FOREWORD

This manual contains an introductory description on the SUZUKI VZ1500 and procedures for its inspection/service and overhaul of its main components.
Other information considered as generally known is not included.
Read the GENERAL INFORMATION section to familiarize yourself with the motorcycle and its maintenance. Use this section as well as other sections to use as a guide for proper inspection and service.
This manual will help you know the motorcycle better so that you can assure your customers of fast and reliable service.

** This manual has been prepared on the basis of the latest specifications at the time of publication. If modifications have been made since then, differences may exist between the content of this manual and the actual motorcycle.*
** Illustrations in this manual are used to show the basic principles of operation and work procedures. They may not represent the actual motorcycle exactly in detail.*
** This manual is written for persons who have enough knowledge, skills and tools, including special tools, for servicing SUZUKI motorcycles. If you do not have the proper knowledge and tools, ask your authorized SUZUKI motorcycle dealer to help you.*

⚠ WARNING

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

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Section 00

Precautions

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Precautions

Precautions

Warning / Caution / Note

B940H20000001

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

⚠ CAUTION

- **If parts replacement is necessary, replace the parts with Suzuki Genuine Parts or their equivalent.**
- **When removing parts that are to be reused, keep them arranged in an orderly manner so that they may be reinstalled in the proper order and orientation.**
- **Be sure to use special tools when instructed.**
- **Make sure that all parts used in reassembly are clean. 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 do not require use of battery power, disconnect the negative (–) cable from the battery.**
- **When tightening the cylinder head or case bolts and nuts, tighten the larger sizes first. Always tighten the bolts and nuts diagonally from the inside toward outside 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

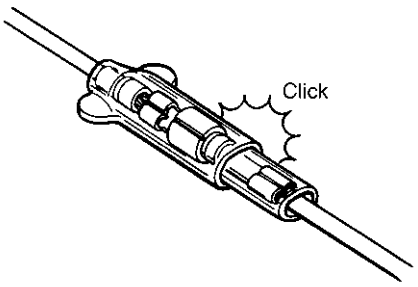
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When handling the electrical parts or servicing the FI system, observe the following points for the safety of the system.

Electrical Parts

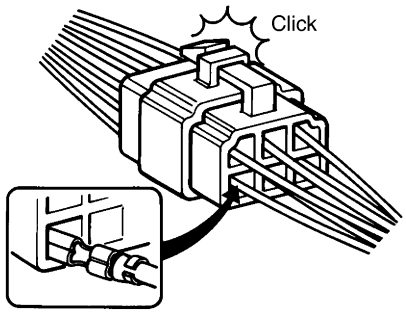
Connector / Coupler

- Faulty FI system is often related to poor electrical contact of connector/coupler. Before servicing individual electronic part, check electrical contact of the connector/coupler.
- When connecting a connector, be sure to push it in until a click is felt.



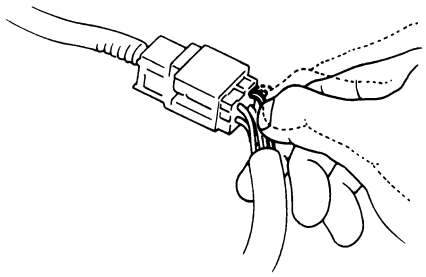
I310G1000001-01

- With a lock type coupler, be sure to release the lock when disconnecting, and push it in fully to engage the lock when connecting.
- 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.
- Push in the coupler straightly. An angled or skewed insertion may cause the terminal to be deformed, possibly resulting in poor electrical contact.
- Inspect each terminal for corrosion and contamination. The terminals must be clean and free of any foreign material which could impede proper terminal contact.
- Before refitting the sealed coupler, make sure its seal rubber is positioned properly. The seal rubber may possibly come off the position during disconnecting work and if the coupler is refitted with the seal rubber improperly positioned, it may result in poor water sealing.



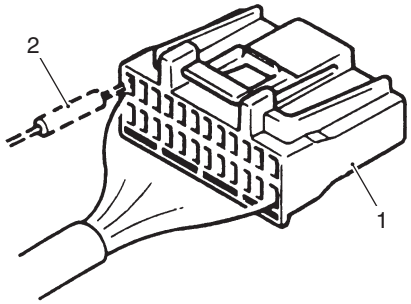
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- Inspect each lead wire circuit for poor connection by shaking it by hand lightly. If any abnormal condition is found, repair or replace.



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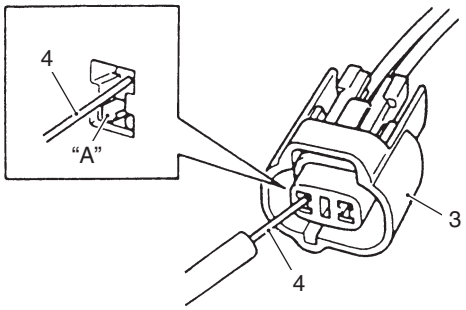
- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (rear) of the connector/coupler.



I649G1000013-02

1. Coupler	2. Probe

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



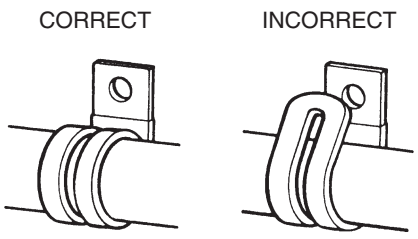
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3. Coupler	4. Probe	"A": Where male terminal fits

- Avoid applying grease or other similar material to connector/coupler terminals to prevent electric trouble.

Clamp

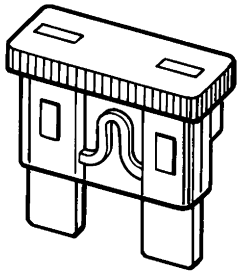
- Clamp the wire harness at such positions as indicated in "Wiring Harness Routing Diagram in Section 9A (Page 9A-5)".
- Bend the clamp properly so that the wire harness is clamped securely.
- In clamping the wire harness, use care not to allow it to hang down.
- Do not use wire or any other substitute for the band type clamp.



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Fuse

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



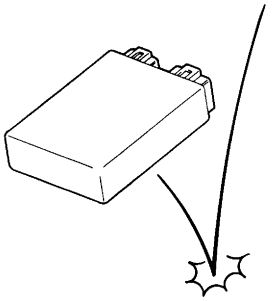
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Switch

Never apply grease material to switch contact points to prevent damage.

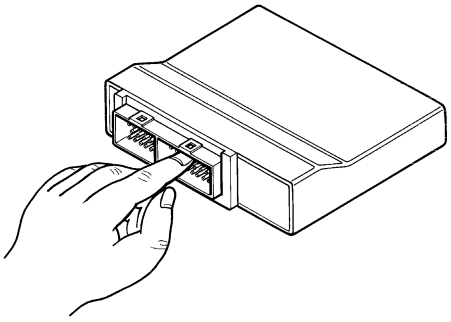
ECM / Various sensors

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



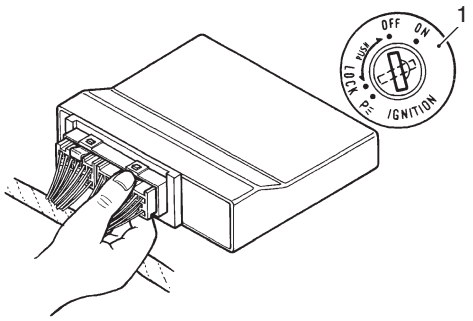
I310G1000007-01

- Be careful not to touch the electrical terminals of the electronic parts (ECM, etc.). The static electricity from your body may damage them.



I310G1000008-01

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

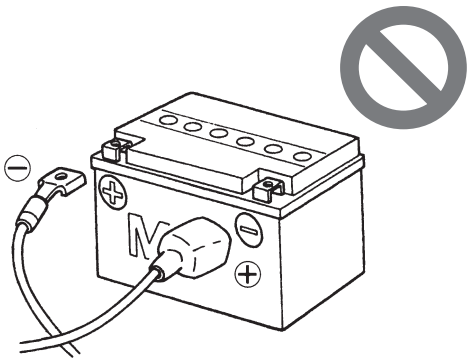


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1. Ignition switch

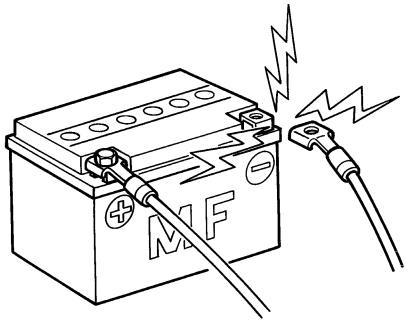
Battery

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



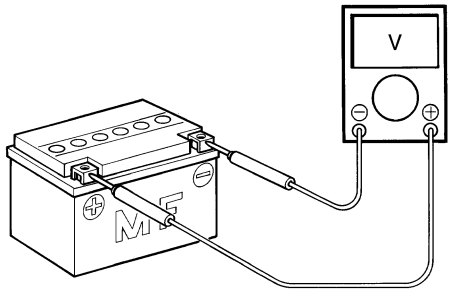
I718H1000004-01

- 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 electronic unit which may result in serious damage.



I310G1000011-01

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



I310G1000012-02

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

Electrical Circuit Inspection Procedure

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

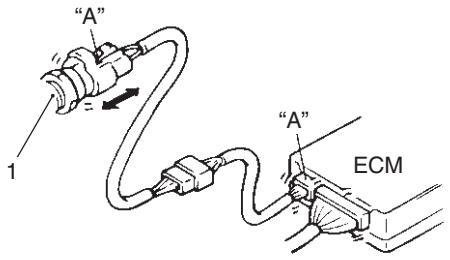
Open circuit check

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

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

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

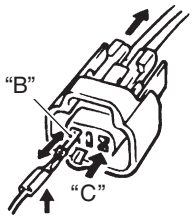
1) Disconnect the negative (–) cable from the battery.
2) Check each connector/coupler at both ends of the circuit being checked for loose connection. Also check for condition of the coupler lock if equipped.



I718H1000005-02

1. Sensor	"A": Check for loose connection

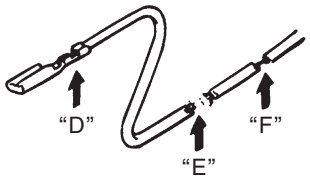
3) Using a test male terminal, check the female terminals of the circuit being checked for contact tension.
Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted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



I649G1000027-02

"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.

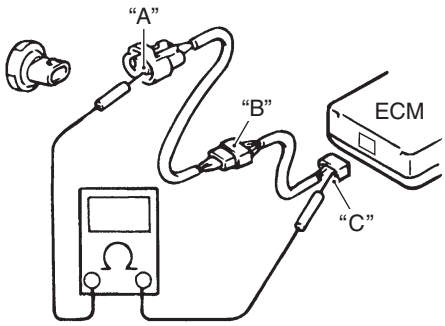


I649G1000028-02

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

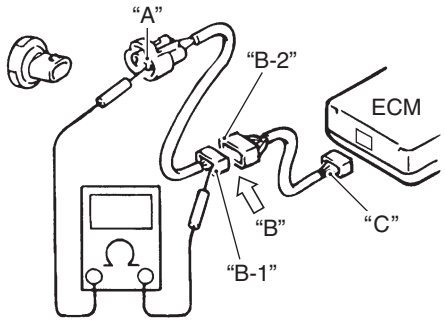
Continuity check

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



I705H1000006-02

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".



I705H1000010-02

Voltage check

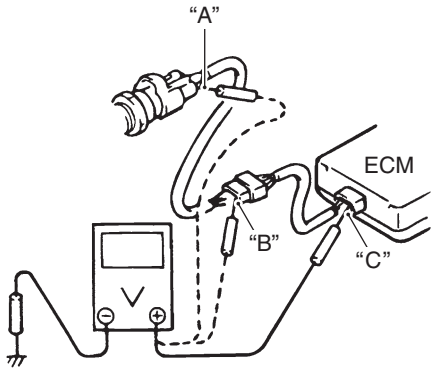
If voltage is supplied to the circuit being checked, voltage check can be used as circuit check.

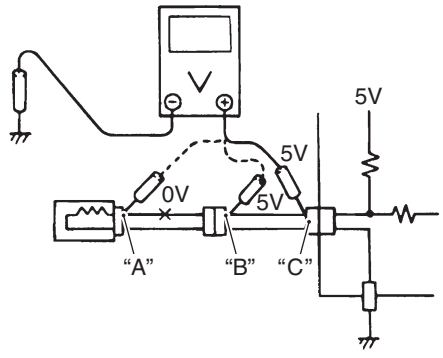
1) With all connectors/couplers connected and voltage applied to the circuit being checked, measure voltage between each terminal and body ground.
2) If measurements were taken as shown in the figure and results were listed in the following, it means that the circuit is open between terminals “A” and “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 following, 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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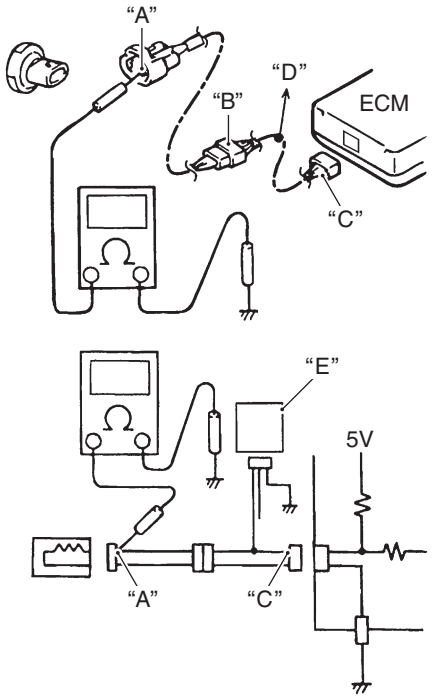
Short circuit check (Wire harness to ground)

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 wrong.

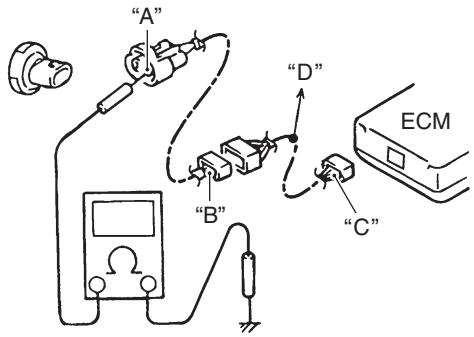
3) Measure resistance between terminal at one end of circuit (“A” terminal in the figure) and body ground. If continuity is indicated, there is a short circuit to ground between terminals “A” and “C”.



I705H1000008-01

“D”: To other parts	“E”: Other parts

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”.



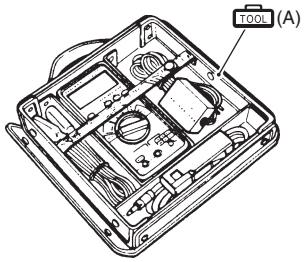
I705H1000009-02

“D”: To other parts

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

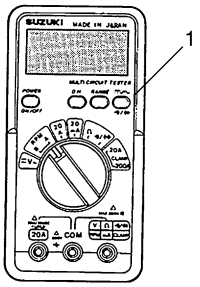


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Using the testers

- Incorrectly connecting the (+) and (–) probes may cause the inside of the tester to be burned.
- 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 MΩ 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
TOOL : 09900–25008 (Multi-circuit tester set)

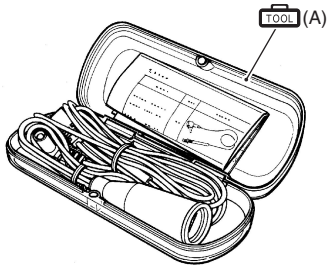


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NOTE

- **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.**
- **When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent the terminal damage or terminal bend.**

Special tool
TOOL (A): 09900–25009 (Needle pointed probe set)

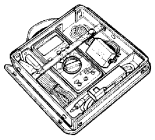
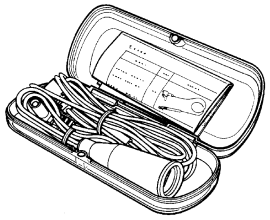


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Special Tools and Equipment

Special Tool

B940H20008001

09900–25008 Multi-circuit tester set ☞(Page 00-7) / ☞(Page 00-7)	
09900–25009 Needle pointed probe set ☞(Page 00-7)	

Section 0

General Information

0

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General Information

General Description

Symbols

B940H20101001

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 indicate 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 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 SUPER “1360” or equivalent. 99000-32130
	Use engine coolant or equivalent. 99000-99032-11X
	Use fork oil or equivalent. 99000-99044-L01
	Apply or use brake fluid.
	Use special tool.
	Do not reuse.
	Note on reassembly.

Abbreviations

B940H20101002

A:
ABDC: After Bottom Dead Center
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
DTC: Diagnostic Trouble code
E:
ECM: Engine Control Module Engine Control Unit (ECU) (FI Control Unit)
ECT Sensor: Engine Coolant Temperature Sensor (ECTS)
Water Temp. Sensor (WTS)
EVAP: Evaporative Emission
F:
FI: Fuel Injection, Fuel Injector
FP: Fuel pump
FPR: Fuel Pressure Regulator

FP Relay: Fuel Pump Relay
G:
GEN: Generator
GND: Ground
GP Switch: Gear Position Switch
H:
HC: Hydrocarbons
HO2 Sensor: Heated Oxgen Sensor (HO2S)
I:
IAP Sensor: Intake Air Pressure Sensor (IAPS)
IAT Sensor: Intake Air Temperature Sensor (IATS)
IG: Ignition
ISC Valve: Idle Speed Control Valve (ISCV)
J:
JASO: Japanese Automobile Standards Organization
L:
LCD: Liquid Crystal Display
LED: Light Emitting Diode (Malfunction Indicator Lamp)
LH: Left Hand
M:
MAL-CODE: Malfunction Code (Diagnostic Code)
Max: Maximum
MIL: Malfunction Indicator Lamp (LED)
Min: Minimum
N:
NOx: Nitrogen Oxides
O:
OHC: Over Head Camshaft
OPS: Oil Pressure Switch
P:
PAIR: Pulsed Secondary Air Injection
PCV: Positive Crankcase Ventilation (Crankcase Breather)
R:
RH: Right Hand
ROM: Read Only Memory
S:
SAE: Society of Automotive Engineers
SDS: Suzuki Diagnosis System
STC System: Secondary Throttle Control System (STCS)
STP Sensor: Secondary Throttle Position Sensor (STPS)
ST Valve: Secondary Throttle Valve (STV)
STV Actuator: Secondary Throttle Valve Actuator (STVA)
T:
TO Sensor: Tip-over Sensor (TOS)
TP Sensor: Throttle Position Sensor (TPS)

SAE-to-Former SUZUKI Term

B940H20101012

This list shows SAE (Society of Automotive Engineers) J1930 terms and abbreviations which may be used in this manual in compliance with SAE recommendations, as well as their former SUZUKI names.
Ex. SAE term (Abbreviation): Former SUZUKI term
A:
Air Cleaner (ACL): Air Cleaner, Air Cleaner Box
B:
Battery Positive Voltage (B+): Battery Voltage, +B
C:
Crankshaft Position Sensor (CKP Sensor): Crankshaft Position Sensor (CKPS), Crank Angle
D:
Data Link Connector (DLC): Dealer Mode Coupler
Diagnostic Test Mode (DTM): —
Diagnostic Trouble Code (DTC): Diagnostic Code, Malfunction Code
E:
Electronic Ignition (EI): —
Engine Control Module (ECM): Engine Control Module (ECM), FI Control Unit, Engine Control Unit (ECU)
Engine Coolant Level (ECL): Coolant Level
Engine Coolant Temperature (ECT): Coolant Temperature, Engine Coolant Temperature, Water Temperature
Engine Speed (RPM): Engine Speed (RPM)
Evaporative Emission (EVAP): Evaporative Emission
Evaporative Emission Canister (EVAP Canister): — (Canister)
F:
Fan Control (FC): —
Fuel Level Sensor: Fuel Level Sensor, Fuel Level Gauge
Fuel Pump (FP): Fuel Pump (FP)
G:
Generator (GEN): Generator
Ground (GND): Ground (GND, GRD)
H:
Hydrocarbons (HC): Hydrocarbons
Heated Oxygen Sensor (HO2S): Heated Oxygen Sensor (HO2S), O2 sensor
I:
Ignition Control Module (ICM): —
Intake Air Temperature (IAT): Intake Air Temperature (IAT), Air Temperature
Idle Speed Control (ISC): —
Ignition Control (IC): Electronic Spark Advance (ESA)
Ignition Control Module (ICM): —
Intake Air Temperature (IAT): Intake Air Temperature (IAT), Air Temperature
M:
Malfunction Indicator Lamp (MIL): LED Lamp, Malfunction Indicator Lamp (MIL)
Manifold Absolute Pressure (MAP): Intake Air Pressure (IAP), Intake Vacuum
Mass Air Flow (MAF): Air Flow
O:
On-Board Diagnostic (OBD): Self-Diagnosis Function, Diagnostic
Open Loop (OL): —
P:
Programmable Read Only Memory (PROM): —
Pulsed Secondary Air Injection (PAIR): Pulse Air Control (PAIR)
Purge Valve (Purge Valve): Purge Valve (SP Valve)

R:
Random Access Memory (RAM): —
Read Only Memory (ROM): ROM
S:
Secondary Air Injection (AIR): —
Secondary Throttle Control System (STCS): STC System (STCS)
Secondary Throttle Valve (STV): ST Valve (STV)
Secondary Throttle Valve Actuator (STVA): STV Actuator (STVA)
T:
Throttle Body (TB): Throttle Body (TB)
Throttle Body Fuel Injection (TBI): Throttle Body Fuel Injection (TBI)
Throttle Position Sensor (TP Sensor): TP Sensor (TPS)
V:
Voltage Regulator (VR): Voltage Regulator
Volume Air Flow (VAF): Air Flow

Vehicle Side View

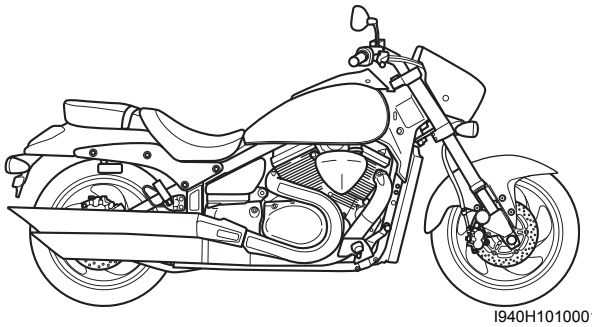
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NOTE

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

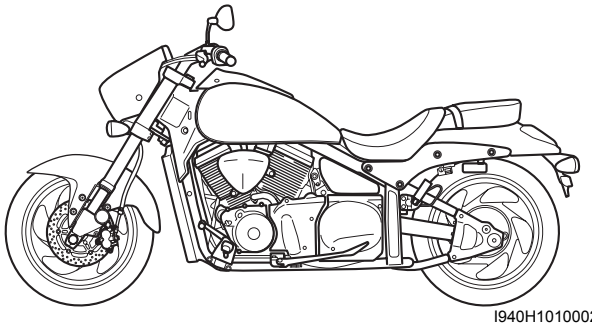
SUZUKI VZ1500 (2009-model)

Right Side



I940H1010001-01

Left Side

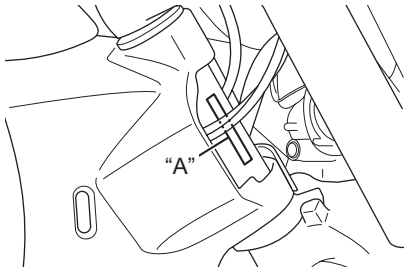


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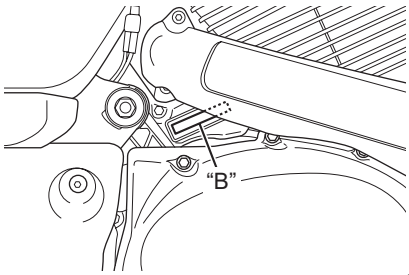
Vehicle Identification Number

B940H20101004

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.



I940H1010003-01



I940H1010004-01

Fuel and Oil Recommendation

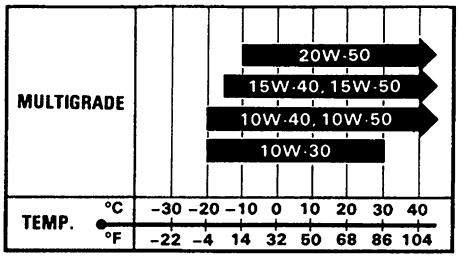
B940H20101005

Fuel (For USA and Canada)
Use only unleaded gasoline of at least 90 pump octane (R/2 + M/2).
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 95 octane (Research Method) or higher. Unleaded gasoline is recommended.

Engine Oil (For USA)
Oil quality is a major contributor to your engine’s performance and life. Always select good quality engine oil.
Suzuki recommends the use of SUZUKI PERFORMANCE 4 MOTOR OIL or equivalent 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 and alternative according to the chart.

Engine Oil (For Other Countries)
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: DOT 4

⚠ WARNING

Since the brake system of this motorcycle is filled with a glycol-based brake fluid by the manufacturer, do not use or mix different types of fluid such as silicone-based and petroleum-based fluid for refilling the system, otherwise serious damage will result.
Do not use any brake fluid taken from old or used or unsealed containers.
Never reuse brake fluid left over from a previous servicing, which has been stored for a long period.

Front Fork Oil
Use fork oil G-10 or an equivalent fork oil.

Engine Coolant Recommendation

B940H20101006

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

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

Anti-freeze/Engine coolant
The engine coolant perform as a corrosion and rust inhibitor as well as anti-freeze. Therefore, the engine coolant should be used at all times even though the atmospheric temperature in your area does not go down to freezing point.
Suzuki recommends the use of SUZUKI COOLANT anti-freeze/engine coolant. If this is not available, use an equivalent which is compatible with an aluminum radiator.

Liquid amount of water/Engine coolant

Solution capacity (total)
2 650 ml (2.8/2.3 US/Imp qt)

For engine coolant mixture information, refer to "Engine Coolant Description in Section 1F (Page 1F-1)".

⚠ CAUTION

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

BREAK-IN Procedures

B940H20101007

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:

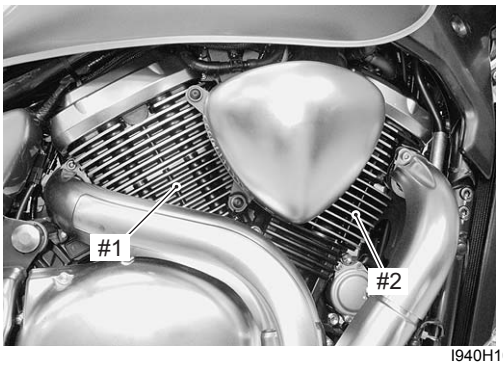
   Speed limits
   Initial 800 km (500 miles): Less than 1/2 throttle
   Up to 1 600 km (1 000 miles): Less than 3/4 throttle

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 9 500 r/min at any time.

Cylinder Identification

B940H20101008

The cylinders of this engine are identified as #1 and #2 cylinder, as counted from rear to front (as viewed by the rider on the seat).



I940H1010005-01

Country and Area Codes

B940H20101009

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

Code	Country or Area	Effective Frame No.
VZ1500 K9 (E-02)	U.K.	JS1CU111200100001 –
VZ1500 K9 (E-19)	E.U.	JS1CU111100100001 –
VZ1500 K9 (E-03)	U.S.A (Except for California)	JS1VY55A 92100001 –
VZ1500 K9 (E-24)	Australia	JS1CU111300100001 –
VZ1500 K9 (E-28)	Canada	JS1VY55A 92100001 –
VZ1500 K9 (E-33)	California (U.S.A)	JS1VY55A 92100001 –

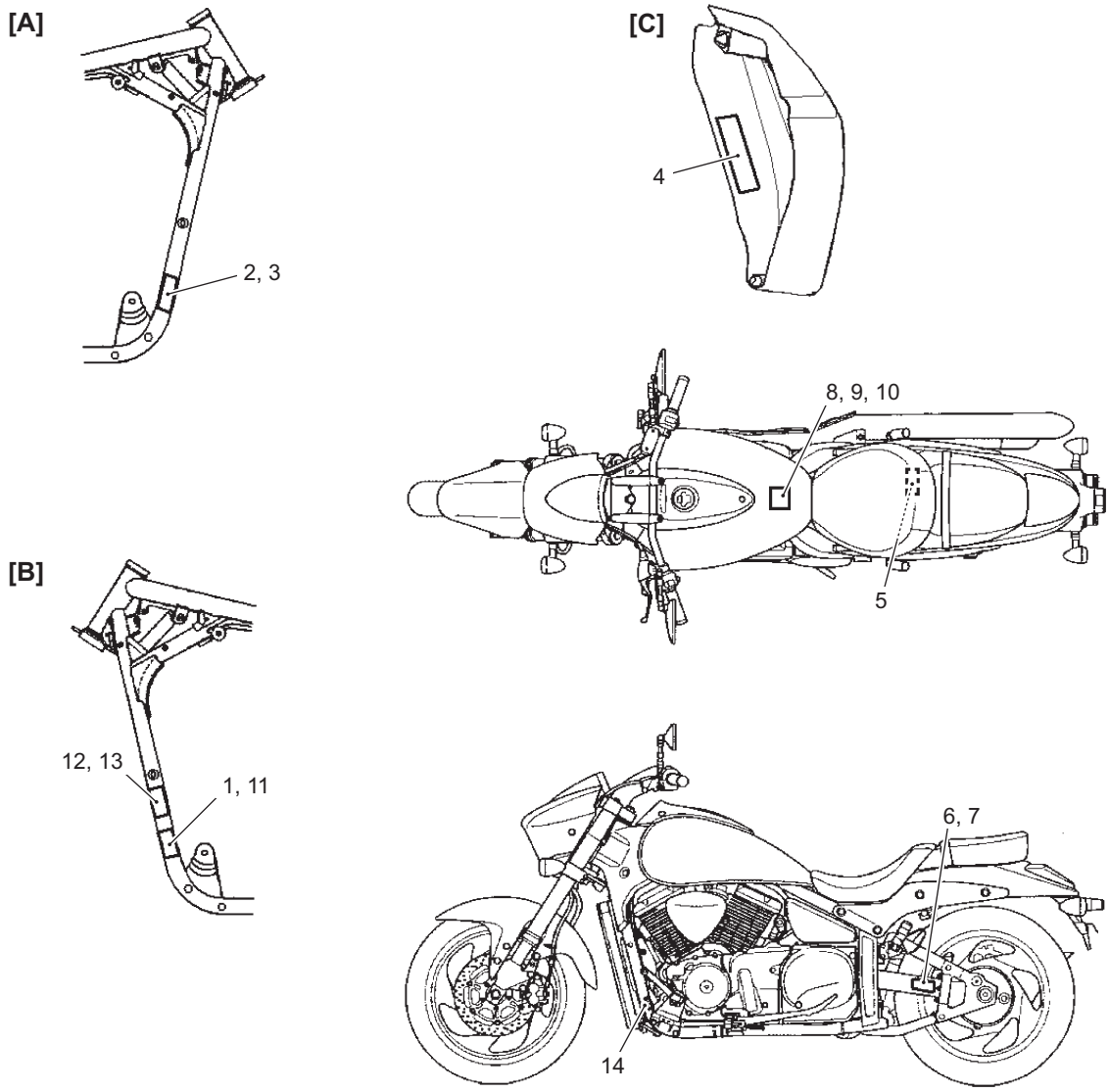
Wire Color Symbols

B940H20101010

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

Warning, Caution and Information Labels Location

B940H20101011



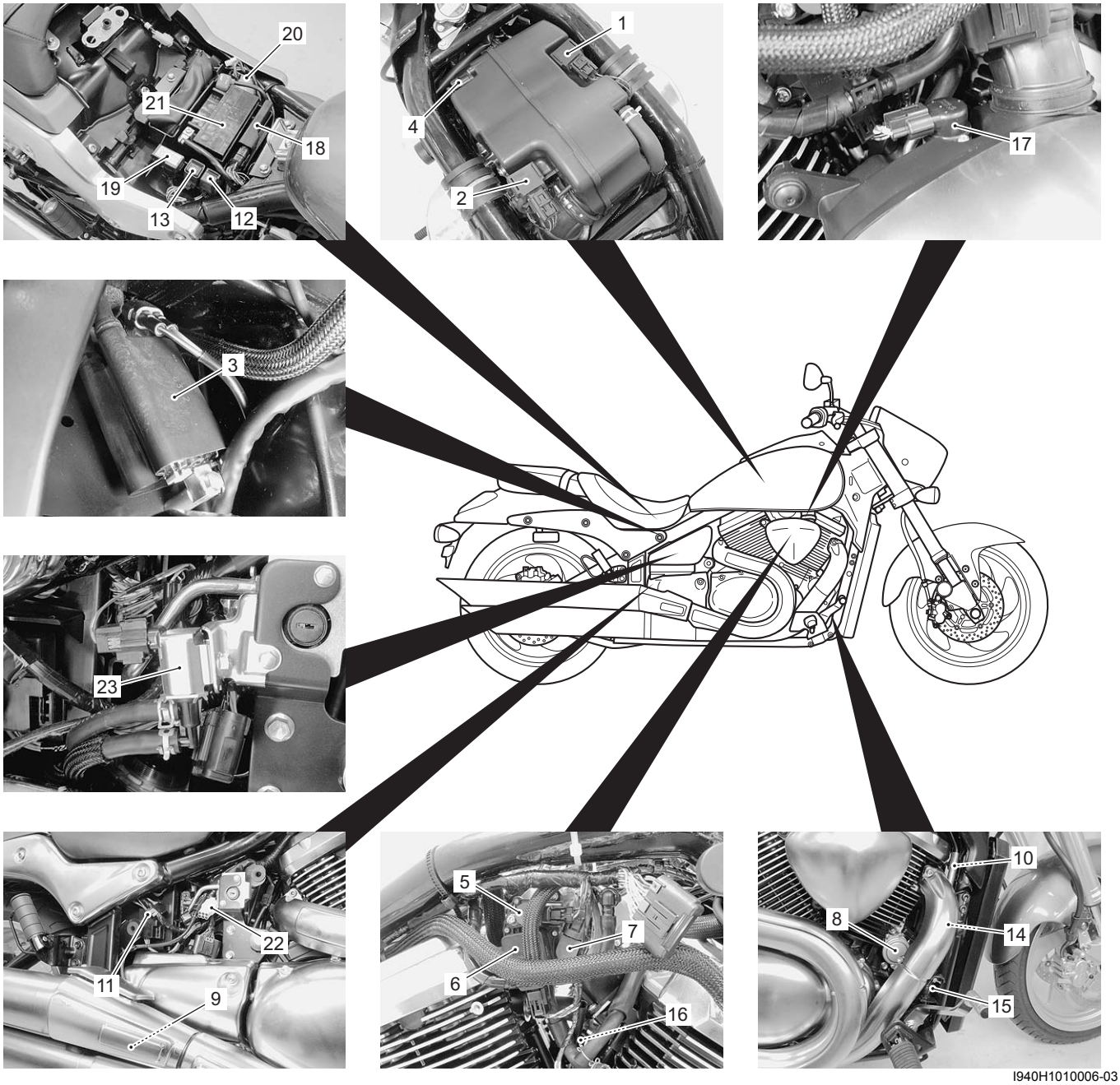
I940H1010008-05

1. Noise label (For E-03, 33)	10. General warning label (French/German/Italian/Swedish) (For E-19)
2. Noise label (For E-24)	11. ICES Canada label (For E-28)
3. Information label (For E-03, 28, 33)	12. I.D. plate (For E-02, 19, 24)
4. Vacuum hose routing label (For E-33)	13. Safety plate (For E-03, 28, 33)
5. Manual notice label (For E-03, 33)	14. Gearshift label
6. Tire information label (English) (For E-03, 33)	[A]: Frame head (Right side)
7. Tire information label (French/German/English) (For E-02, 19, 24, 28)	[B]: Frame head (Left side)
8. General warning label (English) (For E-02, 03, 24, 33)	[C]: Frame cover (Left side)
9. General warning label (English/French) (For E-28)	

Component Location

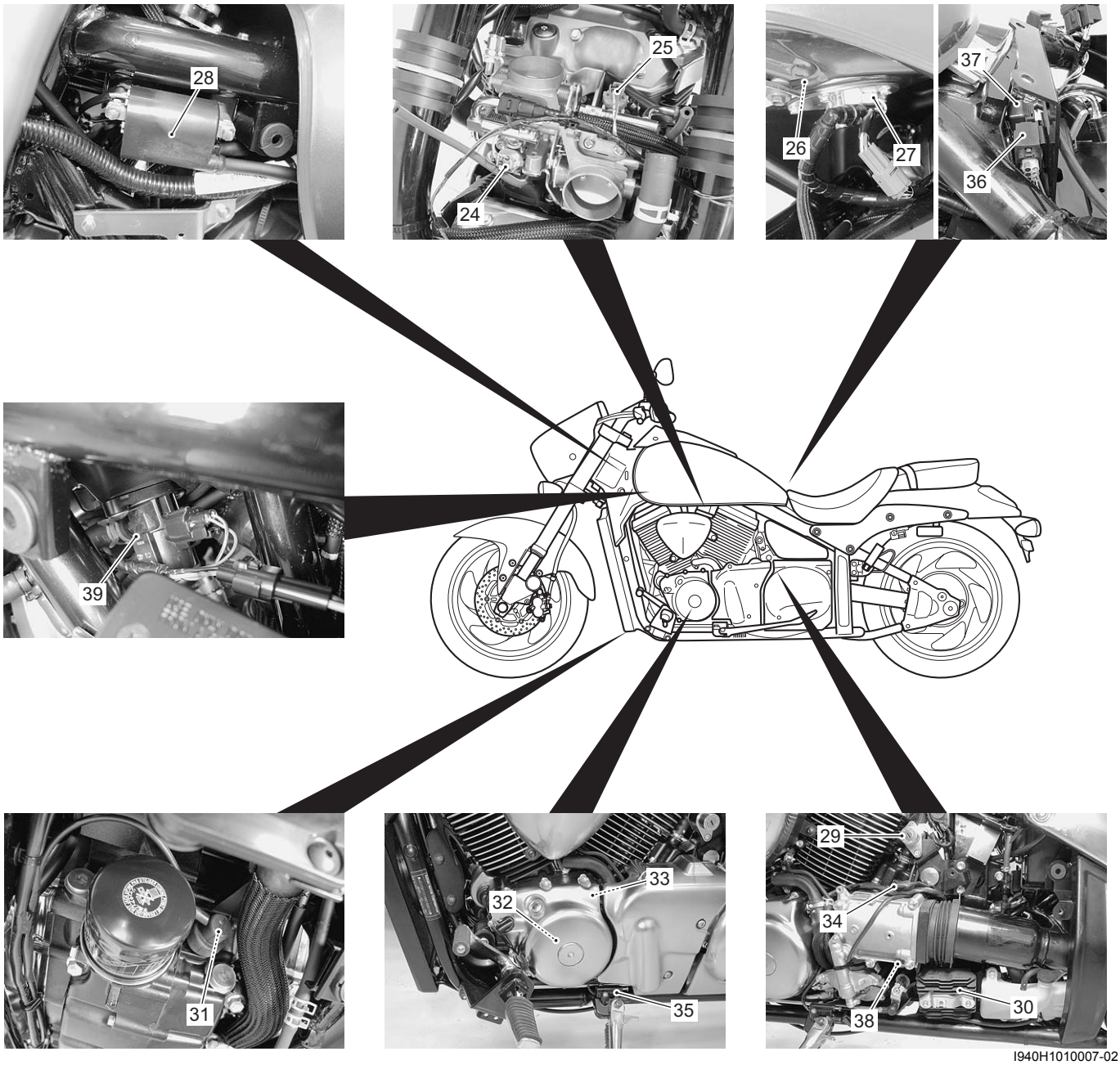
Electrical Components Location

B940H20103001



I940H1010006-03

1. IAP sensor (#2)	9. HO2 sensor (For E-02, 19, 24, 33)	17. ISC valve
2. IAP sensor (#1)	10. Horn	18. ECM (Engine Control Module)
3. Ignition coil (#1)	11. Turn signal/Side-stand relay	19. Fuse box
4. IAT sensor	12. Fuel pump relay	20. Starter relay/Main fuse
5. STP sensor	13. Headlight relay	21. Battery
6. STV actuator	14. Cooling fan	22. Mode select switch coupler
7. TP sensor	15. Rear brake switch	23. EVAP system purge control solenoid valve (For E-33)
8. Starter motor	16. ECT sensor	



I940H1010007-02

24. Fuel injector #1	32. Generator
25. Fuel injector #2	33. CKP sensor
26. Fuel level gauge	34. Speedometer sensor
27. Fuel pump	35. Side-stand switch
28. Ignition coil (#2)	36. TO sensor
29. Ignition switch	37. Cooling fan relay
30. Regulator/Rectifier	38. GP sensor
31. Oil pressure switch	39. PAIR control solenoid valve

Specifications

Specifications

B940H20107001

NOTE

These specifications are subject to change without notice.

Dimensions and curb mass

Item	Specification	Remark
Overall length	2 390 mm (94.1 in)	E-03, 28, 33
	2 410 mm (94.9 in)	E-02, 19, 24
Overall width	870 mm (34.3 in)	
Overall height	1 100 mm (43.3 in)	
Wheelbase	1 690 mm (66.5 in)	
Ground clearance	145 mm (5.7 in)	
Seat height	716 mm (28.2 in)	
Curb mass	328 kg (723 lbs)	

Engine

Item	Specification	Remark
Type	4-stroke, liquid-cooled, OHC, 54-degree, V-twin	
Number of cylinders	2	
Bore	96.0 mm (3.780 in)	
Stroke	101.0 mm (3.376 in)	
Displacement	1 462 cm^3 (89.2 cu. in)	
Compression ratio	9.5 : 1	
Fuel system	Fuel injection	
Air cleaner	Paper element	
Starter system	Electric	
Lubrication system	Wet sump	
Idle speed	1000 $\pm$ 100 r/min	

Drive train

Item		Specification	Remark
Clutch		Wet multi-plate type	
Transmission		5-speed constant mesh	
Gearshift pattern		1-down, 4-up	
Primary reduction ratio		1.407 (76/54)	
Gear ratios	Low	2.187 (35/16)	
	2nd	1.400 (28/20)	
	3rd	1.038 (27/26)	
	4th	0.875 (28/32)	
	Top	0.787 (26/33)	
Final reduction ratio		3.137 (20/17 x 32/12)	
Drive system		Shaft drive	

Chassis

Item	Specification	Remark
Front suspension	Inverted telescopic, coil spring, oil damped	
Rear suspension	Link type, coil spring, oil damped	
Front fork stroke	130 mm (5.1 in)	
Rear wheel travel	108 mm (4.3 in)	
Steering angle	37° (right & left)	
Caster	32°	
Tail	129 mm (5.08 in)	
Turning radius	3.3 m (10.8 ft)	
Front brake	Disc brake, twin	
Rear brake	Disc brake	
Front tire size	120/70ZR 18M/C (59W), tubeless	
Rear tire size	200/50ZR 17M/C (75W), tubeless	

Electrical

Item	Specification	Remark
Ignition type	Electronic ignition (Transistorized)	
Ignition timing	4° B.T.D.C. at 1 000 r/min	
Spark plug	NGK CR6E or DENSO U20ESR-N	
Battery	12 V 64.8 kC (18 Ah)/10 HR	
Generator	Three-phase A.C. generator	
Main fuse	30 A	
Fuse	10/10/10/10/15/15 A	
Headlight	12 V 60/55 W (H4)	
Position light	12 V 5 W	E-02, 19, 24
Front turn signal light	12 V 21 W	E-02, 19, 24
Front turn signal light/Position light	12 V 21/5 W	E-03, 28, 33
Rear turn signal light	12 V 21 W	
Brake light/Taillight	LED	
License plate light	12 V 5 W	
Speedometer light	LED	
Neutral indicator light	LED	
High beam indicator light	LED	
Turn signal indicator light	LED	
Coolant temperature indicator light	LED	
Oil pressure indicator light	LED	
FI indicator light	LED	

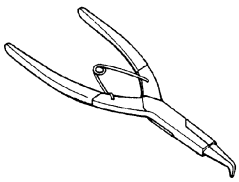
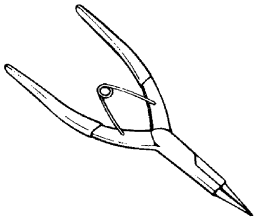
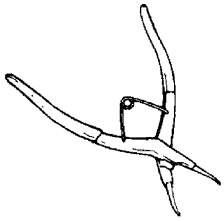
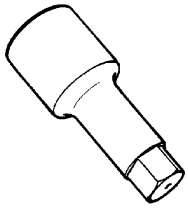
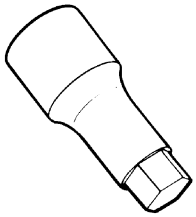
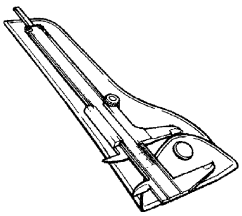
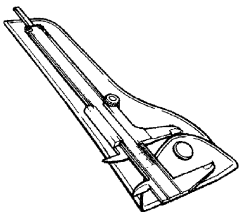
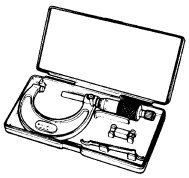
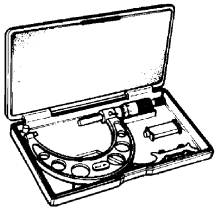
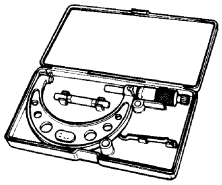
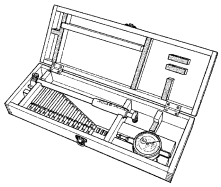
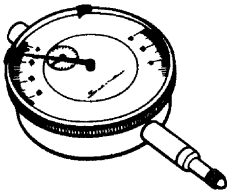
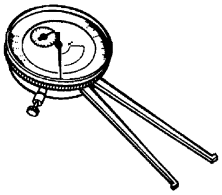
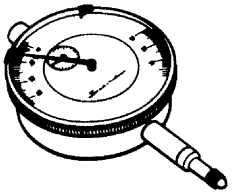
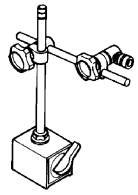
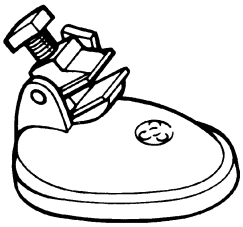
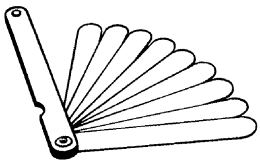
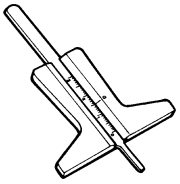
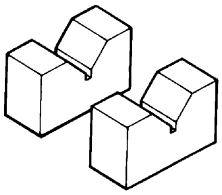
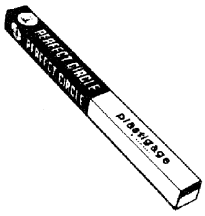
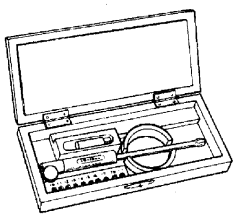
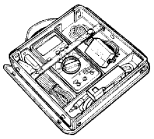
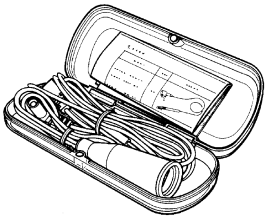
Capacities

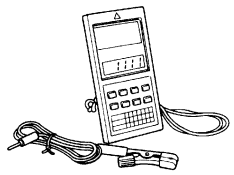
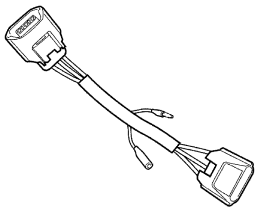
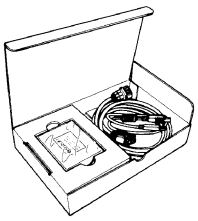
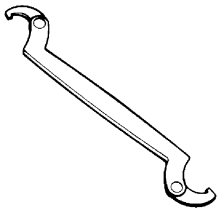
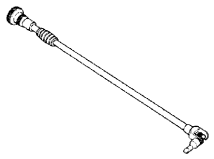
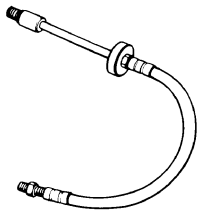
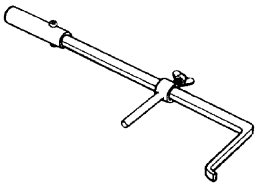
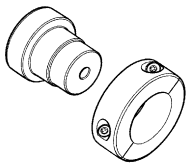
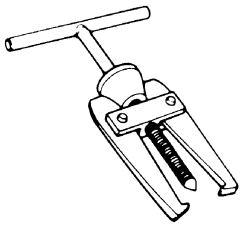
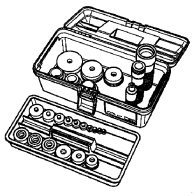
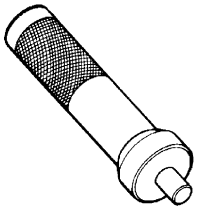
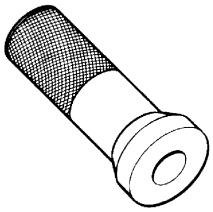
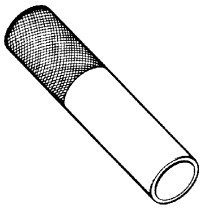
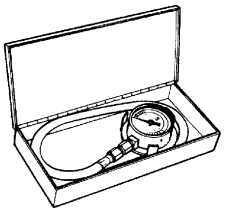
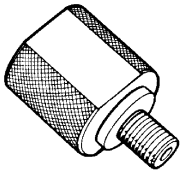
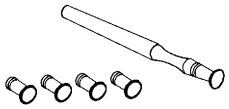
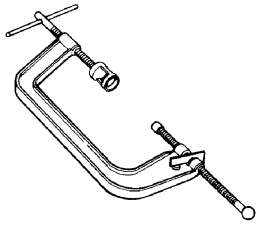
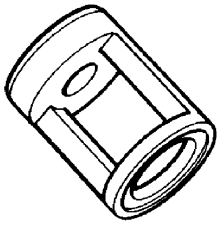
Item		Specification	Remark
Fuel tank		18 L (4.8/4.0 US/Imp gal)	
Engine oil	Oil change	3 000 ml (3.2/2.6 US/Imp qt)	
	With filter change	3 200 ml (3.4/2.8 US/Imp qt)	
	Overhaul	4 000 ml (4.2/3.5 US/Imp qt)	
Coolant		2.7 L (2.9/2.4 US/Imp qt)	
Final gear oil		200 – 220 ml (6.8/7.0 – 7.4/7.7 US/Imp oz)	

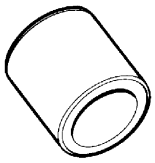
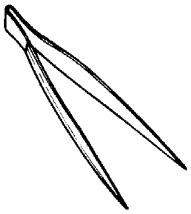
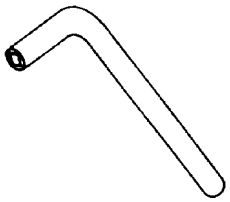
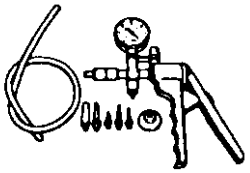
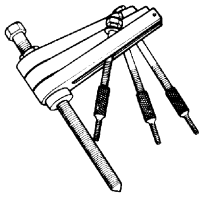
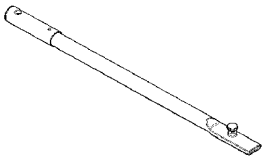
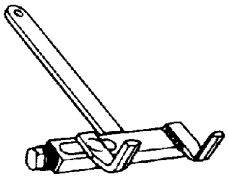
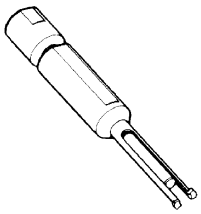
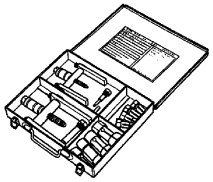
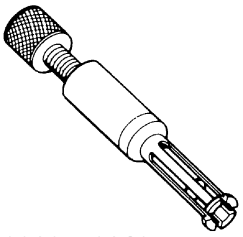
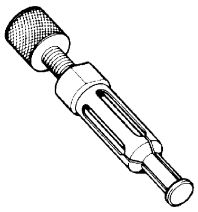
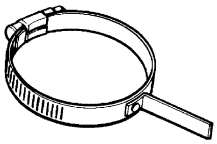
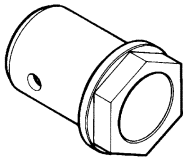
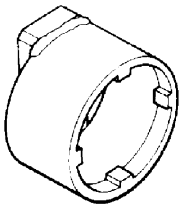
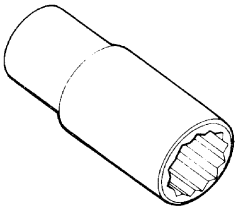
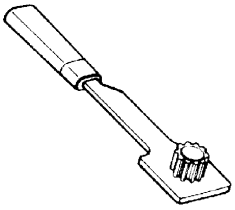
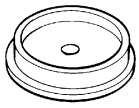
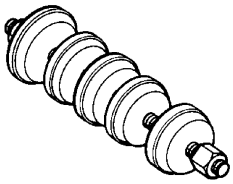
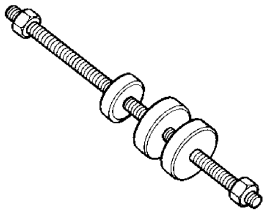
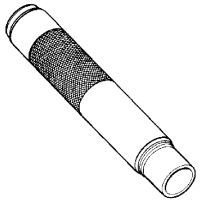
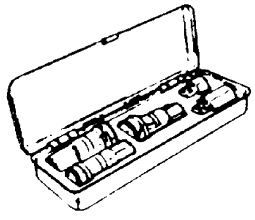
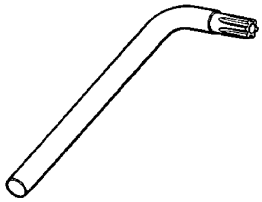
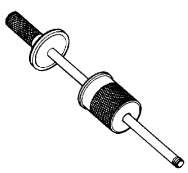
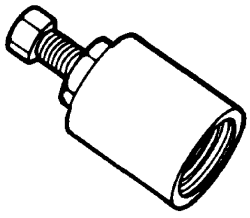
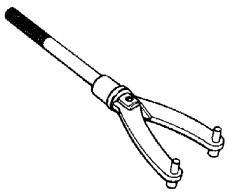
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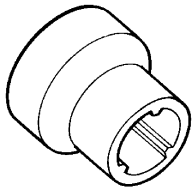
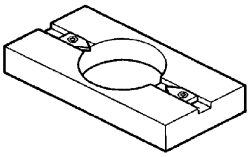
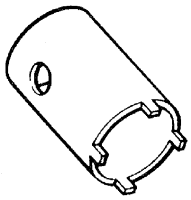
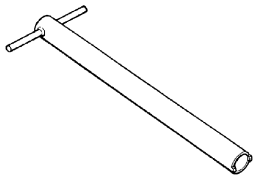
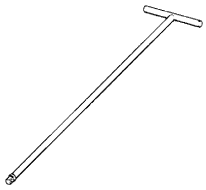
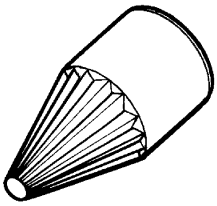
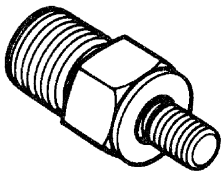
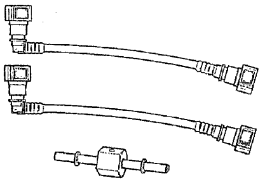
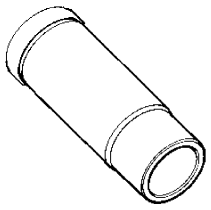
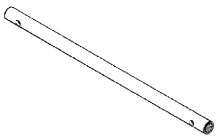
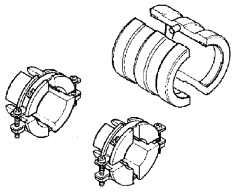
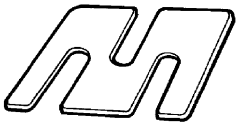
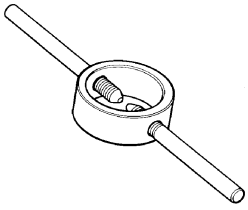
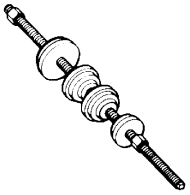
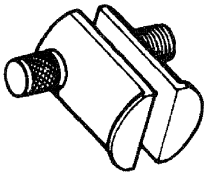
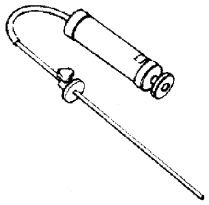
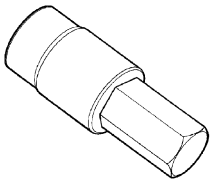
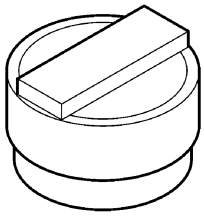
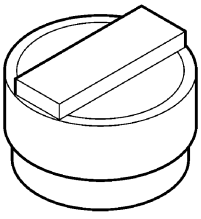
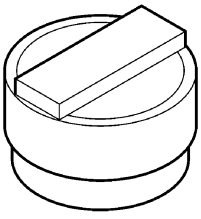
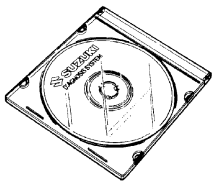
Special Tool

B940H20108001

 **09900–06104** Snap ring pliers	 **09900–06107** Snap ring pliers	 **09900–06108** Snap ring pliers	 **09900–18720** Hexagon socket (14 mm)	 **09900–18740** Hexagon socket (24 mm)
 **09900–20101** Vernier calipers (1/15 mm, 150 mm)	 **09900–20102** Vernier calipers (1/20 mm, 200 mm)	 **09900–20202** Micrometer (1/100 mm, 25 – 50 mm)	 **09900–20203** Micrometer (1/100 mm, 50 – 75 mm)	 **09900–20204** Micrometer (75 – 100 mm)
 **09900–20205** Micrometer (0 – 25 mm)	 **09900–20530** Cylinder gauge set	 **09900–20602** Dial gauge (1/1000 mm, 1 mm)	 **09900–20605** Dial calipers (1/100 mm, 10 – 34 mm)	 **09900–20607** Dial gauge (1/100 mm, 10 mm)
 **09900–20701** Magnetic stand	 **09900–20702** Micrometer stand	 **09900–20803** Thickness gauge	 **09900–20805** Tire depth gauge	 **09900–21304** V-block (100 mm)
 **09900–22301** Plastigauge (0.025 – 0.076 mm)	 **09900–22302** Plastigauge (0.051 – 0.152 mm)	 **09900–22403** Small bore gauge (18 – 35 mm)	 **09900–25008** Multi-circuit tester set	 **09900–25009** Needle pointed probe set

 **09900–26006** Engine tachometer (solar cell type)	 **09900–28630** TPS test wire harness	 **09904–41010** SDS set	 **09910–60611** Universal clamp wrench	 **09913–10130** Carburetor adjust driver
 **09913–10750** Compression gauge adapter	 **09913–50121** Oil seal remover	 **09913–60250** Journal bearing remover/installer	 **09913–60910** Bearing remover	 **09913–70210** Bearing installer set
 **09913–75821** Bearing installer	 **09913–76010** Bearing installer	 **09913–84510** Bearing installer	 **09915–40620** Oil filter wrench	 **09915–64512** Compression gauge
 **09915–74521** Oil pressure gauge hose	 **09915–74533** Oil pressure gauge attachment	 **09915–77331** Meter (for high pressure)	 **09916–10911** Valve lapper set	 **09916–14510** Valve lifter
 **09916–14910** Valve spring compressor attachment	 **09916–34542** Reamer handle	 **09916–34550** Valve guide reamer (5.5 mm)	 **09916–34580** Valve guide reamer (10.8 mm)	 **09916–44910** Valve guide remover/ installer

 **09916–44920** Valve guide installer attachment	 **09916–84511** Tweezers	 **09917–10410** Valve adjuster driver	 **09917–47011** Vacuum pump gauge	 **09920–13120** Crankcase separating tool
 **09920–31020** Extension handle	 **09920–53740** Clutch sleeve hub holder	 **09921–20210** Bearing remover	 **09921–20240** Bearing remover set	 **09923–73210** Bearing remover
 **09923–74511** Bearing remover	 **09924–34510** Backlash measuring tool (ϕ27 – 50)	 **09924–41830** Bearing retainer wrench	 **09924–62410** Final drive gear bearing holder wrench	 **09924–62430** Long socket (22 mm)
 **09924–64510** Final driving gear coupling holder	 **09924–74520** Oil seal installer/ remover	 **09924–84510** Bearing installer set	 **09924–84521** Bearing installer set	 **09925–18011** Steering bearing installer
 **09930–10121** Spark plug wrench set	 **09930–11950** Torx wrench	 **09930–30104** Rotor remover sliding shaft	 **09930–30721** Rotor remover	 **09930–40113** Rotor holder

 **09930–73140** Starter torque limiter socket	 **09930–73170** Starter torque limiter holder	 **09930–82720** Mode select switch	 **09940–14911** Steering stem nut wrench	 **09940–30221** Front fork assembling tool
 **09940–34520** T handle	 **09940–34531** Attachment A	 **09940–40211** Fuel pressure gauge adapter	 **09940–40220** Fuel pressure gauge hose attachment	 **09940–51410** Bearing installer
 **09940–52841** Front fork inner rod holder	 **09940–52861** Front fork oil seal installer	 **09940–92720** Spring scale	 **09940–94922** Front fork spring stopper plate	 **09940–94930** Front fork spacer holder
 **09941–34513** Steering race installer	 **09941–54911** Bearing outer race remover	 **09941–64511** Bearing remover	 **09941–74911** Steering bearing installer	 **09943–74111** Fork oil level gauge
 **09944–28320** Hexagon socket (19 mm)	 **09951–16080** Bearing installer	 **09951–16310** Bearing installer	 **09951–17010** Bearing installer	 **99565–01010–017** CD-ROM Ver.17

Maintenance and Lubrication

Precautions

Precautions for Maintenance

B940H20200001

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

NOTE

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

General Description

Recommended Fluids and Lubricants

B940H20201001

Refer to “Fuel and Oil Recommendation in Section 0A (Page 0A-3)” and “Engine Coolant Recommendation in Section 0A (Page 0A-4)”.

Scheduled Maintenance

Periodic Maintenance Schedule Chart

B940H20205001

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
	miles	600	4 000	7 500	11 000	14 500
	months	2	12	24	36	48
Air cleaner element		—	I	I	R	I
Exhaust pipe bolts and muffler bolts		T	—	T	—	T
Valve clearance		I	—	I	—	I
Spark plugs		—	I	R	I	R
Fuel line		—	I	I	I	I
Evaporative emission control system (E-33 only)		—	—	I	—	I
Engine oil		R	R	R	R	R
Engine oil filter		R	—	—	R	—
Final gear oil		R	—	I	—	I
Throttle cable play		I	I	I	I	I
PAIR (air supply) system		—	—	I	—	I
Throttle valve synchronization		I (E-33 only)	—	I	—	I
Engine coolant		Replace every 2 years.				
Radiator hose		—	I	I	I	I
Clutch cable play		—	I	I	I	I
Brakes		I	I	I	I	I
Brake hose		—	I	I	I	I
		Replace every 4 years.				
Brake fluid		—	I	I	I	I
		Replace every 2 years.				

Item	Interval					
	km	1 000	6 000	12 000	18 000	24 000
	miles	600	4 000	7 500	11 000	14 500
	months	2	12	24	36	48
Tires		—	I	I	I	I
Steering		I	—	I	—	I
Front fork		—	—	I	—	I
Rear suspension		—	—	I	—	I
Chassis bolts and nuts		T	T	T	T	T

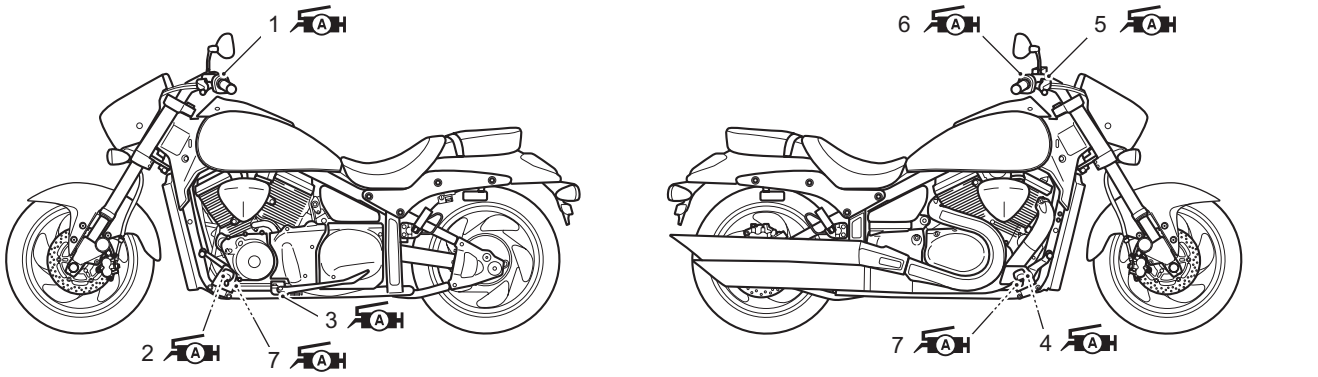
Lubrication Points

B940H20205002

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.**



I940H1020001-03

1. Clutch lever holder	5. Brake lever holder
2. Gearshift link pivot	6. Throttle cable
3. Side-stand pivot and spring hook	7. Footrest pivot
4. Brake pedal pivot	: Apply grease.

Repair Instructions

Air Cleaner Element Replacement

B940H20206001

Replace air cleaner element
Every 18 000 km (11 000 miles, 36 months)

Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-6)”.

Air Cleaner Element Inspection

B940H20206002

Inspect air cleaner element
Every 6 000 km (4 000 miles, 12 months)

Inspection

1) Remove the air cleaner element. Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-6)”.

2) Inspect the air cleaner element for clogging. If it is clogged with dirt, replace it with a new one.

⚠ CAUTION

Do not blow the air cleaner element with compressed air.

NOTE

If driving under dusty conditions, replace the air cleaner element more frequently. Make sure that the air cleaner is in good condition at all times. The life of the engine depends largely on this component.

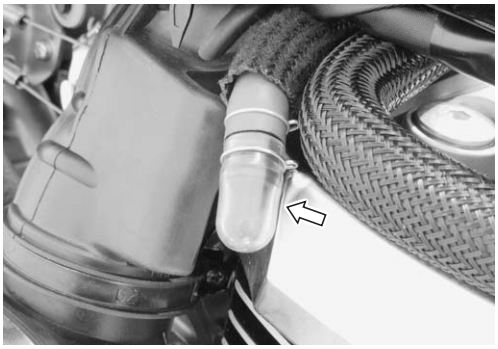


I940H1020002-01

3) After finishing the air cleaner element inspection, reinstall the removed parts.
4) Drain water from the air cleaner and air cleaner chamber by removing the drain plug.



I940H1020003-01



5) Reinstall the drain plug.

I940H1020004-01

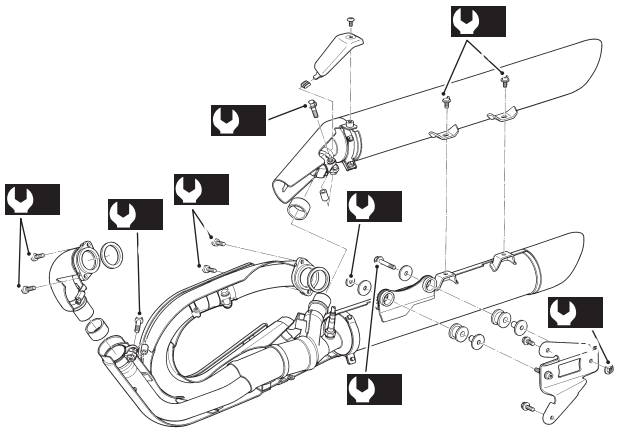
Exhaust Pipe Bolt and Muffler Bolt Inspection

B940H20206003

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

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

Tightening torque
Exhaust pipe bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Muffler connecting bolt (b): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)
Muffler joint bolt (c): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)
Muffler support bolt (d): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)
Muffler support nut (e): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



I940H1020005-04

Valve Clearance Inspection and Adjustment

B940H20206004

Inspect valve clearance
Initially at 1 000km (600 miles, 2 months) 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 (Page 1G-9)”.
2) Remove the right frame head cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.

3) Remove the cylinder head cover caps.



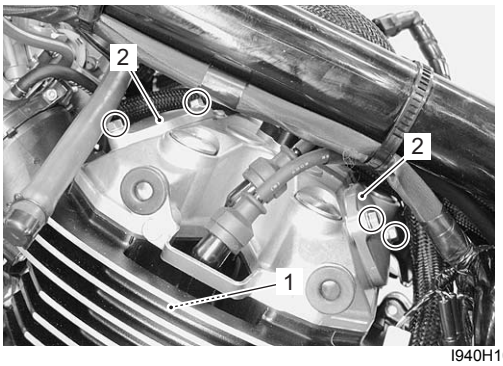
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I940H1020007-01

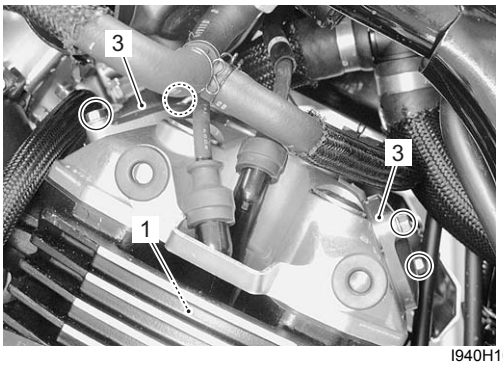
4) Remove the air cleaner chamber. Refer to “Air Cleaner Chamber Removal and Installation in Section 1D (Page 1D-7)”.
5) Remove the spark plugs (1). Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)”.
6) Remove the cylinder head inspection covers (2) and (3).

#1 Cylinder



I940H1020008-02

#2 Cylinder



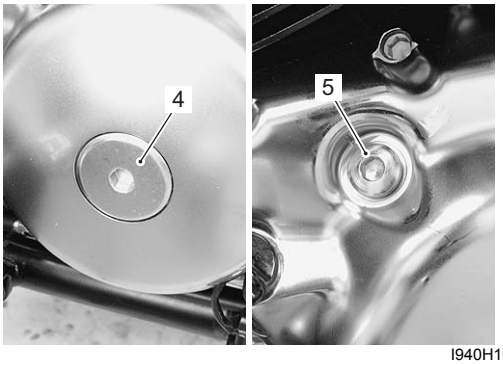
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NOTE

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

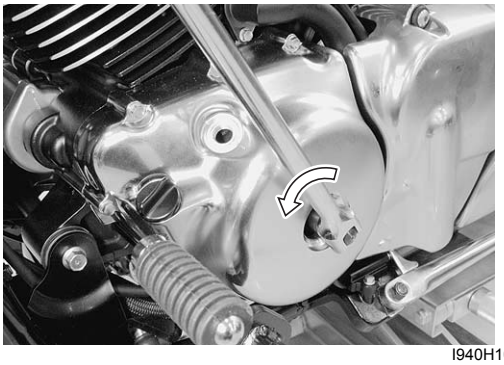
Valve clearance (When cold)
IN.: 0.08 – 0.13 mm (0.003 – 0.005 in)
EX.: 0.17 – 0.22 mm (0.007 – 0.009 in)

7) Remove the generator cover plug (4) and valve timing inspection plug (5).

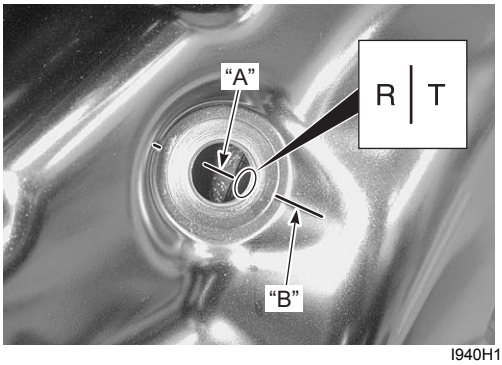


I940H1020010-01

8) Turn the crankshaft to set the #1 (Rear) cylinder at TDC of compression stroke. (Align the “R | T” line of “A” on the generator rotor to the center line “B” of valve timing inspection hole.)



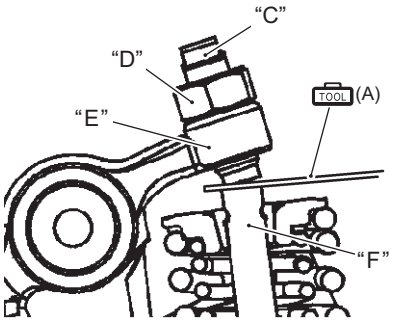
I940H1020011-03



I940H1020012-06

9) To inspect the #1 (Rear) cylinder tappet clearance, use a thickness gauge between the tappet and the cam. If the clearance is out of specification, adjust it into the specified range.

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



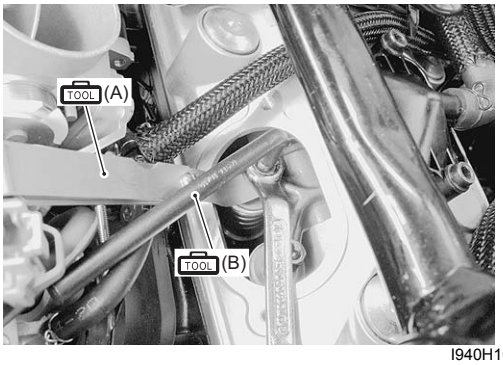
I940H1020013-03

“C”: Adjusting screw	“E”: Rocker arm
“D”: Lock-nut	“F”: Valve stem

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

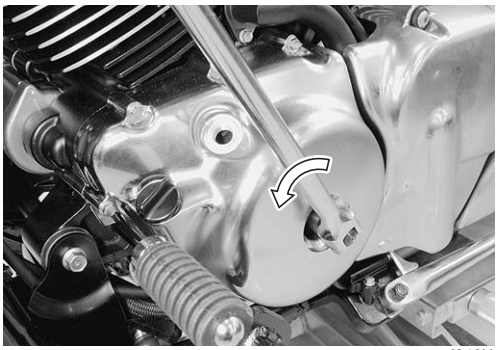
Special tool
TOOL (A): 09900–20803 (Thickness gauge)
TOOL (B): 09917–10410 (Valve adjuster driver)

Tightening torque
Valve clearance adjuster lock-nut: 15 N·m (1.5 kgf-m, 11.0 lbf-ft)

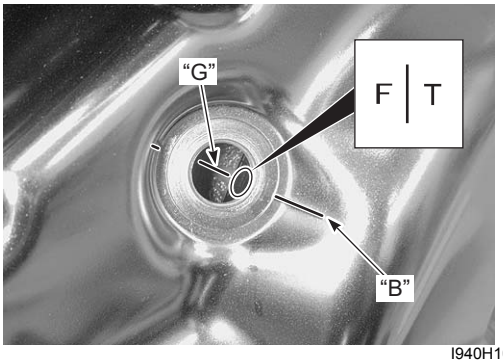


I940H1020063-01

11) Turn the crankshaft 486 degrees (1-1/3 turns) to set the #2 (Front) cylinder at TDC of compression stroke. (Align the “F | T” line of “G” on the generator rotor to the center line “B” of valve timing inspection hole.)



I940H1020014-02

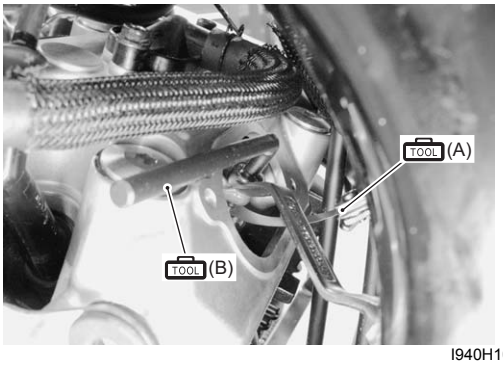


I940H1020015-05

12) Inspect the #2 (Front) cylinder tappet clearance as the same manner of #1 (Rear) cylinder and adjust the clearance if necessary.

Special tool
(A): 09900–20803 (Thickness gauge)
(B): 09917–10410 (Valve adjuster driver)

Tightening torque
Valve clearance adjuster lock-nut: 15 N·m (1.5 kgf-m, 11.0 lbf-ft)



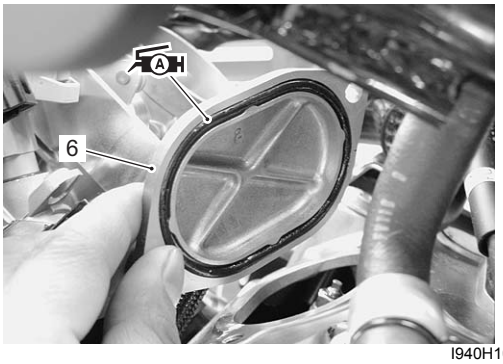
I940H1020016-01

13) After inspect and adjust the clearance, apply grease to the valve timing inspection cap O-rings and install the inspection caps (6).

: Grease 99000–25010 (SUSUKI SUPER GREASE A or equivalent)

⚠ CAUTION

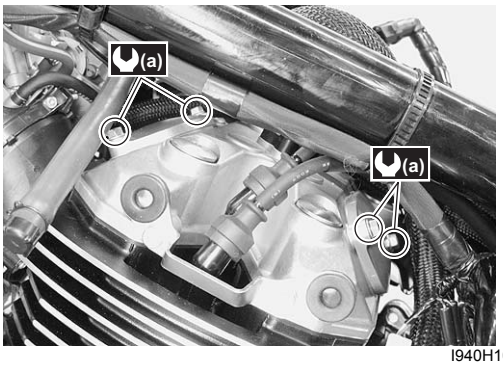
Use a new O-rings to prevent oil leakage.



I940H1020017-01

14) Tighten the valve timing inspection cap bolts to the specified torque.

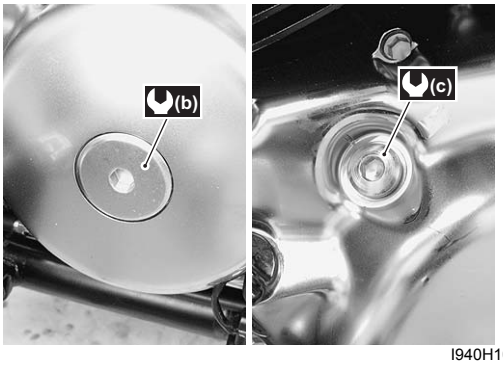
Tightening torque
Valve timing inspection cap bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1020068-01

15) Tighten the generator cover cap and valve timing inspection plug to the specified torque.

Tightening torque
Generator cover cap (b): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
Valve timing inspection plug (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I940H1020018-03

Spark Plug Replacement

B940H20206005

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

Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)”.

Spark Plug Inspection and Cleaning

B940H20206006

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

Heat Range

1) Remove the spark plugs. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)”.
2) Check spark plug heat range by observing electrode color.
   If it appears white or glazed, replace the spark plug with colder type one.

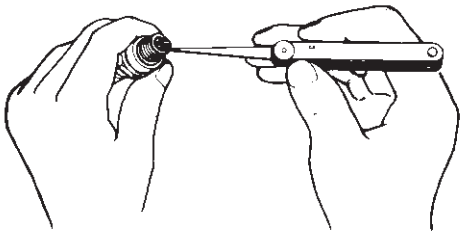
Heat range

	Standard	Cold type
NGK	CR6E	CR7E
DENSO	U20ESR-N	U22ESR-N

3) After finishing the spark plug inspection, reinstall the removed parts.

Carbon Deposits

1) Remove the spark plugs. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)”.
2) Check 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.



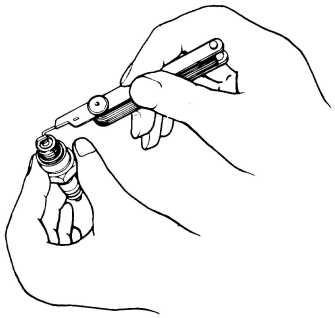
I649G1020010-02

3) After finishing the spark plug inspection, reinstall the removed parts.

Spark Plug Gap

1) Remove the spark plugs. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)”.
2) Measure the spark plug gap using a thickness gauge.
   Adjust the spark plug gap if necessary.

Spark plug gap
0.7 – 0.8 mm (0.028 – 0.030 in)



I940H1020071-01

3) After finishing the spark plug inspection, reinstall the removed parts.

Electrodes Condition

1) Remove the spark plugs. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)”.
2) 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, or damaged thread.

⚠ CAUTION

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

3) After finishing the spark plug inspection, reinstall the removed parts.

Fuel Line Inspection

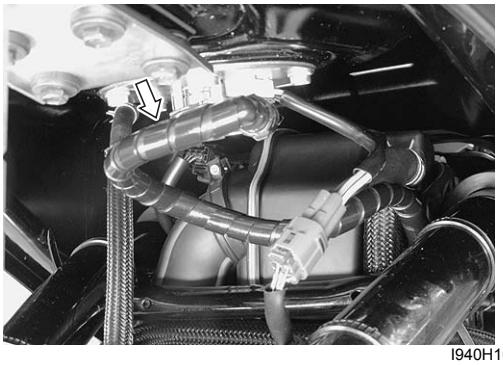
B940H20206007

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

Inspect the fuel line in the following procedures:

1) Remove the seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the fuel tank mounting bolts. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
3) Lift up the fuel tank.

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



I940H1020074-01

5) After finishing the fuel feed hose inspection, reinstall the removed parts.

Evaporative Emission Control System Inspection (E-33 Only)

B940H20206008

Inspect evaporative emission control system
Every 12 000 km (7 500 miles, 24 months)

Inspect the evaporative emission control system periodically (E-33 only).

Engine Oil and Filter Replacement

B940H20206009

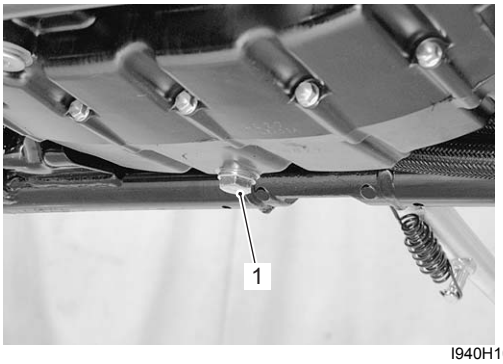
Replace engine oil
Initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter

Replace oil filter
Initially at 1 000 km (600 miles, 2 months) and every 18 000 km (11 000 miles, 36 months) thereafter

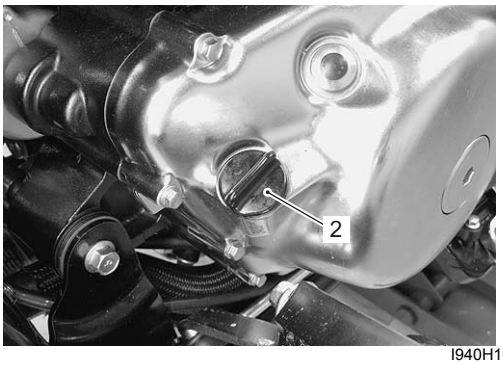
Oil should be changed while the engine is warm. Oil filter replacement at the above intervals, should be done together with the engine oil change.

Engine Oil Replacement

1) Keep the motorcycle upright with a jack or wooden block.
2) Place an oil pan below the engine, and drain engine oil by removing the oil drain plug (1) and filler cap (2).



I940H1020020-01



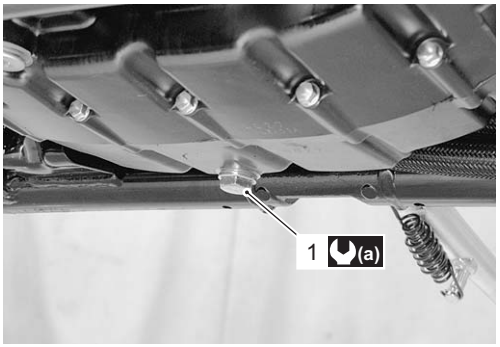
I940H1020021-01

3) Tighten the oil drain plug (1) to the specified torque.

⚠ CAUTION

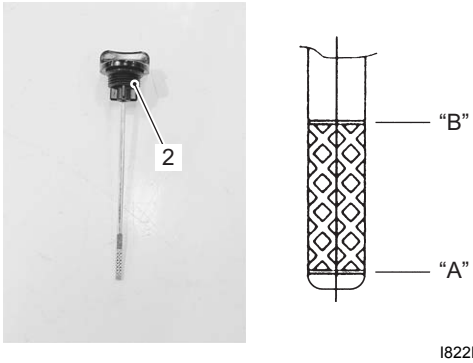
Replace the gasket washers with new one.

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



I940H1020022-01

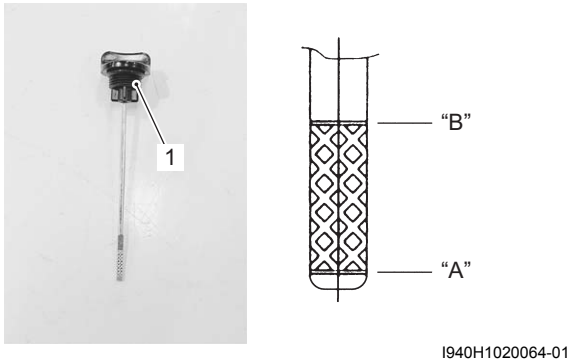
4) Pour new oil through the oil filler hole. When performing an oil change (without oil filter replacement), the engine will hold about 3.0 L (3.2/ 2.6 US/Imp qt) of oil. Use of SF/SG or SH/SJ in API with MA in JASO.
5) Start up the engine and allow it to run for about 15 minutes at idling speed.
6) Turn off the engine and wait about three minutes, then check the oil level on the dipstick (2). The oil level should be between the low level line “A” and full level line “B”. If the oil level is lower than the low level line “A”, add oil to the full level line “B”.



I822H1020030-01

Oil Level Inspection

- Start up the engine and allow it to run about 15 minutes at idling speed.
- Keep the motorcycle upright.
- Turn off the engine and wait about three minutes, then check the oil level by removing the filler cap (1). If the level is below level line “A”, add oil to full level line “B”. (Do not screw the filler cap.) If the level is above full level line “B”, drain oil to full level line “B”.



I940H1020064-01

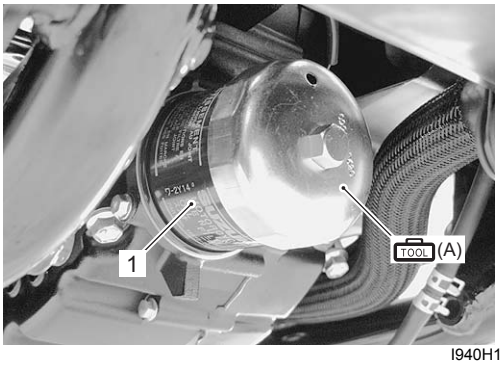
Oil Filter Replacement

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

NOTE

Remove the oil filter wrench once the oil filter has come loose.

Special tool
TOOL (A): 09915–40620 (Oil filter wrench)



I940H1020065-01

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.

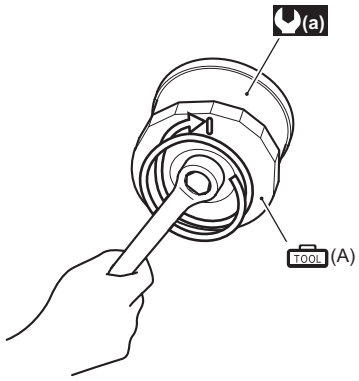
4) Install a new oil filter. Turn it by hand until you feel that the oil filter O-ring contacts the oil filter mounting surface. Then, tighten the oil filter two full turns (or to specified torque) using the special tool.

NOTE

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

Special tool
TOOL (A): 09915–40620 (Oil filter wrench)

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



I940H1020023-03

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: 3 000 ml (3.2/2.6 US/Imp qt)
Oil and filter change: 3 600 ml (3.8/3.2 US/Imp qt)
Engine overhaul: 4 000 ml (4.2/3.5 US/Imp qt)

Final Gear Oil Replacement

B940H20206010

Inspect final gear oil
Every 12 000 km (7 500 miles, 24 months)

Replace final gear oil
Initially at 1 000 km (600 miles, 2 months)

Replace initially at 1 000 km (600 miles, 2 months) and inspect every 12 000 km (7 500 miles, 24 months) thereafter.

1) Keep the motorcycle upright.
2) Place an oil pan under the final gear case.
3) Remove the filler cap (1) and drain plug (2) to drain oil.
4) Tighten the drain plug (2) to the specified torque. Pour the specified oil (SAE 90 hypoid gear oil with GL-5 under API classification) through the filler hole until the oil level reaches the filler hole.

⚠ CAUTION

Use a new gasket to prevent oil leakage.

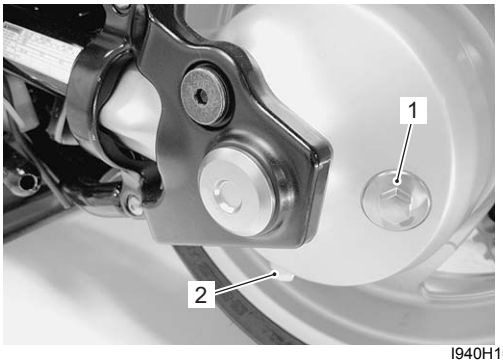
Tightening torque
Final gear oil drain plug: 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

Final gear oil capacity
200 – 220 ml (6.8/7.0 – 7.4/7.7 US/Imp oz)

5) Tighten the filler cap (1).

⚠ CAUTION

Use a new O-ring to prevent oil leakage.



I940H1020066-01

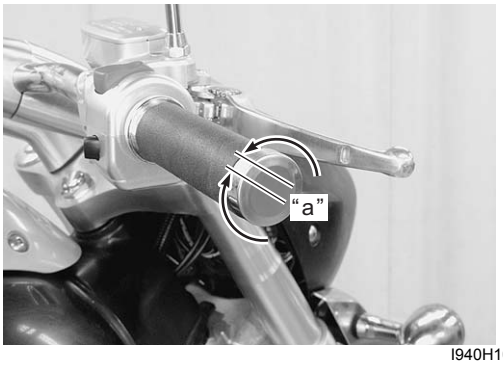
Throttle Cable Play Inspection and Adjustment

B940H20206011

Inspect throttle cable play
Initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter

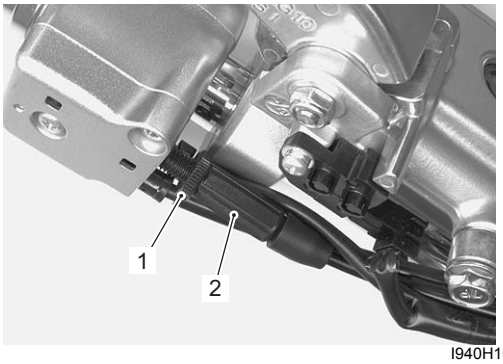
Inspect and adjust the throttle cable play “a” as follows.

Throttle cable play “a”
2.0 – 4.0 mm (0.08 – 0.16 in)



I940H1020024-03

1) Loosen the lock-nut (1) of the throttle pulling cable.
2) Turn the adjuster (2) in or out until the throttle cable play “a” (at the throttle grip) is between 2.0 – 4.0 mm (0.08 – 0.16 in).
3) Tighten the lock-nut (1) while holding the adjuster (2).



I940H1020072-01

⚠ 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.

PAIR System Inspection

B940H20206012

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

Inspect the PAIR (air supply) system periodically. Refer to “PAIR System Inspection in Section 1B (Page 1B-9)”.

Throttle Valve Synchronization

B940H20206013

Inspect throttle valve synchronization
Initially 1 000 km (600 miles, 2 months) (E-33 only) and every 12 000 km (7 500 miles, 24 months)

Inspect the throttle valve synchronization periodically. Refer to “Throttle Valve Synchronization in Section 1D (Page 1D-18)”.

Cooling System Inspection

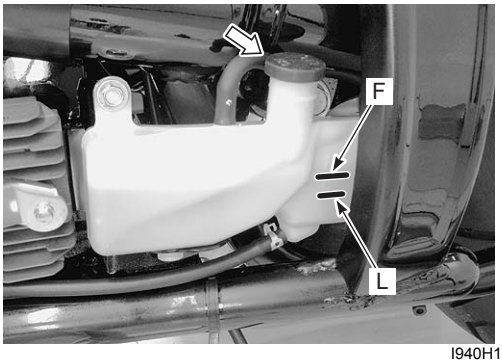
B940H20206014

Inspect cooling system
Every 6 000 km (4 000 miles, 6 months)

Replace engine coolant
Every 2 years

Engine Coolant Level Inspection

1) Keep the motorcycle upright.
2) Remove the frame side lower cover. Refer to “Exterior Parts Construction in Section 9D (Page 9D-2)”.
3) Check the engine coolant level by observing the full and lower lines on the engine coolant reservoir tank. If the level is below the lower line, add engine coolant to the full line from the engine coolant reservoir tank filler.



I940H1020026-02

4) Reinstall the frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.

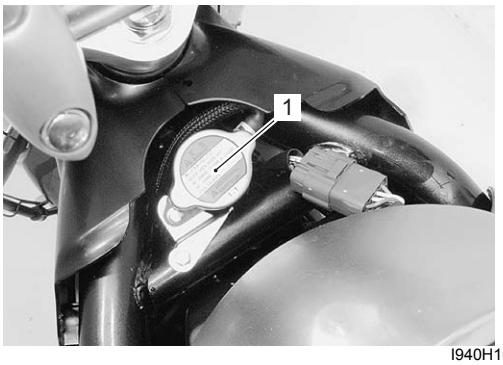
Engine Coolant Change

Refer to “Engine Coolant Description in Section 1F (Page 1F-1)”.

⚠ WARNING

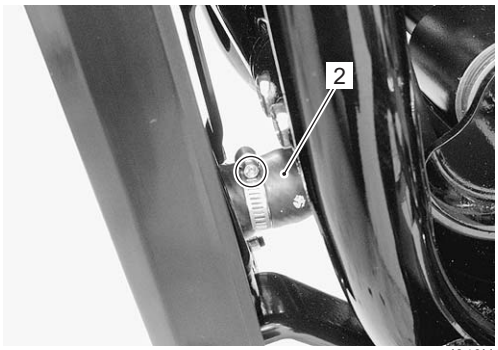
Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor. Engine coolant may be harmful if swallowed or if it comes in contact with skin or eyes. If engine coolant gets into the eyes or in contact with the skin, flush thoroughly with plenty of water.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

1) Move the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Remove the radiator cap (1).



I940H1020027-03

3) Drain engine coolant by disconnecting the radiator outlet hose (2).



I940H1020028-02

4) Flush the radiator with fresh water if necessary.
5) Reconnect the water pump outlet hose.
6) Pour the specified engine coolant up to the thermostat connector inlet.

   Engine coolant capacity (excluding reservoir)
   2 400 ml (2.5/2.1 US/Imp qt)

7) Bleed air from the cooling circuit.
8) After changing engine coolant, reinstall the removed parts.

Air Bleeding From the Cooling Circuit

1) Support the motorcycle upright with a jack.
2) Move the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
3) Place a rag under the radiator inlet.

4) Pour engine coolant up to the radiator inlet.



I940H1020029-01

5) Slowly swing the motorcycle, right and left, to bleed the air trapped in the cooling circuit.
6) Add engine coolant up to the radiator inlet.
7) Start up the engine and bleed air from the radiator inlet completely.
8) Add engine coolant up to the radiator inlet.
9) Repeat the 6), 7) procedures until no air bleeds from the radiator inlet.
10) Close the radiator cap securely.
11) After warming up and cooling down the engine several times, add the engine coolant up to the full level of the reservoir.

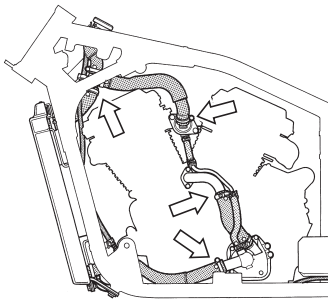
⚠ CAUTION

Make sure that the radiator is filled with engine coolant up to the reservoir full level.

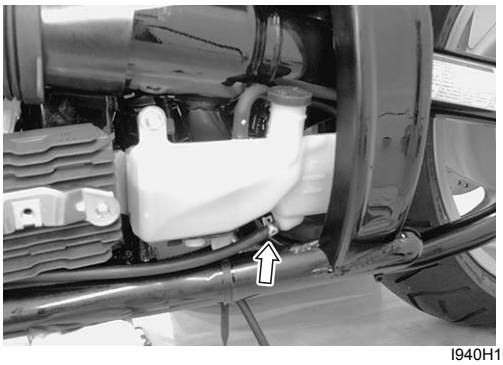
12) Reinstall the removed parts.

Radiator Hose Inspection

Check the radiator hoses for crack, damage or engine coolant leakage. If any defect is found, replace the radiator hose with a new one.



I940H1020030-01



I940H1020031-01

Clutch Cable Play Inspection and Adjustment

B940H20206015

Inspect clutch cable play

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

Inspect and adjust the clutch cable play “a” as follows:

1) Remove the secondary gear case cover and frame side lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the clutch cable holder (1) with the clutch cable.



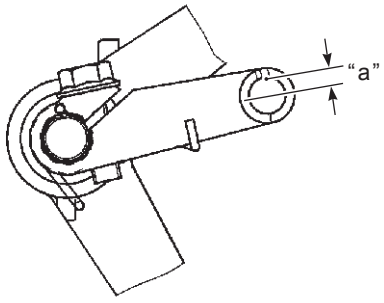
I940H1020032-01

3) Inspect the clutch release arm play “a”.

Clutch release arm play “a”

STD: 6.0 mm (0.24 in)

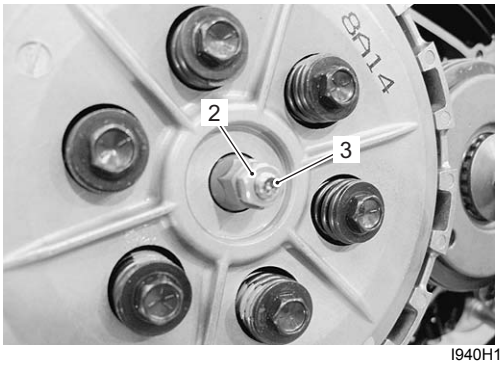
Limit: 2.0 mm (0.08 in)



I940H1020033-04

4) If the clutch release arm play “a” less than the service limit, adjust the clutch release screw as follows.
   a) Drain engine oil. Refer to “Engine Oil and Filter Replacement (Page 0B-8)”.
   b) Remove the exhaust pipes and mufflers. Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.
   c) Remove the clutch cover. Refer to “Clutch Removal in Section 5C (Page 5C-6)”.
   d) Loosen the lock-nut (2) and turn in the release screw (3) to feel resistance.
   e) From that position, turn out the release screw (3) 1/2 turn and tighten the lock-nut (2) securely by holding the release screw (3).

Clutch release screw
1/2 turn back



I940H1020034-01

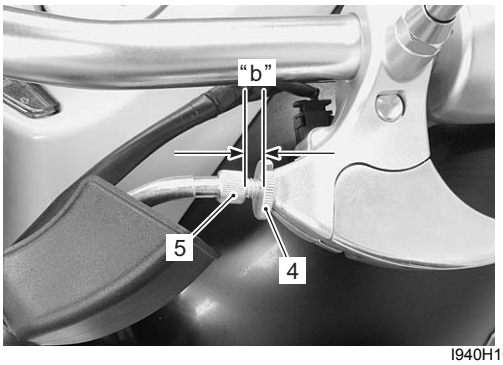
   f) Install the clutch cover and muffler. Refer to “Clutch Installation in Section 5C (Page 5C-8)” and “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.
   g) Pour engine oil. Refer to “Engine Oil and Filter Replacement (Page 0B-8)”.

5) Install the clutch cable holder (1).



I940H1020032-01

6) Loosen the lock-nut (4).
7) Turn in the adjuster (5) until 3 - 5 mm (0.1 - 0.2 in) “b” as shown in the figure.

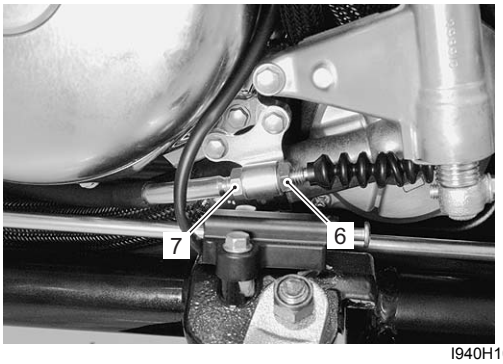


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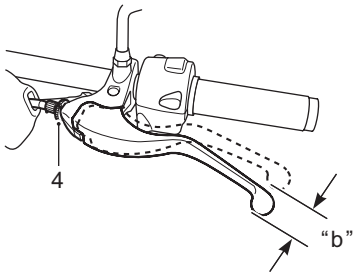
“b”: 3 – 5 mm (0.1 – 0.2 in)

8) Loosen the lock-nut (6), and turn the cable adjuster (7) to obtain 10 – 15 mm (0.4 – 0.6 in) of free play “b” at the clutch lever end.
9) Tighten the lock-nut (4).

Clutch cable play “b”
10 – 15 mm (0.4 – 0.6 in)



I940H1020036-01



I940H1020037-01

10) Tighten the lock-nut (6) to the specified torque.

⚠ CAUTION

Be careful not to contact the clutch cable and gearshift rod when operating the gearshift.

Tightening torque
Clutch cable adjuster lock-nut: 4.5 N·m (0.45 kgf-m, 3.0 lbf-ft)

11) Install the secondary gear case cover and frame side lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.

Brake System Inspection

B940H20206016

Inspect brake system
Initially at 1 000 km (600 miles, 2 months) 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)

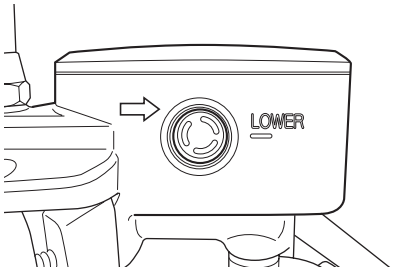
⚠ WARNING

- **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.**

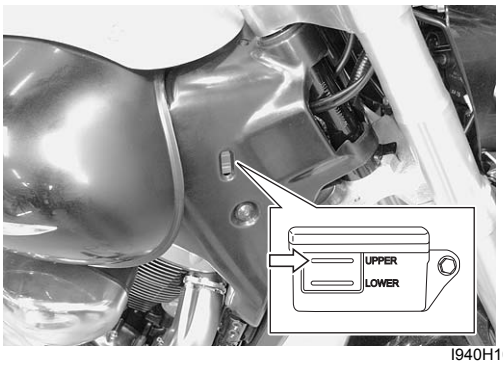
Brake Fluid Level Check

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)



I940H1020038-01



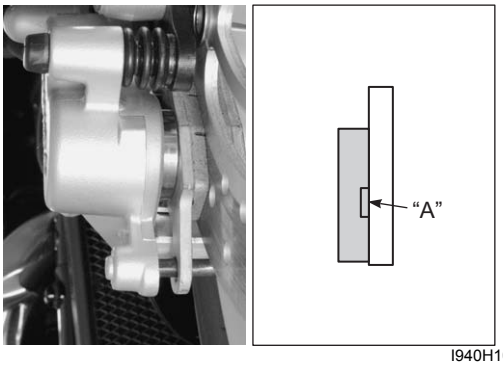
I940H1020039-04

Brake Pads Check

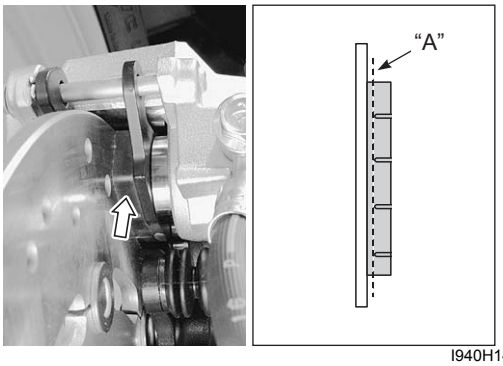
The extent of brake pad wear can be checked by observing the grooved limit line “A” on the pad. When the wear exceeds the grooved limit line, replace the pads with new ones. Refer to “Front Brake Pad Replacement in Section 4B (Page 4B-2)” and “Rear Brake Pad Replacement in Section 4C (Page 4C-2)”.

⚠ CAUTION

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



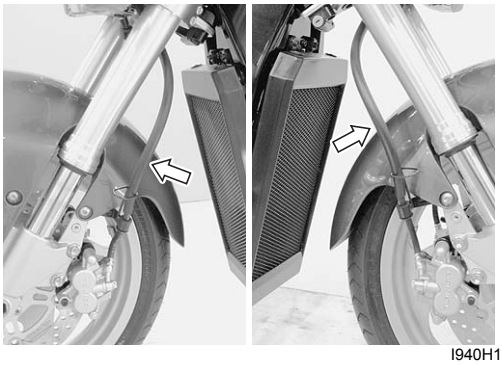
I940H1020040-01



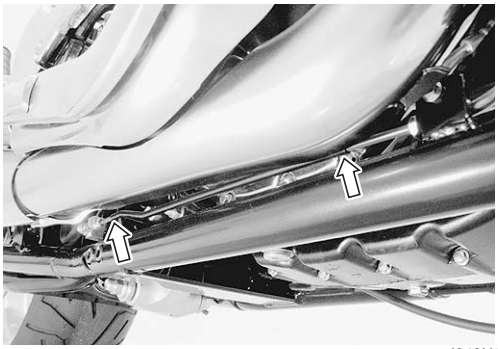
I940H1430001-05

Front and Rear Brake Hose Inspection

1) Remove the seat, right frame head cover and fuel tank. Refer to “Exterior Parts Construction in Section 9D (Page 9D-2)” and “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Inspect the brake hoses and hose joints for crack, damage or brake oil leakage. If any defects are found, replace the brake hose with a new one. Refer to “Front Brake Hose Removal and Installation in Section 4A (Page 4A-8)” and “Rear Brake Hose Removal and Installation in Section 4A (Page 4A-8)”.



I940H1020042-01



I940H1020043-02



I940H1020044-01



I940H1020045-01

3) Reinstall the removed parts.

Brake Pedal Height Inspection and Adjustment

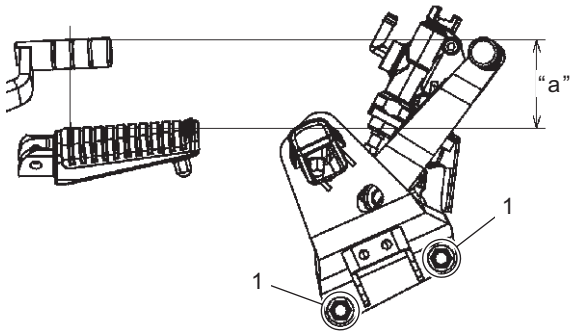
⚠ WARNING

Do not adjust the brake pedal height when exhaust pipe is hot.

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 – 70 mm (2.4 – 2.8 in)

2) Remove the right footrest bracket bolts (1).

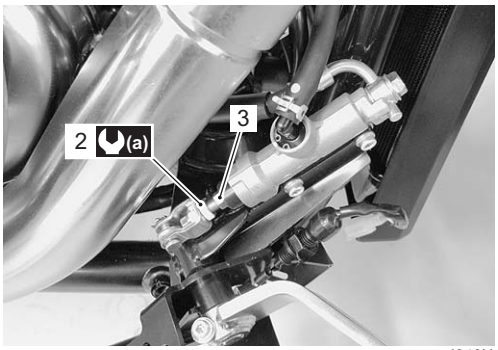


I940H1020070-01

3) Move and support the right footrest bracket and loosen the lock-nut (2).
4) Turn the push rod (3) until the brake pedal height becomes 60 – 70 mm (2.4 – 2.8 in) “a” above the top of the footrest.

5) Tighten the lock-nut (2) to the specified torque.

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



I940H1020047-02

6) Apply thread lock to the right footrest bracket bolts (1) and tighten them to the specified torque.

1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque
Front footrest bracket bolt (b): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)



I940H1020067-03

Brake Hose Replacement

Replace brake hose
Every 4 years

Refer to “Front Brake Hose Removal and Installation in Section 4A (Page 4A-8)” and “Rear Brake Hose Removal and Installation in Section 4A (Page 4A-8)”.

Brake Fluid Replacement

Replace brake fluid
Every 2 years

Refer to “Brake Fluid Replacement in Section 4A (Page 4A-6)”.

Air Bleeding from Brake Fluid Circuit
Refer to “Air Bleeding from Brake Fluid Circuit in Section 4A (Page 4A-4)”.

Rear Brake Light Switch Adjustment
Refer to “Rear Brake Light Switch Inspection and Adjustment in Section 4A (Page 4A-4)”.

Tire Inspection

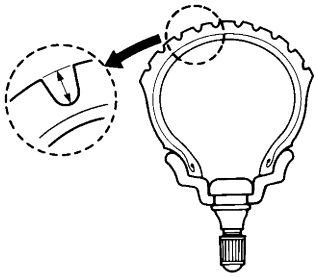
B940H20206017

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
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)

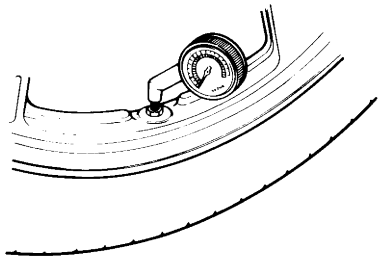


I310G1020068-02

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/cm²	psi	kPa	kgf/cm²	psi
Front	250	2.50	36	250	2.50	36
Rear	250	2.50	36	290	2.90	42



I310G1020069-02

⚠ CAUTION

The standard tire fitted on this motorcycle is 120/70ZR 18M/C (59W) for the front and 200/50ZR 17M/C (75W) for the rear. The use of tires other than those specified may cause instability. It is highly recommended to use the specified tires.

Tire type
BRIDGESTONE

- **Front: G853 G**
- **Rear: G852 G**

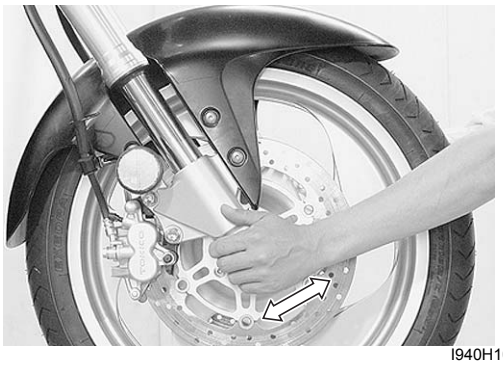
Steering System Inspection

B940H20206018

Inspect steering system
Initially at 1 000 km (600 miles, 2 months) and every 12 000 km (7 500 miles, 24 months) thereafter

Steering should be adjusted properly for smooth turning of handlebars and safe running. Overtighten 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 (Page 6B-8)".



I940H1020048-02

Front Fork Inspection

B940H20206019

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 Disassembly and Assembly in Section 2B (Page 2B-3)".



I940H1020049-03

Rear Suspension Inspection

B940H20206020

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 (Page 2C-6)” and “Cushion Lever Removal and Installation in Section 2C (Page 2C-7)”.



I940H1020050-01



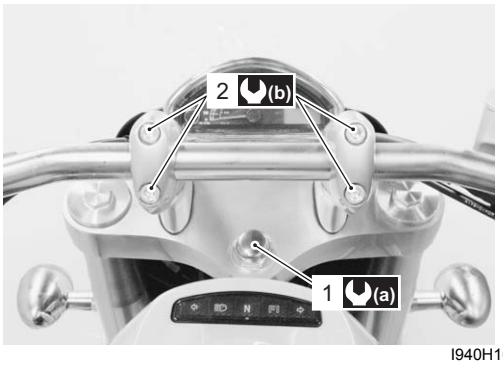
I940H1020051-01

Chassis Bolt and Nut Inspection

B940H20206021

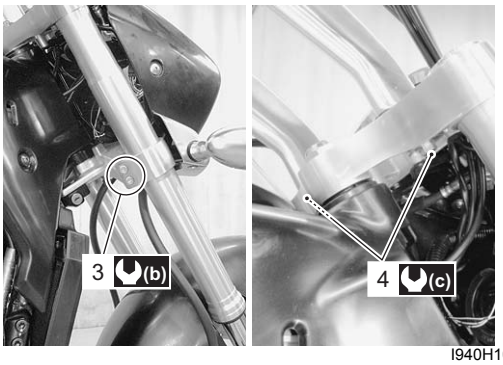
Tighten chassis bolt and nut
Initially at 1 000 km (600 miles, 2 months) and every 6 000 km (4 000 miles, 12 months) thereafter

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



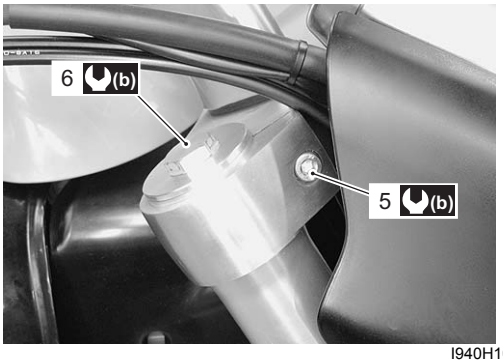
I940H1020052-01

1 (a)	Steering stem head nut 90 N·m (9.0 kgf-m, 65.0 lbf-ft)
2 (b)	Handlebar clamp bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



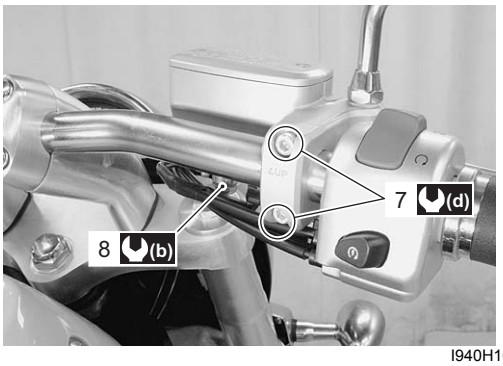
I940H1020053-01

3 (b)	Front fork lower clamp bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
4 (c)	Handlebar holder bolt 45 N·m (4.5 kgf-m, 32.5 lbf-ft)



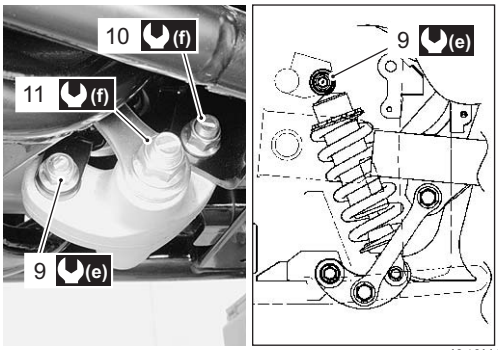
I940H1020054-03

5 (b)	Front fork upper clamp bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
6 (b)	Front fork cap bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



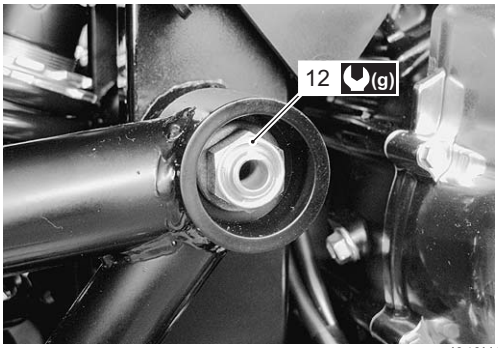
I940H1020055-02

7 (d)	Front brake master cylinder mounting bolt 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
8 (b)	Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



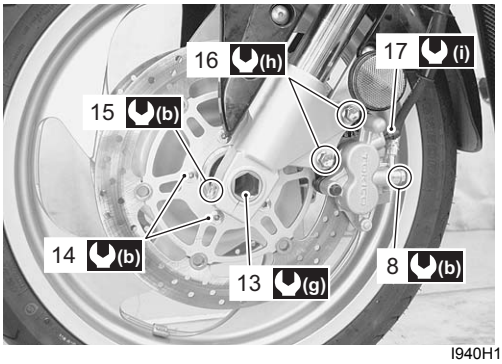
I940H1020056-02

9	(e)	Rear shock absorber mounting nut 65 N·m (6.5 kgf-m, 47.0 lbf-ft)
10	(f)	Cushion lever nut 132 N·m (13.2 kgf-m, 95.5 lbf-ft)
11	(f)	Cushion rod nut 132 N·m (13.2 kgf-m, 95.5 lbf-ft)



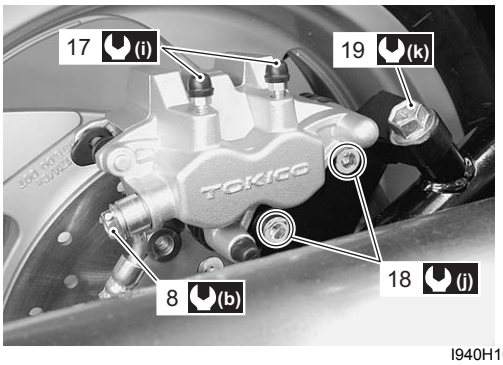
I940H1020057-05

12	(g)	Swingarm pivot shaft 100 N·m (10.0 kgf-m, 72.5 lbf-ft)



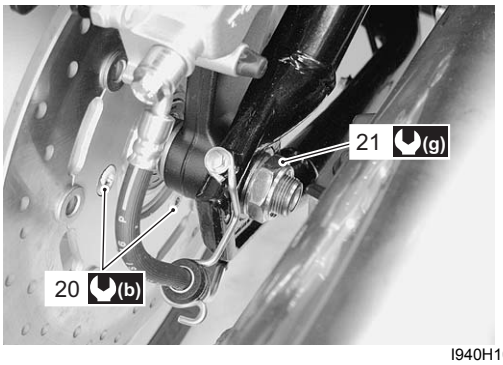
I940H1020058-03

8	(b)	Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
13	(g)	Front axle 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
14	(b)	Brake disc bolt (Front) 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
15	(b)	Front axle pinch bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
16	(h)	Front brake caliper mounting bolt 39 N·m (3.9 kgf-m, 28.0 lbf-ft)
17	(i)	Air bleeder valve 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)



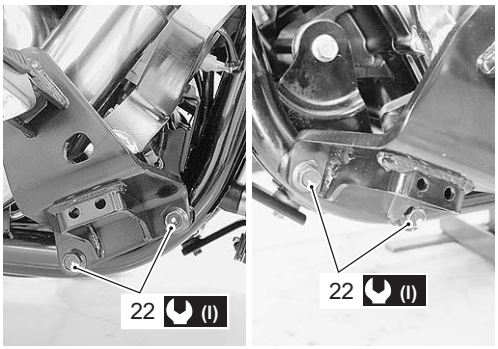
I940H1020059-04

8	(b)	Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
17	(i)	Air bleeder valve 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)
18	(j)	Rear brake caliper mounting bolt 54 N·m (5.4 kgf-m, 39.0 lbf-ft)
19	(k)	Rear brake caliper bracket mounting bolt 94 N·m (9.4 kgf-m, 68.0 lbf-ft)



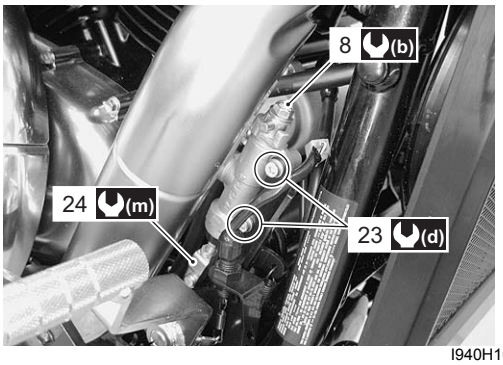
I940H1020060-04

20	(b)	Brake disc bolt (Rear) 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
21	(g)	Rear axle nut 100 N·m (10.0 kgf-m, 72.5 lbf-ft)



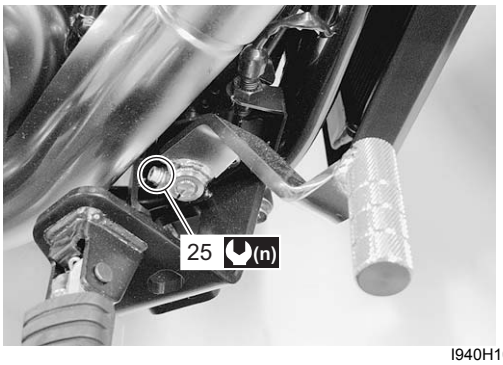
I940H1020061-03

22	(l)	Front footrest bolt 50 N·m (5.0 kgf-m, 36.0 lbf-ft)



I940H1020062-04

8	(b)	Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
23	(d)	Rear brake master cylinder mounting bolt 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
24	(m)	Rear brake master cylinder rod lock-nut 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



I940H1020069-02

25	(n)	Rear brake pedal boss bolt 16 N·m (1.6 kgf-m, 11.5 lbf-ft)

Compression Pressure Check

B940H20206022

Refer to “Compression Pressure Check in Section 1D (Page 1D-3)”.

Oil Pressure Check

B940H20206023

Refer to “Oil Pressure Check in Section 1E (Page 1E-2)”.

SDS Check

B940H20206024

Refer to “SDS Check in Section 1A (Page 1A-16)”.

Specifications

Tightening Torque Specifications

B940H20207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Exhaust pipe bolt	23	2.3	16.5	☞(Page 0B-3)
Muffler connecting bolt	26	2.6	19.0	☞(Page 0B-3)
Muffler joint bolt	26	2.6	19.0	☞(Page 0B-3)
Muffler support bolt	26	2.6	19.0	☞(Page 0B-3)
Muffler support nut	26	2.6	19.0	☞(Page 0B-3)
Valve clearance adjuster lock-nut	15	1.5	11.0	☞(Page 0B-5) / ☞(Page 0B-6)
Valve timing inspection cap bolt	10	1.0	7.0	☞(Page 0B-6)
Generator cover cap	11	1.1	8.0	☞(Page 0B-6)
Valve timing inspection plug	23	2.3	16.5	☞(Page 0B-6)
Oil drain plug	23	2.3	16.5	☞(Page 0B-8)
Oil filter	20	2.0	14.5	☞(Page 0B-9)
Final gear oil drain plug	23	2.3	16.5	☞(Page 0B-10)
Clutch cable adjuster lock-nut	4.5	0.45	3.0	☞(Page 0B-13)
Rear master cylinder rod lock-nut	18	1.8	13.0	☞(Page 0B-16)
Front footrest bracket bolt	50	5.0	36.0	☞(Page 0B-16)

NOTE

The specified tightening torque is described in the following.
“Chassis Bolt and Nut Inspection (Page 0B-18)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H20208001

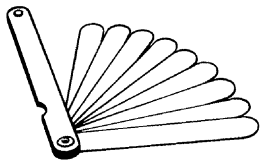
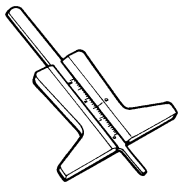
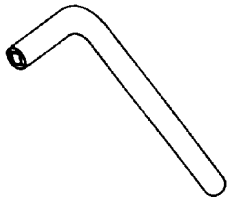
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 0B-14)
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 0B-6)
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞(Page 0B-16)

NOTE

Required service material is also described in the following.
“Lubrication Points (Page 0B-2)”

Special Tool

B940H20208002

09900–20803 Thickness gauge ☞(Page 0B-5) / ☞(Page 0B-5) / ☞(Page 0B-6) 	09900–20805 Tire depth gauge ☞(Page 0B-16) 
09915–40620 Oil filter wrench ☞(Page 0B-9) / ☞(Page 0B-9) 	09917–10410 Valve adjuster driver ☞(Page 0B-5) / ☞(Page 0B-6) 

Service Data

Specifications

Service Data

B940H20307001

Valve + Guide

Unit: mm (in)

Item	Standard		Limit
Valve diam.	IN.	33 (1.30)	—
	EX.	30 (1.18)	—
Tappet clearance (When cold)	IN.	0.08 – 0.13 (0.003 – 0.005)	—
	EX.	0.17 – 0.22 (0.007 – 0.009)	—
Valve guide to valve stem clearance	IN.	0.010 – 0.037 (0.0004 – 0.0015)	—
	EX.	0.030 – 0.057 (0.0012 – 0.0022)	—
Valve guide I.D.	IN. & EX.	5.500 – 5.512 (0.2165 – 0.2170)	—
Valve stem O.D.	IN.	5.475 – 5.490 (0.2156 – 0.2161)	—
	EX.	5.455 – 5.470 (0.2148 – 0.2154)	—
Valve stem deflection	IN. & EX.	—	0.35 (0.014)
Valve stem runout	IN. & EX.	—	0.05 (0.002)
Valve head thickness	IN. & EX.	—	0.5 (0.02)
Valve stem end length	IN. & EX.	—	3.2 (0.13)
Valve seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	—
Valve head radial runout	IN. & EX.	—	0.03 (0.001)
Valve spring free length	Inner	—	34.4 (1.35)
	Outer	—	38.1 (1.50)
Valve spring tension	Inner	58 – 66 N (5.9 – 6.7 kgf, 13.1 – 15.0 lbs) at length 27.56 mm (1.09 in)	—
	Outer	135 – 155 N (13.5 – 15.5 kgf, 30.4 – 34.9 lbs) at length 31.06 mm (1.23 in)	—

Camshaft + Cylinder Head

Unit: mm (in)

Item	Standard		Limit
Cam height	IN.	33.060 – 33.110 (1.3016 – 1.3035)	32.760 (1.2898)
	EX.	33.110 – 33.160 (1.304 – 1.306)	32.810 (1.2917)
Camshaft journal oil clearance	IN. & EX.	0.032 – 0.066 (0.0013 – 0.0026)	0.150 (0.0059)
Camshaft journal holder I.D.	Sprocket side	22.012 – 22.025 (0.8666 – 0.8671)	—
	Other side	18.512 – 18.525 (0.7288 – 0.7293)	—
Camshaft journal O.D.	Sprocket side	21.959 – 21.980 (0.8645 – 0.8653)	—
	Other side	18.459 – 18.480 (0.7267 – 0.7276)	—
Camshaft runout	IN. & EX.	—	0.10 (0.004)
Cylinder head distortion	—		0.05 (0.002)
Rocker arm shaft O.D.	IN. & EX.	11.973 – 11.984 (0.4714 – 0.4718)	
Rocker arm I.D.	IN. & EX.	12.000 – 12.018 (0.4724 –0.4731)	

Cylinder + Piston + Piston Ring

Unit: mm (in)

Item	Standard		Limit
Compression pressure (Automatic decomp. actuated)	#1 Cylinder	850 – 1 450 kPa (8.5 – 14.5 kgf/cm^2, 121 – 206 psi)	750 kPa (7.5 kgf/cm^2, 106.7 psi)
	#2 Cylinder	650 – 1 250 kPa (6.5 – 12.5 kgf/cm^2, 92 – 178 psi)	550 kPa (5.5 kgf/cm^2, 78.2 psi)
Piston-to-cylinder clearance	0.025 – 0.035 (0.0010 – 0.0014)		0.120 (0.0047)
Cylinder bore	96.000 – 96.015 (3.7795 – 3.7801)		Nicks or Scratches
Piston diam.	95.970 – 95.985 (3.7783 – 3.7789) Measure at 15 mm (0.6 in) from the skirt end.		95.88 (3.7748)
Cylinder distortion	—		0.05 (0.002)
Piston ring free end gap	1st	Approx. 11 (0.43)	8.8 (0.35)
	2nd	Approx. 11 (0.43)	8.8 (0.35)
Piston ring end gap	1st	0.10 – 0.25 (0.004 – 0.010)	0.5 (0.020)
	2nd	0.10 – 0.25 (0.004 – 0.010)	0.5 (0.020)
Piston ring-to-groove clearance	1st	—	0.180 (0.0071)
	2nd	—	0.150 (0.0059)
Piston ring groove width	1st	1.21 – 1.23 (0.0476 – 0.0484)	—
	2nd	1.01 – 1.03 (0.0398 – 0.0402)	—
	Oil	2.51 – 2.53 (0.0988 – 0.0996)	—
Piston ring thickness	1st	1.17 – 1.19 (0.046 – 0.047)	—
	2nd	0.97 – 0.99 (0.038 – 0.039)	—
Piston pin bore I.D.	22.002 – 22.008 (0.8662 – 0.8665)		22.030 (0.8673)
Piston pin O.D.	21.993 – 22.000 (0.8658 – 0.8661)		21.980 (0.8654)

Conrod + Crankshaft

Unit: mm (in)

Item	Standard	Limit
Conrod small end I.D.	22.010 – 22.018 (0.8665 – 0.8668)	22.040 (0.8677)
Conrod big end side clearance	0.100 – 0.200 (0.0039 – 0.0078)	0.30 (0.012)
Conrod big end width	19.95 – 20.00 (0.785 – 0.787)	—
Crank pin width	20.10 – 20.15 (0.791 – 0.793)	—
Conrod big end oil clearance	0.032 – 0.056 (0.0013 – 0.0022)	0.080 (0.0031)
Crank pin O.D.	54.976 – 55.000 (2.1644 – 2.1654)	—
Crankshaft journal oil clearance	0.002 – 0.029 (0.00008 – 0.00114)	0.080 (0.0031)
Crankshaft journal O.D.	54.985 – 55.000 (2.1648 – 2.1654)	—
Crankshaft thrust bearing thickness	1.925 – 2.075 (0.0758 – 0.0817)	—
Crankshaft thrust clearance	0.100 – 0.150 (0.0039 – 0.0059)	—
Crankshaft runout	—	0.05 (0.002)

Oil Pump

Item	Standard	Limit
Oil pressure (at 60 °C, 140 °F)	Above 400 kPa (4.0 kgf/cm^2, 57 psi) Below 800 kPa (8.0 kgf/cm^2, 114 psi) at 3 000 r/min	—

Clutch

Unit: mm (in)

Item	Standard		Limit
Clutch cable play	10 – 15 (0.4 – 0.6)		—
Clutch release arm play	6.0 (0.24)		2.0 (0.08)
Clutch release screw	1/2 turn back		—
Clutch drive plate thickness	No. 1	3.72 – 3.88 (0.146 – 0.153)	3.42 (0.135)
	No. 2	3.72 – 3.88 (0.146 – 0.153)	3.42 (0.135)
	No. 3	3.72 – 3.88 (0.146 – 0.153)	3.42 (0.135)
Clutch drive plate claw width	No. 1, 2, 3	13.9 – 14.0 (0.154 – 0.551)	13.1 (0.516)
Clutch driven plate distortion	—		0.10 (0.004)
Clutch spring free length	38.79 (1.53)		36.9 (1.45)

Thermostat + Radiator + Fan + Coolant

Item	Standard		Note
Thermostat valve opening temperature	Approx. 88 °C (190 °F)		—
Thermostat valve lift	Over 8 mm (0.31 in) at 100 °C (212 °F)		—
ECT sensor resistance	20 °C (68 °F)	Approx. 2.45 kΩ	—
	50 °C (122 °F)	Approx. 0.811 kΩ	—
	80 °C (176 °F)	Approx. 0.318 kΩ	—
	110 °C (230 °F)	Approx. 0.142 kΩ	—
Radiator cap valve opening pressure	108 – 137 kPa (1.1 – 1.4 kgf/cm^2, 15.6 – 19.5 psi)		—
Cooling fan operating temperature	OFF → ON	Approx. 105 °C (221 °F)	—
	ON → OFF	Approx. 99 °C (210 °F)	—
Engine coolant type	Use an antifreeze/coolant compatible with aluminum radiator, mixed with distilled water only, at the ratio of 50:50.		—
Engine coolant	Reservoir tank side	Approx. 250 ml (0.3/0.2 US/Imp qt)	—
	Engine side	Approx. 2 400 ml (2.5/2.1 US/Imp qt)	—

Drive Train

Unit: mm (in) Except ratio

Item		Standard	Limit
Primary reduction ratio		1.407 (76/54)	—
Final reduction ratio		3.137 (20/17 x 32/12)	—
Gear ratios	1st	2.187 (35/16)	—
	2nd	1.400 (28/20)	—
	3rd	1.038 (27/26)	—
	4th	0.875 (28/32)	—
	Top	0.787 (26/33)	—
Shift fork to groove clearance		0.1 – 0.3 (0.004 – 0.012)	0.5 (0.02)
Shift fork groove width		5.0 – 5.1 (0.197 – 0.201)	—
Shift fork thickness		4.8 – 4.9 (0.189 – 0.193)	—
Gearshift lever height		95 – 105 (3.7 – 4.1)	—

Driveline / Axle

Unit: mm (in)

Item	Standard/Specification	Limit
Secondary bevel gear backlash	0.03 – 0.15 (0.001 – 0.006)	—
Final bevel gear backlash	0.08 – 0.16 (0.003 – 0.006)	—
Damper spring free length	—	20.5 (0.81)
Final gear oil type	Hypoid gear oil SAE #90, API grade GL-5	—
Final gear oil capacity	200 – 220 ml (6.8/7.0 – 7.4/7.7 US/Imp oz)	—

Injector + Fuel Pump + Fuel Pressure Regulator

Item	Specification	Note
Injector resistance	11 – 13 Ω at 23 °C (73 °F)	
Fuel discharge amount	168 ml and more (5.7/5.9 US/Imp oz) for 10 seconds at 300 kPa (3.0 kgf/cm^2, 43 psi)	
Fuel pressure regulator operating set pressure	Approx. 300 kPa (3.0 kgf/cm^2, 43 psi)	

FI Sensors

Item	Specification		Note
CKP sensor resistance	170 – 260 Ω		
CKP sensor peak voltage	3.0 V and more		When cranking
IAP sensor input voltage (F & R)	4.5 – 5.5 V		
IAP sensor output voltage (F & R)	Approx. 2.6 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor resistance	Closed	Approx. 1.1 kΩ	
	Opened	Approx. 4.3 kΩ	
TP sensor output voltage	Closed	Approx. 1.1 V	
	Opened	Approx. 4.3 V	
ECT sensor input voltage	4.5 – 5.5 V		
ECT sensor output voltage	0.1 – 4.85 V		
ECT sensor resistance	Approx. 2.45 kΩ at 20 °C (68 °F)		
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor output voltage	0.1 – 4.6 V		
IAT sensor resistance	Approx. 2.5 kΩ at 20 °C (68 °F)		
TO sensor resistance	16.5 – 22.3 kΩ		
TO sensor voltage	Normal	0.4 – 1.4 V	
	Leaning	3.7 – 4.4 V	When leaning 65°
GP switch voltage	0.6 V and more		From 1st to Top
Injector voltage	Battery voltage		
STP sensor input voltage	4.5 – 5.5 V		
STP sensor output voltage	Closed	Approx. 0.6 V	
	Opened	Approx. 4.2 V	
STV actuator resistance	Approx. 7 Ω		
HO2 sensor output voltage	0.4 V and less at idle speed		E-02, 19, 24, 33
	0.6 V and more at 4 000 r/min		E-02, 19, 24, 33
HO2 sensor heater resistance	4.0 – 5.0 Ω at 23 °C (73 °F)		
PAIR solenoid valve resistance	18 – 22 Ω at 20 – 30 °C (68 – 86 °F)		
ISC valve resistance	Approx. 20 Ω at 20 °C (68 °F)		
EVAP system purge control solenoid valve resistance	Approx. 32 Ω at 20 °C (68 °F)		E-33 only

Throttle Body

Item	Specification
Bore size	42 mm (2.0 in)
I.D. No.	40H1 (For E-33), 40H0 (For the others)
Idle r/min	1 000 ± 100 r/min/Warmed engine
Throttle cable play	2.0 – 4.0 mm (0.08 – 0.16 in)

Electrical

Unit: mm (in)

Item			Specification		Note
Firing order			1 · 2		
Spark plug			Type	NGK: CR6E DENSO: U20ESR-N	
			Gap	0.7 – 0.8 (0.028 – 0.031)	
Spark performance			Over 8 (0.3) at 1 atm.		
CKP sensor resistance			170 – 260 Ω		
CKP sensor peak voltage			3.0 V and more		When cranking
Ignition coil resistance			Primary	1 – 5 Ω	
			Secondary	25 – 40 kΩ	
Ignition coil primary peak voltage			150 V and more		#2: (+) B, (–) Ground #1: (+) W/Bl, (–) Ground
Generator coil resistance			0.2 – 0.6 Ω		
Generator maximum output			Approx. 425 W at 5 000 r/min		
Generator no-load voltage (When engine is cold)			80 V (AC) and more at 5 000 r/min		
Regulated voltage			13.5 – 15.5 V at 5 000 r/min		
Starter relay resistance			3 – 6 Ω		
Battery	Type designation		FTZ16-BS		
	Capacity		12 V 64.8 kC (18 Ah)/10 HR		
Fuse size	Headlight	HI	10 A		
		LO	10 A		
	Fuel		10 A		
	Ignition		10 A		
	Signal		10 A		
	Fan motor		15 A		
	Main		30 A		
Starter motor brush length			Standard	12.5 (0.49)	
			Limit	6.0 (0.24)	
Starter torque limiter slip torque			Standard	19.6 – 39.2 N·m (1.96 – 3.92 kgf-m, 14.0 – 28.5 lbf-ft)	

Wattage
Unit: W

Item		Specification	
		E-03, 28, 33	E-02, 19, 24
Headlight	HI	60	←
	LO	55	←
Position light		—	5
Brake light/Taillight		LED	←
Front turn signal light/Position light		21/5	—
Front turn signal light		—	21
Rear turn signal light		21	←
Speedometer light		LED	←
Turn signal indicator light		LED	←
High beam indicator light		LED	←
Neutral position indicator light		LED	←
Fuel level indicator light		LED	←
Coolant temperature indicator light		LED	←
Oil pressure indicator light		LED	←
FI indicator light		LED	←
License plate light		5	←

Brake + Wheel
Unit: mm (in)

Item	Standard			Limit
Rear brake pedal height	60 – 70 (2.4 – 2.8)			—
Brake disc thickness	Front	4.3 – 4.7 (0.169 – 0.185)		4.0 (0.16)
	Rear	6.6 – 7.0 (0.260 – 0.276)		6.3 (0.25)
Brake disc runout	Front & Rear	—		0.30 (0.012)
Master cylinder bore	Front	15.870 – 15.913 (0.6248 – 0.6265)		—
	Rear	15.870 – 15.913 (0.6248 – 0.6265)		—
Master cylinder piston diam.	Front	15.827 – 15.854 (0.6231 – 0.6242)		—
	Rear	15.827 – 15.854 (0.6231 – 0.6242)		—
Brake caliper cylinder bore	Front	30.230 – 30.306 (1.1902 – 1.1931)		—
	Rear	30.230 – 30.306 (1.1902 – 1.1931)		—
Brake caliper piston diam.	Front	30.150 – 30.200 (1.1870 – 1.1890)		—
	Rear	30.150 – 30.200 (1.1870 – 1.1890)		—
Brake fluid type	DOT 4			—
Wheel rim runout	Front & Rear	Axial	—	2.0 (0.08)
		Radial		
Wheel axle runout	Front & Rear	—		0.25 (0.010)
Wheel rim size	Front	18 M/C x MT 3.50		—
	Rear	17 M/C x MT 6.00		—

Suspension

Unit: mm (in)

Item	Standard	Limit
Front fork stroke	130 (5.1)	—
Front fork spring free length	338 (13.3)	331 (13.0)
Front fork inner tube O.D.	43 (1.7)	—
Front fork oil level (Without spring, inner tube fully compressed)	121 (4.8)	—
Front fork oil type	SUZUKI FORK OIL L01 or an equivalent fork oil	—
Front fork oil capacity (Each leg)	636 ml (21.5/22.4 US/Imp oz)	—
Rear shock absorber spring pre-set length	192 (7.56)	—
Rear wheel travel	108 (4.3)	—
Swingarm pivot shaft runout	—	0.3 (0.01)

Tire

Item		Standard	Limit
Cold inflation tire pressure (Solo riding)	Front	250 kPa (2.50 kgf/cm^2, 36 psi)	—
	Rear	250 kPa (2.50 kgf/cm^2, 36 psi)	—
Cold inflation tire pressure (Dual riding)	Front	250 kPa (2.50 kgf/cm^2, 36 psi)	—
	Rear	290 kPa (2.90 kgf/cm^2, 42 psi)	—
Tire size	Front	120/70ZR 18M/C (59W), tubeless	—
	Rear	200/50ZR 17M/C (75W), tubeless	—
Tire type	Front	BRIDGESTONE: G853 G	—
	Rear	BRIDGESTONE: G852 G	—
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 90 pump octane (R/2 + M/2). 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-03, 28, 33
	Gasoline used should be graded 95 octane or higher. An unleaded gasoline type is recommended.		Others
Fuel tank capacity	18 L (4.8/4.0 US/Imp gal)		
Engine oil type	SAE 10W-40, API SF/SG or SH/SJ with JASO MA		
Engine oil capacity	Change	3 000 ml (3.2/2.6 US/Imp qt)	
	Filter change	3 200 ml (3.4/2.8 US/Imp qt)	
	Overhaul	4 000 ml (4.2/3.5 US/Imp qt)	

Tightening Torque List

B940H20307002

Engine

Item			N·m	kgf-m	lbf-ft
Cylinder head cover bolt			14	1.4	10.0
Cylinder head cover bracket bolt			10	1.0	7.0
Cylinder head bolt	[L160]		26	2.6	19.0
	[L180]		26	2.6	19.0
	[L190]	Initial	25	2.5	18.0
		Final	42	4.2	30.5
Cylinder head inspection cap bolts			10	1.0	7.0
Water jacket plug (Cylinder head)			26	2.6	19.0
Camshaft journal holder bolt			10	1.0	7.0
Cam chain sprocket bolt			15	1.5	11.0
Cam chain tension adjuster bolt (Front & Rear)			10	1.0	7.0
Cam chain tension adjuster cap bolt			23	2.3	16.5
Cam chain tensioner bolt (Front & Rear)			23	2.3	16.5
Valve clearance adjuster lock-nut			15	1.5	11.0
Cam chain guide bolt (Front & Rear)			23	2.3	16.5
Exhaust pipe bolt			23	2.3	16.5
HO2 sensor			48	4.8	34.5
Spark plug			11	1.1	8.0
Primary drive gear bolt			150	15.0	108.5
Starter clutch bolt			25	2.5	18.0
Conrod cap bolt	Initial		35	3.5	25.5
	Final		After tightening to the above torque, tighten 1/4 of a turn (90°).		
Oil drain plug			23	2.3	16.5
Crankcase bolt	[M6]	Initial	6	0.6	4.5
		Final	11	1.1	8.0
	[M8]	Initial	15	1.5	11.0
		Final	26	2.6	19.0
Oil gallery plug	[M8]		18	1.8	13.0
	[M14]		23	2.3	16.5
	[M16]		35	3.5	25.5
Oil gallery plug (Transmission oil jet)	[M10]		18	1.8	13.0
Oil pressure switch			14	1.4	10.0
Oil pressure switch lead wire bolt			1.5	0.15	1.0
Oil pump cover screw			1.3	0.13	1.0
Clutch sleeve hub nut			95	9.5	68.5
Clutch spring set bolt			10	1.0	7.0
Clutch spring support bolt			23	2.3	16.5
Clutch cable adjuster lock-nut			4.5	0.45	3.0
Valve timing inspection plug			23	2.3	16.5
Valve timing inspection cap bolt			10	1.0	7.0
Gearshift cam stopper plate bolt			10	1.0	7.0
Gearshift arm stopper			19	1.9	13.5
Gearshift cam stopper bolt			10	1.0	7.0
Gearshift lever bolt			50	5.0	36.0
Generator cover plug			11	1.1	8.0
Generator rotor bolt			160	16.0	115.5
Generator stator set bolt			11	1.1	8.0
Starter motor mounting bolt			10	1.0	7.0
Starter motor housing bolt			5	0.5	3.5
Starter motor lead wire mounting nut			6	0.6	4.5
Brush holder nut			11	1.1	8.0
Oil filter			20	2.0	14.5
Engine mounting nut			55	5.5	40.0
Muffler connecting bolt			26	2.6	19.0
Muffler support nut			26	2.6	19.0

Item	N·m	kgf-m	lbf-ft
Muffler support bolt	26	2.6	19.0
Muffler joint bolt	26	2.6	19.0
Muffler mounting nut	26	2.6	19.0
Rear muffler upper cover mounting bolt	10	1.0	7.0
Air cleaner box mounting bolt	5.5	0.55	4.0

Driveline / Axle

Item		N·m	kgf-m	lbf-ft
Secondary drive gear bolt		160	16.0	115.5
Secondary driven bevel gear bearing stopper		105	10.5	76.0
Secondary bevel gear coupling nut		95	9.5	68.5
Secondary gear case bolt	Initial	15	1.5	11.0
	Final	26	2.6	19.0
Secondary driven gear bearing housing bolt		55	5.5	40.0
Final gear case nut		40	4.0	29.0
Final drive gear coupling nut		100	10.0	72.5
Final drive bevel gear bearing stopper		110	11.0	79.5
Final gear case bolt	[M8]	23	2.3	16.5
	[M10]	50	5.0	36.0
Final gear oil drain plug		23	2.3	16.5

FI System and Intake Air System

Item	N·m	kgf-m	lbf-ft
CKP sensor mounting bolt	5.5	0.55	4.0
Fuel pump mounting bolt	10	1.0	7.0
GP switch mounting bolt	6.5	0.65	4.5
TP sensor mounting screw	3.5	0.35	2.5
STP sensor mounting screw	3.5	0.35	2.5
IAT sensor mounting screw	1.3	0.13	1.0
ISC valve mounting bolt	4.5	0.45	3.0
Fuel delivery pipe mounting screw	5	0.5	3.5
EVAP system purge control solenoid valve mounting nut (For E-33)	7	0.7	5.0

Cooling System

Item	N·m	kgf-m	lbf-ft
ECT sensor	18	1.8	13.0
Water hose clamp screw	1.5	0.15	1.0
Water pump case screw	5.5	0.55	4.0
Cooling fan mounting bolt	6.5	0.65	4.5
Radiator heat shield mounting bolt (Left side)	5.5	0.55	4.0
Radiator heat shield mounting bolt (Right side)	10	1.0	7.0

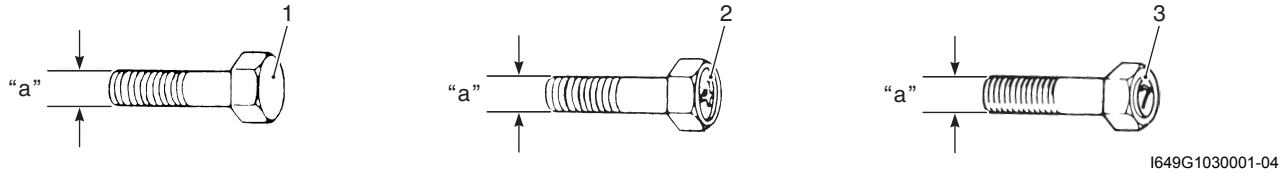
Chassis

Item	N·m	kgf-m	lbf-ft
Handlebar clamp bolt	23	2.3	16.5
Handlebar holder bolt	45	4.5	32.5
Front fork clamp bolt (Upper & Lower)	23	2.3	16.5
Front fork cap bolt	23	2.3	16.5
Front fork cylinder bolt	30	3.0	21.5
Steering stem nut	45 N·m (4.5 kgf-m, 32.5 lbf-ft) then turn back 1/2 – 1/4		
Steering stem head nut	90	9.0	65.0
Front axle	100	10.0	72.5
Front axle pinch bolt	23	2.3	16.5
Damper rod bolt	30	3.0	21.5
Front fork inner rod lock-nut	15	1.5	11.0
Brake disc bolt (Front & Rear)	23	2.3	16.5
Rear brake caliper bracket mounting bolt	94	9.4	68.0
Front brake caliper mounting bolt	39	3.9	28.0
Rear brake caliper mounting bolt	54	5.4	39.0
Air bleeder valve (Front brake)	7.5	0.75	5.5
Air bleeder valve (Rear brake)	7.5	0.75	5.5
Brake hose union bolt (Front & Rear)	23	2.3	16.5
Brake lever pivot bolt	1	0.1	0.7
Brake lever pivot bolt lock-nut	6	0.6	4.5
Front brake master cylinder holder bolt	10	1.0	7.0
Rear brake master cylinder mounting bolt	10	1.0	7.0
Rear master cylinder rod lock-nut	18	1.8	13.0
Rear brake pedal boss bolt	16	1.6	11.5
Frame down tube bolt	50	5.0	36.0
Rear frame bolt	50	5.0	36.0
Rear reflex reflector mounting nut	1.8	0.18	1.3
Front footrest bracket bolt	50	5.0	36.0
Swingarm pivot shaft nut	100	10.0	72.5
Cushion lever mounting nut	132	13.2	95.5
Cushion rod nut	132	13.2	95.5
Rear shock absorber mounting nut (Upper & Lower)	65	6.5	47.0
Rear axle nut	100	10.0	72.5
Rear brake master cylinder rod lock-nut	18	1.8	13.0
Brake pipe flare nut	16	1.6	11.5
Steering lock bracket bolt	26	2.6	19.0
Combination meter mounting bolt	10	1.0	7.0
Headlight cover mounting bolt	8.5	0.85	6.0

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	lbf-ft	N·m	kgf-m	lbf-ft
4	1.5	0.15	1.0	2.3	0.23	1.5
5	3	0.3	2.0	4.5	0.45	3.0
6	5.5	0.55	4.0	10	1.0	7.0
8	13	1.3	9.5	23	2.3	16.5
10	29	2.9	21.0	50	5.0	36.0
12	45	4.5	32.5	85	8.5	61.5
14	65	6.5	47.0	135	13.5	97.5
16	105	10.5	76.0	210	21.0	152.0
18	160	16.0	115.5	240	24.0	173.5



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

Section 1

Engine

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Precautions

Precautions

Precautions for Engine

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Refer to “General Precautions in Section 00 (Page 00-1)” and “Precautions for Electrical Circuit Service in Section 00 (Page 00-2)”.

Engine General Information and Diagnosis

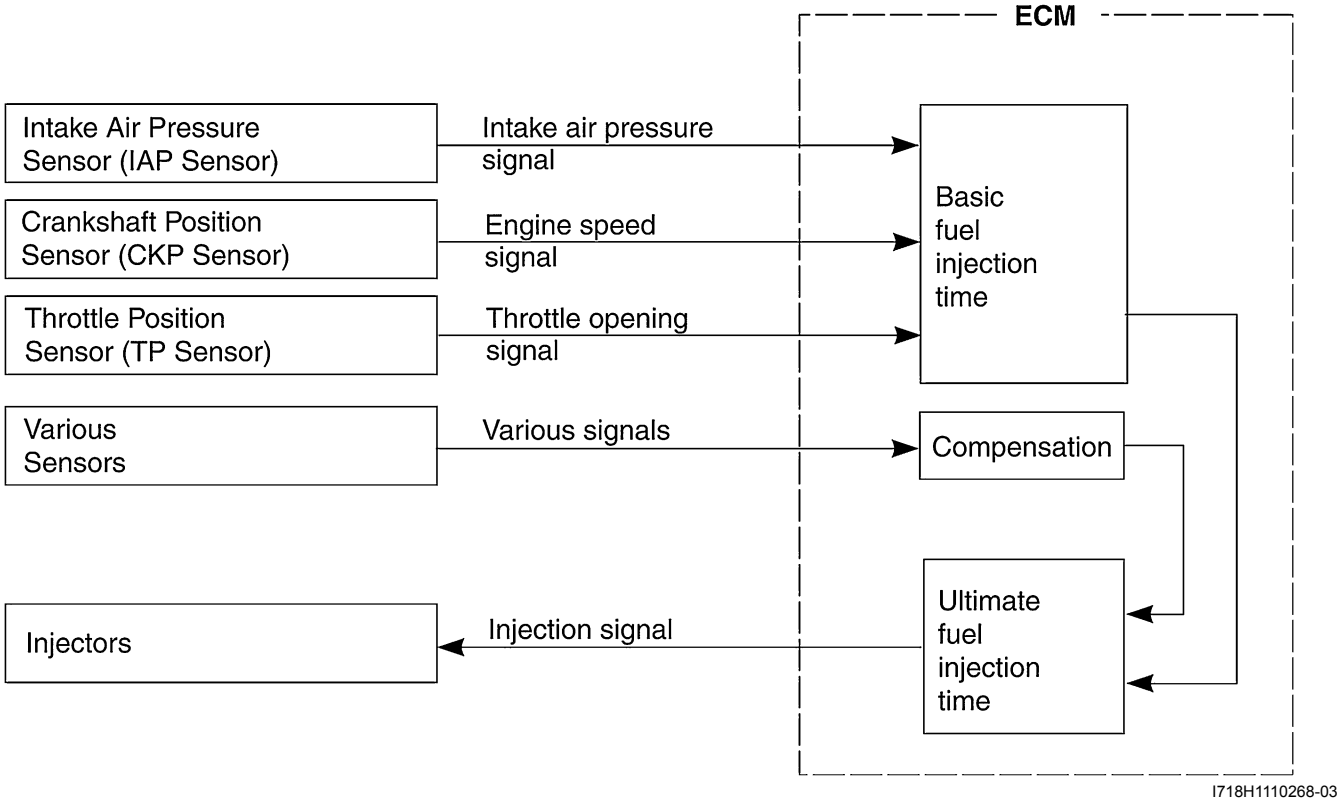
General Description

Injection Timing Description

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Injection Time (Injection Volume)

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



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Compensation of Injection Time (Volume)

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

Signal	Descriptions
ENGINE COOLANT TEMPERATURE SENSOR SIGNAL	When engine coolant temperature is low, injection time (volume) is increased.
INTAKE AIR TEMPERATURE SENSOR SIGNAL	When intake air temperature is low, injection time (volume) is increased.
HEATED OXYGEN SENSOR SIGNAL	Air/fuel ratio is compensated to the theoretical ratio from density of oxygen in exhaust gasses. The compensation occurs in such a way that more fuel is supplied if detected air/fuel ratio is lean and less fuel is supplied if it is rich.
BATTERY VOLTAGE SIGNAL	ECM operates on the battery voltage and at the same time, it monitors the voltage signal for compensation of the fuel injection time (volume). A longer injection time is needed to adjust injection volume in the case of low voltage.
STARTING SIGNAL	When starting engine, additional fuel is injected during cranking engine.
ACCELERATION SIGNAL/DECELERATION SIGNAL	During acceleration, the fuel injection time (volume) is increased, in accordance with the throttle opening speed and engine rpm. During deceleration, the fuel injection time (volume) is decreased.

Injection Stop Control

Signal	Descriptions
TIP-OVER SENSOR SIGNAL (FUEL SHUT-OFF)	When the motorcycle tips over, the tip-over sensor sends a signal to the ECM. Then, this signal cuts OFF current supplied to the fuel pump, fuel injectors and ignition coils.
OVER-REV. LIMITER SIGNAL	The fuel injector stops operation when engine rpm reaches rev. limit rpm. The fuel cut-off circuit is incorporated in this ECM in order to prevent over-running of engine. When engine speed reaches 6 400 r/min, this circuit cuts off fuel at the fuel injector. **⚠ CAUTION** **Under no load, the engine can run over 6 400 r/min though the fuel cut-off circuit is effective, which may possibly cause engine damage. Do not run the engine without load over 6 400 r/min at anytime.**

Self-Diagnosis Function

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The self-diagnosis function is incorporated in the ECM. The function has two modes, “User mode” and “Dealer mode”. The user can only be notified by the LCD (DISPLAY) panel and LED (FI indicator light). To check the function of the individual FI system devices, the dealer mode is provided. In this check, the special tool is necessary to read the code of the malfunction items.

User Mode

Malfunction		LCD (display) indication “A”	FI indicator light indication “B”	Indication mode
“NO”		Odometer *1	—	—
“YES”	Engine can start	Odometer (*1) and “FI” letters *2	FI indicator light turns ON.	Each 2 sec. Odometer (*1) and “FI” is indicated alternately.
	Engine can not start	“FI” letters *3	FI indicator light turns ON and blinks.	“FI” is indicated continuously.

***1**

Current letter displayed any one of the odometer, tripmeter 1 or tripmeter 2.

***2**

When one of the signals is not received by ECM, the fail-safe circuit works and injection is not stopped. In this case, “FI” and odometer (*1) are indicated in the LCD panel and motorcycle can run.

***3**

The injection signal is stopped, when the crankshaft position sensor signal, tip-over sensor signal, ignition signal, #1, #2, #3 and #4 injector signals, fuel pump relay signal or ignition switch signal is not sent to ECM. In this case, “FI” is indicated in the LCD panel. Motorcycle does not run.

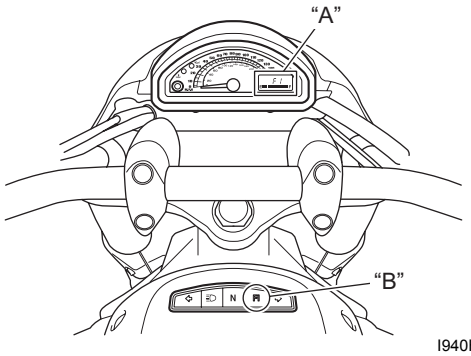
“CHEC”:

The LCD panel indicates “CHEC” when no communication signal from the ECM is received for 3 seconds and more.

For Example:
The ignition switch is turned ON, and the engine stop switch is turned OFF. In this case, the speedometer does not receive any signal from the ECM, and the panel indicates “CHEC”.
If CHEC is indicated, the LCD does not indicate the trouble code. It is necessary to check the wiring harness between ECM and speedometer couplers.
The possible cause of this indication is as follows:
Engine stop switch is in OFF position. Side-Stand/ignition inter-lock system is not working. Ignition fuse is burnt.

NOTE

The FI light “B” turns ON about 3 seconds after turning the ignition switch ON.



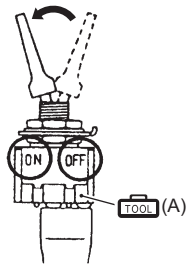
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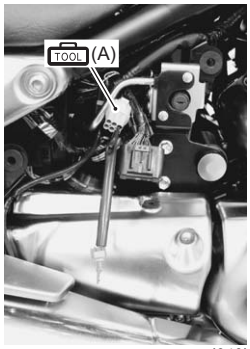
Dealer Mode
The defective function is memorized in the computer. Use the special tool’s coupler to connect to the mode select switch. The memorized malfunction code is displayed on LCD (DISPLAY) panel. Malfunction means that the ECM does not receive signal from the devices. These affected devices are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

⚠ CAUTION

Before checking the malfunction code, do not disconnect the ECM coupler.
If the coupler from the ECM is disconnected, the malfunction code memory is erased and the malfunction code can not be checked.

Special tool
TOOL (A): 09930–82720 (Mode select switch)





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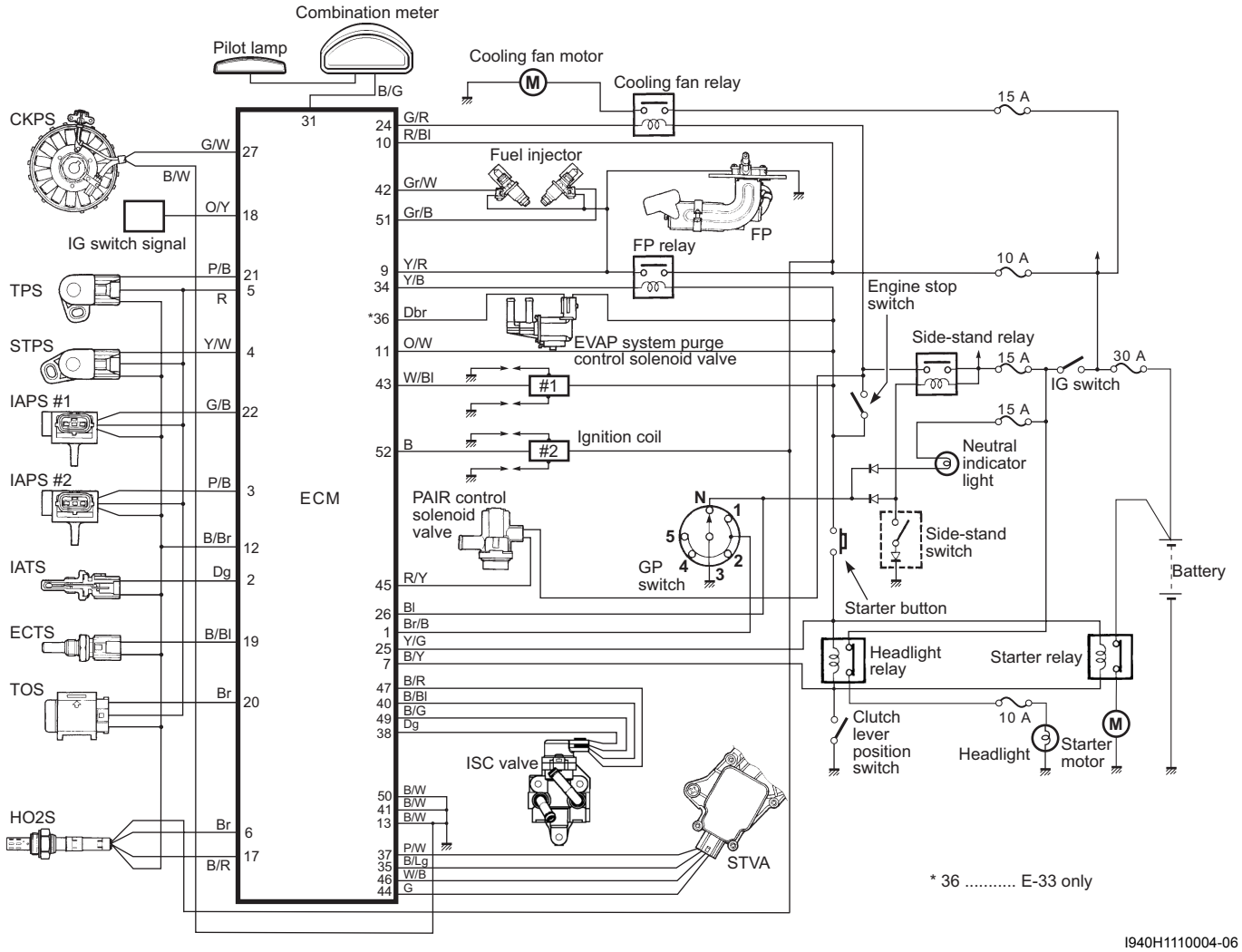
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Malfunction	LCD (display) indication	FI light indication	Indication mode
“NO”	C00	FI indicator light turns OFF.	—
“YES”	C** code is indicated from small numeral to large one.		For each 2 sec., code is indicated.

