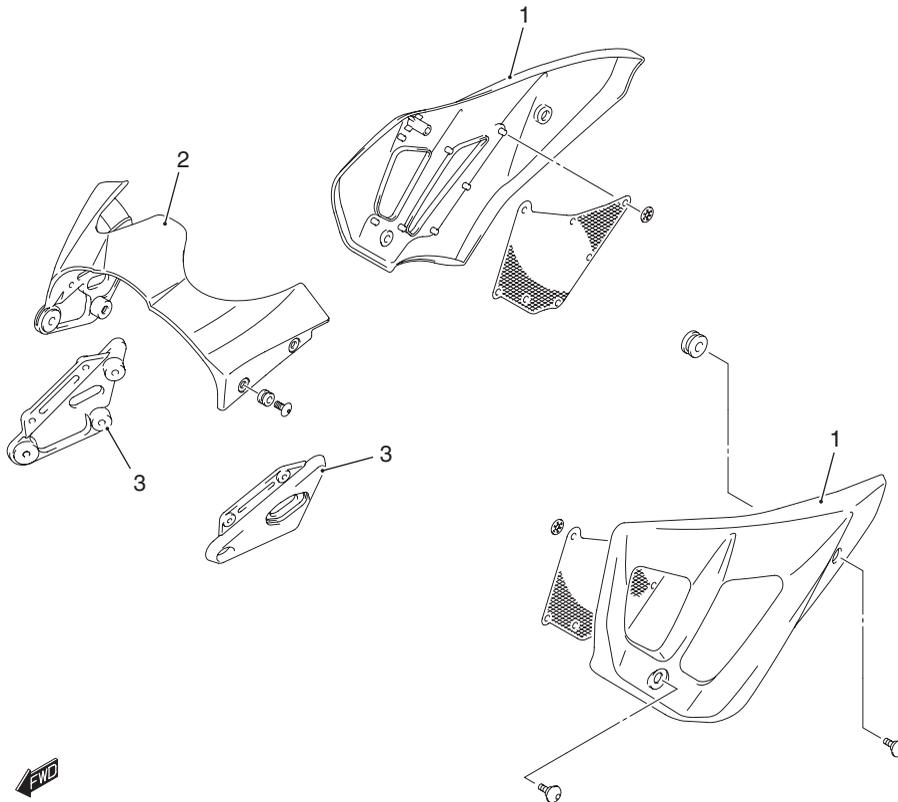
1. Screw	3. Seat lock
2. Seat lock cable	4. Plate

Repair Instructions

Exterior Parts Construction

GSF1200

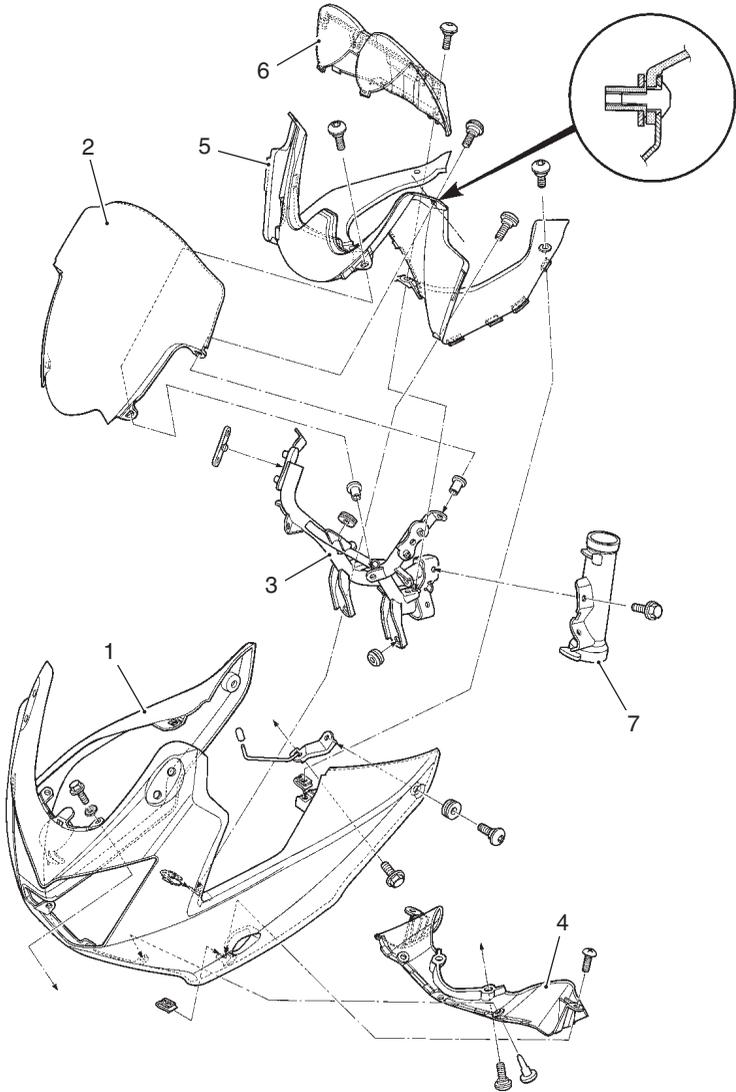
B649G19406001



I649G1940002-02

1. Frame head cover	2. Headlight housing cover	3. Headlight housing stay
---------------------	----------------------------	---------------------------