Schematic and Routing Diagram

FI System Wiring Diagram

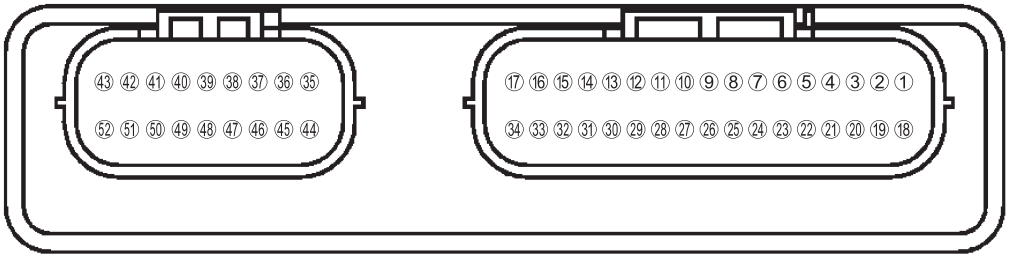
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I940H1110004-06

Terminal Alignment of ECM Coupler

B940H21102002



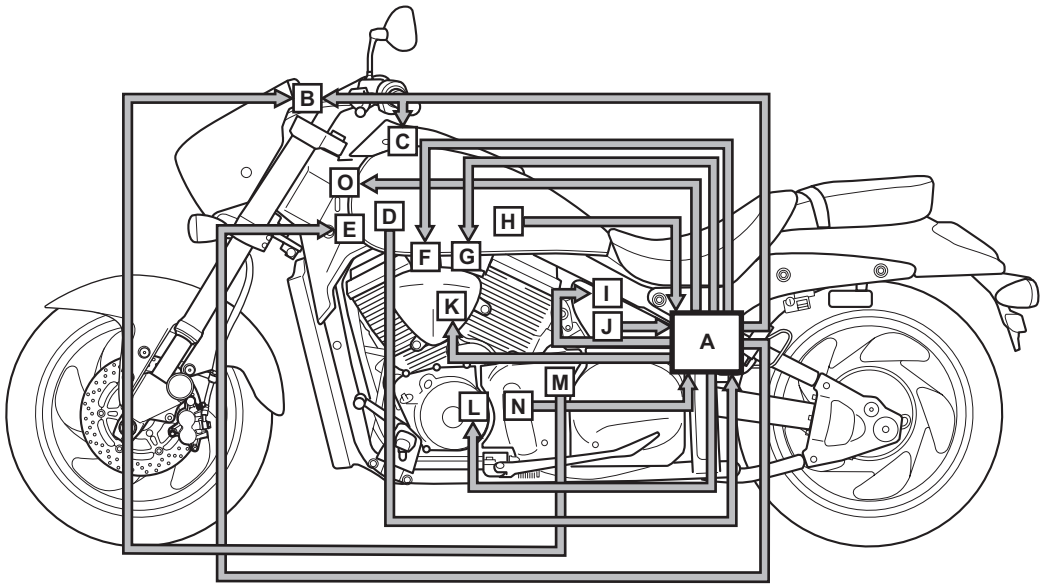
I940H1110005-03

TERMINAL NO.	CIRCUIT	TERMINAL NO.	CIRCUIT
1	GP switch signal (GP)	28	—
2	IAT sensor signal (IATS)	29	—
3	IAP sensor signal #2 (IAPS.2)	30	—
4	STP sensor (STPS)	31	Serial data for speedometer
5	Power source for sensors (VCC)	32	Serial data for self-diagnosis
6	HO2 sensor signal (HO2S)(For E-02, 19, 24, 33)	33	—
7	Clutch lever switch	34	Fuel pump relay (FP relay)
8	—	35	STVA signal (STVA, 1B)
9	Power source for fuel injectors	36	Canister purge solenoid (SOLP)(For E-33)
10	Power source for back-up	37	STVA signal (STVA, 1A)
11	Power source	38	ISC valve signal (ISC, 2B)
12	Sensor ground (E2)	39	—
13	ECM ground (E1)	40	ISC valve signal (ISC, 1B)
14	—	41	General power ground (E01)
15	—	42	Fuel injector #1
16	—	43	Ignition coil #1
17	HO2 sensor heater (HO2SH)(For E-02, 19, 24, 33)	44	STVA signal (STVA, 2B)
18	Ignition switch signal	45	PAIR control solenoid valve (PAIR)
19	ECT sensor signal (ECTS)	46	STVA signal (STVA, 2A)
20	TO sensor signal (TOS)	47	ISC valve signal (ISC, 1A)
21	TP sensor signal (TPS)	48	—
22	IAP sensor signal #1 (APS.1)	49	ISC valve signal (ISC, 2A)
23	—	50	General power ground 2
24	Cooling fan relay	51	Fuel injector #2
25	Starter switch signal	52	Ignition coil #2
26	Neutral signal		
27	CKP sensor signal (CKPS+)		

Component Location

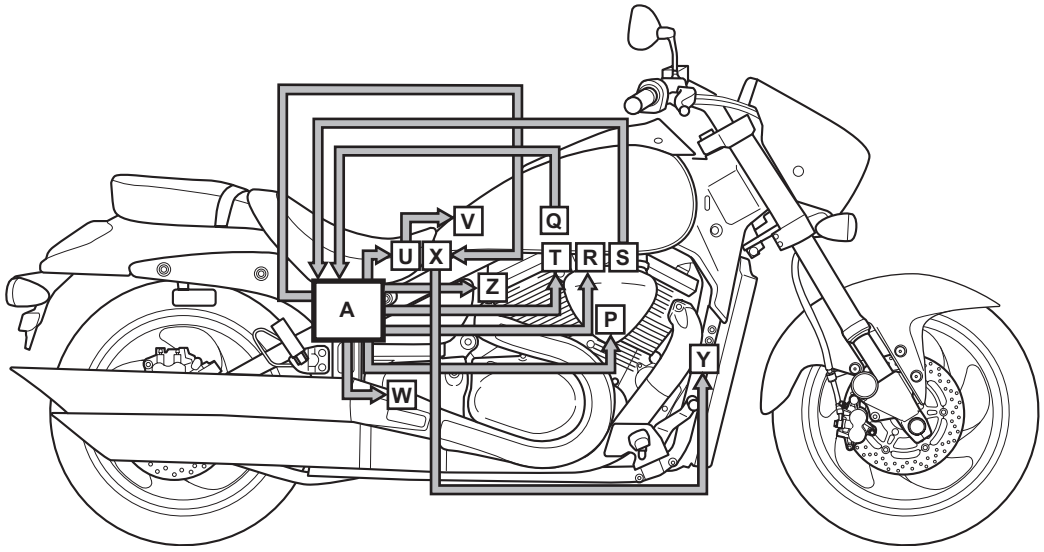
FI System Parts Location

B940H21103001



I940H1110007-04

"A": ECM	"F": Fuel injector #1	"K": Engine coolant temperature sensor (ECTS)
"B": Speedometer	"G": Fuel injector #2	"L": Crank shaft position sensor (CKPS)
"C": Pilot lamp	"H": Intake air pressure sensor #1 (IAPS)	"M": Speedometer sensor
"D": Intake air temperature sensor (IATS)	"I": Ignition coil #1 (IG coil #1)	"N": Gear position switch (GP switch)
"E": PAIR control solenoid valve (PAIR valve)	"J": Tip-over sensor (TOS)	"O": Ignition coil #2 (IG coil #2)



I940H1110006-02

"A": ECM	"U": Fuel pump relay
"P": ISC valve (ISCV)	"V": Fuel pump
"Q": Intake air pressure sensor #2 (IAPS)	"W": HO2 sensor (HO2S) (For E-02, 19, 24, 33)
"R": Secondary throttle position sensor (STPS)	"X": Cooling fan relay
"S": Throttle position sensor (TPS)	"Y": Cooling fan
"T": Secondary throttle valve actuator (STVA)	"Z": EVAP system purge control valve (For E-33)

Diagnostic Information and Procedures

Engine Symptom Diagnosis

B940H21104001

Condition	Possible cause	Correction / Reference Item
Engine will not start or is hard to start (Compression too low)	Valve clearance out of adjustment.	*Adjust.*
	Worn valve guide or poor seating of valve.	*Repair or replace.*
	Mistimed valve.	*Adjust.*
	Excessively worn piston rings.	*Replace.*
	Worn-down cylinder bores.	*Replace.*
	Too slow starter motor cranking.	*Refer to "Starting System Diagram in Section 1I (Page 1I-1)".*
	Poor seating of spark plugs.	*Retighten.*
Engine will not start or is hard to start (Plug not sparking)	Fouled spark plugs.	*Clean.*
	Wet spark plugs.	*Clean and dry.*
	Defective ignition coil/plug caps.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Open-circuited wiring connection.	*Repair or replace.*
	Open or short in high-tension cords.	*Replace.*
Engine will not start or is hard to start (No fuel reaching the intake manifold)	Clogged fuel filter or fuel hose.	*Clean or replace.*
	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective fuel injectors.	*Replace.*
	Defective fuel pump relay.	*Replace.*
	Defective ECM.	*Replace.*
	Open-circuited wiring connection.	*Check and repair.*
Engine will not start or is hard to start (Incorrect fuel/air mixture)	TP sensor out of adjustment.	*Adjust.*
	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective TP sensor.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective IAP sensors.	*Replace.*
	Defective ECM.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective IAT sensor.	*Replace.*
	Clogged ISC valve air passage way.	*Repair or replace.*
Engine idles poorly	Valve clearance out of adjustment.	*Adjust.*
	Poor seating of valves.	*Replace or repair.*
	Defective valve guides.	*Replace.*
	Worn down camshafts.	*Replace.*
	Too wide spark plug gaps.	*Adjust or replace.*
	Defective ignition coil/plug caps.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Defective TP sensor.	*Replace.*
	Defective fuel pump.	*Replace.*
	Imbalanced throttle valve.	*Adjust.*
	Damaged or cranked vacuum hose.	*Replace.*
	Damaged or clogged ISC valve.	*Repair or replace.*
	ISC incorrect learning.	*Reset learned value.*

Condition	Possible cause	Correction / Reference Item
Engine stalls often (Incorrect fuel/air mixture)	Defective IAP sensors or circuit.	*Repair or replace.*
	Clogged fuel filter.	*Clean or replace.*
	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective thermostat.	*Replace.*
	Defective IAT sensor.	*Replace.*
	Damaged or cracked vacuum hose.	*Replace.*
	Damaged or clogged ISC valve.	*Replace or repair.*
Engine stalls often (Fuel injector improperly operating)	Defective fuel injectors.	*Replace.*
	No injection signal from ECM.	*Repair or replace.*
	Open or short circuited wiring connection.	*Repair or replace.*
	Defective battery or low battery voltage.	*Replace or recharge.*
Engine stalls often (Control circuit or sensor improperly operating)	Defective ECM.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective TP sensor.	*Replace.*
	Defective IAT sensor.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective fuel pump relay.	*Replace.*
	Defective ISC valve.	*Replace.*
	ISC incorrect learning.	*Reset learned value.*
Engine stalls often (Engine internal parts improperly operating)	Fouled spark plug.	*Clean.*
	Defective CKP sensor or ECM.	*Replace.*
	Clogged fuel hose.	*Clean.*
	Valve clearance out of adjustment.	*Adjust.*
Noisy engine (Excessive valve chatter)	Too large valve clearance.	*Adjust.*
	Weakened or broken valve springs.	*Replace.*
	Worn tappet or cam surface.	*Replace.*
	Worn or burnt camshaft journal.	*Replace.*
Noisy engine (Noise seems to come from piston)	Worn down pistons or cylinders.	*Replace.*
	Combustion chamber fouled with carbon.	*Clean.*
	Worn piston pins or piston pin bore.	*Replace.*
	Worn piston rings or ring grooves.	*Replace.*
Noisy engine (Noise seems to come from cam chain)	Stretched cam chain.	*Replace.*
	Worn sprockets.	*Replace.*
	Cam chain tension adjuster not working.	*Repair or replace.*
Noisy engine (Noise seems to come from clutch)	Worn splines of countershaft or hub.	*Replace.*
	Worn teeth of clutch plates.	*Replace.*
	Distorted clutch plates, driven and drive.	*Replace.*
	Worn clutch release bearing.	*Replace.*
	Weakened clutch dampers.	*Replace the primary driven gear.*
Noisy engine (Noise seems to come from crankshaft)	Rattling bearing due to wear.	*Replace.*
	Worn or burnt big-end bearings.	*Replace.*
	Worn or burnt journal bearings.	*Replace.*
	Too large thrust clearance.	*Replace thrust bearing.*
Noisy engine (Noise seems to come from balancer)	Worn or burnt balancer gears.	*Replace.*
Noisy engine (Noise seems to come from transmission)	Worn or rubbing gears.	*Replace.*
	Worn splines.	*Replace.*
	Worn or rubbing primary gears.	*Replace.*
	Worn bearings.	*Replace.*

Condition	Possible cause	Correction / Reference Item
Noisy engine (Noise seems to come from water pump)	Too much play on pump shaft bearing.	*Replace.*
	Worn or damaged impeller shaft.	*Replace.*
	Worn or damaged mechanical seal.	*Replace.*
	Contact between pump case and impeller.	*Replace.*
Engine runs poorly in high speed range (Defective engine internal/ electrical parts)	Weakened valve spring.	*Replace.*
	Worn camshafts.	*Replace.*
	Valve timing out of adjustment.	*Adjust.*
	Too narrow spark plug gaps.	*Adjust.*
	Ignition not advanced sufficiently due to poorly working timing advance circuit.	*Replace ECM.*
	Defective ignition coils.	*Replace.*
	Defective ignition coil/plug caps.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Clogged air cleaner element.	*Clean.*
	Clogged fuel hose, resulting in inadequate fuel supply to injector.	*Clean and prime.*
	Defective fuel pump.	*Replace.*
	Defective TP sensor.	*Replace.*
	Defective STP sensor or STVA.	*Replace.*
Engine runs poorly in high speed range (Defective air flow system)	Clogged air cleaner element.	*Clean or replace.*
	Defective throttle valve.	*Adjust or replace.*
	Defective secondary throttle valve.	*Adjust or replace.*
	Sucking air from throttle body joint.	*Repair or replace.*
	Defective ECM.	*Replace.*
	Imbalancing throttle valve synchronization.	*Adjust.*
	Defective STP sensor or STVA.	*Replace.*
Engine runs poorly in high speed range (Defective control circuit or sensor)	Low fuel pressure.	*Repair or replace.*
	Defective TP sensor.	*Replace.*
	Defective IAT sensors.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective GP sensor.	*Replace.*
	Defective IAP sensors.	*Replace.*
	Defective ECM.	*Replace.*
	TP sensor out of adjustment.	*Adjust.*
	Defective STP sensor and/or STVA.	*Replace.*
Engine lacks power (Defective engine internal/ electrical parts)	Loss of valve clearance.	*Adjust.*
	Weakened valve springs.	*Replace.*
	Valve timing out of adjustment.	*Adjust.*
	Worn piston rings or cylinders.	*Replace.*
	Poor seating of valves.	*Repair.*
	Fouled spark plugs.	*Clean or replace.*
	Incorrect spark plugs.	*Adjust or replace.*
	Clogged fuel injectors.	*Replace.*
	TP sensor out of adjustment.	*Adjust.*
	Clogged air cleaner element.	*Replace.*
	Imbalancing throttle valve synchronization.	*Adjust.*
	Sucking air from throttle valve or vacuum hose.	*Retighten or replace.*
	Too much engine oil.	*Drain out excess oil.*
	Defective fuel pump or ECM.	*Replace.*
	Defective CKP sensor and ignition coils.	*Replace.*
	Defective STP sensor or STVA.	*Replace.*

Condition	Possible cause	Correction / Reference Item
Engine lacks power (Defective control circuit or sensor)	Low fuel pressure.	*Repair or replace.*
	Defective TP sensor.	*Replace.*
	Defective IAT sensor.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective GP sensor.	*Replace.*
	Defective IAP sensors.	*Replace.*
	TP sensor out of adjustment.	*Adjust.*
	Defective STP sensor and/or STVA.	*Replace.*
Engine overheats (Defective engine internal parts)	Heavy carbon deposit on piston crown.	*Clean.*
	Not enough oil in the engine.	*Add oil.*
	Defective oil pump or clogged oil circuit.	*Replace or clean.*
	Sucking air from intake pipes.	*Retighten or replace.*
	Use of incorrect engine oil.	*Change.*
	Defective cooling system.	*See radiator section.*
Engine overheats (Lean fuel/air mixture)	Short-circuited IAP sensors/lead wires.	*Repair or replace.*
	Short-circuited IAT sensor/lead wire.	*Repair or replace.*
	Sucking air from intake pipe joint.	*Repair or replace.*
	Defective fuel injectors.	*Replace.*
	Defective ECT sensor.	*Replace.*
Engine overheats (Other factors)	Ignition timing is too advanced due to defective timing advance system (ECT sensor, GP sensor, CKP sensor or ECM).	*Replace.*
	ISC valve incorrect learning.	*Reset learned value.*
Dirty or heavy exhaust smoke	Too much engine oil.	*Check with inspection window, drain out excess oil.*
	Worn piston rings or cylinders.	*Replace.*
	Worn valve guides.	*Replace.*
	Scored or scuffed cylinder walls.	*Replace.*
	Worn valve stems.	*Replace.*
	Defective stem seal.	*Replace.*
	Worn oil ring side rails.	*Replace.*

Self-Diagnostic Procedures

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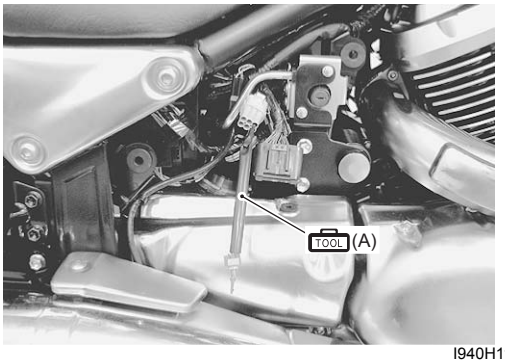
Use of Mode Select Switch

NOTE

- **Do not disconnect the coupler from ECM, battery cable from battery, ECM ground wire from engine or main fuse before confirming DTC (Diagnostic Trouble Code) stored in memory. Such disconnection will erase memorized information in ECM memory.**
- **DTC stored in ECM memory can be checked by the special tool.**
- **Before checking DTC, read self-diagnosis function "User mode and dealer mode" (Refer to "Self-Diagnosis Function (Page 1A-2)".) carefully to have good understanding as to what functions are available and how to use it.**
- **Be sure to read "Precautions for Electrical Circuit Service" (Refer to "Precautions for Electrical Circuit Service in Section 00 (Page 00-2)".) before inspection and observe what is written there.**

1) Remove the right frame side cover. Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-5)".
2) Connect the special tool to the mode select switch coupler at the wiring harness.

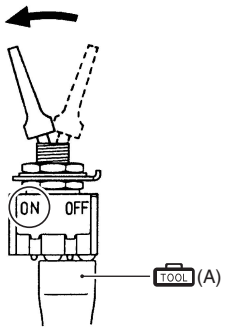
Special tool
TOOL (A): 09930–82720 (Mode select switch)



I940H1110008-02

3) Start the engine or crank the engine for more than 4 seconds.
4) Turn the special tool's switch ON.
5) Check the DTC to determine the malfunction part. Refer to "DTC Table (Page 1A-20)".

Special tool
TOOL (A): 09930–82720 (Mode select switch)



I718H1110006-04



I940H1110009-02

6) After repairing the trouble, turn OFF the ignition switch and turn ON again. If DTC is indicated (C00), the malfunction is cleared.

NOTE

- **Even though DTC (C00) is indicated, the previous malfunction history DTC still remains stored in the ECM. Therefore, erase the history DTC memorized in the ECM using SDS.**
- **DTC is memorized in the ECM also when the lead wire coupler of any sensor is disconnected. Therefore, when a lead wire coupler has been disconnected at the time of diagnosis, erase the stored history DTC using SDS. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-13)".**

7) Turn the ignition switch OFF and disconnect the special tool from the mode select switch coupler.
8) Reinstall the right frame side cover.

Use of SDS

NOTE

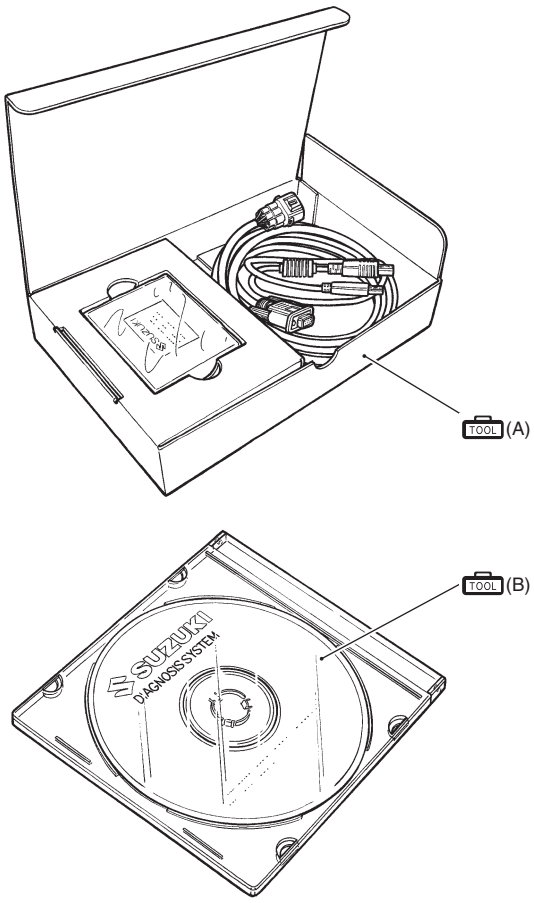
- **Do not disconnect the coupler from ECM, battery cable from battery, ECM ground wire from the engine or main fuse before confirming DTC (Diagnostic Trouble Code) stored in memory. Such disconnection will erase the memorized information in ECM memory.**
- **DTC stored in ECM memory can be checked by SDS.**
- **Be sure to read "Precautions for Electrical Circuit Service in Section 00 (Page 00-2)" before inspection and observe what is written there.**

1) Remove the right frame side cover. Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-5)".
2) Set up the SDS tools. (Refer to the SDS operation manual for further details.)

Special tool
TOOL (A): 09904–41010 (SDS Set)
TOOL (B): 99565–01010–017 (CD-ROM Ver.17)

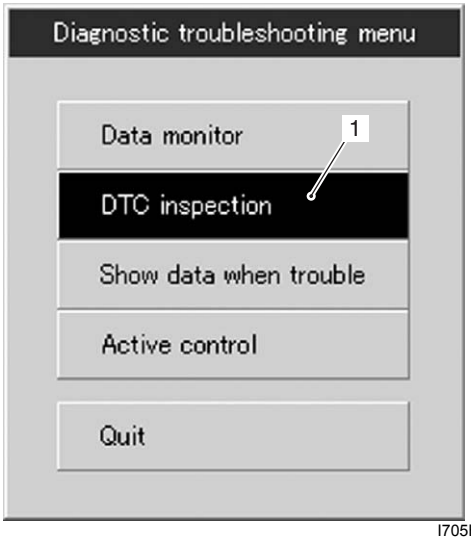


I940H1110010-01



I705H1110116-03

3) Click the DTC inspection button (1).



I705H1110003-01

4) Start the engine or crank the engine for more than 4 seconds.
5) Check the DTC to determine the malfunction part. Refer to “DTC Table (Page 1A-20)”.

NOTE

- **Read the DTC (Diagnostic Trouble Code) and show data when trouble (displaying data at the time of DTC) according to instructions displayed on SDS.**
- **Not only SDS is used for detecting Diagnostic Trouble Codes but also for reproducing and checking on screen the failure condition as described by customers using the trigger. (Refer to “Show Data When Trouble (Displaying Data at the Time of DTC) (Page 1A-14)”.)**
- **How to use trigger. (Refer to the SDS operation manual for further details.)**

6) After repairing the trouble, clear to delete history code (Past DTC). Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.
7) Close the SDS tool and turn the ignition switch OFF.
8) Disconnect the SDS tool and install the right frame side cover.

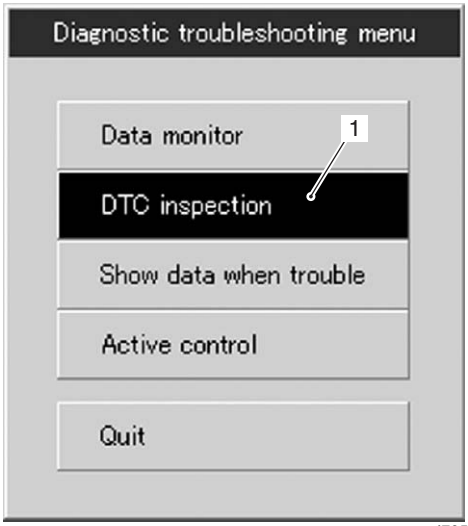
Use of SDS Diagnosis Reset Procedures

B940H21104003

NOTE

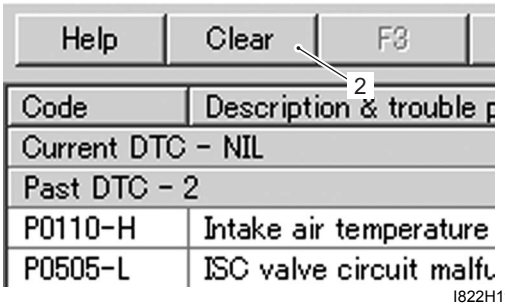
The malfunction code is memorized in the ECM also when the lead wire coupler of any sensor is disconnected. Therefore, when a lead wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.

1) After repairing the trouble, turn OFF the ignition switch and turn ON again.
2) Click the DTC inspection button (1).



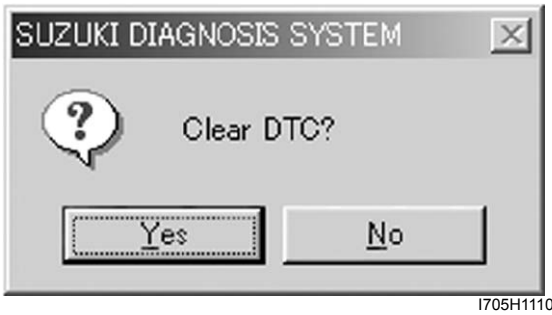
I705H1110003-01

3) Check the DTC.
4) The previous malfunction history code (Past DTC) still remains stored in the ECM. Therefore, erase the history code memorized in the ECM using SDS tool.
5) Click “Clear” (2) to delete history code (Past DTC).



I822H1110139-01

6) Follow the displayed instructions.

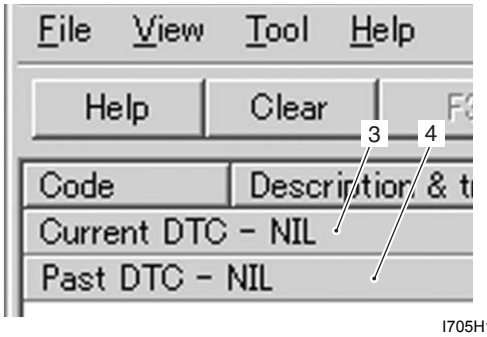


I705H1110006-01



I705H1110009-01

7) Check that both “Current DTC” (3) and “Past DTC” (4) are deleted (NIL).



I705H1110008-01

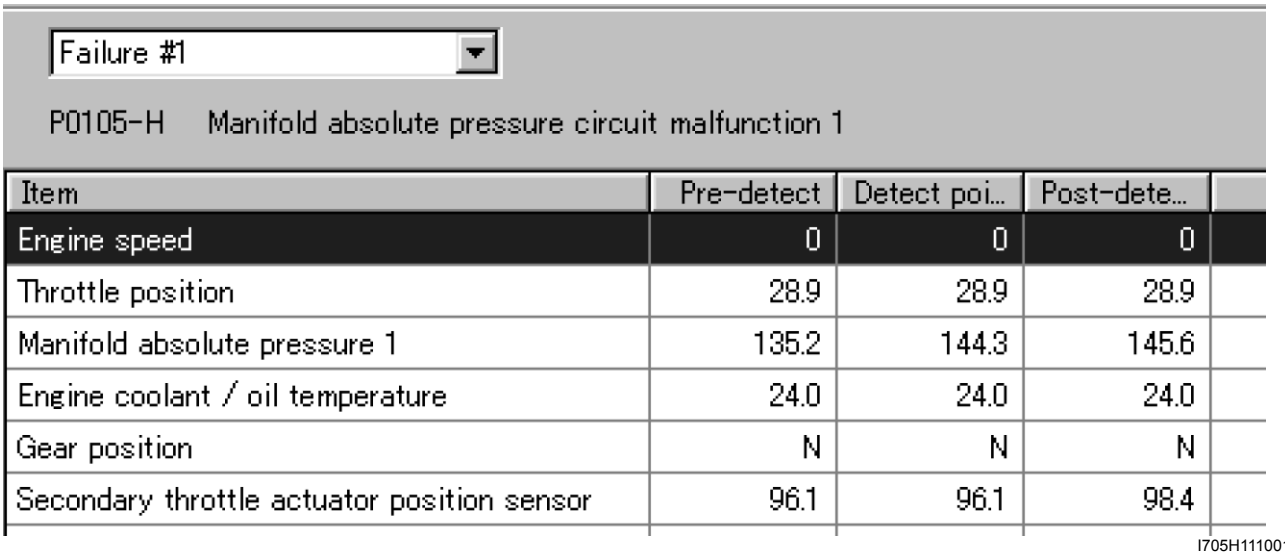
8) Close the SDS tool and turn the ignition switch OFF.
9) Disconnect the SDS tool and install the right frame side cover.

Show Data When Trouble (Displaying Data at the Time of DTC)

B940H21104004

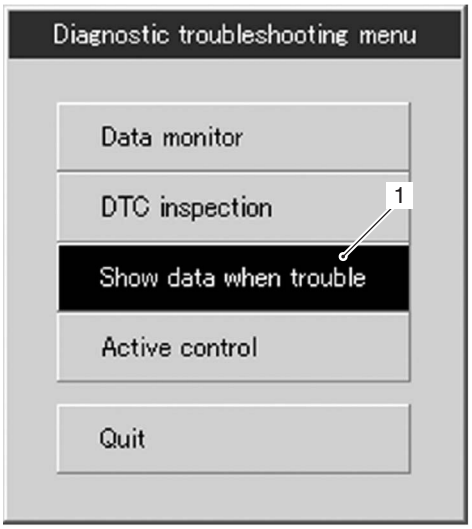
Use of SDS

ECM stores the engine and driving conditions (in the form of data as shown in the figure) at the moment of the detection of a malfunction in its memory. This data is called “Show data when trouble”.
Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the motorcycle was running or stopped) when a malfunction was detected by checking the show data when trouble. This show data when trouble function can record the maximum of two Diagnostic Trouble Codes in the ECM.
Also, ECM has a function to store each show data when trouble for two different malfunctions in the order of occurrence as the malfunction is detected. Utilizing this function, it is possible to know the order of malfunctions that have been detected. Its use is helpful when rechecking or diagnosing a trouble.



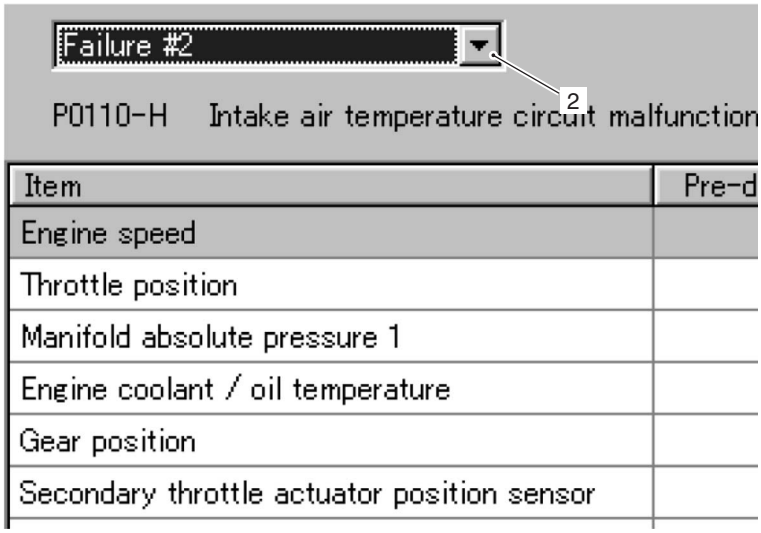
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1) Click “Show data when trouble” (1) to display the data.



I718H1110269-02

2) Click the drop down button (2), either “Failure #1” or “Failure #2” can be selected.



I718H1110270-01

SDS Check

B940H21104005

Using SDS, sample the data at the time of new and periodic vehicle inspections.
After saving the sampled data in the computer, file them by model and by user.
The periodically filed data help improve the accuracy of troubleshooting since they can indicate the condition of vehicle functions that has changed with time.
For example, when a vehicle is brought in for service but the troubleshooting of a failure is not easy, comparing the current data value to past filed data value at time of normal condition can allow the specific engine failure to be determined.
Also, in the case of a customer vehicle which is not periodically brought in for service with no past data value having been saved, if the data value of a good vehicle condition have been already saved as a master (STD), comparison between the same models helps to facilitate the troubleshooting.

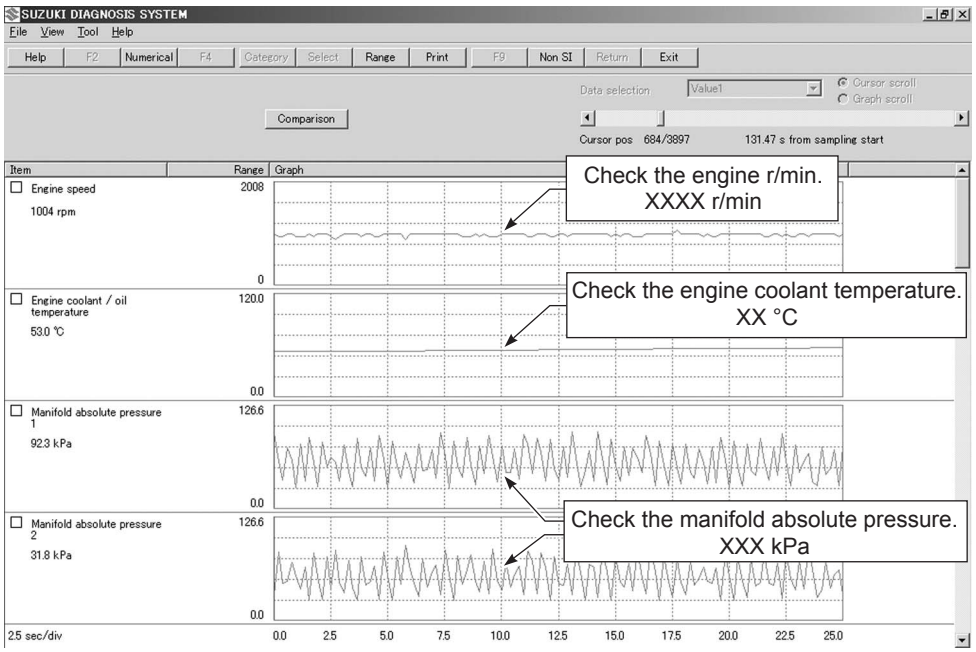
1) Remove the right frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)

Special tool
TOOL : 09904–41010 (SDS set)
TOOL : 99565–01010–017 (CD-ROM Ver.17)

NOTE

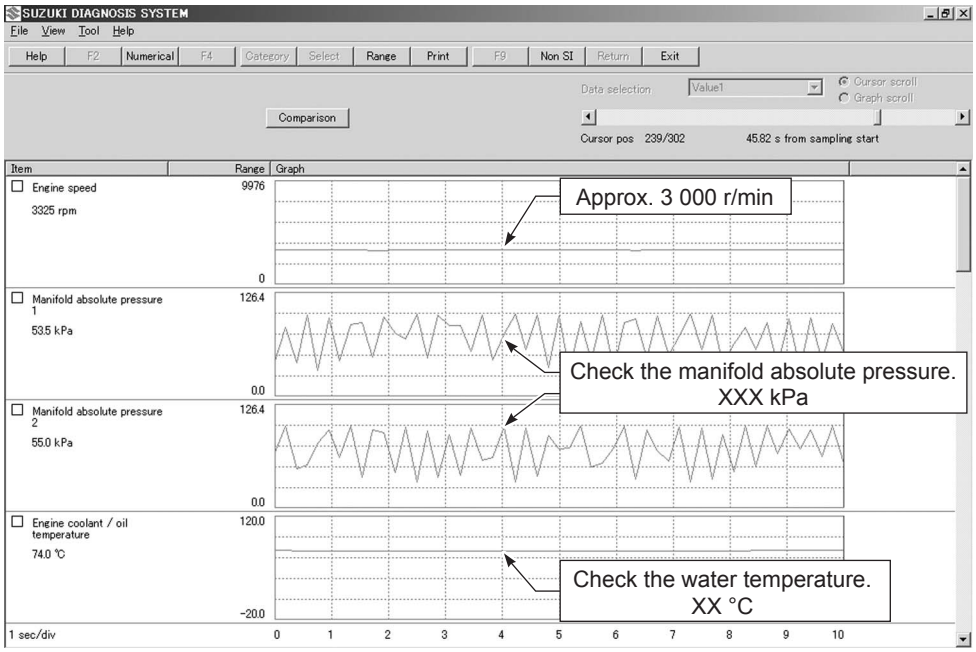
- **Before taking the sample of data, check and clear the Past DTC.**
- **A number of different data under a fixed condition as shown should be saved or filed as sample.**

Sample
Data sampled from cold starting through warm-up



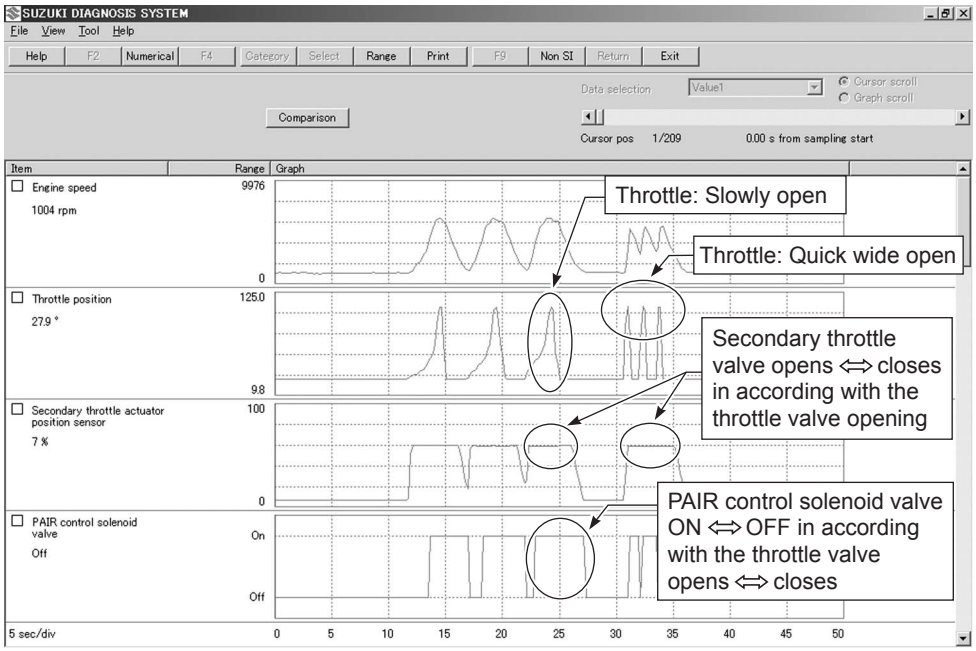
I940H1110095-01

Data at 3 000 r/min under no load



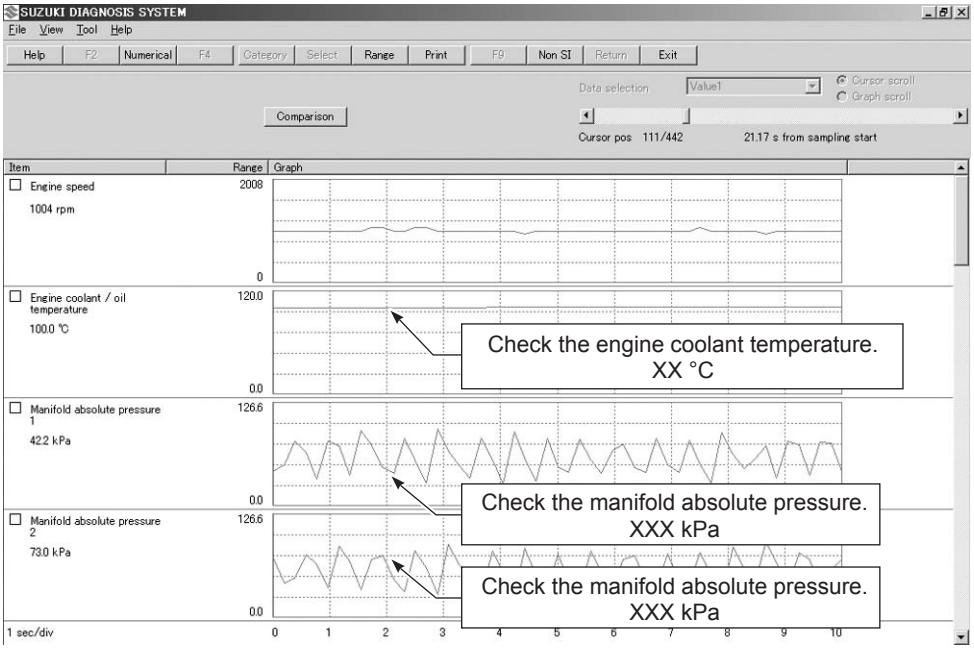
I940H1110096-01

Data at the time of racing



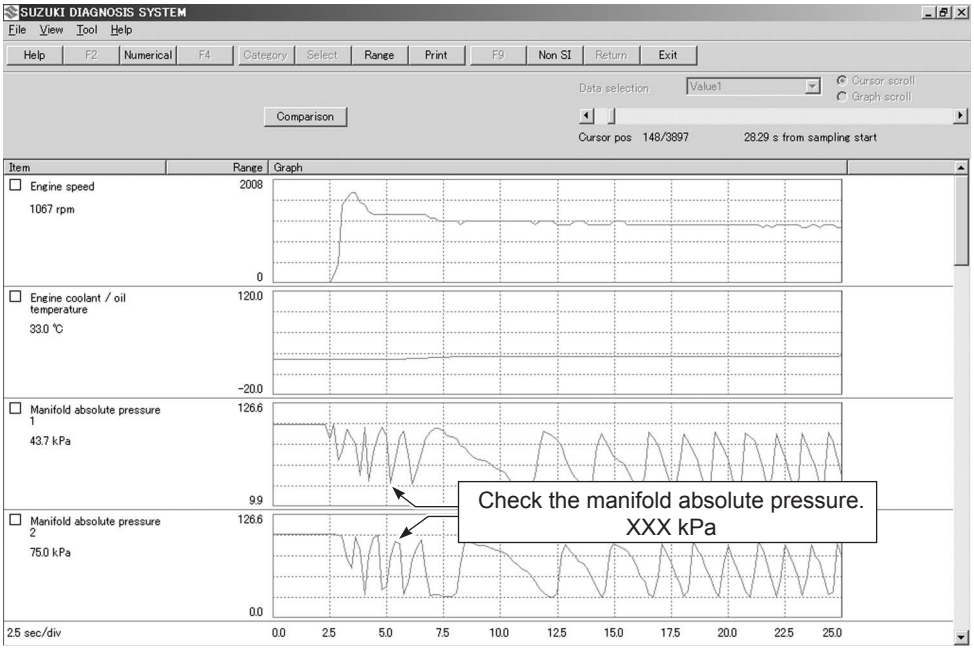
I940H1110097-02

Data of intake negative pressure during idling (100 °C)



I940H1110098-02

Data of manifold absolute pressure operation at the time of starting



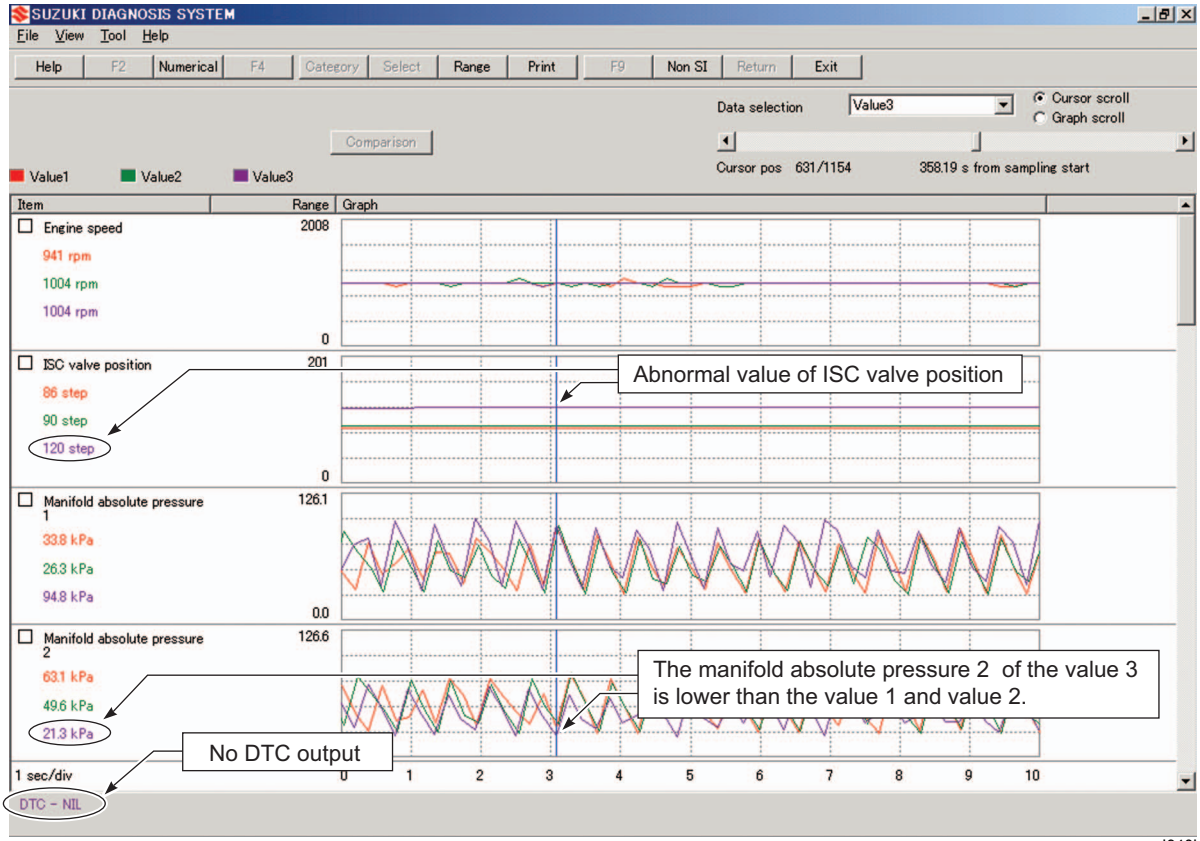
I940H1110099-01

Example of Trouble

Three data; value 1 (past data 1), value 2 (past data 2) and value 3 (current data 3); can be made in comparison by showing them in the graph. Read the change of value by comparing the current data to the past data that have been saved under the same condition, then you may determine how changes have occurred with the passing of time and identify what problem is currently occurring.

NOTE

With DTC not output, if the manifold absolute pressure 2 and ISC valve stepping position are found to be abnormal than the data saved previously, the possible cause may probably lie in the hardware side such as ISC valve air inlet hose (#1 cylinder side) crumple, bend, etc.



I940H1110100-01

DTC Table

B940H21104006

Code	Malfunction Part	Remarks
C00	None	No defective part
C12 (P0335) ☞(Page 1A-26)	Crankshaft position sensor (CKPS)	Pick-up coil signal, signal generator
C13 (P1750) ☞(Page 1A-29)	Intake air pressure sensor #2 (IAPS)	For #2 cylinder
C14 (P0120-H/L) ☞(Page 1A-33)	Throttle position sensor (TPS)	*1
C15 (P0115-H/L) ☞(Page 1A-41)	Engine coolant temperature sensor (ECTS)	
C17 (P0105) ☞(Page 1A-29)	Intake air pressure sensor #1 (IAPS)	For #1 cylinder
C21 (P0110-H/L) ☞(Page 1A-46)	Intake air temperature sensor (IATS)	
C23 (P1651-H/L) ☞(Page 1A-51)	Tip-over sensor (TOS)	
C24 (P0351) ☞(Page 1A-58)	Ignition signal #1 (IG coil #1)	For #1 cylinder
C25 (P0352) ☞(Page 1A-58)	Ignition signal #2 (IG coil #2)	For #2 cylinder
C28 (P1655) ☞(Page 1A-58)	Secondary throttle valve actuator (STVA)	
C29 (P1654-H/L) ☞(Page 1A-62)	Secondary throttle position sensor (STPS)	
C31 (P0705) ☞(Page 1A-69)	Gear position signal (GP switch)	
C32 (P0201) ☞(Page 1A-71)	Injector signal #1	For #1 cylinder
C33 (P0202) ☞(Page 1A-71)	Injector signal #2	For #2 cylinder
C40 (P0505/P0506/ P0507) ☞(Page 1A-74)	Idle speed control valve (ISC valve)	
C41 (P0230) ☞(Page 1A-78)	Fuel pump control system (FP control system)	Fuel pump, fuel pump relay
C42 (P1650) ☞(Page 1A-79)	Ignition switch signal	Anti-theft
C44 (P0130/P0135) ☞(Page 1A-80)	Heated oxygen sensor (HO2S)(E-02, 19, 24, 33)	
C49 (P1656) ☞(Page 1A-86)	PAIR control solenoid valve (PAIR valve)	
C60 (P0480) ☞(Page 1A-90)	Cooling fan control system	Cooling fan relay
C62 (P0443) ☞(Page 1A-93)	EVAP system purge control solenoid valve(E-33 only)	

In the LCD (DISPLAY) panel, the malfunction code is indicated from small code to large code.
*1 To get the proper signal from the throttle position sensor, the sensor basic position is indicated in the LCD (DISPLAY) panel. The malfunction code is indicated in three digits. In front of the three digits, a line appears in any of the three positions, upper, middle or lower line. If the indication is upper or lower line when engine rpm is 900 r/min, slightly turn the throttle position sensor and bring the line to the middle.

Fail-Safe Function Table

B940H21104007

FI system is provided with fail-safe function to allow the engine to start and the motorcycle to run in a minimum performance necessary even under malfunction condition.

Item	Fail-Safe Mode	Starting Ability	Running Ability
IAP sensor	Intake air pressure value is fixed to 101 kPa (760 mmHg).	“YES”	“YES”
TP sensor	The throttle opening value is fixed to full open position.	“YES”	“YES”
ECT sensor	Engine coolant temperature value is fixed to 70 °C (158 °F). Cooling fan is fixed on position.	“YES”	“YES”
IAT sensor	Intake air temperature value is fixed to 25 °C (77 °F).	“YES”	“YES”
Ignition signal	#1 fuel-cut	“YES”	“YES”
		#2 cylinder can run.	
	#2 fuel-cut	“YES”	“YES”
		#1 cylinder can run.	
STV actuator	When motor disconnection or lock occurs, power from ECM is shut off.	“YES”	“YES”
STP sensor	Secondary throttle valve is stopped.	“YES”	“YES”
Gear position signal	Gear position signal is fixed to 4th gear.	“YES”	“YES”
HO2 sensor (E-02, 19, 24, 33)	Feedback compensation is inhibited. (Air/fuel ratio is fixed to normal.)	“YES”	“YES”
PAIR control solenoid valve	ECM stops controlling PAIR control solenoid valve.	“YES”	“YES”
ISC valve	When motor disconnection or lock occurs, power from ECM is shut off.	“YES”	“YES”
EVAP system purge control solenoid valve (E-33 only)	ECM stops controlling EVAP system purge control solenoid valve.	“YES”	“YES”

The engine can start and can run even if the signal in the table is not received from each sensor. But, the engine running condition is not complete, providing only emergency help (by fail-safe circuit). In this case, it is necessary to bring the motorcycle to the workshop for complete repair.
When two ignition signals or two injector signals are not received by ECM, the fail-safe circuit can not work and ignition or injection is stopped.

FI System Troubleshooting

B940H21104008

Customer Complaint Analysis

Record details of the problem (failure, complaint) and how it occurred as described by the customer. For this purpose, use of such an inspection form such as following will facilitate collecting information to the point required for proper analysis and diagnosis.

NOTE

This form is a standard sample. The form should be modified according to conditions and characteristic of each market.

EXAMPLE: CUSTOMER PROBLEM INSPECTION FORM

User name:	**Model:**	**VIN:**	
Date of issue:	**Date Reg.:**	**Date of problem:**	**Mileage:**

Malfunction indicator light condition (LED)	**☐ Always ON / ☐ Sometimes ON / ☐ Always OFF / ☐ Good condition**
Malfunction display/code (LCD)	**User mode: ☐ No display / ☐ Malfunction display ( )**
	Dealer mode: ☐ No code / ☐ Malfunction code ( )

PROBLEM SYMPTOMS	
☐ Difficult Starting **☐ No cranking** **☐ No initial combustion** **☐ No combustion** **☐ Poor starting at** **(☐ cold / ☐ warm / ☐ always)** **☐ Other**	**☐ Poor Driveability** **☐ Hesitation on acceleration** **☐ Back fire / ☐ After fire** **☐ Lack of power** **☐ Surging** **☐ Abnormal knocking** **☐ Engine rpm jumps briefly** **☐ Other**
☐ Poor Idling **☐ Poor fast Idle** **☐ Abnormal idling speed** **(☐ High / ☐ Low) (r/min)** **☐ Unstable** **☐ Hunting (r/min to r/min)** **☐ Other**	**☐ Engine Stall when** **☐ Immediately after start** **☐ Throttle valve is opened** **☐ Throttle valve is closed** **☐ Load is applied** **☐ Other**
☐ OTHERS:	

MOTORCYCLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
Environmental condition	
Weather	**☐ Fair / ☐ Cloudy / ☐ Rain / ☐ Snow / ☐ Always / ☐ Other**
Temperature	**☐ Hot / ☐ Warm / ☐ Cool / ☐ Cold (°C / °F) / ☐ Always**
Frequency	**☐ Always / ☐ Sometimes (times / day, month) / ☐ Only once**
	☐ Under certain condition
Road	**☐ Urban / ☐ Suburb / ☐ Highway / ☐ Mountainous (☐ Uphill / ☐ Downhill)**
	☐ Tarmacadam / ☐ Gravel / ☐ Other
Motorcycle condition	
Engine condition	**☐ Cold / ☐ Warming up phase / ☐ Warmed up / ☐ Always / ☐ Other at starting**
	☐ Immediately after start / ☐ Racing without load / ☐ Engine speed (r/min)
Motorcycle condition	**During driving: ☐ Constant speed / ☐ Accelerating / ☐ Decelerating**
	☐ Right hand corner / ☐ Left hand corner
	☐ At stop / ☐ Motorcycle speed when problem occurs (km/h, mile/h)
	☐ Other:

Visual Inspection

Prior to diagnosis using the mode select switch or SDS, perform the following visual inspections. The reason for visual inspection is that mechanical failures (such as oil leakage) cannot be displayed on the screen with the use of mode select switch or SDS.

- Engine oil level and leakage. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.
- Engine coolant level and leakage. Refer to “Cooling Circuit Inspection in Section 1F (Page 1F-4)”.
- Fuel level and leakage. Refer to “Fuel Line Inspection in Section 0B (Page 0B-7)”.
- Clogged air cleaner element. Refer to “Air Cleaner Element Inspection in Section 0B (Page 0B-2)”.
- Battery condition.
- Throttle cable play. Refer to “Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-10)”.
- Vacuum hose looseness, bend and disconnection.
- Broken fuse.
- FI indicator light operation. Refer to “Combination Meter Inspection in Section 9C (Page 9C-4)”.
- Each warning indicator light operation. Refer to “Combination Meter Inspection in Section 9C (Page 9C-4)”.
- Speedometer operation. Refer to “Speedometer Inspection in Section 9C (Page 9C-7)”.
- Exhaust gas leakage and noise. Refer to “Exhaust System Inspection in Section 1K (Page 1K-4)”.
- Each coupler disconnection.
- Clogged radiator fins. Refer to “Radiator Inspection and Cleaning in Section 1F (Page 1F-5)”.

Malfunction Code and Defective Condition Table

B940H21104009

Malfunction Code		Detected Item	Detected Failure Condition	Check For
C00		NO FAULT	—	—
C12 P0335		CKP sensor	The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	CKP sensor wiring and mechanical parts CKP sensor, lead wire/coupler connection
C13/C17 P1750/P0105		IAP sensor	The sensor should produce following voltage. 0.1 V ≤ Sensor voltage ≤ 4.8 V In other than the above range, C13 (P0170) or C17 (P0105) is indicated.	IAP sensor, lead wire/coupler connection
C14		TP sensor	The sensor should produce following voltage. 0.1 V < Sensor voltage < 4.8 V In other than the above range, C14 (P0120) is indicated.	TP sensor, lead wire/coupler connection
P0120	H		Sensor voltage is higher than specified value.	TP sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	TP sensor circuit open or shorted to ground or VCC circuit open
C15		ECT sensor	The sensor voltage should be the following. 0.1 V ≤ Sensor voltage ≤ 4.85 V In other than the above range, C15 (P0115) is indicated.	ECT sensor, lead wire/coupler connection
P0115	H		Sensor voltage is higher than specified value.	ECT sensor circuit open or ground circuit open
	L		Sensor voltage is lower than specified value.	ECT sensor circuit shorted to ground
C21		IAT sensor	The sensor voltage should be the following. 0.1 V ≤ Sensor voltage ≤ 4.6 V In other than the above range, C21 (P0110) is indicated.	IAT sensor, lead wire/coupler connection
P0110	H		Sensor voltage is higher than specified value.	IAT sensor circuit open or ground circuit open
	L		Sensor voltage is lower than specified value.	IAT sensor circuit shorted to ground

Malfunction Code		Detected Item	Detected Failure Condition	Check For
C23		TO sensor	The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. 0.2 V < Sensor voltage < 4.6 V In other than the above value, C23 (P1651) is indicated.	TO sensor, lead wire/coupler connection
P1651	H		Sensor voltage is higher than specified value.	TO sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	TO sensor circuit open or shorted to ground or VCC circuit open
C24/C25 P0351/P0352		Ignition signal	CKP sensor (pick-up coil) signal is produced, but signal from ignition coil is interrupted 8 times or more continuously. In this case, the code C24 (P0351), C25 (P0352) is indicated.	Ignition coil, wiring/coupler connection, power supply from the battery
C28 P1655		STV actuator	When no actuator control signal is supplied from the ECM, communication signal does not reach ECM or operation voltage does not reach STVA motor, C28 (P1655) is indicated. STVA can not operate properly.	STVA motor, STVA lead wire/ coupler connection
C29		STP sensor	The sensor should produce following voltage. 0.1 V < Sensor voltage < 4.83 V In other than the above range, C29 (P1654) is indicated.	STP sensor, lead wire/coupler connection
P1654	H		Sensor voltage is higher than specified value.	STP sensor circuit shorted to VCC or ground circuit open
	L		Sensor voltage is lower than specified value.	STP sensor circuit open or shorted to ground or VCC circuit open
C31 P0705		Gear position signal	When gear position switch voltage is as follows. GP switch voltage > 0.2 V for 6 sec. and more When gear position switch voltage is neutral and switch voltage is as follows. GP switch voltage ≥ 4.55 V for 6 sec. and more If lower than the above value, C31 (P0705) is indicated.	GP switch, wiring/coupler connection, gearshift cam, etc.
C32/C33 P0201/P0202		Fuel injector	CKP sensor (pickup coil) signal is produced, but fuel injector signal is interrupted 8 times or more continuously. In this case, the code C32 (P0201), C33 (P0202) is indicated.	Primary fuel injector, wiring/ coupler connection, power supply to the injector
C40/P0505		ISC valve	The circuit voltage of motor drive is unusual. Idle speed is higher than the normal condition.	ISC valve circuit open or shorted to ground ISC valve is fixed to full open Disconnected ISC valve hose
C40/P0506			Idle speed is lower than the desired idle speed.	Air passage clogged ISC valve is fixed ISC valve preset position is incorrect
C40/P0507			Idle speed is higher than the desired idle speed.	ISC valve hose connection ISC valve is fixed ISC valve preset position is incorrect
C41 P0230		FP relay	No voltage is applied to the fuel pump, although fuel pump relay is turned ON, or voltage is applied to fuel pump although fuel pump relay is turned OFF.	Fuel pump relay, lead wire/ coupler connection, power source to fuel pump relay and fuel injectors

Malfunction Code	Detected Item	Detected Failure Condition	Check For
C42 P1650	Ignition switch	Ignition switch signal is not input to the ECM.	Ignition switch, lead wire/ coupler
C44/P0130	HO2 sensor (For E-02, 19, 24, 33)	HO2 sensor output voltage is not input to ECM during engine operation and running condition. (Sensor voltage > 0.55 V) If lower than the above value, C44 (P0130) is indicated.	HO2S lead sensor circuit open or shorted to the power source, HO2 sensor lead wire/coupler connection
C44/P0135		The Heater can not operate so that heater operation voltage is not supply to the oxgen heater circuit, C44 (P0135) is indicated.	HO2 sensor circuit open or shorted to the ground Battery voltage supply to the HO2 sensor
C49 P1656	PAIR control solenoid valve	PAIR control solenoid valve voltage is not input to ECM.	PAIR control solenoid valve, lead wire/coupler connection
C60 P0480	Cooling fan relay	Cooling fan relay signal is not input to ECM.	Cooling fan relay, lead wire/ coupler connection
C62 P0443	EVAP system purge control solenoid valve (For E-33)	EVAP system purge control solenoid valve voltage is not input to ECM.	EVAP system purge control solenoid valve, lead wire/ coupler connection

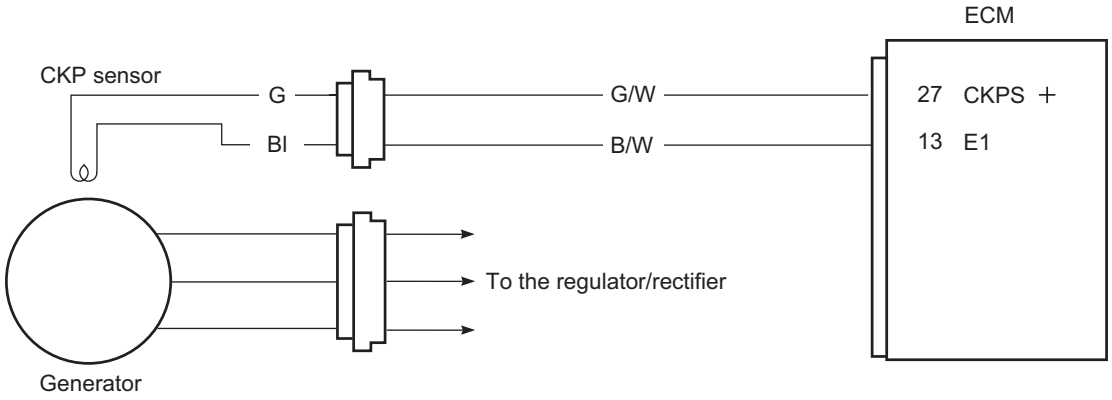
DTC “C12” (P0335): CKP Sensor Circuit Malfunction

B940H21104010

Detected Condition and Possible Cause

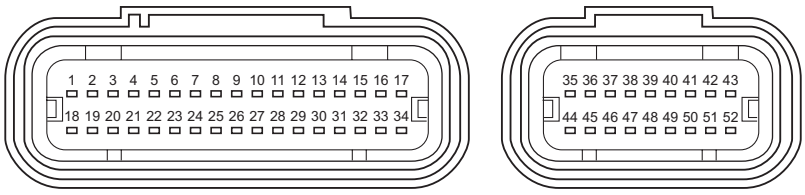
Detected Condition	Possible Cause
The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	• Metal particles or foreign material being stuck on the CKP sensor and rotor tip. • CKP sensor circuit open or short. • CKP sensor malfunction. • ECM malfunction.

Wiring Diagram



I940H1110011-02

ECM coupler (Harness side)



I940H1110012-03

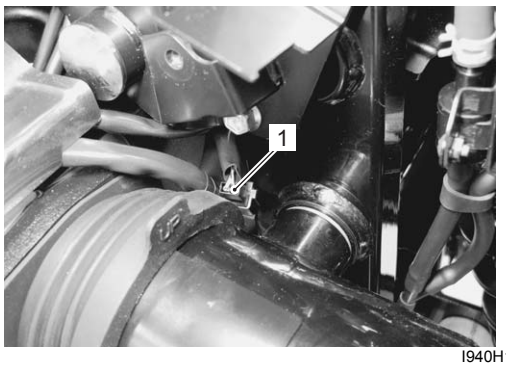
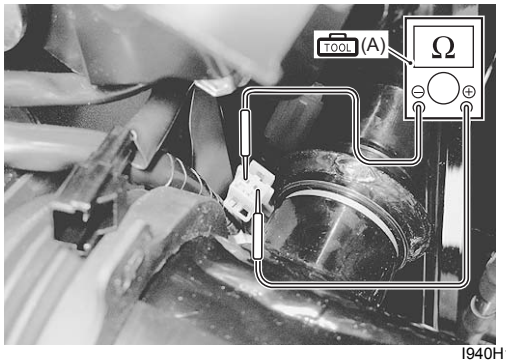
Troubleshooting

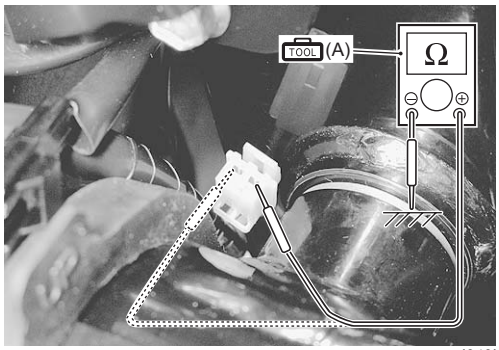
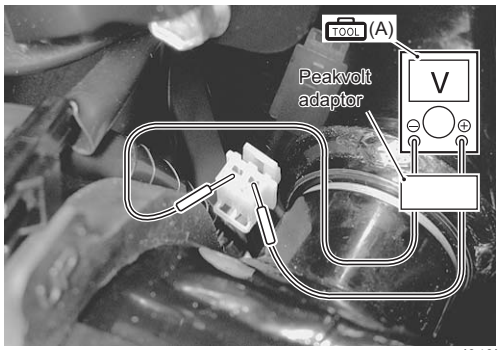
⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the left frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”. 3) Remove the left frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”. 4) Check the CKP sensor coupler (1) for loose or poor contacts. If OK, then measure the CKP sensor resistance.  I940H1110013-01 5) Disconnect the CKP sensor coupler and measure the CKP sensor resistance. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **CKP sensor resistance** **170 – 260 Ω (Bl – G)**  I940H1110014-01	Go to Step 2.	Replace the CKP sensor with a new one.

Step	Action	Yes	No
2	6) If OK, then check the continuity between each terminal and ground. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **CKP sensor continuity** **∞ Ω (Infinity) (Bl – Ground, G – Ground)**  I940H1110015-01 *Are the resistance and continuity OK?*	Go to Step 2.	Replace the CKP sensor with a new one.
3	1) Crank the engine several seconds with the starter motor, and measure the CKP sensor peak voltage at the coupler. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **CKP sensor peak voltage** **3.0 V and more** **((+) terminal: Bl – (–) terminal: G)**  I940H1110118-01 2) Repeat the 1) test procedures several times and measure the highest peak voltage. *Is the voltage OK?*	• G/W or B/W wire of the harness side open or shorted to ground. • Loose or poor contacts on the CKP sensor coupler or ECM coupler (Terminal “27” or “13”). • If the wires and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	• Inspect that metal particles or foreign material stuck on the CKP sensor and rotor tip. • If there are no metal particles and foreign material, then replace the CKP sensor with a new one. Refer to “CKP Sensor Removal and Installation in Section 1C (Page 1C-1)”.

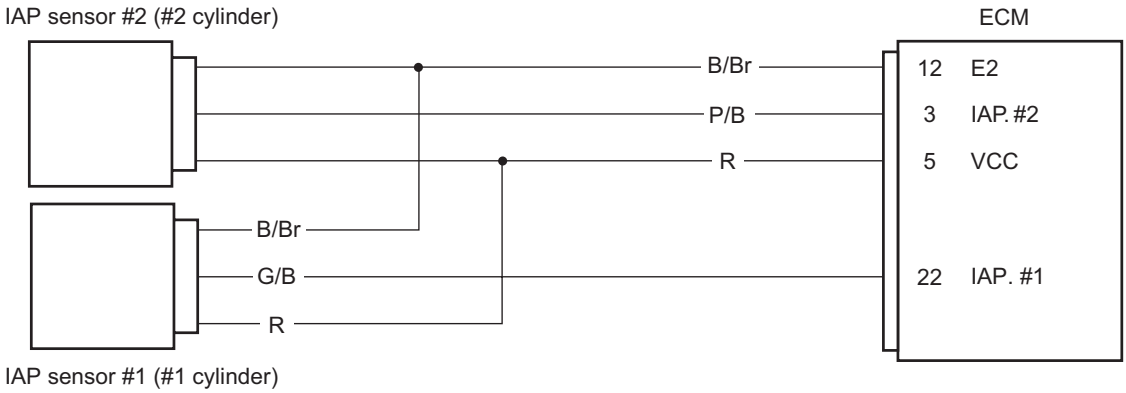
DTC “C13” (P1750) or “C17” (P0105): IAP Sensor Circuit Malfunction

B940H21104011

Detected Condition and Possible Cause

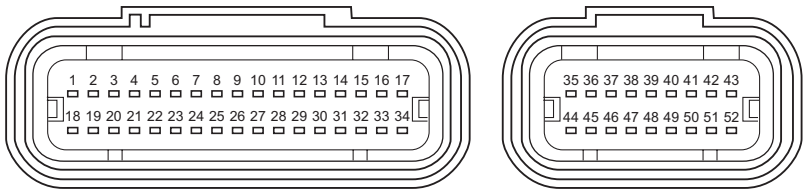
Detected Condition	Possible Cause
IAP sensor voltage is not within the following range. 0.1 V ≤ Sensor voltage ≤ 4.8 V **NOTE** **Note that atmospheric pressure varies depending on weather conditions as well as altitude.** **Take that into consideration when inspecting voltage.**	• Clogged vacuum passage between throttle body and IAP sensor. • Air being drawn from vacuum passage between throttle body and IAP sensor. • IAP sensor circuit open or shorted to ground. • IAP sensor malfunction. • ECM malfunction.

Wiring Diagram



I940H1110017-01

ECM coupler (Harness side)



I940H1110012-03

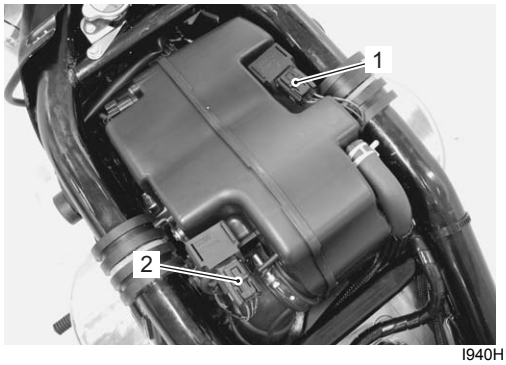
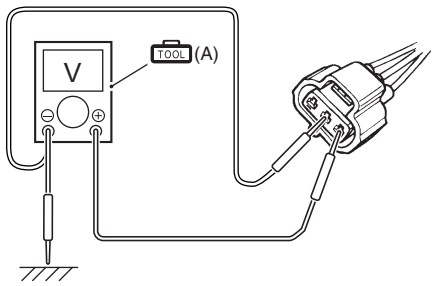
Troubleshooting

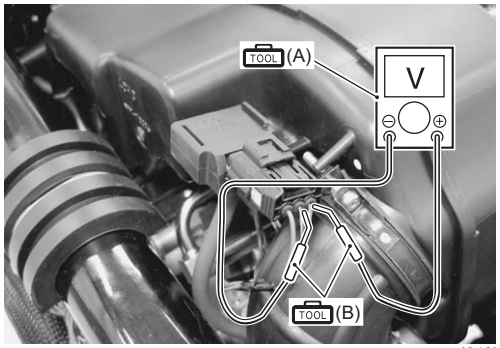
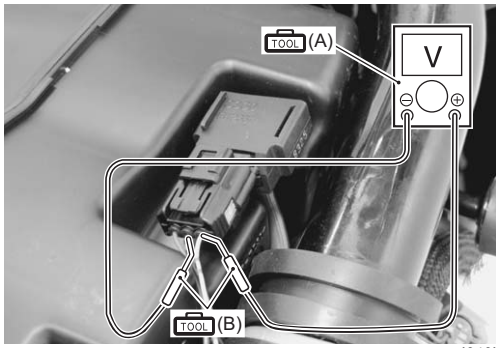
⚠ CAUTION

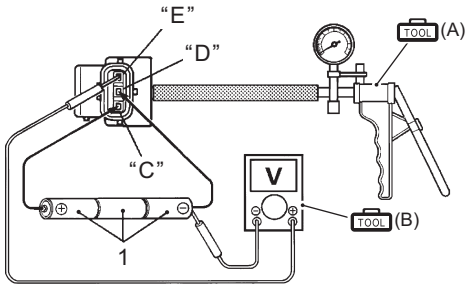
When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

Step	Action	Yes	No
1	1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”. 2) Turn the ignition switch OFF. 3) Check the IAP sensor coupler (#2 (1) or #1 (2)) for loose or poor contacts. If OK, then measure the IAP sensor input voltage.  I940H1110018-03 4) Disconnect the IAP sensor coupler. 5) Turn the ignition switch ON. 6) Measure the voltage between the R wire and ground. If OK, then measure the voltage between the R wire and B/Br wire. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **IAP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I823H1110016-05 *Is the voltage OK?*	Go to Step 2.	• Loose or poor contacts on the ECM coupler. (terminal “11” or “29”) • Open or short circuit in the R or B/Br wire.

Step	Action	Yes	No
2	1) Connect the IAP sensor coupler and ECM coupler. 2) Connect the fuel feed hose and fuel pump read wire coupler, and lift and support the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)". 3) Insert the needle pointed probes to the lead wire coupler. 4) Start the engine at idle speed and measure the IAP sensor output voltage at the wire side coupler. (#2: Between P/B and B/Br wires) (#1: Between G/B and B/Br wires) **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)** **IAP sensor output voltage** **Approx. 2.6 V at idle speed** **(#2: (+) terminal: P/B – (–) terminal: B/Br)** **(#1: (+) terminal: G/B – (–) terminal: B/Br)** **IAP sensor #2**  I940H1110022-01 **IAP sensor #1**  I940H1110019-01 *Is the voltage OK?*	Go to Step 3.	• Check the vacuum hose for crack or damage. • Open or short circuit in the P/B wire (#2). • Open or short circuit in the G/B wire (#1). • If the vacuum hose and wire are OK, replace the IAP sensor with a new one.

<table>
<tr><th>Step</th><th>Action</th><th>Yes</th><th>No</th></tr>
<tr>
<td>3</td>
<td>1) Turn the ignition switch OFF.
2) Remove the IAP sensor. Refer to “IAP Sensor Removal and Installation in Section 1C (Page 1C-2)”.
3) Connect the vacuum pump gauge to the vacuum port of the IAP sensor.
4) Arrange 3 new 1.5 V batteries in series (1) (check that total - voltage is 4.5 – 5.0 V) and connect (–) terminal to ground - terminal “C” and (+) terminal to the VCC terminal “D”.
5) Check the voltage between Vout terminal “E” and ground.
Also, check if voltage reduces when vacuum is applied up to 400 mmHg by using vacuum pump gauge.
Special tool
TOOL (A): 09917–47011 (Vacuum pump gauge)
TOOL (B): 09900–25008 (Multi-circuit tester set)
<u>Tester knob indication</u>
Voltage (⎓)
 

I822H1110024-03
<table>
<tr><th colspan="2">ALTITUDE (Reference)</th><th colspan="2">ATOMOSPHERIC PRESSURE</th><th>OUTPUT VOLTAGE</th></tr>
<tr><td>m</td><td>ft</td><td>kPa</td><td>mmHg</td><td>V</td></tr>
<tr><td>0 – 610</td><td>0 – 2 000</td><td>100 – 95</td><td>760 – 708</td><td>3.4 – 4.0</td></tr>
<tr><td>611 – 1 524</td><td>2 001 – 5 000</td><td>94 – 86</td><td>707 – 635</td><td>3.0 – 3.7</td></tr>
<tr><td>1 525 – 2 438</td><td>5 001 – 8 000</td><td>85 – 77</td><td>634 – 568</td><td>2.6 – 3.4</td></tr>
<tr><td>2 439 – 3 048</td><td>8 001 – 10 000</td><td>76 – 70</td><td>567 – 526</td><td>2.4 – 3.1</td></tr>
</table>
I822H1110025-01
Is the voltage OK?</td>
<td>• R, P/B or B/Br wire open or shorted to ground, or poor “5”, “3” or “12” connection (#2).
• R, G/B or B/Br wire open or shorted to ground, or poor “5”, “22” or “12” connection (#1).
• If wire and connection are OK, intermittent trouble or faulty ECM.
• Recheck each terminal and wire harness for open circuit and poor connection.
• Replace the ECM with a known good one, and inspect it again.</td>
<td>If check result is not satisfactory, replace the IAP sensor with a new one.</td>
</tr>
</table>

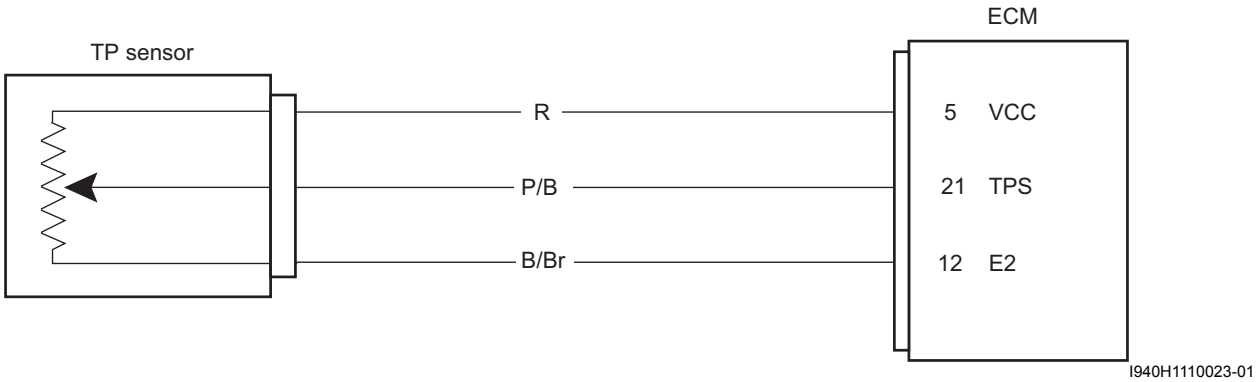
DTC “C14” (P0120-H/L): TP Sensor Circuit Malfunction

B940H21104012

Detected Condition and Possible Cause

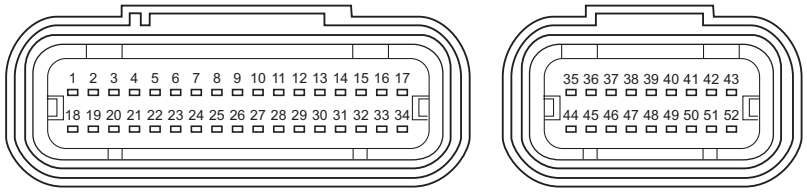
Detected Condition			Possible Cause
C14		Output voltage is not within the following range. Difference between actual throttle opening and opening calculated by ECM is larger than specified value. 0.1 V < Sensor voltage < 4.8 V	• TP sensor maladjusted. • TP sensor circuit open or short. • TP sensor malfunction. • ECM malfunction.
P0120	H	Sensor voltage is higher than specified value.	• TP sensor circuit is shorted to VCC or ground circuit is open.
	L	Sensor voltage is lower than specified value.	• TP sensor circuit is open or shorted to ground or VCC circuit is open.

Wiring Diagram



I940H1110023-01

ECM coupler (Harness side)



I940H1110012-03

Troubleshooting

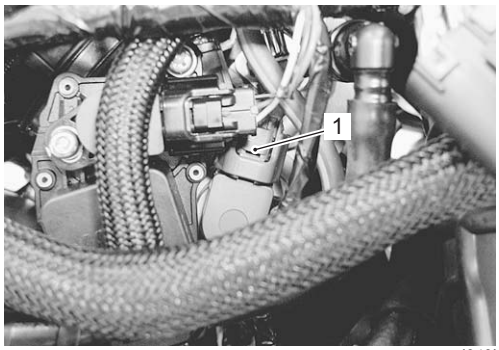
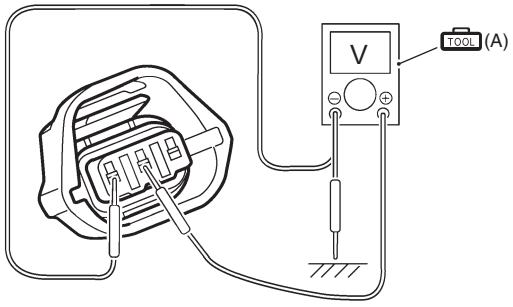
⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

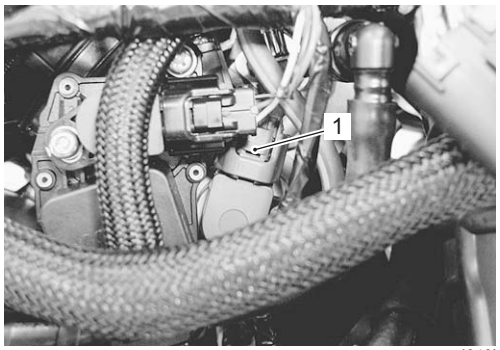
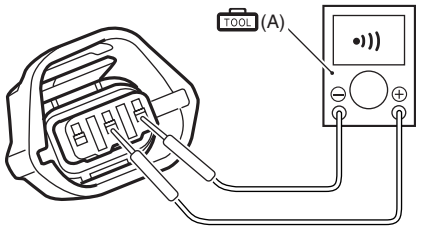
NOTE

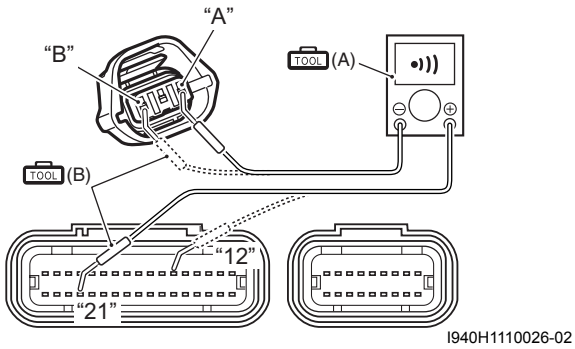
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

C14 (Use of mode select switch)

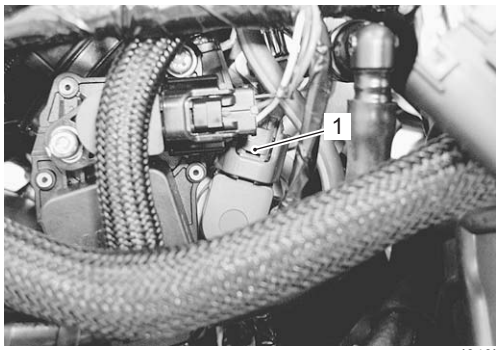
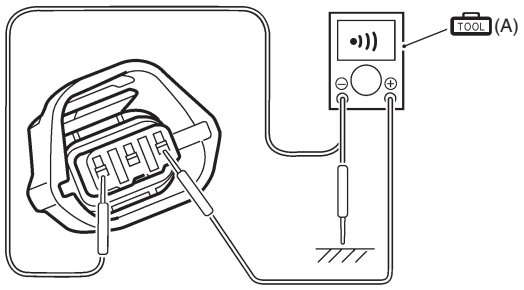
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”. 3) Check the TP sensor coupler (1) for loose or poor contacts. If OK, then measure the TP sensor input voltage.  I940H1110024-01 4) Disconnect the TP sensor coupler. 5) Turn the ignition switch ON. 6) Measure the input voltage between the R wire and ground. If OK, then measure the input voltage between the R wire and B/Br wire. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **TP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I823H1110026-04 *Is the voltage OK?*	Go to Step 3.	• Loose or poor contacts on the ECM coupler. • Open or short circuit in the R or B/Br wire.

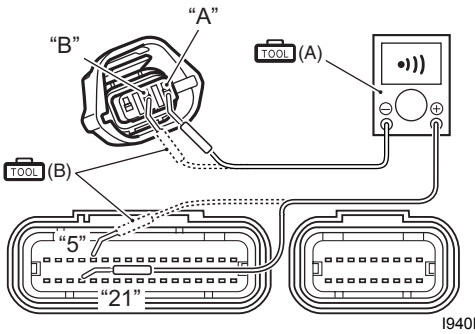
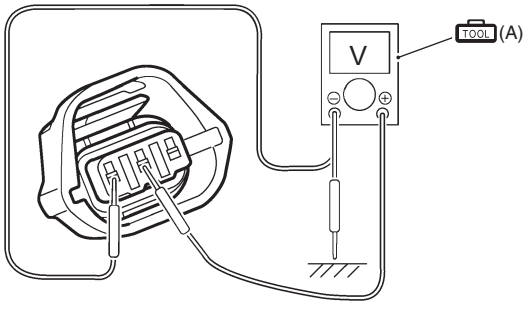
P0120-H (Use of SDS)

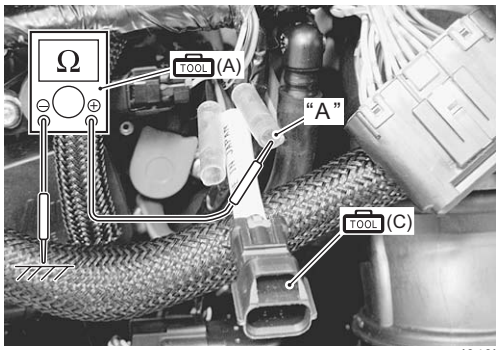
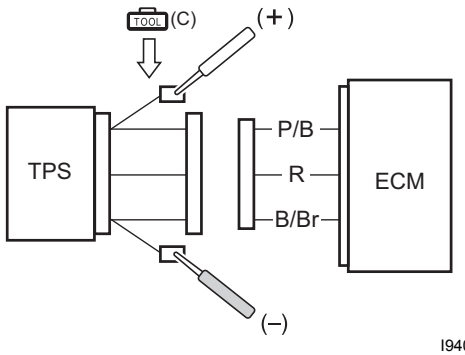
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”. 3) Check the TP sensor coupler (1) for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.  I940H1110024-01 4) Disconnect the TP sensor coupler. 5) Check the continuity between the P/B wire and R wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity (•)))**  I823H1110027-02 6) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	Go to Step 3.	P/B wire shorted to VCC, or B/Br wire open.

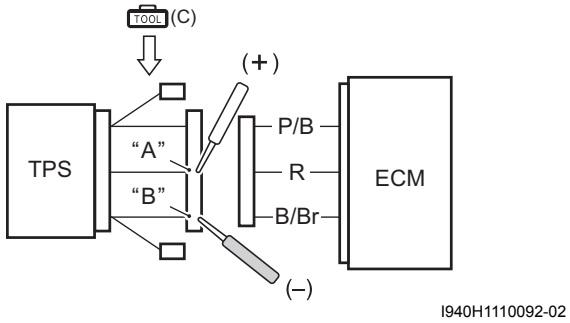
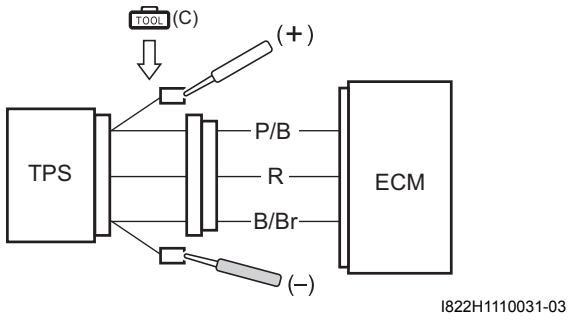
Step	Action	Yes	No
2	7) Check the continuity between the P/B wire “A” and terminal “21”. Also, check the continuity between the B/Br wire “B” and terminal “12”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))** **ECM coupler (Harness side)**  I940H1110026-02 *Is the continuity OK?*	Go to Step 3.	P/B wire shorted to VCC, or B/Br wire open.

P0120-L (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”. 3) Check the TP sensor coupler (1) for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.  I940H1110024-01 4) Disconnect the TP sensor coupler. 5) Check the continuity between the P/B wire and ground. Also, check the continuity between the P/B wire and B/Br wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity (•)))**  I823H1110029-03 6) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	Go to Step 2.	R and P/B wire open, or P/B wire shorted to ground.

Step	Action	Yes	No
2	7) Check the continuity between the P/B wire “A” and terminal “21”. Also, check the continuity between the R wire “B” and terminal “5”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))** **ECM coupler (Harness side)**  I940H1110027-01 *Is the continuity OK?*	Go to Step 2.	R and P/B wire open, or P/B wire shorted to ground.
3	1) Connect the ECM coupler. 2) Turn the ignition switch ON. 3) Measure the input voltage between the R wire and ground. If OK, the measure the input voltage between the R wire and B/Br wire. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **TP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I823H1110031-04 *Is the voltage OK?*	Go to Step 3.	Open or short circuit in the R or B/Br wire.

Step	Action	Yes	No
4	1) Turn the ignition switch OFF. 2) Disconnect the TP sensor coupler. 3) Connect the test harness to the TP sensor. 4) Check the continuity between terminal “A” and ground. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(C): 09900–28630 (TPS test wire harness)** **TP sensor continuity** **∞ Ω (Infinity) (Terminal “A” – Ground)**  I940H1110025-03 5) If OK, then measure the TP sensor resistance at the test harness terminals. 6) Turn the throttle grip and measure the resistance. **TP sensor resistance** **Throttle valve is closed: Approx. 1.1 kΩ** **Throttle valve is opened: Approx. 4.3 kΩ**  I940H1110093-02	Go to Step 3.	• Reset the TP sensor position correctly. • Replace the TP sensor with a new one.

Step	Action	Yes	No
5	7) If OK, then measure the TP sensor resistance at the test harness terminals (between terminal “A” and terminal “B”). **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(C): 09900–28630 (TPS test wire harness)** **Tester knob indication** **Resistance (Ω)** **TP sensor resistance** **Approx. 5.0 kΩ (Terminal “A” – Terminal “B”)**  I940H1110092-02 *Are the continuity and resistance OK?*	Go to Step 3.	• Reset the TP sensor position correctly. • Replace the TP sensor with a new one.
6	1) Turn the ignition switch OFF. 2) Connect the special tool between the TP sensor and its coupler. 3) Turn the ignition switch ON. 4) Measure the TP sensor output voltage between the P/B wire terminal (+) and B/Br wire terminal (–) with turning the throttle grip open and close. **Special tool** **(C): 09900–28630 (TPS test wire harness)** **: 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **TP sensor output voltage** **Throttle valve is closed: Approx. 1.1 V** **Throttle valve is opened: Approx. 4.3 V** **((+) terminal: P/B – (–) terminal: B/Br)**  I822H1110031-03 *Is the voltage OK?*	• P/B, R or B/Br wire open or shorted to ground, or poor “21”, “5” or “12” connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	If check result is not satisfactory, replace TP sensor with a new one. Refer to “Throttle Body Disassembly and Assembly in Section 1D (Page 1D-14)”.

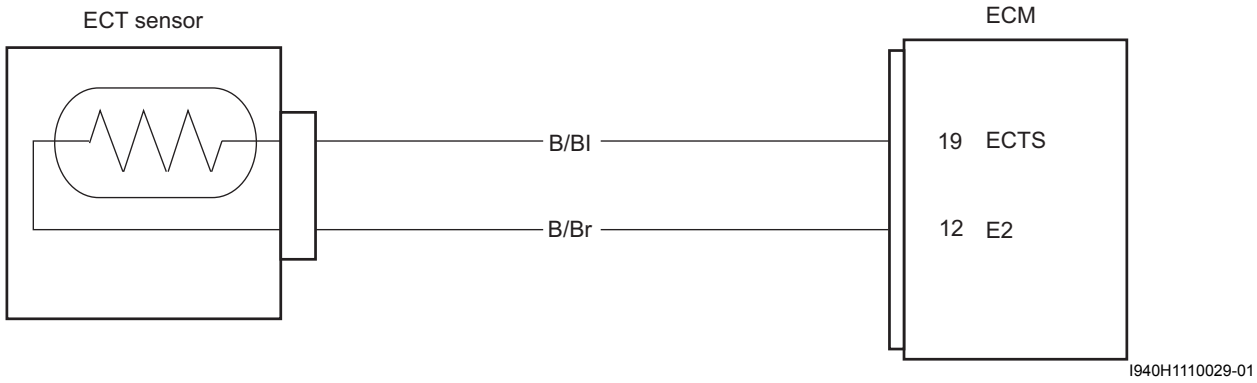
DTC “C15” (P0115-H/L): ECT Sensor Circuit Malfunction

B940H21104013

Detected Condition and Possible Cause

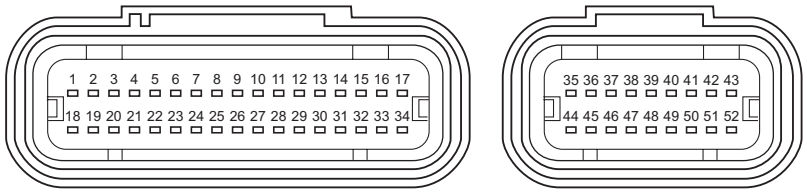
Detected Condition			Possible Cause
C15		Output voltage is not with in the following range. 0.1 V ≤ Sensor voltage ≤ 4.85 V	• ECT sensor circuit open or short. • ECT sensor malfunction. • ECM malfunction.
P0115	H	Sensor voltage is higher than specified value.	• ECT sensor circuit is open or ground circuit open.
	L	Sensor voltage is lower than specified value.	• ECT sensor circuit shorted to ground.

Wiring Diagram



I940H1110029-01

ECM coupler (Harness side)



I940H1110012-03

Troubleshooting

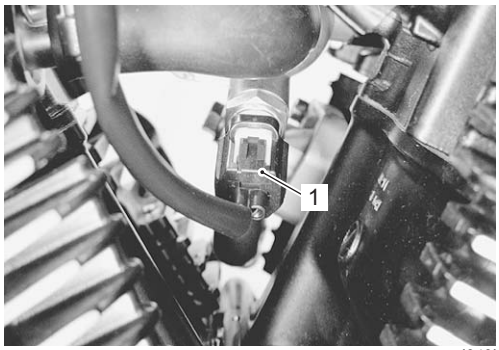
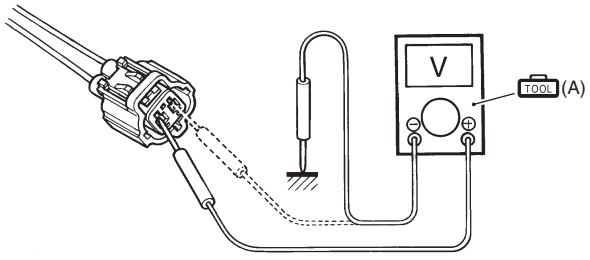
⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

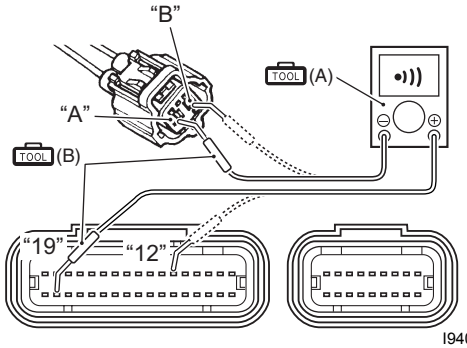
NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

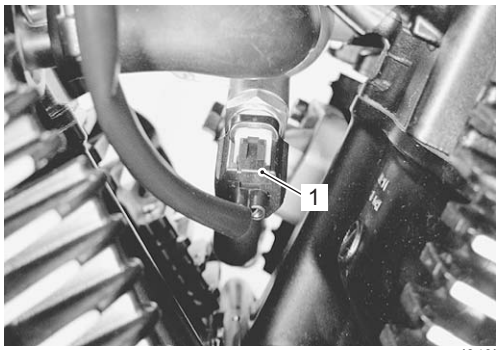
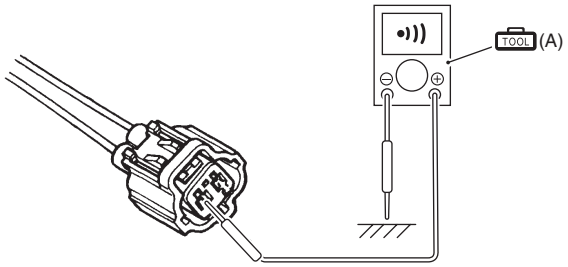
C15 (Use of mode select switch)

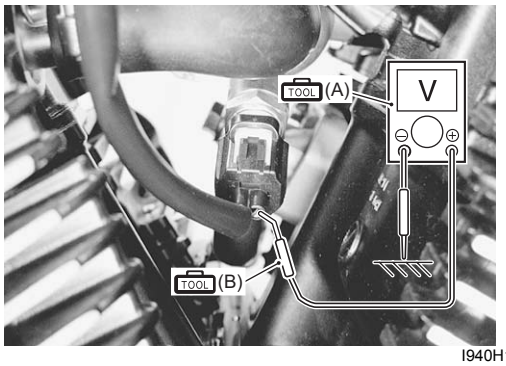
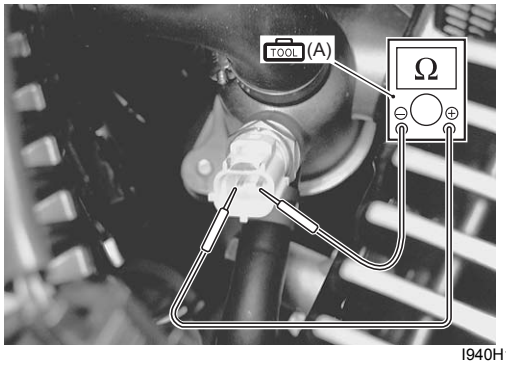
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the right air cleaner box. Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-6)”. 3) Check the ECT sensor coupler (1) for loose or poor contacts. If OK, then measure the ECT sensor input voltage.  I940H1110030-01 4) Disconnect the ECT coupler and turn the ignition switch ON. 5) Measure the input voltage between the B/Bl wire and ground. If OK, then measure the input voltage between the B/Bl wire and B/Br wire. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **ECT sensor input voltage** **4.5 – 5.5 V** **((+) terminal: B/Bl – (–) terminal: Ground, (+) terminal: B/Bl – (–) terminal: B/Br)**  I718H1110048-03 *Is the voltage OK?*	Go to Step 2.	• Loose or poor contacts on the ECM coupler. • Open or short circuit in the B/Bl or B/Br wire.

P0115-H (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the right air cleaner box. Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-6)”. 3) Check the ECT sensor coupler (1) for loose or poor contacts. If OK, then check the ECT sensor lead wire continuity.  I940H1110030-01 4) Disconnect the ECT sensor coupler. 5) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”. 6) Insert the needle pointed probes to the lead wire coupler. 7) Check the continuity between the B/Bl wire “A” and terminal “19”. Also, check the continuity between the B/Br wire “B” and terminal “12”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))** **ECM couplers (Harness side)**  I940H1110031-02 *Is the continuity and voltage OK?*	Go to Step 2.	B/Bl or B/Br wire open.

P0115-L (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the right air cleaner box. Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-6)”. 3) Check the ECT sensor coupler (1) for loose or poor contacts. If OK, then check the ECT sensor lead wire continuity.  I940H1110030-01 4) Disconnect the ECT sensor coupler. 5) Check the continuity between the B/Bl wire and ground. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity (•)))**  I718H1110054-03 6) Connect the ECT sensor coupler. 7) Insert the needle pointed probes to the lead wire coupler. 8) Turn the ignition switch ON.	Go to Step 2.	• B/Bl wire shorted to ground. • If wire is OK, go to Step 2.

Step	Action	Yes	No
2	9) Measure the output voltage between the B/Bl wire and ground. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)** **ECT sensor output voltage** **0.1 – 4.85 V** **((+) terminal: B/Bl – (–) terminal: Ground)**  I940H1110032-01 *Are the continuity and voltage OK?*	Go to Step 2.	• B/Bl wire shorted to ground. • If wire is OK, go to Step 2.
3	1) Turn the ignition switch OFF. 2) Disconnect the ECT sensor coupler. 3) Measure the ECT sensor resistance. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **ECT sensor resistance** **Approx. 2.45 kΩ at 20 °C (68 °F)** **(Terminal – Terminal)**  I940H1110033-02 **NOTE** **Refer to “ECT Sensor Inspection in Section 1C (Page 1C-5)” for details.** *Is the resistance OK?*	• B/Bl or B/Br wire open or shorted to ground, or poor “19” or “12” connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	Replace the ECT sensor with a new one. Refer to “ECT Sensor Inspection in Section 1C (Page 1C-5)”.

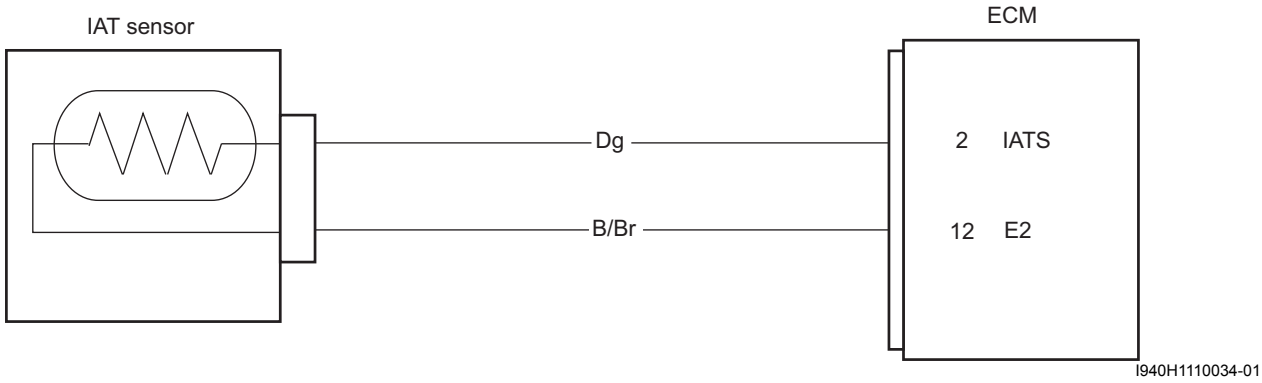
DTC “C21” (P0110-H/L): IAT Sensor Circuit Malfunction

B940H21104014

Detected Condition and Possible Cause

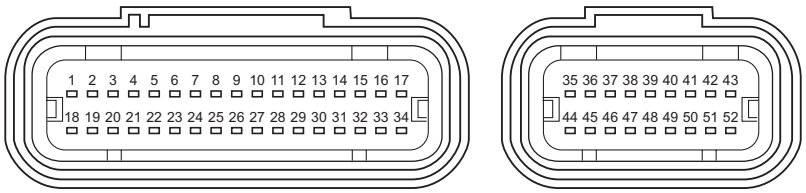
Detected Condition			Possible Cause
C21		Output voltage is not with in the following range. 0.1 V ≤ Sensor voltage ≤ 4.6 V	• IAT sensor circuit open or short. • IAT sensor malfunction. • ECM malfunction.
P0110	H	Sensor voltage is higher than specified value.	• IAT sensor circuit open or ground circuit open.
	L	Sensor voltage is lower than specified value.	• IAT sensor circuit shorted to ground.

Wiring Diagram



I940H1110034-01

ECM coupler (Harness side)



I940H1110012-03

Troubleshooting

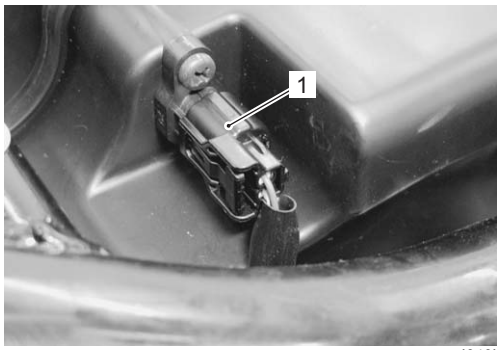
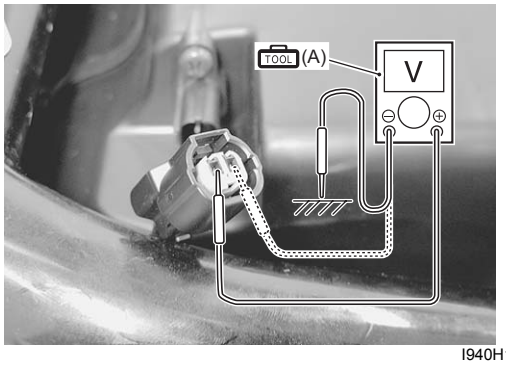
⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

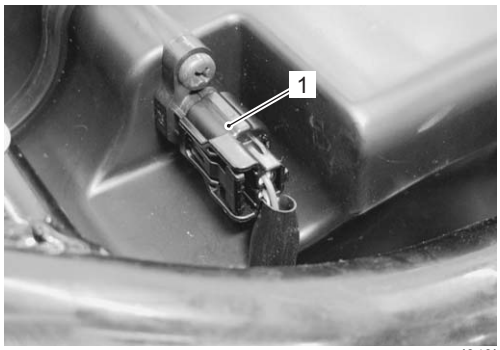
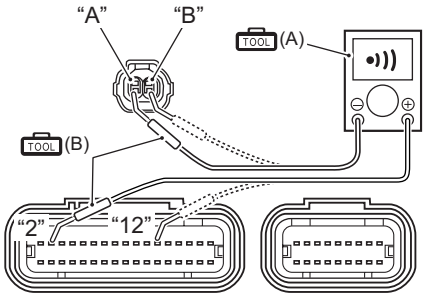
NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

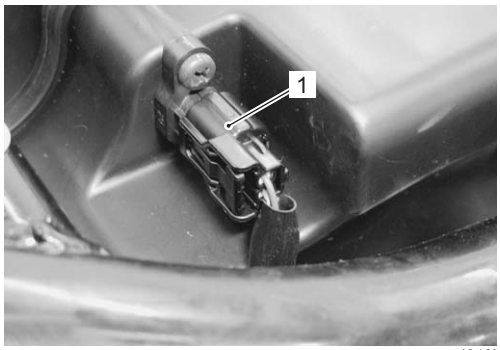
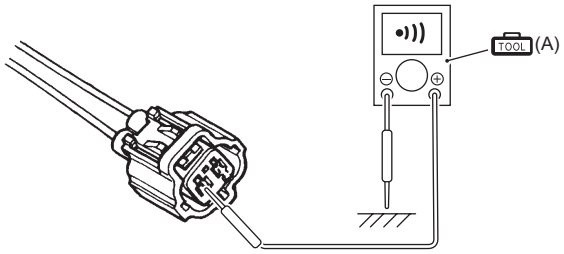
C21 (Use of mode select switch)

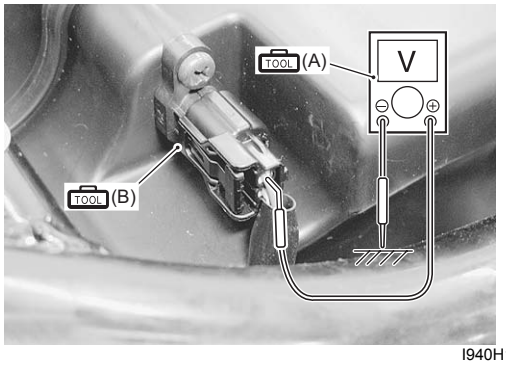
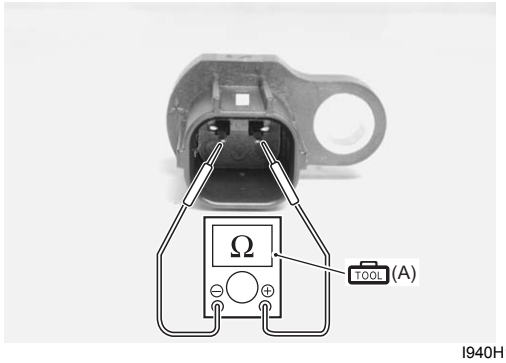
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”. 3) Check the IAT sensor coupler (1) for loose or poor contacts. If OK, then measure the IAT sensor input voltage.  I940H1110035-01 4) Disconnect the IAT sensor coupler and turn the ignition switch ON. 5) Measure the input voltage between the Dg wire terminal and ground. If OK, then measure the input voltage between the Dg wire terminal and B/Br wire terminal. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **IAT sensor input voltage** **4.5 – 5.5 V** **((+) terminal: Dg – (–) terminal: Ground, (+) terminal: Dg – (–) terminal: B/Br)**  I940H1110036-01 *Is the voltage OK?*	Go to Step 2.	• Loose or poor contacts on the ECM coupler. • Open or short circuit in the Dg or B/Br wire.

P0110-H (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”. 3) Check the IAT sensor coupler (1) for loose or poor contacts. If OK, then check the IAT sensor lead wire continuity.  I940H1110035-01 4) Disconnect the IAT sensor coupler. 5) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”. 6) Insert the needle pointed probes to the lead wire coupler. 7) Check the continuity between the Dg wire “A” and terminal “2”. Also, check the continuity between the B/Br wire “B” and terminal “12”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))** **ECM couplers (Harness side)**  I940H1110037-04 *Is the continuity OK?*	Connect the ECM coupler and go to Step 2.	Dg or B/Br wire open.

P0110-L (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”. 3) Check the IAT sensor coupler (1) for loose or poor contacts. If OK, then check the IAT sensor lead wire continuity.  I940H1110035-01 4) Disconnect the IAT sensor coupler. 5) Check the continuity between the Dg wire and ground. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity (•))))**  I822H1110043-01 6) Connect the IAT sensor coupler. 7) Turn the ignition switch ON. 8) Insert the needle pointed probes to the lead wire coupler.	Go to Step 2.	• Dg wire shorted to ground. • If wire is OK, go to Step 2.

Step	Action	Yes	No
2	9) Measure the output voltage between the Dg wire and ground. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)** **IAT sensor output voltage** **0.1 – 4.6 V** **((+) terminal: Dg – (–) terminal: Ground)**  I940H1110038-02 *Are the continuity and voltage OK?*	Go to Step 2.	• Dg wire shorted to ground. • If wire is OK, go to Step 2.
3	1) Turn the ignition switch OFF. 2) Disconnect the IAT sensor coupler. 3) Measure the IAT sensor resistance. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **IAT sensor resistance** **Approx. 2.5 kΩ at 20 °C (68 °F)** **(Terminal – Terminal)**  I940H1110039-01 **NOTE** **IAT sensor resistance measurement method is the same way as that of the ECT sensor. Refer to "ECT Sensor Inspection in Section 1C (Page 1C-5)".** *Is the resistance OK?*	• Dg or B/Br wire open or shorted to ground, or poor "2" or "12" connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	Replace the IAT sensor with a new one. Refer to "IAP Sensor Removal and Installation in Section 1C (Page 1C-2)".

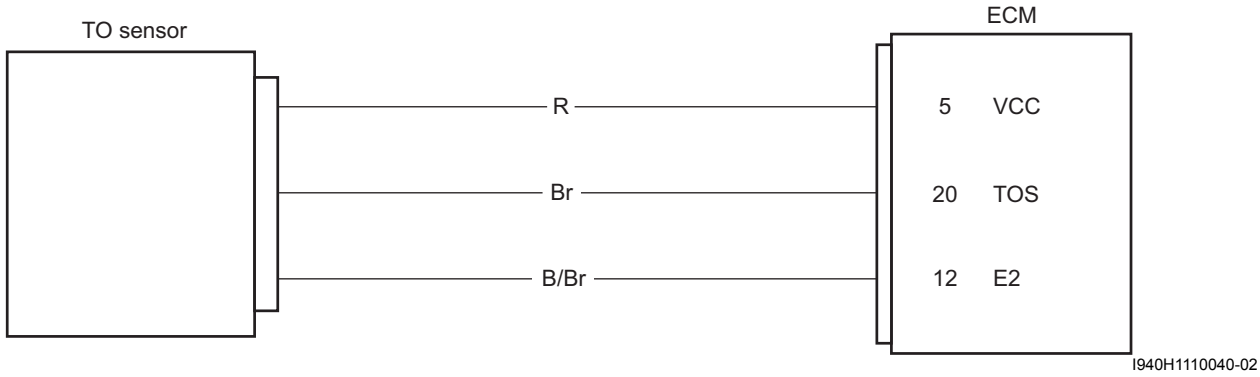
DTC “C23” (P1651-H/L): TO Sensor Circuit Malfunction

B940H21104015

Detected Condition and Possible Cause

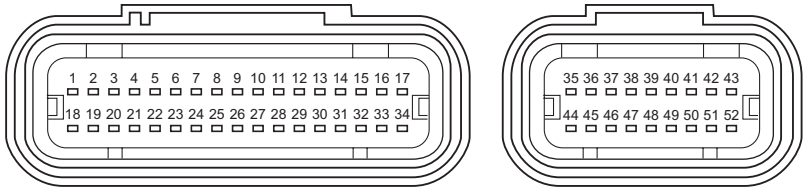
Detected Condition			Possible Cause
C23		The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. 0.2 V < Sensor voltage < 4.6 V	• TO sensor circuit open or short. • TO sensor malfunction. • ECM malfunction.
P1651	H	Sensor voltage is higher than specified value.	• TO sensor circuit is open or ground circuit open.
	L	Sensor voltage is lower than specified value.	• TO sensor circuit is open or shorted to ground or VCC circuit open.

Wiring Diagram



I940H1110040-02

ECM coupler (Harness side)



I940H1110012-03

Troubleshooting

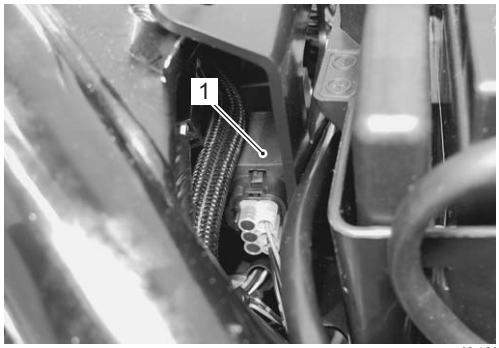
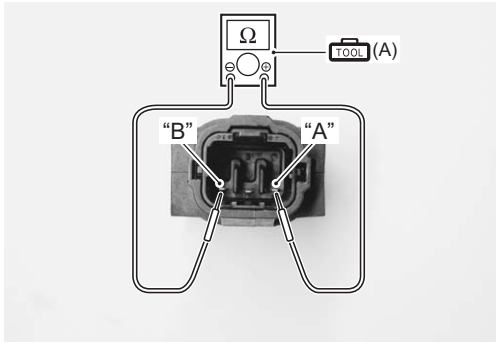
⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

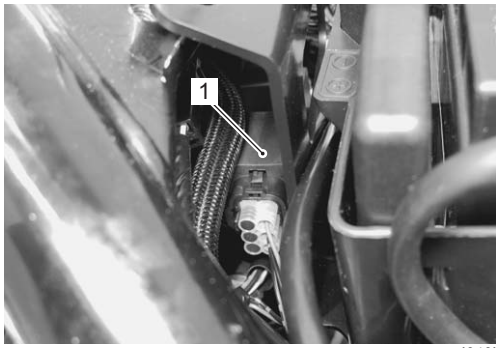
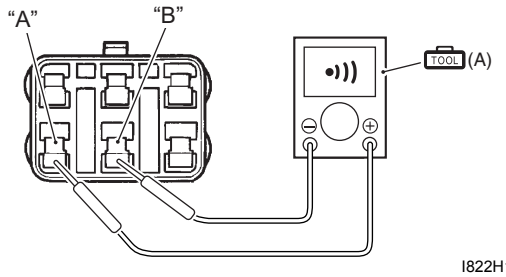
NOTE

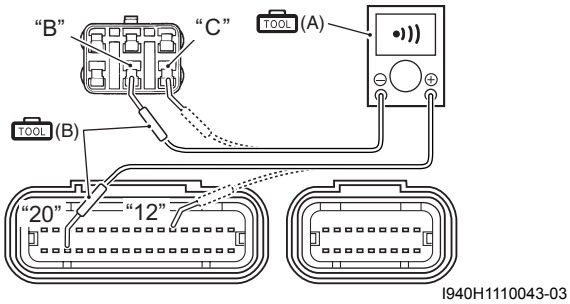
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

C23 (Use of mode select switch)

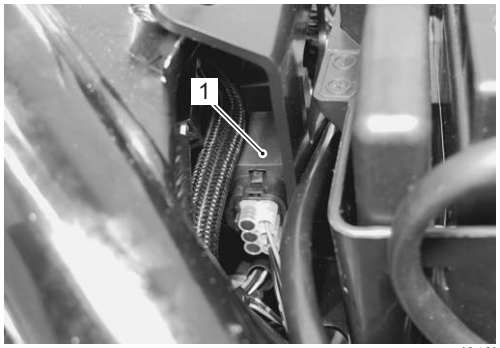
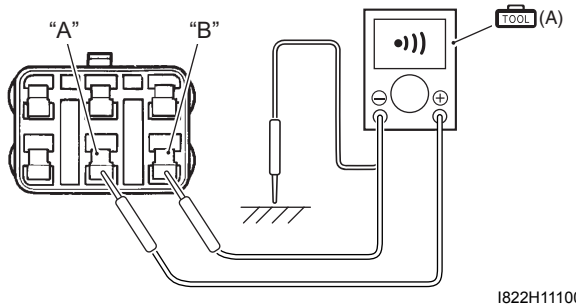
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the TO sensor. Refer to “TO Sensor Removal and Installation in Section 1C (Page 1C-5)”. 3) Check the TO sensor coupler (1) for loose or poor contacts. If OK, then measure the TO sensor resistance.  I940H1110041-01 4) Measure the resistance between terminal “A” and terminal “B”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **TO sensor resistance** **16.5 – 22.3 kΩ** **(Terminal “A” – Terminal “B”)**  I940H1110042-01 *Is the resistance OK?*	Go to Step 2.	Replace the TO sensor with a new one. Refer to “TO Sensor Removal and Installation in Section 1C (Page 1C-5)”.

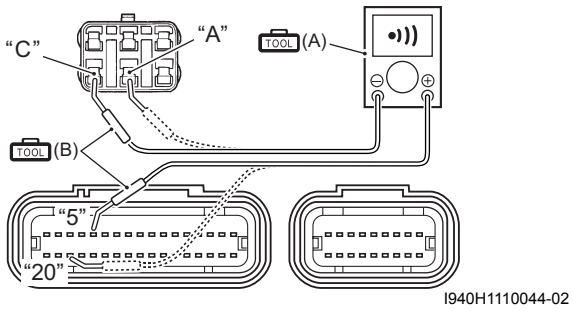
P1651-H (Use of SDS)

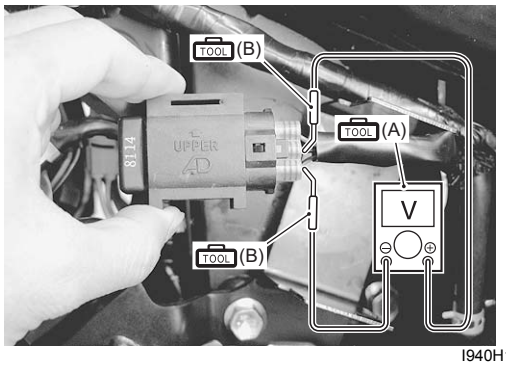
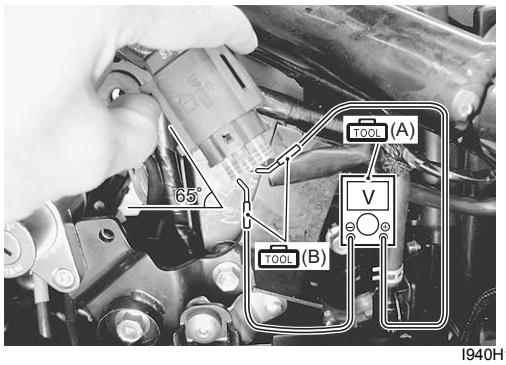
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the TO sensor. Refer to “TO Sensor Removal and Installation in Section 1C (Page 1C-5)”. 3) Check the TO sensor coupler (1) for loose or poor contacts. If OK, then check the TO sensor lead wire continuity.  I940H1110041-01 4) Disconnect the TO sensor coupler. 5) Check the continuity between the R wire “A” and Br wire “B”. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity (•)))**  I822H1110049-01 6) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”. 7) Insert the needle pointed probes to the lead wire coupler.	Go to Step 2.	Br wire shorted to VCC, or B/Br wire open.

Step	Action	Yes	No
2	8) Check the continuity between the Br wire “B” and terminal “20”. Also, check the continuity between B/Br wire “C” and terminal “12”. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))** **ECM coupler (Harness side)**  I940H1110043-03 *Is the continuity OK?*	Go to Step 2.	Br wire shorted to VCC, or B/Br wire open.

P1651-L (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the TO sensor. Refer to “TO Sensor Removal and Installation in Section 1C (Page 1C-5)”. 3) Check the TO sensor coupler (1) for loose or poor contacts. If OK, then check the TO sensor lead wire continuity.  I940H1110041-01 4) Disconnect the TO sensor coupler. 5) Check the continuity between the Br wire “A” and ground. Also, check the continuity between the Br wire “A” and B/Br wire “B”. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity (•)))**  I822H1110052-01 6) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”. 7) Insert the needle pointed probes to the lead wire coupler.	Go to Step 2.	R or Br wire open, or Br wire shorted to ground.

Step	Action	Yes	No
2	8) Check the continuity between the R wire “C” and terminal “5”. Also, then check the continuity between Br wire “A” and terminal “20”. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))** **ECM coupler (Harness side)**  I940H1110044-02 *Is the continuity OK?*	Go to Step 2.	R or Br wire open, or Br wire shorted to ground.

Step	Action	Yes	No
3	1) Connect the ECM coupler and TO sensor coupler. 2) Remove the TO sensor. Refer to “TO Sensor Removal and Installation in Section 1C (Page 1C-5)”. 3) Insert the needle pointed probes to the lead wire coupler. 4) Turn the ignition switch ON. 5) Measure the voltage at the wire side coupler between Br wire and B/Br wire. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)** **TO sensor voltage (Normal)** **0.4 – 1.4 V** **((+) terminal: Br – (–) terminal: B/Br)**  I940H1110045-03 6) Measure the voltage when it is leaned 65° and more to left and right, from the horizontal level. **TO sensor voltage (Leaning)** **3.7 – 4.4 V** **((+) terminal: Br – (–) terminal: B/Br)**  I940H1110046-03 *Is the voltage OK?*	• R, Br or B/Br wire open or shorted to ground, or poor “5”, “20” or “12” connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	• Loosen or poor contacts on the ECM coupler. • Open or short circuit. • Replace the TO sensor with a new one. Refer to “TO Sensor Removal and Installation in Section 1C (Page 1C-5)”.

DTC “C24” (P0351), “C25” (P0352): Ignition System Malfunction

B940H21104016

NOTE

- **Refer to “No Spark or Poor Spark in Section 1H (Page 1H-3)” for details.**
- **When indicating “C24” (P0351) for #1**
- **When indicating “C25” (P0352) for #2**

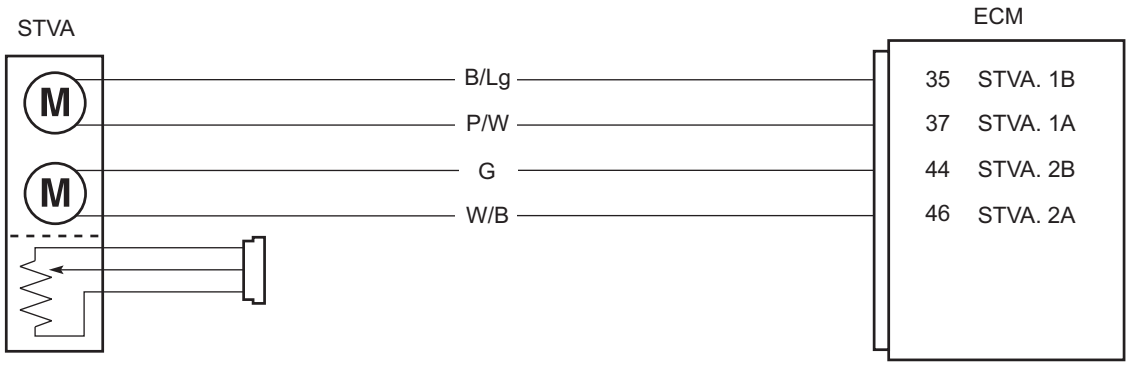
DTC “C28” (P1655): Secondary Throttle Valve Actuator (STVA) Malfunction

B940H21104017

Detected Condition and Possible Cause

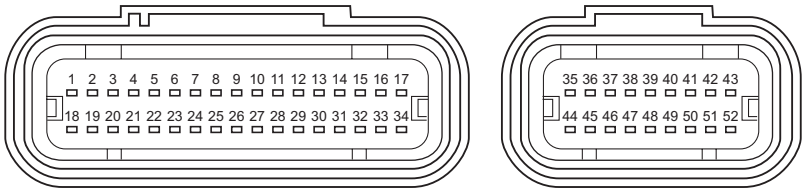
Detected Condition	Possible Cause
The operation voltage does not reach the STVA. ECM does not receive communication signal from the STVA. STVA can not operate properly.	• STVA malfunction. • STVA circuit open or short. • STVA motor malfunction.

Wiring Diagram



I940H1110047-01

ECM coupler (Harness side)



I940H1110012-03

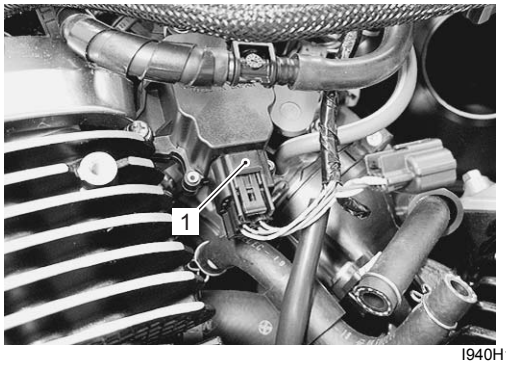
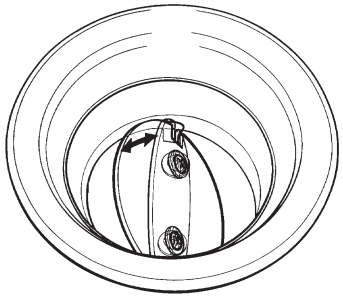
Troubleshooting

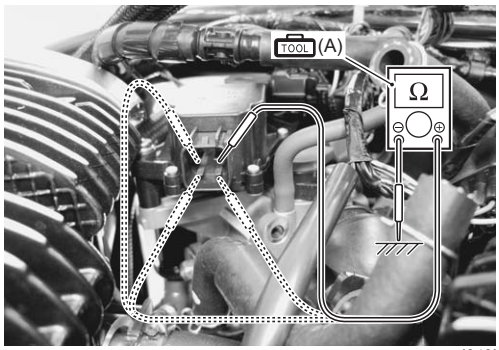
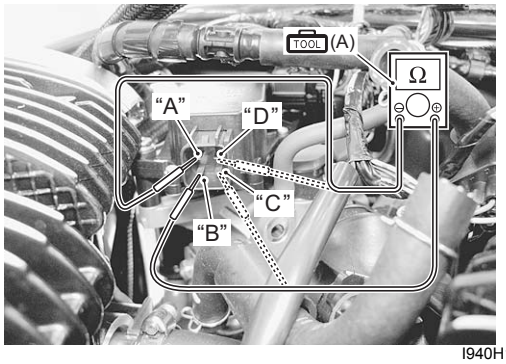
⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

NOTE

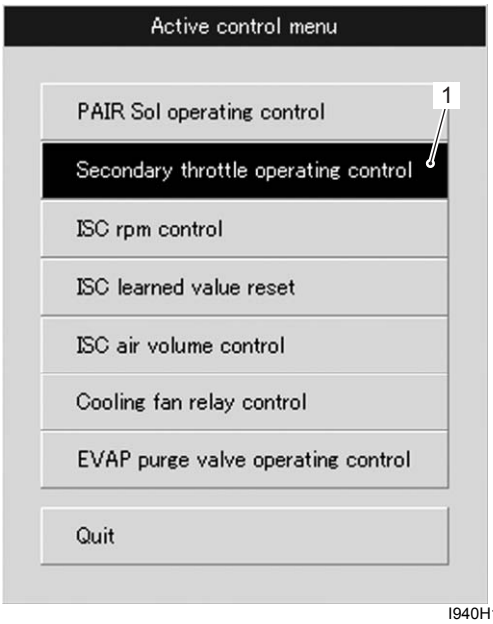
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

Step	Action	Yes	No
1	1) Remove the air cleaner chamber. Refer to “Air Cleaner Chamber Removal and Installation in Section 1D (Page 1D-7)”. 2) Check the STVA lead wire coupler (1) for loose or poor contacts.  I940H1110048-02 3) Turn the ignition switch ON to check the STV operation. (STVA operating order: Full open)  I705H1110063-01 *Is the operation OK?*	Go to Step 2.	• Loose or poor contacts on the coupler. • Open or short circuit in the B/Lg, P/W, W/B or G wire. • If wire and connection are OK, go to Step 2.

Step	Action	Yes	No
2	1) Turn the ignition switch OFF. 2) Disconnect the STVA lead wire coupler. 3) Check the continuity between each terminal and ground. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **STVA continuity** **∞ Ω (Infinity)** **(Terminal – Ground)**  I940H1110049-01 4) If OK, then measure the STVA resistance (between the B/Lg wire “A” and P/W wire “B”) and (between the G wire “C” and W/B wire “D”). **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **STVA resistance** **Approx. 7 Ω** **(Terminal “A” – Terminal “B”, Terminal “C” – Terminal “D”)**  I940H1110050-02 *Is the resistance OK?*	• B/Lg, P/W, G and W/B wire open or shorted to ground, or poor “35”, “37”, “44” and “46” connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	• Loose or poor contacts on the ECM coupler. • Replace the throttle body assembly with a new one. Refer to “Throttle Body Disassembly and Assembly in Section 1D (Page 1D-14)”.

Active Control Inspection

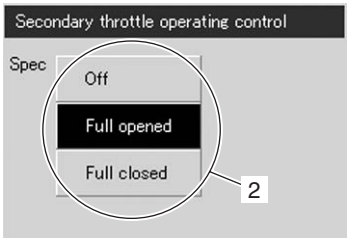
1) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
2) Turn the ignition switch ON.
3) Click “Secondary throttle operating control” (1).



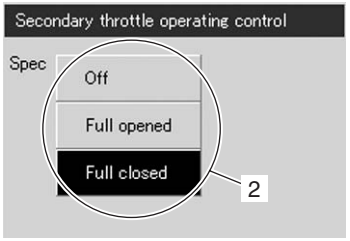
I940H1110094-02

4) Click each button (2).
At this time, if an operation sound is heard from the STVA, the function is normal.

Item	Value	Unit
PAIR control solenoid valve	Off	
Secondary throttle actuator position sensor	99	%
Secondary throttle full opened	Full opened	
Secondary throttle full closed	Except full cls	
Ignition switch signal	Normal	



Item	Value	Unit
PAIR control solenoid valve	Off	
Secondary throttle actuator position sensor	2	%
Secondary throttle full opened	Except full opn	
Secondary throttle full closed	Full closed	
Ignition switch signal	Normal	



I940H1110101-02

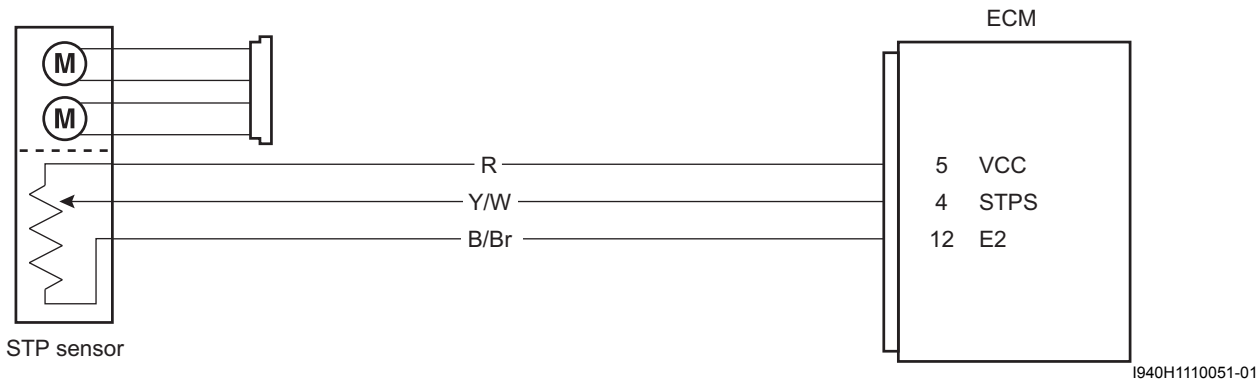
DTC “C29” (P1654-H/L): Secondary Throttle Position Sensor (STPS) Circuit Malfunction

B940H21104018

Detected Condition and Possible Cause

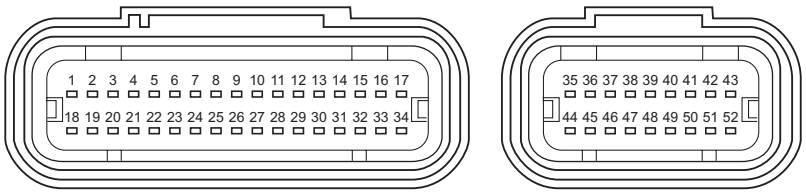
Detected Condition			Possible Cause
C29		Output voltage is not within the following range. Difference between actual throttle opening and opening calculated by ECM is larger than specified value. 0.1 V < Sensor voltage < 4.83 V	• STP sensor maladjusted. • STP sensor circuit open or short. • STP sensor malfunction. • ECM malfunction.
P1654	H	Sensor voltage is higher than specified value.	• STP sensor circuit shorted to VCC or ground circuit open.
	L	Sensor voltage is lower than specified value.	• STP sensor circuit open or shorted to ground or VCC circuit open.

Wiring Diagram



I940H1110051-01

ECM coupler (Harness side)



I940H1110012-03

Troubleshooting

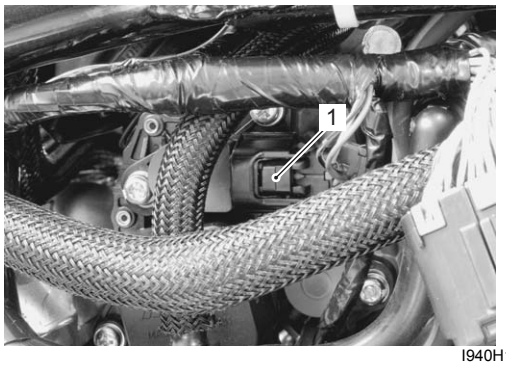
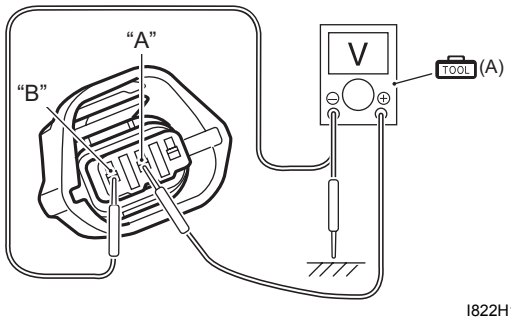
⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

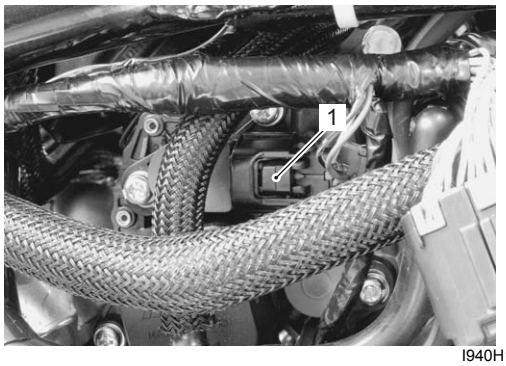
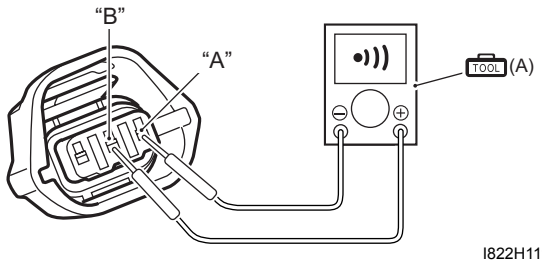
NOTE

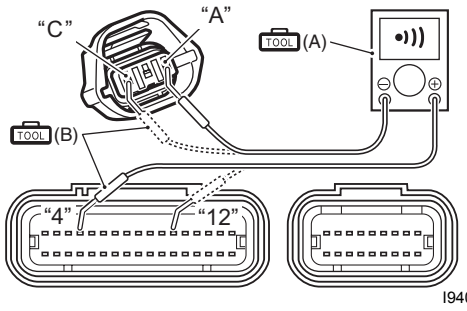
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

C29 (Use of mode select switch)

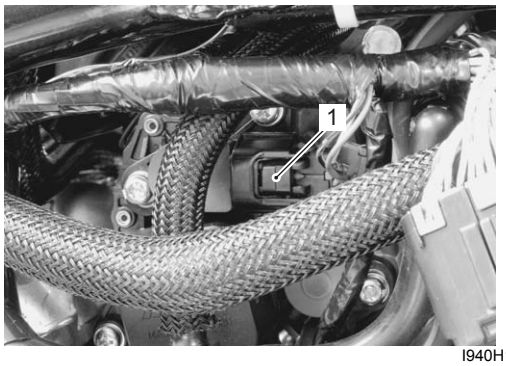
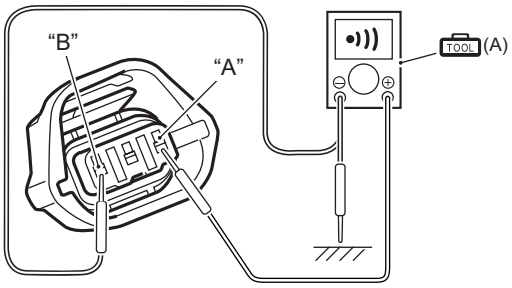
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”. 3) Remove the right air cleaner box. Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-6)”. 4) Check the STP sensor coupler (1) for loose or poor contacts. If OK, then measure the STP sensor input voltage.  I940H1110052-01 5) Disconnect the STP sensor coupler. 6) Turn the ignition switch ON. 7) Measure the input voltage between the R wire “A” and ground. Also, measure the voltage between the R wire “A” and B/Br wire “B”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **STP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I822H1110064-01 *Is the voltage OK?*	Go to Step 2.	• Loose or poor contacts on the ECM coupler. • Open or short circuit in the R wire or B/Br wire.

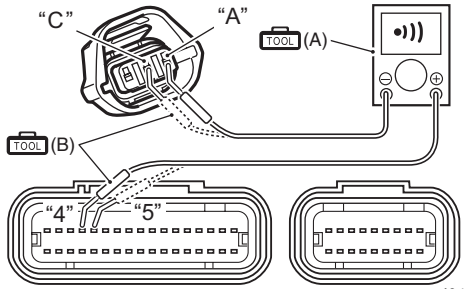
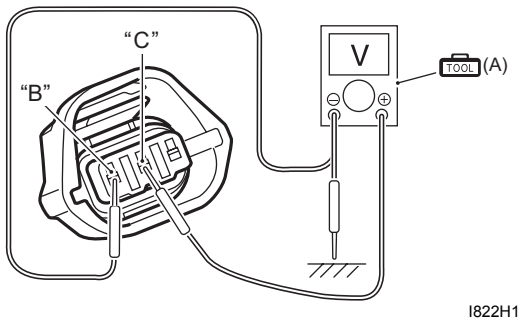
P1654-H (Use of SDS)

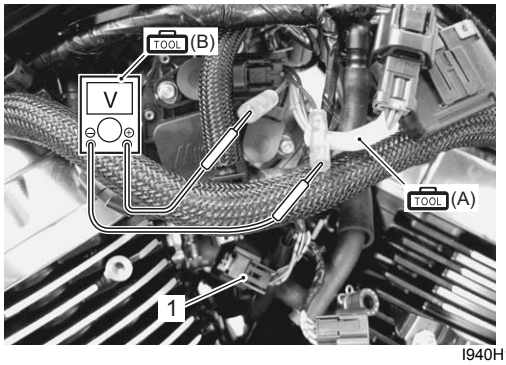
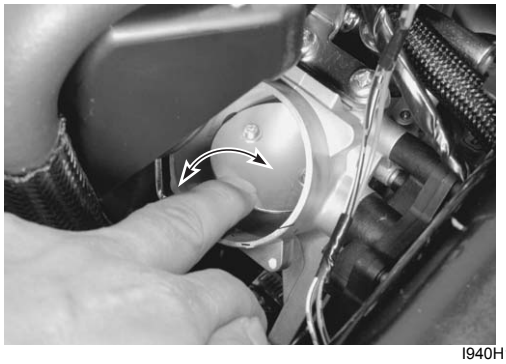
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”. 3) Check the STP sensor coupler (1) for loose or poor contacts. If OK, then check the STP sensor lead wire continuity.  I940H1110052-01 4) Disconnect the STP sensor coupler. 5) Check the continuity between the Y/W wire “A” and R wire “B”. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity (•)))**  I822H1110066-01 6) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	Go to Step 3.	Y/W wire shorted to VCC, or B/Br wire open.

Step	Action	Yes	No
2	7) Check the continuity between the Y/W wire “A” and terminal “4”. Also, check the continuity between the B/Br wire “C” and terminal “12”. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))** **ECM couplers (Harness side)**  I940H1110053-01 *Is the continuity OK?*	Go to Step 3.	Y/W wire shorted to VCC, or B/Br wire open.

P1654-L (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”. 3) Check the STP sensor coupler (1) for loose or poor contacts. If OK, then check the STP sensor lead wire continuity.  I940H1110052-01 4) Disconnect the STP sensor coupler. 5) Check the continuity between the Y/W wire “A” and ground. Also, check the continuity between the Y/W wire “A” and B/Br wire “B”. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity (•)))**  I822H1110069-01 6) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	Go to Step 2.	R or Y/W wire open, or Y/W wire shorted to ground.

Step	Action	Yes	No
2	7) Check the continuity between the Y/W wire “A” and terminal “4”. Also, check the continuity between the R wire “C” and terminal “5”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))** **ECM couplers (Harness side)**  I940H1110054-02 *Is the continuity OK?*	Go to Step 2.	R or Y/W wire open, or Y/W wire shorted to ground.
3	1) Connect the ECM coupler. 2) Turn the ignition switch ON. 3) Measure the input voltage between the R wire “C” and ground. Also, measure the input voltage between the R wire “C” and B/Br wire “B”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **STP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I822H1110071-01 *Is the voltage OK?*	Go to Step 3.	Open or short circuit in the R or B/Br wire.

Step	Action	Yes	No
4	1) Turn the ignition switch OFF. 2) Connect the ECM coupler. 3) Remove the right air cleaner box. Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-6)”. 4) Connect the special tool between the STP sensor and its coupler. **Special tool** **TOOL (A): 09900–28630 (TPS test wire harness)** 5) Disconnect the STVA lead wire coupler (1). 6) Turn the ignition switch ON. 7) Measure the STP sensor output voltage at the coupler (between the Y wire (+) and B wire (–)) by turning the secondary throttle valve (close and open) with your finger. Refer to “STP Sensor Adjustment in Section 1C (Page 1C-6)”. **Special tool** **TOOL (B): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **STP sensor output voltage** **Secondary throttle valve is closed: Approx. 0.6 V** **Secondary throttle valve is opened: Approx. 4.2 V** **((+) terminal: Y/W – (–) terminal: B/BW)**  I940H1110055-02  I940H1110056-01 *Is the voltage OK?*	• R, Y/W or B/Br wire open or shorted to ground, or poor “5”, “14” or “12” connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	If check result is not satisfactory, replace the STP sensor with a new one. Refer to “STP Sensor Removal and Installation in Section 1C (Page 1C-7)”.

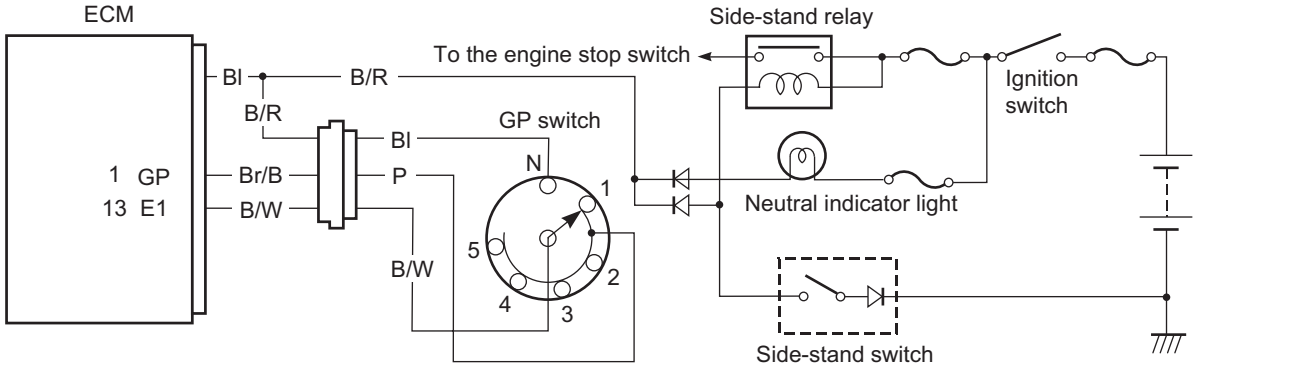
DTC “C31” (P0705): GP Switch Circuit Malfunction

B940H21104019

Detected Condition and Possible Cause

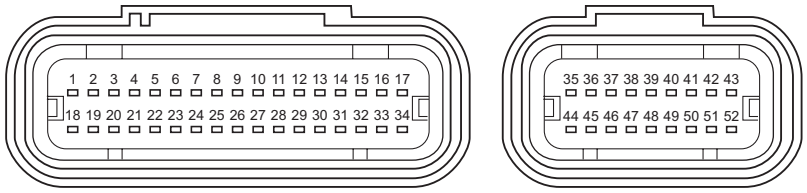
Detected Condition	Possible Cause
No Gear Position switch voltage GP switch voltage is not within the following range. GP switch voltage ≥ 0.2 V for 6 sec. and more When gear position switch voltage is neutral and switch voltage is as follows. GP switch voltage ≥ 4.55 V for 6 sec. and more	• GP switch circuit open or short. • GP switch malfunction. • ECM malfunction.

Wiring Diagram



I940H1110057-02

ECM coupler (Harness side)



I940H1110012-03

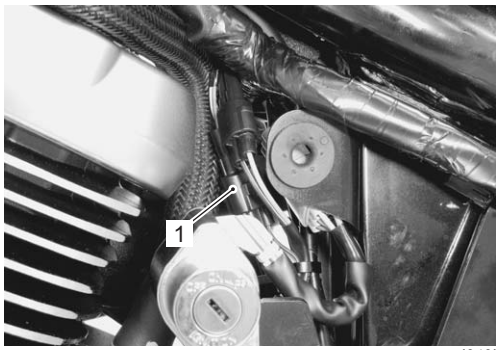
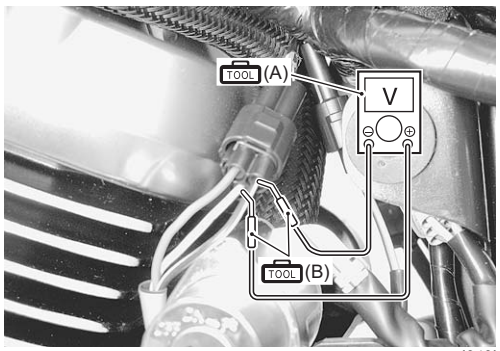
Troubleshooting

⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the left frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”. 3) Check the GP switch coupler (1) for loose or poor contacts. If OK, then measure the GP switch voltage.  I940H1110058-03 4) Support the motorcycle with a jack. 5) Fold the side-stand to up position. 6) Make sure the engine stop switch is in the “RUN” position. 7) Insert the needle pointed probe to the lead wire coupler. 8) Turn the ignition switch ON. 9) Measure the voltage between the P and B/W wire, when shifting the gearshift lever from 1st to Top. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)** **GP switch voltage** **0.6 V and more** **((+) terminal: P – (–) terminal: B/W)**  I940H1110059-01 *Is the voltage OK?*	• P wire open or shorted to ground. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	• P or B/W wire open, or P wire shorted to ground. • Loose or poor contacts on the ECM coupler. • If wire and connection are OK, replace the GP switch with a new one. Refer to “Gear Position (GP) Switch Removal and Installation in Section 5B (Page 5B-10)”.

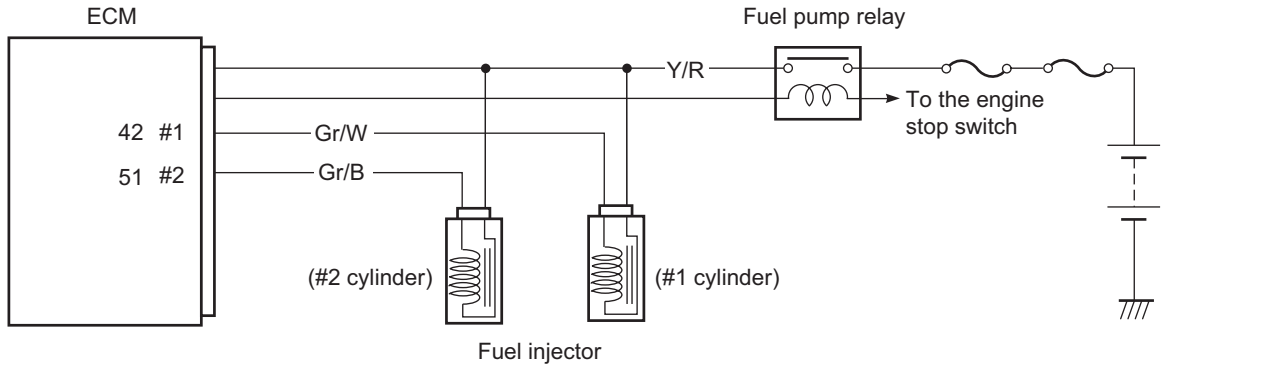
DTC “C32” (P0201), “C33” (P0202): Fuel Injector Circuit Malfunction

B940H21104020

Detected Condition and Possible Cause

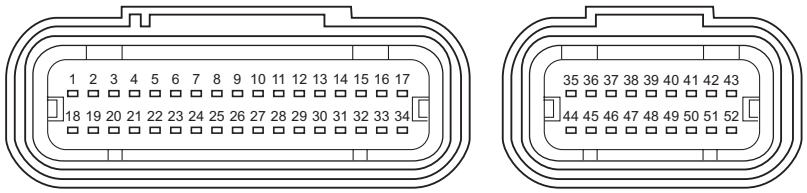
Detected Condition	Possible Cause
CKP signal is produced but fuel injector signal is interrupted by 8 times or more continuity.	• Injector circuit open or short. • Injector malfunction. • ECM malfunction.

Wiring Diagram



I940H1110060-02

ECM coupler (Harness side)



I940H1110012-03

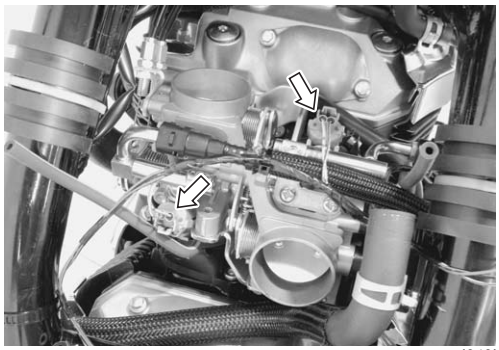
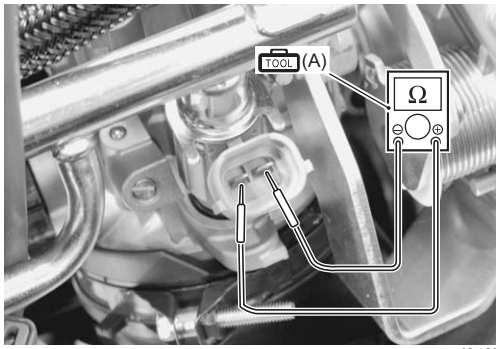
Troubleshooting

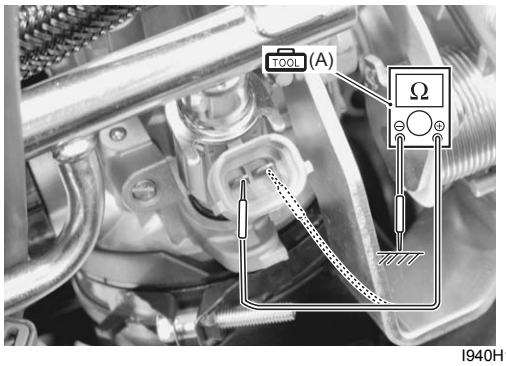
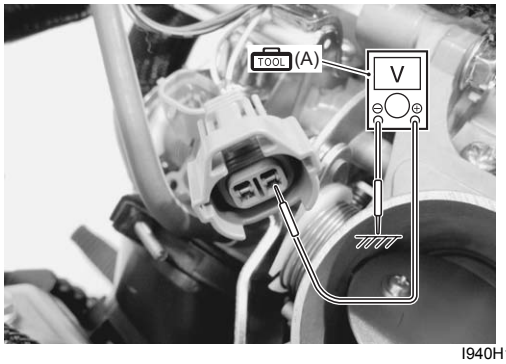
⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the air cleaner chamber. Refer to “Air Cleaner Chamber Removal and Installation in Section 1D (Page 1D-7)”. 3) Check the primary fuel injector coupler for loose or poor contacts. If OK, then measure the injector resistance.  I940H1110061-01 4) Disconnect the injector coupler and measure the resistance between terminals. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **Injector resistance** **11 – 13 Ω at 23 °C (73 °F)** **(Terminal – Terminal)**  I940H1110062-03	Go to Step 2.	Replace the injector with a new one. Refer to “Throttle Body Disassembly and Assembly in Section 1D (Page 1D-14)”.

Step	Action	Yes	No
2	5) If OK, then check the continuity between each terminal and ground. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Injector continuity** **∞ Ω (Infinity)**  I940H1110063-02 *Are the resistance and continuity OK?*	Go to Step 2.	Replace the injector with a new one. Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-14)".
3	1) Turn the ignition switch ON. 2) Measure the injector voltage between the Y/R wire and ground. **NOTE** **Injector voltage can be detected only for 3 seconds after ignition switch is turned ON.** **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Injector voltage** **Battery voltage** **((+) terminal: Y/R – (–) terminal: Ground)**  I940H1110064-01 *Is the voltage OK?*	• Gr/W wire open or shorted to ground, or poor "42" connection (#1 cylinder). • Gr/B wire open or shorted to ground, or poor "51" connection (#2 cylinder). • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".	Open circuit in the Y/R wire.

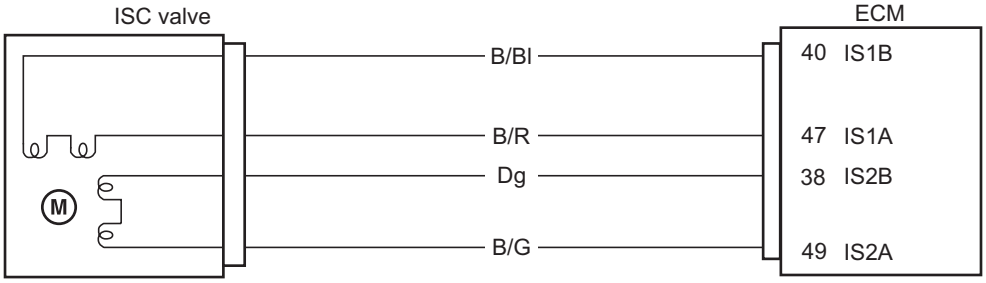
DTC “C40” (P0505 / P0506 / P0507): ISC Valve Circuit Malfunction

B940H21104021

Detected Condition and Possible Cause

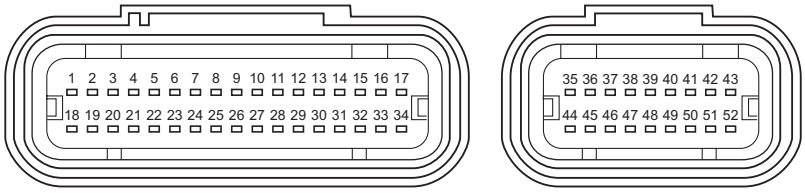
Detected Condition		Possible Cause
C40/P0505	The circuit voltage of motor drive is unusual.	• ISC valve circuit open or shorted to the ground. • Air passage clogged. • ISC valve is fixed. • ISC valve Preset position is incorrect. • Disconnected ISC valve hose. • ISC valve is fixed. • ISC valve Preset position is incorrect.
C40/P0506	Idle speed is lower than the desired idle speed.	
C40/P0507	Idle speed is higher than the desired idle speed.	

Wiring Diagram



I940H1110065-04

ECM coupler (Harness side)



I940H1110012-03

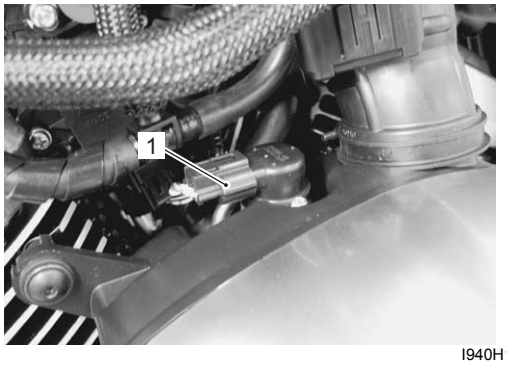
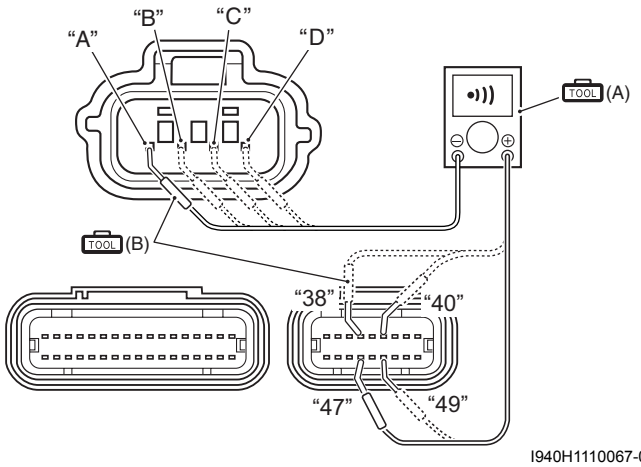
Troubleshooting

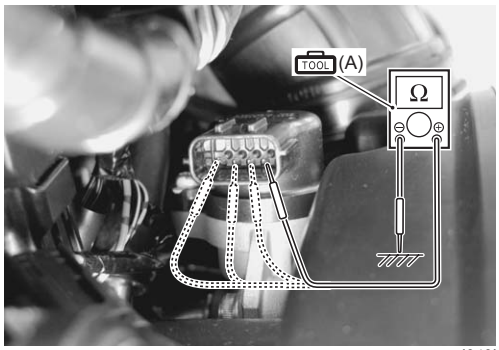
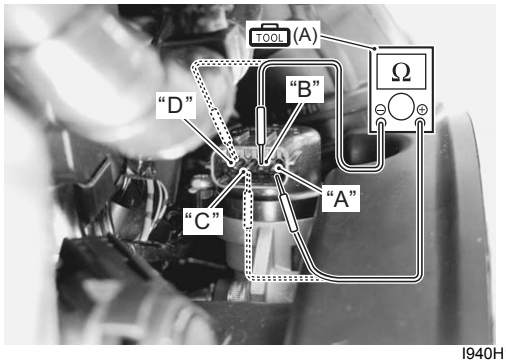
⚠ CAUTION

- **Be careful not to disconnect the ISC valve coupler at least 5 seconds after ignition switch is turned to OFF.**
  If the ECM coupler is disconnected within 5 seconds after ignition switch is turned to OFF, there is a possibility of an unusual valve being written in the ECM and causing an error of ISC valve operation.
- **When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.**

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

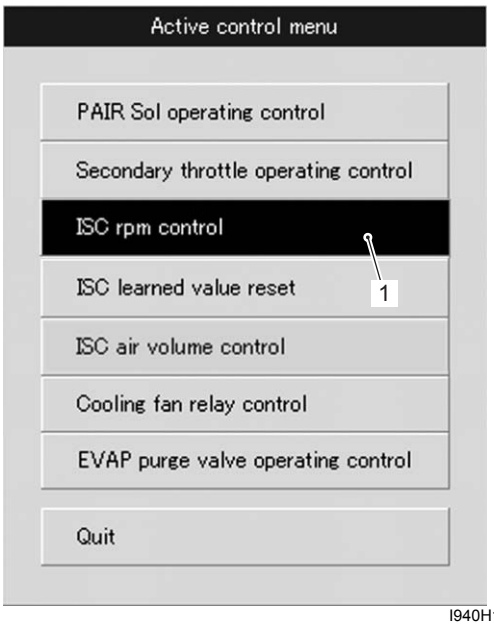
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Check the ISC valve coupler (1) for loose or poor contacts. If OK, then check the ISC valve lead wire continuity.  I940H1110066-01 3) Disconnect the ISC valve coupler and ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”. 4) Check the continuity between terminal “A” and “47”, terminal “B” and “49”, terminal “C” and “40”, terminal “D” and “38”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))** **ECM couplers (Harness side)**  I940H1110067-03 *Is the continuity OK?*	Go to Step 2.	B/R, B/Bl, B/G, or Dg wire open.

Step	Action	Yes	No
2	1) Disconnect the ISC valve coupler. 2) Check the continuity between each terminal and ground. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **ISC valve continuity** **∞ Ω (Infinity)** **(Terminal – Ground)**  I940H1110068-01 3) If OK, then measure the resistance (between the B/R wire “A” and B/Bl wire “B”) and (between the B/G wire “C” and Lg wire “D”). **ISC valve resistance** **Approx. 20 Ω at 20 °C (68 °F)** **(Terminal: “A” – Terminal: “B”, Terminal: “C” – Terminal: “D”)**  I940H1110069-01 *Is the resistance OK?*	If wire is OK, intermittent trouble or faulty ECM.	Replace the ISC valve with a new one. Refer to “Throttle Body Disassembly and Assembly in Section 1D (Page 1D-14)”.

Active Control Inspection (ISC RPM Control)

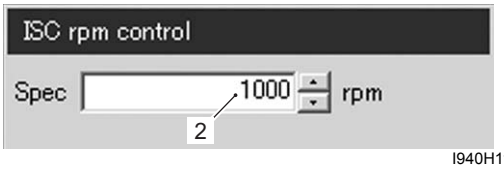
Check 1

1) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
2) Check that the engine is running.
3) Click the “Active control”.
4) Click the “ISC rpm control” (1).



I940H1110102-02

5) Check that the “Spec” (2) is idle speed 1 000 ± 100 rpm.
6) Check that the “Desired idle speed” (3) is within the specified idle rpm.



I940H1110103-02

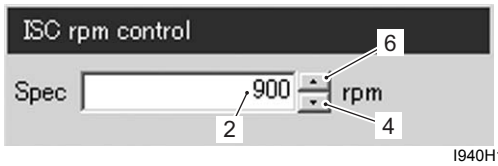
Item	Value	Unit
Engine speed	1004	rpm
Desired idle speed	1004	rpm
ISC valve position	94	step
Throttle position	27.9	°

3

I940H1110104-01

Check 2

1) Click the button (4) and decrease the “Spec” (2) to 900 rpm slowly.
2) Check that the “Desired idle speed” (3) is nearly equal to the “Spec” (2). At the same time, check that the number of steps (5) in the ISC valve position decreases.
3) Click the button (6) and increase the “Spec” (2) slowly.
4) Check that the “Desired idle speed” (3) is nearly equal to the “Spec” (2). Also, check that the number of steps (5) in the ISC valve position increases.



I940H1110105-02

Item	Value	Unit
Engine speed	941	rpm
Desired idle speed	904	rpm
ISC valve position	82	step
Throttle position	27.9	°

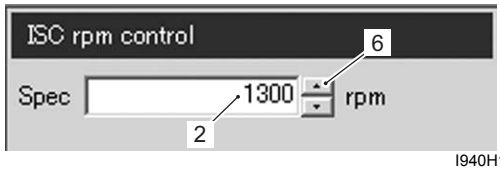
3

5

I940H1110106-01

Check 3

1) Click the button (6) and increase the “Spec” (2) to 1 300 rpm slowly.
2) Check that the “Desired idle speed” (3) is nearly equal to the “Spec” (2). Also, check that the number of steps (5) in the ISC valve position increases.



I940H1110107-02

Item	Value	Unit
Engine speed	1318	rpm
Desired idle speed	1305	rpm
ISC valve position	137	step
Throttle position	27.9	°

3

5

I940H1110108-01

NOTE

Be careful not to increase the “Spec” to 1 400 rpm, or the “Engine speed” may reach the upper limit.

If the ISC valve does not function properly, inspect the ISC valve or replace the ISC valve. Refer to “DTC “C40” (P0505 / P0506 / P0507): ISC Valve Circuit Malfunction (Page 1A-74)” or “Throttle Body Disassembly and Assembly in Section 1D (Page 1D-14)”.

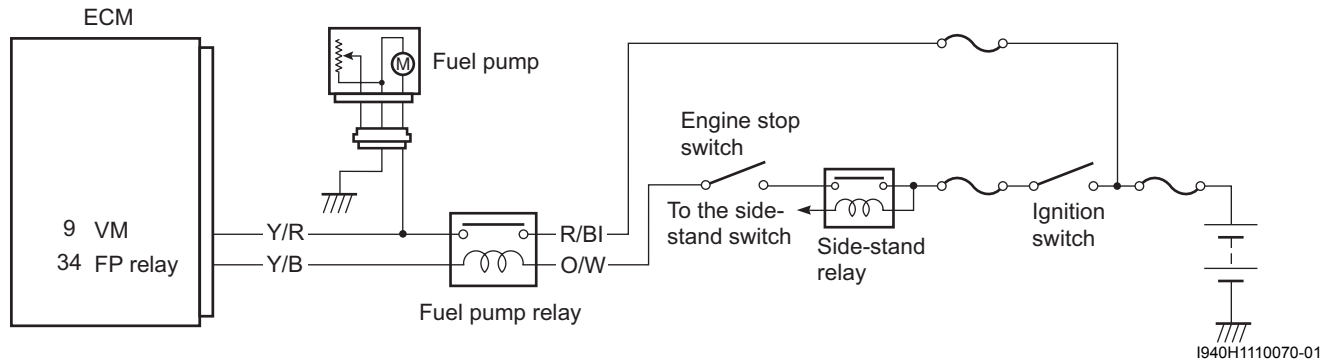
DTC “C41” (P0230): FP Relay Circuit Malfunction

B940H21104022

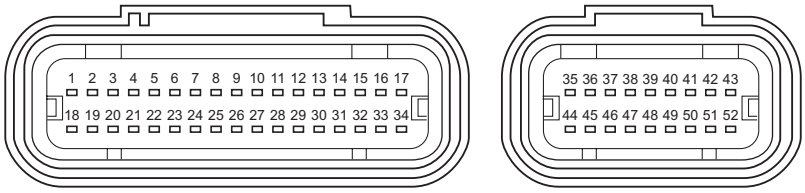
Detected Condition and Possible Cause

Detected Condition	Possible Cause
No voltage is applied to fuel pump.	• Fuel pump relay circuit open or short. • Fuel pump relay malfunction. • ECM malfunction.

Wiring Diagram



ECM coupler (Harness side)



Troubleshooting

⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the front seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”. 3) Check the FP relay coupler (1) for loose or poor contacts. If OK, then check the FP relay. Refer to “Fuel Pump Relay Inspection in Section 1G (Page 1G-6)”.  I940H1110071-01 *Is the FP relay OK?*	• Y/B or O/W wire open or shorted or poor “34” connection. • Y/R or R/Bl wire open, shorted or poor “9” connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	Replace the FP relay with a new one.

DTC “C42” (P1650): IG Switch Circuit Malfunction

B940H21104023

Detected Condition and Possible Cause

Detected Condition	Possible Cause
Ignition switch signal is not input to the ECM.	• Ignition system circuit open or short. • ECM malfunction.

Troubleshooting

NOTE

- **Refer to “Ignition Switch Inspection in Section 1H (Page 1H-9)” for details.**
- **After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.**

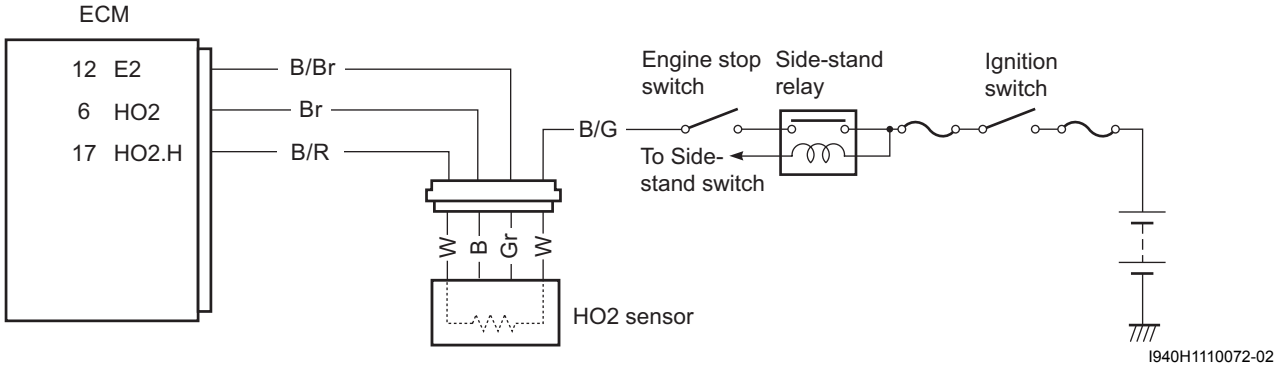
DTC “C44” (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction (For E-02, 19, 24, 33)

B940H21104024

Detected Condition and Possible Cause

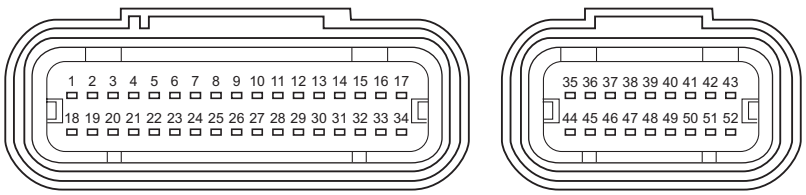
Detected Condition		Possible Cause
C44/P0130	HO2 sensor output voltage is not input to ECM during engine operation and running condition. Sensor voltage < 0.55 V	• HO2 sensor circuit is open or shorted to the power source.
C44/P0135	The heater can not operate so that heater operation voltage is not supplied to the oxygen heater circuit.	• Heated circuit is open or shorted to the ground. • Battery voltage is not supply to the HO2 sensor.

Wiring Diagram



I940H1110072-02

ECM coupler (Harness side)



I940H1110012-03

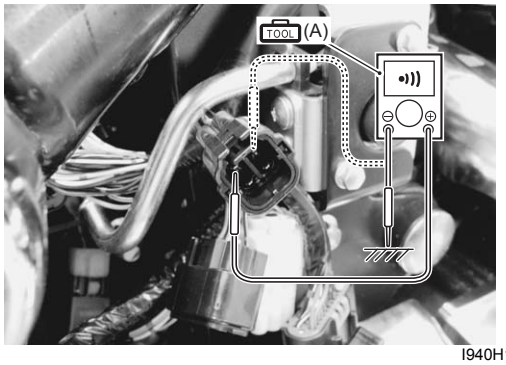
Troubleshooting (When Indicating C44/P0130:)

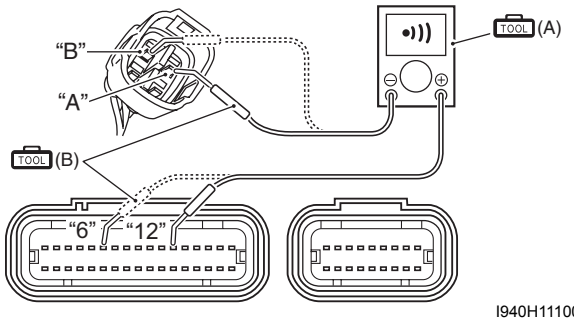
⚠ CAUTION

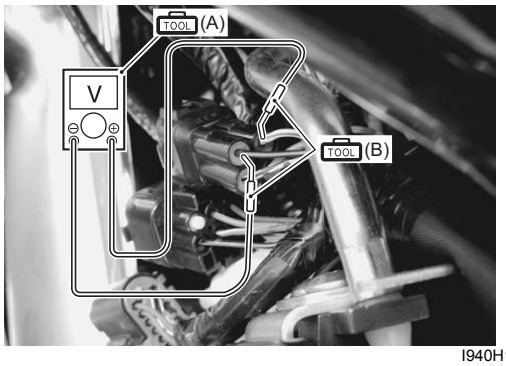
When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the right frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”. 3) Check the HO2 sensor for loose or poor contacts. If OK, then check the HO2 sensor lead wire continuity.  I940H1110073-01 4) Disconnect the HO2 sensor coupler. 5) Check the continuity between the Br wire and ground. Also, check the continuity between Br wire and B/Br wire. If the sound is not hard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity (•)))**  I940H1110074-02 6) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	Go to Step 2.	W/G wire shorted to ground, or Br or B/Br wire open.

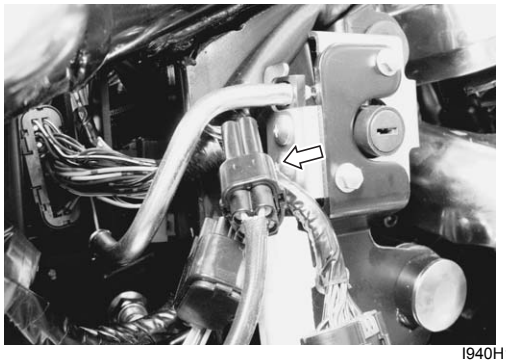
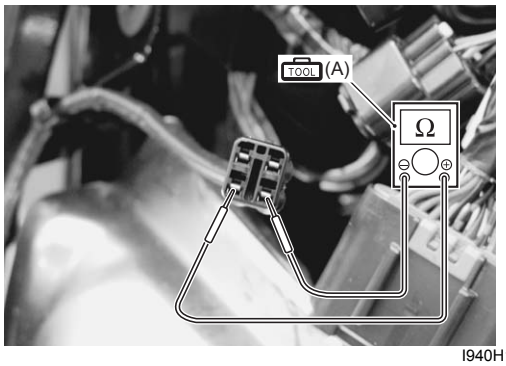
Step	Action	Yes	No
2	7) Check the continuity between the Br wire “B” and terminal “6”. Also check the continuity between the B/Br wire “A” and terminal “12”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))** **ECM couplers (Harness side)**  I940H1110075-02 *Is the continuity OK?*	Go to Step 2.	W/G wire shorted to ground, or Br or B/Br wire open.

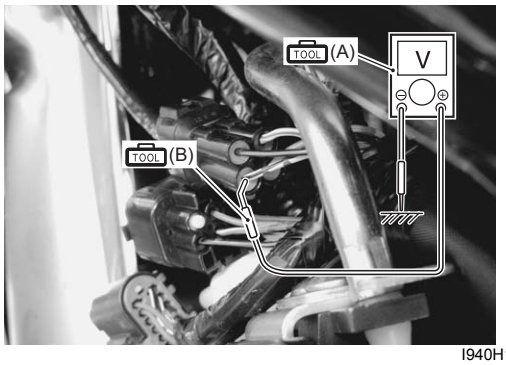
Step	Action	Yes	No
3	1) Connect the ECM coupler and HO2 sensor coupler. 2) Warm up the engine enough. 3) Insert the needle pointed probes to the lead wire coupler. 4) Measure the HO2 sensor output voltage between Br wire and B/Br wire, when idling condition. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)** **HO2 sensor output voltage at idle speed** **0.4 V and less** **((+) terminal: Br – (–) terminal: B/Br)**  I940H1110076-02 5) If OK, then remove the right frame head cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”. Next pinch the PAIR hose (1) with a proper hose clamps.  I940H1110077-01 6) Measure the HO2 sensor output voltage while holding the engine speed at 4 000 r/min. **HO2 sensor output voltage at 4 000 r/min** **0.6 V and more** **((+) terminal: Br – (–) terminal: B/Br)** *Is the voltage OK?*	• Br or B/Br wire open or shorted to the power source, or poor “6” or “12” connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspection it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	Replace the HO2 sensor with a new one. Refer to “Heated Oxygen Sensor (HO2S) Removal and Installation in Section 1B (Page 1B-8)”.

Troubleshooting (When Indicating C44/P0135:)

NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to "Use of SDS Diagnosis Reset Procedures (Page 1A-13)".

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the left frame side cover. Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-5)". 3) Check the HO2 sensor for loose or poor contacts. If OK, then measure the HO2 sensor resistance.  I940H1110073-01 4) Disconnect the HO2 sensor coupler and measure the resistance between terminals. **⚠ CAUTION** **• Temperature of the sensor affects resistance value largely.** **• Make sure that the sensor heater is in correct temperature.** **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **HO2 heater resistance** **4.0 – 5.0 Ω at 23 °C (73°F)** **(W – W)**  I940H1110078-02 *Is the resistance OK?*	Go to Step 2.	Replace the HO2 sensor with a new one. Refer to "HO2 Sensor Removal and Installation in Section 1C (Page 1C-9)".

Step	Action	Yes	No
2	1) Connect the HO2 sensor coupler. 2) Insert the needle pointed probes to the lead wire coupler. 3) Turn the ignition switch ON and measure the heater voltage between the W/B wire and ground. If the tester voltage indicates the battery voltage, it is good condition. **NOTE** **Battery voltage can be detected only before starting the engine.** **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)** **Heater voltage** **Battery voltage** **((+) terminal: B/R – (–) terminal: Ground)**  I940H1110079-02 *Is the voltage OK?*	• B/G or B/R wire open or shorted to the ground, or poor “17” connection. • Recheck each terminal and wire harness for open circuit and poor connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	• Open or short circuit in the B/R wire or B/G wire. • Loose or poor contacts on the ECM coupler or HO2 sensor coupler.

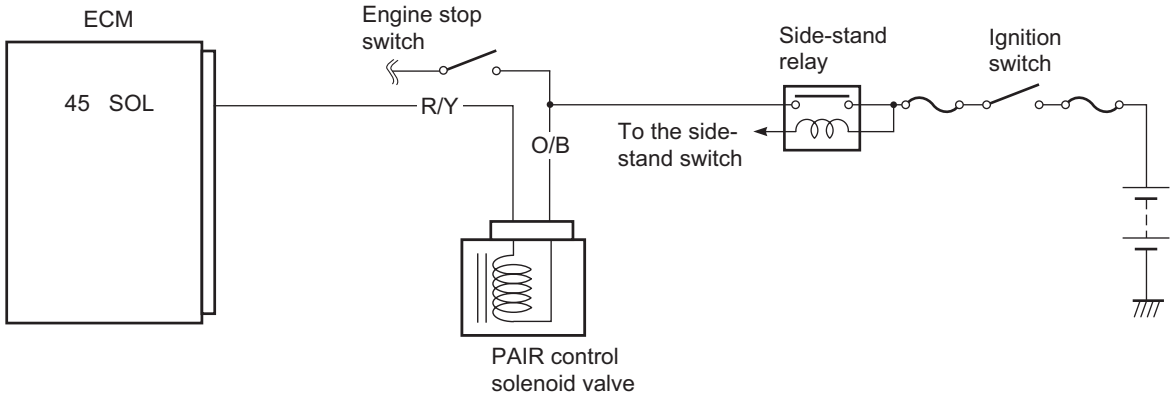
DTC “C49” (P1656): PAIR Solenoid Valve Circuit Malfunction

B940H21104025

Detected Condition and Possible Cause

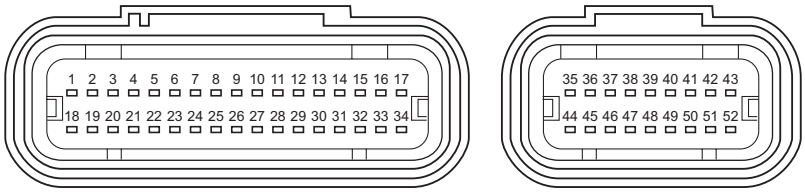
Detected Condition	Possible Cause
PAIR control solenoid valve ampere is not input to ECM.	• PAIR control solenoid valve circuit open or short. • PAIR control solenoid valve malfunction. • ECM malfunction.

Wiring Diagram



I940H1110080-01

ECM coupler (Harness side)



I940H1110012-03

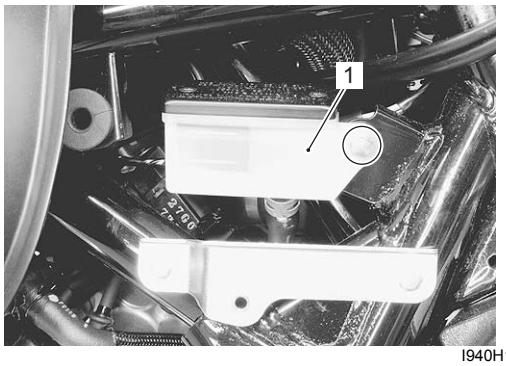
Troubleshooting

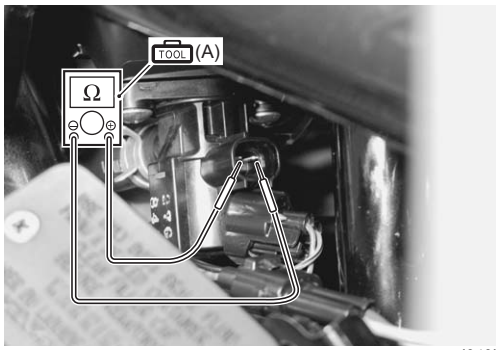
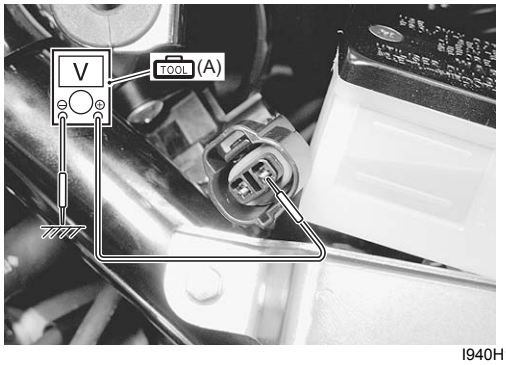
⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

NOTE

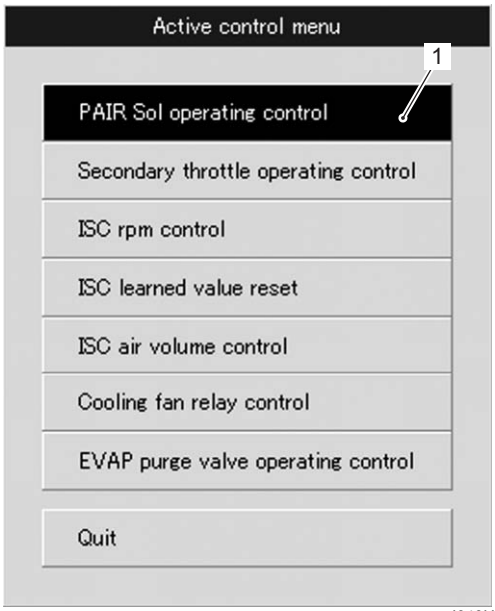
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the right frame head cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”. 3) Move the rear brake reservoir tank (1) by removing the mounting bolt.  I940H1110081-01 4) Check the PAIR control solenoid valve coupler (2) for loose or poor contacts. If OK, then measure the PAIR control solenoid valve resistance.  I940H1110082-01 5) Disconnect the PAIR control solenoid valve coupler.	Go to Step 2.	Replace the PAIR control solenoid with a new one. Refer to “PAIR Control Solenoid Valve Removal and Installation in Section 1B (Page 1B-9)”.

Step	Action	Yes	No
2	6) Measure the resistance between terminals. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **PAIR control solenoid valve resistance** **18 – 22 Ω at 20 – 30 °C (68 – 86 °F)** **(Terminal – Terminal)**  I940H1110083-02 *Is the resistance OK?*	Go to Step 2.	Replace the PAIR control solenoid with a new one. Refer to “PAIR Control Solenoid Valve Removal and Installation in Section 1B (Page 1B-9)”.
3	1) Turn the ignition switch ON. 2) Measure the voltage between the R/Y wire and ground. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **PAIR control solenoid valve voltage** **Battery voltage** **((+) terminal: O/B – (–) terminal: Ground)**  I940H1110090-01 *Is the voltage OK?*	• R/Y wire open or shorted to ground, or poor “45” connection failure. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	Open or short circuit in the O/B wire.

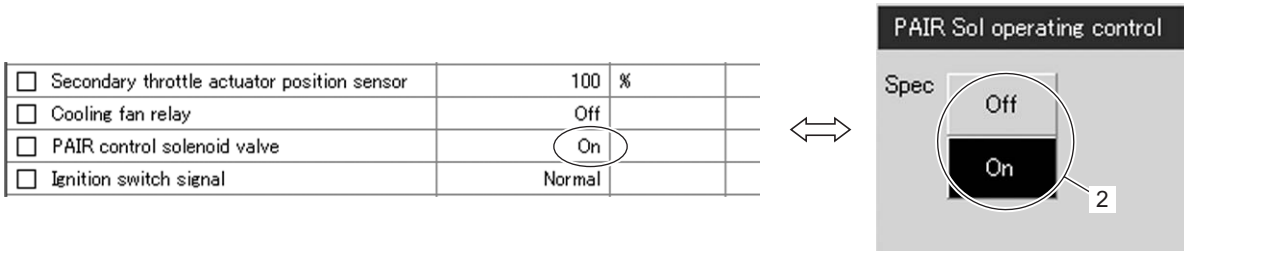
Active Control Inspection

1) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
2) Turn the ignition switch ON.
3) Click “PAIR Sol operating control” (1).



I940H1110110-02

4) Click each button (2). At this time, if an operating sound is heard from the PAIR control solenoid valve, the function is normal.



I940H1110111-04

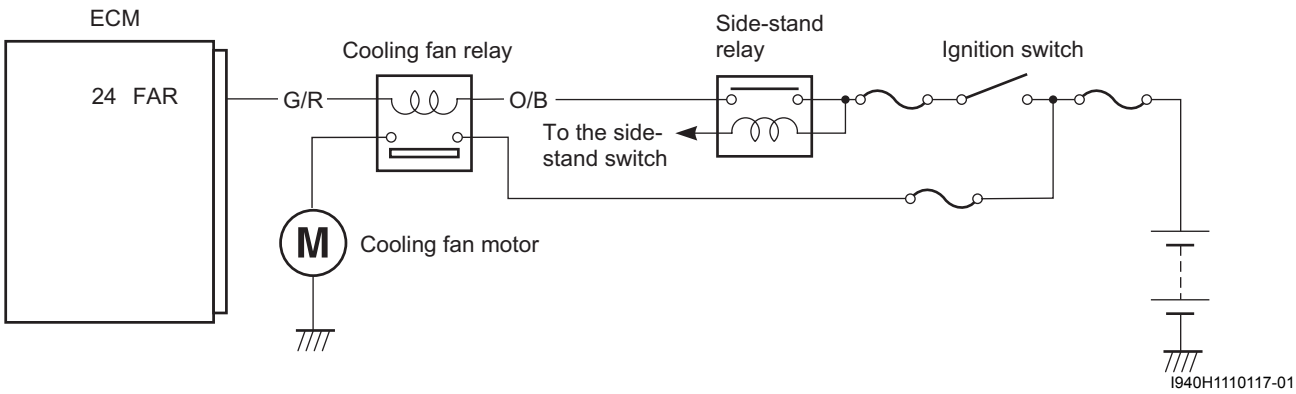
DTC “C60” (P0480): Cooling Fan Relay Circuit Malfunction

B940H21104026

Detected Condition and Possible Cause

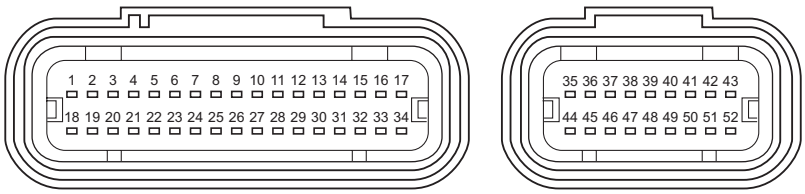
Detected Condition	Possible Cause
Cooling fan relay signal is not input to ECM.	• Cooling fan relay circuit open or short. • ECM malfunction.

Wiring Diagram



I940H1110117-01

ECM coupler (Harness side)



I940H1110012-03

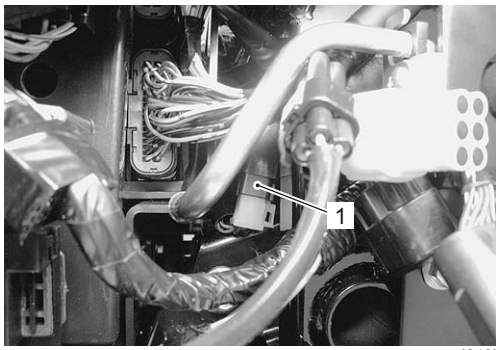
Troubleshooting

⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

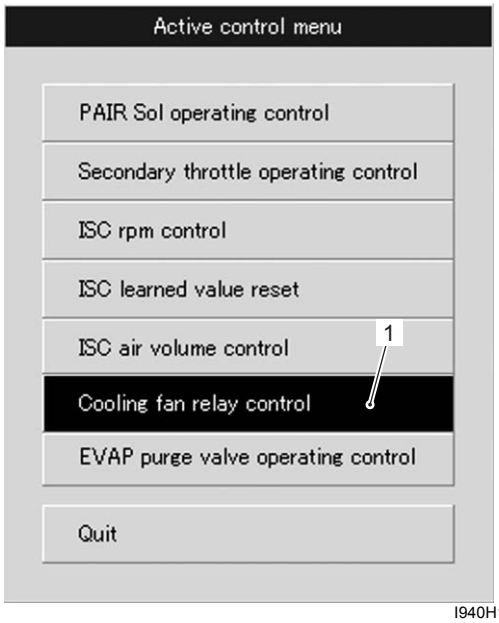
NOTE

After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the right frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”. 3) Check the cooling fan relay (1) coupler for loose or poor contacts. If OK, then inspection the cooling fan relay. Refer to “Cooling Fan Inspection in Section 1F (Page 1F-8)”.  I940H1110085-02 *Is the cooling fan relay OK?*	• O/B and G/R wire open or shorted to ground, or poor “24” connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	Replace the cooling fan relay with a new one.

Active Control Inspection

1) Set up the SDS tool. (Refer to SDS operation manual for further details.)
2) Start the engine and run it in idling condition.
3) Click “Cooling fan relay control” (1).

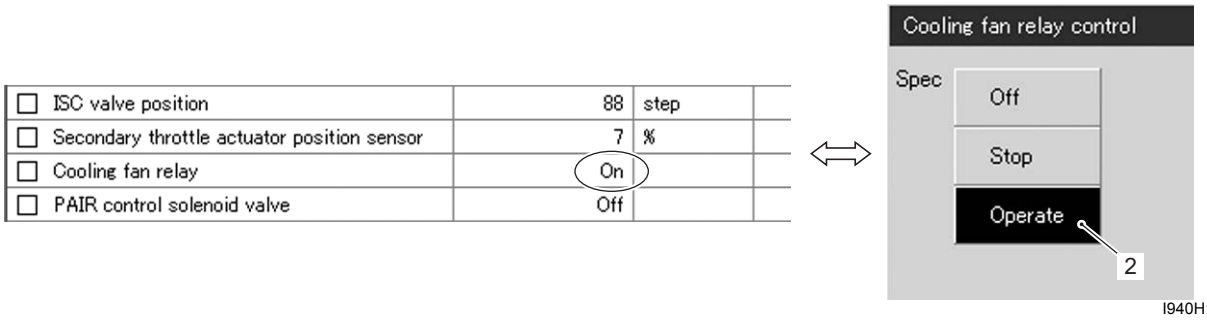


I940H1110112-03

4) Click the “Operate” (2).
At this time, if an operation sound is heard from the cooling fan relay and cooling fan motors are operated, the function is normal.

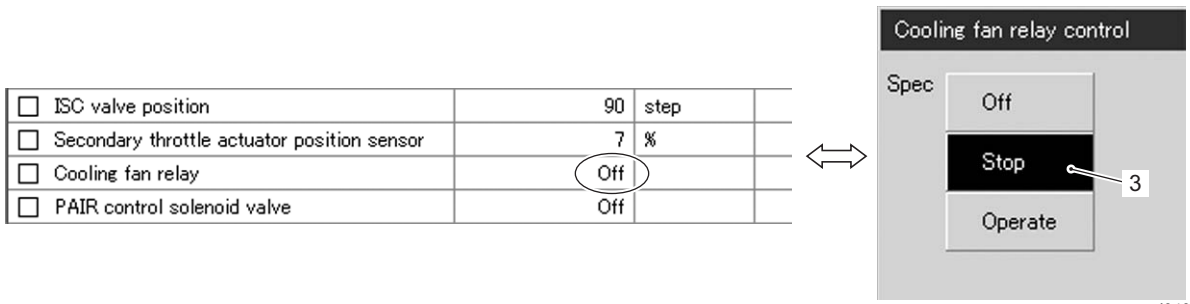
NOTE

Cooling fan relay and cooling fan motor operation can be checked until the engine coolant temperature is less than 100 °C (212 °F) after starting the engine.



I940H1110113-02

5) Click the “Stop” (3) to check the operation properly.



I940H1110114-03

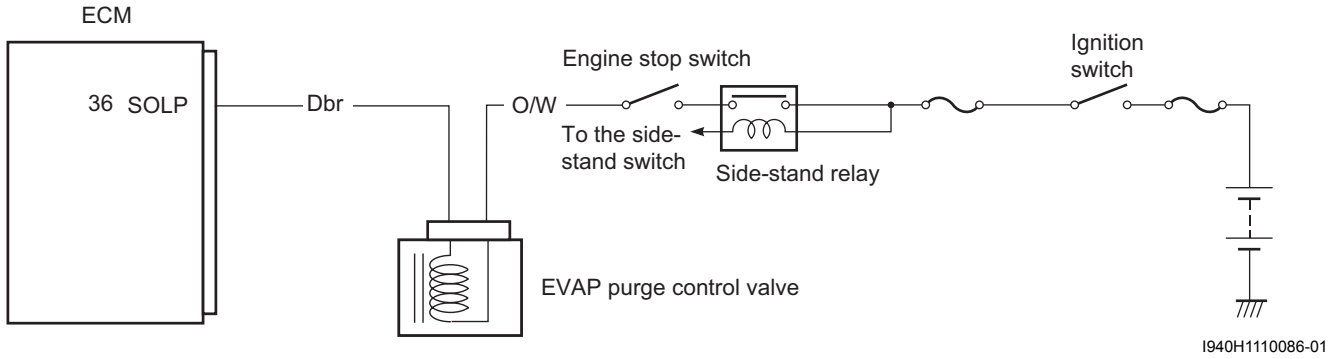
DTC “C62” (P0443): EVAP System Purge Control Solenoid Valve Circuit Malfunction (For E-33)

B940H21104027

Detected Condition and Possible Cause

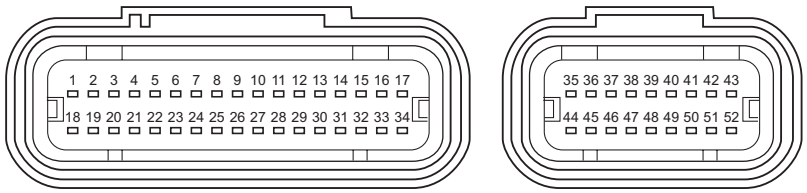
Detected Condition	Possible Cause
EVAP system purge control valve voltage is not input to ECM.	• EVAP system purge control valve circuit open or short. • EVAP system purge control valve malfunction. • ECM malfunction.

Wiring Diagram



I940H1110086-01

ECM coupler (Harness side)



I940H1110012-03

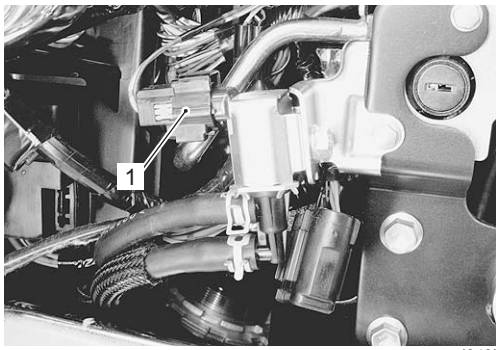
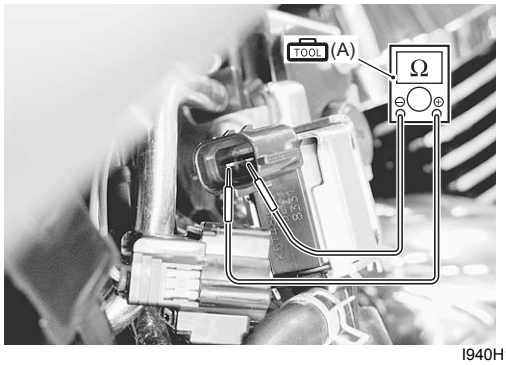
Troubleshooting

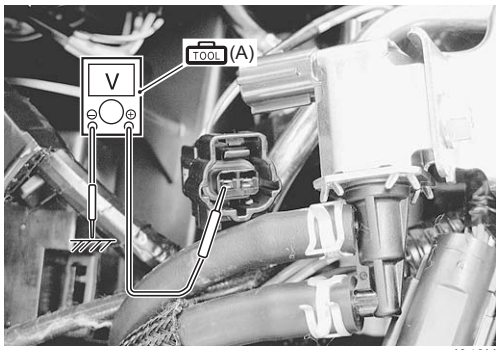
⚠ CAUTION

When using the multi-circuit tester, do not strongly touch the terminal of the ECM coupler with a needle pointed tester probe to prevent terminal damage.

NOTE

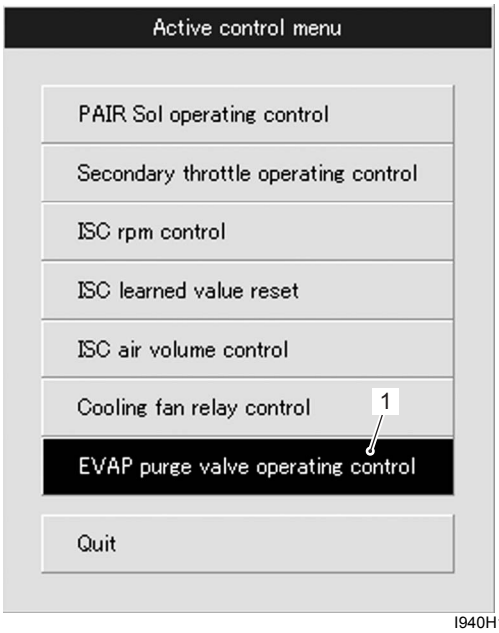
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”. 3) Check the EVAP system purge control valve coupler (1) for loose or poor contacts. If OK, then measure the EVAP system purge control valve resistance.  I940H1110087-01 4) Disconnect the EVAP system purge control valve coupler. 5) Measure the resistance between terminals. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **EVAP system purge control valve resistance** **Approx. 32 Ω at 20 °C (68 °F)** **(Terminal – Terminal)**  I940H1110088-02 *Is the resistance OK?*	Go to Step 2.	Replace the EVAP system purge control with a new one. Refer to “Evaporative Emission Control System Removal and Installation (Only for E-33) in Section 1B (Page 1B-11)”.

Step	Action	Yes	No
2	1) Turn the ignition switch ON. 2) Measure the voltage between the O/W wire and ground. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **EVAP system purge control valve voltage** **Battery voltage** **((+) terminal: O/W – (–) terminal: Ground)**  I940H1110089-02 *Is the voltage OK?*	• W/Y wire open or shorted to ground, or poor “36” connection failure. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit and poor connection. • Replace the ECM with a known good one, and inspect it again. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”.	Open or short circuit in the O/W wire.

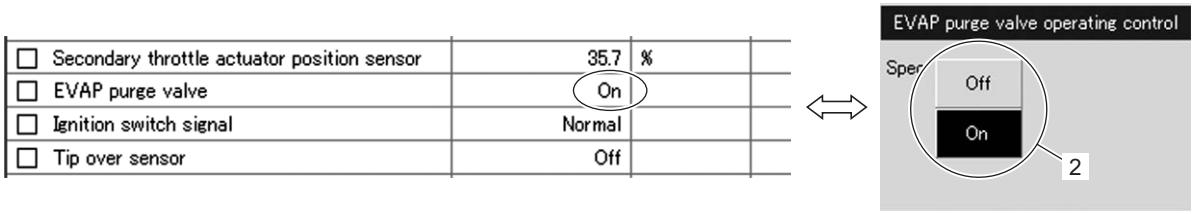
Active Control Inspection

1) Set up the SDS tool. (Refer to SDS operation manual for further details.)
2) Turn the ignition switch ON.
3) Click “EVAP purge valve operating control” (1).



I940H1110115-01

4) Click each button (2). At this time, if an operating sound is heard from the EVAP system purge control valve, the function is normal.



I940H1110116-01

Specifications

Service Data

B940H21107001

Injector

Item	Specification	Note
Injector resistance	11 – 13 Ω at 23 °C (73 °F)	

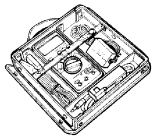
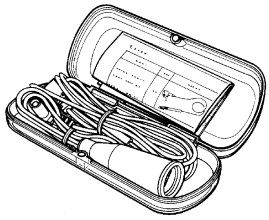
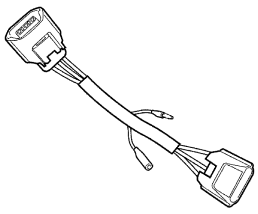
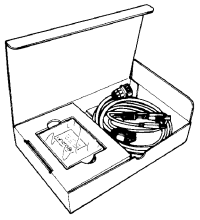
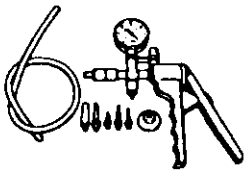
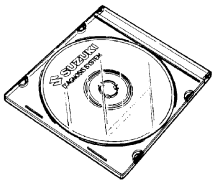
FI Sensors

Item	Specification		Note
CKP sensor resistance	170 – 260 Ω		
CKP sensor peak voltage	3.0 V and more		When cranking
IAP sensor input voltage (F & R)	4.5 – 5.5 V		
IAP sensor output voltage (F & R)	Approx. 2.6 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor resistance	Closed	Approx. 1.1 kΩ	
	Opened	Approx. 4.3 kΩ	
TP sensor output voltage	Closed	Approx. 1.1 V	
	Opened	Approx. 4.3 V	
ECT sensor input voltage	4.5 – 5.5 V		
ECT sensor output voltage	0.1 – 4.85 V		
ECT sensor resistance	Approx. 2.45 kΩ at 20 °C (68 °F)		
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor output voltage	0.1 – 4.6 V		
IAT sensor resistance	Approx. 2.5 kΩ at 20 °C (68 °F)		
TO sensor resistance	16.5 – 22.3 kΩ		
TO sensor voltage	Normal	0.4 – 1.4 V	
	Leaning	3.7 – 4.4 V	When leaning 65°
GP switch voltage	0.6 V and more		From 1st to Top
Injector voltage	Battery voltage		
Ignition coil primary peak voltage	150 V and more		#2: (+) B, (–) Ground #1: (+) W/Bl, (–) Ground
STP sensor input voltage	4.5 – 5.5 V		
STP sensor output voltage	Closed	Approx. 0.6 V	
	Opened	Approx. 4.2 V	
STV actuator resistance	Approx. 7 Ω		
HO2 sensor output voltage	0.4 V and less at idle speed		
	0.6 V and more at 4 000 r/min		
HO2 sensor heater resistance	4.0 – 5.0 Ω at 23 °C (73 °F)		
PAIR solenoid valve resistance	18 – 22 Ω at 20 – 30 °C (68 – 86 °F)		
ISC valve resistance	Approx. 20 Ω at 20 °C (68 °F)		
EVAP system purge control solenoid valve resistance	Approx. 32 Ω at 20 °C (68 °F)		E-33 only

Special Tools and Equipment

Special Tool

B940H21108001

09900–25008 Multi-circuit tester set ☞(Page 1A-27) / ☞(Page 1A-28) / ☞(Page 1A-28) / ☞(Page 1A-30) / ☞(Page 1A-31) / ☞(Page 1A-32) / ☞(Page 1A-34) / ☞(Page 1A-35) / ☞(Page 1A-36) / ☞(Page 1A-37) / ☞(Page 1A-38) / ☞(Page 1A-38) / ☞(Page 1A-39) / ☞(Page 1A-40) / ☞(Page 1A-40) / ☞(Page 1A-42) / ☞(Page 1A-43) / ☞(Page 1A-44) / ☞(Page 1A-45) / ☞(Page 1A-45) / ☞(Page 1A-47) / ☞(Page 1A-48) / ☞(Page 1A-49) / ☞(Page 1A-50) / ☞(Page 1A-50) / ☞(Page 1A-52) / ☞(Page 1A-53) / ☞(Page 1A-54) / ☞(Page 1A-55) / ☞(Page 1A-56) / ☞(Page 1A-57) / ☞(Page 1A-60) / ☞(Page 1A-60) / ☞(Page 1A-63) / ☞(Page 1A-64) / ☞(Page 1A-65) / ☞(Page 1A-66) / ☞(Page 1A-67) / ☞(Page 1A-67) / ☞(Page 1A-68) / ☞(Page 1A-70) / ☞(Page 1A-72) / ☞(Page 1A-73) / ☞(Page 1A-73) / ☞(Page 1A-75) / ☞(Page 1A-76) / ☞(Page 1A-81) / ☞(Page 1A-82) / ☞(Page 1A-83) / ☞(Page 1A-84) / ☞(Page 1A-85) / ☞(Page 1A-88) / ☞(Page 1A-88) / ☞(Page 1A-94) / ☞(Page 1A-95)	
09900–25009 Needle pointed probe set ☞(Page 1A-31) / ☞(Page 1A-36) / ☞(Page 1A-38) / ☞(Page 1A-43) / ☞(Page 1A-45) / ☞(Page 1A-48) / ☞(Page 1A-50) / ☞(Page 1A-54) / ☞(Page 1A-56) / ☞(Page 1A-57) / ☞(Page 1A-65) / ☞(Page 1A-67) / ☞(Page 1A-70) / ☞(Page 1A-75) / ☞(Page 1A-82) / ☞(Page 1A-83) / ☞(Page 1A-85)	
09900–28630 TPS test wire harness ☞(Page 1A-39) / ☞(Page 1A-40) / ☞(Page 1A-40) / ☞(Page 1A-68)	
09904–41010 SDS set ☞(Page 1A-12) / ☞(Page 1A-16)	
09917–47011 Vacuum pump gauge ☞(Page 1A-32)	
09930–82720 Mode select switch ☞(Page 1A-3) / ☞(Page 1A-11) / ☞(Page 1A-11)	
99565–01010–017 CD-ROM Ver.17 ☞(Page 1A-12) / ☞(Page 1A-16)	

Emission Control Devices

Precautions

Precautions for Emission Control Devices

B940H21200001

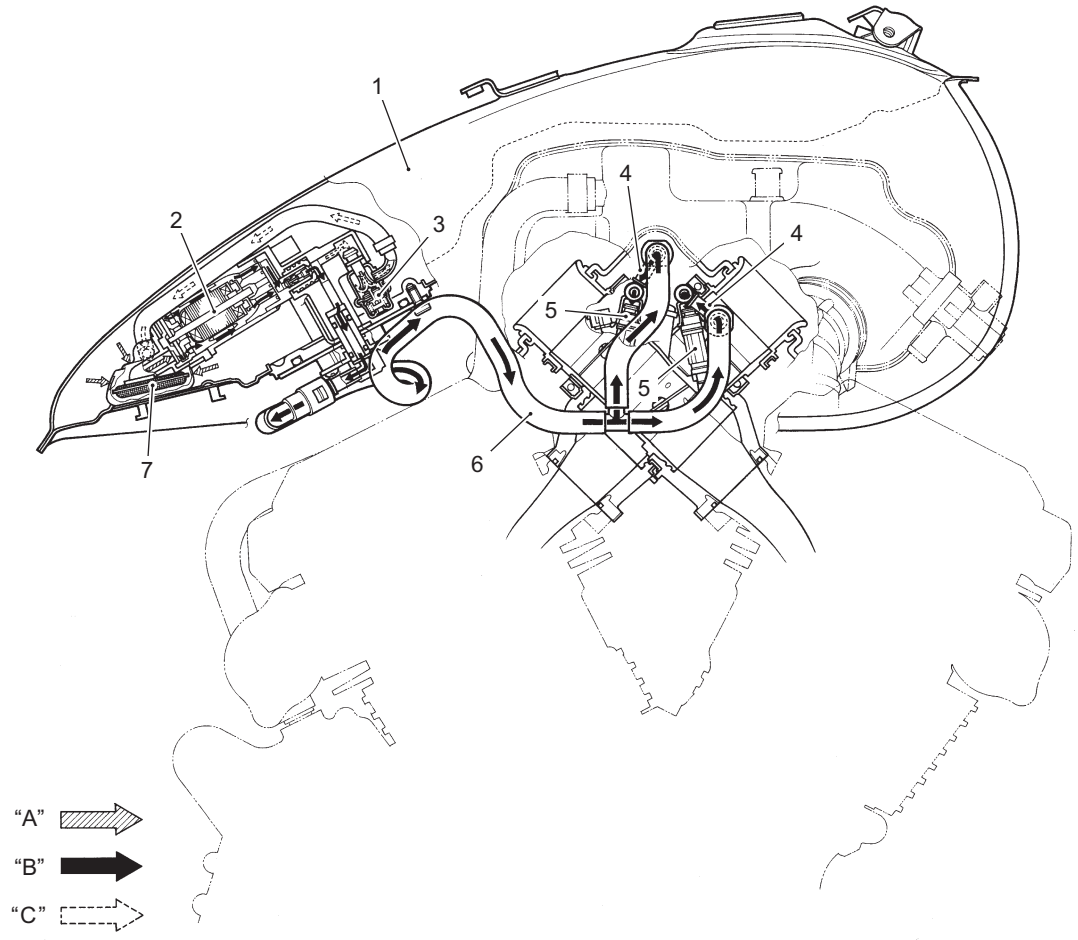
Refer to “General Precautions in Section 00 (Page 00-1)”.

General Description

Fuel Injection System Description

B940H21201001

VZ1500 motorcycles are equipped with a fuel injection system for emission level control. This fuel injection system is precision designed, manufactured and adjusted to comply with the applicable emission limits. With varying engine conditions, all of the fuel injection volumes are precisely controlled by the programmed injection maps in the ECM to reduce CO, NOX and HC. Adjusting, interfering with, improper replacement, or resetting of any of the fuel injection components may adversely affect injection performance and cause the motorcycle to exceed the exhaust emission level limits.



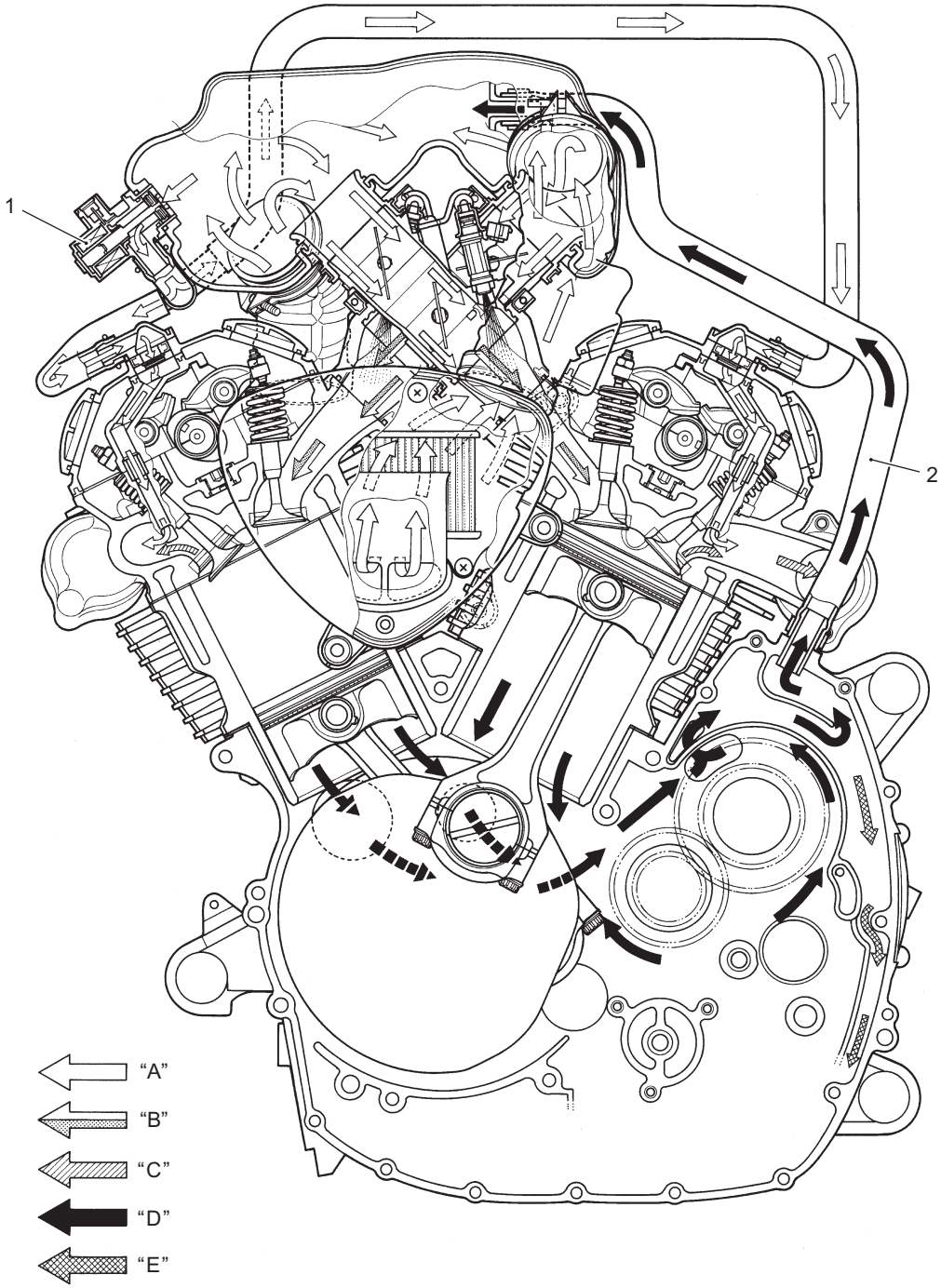
I940H1120017-02

1. Fuel tank	5. Fuel injector	“B”: Pressurized fuel
2. Fuel pump	6. Fuel feed hose	“C”: Relieved fuel
3. Fuel pressure regulator	7. Fuel filter (For low pressure)	
4. Fuel delivery pipe	“A”: Before-pressurized fuel	

Crankcase Emission Control System Description

B940H21201002

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 (breather) hose, air cleaner chamber and throttle body.



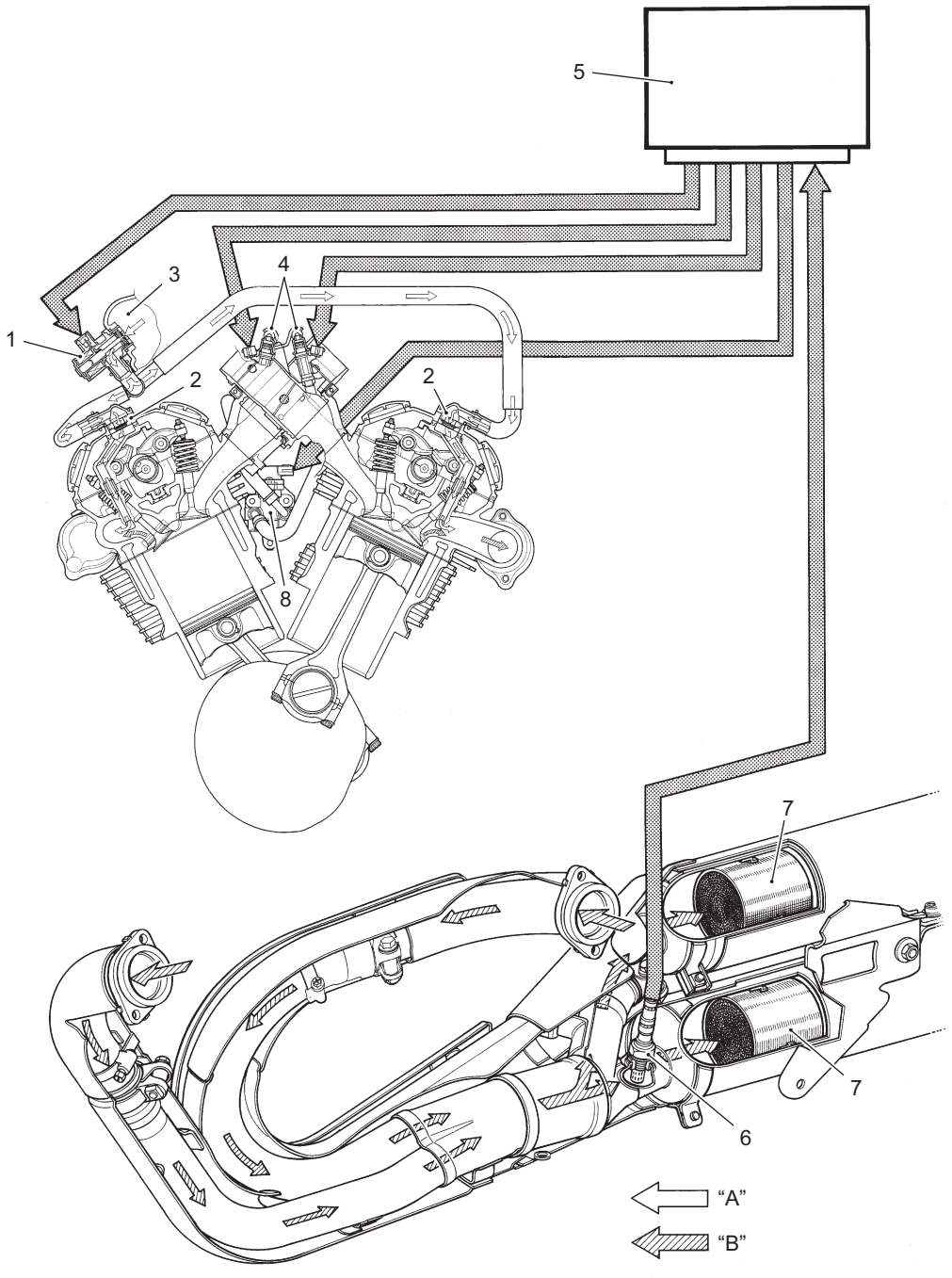
I940H1120019-01

1. PAIR control solenoid valve	"A": Fresh air	"C": Exhaust gas	"E": Return oil
2. PCV hose	"B": Fuel/Air mixture	"D": Blow-by gas	

Exhaust Emission Control System Description

B940H21201003

The exhaust emission control system is composed of the PAIR system, three way catalyst system and ISC system. The fresh air is drawn into the exhaust port through the PAIR control solenoid valve and PAIR reed valve. The PAIR control solenoid valve is operated by the ECM, which is controlled according to the signals from TPS, ECTS, IATS, IAPS and CKPS. ISC valve adjusts the bypass air volume of the throttle body to control engine idling speed with various sensor signals by varying engine running conditions and the idling control contributes to reduce exhaust emission level.



I940H1120020-03

1. PAIR control solenoid valve	6. HO2 sensor (E-02, 19, 24, 33)
2. PAIR reed valve	7. Catalyst
3. Air cleaner chamber	8. ISC valve
4. Fuel injector	"A": Fresh air
5. ECM	"B": Exhaust gas

Noise Emission Control System Description

B940H21201004

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

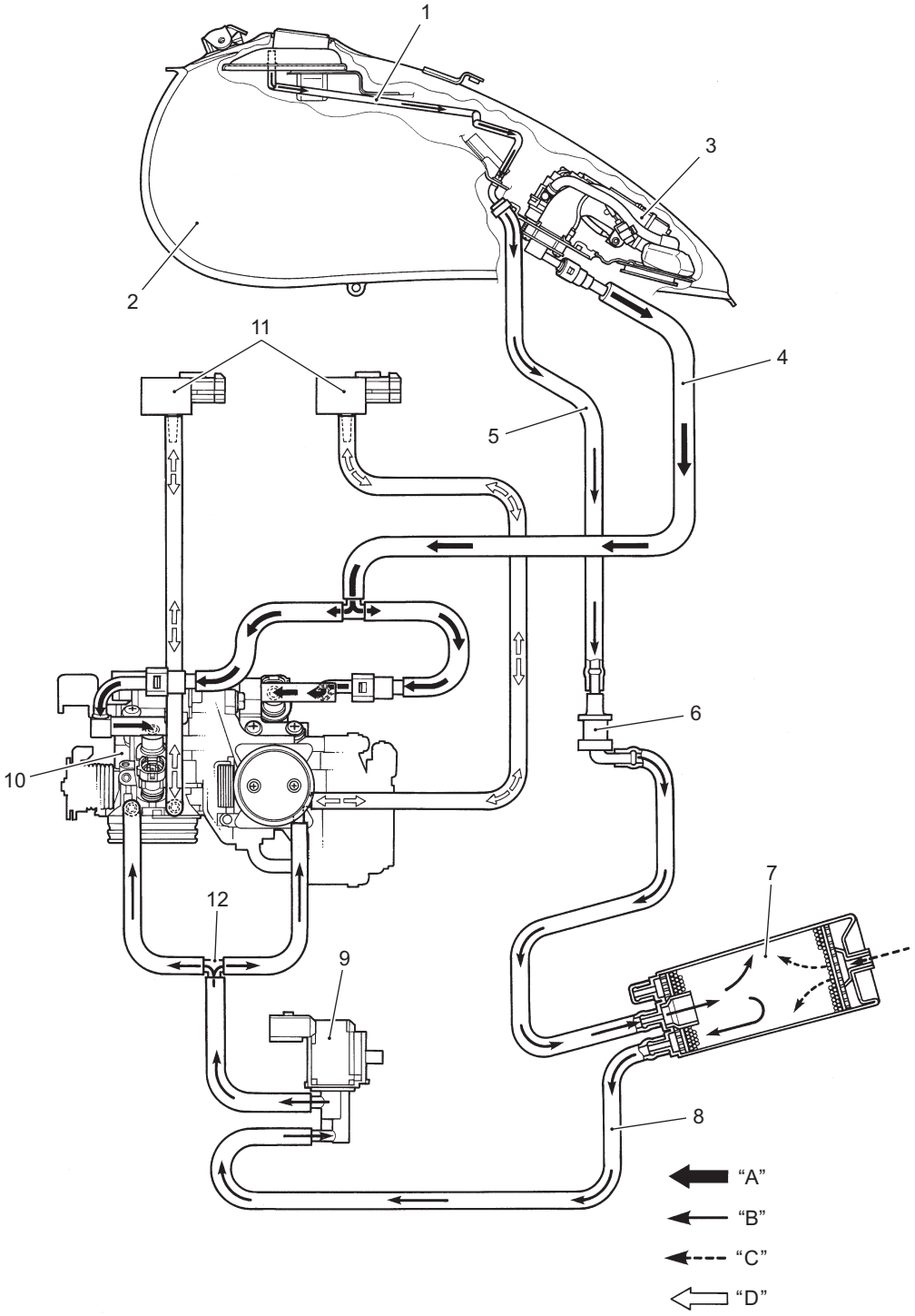
- The removal or rendering inoperative by any person, other than for purposes of maintenance, repair or replacement, of any device or element of design incorporated into any new vehicle for the purpose of noise control prior to its sale or delivery to the ultimate purchaser or while it is in use, or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

Evaporative Emission Control System Diagram (Only for E-33)

B940H21201005



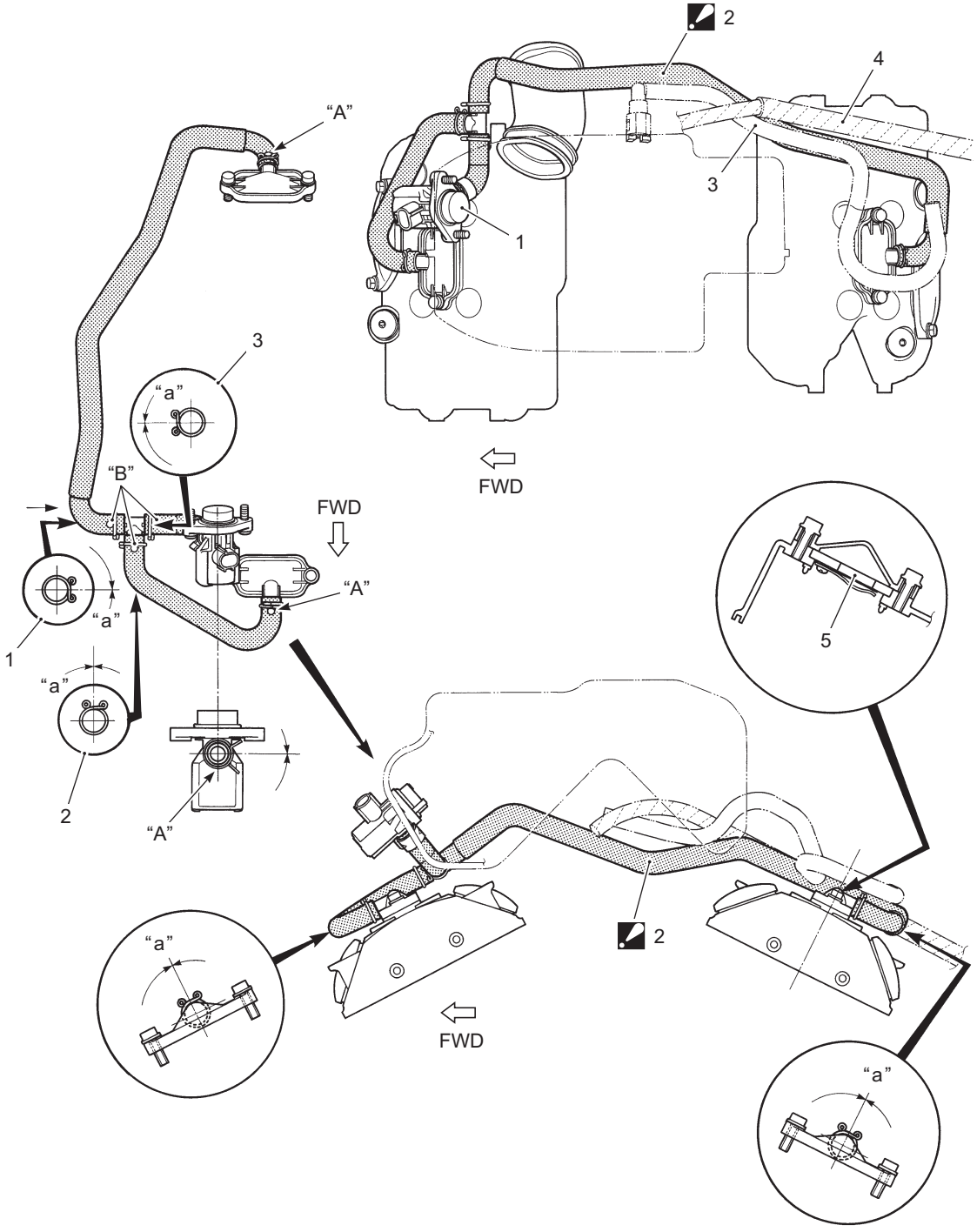
I940H1120018-01

1. Fuel-vapor separator	7. EVAP canister	"A": Fuel
2. Fuel tank	8. Purge hose	"B": HC vapor
3. Fuel pump	9. EVAP purge control valve	"C": Fresh air
4. Fuel feed hose	10. Throttle body	"D": Vacuum
5. Surge hose	11. IAP sensor	
6. Fuel shut-off valve	12. 3-way connector	

Schematic and Routing Diagram

PAIR System Hose Routing Diagram

B940H21202001

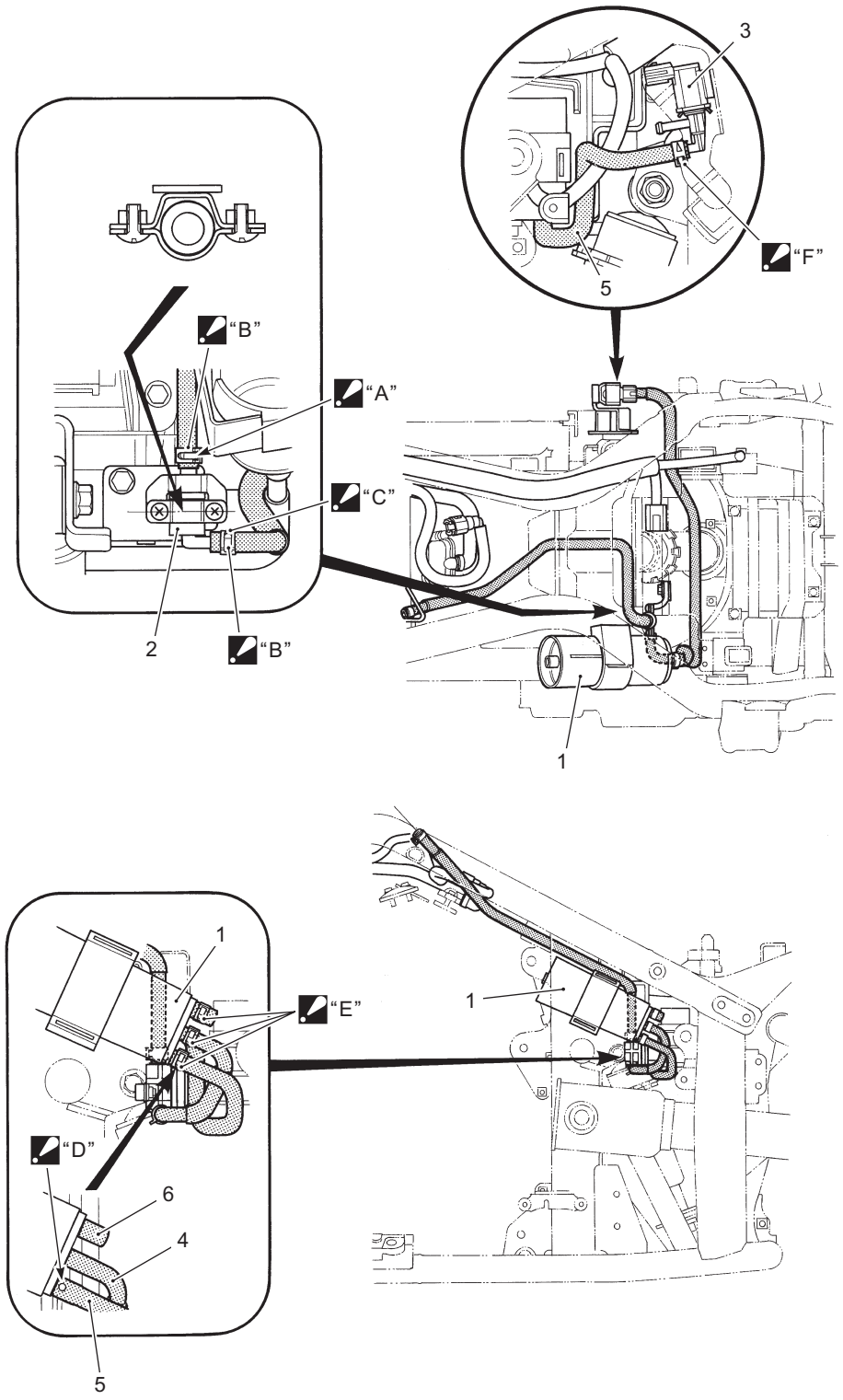


I940H1120001-03

1. PAIR control solenoid valve	5. PAIR reed valve
2. PAIR hose (Rear) : Pass the PAIR hose (Rear) under the fuel hose and wiring harness.	"A": Matching mark (White)
3. Fuel hose	"B": Matching mark (Yellow)
4. Wiring harness	"a": 0°

EVAP Canister Hose Routing Diagram (Only for E-33)

B940H21202002



I940H1120021-01

1. EVAP canister	"A": Face the white mark on the hose to backward.
2. Fuel shut-off valve	"B": Face the tip of the clip to backward.
3. Purge control valve	"C": Face the white mark on the hose to upper.
4. Surge hose	"D": Face the white mark on the hose to outside.
5. Purge hose	"E": Face the tip of the clip to outside.
6. Cap	"F": Face the tip of the clip to downward.

Repair Instructions

Heated Oxygen Sensor (HO2S) Removal and Installation

B940H21206001

Removal

Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.

⚠ WARNING

Do not remove the HO2 sensor while it is hot.

⚠ CAUTION

- **Be careful not to expose the HO2 sensor to excessive shock.**
- **Do not use an impact wrench when removing or installing the HO2 sensor.**
- **Be careful not to twist or damage the sensor lead wires.**

Installation

Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.

⚠ CAUTION

Do not apply oil or other materials to the sensor air hole.

Heated Oxygen Sensor (HO2S) Inspection

B940H21206002

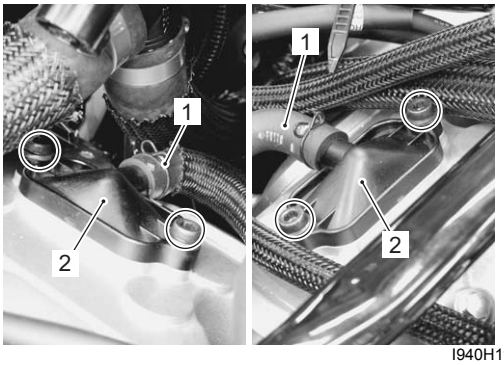
Refer to “DTC “C44” (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction (For E-02, 19, 24, 33) in Section 1A (Page 1A-80)”.

PAIR Reed Valve Removal and Installation

B940H21206003

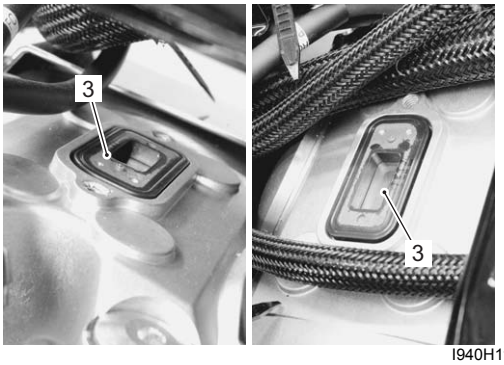
Removal

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Remove the air cleaner chamber. Refer to “Air Cleaner Chamber Removal and Installation in Section 1D (Page 1D-7)”.
3) Disconnect the PAIR hoses (1) and remove the PAIR reed valve covers (2).



I940H1120002-01

4) Remove the PAIR reed valves (3).



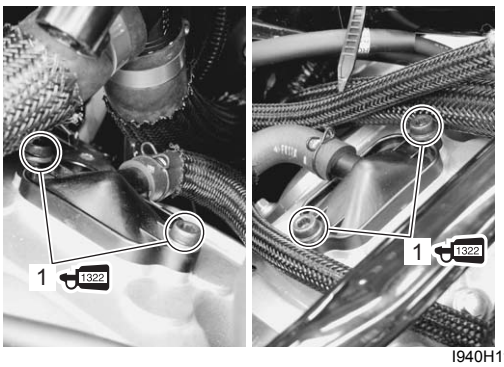
I940H1120003-01

Installation

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

- Apply thread lock to the bolts (1) and tighten them.

1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)



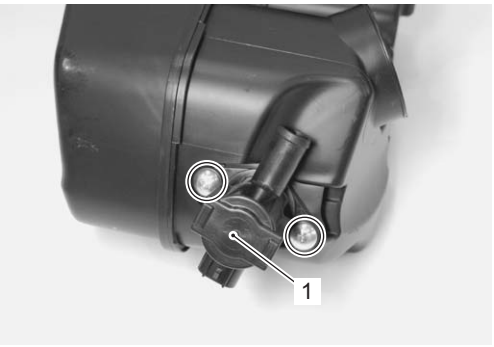
I940H1120004-01

PAIR Control Solenoid Valve Removal and Installation

B940H21206004

Removal

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Remove the air cleaner chamber. Refer to “Air Cleaner Chamber Removal and Installation in Section 1D (Page 1D-7)”.
3) Remove the PAIR control solenoid valve (1).



I940H1120005-01

Installation

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

- Apply thin coat of the engine oil to the O-ring(-s).

⚠ CAUTION

Replace the O-ring(-s) with new ones.

- Connect the PAIR control solenoid valve coupler and PAIR hoses securely. Refer to “PAIR System Hose Routing Diagram (Page 1B-6)”.



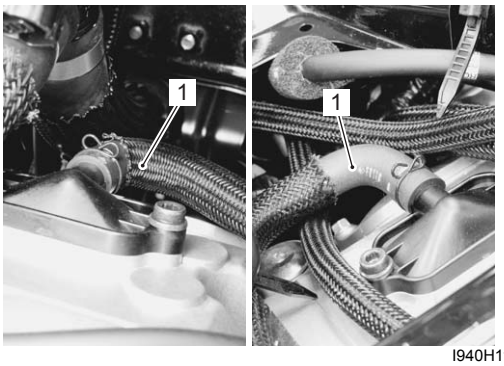
I940H1120006-02

PAIR System Inspection

B940H21206005

PAIR Hose

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Remove the air cleaner chamber. Refer to “Air Cleaner Chamber Removal and Installation in Section 1D (Page 1D-7)”.
3) Inspect the PAIR hoses (1) for wear or damage. If it is worn or damaged, replace the PAIR hose with a new one. Refer to “PAIR System Hose Routing Diagram (Page 1B-6)”.



I940H1120007-01

4) Reinstall the removed parts.

PAIR Reed Valve

NOTE

PAIR control solenoid valve can be checked without removing it from the motorcycle. Refer to “DTC “C49” (P1656): PAIR Solenoid Valve Circuit Malfunction in Section 1A (Page 1A-86)”.

1) Remove the PAIR reed valves. Refer to “PAIR Reed Valve Removal and Installation (Page 1B-8)”.
2) Inspect the reed valves for the carbon deposit. If the carbon deposit is found in the reed valve, replace the PAIR reed valve with a new one.

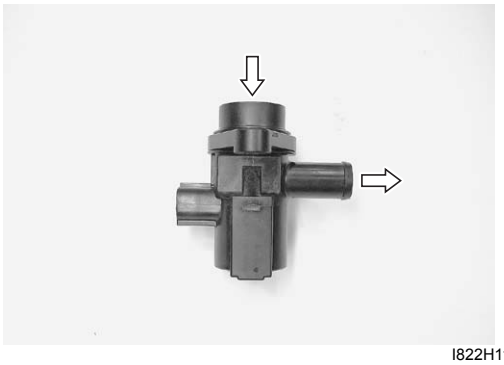


I822H1120012-01

3) Reinstall the PAIR reed valves. Refer to “PAIR Reed Valve Removal and Installation (Page 1B-8)”.

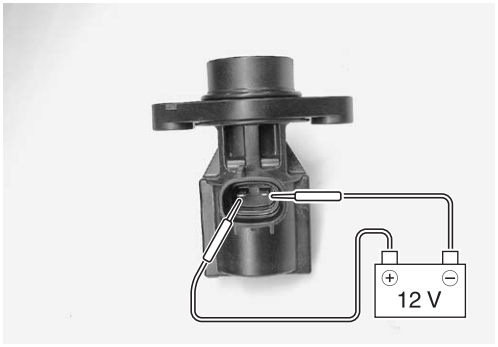
PAIR Control Solenoid Valve

1) Remove the PAIR control solenoid valve. Refer to “PAIR Control Solenoid Valve Removal and Installation (Page 1B-9)”.
2) Check that air flows through the air inlet port to the air outlet port. If air does not flow out, replace the PAIR control solenoid valve with a new one.



I822H1120013-01

3) Connect the 12 V battery to the PAIR control solenoid valve terminals and check the air flow. If air does not flow out, the solenoid valve is in normal condition.



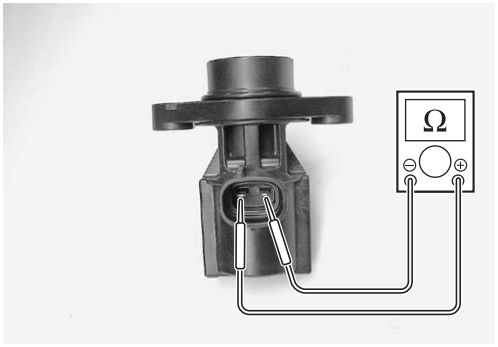
I822H1120014-01

4) Check the resistance between the terminals of the PAIR control solenoid valve.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Resistance (Ω)

PAIR control solenoid valve resistance
18 – 22 Ω at 20 – 30 °C (68 – 86 °F)



I822H1120015-01

5) Reinstall the PAIR control solenoid valve. Refer to “PAIR Control Solenoid Valve Removal and Installation (Page 1B-9)”.

Crankcase Breather (PCV) Hose Inspection

B940H21206006

Inspect the crankcase breather (PCV) hose in the following procedures:

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
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 PCV hose (1) is securely connected.
4) Install the removed parts.



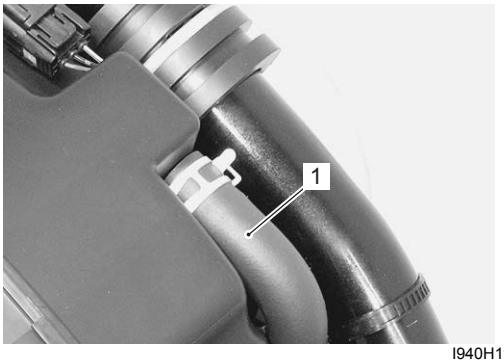
I940H1120008-02

Crankcase Breather (PCV) Hose Removal and Installation

B940H21206007

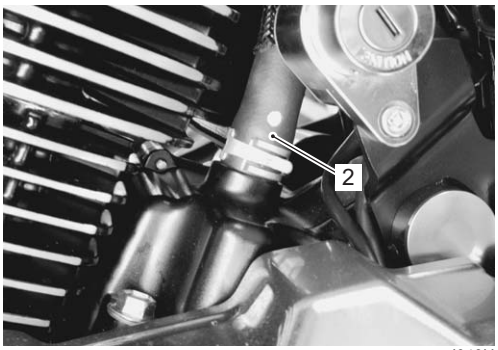
Removal

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Disconnect the air cleaner chamber side of PCV hose (1).



I940H1120009-02

3) Disconnect the crankcase side of PCV hose (2).



I940H1120010-02

Installation

Installation is in the reverse order of removal.
Pay attention to the following point:

- Install the PCV hose as shown in the throttle body construction. Refer to “Throttle Body Construction in Section 1D (Page 1D-10)”.

Evaporative Emission Control System Removal and Installation (Only for E-33)

B940H21206008

Hose

Removal

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Remove the EVAP hose as shown in the EVAP canister hose routing diagram. Refer to “EVAP Canister Hose Routing Diagram (Only for E-33) (Page 1B-7)”.

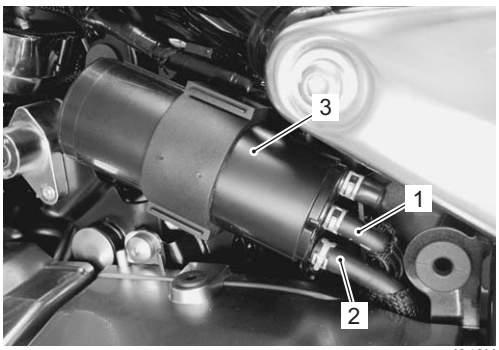
Installation

1) Install the EVAP hose as shown in the EVAP canister hose routing diagram. Refer to “EVAP Canister Hose Routing Diagram (Only for E-33) (Page 1B-7)”.
2) Reinstall the removed parts.

EVAP Canister

Removal

1) Remove the right frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Disconnect the surge hose (1), purge hose (2).
3) Remove the EVAP canister (3).



I940H1120011-03

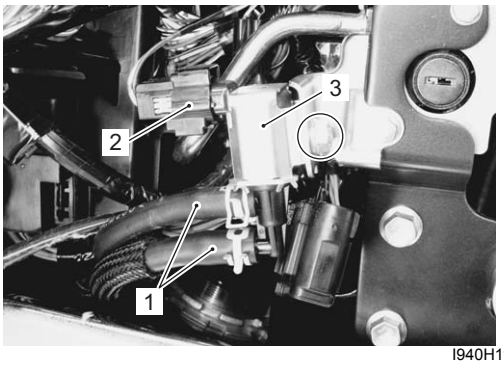
Installation

Install the EVAP canister in the reverse order of removal.

EVAP System Purge Control Solenoid Valve

Removal

1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Disconnect the purge hose (1).
3) Disconnect the coupler (2) and EVAP system purge control solenoid valve (3).

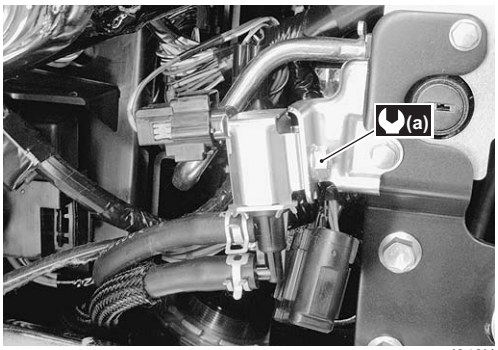


I940H1120012-02

Installation

1) Install the EVAP system purge control solenoid valve as shown in the EVAP canister hose routing diagram. Refer to “EVAP Canister Hose Routing Diagram (Only for E-33) (Page 1B-7)”.
2) Tighten the mounting nut to the specified torque.

Tightening torque
EVAP system purge control solenoid valve mounting nut (a): 7 N·m (0.7 kgf-m, 5.0 lbf-ft)

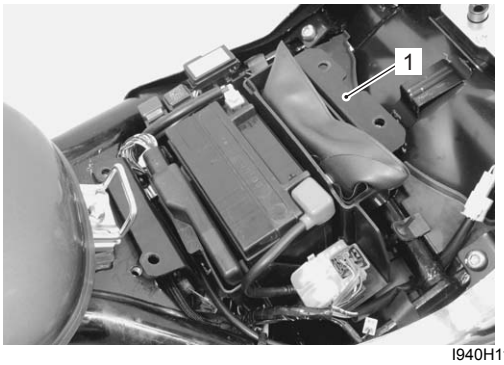


I940H1120016-01

3) Reinstall the removed parts.

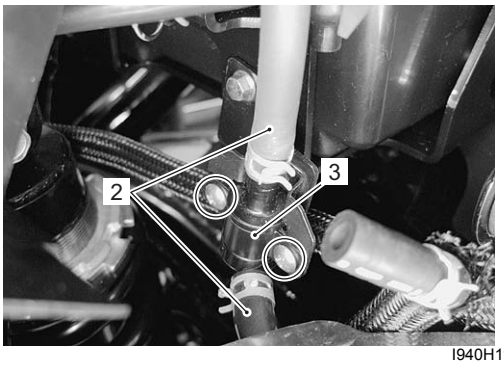
Fuel Shut-off Valve
Removal

1) Move the battery holder (1). Refer to “Battery / Battery Holder Removal and Installation in Section 1J (Page 1J-11)”.



I940H1120013-01

2) Remove the EVAP canister. Refer to “Evaporative Emission Control System Removal and Installation (Only for E-33) (Page 1B-11)”.
3) Disconnect the surge hoses (2).
4) Remove the fuel shut-off valve (3).



I940H1120014-04

Installation

1) Install the fuel shut-off valve as shown in the EVAP canister hose routing diagram. Refer to “EVAP Canister Hose Routing Diagram (Only for E-33) (Page 1B-7)”.
2) Reinstall the removed parts.

Evaporative Emission Control System Inspection (For E-33 only)

B940H21206009

Refer to “Evaporative Emission Control System Removal and Installation (Only for E-33) (Page 1B-11)”.

Hose

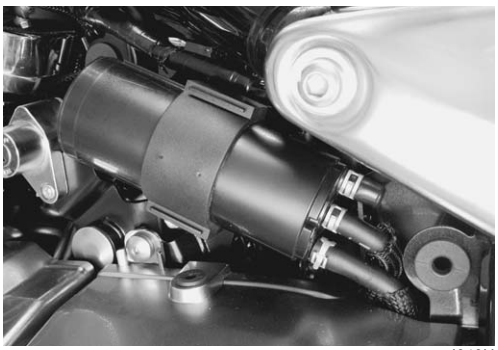
Inspect the hoses for wear or damage. If it is worn or damage, replace the hose with a new one.

NOTE

Make sure that the hoses are securely connected.

EVAP Canister

Inspect the EVAP canister body for damage to the body. If any defect is found, replace the EVAP canister with a new one.



I940H1120015-01

EVAP System Purge Control Solenoid Valve

NOTE

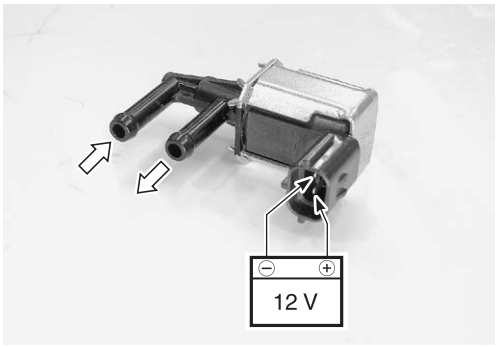
EVAP system purge control solenoid valve can be checked without removing it from the motorcycle. Refer to "DTC "C62" (P0443): EVAP System Purge Control Solenoid Valve Circuit Malfunction (For E-33) in Section 1A (Page 1A-93)".

1) Check that no air flows through both of the air inlet and outlet ports. If air flows out, replace the EVAP system purge control solenoid valve with a new one.



I822H1120026-01

2) Connect the 12 V battery to the terminals of the EVAP system purge control solenoid valve and check the air flow. If air flows out, the solenoid valve is in normal condition.



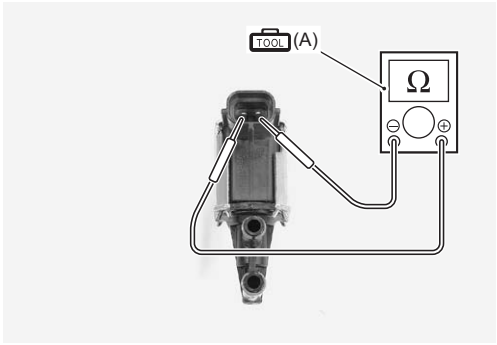
I822H1120027-01

3) Check the resistance between the terminals of the EVAP system purge control solenoid valve. If the resistance is not within the standard range, replace the EVAP system purge control solenoid valve with a new one.

Special tool
(A): 09900–25008 (Multi-circuit tester set)

Tester knob indication
Resistance (Ω)

EVAP system purge control solenoid valve resistance
Approx. 32 Ω at 20 °C (68 °F)

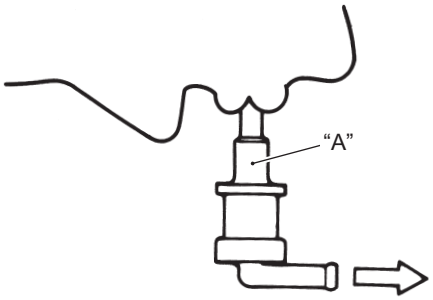


I822H1120028-01

Fuel Shut-Off Valve

Inspect the fuel shut-off valve body for damage. Inspect the fuel shut-off valve operation in the following procedures:

1) When air is blown into the fuel shut-off valve with its side "A" positioned upward, the air can pass through to the canister side.

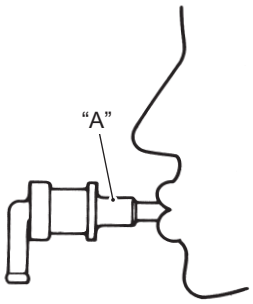


I823H1120037-01

2) When air is blown into the fuel shut-off valve with its side “A” positioned sideways, the air cannot pass through to the canister side. If the fuel shut-off valve operates otherwise, it must be replaced.

⚠ WARNING

Gasoline and gasoline vapor is toxic. A small amount of fuel remains in the fuel shut-off valve when checking it. Do not swallow the fuel when blowing the fuel shut-off valve.



I823H1120038-02

Specifications

Service Data

B940H21207001

FI Sensors

Item	Specification	Note
HO2 sensor output voltage	0.4 V and less at idle speed	
	0.6 V and more at 3 000 r/min	
PAIR solenoid valve resistance	18 – 22 Ω at 20 – 30 °C (68 – 86 °F)	
EVAP system purge control solenoid valve resistance	Approx. 32 Ω at 20 °C (68 °F)	E-33 only

Tightening Torque Specifications

B940H21207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
EVAP system purge control solenoid valve mounting nut	7	0.7	5.0	☞(Page 1B-12)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

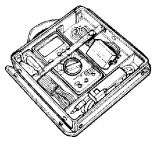
Recommended Service Material

B940H21208001

Material	SUZUKI recommended product or Specification		Note
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞(Page 1B-8)

Special Tool

B940H21208002

09900–25008 Multi-circuit tester set ☞(Page 1B-10) / ☞(Page 1B-13)		

Engine Electrical Devices

Precautions

Precautions for Engine Electrical Device

B940H21300001

Refer to “General Precautions in Section 00 (Page 00-1)” and “Precautions for Electrical Circuit Service in Section 00 (Page 00-2)”.

Component Location

Engine Electrical Components Location

B940H21303001

Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.

Diagnostic Information and Procedures

Engine Symptom Diagnosis

B940H21304001

Refer to “Engine Symptom Diagnosis in Section 1A (Page 1A-7)”.

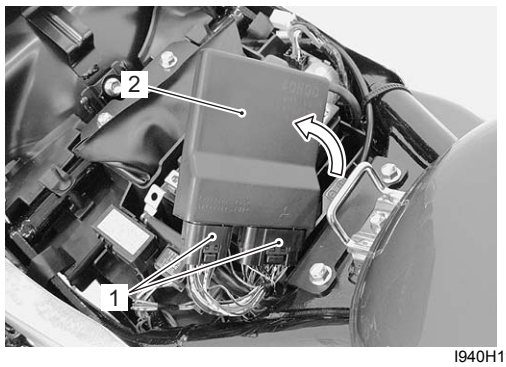
Repair Instructions

ECM Removal and Installation

B940H21306001

Removal

1) Remove the seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the battery (–) lead wire.
3) Disconnect the ECM couplers (1) and remove the ECM (2).



I940H1130001-01

Installation

Install the ECM in the reverse order of removal.

CKP Sensor Inspection

B940H21306002

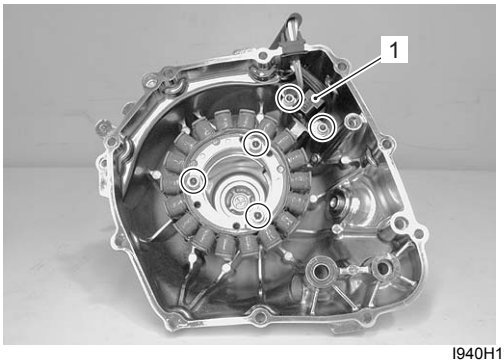
Refer to “CKP Sensor Inspection in Section 1H (Page 1H-8)”.

CKP Sensor Removal and Installation

B940H21306003

Removal

1) Remove the generator cover. Refer to “Generator Removal and Installation in Section 1J (Page 1J-5)”.
2) Remove the CKP sensor (1) along with generator starter.



I940H1130002-01

Installation

Install the CKP sensor in the reverse order of removal. Refer to “Generator Removal and Installation in Section 1J (Page 1J-5)”.

IAP Sensor Inspection

B940H21306004

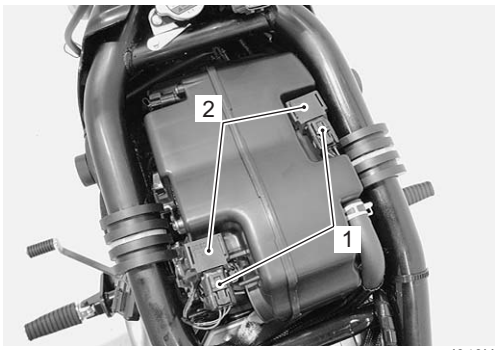
Refer to “DTC “C13” (P1750) or “C17” (P0105): IAP Sensor Circuit Malfunction in Section 1A (Page 1A-29)”.

IAP Sensor Removal and Installation

B940H21306005

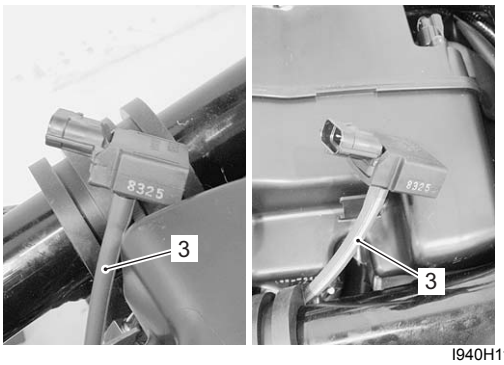
Removal

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Disconnect the IAP sensor (front and rear) couplers (1) and IAP sensors (2) (front and rear) from the air cleaner chamber.



I940H1130003-02

3) Remove the vacuum hoses (3).



I940H1130027-01

Installation

Install the IAP sensors in the reverse order of removal.

TP Sensor Inspection

B940H21306006

Refer to “DTC “C14” (P0120-H/L): TP Sensor Circuit Malfunction in Section 1A (Page 1A-33)”.

TP Sensor Removal and Installation

B940H21306007

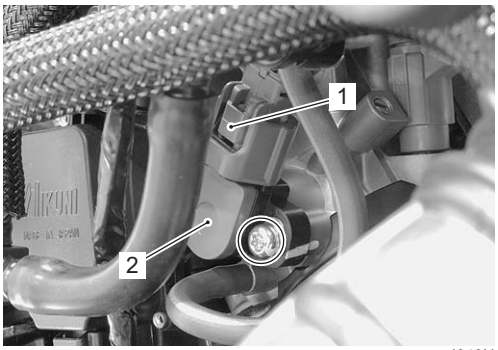
Removal

1) Turn the ignition OFF.
2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
3) Disconnect the TP sensor coupler (1) and remove the TP sensor (2) with the special tool.

NOTE

Prior to disassembly, mark each sensor’s original position with a paint or scribe for accurate reinstallation.

Special tool
TOOL : 09930–11950 (Torx wrench)



I940H1130005-01

Installation

1) Apply thin coat of the engine oil to the O-ring.

⚠ CAUTION

Replace the O-ring with a new one.

2) With the throttle valve fully closed, install the TP sensor (1) and tighten the TP sensor mounting screw to the specified torque.

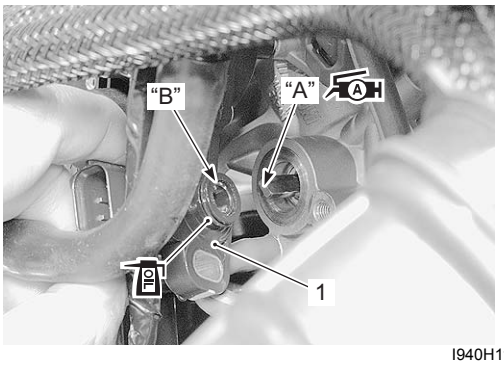
NOTE

- **Align the throttle shaft end “A” with the groove “B” of the TP sensor.**
- **Apply grease to the throttle shaft end “A”, if necessary.**

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

Special tool
TOOL : 09930–11950 (Torx wrench)

Tightening torque
TP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)



I940H1130006-03

NOTE

Make sure the throttle valve open or close smoothly. If the TP sensor adjustment is necessary, refer to “TP Sensor Adjustment (Page 1C-3)”.

TP Sensor Adjustment

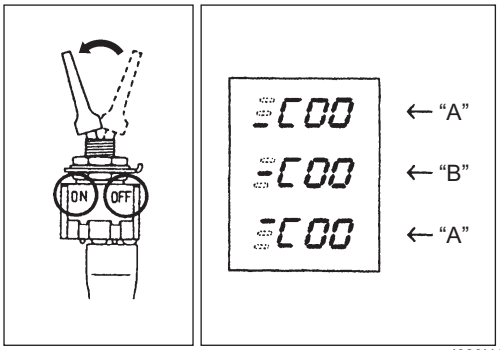
B940H21306008

Inspect the TP sensor setting position and adjust it if necessary in the following procedures:

1) Connect the special tool (Mode select switch) to the dealer mode coupler. Refer to “Self-Diagnostic Procedures in Section 1A (Page 1A-11)”.

   Special tool
   TOOL : 09930–82720 (Mode select switch)

2) Turn the mode select switch ON.
3) Check the position of the bar in the left of C code displayed on the LCD panel.

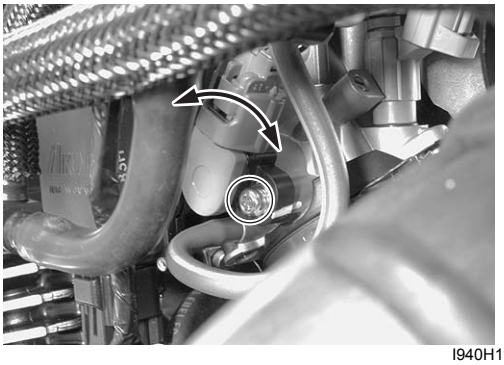


I823H1130022-01

“A”: Incorrect position	“B”: Correct position

4) Loosen the TP sensor mounting screw using the special tool and turn the TP sensor to bring the bar to the correct position.

   Special tool
   TOOL : 09930–11950 (Torx wrench)



I940H1130007-01

5) Tighten the TP sensor mounting screw to the specified torque.

   Tightening torque
   TP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)

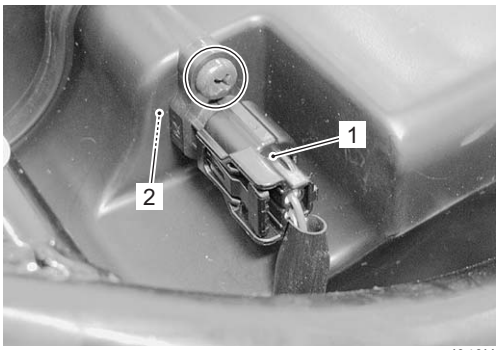
6) Turn off the engine and install the right air cleaner box. Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-6)”.

IAT Sensor Removal and Installation

B940H21306009

Removal

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Disconnect the IAT sensor coupler (1) and remove the IAT sensor (2) by removing the mounting screw.



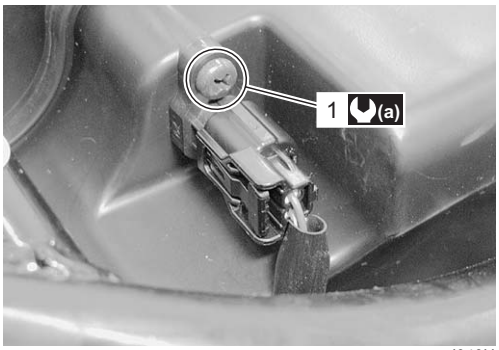
I940H1130028-01

Installation

Install the IAT sensor in the reverse order of removal. Pay attention to the following point:

- Tighten the IAT sensor mounting screw (1) to the specified torque.

  Tightening torque
  IAT sensor mounting screw (a): 1.3 N·m (0.13 kgf-m, 1.0 lbf-ft)



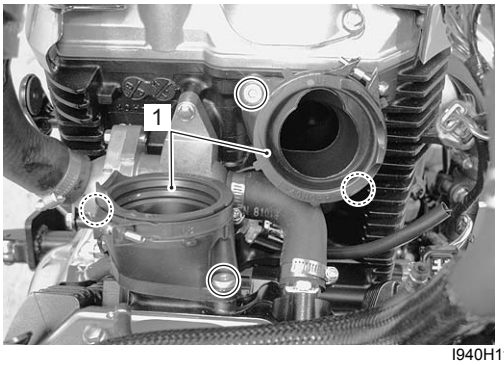
I940H1130029-01

ECT Sensor Removal and Installation

B940H21306010

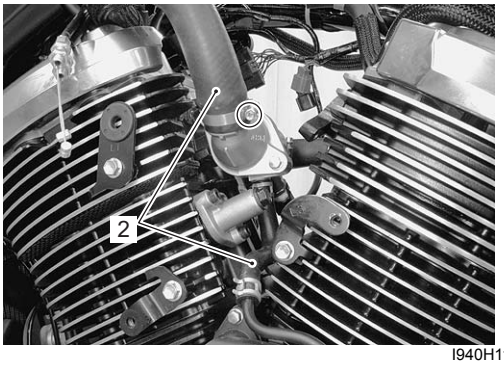
Removal

1) Drain engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.
2) Remove the throttle body. Refer to “Throttle Body Removal and Installation in Section 1D (Page 1D-12)”.
3) Remove the intake pipes (1).



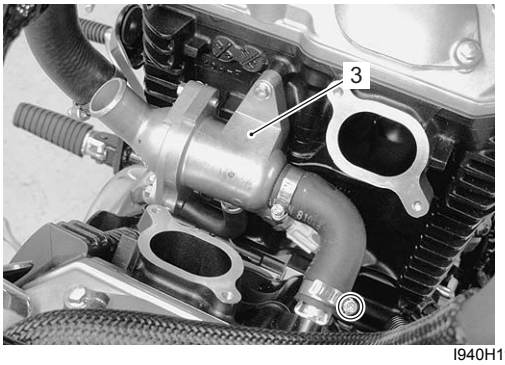
I940H1130009-01

4) Disconnect the water hoses (2).



I940H1130010-02

5) Remove the thermostat case (3) along with the water hose.

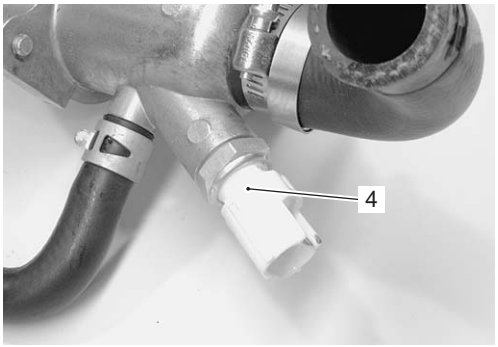


I940H1130011-02

6) Remove the ECT sensor (4).

⚠ CAUTION

Take special care when handling the ECT sensor. It may cause damage if it gets an excessive impact.



I940H1130012-01

Installation

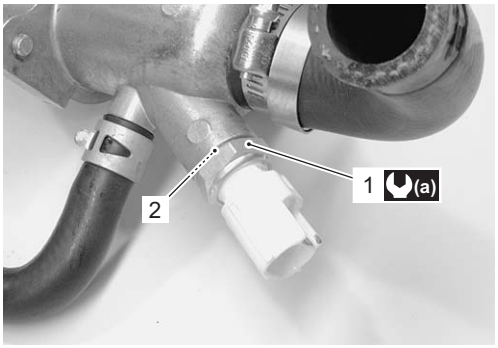
Install the ECT sensor in the reverse order of removal. Pay attention to the following points:

- Tighten the ECT sensor (1) to the specified torque.

⚠ CAUTION

Use the new gasket washer (2) to prevent engine coolant leakage.

Tightening torque
ECT sensor (a): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)

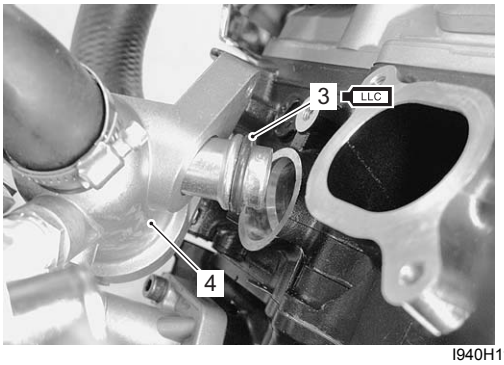


I940H1130013-01

- Apply engine coolant to the O-ring (3) and Install the thermostat case (4).

⚠ CAUTION

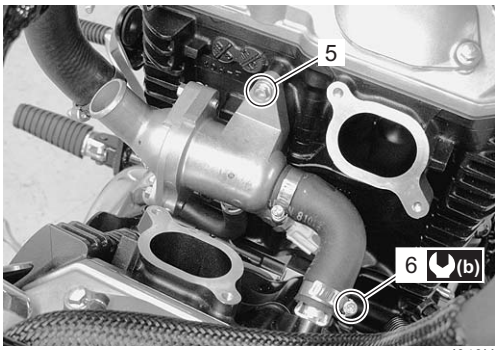
Use a new O-ring (3) to prevent engine coolant leakage.



I940H1130014-01

- Tighten the thermostat case mounting bolt (5).
- Tighten the water hose clamp screw (6) to the specified torque.

Tightening torque
Water hose clamp screw (b): 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)



I940H1130015-02

ECT Sensor Inspection

B940H21306011

Refer to “DTC “C15” (P0115-H/L): ECT Sensor Circuit Malfunction in Section 1A (Page 1A-41)”.
Inspect the ECT sensor in the following procedures:

1) Remove the ECT sensor. Refer to “ECT Sensor Removal and Installation (Page 1C-4)”.
2) Connect the ECT sensor (1) to a circuit tester and place it in the oil (2) contained in a pan, which is placed on a stove.
3) Heat the oil to raise its temperature slowly and read the column thermometer (3) and the ohmmeter. If the ECT sensor ohmic valve does not change in the proportion indicated, replace it with a new one.

⚠ CAUTION

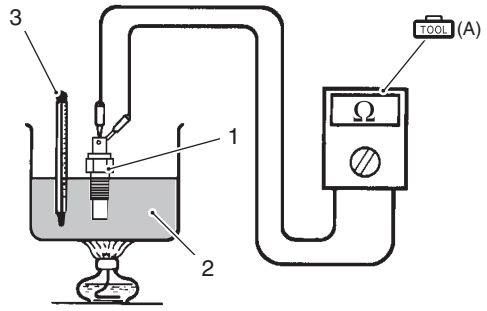
- **Take special care when handling the ECT sensor. It may cause damage if it gets an excessive sharp impact.**
- **Do not contact the ECT sensor and the column thermometer with a pan.**

Special tool
TOOL (A): 09900–25008 (Multi-circuit tester set)

Tester knob indication
Resistance (Ω)

Temperature sensor specification

Temperature	Standard resistance
20 °C (68 °F)	Approx. 2.45 kΩ
50 °C (122 °F)	Approx. 0.811 kΩ
80 °C (176 °F)	Approx. 0.318 kΩ
110 °C (230 °F)	Approx. 0.142 kΩ



I718H1130014-01

4) Install the ECT sensor. Refer to “ECT Sensor Removal and Installation (Page 1C-4)”.

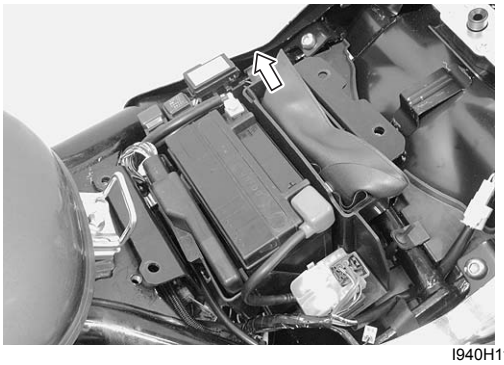
TO Sensor Removal and Installation

B940H21306012

Removal

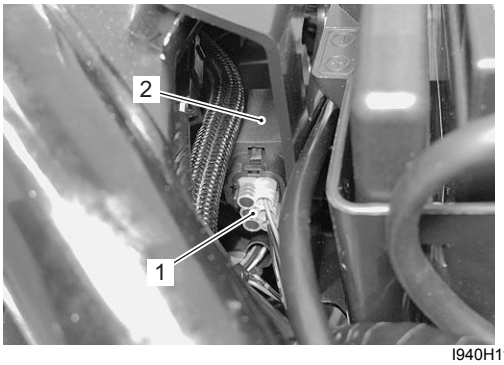
1) Remove the seat and left frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the EVAP canister. (For E-33) Refer to “Evaporative Emission Control System Removal and Installation (Only for E-33) in Section 1B (Page 1B-11)”.

3) Remove the battery holder mounting bolts and move the battery holder as shown.



I940H1130016-01

4) Disconnect the coupler (1) and remove the TO sensor (2).

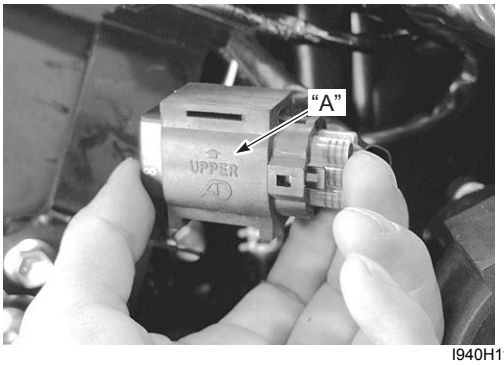


I940H1130017-01

Installation

Install the TO sensor in the reverse order of removal. Pay attention to the following point:

- When installing the TO sensor, bring the “UPPER” letters and arrow mark “A” upward.



I940H1130018-01

TO Sensor Inspection

B940H21306013

Refer to “DTC “C23” (P1651-H/L): TO Sensor Circuit Malfunction in Section 1A (Page 1A-51)”.

STP Sensor Inspection

B940H21306014

Refer to “DTC “C29” (P1654-H/L): Secondary Throttle Position Sensor (STPS) Circuit Malfunction in Section 1A (Page 1A-62)”.

STP Sensor Adjustment

B940H21306015

Adjust the STP sensor in the following procedures:

1) Move the each air cleaner box and lift and support the air cleaner chamber. Refer to “STP Sensor Removal and Installation (Page 1C-7)”.

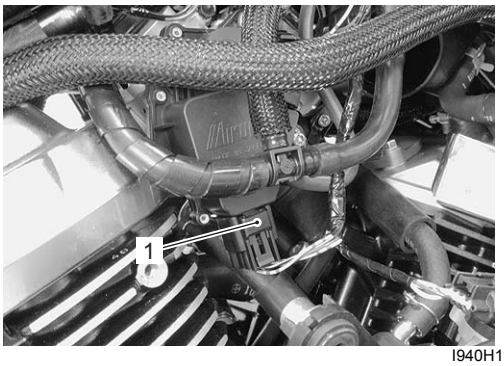
NOTE

It is unnecessary to remove the sensors and hoses.



I940H1130023-01

2) Disconnect the STVA lead wire coupler (1).



I940H1130019-02

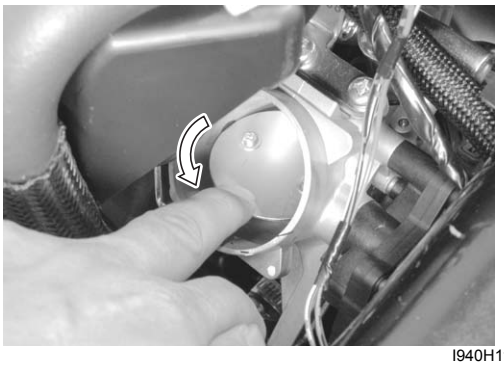
3) Insert the needle pointed probes to the STP sensor coupler (between Y/W and B/Br wires).
4) Turn the ignition switch ON.
5) Connect the special tool between the TP sensor and its coupler.

6) Close the secondary throttle valve by finger and measure the STP sensor output voltage.

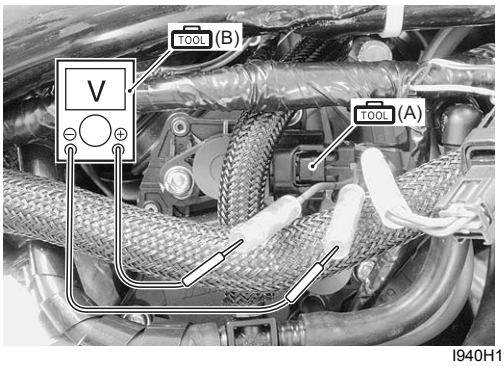
Special tool
(A): 09900–28630 (TPS test wire harness)
(B): 09900–25008 (Multi-circuit tester set)

Tester knob indication
Voltage (⎓)

STP sensor output voltage
ST valve is fully closed: Approx. 0.6 V ((+): Y/W – (–): B/Br)



I940H1130020-01

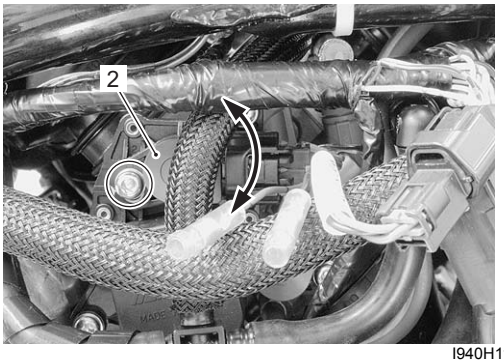


I940H1130021-02

7) Loosen the STP sensor mounting screw adjust the STP sensor (2) until the output voltage comes within the specified value and tighten the STP sensor mounting screw.

Special tool
: 09930–11950 (Torx wrench)

Tightening torque
STP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)



I940H1130022-02

8) Disconnect the special tool and reinstall the removed parts.

STP Sensor Removal and Installation

B940H21306016

Removal

1) Turn the ignition switch OFF.
2) Move the each air cleaner box and lift and support the air cleaner chamber. Refer to “Air Cleaner Chamber Removal and Installation in Section 1D (Page 1D-7)”.

NOTE

It is unnecessary to remove the sensors and hoses.



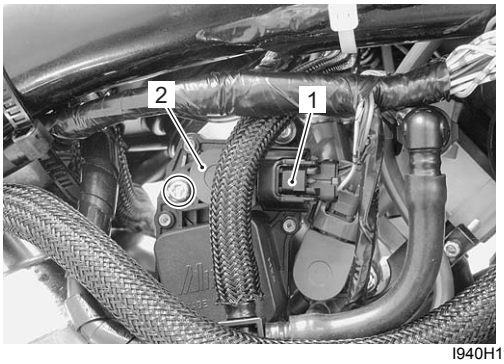
I940H1130023-01

3) Disconnect the coupler (1) and remove the STP sensor (2) with the special tool.

NOTE

Prior to disassembly, mark each sensor’s original position with a paint or scribe for accurate reinstallation.

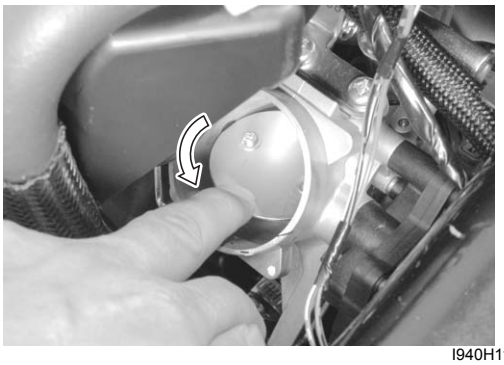
Special tool
: 09930–11950 (Torx wrench)



I940H1130024-01

Installation

1) Close the secondary throttle valve by finger.



I940H1130020-01

2) With the STV fully closed, install the STP sensor (1) and tighten the STP sensor mounting screw to the specified torque.

⚠ CAUTION

Replace the O-ring with a new one.

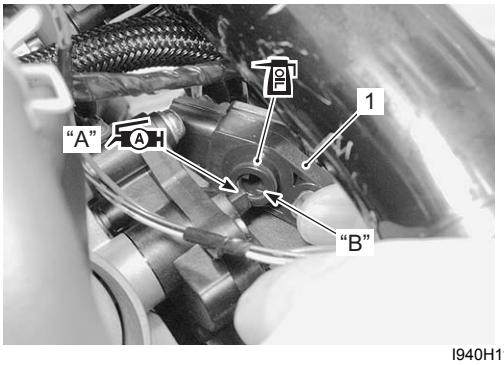
NOTE

- **Apply a thin coat of engine oil to the O-ring.**
- **Align the secondary throttle shaft end "A" with the groove "B" of STP sensor.**
- **Apply grease to the secondary throttle shaft end "A", if necessary.**

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

Special tool
: 09930–11950 (Torx wrench)

Tightening torque
STP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)



I940H1130025-02

3) Make sure the STP valve open or close smoothly.
4) Adjust the position of STP sensor. Refer to "STP Sensor Adjustment (Page 1C-6)".
5) Reinstall the removed parts.

STV Actuator Inspection

B940H21306017

Refer to "DTC "C28" (P1655): Secondary Throttle Valve Actuator (STVA) Malfunction in Section 1A (Page 1A-58)".

STV Actuator Removal and Installation

B940H21306018

Refer to "Throttle Body Disassembly and Assembly in Section 1D (Page 1D-14)".

⚠ CAUTION

- **Never remove the STVA from the throttle body.**
- **The STVA and throttle body are available only as an assembly.**

ISC Valve Inspection

B940H21306019

Refer to "DTC "C40" (P0505 / P0506 / P0507): ISC Valve Circuit Malfunction in Section 1A (Page 1A-74)".

ISC Valve Removal and Installation

B940H21306020

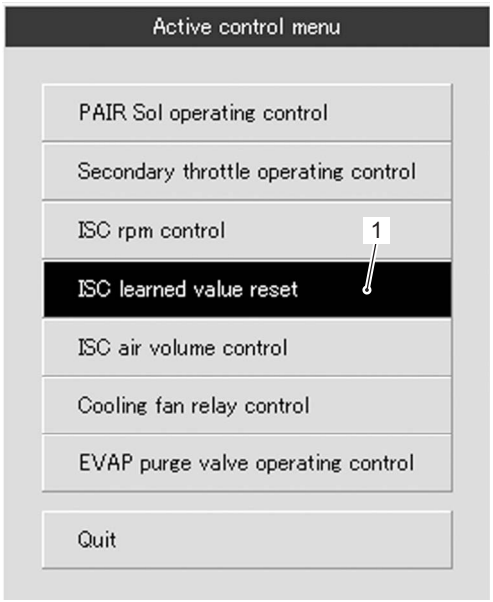
Refer to "ISC Valve Removal and Installation in Section 1D (Page 1D-12)".

ISC Valve Preset and Opening Initialization

B940H21306021

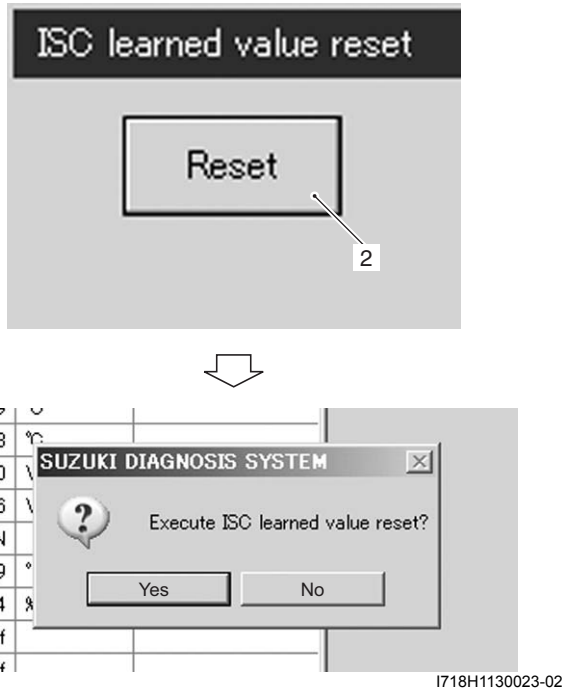
When removing or replacing the ISC valve, set the ISC valve to the following procedures:

1) Turn the ignition switch ON.
2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
3) Click the "Active control".
4) Click the "ISC learned value reset" (1).



I940H1130030-02

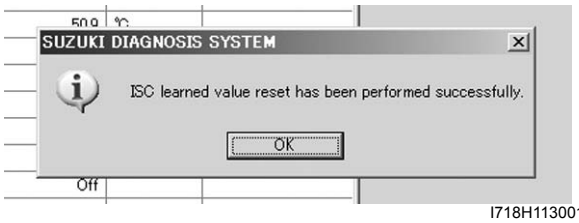
5) Click the “Reset” button (2) to clear the ISC leaned valve.



I718H1130023-02

NOTE

The leaned value of the ISC valve is set at Preset position.



I718H1130019-01

6) Close the SDS tool and turn the ignition switch OFF.

NOTE

The ISC valve opening initialization is automatically started after the ignition switch is turned OFF position.

HO2 Sensor Inspection

B940H21306022

Refer to “DTC “C44” (P0130/P0135): HO2 Sensor (HO2S) Circuit Malfunction (For E-02, 19, 24, 33) in Section 1A (Page 1A-80)”.

HO2 Sensor Removal and Installation

B940H21306023

Refer to “Heated Oxygen Sensor (HO2S) Removal and Installation in Section 1B (Page 1B-8)”.

GP Switch Inspection

B940H21306024

Refer to “Side-stand / Ignition Interlock System Parts Inspection in Section 1I (Page 1I-8)”.

GP Switch Removal and Installation

B940H21306025

Refer to “Gear Position (GP) Switch Removal and Installation in Section 5B (Page 5B-10)”.

Specifications

Service Data

B940H21307001

FI Sensors

Item	Specification		Note
CKP sensor resistance	170 – 260 Ω		
CKP sensor peak voltage	3.0 V and more		When cranking
IAP sensor input voltage (F & R)	4.5 – 5.5 V		
IAP sensor output voltage (F & R)	Approx. 2.6 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
TP sensor resistance	Closed	Approx. 1.1 kΩ	
	Opened	Approx. 4.3 kΩ	
TP sensor output voltage	Closed	Approx. 1.1 V	
	Opened	Approx. 4.3 V	
ECT sensor input voltage	4.5 – 5.5 V		
ECT sensor output voltage	0.1 – 4.85 V		
ECT sensor resistance	Approx. 2.45 kΩ at 20 °C (68 °F)		
IAT sensor input voltage	4.5 – 5.5 V		
IAT sensor output voltage	0.1 – 4.6 V		
IAT sensor resistance	Approx. 2.5 kΩ at 20 °C (68 °F)		
TO sensor resistance	16.5 – 22.3 kΩ		
TO sensor voltage	Normal	0.4 – 1.4 V	
	Leaning	3.7 – 4.4 V	When leaning 65°
GP switch voltage	0.6 V and more		From 1st to Top
Injector voltage	Battery voltage		
STP sensor input voltage	4.5 – 5.5 V		
STP sensor output voltage	Closed	Approx. 0.6 V	
	Opened	Approx. 4.2 V	
STV actuator resistance	Approx. 7 Ω		
HO2 sensor output voltage	0.4 V and less at idle speed		E-02, 19, 24, 33
	0.6 V and more at 4 000 r/min		E-02, 19, 24, 33
HO2 sensor heater resistance	4.0 – 5.0 Ω at 23 °C (73 °F)		
PAIR solenoid valve resistance	18 – 22 Ω at 20 – 30 °C (68 – 86 °F)		
EVAP system purge control solenoid valve resistance	Approx. 32 Ω at 20 °C (68 °F)		E-33 only

Tightening Torque Specifications

B940H21307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
TP sensor mounting screw	3.5	0.35	2.5	☞(Page 1C-2) / ☞(Page 1C-3)
IAT sensor mounting screw	1.3	0.13	1.0	☞(Page 1C-3)
ECT sensor	18	1.8	13.0	☞(Page 1C-4)
Water hose clamp screw	1.5	0.15	1.0	☞(Page 1C-5)
STP sensor mounting screw	3.5	0.35	2.5	☞(Page 1C-7) / ☞(Page 1C-8)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

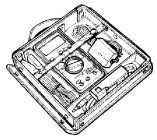
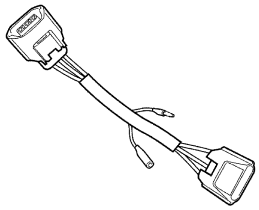
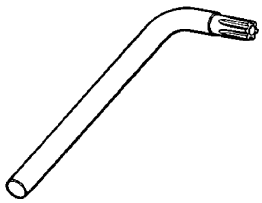
Recommended Service Material

B940H21308001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 1C-2) / ☞(Page 1C-8)

Special Tool

B940H21308002

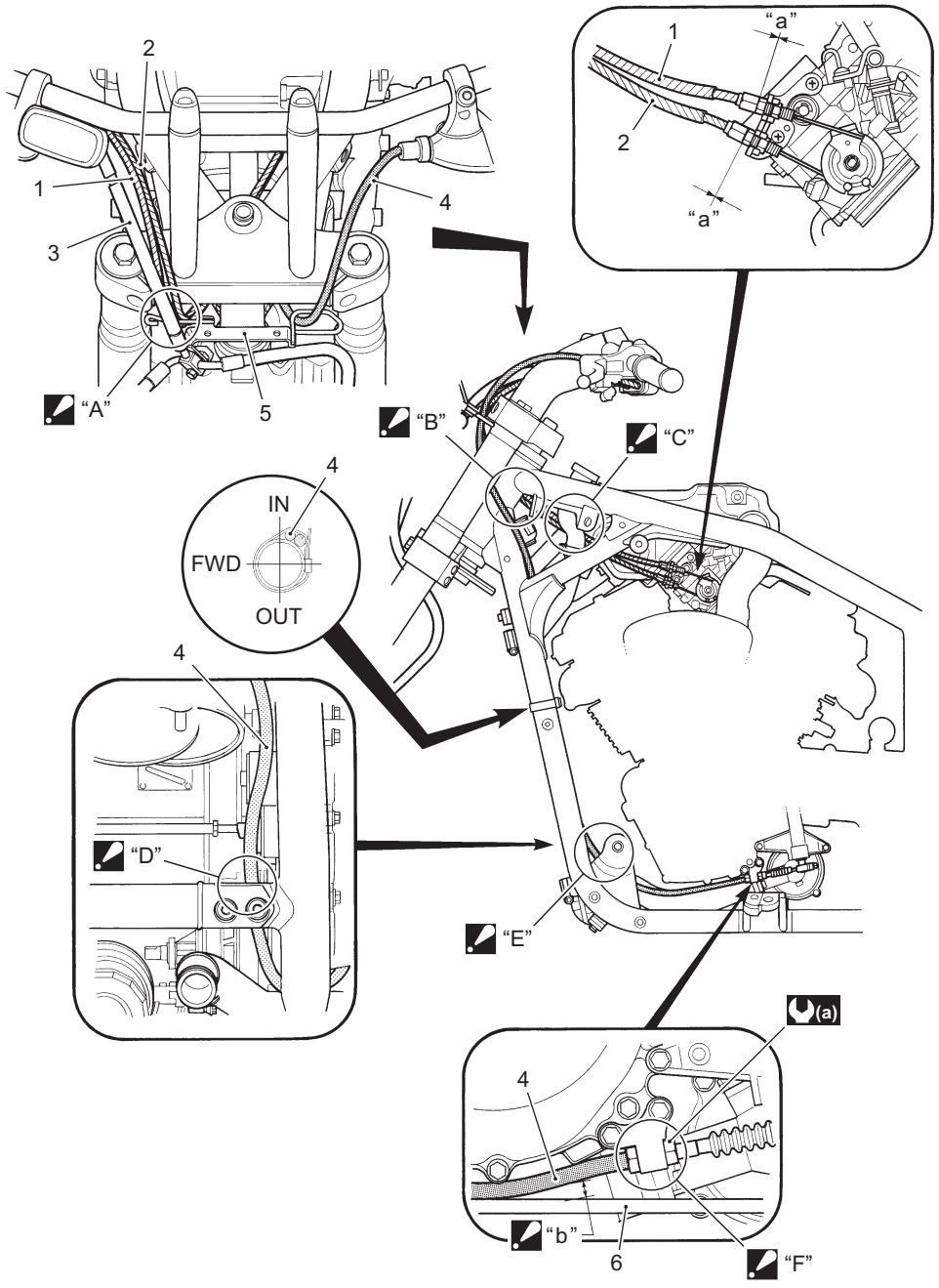
09900–25008 Multi-circuit tester set ☞(Page 1C-5) / ☞(Page 1C-7) 	09900–28630 TPS test wire harness ☞(Page 1C-7) 
09930–11950 Torx wrench ☞(Page 1C-2) / ☞(Page 1C-2) / ☞(Page 1C-3) / ☞(Page 1C-7) / ☞(Page 1C-7) / ☞(Page 1C-8) 	09930–82720 Mode select switch ☞(Page 1C-3) 

Engine Mechanical

Schematic and Routing Diagram

Throttle Cable Routing Diagram

B940H21402001



I940H1140323-06

1. Throttle cable No. 1	"A": Pass the throttle cables behind the cable guide. Pass the brake hose in front of the cable guide.
2. Throttle cable No. 2	"B": Pass the throttle cables right side of the frame head pipe, and the clutch cable left.
3. Front brake hose	"C": Pass the throttle cables between the frame bridge and radiator conduction hose.
4. Clutch cable	"D": Pass the clutch cable behind the frame down tube.
5. Cable guide	"E": Pass the clutch cable inside the engine mounting plate.
6. Gearshift rod	"F": Adjust the clutch cable play on engine side adjuster with the lever side adjuster thread 3 – 5 mm (0.12 – 0.20 in) left.
"a": 1 mm (0.04 in)	(a) : 4.5 N·m (0.45 kgf-m, 3.0 lbf-ft)
"b": 6 mm (0.24 in) or more : Clutch cable must be passed above the radiator hose with keeping clearance of 6 mm (0.24 in) or more from the gearshift rod.	

Diagnostic Information and Procedures

Engine Mechanical Symptom Diagnosis

B940H21404001

Refer to “Engine Symptom Diagnosis in Section 1A (Page 1A-7)”.

Compression Pressure Check

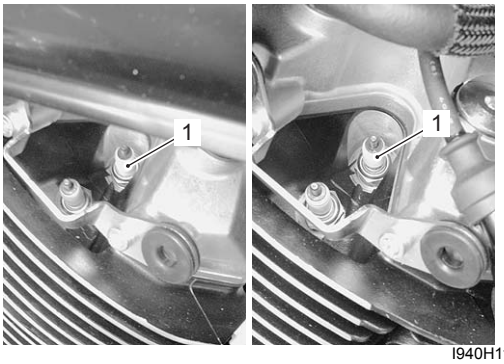
B940H21404002

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) Lift and support (for #1 cylinder) the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
3) Remove the right frame head cover (for #2 cylinder). Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
4) Remove the all spark plug caps and spark plug (1). Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)”.

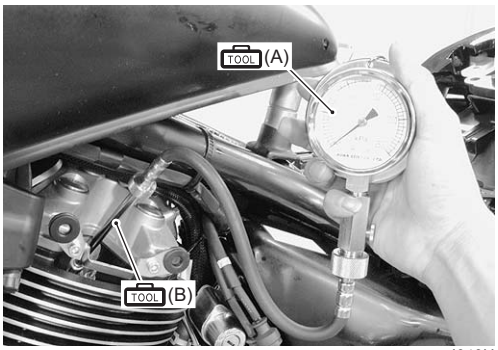


I940H1140003-01

5) Install the compression gauge and adaptor in the spark plug hole. Make sure that the connection is tight.

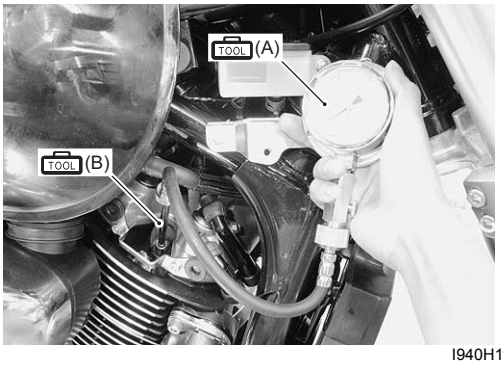
Special tool
(A): 09915–64512 (Compression gauge)
(B): 09913–10750 (Compression gauge adapter)

#1 Cylinder



I940H1140004-01

#2 Cylinder



I940H1140005-01

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



I940H1140006-01

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 from 4) to 7) with the other cylinder.

Compression pressure specification

	Standard	Limit
#1 Cylinder	**850 – 1 450 kPa (8.5 – 14.5 kgf/cm², 121 – 206 psi)**	**750 kPa (7.5 kgf/cm², 106.7 psi)**
#2 Cylinder	**650 – 1 250 kPa (6.5 – 12.5 kgf/cm², 92 – 178 psi)**	**550 kPa (5.5 kgf/cm², 78.2 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 750 kPa (7.5 kgf/cm², 106.7 psi) (#1 cylinder) or 550 kPa (5.5 kgf/cm², 78.2 psi) (#2 cylinder) and less.
- Both compression pressure readings are below 850 kPa (8.5 kgf/cm², 121 psi) (#1 cylinder) and 650 kPa (6.5 kgf/cm², 92 psi) (#2 cylinder) even when they measure 750 kPa (7.5 kgf/cm², 106.7 psi) (#1 cylinder) and 550 kPa (5.5 kgf/cm², 78.2 psi) (#2 cylinder) and more.

9) After checking the compression pressure, reinstall the removed parts.

Repair Instructions

Engine Components Removable with the Engine in Place

B940H21406001

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
Air cleaner element	Refer to “Air Cleaner Element Removal and Installation (Page 1D-6)”.	Refer to “Air Cleaner Element Inspection in Section 0B (Page 0B-2)”.	Refer to “Air Cleaner Element Removal and Installation (Page 1D-6)”.
Oil filter	Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.	—	Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.
Oil pump	Refer to “Oil Pump Removal and Installation in Section 1E (Page 1E-9)”.	Refer to “Oil Pump Inspection in Section 1E (Page 1E-10)”.	Refer to “Oil Pump Removal and Installation in Section 1E (Page 1E-9)”.
Throttle body	Refer to “Throttle Body Removal and Installation (Page 1D-12)”.	Refer to “Throttle Body Inspection and Cleaning (Page 1D-17)”.	Refer to “Throttle Body Removal and Installation (Page 1D-12)”.
Cam chain tension adjuster	Refer to “Engine Top Side Disassembly (Page 1D-27)”.	Refer to “Cam Chain Tension Adjuster Inspection (Page 1D-43)”.	Refer to “Engine Top Side Assembly (Page 1D-32)”.
Cylinder head cover	Refer to “Engine Top Side Disassembly (Page 1D-27)”.	Refer to “Cylinder Head Cover Inspection (Page 1D-41)”.	Refer to “Engine Top Side Assembly (Page 1D-32)”.
Camshafts	Refer to “Engine Top Side Disassembly (Page 1D-27)”.	Refer to “Camshaft Inspection (Page 1D-41)”.	Refer to “Engine Top Side Assembly (Page 1D-32)”.
Cylinder head	Refer to “Engine Top Side Disassembly (Page 1D-27)”.	Refer to “Cylinder Head Related Parts Inspection (Page 1D-47)”.	Refer to “Engine Top Side Assembly (Page 1D-32)”.
Cylinder	Refer to “Engine Top Side Disassembly (Page 1D-27)”.	Refer to “Cylinder Inspection (Page 1D-53)”.	Refer to “Engine Top Side Assembly (Page 1D-32)”.
Pistons	Refer to “Engine Top Side Disassembly (Page 1D-27)”.	Refer to “Piston and Piston Ring Inspection (Page 1D-55)”.	Refer to “Engine Top Side Assembly (Page 1D-32)”.
Starter motor	Refer to “Starter Motor Removal and Installation in Section 1I (Page 1I-3)”.	Refer to “Starter Motor Inspection in Section 1I (Page 1I-6)”.	Refer to “Starter Motor Removal and Installation in Section 1I (Page 1I-3)”.

Item	Removal	Inspection	Installation
PAIR reed valve	Refer to “PAIR Reed Valve Removal and Installation in Section 1B (Page 1B-8)”.	Refer to “PAIR System Inspection in Section 1B (Page 1B-9)”.	Refer to “PAIR Reed Valve Removal and Installation in Section 1B (Page 1B-8)”.
Oil pressure switch	Refer to “Oil Pressure Switch Removal and Installation in Section 1E (Page 1E-5)”.	Refer to “Oil Pressure Indicator Inspection in Section 9C (Page 9C-8)”.	Refer to “Oil Pressure Switch Removal and Installation in Section 1E (Page 1E-5)”.

Engine Right Side

Item	Removal	Inspection	Installation
Exhaust pipe/Muffler	Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.	Refer to “Exhaust System Inspection in Section 1K (Page 1K-4)”.	Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.
Clutch cover	Refer to “Clutch Installation in Section 5C (Page 5C-8)”.	—	Refer to “Clutch Installation in Section 5C (Page 5C-8)”.
Clutch plates	Refer to “Clutch Removal in Section 5C (Page 5C-6)”.	Refer to “Clutch Parts Inspection in Section 5C (Page 5C-12)”.	Refer to “Clutch Removal in Section 5C (Page 5C-6)”.
Clutch sleeve hub	Refer to “Clutch Removal in Section 5C (Page 5C-6)”.	Refer to “Clutch Parts Inspection in Section 5C (Page 5C-12)”.	Refer to “Clutch Installation in Section 5C (Page 5C-8)”.
Primary driven gear	Refer to “Clutch Removal in Section 5C (Page 5C-6)”.	Refer to “Clutch Parts Inspection in Section 5C (Page 5C-12)”.	Refer to “Clutch Installation in Section 5C (Page 5C-8)”.
Oil pressure regulator	Refer to “Oil Pressure Regulator Removal and Installation in Section 1E (Page 1E-3)”.	Refer to “Oil Pressure Regulator / Oil Sump Filter Inspection in Section 1E (Page 1E-4)”.	Refer to “Oil Pressure Regulator Removal and Installation in Section 1E (Page 1E-3)”.
Oil pump drive gear	Refer to “Oil Pump Removal and Installation in Section 1E (Page 1E-9)”.	—	Refer to “Oil Pump Removal and Installation in Section 1E (Page 1E-9)”.
Gearshift shaft	Refer to “Gearshift Shaft / Gearshift Cam Plate Removal and Installation in Section 5B (Page 5B-13)”.	Refer to “Gearshift Linkage Inspection in Section 5B (Page 5B-16)”.	Refer to “Gearshift Shaft / Gearshift Cam Plate Removal and Installation in Section 5B (Page 5B-13)”.

Engine Left Side

Item	Removal	Inspection	Installation
Generator	Refer to “Generator Removal and Installation in Section 1J (Page 1J-5)”.	Refer to “Generator Inspection in Section 1J (Page 1J-4)”.	Refer to “Generator Removal and Installation in Section 1J (Page 1J-5)”.
Secondary driven gear	Refer to “Secondary Driven Gear Assembly Removal and Installation in Section 3A (Page 3A-3)”.	Refer to “Secondary Driven Gear Related Parts Inspection in Section 3A (Page 3A-8)”.	Refer to “Secondary Driven Gear Assembly Removal and Installation in Section 3A (Page 3A-3)”.
Starter idle gear	Refer to “Starter Clutch Inspection in Section 1I (Page 1I-12)”.	—	Refer to “Starter Clutch Inspection in Section 1I (Page 1I-12)”.
Starter clutch	Refer to “Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)”.	Refer to “Starter Clutch Inspection in Section 1I (Page 1I-12)”.	Refer to “Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)”.
CKP sensor	Refer to “Generator Removal and Installation in Section 1J (Page 1J-5)”.	Refer to “CKP Sensor Inspection in Section 1H (Page 1H-8)”.	Refer to “Generator Removal and Installation in Section 1J (Page 1J-5)”.
Water pump	Refer to “Water Pump Removal and Installation in Section 1F (Page 1F-11)”.	Refer to “Water Pump Related Parts Inspection in Section 1F (Page 1F-15)”.	Refer to “Water Pump Removal and Installation in Section 1F (Page 1F-11)”.

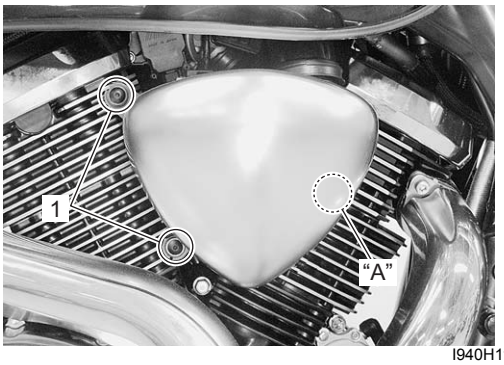
Item	Removal	Inspection	Installation
Gear position switch	Refer to “Gear Position (GP) Switch Removal and Installation in Section 5B (Page 5B-10)”.	Refer to “Gear Position (GP) Switch Inspection in Section 5B (Page 5B-10)”.	Refer to “Gear Position (GP) Switch Removal and Installation in Section 5B (Page 5B-10)”.

Air Cleaner Element Removal and Installation

B940H21406002

Removal

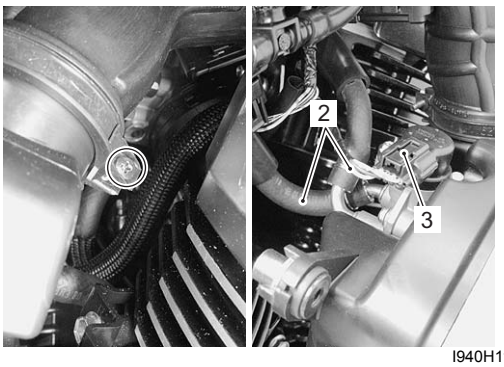
1) Remove the air cleaner box mounting bolts (1).



I940H1140007-03

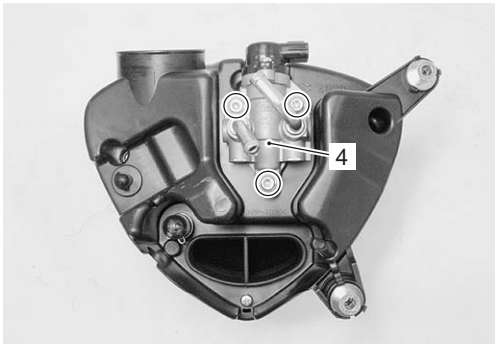
“A”: Hooked point

2) Loosen the air cleaner box clamp screw, and disconnect the ISC hoses (2) (right side) and coupler (3).



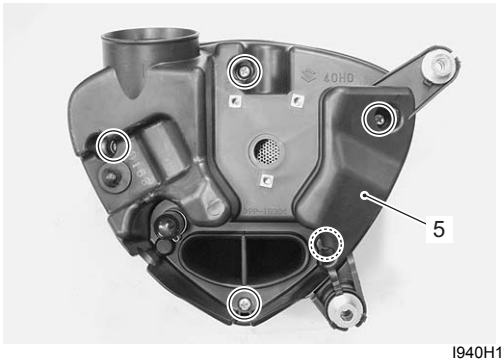
I940H1140008-02

3) Remove the ISC valve (4) (right side).



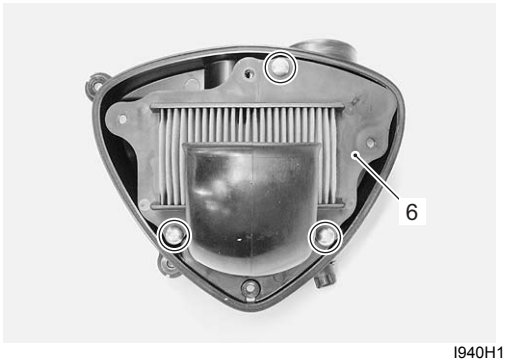
I940H1140009-02

4) Remove the air cleaner case (5).



I940H1140010-04

5) Remove the air cleaner element (6).

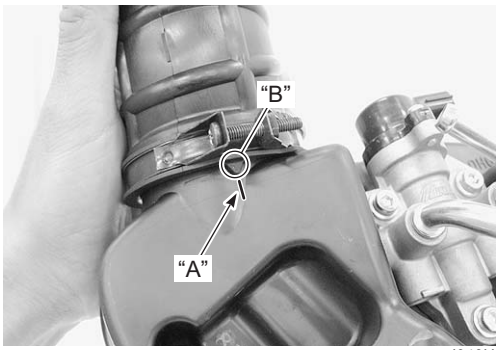


I940H1140011-01

Installation

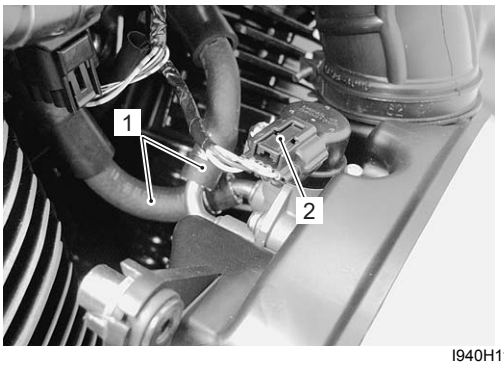
Install the air cleaner element in the reverse order of removal. Pay attention following points:

- Install the ISC valve. Refer to “ISC Valve Removal and Installation (Page 1D-12)”.
- Align the mark “A” of the air cleaner case and convex part “B” of the joint tube.



I940H1140012-01

- Connect the ISC hoses (1) and ISC coupler (2).



I940H1140013-03

- Tighten the air cleaner box mounting bolts to the specified torque.

Tightening torque
Air cleaner box mounting bolt (a): 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)



I940H1140376-02

Air Cleaner Element Inspection and Cleaning

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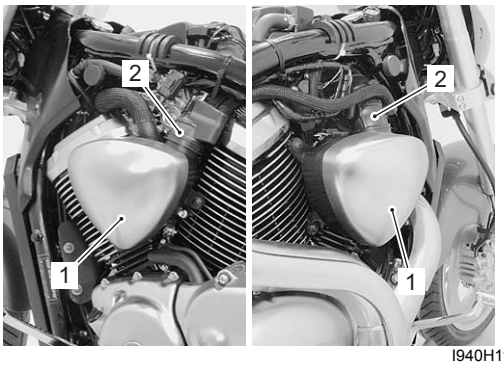
Refer to “Air Cleaner Element Inspection in Section 0B (Page 0B-2)”.

Air Cleaner Chamber Removal and Installation

B940H21406004

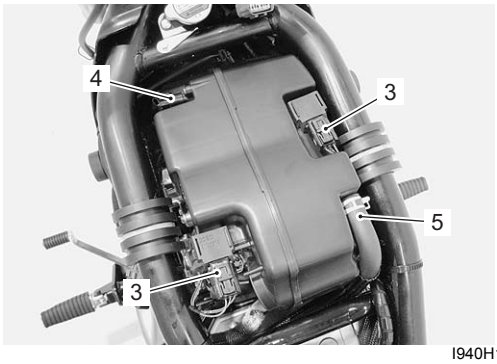
Removal

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Remove the air cleaner box (1). Refer to “Air Cleaner Element Removal and Installation (Page 1D-6)”.
3) Disconnect the joint tube (2), left and right.



I940H1140014-01

4) Remove the following parts from the air cleaner chamber.
   a) IAP sensor (3)
   b) IAT sensor coupler (4)
   c) PCV hose (5)

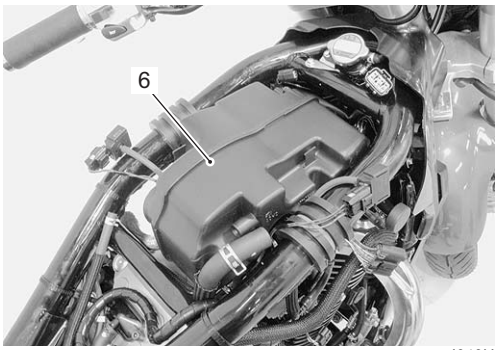


I940H1140015-01

5) Remove the air cleaner chamber (6) from the throttle body.

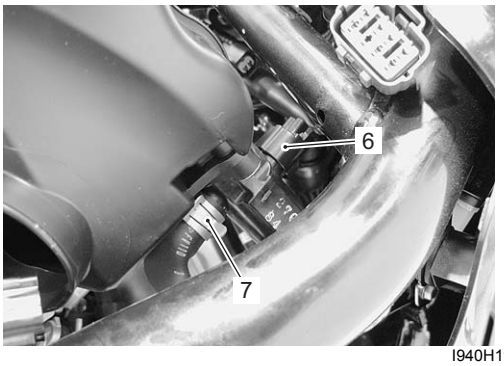


I940H1140016-01



I940H1140017-01

6) Disconnect a PAIR coupler (6) and hose (7).

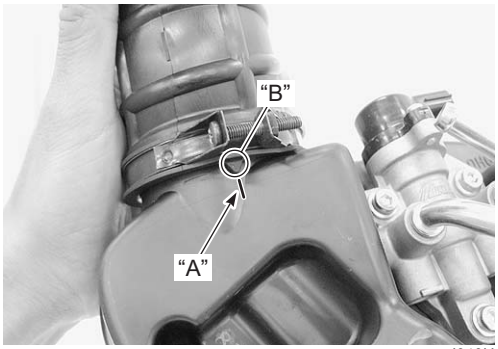


I940H1140018-01

Installation

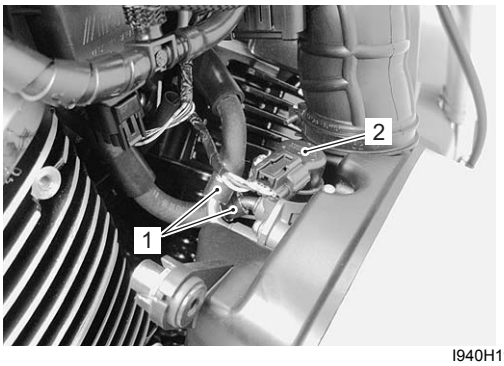
Install the air cleaner chamber in the reverse order of removal. Pay attention to the following points:

- Fit the throttle body clamps properly. Refer to “Throttle Body Construction (Page 1D-10)”.
- Route the hoses properly. Refer to “Throttle Body Construction (Page 1D-10)”.
- Connect the IAP sensor coupler and IAT sensor coupler.
- Align the mark “A” of the air cleaner case and convex part “B” of the joint tube.



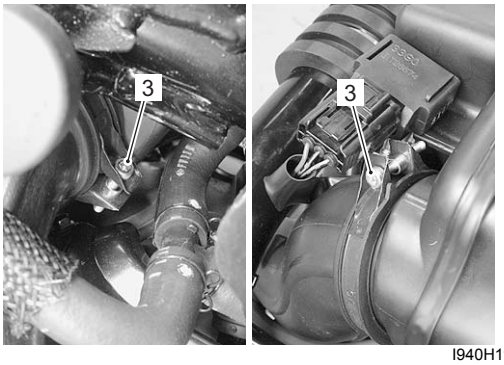
I940H1140012-01

- Connect the ISC hoses (1) and ISC connector (2).



I940H1140019-02

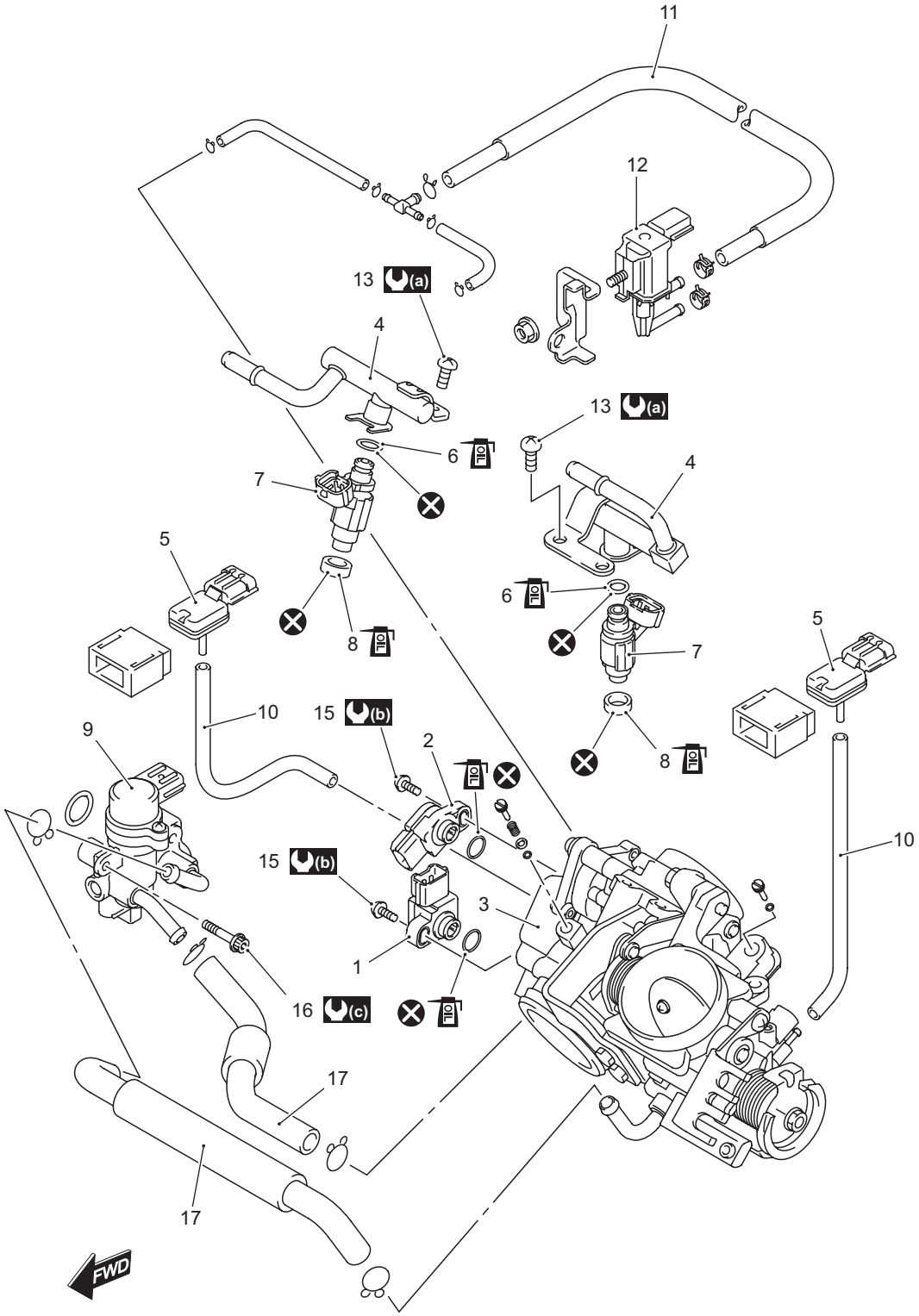
- Install the joint tube to the air cleaner chamber. Refer to “Throttle Body Construction (Page 1D-10)”.
- Tighten the clamp screws (3)



I940H1140020-03

Throttle Body Components

B940H21406005

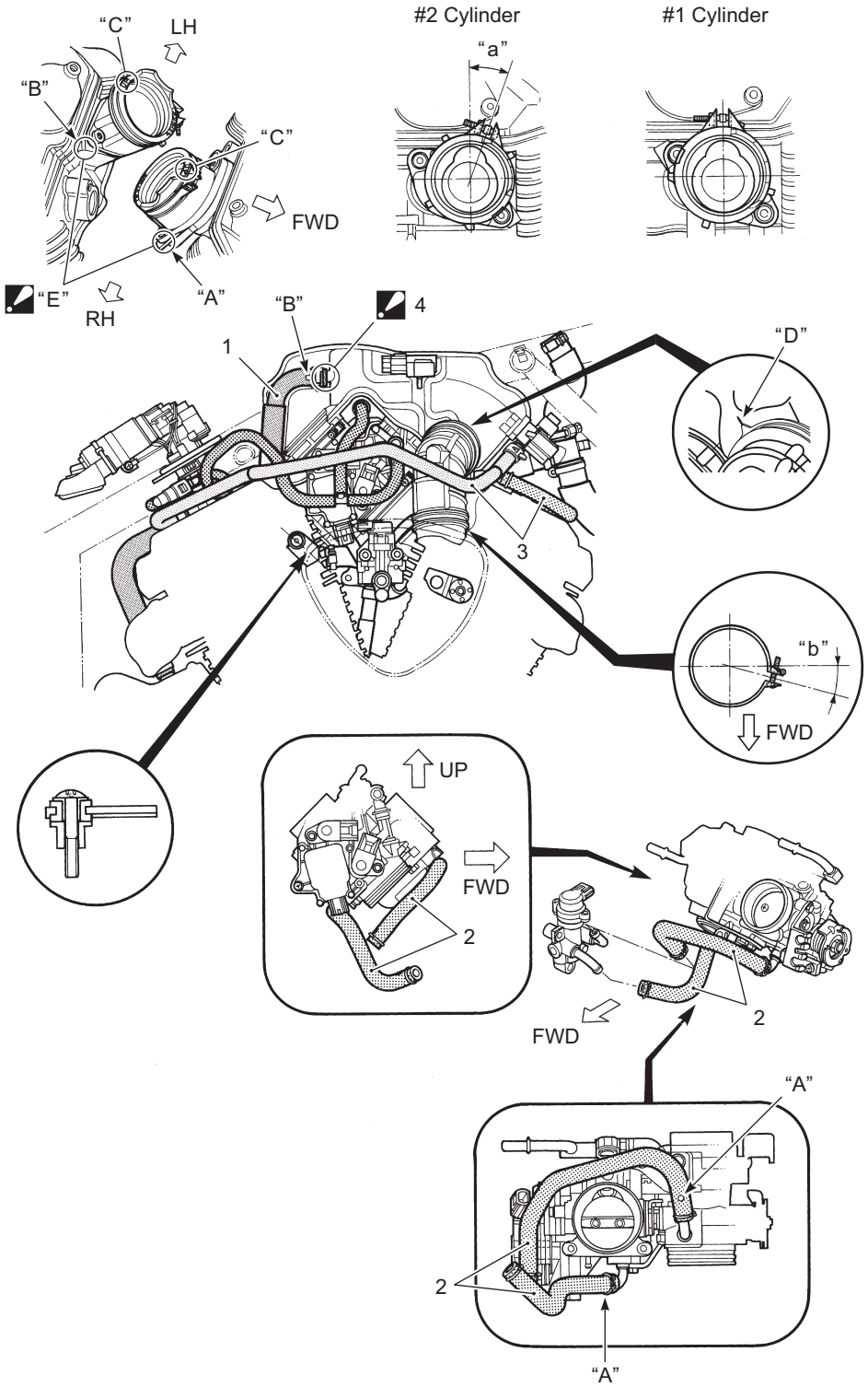


I940H1140378-01

1. TP sensor	7. Fuel injector	13. Fuel delivery pipe mounting screw	(b) : 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)
2. STP sensor	8. Cushion seal	14. STP sensor mounting screw	(c) : 4.5 N·m (0.45 kgf-m, 3.0 lbf-ft)
3. STVA	9. ISC valve	15. TP sensor mounting screw	: Apply engine oil.
4. Fuel delivery pipe	10. Vacuum hose	16. ISC valve mounting bolt	: Do not reuse.
5. IAP sensor	11. Vacuum hose (E-33 only)	17. ISC hose	
6. O-ring	12. EVAP purge control valve	(a) : 5 N·m (0.5 kgf-m, 3.5 lbf-ft)	

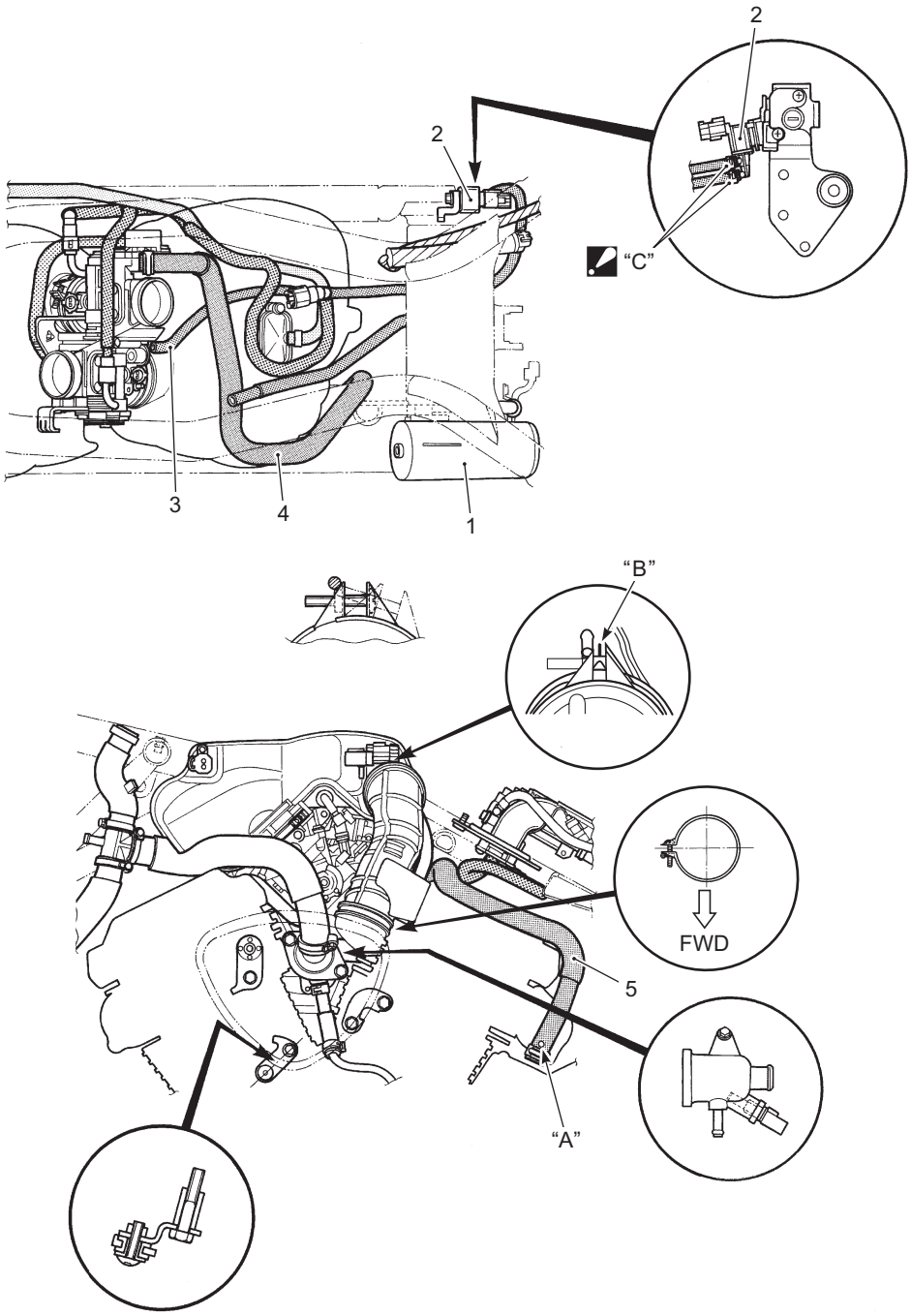
Throttle Body Construction

B940H21406006



I940H1140337-04

1. PCV hose	"A": White mark	"E": Face the lip right side of motorcycle.
2. ISC hose	"B": Yellow mark	"a": 20°
3. PAIR hose	"C": Up mark	"b": 15°
4. Clamp : Face the tip of the clip to outside.	"D": Match mark	



I940H1140338-04

1. Canister (E-33 only)	4. PCV hose	"C": Face the tip of the clip to outside.
2. Canister purge valve (E-33 only)	"A": White mark	
3. Purge hose (E-33 only)	"B": Match mark	

ISC Valve Removal and Installation

B940H21406007

Removal

⚠ CAUTION

Be careful not to disconnect the ISC valve coupler at least 5 seconds after ignition switch is turned to OFF. If the ECM coupler or ISC valve coupler is disconnected within 5 seconds after ignition switch is turned to OFF, there is a possibility of an unusual valve position being written in ECM and causing an error of ISC valve operation.

NOTE

When the ISC valve is removed or replaced, the ISC valve or new one should be set to Preset position. Refer to "ISC Valve Preset and Opening Initialization in Section 1C (Page 1C-8)".

1) Remove the air cleaner box. Refer to "Air Cleaner Element Removal and Installation (Page 1D-6)".
2) Remove the ISC valve (1).



I940H1140021-02

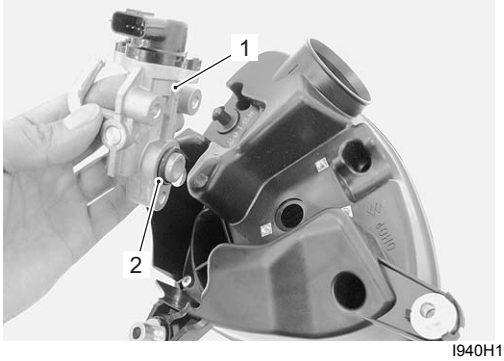
Installation

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

- Install the ISC valve (1).

⚠ CAUTION

Use a new O-ring (2).



I940H1140022-01

- Tighten the ISC valve mounting bolts to the specified torque.

Tightening torque
ISC valve mounting bolt (a): 4.5 N·m (0.45 kgf-m, 3.0 lbf-ft)



I940H1140372-01

Throttle Body Removal and Installation

B940H21406008

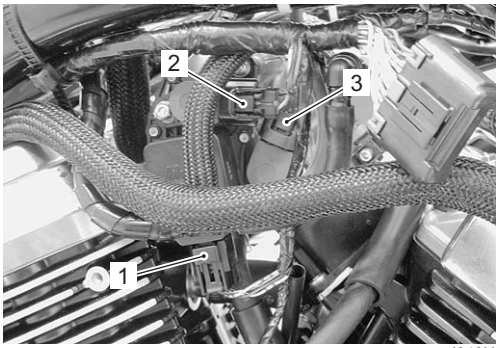
Removal

1) Disconnect the battery (–) lead wire. Refer to "Battery / Battery Holder Removal and Installation in Section 1J (Page 1J-11)".
2) Remove the fuel tank. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
3) Remove the air cleaner chamber. Refer to "Air Cleaner Chamber Removal and Installation (Page 1D-7)".



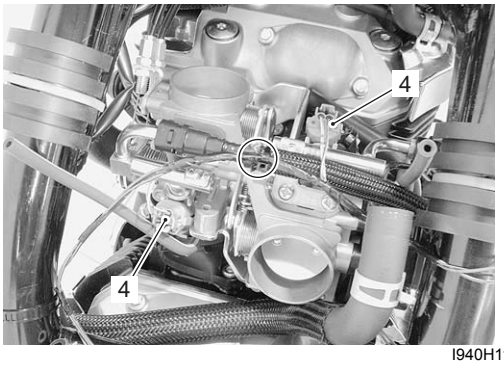
I940H1140023-01

4) Disconnect the STVA lead wire coupler (1), STP sensor lead wire coupler (2) and TP sensor lead wire coupler (3).



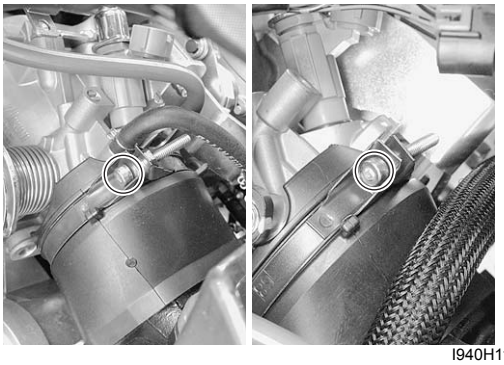
I940H1140024-01

5) Remove the clamp and disconnect the fuel injector couplers (4).



I940H1140025-02

6) Loosen the throttle body clamp screws.



I940H1140026-01

7) Disconnect the throttle cables from the throttle body and remove the throttle body assembly.

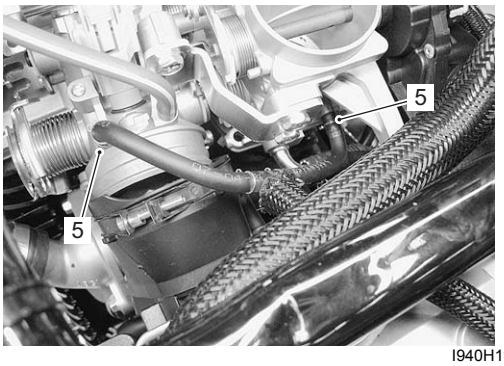
⚠ CAUTION

After disconnecting the throttle cables, do not snap the throttle valve from the open to full close. It may cause damage to the throttle valve and throttle body.



I940H1140027-01

8) Disconnect the EVAP hoses (5). (For E-33)

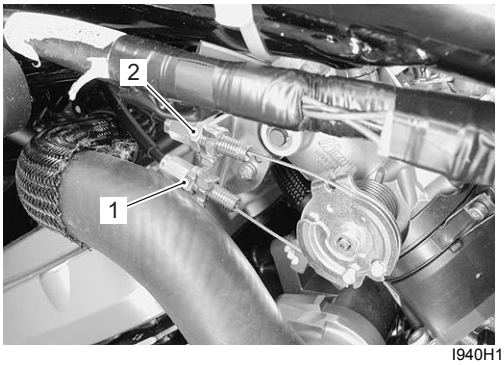


I940H1140028-03

Installation

Install the throttle body in the reverse order of removal. Pay attention to the following points:

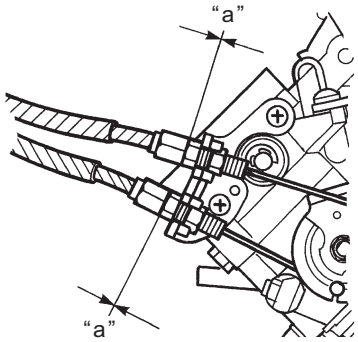
- Connect the throttle pulling cable (1) and throttle returning cable (2) to the throttle body.



I940H1140174-01

- Tighten the throttle body clamp screws. Refer to “Throttle Body Construction (Page 1D-10)”.
- Loosen each throttle cable lock-nut.

- Turn in each throttle cable adjuster fully and locate each outer cable so that the clearance “a” is 0 – 1.0 mm (0 – 0.04 in).



I940H1140030-03

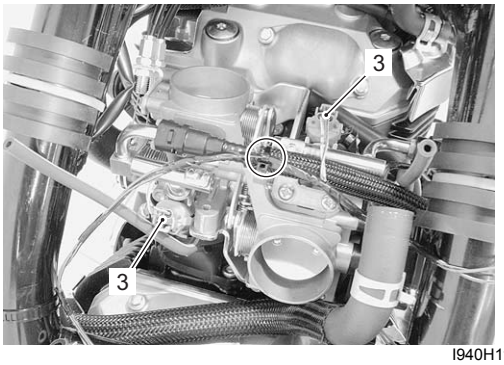
“a”: 0 – 1.0 mm (0 – 0.04 in)

- Tighten each lock-nut.
- Adjust the throttle cable play. Refer to “Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-10)”.
- Connect the fuel injector couplers (3).

NOTE

Make sure that each coupler installed in the correct position.

- Connect the clamp.



I940H1140032-02

Coupler	Wire color
Front (#2 Cylinder)	Y/R and Gr/B
Rear (#1 Cylinder)	Y/R and Gr/W

Throttle Body Disassembly and Assembly

B940H21406009

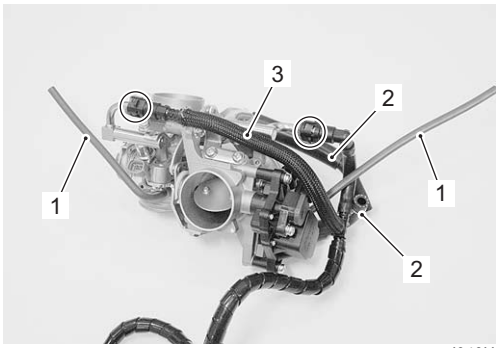
Refer to “Throttle Body Removal and Installation (Page 1D-12)”.

Disassembly

⚠ CAUTION

Identify the position of each removed part. Organize the parts in their respective groups so that they can be reinstalled in their original positions.

1) Disconnect the IAP sensor vacuum hoses (1), ISC valve hoses (2) and fuel feed hose (3).

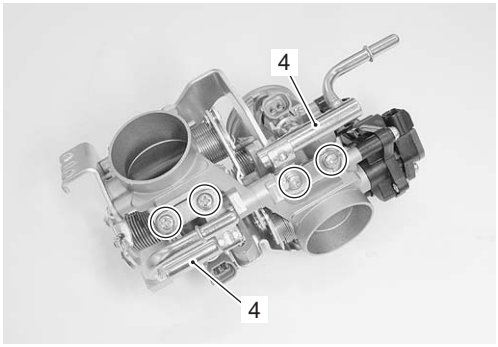


I940H1140033-03

2) Remove the fuel delivery pipes (4).

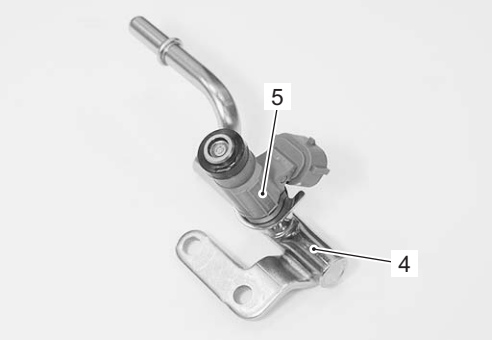
⚠ CAUTION

Be careful not to twist the fuel delivery pipe, when disconnecting the fuel feed hose or removing the fuel delivery pipe.



I940H1140034-01

3) Remove the each fuel injector (5) from the fuel delivery pipes (4).



I940H1140035-03

4) Remove the TP sensor (6) and STP sensor (7).

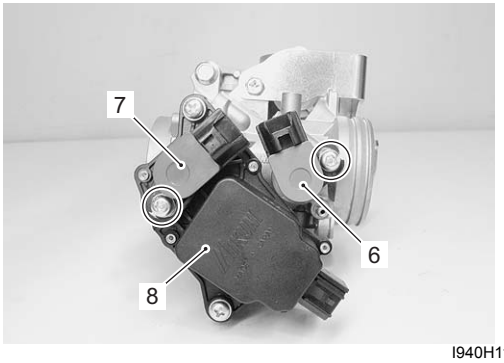
⚠ CAUTION

Never remove the STVA (8) from the throttle body.

NOTE

Prior to disassembly, mark sensor's original position with a paint or scribe for accurate reinstallation.

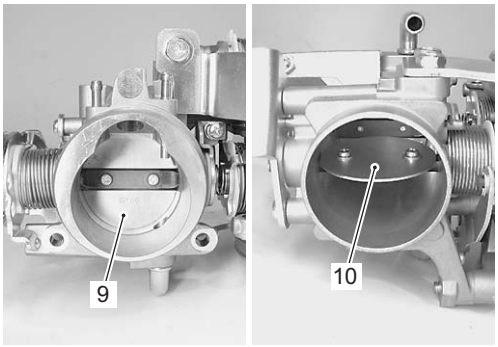
Special tool
TOOL : 09930–11950 (Torx wrench)



I940H1140036-02

⚠ CAUTION

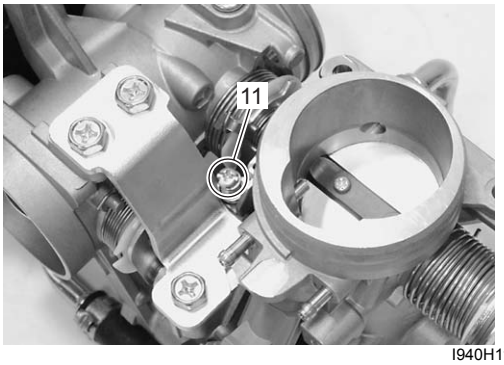
Never remove the throttle valve (9) and secondary throttle valve (10).



I940H1140038-01

⚠ CAUTION

This screw (11) is factory-adjusted at the time of delivery and therefore avoid removing or turning it unless otherwise necessary.



I940H1140039-01

Assembly
Assembly is the throttle body in the reverse order of removal. Pay attention to the following points:

- Apply thin coat of the engine oil to the O-ring.

⚠ CAUTION

Replace the O-ring with a new one.

- With the STV fully closed, install the STP sensor (1) and tighten the STP sensor mounting screw to the specified torque.

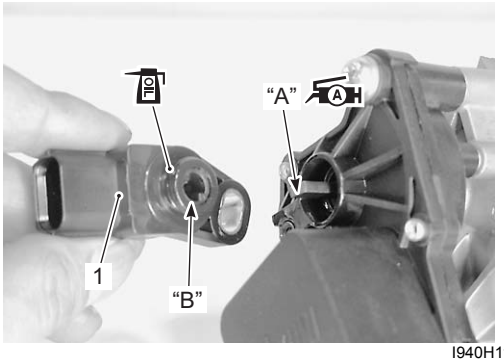
NOTE

- **Align the secondary throttle shaft end "A" with the groove "B" of the STP sensor.**
- **Apply grease to the secondary throttle shaft end "A", if necessary.**

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

Special tool
TOOL : 09930–11950 (Torx wrench)

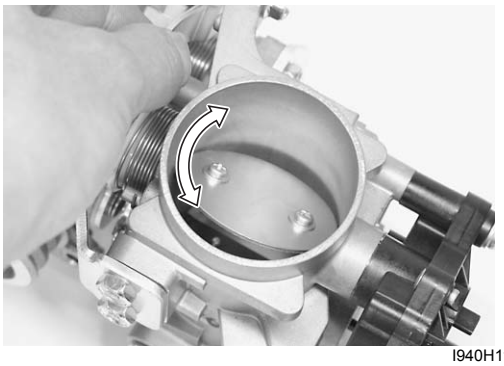
Tightening torque
STP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)



I940H1140040-02

NOTE

Make sure the STP valve open or close smoothly. If the STP sensor adjustment is necessary, refer to "STP Sensor Adjustment in Section 1C (Page 1C-6)".



I940H1140041-01

- Apply thin coat of the engine oil to the O-ring.

⚠ CAUTION

Replace the O-ring with a new one.

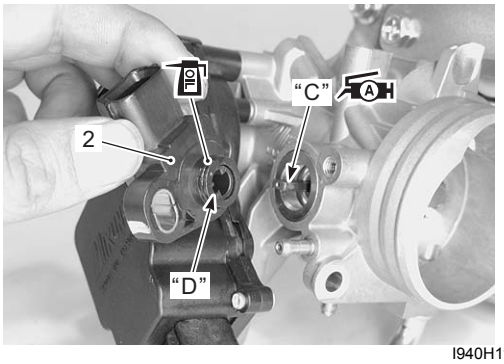
- With the throttle valve fully closed, install the TP sensor (2) and tighten the TP sensor mounting screw to the specified torque.

NOTE

- **Align the throttle shaft end "C" with the groove "D" of the TP sensor.**
- **Apply grease to the throttle shaft end "C", if necessary.**

Special tool
TOOL : 09930–11950 (Torx wrench)

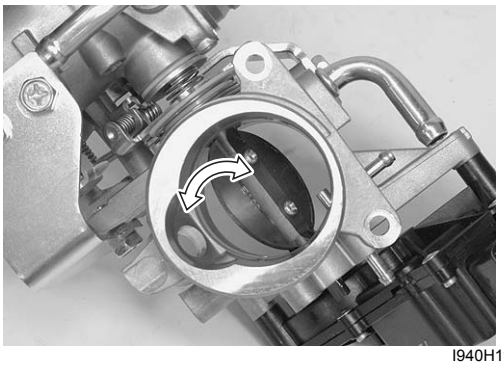
Tightening torque
TP sensor mounting screw: 3.5 N·m (0.35 kgf-m, 2.5 lbf-ft)



I940H1140042-01

NOTE

Make sure the throttle valve open or close smoothly. If the TP sensor adjustment is necessary, refer to "TP Sensor Adjustment in Section 1C (Page 1C-3)".

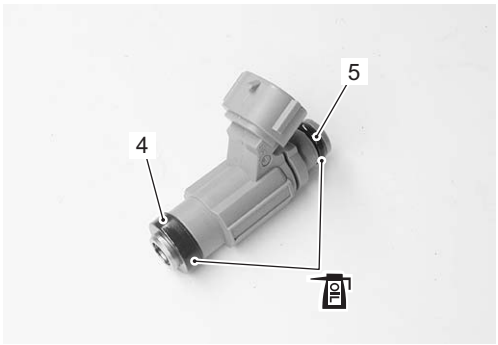


I940H1140043-01

- Apply thin coat of the engine oil to the new cushion seal (4) and O-ring (5).

⚠ CAUTION

Replace the cushion seal and O-ring with the new ones.



I940H1140044-01

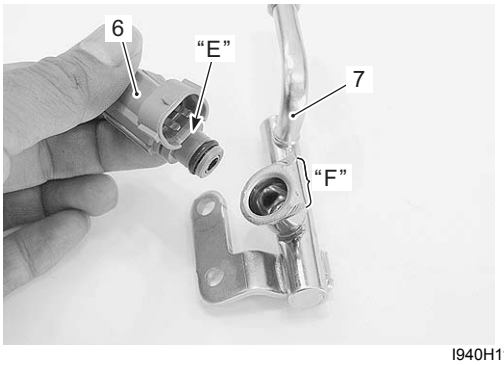
- Install the fuel injector (6) by pushing it straight to the delivery pipe (7).

⚠ CAUTION

Never turn the injector while pushing it.

NOTE

Align the coupler "E" of the injector with boss "F" of the delivery pipe.



I940H1140045-02

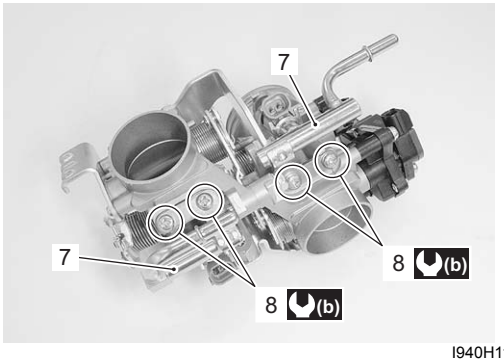
- Install the fuel delivery pipe assembly (7) to the throttle body assembly.

⚠ CAUTION

Never turn the fuel injectors while installing them.

- Tighten the fuel delivery pipe mounting screws (8) to the specified torque.

Tightening torque
Fuel delivery pipe mounting screw (b): 5 N·m (0.5 kgf-m, 3.5 lbf-ft)



I940H1140046-02

Throttle Body Inspection and Cleaning

B940H21406010

Refer to "Throttle Body Disassembly and Assembly (Page 1D-14)".

Cleaning

⚠ WARNING

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

- Clean passageways with a spray-type carburetor cleaner and blow dry with compressed air.

⚠ CAUTION

- **Never clean the main bore of throttle body to prevent come off molybdenum from the throttle valve.**
- **Do not use wire to clean passageways. Wire can damage passageways. If the components cannot be cleaned with a spray cleaner it may be necessary to use a dip-type cleaning solution and allow them to soak. Always follow the chemical manufacturer's instructions for proper use and cleaning of the throttle body components. Do not apply carburetor cleaning chemicals to the rubber and plastic materials.**

Inspection

Check following items for any defects or clogging. Replace the throttle body, if necessary.

- O-ring
- Throttle valve
- Secondary throttle valve
- Vacuum hose

ISC Valve Visual Inspection

Visually inspect the ISC valve, if necessary.

1) Remove the screws.



I940H1140047-01

2) Inspect the ISC valve for any carbon deposition defects. Clean or replace the ISC valve, if necessary.

⚠ CAUTION

Normally, the removed O-ring must be replaced with a new one. However, this O-ring is not available for the spare parts. If it is found to be damaged, replace the ISC valve assembly with a new one.



I940H1140048-01

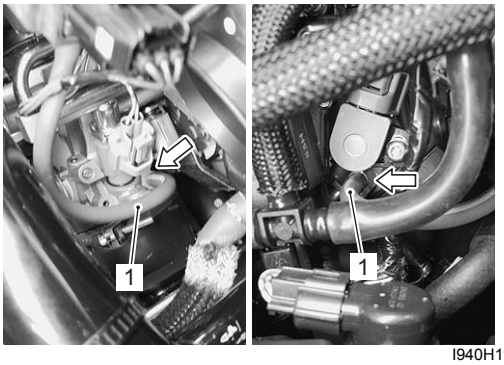
Throttle Valve Synchronization

B940H21406011

Use of SDS Tool

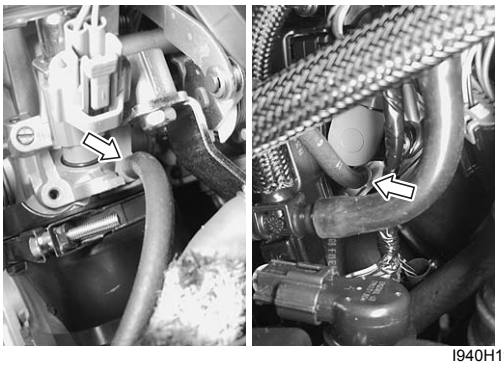
Check and adjust the throttle valve synchronization between two cylinders.