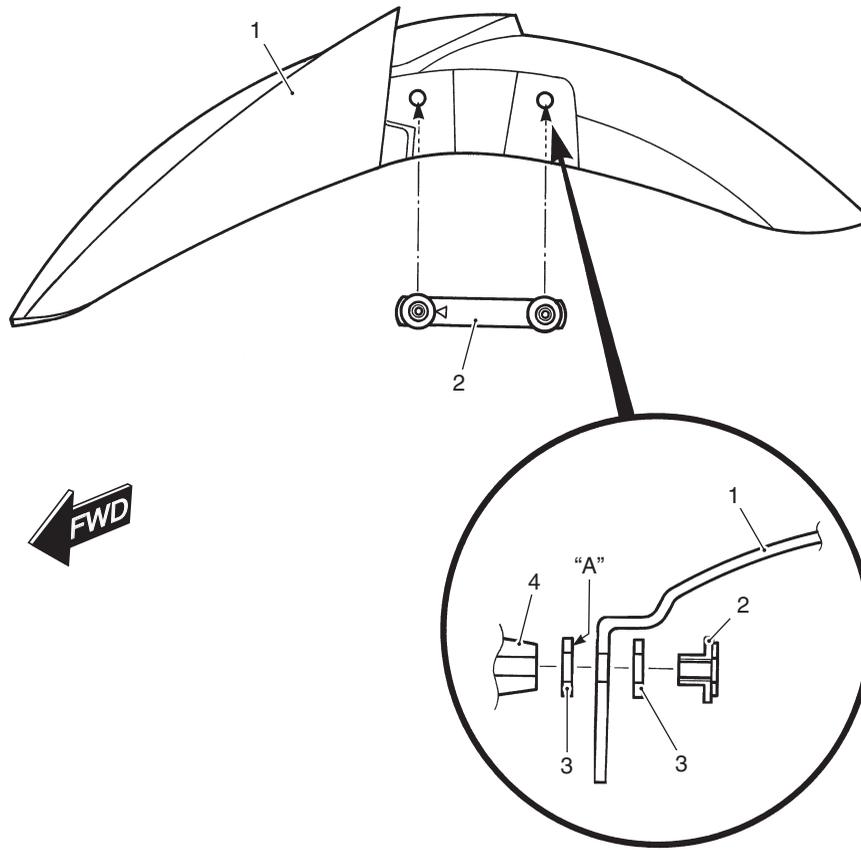
GSF1200S



1. Cowling body	3. Cowling brace	5. Upper panel	7. Head pipe
2. Wind screen	4. Lower panel	6. Meter panel lid	

I649G1940003-05

9D-4 Exterior Parts:

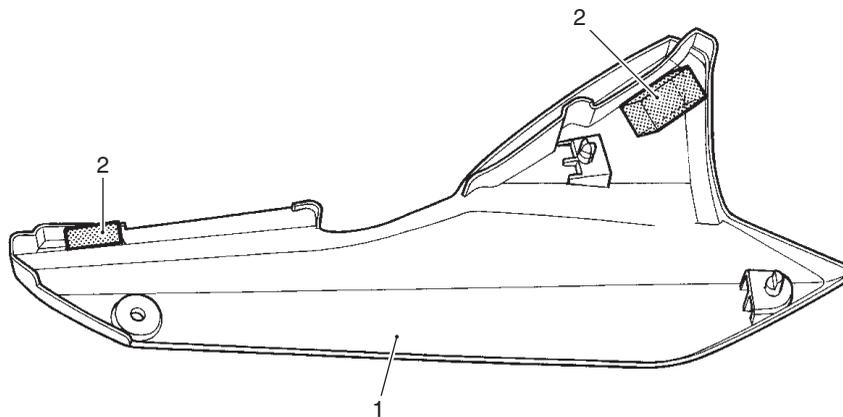


I649G1940031-02

1. Front fender	3. Washer	"A": Before installing the front fender, apply an adhesive agent to the inside of the washer to prevent it from falling.
2. Fender plate nut	4. Front fork	

Frame Cover Cushion Construction

B649G19406002



I649G1940004-02

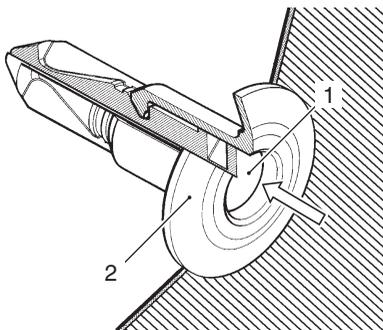
1. Frame cover	2. Cushion
----------------	------------

Fastener Removal and Installation

B649G19406003

Removal

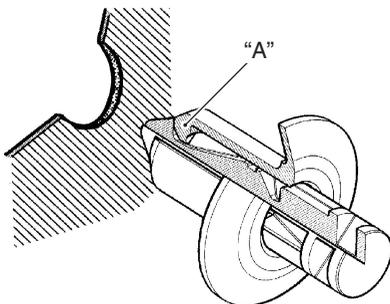
- 1) Depress the head of fastener center piece (1).
- 2) Pull out the fastener (2).



I649G1940005-01

Installation

- 1) Let the center piece stick out toward the head so that the pawls "A" close.



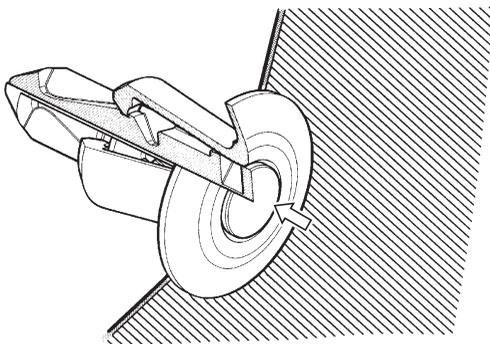
I649G1940006-01

- 2) Insert the fastener into the installation hole.

NOTE

To prevent the pawl "A" from damage, insert the fastener all the way into the installation hole.

- 3) Push in the head of center piece until it becomes flush with the fastener outside face.



I649G1940007-01

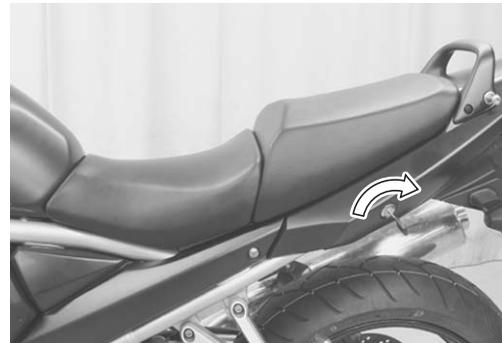
Exterior Parts Removal and Installation

B649G19406004

Seat

Removal

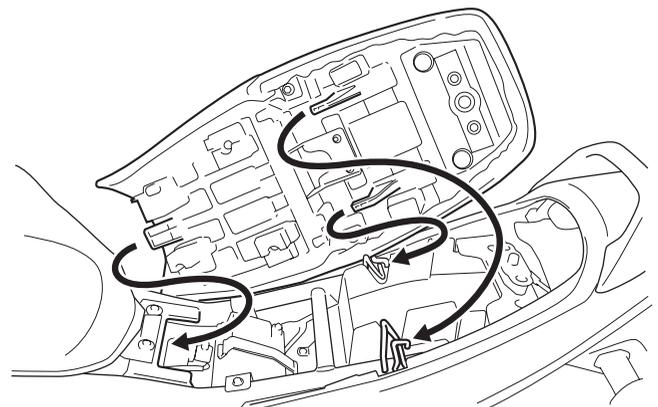
- 1) Unlock the seat with the ignition key.
- 2) Remove the front and rear seats as an assembly.



I649G1940008-01

Installation

Slide the seat hooks into the seat hook retainers and push down firmly until the seat snaps into the locked position.

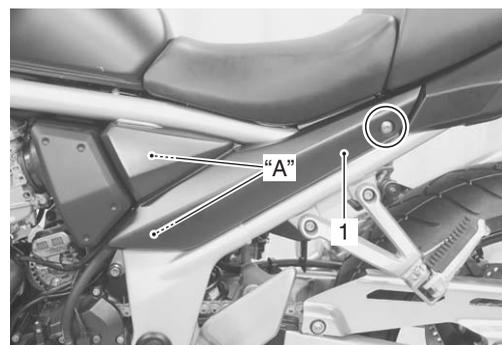


I649G1940009-01

Frame Cover

Removal

Remove the frame covers (1), left and right.



I649G1940010-03

"A": Hooked point

9D-6 Exterior Parts:

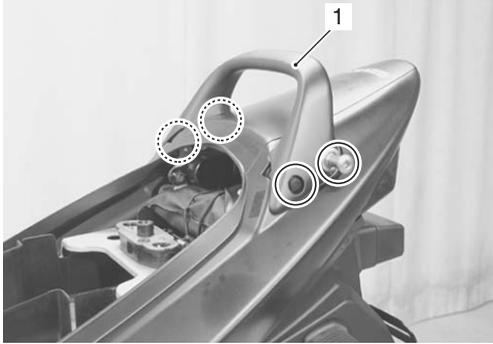
Installation

Install the frame covers in the reverse order of removal.

Pillion Rider Handle and Seat Tail Cover

Removal

- 1) Remove the seat.
- 2) Remove the frame covers.
- 3) Remove the pillion rider handle (1).



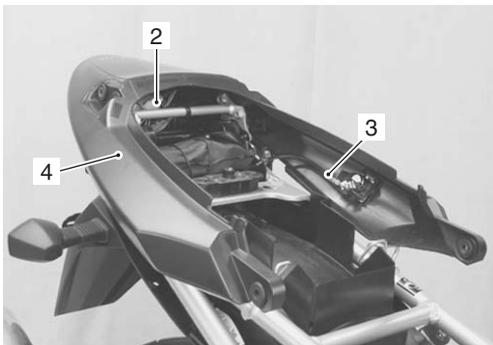
I649G1940011-01

- 4) Remove the fasteners. Refer to "Fastener Removal and Installation: ".



I649G1940012-01

- 5) Disconnect the brake light/tailight lead wire coupler (2).
- 6) Unhook the seat lock cable (3).
- 7) Remove the seat tail cover (4).



I649G1940013-01

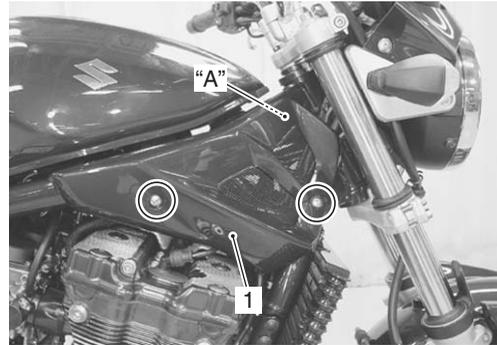
Installation

Install the seat tail cover and pillion rider handle in the reverse order of removal.