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Remove the left air cleaner box along with the joint tube. Refer to “Air Cleaner Chamber Removal and Installation (Page 1D-7)”.
3) Disconnect the IAP sensor hoses (1).



I940H1140382-01

4) Connect the respective vacuum hoses to each vacuum nipple on the throttle body.



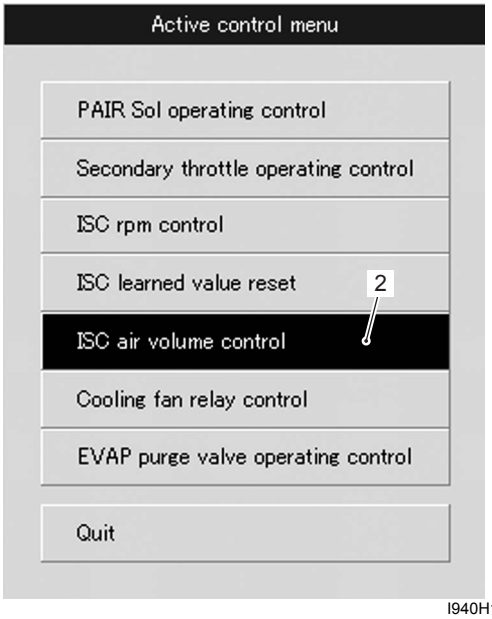
I940H1140383-01

5) Set up the SDS tool. (Refer to the SDS operation manual for further details.)
6) Reinstall the left air cleaner box and joint tube. Refer to “Air Cleaner Chamber Removal and Installation (Page 1D-7)”.
7) Reinstall the fuel tank and lift and support it. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
8) Start the engine.
9) Click “Data monitor”.
10) Warm up the engine (Water temp. more than 70 °C (158 °F)).

☐ Desired idle speed	1004	rpm
☐ Engine coolant / oil temperature	74.0	°C
☐ ISC valve position	94	step
☐ Throttle position	27.9	°
☐ Manifold absolute pressure 2	25.3	kPa

I940H1140373-02

11) Click “Active control”.
12) Click “ISC air volume control” (2).

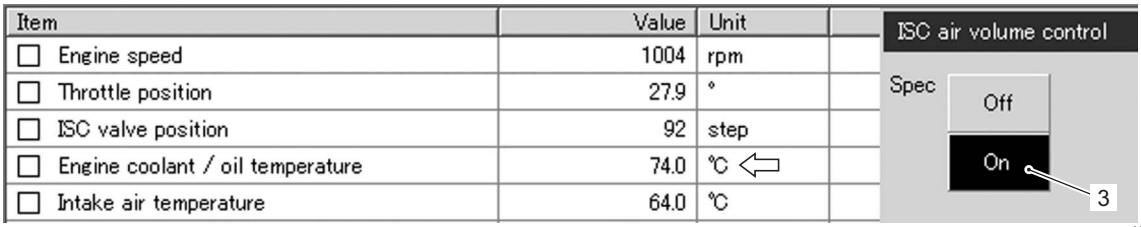


I940H1140339-01

13) Click “ON” button (3) to fix the ISC air volume among 2 cylinders.

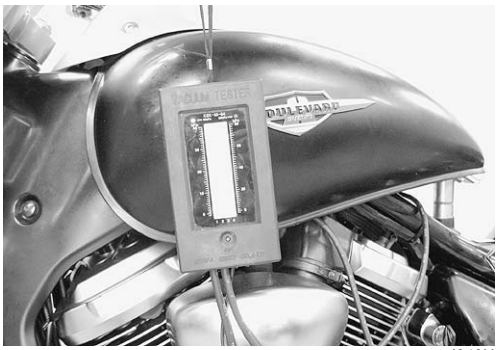
NOTE

When making this synchronization, be sure that the water temperature is within 70 – 100 °C (158 – 212 °F).



I940H1140374-02

14) Check for the synchronization of vacuum from #1 and #2 cylinder.



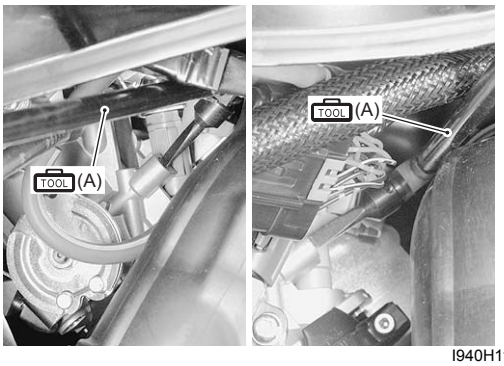
I940H1140051-01

15) Equalize the vacuum of the cylinders by turning each airscrew with the special tool and keep it turning at idling speed.

Special tool
TOOL (A): 09913–10130 (Carburetor adjust driver)

NOTE

Always set the engine rpm at idle rpm.



I940H1140052-01

16) If the adjustment is not yet correct, remove each air screw and clean them with a spray-type carburetor cleaner and blow dry with a compressed air. Also, clean the air screw passageways.

NOTE

- **Slowly turn the air screw in 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.**

17) Repeat the procedures of 7) to 15).

18) Close the SDS tool and turn the ignition switch to OFF position.

19) Disconnect the vacuum tester and reinstall the removed parts.

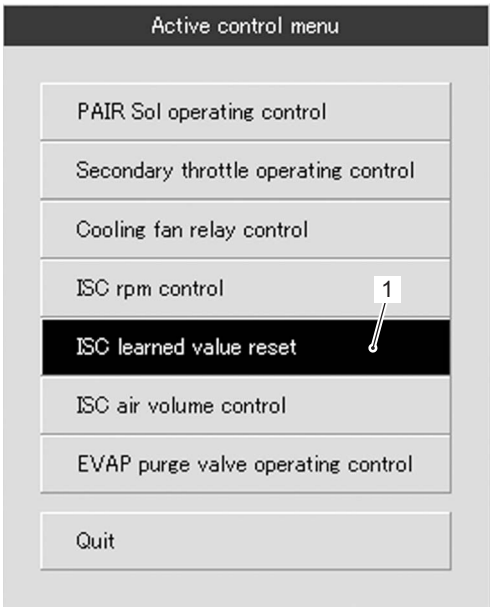
20) After completing the throttle valve synchronization, clear the DTC and reset the ISC learned value using SDS tool. Refer to “ISC Valve Preset and Opening Initialization in Section 1C (Page 1C-8)”

ISC Valve Reset

B940H21406012

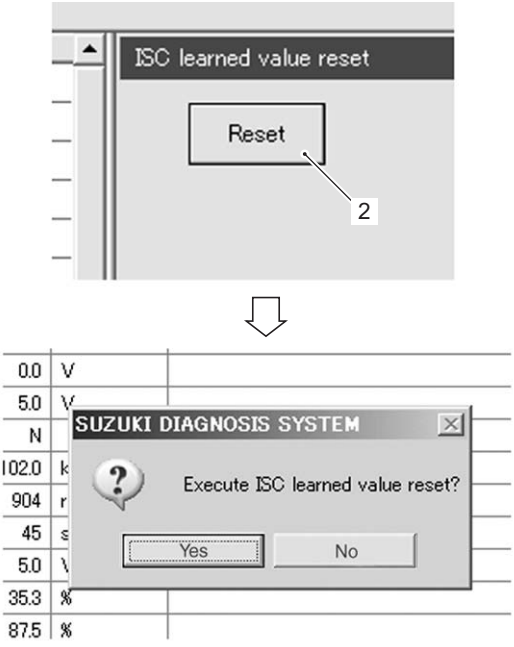
When removing or replacing the throttle body assembly, reset the ISC valve learned value in the following procedures:

1) Turn the ignition switch ON position.
2) Set up the SDS tools. (Refer to the SDS operation manual for further details.)
3) Click “Active control”.
4) Click “ISC learned value reset” (1).



I940H1140340-01

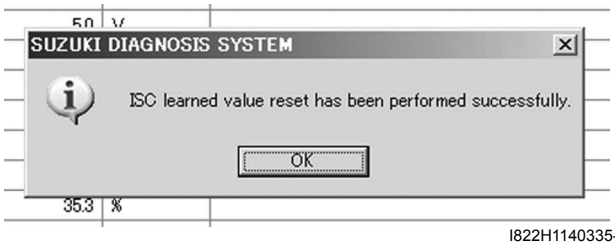
5) Click “Reset” button (2) to clear the ISC learned value.



I822H1140334-01

NOTE

The learned value of the ISC valve is set at RESET position.



I822H1140335-02

6) Close the SDS tool.
7) Turn the ignition switch OFF position.

NOTE

The ISC valve opening initialization is automatically started after the ignition switch is turned OFF.

Engine Assembly Removal

B940H21406013

⚠ CAUTION

Make sure that the motorcycle is supported securely.

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

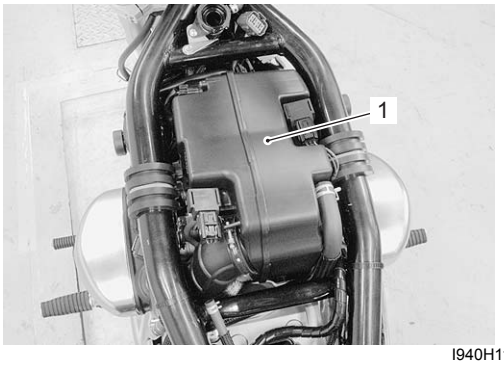
1) Drain engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.
2) Remove the front seat, frame covers and frame head covers. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Disconnect the battery (–) lead wire.



I940H1140301-01

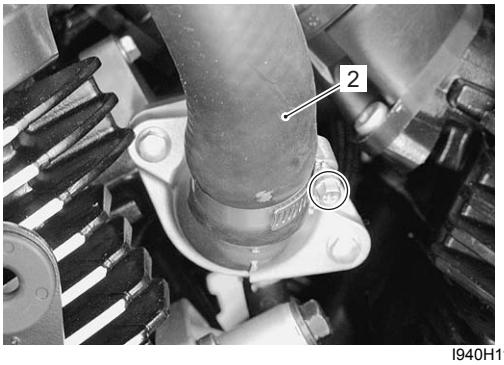
4) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
5) Drain engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.

6) Remove the air cleaner chamber (1). Refer to “Air Cleaner Chamber Removal and Installation (Page 1D-7)”.



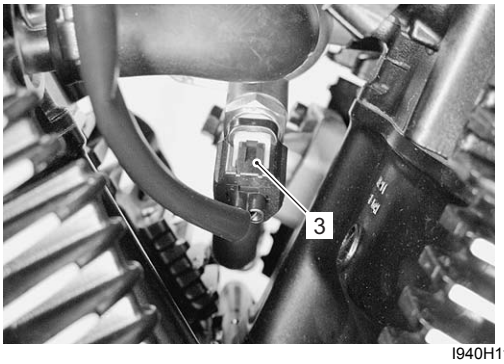
I940H1140341-01

7) Disconnect the thermostat outlet hose (2).



I940H1140342-01

8) Disconnect the ECT sensor coupler (3).



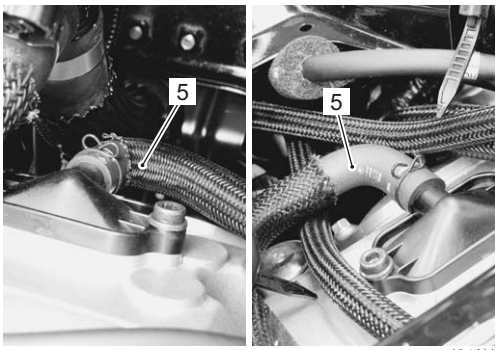
I940H1140343-01

9) Remove the throttle body (4). Refer to “Throttle Body Removal and Installation (Page 1D-12)”.



I940H1140344-01

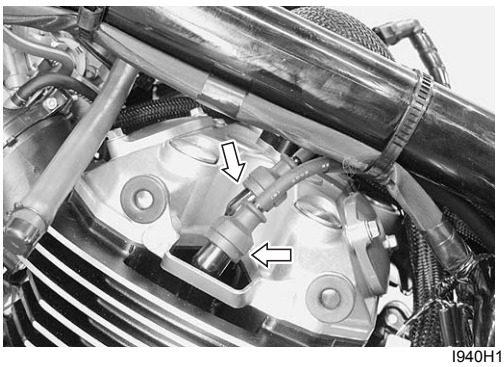
10) Disconnect the PAIR hoses (5).



I940H1140345-01

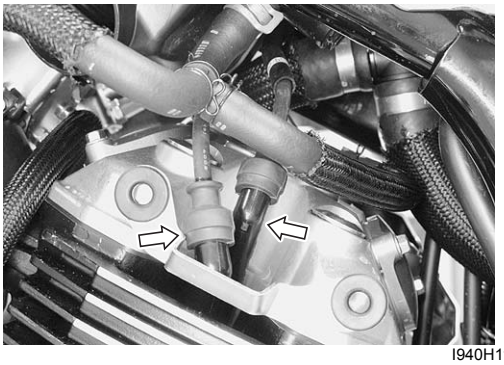
11) Remove the ignition coils/plug caps. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)”.

#1 Cylinder



I940H1140305-01

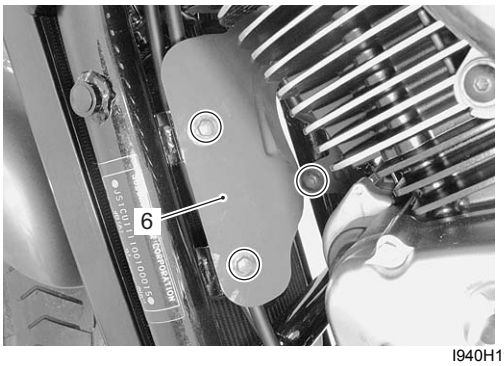
#2 Cylinder



I940H1140306-01

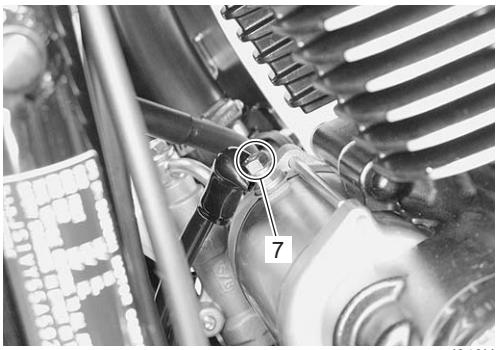
12) Remove the exhaust pipes and mufflers. Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.

13) Remove the heat shield (6).



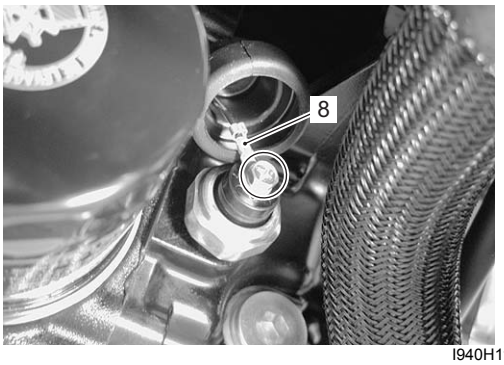
I940H1140346-01

14) Disconnect the starter motor lead wire (7).



I940H1140347-01

15) Remove the oil pressure switch lead wire (8).



I940H1140310-02

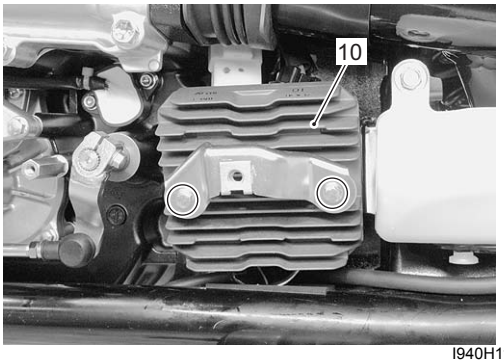
16) Remove the rear master cylinder assembly (9) and right foot pedal. Refer to “Rear Brake Master Cylinder Removal and Installation in Section 4A (Page 4A-13)”.



I940H1140348-01

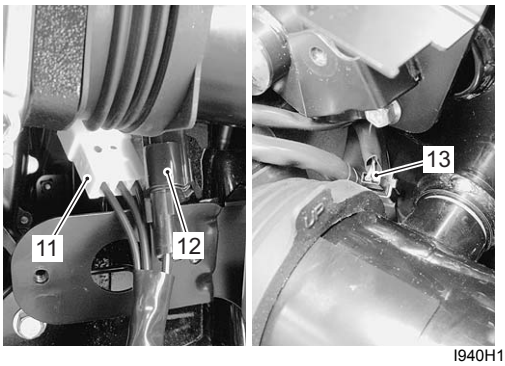
17) Remove the secondary gear case cover and left frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.

18) Remove the regulator/rectifier (10).



I940H1140349-01

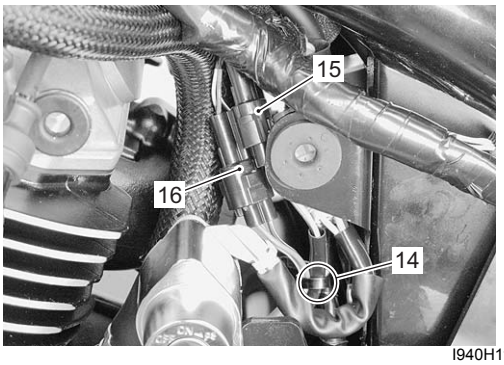
19) Disconnect the generator lead wire coupler (11), regulator/rectifier lead wire coupler (12) and CKP sensor lead wire coupler (13).



I940H1140311-02

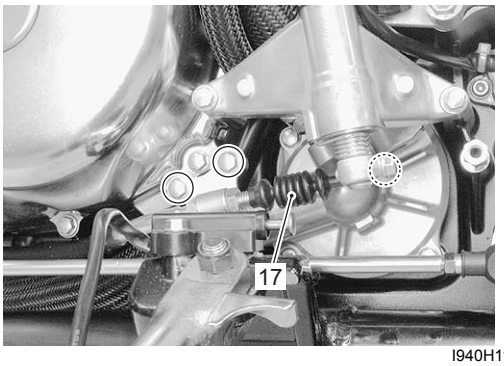
20) Release the lead wires from the clamp (14).

21) Disconnect the side-stand switch lead wire coupler (15) and speedometer sensor lead wire coupler (16).



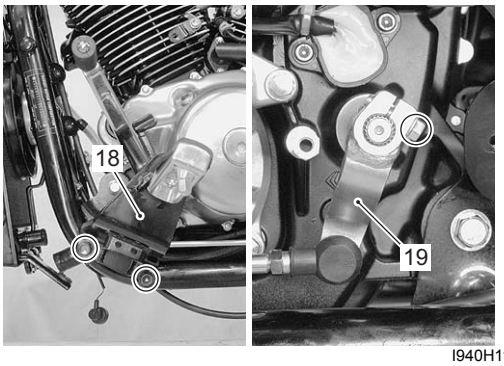
I940H1140350-01

22) Disconnect the clutch cable (17).



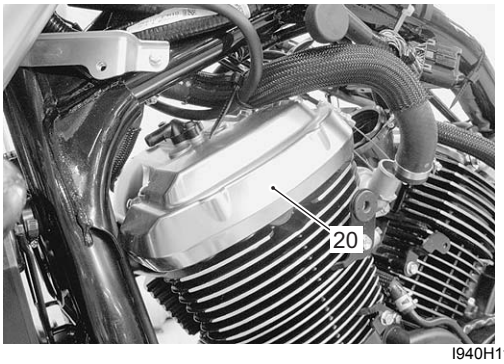
I940H1140351-01

23) Remove the left footrest (18) along with gearshift link arm (19).



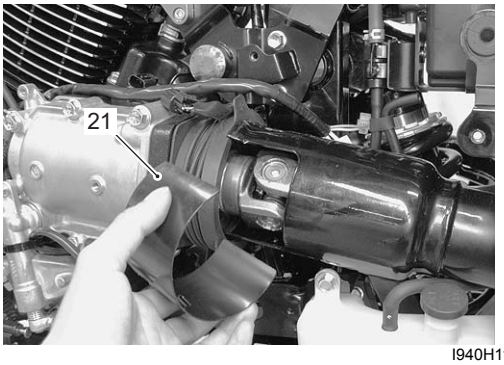
I940H1140352-01

24) Remove the cylinder head cover No. 4 (20).



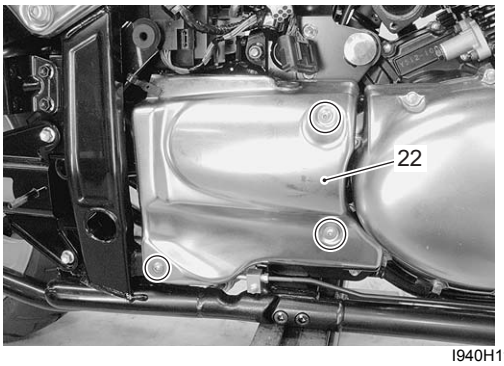
I940H1140353-02

25) Remove the swing arm pivot cover (21).



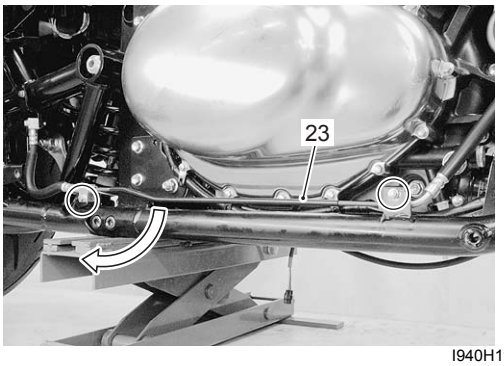
I940H1140354-01

26) Remove the right frame lower cover (22).



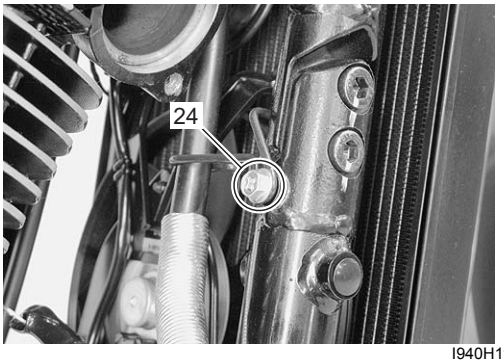
I940H1140312-02

27) Remove the rear brake pipe (23) from the down tube.



I940H1140355-02

28) Remove the rear brake hose clamp (24).



I940H1140356-01

29) Support the engine with a proper jack.



I940H1140357-01

30) Release the lead wires.



I940H1140358-01

31) Remove the engine mounting bolt and nut (25).

32) Remove the frame down tube (26) by removing their bolts and nuts.

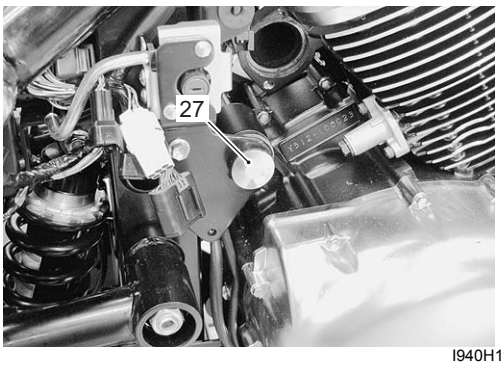


I940H1140359-01



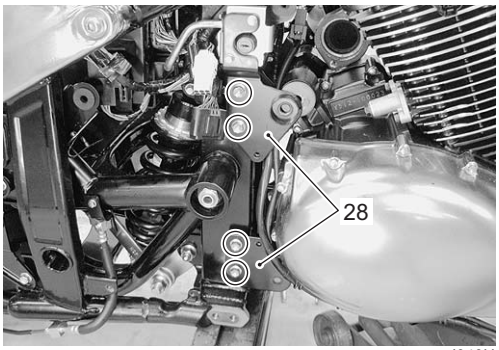
I940H1140377-01

33) Remove the caps (27) left and right.



I940H1140361-01

34) Remove the engine mounting bolts, nuts and engine mounting plates (28).



I940H1140362-01

35) Remove the engine assembly.

NOTE

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



I940H1140363-01

Engine Assembly Installation

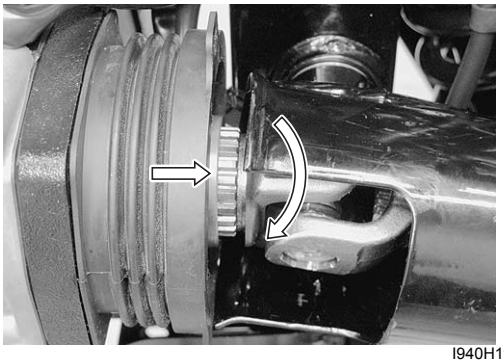
B940H21406014

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

- Install the driven bevel gear coupling to the universal joint.

NOTE

When installing the driven bevel gear coupling, align the splines by turning the rear wheel slowly by hand.

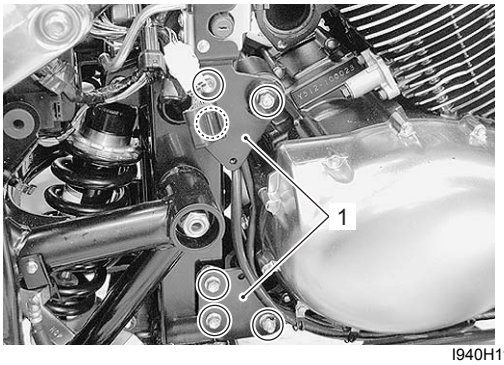


I940H1140364-01

- Install the engine mounting plates (1).
- Insert the two mounting bolts from left side, and tighten their nuts.

NOTE

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



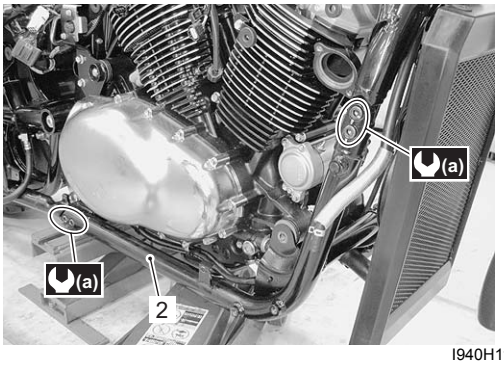
I940H1140365-01

- Install the frame down tube (2).
- Tighten the bolts and nuts to the specified torque.

NOTE

The frame down tube nuts are self-locking. Once the nuts have been removed, they are no longer of any use.

Tightening torque
Frame down tube bolt (a): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)

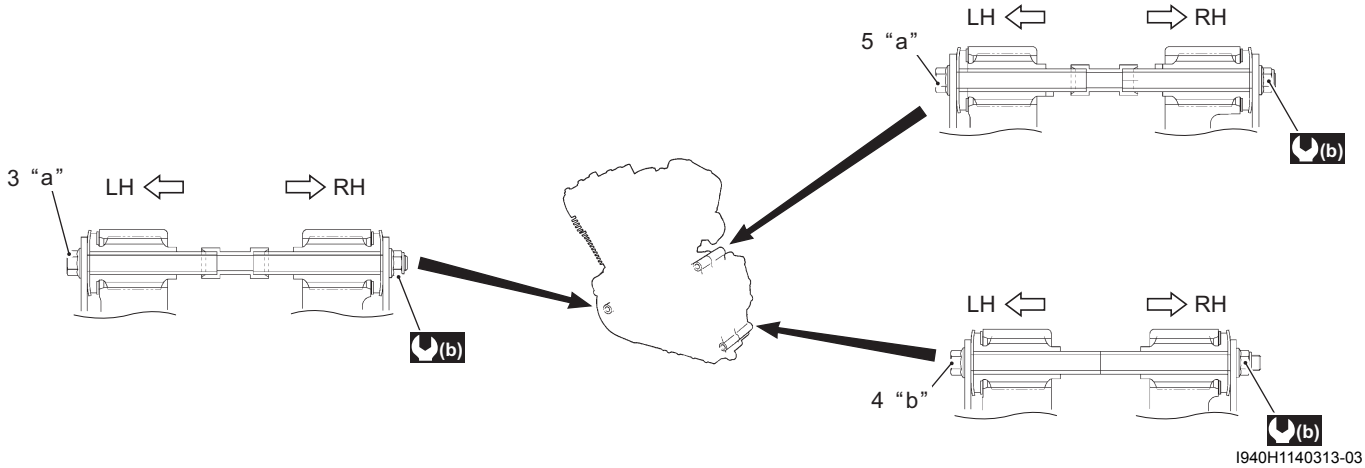


I940H1140366-01



I940H1140367-01

- Tighten all engine mounting bolts and nuts to the specified torque, as shown in the following illustration.



I940H1140313-03

3. Engine mounting bolt (Front)	"a": 215 mm (8.5 in)
4. Engine mounting bolt (Rear lower)	"b": 195 mm (7.7 in)
5. Engine mounting bolt (Rear upper)	(b) : 55 N·m (5.5 kgf-m, 40.0 lbf-ft)

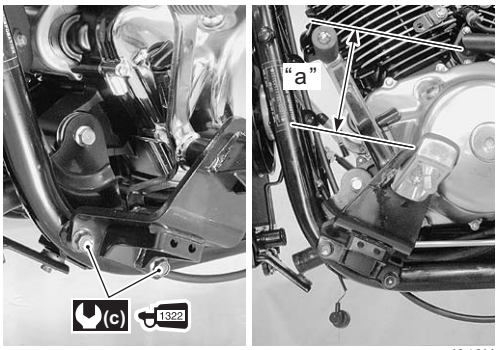
- After remounting the engine, route the wiring harness properly. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-5)”.
- Connect the clutch cable. Refer to “Clutch Cable Removal and Installation in Section 5C (Page 5C-2)”.
- Apply thread lock to the bolts and tighten them.

  1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

  Tightening torque
  Front footrest bracket bolt (c): 50 N·m (5.0 kgf-m, 36 lbf-ft)

- Install the gearshift link arm to the gearshift shaft in the correct position. Refer to “Gearshift Lever Height Inspection and Adjustment in Section 5B (Page 5B-12)”.

  Gearshift lever height “a”
  Standard: 95 – 105 mm (3.7 – 4.1 in)

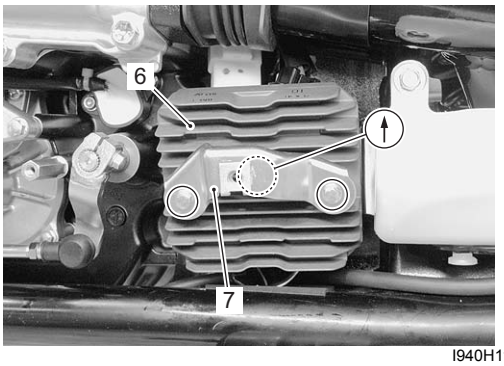


I940H1140368-03

- Install the regulator/rectifier (6).

NOTE

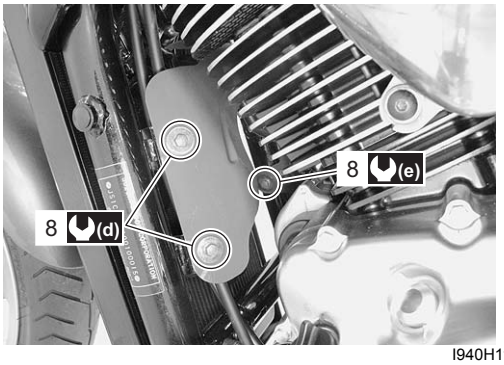
When installing the frame lower cover bracket (7), bring the arrow mark upward.



I940H1140369-04

- Install the right footrest and rear brake master cylinder assembly. Refer to “Rear Brake Master Cylinder Removal and Installation in Section 4A (Page 4A-13)”.
- Install the exhaust pipes and mufflers. Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.
- Connect the water hoses. Refer to “Water Hose Routing Diagram in Section 1F (Page 1F-3)”.
- Install the throttle body. Refer to “Throttle Body Removal and Installation (Page 1D-12)”.
- Install the air cleaner chamber. Refer to “Air Cleaner Chamber Removal and Installation (Page 1D-7)”.
- Tighten the radiator heat shield mounting bolts (8) to the specified torque.

  Tightening torque
  Radiator heat shield mounting bolt (Left side) (d): 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)
  Radiator heat shield mounting bolt (Right side) (e): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1140384-01

- Pour engine coolant and engine oil. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)” and “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.
- After finishing the engine installation, check the following items.
  - Throttle cable play
    Refer to “Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-10)”.
  - Throttle valve synchronization
    Refer to “Throttle Valve Synchronization in Section 0B (Page 0B-11)”.
  - Engine oil and coolant leakage
    Refer to “Cooling Circuit Inspection in Section 1F (Page 1F-4)”.
  - Clutch cable play
    Refer to “Clutch Cable Play Inspection and Adjustment in Section 0B (Page 0B-12)”.

Engine Top Side Disassembly

B940H21406015

It is unnecessary to remove the engine assembly from the frame when servicing the cylinder head cover and camshafts.

NOTE

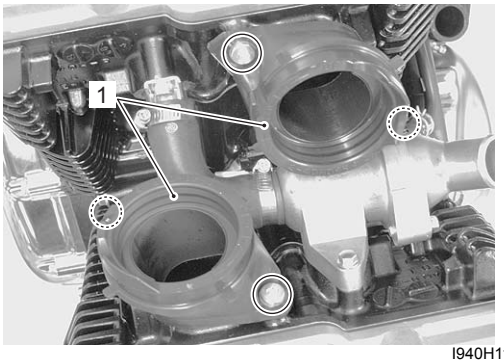
"Engine top side components" can not be serviced with the engine installed in the frame.

⚠ 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.

Intake Pipe

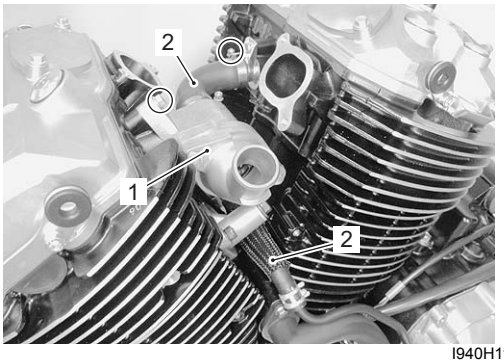
Remove the front and rear intake pipes (1).



I940H1140053-01

Thermostat

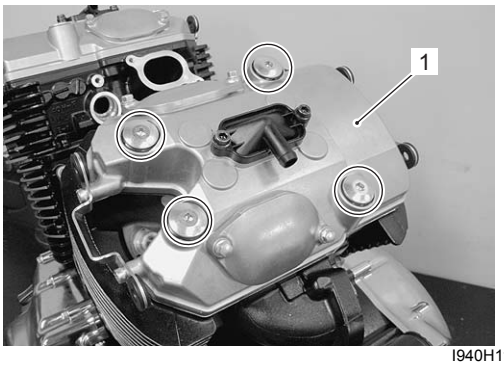
Remove the thermostat assembly (1) and disconnect the water hoses (2).



I940H1140054-01

Cylinder Head Cover (#1 Cylinder)

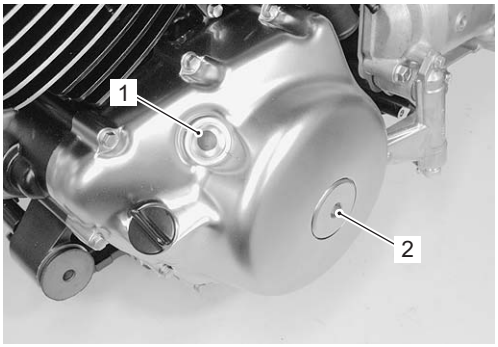
1) Remove the spark plugs. Refer to "Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)".
2) Remove the rear cylinder head cover (1) and its gasket.



I940H1140070-02

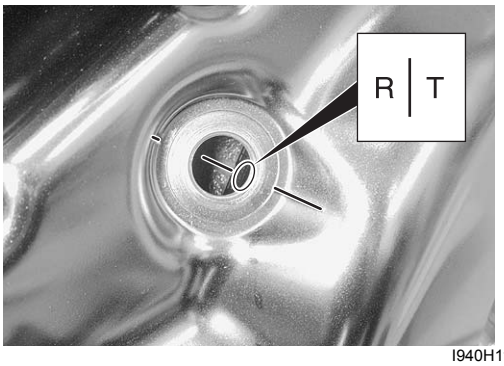
Camshaft (#1 Cylinder)

1) Remove the valve timing inspection plug (1) and generator cover plug (2).



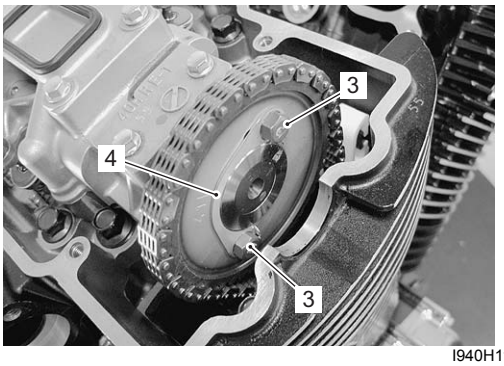
I940H1140056-01

2) Turn the crankshaft to bring the "R I T" line mark on the generator rotor with the valve inspection hole.



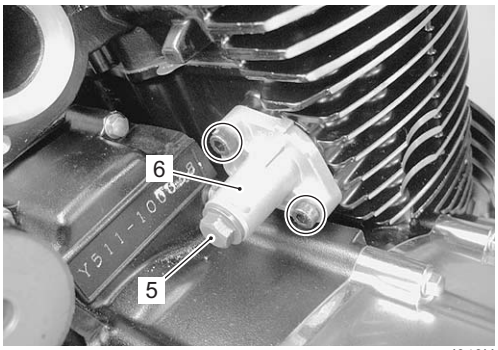
I940H1140071-03

3) Remove the cam chain sprocket bolts (3) and lock washer (4).



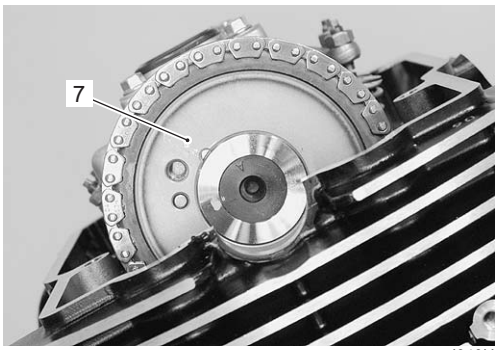
I940H1140333-02

4) Remove the cam chain tension adjuster cap bolt (5) and spring.
5) Remove the rear cam chain tension adjuster (6) and gasket.



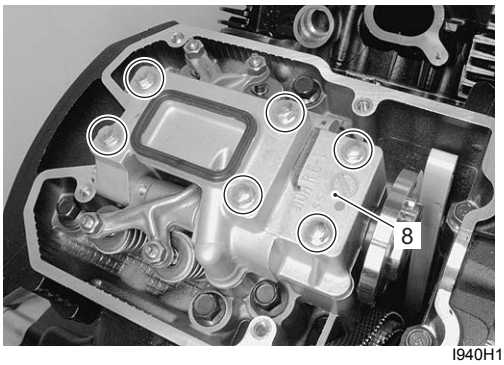
I940H1140074-04

6) Remove the cam chain sprocket (7).



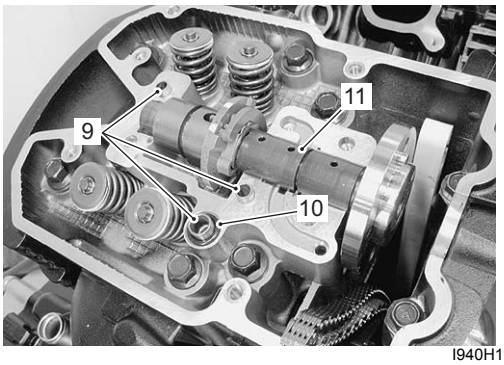
I940H1140334-01

7) Remove the camshaft journal holder (8).



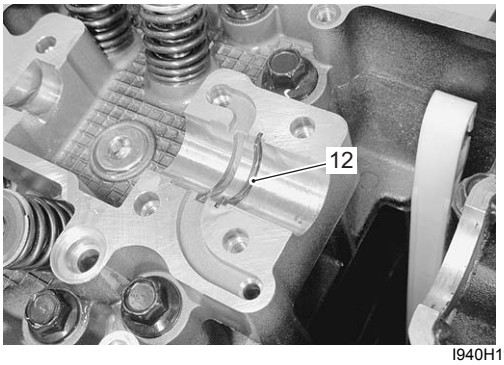
I940H1140075-04

8) Remove the dowel pins (9) and O-ring (10).
9) Remove the camshaft (11).



I940H1140076-04

10) Remove the camshaft C-ring (12).



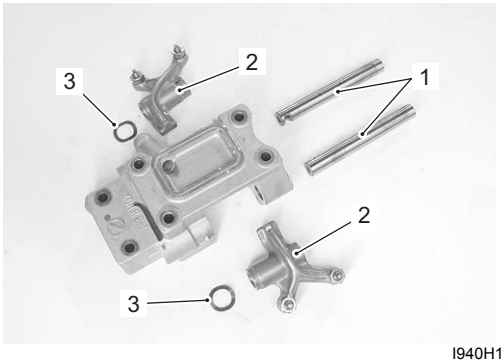
I940H1140077-03

Rocker Arm (#1 Cylinder)

⚠ CAUTION

Be sure to identify each removed part as to its location, and lay the parts out in groups designated as “Exhaust”, “Intake”, so that each will be restored to the original location during assembly.

1) Remove the rocker arm shaft (1).
2) Remove the each rocker arm (2) and wave washer (3).



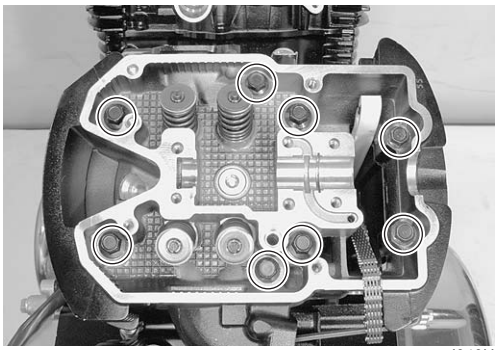
I940H1140317-01

Cylinder Head (#1 Cylinder)

1) Remove the rear cylinder head.

NOTE

Loosen the cylinder head bolts little by little diagonally with the smaller sizes first.



I940H1140078-03

2) Remove the rear cylinder gasket (1) and dowel pins.



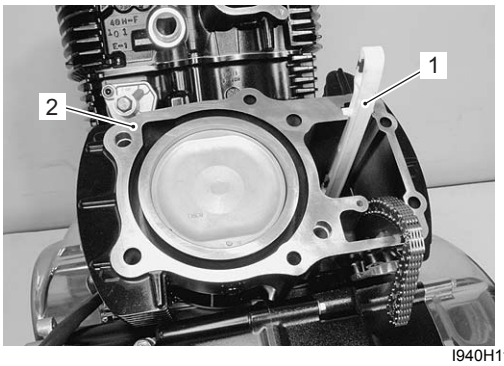
I940H1140079-02

Cylinder (#1 Cylinder)

1) Remove the cam chain guide (1) and rear cylinder (2).

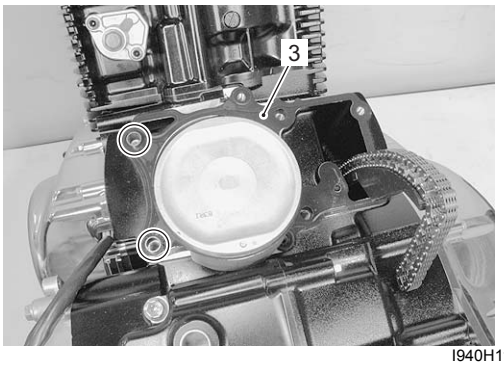
NOTE

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 the cylinder with a plastic hammer.



I940H1140080-02

2) Remove the rear cylinder gasket (3) and dowel pins.



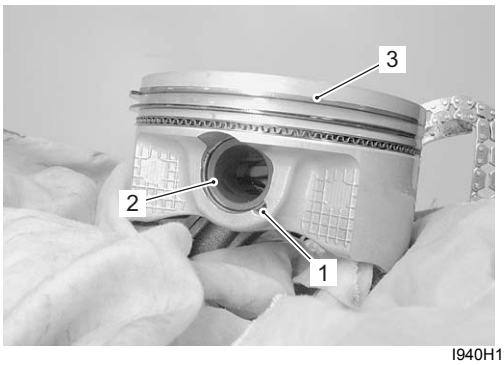
I940H1140081-02

Rear Piston (#1 Cylinder)

1) Place a clean rag over the cylinder base so as not to drop the piston pin circlips into the crankcase.
2) Remove the piston pin circlip (1).
3) Draw out the piston pin (2) and remove the piston (3).

NOTE

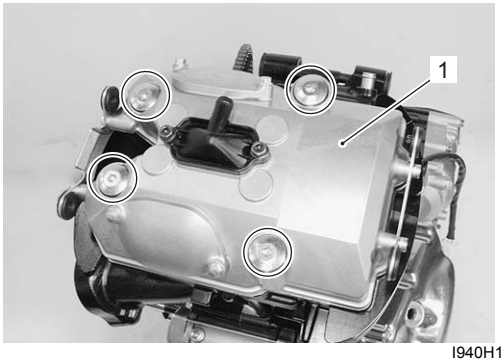
Scribe the cylinder number on the piston head.



I940H1140082-01

Cylinder Head Cover (#2 Cylinder)

1) Remove the spark plugs. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)”.
2) Remove the front cylinder head cover (1) and its gasket.



I940H1140055-02

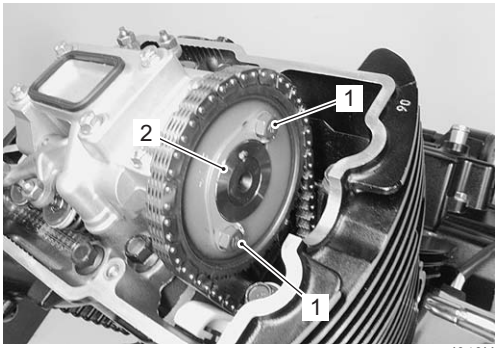
Camshaft (#2 Cylinder)

1) Turn the crankshaft 486 degrees (1 – 1/3 turns) to bring the “F I T” line mark on generator rotor to the index mark of the valve inspection hole.



I940H1140057-04

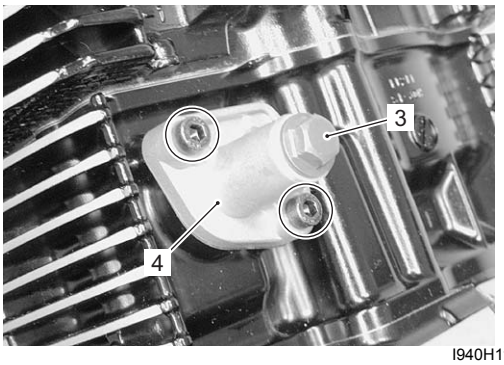
2) Remove the cam chain sprocket bolts (1) and sprocket washer (2).



I940H1140331-01

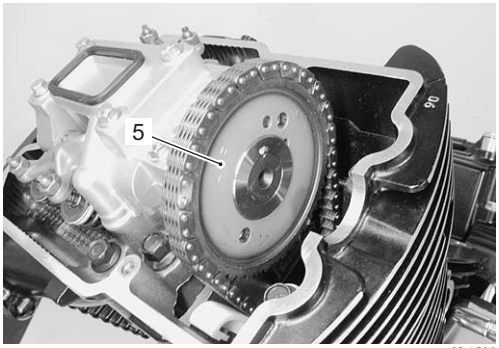
3) Remove the cam chain tension adjuster cap bolt (3), washer and spring.

4) Remove the front cam chain tension adjuster (4) and gasket.



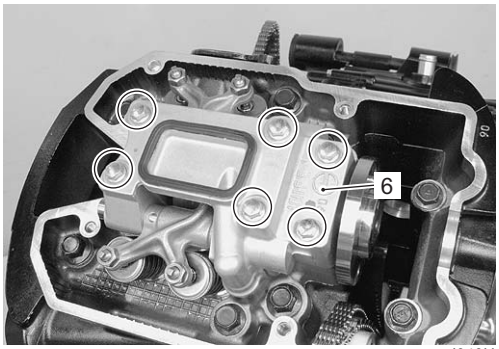
I940H1140060-02

5) Remove the cam chain sprocket (5).



I940H1140332-01

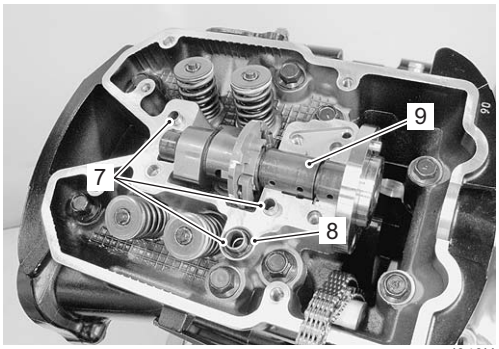
6) Remove the camshaft journal holder (6).



I940H1140061-04

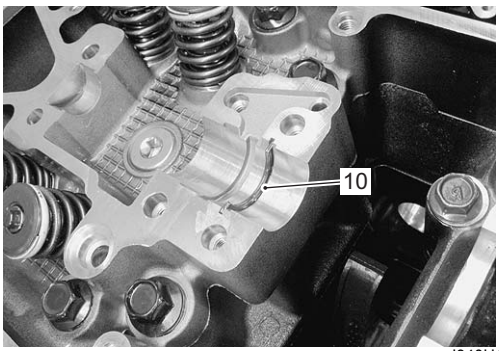
7) Remove the dowel pins (7) and O-ring (8).

8) Remove the camshaft (9).



I940H1140062-02

9) Remove the camshaft C-ring (10).



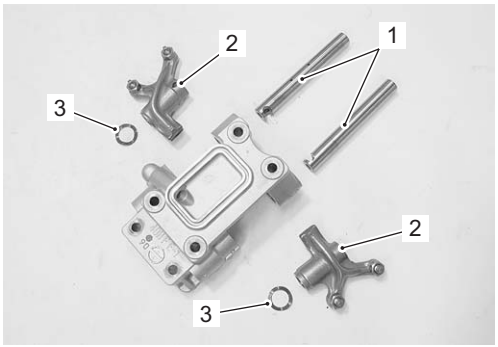
I940H1140063-02

Rocker Arm (#2 Cylinder)

⚠ CAUTION

Be sure to identify each removed part as to its location, and lay the parts out in groups designated as “Exhaust”, “Intake”, so that each will be restored to the original location during assembly.

1) Remove the rocker arm shaft (1).
2) Remove the each rocker arm (2) and wave washer (3).



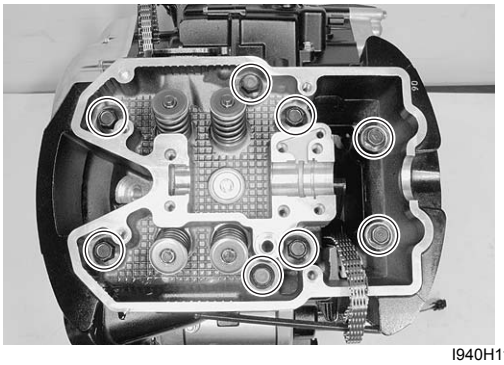
I940H1140068-01

Cylinder Head (#2 Cylinder)

1) Remove the front cylinder head.

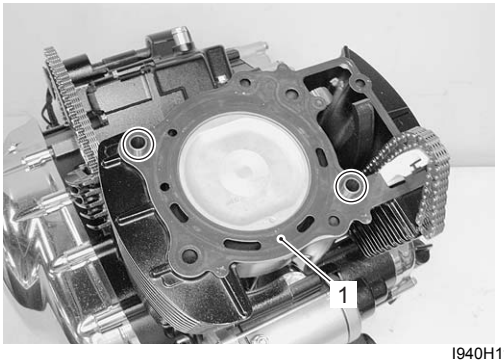
NOTE

Loosen the cylinder head bolts little by little diagonally with the smaller sizes first.



I940H1140064-02

2) Remove the front cylinder head gasket (1) and dowel pins.



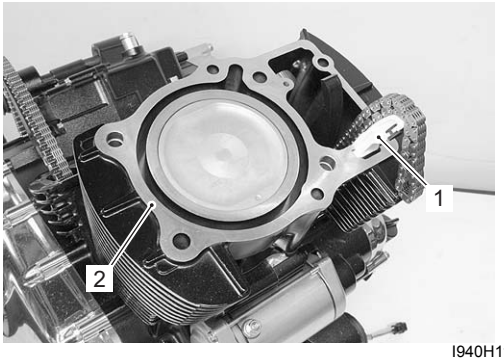
I940H1140065-02

Front Cylinder (#2 Cylinder)

1) Remove the cam chain guide (1) and front cylinder (2).

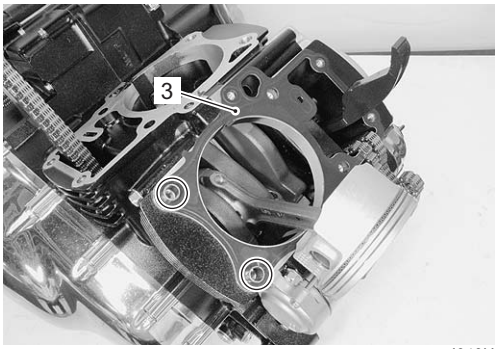
NOTE

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 the cylinder with a plastic hammer.



I940H1140066-03

2) Remove the front cylinder gasket (3) and dowel pins.



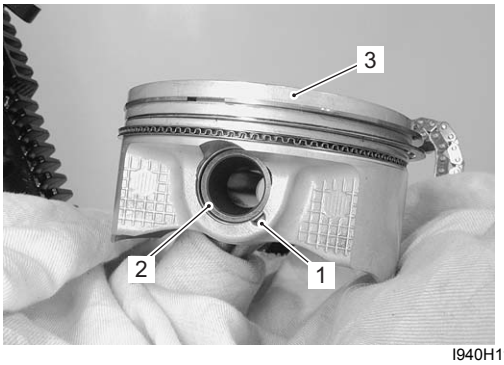
I940H1140067-02

Front Piston (#2 Cylinder)

1) Place a clean rag over the cylinder base so as not to drop the piston pin circlips into the crankcase.
2) Remove the piston pin circlip (1).
3) Draw out the piston pin (2) and remove the piston (3).

NOTE

Scribe the cylinder number on the piston head.



I940H1140315-03

Engine Top Side Assembly

B940H21406016

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

Piston

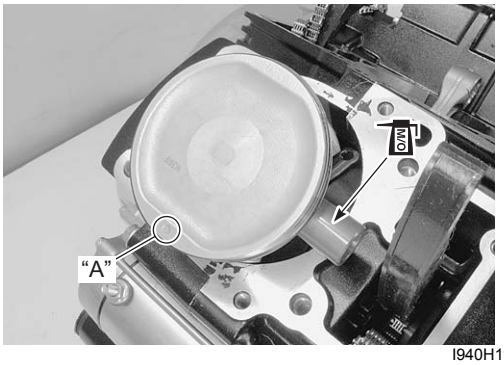
- When installing the piston pins, apply molybdenum oil solution onto each piston pins.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

NOTE

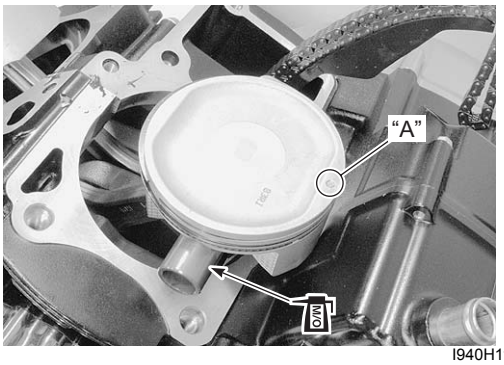
When installing the pistons, the indent "A" on the piston head must be faced to each exhaust side.

Front



I940H1140083-01

Rear



I940H1140084-01

- Place a clean rag over the cylinder base so as not to drop the piston pin circlips (1) into the crankcase.
- Install the piston pin circlips (1).

⚠ CAUTION

Use new piston pin circlips (1) to prevent circlip failure which will occur when it is bent.

NOTE

End gap of the circlip (1) should not be aligned with the cutaway in the piston pin bore.

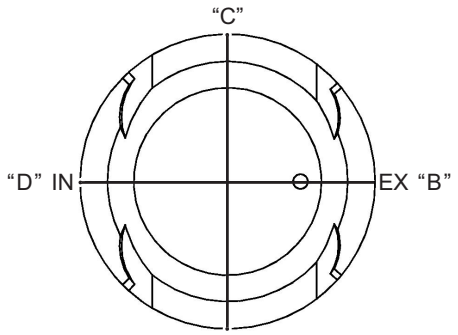


I940H1140085-02

- Apply molybdenum oil solution to the position rings.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

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



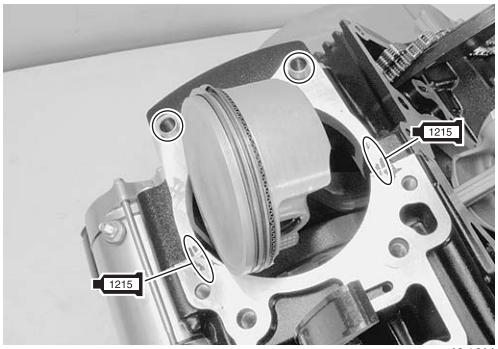
I940H1140379-02

"B":	2nd ring and lower side rail
"C":	Spacer
"D":	1st ring and upper side rail

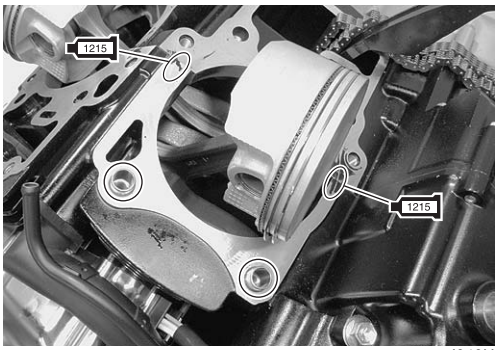
- Apply bond lightly to the mating surface of crankcase.

  1215 : Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)

- Install the dowel pins.



I940H1140086-01



I940H1140087-02

Cylinder

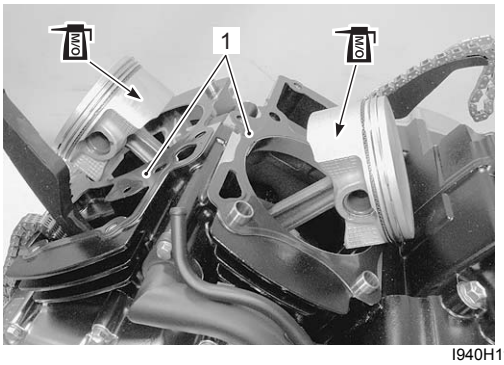
- Install the new gaskets (1), front and rear.

  ⚠ CAUTION

  Use a new gaskets (1) to prevent oil leakage.

- Apply molybdenum oil solution to the sliding surface of the pistons and cylinder walls.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I940H1140088-01

- Hold the piston rings in proper positions, and insert each of the pistons into the respective cylinders.

  NOTE

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



I940H1140089-01



I940H1140090-01

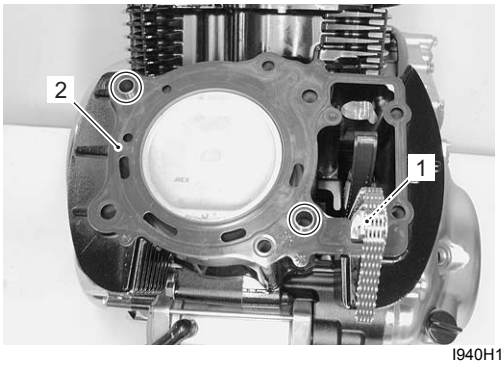
Cylinder Head

- Pull the cam chains out of the cylinders and install the cam chain guides (1).
- Fit the dowel pins and a new cylinder head gaskets (2) to the cylinders.

⚠ CAUTION

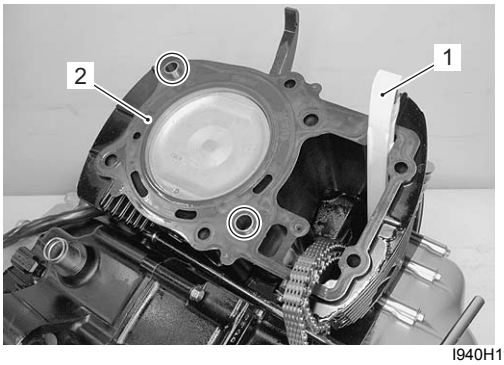
- **There is the guide holder for the bottom end of each cam chain guides (1) cast in the crankcase.**
- **Be sure that the cam chain guides (1) is installed properly.**
- **Use a new gasket (2) to prevent gas leakage.**

Front



I940H1140091-01

Rear

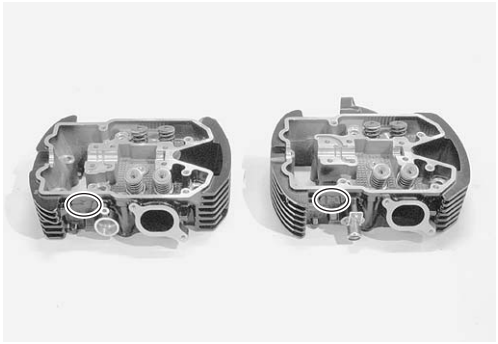


I940H1140092-01

- Place the cylinder heads on the cylinders.

NOTE

- **The cylinder heads can be distinguished by the embossed-letters, “F” and “R”.**
- **When installing the cylinder head, keep the cam chain taut.**



I940H1140370-02

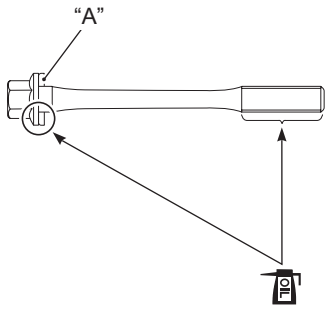
	I.D. mark
Front (#2)	40H – F
Rear (#1)	40H – R

- Apply engine oil to the both side of the washers and thread portion of the bolts before installing the cylinder head bolts.
- Tighten the cylinder head bolts (L190) to the specified two-step torque with a torque wrench sequentially and diagonally.

Tightening torque
Cylinder head bolt (L190) (Initial): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)
Cylinder head bolt (L190) (Final): 42 N·m (4.2 kgf-m, 30.5 lbf-ft)

- Tighten the other bolts (L180) and (L160) to the a little at a time to equalize the pressure.

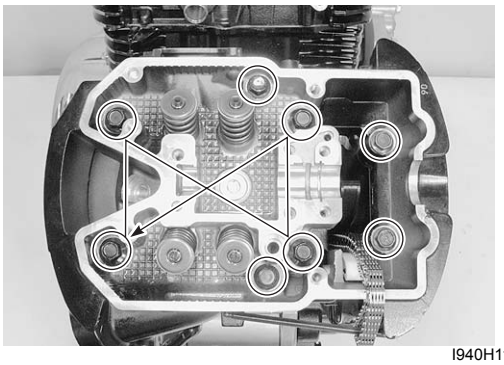
Tightening torque
Cylinder head bolt (L180): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)
Cylinder head bolt (L160): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



I822H1140338-02

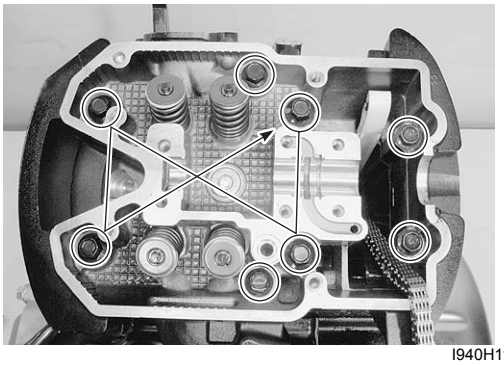
“A”: L190 only

Front



I940H1140093-02

Rear



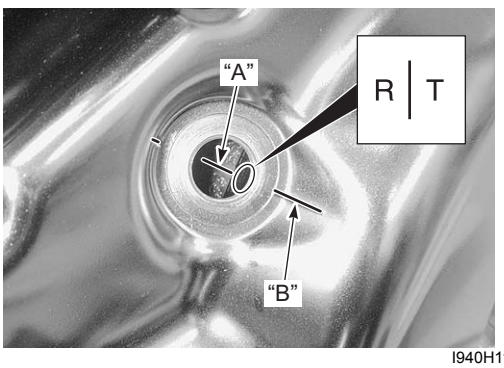
I940H1140094-03

Camshaft / Cam Chain

- Turn the crankshaft clockwise and align the “R I T” line “A” on the generator with the index marks “B” of the timing inspection hole.

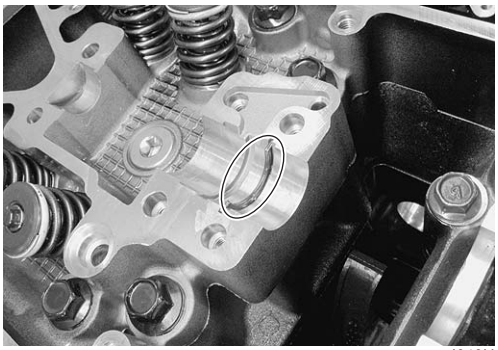
⚠ CAUTION

- **Pull the cam chain upward, or the chain will be caught between crankcase and cam drive sprocket.**
- **To adjust the camshaft timing correctly, be sure to align “R I T” line “A” with the index mark “B” and hold this position when installing the camshafts.**



I940H1140095-01

- Install the C-rings.



I940H1140096-01

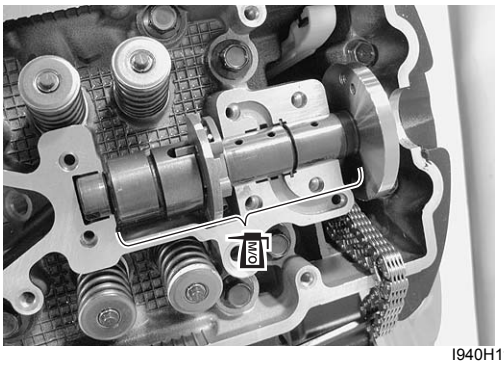
- The camshafts are identified by the embossed letters.

	I.D. mark
Front (#2)	A
Rear (#1)	B

- Before replacing the camshafts on cylinder head, apply molybdenum oil solution to their journals and cam faces.
- Apply molybdenum oil solution to the camshaft journal holders.

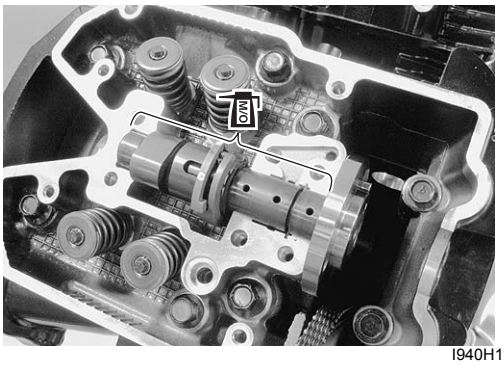
M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

Rear



I940H1140097-01

Front



I940H1140098-01

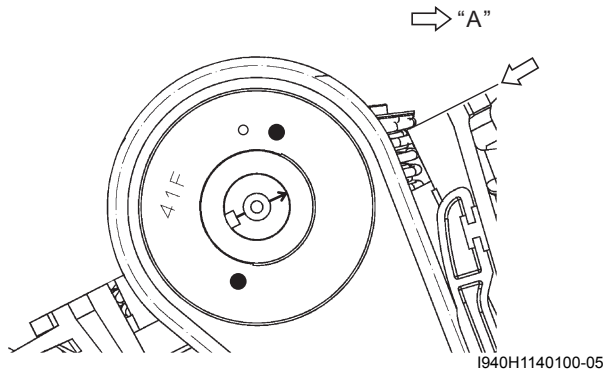
- Temporally install the cam chain sprockets and align the arrow marks on the front and rear camshafts so it is parallel with the surface of the cylinder heads.

NOTE

Each arrow mark points to forward, when the rear piston is at TDC.

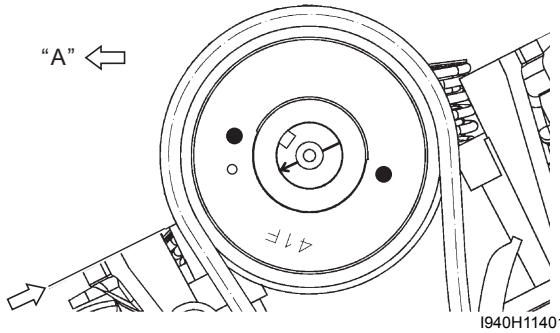
- Engage the cam chain with the camshaft sprocket.

Rear



I940H1140100-05

Front



I940H1140101-05

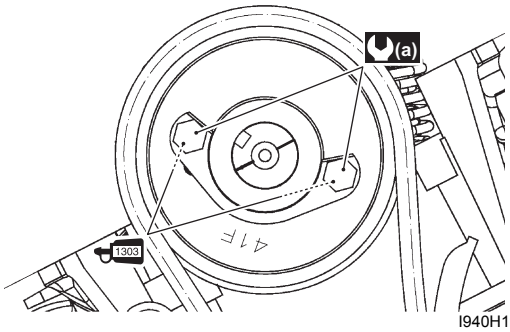
"A": Forward

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

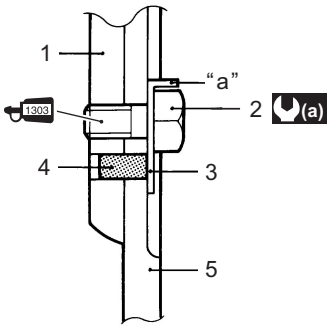
Tightening torque
Cam chain sprocket bolt (a): 15 N·m (1.5 kgf-m, 11.5 lbf-ft)

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

- Bend up the washer tongue positively to lock the bolts.



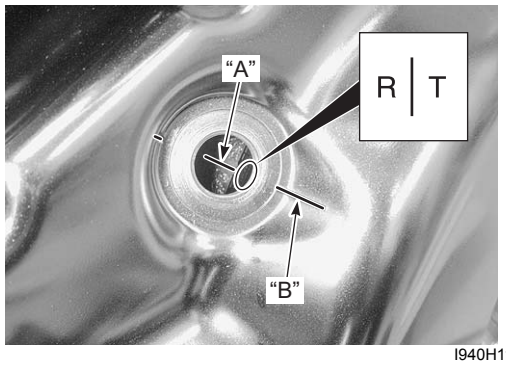
I940H1140112-04



I940H1140113-05

1. Camshaft	3. Washer	5. Sprocket
2. Bolt	4. Pin	"a": Bend up

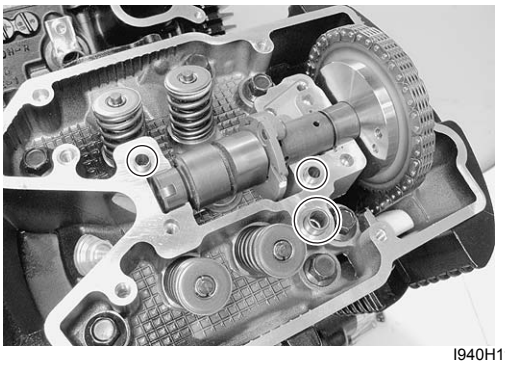
- After tightening the bolt, align the "R I T" line "A" on the generator with the index marks "B" of the timing inspection hole.



I940H1140095-01

Rocker Arm / Camshaft Journal Holder / Cam Chain Tension Adjuster

- Install the dowel pins.



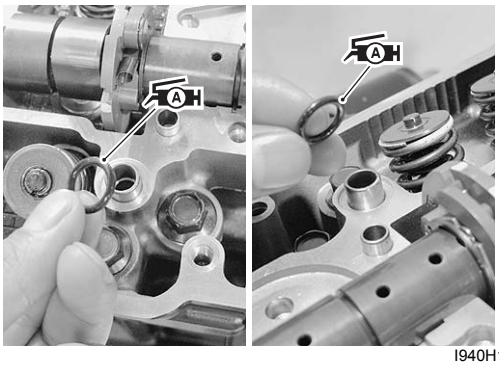
I940H1140110-01

- Apply grease to the new O-rings.

⚠ CAUTION

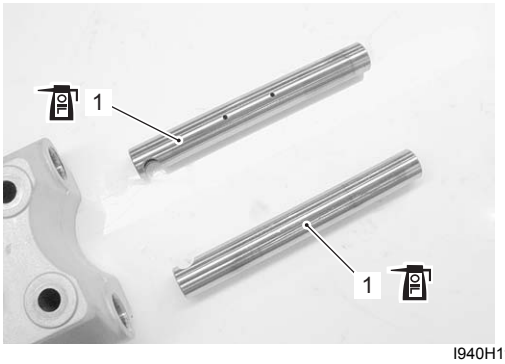
Replace the O-rings with new ones.

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



I940H1140111-01

- Apply engine oil to the rocker arm shafts (1).

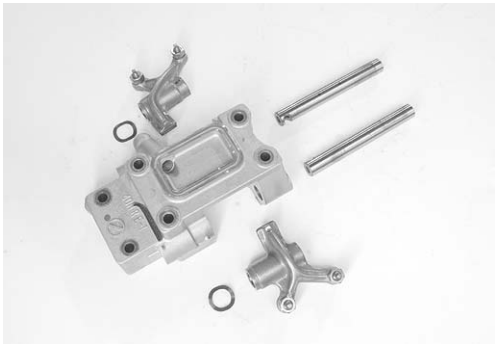


I940H1140114-02

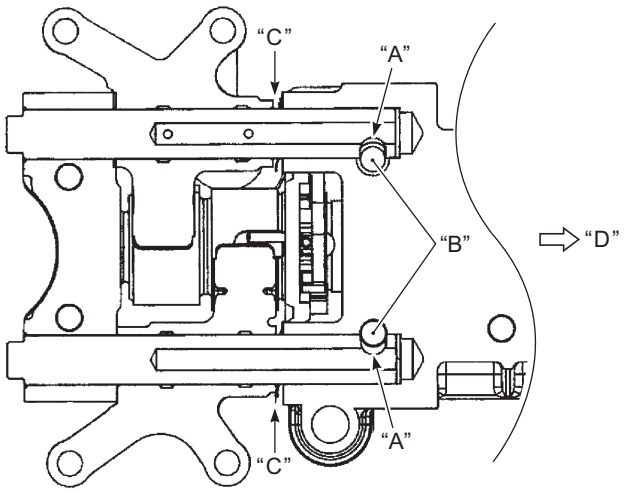
- Install the rocker arm shafts, wave washer and rocker arms.

⚠ CAUTION

Align the groove “A” of the rocker arm shafts and holes “B” of the camshaft journal.



I940H1140115-01

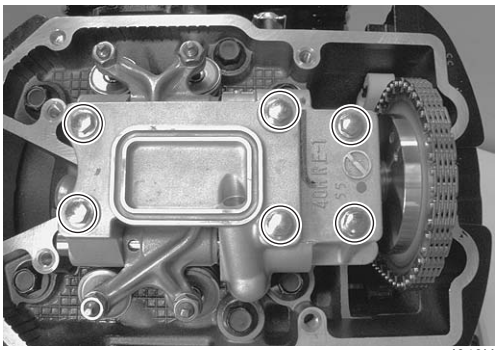


I940H1140116-05

“C”: Wave washer position	“D”: Cam chain sprocket side

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

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



I940H1140381-01

- The rear cam chain tension adjuster are identified by the embossed letters (R-UP).
- Retract the push rod by pushing the stopper (2).

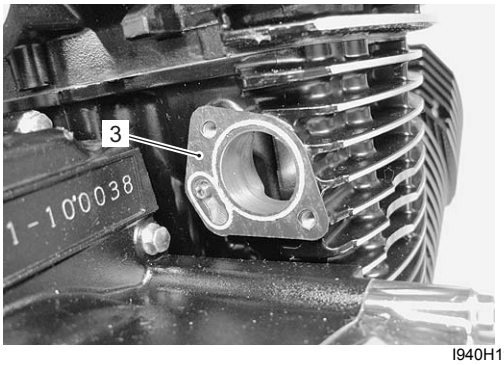


I940H1140102-02

- Install a new gasket (3).

⚠ CAUTION

Use a new gasket to prevent oil leakage.



I940H1140103-02

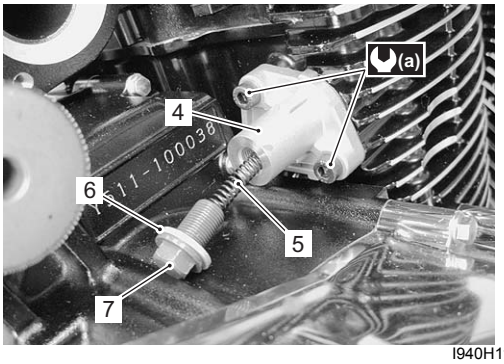
- Install the rear cam chain tension adjuster (4) and tighten its mounting bolts.

Tightening torque
Cam chain tension adjuster bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Install the spring (5).
- Install the gasket (6) and cam chain tension adjuster cap bolt (7).

NOTE

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



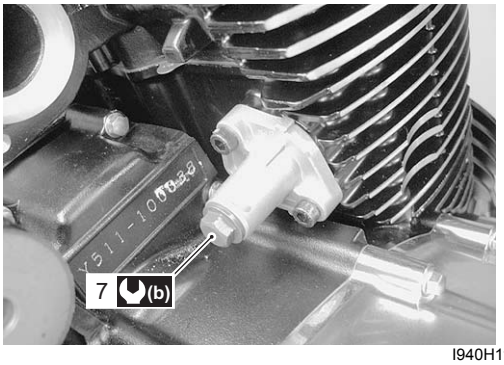
I940H1140104-02

- Tighten the cam chain tension adjuster cap bolt (7) to the specified torque.

Tightening torque
Cam chain tension adjuster cap bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

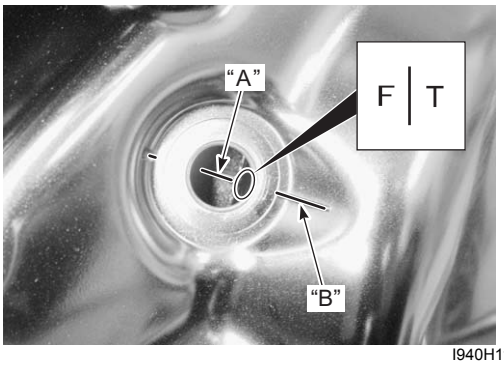
⚠ CAUTION

After installing the cam chain tension adjuster, check to be sure that the adjuster works properly by checking the slack of cam chain.



I940H1140105-03

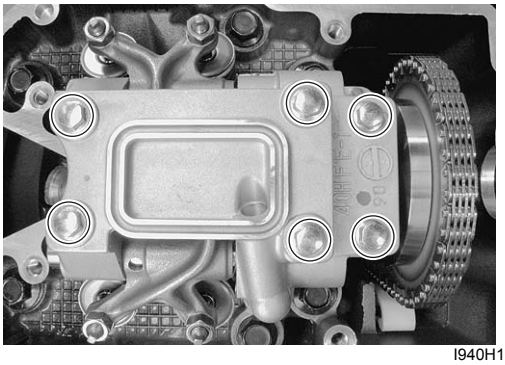
- Turn the crankshaft clockwise approx. 1-1/3 turns (486°) and align the “F I T” line “A” on the generator with the index marks “B” of the timing inspection hole.



I940H1140106-02

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

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



I940H1140117-02

- The front cam chain tension adjuster are identified by the embossed letters (F-UP).
- Retract the push rod by pushing the stopper (8).

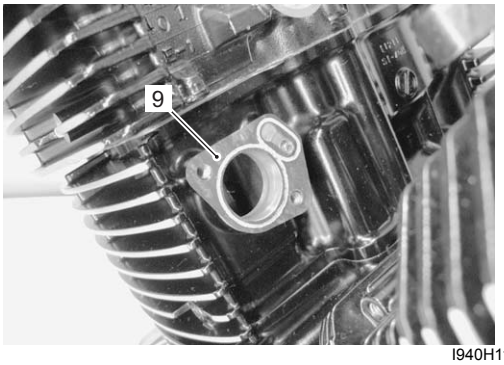


I940H1140107-02

- Install a new gasket (9).

⚠ CAUTION

Use a new gasket to prevent oil leakage.



I940H1140108-02

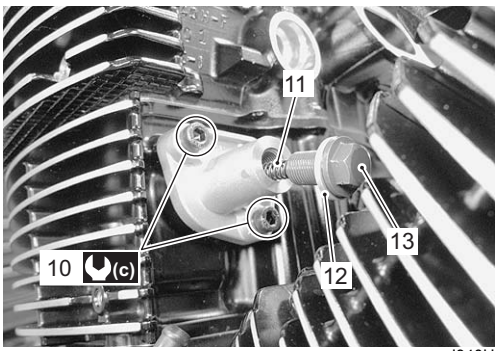
- Install the front cam chain tension adjuster (10) and tighten its mounting bolts.

Tightening torque
Cam chain tension adjuster bolt (c): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

- Install the spring (11).
- Install the gasket (12) and cam chain tension adjuster cap bolt (13).

NOTE

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



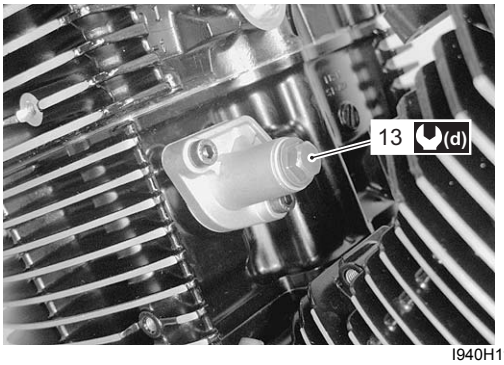
I940H1140291-03

- Tighten the cam chain tension adjuster cap bolt (13) to the specified torque.

Tightening torque
Cam chain tension adjuster cap bolt (d): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

⚠ CAUTION

After installing the cam chain tension adjuster, check to be sure that the adjuster works properly by checking the slack of cam chain.

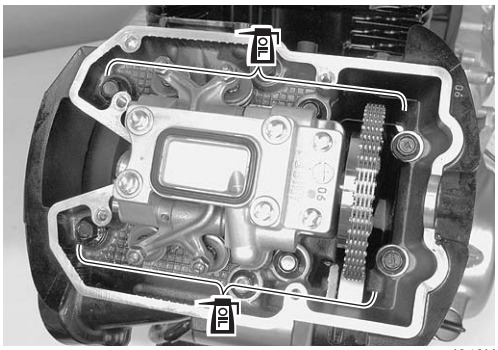


I940H1140109-02

- After installing the camshaft journal holder, rotate the crankshaft (some turns), and recheck the positions of the camshafts.

Cylinder Head Cover

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



I940H1140118-01

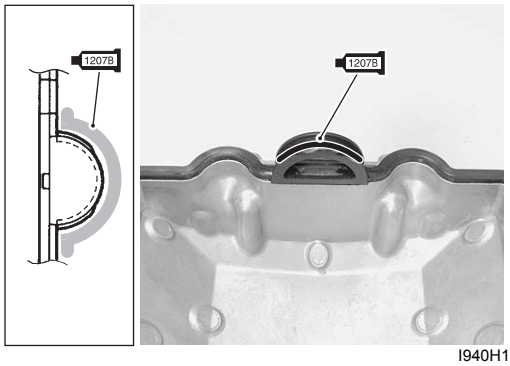
- Install a new gaskets to the cylinder head covers.

⚠ CAUTION

Use new gaskets to prevent oil leakage.

- Apply bond to the cam end caps of the gaskets as shown in the figure.

  1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)



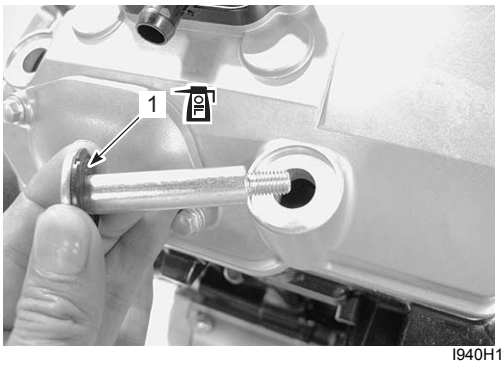
I940H1140119-02

- Place the cylinder head covers on the cylinder heads.
- Fit new gaskets (1) to each head cover bolts.

⚠ CAUTION

Use the new gaskets to prevent oil leakage.

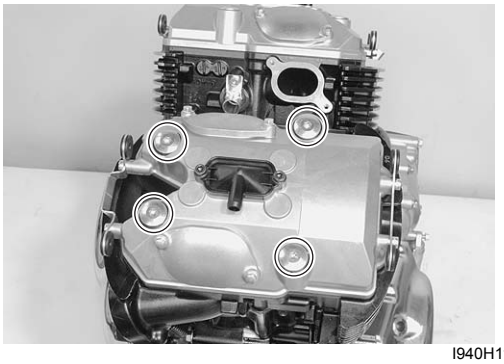
- Apply engine oil to both sides of the gaskets.



I940H1140120-01

- Tighten the cylinder head cover bolts in ascending order of numbers to the specified torque.

  Tightening torque
  Cylinder head cover bolt: 14 N·m (1.4 kgf-m, 10.0 lbf-ft)



I940H1140121-01

Spark Plug

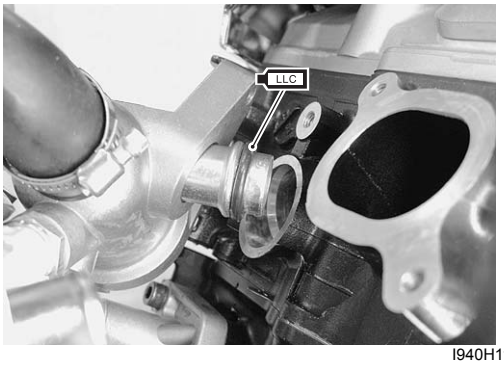
Install the spark plugs. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-4)”.

Thermostat

- Apply engine coolant to the O-ring.

⚠ CAUTION

Use a new O-ring to prevent engine coolant leakage.

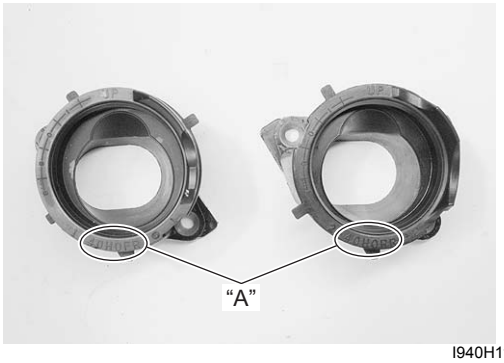


I940H1140122-01

- Connect the water hoses. Refer to “Water Hose Routing Diagram in Section 1F (Page 1F-3)”.

Intake Pipe

- When replacing the intake pipes, identify the different intake pipes according to each I.D. code “A”.



I940H1140123-01

	I.D. mark
Front (#2)	40H FR for #2 cylinder
Rear (#1)	40H RR for #1 cylinder

- Apply grease to the O-ring.

⚠ CAUTION

Use a new O-ring to prevent mixture air from soaking through the joint.

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

NOTE

Face the "UP" mark on the intake pipe to upper.



I940H1140124-01

Valve Clearance Inspection and Adjustment

B940H21406017

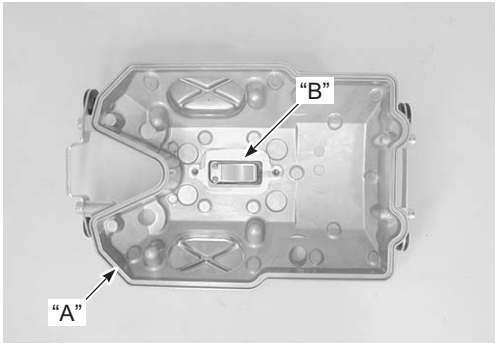
Refer to "Valve Clearance Inspection and Adjustment in Section 0B (Page 0B-3)".

Cylinder Head Cover Inspection

B940H21406018

Inspect the cylinder head cover in the following procedures:

1) Remove the cylinder head covers. Refer to "Engine Top Side Disassembly (Page 1D-27)".
2) Clean and check the gasket grooves "A" and PAIR reed valve gasket mating surfaces "B" of the cylinder head cover.
   If it is damaged, replace the cylinder head covers with a new one.



I940H1140125-02

3) Install the cylinder head covers. Refer to "Engine Top Side Assembly (Page 1D-32)".

Camshaft Inspection

B940H21406019

Refer to "Engine Top Side Disassembly (Page 1D-27)".
Refer to "Engine Top Side Assembly (Page 1D-32)".

Camshaft Identification

The camshafts can be identified by the engraved letter.



I940H1140126-01

"A": Front camshaft	"B": Rear camshaft

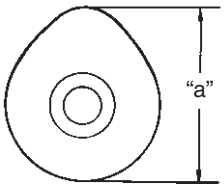
Cam Wear

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 (1/100 mm, 25 – 50 mm))

Cam height "a"
Service limit: (IN.) 32.760 mm (1.2898 in)
Service limit: (EX.) 32.810 mm (1.2917 in)

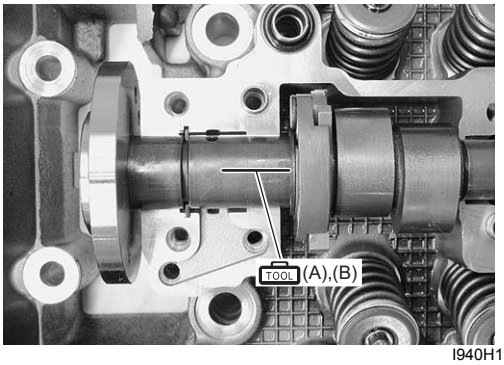


I649G1140199-02

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))

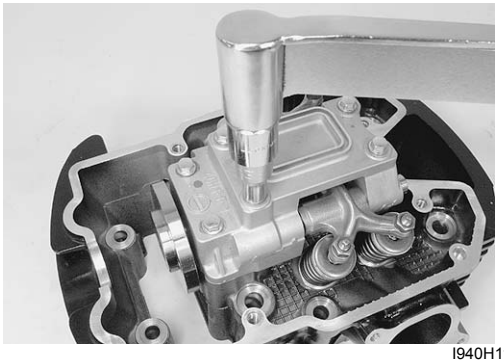


I940H1140127-01

3) Install camshaft journal holder and tighten the camshaft journal holder bolts in ascending order of numbers to the specified torque. Refer to “Engine Top Side Assembly (Page 1D-32)”.

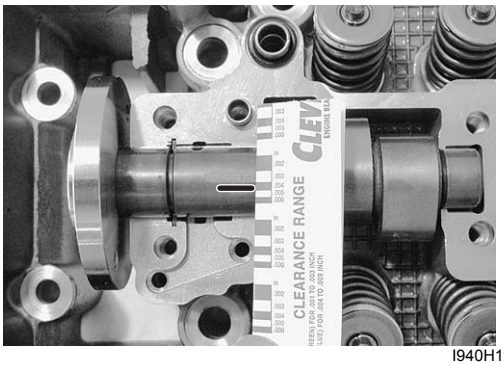
NOTE
Do not rotate the camshafts with the plastigauge in place.

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


I940H1140128-01

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

Camshaft journal oil clearance (IN. & EX.)
Service limit: 0.150 mm (0.0059 in)



I940H1140129-01

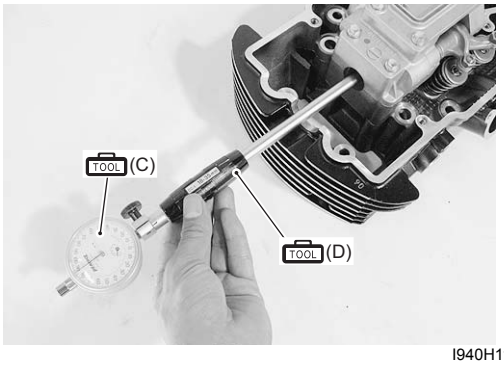
6) If the camshaft journal oil clearance exceeds the limit, measure the inside diameter of the camshaft journal holder and the outside diameter of the camshaft journal. Replace the camshaft or the cylinder head depending upon which one exceeds the specification.

Special tool
(C): 09900–20602 (Dial gauge (1/1000 mm, 1 mm))
(D): 09900–22403 (Small bore gauge (18 – 35 mm))

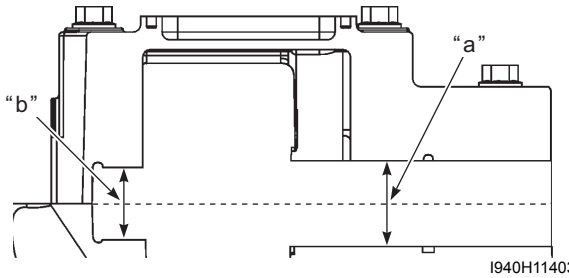
Camshaft journal holder I.D. (IN. & EX.)
Standard (a): 22.012 – 22.025 mm (0.8666 – 0.8671 in)
Standard (b): 18.512 – 18.525 mm (0.7288 – 0.7293 in)

Special tool
(E): 09900–20530 (Cylinder gauge set)

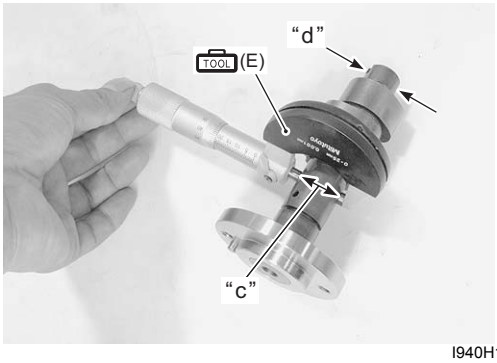
Camshaft journal O.D. (IN. & EX.)
Standard (c): 21.959 – 21.980 mm (0.8645 – 0.8653 in)
Standard (d): 18.459 – 18.480 mm (0.7267 – 0.7276 in)



I940H1140130-01



I940H1140328-01



I940H1140131-04

Camshaft Runout

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

Special tool

TOOL : 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL : 09900–20701 (Magnetic stand)
TOOL : 09900–21304 (V-block (100 mm))

Camshaft runout (IN. & EX.)
Service limit: 0.10 mm (0.004 in)

Automatic-decomp. Inspection

B940H21406020

Inspect the camshaft sprocket and automatic-decomp. in the following procedures:

Camshaft Sprocket

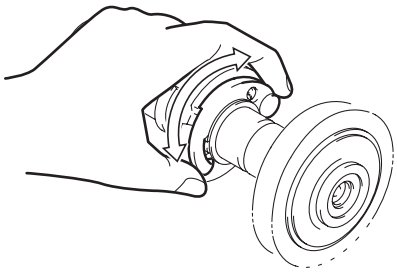
1) Remove the front and rear camshafts. Refer to "Engine Top Side Disassembly (Page 1D-27)".
2) Inspect the teeth of each camshaft sprocket for wear or damage.
   If they are worn or damaged, replace the camshaft assembly and cam chain as a set.

Automatic Decompression

Move the automatic decompression weight by hand to inspect if it is operating smoothly. If it does not operate smoothly, replace the camshaft/automatic decompression assembly with a new one.

⚠ CAUTION

Do not attempt to disassemble the cam sprockets and automatic-decomp. assembly. They are unserviceable.


I940H1140132-01

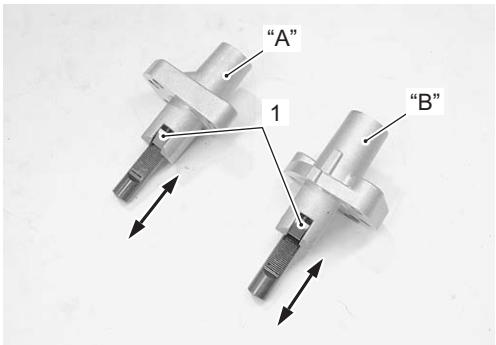
- Install the front and rear camshafts. Refer to "Engine Top Side Assembly (Page 1D-32)".

Cam Chain Tension Adjuster Inspection

B940H21406021

The cam chain tensions are maintained at the proper cam chain tension automatically.

1) Remove the cam chain tensions, front and rear adjuster. Refer to "Engine Top Side Disassembly (Page 1D-27)".
2) Unlock the ratchet (1), and move the push rod in place to see if it slides smoothly. If any stickiness is noted or ratchet mechanism is faulty, replace the cam chain tension adjuster assembly with a new one.



I940H1140133-01

"A":	Front cam chain tension adjuster
"B":	Rear cam chain tension adjuster

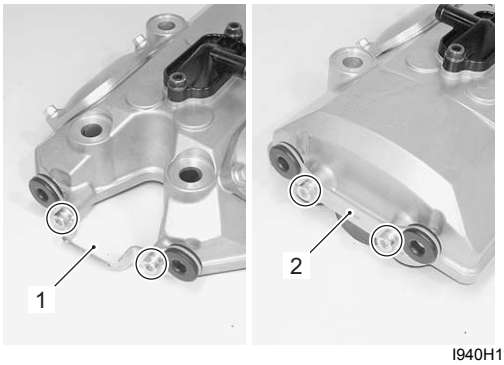
3) Install the cam chain tension adjusters. Refer to "Engine Top Side Assembly (Page 1D-32)".

Cylinder Head Cover Disassembly and Assembly

B940H21406022

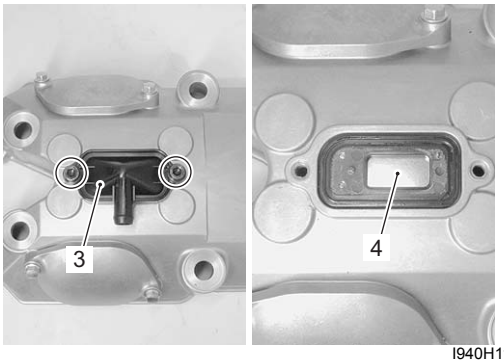
Disassembly

1) Remove the head cover brackets (1) and (2), left and right.



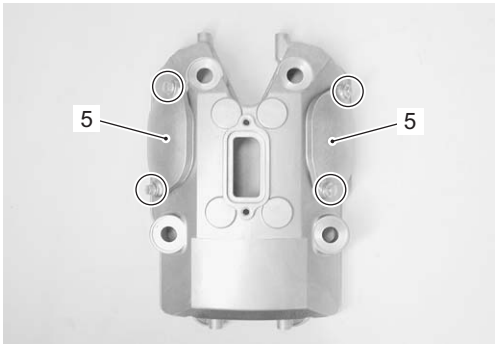
I940H1140134-01

2) Remove the PAIR read valve cover (3) and PAIR read valve (4).



I940H1140135-01

3) Remove the valve timing inspection caps (5).



I940H1140136-01

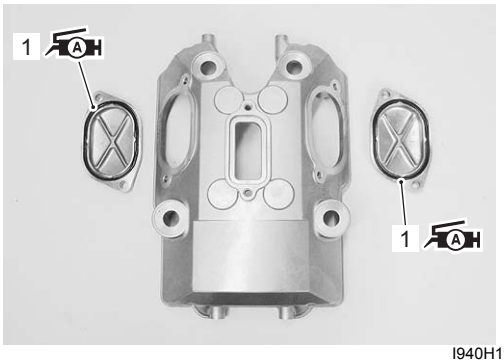
Assembly

1) Apply grease to the valve timing inspection cap O-rings (1).

⚠ CAUTION

Replace the O-rings (1) with new ones.

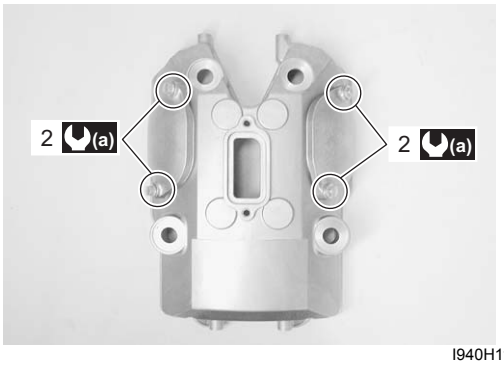
: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I940H1140138-01

2) Install the valve timing inspection caps and tighten the bolts (2) to the specified torque.

Tightening torque
Valve timing inspection cap bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

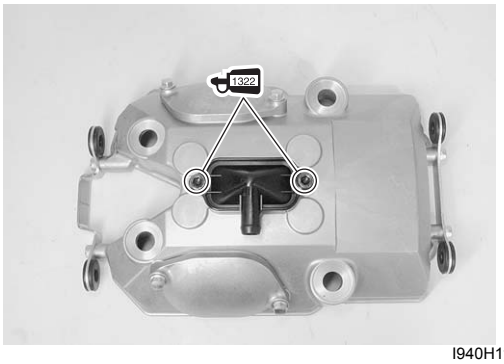


I940H1140137-03

3) Install the PAIR read valve and PAIR read valve cover.

4) Apply thread lock to the bolts and tighten them.

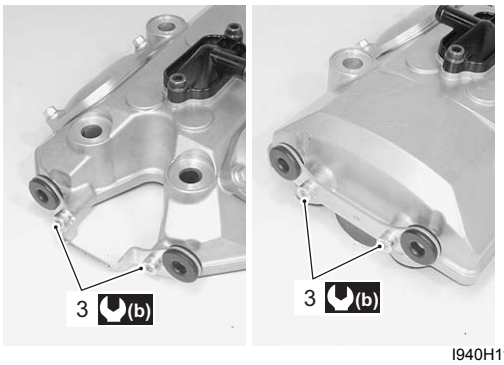
1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)



I940H1140139-01

5) Install the cylinder head cover brackets, left and right.
6) Tighten the cylinder head cover bracket bolts (3).

Tightening torque
Cylinder head cover bracket bolt (b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1140140-02

PAIR Reed Valve / PAIR Reed Valve Cover Inspection

B940H21406023

Refer to “PAIR System Inspection in Section 1B (Page 1B-9)”.

Cylinder Head Disassembly and Assembly

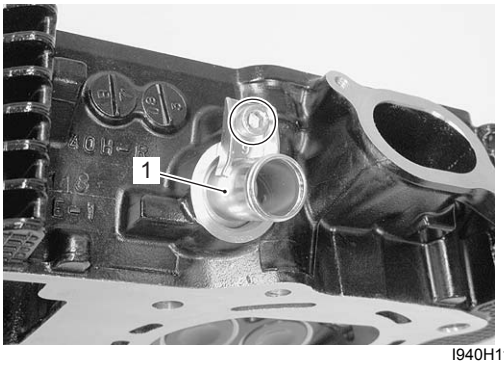
B940H21406024

Refer to “Engine Top Side Disassembly (Page 1D-27)”.
Refer to “Engine Top Side Assembly (Page 1D-32)”.

⚠ CAUTION

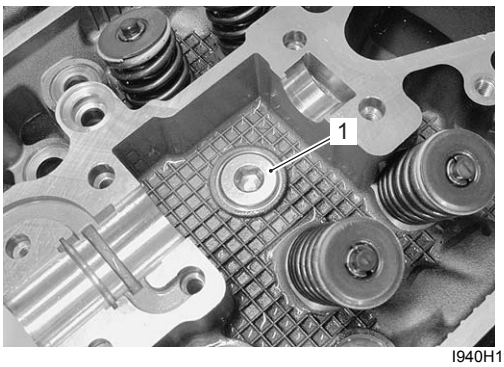
Identify the position of each removed part. Organize the parts in their respective groups (i.e., intake, exhaust, No. 1 or No. 2) so that they can be installed in their original locations.

Disassembly
Water jacket pipe
Remove the water jacket pipe (1) (for rear cylinder).



I940H1140141-01

Water jacket plug (Cylinder head)
Remove the water jacket plug (1) (for front and rear cylinder).

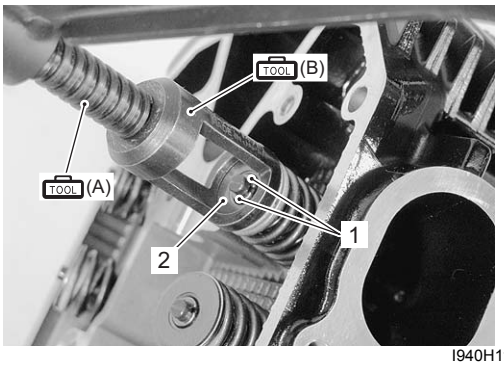


I940H1140142-01

Valve / Valve spring

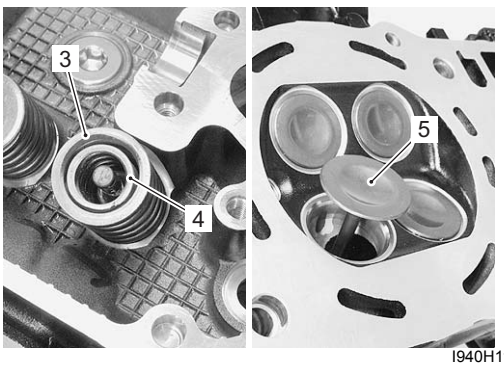
1) Using the special tools, compress the valve spring and remove the two cotter halves (1) and valve spring retainer (2) from the valve stem.

Special tool
TOOL (A): 09916–14510 (Valve lifter)
TOOL (B): 09916–14910 (Valve spring compressor attachment)
TOOL : 09916–84511 (Tweezers)



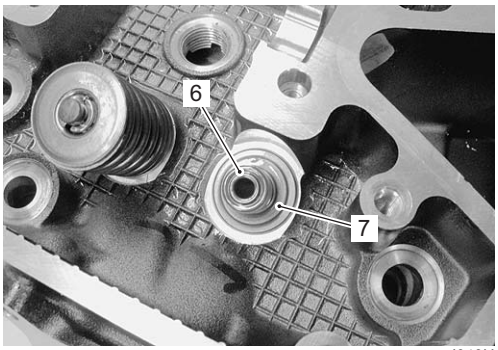
I940H1140143-01

2) Remove the valve spring retainer (2) and outer valve spring (3) and inner valve spring (4).
3) Pull out the valve (5) from the combustion chamber side.



I940H1140144-02

4) Remove the oil seal (6) and spring seat (7).



I940H1140145-01

Assembly

Assembly is in the reverse order of disassembly. Pay attention to the following points:

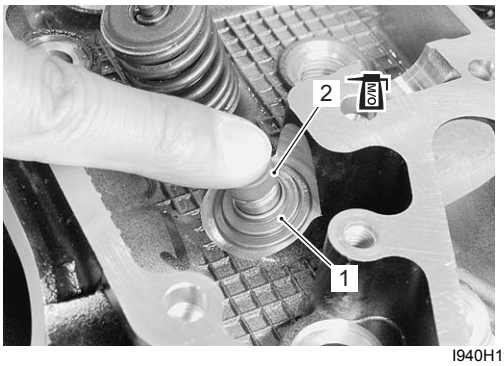
Valve / Valve spring

- Install the valve spring seat (1).
- Apply molybdenum oil solution to the oil seal (2), and press-fit it into position.

⚠ CAUTION

Do not reuse the removed oil seal.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



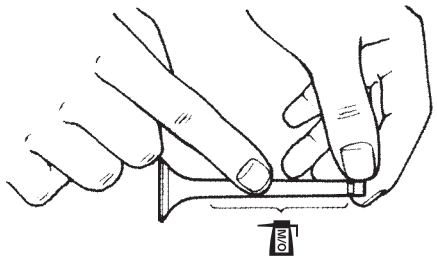
I940H1140292-01

- Insert the valve, with its stem coated with molybdenum oil solution all around and along the full stem length without any break.

⚠ CAUTION

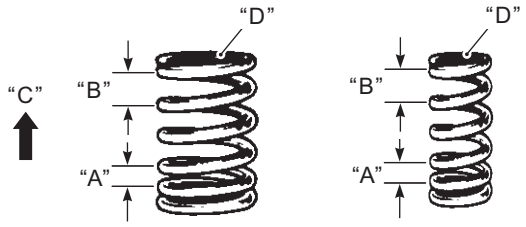
When inserting the valve, take care not to damage the lip of the oil seal.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I705H1140165-01

- Install the valve springs with the small-pitch portion "A" facing cylinder head.



I940H1140148-01

"A": Small-pitch portion	"C": UPWARD
"B": Large-pitch portion	"D": Paint

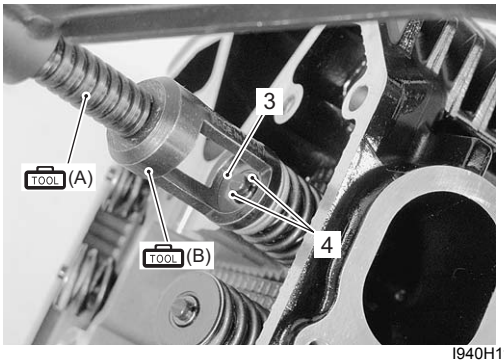
- Put on the valve spring retainer (3), and using the special tools, press down the spring, fit the cotter halves to the stem end, and release the lifter to allow the cotter (4) halves to wedge in between retainer and stem.

⚠ CAUTION

- **Be sure to restore each spring and valve to their original positions.**
- **Be careful not to damage the valve and valve stem when handling it.**

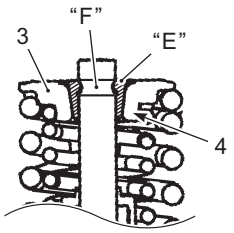
Special tool

TOOL (A): 09916–14510 (Valve lifter)
TOOL (B): 09916–14910 (Valve spring compressor attachment)
TOOL : 09916–84511 (Tweezers)



I940H1140149-01

- Be sure that the rounded lip “E” of the cotter fits snugly into the groove “F” in the stem end.



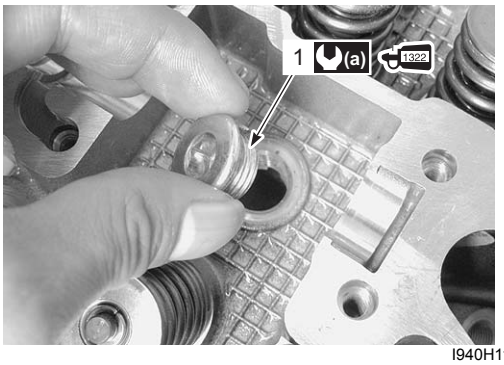
I940H1140150-02

3. Valve spring retainer	4. Cotter

Water jacket plug (Cylinder head)
Apply thread lock to the water jacket plugs (1) and tighten them to the specified torque.

1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque
Water jacket plug (Cylinder head) (a): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



I940H1140151-01

Water jacket pipe
Apply engine coolant to the O-ring and install the water jacket pipe.

⚠ CAUTION

Use a new O-ring to prevent engine coolant leakage.



I940H1140152-01

Cylinder Head Related Parts Inspection

B940H21406025

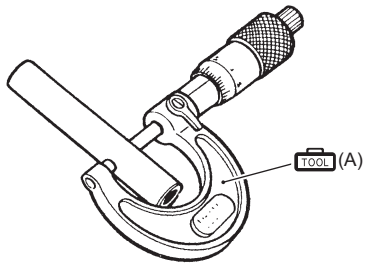
Refer to “Cylinder Head Disassembly and Assembly (Page 1D-45)”.

Rocker Arm Shaft Outside Diameter

1) Remove the rocker arm shafts from the cylinder head cover. Refer to “Cylinder Head Cover Disassembly and Assembly (Page 1D-44)”.
2) Measure each rocker arm shaft out side diameter using the micrometer. If the diameter exceeds the limit, replace the rocker arm shaft with a new one.

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

Rocker arm shaft O.D. (IN. & EX.)
Standard: 11.973 – 11.984 mm (0.4714 – 0.4718 in)



I940H1140153-01

3) Reinstall the removed parts.

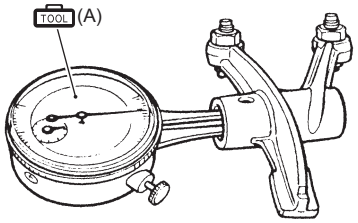
Rocker Arm Inspection
When checking the rocker arm, the inside diameter of the rocker arm and wear of the camshaft contacting surface should be checked.

1) Remove the cylinder head cover from the cylinder head. Refer to “Engine Top Side Disassembly (Page 1D-27)”.
2) Remove the rocker arms from the cylinder head cover. Refer to “Cylinder Head Cover Disassembly and Assembly (Page 1D-44)”.

3) Install each rocker arm inside diameter using the dial caliper.

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

Rocker arm I.D. (IN. & EX.)
Standard: 12.000 – 12.018 mm (0.4724 – 0.4731 in)



I940H1140154-01

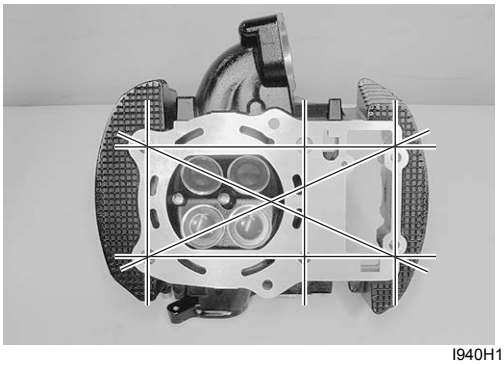
4) Visually inspect the camshaft contacting surface. If the diameter exceeds the limit or any damage is found, replace the rocker arm with a new one.
5) Reinstall the removed parts.

Cylinder Head Distortion

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

Special tool
: 09900–20803 (Thickness gauge)

Cylinder head distortion
Service limit: 0.05 mm (0.002 in)



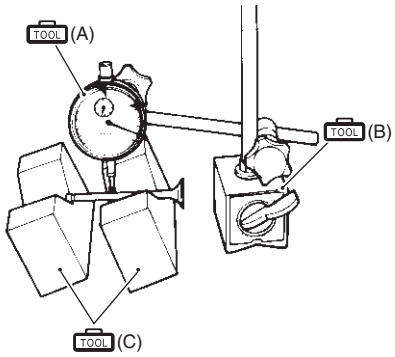
I940H1140155-03

Valve Stem Runout

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

Special tool
(A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
(B): 09900–20701 (Magnetic stand)
(C): 09900–21304 (V-block (100 mm))

Valve stem runout (IN. & EX.)
Service limit: 0.05 mm (0.002 in)



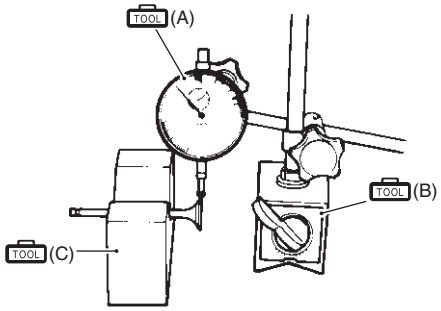
I649G1140231-03

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): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
(B): 09900–20701 (Magnetic stand)
(C): 09900–21304 (V-block (100 mm))

Valve head radial runout (IN. & EX.)
Service limit: 0.03 mm (0.001 in)



I649G1140232-03

Valve Stem / Valve Face Wear Condition
Visually inspect each valve stem and valve face for wear and pitting. If it is worn of damaged, replace the valve with a new one.

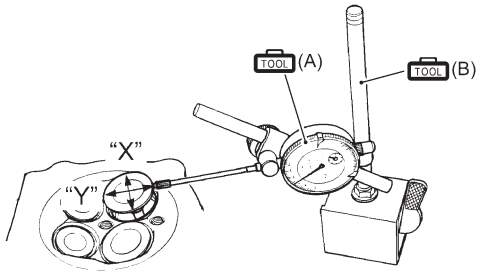


I940H1140156-01

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

Special tool
(A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
(B): 09900–20701 (Magnetic stand)

Valve stem deflection (IN. & EX.)
Service limit: 0.35 mm (0.014 in)



I940H1140157-01

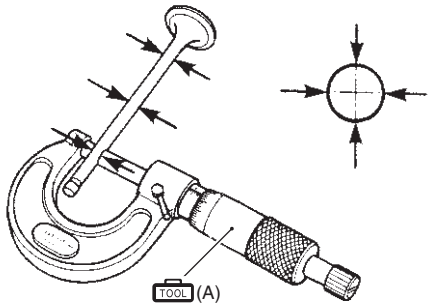
Valve Stem Wear
Measure the valve stem O.D. using the micrometer.
If the valve stem is worn down to the limit, as measured with a micrometer, replace the valve.
If the stem is within the limit, then replace the guide.
After replacing valve or guide, be sure to recheck the deflection.

Special tool
(A): 09900–20205 (Micrometer (0 – 25 mm))

Valve stem O.D.
Standard (IN.): 5.475 – 5.490 mm (0.2156 – 0.2161 in)
Standard (EX.): 5.455 – 5.470 mm (0.2148 – 0.2154 in)

NOTE

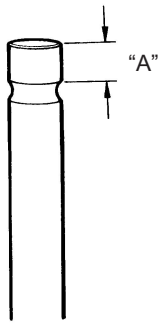
If valve guides have to be removed for replacement after inspecting related parts, carry out the steps shown in valve guide replacement. Refer to “Valve Guide Replacement (Page 1D-50)”.



I718H1140122-01

Valve Stem End Condition
Inspect the valve stem end face for pitting and wear. If pitting or wear of the stem end face are present, the valve stem end may be resurfaced, providing that the length “A” will not be reduced to less than the service limit. If this length becomes less than the service limit, the valve must be replaced.

Valve stem end length
Service limit: 3.2 mm (0.13 in)



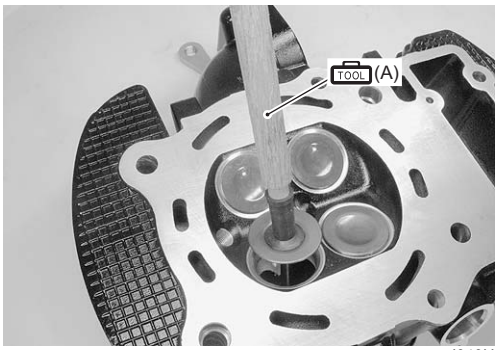
I827H1140065-01

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.

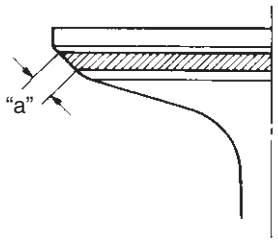
Special tool
(A): 09916–10911 (Valve lapper set)



I940H1140158-01

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 (Page 1D-52)”.

Valve seat width “a” (IN. & EX.)
Standard: 0.9 – 1.1 mm (0.035 – 0.043 in)



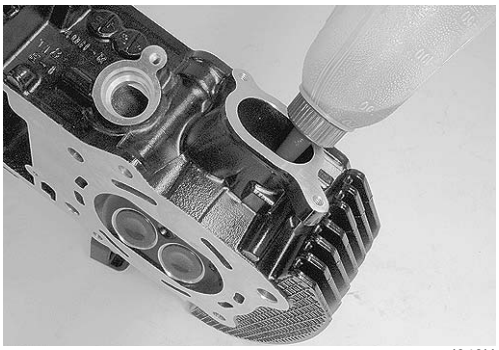
I649G1140246-02

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 (Page 1D-52)”.

⚠ WARNING

Always use extreme caution when handling gasoline.



I940H1140159-02

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 (Page 0B-3)”.

Valve Guide Replacement

B940H21406026

1) Remove the cylinder head. Refer to “Engine Top Side Disassembly (Page 1D-27)”.
2) Remove the valves and springs. Refer to “Cylinder Head Disassembly and Assembly (Page 1D-45)”.
3) Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.

Special tool
(A): 09916–44910 (Valve guide remover/ installer)

NOTE

- **Discard the removed valve guide sub assemblies.**
- **Only oversized valve guides are available as replacement parts. (Part No. 11115-32E70)**



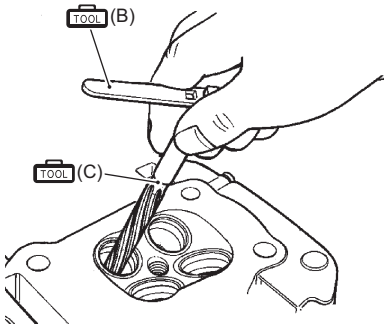
I940H1140160-01

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
TOOL (B): 09916–34580 (Valve guide reamer (10.8 mm))
TOOL (C): 09916–34542 (Reamer handle)



I940H1140375-01

5) 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.

6) Apply engine oil to each valve guide and valve guide hole.

7) Drive the guide into the guide hole using the valve guide installer and attachment.

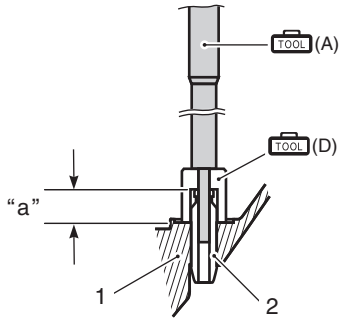
NOTE

Install the valve guide until the attachment contacts the cylinder head.

⚠ CAUTION

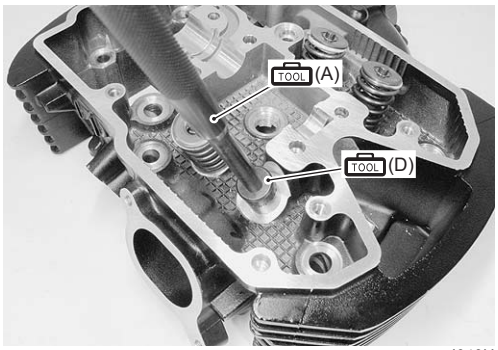
Failure to oil the valve guide hole before driving the new guide into place may result in a damaged guide or head.

Special tool
TOOL (A): 09916–44910 (Valve guide remover/ installer)
TOOL (D): 09916–44920 (Valve guide installer attachment)



I940H1140161-02

1. Cylinder head	"a": 15 mm (0.59 in)
2. Valve guide	



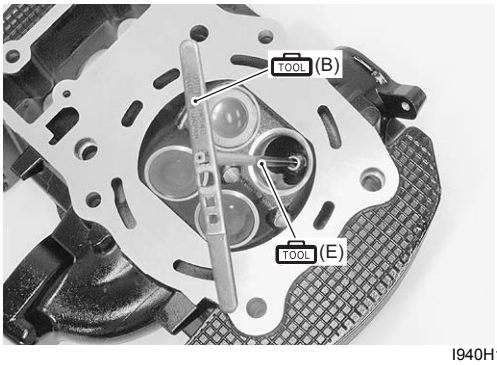
I940H1140162-02

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

Special tool
TOOL (B): 09916–34542 (Reamer handle)
TOOL (E): 09916–34550 (Valve guide reamer (5.5 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.**



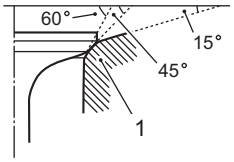
I940H1140163-02

9) Install the valves and springs. Refer to “Cylinder Head Disassembly and Assembly (Page 1D-45)”.
10) Install the cylinder head. Refer to “Engine Top Side Assembly (Page 1D-32)”.

Valve Seat Repair

B940H21406027

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



I822H1140363-01

	Intake	Exhaust
Seat angle	15°/45°/60°	←
Seat width	0.9 – 1.1 mm (0.035 – 0.043 in)	←
Valve diameter	33 mm (1.65 in)	30 mm (1.18 in)
Valve guide I.D.	5.500 – 5.512 mm (0.2165 – 0.2170 in)	←

⚠ CAUTION

- **The valve seat contact area must be inspected after each cut.**
- **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 (Page 0B-3)”.

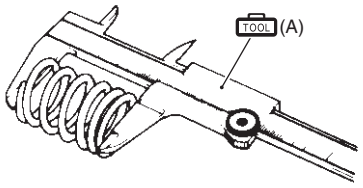
Valve Spring

The force of the coil spring keeps the valve seat tight. 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 its free length and also by the force required to compress it. If the spring length is less than the service limit or if the force required to compress the spring does not fall within the range specified, replace spring as a set.

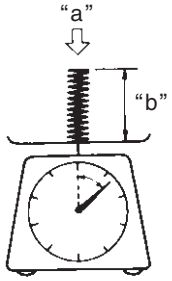
Special tool
TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Valve spring free length
Service limit: (Inner) 34.4 mm (1.35 in)
Service limit: (Outer) 38.1 mm (1.50 in)

Valve spring tension
Standard: (Inner) 58 – 66 N (5.9 – 6.7 kgf, 13.1 – 15.0 lbf-ft) 27.56 mm (1.09 in)
Standard: (Outer) 135 – 155 N (13.8 – 15.8 kgf, 30.4 – 34.9 lb-ft) 31.06 mm (1.23 in)



I649G1140237-03



I649G1140238-03

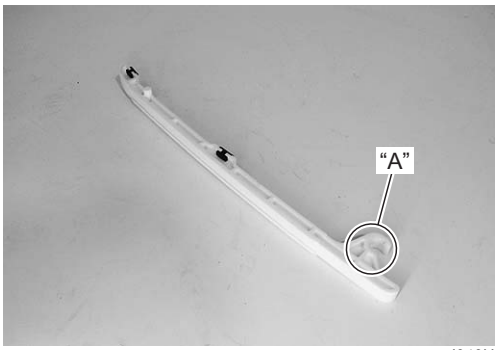
	Tension “a”	Length “b”
Inner	58 – 66 N (5.9 – 6.7 kgf, 13.1 – 15.0 lbs)	27.56 mm (1.09 in)
Outer	135 – 155 N (13.8 – 15.8 kgf, 30.4 – 34.9 lbs)	31.06 mm (1.23 in)

Cam Chain Guide Inspection

B940H21406028

Inspect the cam chain guide in the following procedures:

1) Remove the cam chain guides. Refer to “Engine Top Side Disassembly (Page 1D-27)”.
2) Check the contacting surface and the part “A” of the cam chain guide. If it is worn or damaged, replace it with a new one.



I940H1140164-02

3) Install the cam chain guide. Refer to “Engine Top Side Assembly (Page 1D-32)”.

Cylinder Inspection

B940H21406029

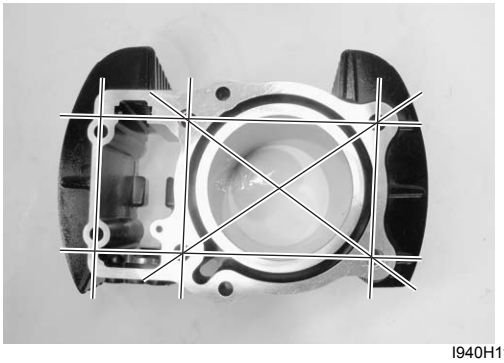
Refer to “Engine Top Side Disassembly (Page 1D-27)”.
Refer to “Engine Top Side Assembly (Page 1D-32)”.

Cylinder Distortion

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

Special tool
TOOL : 09900–20803 (Thickness gauge)

Cylinder distortion
Service limit: 0.05 mm (0.002 in)



I940H1140165-01

Cylinder Bore

Check the cylinder wall for any scratches, nicks or other damage.

Cylinder bore
Standard: 96.000 – 96.015 mm (3.7795 – 3.7801 in)



I940H1140166-01

Piston Ring Removal and Installation

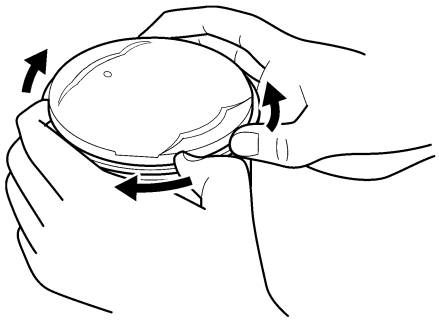
B940H21406030

Removal

1) Draw out the piston pin and remove the piston. Refer to “Engine Top Side Disassembly (Page 1D-27)”.
2) Carefully spread the ring opening with your thumbs and then push up the opposite side of the 1st ring to remove it.

NOTE

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



I822H1140349-02

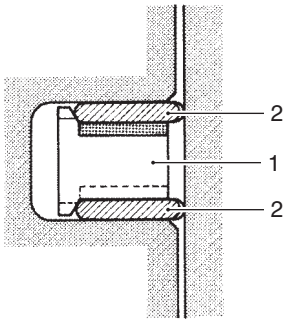
3) Remove the 2nd ring and oil ring in the same procedure.

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.**

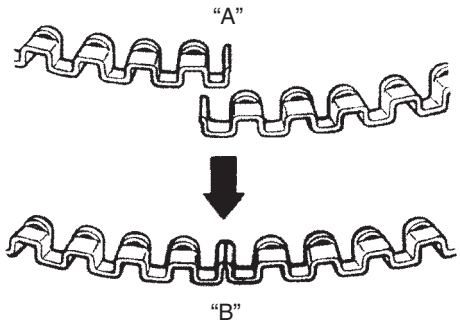
1) Install the piston rings in the order of the oil ring, 2nd ring and 1st ring.
   a) The first member to go into the of the oil ring groove is a spacer (1).
   After placing the spacer, fit the two side rails (2).



I718H1140143-02

⚠ CAUTION

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



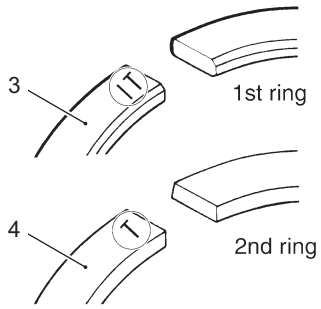
I705H1140170-02

"A": INCORRECT	"B": CORRECT

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

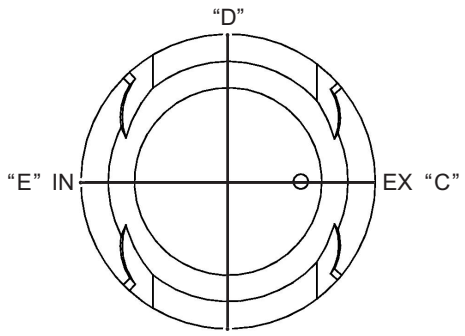
NOTE

- **1st ring has letters "IT" marked on the side. Be sure to bring the marked side to the top when fitting it to the position.**
- **2nd ring has letters "T" marked on the side. Be sure to bring the marked side to the top when fitting it to the piston.**



I940H1140167-01

2) Position the gaps of the three rings and side rails as shown. Before inserting piston into the cylinder, check that the gaps are so located.



I940H1140380-02

"C": 2nd ring and lower side rail
"D": Spacer
"E": 1st ring and upper side rail

3) Install the piston and piston pin. Refer to "Engine Top Side Assembly (Page 1D-32)".

Piston and Piston Ring Inspection

B940H21406031

Refer to “Piston Ring Removal and Installation (Page 1D-53)”.

Piston Diameter

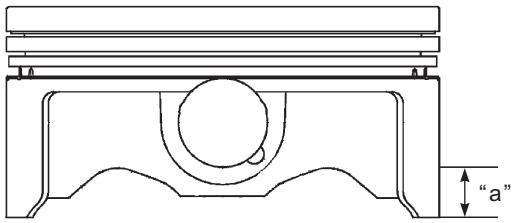
Measure the piston diameter using the micrometer at 15mm (0.6 in) “a” from the skirt end. If the piston diameter is less than the service limit, replace the piston.

Special tool

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

Piston diameter

Service limit: 95.880 mm (3.7748 in)



I940H1140168-03



I940H1140169-01

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: 0.120 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 – 25 mm))

Piston ring-to-groove clearance

Service limit: (1st): 0.180 mm (0.0071 in)

Service limit: (2nd): 0.150 mm (0.0059 in)

Piston ring groove width

Standard: (1st): 1.21 – 1.23 mm (0.0476 – 0.0484 in)

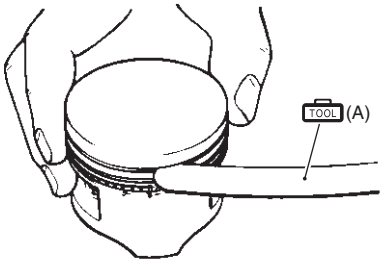
Standard: (2nd): 1.01 – 1.03 mm (0.0398 – 0.0406 in)

Standard: (Oil): 2.51 – 2.53 mm (0.0988 – 0.0996 in)

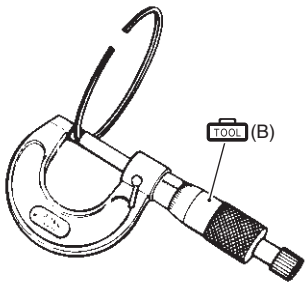
Piston ring thickness

Standard: (1st): 1.17 – 1.19 mm (0.046 – 0.047 in)

Standard: (2nd): 0.97 – 0.99 mm (0.038 – 0.039 in)



I649G1140263-03



I649G1140264-03

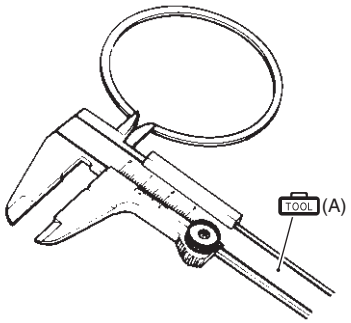
Piston Ring Free End Gap and Piston Ring End Gap
Measure the piston ring free end gap using vernier calipers. Next, fit the piston ring squarely into the cylinder and measure the piston ring end gap using the thickness gauge. If any of the measurements exceed the service limit, replace the piston ring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

Special tool
TOOL (A): 09900–20101 (Vernier calipers (1/15 mm, 150 mm))

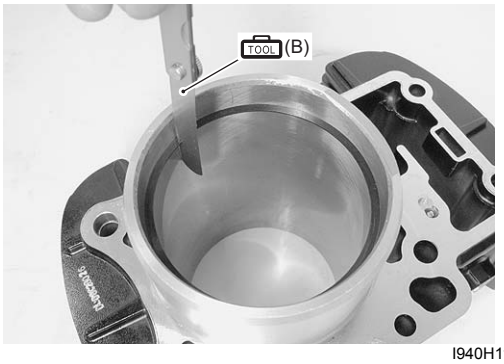
Piston ring free end gap
Service limit: (1st): 8.8 mm (0.35 in)
Service limit: (2nd): 8.8 mm (0.35 in)

Special tool
TOOL (B): 09900–20803 (Thickness gauge)

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



I649G1140265-03

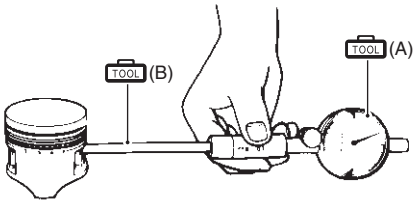


I940H1140170-01

Piston Pin / Pin Bore
Measure the piston pin bore inside diameter using the small bore gauge. If measurement is out of specification, replace the piston.

Special tool
TOOL (A): 09900–20602 (Dial gauge (1/1000 mm, 1 mm))
TOOL (B): 09900–22403 (Small bore gauge (18 – 35 mm))

Piston pin bore I.D.
Service limit: 22.030 mm (0.8673 in)

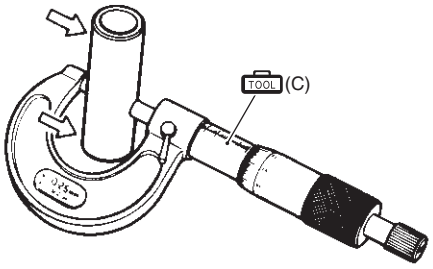


I649G1140267-03

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

Piston pin O.D.
Service limit: 21.980 mm (0.8654 in)



I649G1140268-03

Engine Bottom Side Disassembly

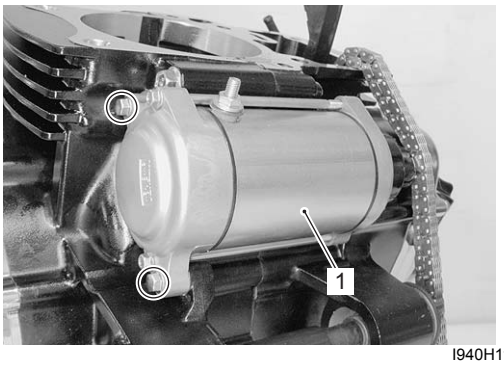
B940H21406032

Refer to “Engine Assembly Removal (Page 1D-20)”.
Refer to “Engine Top Side Disassembly (Page 1D-27)”.

NOTE

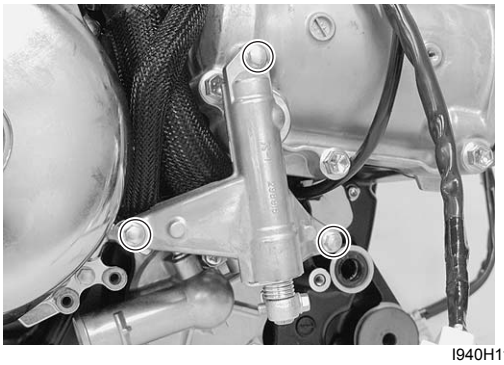
The crankcase must be separated to service the crankshaft and conrod.

Starter Motor
Remove the starter motor (1).



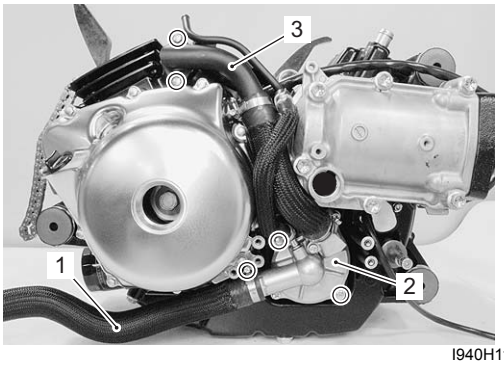
I940H1140171-01

Clutch Release Assembly / Push Rod
Remove the clutch release assembly and push rod. Refer to “Clutch Release Assembly / Push Rod Removal and Installation in Section 5C (Page 5C-2)”.


I940H1140172-01

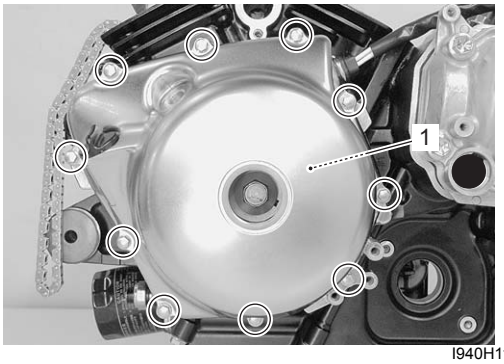
Water Pump

1) Disconnect the radiator outlet hose (1).
2) Remove the water pump assembly (2) along with the cylinder inlet pipe/cylinder inlet hose (3).



I940H1140173-01

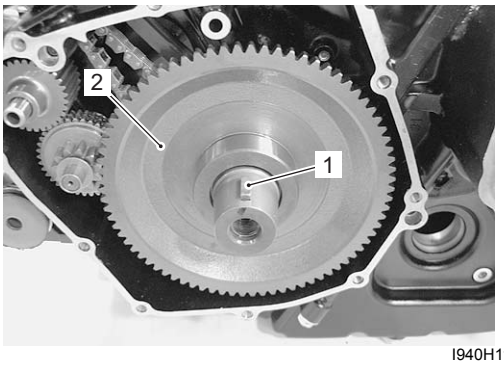
Generator
Remove the generator component parts (1). Refer to “Generator Removal and Installation in Section 1J (Page 1J-5)”.



I940H1140175-02

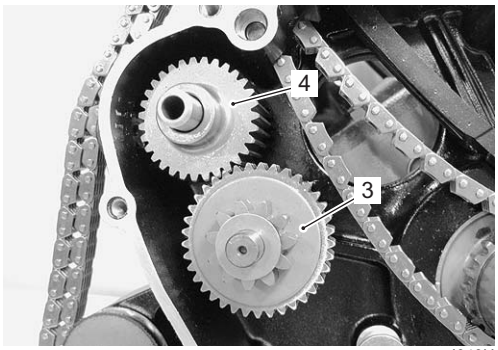
Starter Driven Gear / Starter Torque Limiter / Starter Idle Gear

- Remove the key (1) and starter driven gear (2).



I940H1140176-01

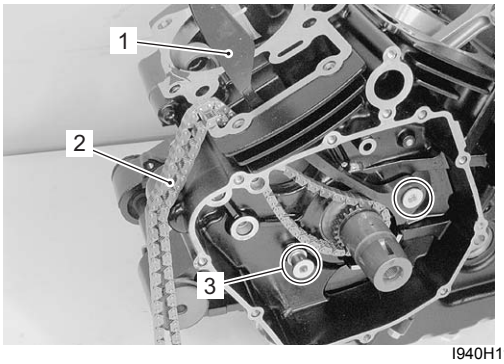
- Remove the starter torque limiter (3) and starter idle gear (4).



I940H1140177-01

Front Cam Chain

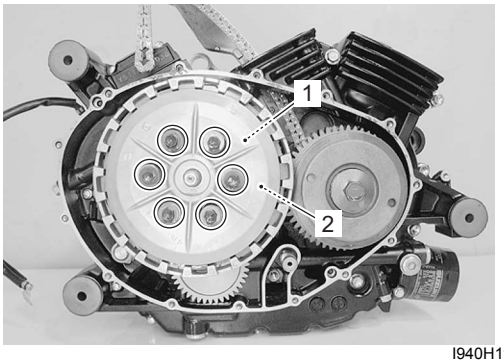
1) Remove the front cam chain tensioner (1).
2) Remove the cam chain (2) and cams.
3) Remove the cam chain guide bolt (3).



I940H1140178-03

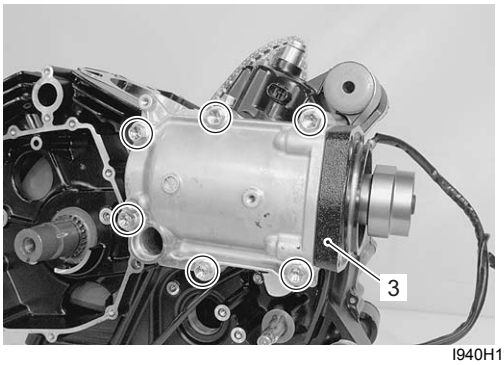
Clutch / Secondary Drive Gear

1) Remove the clutch drive plates (1) and driven plates (2).
Refer to “Clutch Removal in Section 5C (Page 5C-6)”.



I940H1140179-02

2) Remove the secondary gear case and driven gear assembly (3). Refer to “Secondary Driven Gear Assembly Removal and Installation in Section 3A (Page 3A-3)”.

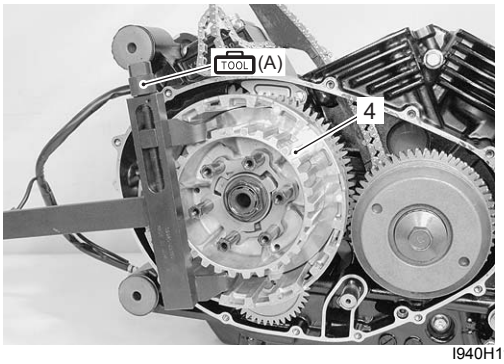


I940H1140180-04

3) Shift the transmission into 1st gear.

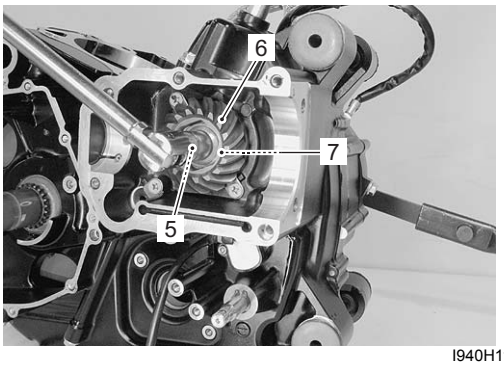
4) Hold the clutch sleeve hub (4) with the special tool.

Special tool
TOOL (A): 09920–53740 (Clutch sleeve hub holder)
TOOL : 09920–31020 (Extension handle)



I940H1140181-03

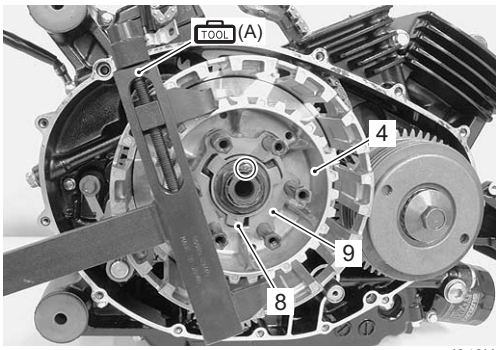
5) Loosen the secondary drive gear bolt (5) and remove the secondary drive gear (6) and shim (7).



I940H1140182-04

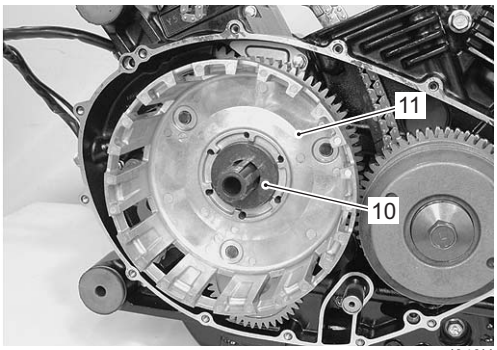
6) Unlock the clutch hub nut.

7) Loosen the clutch hub nut and remove the clutch sleeve hub (4) along with the clutch drive cam (8) and driven cam (9).



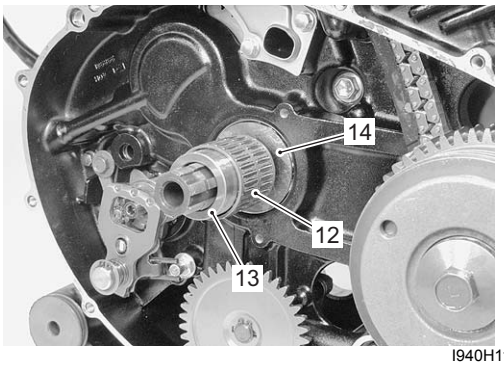
I940H1140183-03

8) Remove the washer (10) and primary driven gear (11).



I940H1140184-03

9) Remove the needle roller bearing (12), spacer (13) and washer (14).



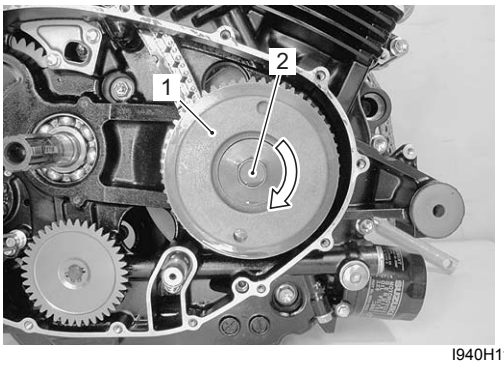
I940H1140185-03

Primary Drive Gear

Remove the primary drive gear (1). Refer to “Primary Drive Gear Removal and Installation in Section 5C (Page 5C-13)”.

⚠ CAUTION

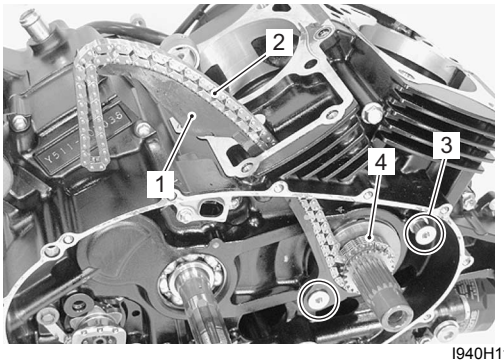
The primary drive gear bolt (2) has left-hand threads.



I940H1140186-02

Rear Cam Chain / Rear Cam Chain Drive Sprocket

1) Remove the rear cam chain tensioner (1).
2) Remove the cam chain (2).
3) Remove the cam chain guide bolt (3).
4) Remove the cam chain drive sprocket (4).



I940H1140187-01

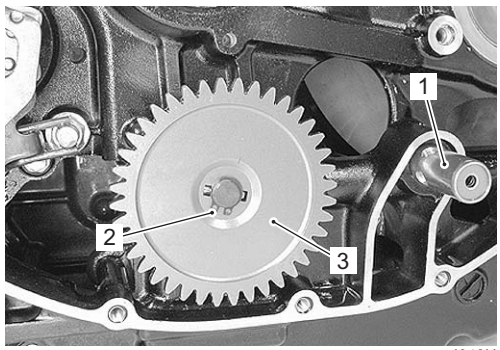
Oil Pump Drive Gear / Oil Pressure Regulator

1) Remove the oil pressure regulator (1).
2) Remove the snap ring (2) and oil pump driven gear (3).

NOTE

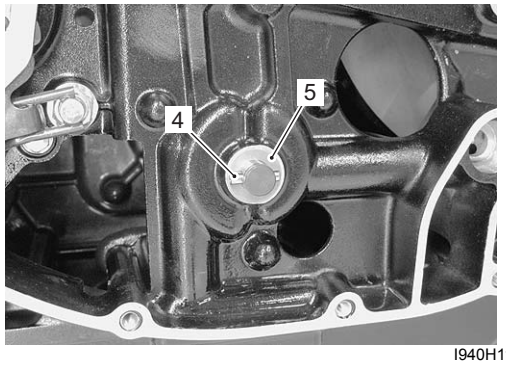
Do not drop the snap ring (2) into the crankcase.

Special tool
TOOL : 09900–06107 (Snap ring pliers)



I940H1140191-02

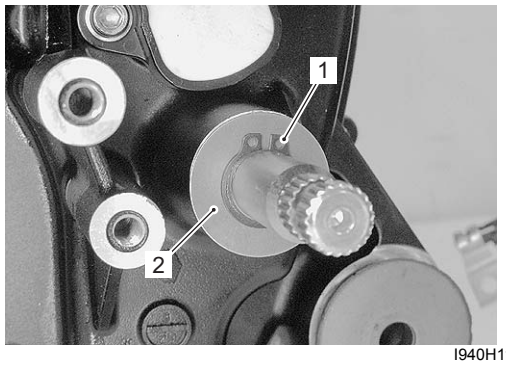
3) Remove the pin (4) and washer (5).



I940H1140192-01

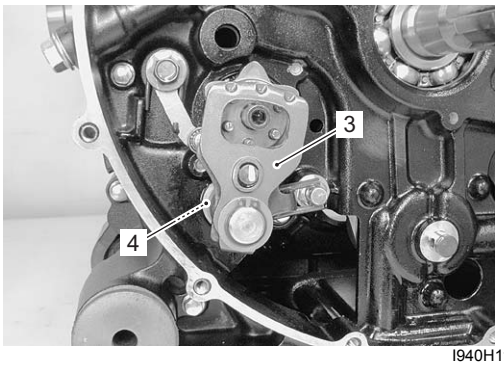
Gearshift System

1) Remove the snap ring (1) and washer (2).



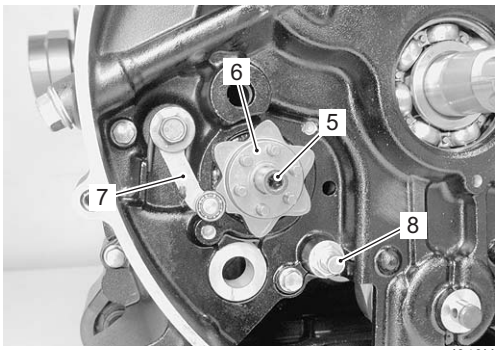
I940H1140188-01

2) Draw out the gearshift shaft assembly (3) and washer (4).



I940H1140189-01

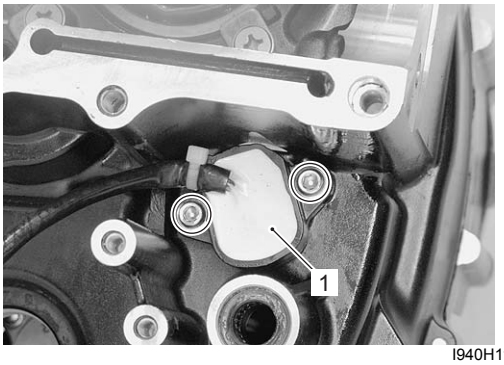
3) Remove the gearshift cam plate bolt (5) and gearshift cam plate (6).
4) Remove the gearshift cam stopper (7) and gearshift arm stopper (8).



I940H1140190-02

Gear Position Switch

Remove the gear position switch (1).



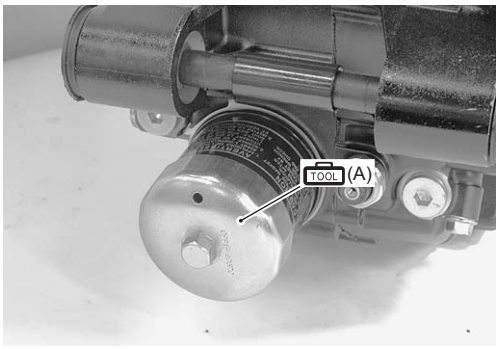
I940H1140193-01

Oil Filter

Remove the oil filter with the special tool.

Special tool

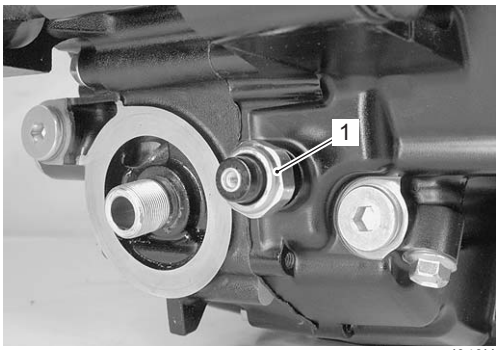
(A): 09915–40620 (Oil filter wrench)



I940H1140293-01

Oil Pressure Switch

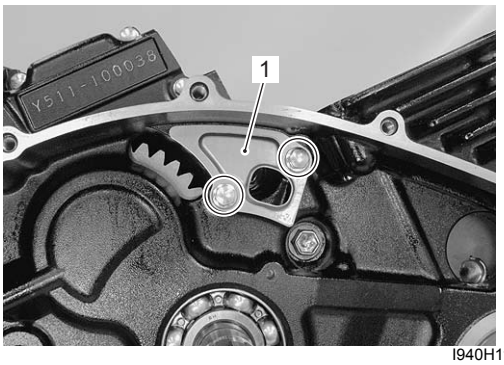
1) Remove the oil pressure switch (1).



I940H1140195-01

Oil Separator Plate

1) Remove the oil separator plate (1).



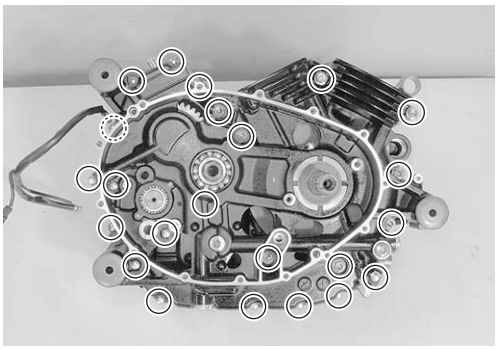
I940H1140196-01

Crankcase

1) Remove the crankcase bolts.

NOTE

Loosen the crankcase bolts diagonally with the smaller sizes first.



I940H1140197-01

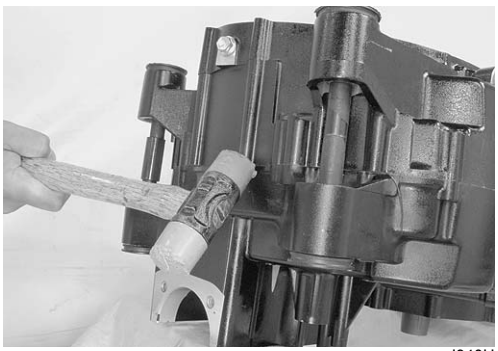
2) Make sure that all of the bolts are removed. Then, tap the sides of the right crankcase using a plastic hammer to separate the left and right crankcase halves and then lift the right crankcase off of the left crankcase.

NOTE

The crankshaft and transmission components should remain in the left crankcase half.

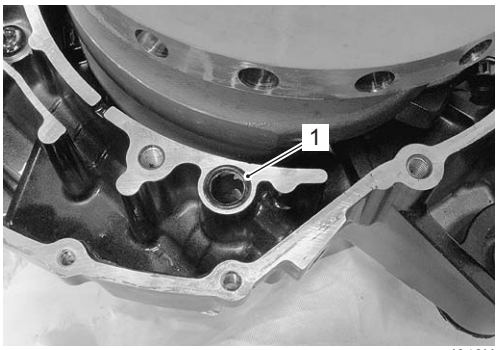


I940H1140198-01

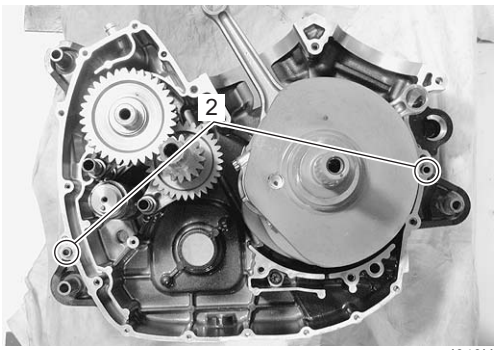


I940H1140199-01

3) Remove the O-rings (1) and dowel pins (2).



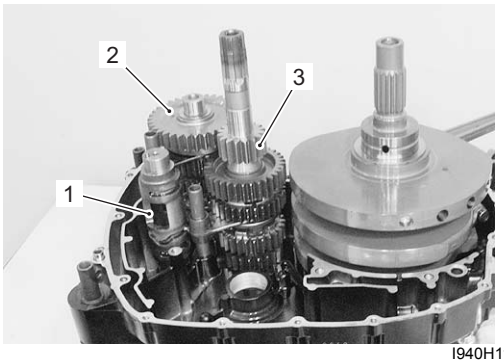
I940H1140200-01



I940H1140201-01

Transmission / Gearshift Cam

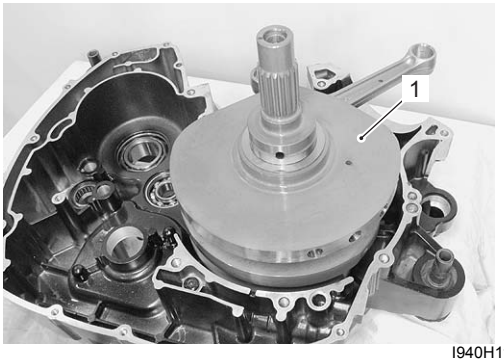
Remove the gearshift cam (1), driveshaft assembly (2) and countershaft assembly (3).



I940H1140202-02

Crankshaft

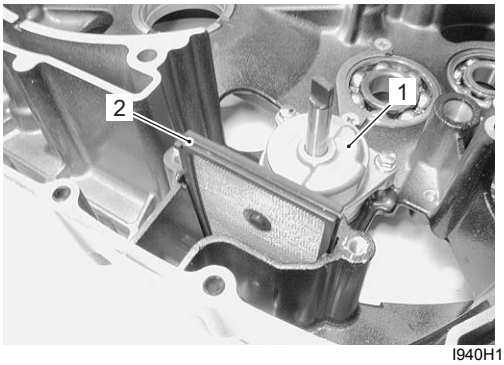
1) Remove the crankshaft (1).



I940H1140203-01

Oil Pump / Oil Sump Filter

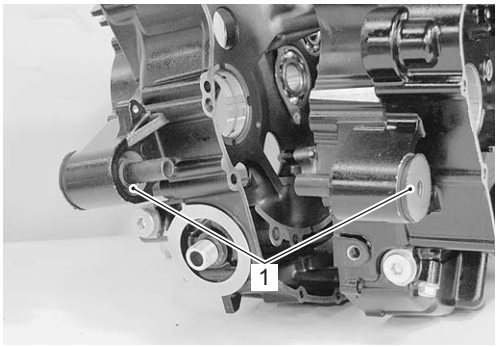
Remove the oil pump assembly (1) and oil sump filter (2). Refer to “Oil Pump Removal and Installation in Section 1E (Page 1E-9)” and “Oil Sump Filter Removal and Installation in Section 1E (Page 1E-4)”.



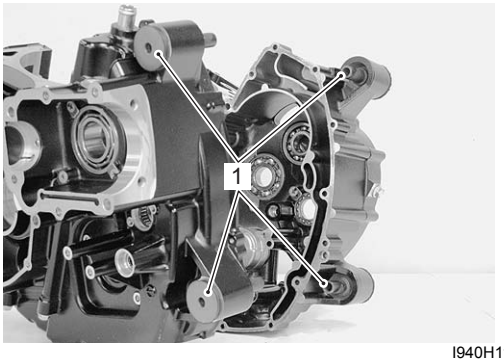
I940H1140204-01

Engine Mount Bushing

Remove the upper and lower crankcase engine mount bushings (1), if necessary.



I940H1140205-01



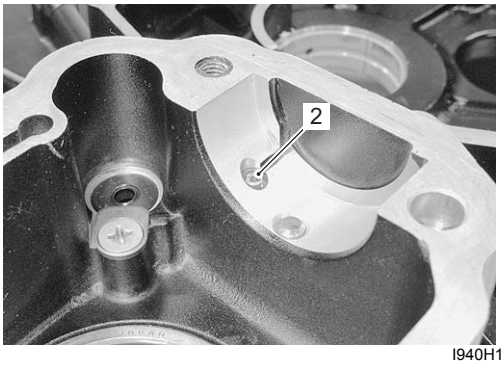
I940H1140206-01

Oil Jet

1) Remove the piston cooling jets (1) and oil jet (secondary gear) (2) from the each crankcase.

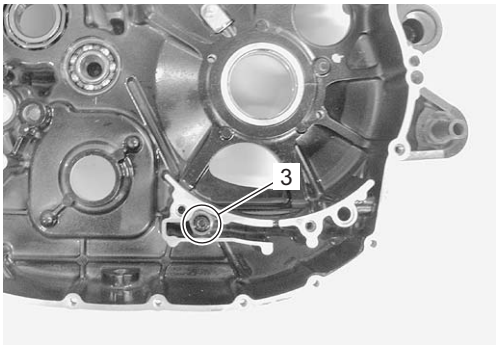


I940H1140207-01



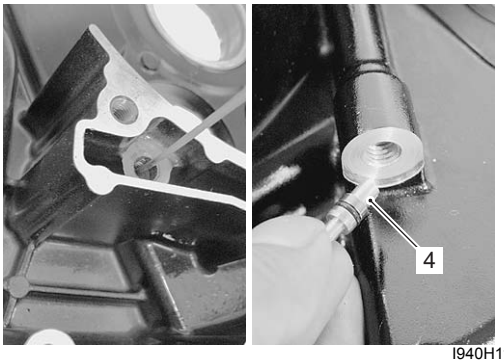
I940H1140208-01

2) Remove the oil gallery plug (3).



I940H1140294-01

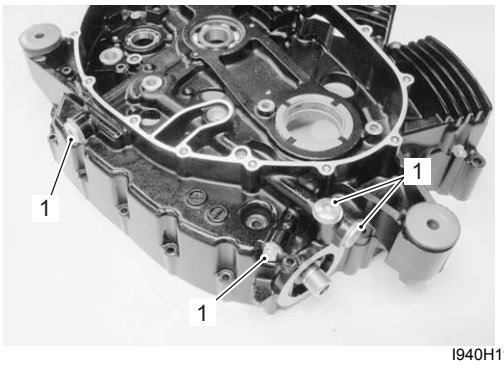
3) Remove the oil jet (transmission) (4) with the suitable bar.



I940H1140295-02

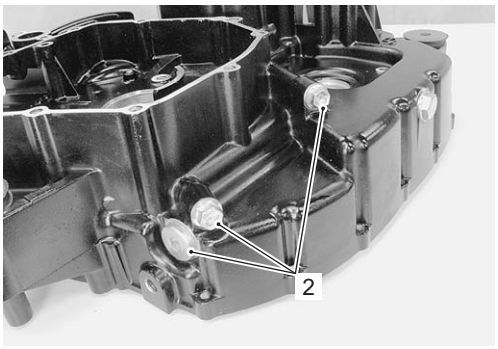
Oil Gallery Plug

1) Remove the oil gallery plugs (1) from the right crankcase.

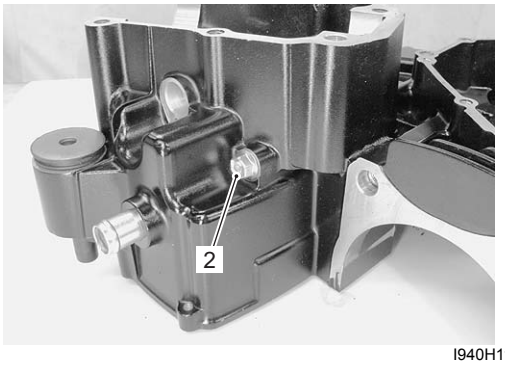


I940H1140209-02

2) Remove the oil gallery plugs (2) from the left crankcase.



I940H1140210-01



I940H1140211-01

Crankshaft Journal Bearing

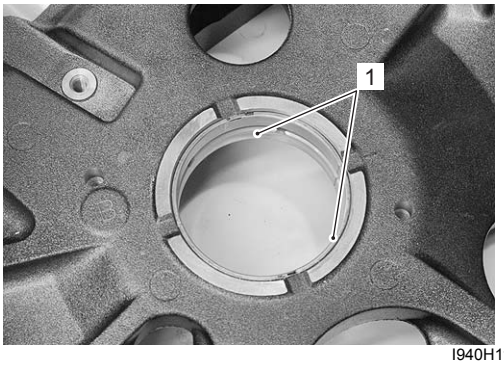
Remove the crankshaft journal bearings (1). Refer to "Crankshaft Bearing Inspection and Adjustment (Page 1D-77)".

⚠ 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

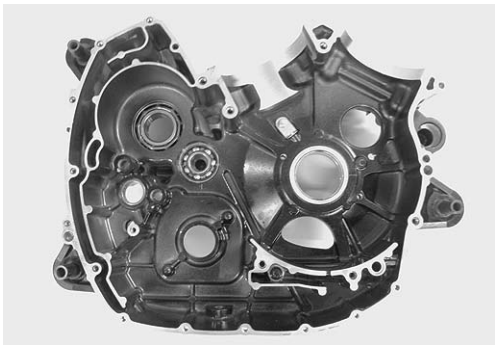
- **Do not remove the crankshaft journal bearings unless absolutely necessary.**
- **Make a note of where the crankshaft journal bearings are removed from so that they can be reinstalled in their original positions.**



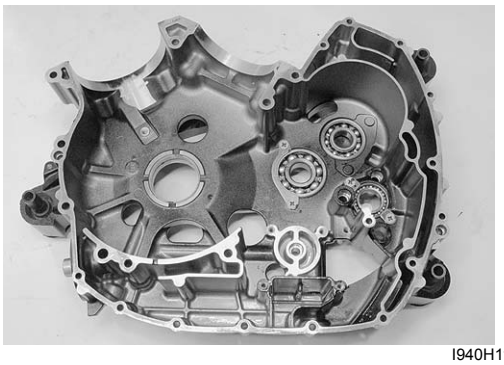
I940H1140213-02

Bearing

Remove the bearings from the crankcase, if necessary. Refer to "Bearing Removal and Installation in Section 5B (Page 5B-7)".



I940H1140318-01



I940H1140319-02

Engine Bottom Side Assembly

B940H21406033

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 Gallery Plug

⚠ CAUTION

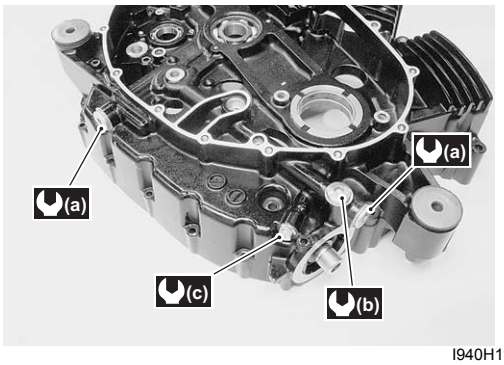
Use each new gasket.

- Apply thread lock to the oil gallery plug and tighten it to the specified torque.

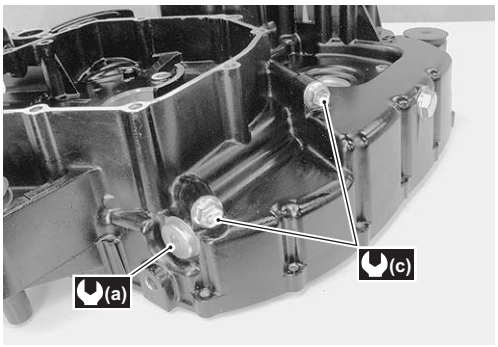
  1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

- Tighten each plugs to the specified torque.

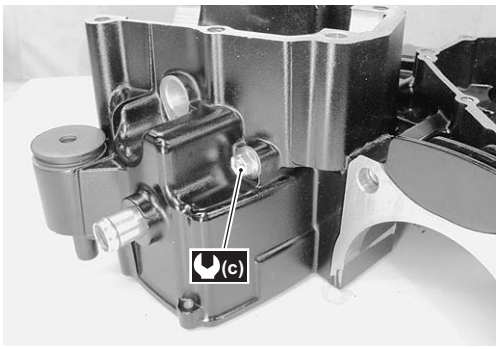
  Tightening torque
  Oil gallery plug (M16) (a): 35 N·m (3.5 kgf-m, 25.5 lbf-ft)
  Oil gallery plug (M14) (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
  Oil gallery plug (M8) (c): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



I940H1140296-01



I940H1140297-01



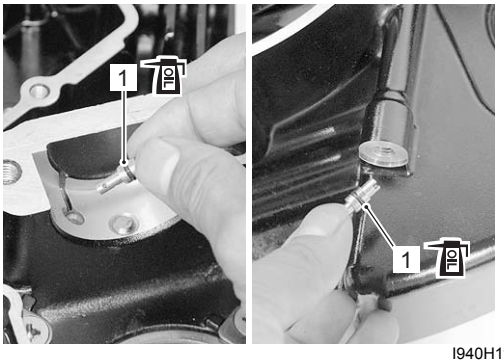
I940H1140298-01

Oil Jet

⚠ CAUTION

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

- Apply engine oil to the new O-ring (1).



I940H1140214-02

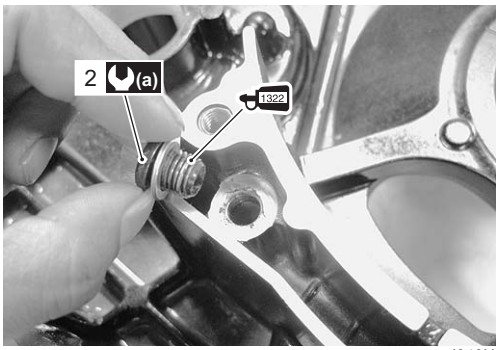
- Apply thread lock to the oil gallery plug (2) and tighten it to the specified torque.

⚠ CAUTION

Use the new gasket.