Frame Head Cover (GSF1200)

Removal

Remove the frame head covers (1), left and right.



I649G1940014-02

"A": Hooked point

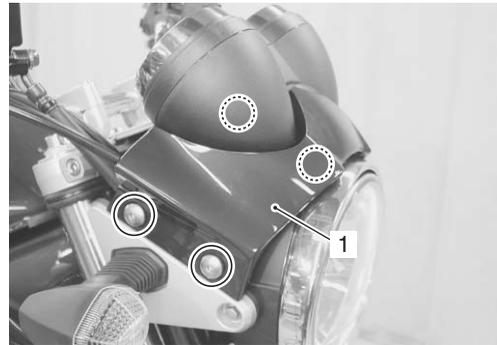
Installation

Install the frame head covers in the reverse order of removal.

Headlight Housing Cover (GSF1200)

Removal

Remove the headlight housing cover (1).



I649G1940015-02

Installation

Install the headlight housing cover in the reverse order of removal.

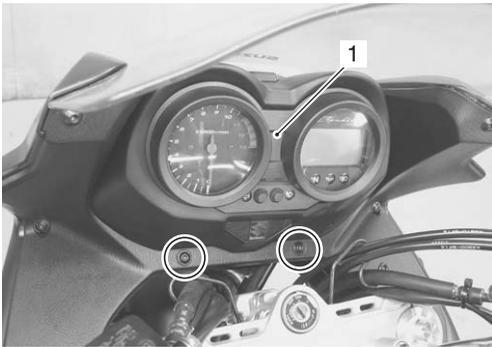
Cowling and Cowling Brace (GSF1200S)

- 1) Remove the caps.
- 2) Remove the rear view mirrors, left and right.



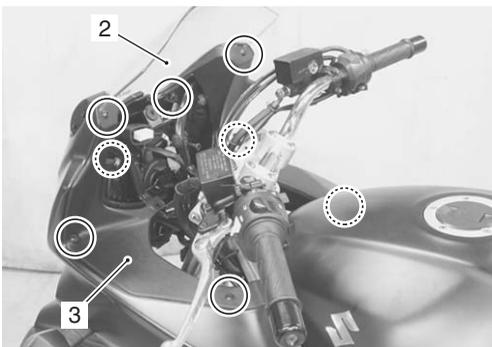
I649G1940016-01

3) Remove the combination meter assembly (1). Refer to "Combination Meter Removal and Installation: in Section 9C".



I649G1940017-01

4) Remove the wind screen (2) and upper panel (3).



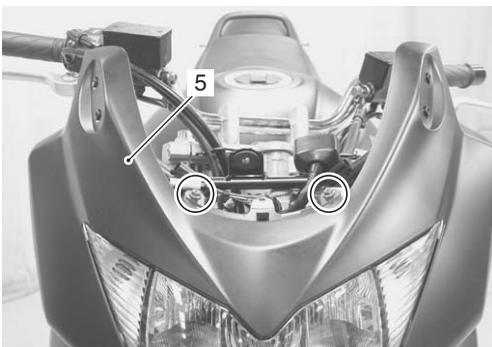
I649G1940018-01

5) Disconnect the turn signal lead wire couplers and remove the turn signal lights (4), left and right. Refer to "Front Turn Signal Light Removal and Installation: in Section 9B".

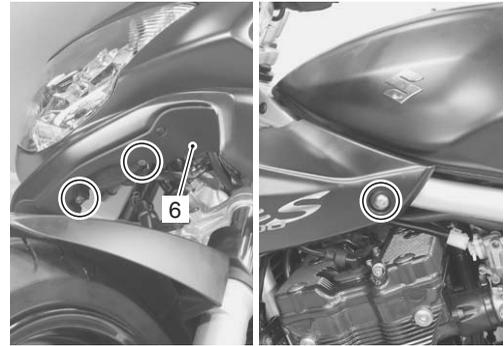


I649G1940029-01

6) Remove the cowling (5) along with the lower panel (6).

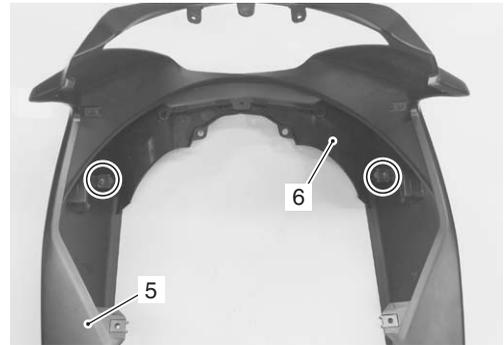


I649G1940020-01



I649G1940019-01

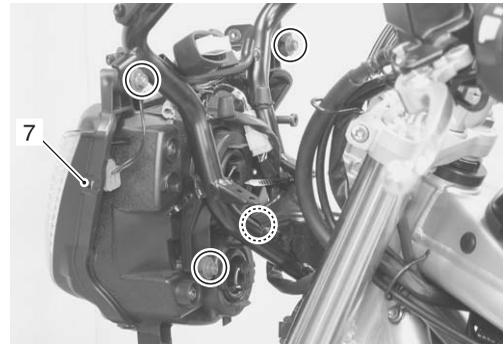
7) Remove the lower panel (6) from the cowling (5).