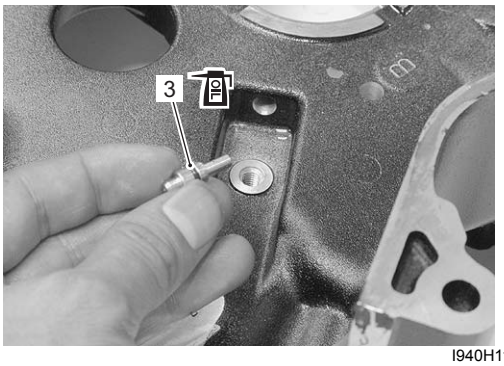
1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque
Oil gallery plug (Transmission oil jet) (M10) (a): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



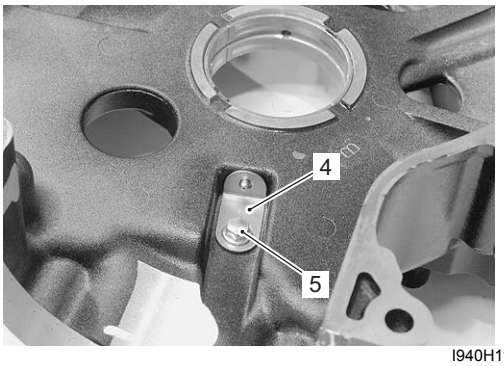
I940H1140299-01

- Fit the new O-ring (3) to each piston cooling oil jets and apply engine oil to them.



I940H1140215-02

- Install the oil jet plates (4) and tighten the bolts (5).

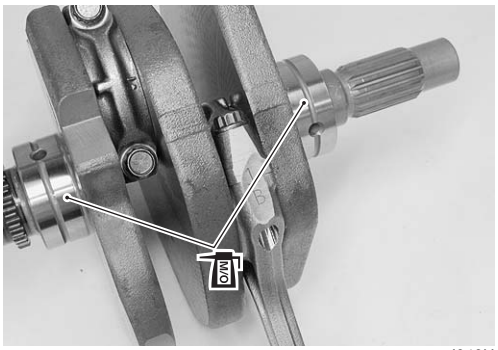


I940H1140216-02

Crankshaft

- Apply MOLYBDENUM OIL SOLUTION to each crankshaft journal and bearing lightly.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I940H1140217-02

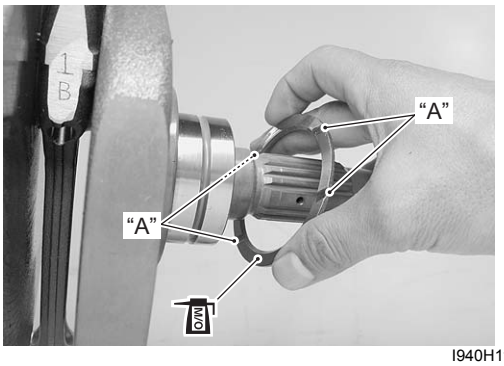


I940H1140218-02

- Apply molybdenum oil solution to the thrust bearing.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

- Insert the thrust bearing with oil groove “A” facing the crank web.



I940H1140219-02

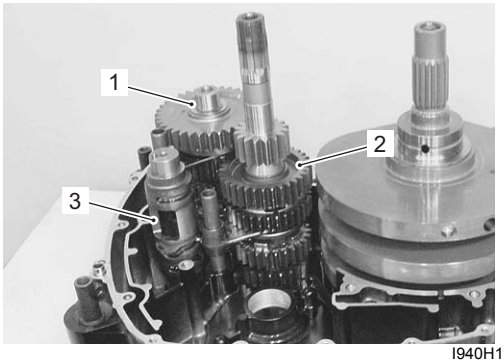
- Install the crankshaft assembly to the left crankcase.



I940H1140220-01

Transmission / Gearshift Cam

- Install the driveshaft assembly (1), countershaft assembly (2) and gearshift cam (3). Refer to “Transmission Removal and Installation in Section 5B (Page 5B-3)”.



I940H1140221-01

Crankcase

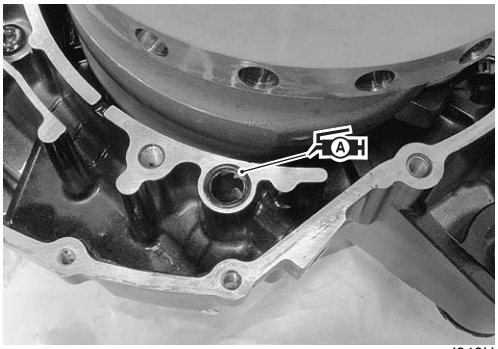
- Apply grease to the O-ring.

⚠ CAUTION

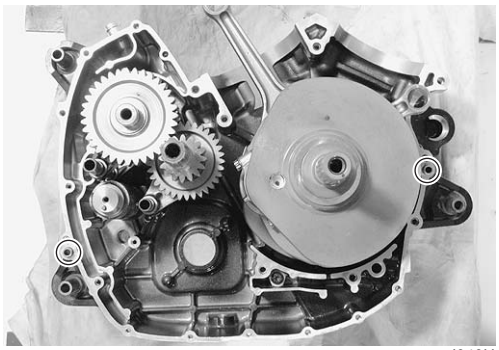
Use the new O-ring to prevent oil pressure leak.

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

- Install the dowel pins and O-ring in the left crankcase.



I940H1140222-01



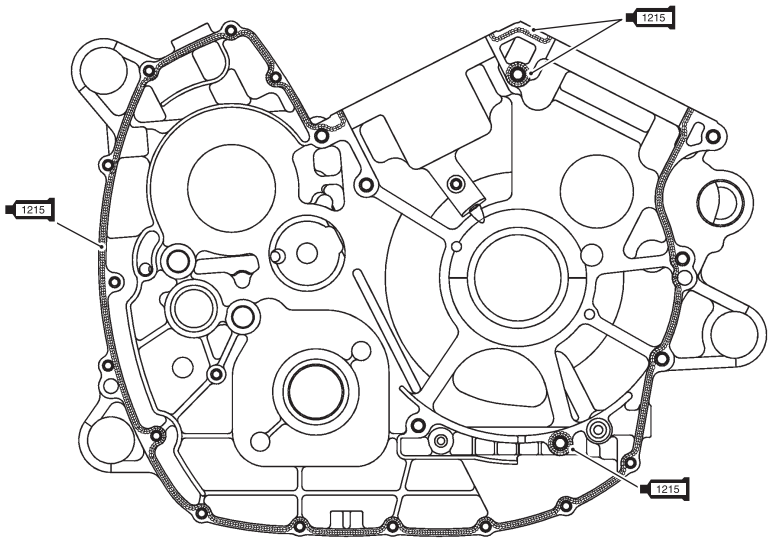
I940H1140223-01

- Apply bond to the mating surface of the lower crankcase.

NOTE

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

1215 : Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)



I940H1140224-01

1215 : Apply bond.

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

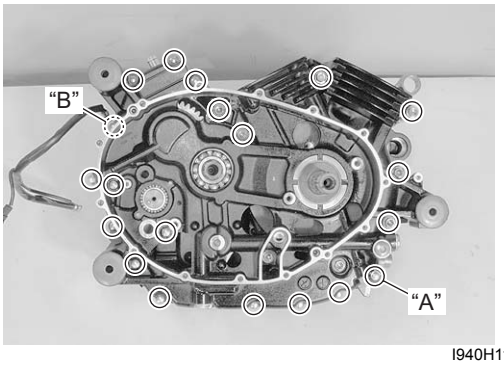
⚠ CAUTION

Use the new copper washers and new gasket washers to prevent oil leakage.

NOTE

Fit the new copper washers "A" and lead wire "B" to the crankcase bolts.

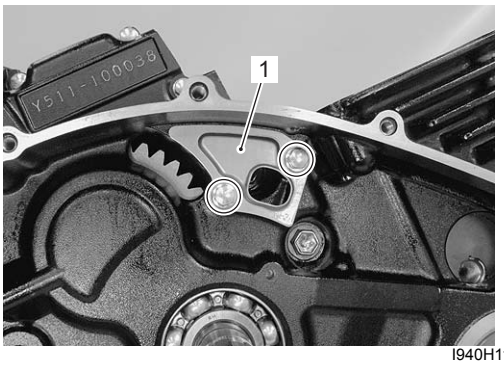
Tightening torque
Crankcase bolt (M6): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
Crankcase bolt (M8) (Initial): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
Crankcase bolt (M8) (Final): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



I940H1140226-01

- Check that the driveshaft and countershaft rotate smoothly.

Oil Separator Plate
Install the oil separator plate (1).



I940H1140227-01

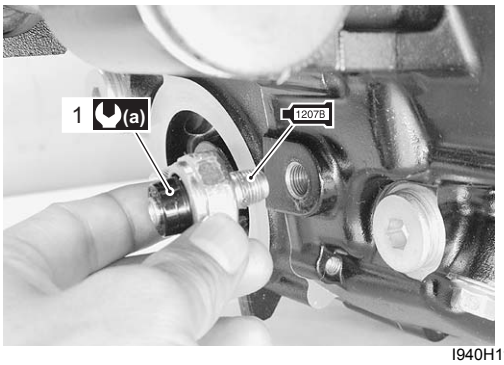
Oil Pressure Switch
Apply bond to the thread part of the oil pressure switch (1) and tighten the oil pressure switch (1) to the specified torque.

NOTE

Be careful not to apply bond to the hole of thread end.

1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

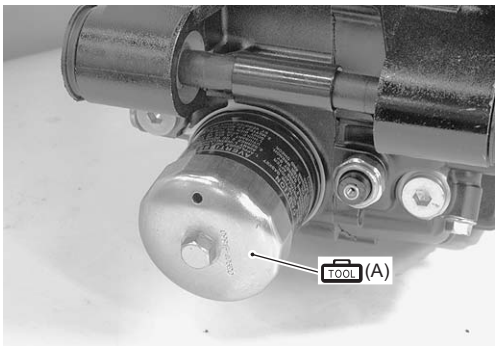
Tightening torque
Oil pressure switch (a): 14 N·m (1.4 kgf-m, 10 lbf-ft)



I940H1140228-02

Oil Filter
Install the oil filter with the special tool. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-8)".

Special tool
TOOL (A): 09915–40620 (Oil filter wrench)



I940H1140229-01

Gear Position Switch

- Apply grease to the O-ring.

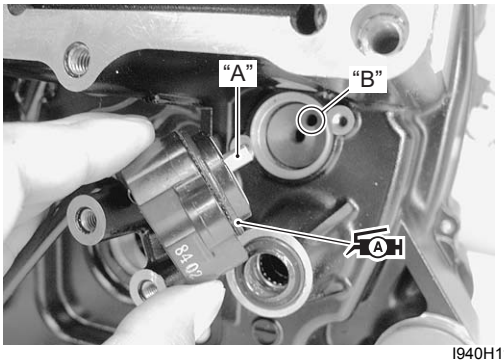
⚠ CAUTION

Replace the O-ring with a new one.

NOTE

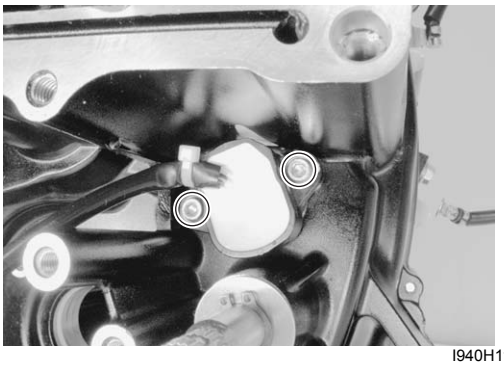
Align the gear position switch pin "A" with the gearshift cam hole "B".

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



I940H1140230-01

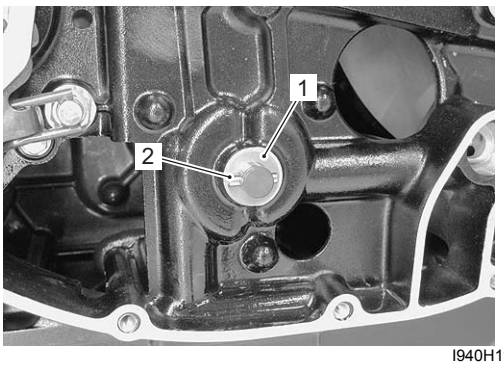
- Install the gear position switch.



I940H1140231-01

Oil Pump Driven Gear / Oil Pressure Regulator

- Install the washer (1) and pin (2).



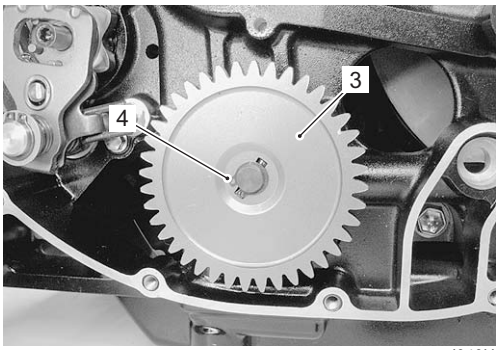
I940H1140232-01

- Install the oil pump driven gear (3) and snap ring (4).

NOTE

Never reuse a snap ring.

Special tool
TOOL : 09900–06107 (Snap ring pliers)



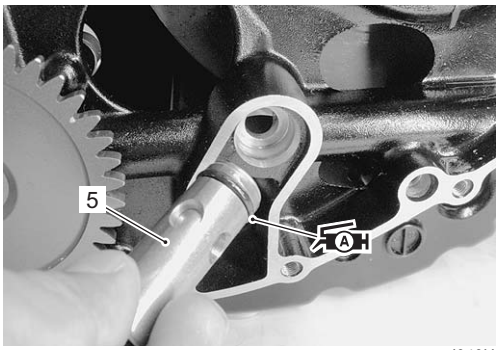
I940H1140233-01

- Apply grease to the O-rings and pass in the oil pressure regulator (5) to the lower crankcase.

⚠ CAUTION

Use the new O-rings to prevent oil leakage.

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



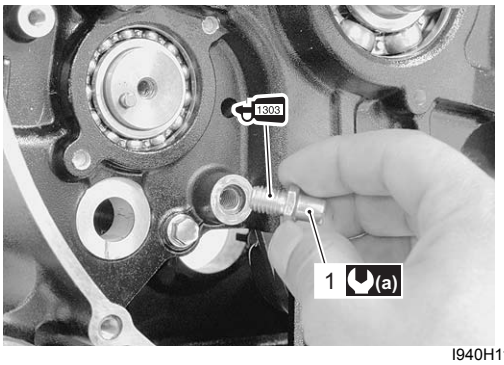
I940H1140234-01

Gearshift System

- Apply thread lock to the gearshift arm stopper (1) and tighten it to the specified torque.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Gearshift arm stopper (a): 19 N·m (1.9 kgf-m, 13.5 lbf-ft)



I940H1140235-01

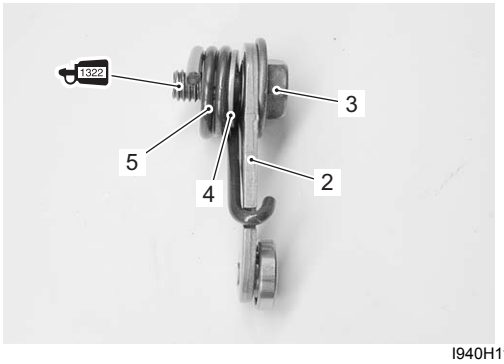
- Install the gearshift cam stopper (2), bolt (3), washer (4) and return spring (5).
- Apply thread lock to the gearshift cam stopper bolt (3) and tighten it to the specified torque.

1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

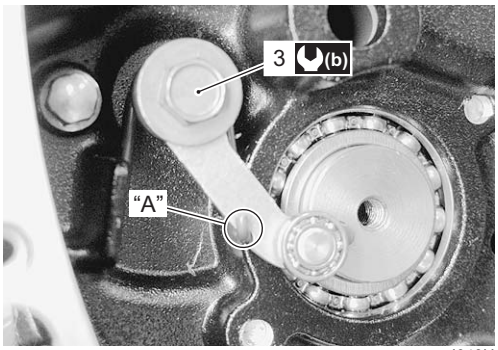
NOTE

Hook the return spring end "A" to the stopper (1).

Tightening torque
Gearshift cam stopper bolt (b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1140236-02

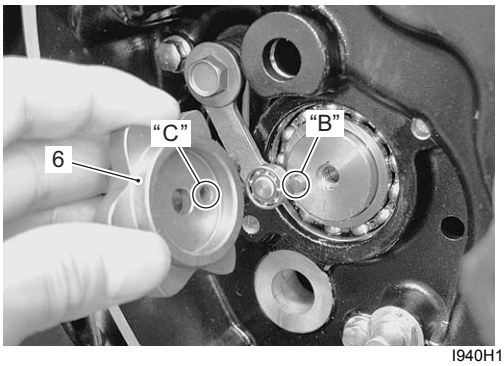


I940H1140320-01

- Check the gearshift cam stopper moves smoothly.
- Locate the gearshift cam in the neutral position.
- Install the gearshift cam stopper plate (6).

NOTE

Align the gearshift cam pin "B" with the gearshift cam stopper plate hole "C".

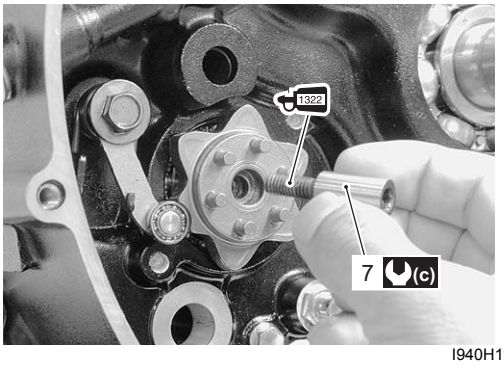


I940H1140238-01

- Apply thread lock to the gearshift cam stopper plate bolt (7) and tighten it to the specified torque.

1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque
Gearshift cam stopper plate bolt (c): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

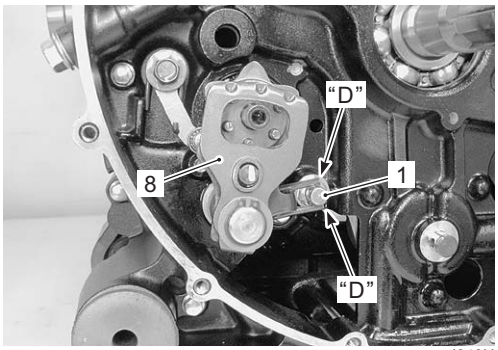


I940H1140239-01

- Install the gearshift cam shaft assembly (8).

NOTE

Pinch the gearshift arm stopper (1) with return spring ends “D”.



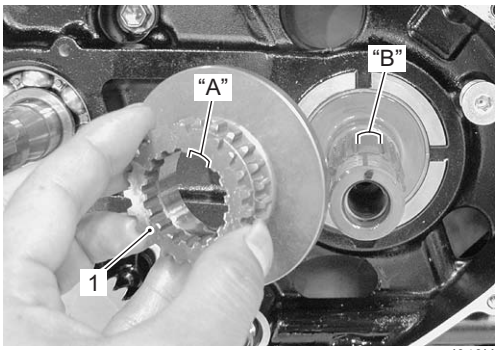
I940H1140300-02

Rear Cam Chain / Rear Cam Chain Drive Sprocket / Cam Chain Tensioner

- Install the rear cam chain drive sprocket (1).

NOTE

When installing the cam chain drive sprocket, align the wide spline tooth “A” and “B”.

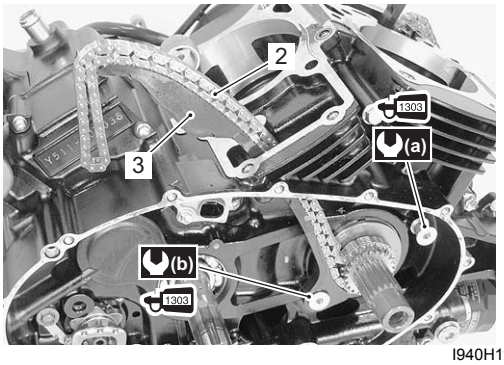


I940H1140241-02

- Install the rear cam chain (2).
- Install the cam chain tensioner (3).
- Apply thread lock to the bolts and tighten its to the specified torque.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Cam chain guide bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Rear cam chain tensioner bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



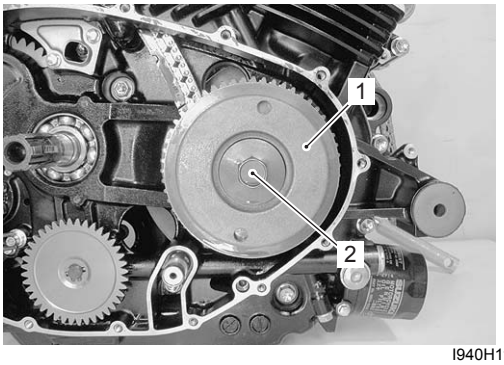
I940H1140242-01

Primary Drive Gear

- Install the primary drive gear assembly (1). Refer to “Primary Drive Gear Removal and Installation in Section 5C (Page 5C-13)”.

⚠ CAUTION

The primary drive gear bolt (2) has left-hand threads.



I940H1140243-03

Clutch / Secondary Drive Gear

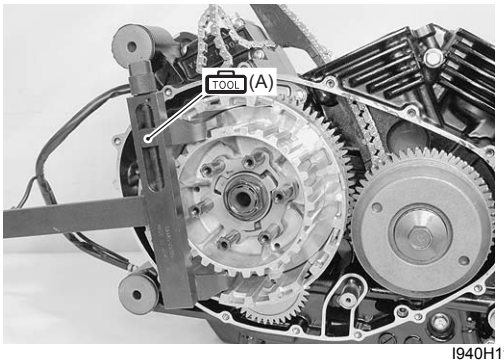
- Install the clutch sleeve hub. Refer to “Clutch Installation in Section 5C (Page 5C-8)”.

NOTE

It is difficult to install the primary driven gear, rotate the crankshaft.

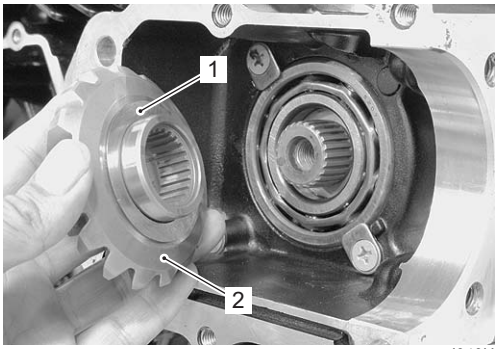
- Shift the transmission into 1st gear.
- Hold the clutch sleeve hub with the special tool.

Special tool
TOOL (A): 09920–53740 (Clutch sleeve hub holder)
TOOL : 09920–31020 (Extension handle)



I940H1140244-01

- Install the secondary drive gear shim (1) and secondary drive gear (2).

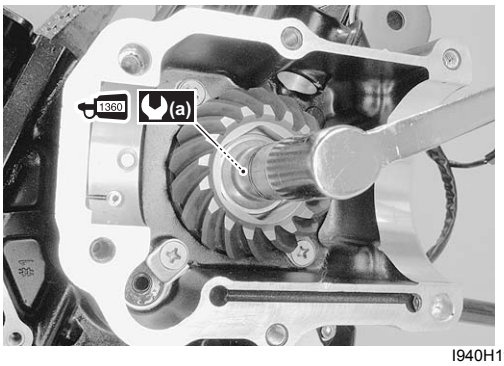


I940H1140245-01

- Apply thread lock to the secondary drive gear bolt and tighten it to the specified torque.

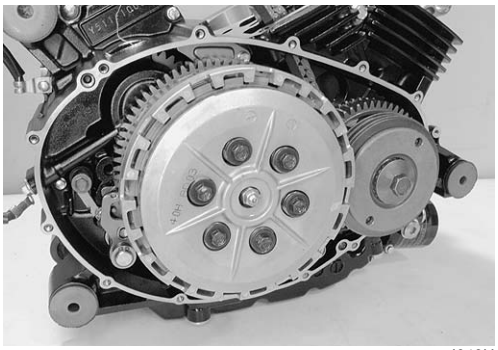
1360 : Thread lock cement 99000–32130 (THREAD LOCK CEMENT SUPER 1360 or equivalent)

Tightening torque
Secondary drive gear bolt (a): 160 N·m (16.0 kgf-m, 115.5 lbf-ft)



I940H1140246-01

- Install the clutch drive plates, driven plates, push rod, push pease and pressure plate. Refer to “Clutch Installation in Section 5C (Page 5C-8)”.

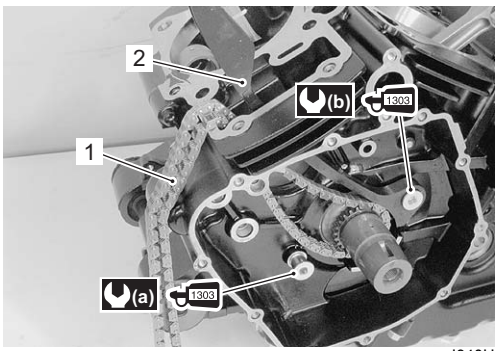

I940H1140247-01

Front Cam Chain / Front Cam Chain Tensioner

- Install the front cam chain (1) and cam chain tensioner (2).
- Apply thread lock to the bolts and tighten its to the specified torque.

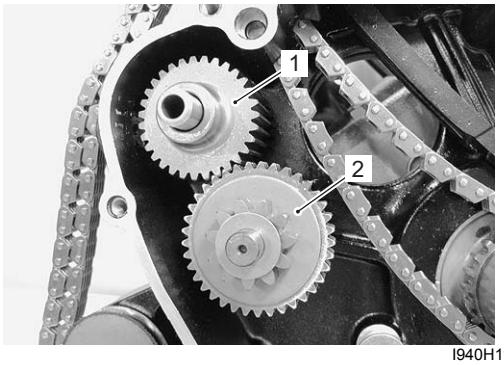
1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Cam chain guide bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Front cam chain tensioner bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I940H1140248-01

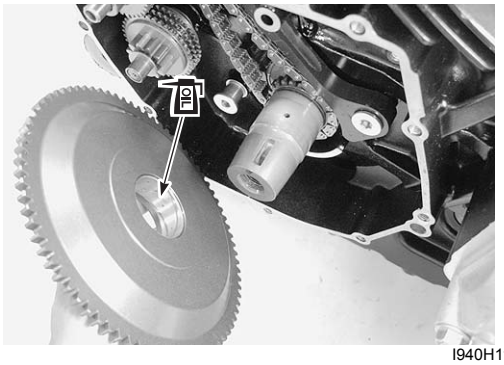
Starter Torque Limiter / Starter Idle Gear
Install the starter idle gear (1) and starter torque limiter (2). Refer to “Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)”.



I940H1140249-01

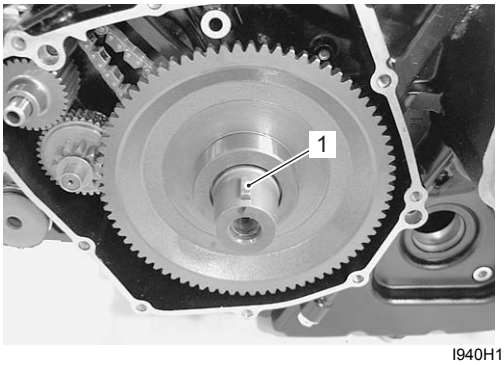
Starter Driven Gear

- Apply engine oil to the bushing of the starter driven gear.



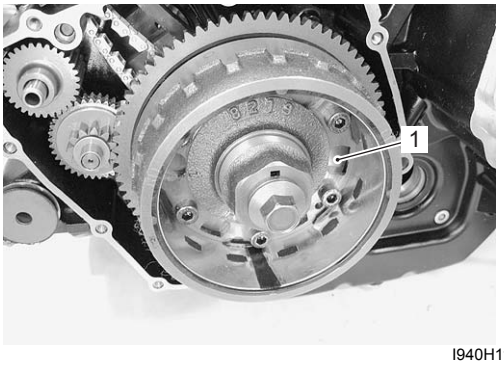
I940H1140250-01

- Install the key (1).



I940H1140251-01

Generator
Install the generator component parts (1). Refer to “Generator Removal and Installation in Section 1J (Page 1J-5)”.



I940H1140252-01

Water Pump

- Apply grease to the O-ring.

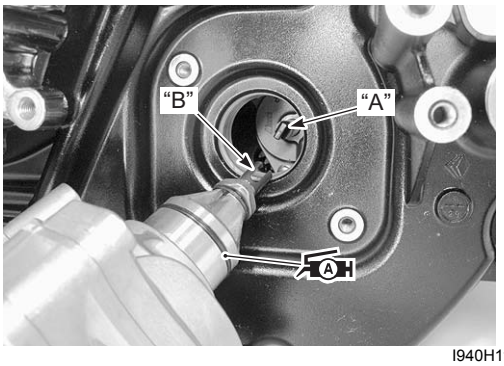
⚠ CAUTION

Use a new O-ring to prevent oil leakage.

NOTE

When install the water pump, fit the convex part “A” of the oil pump shaft onto the concave part “B” of the water pump shaft.

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



I940H1140321-01

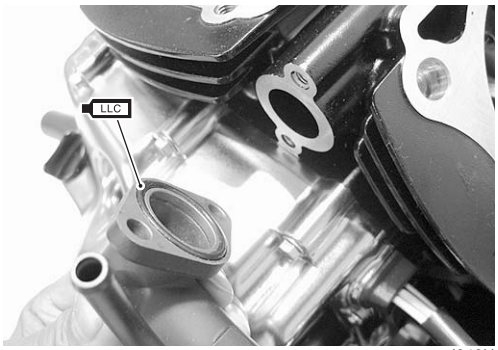
- Tighten the water pump mounting bolts.


I940H1140253-01

- Apply engine coolant to the O-ring.

NOTE

Use a new O-ring to prevent engine coolant leakage.



I940H1140254-01

- Tighten the water inlet pipe mounting bolts.

Clutch Release Assembly / Push Rod

Install the push rod and clutch release assembly. Refer to “Clutch Release Assembly / Push Rod Removal and Installation in Section 5C (Page 5C-2)”.

Starter Motor

- Apply grease to the O-ring.

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

⚠ CAUTION

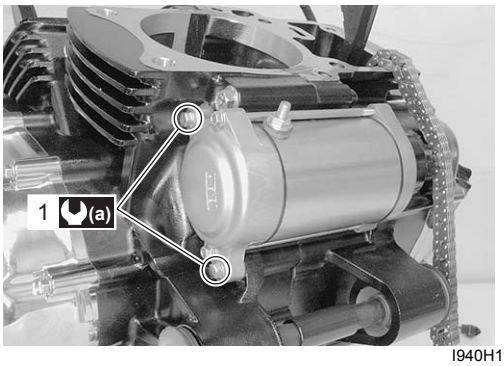
Replace the O-ring with a new one.



I940H1140255-01

- Tighten the starter motor mounting bolts (1) to the specified torque.

Tightening torque
Starter motor mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1140256-02

Engine Top Side

Assembly the engine top side. Refer to “Engine Top Side Assembly (Page 1D-32)”.

Cam Chain Tensioner Inspection

B940H21406034

Inspect the cam chain tensioner in the following procedures:

1) Remove the cam chain tensioner. Refer to “Engine Bottom Side Disassembly (Page 1D-56)” and “Engine Bottom Side Assembly (Page 1D-64)”.
2) Check the contacting surface of the cam chain tensioner. If it is worn or damage, replace it with a new one.



I940H1140371-01

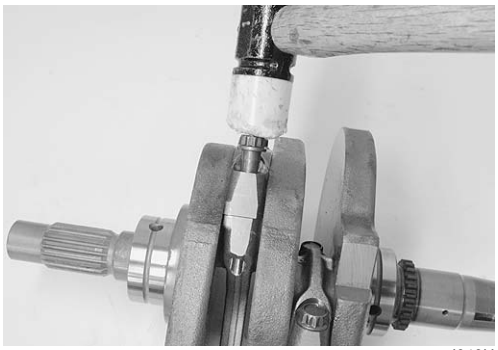
3) Install the cam chain tensioner. Refer to “Engine Bottom Side Disassembly (Page 1D-56)” and “Engine Bottom Side Assembly (Page 1D-64)”.

Conrod Removal and Installation

B940H21406035

Removal

1) Remove the crankshaft assembly from the crankcase. Refer to “Engine Bottom Side Disassembly (Page 1D-56)”.
2) Loosen the conrod cap bolts, and tap the conrod cap bolts lightly with plastic hammer to remove the conrod cap.
3) Remove the conrods and mark them to identify their respective cylinders.



I940H1140257-01

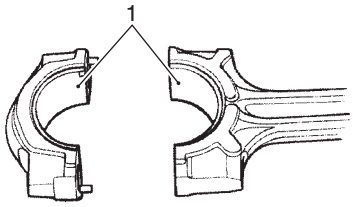
4) Remove the bearings (1).

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.



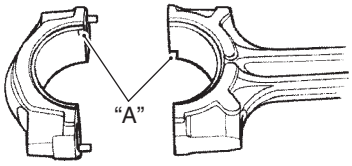
I718H1140269-01

Installation

1) When installing the bearings into the conrod cap and conrod, be sure to fix the stopper part “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 (Page 1D-76)”.



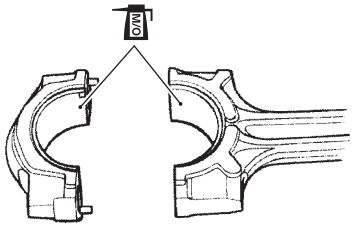
I717H1140221-02

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

⚠ CAUTION

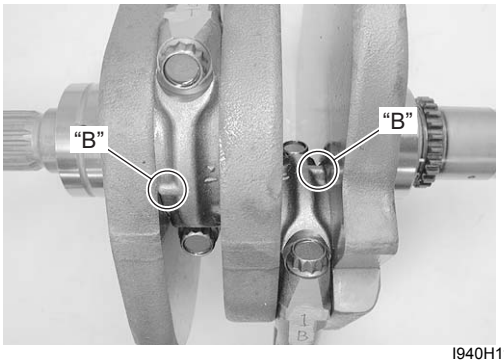
Be sure to clean the conrod big end.

M/O: Molybdenum oil (Molybdenum oil solution)



I718H1140273-01

3) When fitting the conrod cap, make sure that convex part “B” on each conrod faces out side.



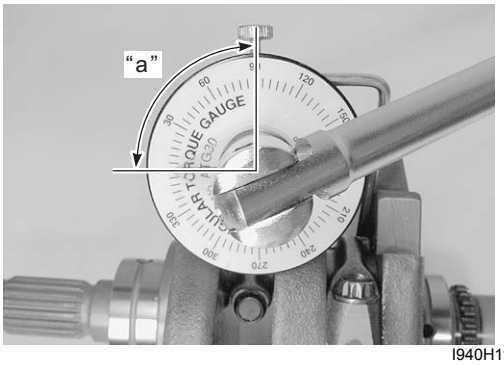
I940H1140258-01

4) Apply engine oil to the conrod cap bolts.
5) Tighten the conrod cap bolts as following two steps.

Tightening torque
Conrod cap bolt: 35 N·m (3.5 kgf-m, 25.5 lb-ft) then turn in 1/4 (90°) turn



I940H1140259-01



I940H1140260-02

"a": 90°

6) Check that the conrod moves smoothly.
7) Install the crankshaft assembly to the crankcase. Refer to "Engine Bottom Side Assembly (Page 1D-64)".

Conrod / Crankshaft Inspection

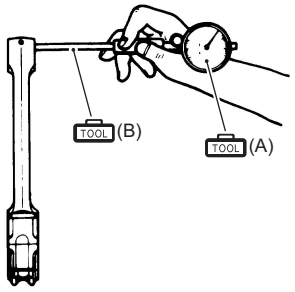
B940H21406036

Refer to "Conrod Removal and Installation (Page 1D-74)".

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 (1/1000 mm, 1 mm))
TOOL (B): 09900–22403 (Small bore gauge (18 – 35 mm))

Conrod small end I.D.
Service limit: 22.040 mm (0.8677 in)



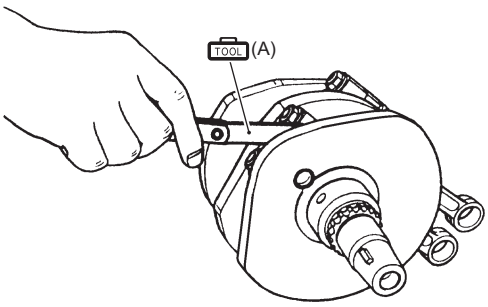
I940H1140261-01

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: 0.30 mm (0.012 in)



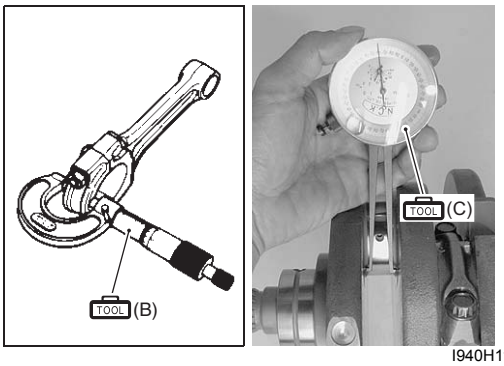
I940H1140262-02

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 (Page 1D-74)". If the width exceed the limit, replace the conrod or crankshaft.

Special tool
TOOL (B): 09900–20205 (Micrometer (0 – 25 mm))
TOOL (C): 09900–20605 (Dial calipers (1/100 mm, 10 – 34 mm))

Conrod big end width
Standard: 19.95 – 20.00 mm (0.785 – 0.787 in)

Crank pin width
Standard: 20.10 – 20.15 mm (0.791 – 0.793 in)



I940H1140265-01

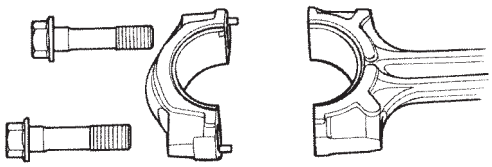
Conrod Crank Pin Bearing Inspection and Selection

B940H21406037

Refer to “Conrod Removal and Installation (Page 1D-74)”.

Inspection

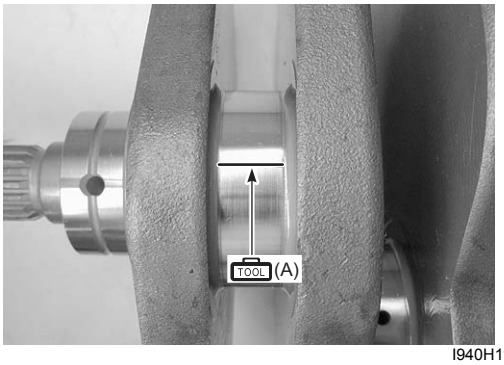
1) Inspect the bearing surfaces for any signs of fusion, pitting, burn or flaws. If any, replace them with a specified set of bearings.



I718H1140285-01

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

Special tool
(A): 09900–22301 (Plastigauge (0.025 – 0.076 mm))



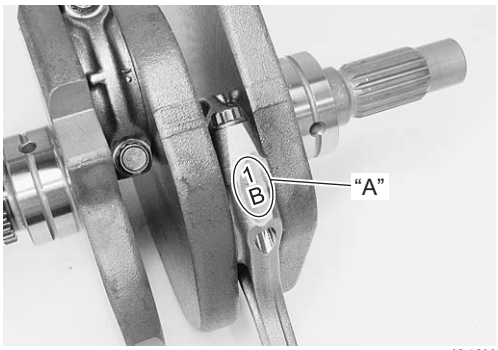
I940H1140266-02

3) Tighten the conrod cap bolts to the specified torque, in two stages. Refer to “Conrod Removal and Installation (Page 1D-74)”.

NOTE

- **When installing the conrod cap to the crank pin, make sure that I.D code “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 bolt: 35 N·m (3.5 kgf-m, 25.5 lb-ft) then turn in 1/4 (90°) turn

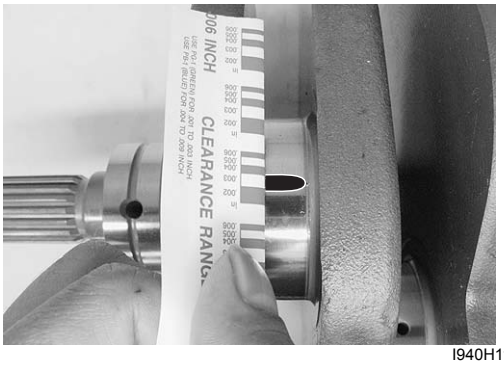


I940H1140267-02

4) Remove the conrod 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)

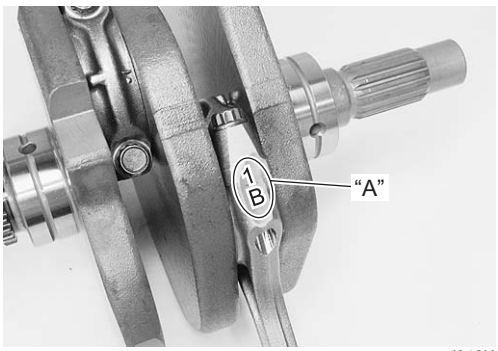
Conrod big end oil clearance
Service limit: 0.080 mm (0.0031 in)



I940H1140268-03

Selection

1) Check the corresponding conrod I.D. code numbers ([1] or [2]) “A”.

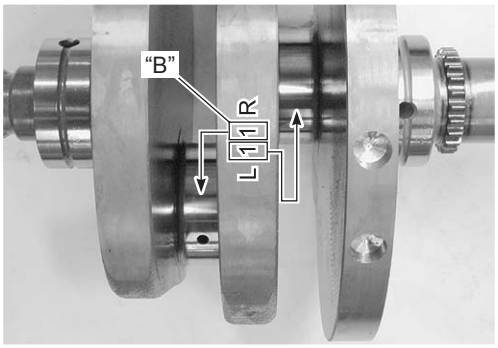


I940H1140267-02

Conrod I.D. specification

Code “A”	I.D. specification
1	58.000 – 58.008 mm (2.2835 – 2.2838 in)
2	58.008 – 58.016 mm (2.2838 – 2.2841 in)

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



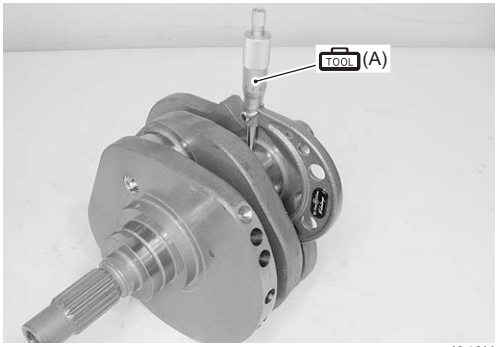
I940H1140322-04

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	54.992 – 55.000 mm (2.1650 – 2.1654 in)
2	54.984 – 54.992 mm (2.1647 – 2.1650 in)
3	54.976 – 54.984 mm (2.1644 – 2.1647 in)

Special tool
TOOL (A): 09900–20203 (Micrometer (1/100 mm, 50 – 75 mm))



I940H1140269-01

4) Select the specified bearings from the bearing selection table.

⚠ CAUTION

The bearings should be replaced as a set.

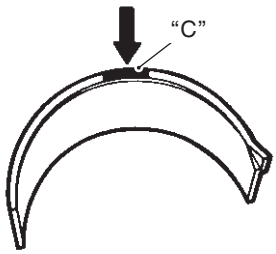
Bearing selection table

		Crank pin O.D. “B”		
	Code	1	2	3
Conrod I.D. “A”	1	Green	Black	Brown
	2	Black	Brown	Yellow

I718H1140293-01

Bearing thickness specification

Color “C” (Part No.)	Thickness
Green (12164-40H00-0A0)	1.480 – 1.484 mm (0.0583 – 0.0584 in)
Black (12164-40H00-0B0)	1.484 – 1.488 mm (0.0584 – 0.0586 in)
Brown (12164-40H00-0C0)	1.488 – 1.492 mm (0.0586 – 0.0587 in)
Yellow (12164-40H00-0D0)	1.492 – 1.496 mm (0.0587 – 0.0589 in)



I649G1140336-02

“C”: Color code

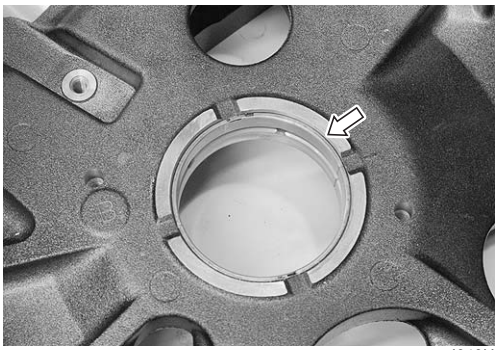
Crankshaft Bearing Inspection and Adjustment

B940H21406038

Refer to “Engine Bottom Side Disassembly (Page 1D-56)” and “Engine Bottom Side Assembly (Page 1D-64)”.

Inspection

1) Inspect the crankshaft bearings for any damage.

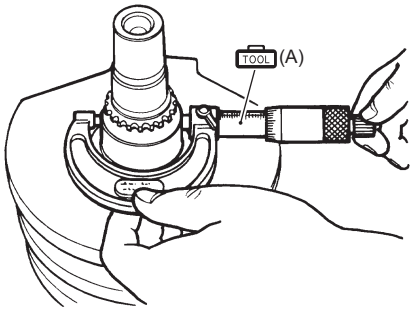


I940H1140270-01

2) Measure the crankshaft journal O.D. with the special tool.

Special tool
(A): 09900–20203 (Micrometer (1/100 mm, 50 – 75 mm))

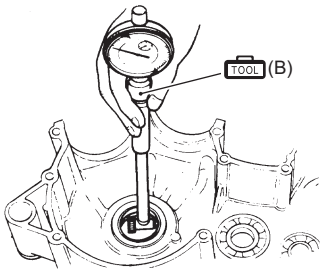
Crankshaft journal O.D.
Standard: 54.985 – 55.000 mm (2.1648 – 2.1654 in)



I940H1140271-01

3) If each crankshaft journal O.D. is not within the standard range, replace the crankshaft with a new one.
4) Measure the crankshaft journal bearing I.D. with the special tool.

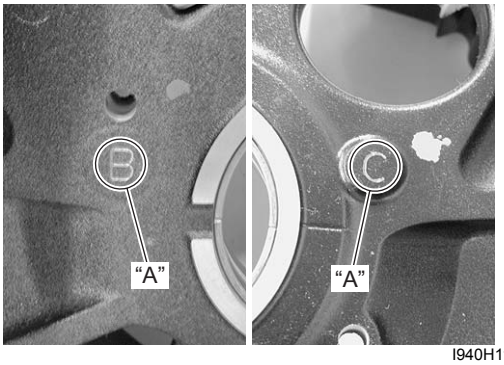
Special tool
(B): 09900–20530 (Cylinder gauge set)



I940H1140272-01

NOTE

Check the each crankcase journal I.D. code mark "A".



I940H1140273-01

Crankshaft journal oil clearance
Standard: 0.002 – 0.029 mm (0.00008 – 0.00114 in)

5) If each crankshaft journal oil clearance is not within the standard range, replace crankshaft journal bearings with new ones.

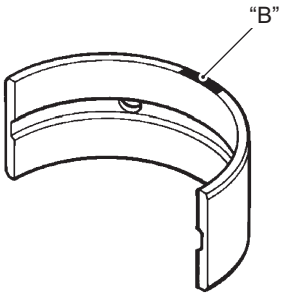
⚠ CAUTION

Bearing must be replaced as a seat.

Selection
Select the specified bearings from the crankcase bore I.D. code.

Bearing selection table

I.D. code "A"	Bearing thickness	Color "B"
A	1.996 – 1.999 mm (0.0786 – 0.0787 in)	Green (12229 – 40H00 – 0A0)
B	1.999 – 2.002 mm (0.0787 – 0.0788 in)	Black (12229 – 40H00 – 0B0)
C	2.002 – 2.005 mm (0.0788 – 0.0789 in)	Blown (12229 – 40H00 – 0C0)



I940H1140274-01

"B": Color code

Crankshaft Bearing Replacement

B940H21406039

Use the special tool to replace the crankshaft journal bearings. The replacement procedure is as follows:

Special tool
(A): 09913–60250 (Journal bearing remover/ installer)

- Set the special tool as shown to remove the crankshaft journal bearings.

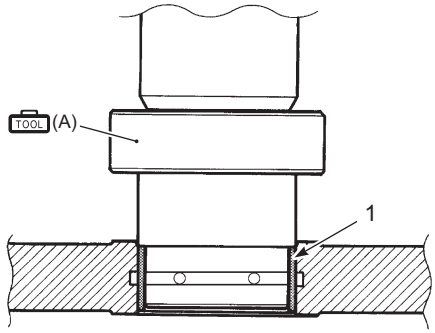
NOTE

Remove the crankshaft journal bearings in only one direction, from inside to outside of each crankcase half.

- Gradually press out the bearing (1) with the special tool by using the hydraulic press.

⚠ CAUTION

The removed bearings must be replaced with new ones.



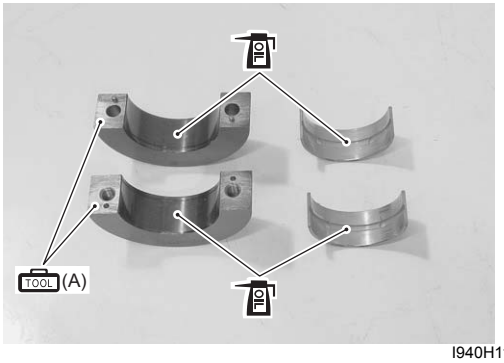
I940H1140275-01

- Set the specified crankshaft journal bearings to the special tool.

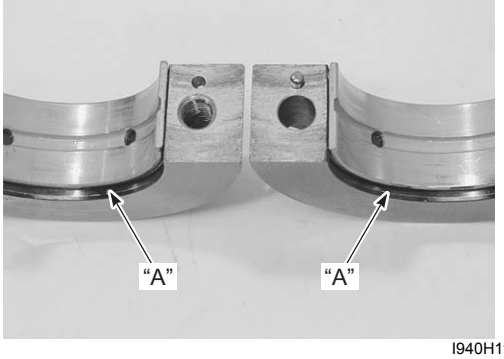
⚠ CAUTION

- **Before setting the bearing, apply enough engine oil to the special tool and bearings.**
- **When setting the bearing, align the bearing side with the engraved line "A" and also the bearing edge with the matching surface of the special tool.**

Special tool
TOOL (A): 09913–60250 (Journal bearing remover/ installer)



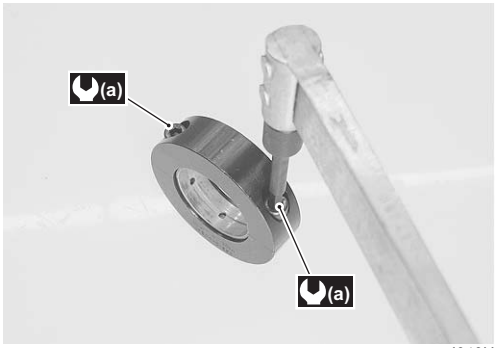
I940H1140277-02



I940H1140278-01

- Tighten the special tool bolt to the specified torque.

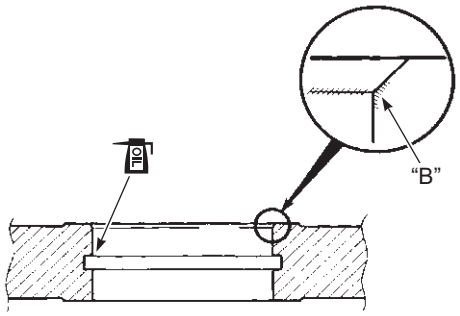
Tightening torque
Special tool bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I940H1140279-01

⚠ CAUTION

Before installing the bearings, lightly shave off the sharp edge "B" part of the crankcase chamber by using an oilstone and wash the crankcase bore with enough engine oil.

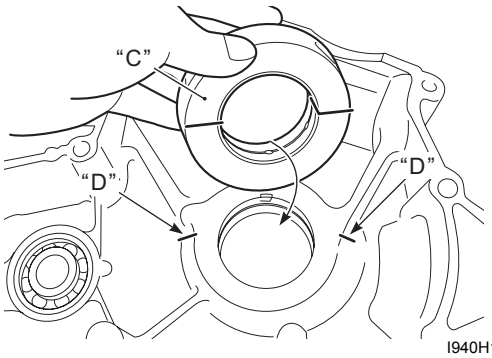


I940H1140280-01

- Set the bearings installed in the special tool to the crankcase half as shown.

⚠ CAUTION

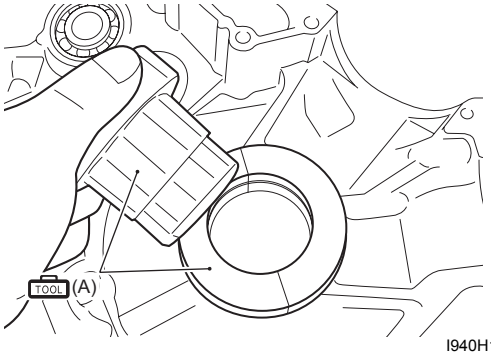
- **Be sure the bearing protruded side "C" faces the crankcase bore.**
- **Align the special tool mating surface with the line mark "D" on the crankcase.**



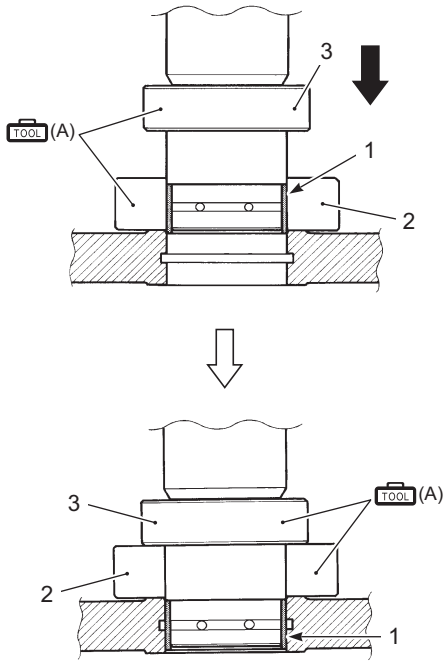
I940H1140335-01

- Apply enough engine oil to the special tool and the bearings and then set the special tool carefully.
- Gradually press in the bearing (1) into the main journal bore by using the hydraulic press until the special tool (2) stops the special tool (3).

Special tool
TOOL (A): 09913–60250 (Journal bearing remover/ installer)

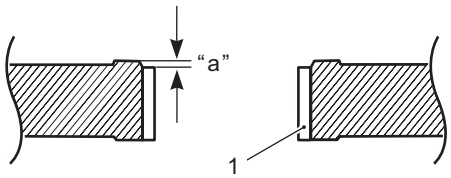


I940H1140336-01



I940H1140283-03

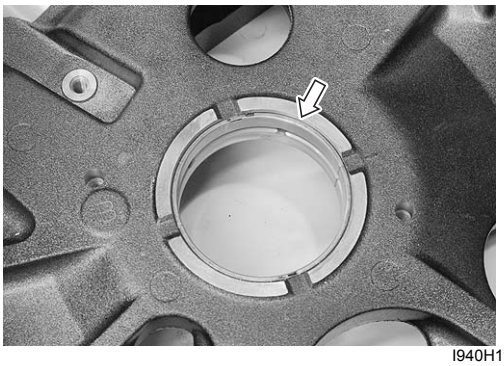
- Measure the clearance from case surface to bearing (1).



I940H1140284-01

"a": 1.0 mm (0.04 in)

- After installing the bearings, check the bearing surface for any scratch or damage.



I940H1140286-01

Crankshaft Thrust Clearance Inspection and Adjustment

B940H21406040

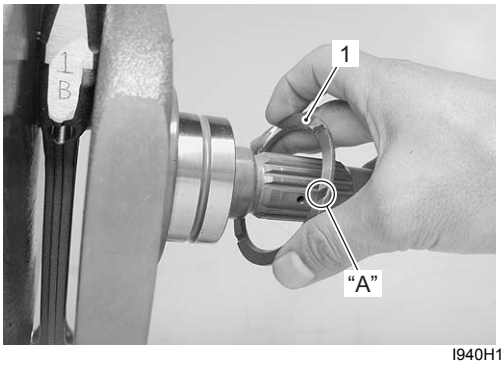
Refer to "Engine Bottom Side Disassembly (Page 1D-56)".
Refer to "Engine Bottom Side Assembly (Page 1D-64)".

Inspection

1) Install the crankshaft in the right crankcase half after installing the thrust shim (1) on the crankshaft.

NOTE

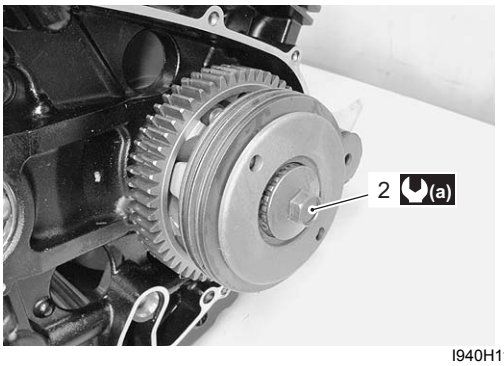
The oil grooved face "A" of thrust shim (1) is faced to crankshaft web side.



I940H1140287-01

2) Place the thrust washer, camshaft drive sprocket and primary drive gear on the right end of the crankshaft and tighten primary drive gear bolt (2) to the specified torque. Refer to “Primary Drive Gear Removal and Installation in Section 5C (Page 5C-13)”.

Tightening torque
Primary drive gear bolt (a): 150 N·m (15.0 kgf-m, 108.5 lbf-ft)



I940H1140288-01

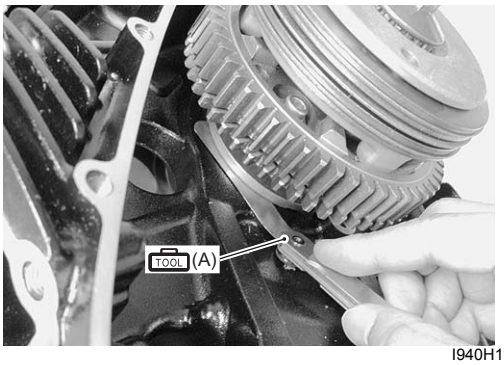
3) Measure the thrust clearance by using the thickness gauge. If the thrust clearance exceeds the standard range, adjust the thrust clearance.

NOTE

Pull the crankshaft to the right (Primary driven gear side) so that there is no clearance on the thrust bearing.

Special tool
(A): 09900–20803 (Thickness gauge)

Crankshaft thrust clearance
Standard: 0.100 – 0.150 mm (0.0039 – 0.0059 in)

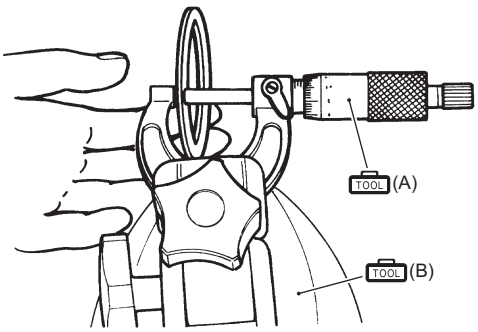


I940H1140289-01

Selection

1) Remove the thrust bearing and measure its thickness using the micrometer. If the thickness of the thrust bearing is below standard, replace it with a new one and once again perform the thrust clearance measurement listed above.

Special tool
(A): 09900–20205 (Micrometer (0 – 25 mm))
(B): 09900–20702 (Micrometer stand)



I940H1140290-02

2) Select a thrust bearing from the selection table.

Thrust bearing selection table

Part No.	Thrust bearing thickness	Thrust clearance
(12228-40H00-0A0)	1.925 – 1.950 mm (0.0758 – 0.0768 in)	0.100 – 0.150 mm (0.0040 – 0.0059 in)
(12228-40H00-0B0)	1.950 – 1.975 mm (0.0768 – 0.0778 in)	0.100 – 0.150 mm (0.0040 – 0.0059 in)
(12228-40H00-0C0)	1.975 – 2.000 mm (0.0778 – 0.0787 in)	0.100 – 0.150 mm (0.0040 – 0.0059 in)
(12228-40H00-0D0)	2.000 – 2.025 mm (0.0787 – 0.0797 in)	0.100 – 0.150 mm (0.0040 – 0.0059 in)
(12228-40H00-0E0)	2.025 – 2.050 mm (0.0797 – 0.0807 in)	0.100 – 0.150 mm (0.0040 – 0.0059 in)
(12228-40H00-0F0)	2.050 – 2.075 mm (0.0807 – 0.0817 in)	0.100 – 0.150 mm (0.0040 – 0.0059 in)

3) After selecting a thrust bearing, install it and then measure the thrust clearance again.

Specifications

Service Data

B940H21407001

Valve + Guide

Unit: mm (in)

Item	Standard		Limit
Valve diam.	IN.	33 (1.30)	—
	EX.	30 (1.18)	—
Tappet clearance (When cold)	IN.	0.08 – 0.13 (0.003 – 0.005)	—
	EX.	0.17 – 0.22 (0.007 – 0.009)	—
Valve guide to valve stem clearance	IN.	0.010 – 0.037 (0.0004 – 0.0015)	—
	EX.	0.030 – 0.057 (0.0012 – 0.0022)	—
Valve guide I.D.	IN. & EX.	5.500 – 5.512 (0.2165 – 0.2170)	—
Valve stem O.D.	IN.	5.475 – 5.490 (0.2156 – 0.2161)	—
	EX.	5.455 – 5.470 (0.2148 – 0.2154)	—
Valve stem deflection	IN. & EX.	—	0.35 (0.014)
Valve stem runout	IN. & EX.	—	0.05 (0.002)
Valve head thickness	IN. & EX.	—	0.5 (0.02)
Valve stem end length	IN. & EX.	—	3.2 (0.13)
Valve seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	—
Valve head radial runout	IN. & EX.	—	0.03 (0.001)
Valve spring free length	Inner	—	34.4 (1.35)
	Outer	—	38.1 (1.50)
Valve spring tension	Inner	58 – 66 N (5.9 – 6.7 kgf, 13.1 – 15.0 lbs) at length 27.56 mm (1.09 in)	—
	Outer	135 – 155 N (13.5 – 15.5 kgf, 30.4 – 34.9 lbs) at length 31.06 mm (1.23 in)	—

Camshaft + Cylinder Head

Unit: mm (in)

Item	Standard		Limit
Cam height	IN.	33.060 – 33.110 (1.3016 – 1.3035)	32.760 (1.2898)
	EX.	33.110 – 33.160 (1.304 – 1.306)	32.810 (1.2917)
Camshaft journal oil clearance	IN. & EX.	0.032 – 0.066 (0.0013 – 0.0026)	0.150 (0.0059)
Camshaft journal holder I.D.	Sprocket side	22.012 – 22.025 (0.8666 – 0.8671)	—
	Other side	18.512 – 18.525 (0.7288 – 0.7293)	—
Camshaft journal O.D.	Sprocket side	21.959 – 21.980 (0.8645 – 0.8653)	—
	Other side	18.459 – 18.480 (0.7267 – 0.7276)	—
Camshaft runout	IN. & EX.	—	0.10 (0.004)
Cylinder head distortion	—		0.05 (0.002)
Rocker arm shaft O.D.	IN. & EX.	11.973 – 11.984 (0.4714 – 0.4718)	
Rocker arm I.D.	IN. & EX.	12.000 – 12.018 (0.4724 –0.4731)	

Cylinder + Piston + Piston Ring

Unit: mm (in)

Item	Standard		Limit
Compression pressure (Automatic decomp. actuated)	#1 Cylinder	850 – 1 450 kPa (8.5 – 14.5 kgf/cm^2, 121 – 206 psi)	750 kPa (7.5 kgf/cm^2, 106.7 psi)
	#2 Cylinder	650 – 1 250 kPa (6.5 – 12.5 kgf/cm^2, 92 – 178 psi)	550 kPa (5.5 kgf/cm^2, 78.2 psi)
Piston-to-cylinder clearance	0.025 – 0.035 (0.0010 – 0.0014)		0.120 (0.0047)
Cylinder bore	96.000 – 96.015 (3.7795 – 3.7801)		Nicks or Scratches
Piston diam.	95.970 – 95.985 (3.7783 – 3.7789) Measure at 15 mm (0.6 in) from the skirt end.		95.88 (3.7748)
Cylinder distortion	—		0.05 (0.002)
Piston ring free end gap	1st	Approx. 11 (0.43)	8.8 (0.35)
	2nd	Approx. 11 (0.43)	8.8 (0.35)
Piston ring end gap	1st	0.10 – 0.25 (0.004 – 0.010)	0.5 (0.020)
	2nd	0.10 – 0.25 (0.004 – 0.010)	0.5 (0.020)
Piston ring-to-groove clearance	1st	—	0.180 (0.0071)
	2nd	—	0.150 (0.0059)
Piston ring groove width	1st	1.21 – 1.23 (0.0476 – 0.0484)	—
	2nd	1.01 – 1.03 (0.0398 – 0.0402)	—
	Oil	2.51 – 2.53 (0.0988 – 0.0996)	—
Piston ring thickness	1st	1.17 – 1.19 (0.046 – 0.047)	—
	2nd	0.97 – 0.99 (0.038 – 0.039)	—
Piston pin bore I.D.	22.002 – 22.008 (0.8662 – 0.8665)		22.030 (0.8673)
Piston pin O.D.	21.992 – 22.000 (0.8658 – 0.8661)		21.980 (0.8654)

Conrod + Crankshaft

Unit: mm (in)

Item	Standard	Limit
Conrod small end I.D.	22.010 – 22.018 (0.8665 – 0.8668)	22.040 (0.8677)
Conrod big end side clearance	0.100 – 0.200 (0.0039 – 0.0078)	0.30 (0.012)
Conrod big end width	19.95 – 20.00 (0.785 – 0.787)	—
Crank pin width	20.10 – 20.15 (0.791 – 0.793)	—
Conrod big end oil clearance	0.032 – 0.056 (0.0013 – 0.0022)	0.080 (0.0031)
Crank pin O.D.	54.976 – 55.000 (2.1644 – 2.1654)	—
Crankshaft journal oil clearance	0.002 – 0.029 (0.00008 – 0.00114)	0.080 (0.0031)
Crankshaft journal O.D.	54.985 – 55.000 (2.1648 – 2.1654)	—
Crankshaft thrust bearing thickness	1.925 – 2.075 (0.0758 – 0.0817)	—
Crankshaft thrust clearance	0.100 – 0.150 (0.0039 – 0.0059)	—
Crankshaft runout	—	0.05 (0.002)

Tightening Torque Specifications

B940H21407002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Air cleaner box mounting bolt	5.5	0.55	4.0	☞(Page 1D-7)
ISC valve mounting bolt	4.5	0.45	3.0	☞(Page 1D-12)
STP sensor mounting screw	3.5	0.35	2.5	☞(Page 1D-15)
TP sensor mounting screw	3.5	0.35	2.5	☞(Page 1D-16)
Fuel delivery pipe mounting screw	5	0.5	3.5	☞(Page 1D-17)
Frame down tube bolt	50	5.0	36.0	☞(Page 1D-25)
Front footrest bracket bolt	50	5.0	36	☞(Page 1D-26)
Radiator heat shield mounting bolt (Left side)	5.5	0.55	4.0	☞(Page 1D-26)
Radiator heat shield mounting bolt (Right side)	10	1.0	7.0	☞(Page 1D-26)
Cylinder head bolt (L190) (Initial)	25	2.5	18.0	☞(Page 1D-34)
Cylinder head bolt (L190) (Final)	42	4.2	30.5	☞(Page 1D-34)
Cylinder head bolt (L180)	26	2.6	19.0	☞(Page 1D-34)
Cylinder head bolt (L160)	26	2.6	19.0	☞(Page 1D-34)
Cam chain sprocket bolt	15	1.5	11.5	☞(Page 1D-36)
Camshaft journal holder bolt	10	1.0	7.0	☞(Page 1D-37) / ☞(Page 1D-38) / ☞(Page 1D-42)
Cam chain tension adjuster bolt	10	1.0	7.0	☞(Page 1D-38) / ☞(Page 1D-39)
Cam chain tension adjuster cap bolt	23	2.3	16.5	☞(Page 1D-38) / ☞(Page 1D-39)
Cylinder head cover bolt	14	1.4	10.0	☞(Page 1D-40)
Valve timing inspection cap bolt	10	1.0	7.0	☞(Page 1D-44)
Cylinder head cover bracket bolt	10	1.0	7.0	☞(Page 1D-45)
Water jacket plug (Cylinder head)	26	2.6	19.0	☞(Page 1D-47)
Oil gallery plug (M16)	35	3.5	25.5	☞(Page 1D-64)
Oil gallery plug (M14)	23	2.3	16.5	☞(Page 1D-64)
Oil gallery plug (M8)	18	1.8	13.0	☞(Page 1D-64)
Oil gallery plug (Transmission oil jet) (M10)	18	1.8	13.0	☞(Page 1D-64)
Crankcase bolt (M6)	11	1.1	8.0	☞(Page 1D-67)
Crankcase bolt (M8) (Initial)	15	1.5	11.0	☞(Page 1D-67)
Crankcase bolt (M8) (Final)	26	2.6	19.0	☞(Page 1D-67)
Oil pressure switch	14	1.4	10	☞(Page 1D-67)
Gearshift arm stopper	19	1.9	13.5	☞(Page 1D-69)
Gearshift cam stopper bolt	10	1.0	7.0	☞(Page 1D-69)
Gearshift cam stopper plate bolt	10	1.0	7.0	☞(Page 1D-69)
Cam chain guide bolt	23	2.3	16.5	☞(Page 1D-70) / ☞(Page 1D-71)
Rear cam chain tensioner bolt	23	2.3	16.5	☞(Page 1D-70)
Secondary drive gear bolt	160	16.0	115.5	☞(Page 1D-71)
Front cam chain tensioner bolt	23	2.3	16.5	☞(Page 1D-71)
Starter motor mounting bolt	10	1.0	7.0	☞(Page 1D-73)
Conrod cap bolt	35 N·m (3.5 kgf-m, 25.5 lb-ft) then turn in 1/4 (90°) turn			☞(Page 1D-75) / ☞(Page 1D-76)
Special tool bolt	23	2.3	16.5	☞(Page 1D-79)
Primary drive gear bolt	150	15.0	108.5	☞(Page 1D-81)

NOTE

The specified tightening torque is described in the following.
“Throttle Cable Routing Diagram (Page 1D-2)”
“Throttle Body Components (Page 1D-9)”
“Engine Assembly Installation (Page 1D-24)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H21408001

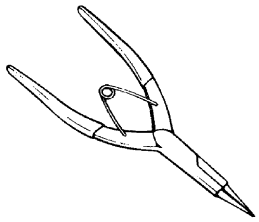
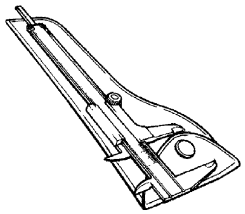
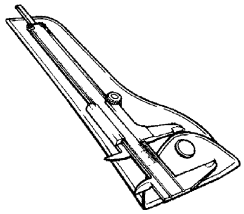
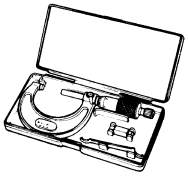
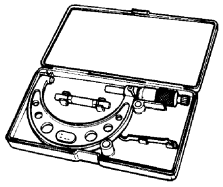
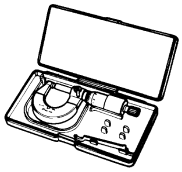
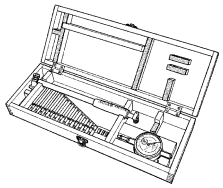
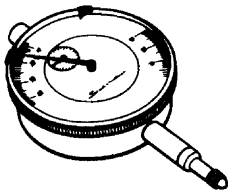
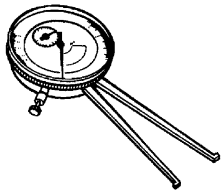
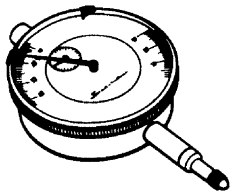
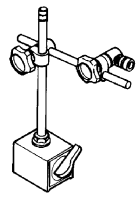
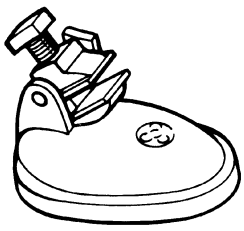
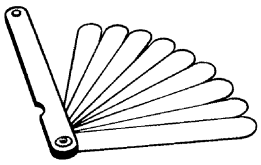
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 1D-15) / ☞(Page 1D-37) / ☞(Page 1D-41) / ☞(Page 1D-44) / ☞(Page 1D-66) / ☞(Page 1D-68) / ☞(Page 1D-68) / ☞(Page 1D-72) / ☞(Page 1D-73)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 1D-32) / ☞(Page 1D-33) / ☞(Page 1D-33) / ☞(Page 1D-35) / ☞(Page 1D-46) / ☞(Page 1D-46) / ☞(Page 1D-65) / ☞(Page 1D-65) / ☞(Page 1D-74)
Sealant	SUZUKI BOND No.1215 or equivalent	P/No.: 99000–31110	☞(Page 1D-33) / ☞(Page 1D-66)
	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 1D-40) / ☞(Page 1D-67)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 1D-36) / ☞(Page 1D-69) / ☞(Page 1D-70) / ☞(Page 1D-71)
	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞(Page 1D-26) / ☞(Page 1D-44) / ☞(Page 1D-47) / ☞(Page 1D-64) / ☞(Page 1D-64) / ☞(Page 1D-69) / ☞(Page 1D-69)
	THREAD LOCK CEMENT SUPER 1360 or equivalent	P/No.: 99000–32130	☞(Page 1D-71)

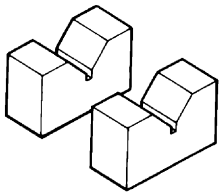
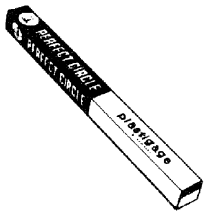
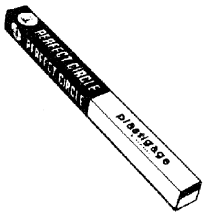
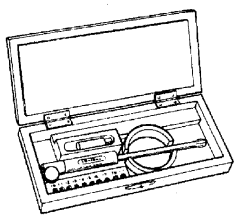
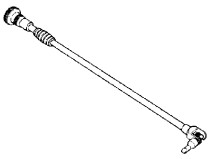
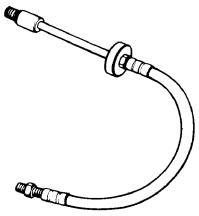
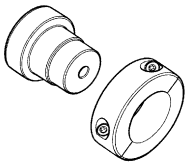
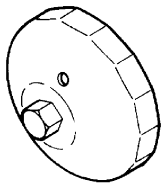
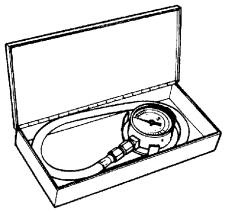
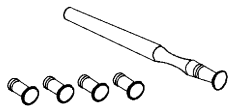
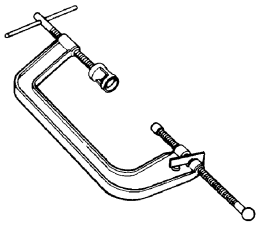
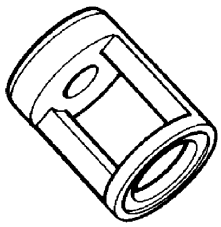
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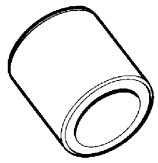
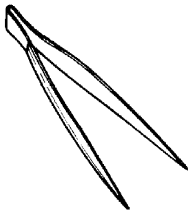
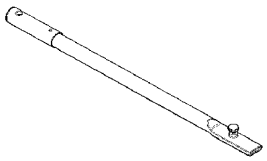
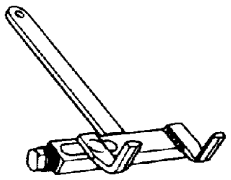
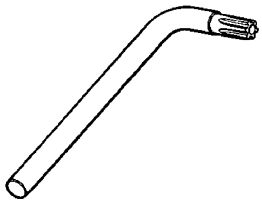
Required service material is also described in the following.
“Throttle Body Components (Page 1D-9)”
“Engine Bottom Side Assembly (Page 1D-64)”

Special Tool

B940H21408002

09900–06107 Snap ring pliers ☞(Page 1D-59) / ☞(Page 1D-68)	
09900–20101 Vernier calipers (1/15 mm, 150 mm) ☞(Page 1D-56)	
09900–20102 Vernier calipers (1/20 mm, 200 mm) ☞(Page 1D-52)	
09900–20202 Micrometer (1/100 mm, 25 – 50 mm) ☞(Page 1D-41)	
09900–20203 Micrometer (1/100 mm, 50 – 75 mm) ☞(Page 1D-77) / ☞(Page 1D-78)	
09900–20204 Micrometer (75 – 100 mm) ☞(Page 1D-55)	
09900–20205 Micrometer (0 – 25 mm) ☞(Page 1D-47) / ☞(Page 1D-49) / ☞(Page 1D-55) / ☞(Page 1D-56) / ☞(Page 1D-75) / ☞(Page 1D-81)	
09900–20530 Cylinder gauge set ☞(Page 1D-42) / ☞(Page 1D-78)	
09900–20602 Dial gauge (1/1000 mm, 1 mm) ☞(Page 1D-42) / ☞(Page 1D-56) / ☞(Page 1D-75)	
09900–20605 Dial calipers (1/100 mm, 10 – 34 mm) ☞(Page 1D-48) / ☞(Page 1D-75)	
09900–20607 Dial gauge (1/100 mm, 10 mm) ☞(Page 1D-43) / ☞(Page 1D-48) / ☞(Page 1D-48) / ☞(Page 1D-49)	
09900–20701 Magnetic stand ☞(Page 1D-43) / ☞(Page 1D-48) / ☞(Page 1D-48) / ☞(Page 1D-49)	
09900–20702 Micrometer stand ☞(Page 1D-81)	
09900–20803 Thickness gauge ☞(Page 1D-48) / ☞(Page 1D-53) / ☞(Page 1D-55) / ☞(Page 1D-56) / ☞(Page 1D-75) / ☞(Page 1D-81)	

09900–21304 V-block (100 mm) ☞(Page 1D-43) / ☞(Page 1D-48) / ☞(Page 1D-48) 	09900–22301 Plastigauge (0.025 – 0.076 mm) ☞(Page 1D-42) / ☞(Page 1D-76) 
09900–22302 Plastigauge (0.051 – 0.152 mm) ☞(Page 1D-42) 	09900–22403 Small bore gauge (18 – 35 mm) ☞(Page 1D-42) / ☞(Page 1D-56) / ☞(Page 1D-75) 
09913–10130 Carburetor adjust driver ☞(Page 1D-19) 	09913–10750 Compression gauge adapter ☞(Page 1D-3) 
09913–60250 Journal bearing remover/ installer ☞(Page 1D-78) / ☞(Page 1D-79) / ☞(Page 1D-80) 	09915–40620 Oil filter wrench ☞(Page 1D-60) / ☞(Page 1D-67) 
09915–64512 Compression gauge ☞(Page 1D-3) 	09916–10911 Valve lapper set ☞(Page 1D-50) 
09916–14510 Valve lifter ☞(Page 1D-45) / ☞(Page 1D-46) 	09916–14910 Valve spring compressor attachment ☞(Page 1D-45) / ☞(Page 1D-46) 
09916–34542 Reamer handle ☞(Page 1D-51) / ☞(Page 1D-51) 	09916–34550 Valve guide reamer (5.5 mm) ☞(Page 1D-51) 
09916–34580 Valve guide reamer (10.8 mm) ☞(Page 1D-51) 	09916–44910 Valve guide remover/ installer ☞(Page 1D-50) / ☞(Page 1D-51) 

09916–44920 Valve guide installer attachment ☞(Page 1D-51) 	09916–84511 Tweezers ☞(Page 1D-45) / ☞(Page 1D-46) 
09920–31020 Extension handle ☞(Page 1D-58) / ☞(Page 1D-71) 	09920–53740 Clutch sleeve hub holder ☞(Page 1D-58) / ☞(Page 1D-71) 
09930–11950 Torx wrench ☞(Page 1D-15) / ☞(Page 1D-15) / ☞(Page 1D-16) 	

Engine Lubrication System

Precautions

Precautions for Engine Oil

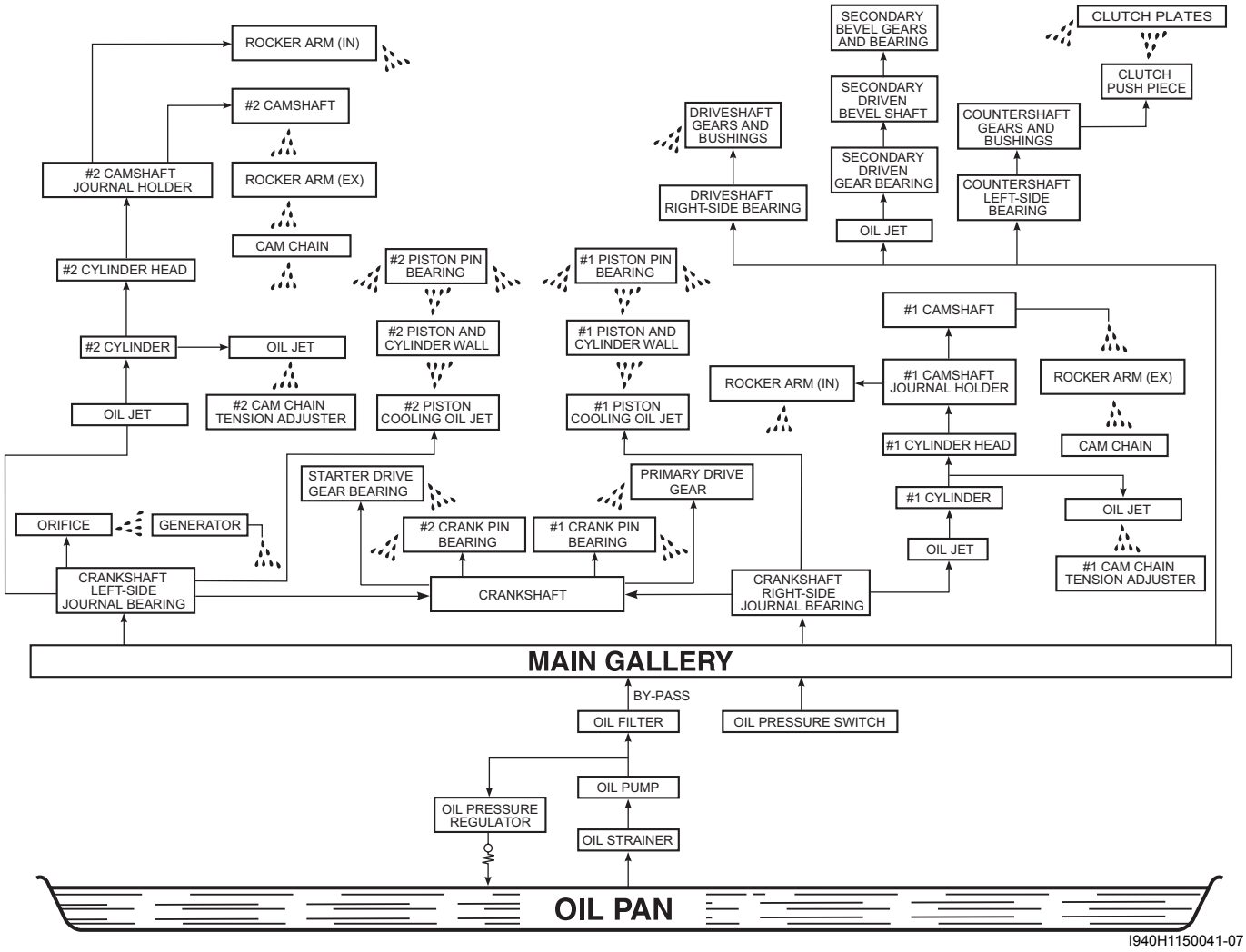
B940H21500001

Refer to “Fuel and Oil Recommendation in Section 0A (Page 0A-3)”.

Schematic and Routing Diagram

Engine Lubrication System Chart Diagram

B940H21502001



I940H1150041-07

Diagnostic Information and Procedures

Engine Lubrication Symptom Diagnosis

B940H21504001

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.*
	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

B940H21504002

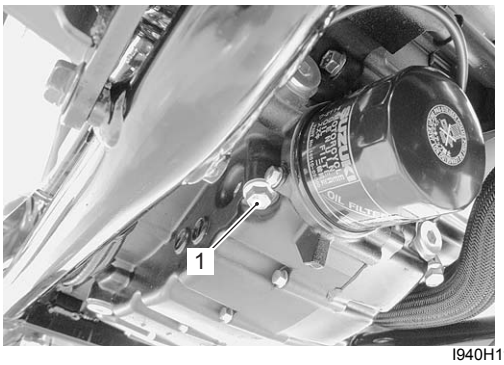
Check the engine oil pressure periodically. This will give a good indication of the condition of the moving parts.

NOTE

Before checking the oil pressure, check the following:

- **Oil level (Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-8)".)**
- **Oil leaks (If leak is found, repair it.)**
- **Oil quality (If oil is discolored or deteriorated, replace it.)**

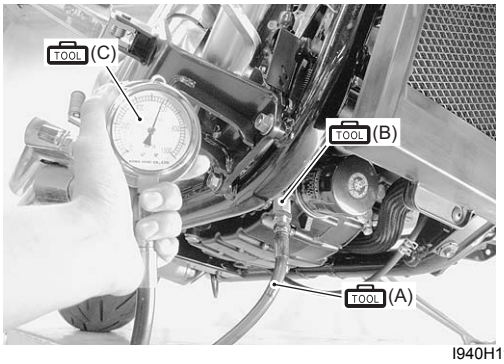
1) Start the engine and check if the oil pressure indicator light is turned on. If the light stays on, check the oil pressure indicator light circuit. If the circuit is OK, check the oil pressure in the following manner.
2) Place an oil pan bellow the engine, and remove the main oil gallery plug (1).



I940H1150001-01

3) Install the oil pressure gauge and attachment into the main oil gallery.

Special tool
TOOL (A): 09915–74521 (Oil pressure gauge hose)
TOOL (B): 09915–74533 (Oil pressure gauge attachment)
TOOL (C): 09915–77331 (Meter (for high pressure))



I940H1150002-02

4) Connect the tachometer to the high-tension cord.

Special tool
TOOL (D): 09900–26006 (Engine tachometer (solar cell type))



I940H1150003-02

5) Warm up the engine as follows:
Summer: 5 min. at idle r/min
Winter: 8 min. at idle r/min

6) 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
400 – 800 kPa (4.0 – 8.0 kgf/cm², 57 – 114 psi) at 3 000 r/min, Oil temp. at 60 °C (140 °F)

High oil pressure	Low oil pressure
• Engine oil viscosity is too high • Clogged oil passage • Combination of the above items	• Clogged oil filter • Oil leakage from the oil passage • Damaged O-ring • Defective oil pump • Combination of the above items

7) Stop the engine and remove the oil pressure gauge and attachment.

8) Reinstall the main oil gallery plug (1) and tighten it to the specified torque.

⚠ CAUTION

Use a new gasket to prevent oil leakage.

Tightening torque
Oil gallery plug (a): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



I940H1150004-02

9) Check the engine oil level. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.

Repair Instructions

Engine Oil and Filter Replacement

B940H21506001

Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.

Engine Oil Level Inspection

B940H21506002

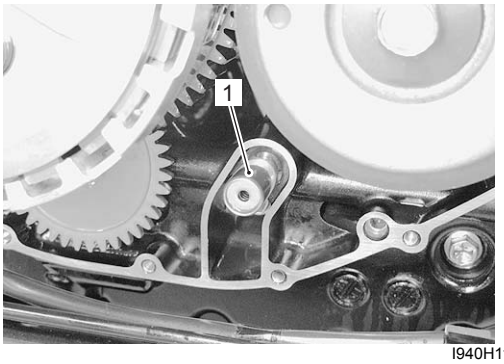
Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.

Oil Pressure Regulator Removal and Installation

B940H21506003

Removal

1) Drain engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.
2) Remove the clutch cover. Refer to “Clutch Removal in Section 5C (Page 5C-6)”.
3) Remove the oil pressure regulator (1).



I940H1150005-01

Installation

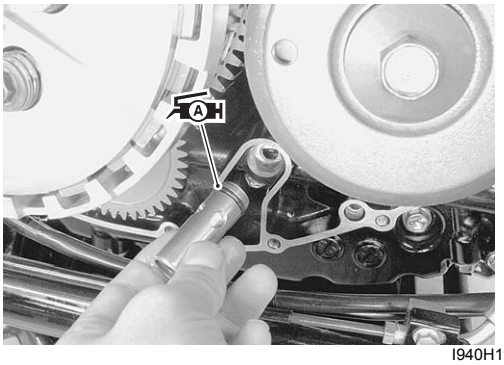
Installation is in the reverse order of removal.
Pay attention to the following points:

- Apply grease to the O-ring and install them.

⚠ CAUTION

Use new O-rings to prevent oil leakage.

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



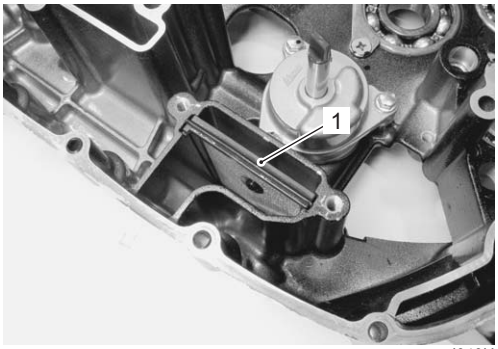
I940H1150006-01

Oil Sump Filter Removal and Installation

B940H21506004

Removal

1) Remove the engine assembly from the frame. Refer to “Engine Assembly Removal in Section 1D (Page 1D-20)”.
2) Disassemble the engine top side. Refer to “Engine Top Side Disassembly in Section 1D (Page 1D-27)”.
3) Separate the left and right crankcase. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-56)”.
4) Remove the oil sump filter (1).



I940H1150017-01

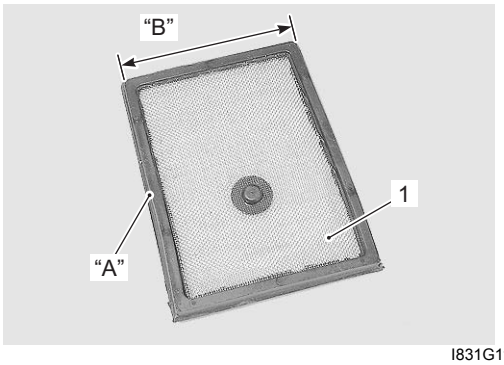
Installation

Install the oil sump filter in the reverse order of removal. Pay attention to the following points:

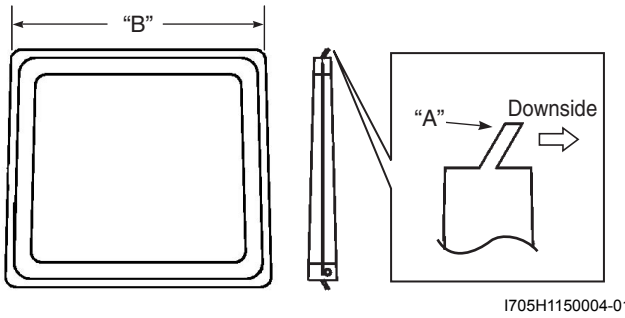
- Install the oil sump filter (1).

⚠ CAUTION

- **The lip “A” of the oil sump filter should be positioned downward.**
- **The shorter side “B” of the oil sump filter should be positioned inside.**



I831G1150006-02



I705H1150004-01

“A”: Lip	“B”: Shorter side

Oil Pressure Regulator / Oil Sump Filter Inspection

B940H21506005

Refer to “Oil Pressure Regulator Removal and Installation (Page 1E-3)” and “Oil Sump Filter Removal and Installation (Page 1E-4)”.

Oil pressure regulator

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



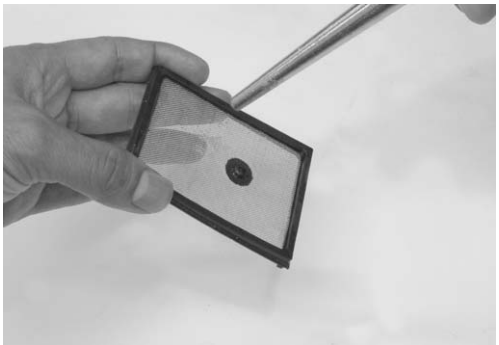
I822H1150014-01

Oil Sump Filter

If the oil sump filter is clogged with sediment or rust, clean the oil sump filter using compressed air.

NOTE

When the filter is dirtied excessively, replace the oil sump filter with a new one.



I940H1150018-01

Oil Pressure Switch Removal and Installation

B940H21506006

Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.

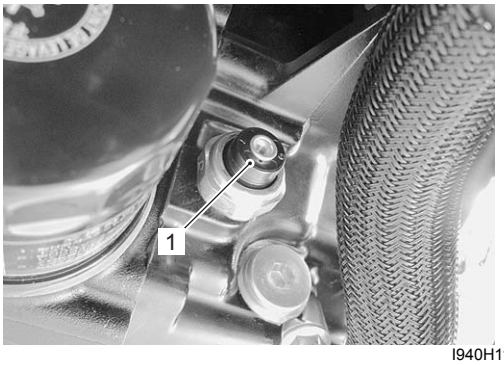
Removal

1) Turn the ignition switch OFF.
2) Drain engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.
3) Disconnect the oil pressure switch lead wire.



I940H1150007-01

4) Remove the oil pressure switch (1).



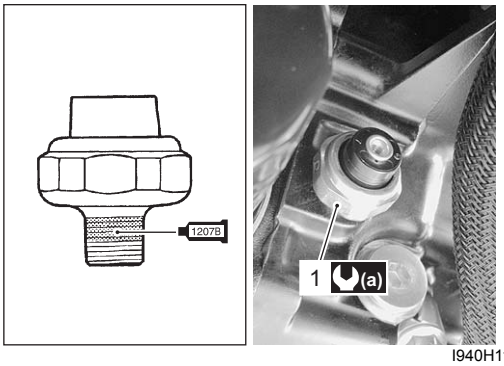
I940H1150008-01

Installation

1) Install the oil pressure switch (1), apply the bond to its thread part and tighten it to the specified torque.

1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

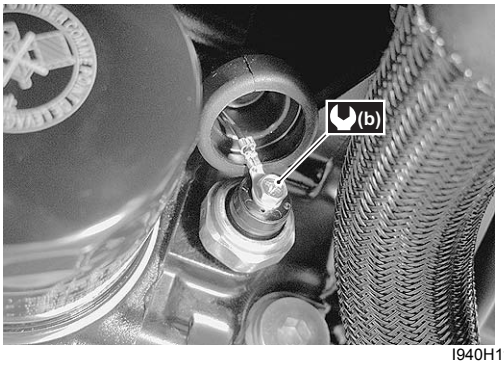
Tightening torque
Oil pressure switch (a): 14 N·m (1.4 kgf-m, 10.0 lbf-ft)



I940H1150009-01

2) Connect the oil pressure switch lead wire securely. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-5)”.

Tightening torque
Oil pressure switch lead wire bolt (b): 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)



I940H1150010-01

3) Pour engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.

Oil Pressure Switch Inspection

B940H21506007

Refer to “Oil Pressure Indicator Inspection in Section 9C (Page 9C-8)”.

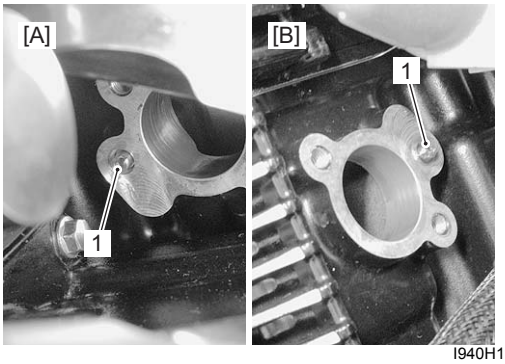
Oil Jet Removal and Installation

B940H21506008

Oil Jet (For Cam Chain Tension Adjuster)

Removal

1) Remove the each cam chain tension adjuster. Refer to “Engine Top Side Disassembly in Section 1D (Page 1D-27)”.
2) Remove the oil jets (1).



I940H1150011-01

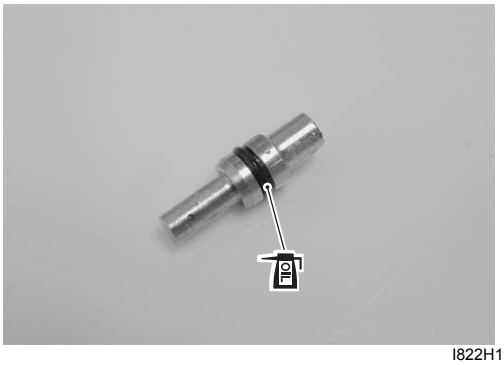
[A]: #1 cylinder	[B]: #2 cylinder

Installation
Installation is in the reverse order of removal. Pay attention to the following point:

- Apply engine oil to the O-ring.

⚠ CAUTION

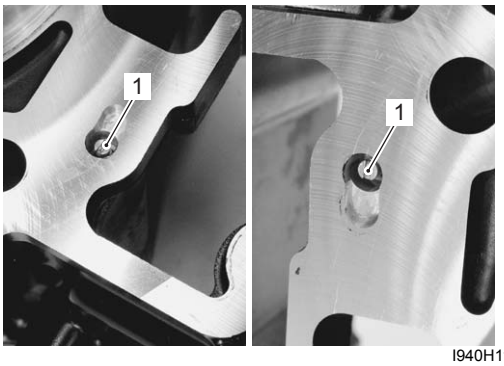
Use a new O-ring to prevent oil leakage.



I822H1150025-01

Oil Jet (For Cylinder Head)
Removal

1) Remove the engine assembly. Refer to “Engine Top Side Disassembly in Section 1D (Page 1D-27)”.
2) Remove the front and rear cylinders. Refer to “Engine Top Side Disassembly in Section 1D (Page 1D-27)”.
3) Remove the oil jets (1).

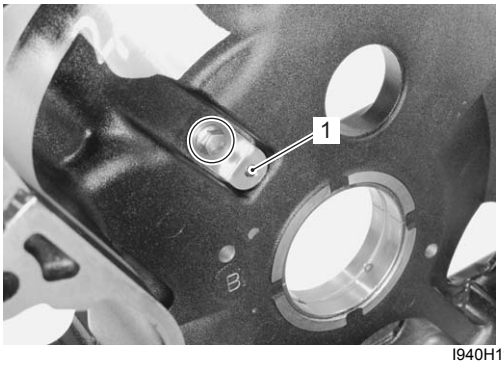


I940H1150019-01

Installation
Installation is in the reverse order of removal. Refer to “Engine Top Side Assembly in Section 1D (Page 1D-32)”.

Oil Jet (For Piston Cooling)
Removal

1) Remove the engine assembly. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-56)”.
2) Separate the crankcases, left and right. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-56)”.
3) Remove the crankshaft assembly. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-56)”.
4) Remove the piston cooling oil jets (1) from the each crankcase.



I940H1150020-01

Installation
Installation is in the reverse order of removal. Pay attention to the following points:

- Fit new O-ring (1) to each piston cooling oil jet as shown and apply engine oil to them.

⚠ CAUTION

Use new O-rings to prevent oil pressure leakage.



I940H1150022-01

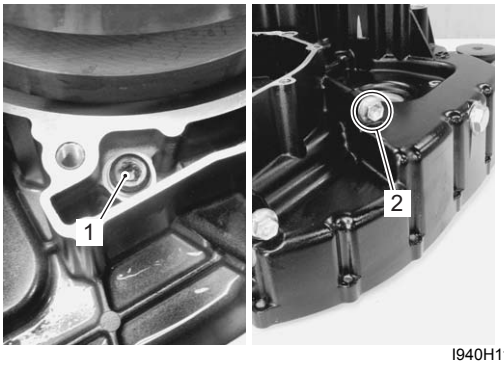
- Tighten the oil jet plate bolts securely.



I940H1150024-01

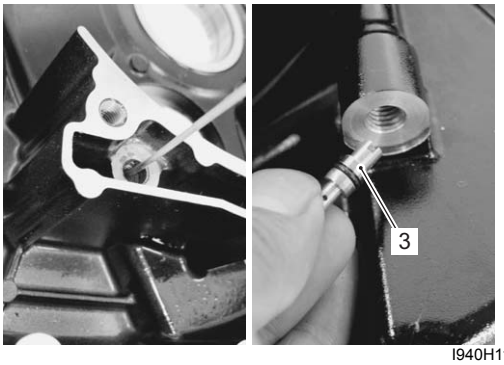
Oil Jet (For Transmission)
Removal

1) Remove the engine assembly. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-56)”.
2) Separate the crankcases, upper and lower. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-56)”.
3) Remove the oil gallery plugs (1) and (2).



I940H1150025-01

4) Remove the oil jet (3) with a suitable bar.



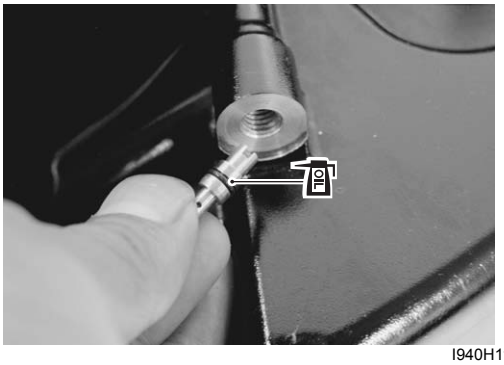
I940H1150026-02

Installation
Installation is in the reverse order of removal. Pay attention to the following points:

- Apply engine oil to the O-ring.

⚠ CAUTION

Use a new O-ring to prevent oil leakage.



I940H1150027-01

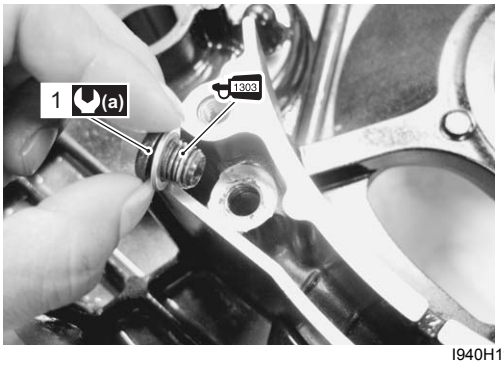
- Apply thread lock to the thread part and tighten the oil gallery plug (1) to the specified torque.

⚠ CAUTION

Use a new gasket to prevent oil leakage.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Oil gallery plug (M10) (a): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



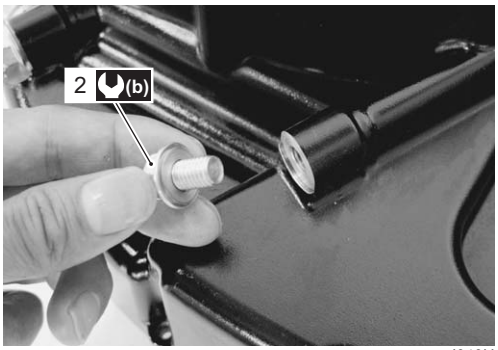
I940H1150028-01

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

⚠ CAUTION

Use a new gasket to prevent oil leakage.

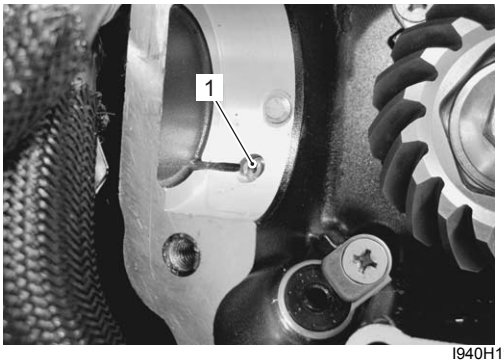
Tightening torque
Oil gallery plug (M8) (b): 18 N·m (1.8 kgf-m, 13.0 lbf-ft)



I940H1150029-01

Oil Jet (For Secondary Gear)
Removal

1) Remove the secondary driven gear assembly. Refer to “Secondary Driven Gear Assembly Removal and Installation in Section 3A (Page 3A-3)”.
2) Remove the oil jet (1).



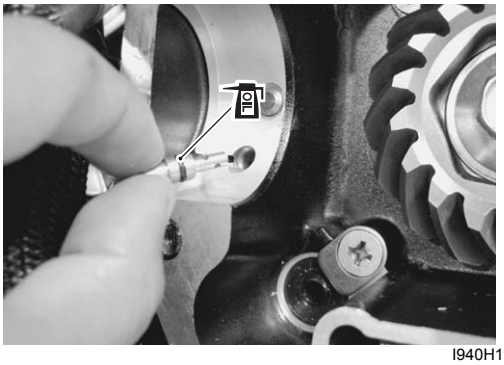
I940H1150030-01

Installation
Installation is in the reverse order of removal. Pay attention to the following points:

- Apply engine oil to the O-ring.

⚠ CAUTION

Use a new O-ring to prevent oil leakage.



I940H1150031-01

Oil Jet Inspection

B940H21506009

Refer to “Oil Jet Removal and Installation (Page 1E-5)”. 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.



I940H1150032-01



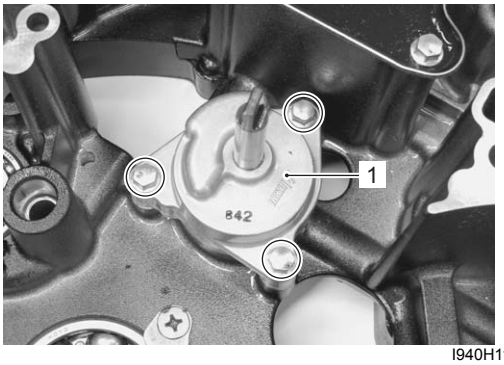
I940H1150033-02

Oil Pump Removal and Installation

B940H21506010

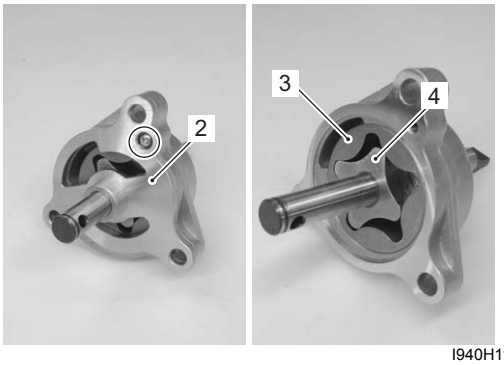
Removal

1) Separate the crankcase. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-56)”.
2) Remove the oil pump (1).



I940H1150034-01

3) Remove the cover (2), return pump outer rotor (3) and inner rotor (4).

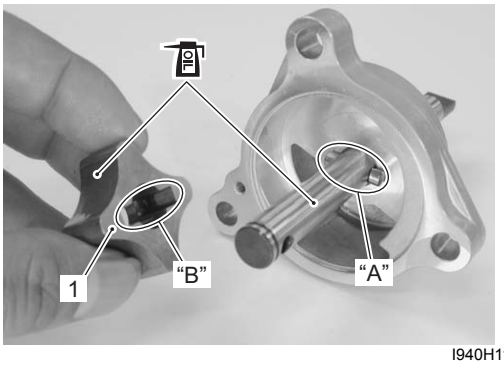


I940H1150035-01

Installation

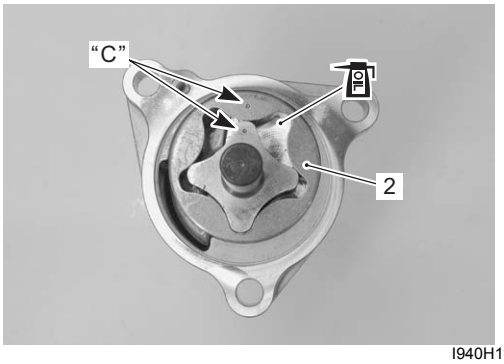
Installation is in the reverse order of removal. Pay attention to the following points:

- Apply engine oil to the sliding surface of the oil pump inner rotor (1) and shaft.
- When installing the inner rotor (1), align the pin “A” with the groove “B” of the inner rotor.



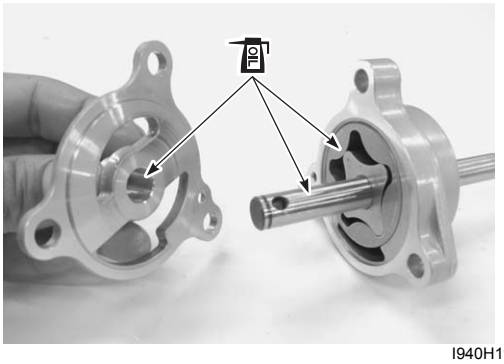
I940H1150036-01

- Apply engine oil to the oil pump sliding surface of the oil pump outer rotor (2).
- Check the punch marks “C” of the rotors faces outside.



I940H1150037-01

- Before mounting the oil pump, apply engine oil to the sliding surfaces of the outer rotor, inner rotor and shaft.



I940H1150038-01

- Tighten the screw (3) to the specified torque.

Tightening torque
Oil pump cover screw (a): 1.3 N·m (0.13 kgf-m, 1.0 lbf-ft)



I940H1150042-01

- Tighten the oil pump mounting bolts.



I940H1150039-01

- Assemble the engine. Refer to “Engine Bottom Side Assembly in Section 1D (Page 1D-64)” and “Engine Top Side Assembly in Section 1D (Page 1D-32)”.

Oil Pump Inspection

B940H21506011

Oil Pump

Inspect the oil pump in the following procedures:

1) Remove the oil pump. Refer to “Oil Pump Removal and Installation (Page 1E-9)”.
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.

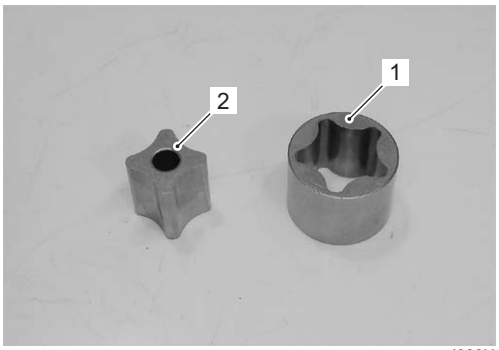


I940H1150040-01

3) Install the oil pump. Refer to “Oil Pump Removal and Installation (Page 1E-9)”.

Outer / Inner Rotor

Inspect the outer rotor (1) and inner rotor (2) for any scratches or other damage. If any damages are found, replace them with new ones.



I822H1150039-01

Specifications

Service Data

B940H21507001

Oil Pump

Item	Standard	Limit
Oil pressure (at 60 °C, 140 °F)	Above 400 kPa (4.0 kgf/cm^2, 57 psi) Below 800 kPa (8.0 kgf/cm^2, 114 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	3 000 ml (3.2/2.6 US/Imp qt)	
	Filter change	3 200 ml (3.4/2.8 US/Imp qt)	
	Overhaul	4 000 ml (4.2/3.5 US/Imp qt)	

Tightening Torque Specifications

B940H21507002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Oil gallery plug	18	1.8	13.0	☞(Page 1E-3)
Oil pressure switch	14	1.4	10.0	☞(Page 1E-5)
Oil pressure switch lead wire bolt	1.5	0.15	1.0	☞(Page 1E-5)
Oil gallery plug (M10)	18	1.8	13.0	☞(Page 1E-7)
Oil gallery plug (M8)	18	1.8	13.0	☞(Page 1E-8)
Oil pump cover screw	1.3	0.13	1.0	☞(Page 1E-9)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

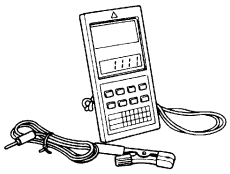
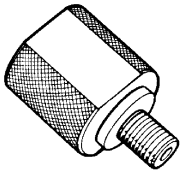
Recommended Service Material

B940H21508001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 1E-3)
Sealant	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 1E-5)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 1E-7)

Special Tool

B940H21508002

09900–26006 Engine tachometer (solar cell type) ☞(Page 1E-2)		09915–74521 Oil pressure gauge hose ☞(Page 1E-2)	
09915–74533 Oil pressure gauge attachment ☞(Page 1E-2)		09915–77331 Meter (for high pressure) ☞(Page 1E-2)	

Engine Cooling System

Precautions

Precautions for Engine Cooling System

B940H21600001

⚠ WARNING

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

Precautions for Engine Coolant

B940H21600002

Refer to “Engine Coolant Recommendation in Section 0A (Page 0A-4)”.

General Description

Engine Coolant Description

B940H21601001

⚠ CAUTION

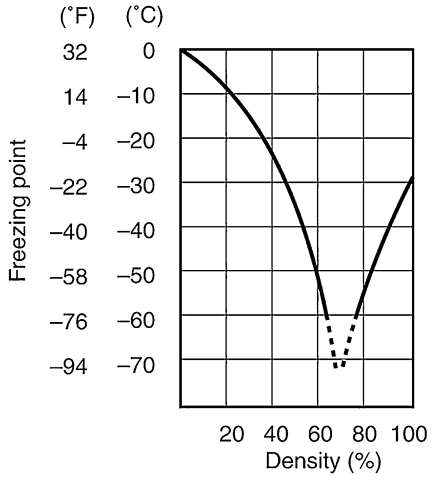
- **Use a high quality ethylene glycol base anti-freeze, mixed with distilled water. Do not mix an alcohol base anti-freeze and different brands of anti-freeze.**
- **Do not put in more than 60% anti-freeze or less than 50%. (Refer to Fig. 1 and 2.)**

At the time of manufacture, the cooling system is filled with a 50:50 mixture of distilled water and ethylene glycol anti-freeze. This 50:50 mixture will provide the optimum corrosion protection and excellent heat protection, and will protect the cooling system from freezing at temperatures above –31 °C (–24 °F).
If the vehicle is to be exposed to temperatures below –31 °C (–24 °F), this mixing ratio should be increased up to 55% or 60% according to the figure.

Anti-freeze Proportioning Chart

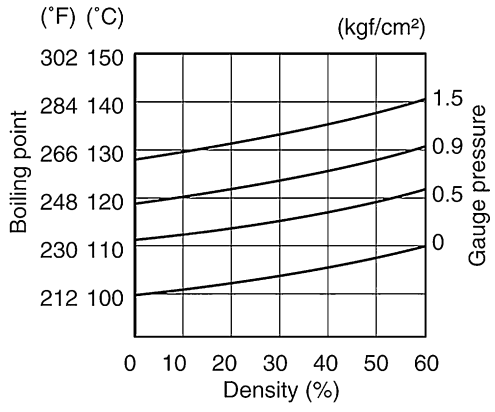
Anti-freeze density	Freezing point
50%	–31 °C (–24 °F)
55%	–40 °C (–40 °F)
60%	–55 °C (–67 °F)

Fig.1: Engine coolant density-freezing point curve



I310G1160001-01

Fig.2: Engine coolant density-boiling point curve

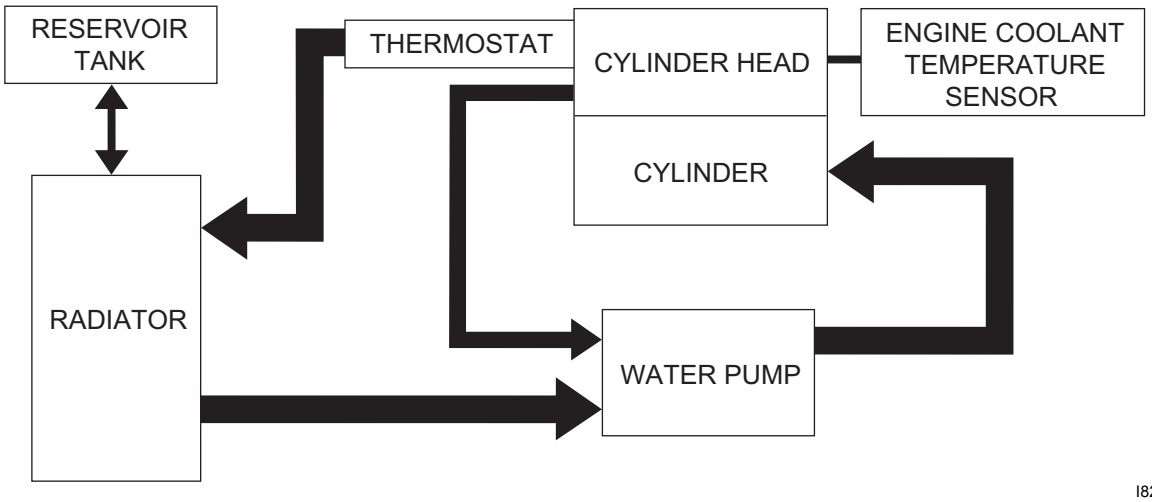


I310G1160002-01

Schematic and Routing Diagram

Cooling Circuit Diagram

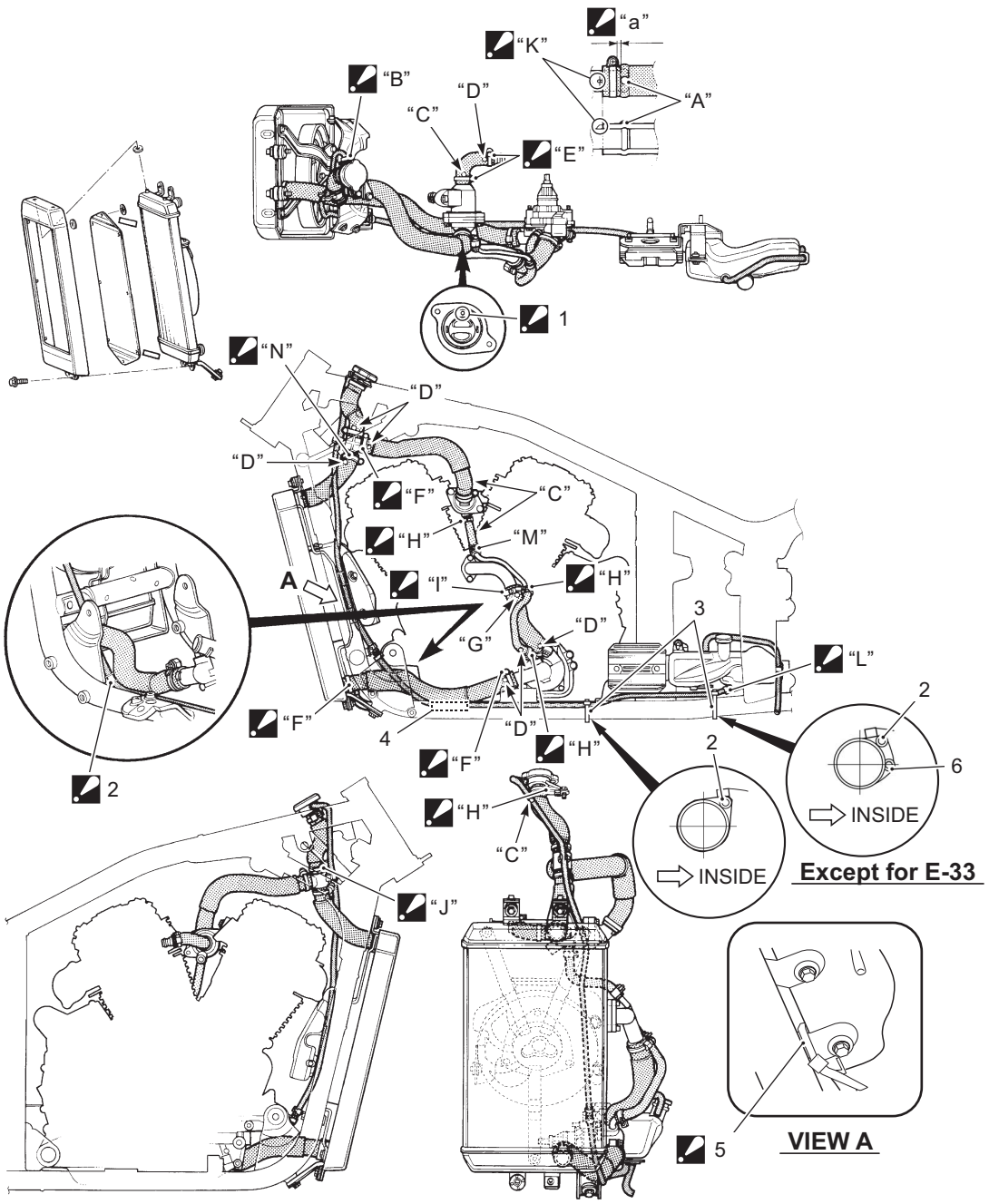
B940H21602001



I822H1160053-01

Water Hose Routing Diagram

B940H21602002



I940H1160048-12

1. Jiggle valve : Jiggle valve on the thermostat must be set upward.	"B": Clamp end should face downward	"I": Clamp screw head should face backward.
2. Reservoir tank inlet hose : Pass the reservoir tank inlet hose between the frame and radiator outlet hose.	"C": Red marking	"J": Clamp screw head should face forward left side.
3. Clamp	"D": White marking	"K": Insert the hose to the stopper.
4. Protection tape	"E": Clamp screw head should face upward.	"L": Clamp end should face upward.
5. Clamp : Clamp the reservoir tank inlet hose with the clamp.	"F": Clamp screw head should face left side.	"M": Clamp end should face backward.
6. Fuel tank breather hose (Except for E-33)	"G": Yellow marking	"N": Clamp screw head should face backward left side.
"A": Marking position	"H": Clamp end should face left side.	"a": Keep clearance.

Diagnostic Information and Procedures

Engine Cooling Symptom Diagnosis

B940H21604001

Condition	Possible cause	Correction / Reference Item
Engine overheats	Not enough engine coolant.	*Add engine coolant.*
	Radiator core clogged with dirt or scale.	*Clean.*
	Faulty cooling fan.	*Repair or replace.*
	Defective cooling fan relay, or open-or-short circuited.	*Repair or replace.*
	Clogged water passage.	*Clean.*
	Air trapped in the cooling circuit.	*Bleed air.*
	Defective water pump.	*Replace.*
	Use of incorrect engine coolant.	*Replace.*
	Defective thermostat.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective ECM.	*Replace.*
Engine over cools	Defective cooling fan relay, or open-or-short circuited.	*Repair or replace.*
	Extremely cold weather.	*Put on radiator cover.*
	Defective thermostat.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective ECM.	*Replace.*

Repair Instructions

Cooling Circuit Inspection

B940H21606001

⚠ WARNING

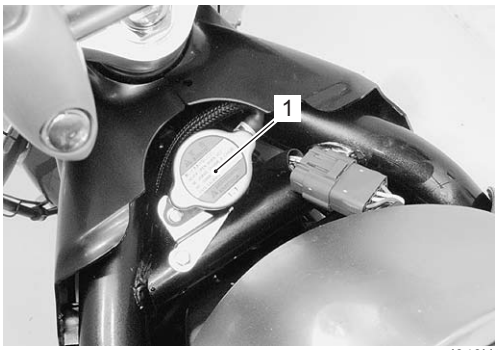
- **Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.**
- **When removing the radiator cap tester, put a rag on the filler to prevent the engine coolant from spraying out.**

Inspect the cooling circuit in the following procedures:

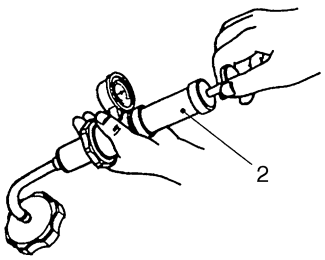
1) Move the fuel tank backward. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Remove the radiator cap (1) and connect the radiator tester (2) to the filler.
3) Pressurize the cooling system with 120 kPa (1.2 kgf/cm, 17 psi) of pressure, and then check if it holds the pressure for 10 seconds.

⚠ CAUTION

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



I940H1020027-03



I705H1160004-01

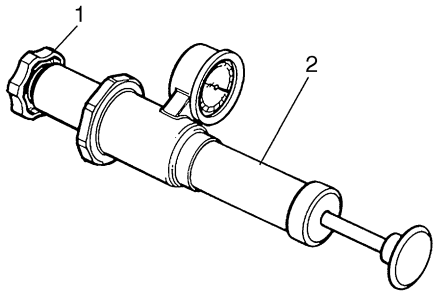
4) After finishing the cooling circuit inspection, reinstall the removed parts.

Radiator Cap Inspection

B940H21606002

Inspect the radiator cap in the following procedures:

1) Remove the radiator cap. Refer to “Cooling Circuit Inspection (Page 1F-4)”.
2) Attach the radiator cap (1) to the radiator tester (2) as shown in the figure.



I718H1160033-01

3) Slowly apply pressure to the radiator cap.
   If the radiator cap does not hold the pressure for at least 10 seconds, replace it with a new one.

   Radiator cap release pressure
   108 – 137 kPa (1.1 – 1.4 kgf/cm^2, 15.6 – 19.5 psi)

4) After finishing the radiator cap inspection, reinstall the removed parts.

Radiator Inspection and Cleaning

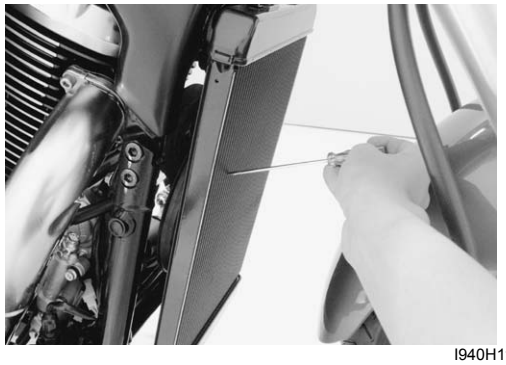
B940H21606003

Radiator Hose

Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.

Radiator

Inspect the radiator for water leaks. If any defects are found, replace the radiator with a new one.
If the fins are bent or dented, repair them by carefully straightening them with the blade of a small screwdriver.



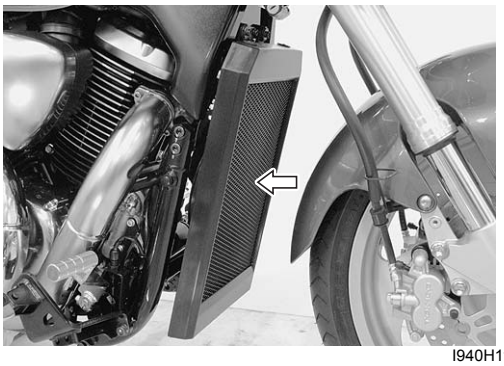
I940H1160002-01

Radiator Cleaning

Blow out any foreign matter that is stuck in the radiator 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 engine. If compressed air is applied from the front side, dirt will be forced into the pores of radiator.**



I940H1160003-01

Radiator / Cooling Fan Motor Removal and Installation

B940H21606004

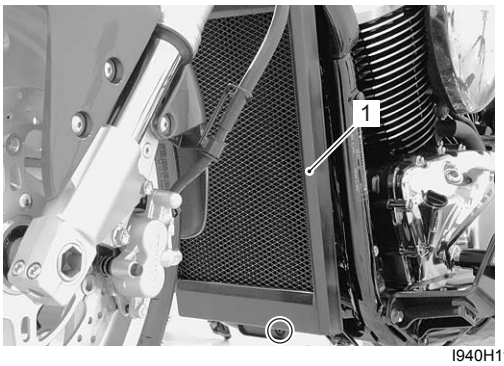
Removal

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Drain engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.
3) Disconnect the cooling fan motor coupler.



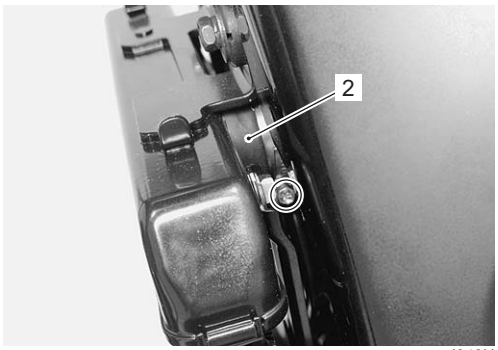
I940H1160004-01

4) Remove the radiator cover (1).



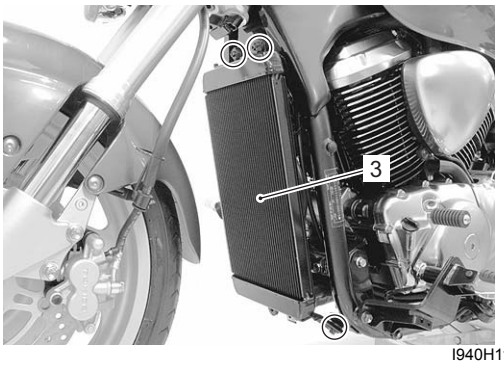
I940H1160005-01

5) Disconnect the radiator inlet hose (2).



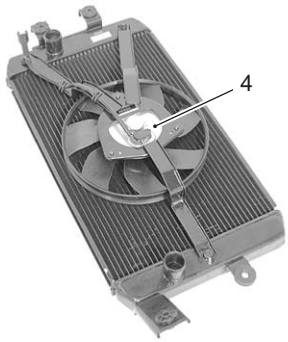
I940H1160006-03

6) Remove the radiator assembly (3) by removing the bolts.



I940H1160007-01

7) Remove the cooling fan motor (4) from the radiator.



I940H1160008-02

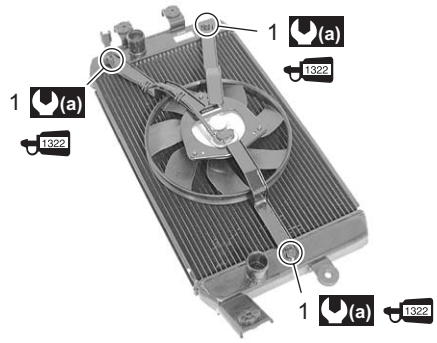
Installation

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

- Apply thread lock to the cooling fan mounting bolts (1) and tighten them to the specified torque.

  1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

  Tightening torque
  Cooling fan mounting bolt (a): 6.5 N·m (0.65 kgf-m, 4.5 lbf-ft)



I940H1160049-02

- Connect the radiator hoses securely and tighten the each clamp screws to the specified torque. Refer to “Water Hose Routing Diagram (Page 1F-3)”.

  Tightening torque
  Water hose clamp screw : 1.5 N·m (0.15 kgf-m, 1.0 lbf-ft)

- Pour engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.
- Bleed air from the cooling circuit. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.

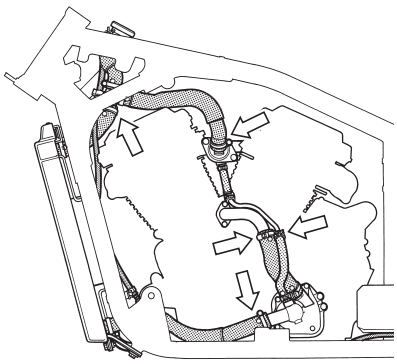
Water Hose Inspection

B940H21606005

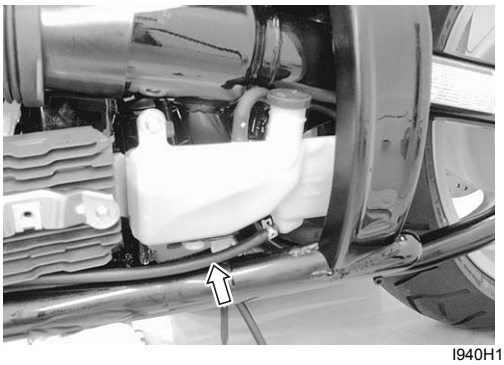
Inspect the water hoses in the following procedures:

1) Move the fuel tank backward. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Remove the left frame lower cover and secondary gear case cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Check the water hoses for crack, damage or engine coolant leakage. If any defect is found, replace the radiator hose with a new one.

4) Any leakage from the connecting section should be corrected by proper tightening. Refer to “Water Hose Routing Diagram (Page 1F-3)”.



I940H1160009-01



I940H1160010-01

5) After finishing the water hose inspection, reinstall the removed parts.

Water Hose Removal and Installation

B940H21606006

Removal

1) Drain engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.
2) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
3) Remove the left frame head cover.
4) Remove the secondary gear case cover and left frame lower cover.
5) Remove the left air clearner box.
6) Remove the water hose as shown in the water hose routing diagram. Refer to “Water Hose Routing Diagram (Page 1F-3)”.

Installation

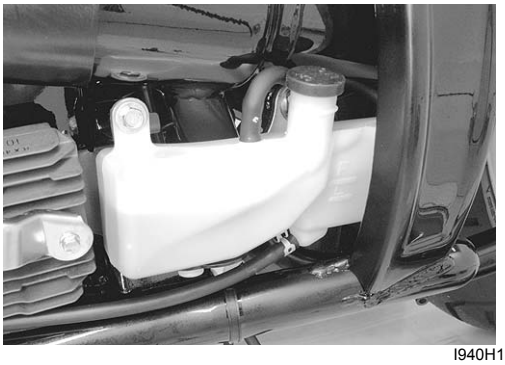
1) Install the water hose as shown in the water hose routing diagram. Refer to “Water Hose Routing Diagram (Page 1F-3)”.
2) Pour engine coolant and bleed air from the cooling circuit. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.
3) Reinstall the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.

Radiator Reservoir Tank Inspection

B940H21606007

Inspect the radiator reservoir tank in the following procedures:

1) Remove the left frame lower cover and secondary gear case cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Inspect the radiator reservoir tank cooling leaks. If any defects are found, replace the radiator reservoir tank with a new one.



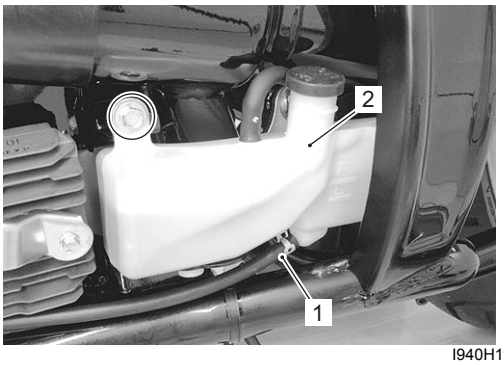
I940H1160011-01

Radiator Reservoir Tank Removal and Installation

B940H21606008

Removal

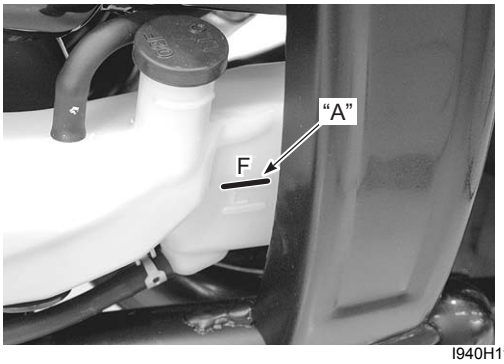
1) Remove the left frame lower cover and secondary gear case cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the reservoir tank bolts.
3) Disconnect the hose (1) and drain the engine coolant.
4) Remove the reservoir tank (2).



I940H1160012-01

Installation
Install radiator reservoir tank in the reverse order of removal. Pay attention to the following point:

- Fill the reservoir tank to the upper level “A”. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.



I940H1160013-02

Cooling Fan Inspection

B940H21606009

Cooling fan operating temperature
Standard
(ON → OFF): Approx. 100 °C (212 °F)
(OFF → ON): Approx. 105 °C (221 °F)

Inspect the cooling fan in the following procedures:

1) Disconnect the cooling fan motor coupler (1).

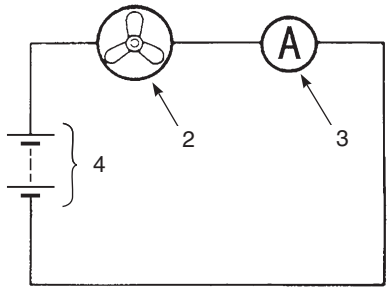


I940H1160014-01

2) Test the cooling fan motor for load current with an ammeter connected as shown in the figure.
If the fan motor does not turn, replace the cooling fan assembly with a new one. Refer to “Radiator / Cooling Fan Motor Removal and Installation (Page 1F-5)”.

NOTE

- **When making this test, it is not necessary to remove the cooling fan.**
- **Make sure that the battery has a capacity enough to supply the motor with 12 V.**
- **With the motor running at full speed, the ammeter should indicate an amperage not higher than 6.0 A.**



I718H1160048-01

2. Fan motor	3. Ammeter	4. Battery

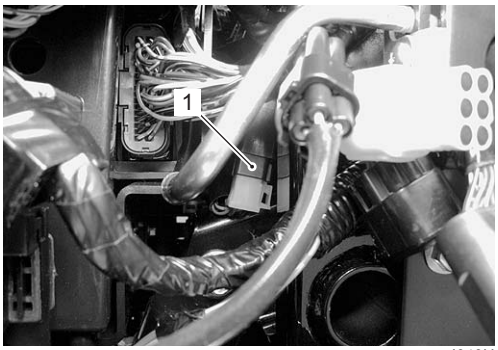
3) Connect the cooling fan motor coupler.

Cooling Fan Relay Inspection

B940H21606010

Inspect the fan relay in the following procedures:

1) Remove the seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the battery holder. Refer to “Battery / Battery Holder Removal and Installation in Section 1J (Page 1J-11)”.
3) Remove the cooling fan relay (1).

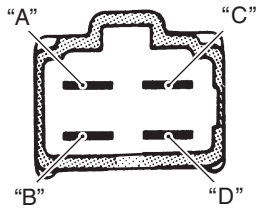


I940H1160015-01

4) First check the insulation between “A” and “B” terminals with tester. Then apply 12 V to “C” and “D” terminals, (+) to “C” and (–) to “D”, and check the continuity between “A” and “B”.
If there is no continuity, replace it with a new one.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication set
Continuity test (•))))



I718H1160006-03

5) Reinstall the removed parts.

ECT Sensor Removal and Installation

B940H21606011

Refer to “ECT Sensor Removal and Installation in Section 1C (Page 1C-4)”.

ECT Sensor Inspection

B940H21606012

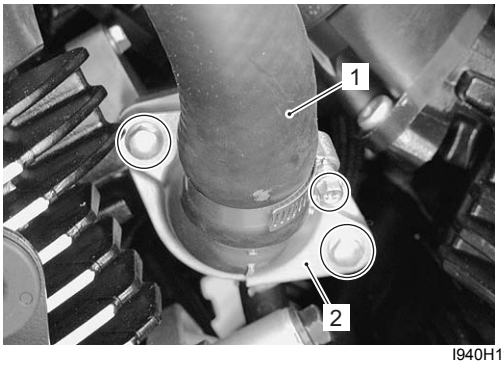
Refer to “ECT Sensor Inspection in Section 1C (Page 1C-5)”.

Thermostat Removal and Installation

B940H21606013

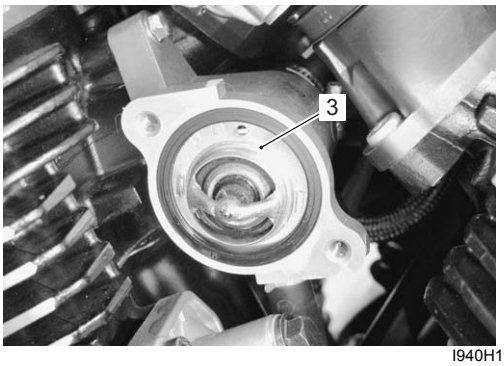
Removal

1) Drain a small amount of engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.
2) Remove the left air cleaner cover. Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-6)”.
3) Disconnect the radiator inlet hose (1).
4) Remove the connector cap (2).



I940H1160016-01

5) Remove the thermostat (3).



I940H1160017-01

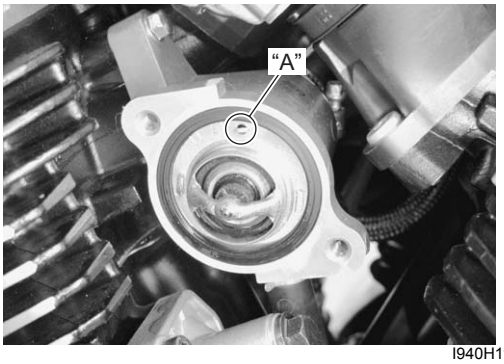
Installation

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

- Install the thermostat.

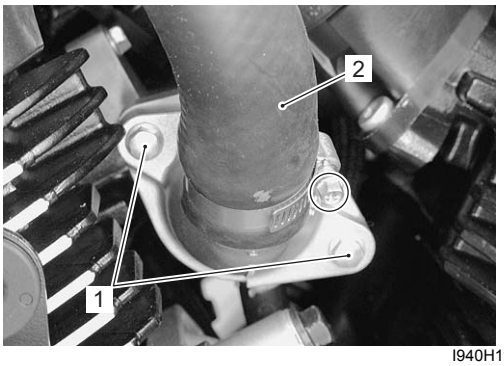
NOTE

The jiggle valve “A” of the thermostat faces upside.



I940H1160018-01

- Tighten the thermostat connector bolts (1).
- Connect the water hose (2) securely.



I940H1160019-01

- Pour engine coolant and bleed air from the cooling circuit. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.

Thermostat Inspection

B940H21606014

Inspect the thermostat in the following procedures:

1) Remove the thermostat. Refer to “Thermostat Removal and Installation (Page 1F-9)”.
2) Inspect the thermostat pellet for signs of cracking.



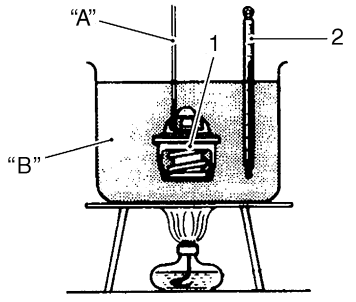
I940H1160020-01

3) Test the thermostat at the bench for control action.

⚠ CAUTION

- **Do not contact the thermostat (1) and the column thermometer (2) with a pan.**
- **As the thermostat operating response to water temperature change is gradual, do not raise water temperature too quickly.**
- **The thermostat with its valve open even slightly under normal temperature must be replaced.**

4) Immerse the thermostat (1) in the water contained in a beaker and note that the immersed thermostat is in suspension.
5) Heat the water by placing the beaker on a stove and observe the rising temperature on a thermometer (2).



I705H1160030-03

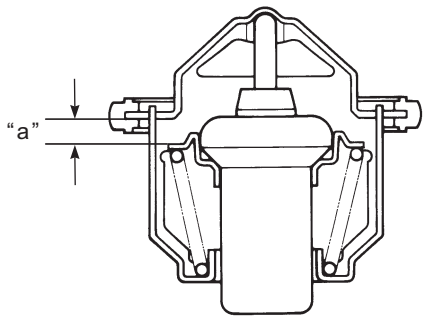
“A”: String	“B”: Water

6) Read the thermometer just when opening the thermostat. If this reading, which is the temperature level at which the thermostat valve begins to open, is out of the standard value, replace the thermostat with a new one.

Thermostat valve opening temperature
Standard: Approx. 88 °C (190 °F)

7) Keep on heating the water to raise its temperature.
8) Just when the water temperature reaches specified value, the thermostat valve should have been lifted by at least 8 mm (0.31 in). A thermostat failing to satisfy either of the two requirements (start-to-open temperature and valve lift) must be replaced.

Thermostat valve lift “a”
Standard: 8 mm and over at 100 °C (0.31 in and over at 212 °F)

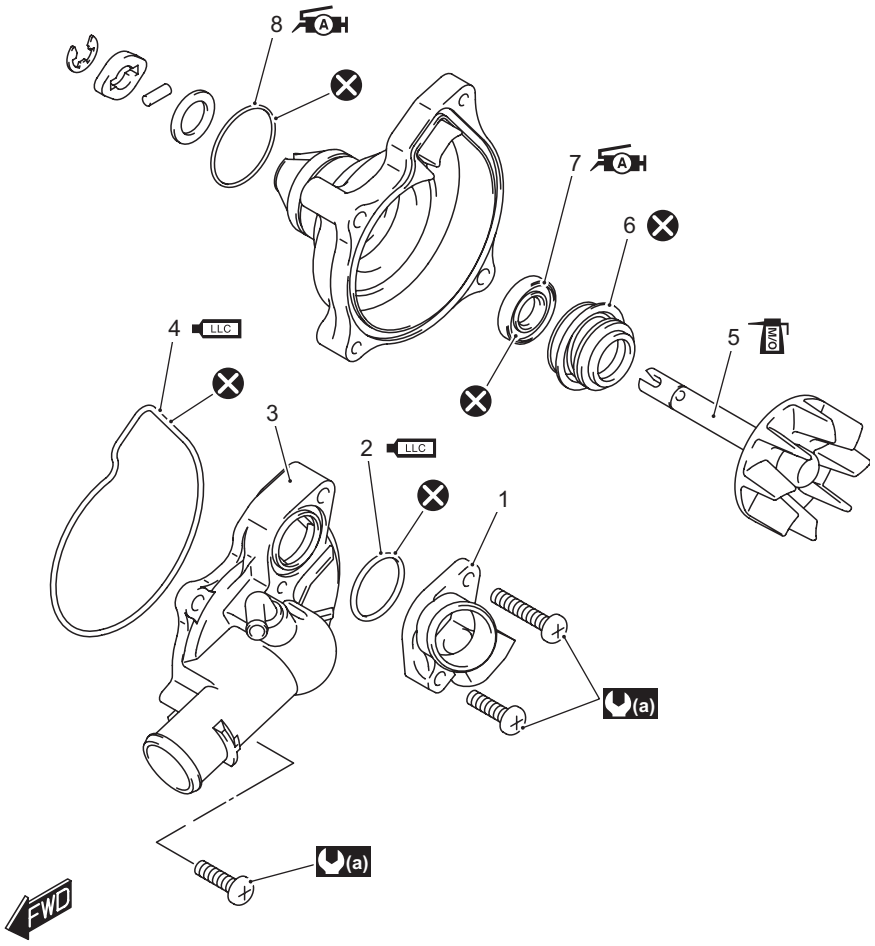


I940H1160021-01

9) Install the thermostat. Refer to “Thermostat Removal and Installation (Page 1F-9)”.

Water pump Components

B940H21606015



I940H1160050-02

1. Connector	6. Mechanical seal	LLC : Apply engine coolant.
2. O-ring	7. Oil seal	MO : Apply molybdenum oil solution.
3. Water pump case	8. O-ring	: Do not reuse.
4. O-ring	(a) : 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)	
5. Impeller assembly	: Apply grease.	

Water Pump Removal and Installation

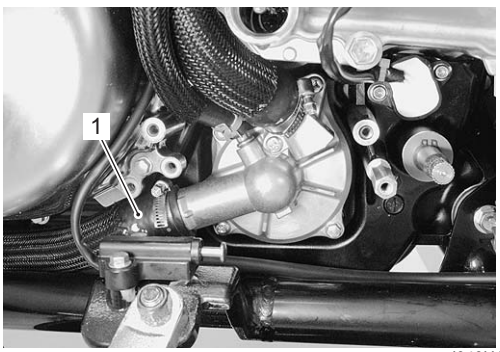
B940H21606016

Removal

NOTE

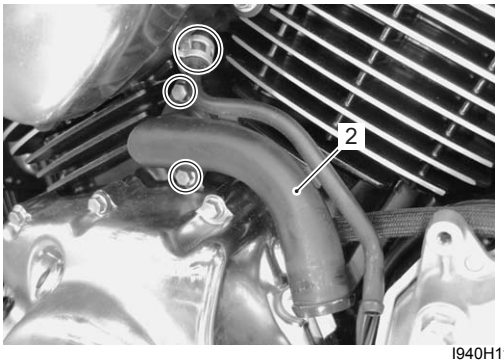
Before draining engine oil and engine coolant, inspect engine oil and coolant leakage between the water pump and crankcase. If engine oil is leaking, visually inspect the oil seal and O-ring. If engine coolant is leaking, visually inspect the mechanical seal and seal washer. Refer to "Water Pump Related Parts Inspection (Page 1F-15)".

1) Drain engine oil and coolant. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-8)" and "Cooling System Inspection in Section 0B (Page 0B-11)".
2) Remove the left frame lower cover and secondary gear case cover. Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-5)".
3) Remove the clutch release assembly. Refer to "Clutch Release Assembly / Push Rod Removal and Installation in Section 5C (Page 5C-2)".
4) Disconnect the water pump inlet hose (1).



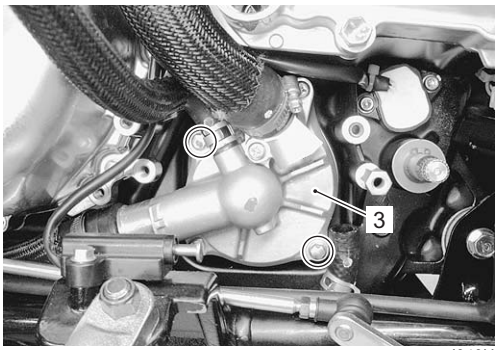
I940H1160022-01

5) Remove the air cleaner box. Refer to “Air Cleaner Chamber Removal and Installation in Section 1D (Page 1D-7)”.
6) Remove the water pump outlet pipe (2).



I940H1160023-01

7) Remove the water pump (3).



I940H1160024-01

Installation
Install the water pump in the reverse order of removal. Pay attention to the following points:

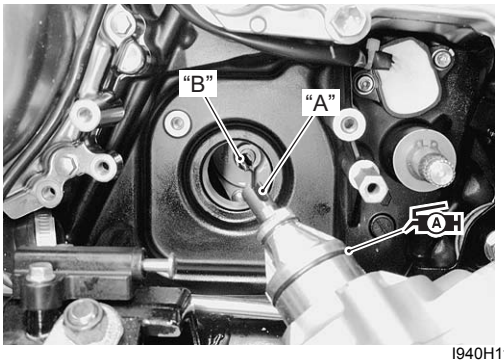
- Apply grease to the O-ring.

⚠ CAUTION

Replace the O-ring with the a new one.

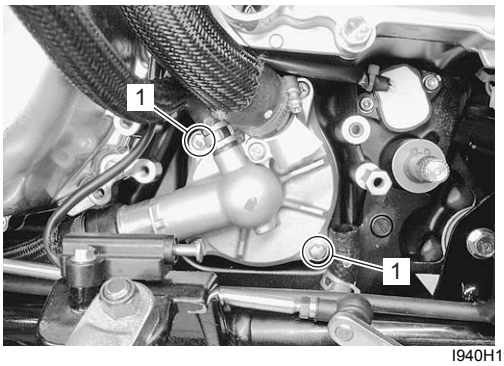
: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

- Install the water pump assembly with the slot on the pump shaft end “A” securely engaged with the flat “B” on the oil pump shaft.



I940H1160025-01

- Tighten the water pump mounting bolts (1).

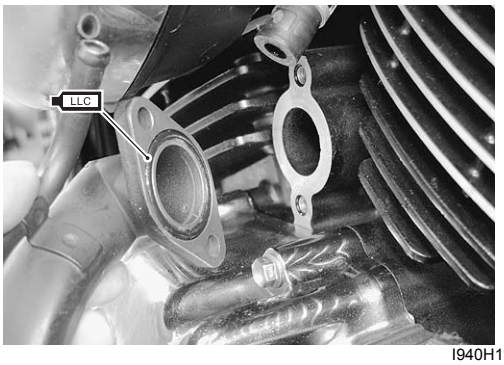


I940H1160026-01

- Apply engine coolant to the O-ring.

⚠ CAUTION

Use a new O-ring to prevent engine coolant leakage.



I940H1160027-01

- Connect the water hoses securely. Refer to “Water Hose Routing Diagram (Page 1F-3)”.
- Pour engine oil and coolant. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)” and “Cooling System Inspection in Section 0B (Page 0B-11)”.
- Bleed air from the cooling circuit. Refer to “Cooling System Inspection in Section 0B (Page 0B-11)”.

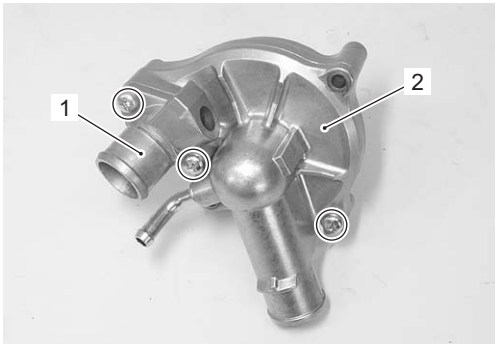
Water Pump Disassembly and Assembly

B940H21606017

Refer to “Water Pump Removal and Installation (Page 1F-11)”.

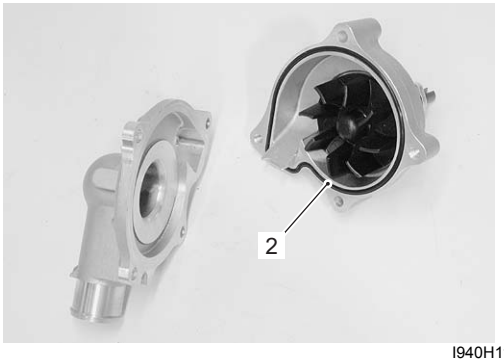
Disassembly

1) Disconnect the water hoses.
2) Remove the connector (1) and water pump case (2).



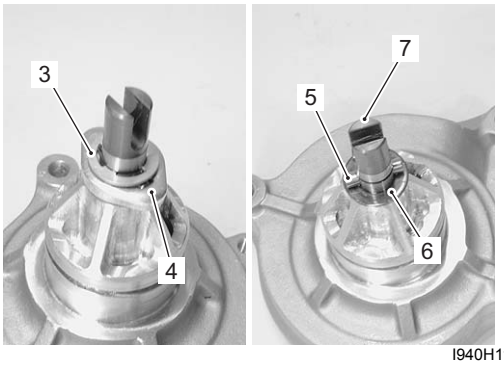
I940H1160028-01

3) Remove the O-ring (2).



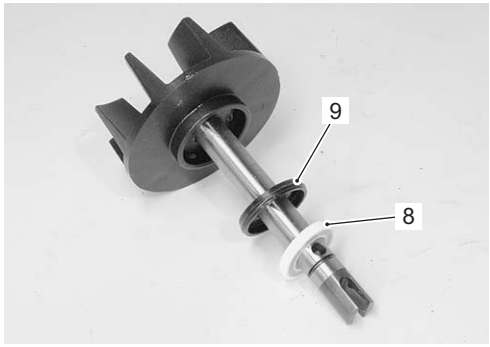
I940H1160030-01

4) Remove the E-ring (3), cap (4), pin (5) and washer (6).
5) Remove the impeller assembly (7).



I940H1160031-02

6) Remove the mechanical seal ring (8) and rubber seal (9) from the impeller assembly.



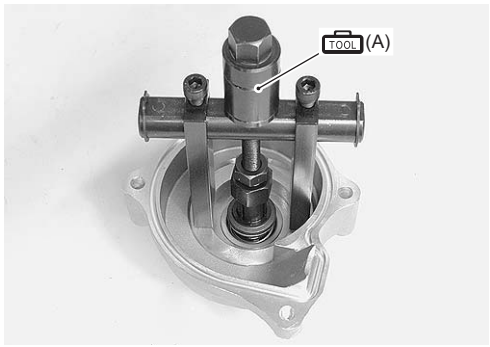
I940H1160032-01

7) Remove the mechanical seal with the special tool.

NOTE

If there is no abnormal condition, the mechanical seal removal is not necessary.

Special tool
TOOL (A): 09921–20240 (Bearing remover set)



I940H1160033-01

8) Remove the oil seal.

NOTE

If there is no abnormal condition, the oil seal removal is not necessary.



I940H1160034-01

Assembly

1) Install the oil seal with the special tool.

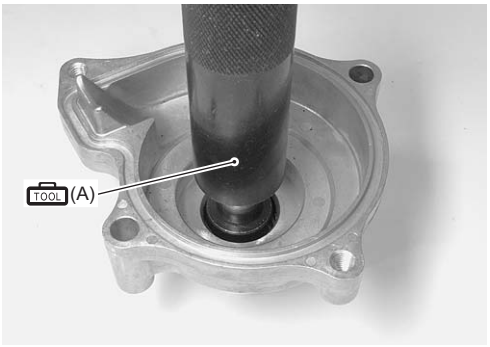
⚠ CAUTION

Replace the oil seal with a new one.

NOTE

The stamped mark on the oil seal should face mechanical seal side.

Special tool
(A): 09913–70210 (Bearing installer set)



I940H1160035-01

2) Apply a small quantity of grease to the oil seal lip.

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



I940H1160036-01

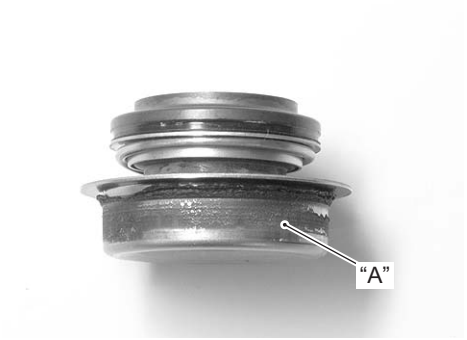
3) Install a new mechanical seal using a suitable size socket wrench.

⚠ CAUTION

Replace the mechanical seal with a new one.

NOTE

On the new mechanical seal, the sealer “A” has been applied.



I940H1160037-01



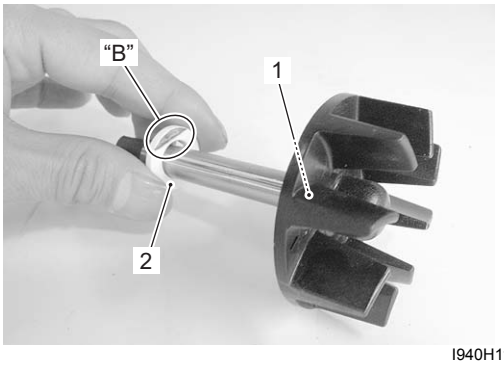
I940H1160038-01

4) Install the rubber seal (1) into the impeller.

5) After wiping off the oily or greasy matter from the mechanical seal ring (2), install it into the impeller.

NOTE

The paint marked side “B” of mechanical seal ring faces the rubber seal.



I940H1160039-02

6) Apply molybdenum solution to the impeller shaft (3).

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

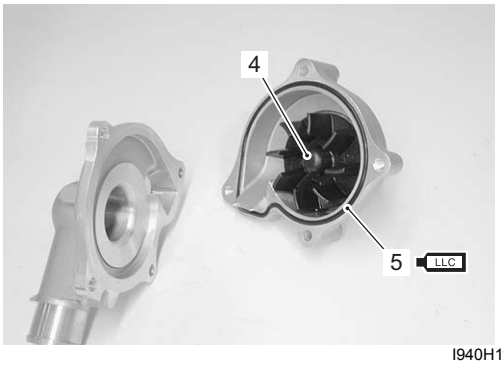


I940H1160040-01

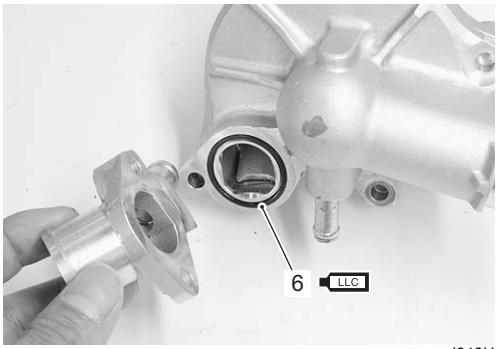
7) Install the impeller (4).
8) Install a new O-ring (5) and (6) apply engine coolant to it.

⚠ CAUTION

Use a new O-rings to prevent engine coolant leakage.



I940H1160041-02



I940H1160042-02

9) Fit the water pump case and tighten the water pump case screws to the specified torque.

Tightening torque
Water pump case screw (a): 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)



I940H1160043-02

Water Pump Related Parts Inspection

B940H21606018

Refer to “Water Pump Disassembly and Assembly (Page 1F-13)”.

Mechanical Seal

Visually inspect the mechanical seal for damage, with particular attention given to the sealing face.
Replace the mechanical seal that shows indications of leakage.



I940H1160044-01

Oil Seal

Visually inspect the oil seal for damage, with particular attention given to the lip.
Replace the oil seal that shows indications of leakage.



I940H1160045-01

Impeller / Shaft
Visually inspect the impeller and its shaft for damage. Replace the impeller or shaft if necessary.



I940H1160046-01

Impeller Shaft Journal
Visually inspect the journal for damage or scratch. Replace the water pump body if necessary.



I940H1160047-01

Specifications

Service Data

B940H21607001

Thermostat + Radiator + Fan + Coolant

Item	Standard		Note
Thermostat valve opening temperature	Approx. 88 °C (190 °F)		—
Thermostat valve lift	Over 8 mm (0.31 in) at 100 °C (212 °F)		—
ECT sensor resistance	20 °C (68 °F)	Approx. 2.45 kΩ	—
	50 °C (122 °F)	Approx. 0.811 kΩ	—
	80 °C (176 °F)	Approx. 0.318 kΩ	—
	110 °C (230 °F)	Approx. 0.142 kΩ	—
Radiator cap valve opening pressure	108 – 137 kPa (1.1 – 1.4 kgf/cm^2, 15.6 – 19.5 psi)		—
Cooling fan operating temperature	OFF → ON	Approx. 105 °C (221 °F)	—
	ON → OFF	Approx. 100 °C (212 °F)	—
Engine coolant type	Use an antifreeze/coolant compatible with aluminum radiator, mixed with distilled water only, at the ratio of 50:50.		—
Engine coolant	Reservoir tank side	Approx. 250 ml (0.3/0.2 US/Imp qt)	—
	Engine side	Approx. 2 400 ml (2.5/2.1 US/Imp qt)	—

Tightening Torque Specifications

B940H21607002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Cooling fan mounting bolt	6.5	0.65	4.5	☞(Page 1F-6)
Water hose clamp screw	1.5	0.15	1.0	☞(Page 1F-6)
Water pump case screw	5.5	0.55	4.0	☞(Page 1F-15)

NOTE

The specified tightening torque is described in the following.
"Water pump Components (Page 1F-11)"

Reference:
For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-8)".

Special Tools and Equipment

Recommended Service Material

B940H21608001

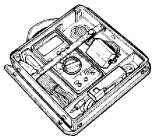
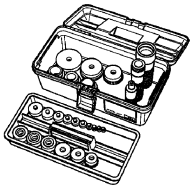
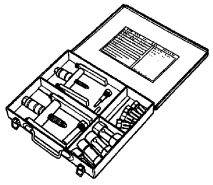
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 1F-12) / ☞(Page 1F-14)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 1F-15)
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞(Page 1F-6)

NOTE

Required service material is also described in the following.
"Water pump Components (Page 1F-11)"

Special Tool

B940H21608002

09900–25008 Multi-circuit tester set ☞(Page 1F-9) 	09913–70210 Bearing installer set ☞(Page 1F-14) 
09921–20240 Bearing remover set ☞(Page 1F-13) 	

Fuel System

Precautions

Precautions for Fuel System

B940H21700001

⚠ WARNING

- **Keep away from fire or spark.**
- **During disassembling, use care to minimize spillage of gasoline.**
- **Spilled gasoline should be wiped off immediately.**
- **Work in a well-ventilated area.**

⚠ CAUTION

- **To prevent the fuel system (fuel tank, fuel hose, etc.) from contamination with foreign particles, blind all openings.**
- **After removing the throttle body, tape the cylinder intake section to prevent foreign particles from entering.**

General Description

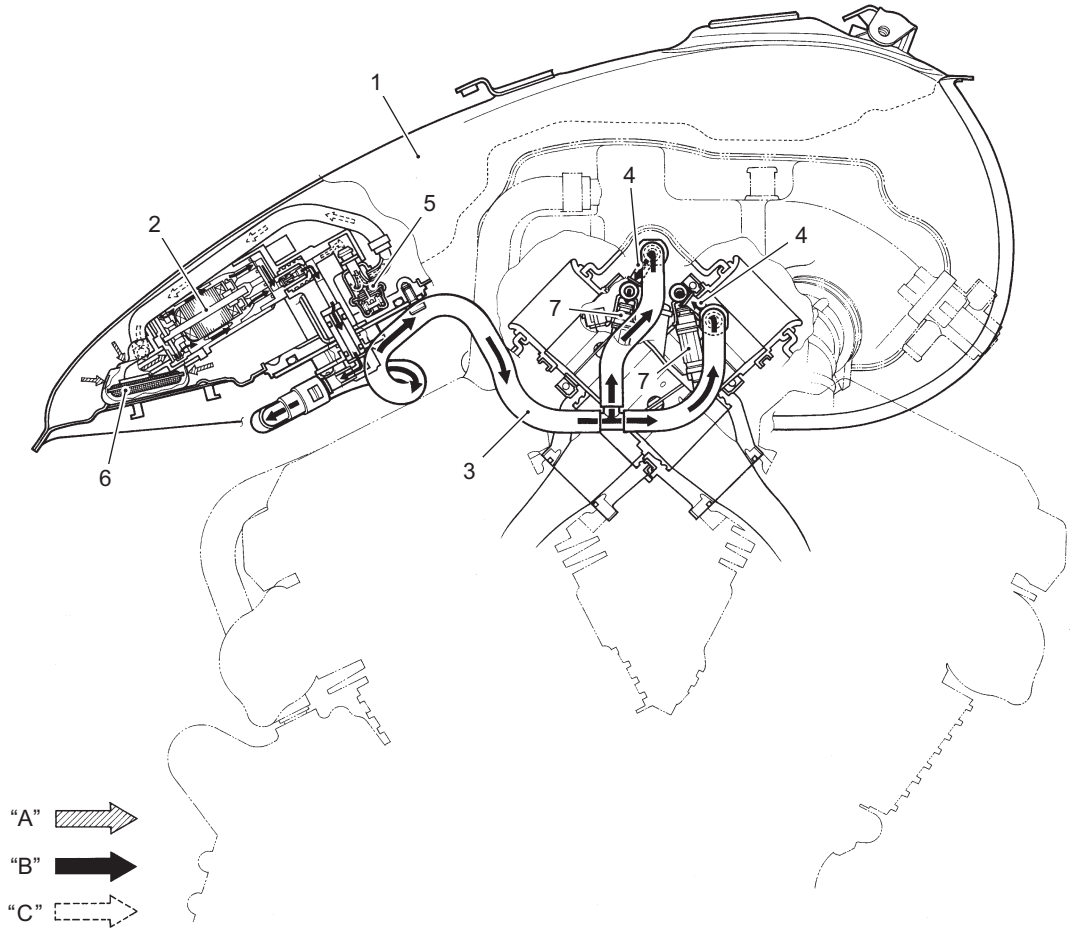
Fuel System Description

B940H21701001

Fuel System

The fuel delivery system consists of the fuel tank (1), fuel pump (2), fuel feed hose (3), fuel delivery pipe (4) (including fuel injectors), fuel pressure regulator (5) and fuel filter (6). There is no fuel return hose. The fuel in the fuel tank (1) is pumped up by the fuel pump (2) and pressurized fuel flows into the injector (7) installed in the fuel delivery pipe (4). Fuel pressure is regulated by the fuel pressure regulator (5). As the fuel pressure applied to the fuel injector (7) (the fuel pressure in the fuel delivery pipe) is always kept at absolute fuel pressure of 300 kPa (3.0 kgf/cm^2, 43 psi), the fuel is injected into the throttle body in conic dispersion when the injector (7) opens according to the injection signal from the ECM.

The fuel relieved by the fuel pressure regulator (5) flows back to the fuel tank (1).