I649G1940021-01

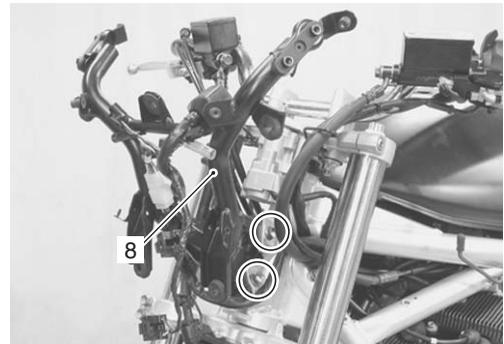
8) Disconnect the headlight and position light couplers.

9) Remove the headlight assembly (7).



I649G1940022-01

10) Remove the cowling brace (8).



I649G1940023-01

9D-8 Exterior Parts:

Installation

Install the cowling and cowling brace in the reverse order of removal. Pay attention to the following point:

- After installing, be sure to inspect the headlight beam. Refer to "Headlight Beam Adjustment: in Section 9B".

Front Fender

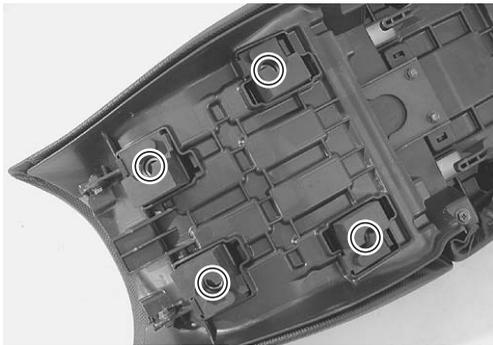
Refer to "Front Fork Removal and Installation: in Section 2B".

Seat Height Adjustment

B649G19406005

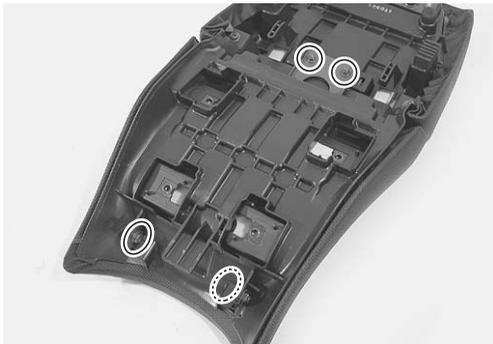
Adjust the seat height in the following procedures:

- 1) Remove the seat assembly. Refer to "Exterior Parts Removal and Installation: ".
- 2) Remove the seat height adjust dampers.



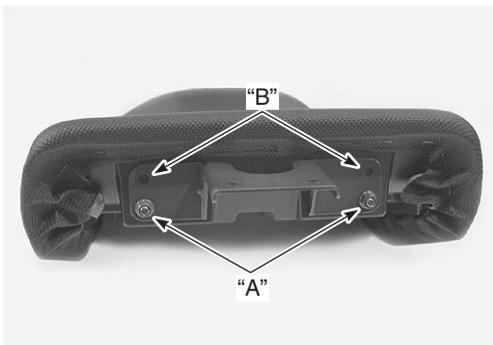
I649G1940024-01

- 3) Remove the front seat from the rear seat.



I649G1940025-01

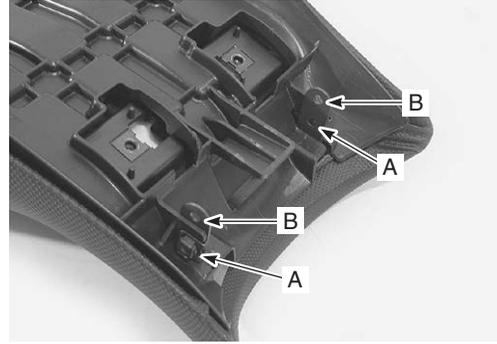
- 4) Adjust the seat height adjuster position "A" or "B".



I649G1940026-01

"A": For low (Normal) position "B": For high position

- 5) Reinstall the front seat and adjust the seat height adjuster position "A" or "B".



I649G1940027-02

"A": For low (Normal) position "B": For high position

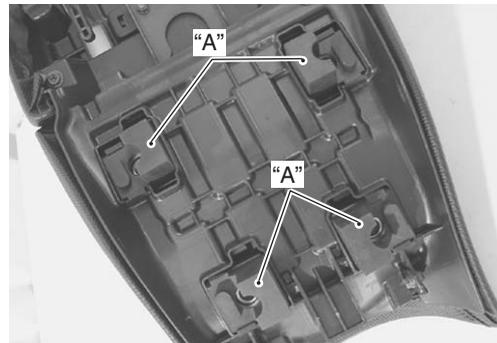
- 6) Install the seat height adjust dampers.

NOTE

Dampers are used in two ways "A" or "B". Pay attention to the direction of dampers when installing them.

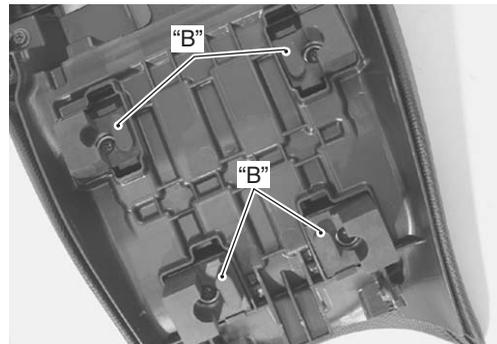
CAUTION

Position of adjuster and direction of dampers must be unified either "A" or "B".



I649G1940028-02

"A": For low (Normal) position



I649G1940030-01

"B": For high position

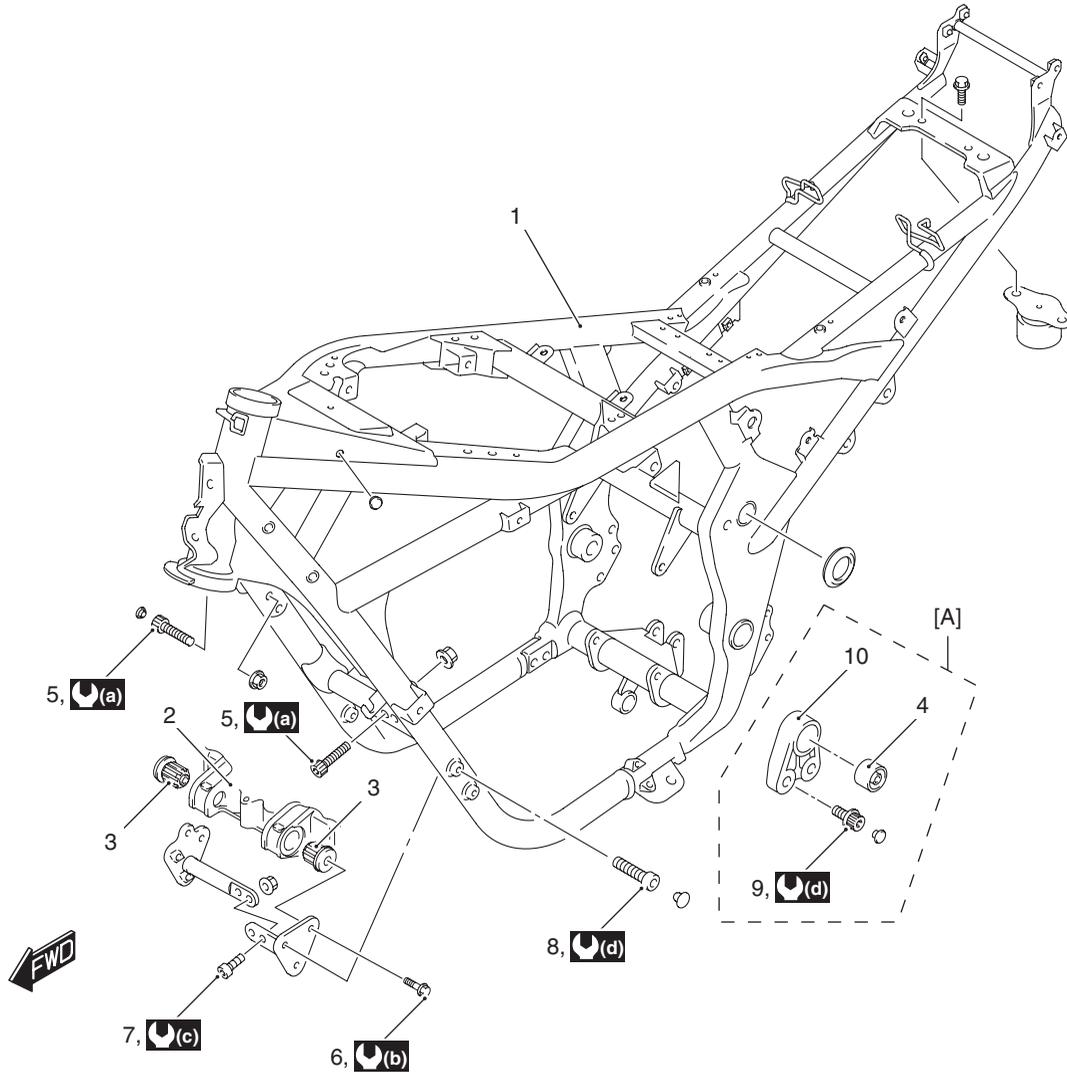
- 7) Install the seat assembly. Refer to "Exterior Parts Removal and Installation: ".

Body Structure

Repair Instructions

Body Frame Construction

B649G19506007



I649G1950005-02

1. Frame	6. Engine mounting bolt (Front)	[A]: Except for E-28
2. Crankcase	7. Engine mounting joint bolt	(a) : 50 N·m (5.0 kgf·m, 36.0 lb-ft)
3. Engine mount bushing	8. Joint mounting bolt	(b) : 55 N·m (5.5 kgf·m, 40.0 lb-ft)
4. Engine mounting bracket bushing	9. Bracket mounting bolt	(c) : 70 N·m (7.0 kgf·m, 50.5 lb-ft)
5. Frame down tube bolt	10. Engine mounting bracket	(d) : 23 N·m (2.3 kgf·m, 16.5 lb-ft)

Engine Mounting Bracket Bushing Replacement

B649G19506008

Replace the engine mounting bracket bushing if necessary, as shown in the body frame construction. Refer to "Body Frame Construction: ".