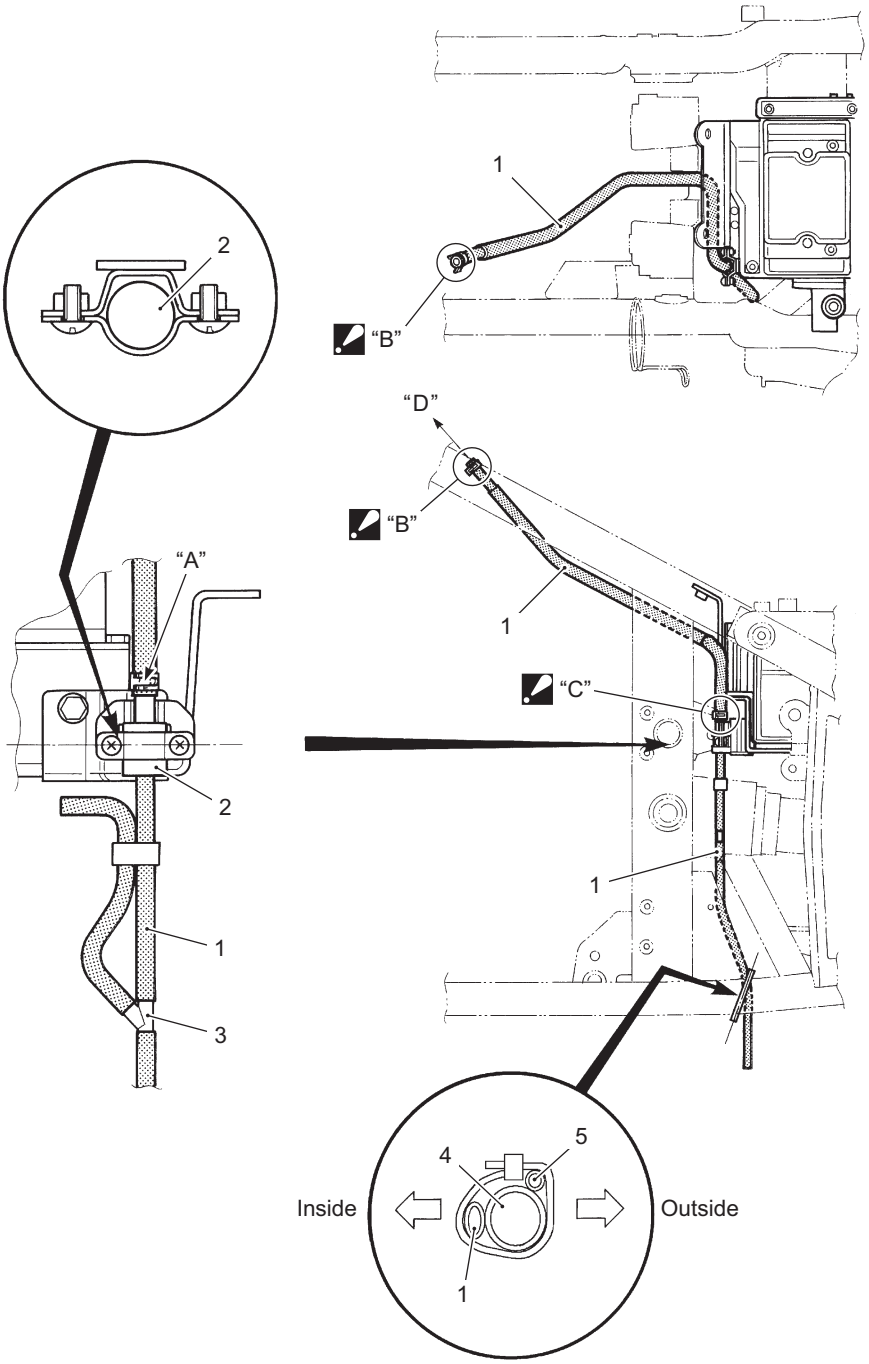
I940H1170034-02

1. Fuel tank	4. Fuel delivery pipe	7. Fuel injector	"C": Relieved fuel
2. Fuel pump	5. Fuel pressure regulator	"A": Before-pressurized fuel	
3. Fuel feed hose	6. Fuel filter	"B": Pressurized fuel	

Schematic and Routing Diagram

Fuel Tank Breather Hose Routing Diagram

B940H21702001



I940H1170036-01

1. Fuel tank breather hose	"A": White mark
2. Fuel tank breather valve	"B": Face the tip of the clip lower.
3. 3 way joint	"C": Face the tip of the clip forward.
4. Frame	"D": To the fuel tank
5. Coolant reservoir tank inlet hose	

Diagnostic Information and Procedures

Fuel System Diagnosis

B940H21704001

Condition	Possible cause	Correction / Reference Item
Engine will not start or is hard to start (No fuel reaching the intake manifold)	Clogged fuel filter or fuel hose.	*Clean or replace.*
	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective fuel injectors.	*Replace.*
	Defective fuel pump relay.	*Replace.*
	Defective ECM.	*Replace.*
	Open-circuited wiring connections.	*Check and repair.*
Engine will not start or is hard to start (Incorrect fuel/air mixture)	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Defective TP sensor.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective IAP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective IAT sensors.	*Replace.*
	Dirty throttle body.	*Clean.*
Engine stalls often (Incorrect fuel/air mixture)	Defective IAP sensor or circuit.	*Repair or replace.*
	Clogged fuel filter.	*Clean or replace.*
	Defective fuel pump.	*Replace.*
	Defective fuel pressure regulator.	*Replace.*
	Damaged or cracked vacuum hose.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective thermostat.	*Replace.*
	Defective IAT sensor.	*Replace.*
Engine stalls often (Fuel injector improperly operating)	Defective fuel injectors.	*Replace.*
	No injection signal from ECM.	*Repair or replace.*
	Open or short circuited wiring connection.	*Repair or replace.*
	Defective battery or low battery voltage.	*Replace or recharge.*
Engine runs poorly in high speed range (Defective control circuit or sensor)	Low fuel pressure.	*Repair or replace.*
	Defective TP sensor.	*Replace.*
	Defective IAT sensor.	*Replace.*
	Defective IAP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Defective STP sensor or STVA.	*Replace.*
	Defective GP switch.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ISC valve.	*Replace.*
	TP sensor out of adjustment.	*Adjust or replace.*
Engine lacks power (Defective control circuit or sensor)	Low fuel pressure.	*Repair or replace.*
	Defective TP sensor.	*Replace.*
	Defective IAT sensor.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective GP switch.	*Replace.*
	Defective IAP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Defective STP sensor or STVA.	*Replace.*
	Defective ISC valve.	*Replace.*
	TP sensor out of adjustment.	*Adjust or replace.*

Repair Instructions

Fuel Pressure Inspection

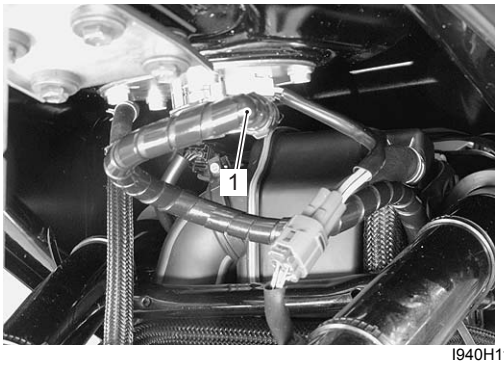
B940H21706001

⚠ WARNING

- **Keep away from fire or spark.**
- **Spilled gasoline should be wiped off immediately.**
- **Work in a well-ventilated area.**

Inspect the fuel pressure in the following procedures:

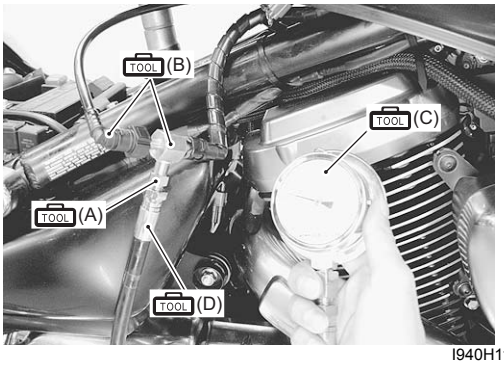
1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation (Page 1G-9)”.
2) Place a rag under the fuel feed hose and disconnect fuel feed hose (1) from the fuel pump.



I940H1170037-01

3) Install the special tools between the fuel pump and fuel delivery pipe.

Special tool
TOOL (A): 09940–40211 (Fuel pressure gauge adapter)
TOOL (B): 09940–40220 (Fuel pressure gauge hose attachment)
TOOL (C): 09915–77331 (Meter (for high pressure))
TOOL (D): 09915–74521 (Oil pressure gauge hose)



I940H1170002-03

4) Turn the ignition ON and check for fuel pressure.

Fuel pressure
Approx. 300 kPa (3.0 kgf/cm², 43 psi)

If the fuel pressure is lower than the specification, check for the followings:

- Fuel hose leakage
- Clogged fuel filter
- Pressure regulator
- Fuel pump

If the fuel pressure is higher than the specification, check for the followings:

- Fuel pump
- Pressure regulator

5) Remove the special tools.

⚠ WARNING

Before removing the special tools, turn the ignition switch OFF and release the fuel pressure slowly.

6) Reinstall the fuel tank. Refer to “Fuel Tank Removal and Installation (Page 1G-9)”.

Fuel Pump Inspection

B940H21706002

Turn the ignition switch ON and check that the fuel pump operates for a few seconds.
If the fuel pump motor does not make operating sound, inspect the fuel pump circuit connections or inspect the fuel pump relay and TO sensor. Refer to “Fuel Pump Relay Inspection (Page 1G-6)” and “DTC “C23” (P1651-H/L): TO Sensor Circuit Malfunction in Section 1A (Page 1A-51)”.
If the fuel pump relay, TO sensor and fuel pump circuit connections are OK, the fuel pump may be faulty, replace the fuel pump with a new one. Refer to “Fuel Pump Assembly / Fuel Level Gauge Removal and Installation (Page 1G-12)”.

Fuel Discharge Amount Inspection

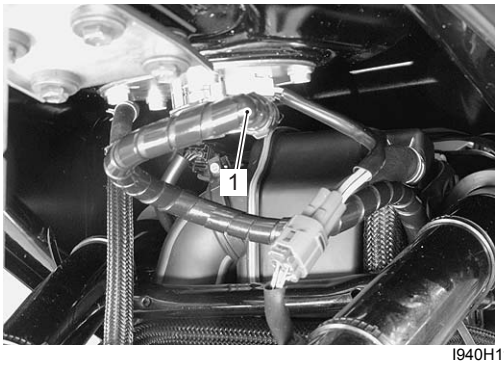
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⚠ WARNING

- **Keep away from fire or spark.**
- **Spilled gasoline should be wiped off immediately.**
- **Work in a well-ventilated area.**

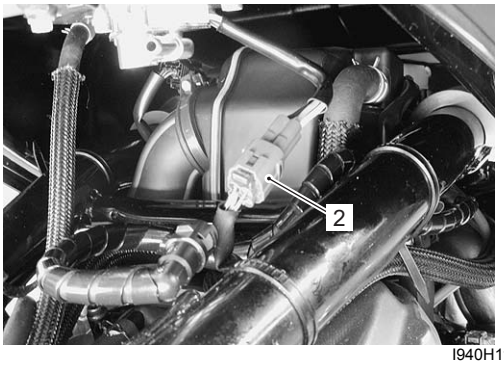
Inspect the fuel discharge amount in the following procedures:

1) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation (Page 1G-9)”.
2) Place a rag under the fuel feed hose (1) from the fuel pump.



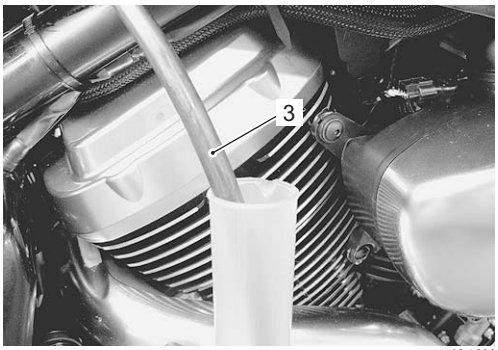
I940H1170037-01

3) Disconnect the fuel pump lead wire coupler (2).



I940H1170038-01

4) Connect a proper fuel hose (3) to the fuel pump.
5) Place the measuring cylinder and insert the fuel hose end into the measuring cylinder.



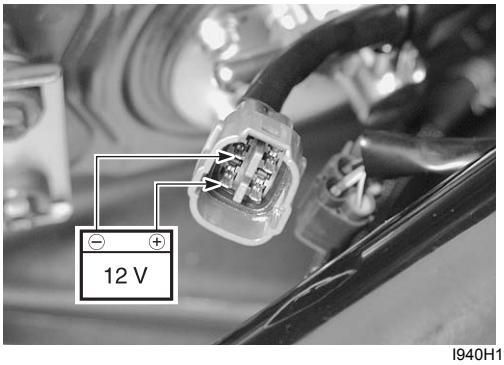
I940H1170005-02

6) Connect a proper lead wire into the fuel pump lead wire coupler (fuel pump side) and apply 12 V to the fuel pump (between (+) R wire and (–) B wire) for 10 seconds and measure the amount of fuel discharged.
If the discharge amount is out of the specification, the probable cause may be failure of the fuel pump or clogged fuel filter.

NOTE

The battery must be in fully charged condition.

Fuel discharge amount
168 ml (5.7/5.9 US/Imp oz) and more/10 seconds



I940H1170006-03

7) After finishing the fuel discharge inspection, reinstall the fuel tank. Refer to “Fuel Tank Removal and Installation (Page 1G-9)”.

Fuel Pump Relay Inspection

B940H21706004

Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.
Inspect the fuel pump relay in the following procedures:

1) Remove the battery holder. Refer to “Battery / Battery Holder Removal and Installation in Section 1J (Page 1J-11)”.
2) Remove the fuel pump relay (1).

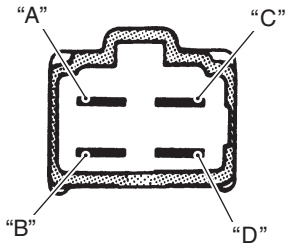


I940H1170007-02

3) First, check for insulation with the tester between terminals “A” and “B”. Next, check for continuity between “A” and “B” with 12 V voltage applied, positive (+) to terminal “C” and negative (–) to terminal “D”. If continuity does not exist, replace the relay with a new one.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity test (•)))



I718H1170013-01

Fuel Hose Inspection

B940H21706005

Refer to “Fuel Line Inspection in Section 0B (Page 0B-7)”.

Fuel Level Gauge Inspection

B940H21706006

Refer to “Fuel Level Gauge Inspection in Section 9C (Page 9C-7)”.

Fuel Level Indicator Inspection

B940H21706007

Refer to “Fuel Level Indicator Inspection in Section 9C (Page 9C-6)”.

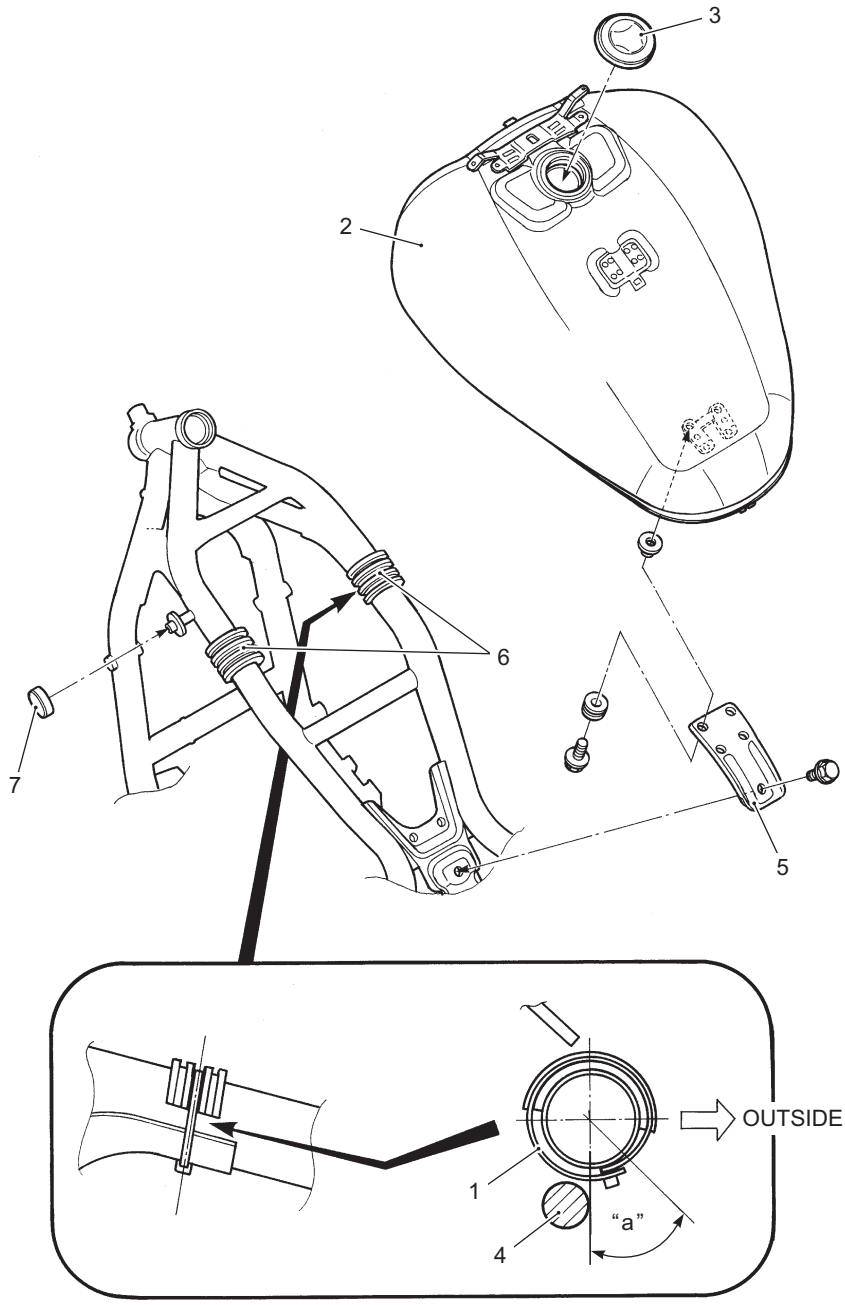
Fuel Level Indicator Switch (Thermistor) Inspection

B940H21706008

Refer to “Fuel Level Indicator Switch (Thermistor) Inspection in Section 9C (Page 9C-6)”.

Fuel Tank Construction

B940H21706009



I940H1170032-06

1. Clamp	4. Wiring harness	7. Cushion
2. Fuel tank	5. Fuel tank bracket	“a”: 45° ± 5°
3. Fuel tank cap	6. Fuel tank cushion	

Fuel Tank Removal and Installation

B940H21706010

Removal

⚠ WARNING

- **Keep away from fire or spark.**
- **Spilled gasoline should be wiped off immediately.**
- **Work in a well-ventilated area.**

1) Remove the seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the fuel tank mounting bolt.



I940H1170008-02

3) Lift and support the fuel tank.

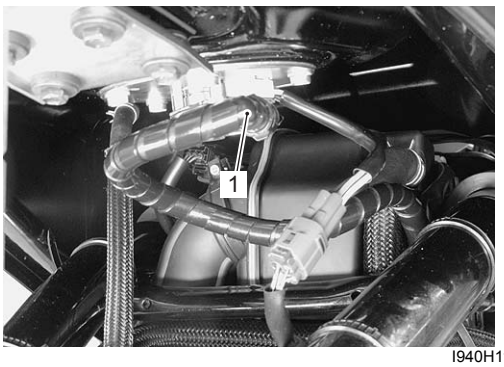


I940H1170009-02

4) Place a rag under the fuel feed hose and disconnect the fuel feed hose (1).

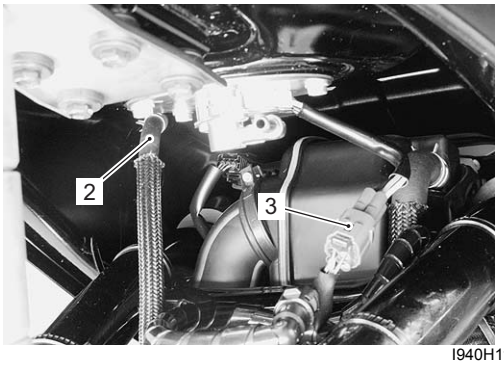
⚠ CAUTION

When removing the fuel tank, do not leave the fuel feed hose (1) on the fuel pump side.



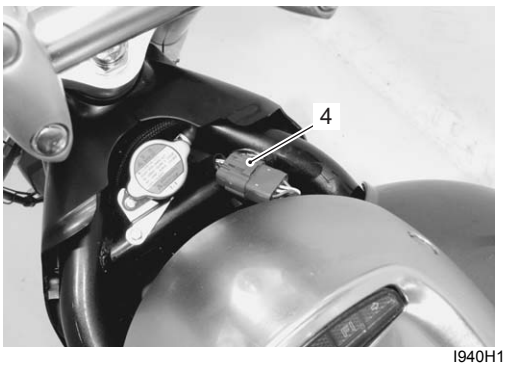
I940H1170037-01

5) Disconnect the fuel tank breather hose (2).
6) Disconnect the fuel pump lead wire coupler (3).



I940H1170039-01

7) Disconnect the pilot lamp lead wire coupler (4).



I940H1170011-01

8) Remove the fuel tank.

⚠ **CAUTION**

Be careful not to scratch the radiator cap.

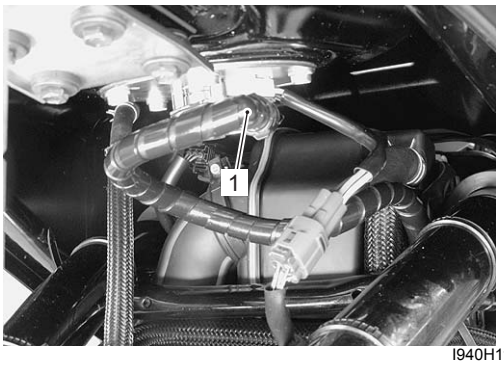
Installation

Install the fuel tank in the reverse order of removal. Pay attention to the following points:

⚠ **CAUTION**

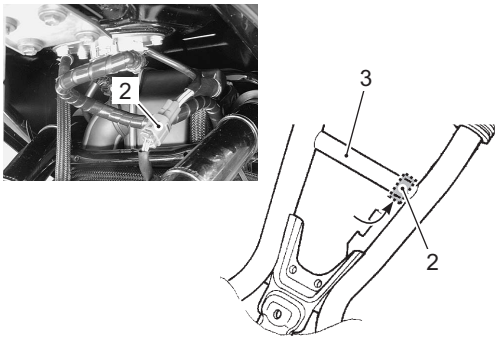
- **Be careful not to bend the hoses.**
- **When installing the fuel tank, be careful not to scratch the radiator cap.**

- Connect the fuel feed hose (1) until it locks securely (a click is heard).



I940H1170037-01

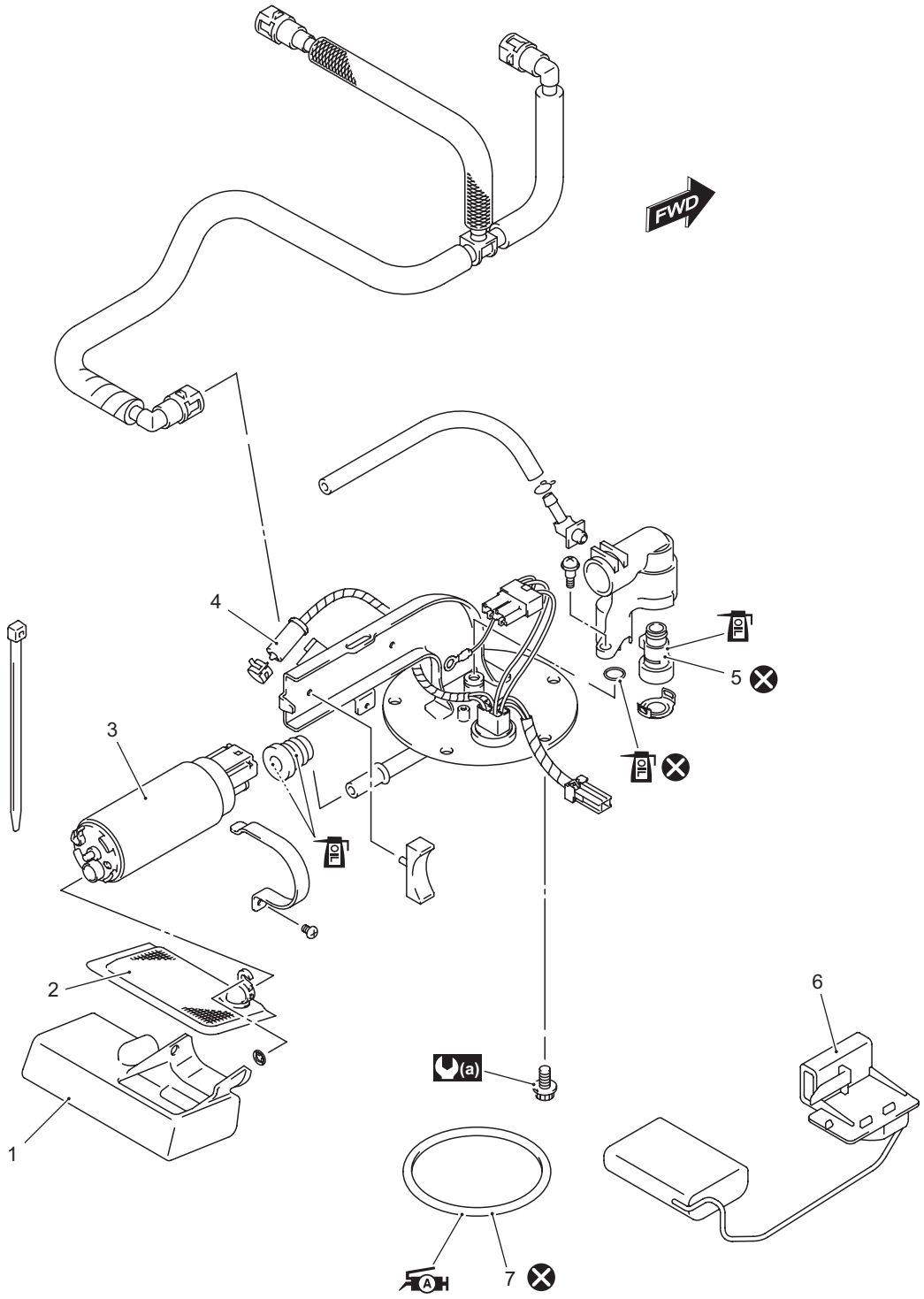
- When installing the fuel tank, pass the fuel pump coupler (2) to under of the frame bridge (3).



I940H1170040-02

Fuel Pump Components

B940H21706011



I940H1170035-02

1. Filter cover	5. Fuel pressure regulator assembly	: Apply engine oil.
2. Fuel mesh filter	6. Fuel level gauge	: Apply grease.
3. Fuel pump	7. O-ring	: Do not reuse.
4. Thermistor	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	

Fuel Pump Assembly / Fuel Level Gauge Removal and Installation

B940H21706012

Removal

⚠ WARNING

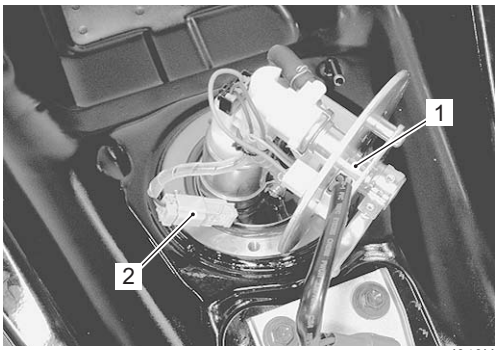
- **Spilled gasoline should be wiped off immediately.**
- **Keep away from fire or spark.**
- **Work in a well-ventilated area.**

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation (Page 1G-9)”.
2) Remove fuel pump mounting bolts diagonally.



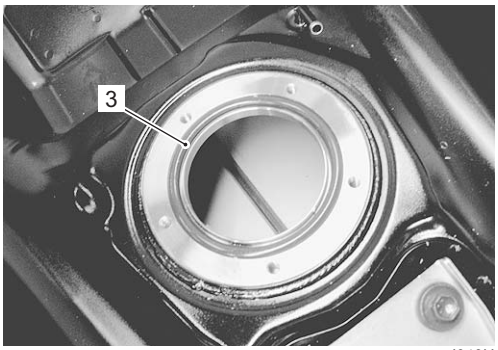
I940H1170041-01

3) Remove the fuel pump assembly (1) and disconnect the fuel level gauge lead wire coupler (2).



I940H1170015-02

4) Remove the O-ring (3).

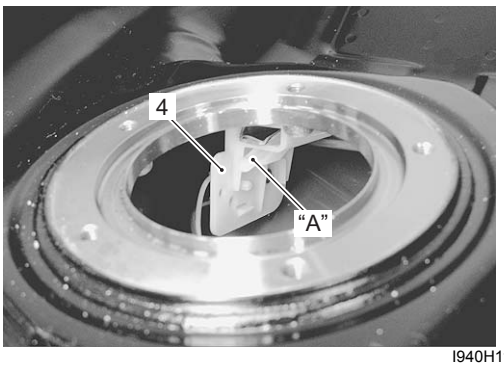


I940H1170016-03

5) Remove the fuel level gauge (4) while pushing the pawl end “A”.

⚠ CAUTION

Do not pull the lead wire when removing the fuel gauge.



I940H1170017-03

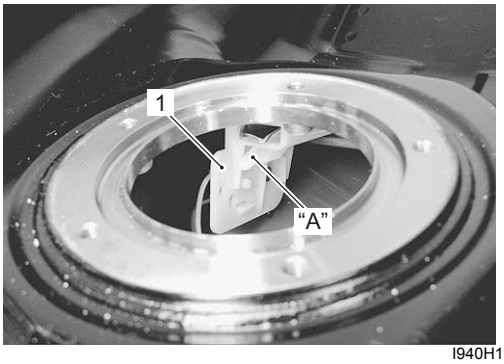
Installation

Install the fuel pump assembly in the reverse order of removal. Pay attention to the following points:

- Install the fuel level gauge (1) into the fuel tank.

NOTE

Push the lock position “A” fully until the clicking sound heard.



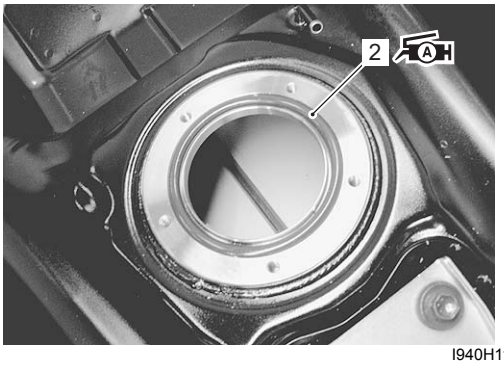
I940H1170018-02

- Apply grease to the O-ring (2).

⚠ CAUTION

Replace the O-ring with a new one.

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



I940H1170019-03

- When installing the fuel pump assembly, first tighten all the fuel pump mounting bolts lightly and then to the specified torque as shown in the figure.

Tightening torque
Fuel pump mounting bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1170042-02

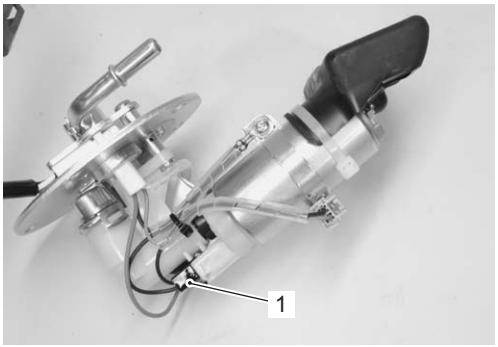
Fuel Pump Disassembly and Assembly

B940H21706013

Refer to “Fuel Pump Assembly / Fuel Level Gauge Removal and Installation (Page 1G-12)”.

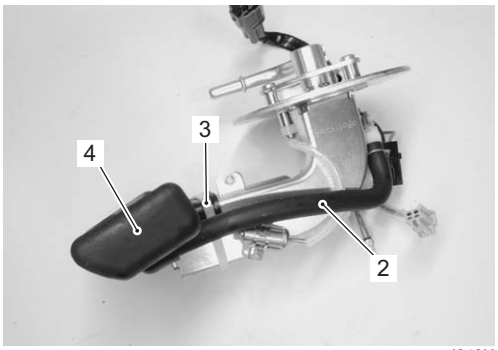
Disassembly

1) Disconnect the fuel pump coupler (1).



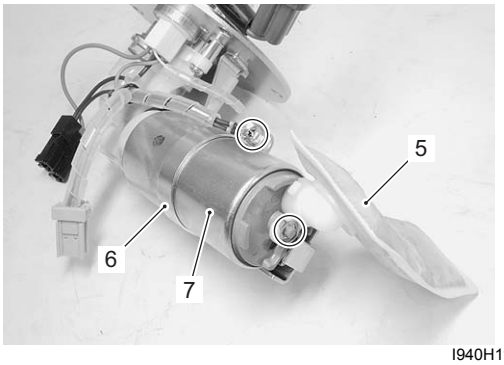
I940H1170021-03

2) Remove the hose (2), clamp (3) and filter cover (4).



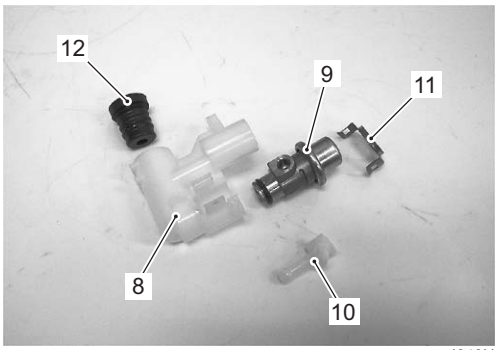
I940H1170022-03

3) Remove the fuel mesh filter (5).
4) Remove the band (6).
5) Remove the fuel pump (7).



I940H1170023-03

6) Remove the following parts from the adapter (8).
   - Pressure regulator (9)
   - Joint (10)
   - Clip (11)
   - Insulator (12)

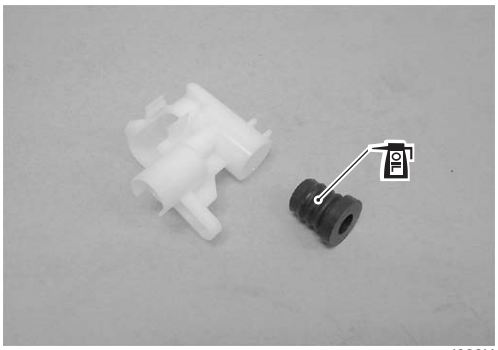


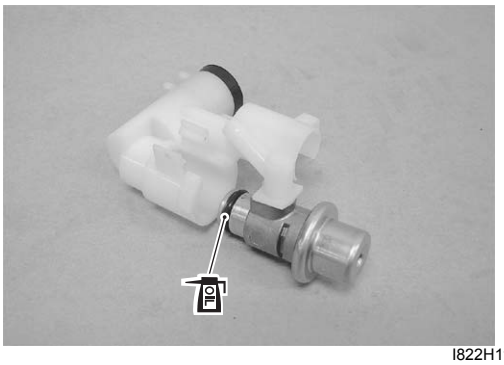
I940H1170028-02

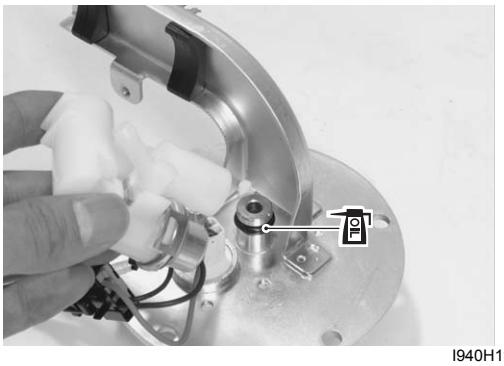
Assembly
Refer to “Fuel Mesh Filter Inspection (Page 1G-14)”. Assemble the fuel tank pump in the reverse order of the disassembly. Pay attention to the following points:

⚠ CAUTION

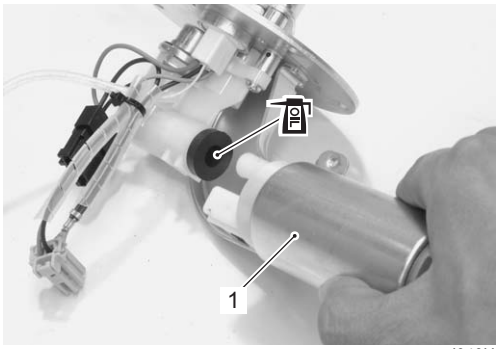
- **To prevent fuel leakage, insulator and O-ring must be replaced with a new one.**
- **Apply engine oil lightly to insulator and of the O-rings.**


I822H1170023-01


I822H1170024-01


I940H1170024-01

- Apply thin coat of the engine oil to the bushing.
- Install the fuel pump (1).



I940H1170025-01

Fuel Mesh Filter Inspection

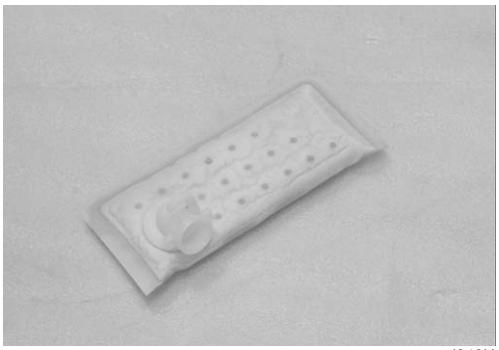
B940H21706014

Inspect the fuel mesh filter in the following procedures:

1) Remove the fuel mesh filter. Refer to “Fuel Pump Disassembly and Assembly (Page 1G-13)”.
2) If the fuel mesh filter is clogged with foreign particles, it hinders smooth gasoline flow resulting in loss of engine power.

NOTE

When the fuel mesh filter is dirtied excessively, replace the fuel mesh filter with a new one.


I940H1170026-01

3) Reinstall the fuel mesh filter. Refer to “Fuel Pump Disassembly and Assembly (Page 1G-13)”.

Fuel Injector / Fuel Delivery Pipe Removal and Installation

B940H21706015

Refer to “Throttle Body Removal and Installation in Section 1D (Page 1D-12)”.

Fuel Injector Inspection and Cleaning

B940H21706016

Inspect the fuel injector in the following procedures:

1) Remove the fuel injector. Refer to “Throttle Body Disassembly and Assembly in Section 1D (Page 1D-14)”.
2) Check the fuel injector filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in the fuel lines and fuel tank.



I940H1170027-01

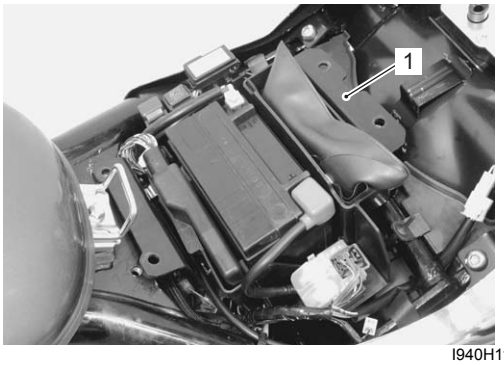
3) Install the fuel injector. Refer to “Throttle Body Disassembly and Assembly in Section 1D (Page 1D-14)”.

Fuel Tank Breather Valve Removal and Installation

B940H21706017

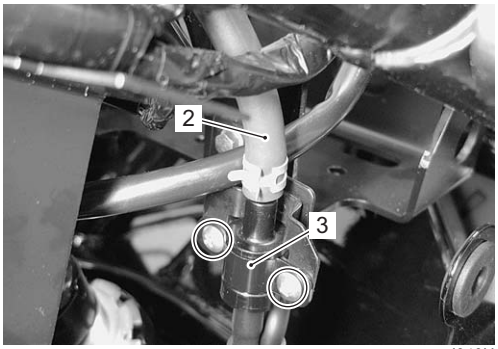
Removal

1) Move the battery holder (1). Refer to “Battery / Battery Holder Removal and Installation in Section 1J (Page 1J-11)”.



I940H1120013-01

2) Disconnect the breather valve hose (2).
3) Remove the fuel tank breather valve (3).



I940H1170031-01

Installation

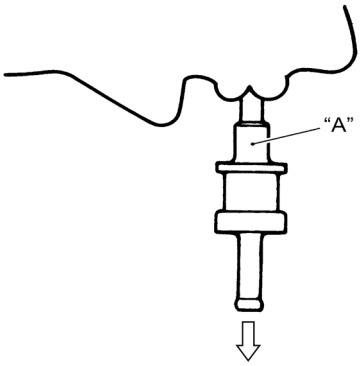
1) Install the fuel shut-off valve as shown in the Fuel tank breather hose routing diagram. Refer to “Fuel Tank Breather Hose Routing Diagram (Page 1G-3)”.
2) Reinstall the removed parts.

Fuel Tank Breather Inspection

B940H21706018

Inspect the fuel tank breather valve body for damage. Inspect the fuel tank breather valve operation in the following procedures:

1) When air is blown into the fuel tank breather valve with its side “A” positioned upward, the air can pass through to the drain side.

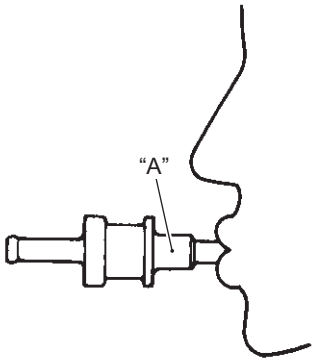


I940H1170029-03

2) When air is blown into the fuel tank breather valve with its side “A” positioned sideways, the air cannot pass through to the canister side. If the fuel tank breather valve operates otherwise, it must be replaced.

⚠ CAUTION

Gasoline and gasoline vapor is toxic. A small amount of fuel remains in the fuel tank breather valve when checking it. Do not swallow the fuel when blowing the fuel breather valve.



I940H1170030-02

Specifications

Service Data

B940H21707001

Injector + Fuel Pump + Fuel Pressure Regulator

Item	Specification	Note
Injector resistance	11 – 13 Ω at 23 °C (73 °F)	
Fuel discharge amount	168 ml and more (5.7/5.9 US/Imp oz) for 10 seconds at 300 kPa (3.0 kgf/cm^2, 43 psi)	
Fuel pressure regulator operating set pressure	Approx. 300 kPa (3.0 kgf/cm^2, 43 psi)	

Fuel

Item	Specification	Note
Fuel type	Use only unleaded gasoline of at least 90 pump octane (R/2 + M/2). 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-03, 28, 33
	Gasoline used should be graded 95 octane or higher. An unleaded gasoline type is recommended.	Others
Fuel tank capacity	18 L (4.8/4.0 US/Imp gal)	

Tightening Torque Specifications

B940H21707002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Fuel pump mounting bolt	10	1.0	7.0	☞(Page 1G-13)

NOTE

The specified tightening torque is described in the following.
“Fuel Pump Components (Page 1G-11)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H21708001

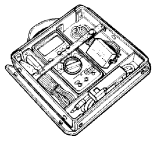
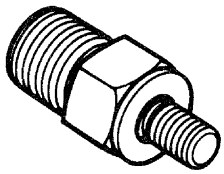
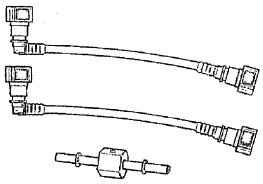
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 1G-13)

NOTE

Required service material is also described in the following.
“Fuel Pump Components (Page 1G-11)”

Special Tool

B940H21708002

09900–25008 Multi-circuit tester set ☞(Page 1G-7) 	09915–74521 Oil pressure gauge hose ☞(Page 1G-5) 
09915–77331 Meter (for high pressure) ☞(Page 1G-5) 	09940–40211 Fuel pressure gauge adapter ☞(Page 1G-5) 
09940–40220 Fuel pressure gauge hose attachment ☞(Page 1G-5) 	

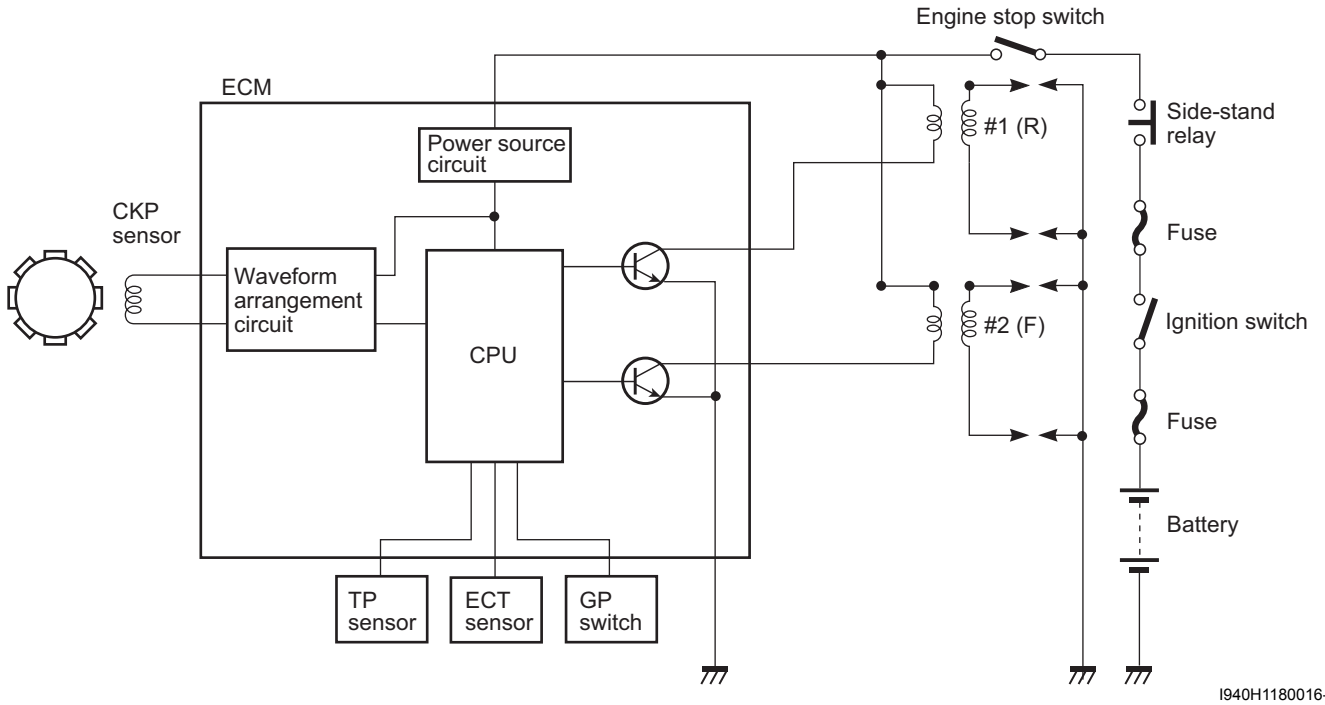
Ignition System

Schematic and Routing Diagram

Ignition System Diagram

B940H21802001

Refer to “Wire Color Symbols in Section 0A (Page 0A-5)”.



I940H1180016-03

Ignition System Components Location

B940H21802002

Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.

Diagnostic Information and Procedures

Ignition System Symptom Diagnosis

B940H21804001

Condition	Possible cause	Correction / Reference Item
Spark plug not sparking	Damaged spark plugs.	*Replace.*
	Fouled spark plugs.	*Clean or replace.*
	Wet spark plugs.	*Clean and dry or replace.*
	Defective ignition coil/plug caps.	*Replace.*
	Defective ignition coils.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Open-circuited wiring connections.	*Repair or replace.*
	Open or short in high tension cord.	*Replace.*
Engine stalls easily (No spark)	Fouled spark plugs.	*Clean or replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
Spark plug is wet or quickly becomes fouled with carbon	Excessively rich air/fuel mixture.	*Inspect FI system.*
	Excessively high idling speed.	*Inspect FI system.*
	Incorrect gasoline.	*Change.*
	Dirty air cleaner element.	*Clean or replace.*
	Incorrect spark plug (Cold type).	*Change to hot type spark plug.*
Spark plug quickly becomes fouled with oil or carbon	Worn piston rings.	*Replace.*
	Worn pistons.	*Replace.*
	Worn cylinders.	*Rebore or replace.*
	Excessive valve-stem to valve-guide clearance.	*Replace.*
	Worn valve stem oil seals.	*Replace.*
Spark plug electrodes overheat or burn	Incorrect spark plug.	*Change to cold type spark plug.*
	Overheated engine.	*Tune-up.*
	Loose spark plugs.	*Tighten.*
	Excessively lean air/fuel mixture.	*Inspect FI system.*

No Spark or Poor Spark

B940H21804002

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. *Is there connection in the ignition system couplers?*	Go to Step 2.	Poor connection of couplers.
2	Measure the battery voltage between input lead wires at the ECM with the ignition switch in the "ON" position. *Is the voltage OK?*	Go to Step 3.	• 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 and Plug Cap Inspection (Page 1H-7)". **NOTE** **This inspection method is applicable only with the multi-circuit tester and the peak volt adaptor.** *Is the peak voltage OK?*	Go to Step 4.	Go to Step 5.
4	Inspect the spark plugs. Refer to "Spark Plug Inspection and Cleaning in Section 0B (Page 0B-7)". *Is the spark plug(-s) OK?*	Go to Step 5.	Faulty spark plug(-s).
5	Inspect the plug cap(-s). Refer to "Ignition Coil and Plug Cap Inspection (Page 1H-7)". *Is the plug cap(-s) OK?*	Go to Step 6.	Faulty ignition coil(-s).
6	Measure the CKP sensor peak voltage and its resistance. Refer to "CKP Sensor Inspection (Page 1H-8)". **NOTE** **The CKP sensor peak voltage inspection is applicable only with the multi-circuit tester and peak volt adaptor.** *Are the peak voltage and resistance OK?*	• Faulty ECM. • Open or short circuit in wire harness. • Poor connection of ignition couplers.	• Faulty CKP sensor. • Metal particles or foreign material being stuck on the CKP sensor and rotor tip.

Repair Instructions

Spark Plug Cap and Spark Plug Removal and Installation

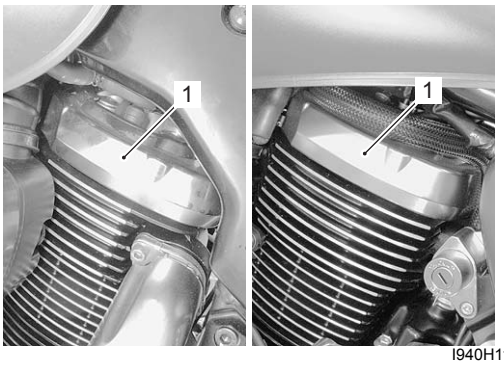
B940H21806001

Removal

⚠ WARNING

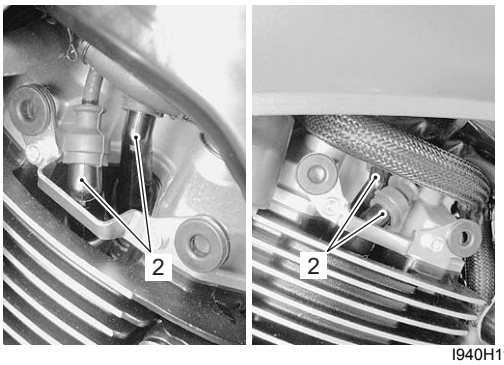
The hot engine can burn you.
Wait until the engine is cool enough to touch.

1) Turn the ignition switch OFF.
2) Remove the cylinder head covers (1).



I940H1180001-01

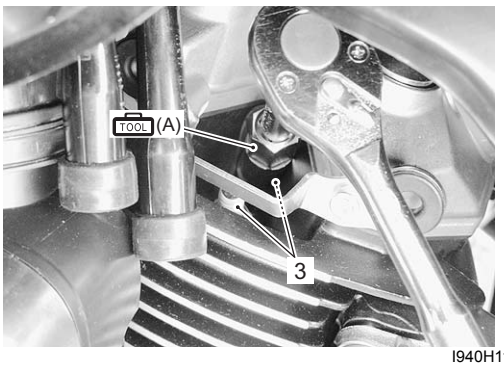
3) Disconnect the spark plug caps (2).



I940H1180002-01

4) Remove the spark plugs (3) with the special tool.

Special tool
TOOL (A): 09930–10121 (Spark plug wrench set)



I940H1180003-01

Installation

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

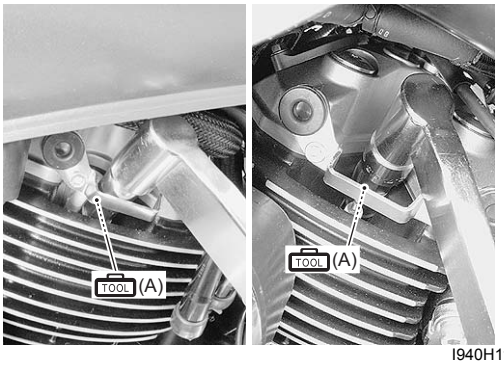
- Screw the spark plugs into the cylinder head with fingers, and then tighten them to the specified torque.

⚠ CAUTION

Do not cross thread or over tighten the spark plug, or such an operation will damage the aluminum threads of the cylinder head.

Special tool
TOOL (A): 09930–10121 (Spark plug wrench set)

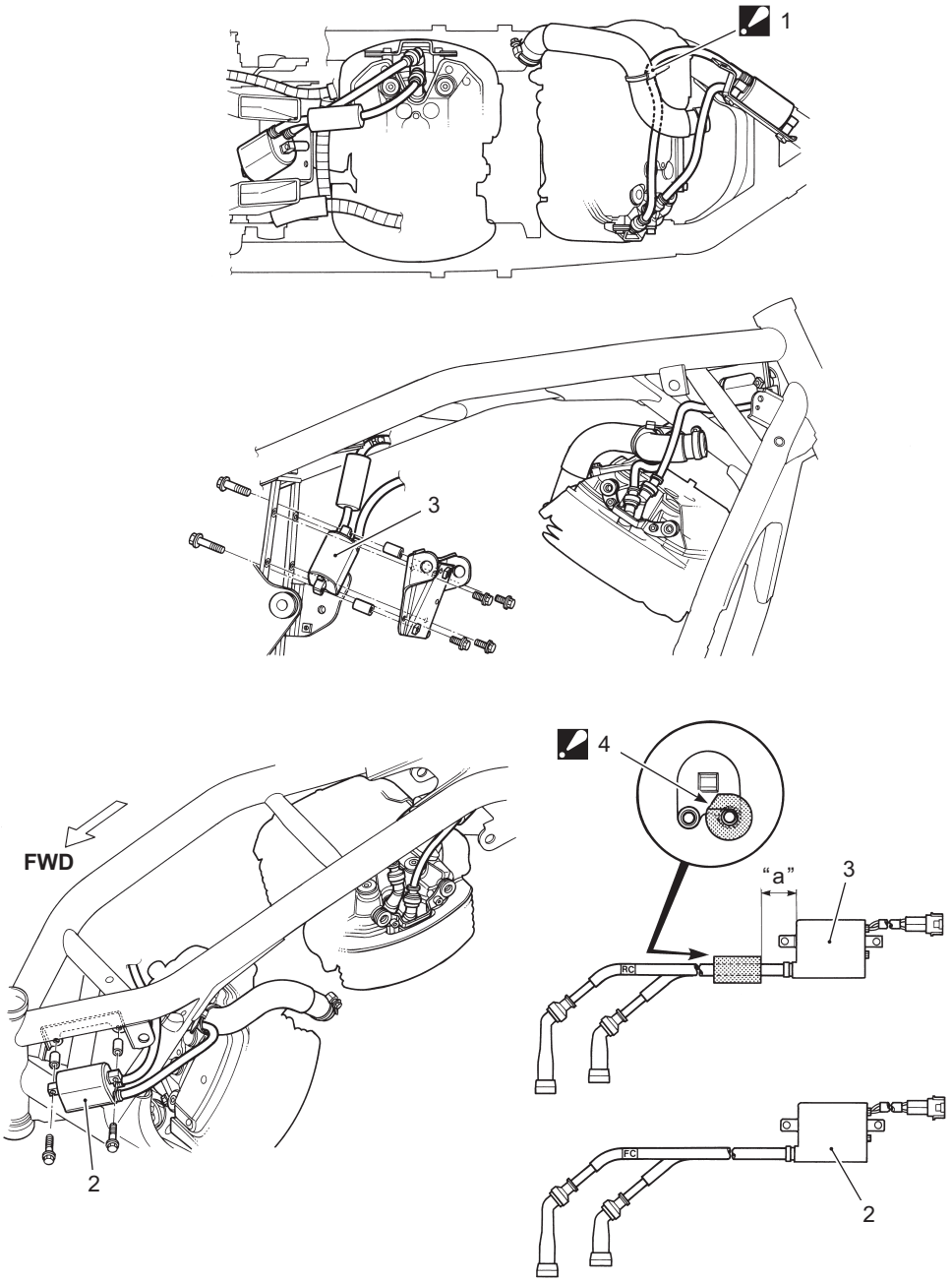
Tightening torque
Spark plug: 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



I940H1180004-01

Ignition Coil Construction

B940H21806002



I940H1180017-01

1. Clamp : Clamp the high tension code so it does not contact to the cylinder head cover cap.	4. Cushion : Align both edges of cushion when adhering it.
2. #2 ignition coil	"a": 50 mm (1.97 in)
3. #1 ignition coil	

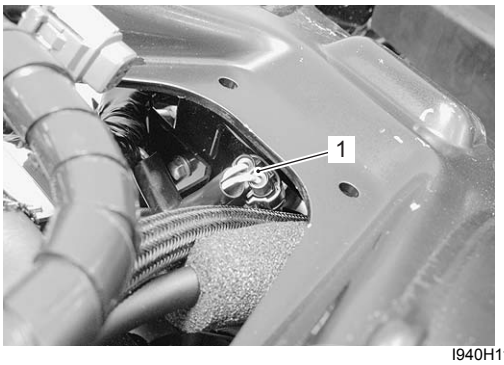
Ignition Coil Removal and Installation

B940H21806003

Removal

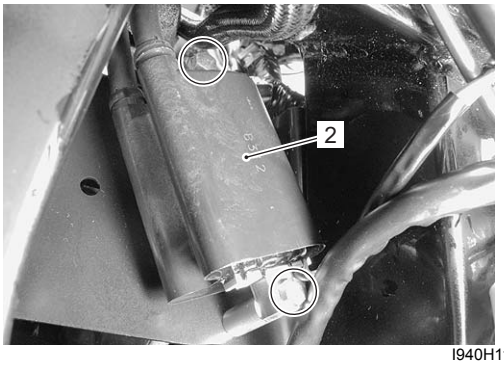
#1 cylinder

1) Turn the ignition switch OFF.
2) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
3) Remove the battery holder. Refer to “Battery / Battery Holder Removal and Installation in Section 1J (Page 1J-11)”.
4) Disconnect the #1 ignition coil lead wire coupler (1).



I940H1180005-01

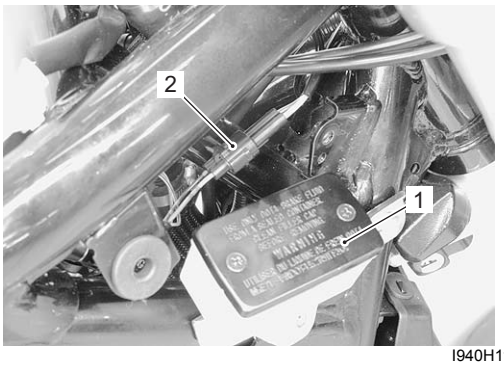
5) Remove the #1 ignition coil (2).



I940H1180006-01

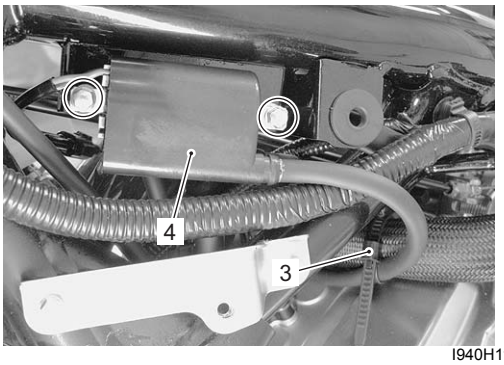
 # 2 cylinder

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Remove the left and right frame head cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Move the rear brake reservoir tank (1) by removing the mounting bolt.
4) Disconnect the #2 ignition coil lead wire coupler (2).



I940H1180007-01

5) Remove the clamp (3) and ignition coil (4).



I940H1180008-02

Installation

Install the ignition coils as shown in the ignition coil construction. Refer to “Ignition Coil Construction (Page 1H-5)”.

Spark Plug Inspection and Cleaning

B940H21806004

Refer to “Spark Plug Inspection and Cleaning in Section 0B (Page 0B-7)”.

Ignition Coil and Plug Cap Inspection

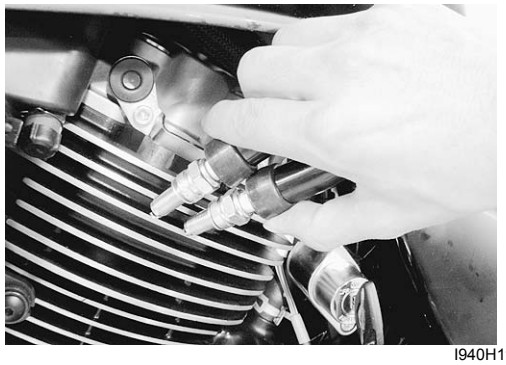
B940H21806005

Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.

Ignition Coil Primary Peak Voltage

Inspect the multi-circuit tester with peak voltage adaptor as procedures:

1) Connect new spark plug to each spark plug cap and ground them to the cylinder head.



I940H1180009-01

2) Connect the multi-circuit tester with peak voltage adaptor as follows:

#1 and #2 ignition coil
(+) probe: W/Bl lead wire (#1 cylinder)
(+) probe: B lead wire (#2 cylinder)
(–) probe: Ground

NOTE

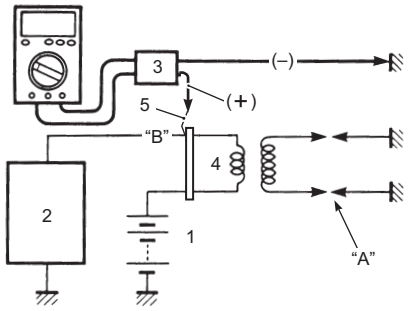
Do not disconnect the ignition coil primary wire coupler.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)
TOOL : 09900–25009 (Needle pointed probe set)

⚠ CAUTION

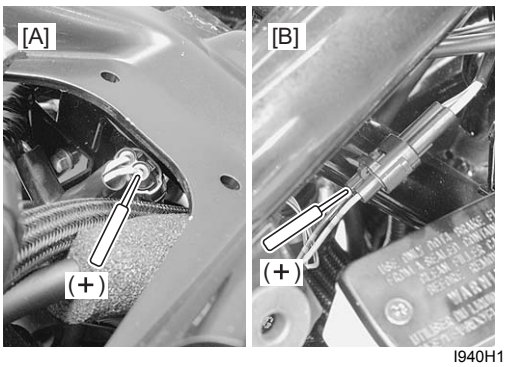
Before using the multi-circuit tester and peak volt adaptor, be sure to refer to the appropriate instruction manual.

Tester knob indication
Voltage: (⎓)



I940H1180010-02

1. Battery	5. Needle pointed probe
2. ECM	“A”: New spark plug
3. Peak voltage adaptor	“B”: B or W/Bl lead wire
4. Ignition coil	



I940H1180011-03

[A]: #1 cylinder	[B]: #2 cylinder

3) Inspect the ignition coil primary peak voltage in the following procedures:

⚠ WARNING

Do not touch the tester probes and spark plugs to prevent an electric shock while testing.

a) Shift the transmission into neutral, turn the ignition switch ON and grasp the clutch lever.
b) Press the starter button and allow the engine to crank for a few seconds, and then measure the ignition coil primary peak voltage.

4) Repeat the b) procedure several times and measure the highest peak voltage.

Ignition coil primary peak voltage
150 V and more

If the peak voltage is lower than the specified values, inspect the ignition coil. Refer to “Ignition Coil and Plug Cap Inspection (Page 1H-7)”.

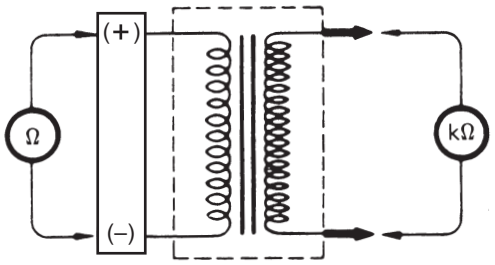
Ignition Coil Resistance

- Disconnect the spark plug caps. Refer to “Spark Plug Cap and Spark Plug Removal and Installation (Page 1H-4)”.
- Measure the ignition coil resistance in both the primary and secondary windings. If the resistance is not within the standard range, replace the ignition coil with a new one.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Resistance (Ω)

Ignition coil resistance
Primary: 1 – 5 Ω ((+) terminal – (–) terminal)
Secondary: 25 – 40 kΩ (Plug cap – Plug cap)



I940H1180012-01

CKP Sensor Inspection

B940H21806006

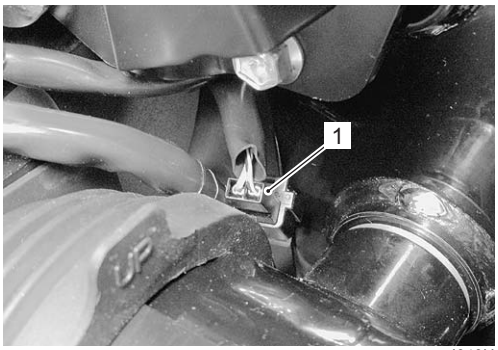
Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.

CKP Sensor Peak Voltage

1) Remove the left frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the left frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Disconnect the CKP sensor lead wire coupler (1) and connect the multi-circuit tester with the peak volt adaptor.

NOTE

Be sure that all of the couplers are connected properly and the battery is fully-charged.



I940H1180013-03

4) Connect the multi-circuit tester with the peak volt adaptor as follows:

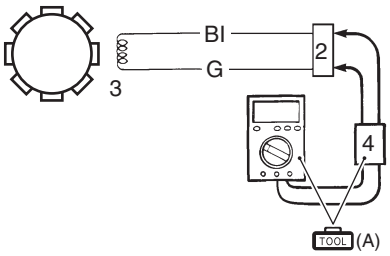
⚠ CAUTION

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 (⎓)

CKP sensor	(+) Probe	(–) Probe
	BI	G



I940H1180018-01

2. CKP sensor coupler	4. Peak voltage adaptor
3. CKP sensor	

5) Measure the CKP sensor peak voltage in the following procedures:
   a) Shift the transmission into neutral, turn the ignition switch ON and grasp the clutch lever.
   b) Press the starter button and allow the engine to crank for a few seconds, and then measure the CKP sensor peak voltage.
6) Repeat the b) procedure several times and measure the highest CKP sensor peak voltage.

CKP sensor peak voltage
3.0 V and more (BI – G)

7) If the peak voltage is within the specification, check the continuity between the CKP sensor coupler and ECM coupler.

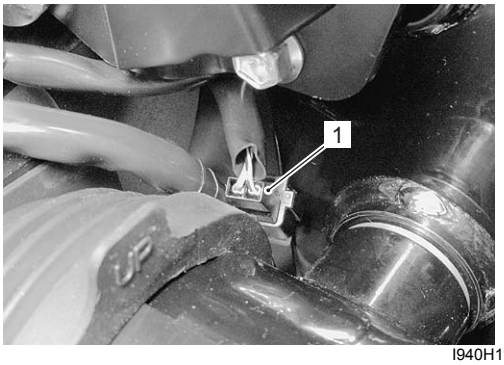
⚠ CAUTION

Normally, use the needle pointed probe to the backside of the lead wire coupler to prevent the terminal bend and terminal alignment.

8) After measuring the CKP sensor peak voltage, connect the CKP sensor coupler.

CKP Sensor Resistance

1) Disconnect the CKP sensor coupler (1).

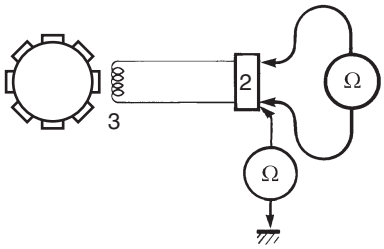


I940H1180013-03

2) Measure the resistance between the lead wires and ground. If the resistance is not within the standard range, replace the CKP sensor with a new one. Refer to "CKP Sensor Removal and Installation (Page 1H-9)".

Tester knob indication
Resistance (Ω)

CKP sensor resistance
160 – 270 Ω (Bl – G)
∞ Ω (Bl – Ground)



I718H1180008-02

2. CKP sensor coupler	3. CKP sensor

3) After measuring the CKP sensor resistance, connect the CKP sensor coupler.

CKP Sensor Removal and Installation

B940H21806007

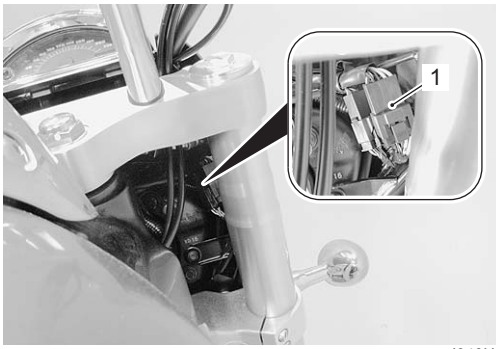
Refer to "Generator Removal and Installation in Section 1J (Page 1J-5)".

Engine Stop Switch Inspection

B940H21806008

Inspect the engine stop switch in the following procedures:

1) Turn the ignition switch OFF.
2) Remove the headlight. Refer to "Headlight Removal and Installation in Section 9B (Page 9B-2)".
3) Disconnect the right handlebar switch coupler (1).



I940H1180014-03

4) 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 (Page 6B-1)".

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity (•)))

Color / Position	O/B	O/W
OFF (⊗)		
RUN (⊙)	○———	———○

I822H1180023-01

5) After finishing the engine stop switch inspection, reinstall the removed parts.

Ignition Switch Inspection

B940H21806009

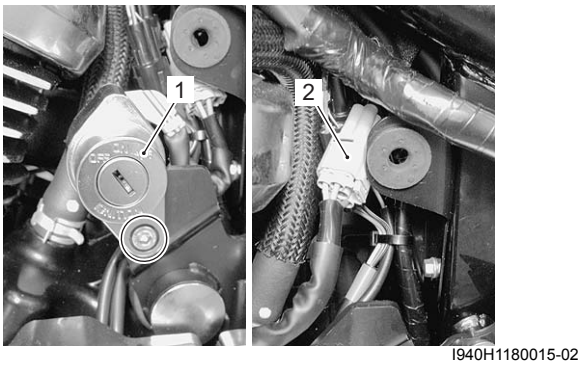
Refer to "Ignition Switch Inspection in Section 9C (Page 9C-9)".

Ignition Switch Removal and Installation

B940H21806010

Removal

1) Remove the left frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the ignition switch (1).
3) Disconnect the ignition switch lead wire coupler (2).



I940H1180015-02

Installation

Install the ignition switch in the reverse order of removal.

Specifications

Service Data

B940H21807001

Electrical

Unit: mm (in)

Item	Specification		Note
Firing order	1 · 2		
Spark plug	Type	NGK: CR6E DENSO: U20ESR-N	
	Gap	0.6 – 0.7 (0.024 – 0.028)	
Spark performance	Over 8 (0.3) at 1 atm.		
CKP sensor resistance	170 – 260 Ω		
Ignition coil resistance	Primary	1 – 5 Ω	
	Secondary	25 – 40 kΩ	
CKP sensor peak voltage	3.0 V and more		When cranking
Ignition coil primary peak voltage	150 V and more		#1: (+) B, (–) Ground #2: (+) W/Bl, (–) Ground

Tightening Torque Specifications

B940H21807002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Spark plug	11	1.1	8.0	☞(Page 1H-4)

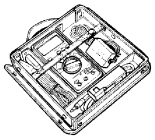
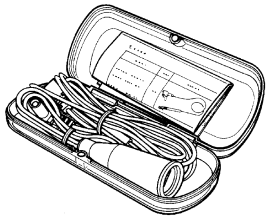
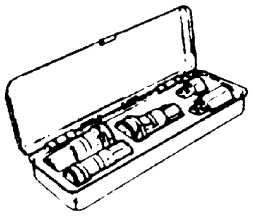
Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Special Tool

B940H21808001

09900–25008 Multi-circuit tester set ☞(Page 1H-7) / ☞(Page 1H-8) / ☞(Page 1H-8) / ☞(Page 1H-9) 	09900–25009 Needle pointed probe set ☞(Page 1H-7) 
09930–10121 Spark plug wrench set ☞(Page 1H-4) / ☞(Page 1H-4) 	

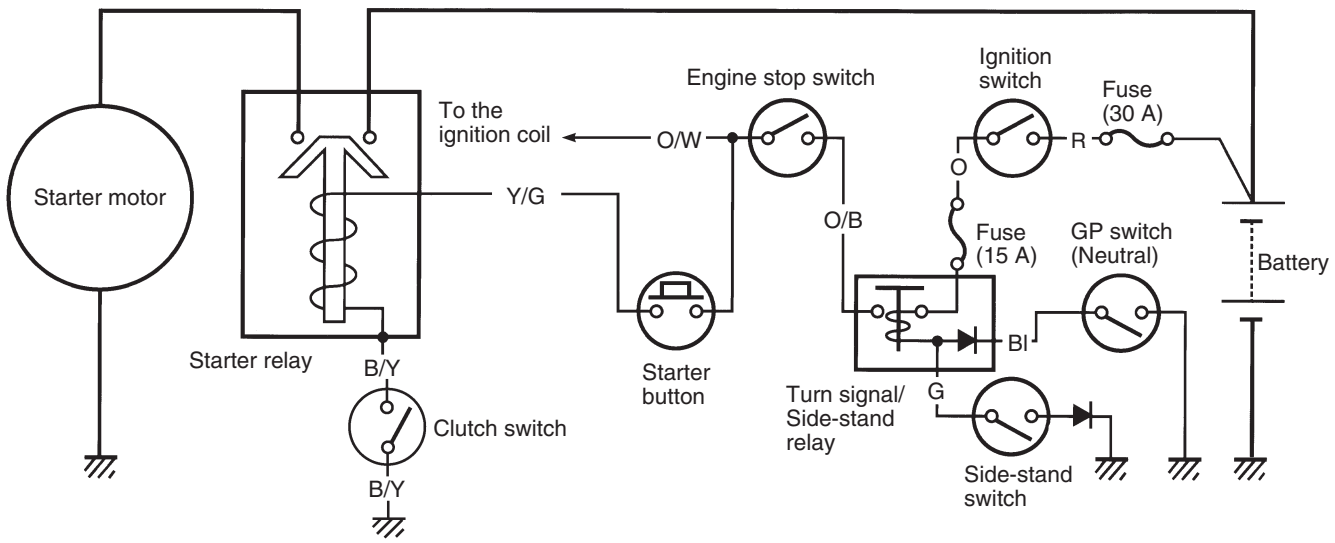
Starting System

Schematic and Routing Diagram

Starting System Diagram

B940H21902001

Refer to “Wire Color Symbols in Section 0A (Page 0A-5)”.



I822H1190001-01

Component Location

Starting System Components Location

B940H21903001

Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.

Diagnostic Information and Procedures

Starting System Symptom Diagnosis

B940H21904001

Condition	Possible cause	Correction / Reference Item
Engine does not turn though the starter motor runs	Faulty starter clutch.	*Replace.*
Starter button is not effective	Run down battery.	*Repair or replace.*
	Defective switch contacts.	*Replace.*
	Brushes not seating properly on starter motor commutator.	*Repair or replace.*
	Defective starter relay or starter interlock switch.	*Replace.*
	Defective main fuse.	*Replace.*

Starter Motor will not Run

B940H21904002

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. *Is a click sound heard?*	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.) *Does the starter motor run?*	• Faulty starter relay. • Loose or disconnected starter motor lead wire. • Loose or disconnected between starter relay and battery (+) terminal.	Faulty starter motor.
3	Measure the starter relay voltage at the starter relay connectors (between Y/G (+) and B/Y (–)) when the starter button is pushed. *Is the voltage OK?*	Go to Step 4.	• Faulty ignition switch. • Faulty engine stop switch. • Faulty clutch lever position switch. • Faulty gear position switch. • Faulty turn signal/ side-stand relay. • Faulty starter button. • Faulty side-stand switch. • Poor contact of connector. • Open circuit in wire harness.
4	Check the starter relay. Refer to “Starter Relay Inspection (Page 1I-7)”. *Is the starter relay OK?*	Poor contact of the starter relay.	Faulty starter relay.

Starter Motor Runs but Does not Crank the Engine

B940H21904003

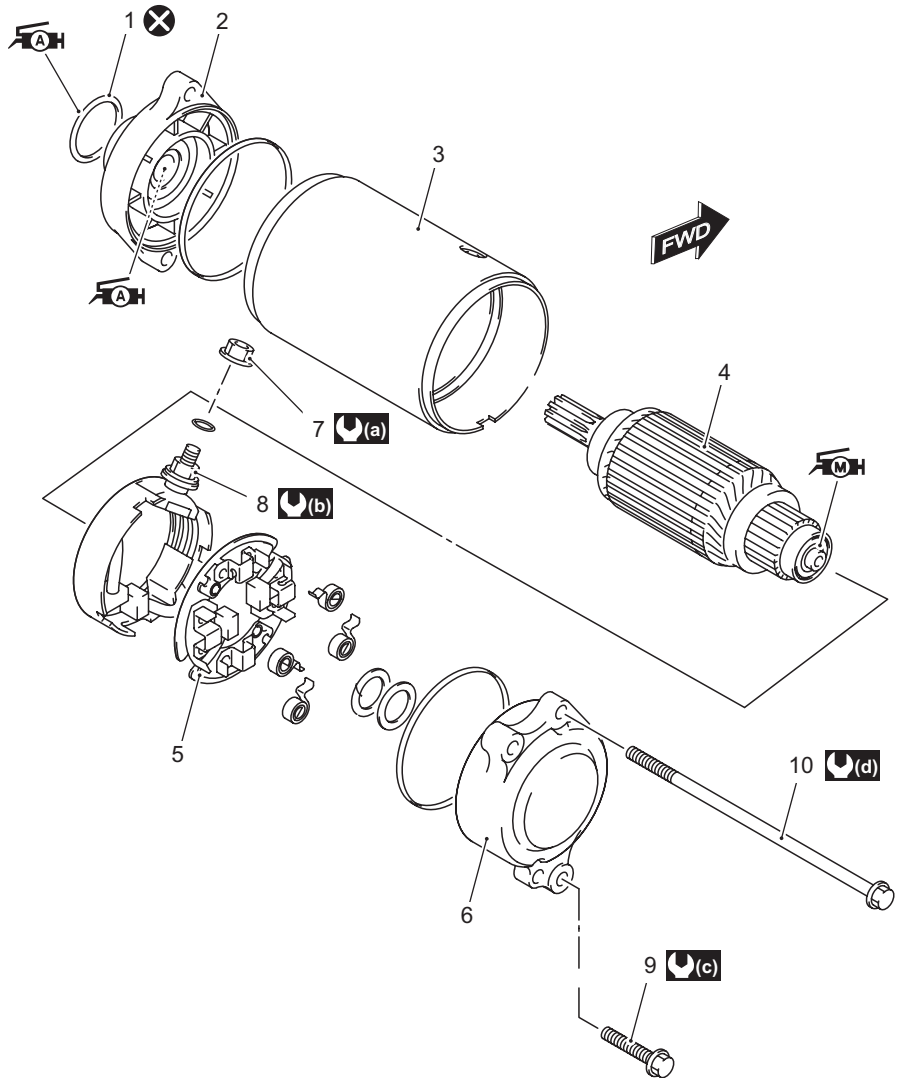
The starter motor runs when the transmission is in neutral, but does not run when the transmission is in any position other than neutral, with the side-stand up.

Step	Action	Yes	No
1	Check the side-stand switch. Refer to “Side-stand / Ignition Interlock System Parts Inspection (Page 1I-8)”. *Is the side-stand switch OK?*	Go to Step 2.	Faulty side-stand switch.
2	Check the starter clutch. Refer to “Starter Clutch Inspection (Page 1I-12)”. *Is the starter clutch OK?*	• Open circuit in wire harness. • Poor contact of connector.	Faulty starter clutch.

Repair Instructions

Starter Motor Components

B940H21906001



I940H1190038-01

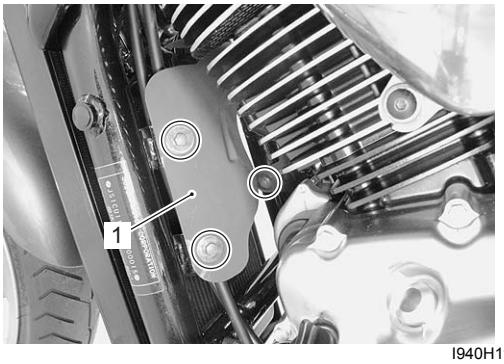
1. O-ring	7. Starter motor lead wire mounting nut	(c) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
2. Housing end (Inside)	8. Brush holder nut	(d) : 5 N·m (0.5 kgf-m, 3.5 lbf-ft)
3. Starter motor case	9. Starter motor mounting bolt	A : Apply grease.
4. Armature	10. Starter motor housing bolt	M : Apply moly paste to sliding surface.
5. Brush holder	(a) : 6 N·m (0.6 kgf-m, 4.5 lbf-ft)	: Do not reuse.
6. Housing end (Outside)	(b) : 11 N·m (1.1 kgf-m, 8.0 lbf-ft)	

Starter Motor Removal and Installation

B940H21906002

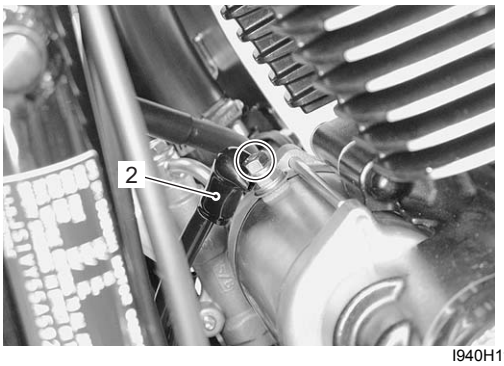
Removal

1) Turn the ignition switch OFF and disconnect the battery (–) lead wire. Refer to “Battery / Battery Holder Removal and Installation in Section 1J (Page 1J-11)”.
2) Remove the radiator heat shield (1).



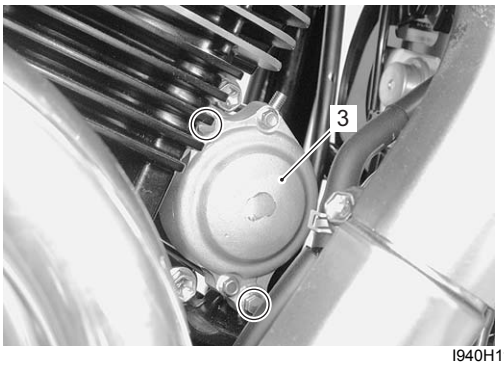
I940H1190001-01

3) Disconnect the starter motor read wire (2).

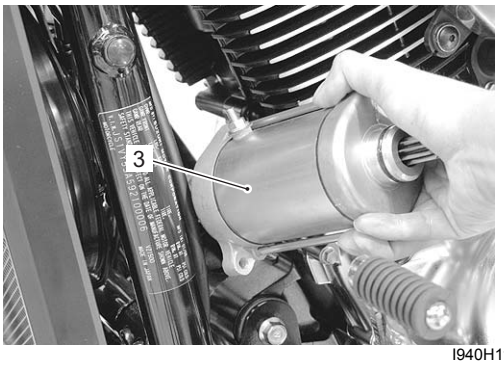


I940H1190002-01

4) Remove the starter motor (3) from the left side of the motorcycle.



I940H1190003-01



I940H1190035-01

Installation

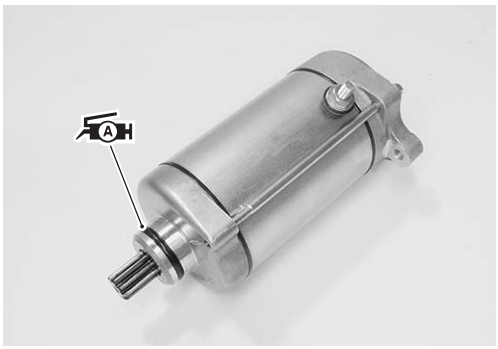
Install the starter motor in the reverse order of removal. Pay attention to the following points:

- Apply grease to the starter motor O-ring.

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

⚠ CAUTION

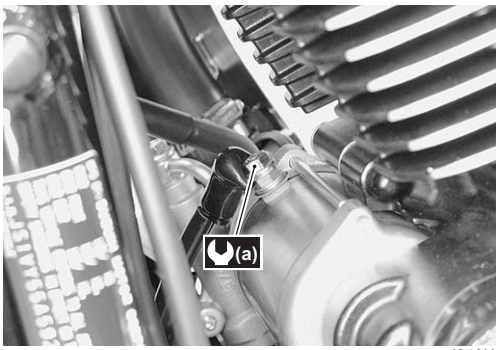
Replace the O-ring with a new one.



I940H1190004-01

- Connect the starter motor lead wire.

Tightening torque
Starter motor lead wire mounting nut (a): 6 N·m (0.6 kgf-m, 4.5 lbf-ft)



I940H1190005-01

- Tighten the starter motor mounting bolt (1) to the specified torque.

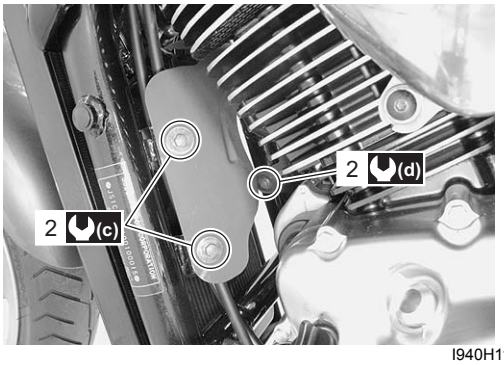
Tightening torque
Starter motor mounting bolt (b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1190006-01

- Tighten the radiator heat shield mounting bolts (2) to the specified torque.

  Tightening torque
  Radiator heat shield mounting bolt (Left side) (c): 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)
  Radiator heat shield mounting bolt (Right side) (d): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1190037-02

Starter Motor Disassembly and Assembly

B940H21906003

Refer to “Starter Motor Removal and Installation (Page 1I-3)”.

Disassembly
Disassemble the starter motor as shown in the starter motor components diagram. Refer to “Starter Motor Components (Page 1I-3)”.

Assembly
Reassemble the starter motor in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

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

- Apply grease to the lip of the oil seal.

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



I940H1190007-01

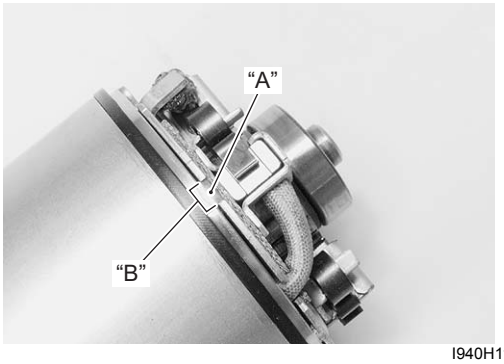
- Apply a small quantity of moly paste to the armature shaft.

  : Moly paste 99000–25140 (SUZUKI Moly paste or equivalent)



I940H1190008-01

- Align the projection “A” on the brush holder with the groove “B” on the starter motor case.

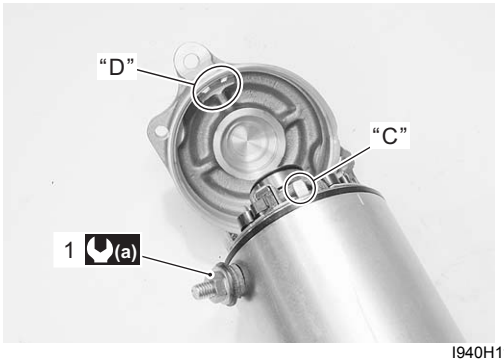


I940H1190009-03

- Tighten the brush holder nut (1) to the specified torque.

  Tightening torque
  Brush holder nut (a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)

- Align the projection “C” on the brush holder with the groove “D” on the housing end.



I940H1190010-01

- Align the match mark on the starter motor case with the match mark on the housing end.
- Tighten the starter motor housing bolts (2).

Tightening torque
Starter motor housing bolt (b): 5 N·m (0.5 kgf-m, 3.5 lbf-ft)



I940H1190011-02

Starter Motor Inspection

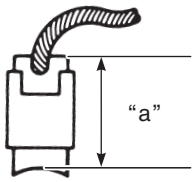
B940H21906004

Refer to “Starter Motor Disassembly and Assembly (Page 1I-5)”.

Carbon Brush
Inspect the carbon brushes for abnormal wear, cracks or smoothness in the brush holder.
If any damages are found, replace the brush assembly with a new one.
Make sure that the length “a” is not less than 6.0 mm (0.24 in). If this length becomes less than 6.0 mm (0.24 in), replace the brush with a new one.

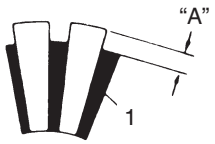
Brush length “a”
Service limit: 6.0 mm (0.24 in)

Special tool
TOOL : 09900–20102 (Vernier calipers (1/20 mm, 200 mm))



I831G1190065-01

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.

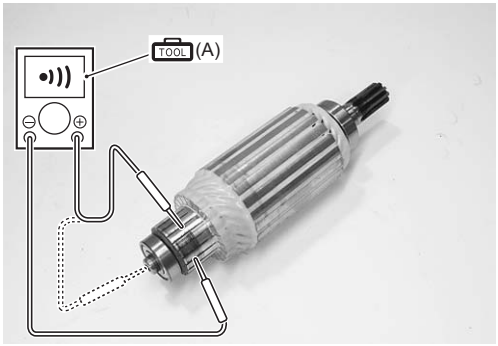


I649G1190016-02

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

Tester knob indication
Continuity set (•))))



I940H1190012-02

Bearing
Inspect the armature shaft bearing for abnormal noise and smooth rotation. If there is anything unusual, replace the armature assembly.



I940H1190013-01

Oil Seal
Check the seal lip for damage.
If any damage is found, replace the housing end (Inside).



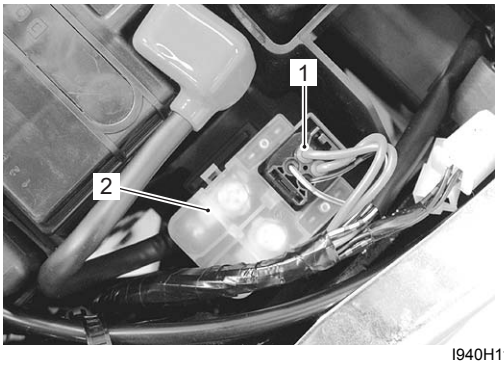
I940H1190014-01

Starter Relay Removal and Installation

B940H21906005

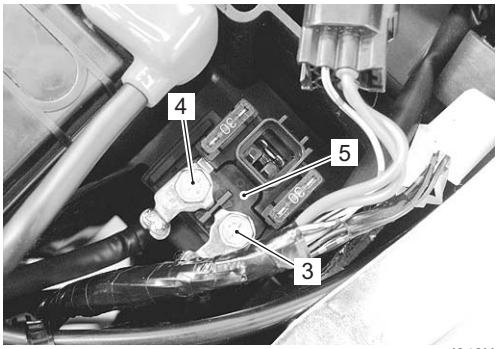
Removal

1) Turn the ignition switch OFF.
2) Remove the seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Disconnect the battery (–) lead wire from the battery.
4) Disconnect the starter relay coupler (1) and remove the starter relay cover (2).



I940H1190015-01

5) Disconnect the starter motor lead wire (3) and battery (+) lead wire (4).
6) Remove the starter relay (5).



I940H1190016-01

Installation
Install the starter relay in the reverse order of removal.

Starter Relay Inspection

B940H21906006

Inspect the starter relay in the following procedures:

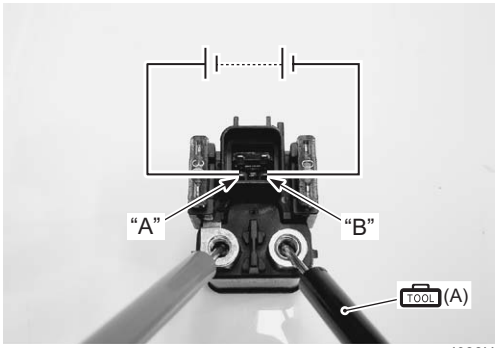
1) Remove the starter relay. Refer to “Starter Relay Removal and Installation (Page 1I-7)”.
2) Apply 12 V to “A” and “B” terminals and check for continuity between the positive and negative terminals using the multi-circuit tester. If the starter relay clicks and continuity is found, the relay is OK.

⚠ CAUTION

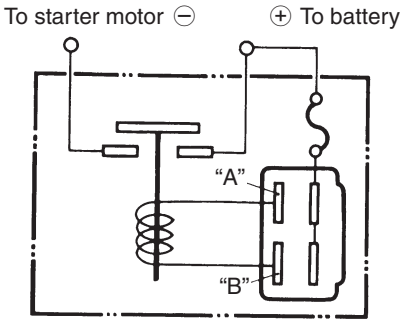
Do not apply battery voltage to the starter relay for five seconds and more, since the relay coil may overheat and get damaged.

Special tool
TOOL (A): 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity test (•)))



I822H1190019-02

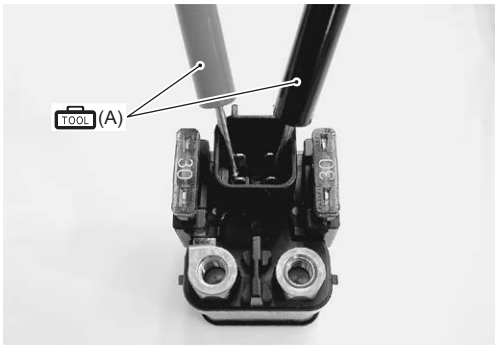


I649G1190022-02

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



I822H1190020-01

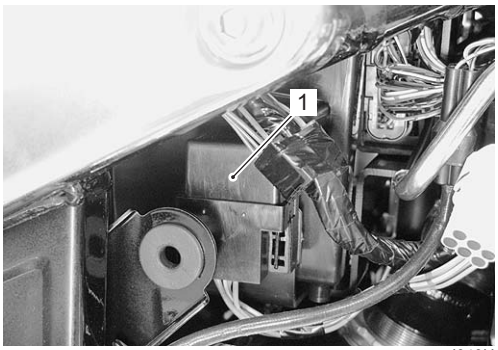
4) Install the starter relay. Refer to “Starter Relay Removal and Installation (Page 1I-7)”.

Turn Signal / Side-stand Relay Removal and Installation

B940H21906007

Removal

1) Turn the ignition switch OFF.
2) Remove the right frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Remove the turn signal/side-stand relay (1).



I940H1190017-01

Installation
Install the turn signal/side-stand relay in the reverse order of removal.

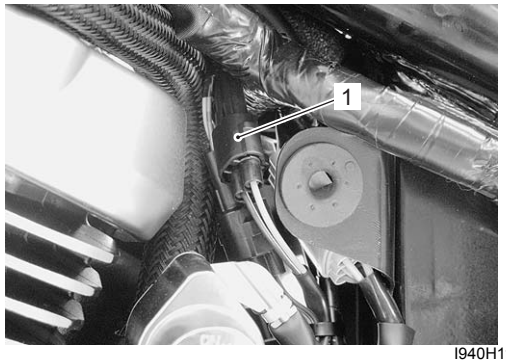
Side-stand / Ignition Interlock System Parts Inspection

B940H21906008

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) Turn the ignition switch OFF.
2) Remove the left frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Disconnect the side-stand switch coupler (1).



I940H1190018-01

4) Measure the voltage between Green and Black/White lead wires.

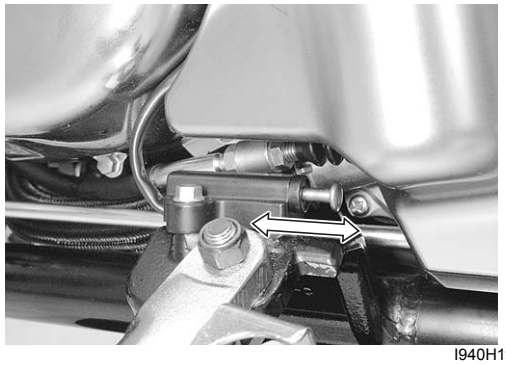
Special tool
: 09900–25008 (Multi-circuit tester set)

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.

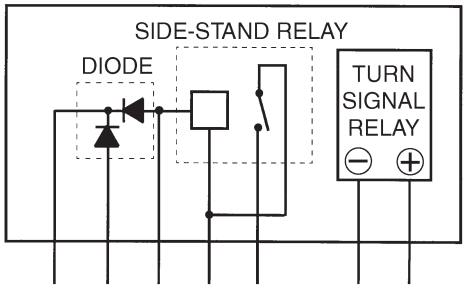


I940H1190019-01

5) Connect the side-stand switch coupler.
6) Install the left frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.

Turn Signal / Side-stand Relay

The turn signal/side-stand relay is composed of the turn signal relay, side-stand relay and diode.



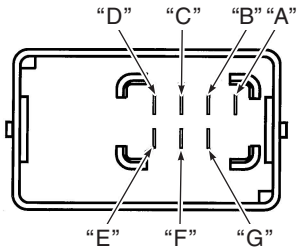
I649G1190027-02

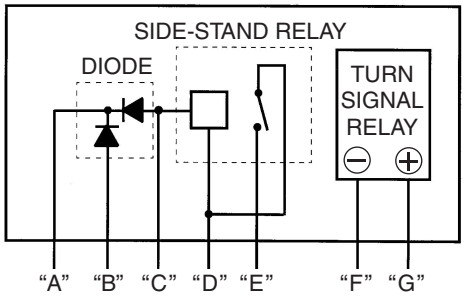
Side-stand relay

1) Remove the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation (Page 1I-8)".
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.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity test (•)))





I649G1190028-02

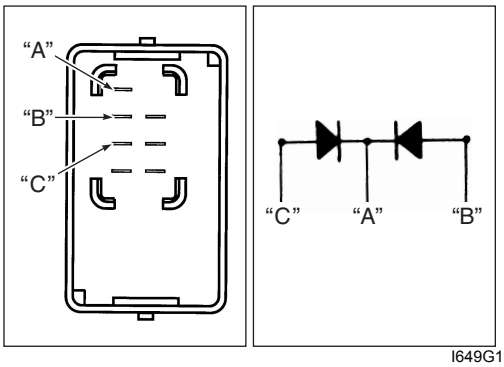
4) Install the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation (Page 1I-8)".

Diode inspection

1) Remove the turn signal/side-stand relay. Refer to "Turn Signal / Side-stand Relay Removal and Installation (Page 1I-8)".
2) Measure the voltage between the "A", "B" and "C" terminals using the multi-circuit tester.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Diode test (⊣◀)



I649G1190029-02

	⊕ Probe of tester to:		
⊖ Probe of tester to:		"B", "C"	"A"
	"B", "C"	—	1.4 V and more (Tester's battery voltage)
	"A"	0.4 – 0.6 V	—

I649G1190046-04

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 (Page 1I-8)".

Gear Position Switch

1) Remove the right frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Disconnect the gear position switch coupler.

⚠ CAUTION

When disconnecting and connecting the gear position switch coupler, make sure to turn off the ignition switch, or electronic parts may get damaged.



I940H1190020-01

3) Check the continuity between Blue and Black/White lead wires with the transmission in “NEUTRAL”.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity test (•))))

	BI	B/W
ON (Neutral)	○	○
OFF (Except neutral)		

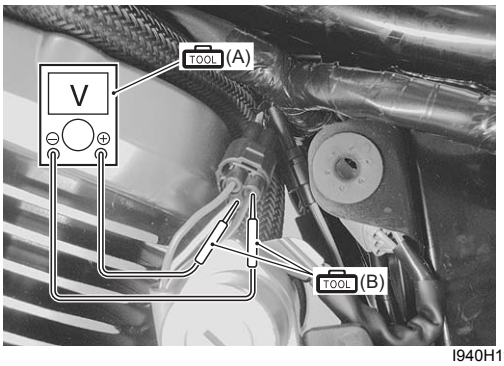
I649G1190045-03

4) Connect the gear position switch coupler to the wiring harness.
5) Insert the needle pointed probes to the lead wire coupler.
6) Turn the ignition switch ON and side-stand to upright position.
7) Measure the voltage between Pink and Black/White lead wires using the multi-circuit tester when shifting the gearshift lever from low to top.

Special tool
TOOL (A): 09900–25008 (Multi-circuit tester set)
TOOL (B): 09900–25009 (Needle pointed probe set)

Tester knob indication
Voltage (⎓)

Gear position switch voltage (Except neutral position)
0.6 V and more ((+) P – (–) B)



I940H1190021-01

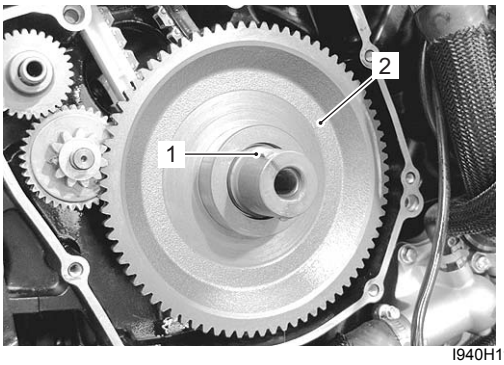
8) Turn the ignition switch OFF.
9) Install the right frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.

Starter Torque Limiter / Starter Clutch Removal and Installation

B940H21906009

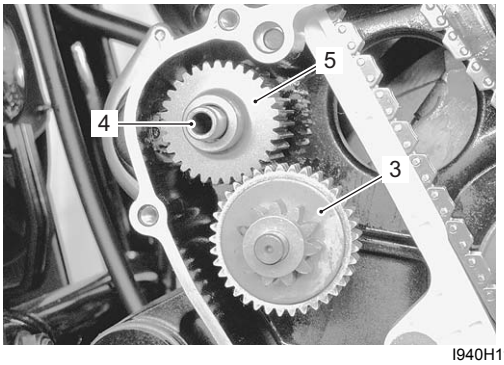
Removal

1) Drain engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.
2) Remove the generator rotor assembly. Refer to “Generator Removal and Installation in Section 1J (Page 1J-5)”.
3) Remove the key (1) and starter driven gear (2).



I940H1190022-01

4) Remove the starter torque limiter (3), idle gear shaft (4) and starter idle gear (5).



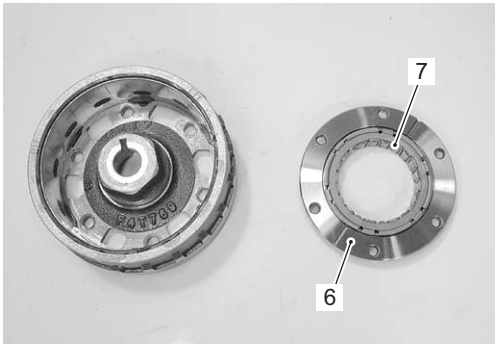
I940H1190023-01

5) Hold the generator rotor and remove the starter clutch bolts.



I940H1190024-01

6) Remove the one way clutch (6) from the guide (7).



I940H1190025-02

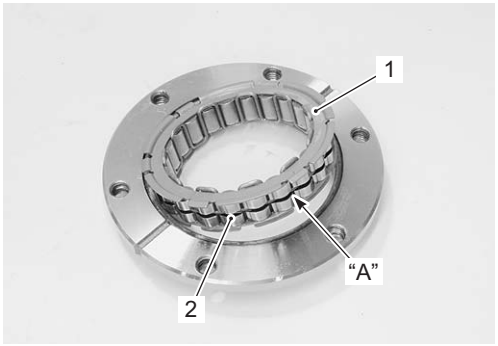
Installation

Install the starter clutch in the reverse order of removal. Pay attention to the following points:

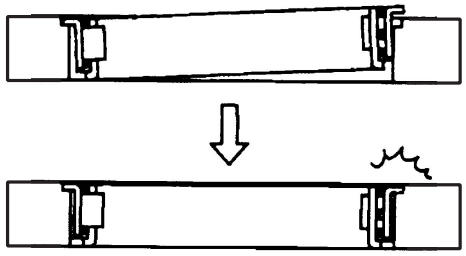
- When inserting the one way clutch (1) into the guide (2), fit the flange “A” in the step of the guide (2).

NOTE

Be sure to seat the flange “A” of the one way clutch (1) to the guide (2).



I940H1190026-01

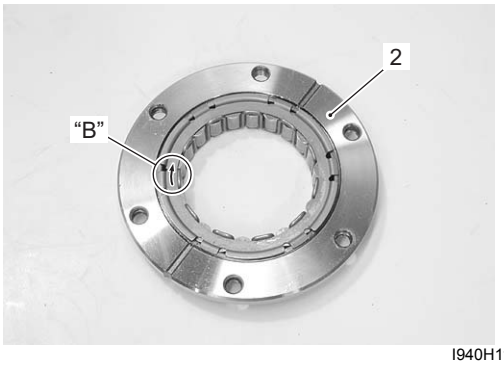


I718H1190031-01

- Install the guide (2) to the generator rotor.

NOTE

The arrow mark “B” must face to the generator rotor side.



I940H1190027-02

- Apply thread lock to the bolts, and then tighten them to the specified torque with the special tool.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Starter clutch bolt (a): 25 N·m (2.5 kgf-m, 18.0 lbf-ft)

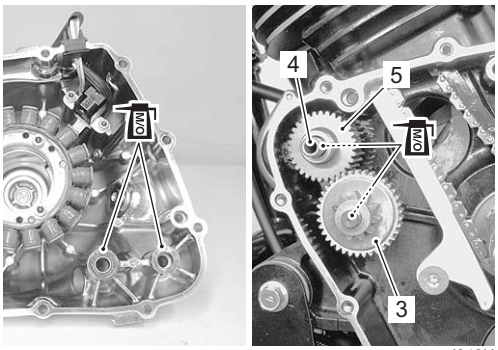


I940H1190028-01

- Apply molybdenum oil solution to the idle gear shaft holes.

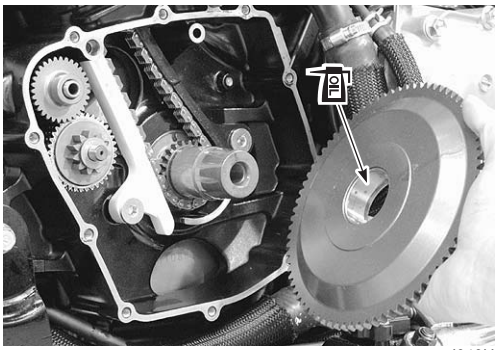
  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

- Install the starter torque limiter (3), idle gear shaft (4) and starter idle gear (5).



I940H1190029-01

- Apply engine oil to the bushing of the starter driven gear.



I940H1190030-01

- Install the generator rotor assembly onto crankshaft. Refer to “Generator Removal and Installation in Section 1J (Page 1J-5)”.

Starter Torque Limiter Inspection

B940H21906010

⚠ CAUTION

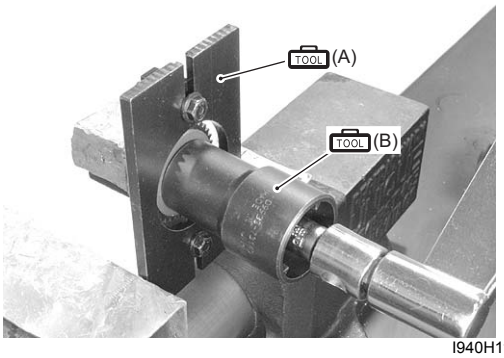
- **Do not attempt to disassemble the starter torque limiter.**
- **The starter torque limiter is available only as an assembly part.**

1) Hold the starter torque limiter with the special tools and vise.

   Special tool
   TOOL (A): 09930–73170 (Starter torque limiter holder)
   TOOL (B): 09930–73140 (Starter torque limiter socket)

2) Turn the starter torque limiter with a torque wrench and check the slip torque. If the slip torque is not within the specification, replace the starter torque limiter with a new one.

   Starter torque limiter slip torque
   Standard: 19.6 – 39.2 N·m (1.96 – 3.92 kgf-m, 14.0 – 28.5 lbf-ft)



I940H1190031-01

Starter Clutch Inspection

B940H21906011

Refer to “Starter Torque Limiter / Starter Clutch Removal and Installation (Page 1I-10)”.

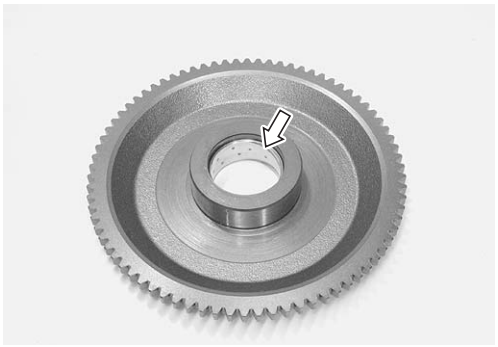
Starter Clutch

1) Install the starter driven gear onto the starter clutch.
2) Turn the starter driven gear by hand to inspect the starter clutch for a smooth movement. The gear turns in one direction only. If a large resistance is felt for rotation, inspect the starter clutch or the starter clutch contacting surface on the starter driven gear for wear or damage.
   If they are found to be damaged, replace them with new ones.



I940H1190032-01

Starter Driven Gear Bearing
Inspect the starter driven gear bushing for wear or damage.



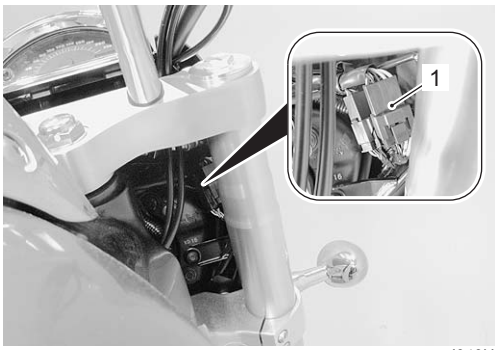
I940H1190033-01

Starter Button Inspection

B940H21906012

Inspect the starter button in the following procedures:

1) Remove the headlight assembly.
   Refer to “Headlight Removal and Installation in Section 9B (Page 9B-2)”.
2) Disconnect the right handlebar switch coupler (1).



I940H1190036-01

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 (Page 6B-1)”.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity (•))))

Position \ Color	O/W	Y/G
•		
PUSH	○	○

I822H1190042-01

4) After finishing the starter button inspection, reinstall the removed parts.

Specifications

Service Data

B940H21907001

Unit: mm (in)

Item	Specification		Note
Starter motor brush length	Standard	12.5 (0.49)	
	Limit	6.0 (0.24)	
Starter torque limiter slip torque	Standard	19.6 – 39.2 N·m (1.96 – 3.92 kgf-m, 14.0 – 28.5 lbf-ft)	
Starter relay resistance	3 – 6 Ω		

Tightening Torque Specifications

B940H21907002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Starter motor lead wire mounting nut	6	0.6	4.5	☞(Page 1I-4)
Starter motor mounting bolt	10	1.0	7.0	☞(Page 1I-4)
Radiator heat shield mounting bolt (Left side)	5.5	0.55	4.0	☞(Page 1I-5)
Radiator heat shield mounting bolt (Right side)	10	1.0	7.0	☞(Page 1I-5)
Brush holder nut	11	1.1	8.0	☞(Page 1I-5)
Starter motor housing bolt	5	0.5	3.5	☞(Page 1I-6)
Starter clutch bolt	25	2.5	18.0	☞(Page 1I-11)

NOTE

The specified tightening torque is described in the following.
“Starter Motor Components (Page 1I-3)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H21908001

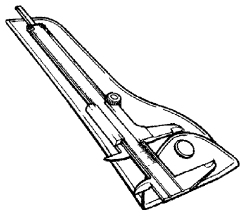
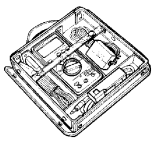
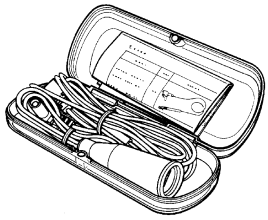
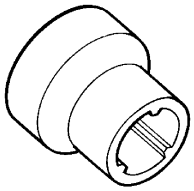
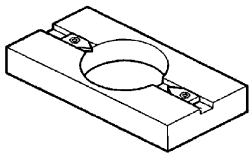
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 1I-4) / ☞(Page 1I-5)
Moly paste	SUZUKI Moly paste or equivalent	P/No.: 99000–25140	☞(Page 1I-5)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 1I-12)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 1I-11)

NOTE

Required service material is also described in the following.
“Starter Motor Components (Page 1I-3)”

Special Tool

B940H21908002

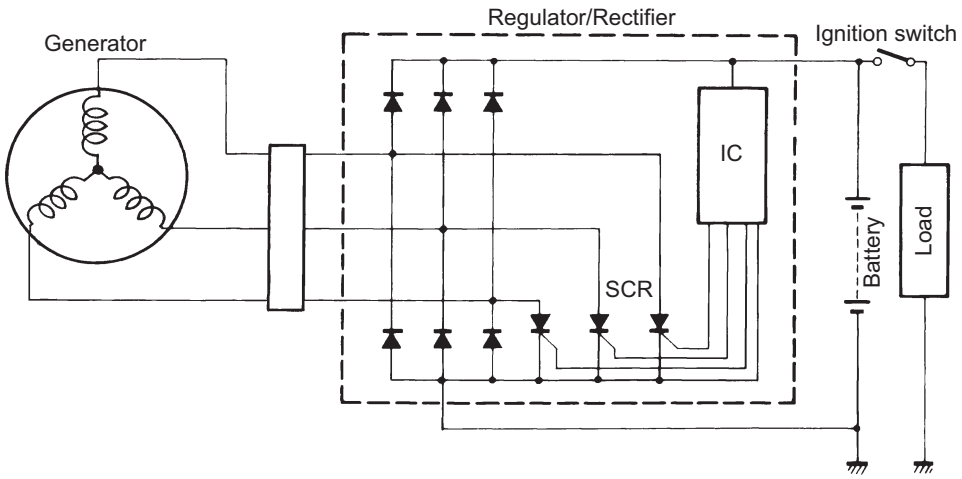
09900–20102 Vernier calipers (1/20 mm, 200 mm) ☞(Page 1I-6) 	09900–25008 Multi-circuit tester set ☞(Page 1I-6) / ☞(Page 1I-7) / ☞(Page 1I-8) / ☞(Page 1I-8) / ☞(Page 1I-9) / ☞(Page 1I-9) / ☞(Page 1I-10) / ☞(Page 1I-10) / ☞(Page 1I-13) 
09900–25009 Needle pointed probe set ☞(Page 1I-10) 	09930–73140 Starter torque limiter socket ☞(Page 1I-12) 
09930–73170 Starter torque limiter holder ☞(Page 1I-12) 	

Charging System

Schematic and Routing Diagram

Charging System Diagram

B940H21A02001



I940H11A0026-03

Component Location

Charging System Components Location

B940H21A03001

Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.

Diagnostic Information and Procedures

Charging System Symptom Diagnosis

B940H21A04001

Condition	Possible cause	Correction / Reference Item
Generator does not charge	Open- or short-circuited lead wires, or loose lead connections.	*Repair, replace or connect properly.*
	Short-circuited, grounded or open generator coil.	*Replace.*
	Short-circuited or punctured regulator/ rectifier.	*Replace.*
Generator does charge, but charging rate is below the specification	Lead wires tend to get short- or open-circuited or loosely connected at terminals.	*Repair or retighten.*
	Grounded or open-circuited generator coil.	*Replace.*
	Defective regulator/rectifier.	*Replace.*
	Defective cell plates in the battery.	*Replace the battery.*
Generator overcharges	Internal short-circuit in the battery.	*Replace the battery.*
	Damaged or defective regulator/rectifier.	*Replace.*
	Poorly grounded regulator/rectifier.	*Clean and tighten ground connection.*
Unstable charging	Lead wire insulation frayed due to vibration, resulting in intermittent short-circuiting.	*Repair or replace.*
	Internally short-circuited generator.	*Replace.*
	Defective regulator/rectifier.	*Replace.*
Battery overcharges	Faulty regulator/rectifier.	*Replace.*
	Faulty battery.	*Replace.*
	Poor contact of generator lead wire coupler.	*Repair.*
Battery runs down quickly	Trouble in charging system.	*Check the generator, regulator/rectifier and circuit connections and make necessary adjustments to obtain specified charging operation.*
	Cell plates have lost much of their active materials a result of overcharging.	*Replace the battery and correct the charging system.*
	Internal short-circuit in the battery.	*Replace the battery.*
	Too low battery voltage.	*Recharge the battery fully.*
	Too old battery.	*Replace the battery.*
Battery "sulfation"	Incorrect charging rate. (When not in use battery should be checked at least once a month to avoid sulfation.)	*Replace the battery.*
	The battery was left unused in a cold climate for too long.	*Replace the battery if badly sulfated.*
"Sulfation", acidic white powdery substance or spots on surface of cell plates	Cracked battery case.	*Replace the battery.*
	Battery has been left in a run-down condition for a long time.	*Replace the battery.*

Battery Runs Down Quickly

B940H21A04002

Troubleshooting

Step	Action	Yes	No
1	Check accessories which use excessive amounts of electricity. *Are accessories being installed?*	Remove accessories.	Go to Step 2.
2	Check the battery for current leakage. Refer to “Battery Current Leakage Inspection (Page 1J-3)”. *Is the battery for current leakage OK?*	Go to Step 3.	• Short circuit of wire harness. • Faulty electrical equipment.
3	Measure the regulated voltage between the battery terminals. Refer to “Regulated Voltage Inspection (Page 1J-4)”. *Is the regulated voltage OK?*	• Faulty battery. • Abnormal driving condition.	Go to Step 4.
4	Measure the resistance of the generator coil. Refer to “Generator Inspection (Page 1J-4)”. *Is the resistance of generator coil OK?*	Go to Step 5.	• Faulty generator coil. • Disconnected lead wires.
5	Measure the generator no-load performance. Refer to “Generator Inspection (Page 1J-4)”. *Is the generator no-load performance OK?*	Go to Step 6.	Faulty generator.
6	Inspect the regulator/rectifier. Refer to “Regulator / Rectifier Inspection (Page 1J-8)”. *Is the regulator/rectifier OK?*	Go to Step 7.	Faulty regulator/rectifier.
7	Inspect wirings. *Is the wirings OK?*	Faulty battery.	• Short circuit of wire harness. • Poor contact of couplers.

Repair Instructions

Battery Current Leakage Inspection

B940H21A06001

Inspect the battery current leakage in the following procedures:

1) Turn the ignition switch OFF.
2) Remove the seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
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.

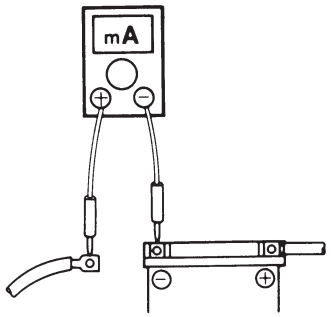
⚠ CAUTION

- **In case of a large current leak, turn the tester to high range first to avoid tester damage.**
- **Do not turn the ignition switch to ON position when measuring current.**

Special tool
TOOL (A): 09900–25008 (Multi-circuit tester set)

Tester knob indication
Current (⎓ , 20 mA)

Battery current (Leak)
Under 3 mA



I649G11A0002-02

5) Connect the battery (–) terminal and install the seat. Refer to “Battery / Battery Holder Removal and Installation (Page 1J-11)” and “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.

Regulated Voltage Inspection

B940H21A06002

Inspect the regulated voltage in the following procedures:

1) Remove the seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Connect the special tool to the high-tension cord.

Special tool
TOOL : 09900–26006 (Engine tachometer (solar cell type))

3) Start the engine and keep it running at 5 000 r/min with the dimmer switch turned HI position.
4) Measure the DC voltage between the battery (+) and (–) terminals using the multi-circuit tester. If the voltage is not within the specified value, inspect the generator and regulator/rectifier. Refer to “Generator Inspection (Page 1J-4)” and “Regulator / Rectifier Inspection (Page 1J-8)”.

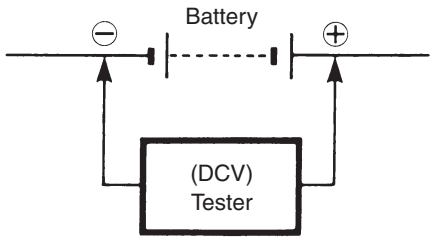
NOTE

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

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Voltage (⎓)

Regulated voltage (Charging output)
Standard: 13.5 – 15.5 V at 5 000 r/min



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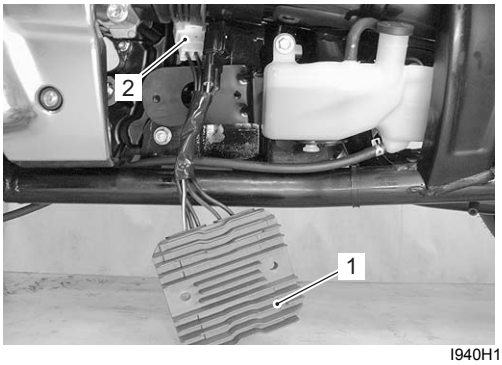
5) Install the seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.

Generator Inspection

B940H21A06003

Generator Coil Resistance

1) Remove the left frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the regulator/rectifier (1) from the bracket.
3) Disconnect the generator coupler (2).



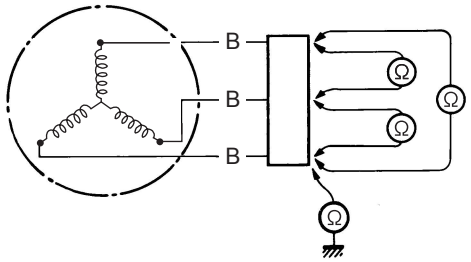
I940H11A0001-03

4) Measure the resistance between the three lead wires.
If the resistance is out of specified value, replace the stator with a new one. Also, check that the generator core is insulated properly.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Resistance (Ω)

Generator coil resistance
0.2 – 0.6 Ω (B – B)
∞ Ω (B – Ground)



I827H11A0003-02

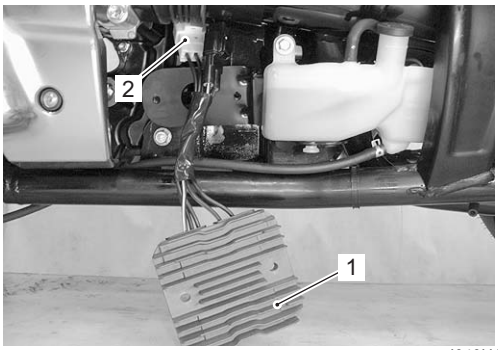
5) Connect the generator coupler.

No-load Performance

1) Remove the left frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the regulator/rectifier (1) from the bracket.
3) Disconnect the generator coupler (2).

4) Connect the special tool to the high-tension cord.

Special tool
(TOOL) : 09900–26006 (Engine tachometer (solar cell type))



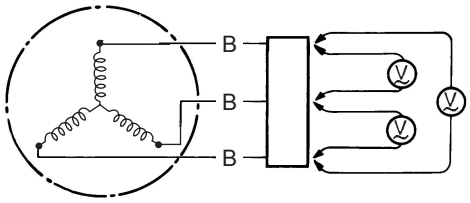
I940H11A0001-03

5) Start the engine and keep it running at 5 000 r/min.
6) Using the multi-circuit tester, measure the voltage between three lead wires.
If the tester reads under the specified value, replace the generator with a new one.

Special tool
(TOOL) : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Voltage (~)

Generator no-load performance (When engine is cold)
80 V (AC) and more at 5 000 r/min



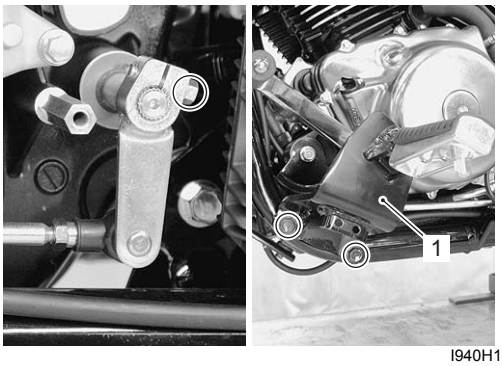
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Generator Removal and Installation

B940H21A06004

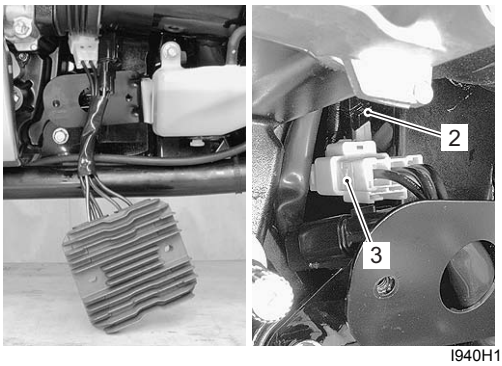
Removal

1) Disconnect the battery (–) lead wire. Refer to "Battery / Battery Holder Removal and Installation (Page 1J-11)".
2) Drain engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-8)".
3) Remove the left frame lower cover and secondary gear case cover. Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-5)".
4) Remove the left foot rest (1) along with the gearshift lever.



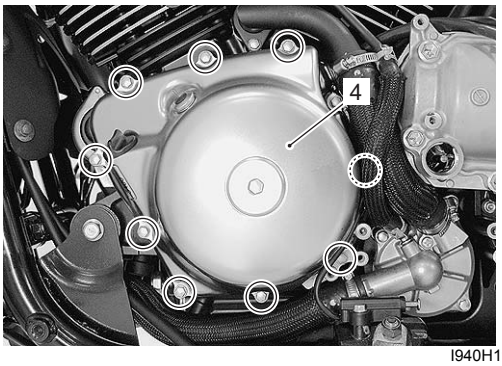
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5) Remove the clutch release assembly. Refer to "Clutch Release Assembly / Push Rod Removal and Installation in Section 5C (Page 5C-2)".
6) Remove the regulator/rectifier and disconnect the CKP sensor coupler (2) and generator coupler (3).



I940H11A0005-02

7) Remove the generator cover (4).



I940H11A0006-03

8) Remove the gasket (5) and dowel pins.

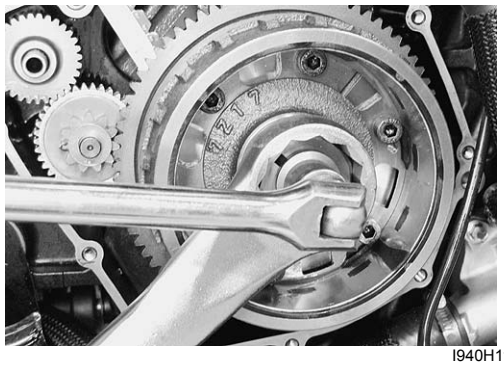


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9) Loosen the generator rotor bolt.

NOTE

When loosen the rotor bolt, do not remove it. The rotor bolt is used in conjunction with the rotor remover when removing the rotor.



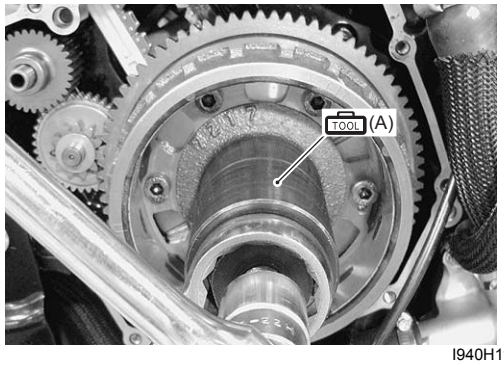
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10) Remove the generator rotor assembly with the special tool.

NOTE

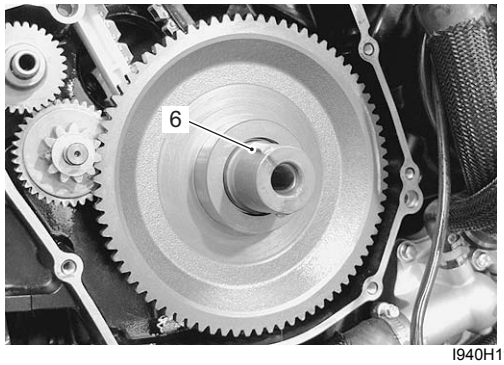
Remove the starter clutch if necessary. Refer to "Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)".

Special tool
TOOL (A): 09930–30721 (Rotor remover)



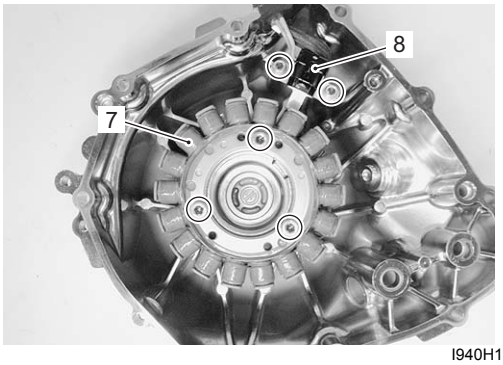
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11) Remove the key (6).



I940H11A0010-01

12) Remove the generator stator (7) along with the CKP sensor (8).



I940H11A0011-02

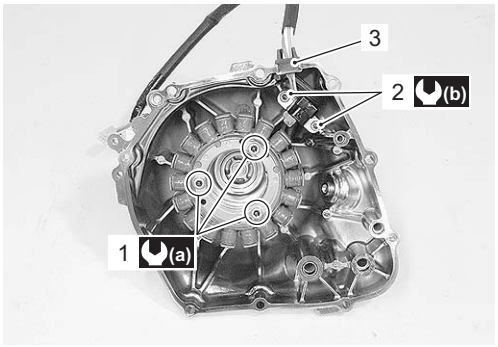
Installation
Install the generator in the reverse order of removal. Pay attention to the following points:

- Tighten the generator starter set bolts (1) and CKP sensor mounting bolts (2) to the specified torque.

NOTE

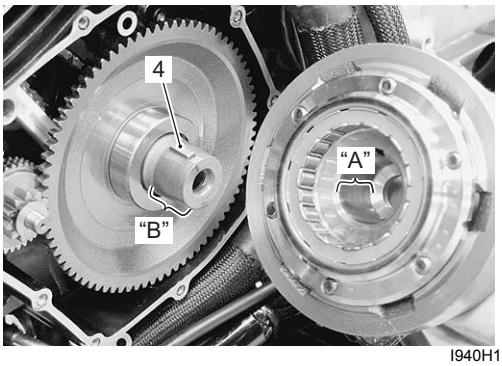
Be sure the grommet (3) is set to the generator cover.

Tightening torque
Generator stator set bolt (a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)
CKP sensor mounting bolt (b): 5.5 N·m (0.55 kgf-m, 4.0 lbf-ft)



I940H11A0002-02

- Degrease the tapered portion “A” of generator rotor and also the crankshaft “B”. Use nonflammable cleaning solvent to wipe off oily or greasy matter and make these surfaces completely dry.
- Fit the key (4) in the key slot on the crankshaft.
- Install the generator rotor onto crankshaft.



I940H11A0012-01

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

Tightening torque
Generator rotor bolt (c): 160 N·m (16.0 kgf-m, 115.5 lbf-ft)



I940H11A0013-01

- Apply molybdenum oil solution to the idle gear shaft holes.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

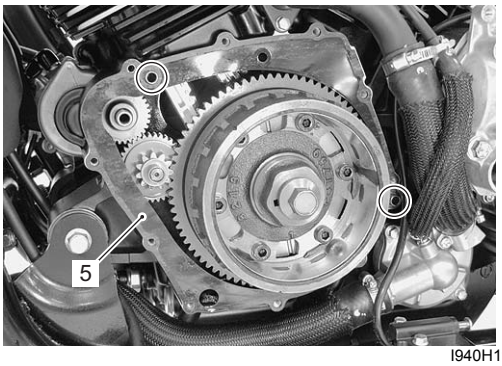


I940H11A0014-02

- Install the dowel pins and new gasket (5).

⚠ CAUTION

Use a new gasket to prevent oil leakage.



I940H11A0015-01

- Install the generator cover and tighten the generator cover bolts.

⚠ WARNING

Be careful not to pinch the finger between the generator cover and the crankcase.


I940H11A0016-01

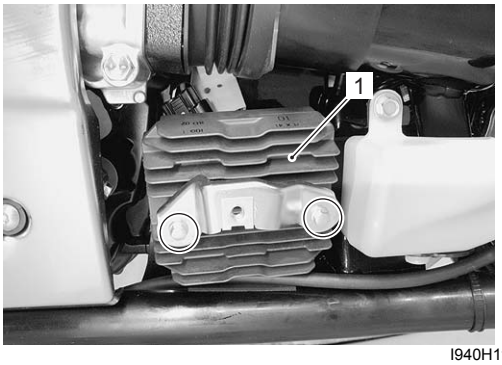
- Install the gearshift lever. Refer to “Gearshift Lever Removal and Installation in Section 5B (Page 5B-11)”.

Regulator / Rectifier Inspection

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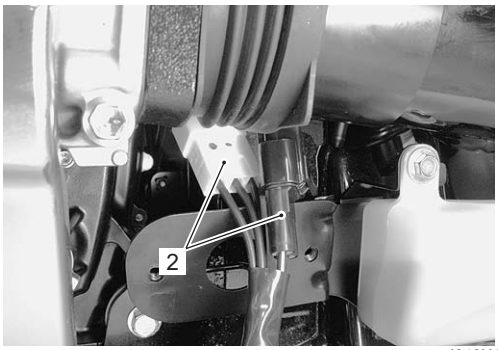
Inspect the regulator/rectifier in the following procedures:

1) Turn the ignition switch to OFF position.
2) Remove the left frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Remove the regulator/rectifier (1).



I940H11A0017-02

4) Disconnect the regulator/rectifier couplers (2).



I940H11A0018-02

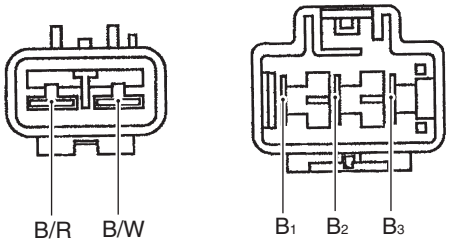
5) Measure the voltage between the terminals using the multi-circuit tester as indicated in the following table. If the voltage is not within the specified value, replace the regulator/rectifier with a new one.

NOTE

If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Diode test (⊣◀)



I822H11A0019-01

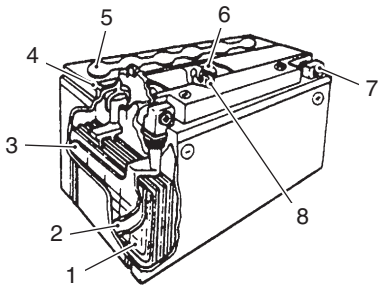
Unit: V

		(+) probe of tester to:				
		B/R	B/W	B_1	B_2	B_3
(–) probe of tester to:	B/R	—	0.3 – 1.0	0.1 – 0.8	0.1 – 0.8	0.1 – 0.8
	B/W	*	—	*	*	*
	B_1	*	0.1 – 0.8	—	*	*
	B_2	*	0.1 – 0.8	*	—	*
	B_3	*	0.1 – 0.8	*	*	—
*1.4 V and more (tester’s battery voltage)						

6) Connect the regulator/rectifier couplers and bind the clamp.

Battery Components

B940H21A06006



I649G11A0046-03

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

B940H21A06007

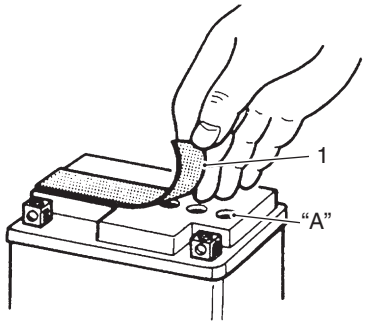
Initial Charging

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”.

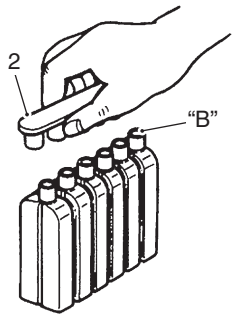


I649G11A0039-03

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.**



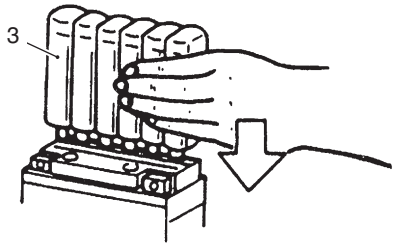
I649G11A0040-03

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.

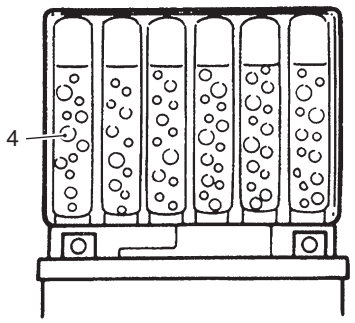
NOTE

Do not allow any of the electrolyte to spill.



I649G11A0041-03

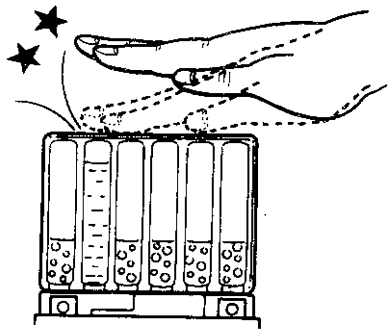
5) Make sure that air bubbles (4) rise to the top of each electrolyte container, and leave in this position for about more than 20 minutes.



I649G11A0042-03

NOTE

If no air bubbles come out from a filler port, tap the bottom of the electrolyte container two or three times.
Never remove the container from the battery.

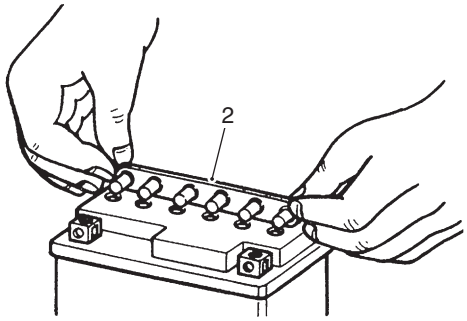


I310G11A0024-01

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 (2) 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.

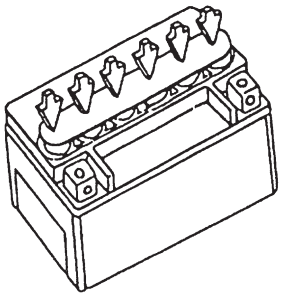
⚠ CAUTION

- **Once the caps are installed to the battery, do not remove the caps.**
- **Do not tap the caps with a hammer when installing them.**

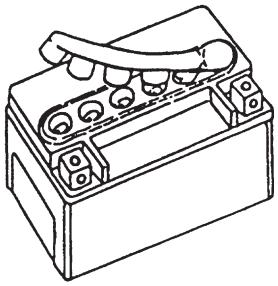


I718H11A0027-01

Correct



Incorrect



I649G11A0047-02

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 / Battery Holder Removal and Installation (Page 1J-11)".

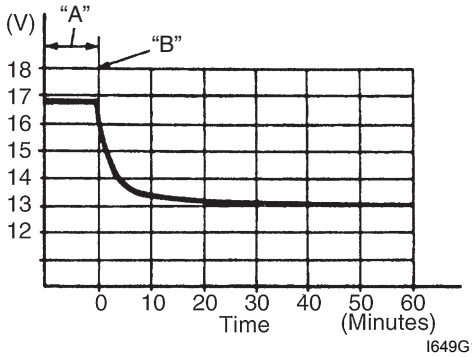
2) Measure the battery voltage using the multi-circuit tester.
If the voltage reading is less than the 12 V (DC), recharge the battery with a battery charger.

Recharging time
1.8 A for 5 to 10 hours or 9 A for 1 hour

⚠ CAUTION

Be careful not to permit the charging current to exceed 9 A at any time.

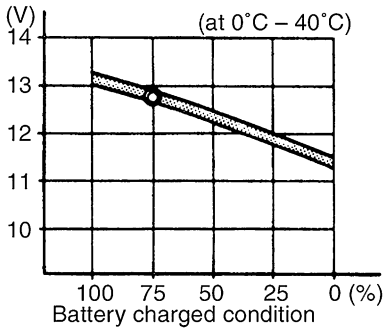
3) After recharging, wait at least 30 minutes and then measure the battery voltage using the multi-circuit tester.
If the battery voltage is less than 12.5 V, recharge the battery again.
If the battery voltage is still less than 12.5 V after recharging, replace the battery with a new one.



I649G11A0045-02

"A": Charging period	"B": Stop charging

4) Install the battery to the motorcycle. Refer to "Battery / Battery Holder Removal and Installation (Page 1J-11)".



I705H11A0029-02

Battery / Battery Holder Removal and Installation

B940H21A06008

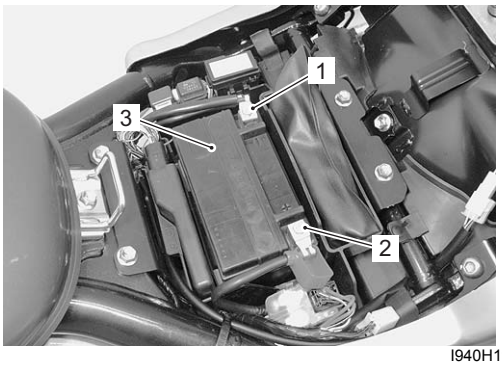
Removal

1) Remove the seat. Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-5)".
2) Disconnect the battery (–) lead wire (1).
3) Disconnect the battery (+) lead wire (2).

NOTE

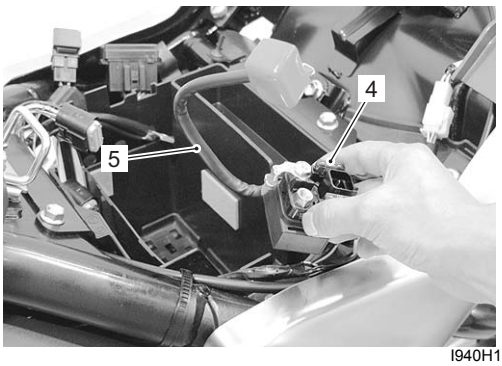
Be sure to disconnect the battery (–) lead wire (1) first, then disconnect the battery (+) lead wire (2).

4) Remove the battery (3) from the motorcycle.



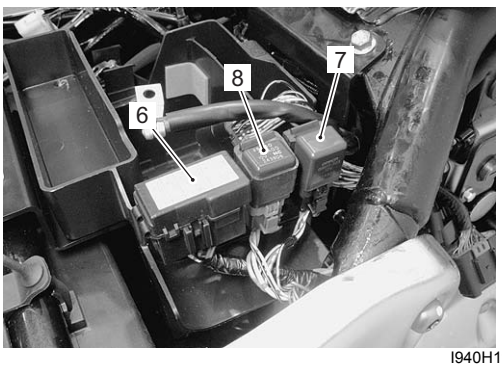
I940H11A0019-01

5) Remove the ECM. Refer to "ECM Removal and Installation in Section 1C (Page 1C-1)".
6) Remove the starter relay (4) along with the (+) lead wire (5). Refer to "Starter Relay Removal and Installation in Section 1I (Page 1I-7)".



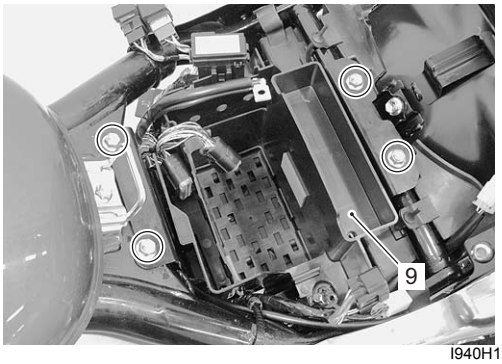
I940H11A0020-01

7) Remove the fuse box (6), fuel pump relay (7) and headlight relay (8).



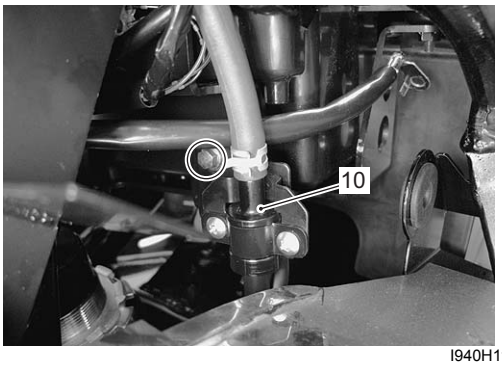
I940H11A0021-02

8) Remove the side stand relay. Refer to “Turn Signal / Side-stand Relay Removal and Installation in Section 1I (Page 1I-8)”.
9) Lift the battery holder (9) by removing the bolts.



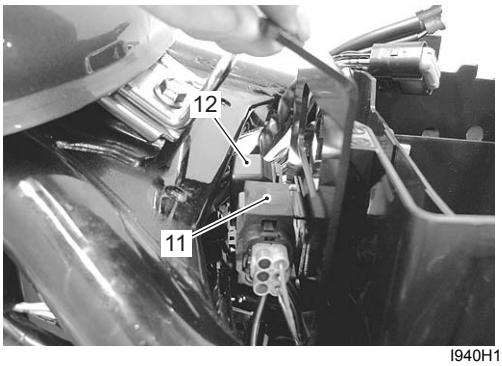
I940H11A0022-01

10) Remove the shut-off valve (10).



I940H11A0023-01

11) Remove the TO sensor (11) and cooling fan relay (12).



I940H11A0024-02

Installation
Install the battery holder and battery in the reverse order of removal. Pay attention to the following points:

- Install the battery.

⚠ CAUTION

Never use anything except the specified battery.

- Tighten the battery lead wire mounting bolts securely.


I940H11A0025-01

Battery Visual Inspection

B940H21A06009

Inspect the battery in the following procedures:

1) Remove the seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
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 (Page 9D-5)”.

Specifications

Service Data

B940H21A07001

Electrical

⚠ CAUTION

Never use anything except the specified battery.

Unit: mm (in)

Item		Specification	Note
Generator coil resistance		0.2 – 0.6 Ω	
Generator maximum output		Approx. 425 W at 5 000 r/min	
Generator no-load voltage (When engine is cold)		80 V (AC) and more at 5 000 r/min	
Regulated voltage		13.5 – 15.5 V at 5 000 r/min	
Battery	Type designation	FTZ16-BS	
	Capacity	12 V 64.8 kC (18 Ah)/10 HR	

Tightening Torque Specifications

B940H21A07002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Generator stator set bolt	11	1.1	8.0	☞(Page 1J-6)
CKP sensor mounting bolt	5.5	0.55	4.0	☞(Page 1J-6)
Generator rotor bolt	160	16.0	115.5	☞(Page 1J-7)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

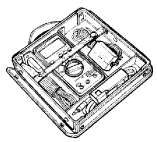
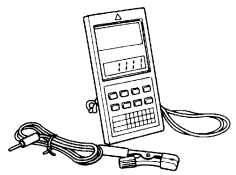
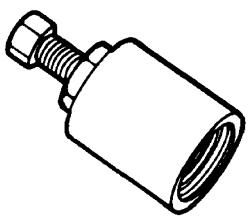
Recommended Service Material

B940H21A08001

Material	SUZUKI recommended product or Specification		Note
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 1J-7)

Special Tool

B940H21A08002

09900–25008 Multi-circuit tester set ☞(Page 1J-3) / ☞(Page 1J-4) / ☞(Page 1J-4) / ☞(Page 1J-5) / ☞(Page 1J-8) 	09900–26006 Engine tachometer (solar cell type) ☞(Page 1J-4) / ☞(Page 1J-5) 
09930–30721 Rotor remover ☞(Page 1J-6) 	

Exhaust System

Precautions

Precautions for Exhaust System

B940H21B00001

⚠ WARNING

To avoid the risk 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.

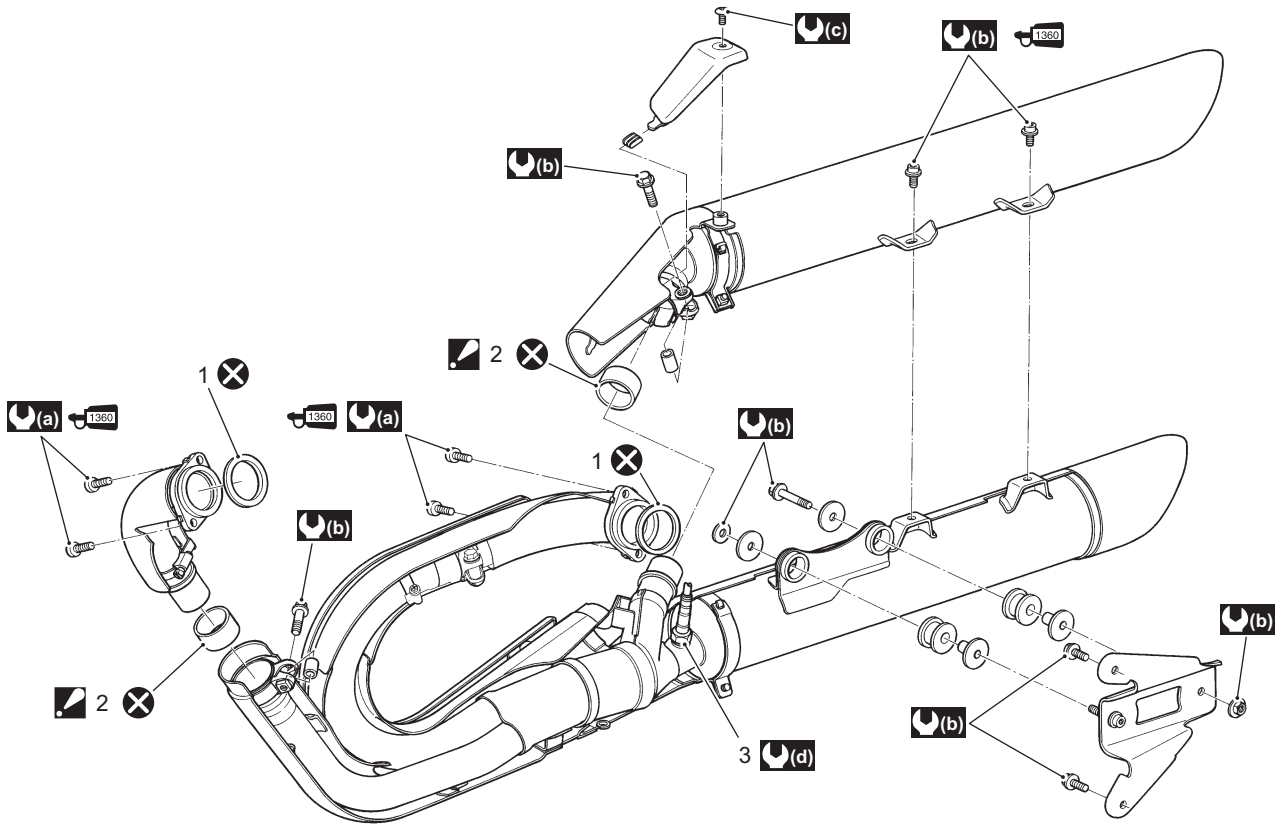
⚠ CAUTION

Make sure that the exhaust pipes and muffler have enough clearance from the rubber parts and plastic parts to avoid melting.

Repair Instructions

Exhaust System Construction

B940H21B06001



I940H11B0017-01

1. Gasket	(c) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
2. Connector : Chamfer side should face muffler side.	(d) : 48 N·m (4.8 kgf-m, 34.5 lbf-ft)
3. HO2 sensor (For E-02, 19, 24, 33)	1360 : Apply thread lock to the thread part.
(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	⊗ : Do not reuse.
(b) : 26 N·m (2.6 kgf-m, 19.0 lbf-ft)	

⚠ CAUTION

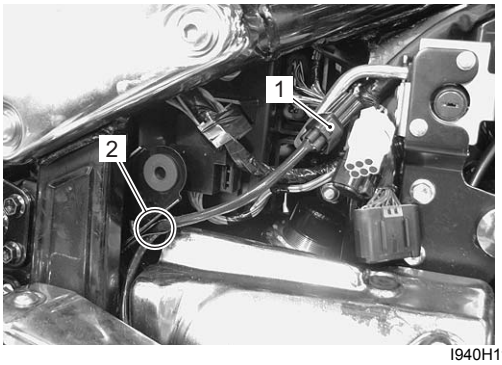
Replace the gaskets and connectors with new ones when reassembling.

Exhaust Pipe / Muffler Removal and Installation

B940H21B06002

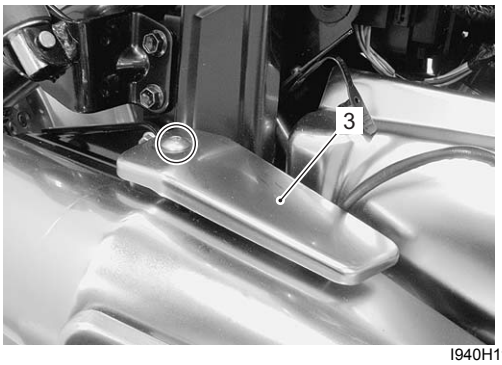
Removal

1) Remove the right frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Disconnect the HO2 sensor lead wire coupler (1) and remove the clamp (2).



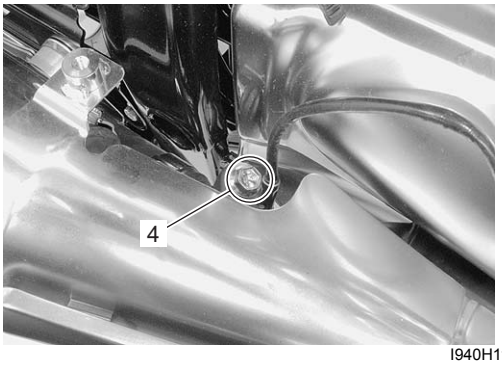
I940H11B0002-02

3) Remove the rear muffler upper cover (3).



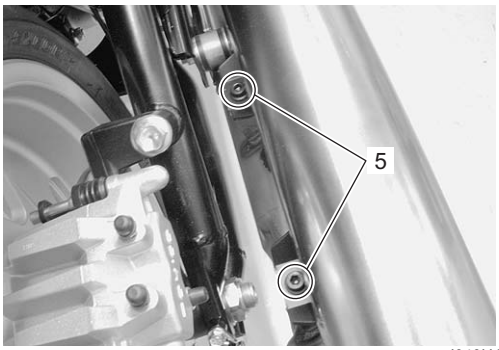
I940H11B0003-01

4) Loosen the muffler connecting bolt (4).



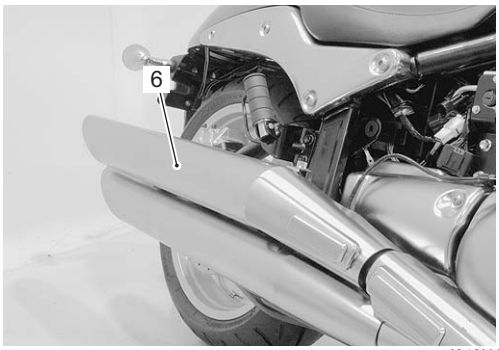
I940H11B0004-01

5) Remove the muffler joint bolts (5).



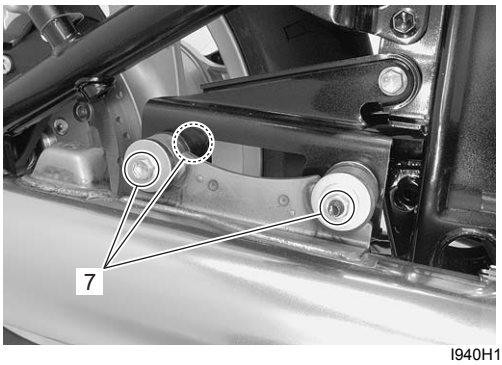
I940H11B0005-01

6) Remove the rear muffler (6).



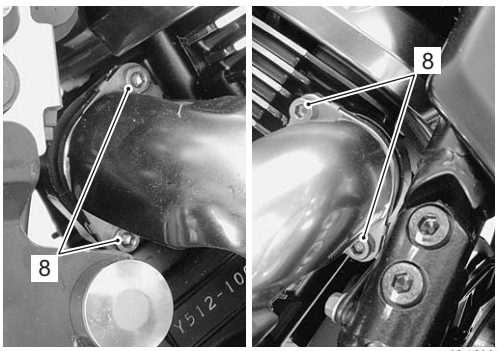
I940H11B0006-01

7) Remove the muffler support bolt and nut (7).



I940H11B0007-01

8) Remove the exhaust pipe bolts (8).



I940H11B0008-01

9) Remove the front muffler (9) along with the exhaust pipe.



I940H11B0009-01

10) Remove the front exhaust pipe (10).

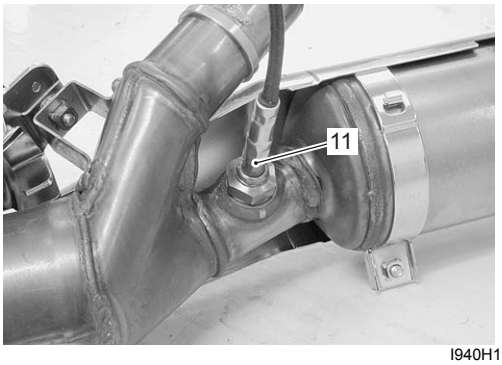


I940H11B0016-01

11) Remove the HO2 sensor (11) from the exhaust pipe.

⚠ CAUTION

- **Be careful not to expose it to an excessive shock.**
- **Be careful not to twist or damage the sensor lead wire.**



I940H11B0010-02

Installation

Installation is in the reverse order of removal. Pay attention to the following points:

- Tighten the HO2 sensor to the specified torque.

  Tightening torque
  HO2 sensor (a): 48 N·m (4.8 kgf-m, 34.5 lbf-ft)

⚠ CAUTION

- **Be careful not to expose it to an excessive shock.**
- **Do not use an impact wrench when installing the HO2 sensor.**
- **Be careful not to twist or damage the sensor lead wires.**
- **Do not apply oil or other materials to the sensor air hole.**



I940H11B0011-01

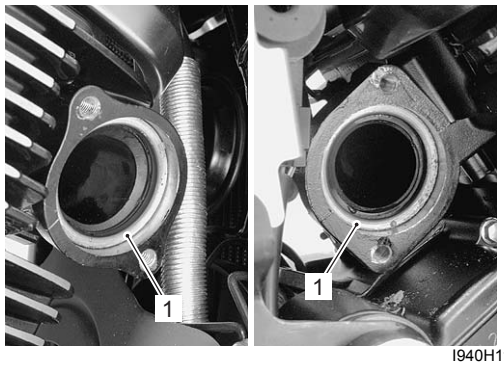
- Install the exhaust pipe gaskets (1) and connector (2).

⚠ CAUTION

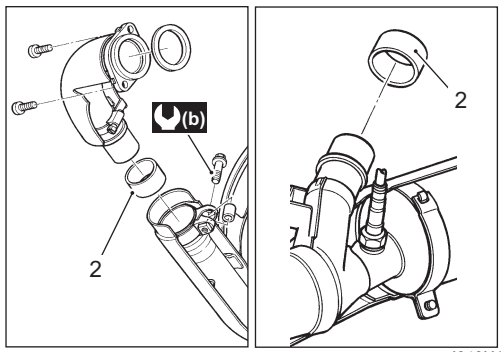
Replace the gaskets and connector with new ones.

- Tighten the front muffler connecting bolt to the specified torque.

  Tightening torque
  Muffler connecting bolt (Front) (b): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



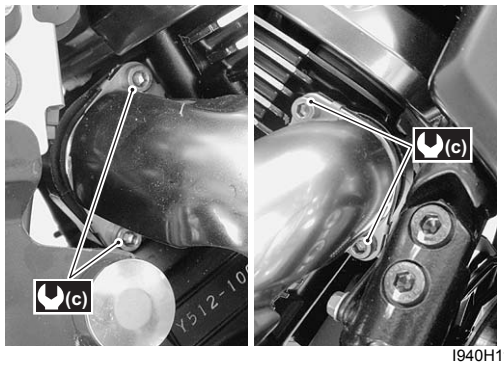
I940H11B0012-01



I940H11B0015-03

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

  Tightening torque
  Exhaust pipe bolt (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I940H11B0013-02

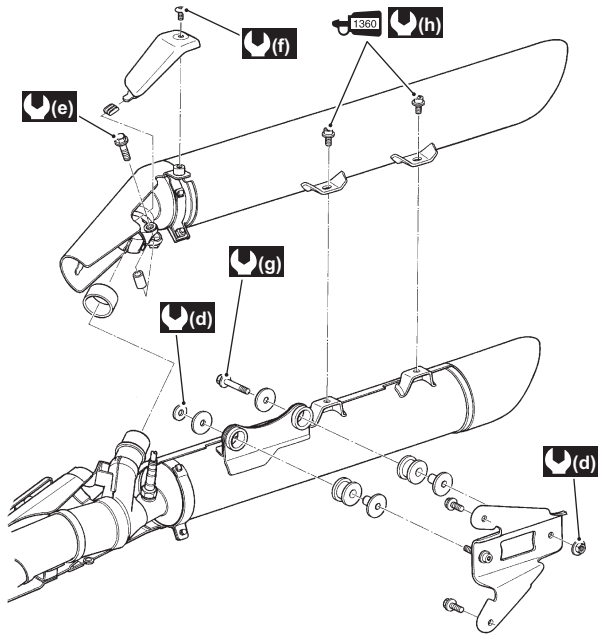
- Tighten the muffler support nuts and muffler connecting bolts to the specified torque.

  Tightening torque
  Muffler support nut (d): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)
  Muffler connecting bolt (Rear) (e): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)
  Rear muffler upper cover mounting bolt (f): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
  Muffler support bolt (g): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)

- Apply thread lock to the muffler joint bolts and exhaust pipe bolt and tighten them to the specified torque.

  1360 : Thread lock cement 99000–32130 (THREAD LOCK CEMENT SUPER 1360 or equivalent)

  Tightening torque
  Muffler joint bolt (h): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



I940H11B0014-07

- Route the HO2 sensor lead wire. Refer to “Throttle Body Construction in Section 1D (Page 1D-10)” and “Wiring Harness Routing Diagram in Section 9A (Page 9A-5)”.

Exhaust System Inspection

B940H21B06003

Inspect the exhaust pipe connection and muffler connection for exhaust gas leakage and mounting condition. If any defect is found, replace the exhaust pipe assembly or muffler with a new one.
Check the exhaust pipe bolts, muffler connecting bolts and muffler mounting nut are tightened to their specified torque.
Refer to “Exhaust Pipe Bolt and Muffler Bolt Inspection in Section 0B (Page 0B-3)”.

Specifications

Tightening Torque Specifications

B940H21B07001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
HO2 sensor	48	4.8	34.5	☞(Page 1K-3)
Muffler connecting bolt (Front)	26	2.6	19.0	☞(Page 1K-4)
Exhaust pipe bolt	23	2.3	16.5	☞(Page 1K-4)
Muffler support nut	26	2.6	19.0	☞(Page 1K-4)
Muffler connecting bolt (Rear)	26	2.6	19.0	☞(Page 1K-4)
Rear muffler upper cover mounting bolt	10	1.0	7.0	☞(Page 1K-4)
Muffler support bolt	26	2.6	19.0	☞(Page 1K-4)
Muffler joint bolt	26	2.6	19.0	☞(Page 1K-4)

NOTE

The specified tightening torque is described in the following.
“Exhaust System Construction (Page 1K-1)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H21B08001

Material	SUZUKI recommended product or Specification		Note
Thread lock cement	THREAD LOCK CEMENT SUPER 1360 or equivalent	P/No.: 99000–32130	☞(Page 1K-4)

NOTE

Required service material is also described in the following.
“Exhaust System Construction (Page 1K-1)”

Section 2

Suspension

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Precautions

Precautions

Precautions for Suspension

B940H22000001

Refer to “General Precautions in Section 00 (Page 00-1)”.

⚠ 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

B940H22104001

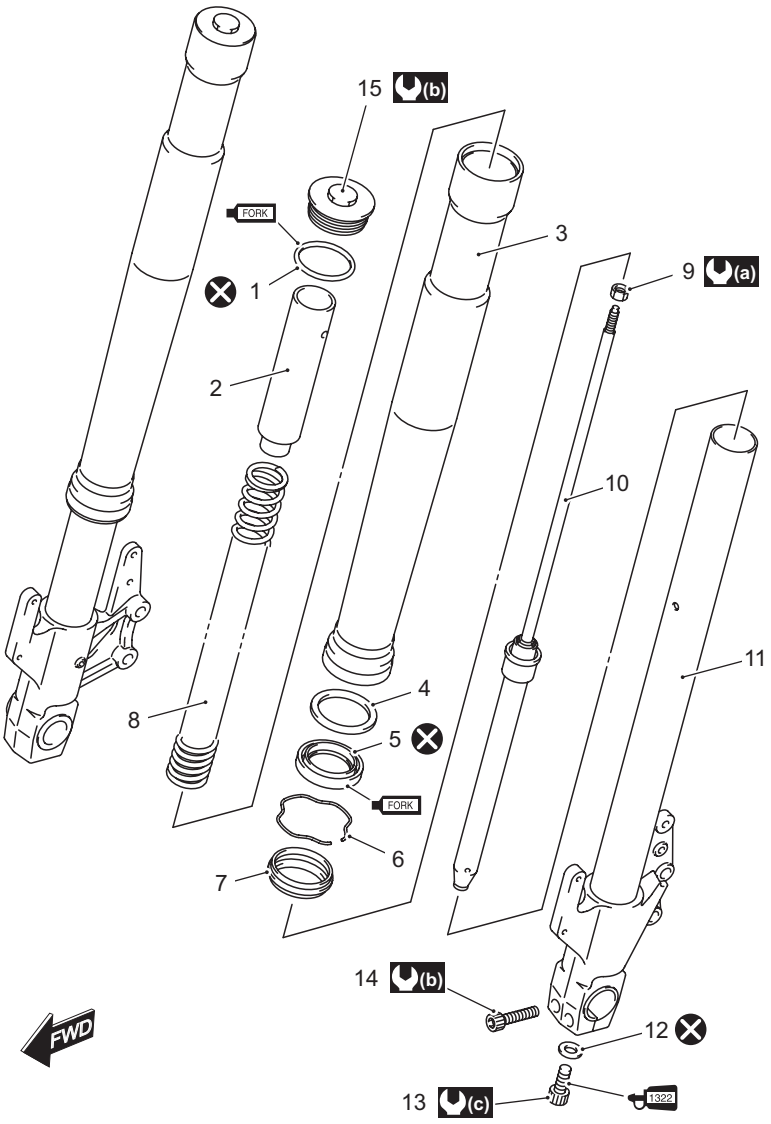
Condition	Possible cause	Correction / Reference Item
Wobbly front wheel	Distorted wheel rim.	*Replace.*
	Worn front wheel bearings.	*Replace.*
	Defective or incorrect tire.	*Replace.*
	Loose front axle.	*Tighten.*
	Loose front axle pinch bolt.	*Tighten.*
	Incorrect fork oil level.	*Adjust.*
Front suspension too soft	Weak spring.	*Replace.*
	Insufficient fork oil.	*Check level and add.*
	Wrong weight fork oil.	*Replace.*
Front suspension too stiff	Excessively viscous fork oil.	*Replace.*
	Excessive fork oil.	*Check level and drain.*
	Bent front axle.	*Replace.*
Front suspension too noisy	Insufficient fork oil.	*Check level and add.*
	Loose front suspension fastener.	*Tighten.*
Wobbly rear wheel	Distorted wheel rim.	*Replace.*
	Worn rear wheel bearing.	*Replace.*
	Defective or incorrect tire.	*Replace.*
	Worn swingarm bearing.	*Replace.*
	Worn rear suspension bearing.	*Replace.*
	Loose rear suspension fastener.	*Tighten.*
Rear suspension too soft	Weak rear shock absorber spring.	*Replace.*
	Rear shock absorber leaks oil.	*Replace.*
	Improperly suspension setting.	*Adjust.*
Rear suspension too stiff	Improper suspension setting.	*Adjust.*
	Bent rear shock absorber shaft.	*Replace.*
	Bent swingarm pivot shaft.	*Replace.*
	Worn swingarm and rear suspension related bearings.	*Replace.*
Rear suspension too noisy	Loose rear suspension fastener.	*Tighten.*
	Worn swingarm bearing.	*Replace.*

Front Suspension

Repair Instructions

Front Fork Components

B940H22206001



I940H1220031-01

1. O-ring	8. Spring	15. Front fork cap bolt
2. Spacer	9. Inner rod lock-nut	(a) : 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
3. Outer tube	10. Inner rod/Damper rod (cartridge)	(b) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
4. Oil seal retainer	11. Inner tube	(c) : 30 N·m (3.0 kgf-m, 21.5 lbf-ft)
5. Oil seal	12. Gasket	1322 : Apply thread lock to the thread part.
6. Oil seal stopper ring	13. Damper rod bolt	FORK : Apply fork oil.
7. Dust seal	14. Front axle pinch bolt	⊗ : Do not reuse.

Front Fork Removal and Installation

B940H22206002

⚠ CAUTION

Do not operate the front brake lever and brake pedal with the front wheel removed.

NOTE

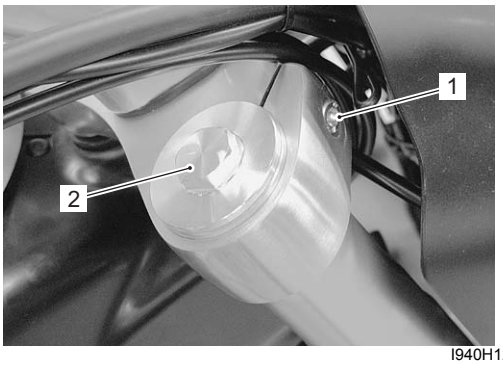
The right and left front forks are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

Removal

1) Remove the front wheel assembly. Refer to “Front Wheel Assembly Removal and Installation in Section 2D (Page 2D-3)”.
2) Remove the front fender. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Loosen the front fork upper clamp bolt (1).

NOTE

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

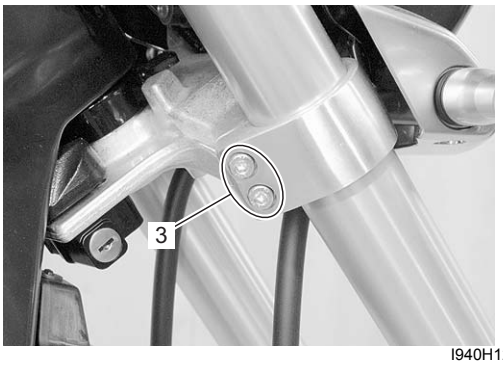


I940H1220001-01

4) Loosen the front fork lower clamp bolts (3) and remove the front fork.

NOTE

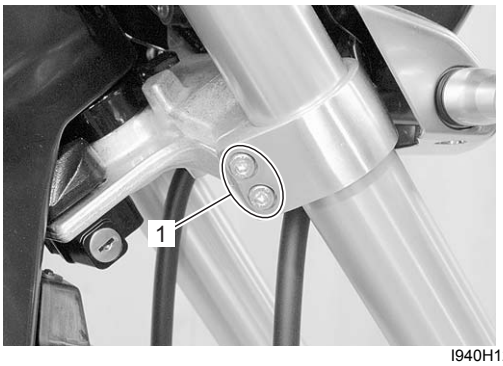
Hold the front fork by the hand to prevent sliding out of the steering stem.



I940H1220002-02

Installation

1) Set the front fork to the front fork lower bracket temporarily by tightening the lower clamp bolts (1).

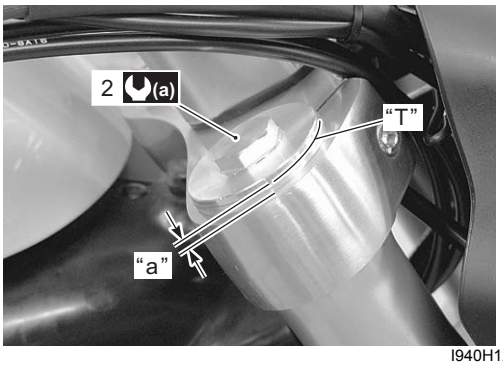


I940H1220003-01

2) Tighten the front fork cap bolt (2) to the specified torque.

Tightening torque
Front fork cap bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

3) Loosen the lower clamp bolts.
4) Set the front fork with the upper surface “T” of the inner tube positioned 5.0 mm (0.197 in) “a” from the upper surface of the upper bracket.



I940H1220004-02

“a”: 5.0 mm (0.197 in)

5) Tighten the front fork lower clamp bolts (1).

Tightening torque
Front fork lower clamp bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I940H1220005-01

6) Tighten the front fork upper clamp bolt (3).

Tightening torque
Front fork upper clamp bolt (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I940H1220006-01

7) Install the front wheel assembly. Refer to "Front Wheel Assembly Removal and Installation in Section 2D (Page 2D-3)".

NOTE

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

⚠ WARNING

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



I940H1220007-01

Front Fork Inspection

B940H22206003

Refer to "Front Fork Inspection in Section 0B (Page 0B-17)".

Front Fork Disassembly and Assembly

B940H22206004

Refer to "Front Fork Removal and Installation (Page 2B-2)".

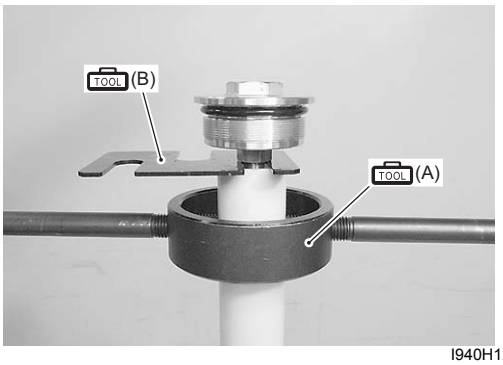
NOTE

The right and left front forks are installed symmetrically and therefore the disassembly procedure for one side is the same as that for the other side.

Disassembly

1) Compress the front fork spring with the special tool (A) and insert the special tool (B) between the lock-nut and the spacer.