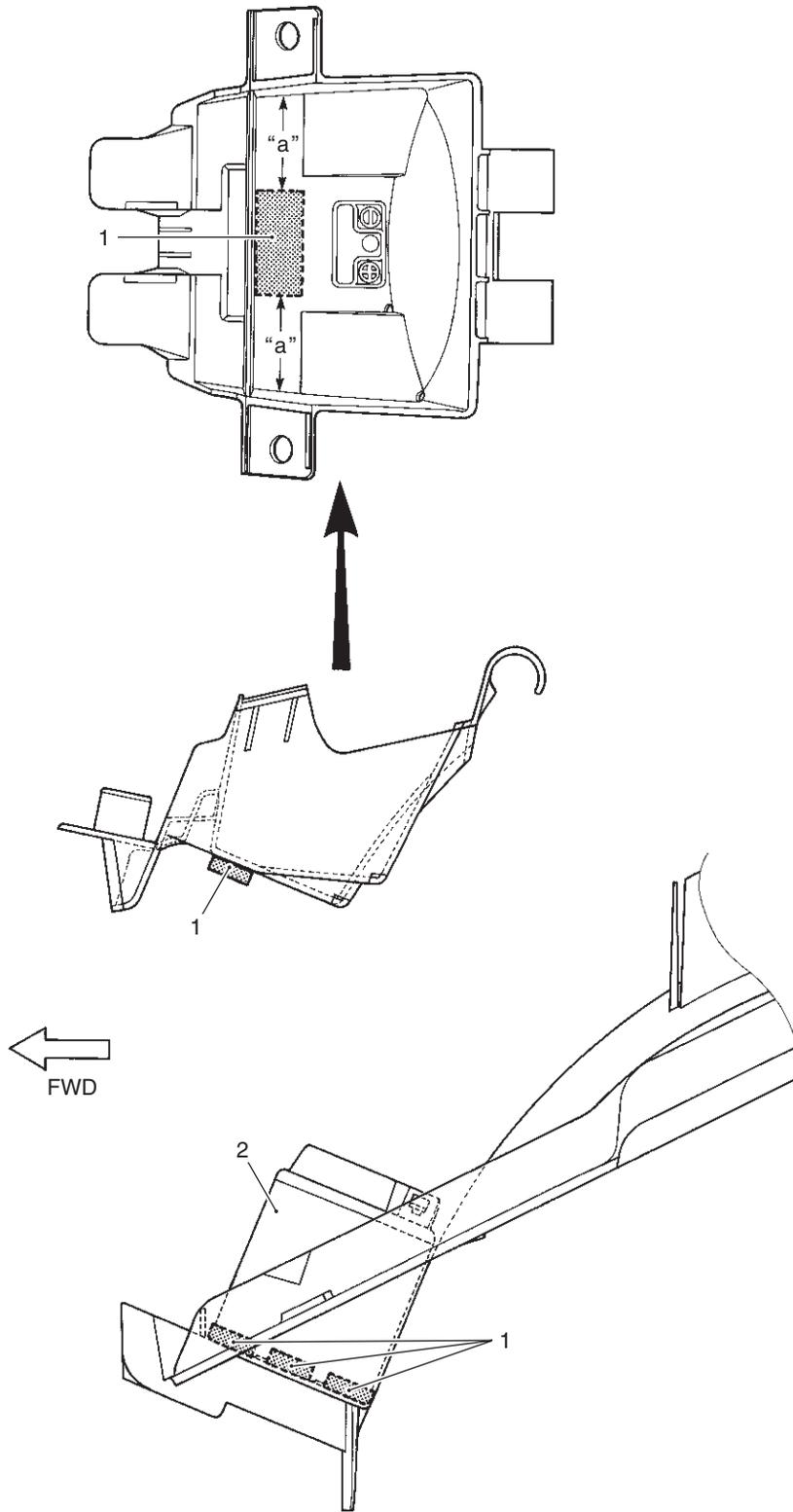
Engine Mount Bushing Replacement

B649G19506009

Replace the engine mount bushing if necessary, as shown in the body frame construction. Refer to "Body Frame Construction: ".

Battery Protector Construction

B649G19506001

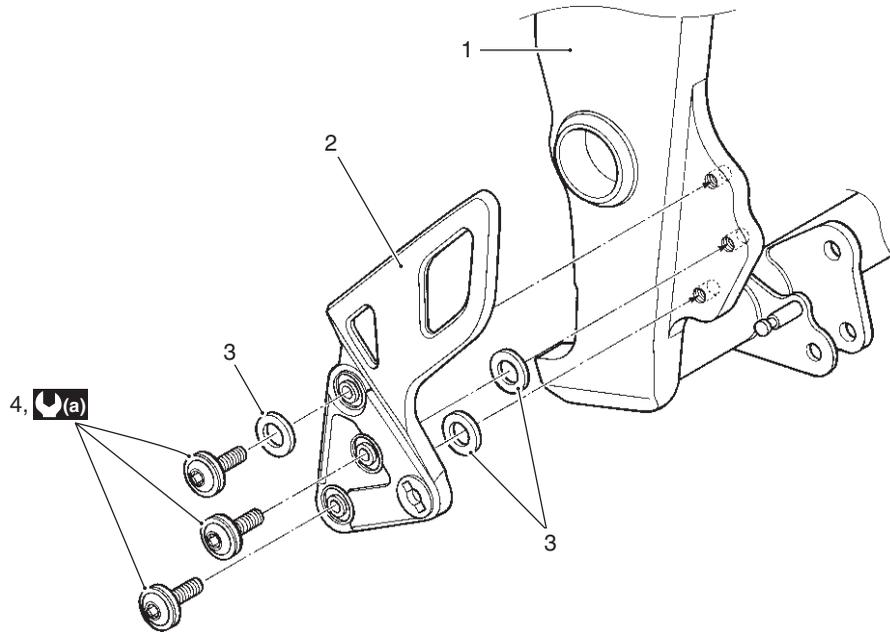


1. Protector	2. Battery	"a": 50 mm (1.97 in)
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I649G1950001-01

Front Footrest Bracket Construction

B649G19506002

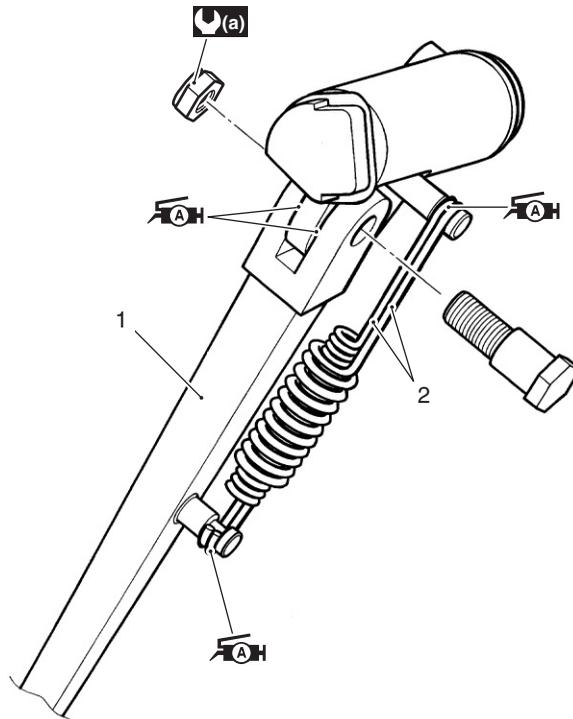


1. Frame	3. Washer	: 23 N·m (2.3 kgf·m, 16.5 lb-ft)
2. Footrest bracket	4. Bolt	

I649G1950002-02

Side-stand Construction

B649G19506003



I649G1950003-02

1. Side-stand	: 40 N·m (4.0 kgf·m, 29.0 lb-ft)
2. Spring	: Apply grease to sliding surface.

9E-4 Body Structure:

Side-stand Removal and Installation

B649G19506004

Removal

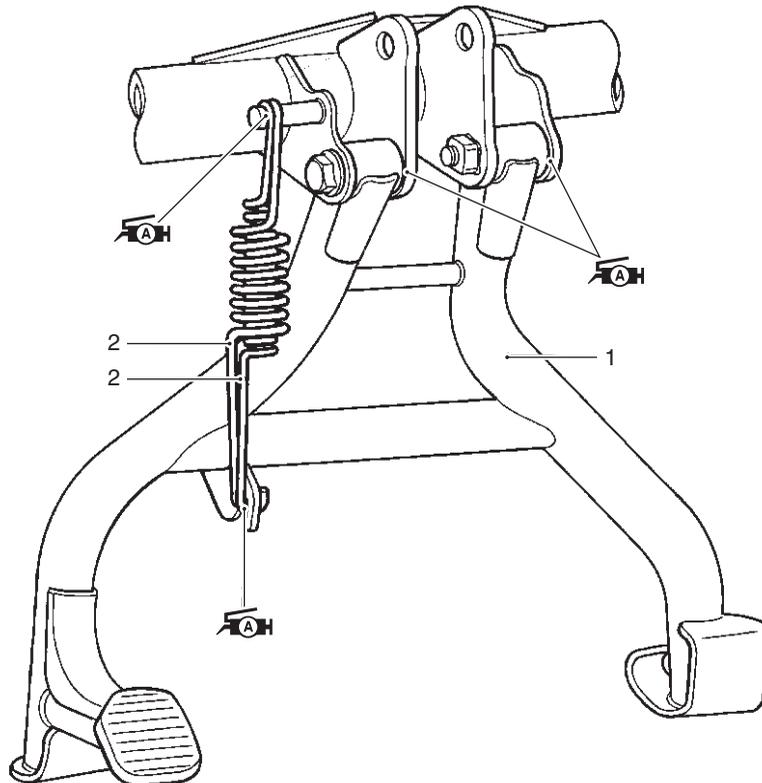
- 1) Support the motorcycle with the center stand.
- 2) Remove the side-stand as shown in the side-stand construction. Refer to "Side-stand Construction: ".

Installation

Install the side-stand as shown in the side-stand construction. Refer to "Side-stand Construction: ".

Center Stand Construction

B649G19506005



I649G1950004-01

1. Center stand	2. Spring	: Apply grease to sliding surface.
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Center Stand Removal and Installation

B649G19506006

Removal

- 1) Support the motorcycle using a jack.

CAUTION

Make sure that the motorcycle is supported securely.

- 2) Remove the center stand as shown in the center stand construction. Refer to "Center Stand Construction: ".

Installation

Install the center stand as shown in the center stand construction. Refer to "Center Stand Construction: ".

Specifications

Tightening Torque Specifications

B649G19507001

NOTE

The specified tightening torque is also described in the following.

“Body Frame Construction: ”

“Front Footrest Bracket Construction: ”

“Side-stand Construction: ”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque Specifications: in Section 0C”.

Special Tools and Equipment

Recommended Service Material

B649G19508001

NOTE

Required service material is also described in the following.

“Side-stand Construction: ”

“Center Stand Construction: ”

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