Special tool
TOOL (A): 09940–94930 (Front fork spacer holder)
TOOL (B): 09940–94922 (Front fork spring stopper plate)



I940H1220008-01

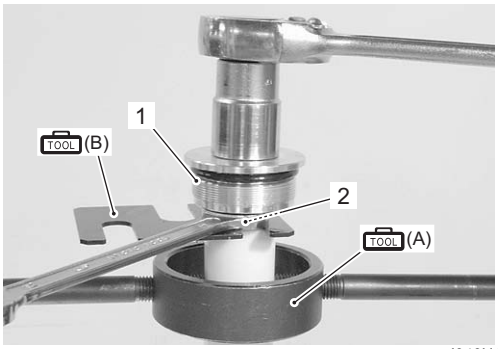
2) Remove the front fork cap bolt (1) from the inner rod by loosening the lock-nut (2).

⚠ CAUTION

After removing the front fork cap bolt (1), avoid holding the outer tube vertically by hand to prevent the inner tube from falling and damaged.

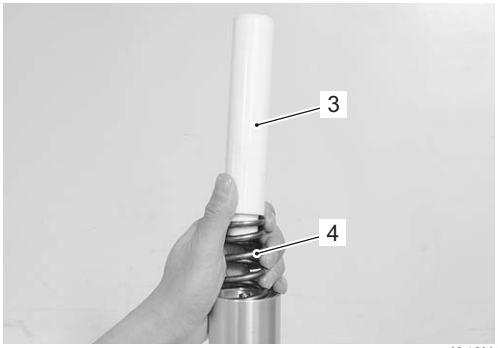
3) Compress the fork spring with the special tool (A) and remove the special tool (B).

Special tool
TOOL (A): 09940–94930 (Front fork spacer holder)
TOOL (B): 09940–94922 (Front fork spring stopper plate)



I940H1220009-01

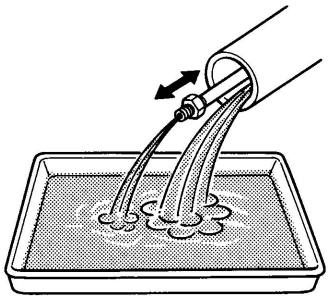
4) Remove the spacer (3) and spring (4).



I940H1220010-01

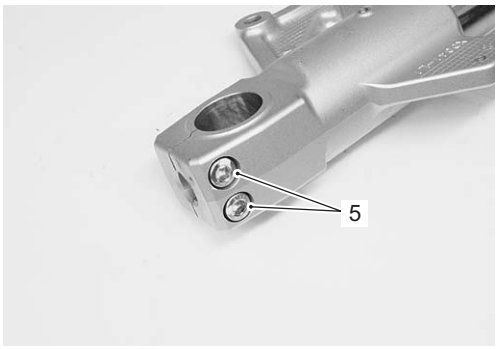
5) Invent the fork and stroke it several times to drain out fork oil.

6) Hold the fork inverted for a few minutes to drain oil.



I823H1220018-01

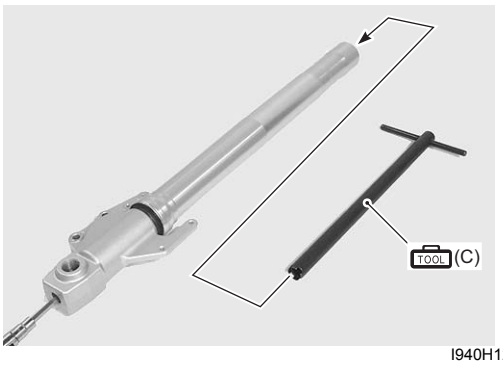
7) Remove the front axle pinch bolts (5).



I940H1220011-01

8) Remove the damper rod bolt using the special tools.

Special tool
TOOL (C): 09940–30221 (Front fork assembling tool)

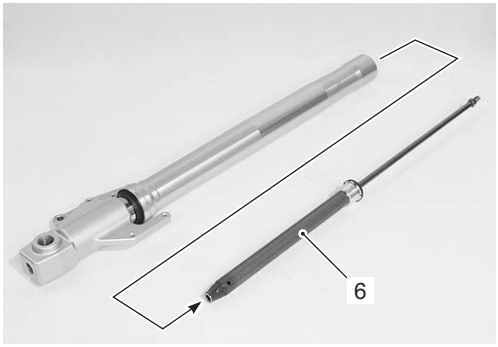


I940H1220012-01

9) Remove the inner rod/damper rod (cartridge) (6).

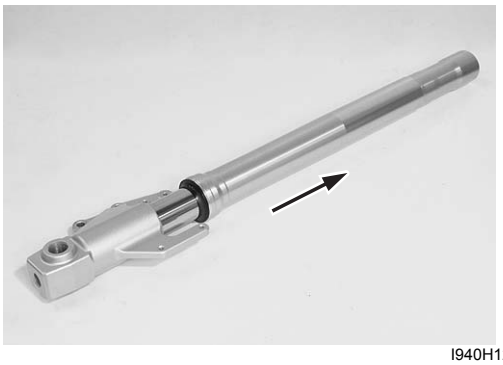
⚠ CAUTION

Do not disassemble the inner rod/damper rod (cartridge).



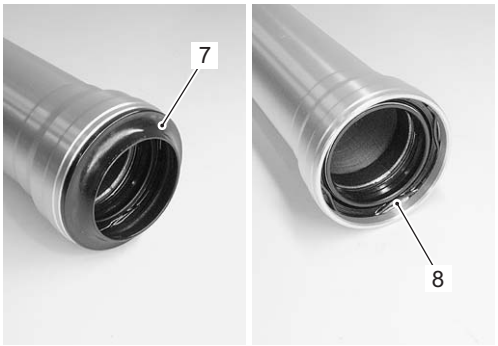
I940H1220013-02

10) Remove the outer tube from the inner tube.



I940H1220014-01

11) Remove the dust seal (7) and oil seal stopper ring (8).



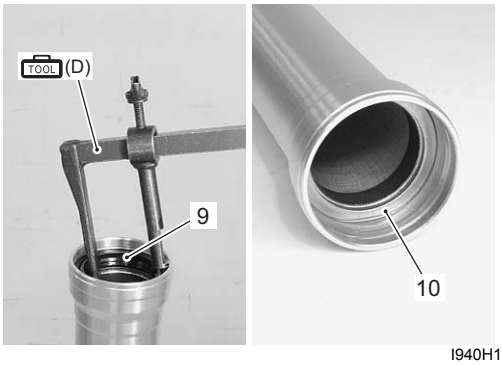
I940H1220015-01

12) Remove the oil seal (9) with the special tool.
13) Remove the oil seal retainer (10).

Special tool
TOOL (D): 09913–50121 (Oil seal remover)

⚠ CAUTION

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



I940H1220016-01

Assembly
Assemble the front fork in the reverse order of disassembly. Pay attention to the following points:

Oil seal and dust seal

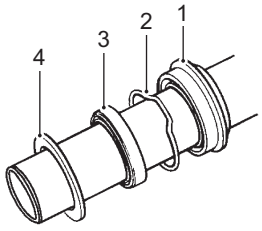
- Install the following parts onto the inner tube.
  - Dust seal (1)
  - Oil seal stopper ring (2)
  - Oil seal (3)
  - Oil seal retainer (4)

⚠ CAUTION

- **The oil seal and dust seal must be replaced with new ones when assembling front fork.**
- **When installing the oil seal to inner tube, be careful not to damage the oil seal lip.**

- Apply fork oil to the oil seal lip.

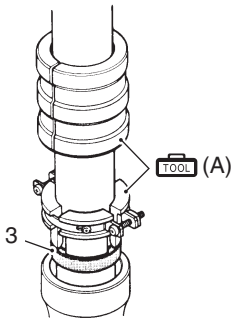
FORK : Fork Oil 99000–99044–L01 (SUZUKI FORK OIL L01 or equivalent)



I940H1220018-02

- Install the oil seal (3) into the outer tube using the special tool.

Special tool
TOOL (A): 09940–52861 (Front fork oil seal installer)



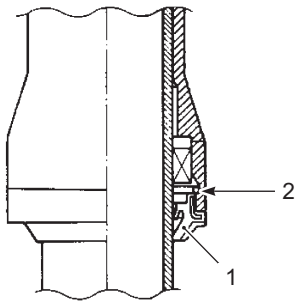
I717H1220024-01

- Install the oil seal stopper ring (2).

⚠ CAUTION

Make sure that the oil seal stopper ring is fitted securely.

- Install the dust seal (1).



I940H1220019-02

Damper rod bolt
Apply thread lock to the damper rod bolt (1) and tighten it to the specified torque with a hexagon wrench and special tools.

⚠ CAUTION

Use a new cylinder bolt gasket to prevent oil leakage.

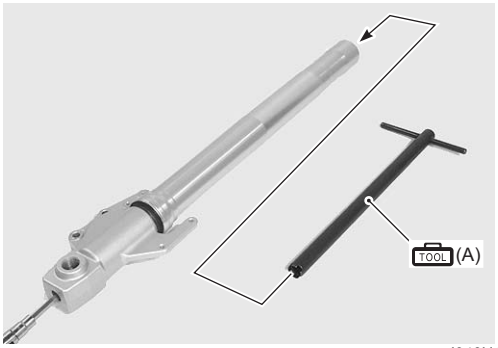
NOTE

Check the front fork for smoothness by stroking it after installing the cylinder.

Special tool
TOOL (A): 09940–34520 (T handle)
TOOL (B): 09940–34531 (Attachment A)

1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque
Damper rod bolt (a): 30 N·m (3.0 kgf-m, 21.5 lbf-ft)



I940H1220020-01



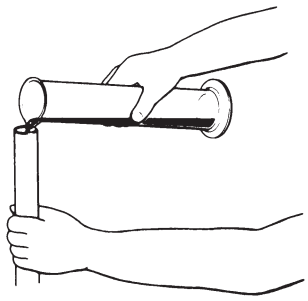
I940H1220021-03

Fork oil

- Place the front fork vertically without spring.
- Compress it fully.
- Pour specified front fork oil to the inner tube.

FORK : Fork Oil 99000–99044–L01 (SUZUKI FORK OIL L01 or equivalent)

Capacity (each leg)
636 ml (21.5/22.4 US/Imp oz)



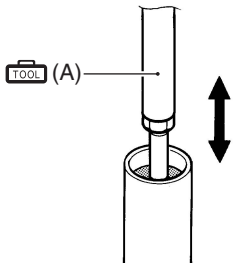
I649G1220026-02

- 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 outer tube to find bubbles while bleeding air.

Special tool
TOOL (A): 09940–52841 (Front fork inner rod holder)

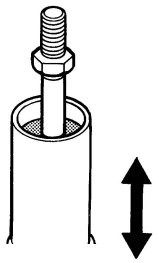


I649G1220027-05

- Refill specified front fork oil up to the top level of the outer tube again. Move the outer 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.**



I649G1220028-03

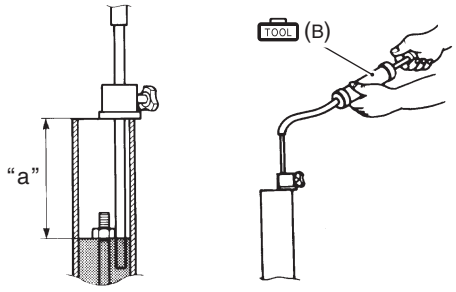
- Hold the front fork vertically and adjust fork oil level with the special tool.

NOTE

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

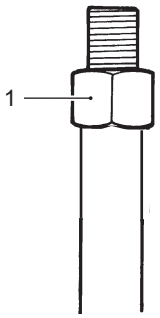
Special tool
(B): 09943–74111 (Fork oil level gauge)

Fork oil level "a"
121 mm (4.8 in)



I823H1220028-01

Front fork inner rod lock-nut
Loosen the lock-nut (1) to the bottom of inner rod threads.

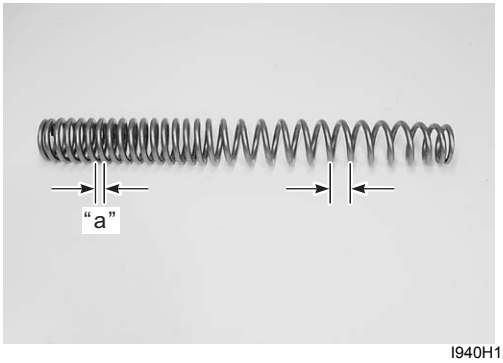


I940H1220023-02

Fork spring
Install the fork spring as shown in the figure.

NOTE

The smaller pitch "a" should face to the bottom side of the front fork.



I940H1220024-01

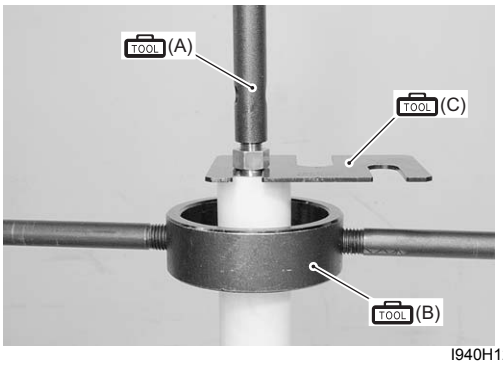
Front fork cap bolt

- Pull up the inner rod with the special tool.

Special tool
(A): 09940–52841 (Front fork inner rod holder)

- Compress the spring with the special tool (B) and then insert the special tool (C) between the lock-nut and the spacer.

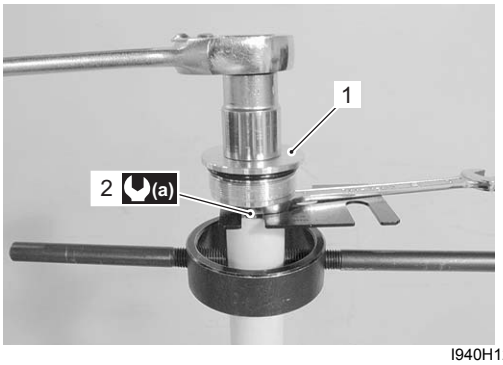
Special tool
(B): 09940–94930 (Front fork spacer holder)
(C): 09940–94922 (Front fork spring stopper plate)



I940H1220025-01

- Slowly turn the cap bolt completely by hand until the end of the cap bolt seats on the lock-nut.
- Hold the cap bolt (1) and tighten the lock-nut (2) to the specified torque.

Tightening torque
Front fork inner rod lock-nut (a): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)



I940H1220026-01

- Remove the special tools.
- Tighten the front fork cap to the outer tube temporarily.

Front Fork Inspection

B940H22206005

Refer to “Front Fork Inspection in Section 0B (Page 0B-17)”.

Front Fork Parts Inspection

B940H22206006

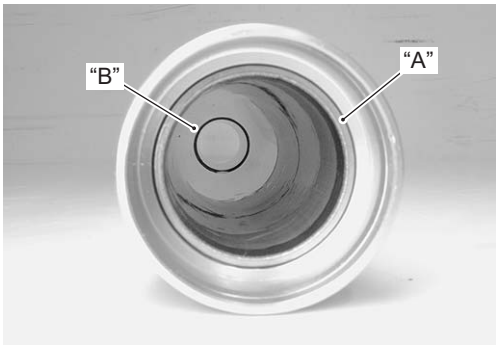
Refer to “Front Fork Disassembly and Assembly (Page 2B-3)”.

Inner and Outer Tubes

- Inspect the inner tube outer surface and outer tube inner surface for scratches.
- Inspect the “ANTI-FRICTION” metal surfaces for scratches.
- If any defects are found, replace them with the new ones.

⚠ CAUTION

Do not remove the “ANTI-FRICTION” metals “A” and “B”.

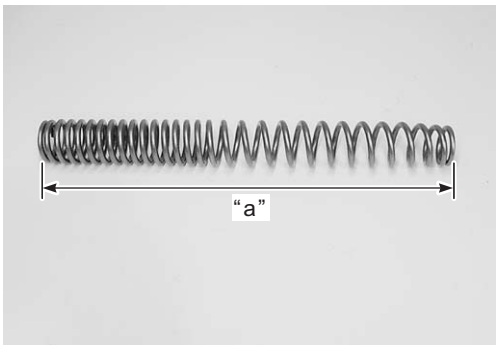


I940H1220027-01

Fork Spring

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

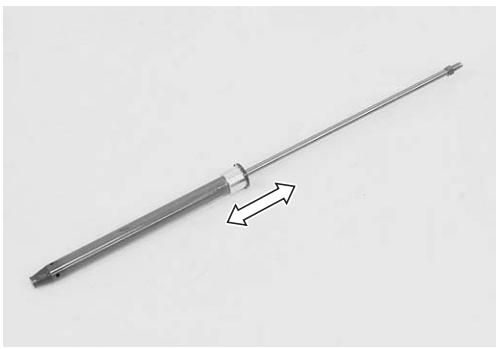
Front fork spring free length
Service limit: 331 mm (13.0 in)



I940H1220028-01

Damper Rod

Move the inner rod by hand to examine it for smoothness.
If any defects are found, replace inner rod/damper rod (cartridge) with a new one.



I940H1220029-01

Specifications

Service Data

B940H22207001

Suspension

Unit: mm (in)

Item	Standard	Limit
Front fork stroke	130 (5.1)	—
Front fork spring free length	338 (13.3)	331 (13.0)
Front fork inner tube O.D.	43 (1.7)	—
Front fork oil level (Without spring, inner tube fully compressed)	121 (4.8)	—
Front fork oil type	SUZUKI FORK OIL L01 or an equivalent fork oil	—
Front fork oil capacity (Each leg)	636 ml (21.5/22.4 US/Imp oz)	—

Tightening Torque Specifications

B940H22207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front fork cap bolt	23	2.3	16.5	☞(Page 2B-2)
Front fork lower clamp bolt	23	2.3	16.5	☞(Page 2B-2)
Front fork upper clamp bolt	23	2.3	16.5	☞(Page 2B-3)
Damper rod bolt	30	3.0	21.5	☞(Page 2B-6)
Front fork inner rod lock-nut	15	1.5	11.0	☞(Page 2B-8)

NOTE

The specified tightening torque is described in the following.
“Front Fork Components (Page 2B-1)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H22208001

Material	SUZUKI recommended product or Specification		Note
Fork Oil	SUZUKI FORK OIL L01 or equivalent	P/No.: 99000–99044–L01	☞(Page 2B-5) / ☞(Page 2B-6)
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞(Page 2B-6)

NOTE

Required service material is also described in the following.
“Front Fork Components (Page 2B-1)”

Special Tool

B940H22208002

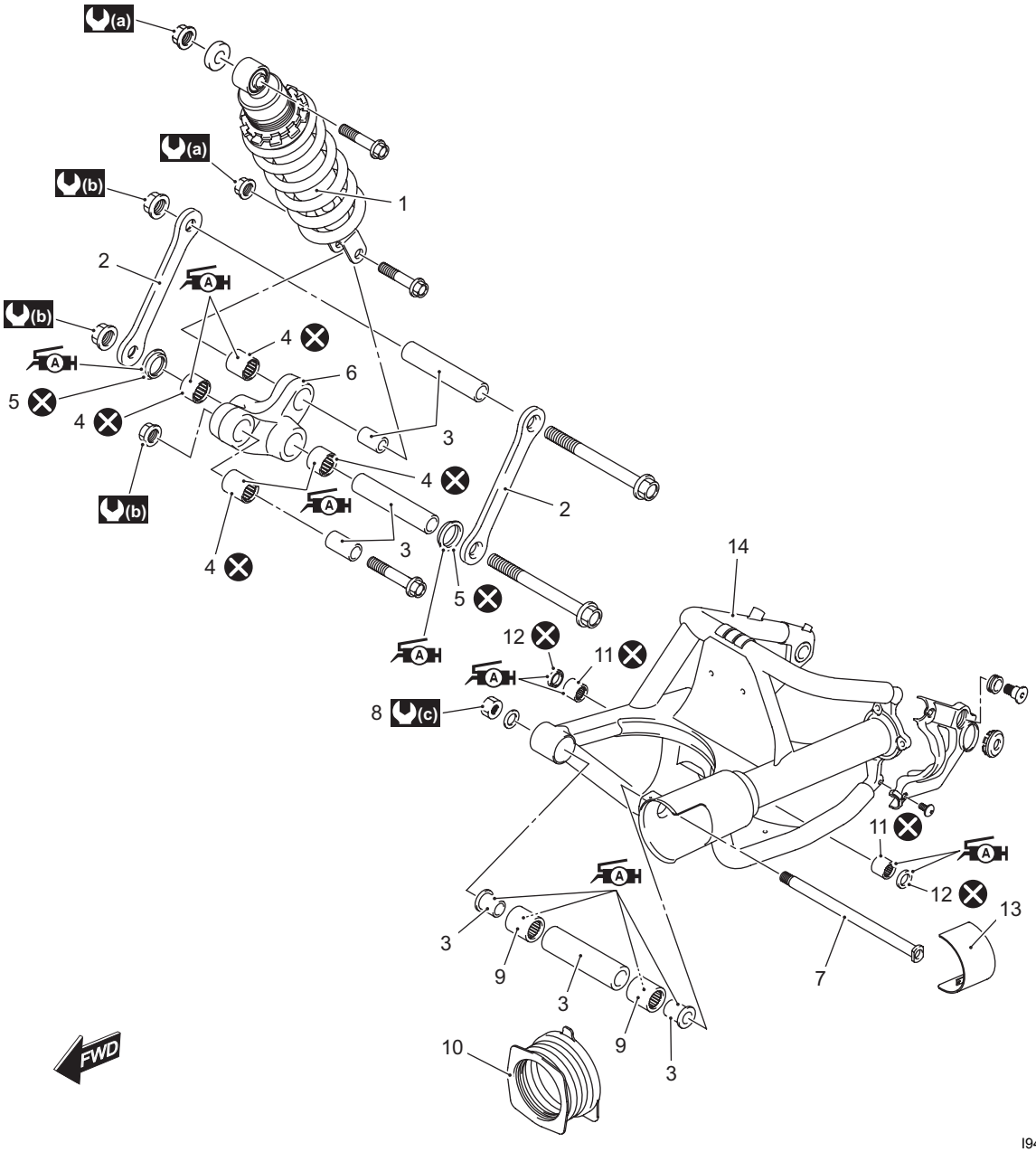
09913–50121 Oil seal remover ☞(Page 2B-5)	09940–30221 Front fork assembling tool ☞(Page 2B-4)
09940–34520 T handle ☞(Page 2B-6)	09940–34531 Attachment A ☞(Page 2B-6)
09940–52841 Front fork inner rod holder ☞(Page 2B-6) / ☞(Page 2B-7)	09940–52861 Front fork oil seal installer ☞(Page 2B-5)
09940–94922 Front fork spring stopper plate ☞(Page 2B-3) / ☞(Page 2B-3) / ☞(Page 2B-7)	09940–94930 Front fork spacer holder ☞(Page 2B-3) / ☞(Page 2B-3) / ☞(Page 2B-7)
09943–74111 Fork oil level gauge ☞(Page 2B-7)	

Rear Suspension

Repair Instructions

Rear Suspension Components

B940H22306001

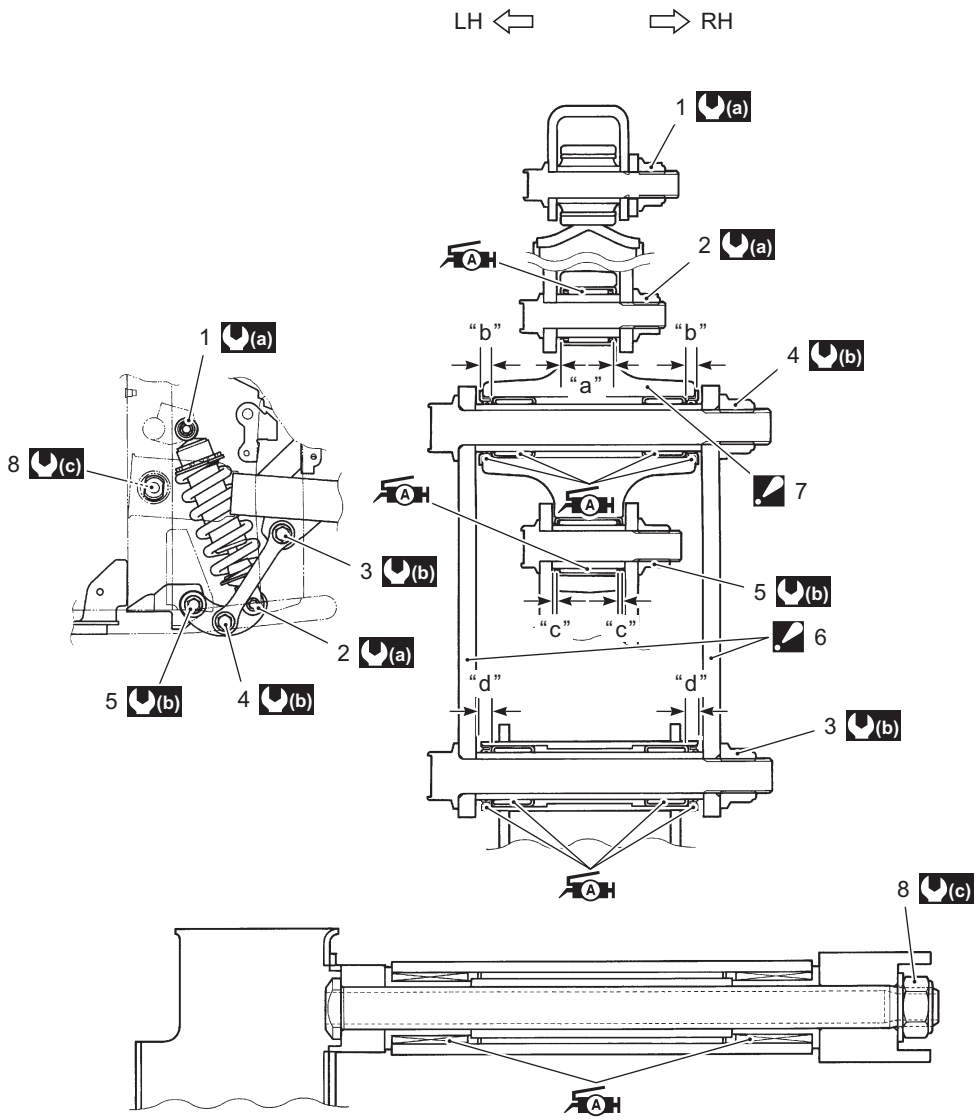


I940H1230044-05

1. Rear shock absorber	8. Swingarm pivot shaft nut	(a) : 65 N·m (6.5 kgf-m, 47.0 lbf-ft)
2. Rear cushion rod	9. Swingarm pivot bearing	(b) : 132 N·m (13.2 kgf-m, 95.5 lbf-ft)
3. Spacer	10. Boot	(c) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
4. Rear cushion lever bearing	11. Rear cushion rod bearing	A : Apply grease to the bearing.
5. Rear cushion lever seal	12. Rear cushion rod seal	⊗ : Do not reuse.
6. Rear cushion lever	13. Swingarm pivot cover	
7. Swingarm pivot shaft	14. Swingarm	

Rear Suspension Assembly Construction

B940H22306002



I940H1230042-04

1. Rear shock absorber mounting nut (Upper)	"a": 0.25 mm (0.01 in)
2. Rear shock absorber mounting nut (Lower)	"b": 5.0 mm (0.20 in)
3. Cushion rod mounting nut (Upper)	"c": 0.5 mm (0.02 in)
4. Cushion rod mounting nut (Lower)	"d": 5.5 mm (0.22 in)
5. Cushion lever mounting nut	(a) : 65 N·m (6.5 kgf-m, 47.0 lbf-ft)
6. Cushion rod : The stamped mark side of the cushion rod should face outside.	(b) : 132 N·m (13.2 kgf-m, 95.5 lbf-ft)
7. Cushion lever : The stamped mark "40H" side of the cushion lever should face right side.	(c) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
8. Swingarm pivot nut	A : Apply grease to the bearing.

Swingarm Assembly Removal and Installation

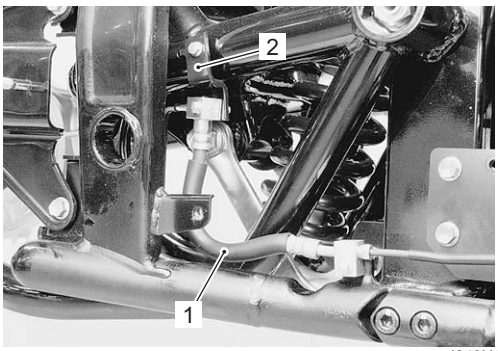
B940H22306003

Removal

⚠ CAUTION

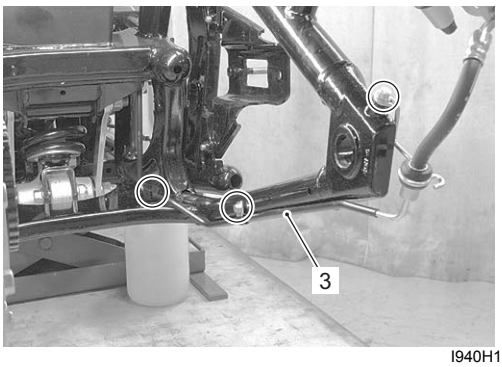
Make sure that the motorcycle is supported securely.

1) Remove the exhaust pipe and muffler. Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.
2) Remove the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation in Section 2D (Page 2D-10)”.
3) Remove the right frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
4) Remove the rear brake hose (1) and bracket (2).



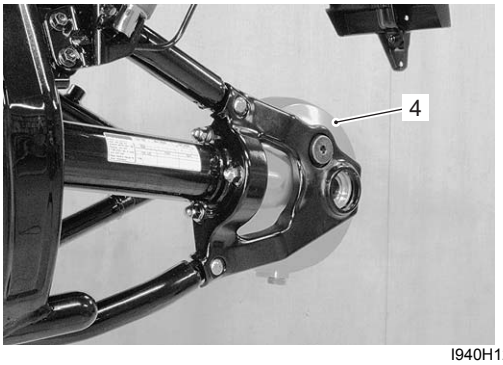
I940H1230001-01

5) Remove the rear brake pipe (3) by removing brake pipe clamps.



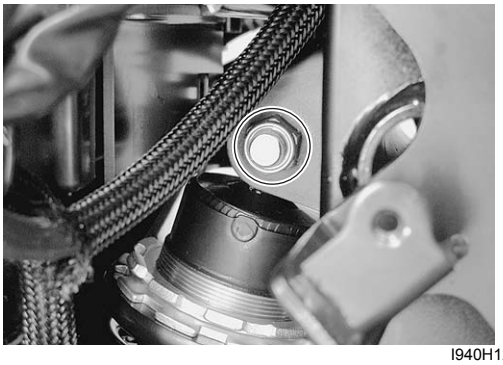
I940H1230002-01

6) Remove the final gear assembly (4). Refer to “Final Gear Assembly Removal and Installation in Section 3A (Page 3A-12)”.



I940H1230003-01

7) Remove the rear shock absorber upper bolt, spacer and nut.



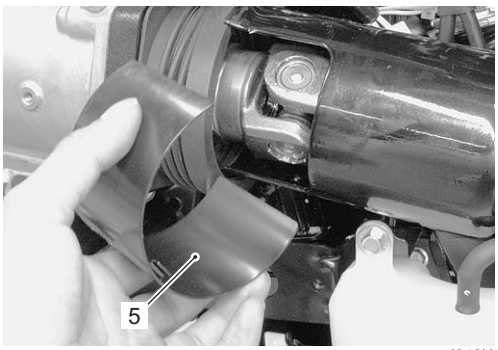
I940H1230004-01

8) Remove the cushion lever mounting bolt and nut.



I940H1230005-01

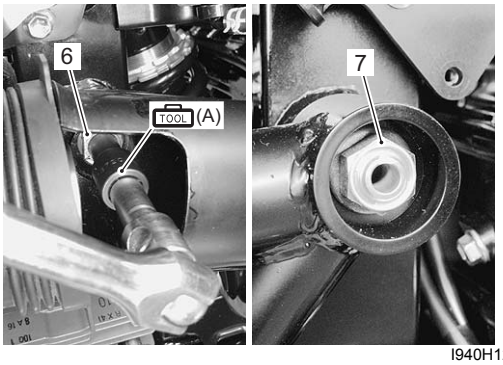
9) Remove the swingarm pivot cover (5).



I940H1230043-01

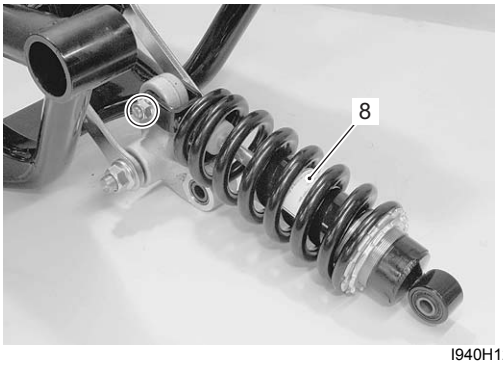
10) Hold the swingarm pivot shaft (6) with the special tool and remove the swingarm pivot shaft nut (7).

Special tool
(A): 09900–18720 (Hexagon socket (14 mm))



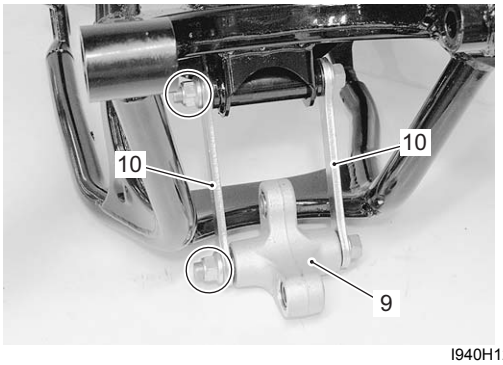
I940H1230007-01

11) Remove the swingarm assembly.
12) Remove the rear shock absorber (8).



I940H1230008-01

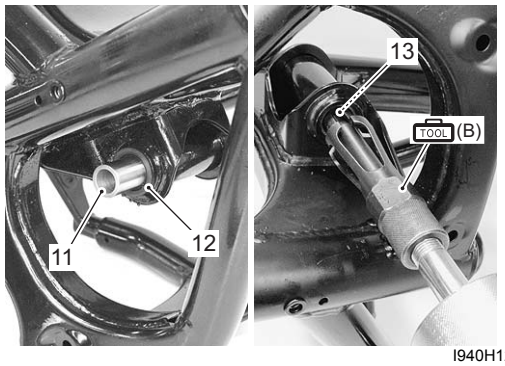
13) Remove the cushion lever (9) and cushion rod (10).



I940H1230009-01

14) Remove the spacer (11), cushion rod seal (12), and cushion rod bearing (13) with the special tools.

Special tool
(B): 09923–73210 (Bearing remover)
: 09930–30104 (Rotor remover sliding shaft)



I940H1230010-03

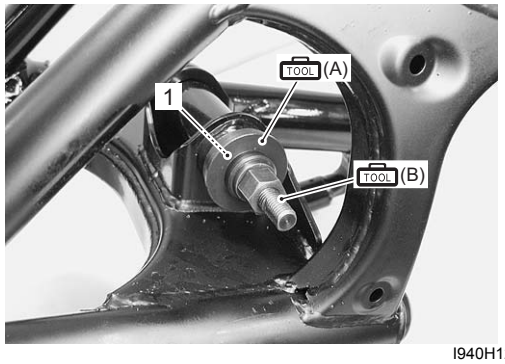
Installation
Install the swingarm in the reverse order of removal. Pay attention in the following points:

⚠ CAUTION

The removed bearings and cushion rod seals must be replaced with new ones.

- Install the cushion rod bearing (1) with the special tool as shown in the rear suspension assembly construction. Refer to “Rear Suspension Assembly Construction (Page 2C-2)”.

Special tool
(A): 09941–34513 (Steering race installer)
(B): 09924–84510 (Bearing installer set)



I940H1230038-01

- Install the oil seal with the special tool.

⚠ CAUTION

Replace the oil seal with a new one.

Special tool
TOOL (C): 09913–70210 (Bearing installer set)



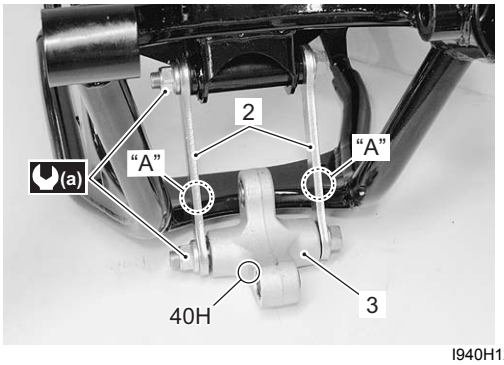
I940H1230039-01

- Install the cushion rod (2) and cushion lever (3) and tighten the cushion rod nut to the specified torque.

NOTE

- **The stamped marks "A" on the cushion rod should be face out side.**
- **The stamped mark "40H" on the cushion lever should be face right side.**

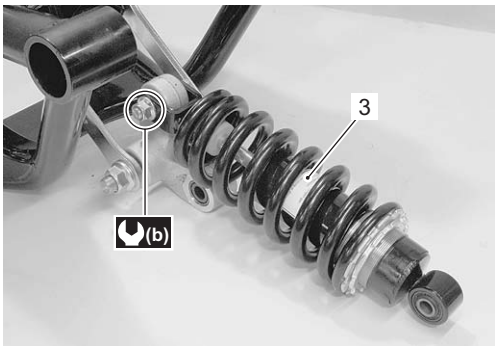
Tightening torque
Cushion rod nut (a): 132 N·m (13.2 kgf-m, 95.5 lbf-ft)



I940H1230011-03

- Install the rear shock absorber (4) and tighten the rear shock absorber mounting nut to the specified torque.

Tightening torque
Rear shock absorber mounting nut (Lower) (b): 65 N·m (6.5 kgf-m, 47.0 lbf-ft)



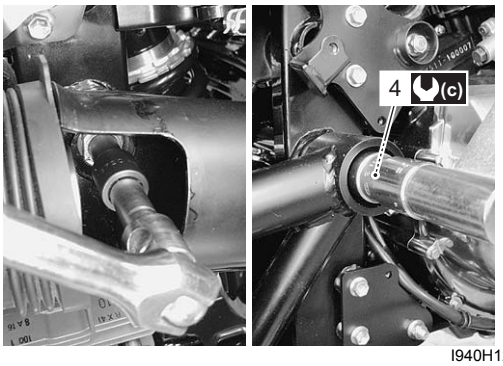
I940H1230012-01

- Install the swingarm assembly and tighten the swingarm pivot shaft nut (4) to the specified torque with the special tool.

NOTE

After tightening the swingarm pivot shaft nut, be sure to check the swingarm operation.

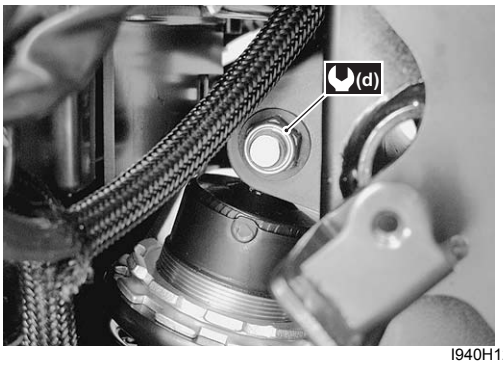
Tightening torque
Swingarm pivot shaft nut (c): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)



I940H1230013-02

- Tighten the rear shock absorber upper nut to the specified torque.

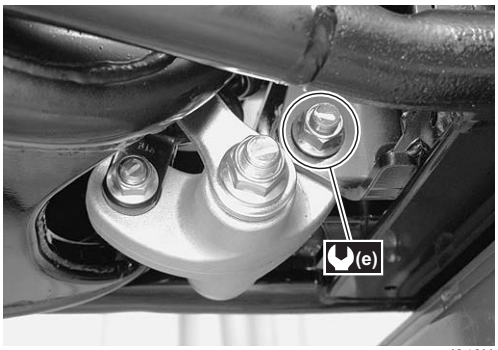
Tightening torque
Rear shock absorber mounting nut (Upper) (d): 65 N·m (6.5 kgf-m, 47.0 lbf-ft)



I940H1230014-02

- Tighten the cushion lever mounting nut to the specified torque.

  Tightening torque
  Cushion lever mounting nut (e): 132 N·m (13.2 kgf-m, 95.5 lbf-ft)



I940H1230015-02

- Install the rear brake pipe as shown in the rear brake hose routing diagram. Refer to “Rear Brake Hose Routing Diagram in Section 4A (Page 4A-2)”.

Rear Suspension Inspection

B940H22306004

Refer to “Rear Suspension Inspection in Section 0B (Page 0B-18)”.

Rear Shock Absorber Removal and Installation

B940H22306005

Refer to “Swingarm Assembly Removal and Installation (Page 2C-3)”.

Rear Shock Absorber Inspection

B940H22306006

Inspect the rear shock absorber in the following procedures:

1) Remove the rear shock absorber. Refer to “Rear Shock Absorber Removal and Installation (Page 2C-6)”.
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.



I940H1230016-01

3) Install the rear shock absorber. Refer to “Swingarm Assembly Removal and Installation (Page 2C-3)”.

Rear Suspension Adjustment

B940H22306007

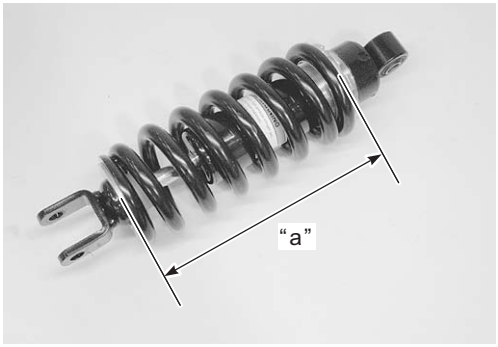
After installing the rear suspension, adjust the spring pre-load and damping force as follows:

Spring Pre-load Adjustment

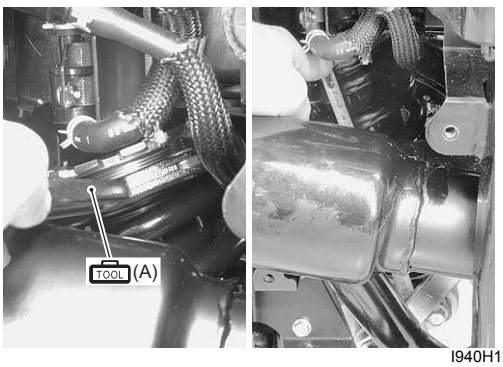
1) Remove the left frame side cover and left frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Turn the adjuster ring (1) to the desired position with the special tool.

   Special tool
   TOOL (A): 09910–60611 (Universal clamp wrench)

STD position “a”
192 mm (7.56 in)



I940H1230017-01



I940H1230018-01

Rear Shock Absorber Disposal

B940H22306008

Refer to “Swingarm Assembly Removal and Installation (Page 2C-3)”.
The rear shock absorber unit contains high-pressure nitrogen gas.

⚠ WARNING

- **The rear shock absorber unit contains high-pressure nitrogen gas.**
- **Mishandling can cause explosion.**
- **Keep away from fire and heat. High gas pressure caused by heat can cause an explosion.**
- **Release gas pressure before disposing.**

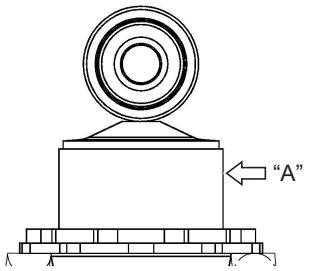
Gas Pressure Release

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.



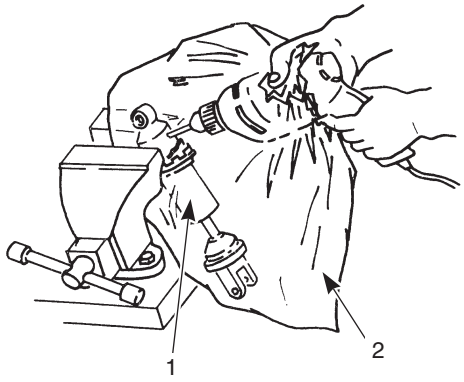
I940H1230019-04

“A”: Mark the drill hole

2) Wrap rear shock absorber (1) with a vinyl bag (2) and fix it on a vise as shown in the figure.
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 many spout out forcefully.**



I649G1230009-03

Cushion Lever Removal and Installation

B940H22306009

Refer to “Swingarm Assembly Removal and Installation (Page 2C-3)”.

Cushion Lever Inspection

B940H22306010

Refer to “Swingarm Assembly Removal and Installation (Page 2C-3)”.

Cushion Lever

Spacer

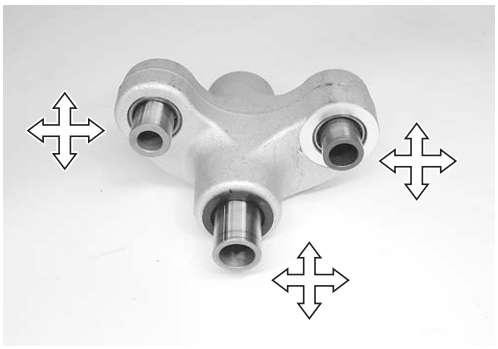
1) Remove the spacers from the cushion lever.
2) Inspect the spacers for any flaws or other damage. If any defects are found, replace the spacers with new ones.



I940H1230020-01

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 (Page 2C-8)”.



I940H1230021-01

Cushion lever

Inspect the cushion lever for damage. If any defect is found, replace the cushion lever with a new one.



I940H1230022-01

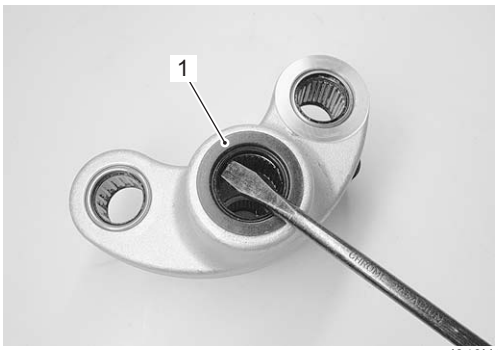
Cushion Lever Bearing Removal and Installation

B940H22306011

Refer to “Swingarm Assembly Removal and Installation (Page 2C-3)”.

Removal

1) Remove the cushion lever seal (1).



I940H1230023-01

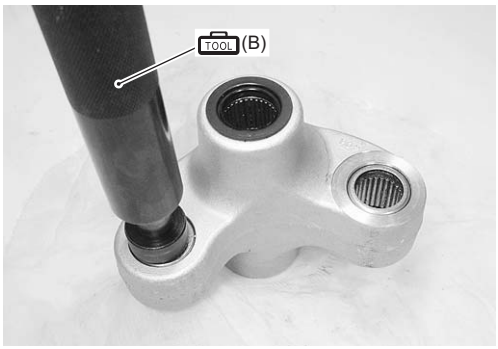
2) Remove the cushion lever bearings using the special tools.

Special tool

(A): 09921–20240 (Bearing remover set)
(B): 09913–70210 (Bearing installer set)



I940H1230024-01



I940H1230025-01

Installation

⚠ CAUTION

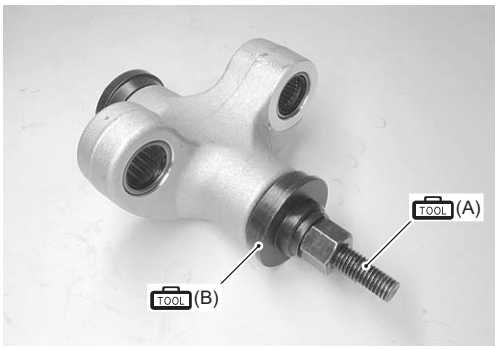
The removed bearings and cushion seals must be replaced with new ones.

1) Press the bearings into the cushion lever with the special tool as shown in the rear suspension assembly construction. Refer to “Rear Suspension Assembly Construction (Page 2C-2)”.

NOTE

When installing the bearing, stamped mark on the bearing must face outside.

Special tool
TOOL (A): 09924–84510 (Bearing installer set)
TOOL (B): 09941–34513 (Steering race installer)



I940H1230026-01

2) Install the cushion lever seal with the special tool.

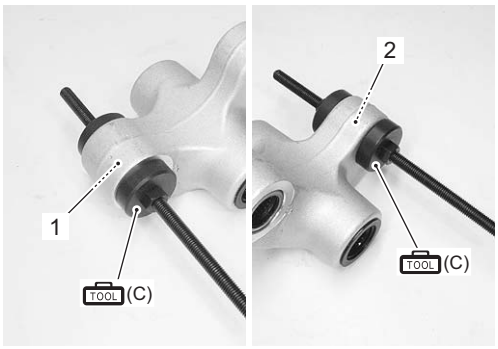
Special tool
TOOL (C): 09913–70210 (Bearing installer set)



I940H1230027-01

3) Install the bearings (1) and (2) with the special tool.

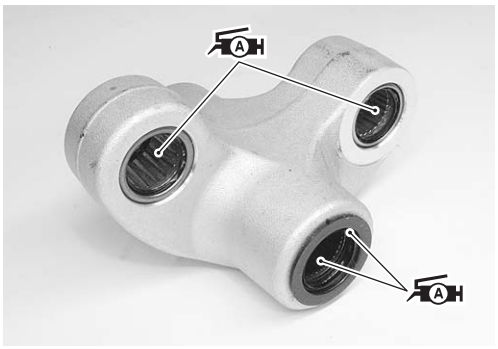
Special tool
TOOL (C): 09924–84521 (Bearing installer set)



I940H1230029-01

4) Apply grease to the bearings and cushion lever seal.

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



I940H1230041-01

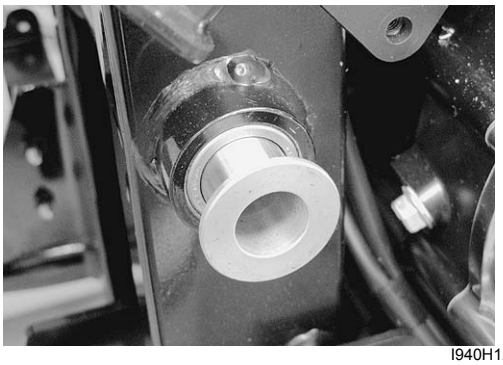
Swingarm Related Parts Inspection

B940H22306012

Refer to “Swingarm Assembly Removal and Installation (Page 2C-3)”.

Spacers

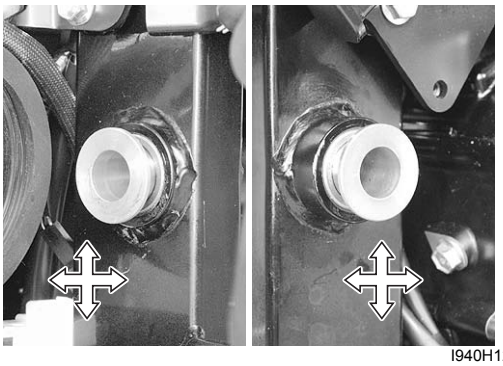
1) Remove the spacers from the frame.
2) Inspect the spacers for wear and damage. If any defects are found, replace the spacers with new ones.



I940H1230030-01

Swingarm 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 (Page 2C-11)”.



I940H1230031-01

Swingarm

Inspect the swingarm for damage. If any defect is found, replace the swingarm with a new one.



I940H1230032-01

Cushion Rod Bearing

1) Insert the spacer into bearings.
2) Check the plat by moving the spacers up and down. If excessive play is noted, replace the bearing with a new one. Refer to “Swingarm Assembly Removal and Installation (Page 2C-3)”.



I940H1230033-01

Cushion Rod

Inspect the cushion rods for damage and bend. If any defects are found, replace the cushion rods with new ones.



I940H1230034-01

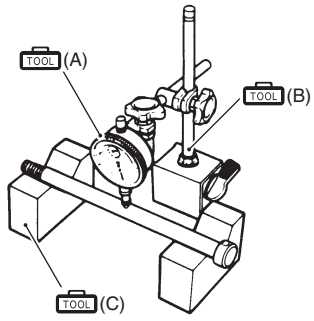
Swingarm Pivot Shaft

Measure the swingarm pivot shaft runout using the dial gauge. If the runout exceeds the service limit, replace the pivot shaft.

Special tool

TOOL (A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL (B): 09900–20701 (Magnetic stand)
TOOL (C): 09900–21304 (V-block (100 mm))

Swingarm pivot shaft runout
Service limit: 0.3 mm (0.01 in)



I649G1230034-03

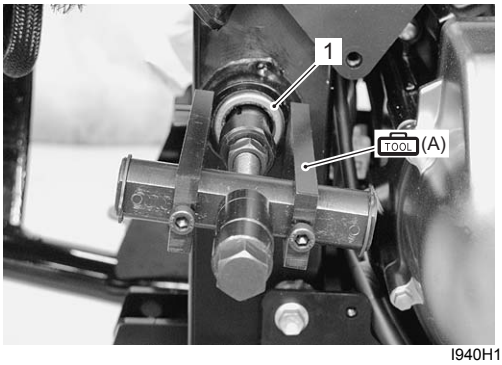
Swingarm Bearing Removal and Installation

B940H22306013

Removal

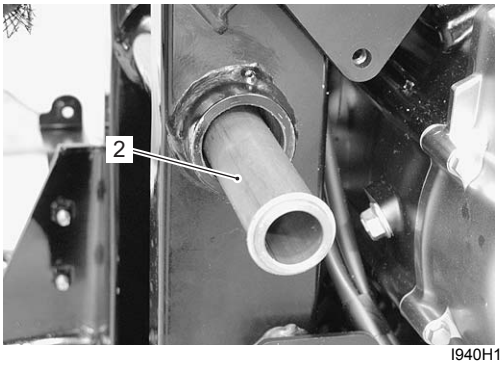
1) Remove the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation in Section 2D (Page 2D-10)”.
2) Remove the swingarm. Refer to “Cushion Lever Removal and Installation (Page 2C-7)”.
3) Draw out the swingarm pivot bearings (1) using the special tool.

Special tool
(A): 09921–20240 (Bearing remover set)



I940H1230035-01

4) Remove the center spacer (2).



I940H1230036-01

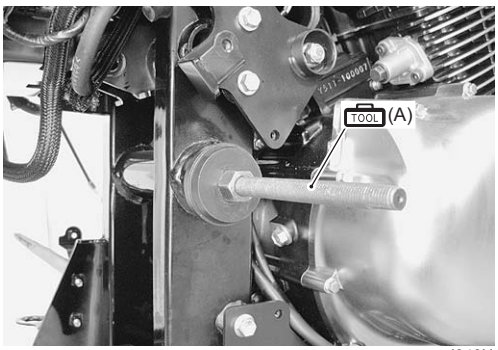
Installation

1) Install the center spacer.
2) Press the bearings into the swingarm pivot with the special tool.

NOTE

When installing the bearing, stamped mark on the bearing must face outside.

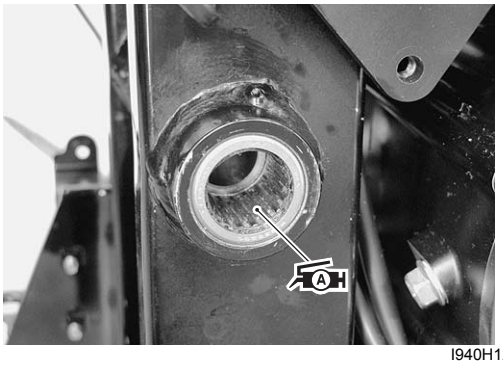
Special tool
(A): 09941–34513 (Steering race installer)



I940H1230037-01

3) Apply grease to the bearings.

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



I940H1230040-01

4) Install the swingarm. Refer to “Cushion Lever Removal and Installation (Page 2C-7)”.
5) Install the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation in Section 2D (Page 2D-10)”.

Specifications

Service Data

B940H22307001

Suspension

Unit: mm (in)

Item	Standard	Limit
Rear shock absorber spring pre-set length	192 (7.56)	
Rear wheel travel	108 (4.3)	—
Swingarm pivot shaft runout	—	0.3 (0.01)

Tightening Torque Specifications

B940H22307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Cushion rod nut	132	13.2	95.5	☞(Page 2C-5)
Rear shock absorber mounting nut (Lower)	65	6.5	47.0	☞(Page 2C-5)
Swingarm pivot shaft nut	100	10.0	72.5	☞(Page 2C-5)
Rear shock absorber mounting nut (Upper)	65	6.5	47.0	☞(Page 2C-5)
Cushion lever mounting nut	132	13.2	95.5	☞(Page 2C-6)

NOTE

The specified tightening torque is described in the following.
“Rear Suspension Components (Page 2C-1)”
“Rear Suspension Assembly Construction (Page 2C-2)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H22308001

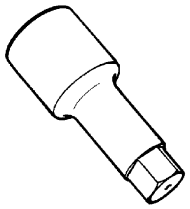
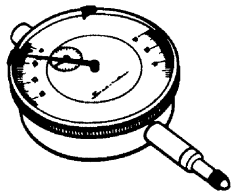
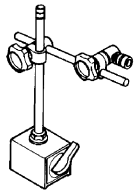
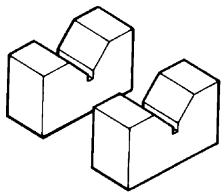
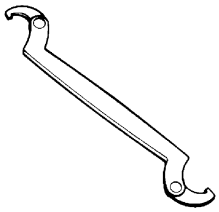
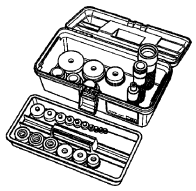
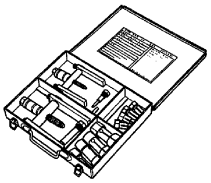
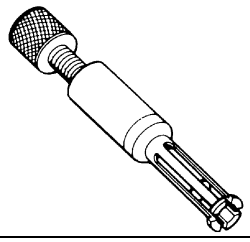
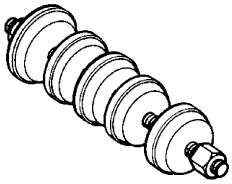
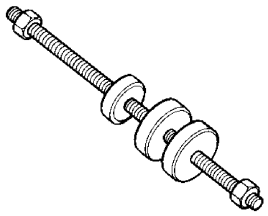
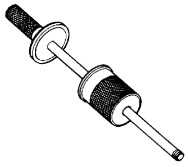
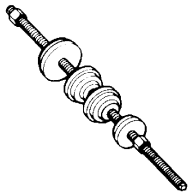
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 2C-9) / ☞(Page 2C-11)

NOTE

Required service material is also described in the following.
“Rear Suspension Components (Page 2C-1)”
“Rear Suspension Assembly Construction (Page 2C-2)”

Special Tool

B940H22308002

09900–18720 Hexagon socket (14 mm) ☞(Page 2C-4) 	09900–20607 Dial gauge (1/100 mm, 10 mm) ☞(Page 2C-10) 
09900–20701 Magnetic stand ☞(Page 2C-10) 	09900–21304 V-block (100 mm) ☞(Page 2C-10) 
09910–60611 Universal clamp wrench ☞(Page 2C-6) 	09913–70210 Bearing installer set ☞(Page 2C-5) / ☞(Page 2C-8) / ☞(Page 2C-9) 
09921–20240 Bearing remover set ☞(Page 2C-8) / ☞(Page 2C-11) 	09923–73210 Bearing remover ☞(Page 2C-4) 
09924–84510 Bearing installer set ☞(Page 2C-4) / ☞(Page 2C-9) 	09924–84521 Bearing installer set ☞(Page 2C-9) 
09930–30104 Rotor remover sliding shaft ☞(Page 2C-4) 	09941–34513 Steering race installer ☞(Page 2C-4) / ☞(Page 2C-9) / ☞(Page 2C-11) 

Wheels and Tires

Precautions

Precautions for Wheel and Tire

B940H22400001

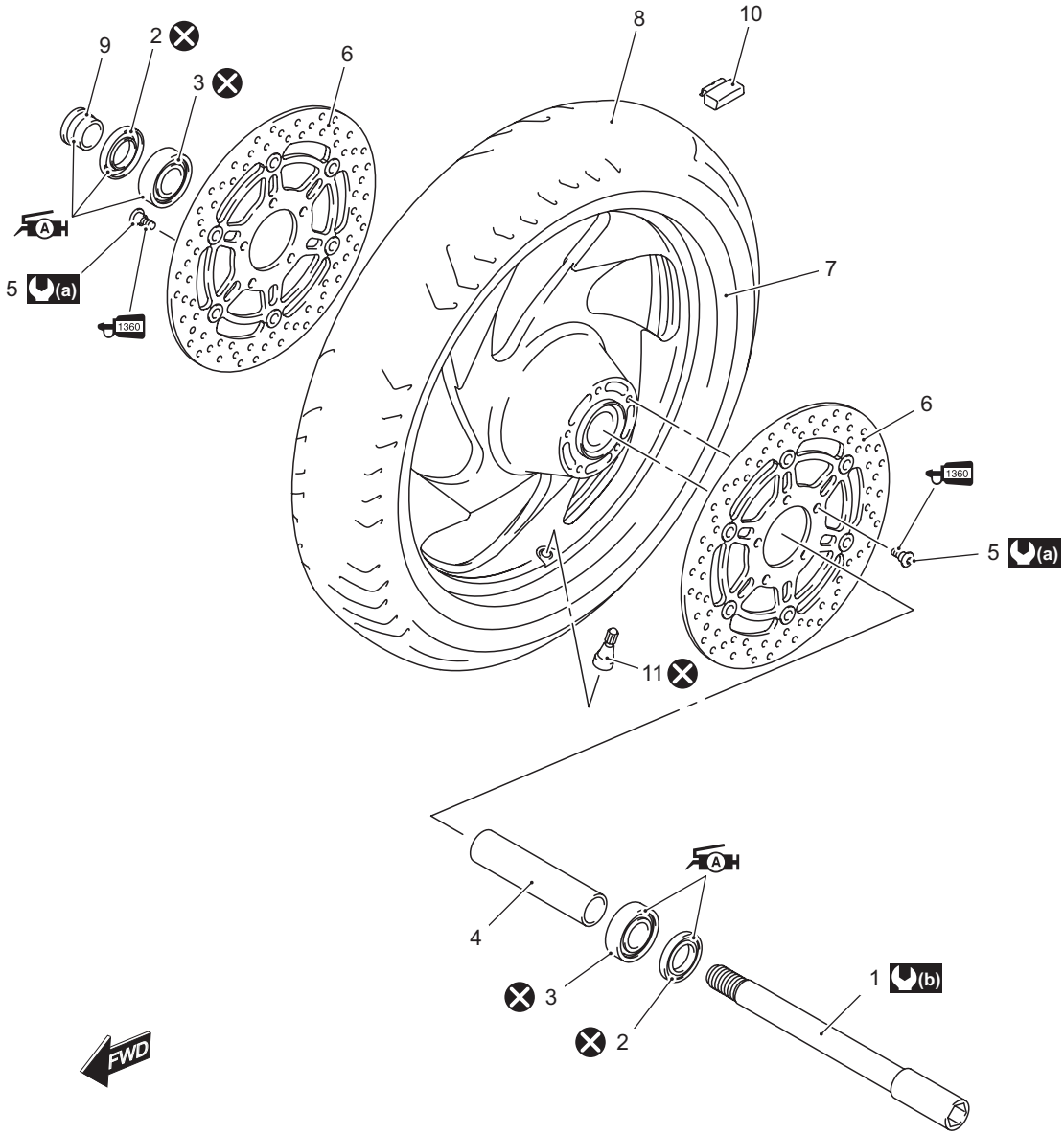
⚠ WARNING

- **Proper tire inflation pressure and loading are important factors to ensure riding safety. Overloading can lead not only to tire damage but also to loss of control.**
- **Under-inflation makes it difficult to turn a corner smoothly and results in premature wear of tires.**
- **Over-inflation reduces tire's area of road contact and thus results in skidding and loss of control.**
- **Do not interchange tires between wheels on the same motorcycle. Do not use tires of sizes and types different from the originally installed tires. Rotation of tires or use of such different tires may adversely affect handling of the motorcycle and can result in loss of control.**
- **Replace the wheel if it is deformed or has cracks or scratches. Also replace the wheel if its runout exceeds the service limit.**
- **Replacement wheels must be equivalent to the originally installed wheels.**

Repair Instructions

Front Wheel Components

B940H22406001

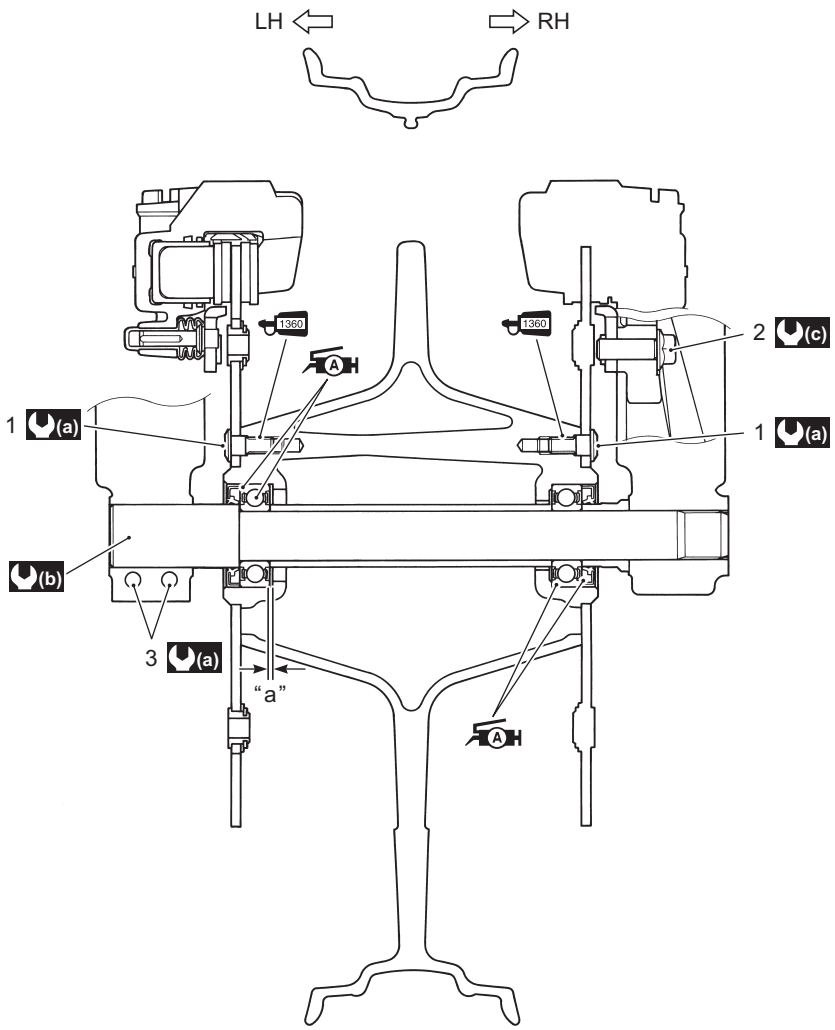


I940H1240047-02

1. Front axle	7. Front wheel	(b) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
2. Dust seal	8. Front tire	A H : Apply grease.
3. Bearing	9. Collar	1360 : Apply thread lock to the thread part.
4. Spacer	10. Wheel balancer	: Do not reuse.
5. Brake disc bolt	11. Air valve	
6. Brake disc	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	

Front Wheel Assembly Construction

B940H22406002



I940H1240042-05

1. Brake disc bolt	"a": Clearance	(c) : 39 N·m (3.9 kgf-m, 28.0 lbf-ft)
2. Brake caliper mounting bolt	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	A : Apply grease.
3. Front axle pinch bolt	(b) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)	1360 : Apply thread lock to the thread part.

Front Wheel Assembly Removal and Installation

B940H22406003

Removal

1) Raise the front wheel off the ground and support the motorcycle with a jack or a wooden block.

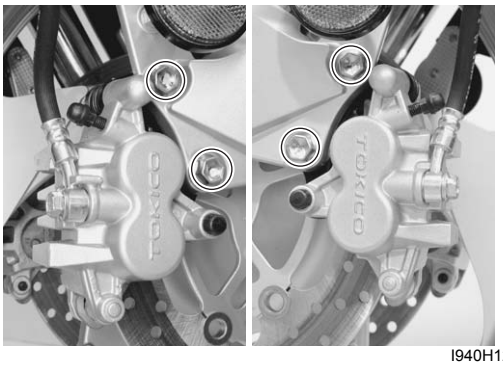
⚠ CAUTION

Do not carry out the work with the motorcycle resting on the side-stand. Make sure that the motorcycle is supported securely.

2) Remove the brake calipers. Refer to "Front Brake Caliper Removal and Installation in Section 4B (Page 4B-3)"

⚠ CAUTION

Do not operate the brake lever while removing the caliper.



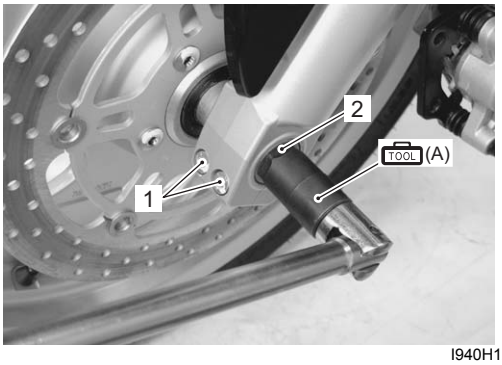
I940H1240003-01

3) Loosen the axle pinch bolts (1) on the left front fork leg.
4) Remove the front axle (2) with the special tool and then remove the front wheel.

NOTE

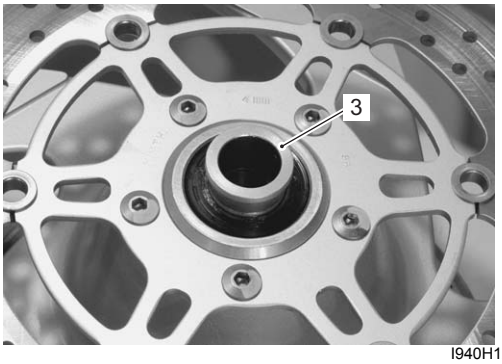
After removing the front wheel, install the calipers temporarily to the original positions.

Special tool
(A): 09900–18740 (Hexagon socket (24 mm))



I940H1240004-03

5) Remove the collar (3).



I940H1240005-02

Installation

1) Apply grease to the collar (1) and install it.

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



I940H1240007-01

2) Install the front wheel with the front axle and tighten the front axle temporarily.

⚠ WARNING

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



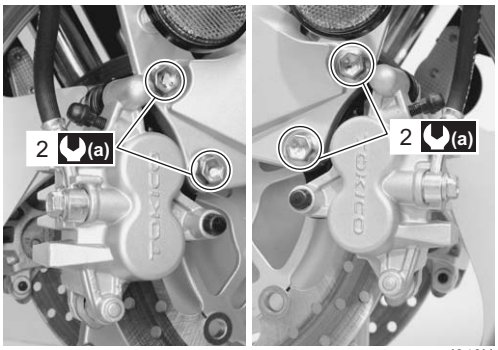
I940H1240009-01

3) Tighten the front brake caliper mounting bolts (2) to the specified torque.

Tightening torque
Front brake caliper mounting bolt (a): 39 N·m (3.9 kgf-m, 28.0 lbf-ft)

⚠ WARNING

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

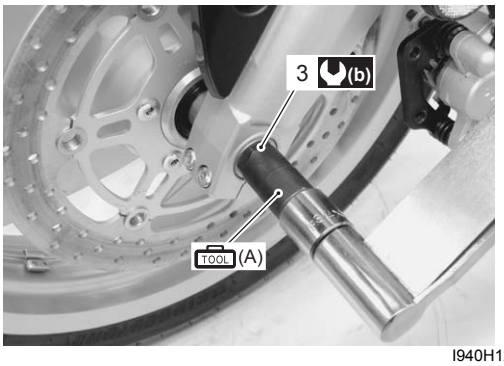


I940H1240010-02

4) Tighten the front axle (3) to the specified torque with the special tool.

Special tool
TOOL (A): 09900–18740 (Hexagon socket (24 mm))

Tightening torque
Front axle (b): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)



I940H1240011-04

5) Move the front fork up and down 4 or 5 times.



I940H1220007-01

6) Tighten the axle pinch bolt (4) 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 lbf-ft)



I940H1240013-02

Front Wheel Related Parts Inspection

B940H22406004

Refer to “Front Wheel Assembly Removal and Installation (Page 2D-3)”.

Tire
Refer to “Tire Inspection in Section 0B (Page 0B-16)”.

Front Brake Disc
Refer to “Front Brake Disc Inspection in Section 4B (Page 4B-7)”.

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 “Front Wheel Dust Seal / Bearing Removal and Installation (Page 2D-6)”.

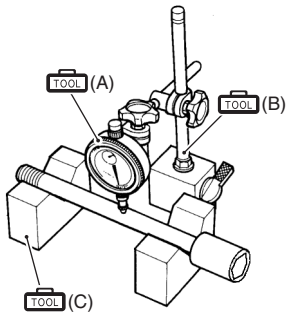


I940H1240014-01

Wheel Axle
Using a dial gauge, check the wheel axle for runout. If the runout exceeds the limit, replace the front axle.

Special tool
TOOL (A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL (B): 09900–20701 (Magnetic stand)
TOOL (C): 09900–21304 (V-block (100 mm))

Wheel axle runout
Service limit: 0.25 mm (0.010 in)

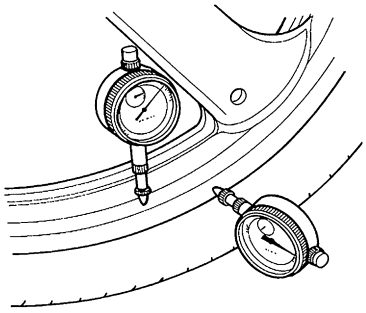


I649G1240054-02

Wheel

1) Remove the brake pads. Refer to “Front Brake Pad Replacement in Section 4B (Page 4B-2)”.
2) 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.
3) Install the brake pads. Refer to “Front Brake Pad Replacement in Section 4B (Page 4B-2)”.

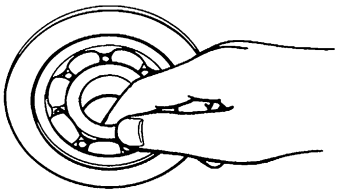
Wheel rim runout
Service limit (Axial and Radial): 2.0 mm (0.08 in)



I649G1240014-02

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 (Page 2D-6)”.



I649G1240015-02

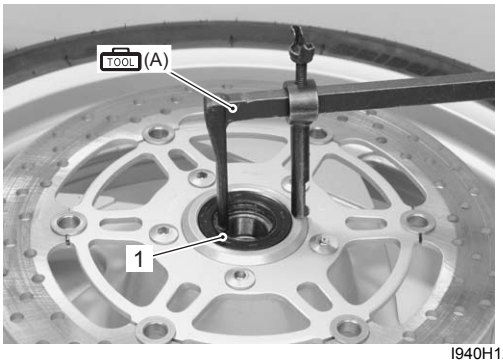
Front Wheel Dust Seal / Bearing Removal and Installation

B940H22406005

Removal

1) Remove the front wheel assembly. Refer to “Front Wheel Assembly Removal and Installation (Page 2D-3)”.
2) Remove the dust seals (1).

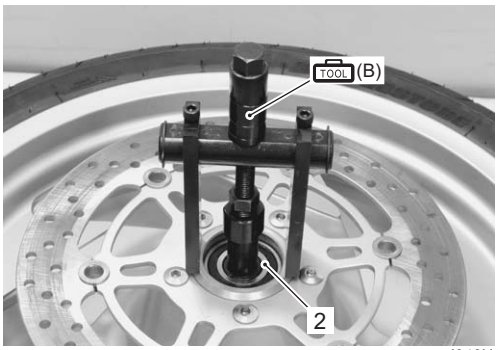
Special tool
TOOL (A): 09913–50121 (Oil seal remover)



I940H1240015-02

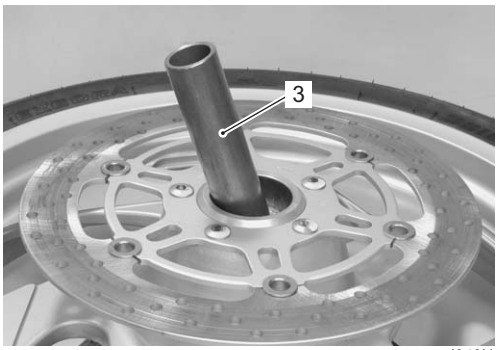
3) Remove the bearings (2) using the special tool.

Special tool
TOOL (B): 09921–20240 (Bearing remover set)



I940H1240016-01

4) Remove the spacer (3).



I940H1240017-01

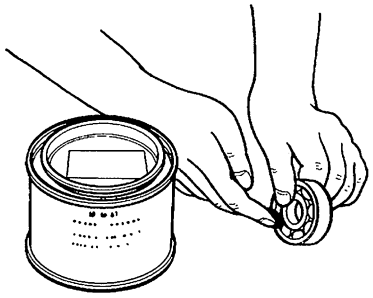
Installation

⚠ CAUTION

The removed dust seals and bearings must be replaced with new ones.

1) Apply grease to the wheel bearings.

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



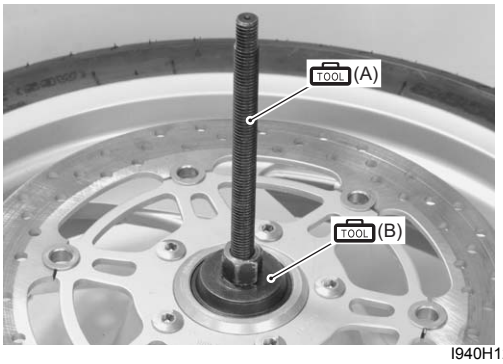
I649G1240019-02

2) First install the right wheel bearing, then install the spacer (1) and left wheel bearing with the special tool.

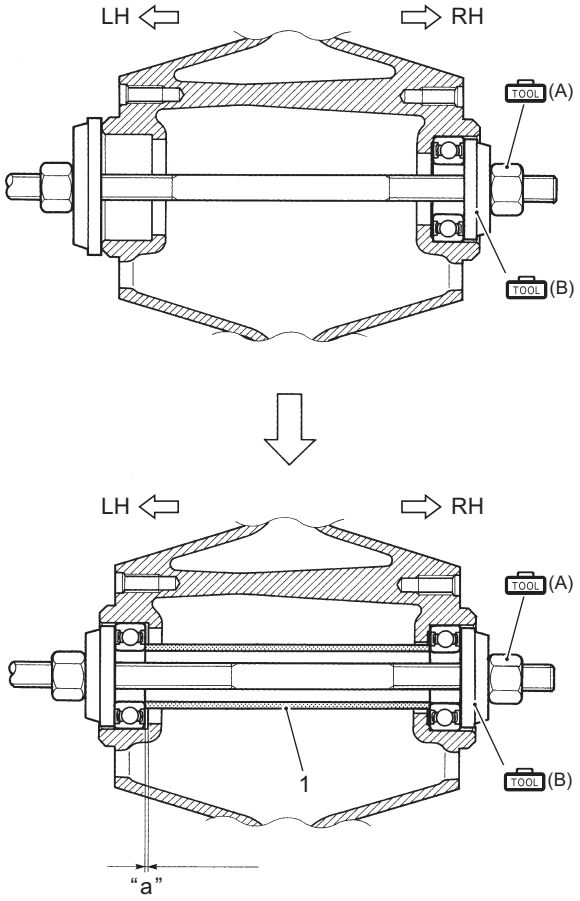
Special tool
TOOL (A): 09941–34513 (Steering race installer)
TOOL (B): 09924–84510 (Bearing installer set)

⚠ CAUTION

The sealed cover of the bearing must face outside.



I940H1240018-02



I940H1240043-02

1. Spacer	“a”: Clearance

3) Install the dust seals with the special tool.

Special tool
TOOL (C): 09913–70210 (Bearing installer set)



I940H1240019-01

4) Apply grease to the lip of the dust seals.

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

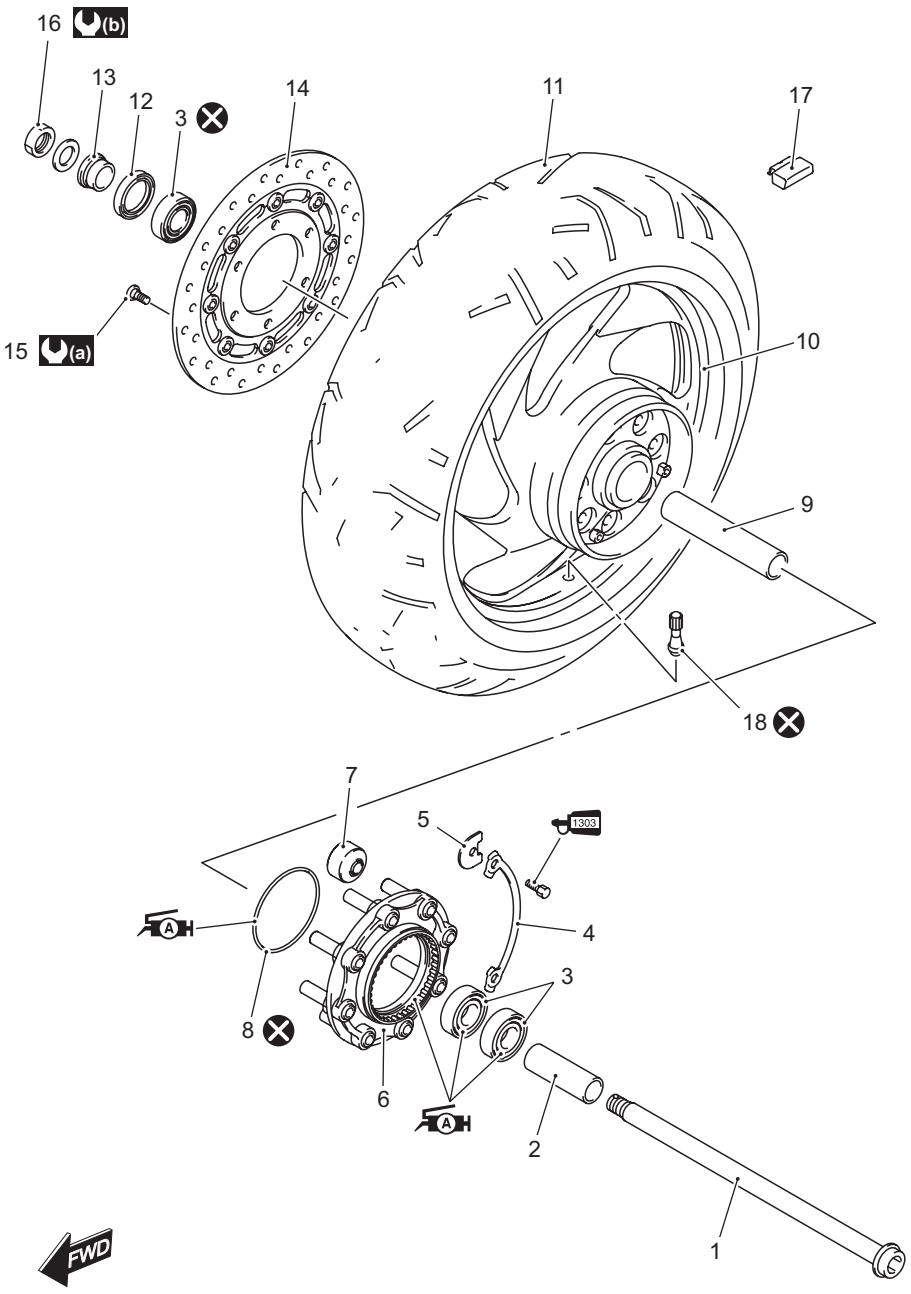


I940H1240021-01

5) Install the front wheel assembly. Refer to “Front Wheel Assembly Removal and Installation (Page 2D-3)”.

Rear Wheel Components

B940H22406006

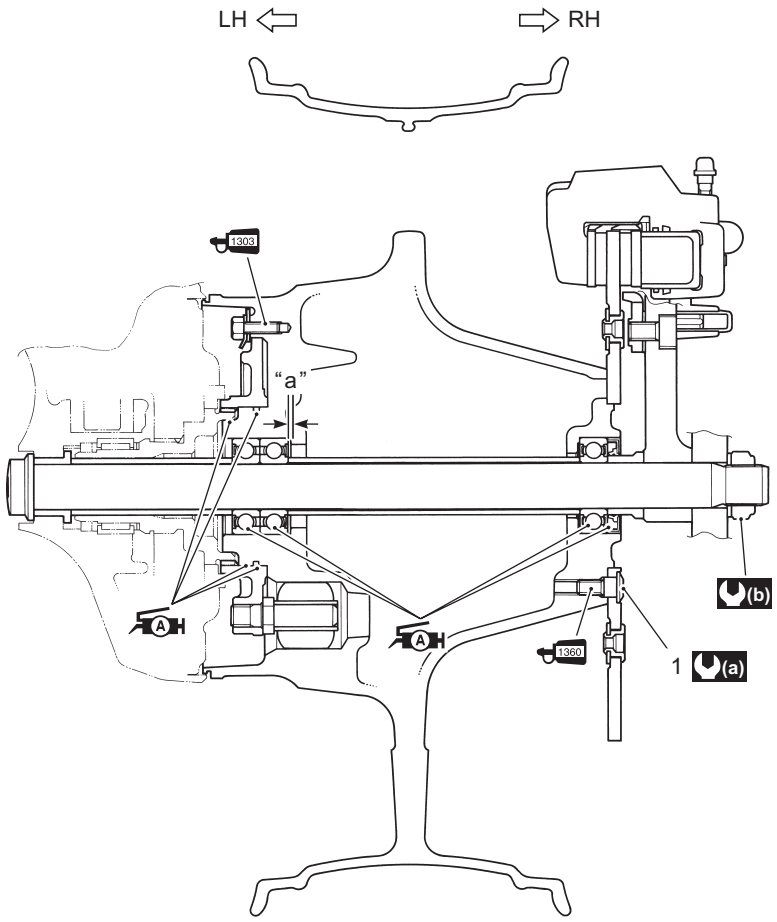


I940H1240046-02

1. Rear axle	9. Spacer	17. Wheel balancer
2. Spacer	10. Rear wheel	18. Air valve
3. Bearing	11. Rear tire	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
4. Lock washer	12. Dust seal	(b) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
5. Driven joint stopper	13. Collar	A H : Apply grease.
6. Driven joint	14. Brake disc	1303 : Apply thread lock to the thread part.
7. Wheel damper	15. Brake disc bolt	: Do not reuse.
8. O-ring	16. Rear axle nut	

Rear Wheel Assembly Construction

B940H22406007



I940H1240044-04

1. Brake disc bolt	(b) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)	A : Apply grease.
"a": Clearance	1303 : Apply thread lock to the thread part.	
(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	1360 : Apply thread lock to the thread part.	

Rear Wheel Assembly Removal and Installation

B940H22406008

Removal

1) Support the motorcycle with the jack or wooden block.
2) Remove the rear brake caliper. Refer to "Rear Brake Caliper Removal and Installation in Section 4C (Page 4C-3)".

⚠ CAUTION

Do not operate the brake pedal while removing the caliper.

NOTE

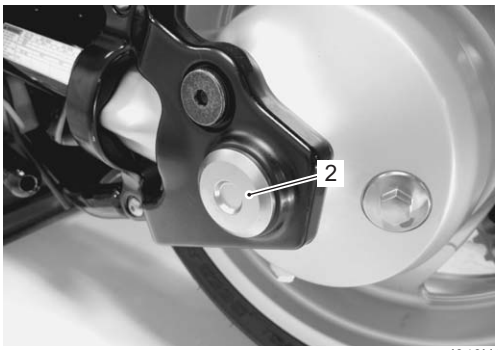
It is unnecessary to disengage the brake hose from the caliper.

3) Remove the brake caliper bracket mounting bolt (1).



I940H1240022-01

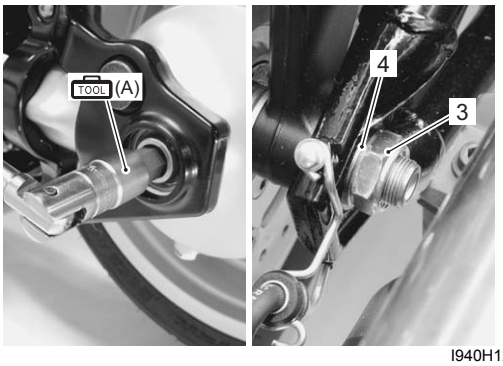
4) Remove the cap (2).



I940H1240023-01

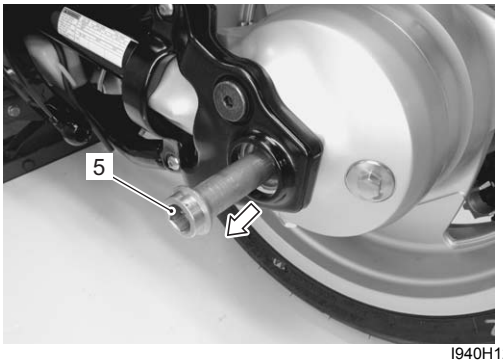
5) Hold the rear axle with the special tool and remove the axle nut (3) and washer (4).

Special tool
(A): 09944–28320 (Hexagon socket (19 mm))



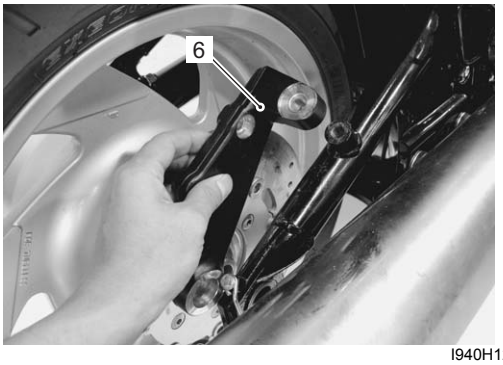
I940H1240024-01

6) Draw out the rear axle (5).



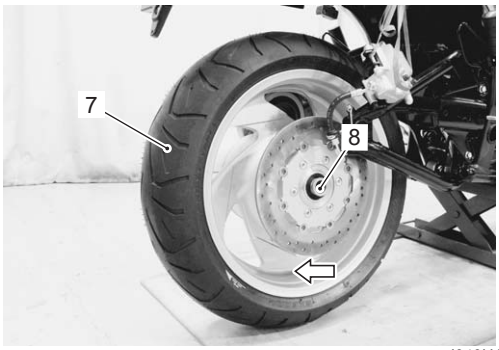
I940H1240025-01

7) Remove the brake caliper bracket (6).



I940H1240026-01

8) Remove the rear wheel assembly (7) and collar (8).

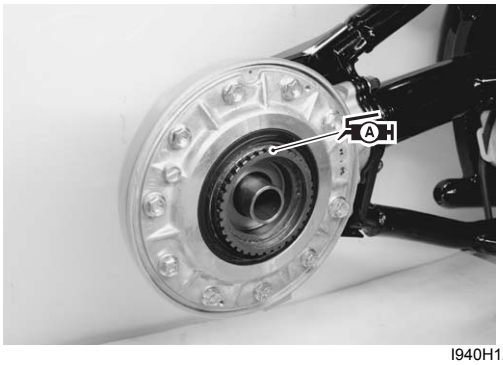


I940H1240027-01

Installation

1) Apply grease to the final gear spline.

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



I940H1240028-01

2) Install the rear wheel with the front axle and tighten the front axle temporarily.

⚠ WARNING

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

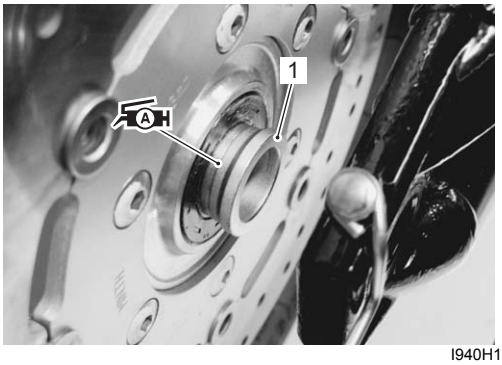


I940H1240029-01

3) Apply grease to the dust seal lip.

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

4) Install the collar (1).



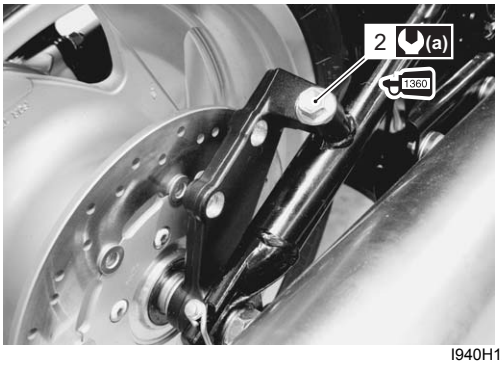
I940H1240030-01

5) Install the rear wheel, rear axle and brake caliper bracket.

6) Apply thread lock to the brake caliper bracket mounting bolt (2) and tighten it to the specified torque.

1360 : Thread lock cement 99000–32130 (THREAD LOCK CEMENT SUPER 1360 or equivalent)

Tightening torque
Rear brake caliper bracket mounting bolt (a): 94 N·m (9.4 kgf-m, 68.0 lbf-ft)



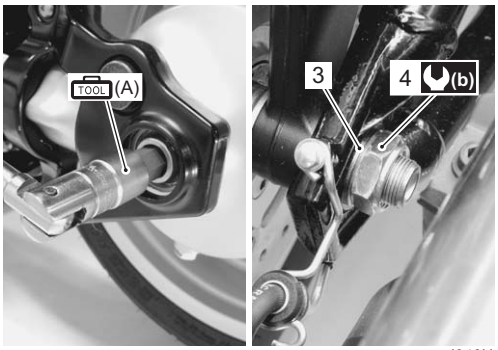
I940H1240031-03

7) Install the washer (3) and rear axle nut (4).

8) Hold the rear axle with the special tool and tighten the rear axle nut (4) to the specified torque.

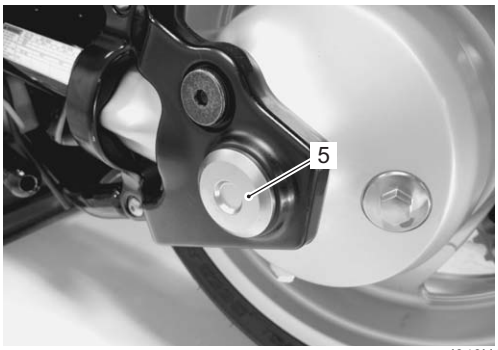
Tightening torque
Rear axle nut (b): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)

Special tool
TOOL (A): 09944–28320 (Hexagon socket (19 mm))



I940H1240032-01

9) Install the cap (5).



I940H1240033-01

10) Install the brake caliper. Refer to “Rear Brake Caliper Removal and Installation in Section 4C (Page 4C-3)”.

Rear Wheel Related Parts Inspection

B940H22406009

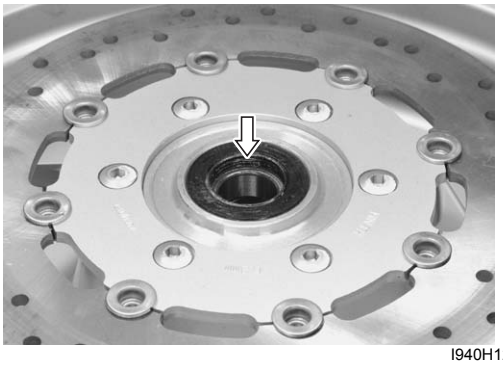
Refer to “Rear Wheel Assembly Removal and Installation (Page 2D-10)”.

Tire
Refer to “Tire Inspection in Section 0B (Page 0B-16)”.

Rear Brake Disc
Refer to “Rear Brake Disc Inspection in Section 4C (Page 4C-7)”.

Wheel Damper
Refer to “Wheel Dumper Inspection in Section 3A (Page 3A-23)”.

Dust Seal
Inspect the dust seal lip for wear or damage. If any defects are found, replace the dust seal with a new one. Refer to “Rear Wheel Dust Seal / Bearing Removal and Installation (Page 2D-13)”.

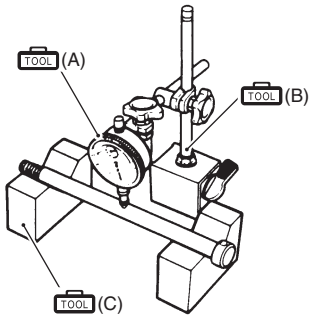


I940H1240034-01

Wheel Axle
Using a dial gauge, check the wheel axle for runout, If the runout exceeds the limit, replace the axle shaft.

Wheel axle runout
Service limit: 0.25 mm (0.010 in)

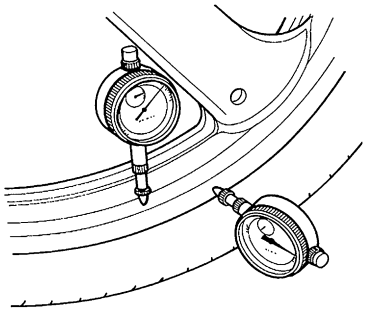
Special tool
TOOL (A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL (B): 09900–20701 (Magnetic stand)
TOOL (C): 09900–21304 (V-block (100 mm))



I649G1230034-03

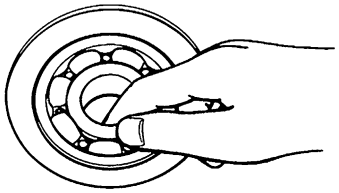
Wheel
1) Remove the brake pads. Refer to “Rear Brake Pad Replacement in Section 4C (Page 4C-2)”.
2) Make sure that the wheel runout checked as shown does not exceed the service limit. An excessive runout is usually due to worn or loosened wheel bearings and can be reduced by replacing the bearings. If bearing replacement fails to reduce the runout, replace the wheel.
3) Install the brake pads. Refer to “Rear Brake Pad Replacement in Section 4C (Page 4C-2)”.

Wheel rim runout
Service limit (Axial and Radial): 2.0 mm (0.08 in)



I649G1240014-02

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 (Page 2D-13)”.



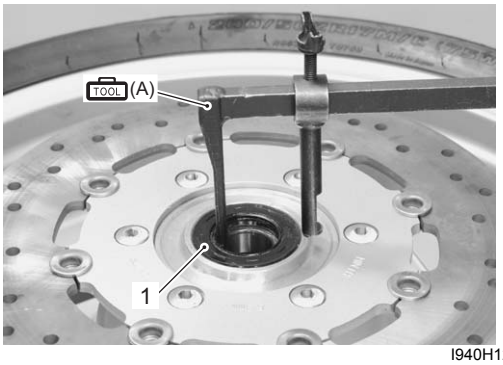
I649G1240015-02

Rear Wheel Dust Seal / Bearing Removal and Installation

B940H22406010

Removal
1) Remove the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation (Page 2D-10)”.
2) Remove the dust seal (1).

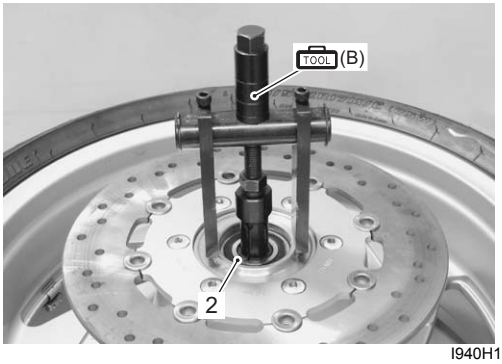
Special tool
TOOL (A): 09913–50121 (Oil seal remover)



I940H1240035-01

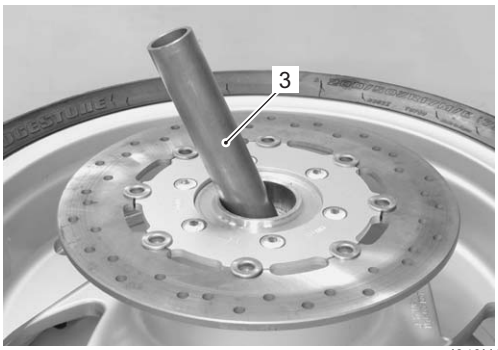
3) Remove the bearings (2) on both sides using the special tool.

Special tool
(B): 09921–20240 (Bearing remover set)



I940H1240036-01

4) Remove the spacer (3).



I940H1240037-01

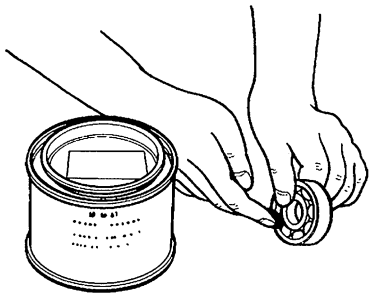
Installation

⚠ CAUTION

The removed dust seals and bearings must be replaced with new ones.

1) Apply grease to the wheel bearings.

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



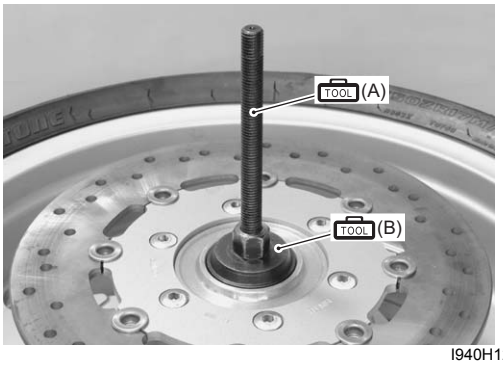
I649G1240019-02

2) First install the right wheel bearing, then install the spacer (1) and left wheel bearings with the special tools.

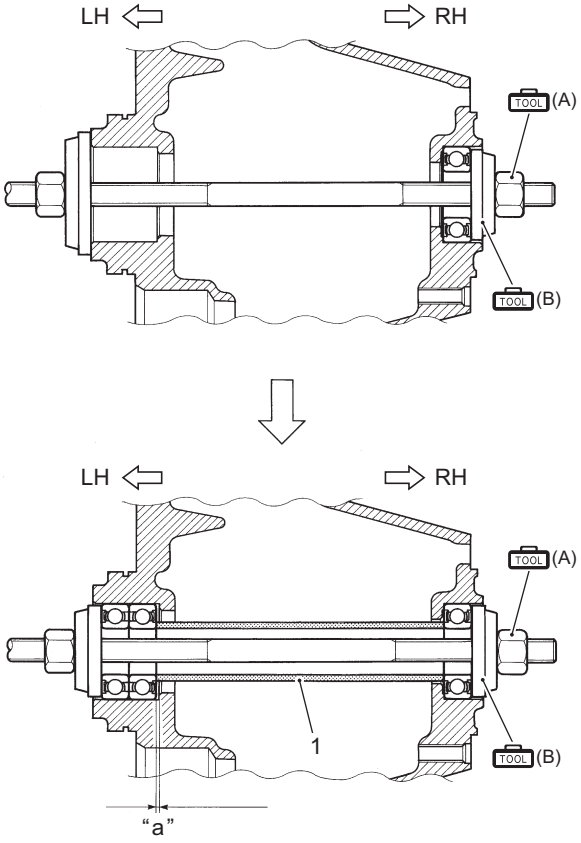
Special tool
(A): 09941–34513 (Steering race installer)
(B): 09924–84510 (Bearing installer set)

⚠ CAUTION

The sealed cover of the bearing must face outside.



I940H1240038-01

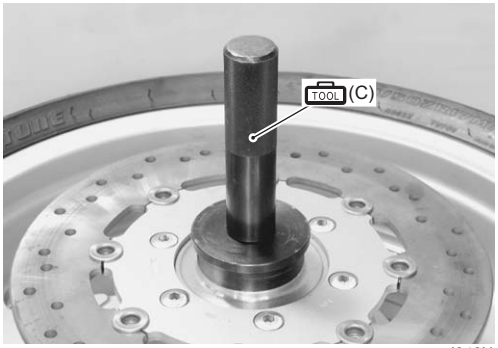


I940H1240045-02

1. Spacer	“a”: Clearance

3) Install a new dust seal with the special tool.

Special tool
(C): 09913–70210 (Bearing installer set)



I940H1240039-01

4) Apply grease to the dust seal lip.

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



I940H1240040-01

5) Install the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation (Page 2D-10)”.

Tire Removal and Installation

B940H22406011

Removal

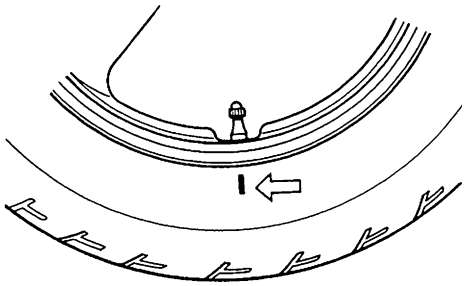
The most critical factor of a tubeless tire is the seal between the wheel rim and the tire bead. For this reason, it is recommended to use a tire changer that can satisfy this sealing requirement and can make the operation efficient as well as functional.

⚠ 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.



I649G1240037-02

Installation

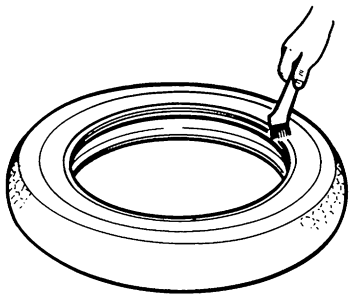
⚠ CAUTION

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.



I649G1240038-02

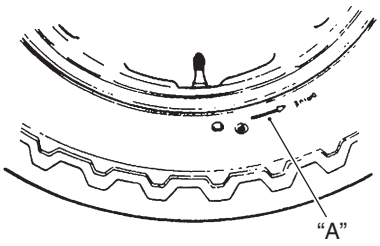
2) Install the tire onto the wheel.

⚠ 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.**



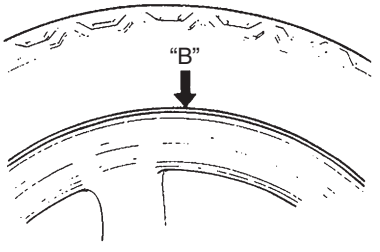
I649G1240039-02

3) Bounce the tire several times while rotating. This makes the tire bead expand outward to contact the wheel, thereby facilitating air inflation.
4) Install the valve core and inflate the tire.

⚠ WARNING

- **Do not inflate the tire to more than 400 kPa (4.0 kgf/cm^2, 57 psi). 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 "rim 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.



I649G1240040-02

7) When the bead has been fitted properly, adjust the pressure to specification.
8) As necessary, adjust the tire balance. Refer to "Wheel Balance Check and Adjustment (Page 2D-18)".

Cold inflation tire pressure

	Front	Rear
Solo riding	250 kPa (2.50 kgf/cm^2, 36 psi)	250 kPa (2.50 kgf/cm^2, 36 psi)
Dual riding	250 kPa (2.50 kgf/cm^2, 36 psi)	290 kPa (2.90 kgf/cm^2, 42 psi)

9) Install the wheel assembly. Refer to "Front Wheel Assembly Removal and Installation (Page 2D-3)" and "Rear Wheel Assembly Removal and Installation (Page 2D-10)".

Wheel / Tire / Air Valve Inspection and Cleaning

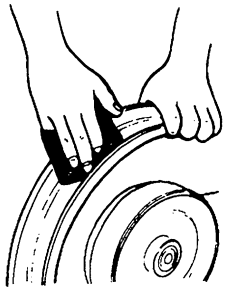
B940H22406012

Refer to "Tire Removal and Installation (Page 2D-15)".

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 Related Parts Inspection (Page 2D-5)" and "Rear Wheel Related Parts Inspection (Page 2D-12)".

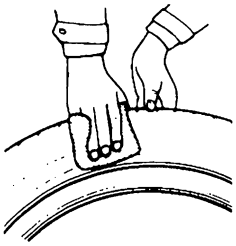


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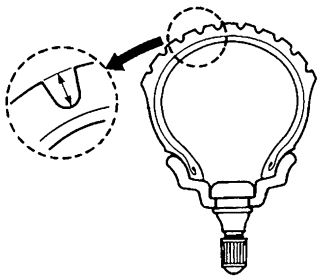
Tire

Tire must be checked for the following points:

- Nick and rupture on side wall
- Tire tread depth (Refer to “Tire Inspection in Section 0B (Page 0B-16)”.)
- Tread separation
- Abnormal, uneven wear on tread
- Surface damage on bead
- Localized tread wear due to skidding (Flat spot)
- Abnormal condition of inner liner



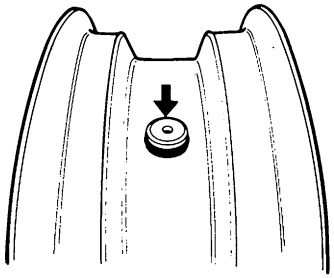
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I649G1240043-02

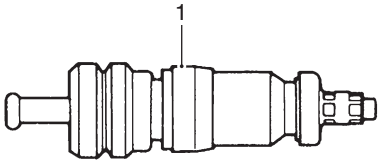
Air Valve

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 (Page 2D-17)”.



I649G1240044-02

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 (Page 2D-17)”.



I649G1240045-02

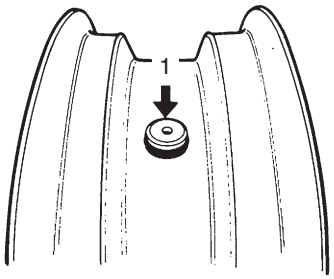
1. Seal

Air Valve Removal and Installation

B940H22406013

Removal

1) Remove the wheel assembly. Refer to “Front Wheel Assembly Removal and Installation (Page 2D-3)” and “Rear Wheel Assembly Removal and Installation (Page 2D-10)”.
2) Remove the tire. Refer to “Tire Removal and Installation (Page 2D-15)”.
3) Remove the air valve (1) from the wheel.

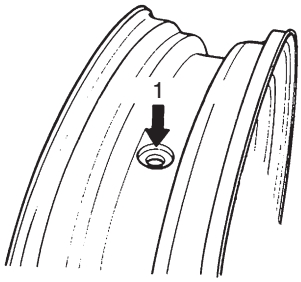


I649G1240046-02

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 (1) must be cleaned off.



I718H1240054-01

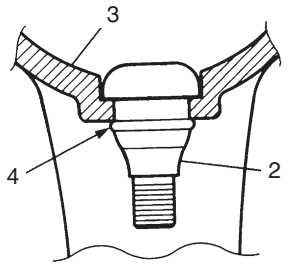
- Install the air valve (2) in the wheel (3).

⚠ CAUTION

- **Be careful not to damage the lip (4) of the 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.



I718H1240055-01

2. Valve	3. Wheel	4. Valve lip

Wheel Balance Check and Adjustment

B940H22406014

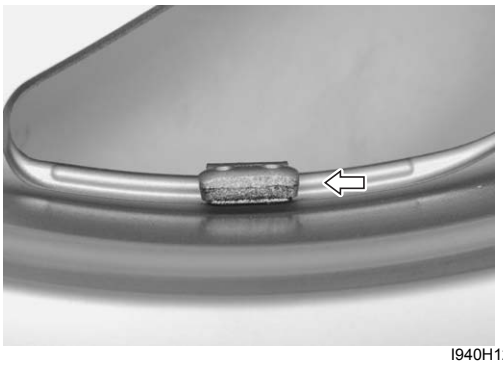
Check and adjust the wheel balance in the following procedures:

1) Removal the wheel assembly. Refer to “Front Wheel Assembly Removal and Installation (Page 2D-3)” and “Rear Wheel Assembly Removal and Installation (Page 2D-10)”.
2) 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.

3) When installing the balancer weight to the wheel, set the balancer weight on center rib of the wheel.



I940H1240041-01

4) Recheck the wheel balance.
5) Install the wheel assembly. Refer to “Front Wheel Assembly Removal and Installation (Page 2D-3)” and “Rear Wheel Assembly Removal and Installation (Page 2D-10)”.

Specifications

Service Data

B940H22407001

Wheel

Unit: mm (in)

Item	Standard			Limit
Wheel rim runout	Front & Rear	Axial	—	2.0 (0.08)
		Radial		
Wheel axle runout	Front & Rear	—		0.25 (0.010)
Wheel rim size	Front	18 M/C x MT 3.50		—
	Rear	17 M/C x MT 6.00		—

Tire

Item		Standard	Limit
Cold inflation tire pressure (Solo riding)	Front	250 kPa (2.50 kgf/cm^2, 36 psi)	—
	Rear	250 kPa (2.50 kgf/cm^2, 36 psi)	—
Cold inflation tire pressure (Dual riding)	Front	250 kPa (2.50 kgf/cm^2, 36 psi)	—
	Rear	290 kPa (2.90 kgf/cm^2, 42 psi)	—
Tire size	Front	120/70ZR 18M/C (59W), tubeless	—
	Rear	200/50ZR 17M/C (75W), tubeless	—
Tire type	Front	BRIDGESTONE: G853 G	—
	Rear	BRIDGESTONE: G852 G	—
Tire tread depth (Recommended depth)	Front	—	1.6 mm (0.06 in)
	Rear	—	2.0 mm (0.08 in)

Tightening Torque Specifications

B940H22407002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front brake caliper mounting bolt	39	3.9	28.0	☞(Page 2D-4)
Front axle	100	10.0	72.5	☞(Page 2D-5)
Front axle pinch bolt	23	2.3	16.5	☞(Page 2D-5)
Rear brake caliper bracket mounting bolt	94	9.4	68.0	☞(Page 2D-12)
Rear axle nut	100	10.0	72.5	☞(Page 2D-12)

NOTE

The specified tightening torque is described in the following.
“Front Wheel Components (Page 2D-2)”
“Front Wheel Assembly Construction (Page 2D-3)”
“Rear Wheel Components (Page 2D-9)”
“Rear Wheel Assembly Construction (Page 2D-10)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H22408001

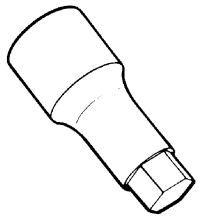
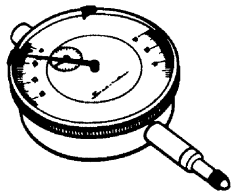
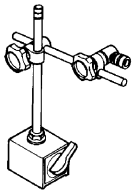
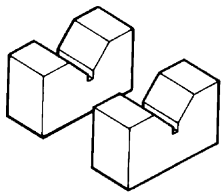
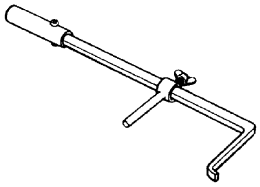
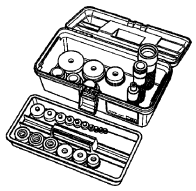
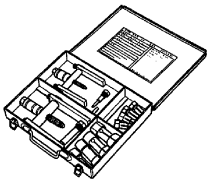
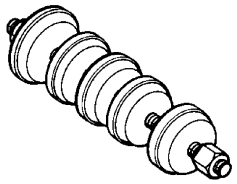
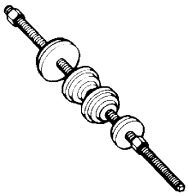
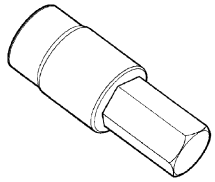
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 2D-4) / ☞(Page 2D-7) / ☞(Page 2D-8) / ☞(Page 2D-11) / ☞(Page 2D-12) / ☞(Page 2D-14) / ☞(Page 2D-15)
Thread lock cement	THREAD LOCK CEMENT SUPER 1360 or equivalent	P/No.: 99000–32130	☞(Page 2D-12)

NOTE

Required service material is also described in the following.
“Front Wheel Components (Page 2D-2)”
“Front Wheel Assembly Construction (Page 2D-3)”
“Rear Wheel Components (Page 2D-9)”
“Rear Wheel Assembly Construction (Page 2D-10)”

Special Tool

B940H22408002

09900–18740 Hexagon socket (24 mm) ☞(Page 2D-4) / ☞(Page 2D-5) 	09900–20607 Dial gauge (1/100 mm, 10 mm) ☞(Page 2D-5) / ☞(Page 2D-13) 
09900–20701 Magnetic stand ☞(Page 2D-5) / ☞(Page 2D-13) 	09900–21304 V-block (100 mm) ☞(Page 2D-5) / ☞(Page 2D-13) 
09913–50121 Oil seal remover ☞(Page 2D-6) / ☞(Page 2D-13) 	09913–70210 Bearing installer set ☞(Page 2D-7) / ☞(Page 2D-15) 
09921–20240 Bearing remover set ☞(Page 2D-6) / ☞(Page 2D-14) 	09924–84510 Bearing installer set ☞(Page 2D-7) / ☞(Page 2D-14) 
09941–34513 Steering race installer ☞(Page 2D-7) / ☞(Page 2D-14) 	09944–28320 Hexagon socket (19 mm) ☞(Page 2D-11) / ☞(Page 2D-12) 

Section 3

Driveline / Axle

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Precautions

Precautions

Precautions for Driveline / Axle

B940H23000001

Refer to “General Precautions in Section 00 (Page 00-1)”.

⚠ WARNING

Support the motorcycle with a jack or wooden block when servicing the driveshafts and drive train.

Drive Chain / Drive Train / Drive Shaft

Diagnostic Information and Procedures

Drive Chain and Sprocket Symptom Diagnosis

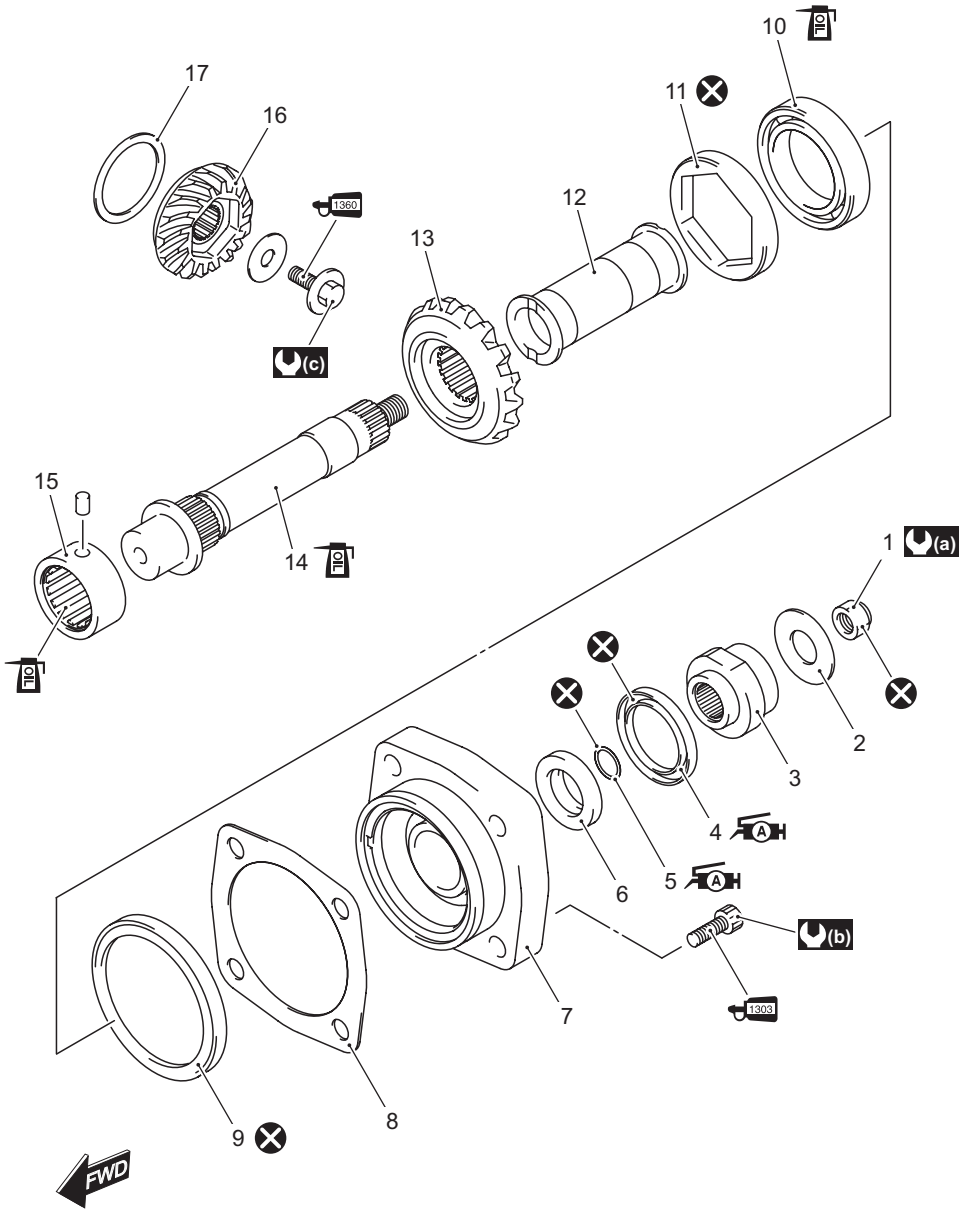
B940H23104001

Condition	Possible cause	Correction / Reference Item
Noisy shaft drive (Noise seems to come from secondary bevel gear and final bevel gear assemblies)	Oil level too low.	*Refill. (Check oil jet./Replace oil seal.)*
	Drive and driven bevel gears damaged or worn.	*Replace.*
	Excessive backlash.	*Adjust.*
	Improper tooth contact.	*Adjust.*
	Damage to bearings.	*Replace.*
Noisy shaft drive (Noise seems to come from propeller shaft area)	Propeller shaft universal joint damaged.	*Replace.*
	Propeller shaft splines damaged or worn.	*Replace.*
	Insufficient lubricant.	*Refill. (Replace oil seal.)*
	Cam dog contacting surface damaged or worn.	*Replace.*

Repair Instructions

Secondary Gear Components

B940H23106001

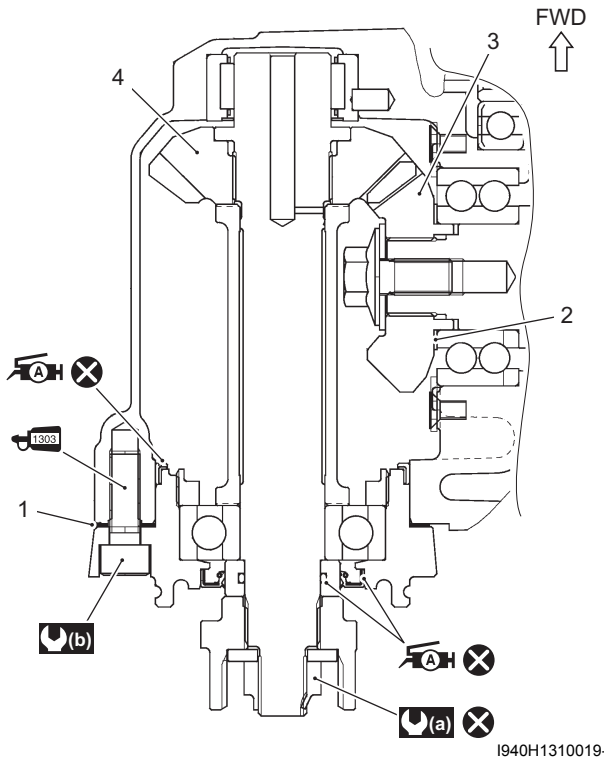


I940H1310057-02

1. Driven bevel gear coupling nut	9. Oil seal	17. Shim(-s)
2. Washer	10. Bearing	(a) : 95 N·m (9.5 kgf-m, 68.5 lbf-ft)
3. Driven bevel gear coupling	11. Secondary driven bearing stopper	(b) : 55 N·m (5.5 kgf-m, 40.0 lbf-ft)
4. O-ring	12. Secondary driven bevel gear spacer	(c) : 160 N·m (16.0 kgf-m, 115.5 lbf-ft)
5. Secondary shaft spacer	13. Secondary driven bevel gear	A H : Apply grease.
6. Oil seal	14. Secondary driven gear shaft	1303 : Apply thread lock to the thread part.
7. Bearing housing	15. Bearing	1360 : Apply thread lock to the thread part.
8. Shim(-s)	16. Secondary drive bevel gear	: Apply engine oil.

Secondary Gear Construction

B940H23106002



I940H1310019-02

1. Shims	4. Secondary driven gear	: Apply grease.
2. Shims	(a) : 95 N·m (9.5 kgf-m, 68.5 lbf-ft)	1303 : Apply thread lock to the thread part.
3. Secondary drive gear	(b) : 55 N·m (5.5 kgf-m, 40.0 lbf-ft)	: Do not reuse.

Secondary Driven Gear Assembly Removal and Installation

B940H23106003

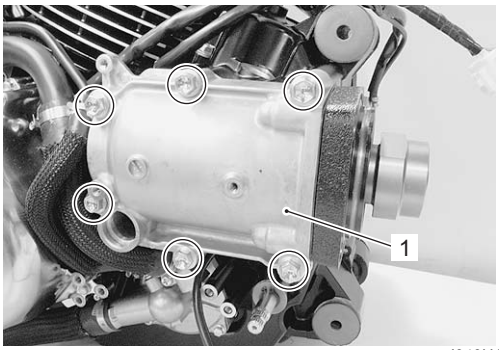
Removal

1) Remove the engine assembly. Refer to “Engine Assembly Removal in Section 1D (Page 1D-20)”.
2) Remove the speed sensor. Refer to “Speed Sensor Removal and Installation in Section 9C (Page 9C-7)”.
3) Remove the clutch release assembly. Refer to “Clutch Release Assembly / Push Rod Removal and Installation in Section 5C (Page 5C-2)”.



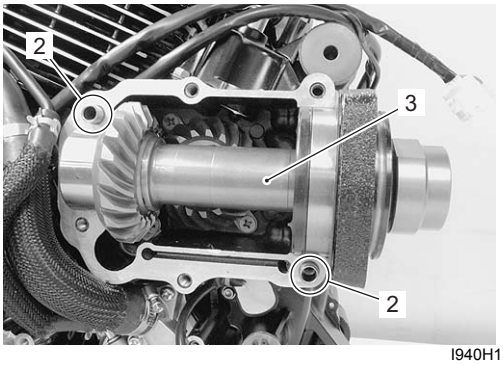
I940H1310022-01

4) Remove the secondary gear case (1).



I940H1310021-01

5) Remove the dowel pins (2) and secondary driven gear assembly (3).

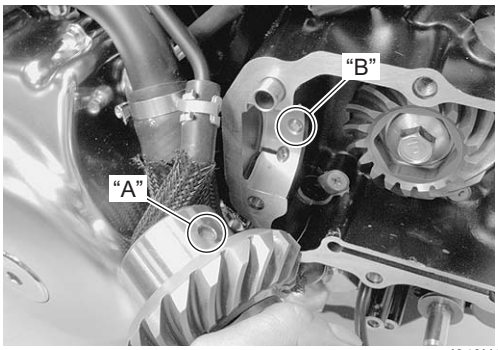


I940H1310023-01

Installation

Install the secondary driven gear assembly in the reverse order of removal. Pay attention to the following points:

- When installing the secondary driven gear assembly, align the pin “A” and hole “B” of the bearing.



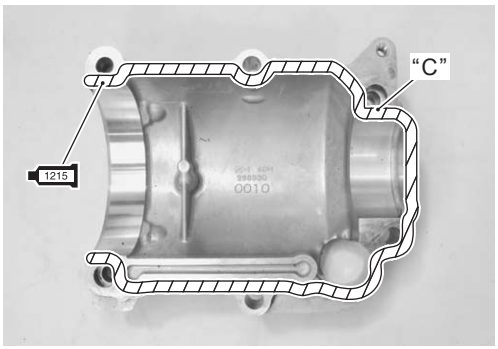
I940H1310024-01

- Apply bond to the each matching surface “C” and “D”.

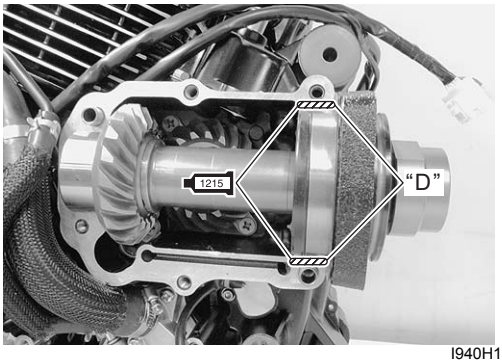
NOTE

- **Make surfaces free from moisture, oil, dust and other foreign materials.**
- **Spread on surfaces thinly to form an even layer, and assemble the secondary gear case few minutes.**
- **Take extreme care not to apply any bond to the oil hole, oil groove and bearing.**

1215 : Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)



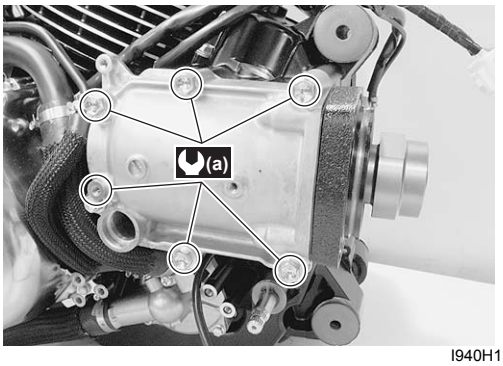
I940H1310025-03



I940H1310053-01

- Install the secondary gear case and temporarily tighten the bolts to the specified torque.

Tightening torque
Secondary gear case bolt (Initial) (a): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)

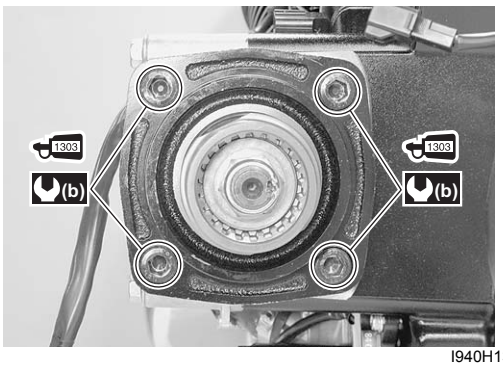


I940H1310026-04

- Apply a small quantity of the thread lock to the bearing housing bolts and tighten them to the specified torque.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

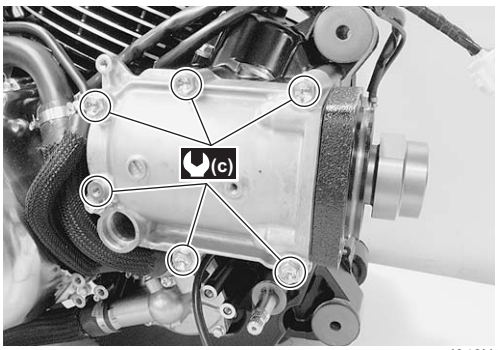
Tightening torque
Secondary driven gear bearing housing bolt (b): 55 N·m (5.5 kgf-m, 40.0 lbf-ft)



I940H1310027-03

- Tighten the secondary gear bolts to the specified torque.

Tightening torque
Secondary gear case bolt (Final) (c): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



I940H1310028-01

Secondary Driven Gear Disassembly and Assembly

B940H23106004

Refer to “Secondary Driven Gear Assembly Removal and Installation (Page 3A-3)”.

Disassembly

1) Remove the shims (1).



I940H1310029-01

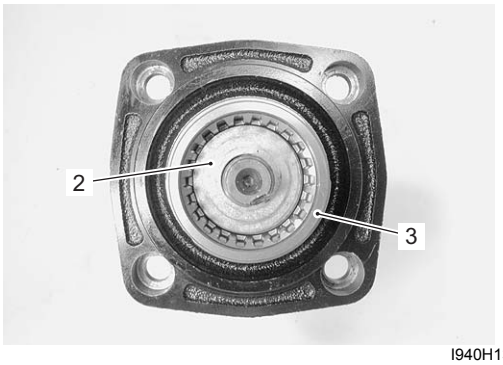
2) Unlock the nut with a chisel.
3) Remove the driven bevel gear coupling nut with the special tool.

Special tool
TOOL (A): 09924–64510 (Final driving gear coupling holder)



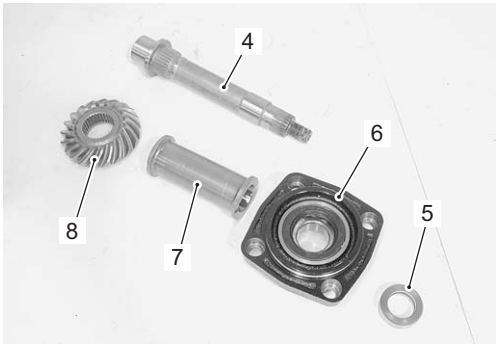
I940H1310030-01

4) Remove the washer (2) and driven bevel gear coupling (3).



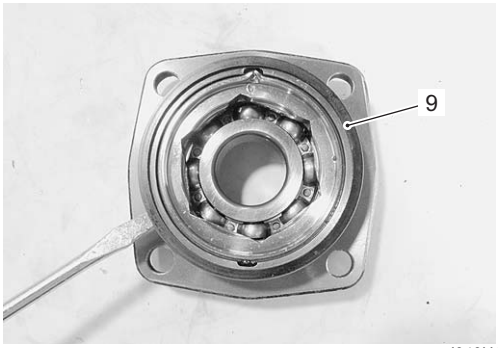
I940H1310031-01

5) Remove the following parts from the shaft (4).
   - Secondary shaft spacer (5)
   - Bearing housing (6)
   - Secondary driven bevel gear spacer (7)
   - Secondary driven bevel gear (8)



I940H1310032-01

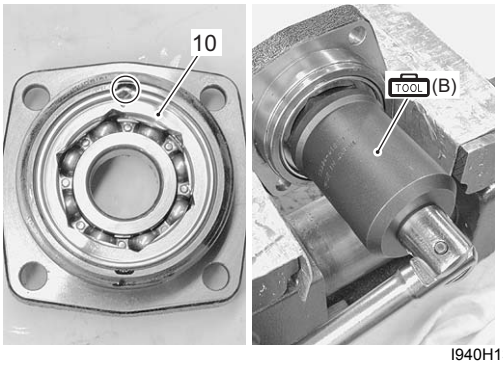
6) Remove the oil seal (9).



I940H1310033-01

7) Unlock the secondary driven bearing stopper (10).
8) Remove the secondary driven bearing stopper (10) with the special tool.

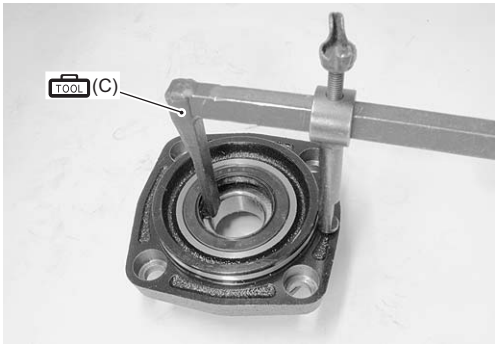
Special tool
TOOL (B): 09924–41830 (Bearing retainer wrench)



I940H1310034-01

9) Remove the oil seal with the special tool.

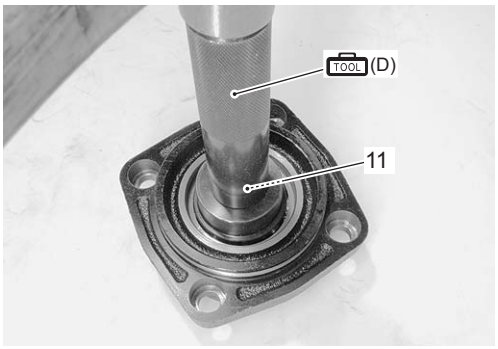
Special tool
TOOL (C): 09913–50121 (Oil seal remover)



I940H1310035-01

10) Remove the bearing (11).

Special tool
TOOL (D): 09913–70210 (Bearing installer set)



I940H1310036-03

Assembly

NOTE

Bearing installing the gears, apply engine oil to the rotating parts.

1) Install the bearing with the special tool.

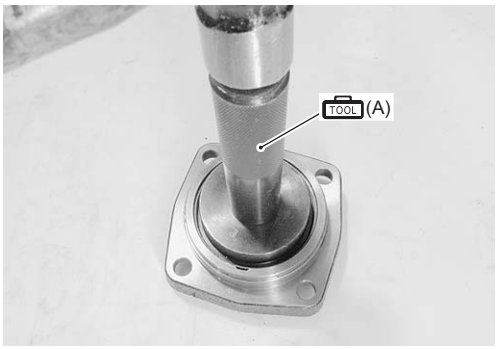
⚠ CAUTION

The removed bearing must be replaced with a new one.

NOTE

When installing the bearing, stamped mark on the bearing must face outside.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)



I940H1310037-01

2) Install the oil seal with the special tool.

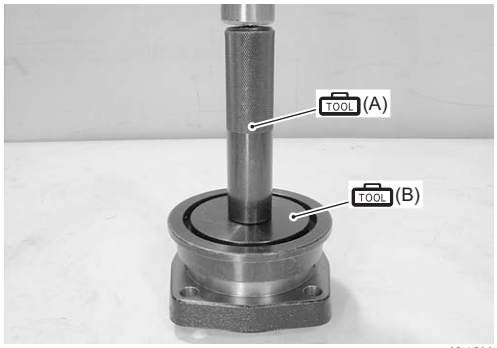
⚠ CAUTION

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

Special tool
TOOL (A): 09913–70210 (Bearing installer set)
TOOL (B): 09924–74520 (Oil seal installer/ remover)



I940H1310038-03



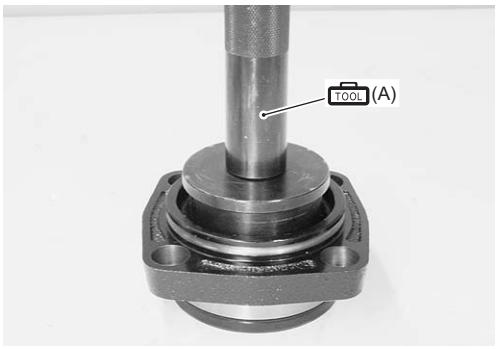
I940H1310039-01

3) Install the oil seal with the special tool.

⚠ CAUTION

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

Special tool
TOOL (A): 09913–70210 (Bearing installer set)



I940H1310040-01

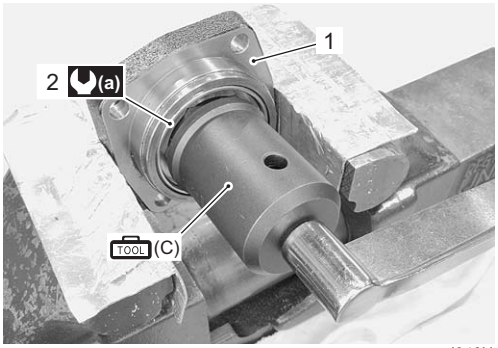
4) Install the bearing housing (1) and tighten the bearing stopper (2) to the specified torque with the special tool.

⚠ CAUTION

Replace the bearing stopper (2) with a new one.

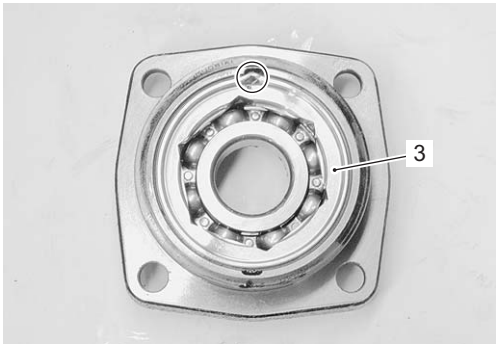
Special tool
TOOL (C): 09924–41830 (Bearing retainer wrench)

Tightening torque
Secondary driven bevel gear bearing stopper (a): 105 N·m (10.5 kgf-m, 76.0 lbf-ft)



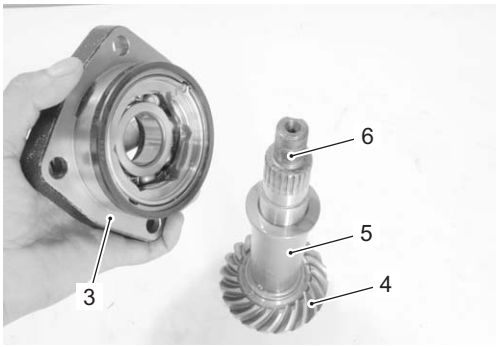
I940H1310041-02

5) Lock the bearing stopper (3) with a center punch.



I940H1310042-01

6) Install the secondary driven bevel gear (4), secondary driven bevel gear spacer (5) and bearing housing (3) to the shaft (6).



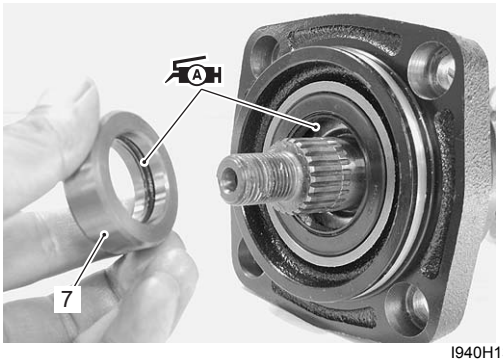
I940H1310043-01

7) Apply grease to the lip of oil seal and O-ring and install the secondary shaft spacer (7).

⚠ CAUTION

Replace the O-ring with a new one.

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



I940H1310044-01

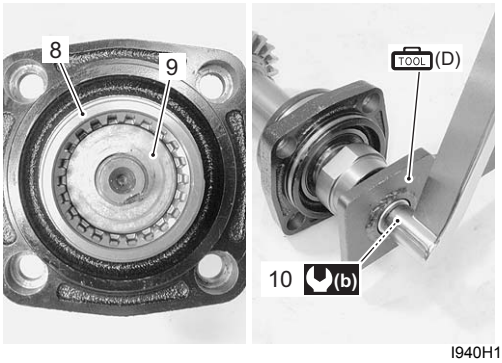
8) Install the coupling (8) and washer (9).
9) Tighten the coupling nut (10) to the specified torque with the special tool.

⚠ CAUTION

Replace the coupling nut (10) with a new one.

Special tool
TOOL (D): 09924–64510 (Final driving gear coupling holder)

Tightening torque
Secondary bevel gear coupling nut (b): 95 N·m (9.5 kgf-m, 68.5 lbf-ft)



I940H1310045-03

10) Lock the coupling nut (10) with a center punch.



I940H1310046-01

Secondary Driven Gear Related Parts Inspection

B940H23106005

Refer to “Secondary Driven Gear Disassembly and Assembly (Page 3A-5)”.

Driven Bevel Gear
Inspect the driven bevel gear for wear or damage. If any defects are found, replace the gear with a new one.



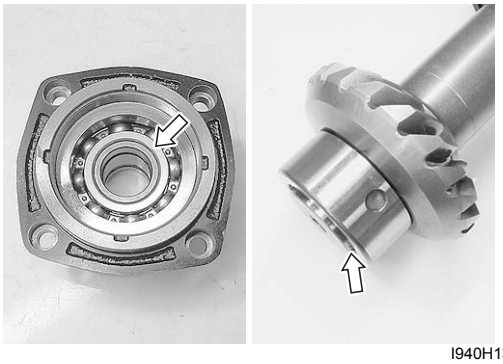
I822H1310030-01

Driven Bevel Gear Shaft
Inspect the driven bevel gear shaft for wear or damage. If any defects are found, replace the driven bevel gear shaft with a new one.



I822H1310032-01

Bearing
Inspect the secondary bevel gear bearings, left and right for abnormal noise and smooth rotation.
Replace the bearing if there is anything unusual. Refer to “Secondary Driven Gear Disassembly and Assembly (Page 3A-5)”.



I940H1310055-01

Oil Seal
Inspect the oil seal for wear or damage. If any defects are found, replace the oil seal with a new one.



I940H1310056-01

Secondary Gear Shim Inspection and Adjustment

B940H23106006

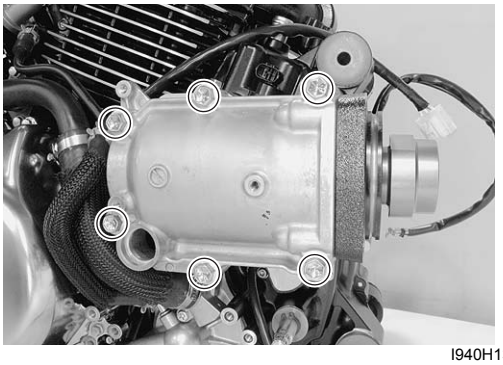
Backlash
Refer to “Secondary Driven Gear Assembly Removal and Installation (Page 3A-3)”.

1) Tighten the secondary driven gear case bolts to the specified torque.

NOTE

Do not apply bond on the driven gear housing at this stage. Bond is applied after backlash and tooth contact are correct.

Tightening torque
Secondary gear case bolt (Initial): 15 N·m (1.5 kgf-m, 11.0 lbf-ft)
Secondary gear case bolt (Final): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



I940H1310047-02

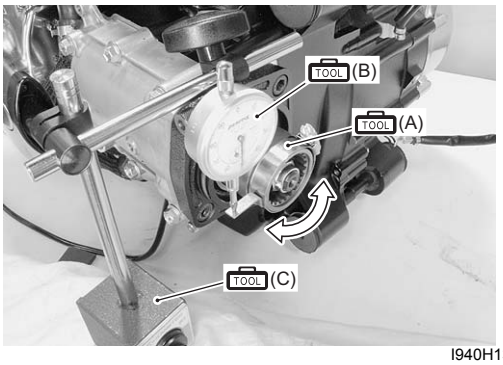
2) Measure the backlash as follows:

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

  Special tool
  (A): 09924–34510 (Backlash measuring tool (ϕ27 – 50))
  (B): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
  (C): 09900–20701 (Magnetic stand)

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

  Secondary gear backlash
  Standard: 0.03 – 0.15 mm (0.001 – 0.006 in)



I940H1310048-01

- If the backlash is not within specification, the shims (driven bevel gear side) must be changed and the backlash should be rechecked until correct. Refer to the chart for appropriate changes.

NOTE

When changing the shims (driven bevel gear side), measure the thickness of the old shims. Using the thickness of the old shims as a guide, adjust the backlash by referring to the chart.

Backlash	Shim adjustment
Under 0.03 mm (0.001 in)	Increase shim thickness
0.03 – 0.15 mm (0.001 – 0.006 in)	Correct
Over 0.15 mm (0.006 in)	Decrease shim thickness

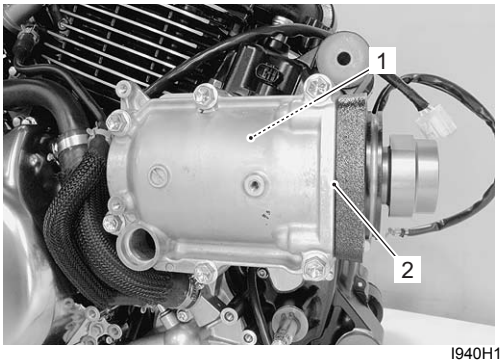
List of shims (For driven bevel gear side)

	Part number	Shim thickness
24945-40810 (Shim set: 5 pcs.)	24945-40H00-030	0.30 mm (0.012 in)
	24945-40H00-035	0.35 mm (0.014 in)
	24945-40H00-040	0.40 mm (0.016 in)
	24945-40H00-050	0.50 mm (0.020 in)
	24945-40H00-060	0.60 mm (0.024 in)

Tooth Contact

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

1) Remove the secondary gear case.
2) Clean and degrease the secondary drive bevel gear teeth, and apply a coating of machinist's layout dye or paste to several teeth.
3) Reinstall the secondary gear case same as backlash measurement, with removed shims (1) and (2).



I940H1310049-01

1.	Shim (Drive bevel gear side)
2.	Shim (Driven bevel gear side)

4) Rotate the secondary driven bevel gear coupling several turns in both directions.
5) Remove the secondary gear case from the crankcase, and observe the tooth contact pattern made in the dye or paste.
6) Compare the tooth contact pattern to the examples as shown in [A], [B] and [C].
7) If tooth contact is found to be incorrect, the shims of the secondary drive bevel gear and secondary driven bevel gear must be changed, tooth contact should be rechecked until correct.

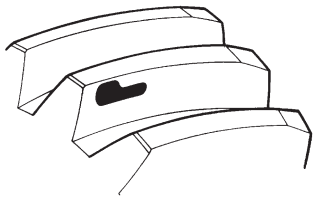
⚠ CAUTION

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

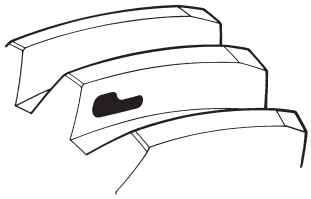
Backlash	Shim adjustment
Contact at tooth top [A]	Decrease thickness of shims (1) or (2)
Contact at tooth root [B]	Increase thickness of shims (1) or (2)

Contact Position

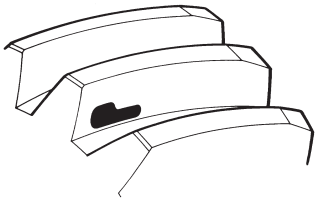
[A]



[B]



[C]



I822H1310109-03

[A]:	Incorrect (Contact at tooth top)
[B]:	Correct
[C]:	Incorrect (Contact at tooth root)

List of shims (For drive bevel gear side) (1)

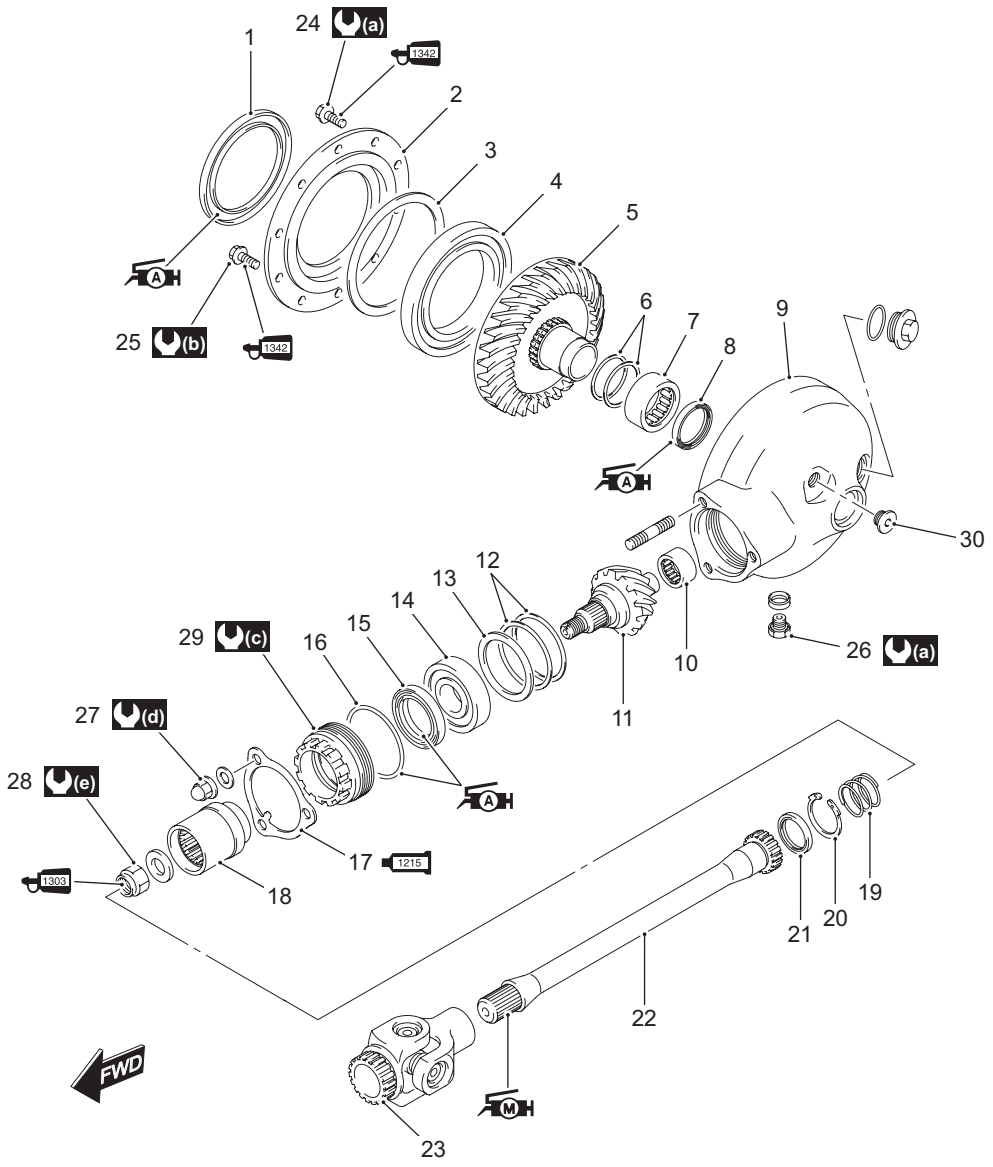
	Part number	Shim thickness
24935-40810 (Shim set: 9 pcs.)	24935-40H00-080	0.80 mm (0.031 in)
	24935-40H00-085	0.85 mm (0.033 in)
	24935-40H00-090	0.90 mm (0.035 in)
	24935-40H00-095	0.95 mm (0.037 in)
	24935-40H00-100	1.00 mm (0.039 in)
	24935-40H00-105	1.05 mm (0.041 in)
	24935-40H00-110	1.10 mm (0.043 in)
	24935-40H00-115	1.15 mm (0.045 in)
	24935-40H00-120	1.20 mm (0.047 in)

List of shims (For driven bevel gear side) (2)

	Part number	Shim thickness
24945-40810 (Shim set: 5 pcs.)	24945-40H00-030	0.30 mm (0.012 in)
	24945-40H00-035	0.35 mm (0.014 in)
	24945-40H00-040	0.40 mm (0.016 in)
	24945-40H00-050	0.50 mm (0.020 in)
	24945-40H00-060	0.60 mm (0.024 in)

Final Bevel Gear Components

B940H23106007

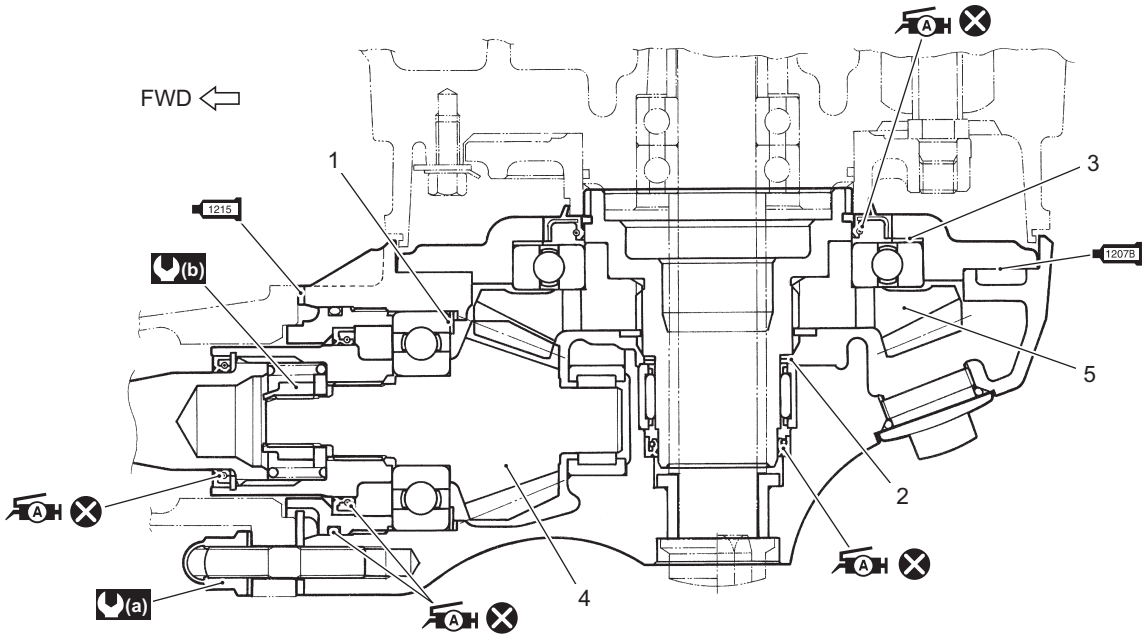


I940H1310058-02

1. Oil seal	15. Oil seal	29. Drive bearing stopper
2. Final gear bearing case	16. O-ring	30. Final gear case pivot bolt
3. Shims	17. Stopper plate	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
4. Final driven gear bearing	18. Final drive gear coupling	(b) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
5. Final driven bevel gear	19. Spring	(c) : 110 N·m (11.0 kgf-m, 79.5 lbf-ft)
6. Shims	20. Snap ring	(d) : 40 N·m (4.0 kgf-m, 29.0 lbf-ft)
7. Final driven gear bearing	21. Oil seal	(e) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)
8. Oil seal	22. Propeller shaft	A : Apply grease.
9. Final gear case	23. Universal joint	M : Apply moly paste.
10. Final drive gear bearing	24. Final gear case bolt (M8)	1215 : Apply bond to mating surface.
11. Final drive bevel gear	25. Final gear case bolt (M10)	1303 : Apply thread lock to the thread part.
12. Shims	26. Oil drain plug	1342 : Apply thread lock to the thread part.
13. Washer	27. Final gear case nut	
14. Final drive bevel gear bearing	28. Final driven gear coupling nut	

Final Gear Construction

B940H23106008



I822H1310041-05

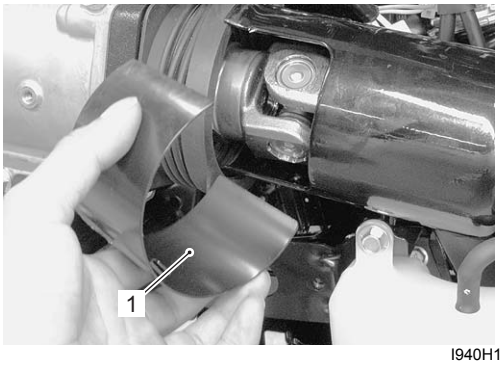
1. Shims	5. Final driven bevel gear	1207B : Apply bond to matching surface.
2. Shims	(a) : 40 N·m (4.0 kgf-m, 29.0 lbf-ft)	1215 : Apply bond to matching surface.
3. Shims	(b) : 100 N·m (10.0 kgf-m, 72.5 lbf-ft)	: Do not reuse.
4. Final drive bevel gear	: Apply grease.	

Final Gear Assembly Removal and Installation

B940H23106009

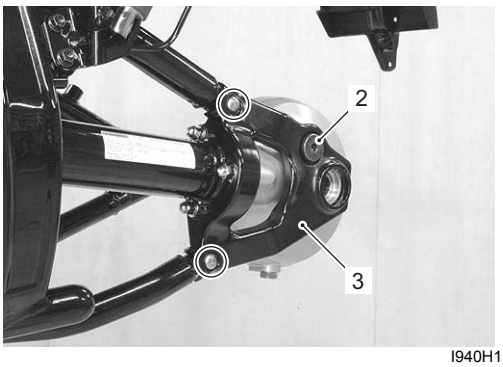
Removal

1) Drain final gear oil. Refer to “Final Gear Oil Replacement in Section 0B (Page 0B-10)”.
2) Remove the rear wheel. Refer to “Rear Wheel Assembly Removal and Installation in Section 2D (Page 2D-10)”.
3) Remove the swingarm pivot cover (1).



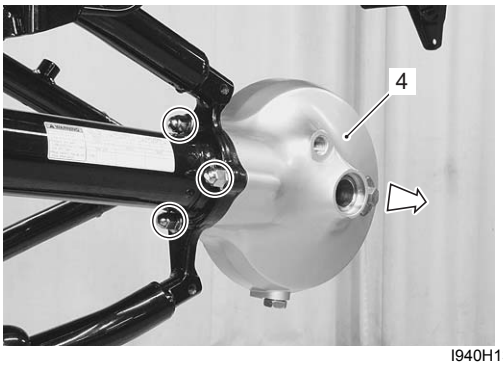
I940H1310054-01

4) Remove the final gear case pivot bolt (2) and swing arm cover (3).



I940H1310001-02

5) Remove the final gear case nut and washer.
6) Remove the final gear case (4) backward.



I940H1310002-02

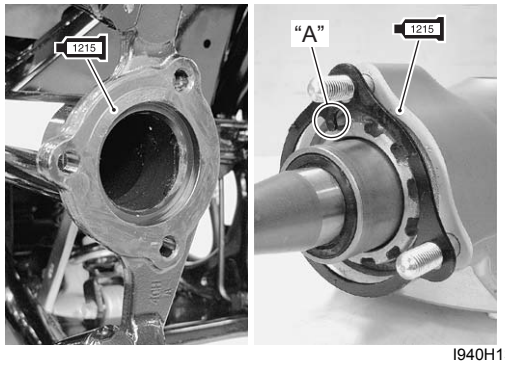
Installation

1) Apply bond to the mating surface of the final gear case and swingarm.

1215 : Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)

⚠ CAUTION

When installing the stopper plate, fit the protrusion "A" of the plate to the one of the bearing stopper grooves.



I940H1310003-02

2) Apply moly paste to the propeller shaft spline.

M : Moly paste 99000–25140 (SUZUKI MOLY PASTE or equivalent)

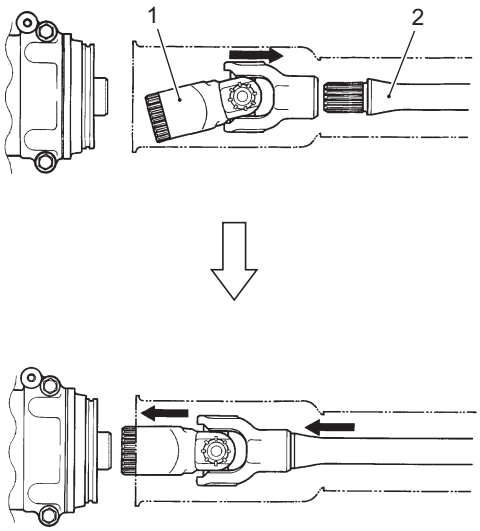


I940H1310018-01

3) Install the universal joint (1) to the rear propeller shaft (2) and install the final gear assembly.

NOTE

To install the final gear case easily, move the dust boot front and the universal joint turn into the propeller shaft.



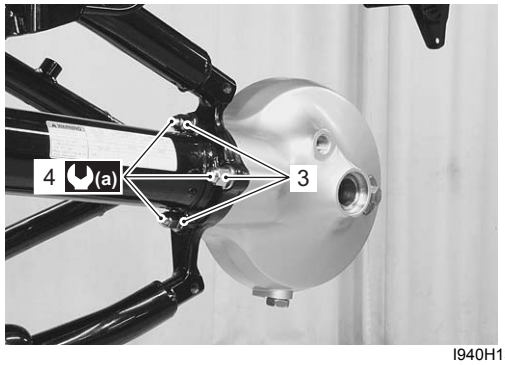
I940H1310004-01

4) Install the washers (3) and tighten the final gear case nut (4) to the specified torque.

NOTE

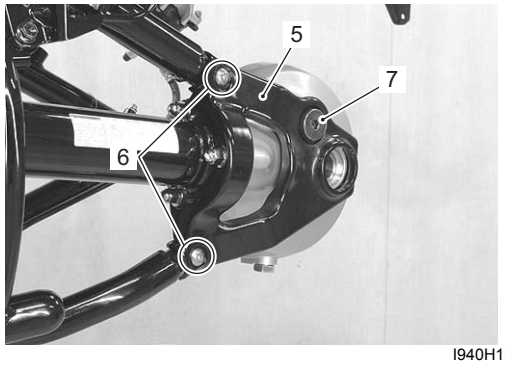
The conical side of the washer (3) faces outside.

Tightening torque
Final gear case nut (a): 40 N·m (4.0 kgf-m, 29.0 lbf-ft)



I940H1310005-01

5) Install the swingarm cover (5) and tighten the mounting bolts (6) and final gear case pivot bolt (7).



I940H1310006-01

6) Install the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation in Section 2D (Page 2D-10)”.
7) Pour final gear oil. Refer to “Final Gear Oil Replacement in Section 0B (Page 0B-10)”.

Final Gear Disassembly and Assembly

B940H23106010

Refer to “Final Gear Assembly Removal and Installation (Page 3A-12)”.

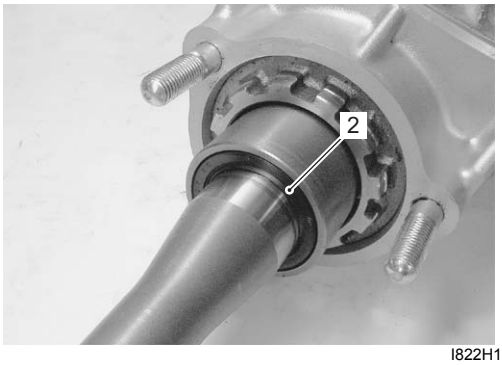
Disassembly

1) Remove the stopper plate (1).



I822H1310047-01

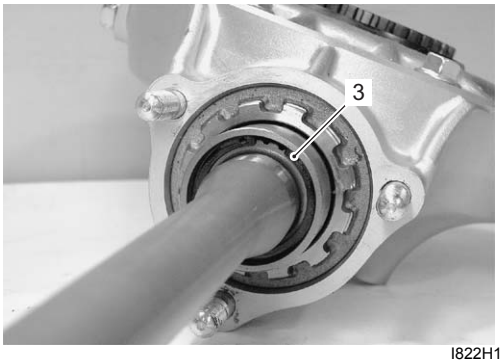
2) Remove the dust seal (2).



I822H1310048-01

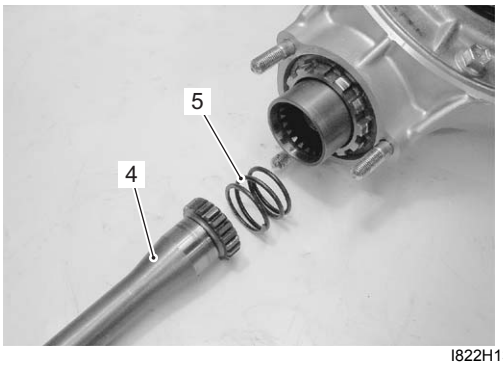
3) Remove the snap ring (3) with the special tool.

Special tool
TOOL : 09900–06108 (Snap ring pliers)



I822H1310049-01

4) Remove the propeller shaft (4) and spring (5).

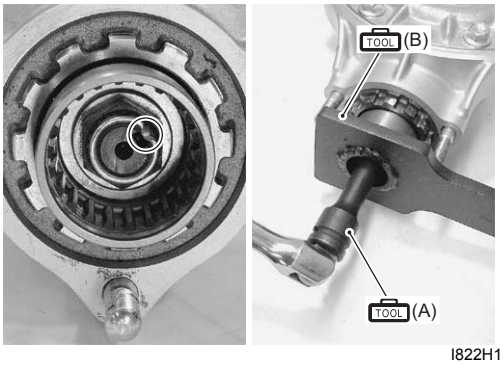


I822H1310050-01

5) Unlock the final drive gear coupling nut with a chisel.
6) Remove the final drive gear coupling nut with the special tools.

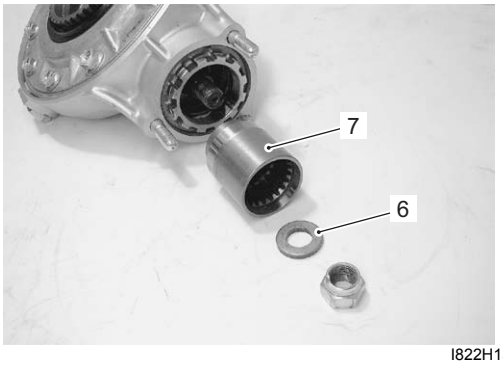
Special tool
TOOL (A): 09924–62430 (Long socket (22 mm))

Special tool
TOOL (B): 09924–64510 (Final driving gear coupling holder)



I822H1310051-01

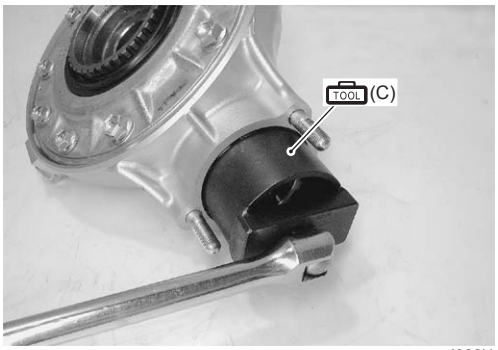
7) Remove the washer (6) and final drive gear coupling (7).



I822H1310052-01

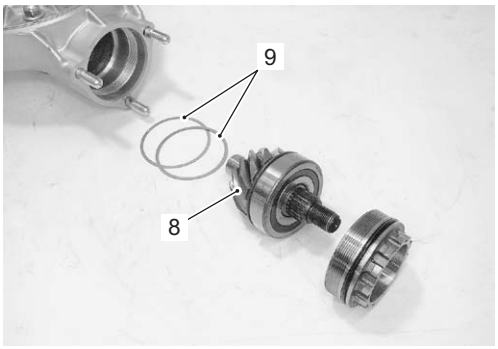
8) Remove the bearing stopper with the special tool.

Special tool
TOOL (C): 09924–62410 (Final drive gear bearing holder wrench)



I822H1310053-03

9) Remove the final drive bevel gear (8) and shims (9).



I822H1310054-02

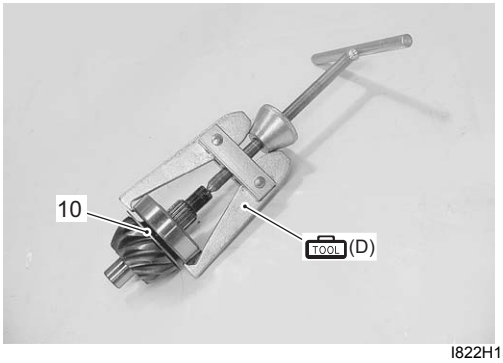
10) Remove the bearing with the inner race from the final drive bevel gear with the special tool.

Special tool
TOOL (D): 09913–60910 (Bearing remover)

NOTE

If no abnormal noise, the bearing removal is not necessary.

11) Remove the washer (10).



I822H1310055-01

12) Remove the inner race with the special tool.

Special tool
TOOL (D): 09913–60910 (Bearing remover)

⚠ CAUTION

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



I822H1310056-01

13) Remove the final gear case bolts.



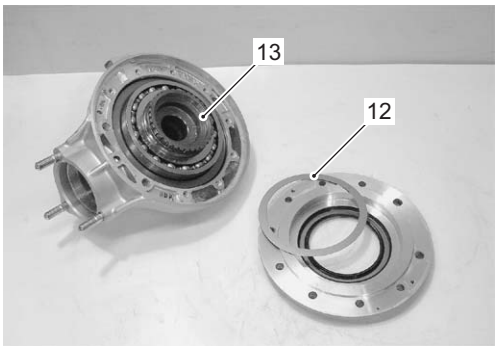
I822H1310057-01

14) Remove the final gear bearing case (11) from the final gear case by using two 5 mm screws.



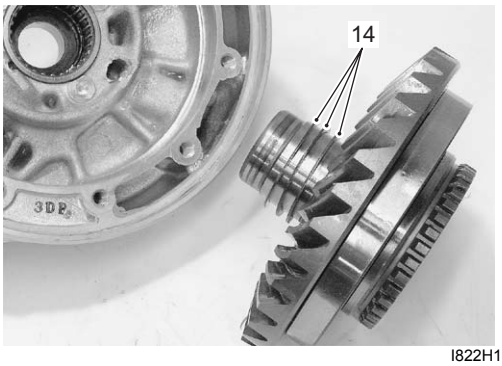
I822H1310058-01

15) Remove the shim (12) and final driven bevel gear (13).



I822H1310059-01

16) Remove the shims (14).

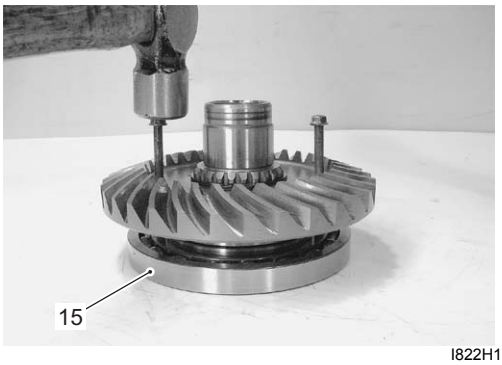


I822H1310060-01

17) Remove the final driven bevel gear bearing (15) from the bevel gear with two bolts or suitable bars.

NOTE

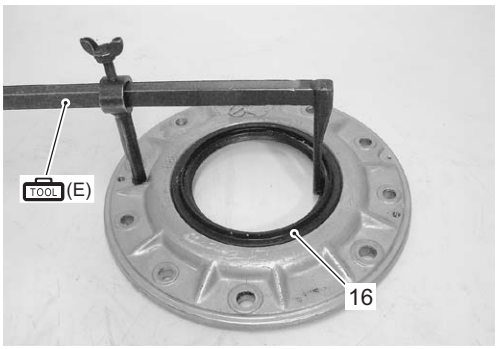
If no abnormal noise, the bearing removal is not necessary.



I822H1310061-01

18) Remove the oil seal (16) with the special tool.

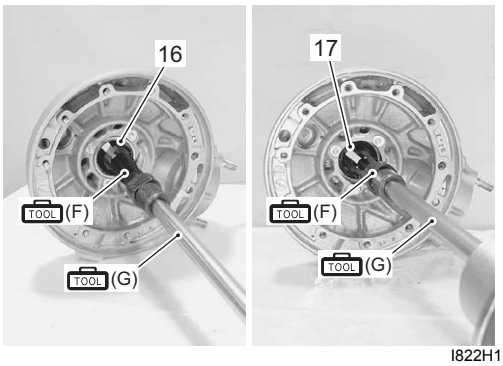
Special tool
(E): 09913–50121 (Oil seal remover)



I822H1310062-01

19) Remove the final driven gear bearing (16) and oil seal (17) with the special tools.

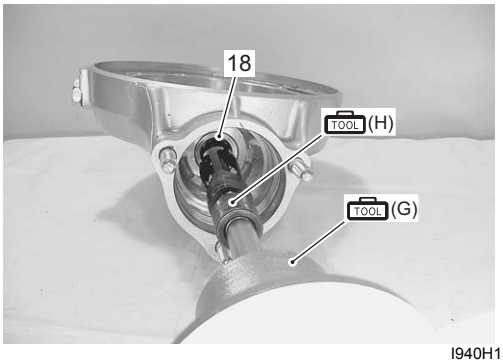
Special tool
(F): 09941–64511 (Bearing remover)
(G): 09930–30104 (Rotor remover sliding shaft)



I822H1310063-01

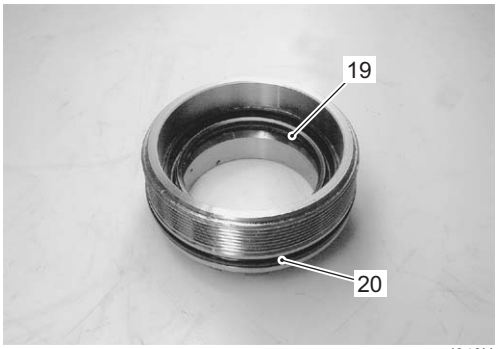
20) Remove the final drive gear bearing (18) with the special tools.

Special tool
(H): 09923–74511 (Bearing remover)
(G): 09930–30104 (Rotor remover sliding shaft)



I940H1310050-01

21) Remove the oil seal (19) and O-ring (20) from the bearing stopper.



I940H1310051-01

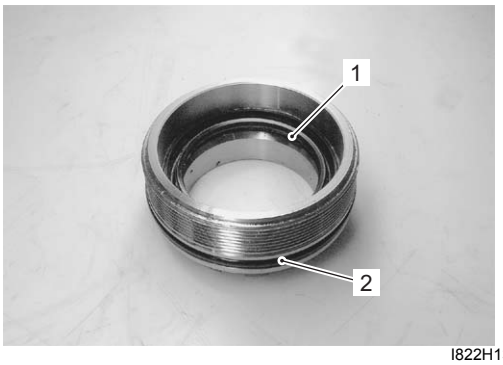
Assembly

Reassemble the final gear case in the reverse order of disassembly. Pay attention to the following points:

- Install a oil seal (1) and O-ring (2) to the bearing stopper.

NOTE

The removed oil seal (1) and O-ring (2) must be replaced with new ones.



I822H1310066-01

- Install the final drive gear bearing into the final gear case with the special tool.

Special tool
(A): 09913–75821 (Bearing installer)



I822H1310089-02

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

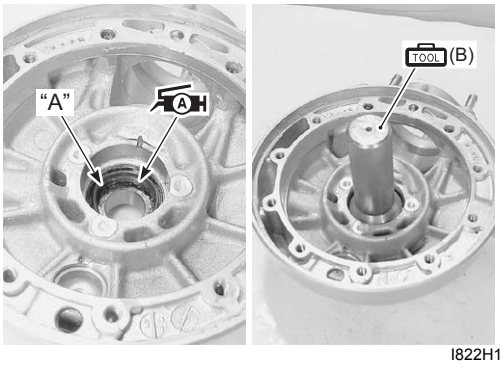
Special tool
(B): 09913–76010 (Bearing installer)

⚠ CAUTION

- **Use a new oil seal to prevent oil leakage.**
- **The lip and spring of the oil seal "A" should face to the driven bevel gear side.**

- Apply grease to the oil seal lip.

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



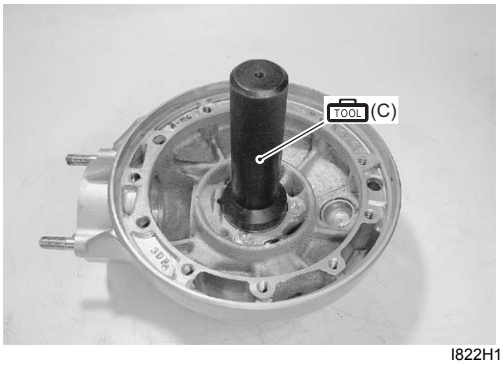
I822H1310068-03

- Install the final driven gear bearing into the final gear case with the special tool.

Special tool
(C): 09951–16080 (Bearing installer)

NOTE

The stamped mark side of bearing face to the driven bevel gear side.



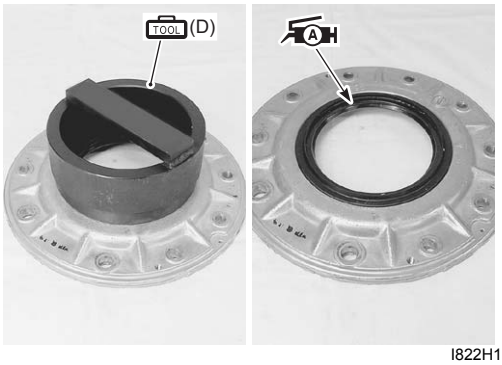
I822H1310071-02

- Install a new oil seal to the final gear bearing case with the special tool.

  Special tool
  TOOL (D): 09951–16310 (Bearing installer)

- Apply grease to the lip of the oil seal.

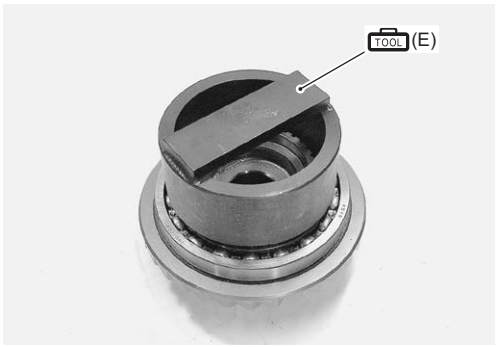
  A : Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I822H1310070-02

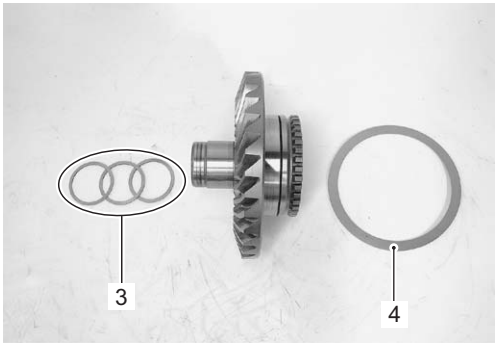
- Install the final driven bevel gear bearing to the bevel gear with the special tool.

  Special tool
  TOOL (E): 09951–17010 (Bearing installer)



I822H1310069-02

- Install the correct shims (3) and (4) to the both sides of the final driven bevel gear and install the gear to the final gear case.



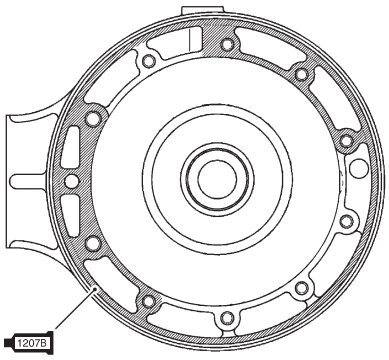
I822H1310072-01

- Apply bond to the mating surface of the final gear case and final gear bearing case.

  ⚠ CAUTION

  Do not block the breather passage when applying bond.

  1207B : Sealant 99000–31140 (SUZUKI BOND No.1207B or equivalent)

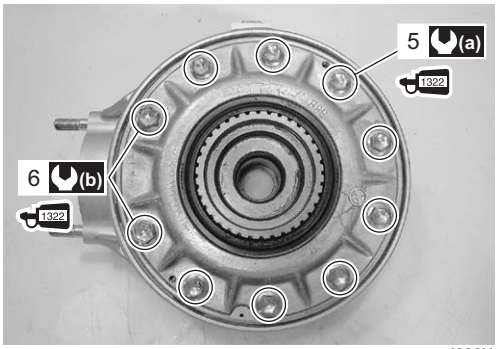


I940H1310052-03

- Apply thread lock to the final gear case bolts (5) and (6), and tighten them to the specified torque.

  1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

  Tightening torque
  Final gear case bolt (M8) (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
  Final gear case bolt (M10) (b): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)



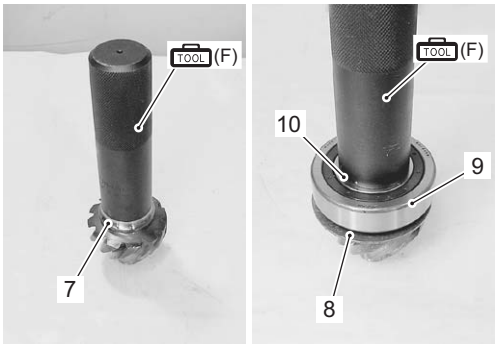
I822H1310074-02

- Install the inner race (7), washer (8), bearing (9) and inner race (10) with the special tool.

Special tool
TOOL (F): 09913–84510 (Bearing installer)

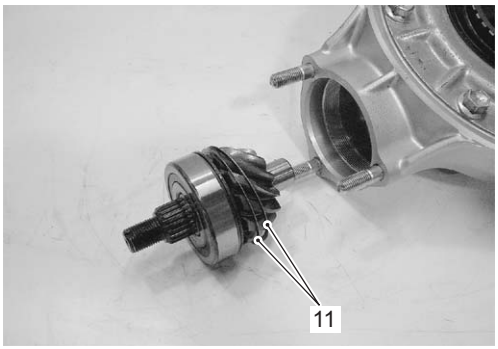
NOTE

When installing the bearing, stamped mark on the bearing must face outside.



I822H1310075-03

- Install the correct shims (11) to the final drive bevel gear, and install the bevel gear to the final gear case.



I822H1310076-01

- Apply grease to the O-ring and the lip of the oil seal.
- Install the bearing stopper (12).

⚠ CAUTION

Use a new oil seal and O-ring to prevent oil leakage.

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

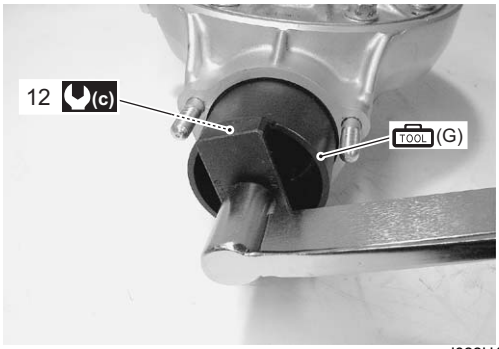


I822H1310077-01

- Tighten the bearing stopper (12) to the specified torque with the special tool.

Special tool
TOOL (G): 09924–62410 (Final drive gear bearing holder wrench)

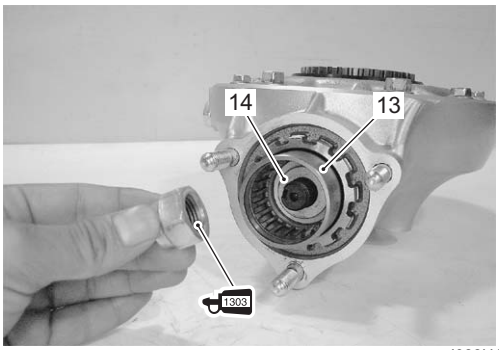
Tightening torque
Final drive bevel gear bearing stopper (c): 110 N·m (11.0 kgf-m, 79.5 lbf-ft)



I822H1310078-02

- Install the final drive gear coupling (13) and washer (14).
- Apply a small quantity of the thread lock to the final drive gear coupling nut.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)



I822H1310079-01

- Tighten the nut to the specified torque with the special tool.

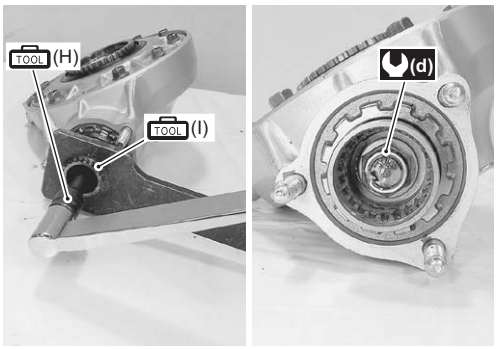
⚠ CAUTION

Use a new nut.

Tightening torque
Final drive gear coupling nut (d): 100 N·m (10.0 kgf-m, 72.5 lbf-ft)

Special tool
TOOL (H): 09924–62430 (Long socket (22 mm))
TOOL (I): 09924–64510 (Final driving gear coupling holder)

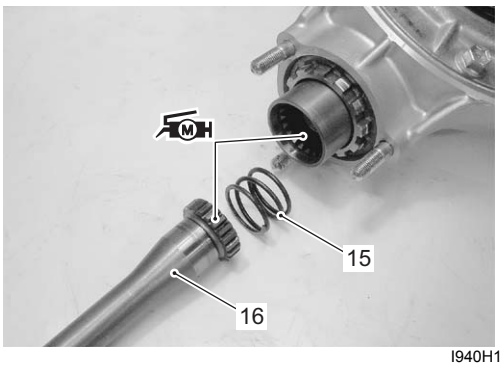
- Lock the final drive bevel gear coupling nut with a center punch.



I822H1310080-03

- Apply 5 – 7 cm^3 Lithium Base Molybdenum grease (NLGI#2) to the propeller shaft splines and final drive bevel gear coupling.
- Install the spring (15) and propeller shaft (16).

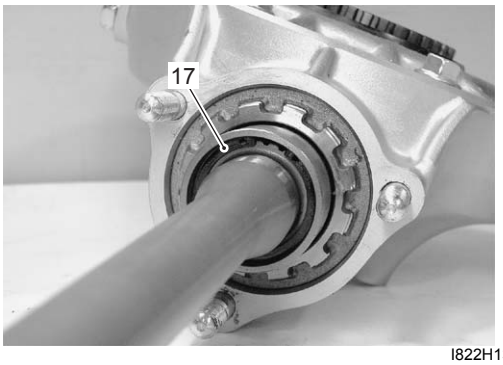
M : Moly paste 99000–25140 (SUZUKI MOLY PASTE or equivalent)



I940H1310059-01

- Install the snap ring (17).
- After installing the propeller shaft with a new snap ring, make sure that the propeller shaft turns smoothly without any hitch or bearing noise.

Special tool
TOOL : 09900–06108 (Snap ring pliers)



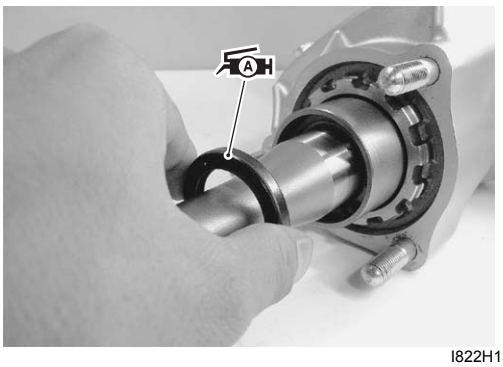
I822H1310082-03

- Apply grease to the lip of the dust seal.

⚠ CAUTION

Use a new dust seal to prevent oil leakage.

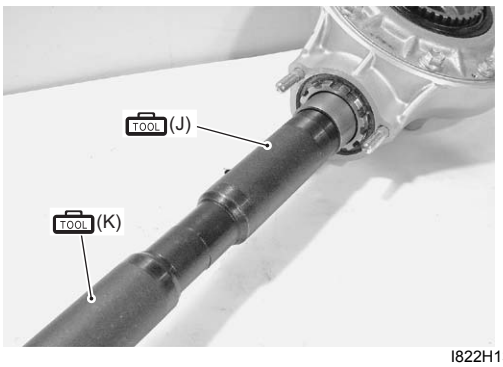
A : Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I822H1310083-02

- Install the dust seal with the special tools.

Special tool
TOOL (J): 09940–51410 (Bearing installer)
TOOL (K): 09925–18011 (Steering bearing installer)



I822H1310084-02

Final Gear Parts Inspection

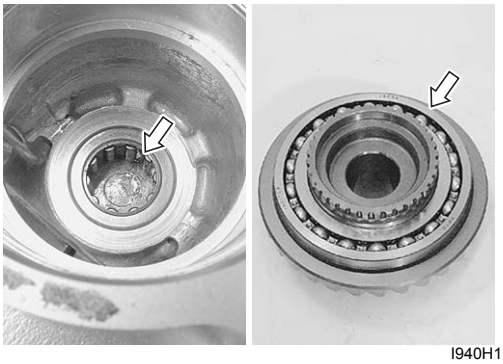
B940H23106011

Drive / Driven Bevel Gear

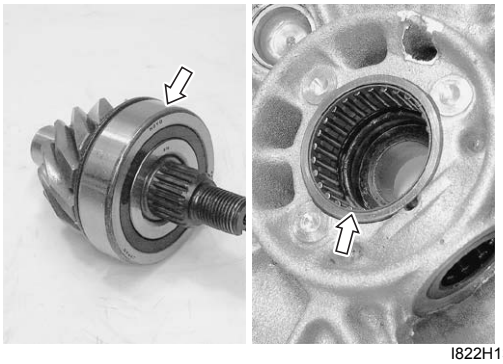
Inspect the drive and/or driven bevel gear wear or damage. If any defects are found, replace the drive and/or driven bevel gear with a new one.

Bearing

Inspect bearings, left and right for abnormal noise and smooth rotation. Replace the bearing, if there is anything unusual. Refer to “Final Gear Disassembly and Assembly (Page 3A-14)”.



I940H1310007-01



I822H1310086-01

Spring

Inspect the spring damage or fatigue. If any defects are found, replace the spring with a new one.



I822H1310087-01

Oil Seal

Inspect the oil seal for wear and damage. If any defects are found, replace the oil seal with a new one.



I822H1310110-01



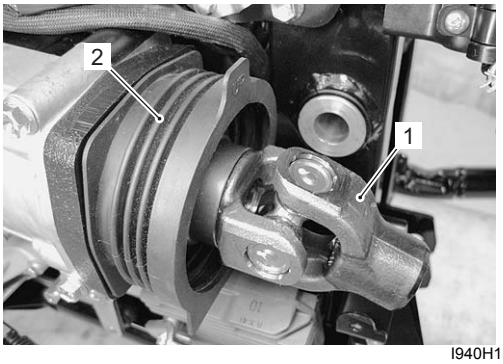
I822H1310090-02

Universal Joint Removal and Installation

B940H23106012

Removal

1) Remove the swingarm. Refer to “Swingarm Assembly Removal and Installation in Section 2C (Page 2C-3)”.
2) Remove the universal joint (1) and boot (2).



I940H1310008-01

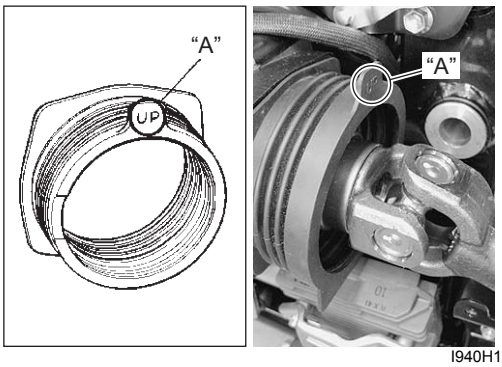
Installation

Install the universal joint in the reverse order of removal. Pay attention to the following point:

- Before installing the swingarm, install the boot and the universal joint.

NOTE

Make sure that the "UP" mark "A" on the boot faces to up.



I940H1310009-01

Universal Joint Inspection

B940H23106013

Inspect the play by turning the universal joint. If excessive play is noted, replace it with a new one.

⚠ CAUTION

Do not attempt to disassemble the universal joint.



I940H1310010-01

Rear Wheel Dumper Removal and Installation

B940H23106014

Removal

1) Remove the rear wheel assembly. Refer to "Rear Wheel Assembly Removal and Installation in Section 2D (Page 2D-10)".
2) Flatten the lock washers.
3) Remove the bolts, washers and plates.

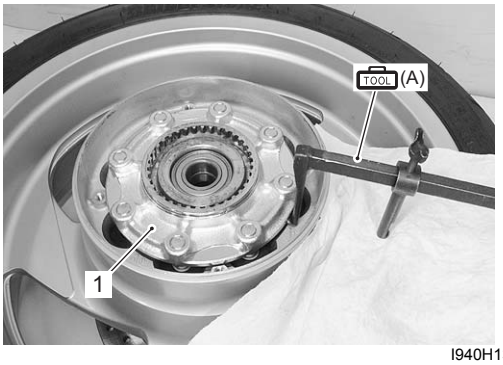


I940H1310011-01

4) Remove the driven hub joint (1) with the special tool and wooden block.

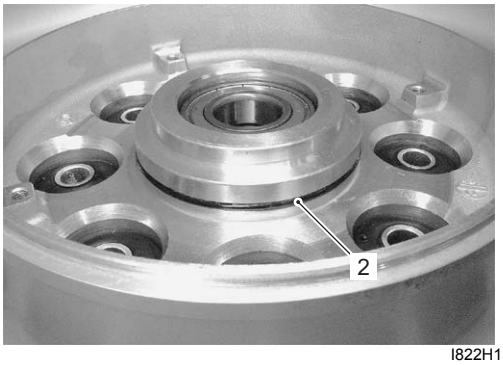
Special tool

TOOL (A): 09913–50121 (Oil seal remover)



I940H1310012-01

5) Remove the O-ring (2).



I822H1310095-01

6) Remove the dumpers with a screw driver.



I940H1310013-01

Installation

Install the wheel damper in the reverse order of removal. Pay attention to the following points:

- Install the wheel dumpers.

NOTE

If soap water is applied around the dumper, it makes the job easier.



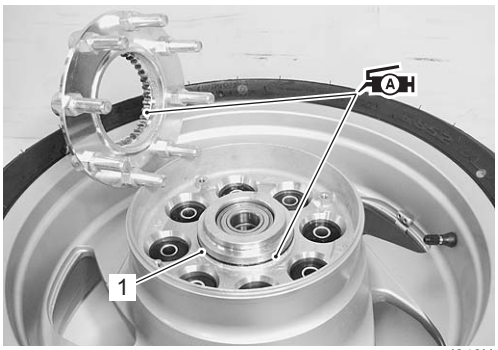
I940H1310014-01

- Apply grease to the O-ring (1) and the final gear spline.

⚠ CAUTION

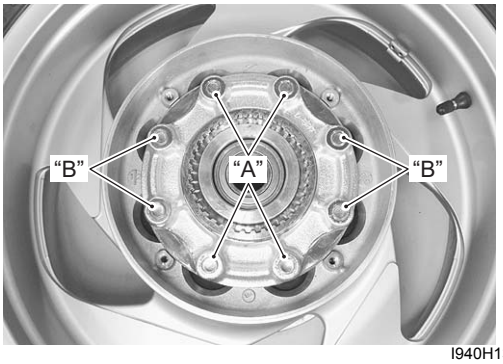
The removed O-ring must be replaced with a new one.

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



I940H1310015-01

- When install the driven hub joint, align the driven hub joint flat surface “A” with the screw holes “B” of the wheel.

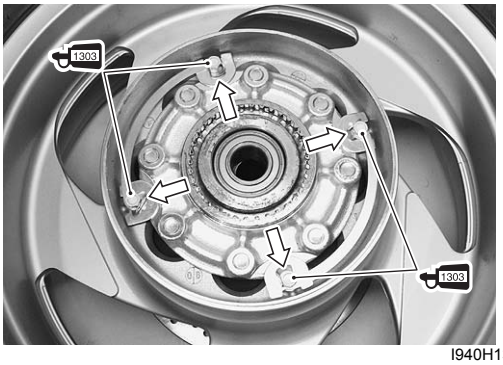


I940H1310016-01

- Apply thread lock to the driven hub joint bolts.

: Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

- Tighten the driven hub joint bolts securely.
- Bend up washers to lock the bolts.



I940H1310017-01

Wheel Dumper Inspection

B940H23106015

Inspect the dumpers for wear and damage. Replace the dumper, if there is anything unusual.



I822H1310102-01

Final Gear Shim Inspection and Adjustment

B940H23106016

Refer to “Final Gear Disassembly and Assembly (Page 3A-14)”.

Right Side Shim Adjustment

1) Install the shims and final gear bearing case and tighten the bolts to the specified torque.

Tightening torque
Final gear case bolt (M8) (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Final gear case bolt (M10) (b): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)

NOTE

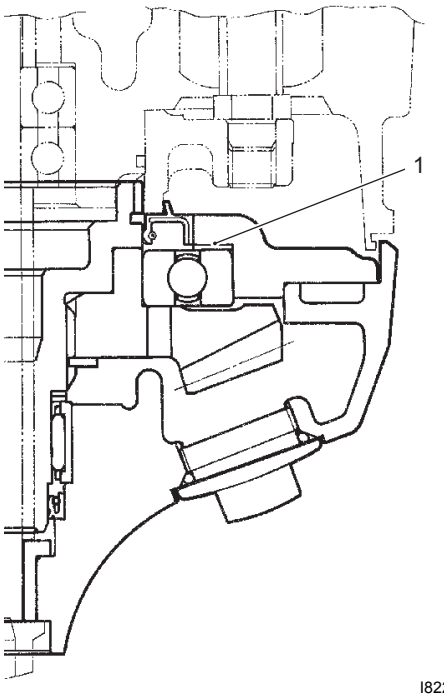
It is not necessary to apply bond and thread lock to the matching surface and bolts at this time.



I822H1310103-01

2) Measure the clearance between the shims (1) and bearing. If it is not within the specification, the must be changed.

Final gear case shim clearance
Standard: 0.1 mm (0.04 in)



I822H1310096-01

List of shims (For final gear case side)

	Part number	Shim thickness
27327-38810 (Shim set: 4 pcs.)	27327-38B00-035	0.35 mm (0.014 in)
	27327-38B00-040	0.40 mm (0.016 in)
	27327-38B00-050	0.50 mm (0.020 in)
	27327-38B00-060	0.60 mm (0.024 in)

Backlash

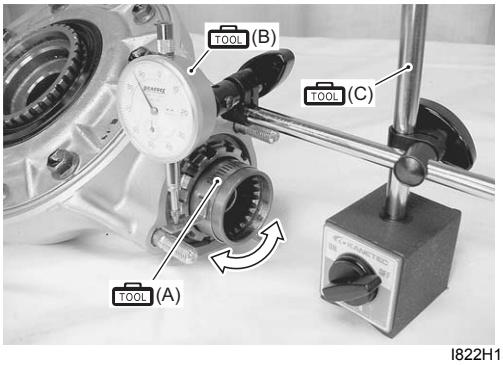
After assembling the final gear case, measure the final bevel gear backlash as follows:

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

Special tool
TOOL (A): 09924–34510 (Backlash measuring tool (ϕ27 – 50))
TOOL (B): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL (C): 09900–20701 (Magnetic stand)

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

Final bevel gear backlash
Standard: 0.08 – 0.16 mm (0.003 – 0.006 in)



I822H1310104-01

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

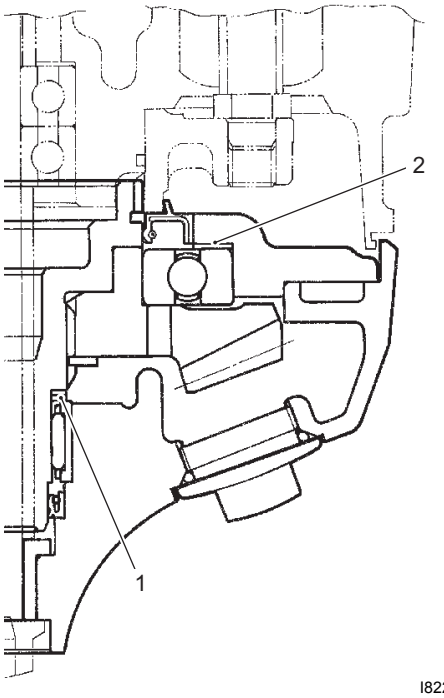
- Remove shims from final gear bearing case and final gear case, and measure total thickness.
- In order not to change the clearance between final driven bevel gear and bearing, the total thickness of the shims installed after a change is made must equal the original total thickness of the shims.

Backlash is too large

- Install a thinner shim pack (1) between the final driven bevel gear and final gear case.
- Increase thickness of the shims (2) between the final driven bevel gear bearing and bearing case by an amount equal to decrease above.

Backlash is too small

- Install a thicker shim pack (1) between the final driven bevel gear and final gear case.
- Decrease thickness of the shims (2) between the final driven gear bearing and bearing case by an amount equal to increase above.



I822H1310105-01

List of shims (1)

	Part number	Shim thickness
27326-48810 (Shim set: 9 pcs.)	09181-40011	0.95 mm (0.026 in)
	09181-40013	1.05 mm (0.041 in)
	09181-40014	1.10 mm (0.043 in)
	09181-40176	1.20 mm (0.047 in)
	09181-40182	1.40 mm (0.055 in)
	09181-40212	1.50 mm (0.059 in)
	27326-40H00-125	1.25 mm (0.049 in)
	27326-40H00-135	1.35 mm (0.053 in)
	27326-40H00-145	1.45 mm (0.057 in)

List of shims (2)

	Part number	Shim thickness
27327-38810 (Shim set: 4 pcs.)	27327-38B00-035	0.35 mm (0.014 in)
	27327-38B00-040	0.40 mm (0.016 in)
	27327-38B00-050	0.50 mm (0.020 in)
	27327-38B00-060	0.60 mm (0.024 in)

EXAMPLE:
Final gear to case shims (1);
1.45 mm + 1.40 mm = 2.85 mm
Final gear bearing to bearing case shims (2),
0.35 mm + 0.60 mm = 0.95 mm
Original total measurement (1) + (2) = 3.80 mm

Backlash too large:
Final gear to case shims (1);
1.35 mm + 1.45 mm = 2.80 mm
Final gear bearing to bearing case shims (2),
0.60 mm + 0.40 mm = 1.00 mm
Total thickness (1) + (2) = 3.80 mm

Backlash too small
Final gear to case shims (1);
1.50 mm + 1.40 mm = 2.90 mm
Final gear bearing to bearing case shims (2),
0.50 mm + 0.40 mm = 0.90 mm
Total thickness (1) + (2) = 3.80 mm

Tooth Contact
After backlash adjustment is carried out, the tooth contact must be checked.

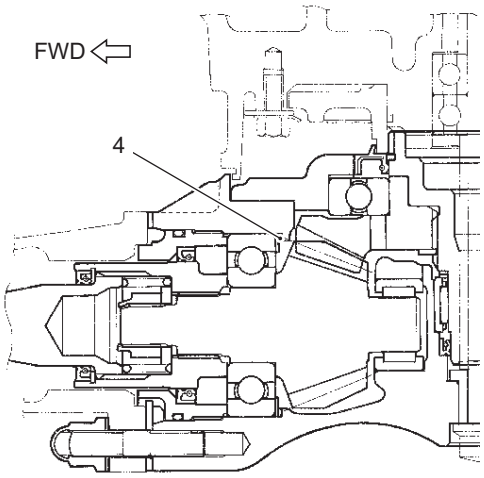
- Remove the case. Do not misplace the shims. Remove the final driven bevel gear.
- Clean and degrease several teeth on the final driven bevel gear. Coat these teeth with machinist's dye or paste, preferably of a light color.
- Reinstall the final driven bevel gear with shims in place, positioning the coated teeth so that they are centered on the final drive bevel gear.
- Reinstall the final gear bearing case and bolts, and tighten to specification.

Tightening torque
Final gear case bolt (M8) (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Final gear case bolt (M10) (b): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)



I822H1310106-01

- Using a socket and handle on the final drive bevel gear coupling nut, rotate the final drive bevel gear several turns in each direction, while loading the final driven bevel gear. This will provide a contact pattern on the coated teeth of the driven bevel gear.
- Remove the final gear bearing case and final driven bevel gear, and inspect the coated teeth of the driven bevel gear. The contact patch should be as shown in the figure of contact position:
- If the tooth contact pattern is incorrect, as shown in [A], a thinner shim (4) is needed between the final drive bevel gear bearing and final gear case.



I822H1310107-03

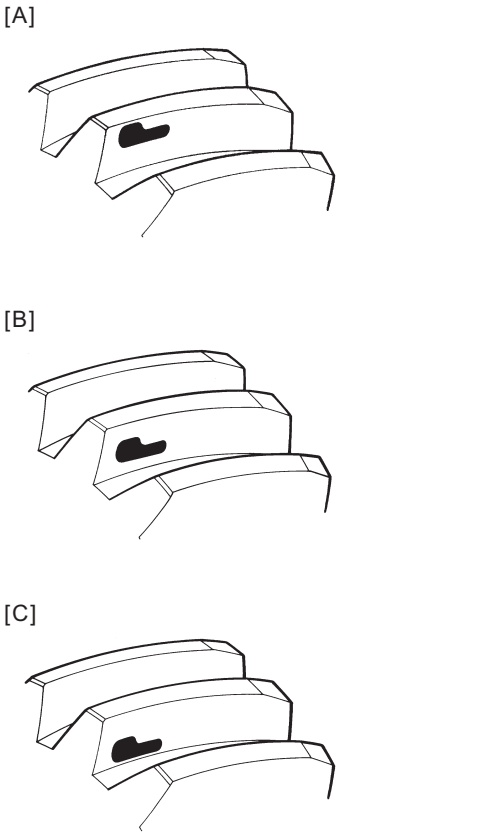
- If the tooth contact pattern is incorrect, as shown in [C], a thicker shim (4) is needed between the final drive bevel gear bearing and final gear case.

- If the tooth contact pattern is incorrect for either reason, the appropriate shim must be installed, and the tooth contact pattern rechecked by repeating the tooth coating procedure above.

NOTE

If it is necessary to adjust the shim (4) thickness between final drive bevel gear bearing and final gear case, the final gear backlash may change, and should be rechecked according to the procedure outlined under the Backlash Measurement sub-section. Both adjustments may be needed until both backlash and tooth contact are correct.

Contact Position



I822H1310039-06

[A]:	Incorrect (Contact at tooth top)
[B]:	Correct
[C]:	Incorrect (Contact at tooth root)

List of shims (4)

	Part number	Shim thickness
27445-24810 (Shim set: 5 pcs.)	27445-24A01-030	0.30 mm (0.012 in)
	27445-24A01-035	0.35 mm (0.014 in)
	27445-24A01-040	0.40 mm (0.016 in)
	27445-24A01-050	0.50 mm (0.020 in)
	27445-24A01-060	0.60 mm (0.024 in)

Specifications

Service Data

B940H23107001

Drive Train

Unit: mm (in) Except ratio

Item	Standard	Limit
Primary reduction ratio	1.407 (76/54)	—
Final reduction ratio	3.137 (20/17 x 32/12)	—

Tightening Torque Specifications

B940H23107002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Secondary gear case bolt (Initial)	15	1.5	11.0	☞(Page 3A-4) / ☞(Page 3A-9)
Secondary driven gear bearing housing bolt	55	5.5	40.0	☞(Page 3A-4)
Secondary gear case bolt (Final)	26	2.6	19.0	☞(Page 3A-4) / ☞(Page 3A-9)
Secondary driven bevel gear bearing stopper	105	10.5	76.0	☞(Page 3A-7)
Secondary bevel gear coupling nut	95	9.5	68.5	☞(Page 3A-8)
Final gear case nut	40	4.0	29.0	☞(Page 3A-13)
Final gear case bolt (M8)	23	2.3	16.5	☞(Page 3A-18) / ☞(Page 3A-24) / ☞(Page 3A-26)
Final gear case bolt (M10)	50	5.0	36.0	☞(Page 3A-18) / ☞(Page 3A-24) / ☞(Page 3A-26)
Final drive bevel gear bearing stopper	110	11.0	79.5	☞(Page 3A-19)
Final drive gear coupling nut	100	10.0	72.5	☞(Page 3A-20)

NOTE

The specified tightening torque is described in the following.
“Secondary Gear Components (Page 3A-2)”
“Secondary Gear Construction (Page 3A-3)”
“Final Bevel Gear Components (Page 3A-11)”
“Final Gear Construction (Page 3A-12)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H23108001

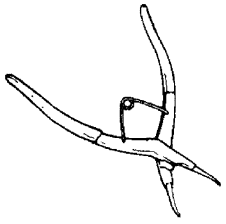
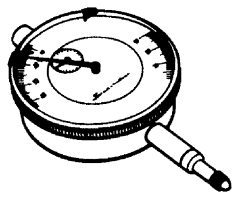
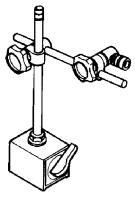
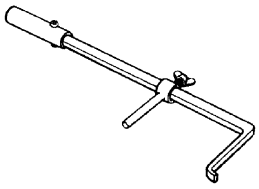
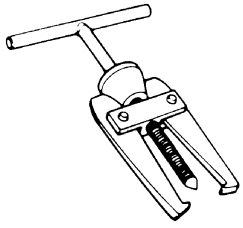
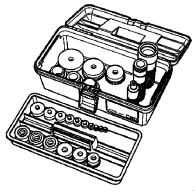
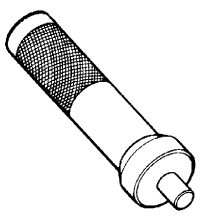
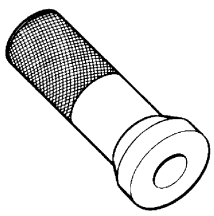
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 3A-7) / ☞(Page 3A-17) / ☞(Page 3A-18) / ☞(Page 3A-19) / ☞(Page 3A-20) / ☞(Page 3A-23)
Moly paste	SUZUKI MOLY PASTE or equivalent	P/No.: 99000–25140	☞(Page 3A-13) / ☞(Page 3A-20)
Sealant	SUZUKI BOND No.1215 or equivalent	P/No.: 99000–31110	☞(Page 3A-4) / ☞(Page 3A-13)
	SUZUKI BOND No.1207B or equivalent	P/No.: 99000–31140	☞(Page 3A-18)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 3A-4) / ☞(Page 3A-19) / ☞(Page 3A-23)
	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞(Page 3A-18)

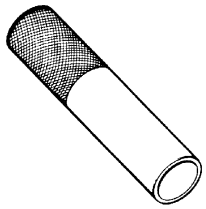
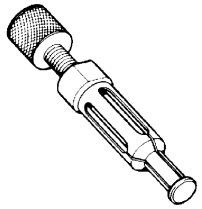
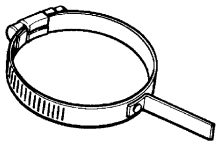
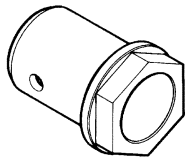
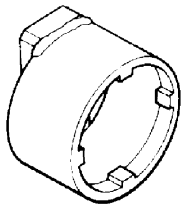
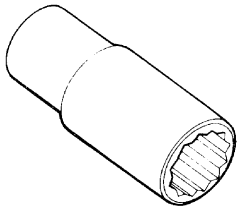
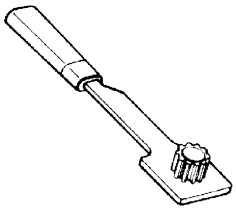
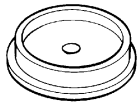
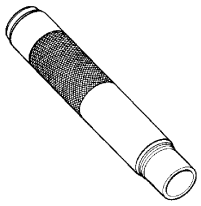
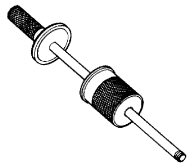
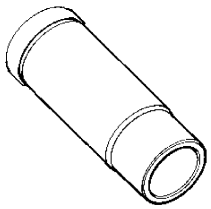
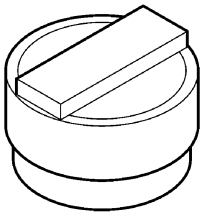
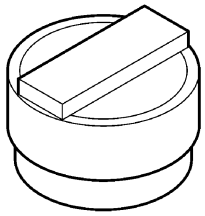
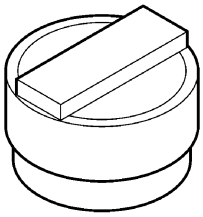
NOTE

Required service material is also described in the following.
“Secondary Gear Components (Page 3A-2)”
“Secondary Gear Construction (Page 3A-3)”
“Final Bevel Gear Components (Page 3A-11)”
“Final Gear Construction (Page 3A-12)”

Special Tool

B940H23108002

09900–06108 Snap ring pliers ☞(Page 3A-14) / ☞(Page 3A-20)		09900–20607 Dial gauge (1/100 mm, 10 mm) ☞(Page 3A-9) / ☞(Page 3A-24)	
09900–20701 Magnetic stand ☞(Page 3A-9) / ☞(Page 3A-24)		09913–50121 Oil seal remover ☞(Page 3A-6) / ☞(Page 3A-16) / ☞(Page 3A-22)	
09913–60910 Bearing remover ☞(Page 3A-15) / ☞(Page 3A-15)		09913–70210 Bearing installer set ☞(Page 3A-6) / ☞(Page 3A-6) / ☞(Page 3A-6) / ☞(Page 3A-7)	
09913–75821 Bearing installer ☞(Page 3A-17)		09913–76010 Bearing installer ☞(Page 3A-17)	

09913–84510 Bearing installer ☞(Page 3A-19) 	09923–74511 Bearing remover ☞(Page 3A-16) 
09924–34510 Backlash measuring tool (ϕ27 – 50) ☞(Page 3A-9) / ☞(Page 3A-24) 	09924–41830 Bearing retainer wrench ☞(Page 3A-5) / ☞(Page 3A-7) 
09924–62410 Final drive gear bearing holder wrench ☞(Page 3A-15) / ☞(Page 3A-19) 	09924–62430 Long socket (22 mm) ☞(Page 3A-14) / ☞(Page 3A-20) 
09924–64510 Final driving gear coupling holder ☞(Page 3A-5) / ☞(Page 3A-8) / ☞(Page 3A-14) / ☞(Page 3A-20) 	09924–74520 Oil seal installer/remover ☞(Page 3A-6) 
09925–18011 Steering bearing installer ☞(Page 3A-20) 	09930–30104 Rotor remover sliding shaft ☞(Page 3A-16) / ☞(Page 3A-16) 
09940–51410 Bearing installer ☞(Page 3A-20) 	09941–64511 Bearing remover ☞(Page 3A-16) 
09951–16080 Bearing installer ☞(Page 3A-17) 	09951–16310 Bearing installer ☞(Page 3A-18) 
09951–17010 Bearing installer ☞(Page 3A-18) 	

Section 4

Brake

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Precautions

Precautions

Precautions for Brake System

B940H24000001

Refer to “General Precautions in Section 00 (Page 00-1)”.

Brake Fluid Information

B940H24000002

⚠ 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 a long period 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

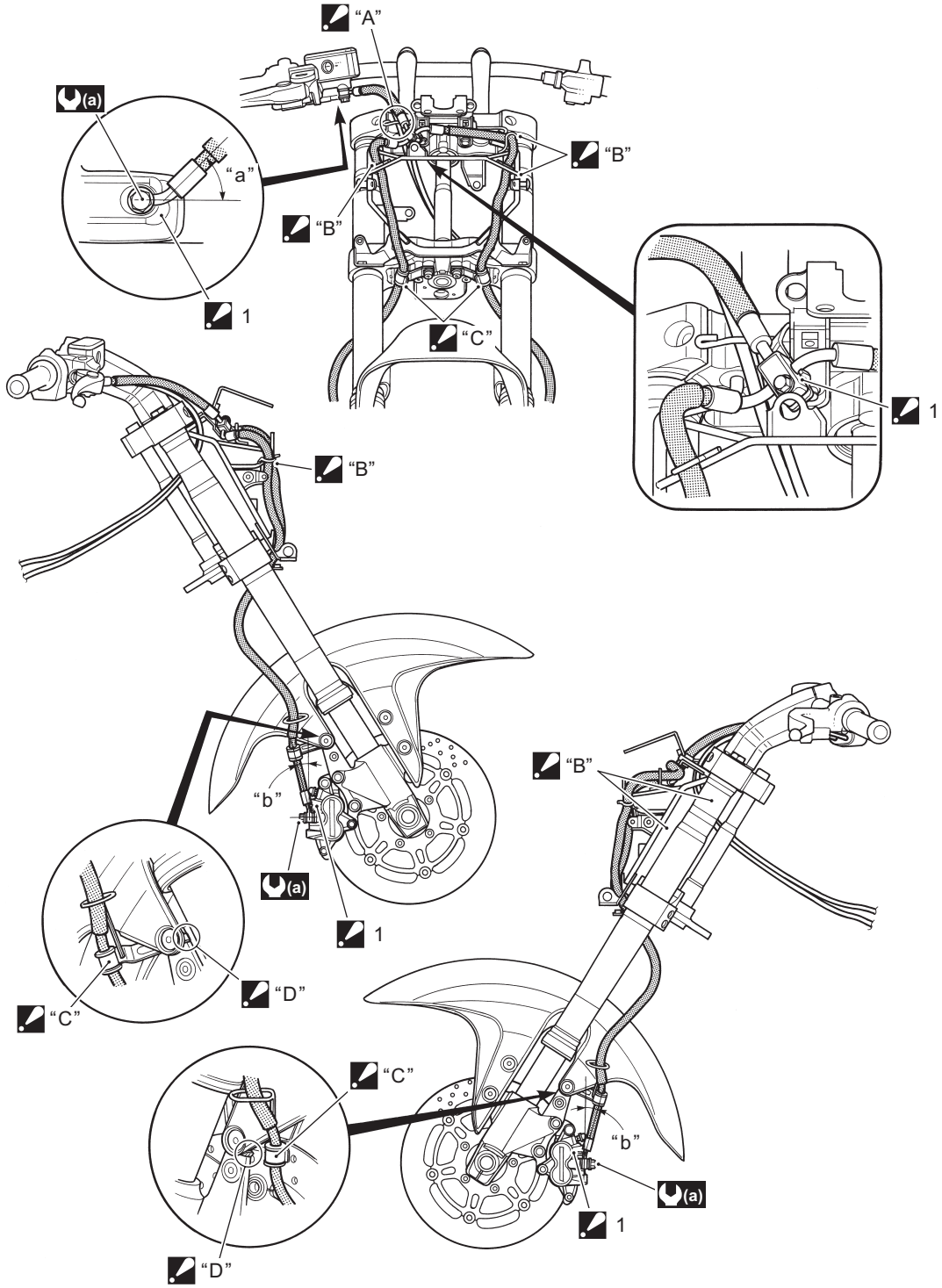
Immediately and completely wipe off any brake fluid contacting any part of the motorcycle. The brake fluid reacts chemically with paint, plastics and rubber materials, etc., and will damage them severely.

Brake Control System and Diagnosis

Schematic and Routing Diagram

Front Brake Hose Routing Diagram

B940H24102001

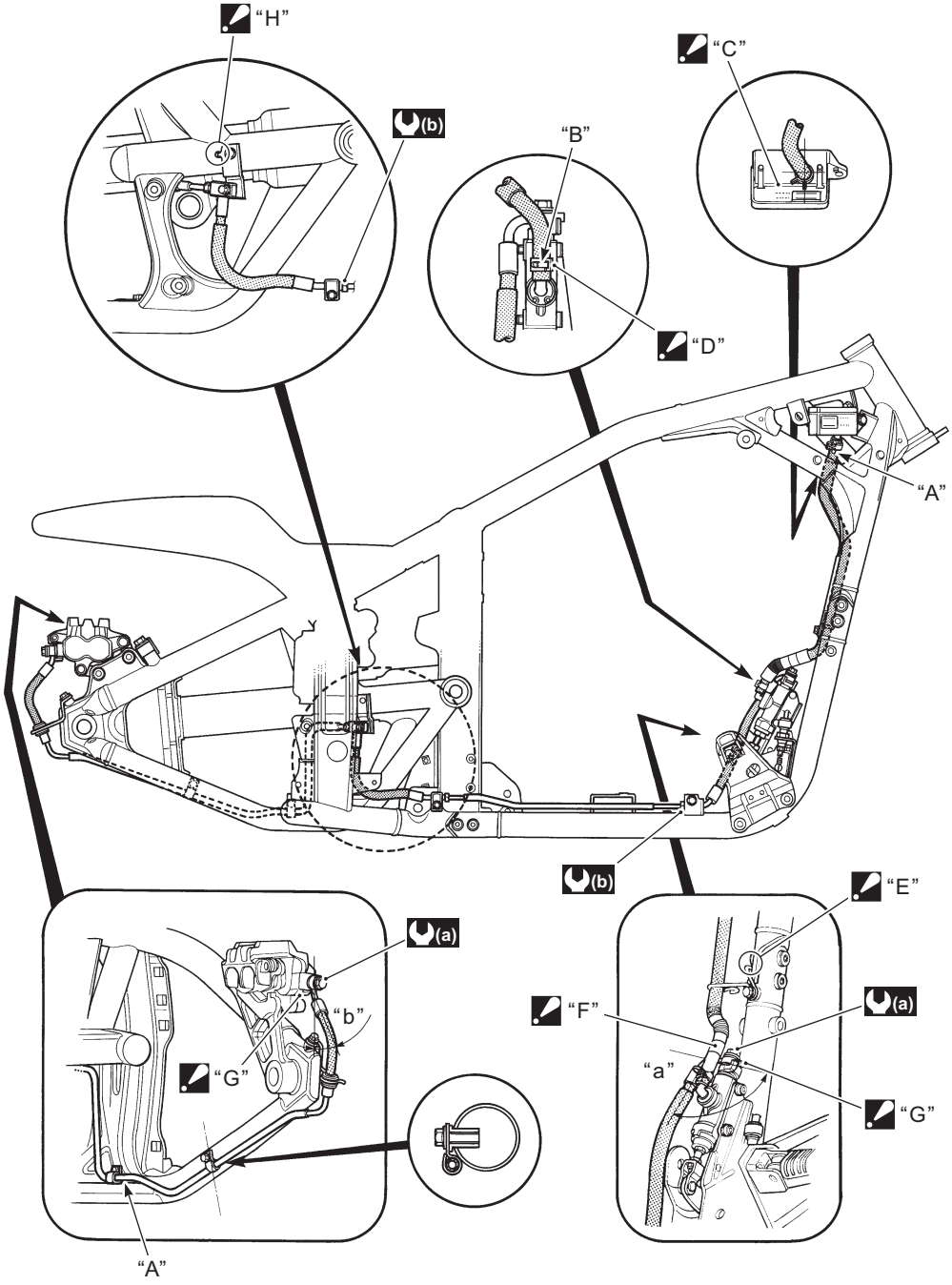


I940H1410081-05

1. Stopper : Position the brake hose union with the stopper before tightening the bolt.	"D": Position the brake hose clamp with the stopper before tightening the bolt.
"A": Pass the brake hose outside the throttle cables.	"a": 42°
"B": Set the brake hose in the guide firmly.	"b": 14°
"C": Clamp the brake hose firmly.	(a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)

Rear Brake Hose Routing Diagram

B940H24102002



I940H1410082-10

"A": White marking	"G": Position the brake hose union with the stopper before tightening the bolt.
"B": Yellow marking	"H": Position the clamp with the hole of the swingarm.
"C": Clamp end should face inside.	"a": 84°
"D": Clamp end should face upward.	"b": 49°
"E": Position the clamp end with the stopper before tightening the bolt.	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
"F": Set the heat shield above the clamp.	(b) : 16 N·m (1.6 kgf-m, 11.5 lbf-ft)

Diagnostic Information and Procedures

Brake Symptom Diagnosis

B940H24104001

Condition	Possible cause	Correction / Reference Item
Insufficient brake power	Leakage of brake fluid from hydraulic system.	*Repair or replace.*
	Worn pads and disc.	*Replace.*
	Oil adhesion on friction surface of pads.	*Clean disc and pads.*
	Air in hydraulic system.	*Bleed air.*
	Not enough brake fluid in the reservoir.	*Replenish.*
Brake squeaking	Carbon adhesion on pad surface.	*Repair surface with sandpaper.*
	Tilted pad.	*Correct pad fitting or replace.*
	Damaged wheel bearing.	*Replace.*
	Loose front-wheel axle or rear-wheel axle.	*Tighten to specified torque.*
	Worn pads and disc.	*Replace.*
	Foreign material in brake fluid.	*Replace brake fluid.*
	Clogged return port of master cylinder.	*Disassemble and clean master cylinder.*
Excessive brake lever stroke	Air in hydraulic system.	*Bleed air.*
	Insufficient brake fluid.	*Replenish fluid to specified level; bleed air.*
	Improper quality of brake fluid.	*Replace with correct fluid.*
Leakage of brake fluid	Insufficient tightening of connection joints.	*Tighten to specified torque.*
	Cracked hose.	*Replace.*
	Worn piston and/or cup.	*Replace piston and/or cup.*
	Worn piston seal and dust seal.	*Replace piston seal and dust seal.*
Brake drags	Rusty part.	*Clean and lubricate.*
	Insufficient brake lever or brake pedal pivot lubrication.	*Lubricate.*

Repair Instructions

Brake Pedal Height Inspection and Adjustment

B940H24106001

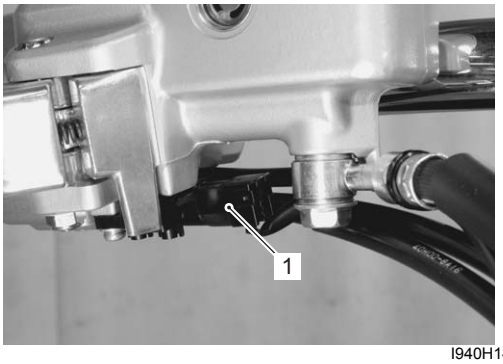
Refer to “Brake System Inspection in Section 0B (Page 0B-14)”.

Front Brake Light Switch Inspection

B940H24106002

Inspect the front brake light switch in the following procedures:

1) Disconnect the front brake light switch lead coupler (1).



I940H1410009-02

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 Brake Master Cylinder / Brake Lever Disassembly and Assembly (Page 4A-11)”.

Special tool
(TOOL) : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity (•))))

Front brake light switch

Color / Position	Terminal (B/R)	Terminal (B/Bl)
OFF		
ON	○	○

I940H1410083-01

3) Connect the front brake light switch lead coupler.

Rear Brake Light Switch Inspection

B940H24106003

Inspect the rear brake light switch in the following procedures:

1) Disconnect the rear brake light switch lead coupler (1).



I940H1410012-01

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
(TOOL) : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity (•))))

Rear brake light switch

Color / Position	Terminal (O/G)	Terminal (W/B)
OFF		
ON	○	○

I822H1410054-01

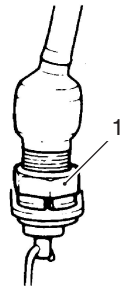
3) Connect the rear brake light switch lead coupler.

Rear Brake Light Switch Inspection and Adjustment

B940H24106004

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.





I940H1410014-01

Brake Fluid Level Check

B940H24106005

Refer to “Brake System Inspection in Section 0B (Page 0B-14)”.

Brake Hose Inspection

B940H24106006

Refer to “Brake System Inspection in Section 0B (Page 0B-14)”.

Air Bleeding from Brake Fluid Circuit

B940H24106007

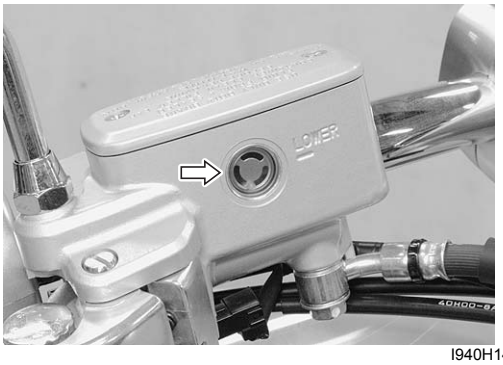
Air trapped in the brake fluid circuit acts like a cushion to absorb a large proportion of the pressure developed by the master cylinder and thus interferes with the full braking performance of the brake caliper. The presence of air is indicated by “sponginess” of the brake lever and also by lack of 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.

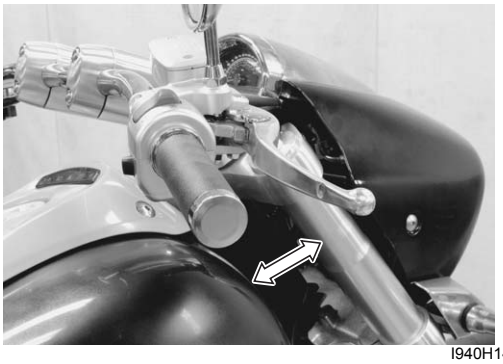
Front Brake

1) Fill the master cylinder reservoir to the top of the inspection window. Place the reservoir cap to prevent dirt from entering.

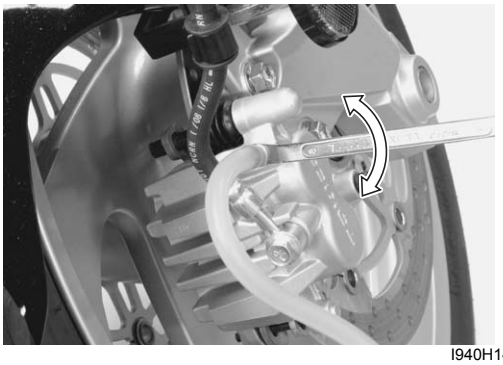


I940H1410015-02

2) Attach a clear hose to the air bleeder valve, and insert the free end of the hose into a receptacle.
3) Squeeze and release the brake lever several times in rapid succession and squeeze the lever fully without releasing it.


I940H1410016-01

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.


I940H1410018-01

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.

Tightening torque
Air bleeder valve (Front brake): 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)

8) Fill the reservoir with brake fluid to the upper mark of the reservoir.


I940H1410019-02

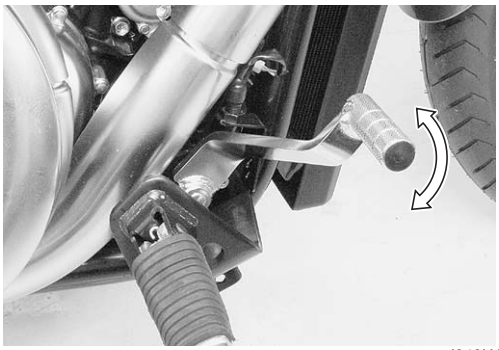
9) Install the reservoir cap.

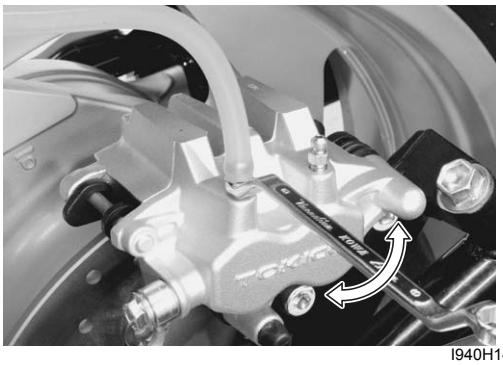
Rear Brake
Bleed air from the rear brake system as the same manner of front brake.

NOTE

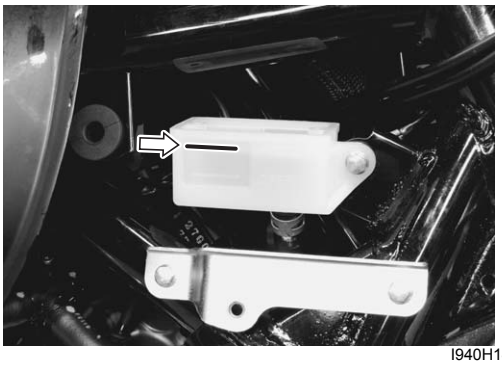
The only difference of bleeding operation from the front brake is that the rear master cylinder is actuated by a pedal.

Tightening torque
Air bleeder valve (Rear brake): 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)


I940H1410020-02


I940H1410023-02

- Fill the reservoir with brake fluid to the upper mark of the reservoir.



I940H1410026-02

Brake Fluid Replacement

B940H24106008

⚠ 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 brake fluid reservoir on a level surface.
2) Remove the brake fluid reservoir cap and diaphragm.
3) Suck up the old brake fluid as much as possible.

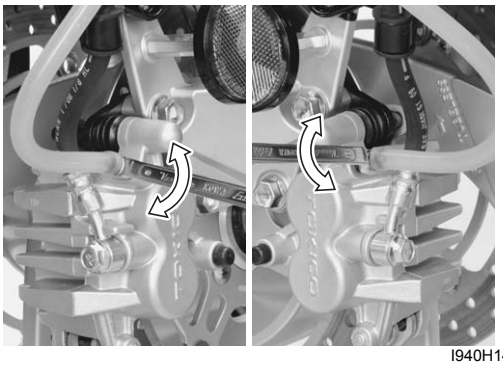


I940H1410027-01

4) Fill the reservoir with new brake fluid.

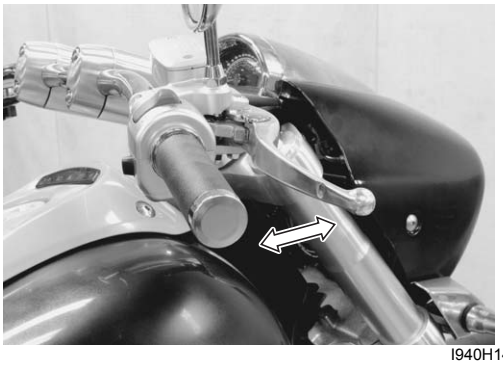
BF: Brake fluid (DOT 4)

5) Connect a clear hose to the air bleeder valve and insert the other end of the hose into a receptacle.



I940H1410029-01

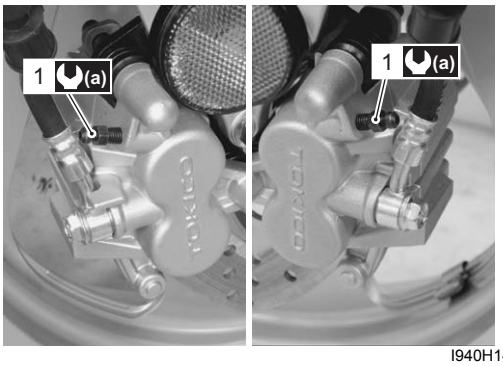
6) Loosen the air bleeder valve and pump the brake lever until the old brake fluid flows out of the brake system.



I940H1410030-02

7) Close the air bleeder valve (1) and disconnect the clear hose.

Tightening torque
Air bleeder valve (Front brake) (a): 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)



I940H1410032-02

8) Fill the reservoir with brake fluid to the upper mark of the reservoir.

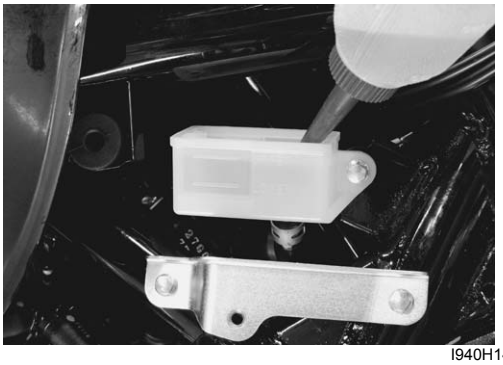


I940H1410019-02

9) Install the reservoir cap.

Rear Brake

1) Place the motorcycle on a level surface.
2) Remove the right frame head cover. Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-5)".
3) Remove the brake fluid reservoir cap and diaphragm.
4) Suck up the old brake fluid as much as possible.



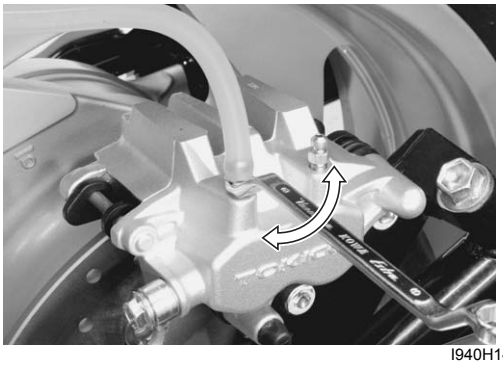
I940H1410035-01

5) Fill the reservoir with new brake fluid.

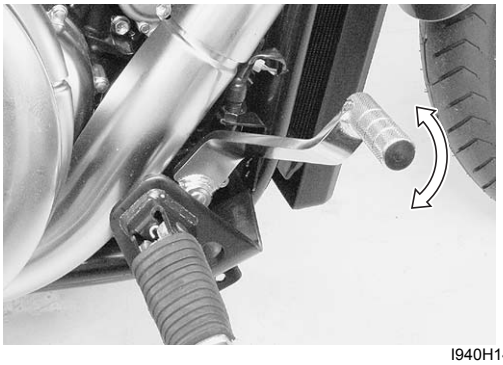
BF: Brake fluid (DOT 4)

6) Connect a clear hose to the air bleeder valve and insert the other end of the hose into a receptacle.

7) Loosen the air bleeder valve and pump the brake pedal until the old brake fluid flows out of the brake system.



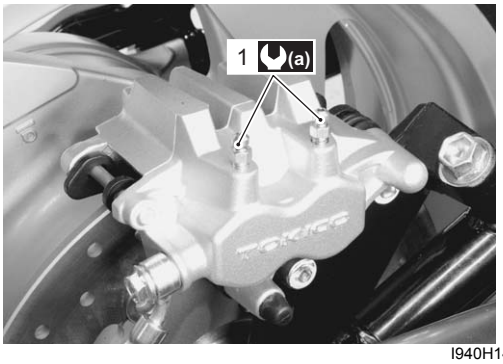
I940H1410036-01



I940H1410020-02

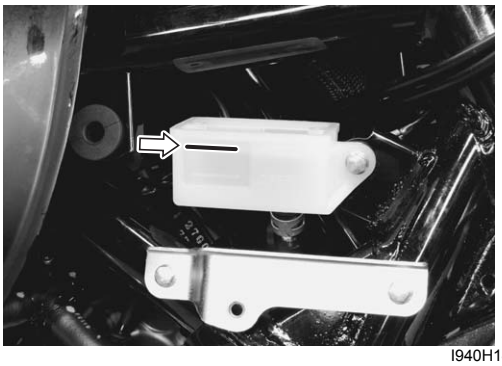
8) Close the air bleeder valve (1) and disconnect the clear hose.

Tightening torque
Air bleeder valve (Rear brake) (a): 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)



I940H1410038-01

9) Fill the reservoir with brake fluid to the upper mark of the reservoir.



I940H1410026-02

Front Brake Hose Removal and Installation

B940H24106009

Removal

1) Drain brake fluid. Refer to “Brake Fluid Replacement (Page 4A-6)”.
2) Remove the front brake hoses as shown in the front brake hose routing diagram. Refer to “Front Brake Hose Routing Diagram (Page 4A-1)”.

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 (Page 4A-1)”.
2) Bleed air from the front brake system. Refer to “Air Bleeding from Brake Fluid Circuit (Page 4A-4)”.

Rear Brake Hose Removal and Installation

B940H24106010

Removal

1) Remove the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
2) Remove the frame head cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Drain brake fluid. Refer to “Brake Fluid Replacement (Page 4A-6)”.
4) Remove the rear brake hoses as shown in the rear brake hose routing diagram. Refer to “Rear Brake Hose Routing Diagram (Page 4A-2)”.

Installation

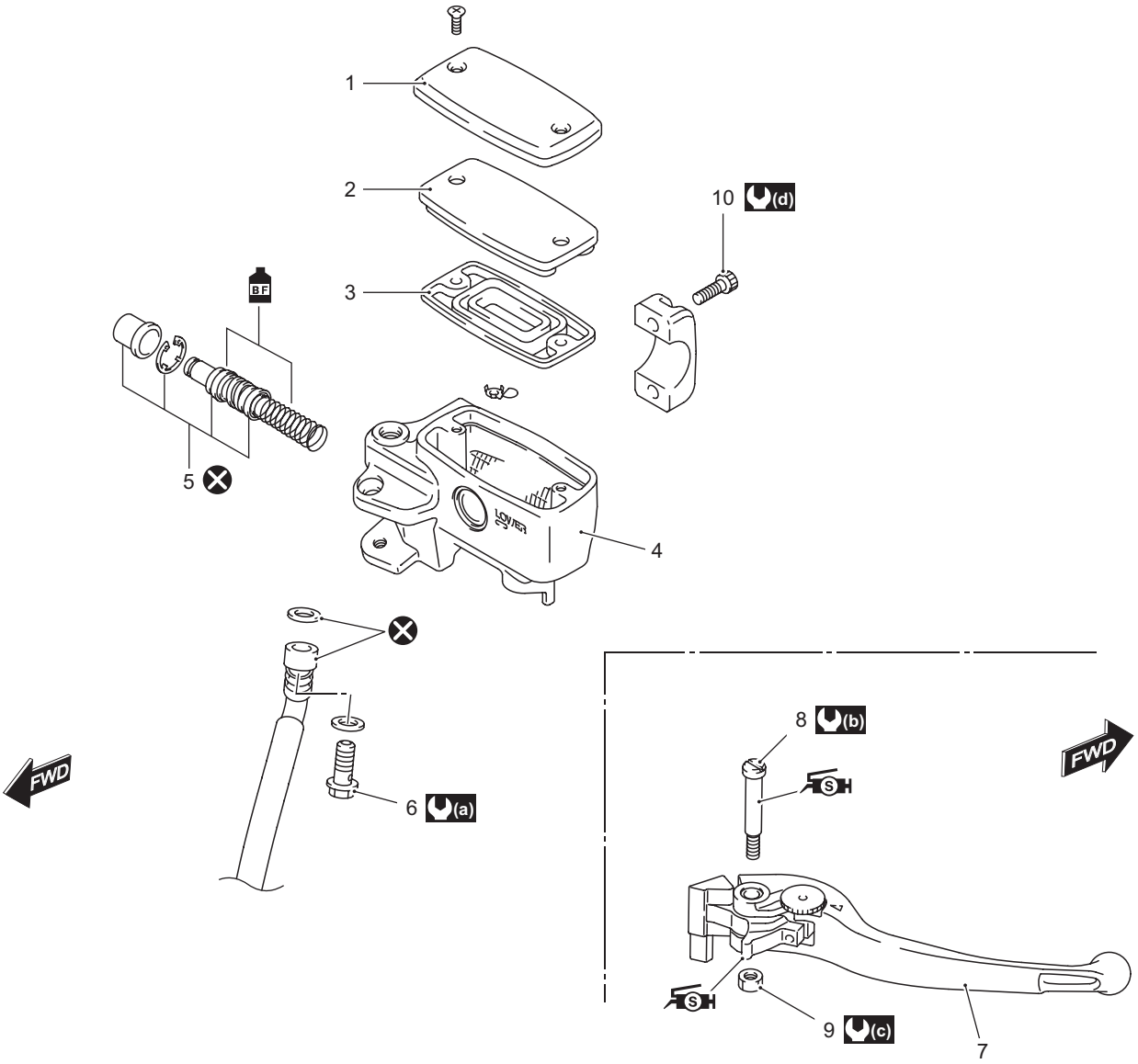
⚠ CAUTION

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 (Page 4A-2)”.
2) Bleed air from the rear brake system. Refer to “Air Bleeding from Brake Fluid Circuit (Page 4A-4)”.
3) Reinstall the removed parts.

Front Brake Master Cylinder Components

B940H24106011



I940H1410088-02

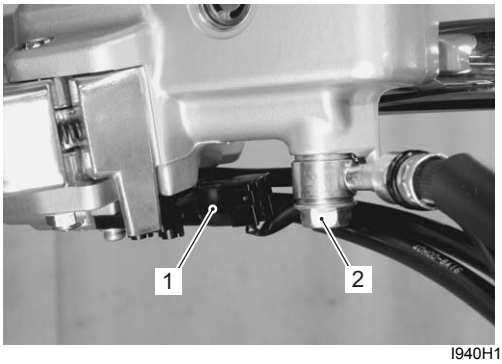
1. Reservoir cap	7. Brake lever	(d) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
2. Plate	8. Brake lever pivot bolt	BF : Apply brake fluid.
3. Diaphragm	9. Brake lever pivot bolt lock-nut	S : Apply silicone grease.
4. Master cylinder	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	: Do not reuse.
5. Piston/Cup set	(b) : 1 N·m (0.1 kgf-m, 0.7 lbf-ft)	
6. Brake hose union bolt	(c) : 6 N·m (0.6 kgf-m, 4.5 lbf-ft)	

Front Brake Master Cylinder Assembly Removal and Installation

B940H24106012

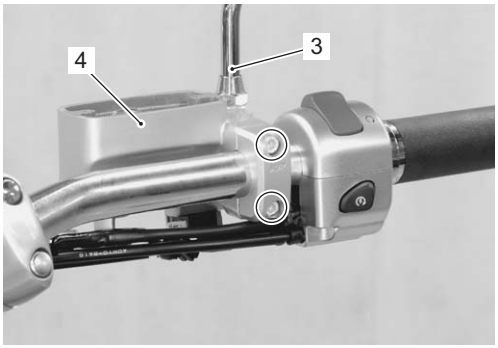
Removal

1) Drain brake fluid. Refer to “Brake Fluid Replacement (Page 4A-6)”.
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.



I940H1410041-01

5) Remove the right rear view mirror (3).
6) Remove the master cylinder assembly (4).



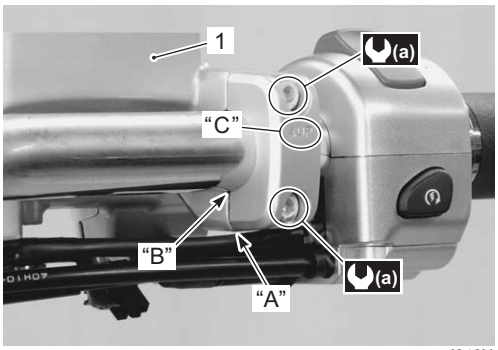
I940H1410042-01

Installation

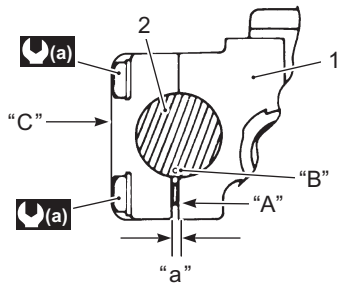
Install the front brake master cylinder in the reverse order of removal. Pay attention to the following points:

- 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
  Front brake master cylinder holder bolt (Upper and Lower) (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1410043-02



I940H1410080-01

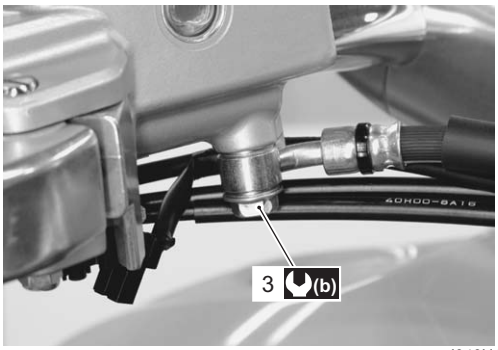
“C”: Up mark	“a”: Clearance

- After setting the brake hose union to the stopper, tighten the union bolt (3) 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 lbf-ft)



I940H1410044-01

- Bleed air from the brake system. Refer to “Air Bleeding from Brake Fluid Circuit (Page 4A-4)”.

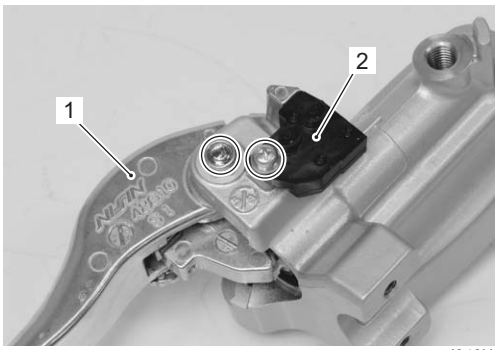
Front Brake Master Cylinder / Brake Lever Disassembly and Assembly

B940H24106013

Refer to “Front Brake Master Cylinder Assembly Removal and Installation (Page 4A-10)”.

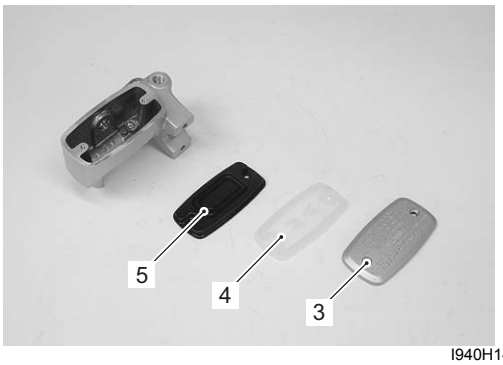
Disassembly

1) Remove the brake lever (1) and brake light switch (2).



I940H1410045-01

2) Remove the reservoir cap (3), plate (4) and diaphragm (5).

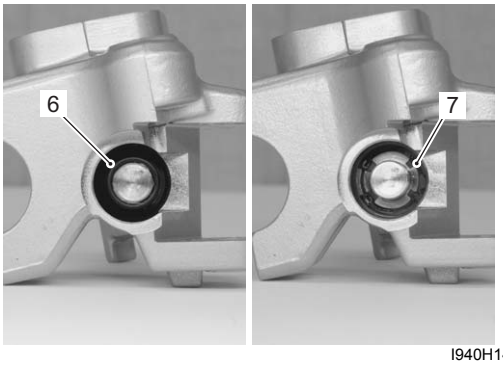


I940H1410046-01

3) Pull out the dust boot (6) and remove the snap ring (7).

Special tool

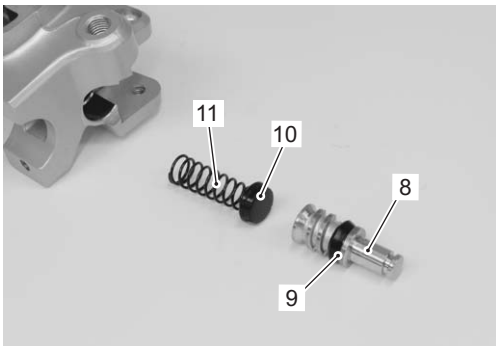
TOOL : 09900–06108 (Snap ring pliers)



I940H1410047-01

4) Remove the following parts from the master cylinder.

- Piston (8)
- Secondary cup (9)
- Primary cup (10)
- Spring (11)



I940H1410048-01

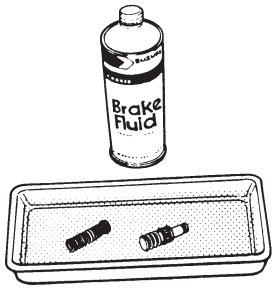
Assembly

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.**

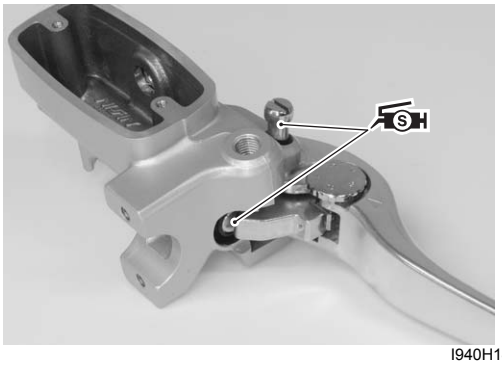
BF: Brake fluid (DOT 4)



I649G1410024-02

- Apply grease to the brake lever pivot bolt.
- Apply grease to the contact point between piston and brake lever.

: Grease 99000–25100 (SUZUKI SILICONE GREASE or equivalent)



I940H1410051-02

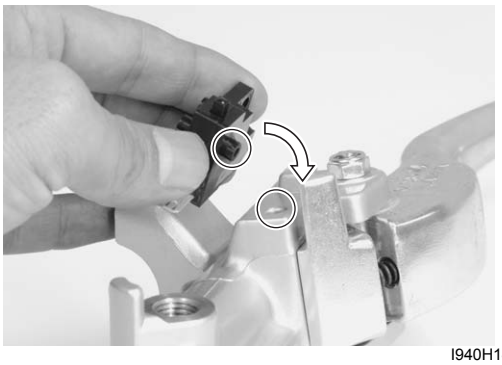
- Tighten the pivot bolt and lock-nut to the specified torque.

Tightening torque
Brake lever pivot bolt (a): 1 N·m (0.1 kgf-m, 0.7 lbf-ft)
Brake lever pivot bolt lock-nut (b): 6 N·m (0.6 kgf-m, 4.5 lbf-ft)



I940H1410053-02

- When installing the brake light switch, align the projection on the switch with the hole in the master cylinder.



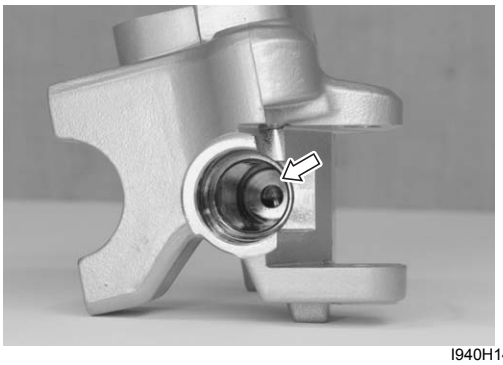
I940H1410054-01

Front Brake Master Cylinder Parts Inspection

B940H24106014

Refer to “Front Brake Master Cylinder / Brake Lever Disassembly and Assembly (Page 4A-11)”.

Master Cylinder
Inspect the master cylinder bore for any scratches or other damage.



I940H1410055-01

Piston
Inspect the piston surface for any scratches or other damage.

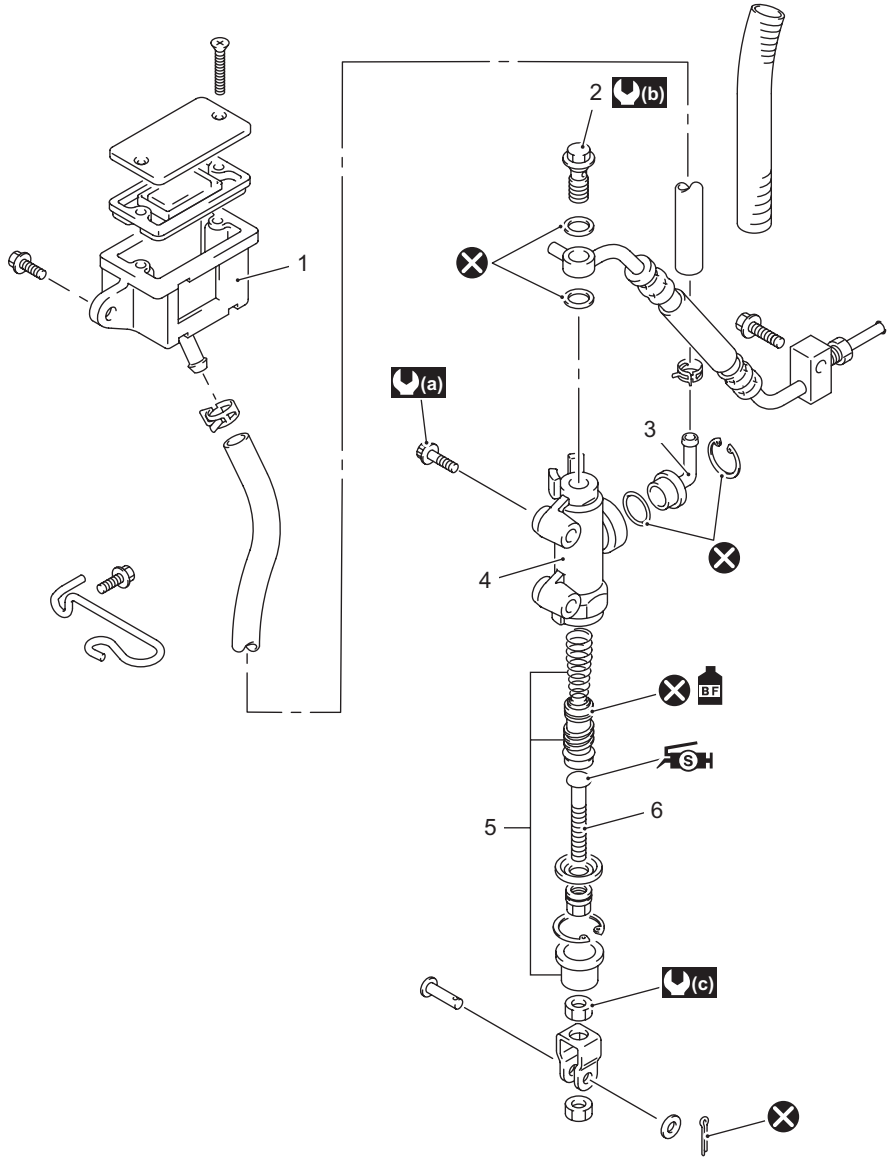
Rubber Parts
Inspect the primary cup, secondary cup and dust boot for wear or damage.



I649G1410028-02

Rear Brake Master Cylinder Components

B940H24106015



I940H1410089-02

1. Reservoir tank	4. Master cylinder	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	S : Apply silicone grease.
2. Brake hose union bolt	5. Piston/Cup set	(b) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	BF : Apply brake fluid.
3. Brake hose connector	6. Push rod	(c) : 18 N·m (1.8 kgf-m, 13.0 lbf-ft)	: Do not reuse.

Rear Brake Master Cylinder Removal and Installation

B940H24106016

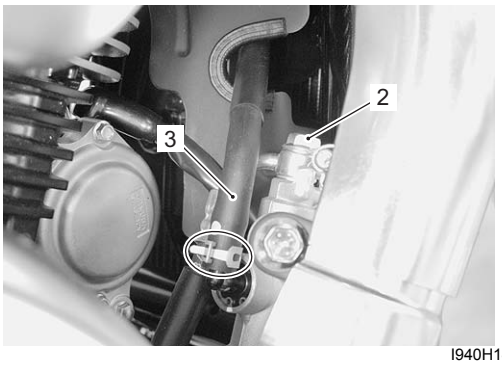
Removal

1) Drain brake fluid. Refer to “Brake Fluid Replacement (Page 4A-6)”.
2) Disconnect the rear brake light switch coupler (1).



I940H1410056-01

3) Remove the union bolt (2).
4) Disconnect the rear reservoir tank hose (3).



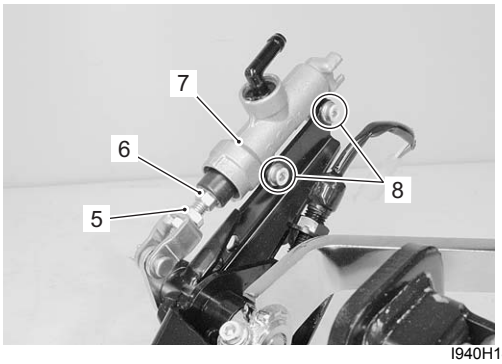
I940H1410058-02

5) Remove the footrest bracket bolts (4).



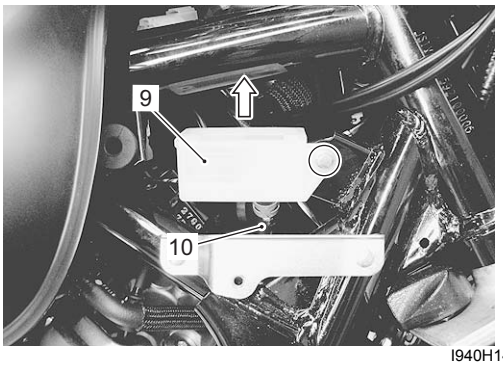
I940H1410059-02

6) Loosen the lock-nut (5) and remove the push rod (6).
7) Remove the rear master cylinder (7) by removing the mounting bolts (8).



I940H1410061-03

8) Remove the reservoir (9) along with reservoir hose (10).

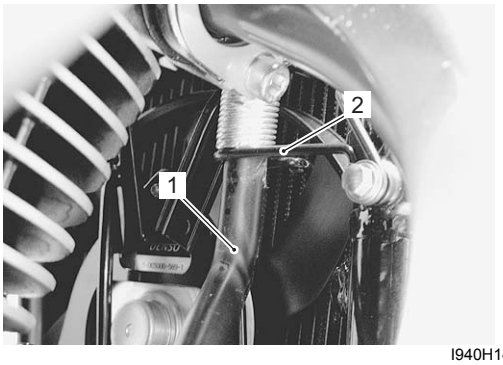


I940H1410062-03

Installation

Install the rear brake master cylinder in the reverse order of removal. Pay attention to the following points:

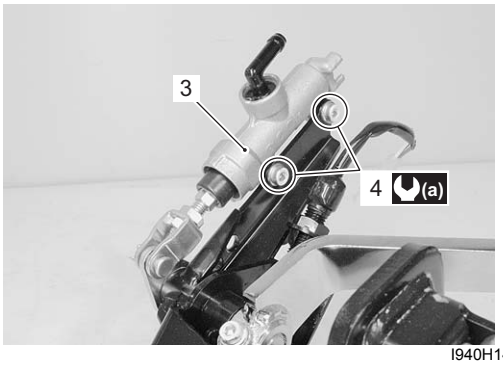
- Install the reservoir hose (1) to the clamp (2).



I940H1410064-02

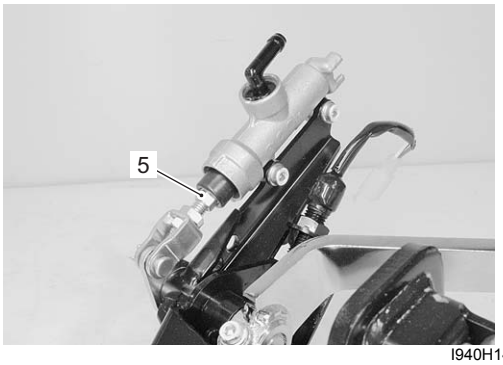
- Install the master cylinder (3) and tighten the master cylinder mounting bolts (4) to the specified torque.

Tightening torque
Rear brake master cylinder mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

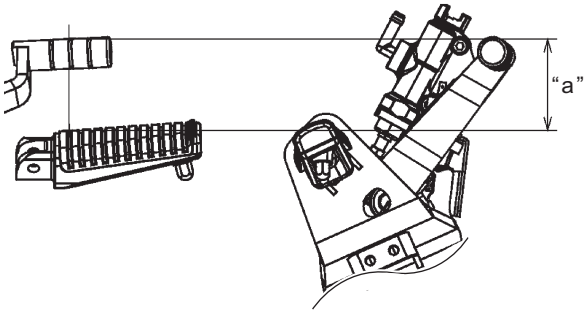


I940H1410066-03

- Turn the push rod (5) until the brake pedal becomes 60 – 70 mm (2.4 – 2.8 in.) “a” above the top of the footrest.



I940H1410067-05



I940H1410068-04

“a”: 60 – 70 mm (2.4 – 2.8 in)

- Tighten the lock-nut (6) to the specified torque.

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



I940H1410069-03

- Apply thread lock to the footrest bracket bolts (7) and tighten them to the specified torque.

1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque
Front footrest bracket bolt (c): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)



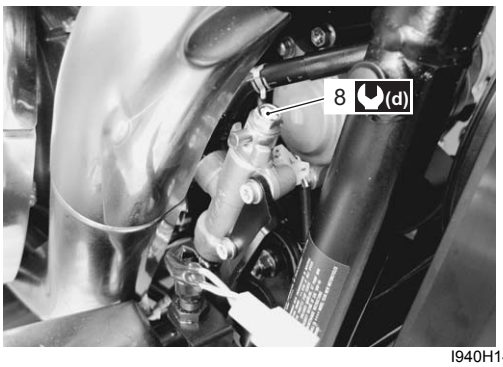
I940H1410070-04

- Tighten the brake hose union bolt (8) 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 (d): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I940H1410071-02

- Connect the rear reservoir tank hose and rear brake light switch coupler properly.
- Bleed air from the system after reassembling the master cylinder. Refer to “Air Bleeding from Brake Fluid Circuit (Page 4A-4)”.

Rear Brake Master Cylinder Disassembly and Assembly

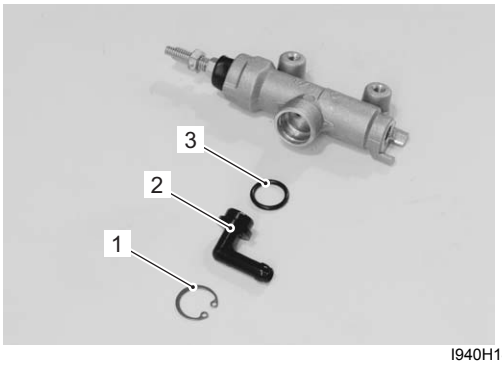
B940H24106017

Refer to “Rear Brake Master Cylinder Removal and Installation (Page 4A-13)”.

Disassembly

1) Remove the snap ring (1), brake hose connector (2) and O-ring (3).

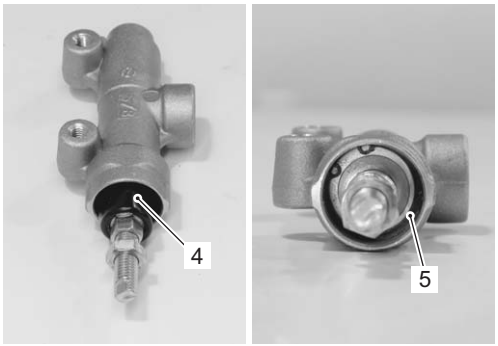
Special tool
TOOL : 09900–06108 (Snap ring pliers)



I940H1410073-01

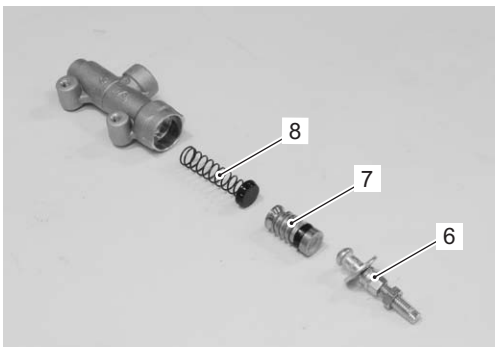
2) Pull out the dust boot (4) and remove the snap ring (5).

Special tool
TOOL : 09900–06108 (Snap ring pliers)



I940H1410074-01

3) Remove the push rod (6), piston/cup set (7) and spring (8).



I940H1410075-01

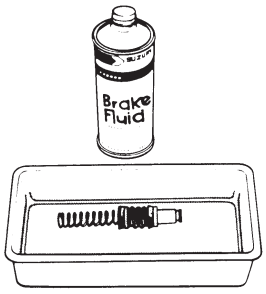
Assembly

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.**

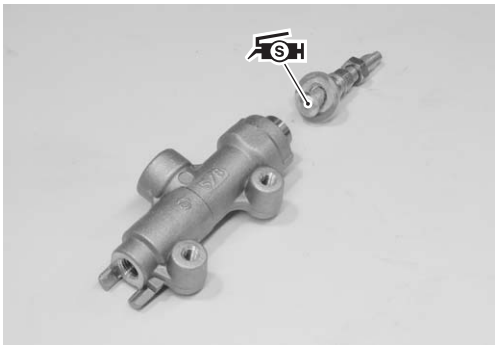
BF: Brake fluid (DOT 4)



I649G1410036-02

- Apply grease to the push rod end.

SH : Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)



I940H1410076-01

- Install the O-ring (1) and brake hose connector (2).

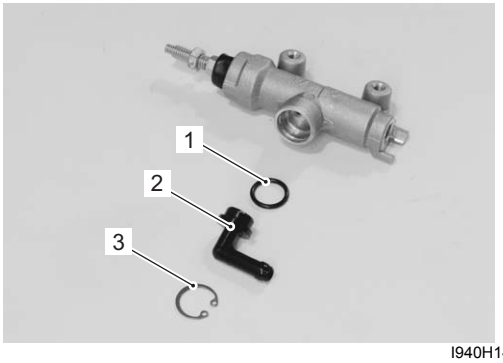
⚠ CAUTION

Replace the O-ring (1) with a new one.

- Install the snap ring (3).

⚠ CAUTION

Do not reuse the snap ring (3).



I940H1410078-01

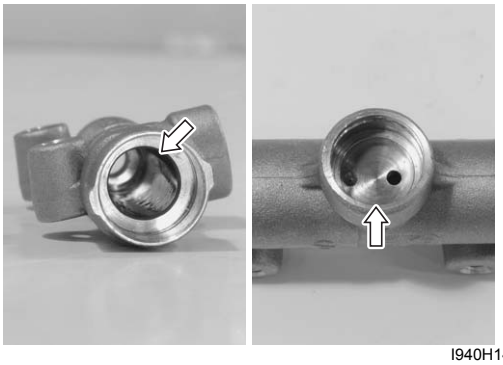
Rear Brake Master Cylinder Parts Inspection

B940H24106018

Refer to “Rear Brake Master Cylinder Disassembly and Assembly (Page 4A-16)”.

Master Cylinder

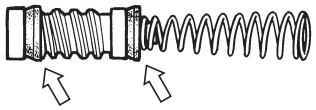
Inspect the master cylinder bore for any scratches or other damage.



I940H1410079-01

Cup Set

Inspect the cup set for other damage.



I822H1410045-01

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.



I649G1410039-02

Rear Brake Pedal Removal and Installation

B940H24106019

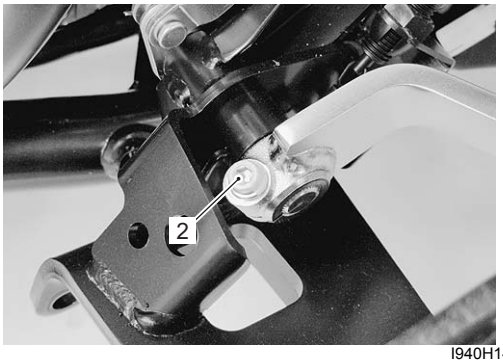
Removal

1) Remove the right footrest bracket bolts (1).



I940H1410087-02

2) Move and support the right footrest bracket and remove the rear brake pedal boss bolt (2).
3) Remove the rear brake pedal.

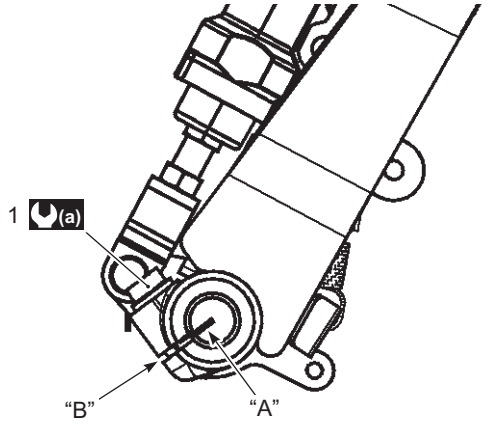


I940H1410084-01

Installation
Install the rear brake pedal in the reverse order of removal. Pay attention to the following points:

- When installing the rear brake pedal, position the punched mark “A” of the brake rod and slit “B” of the brake pedal.
- Tighten the rear brake pedal boss bolt (1) to the specified torque.

  Tightening torque
  Rear brake pedal boss bolt (a): 16 N·m (1.6 kgf-m, 11.5 lbf-ft)



I940H1410085-01

- Apply thread lock to the right foot bracket bolts (2) and tighten them to the specified torque.

  1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

  Tightening torque
  Front footrest bracket bolt (b): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)



I940H1410086-01

Specifications

Service Data

B940H24107001

Brake
Unit: mm (in)

Item	Standard		Limit
Rear brake pedal height	60 – 70 (2.4 – 2.8)		—
Brake disc thickness	Front	4.3 – 4.7 (0.169 – 0.185)	4.0 (0.16)
	Rear	6.6 – 7.0 (0.260 – 0.276)	6.3 (0.25)
Brake disc runout	Front & Rear	—	0.30 (0.012)
Master cylinder bore	Front	15.870 – 15.913 (0.6248 – 0.6265)	—
	Rear	15.870 – 15.913 (0.6248 – 0.6265)	—
Master cylinder piston diam.	Front	15.827 – 15.854 (0.6231 – 0.6242)	—
	Rear	15.827 – 15.854 (0.6231 – 0.6242)	—
Brake caliper cylinder bore	Front	30.230 – 30.306 (1.1902 – 1.1931)	—
			—
	Rear	30.230 – 30.306 (1.1902 – 1.1931)	—
Brake caliper piston diam.	Front	30.150 – 30.200 (1.1870 – 1.1890)	—
			—
	Rear	30.150 – 30.200 (1.1870 – 1.1890)	—
Brake fluid type	DOT 4		—

Tightening Torque Specifications

B940H24107002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Air bleeder valve (Front brake)	7.5	0.75	5.5	☞(Page 4A-5) / ☞(Page 4A-6)
Air bleeder valve (Rear brake)	7.5	0.75	5.5	☞(Page 4A-5) / ☞(Page 4A-7)
Front brake master cylinder holder bolt (Upper and Lower)	10	1.0	7.0	☞(Page 4A-10)
Brake hose union bolt	23	2.3	16.5	☞(Page 4A-10) / ☞(Page 4A-15)
Brake lever pivot bolt	1	0.1	0.7	☞(Page 4A-12)
Brake lever pivot bolt lock-nut	6	0.6	4.5	☞(Page 4A-12)
Rear brake master cylinder mounting bolt	10	1.0	7.0	☞(Page 4A-14)
Rear brake master cylinder rod lock-nut	18	1.8	13.0	☞(Page 4A-15)
Front footrest bracket bolt	50	5.0	36.0	☞(Page 4A-15) / ☞(Page 4A-18)
Rear brake pedal boss bolt	16	1.6	11.5	☞(Page 4A-18)

NOTE

The specified tightening torque is described in the following.
“Front Brake Hose Routing Diagram (Page 4A-1)”
“Rear Brake Hose Routing Diagram (Page 4A-2)”
“Front Brake Master Cylinder Components (Page 4A-9)”
“Rear Brake Master Cylinder Components (Page 4A-13)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H24108001

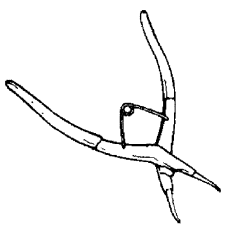
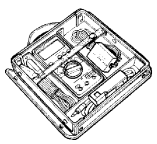
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4A-6) / ☞(Page 4A-7) / ☞(Page 4A-11) / ☞(Page 4A-16)
Grease	SUZUKI SILICONE GREASE or equivalent	P/No.: 99000–25100	☞(Page 4A-12) / ☞(Page 4A-16)
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞(Page 4A-15) / ☞(Page 4A-18)

NOTE

Required service material is also described in the following.
“Front Brake Master Cylinder Components (Page 4A-9)”
“Rear Brake Master Cylinder Components (Page 4A-13)”

Special Tool

B940H24108002

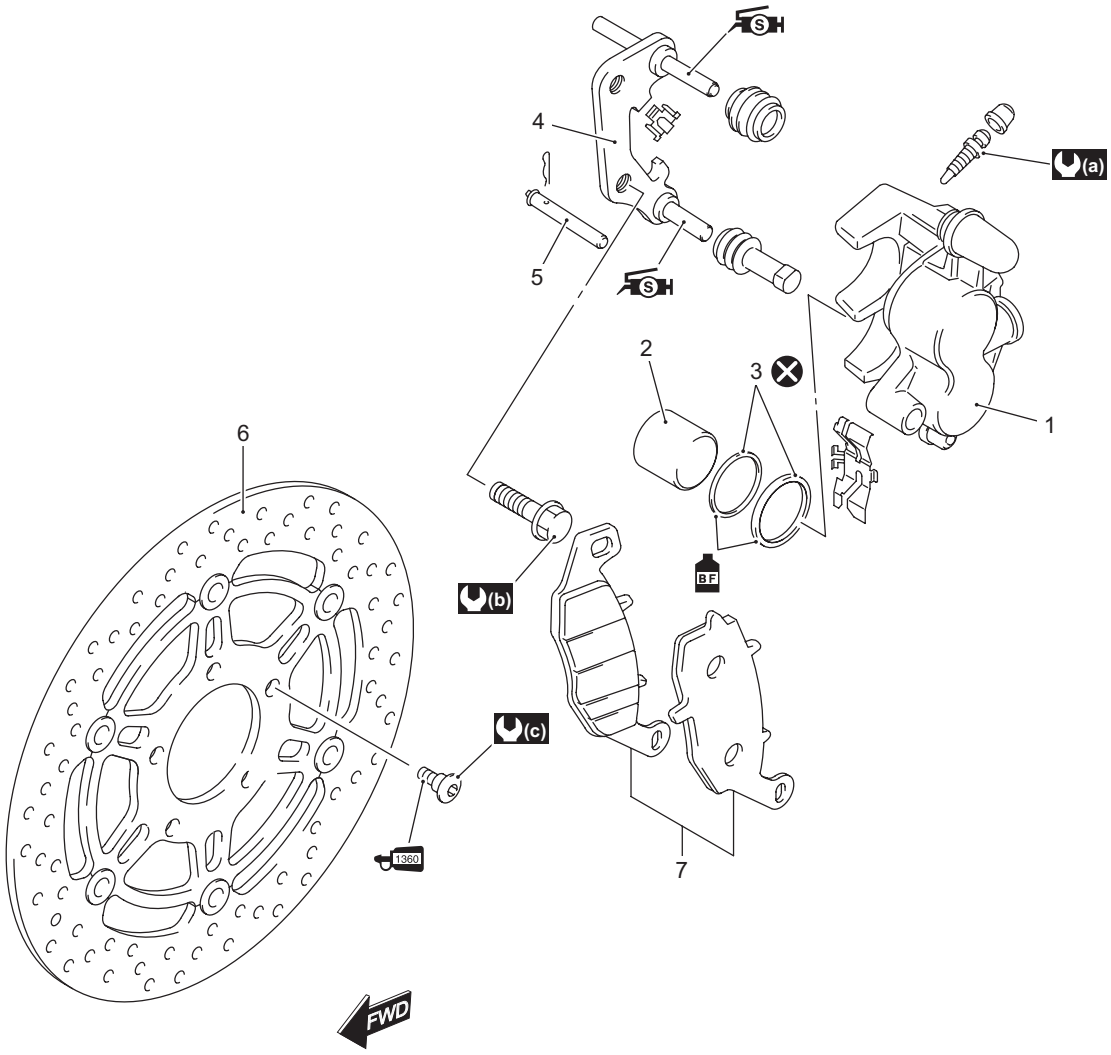
09900–06108 Snap ring pliers ☞(Page 4A-11) / ☞(Page 4A-16) / ☞(Page 4A-16)		09900–25008 Multi-circuit tester set ☞(Page 4A-3) / ☞(Page 4A-4)	

Front Brakes

Repair Instructions

Front Brake Components

B940H24206001



I940H1420024-02

1. Front brake caliper	6. Brake disc	S : Apply silicone grease.
2. Piston	7. Front brake pad set	1360 : Apply thread lock to the thread part.
3. Oil seal/Dust seal	(a) : 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)	BF : Apply brake fluid.
4. Caliper holder	(b) : 39 N·m (3.9 kgf-m, 28.0 lbf-ft)	⊗ : Do not reuse.
5. Pad set pin	(c) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	

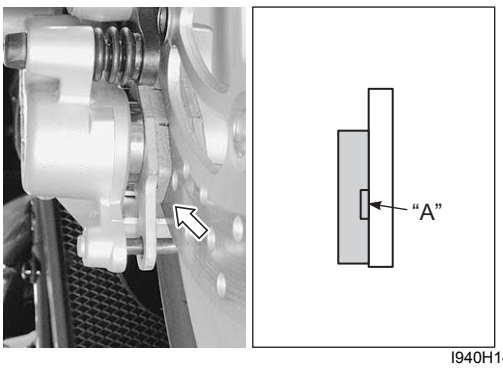
Front Brake Pad Inspection

B940H24206002

The extent of brake pads wear can be checked by observing the grooved limit line “A” on the pads. When the wear exceeds the grooved limit line, replace the pads with new ones. Refer to “Front Brake Pad Replacement (Page 4B-2)”.

⚠ CAUTION

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

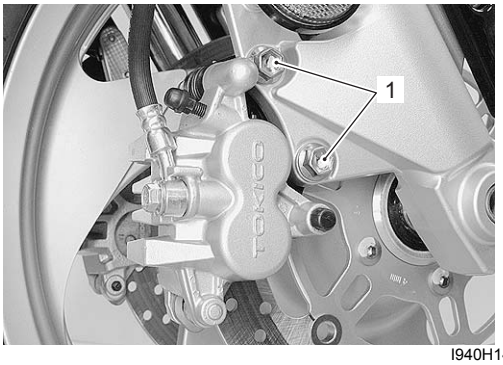


I940H1420001-01

Front Brake Pad Replacement

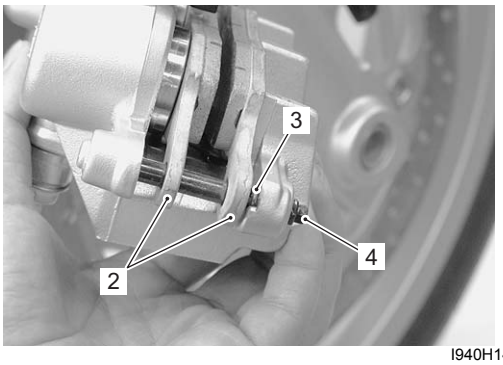
B940H24206003

1) Remove the brake caliper by removing the caliper mounting bolts (1).



I940H1420002-01

2) Remove the pads (2) by removing the pad set pin clip (3) and pad set pin (4).



I940H1420003-01

⚠ CAUTION

Do not operate the brake lever and brake pedal while dismounting the pads.

3) Clean up the caliper especially around the caliper piston.

⚠ CAUTION

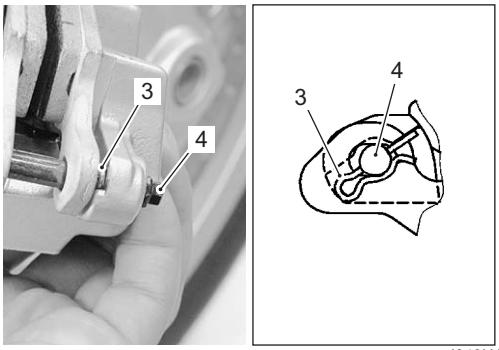
Replace the brake pads as a set, otherwise braking performance will be adversely affected.



I940H1420004-01

4) Install the new brake pads.

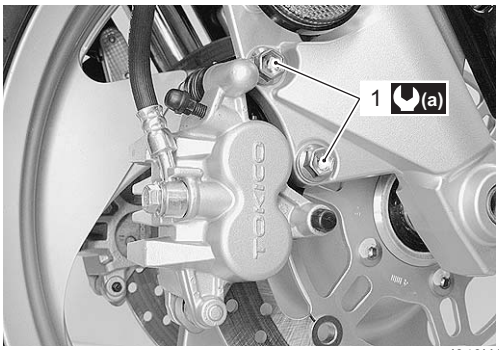
5) Insert the pad set pin (4) and pad set pin clip (3) as shown in the figure.



I940H1420005-01

6) Tighten the brake caliper mounting bolts (1) to the specified torque.

Tightening torque
Front brake caliper mounting bolt (a): 39 N·m (3.9 kgf-m, 28.0 lbf-ft)



I940H1420006-01

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

B940H24206004

NOTE

The right and left calipers are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

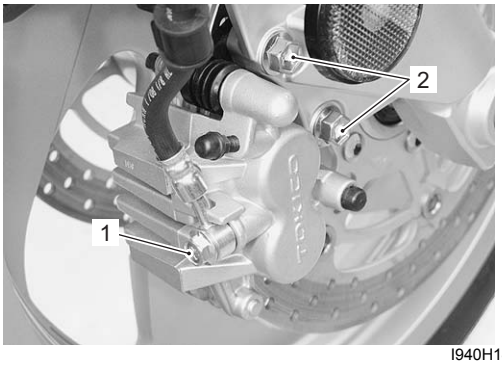
Removal

1) Drain brake fluid. Refer to “Brake Fluid Replacement in Section 4A (Page 4A-6)”.
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 caliper by removing the caliper mounting bolts (2).



I940H1420007-01

Installation

Install the brake caliper in the reverse order of removal. Pay attention to the following points:

- Tighten each bolt to the specified torque.

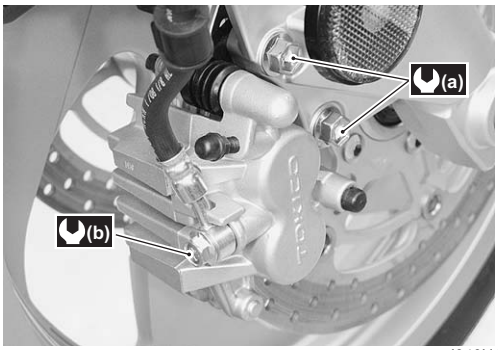
  Tightening torque
  Front brake caliper mounting bolt (a): 39 N·m (3.9 kgf-m, 28.0 lbf-ft)

- After setting the brake hose union to the stopper, tighten the union bolts to the specified torque.

⚠ CAUTION

The seal washers should be replaced with new ones to prevent fluid leakage.

Tightening torque
Brake hose union bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I940H1420008-01

- Bleed air from the brake system after installing the caliper. Refer to “Air Bleeding from Brake Fluid Circuit in Section 4A (Page 4A-4)”.
- 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

B940H24206005

Refer to “Front Brake Caliper Removal and Installation (Page 4B-3)”.

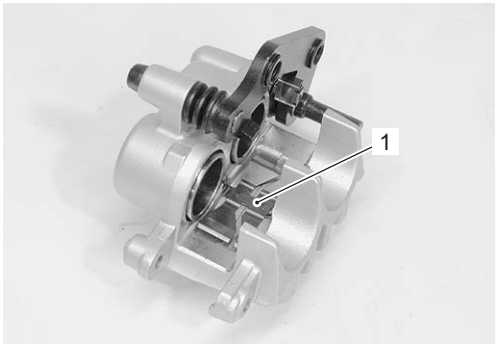
NOTE

The right and left calipers are installed symmetrically and therefore the disassembly procedure for one side is the same as that for the other side.

Disassembly

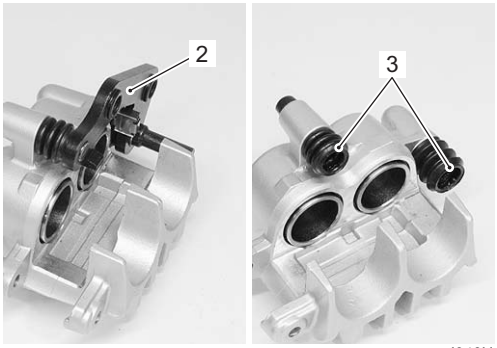
Brake caliper

1) Remove the brake pads. Refer to “Front Brake Pad Replacement (Page 4B-2)”.
2) Remove the pad spring (1).



I940H1420009-01

3) Remove the caliper holder (2) and boots (3).



I940H1420010-01

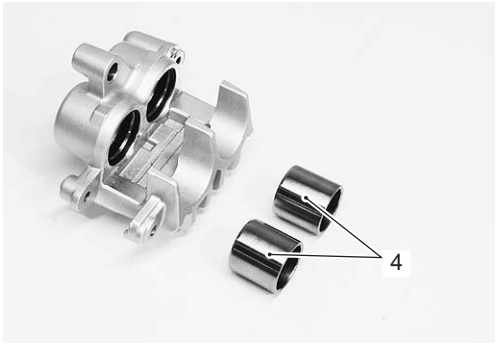
4) Place a rag over the pistons to prevent it from popping out and then force out the pistons (4) using compressed air.

⚠ CAUTION

Do not use high pressure air to prevent piston damage.

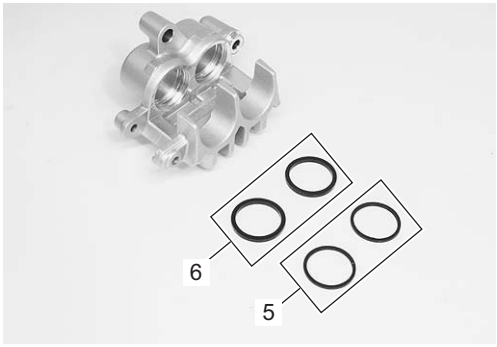


I940H1420011-01



I940H1420012-01

5) Remove the dust seals (5) and piston seals (6).



I940H1420013-01

Brake caliper carrier

- Remove the pad guide (1).



I940H1420014-01

Assembly

Assemble the caliper in the reverse order of disassembly. Pay attention to the following points:

Brake caliper carrier

- Install the pad guide (1).



I940H1420014-01

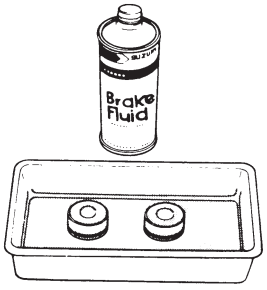
Brake caliper

- 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.**



I649G1420012-02

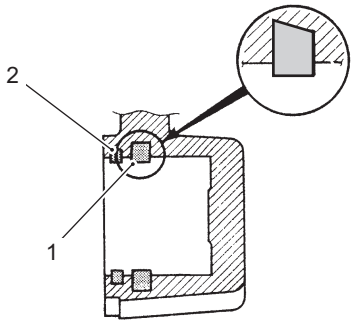
- Apply the brake fluid to piston seal (1) and dust seal (2).

  ⚠ CAUTION

  Replace the piston seals (1) and dust seals (2) with new ones.

  BF: Brake fluid (DOT 4)

- Install the piston seals as shown in the figure.

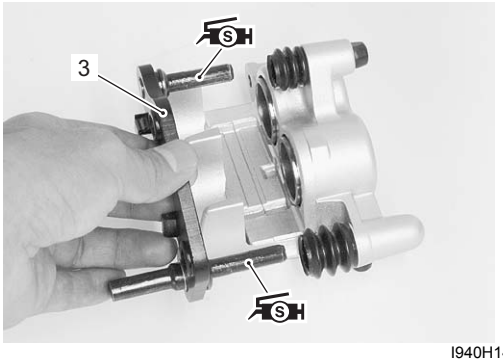


I822H1420030-01

- Apply grease to the two pins.

  : Grease 99000–25100 (SUZUKI SILICONE GREASE or equivalent)

- Install the brake caliper carrier (3) to the brake caliper.



I940H1420015-01

- Install the brake pads. Refer to “Front Brake Pad Replacement (Page 4B-2)”.
- Install the brake caliper and brake hose. Refer to “Front Brake Caliper Removal and Installation (Page 4B-3)” and “Front Brake Hose Routing Diagram in Section 4A (Page 4A-1)”.

Front Brake Caliper Parts Inspection

B940H24206006

Refer to “Front Brake Caliper Disassembly and Assembly (Page 4B-3)”.

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.



I940H1420016-01

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.



I940H1420017-01

Brake Pad Set Pin / Clip
Inspect the brake pad set pin for wear and other damage. If any damage is found, replace defective parts with a new one.



I940H1420018-01

Brake Pad Spring
Inspect the brake pad spring for damage and excessive bend. If any defects are found, replace the brake pad spring with a new one.



I940H1420019-01

Brake Pad Guide
Inspect the brake pad guide for damage and excessive bend. If any defects are found, replace the brake pad guide with a new one.



I822H1430021-01

Boots
Inspect the boots for damage or wear. If defects are found, replace them new ones.



I940H1420020-01

Brake Caliper Carrier
Inspect the brake caliper carrier for damage. If any damages are found, replace the brake caliper carrier with a new one.



I940H1420021-01

Front Brake Disc Removal and Installation

B940H24206007

Removal

1) Remove the front wheel assembly. Refer to “Front Wheel Assembly Removal and Installation in Section 2D (Page 2D-3)”.
2) Remove the front brake disc.



I940H1420023-02

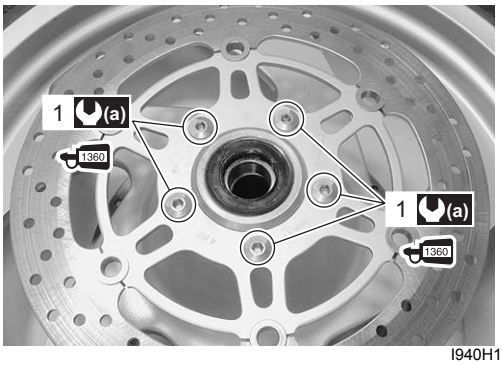
Installation

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 to the brake disc bolts (1) and tighten them to the specified torque.

1360 : 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 lbf-ft)



I940H1420022-01

Front Brake Disc Inspection

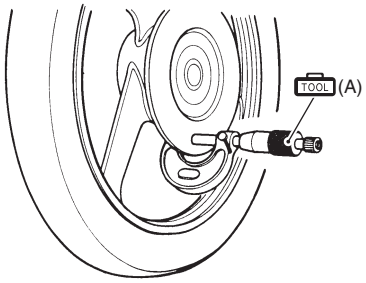
B940H24206008

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

Brake disc thickness
Service limit (Front): 4.0 mm (0.16 in)



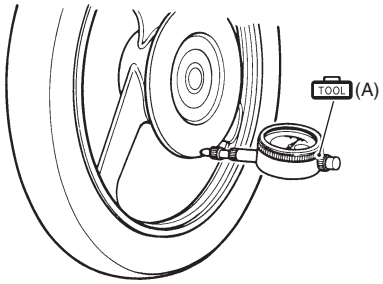
I649G1420019-03

Brake Disc Runout

1) Dismount the front brake caliper. Refer to “Front Brake Caliper Removal and Installation (Page 4B-3)”.
2) Measure the runout using the dial gauge.
Replace the disc if the runout exceeds the service limit.

Special tool
TOOL (A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL : 09900–20701 (Magnetic stand)

Brake disc runout
Service limit: 0.30 mm (0.012 in)



I649G1420020-03

3) Remount the front brake caliper. Refer to “Front Brake Caliper Removal and Installation (Page 4B-3)”.

Specifications

Service Data

B940H24207001

Brake

Unit: mm (in)

Item	Standard		Limit
Brake disc thickness	Front	4.3 – 4.7 (0.169 – 0.185)	4.0 (0.16)
Brake disc runout	Front & Rear	—	0.30 (0.012)
Brake caliper cylinder bore	Front	30.230 – 30.306 (1.1902 – 1.1931)	—
Brake caliper piston diam.	Front	30.150 – 30.200 (1.1870 – 1.1890)	—
Brake fluid type	DOT 4		—

Tightening Torque Specifications

B940H24207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Front brake caliper mounting bolt	39	3.9	28.0	☞(Page 4B-2) / ☞(Page 4B-3)
Brake hose union bolt	23	2.3	16.5	☞(Page 4B-3)
Brake disc bolt	23	2.3	16.5	☞(Page 4B-7)

NOTE

The specified tightening torque is described in the following.
“Front Brake Components (Page 4B-1)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H24208001

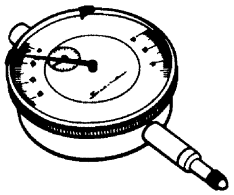
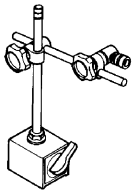
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4B-5) / ☞(Page 4B-5)
Grease	SUZUKI SILICONE GREASE or equivalent	P/No.: 99000–25100	☞(Page 4B-5)
Thread lock cement	Thread Lock Cement Super 1360 or equivalent	P/No.: 99000–32130	☞(Page 4B-7)

NOTE

Required service material is also described in the following.
“Front Brake Components (Page 4B-1)”

Special Tool

B940H24208002

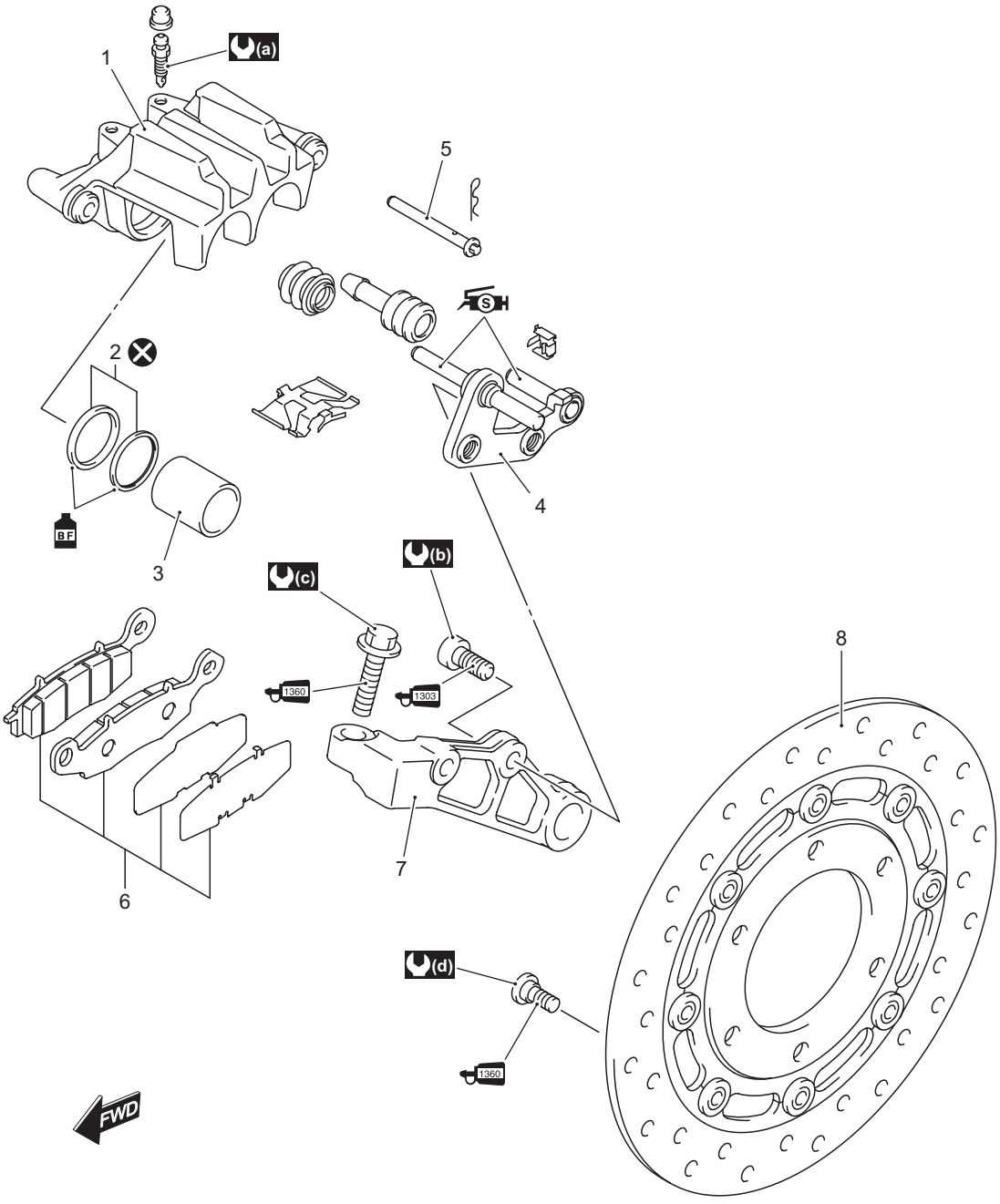
09900–20205 Micrometer (0 – 25 mm) ☞(Page 4B-7) 	09900–20607 Dial gauge (1/100 mm, 10 mm) ☞(Page 4B-7) 
09900–20701 Magnetic stand ☞(Page 4B-7) 	

Rear Brakes

Repair Instructions

Rear Brake Components

B940H24306001



I940H1430023-02

1. Rear brake caliper	7. Brake caliper bracket	1303 : Apply thread lock to the thread part.
2. Piston seal/Dust seal	8. Brake disc	1360 : Apply thread lock to the thread part.
3. Piston	(a) : 7.5 N·m (0.75 kgf-m, 5.5 lbf-ft)	(S) : Apply silicone grease to sliding surface.
4. Caliper holder	(b) : 54 N·m (5.4 kgf-m, 39.0 lbf-ft)	BF : Apply brake fluid.
5. Pad set pin	(c) : 94 N·m (9.4 kgf-m, 68.0 lbf-ft)	: Do not reuse.
6. Rear brake pad set	(d) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	

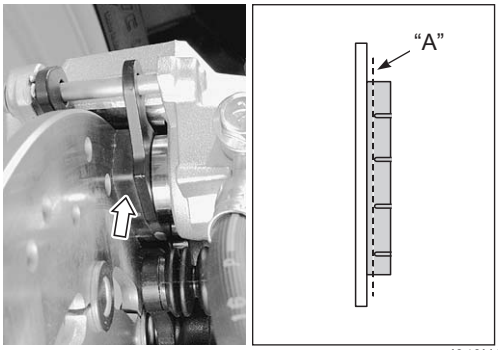
Rear Brake Pad Inspection

B940H24306002

The extent of brake pads wear can be checked by observing the grooved limit line “A” on the pads. When the wear exceeds the grooved limit line, replace the pads with new ones. Refer to “Rear Brake Pad Replacement (Page 4C-2)”.

⚠ CAUTION

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



I940H1430001-05

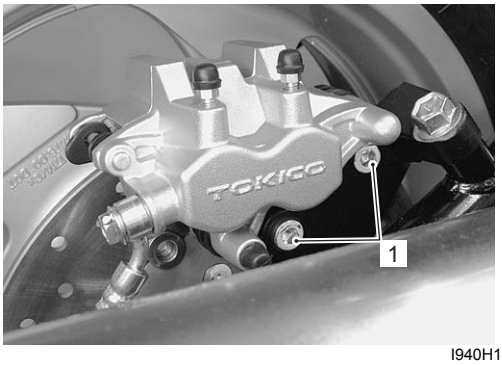
Rear Brake Pad Replacement

B940H24306003

1) Remove the caliper mounting bolts (1).

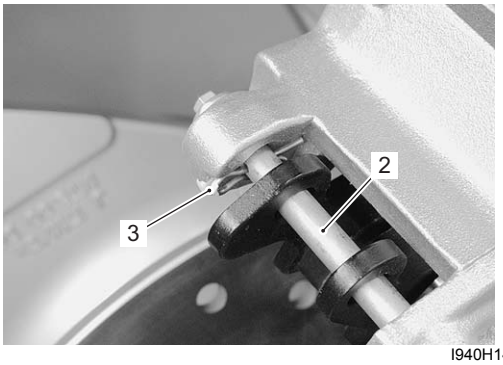
⚠ CAUTION

Do not operate the brake pedal while dismounting the pads.



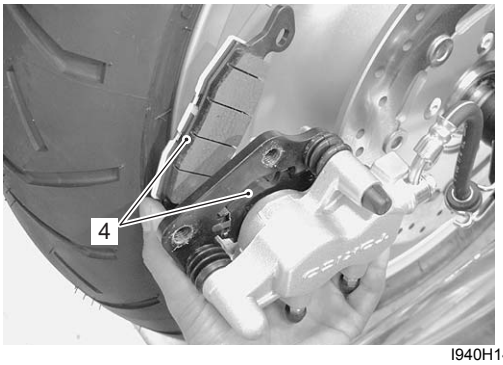
I940H1430002-01

2) Remove the pads mounting pin (2) by removing the clip (3).



I940H1430003-01

3) Remove the brake pads (4).



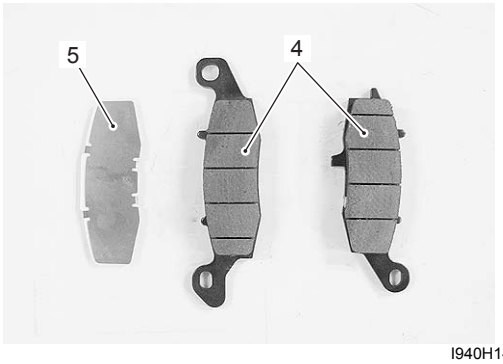
I940H1430004-02

4) Clean up the caliper, especially around the caliper piston.

5) Aseemble the new brake pads (4) and shim (5).

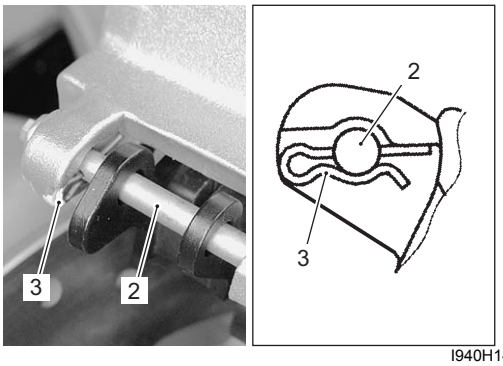
⚠ CAUTION

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



I940H1430005-02

6) Insert the pad mounting pin (2) and install the clip (3) as shown in the figure.

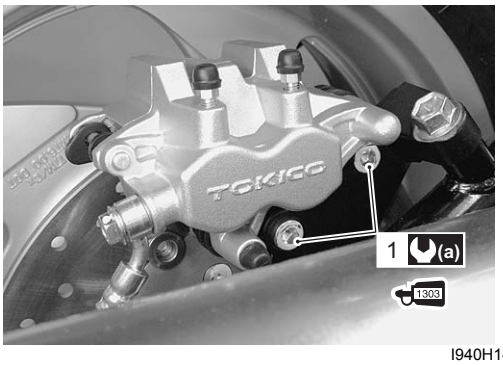


I940H1430006-02

7) Apply thread lock to the caliper mounting bolts (1) and tighten them to the specified torque.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Rear brake caliper mounting bolt (a): 54 N·m (5.4 kgf-m, 39.0 lbf-ft)



I940H1430007-02

NOTE

After replacing the brake pads, pump the brake pedal several times to check for proper brake operation and then check the brake fluid level.

Rear Brake Caliper Removal and Installation

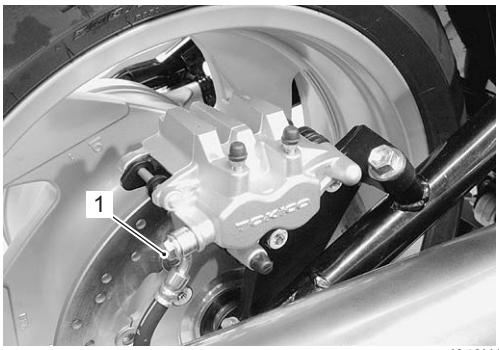
B940H24306004

Removal

1) Drain brake fluid. Refer to “Brake Fluid Replacement in Section 4A (Page 4A-6)”.
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.



I940H1430008-01

3) Remove the brake caliper and brake pads. Refer to “Rear Brake Pad Replacement (Page 4C-2)”.

Installation

Install the brake caliper in the reverse order of removal. Pay attention to the following points:

- Install the brake pad and remount the brake caliper. Refer to “Rear Brake Pad Replacement (Page 4C-2)”.
- After setting the brake hose union to the stopper, tighten the union bolt (1) 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 (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I940H1430009-01

- Bleed air from the brake system after installing the caliper. Refer to “Air Bleeding from Brake Fluid Circuit in Section 4A (Page 4A-4)”.
- 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

B940H24306005

Refer to “Rear Brake Caliper Removal and Installation (Page 4C-3)”.

Disassembly

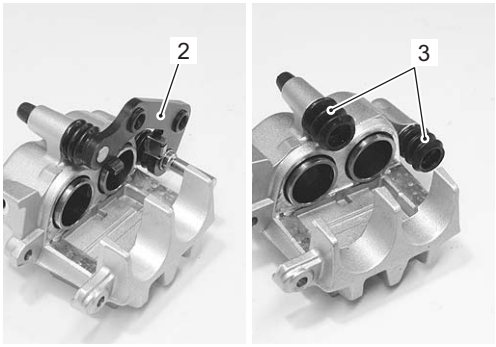
Brake caliper

1) Remove the pad spring (1).



I940H1430010-01

2) Remove the caliper holder (2) and rubber boots (3).



I940H1430011-01

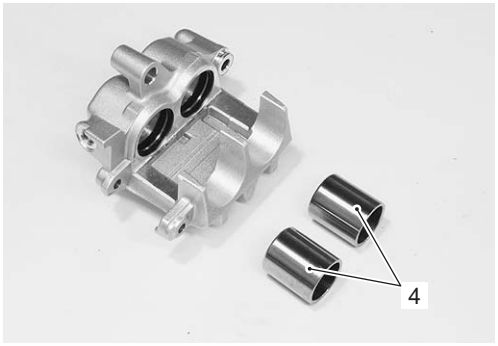
3) Place a rag over the piston to prevent it from popping out and then force out the pistons (4) using compressed air.

⚠ CAUTION

Do not use high pressure air to prevent piston damage.

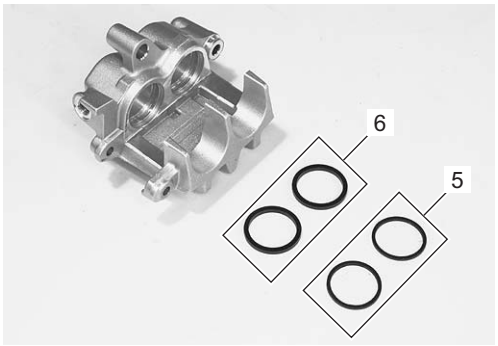


I940H1430012-01



I940H1430013-01

4) Remove the dust seals (5) and piston seals (6).



I940H1430014-01

Brake caliper carrier
Remove the pad guide (1).



I940H1430015-01

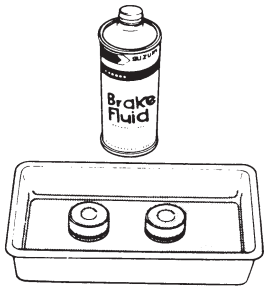
Assembly
Assemble the caliper in the reverse order of disassembly. Pay attention to the following points:

- Wash the caliper bore and piston with specified brake fluid. Particularly wash the dust seal 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.**



I649G1420012-02

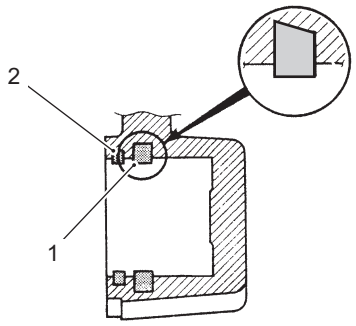
- Apply the brake fluid to piston seal (1) and dust seal (2).

  ⚠ CAUTION

  Replace the piston seal (1) and dust seal (2) with new ones.

  BF: Brake fluid (DOT 4)

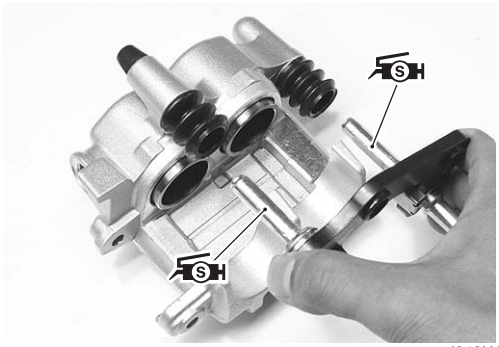
- Install the piston seals as shown in the figure.



I822H1420030-01

- Apply grease to the two pins.

  : Grease 99000–25100 (SUZUKI Silicone Grease or equivalent)



I940H1430016-01

- Install the brake pads. Refer to “Rear Brake Pad Replacement (Page 4C-2)”.
- Install the brake caliper and brake hose. Refer to “Rear Brake Caliper Removal and Installation (Page 4C-3)” and “Rear Brake Hose Routing Diagram in Section 4A (Page 4A-2)”.

Rear Brake Caliper Parts Inspection

B940H24306006

Refer to “Rear Brake Caliper Disassembly and Assembly (Page 4C-4)”.

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.



I940H1430017-01

Brake Caliper Piston

Inspect the brake caliper piston surface for any scratches or other damage. If any damage is found, replace the piston with new ones.



I940H1430018-01

Brake Pad Set Pin / Clip

Inspect the brake pad set pin and clip for wear and other damage. If any damage is found, replace defective parts with a new one.



I822H1430018-01

Boot

Inspect the boots for damage and wear. If any defects are found, replace them with new ones.



I822H1430019-01

Brake Pad Spring

Inspect the brake pad spring for damage and excessive bend. If any defects are found, replace the brake pad spring with a new one.



I940H1430019-01

Brake Pad Guide

Inspect the brake pad guide for damage and excessive bend. If any defects are found, replace the brake pad guide with a new one.



I822H1430021-01

Brake Caliper Carrier
Inspect the brake caliper carrier for damage. If any damages are found, replace the brake caliper carrier with new one.



I940H1430020-01

Rear Brake Disc Removal and Installation

B940H24306007

Removal

1) Remove the rear wheel assembly. Refer to “Rear Wheel Assembly Removal and Installation in Section 2D (Page 2D-10)”.
2) Remove the rear brake disc.



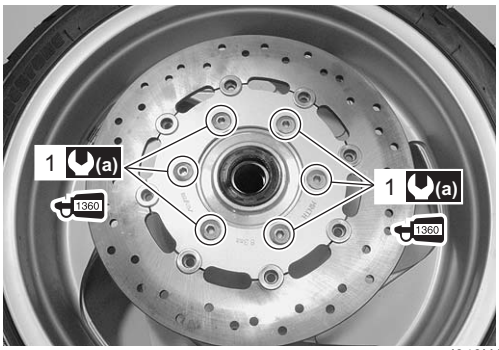
I940H1430021-01

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 to the brake disc bolts (1) and tighten them to the specified torque.

1360 : 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 lbf-ft)



I940H1430022-01

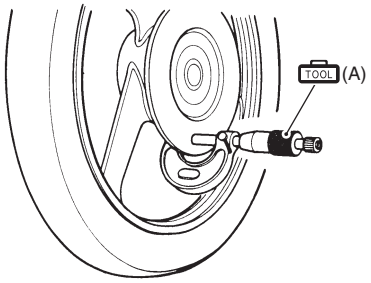
Rear Brake Disc Inspection

B940H24306008

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

Brake disc thickness
Service limit (Rear): 6.3 mm (0.25 in)



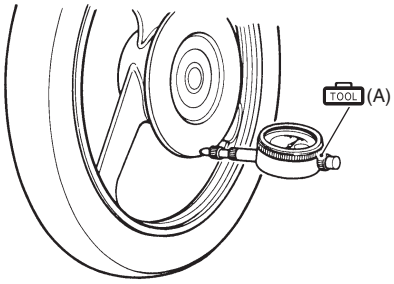
I649G1430027-03

Brake Disc Runout

1) Dismount the rear brake caliper. Refer to “Rear Brake Caliper Removal and Installation (Page 4C-3)”.
2) Measure the runout using the dial gauge. Replace the disc if the runout exceeds the service limit.

Special tool
TOOL (A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL : 09900–20701 (Magnetic stand)

Brake disc runout
Service limit: 0.30 mm (0.012 in)



I649G1430028-03

3) Remount the rear brake caliper. Refer to “Rear Brake Caliper Removal and Installation (Page 4C-3)”.

Specifications

Service Data

B940H24307001

Brake
Unit: mm (in)

Item	Standard		Limit
Rear brake pedal height	60 – 70 (2.4 – 2.8)		—
Brake disc thickness	Rear	6.6 – 7.0 (0.260 – 0.276)	6.3 (0.25)
Brake disc runout	Front & Rear	—	0.30 (0.012)
Brake caliper cylinder bore	Rear	30.230 – 30.306 (1.1902 – 1.1931)	—
Brake caliper piston diam.	Rear	30.150 – 30.200 (1.1870 – 1.1890)	—
Brake fluid type	DOT 4		—

Tightening Torque Specifications

B940H24307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear brake caliper mounting bolt	54	5.4	39.0	☞(Page 4C-3)
Brake hose union bolt	23	2.3	16.5	☞(Page 4C-3)
Brake disc bolt	23	2.3	16.5	☞(Page 4C-7)

NOTE

The specified tightening torque is described in the following.
“Rear Brake Components (Page 4C-1)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H24308001

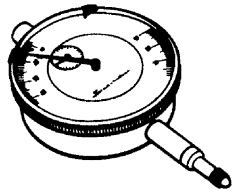
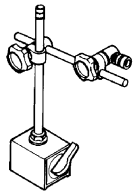
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4C-5) / ☞(Page 4C-5)
Grease	SUZUKI Silicone Grease or equivalent	P/No.: 99000–25100	☞(Page 4C-5)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 4C-3)
	Thread Lock Cement Super 1360 or equivalent	P/No.: 99000–32130	☞(Page 4C-7)

NOTE

Required service material is also described in the following.
"Rear Brake Components (Page 4C-1)"

Special Tool

B940H24308002

09900–20205 Micrometer (0 – 25 mm) ☞(Page 4C-7) 	09900–20607 Dial gauge (1/100 mm, 10 mm) ☞(Page 4C-8) 
09900–20701 Magnetic stand ☞(Page 4C-8) 	

Section 5

Transmission / Transaxle

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Precautions

Precautions

Precautions for Transmission / Transaxle

B940H25000001

Refer to “General Precautions in Section 00 (Page 00-1)”.

Manual Transmission

Diagnostic Information and Procedures

Manual Transmission Symptom Diagnosis

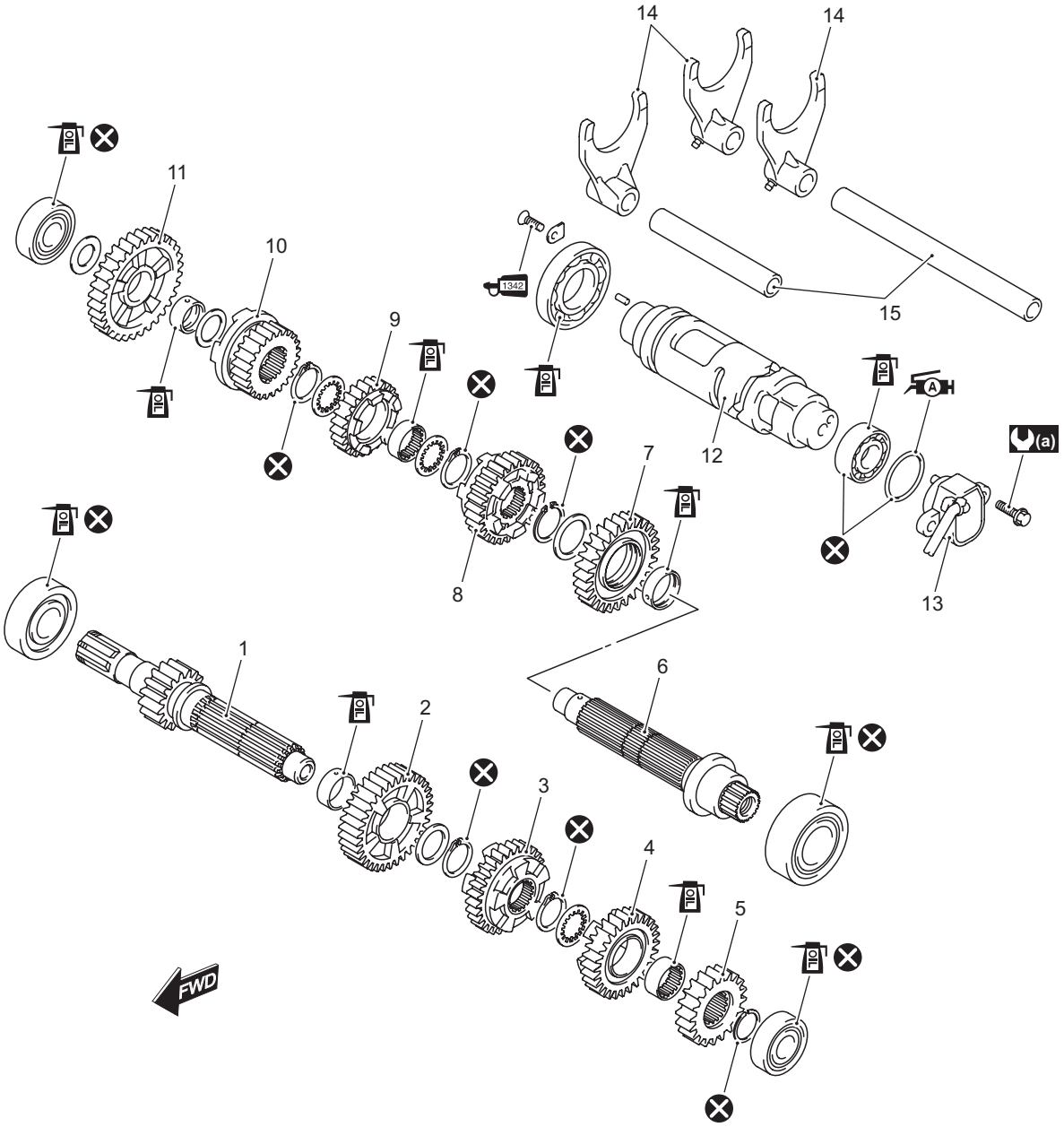
B940H25204001

Condition	Possible cause	Correction / Reference Item
Engine is noisy (Noise seems to come from the transmission)	Worn or rubbing gear.	*Replace.*
	Worn countershaft spline.	*Replace countershaft.*
	Worn driveshaft spline.	*Replace driveshaft.*
	Worn or rubbing primary gear.	*Replace.*
	Worn bearing.	*Replace.*
Transmission will not shift	Broken gearshift cam.	*Replace.*
	Distorted gearshift fork.	*Replace.*
	Worn gearshift pawl.	*Replace.*
Transmission will not shift back	Broken gearshift shaft return spring.	*Replace.*
	Rubbing or stuck gearshift shaft.	*Repair or replace.*
	Worn or distorted gearshift fork.	*Replace.*
Transmission jumps out of gear	Worn shifting gears on driveshaft or countershaft.	*Replace.*
	Worn or distorted gearshift fork.	*Replace.*
	Weakened gearshift stopper spring.	*Replace.*
	Worn gearshift cam plate.	*Replace.*

Repair Instructions

Transmission Components

B940H25206001



I940H1520072-03

1. Countershaft/1st drive gear	6. Driveshaft	11. 1st driven gear	(a) : 6.5 N·m (0.65 kgf-m, 4.5 lbf-ft)
2. 5th drive gear	7. 2nd driven gear	12. Gearshift cam	OIL : Apply oil.
3. 4th drive gear	8. 3rd driven gear	13. Gear position switch	A : Apply grease.
4. 3rd drive gear	9. 4th driven gear	14. Gearshift fork	1342 : Apply thread lock to the thread part.
5. 2nd drive gear	10. 5th driven gear	15. Gearshift fork shaft	: Do not reuse.

Transmission Removal and Installation

B940H25206002

Removal

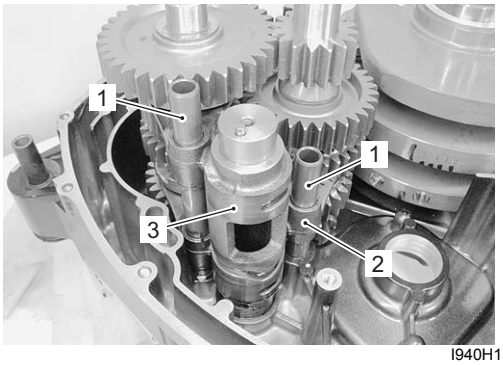
1) Remove the engine assembly from the frame. Refer to “Engine Assembly Removal in Section 1D (Page 1D-20)”.
2) Disassemble the engine top side. Refer to “Engine Top Side Disassembly in Section 1D (Page 1D-27)”.
3) Separate the crankcase. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-56)”.

Special tool
TOOL : 09920–13120 (Crankcase separating tool)



I940H1520001-01

4) Remove the gearshift fork shafts (1), gearshift fork (2) and gearshift cam (3).



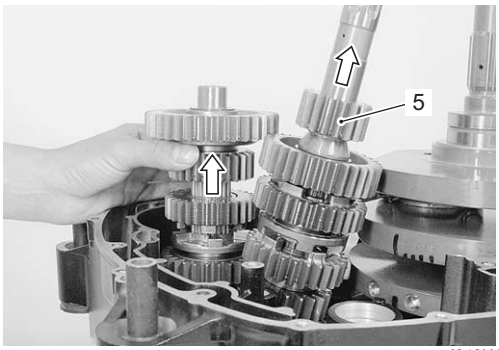
I940H1520002-01

5) Remove the gearshift forks (4).



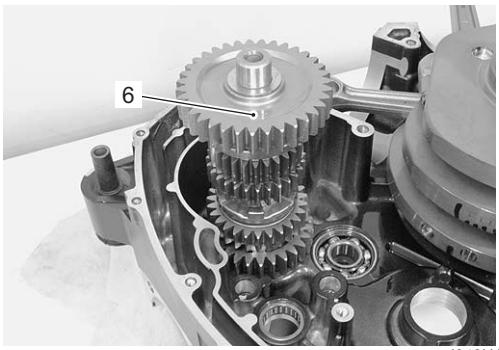
I940H1520003-01

6) Remove the countershaft assembly (5) as shown.



I940H1520004-01

7) Remove the driveshaft (6).



I940H1520005-01

8) Remove the bearings from the crankcase. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-56)”.

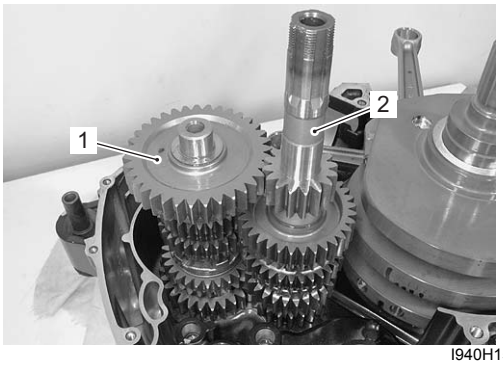
Installation

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

⚠ CAUTION

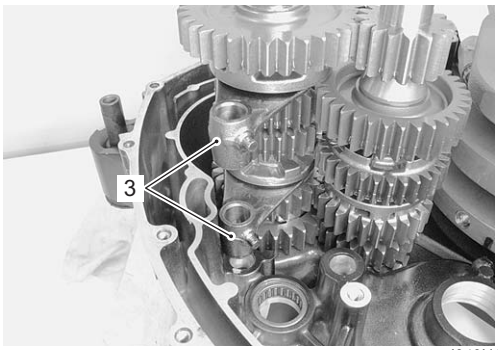
- **Apply engine oil to each gears and shafts.**
- **Replace the removed bearing with a new one.**

- Install the bearings. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-56)” and “Engine Bottom Side Assembly in Section 1D (Page 1D-64)”.
- Install the driveshaft (1) and countershaft (2) with the plastic mallet.



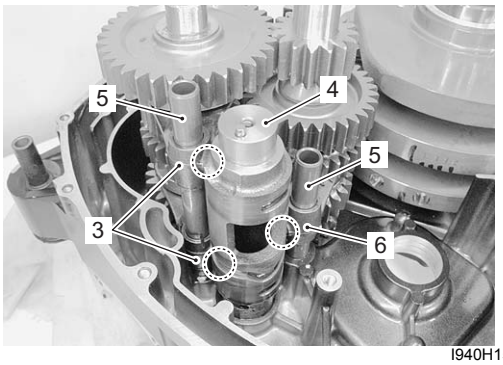
I940H1520006-02

- Install the gearshift forks (3).



I940H1520007-02

- Install the gearshift cam (4).
- With engaging each fork (3) and to the cam groove, insert the fork shaft (5) and gear shift fork (6).

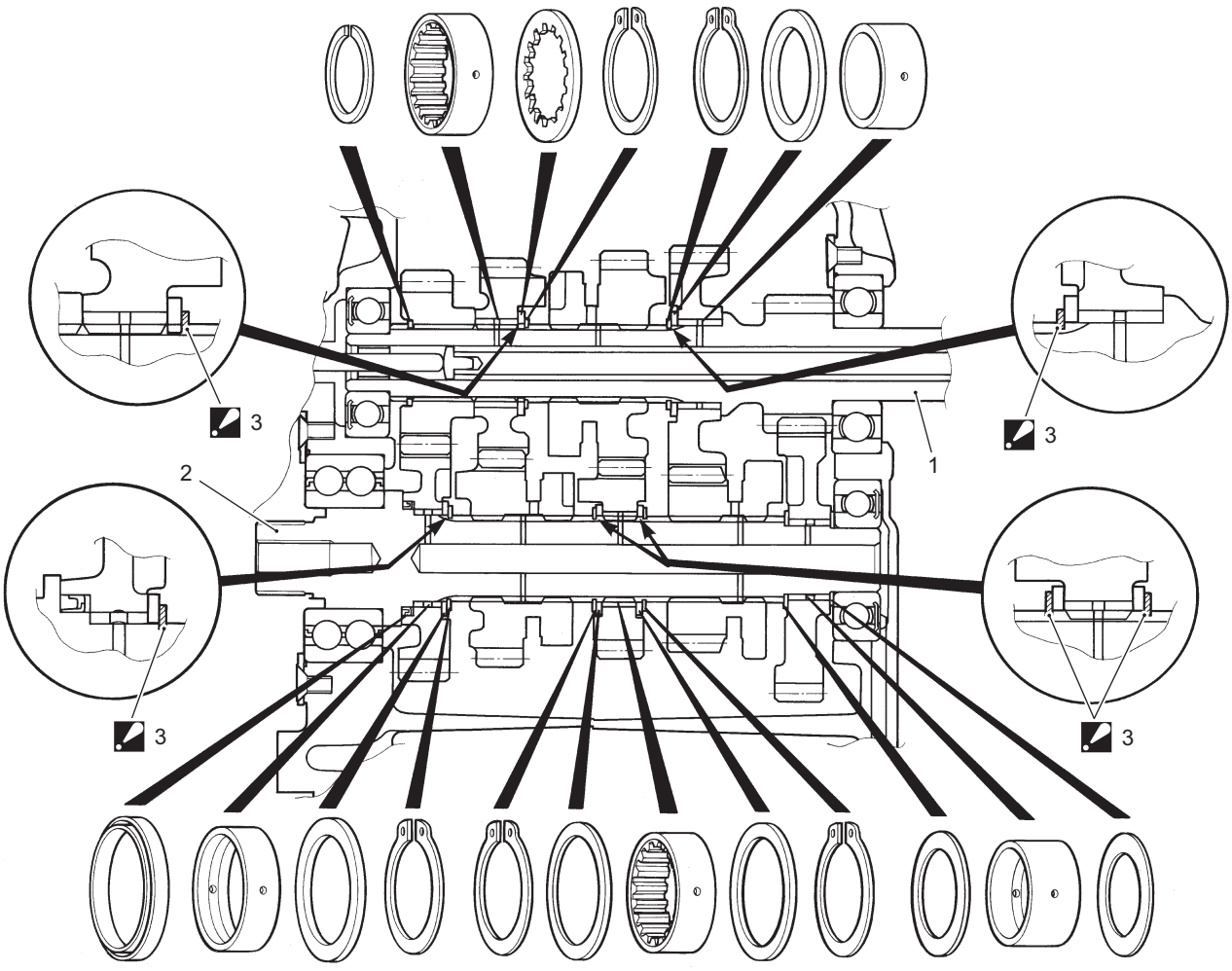


I940H1520009-03

- Assemble the engine. Refer to “Engine Bottom Side Assembly in Section 1D (Page 1D-64)”.
- Remount engine assembly. Refer to “Engine Assembly Installation in Section 1D (Page 1D-24)” and “Engine Top Side Assembly in Section 1D (Page 1D-32)”.

Transmission Construction

B940H25206003



I940H1520026-01

1. Countershaft	2. Driveshaft	3. Snap ring : Assemble the snap ring with sharp edge side out.

Countershaft Gear / Driveshaft Gear Disassembly and Assembly

B940H25206004

Refer to “Transmission Removal and Installation (Page 5B-3)”.

Disassembly

⚠ CAUTION

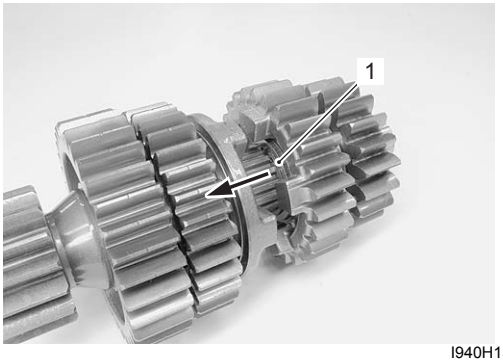
Identify the position of each removed part. Organize the parts in their respective groups (i.e., drive or driven) so that they can be reinstalled in their original positions.

Disassemble the countershaft and driveshaft as shown in the transmission construction. Refer to “Transmission Construction (Page 5B-4)”.
Pay attention to the following points:

Driveshaft

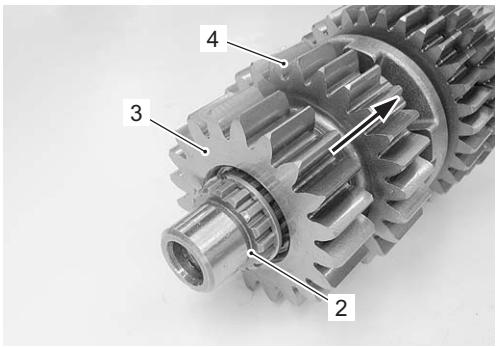
- Open the 3rd drive gear snap ring (1) with the special tool from its groove and slide it towards the 4th drive gear side.

  Special tool
  TOOL : 09900–06104 (Snap ring pliers)



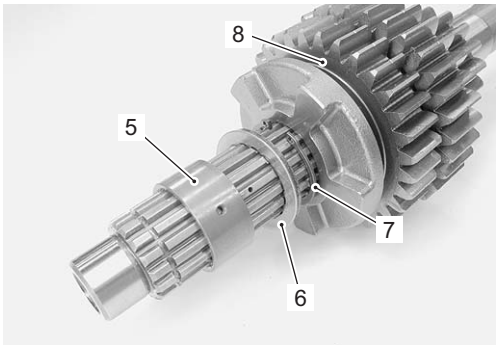
I940H1520010-02

- Slide the 3rd (4) and 2nd (3) drive gears toward the 4th drive gear side, then remove the circlip (2).



I940H1520011-01

- Remove the 3rd drive gear bushing (5), washer (6), snap ring (7) and 4th drive gear (8).

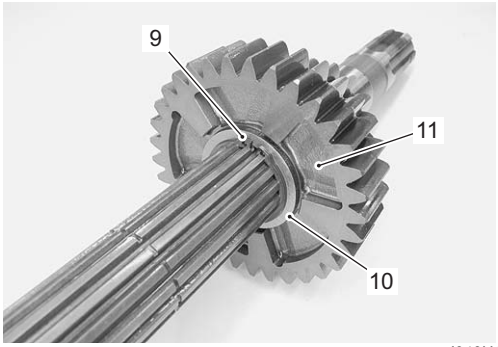


I940H1520012-01

- Remove the snap ring (9) with the special tool.

  Special tool
  TOOL : 09900–06107 (Snap ring pliers)

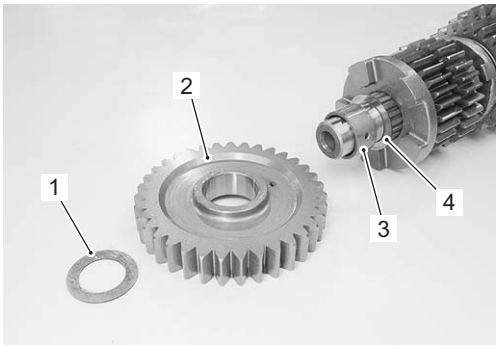
- Remove the washer (10) and 5th drive gear (11).



I940H1520013-01

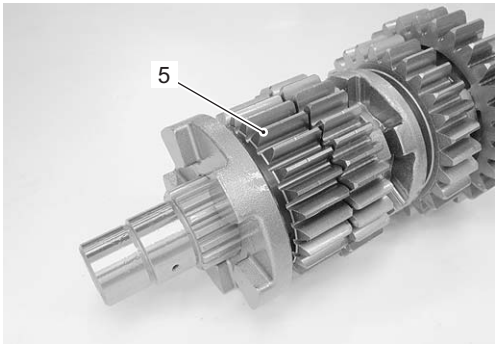
Countershaft

- Remove the washer (1) and 1st driven gear (2).
- Remove the 1st driven gear bushing (3), washer (4).



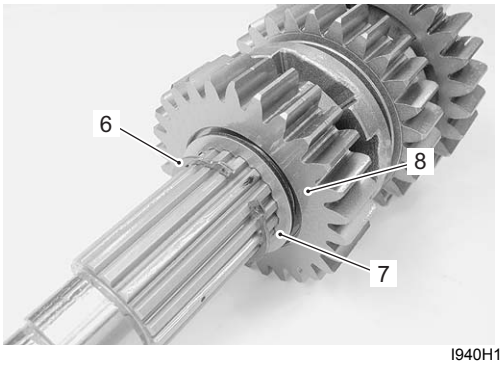
I940H1520014-01

- Remove the 5th driven gear (5).



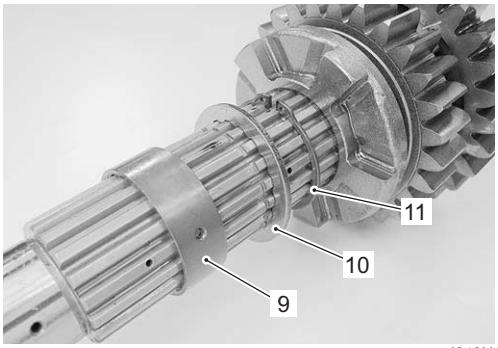
I940H1520015-01

- Remove the snap ring (6), washer (7) and 4th driven gear (8).

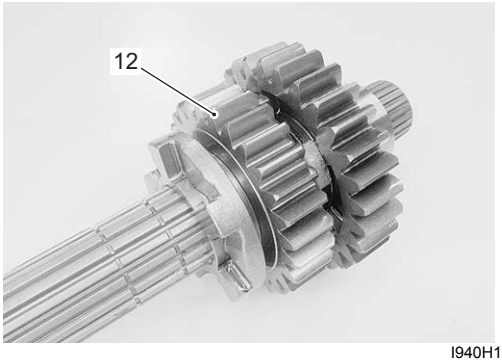


I940H1520016-01

- Remove the 4th driven gear bushing (9), washer (10), snap ring (11) and 3rd driven gear (12).

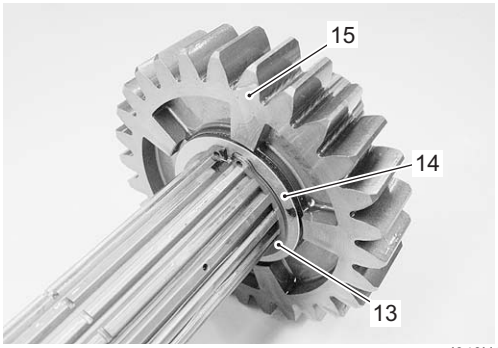


I940H1520017-01



I940H1520018-01

- Remove the snap ring (13), washer (14), 2nd driven gear (15) and its bushing.



I940H1520019-01

Assembly

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 (Page 5B-4)".

⚠ CAUTION

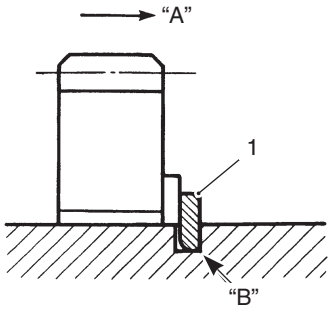
- **Never reuse a snap rings. After a snap rings has been removed from a shaft, it should be discarded and a new snap rings must be installed.**
- **When installing a new snap rings, do not expand the end gap larger than required to slip the snap rings over the shaft.**
- **After installing snap rings,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

NOTE

- **Rotate the bearing by hand to inspect if there are any abnormal noises and smooth rotation. Replace the bearing if there is anything unusual.**
- **Before installing the gears, apply engine oil to the driveshaft and countershaft.**
- **Before installing the oil seal, apply grease to the oil seal lip.**

: 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 figure.

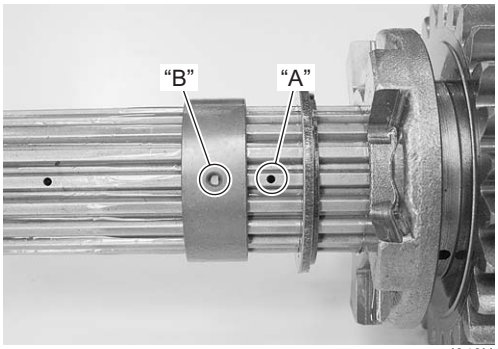


I649G1520049-02

1. Snap ring	"A": Thrust	"B": Sharp edge

Driveshaft

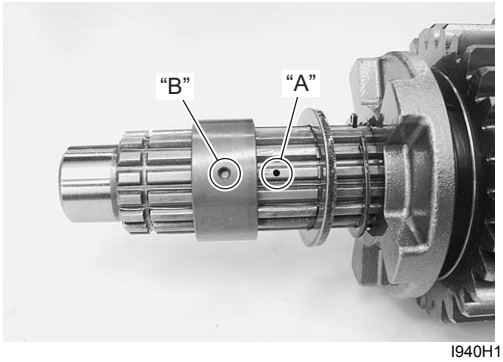
When installing the gear bushing onto the driveshaft, align the shaft oil hole "A" with the bushing oil hole "B".



I940H1520020-01

Countershaft

When installing the gear bushing onto the countershaft, align the shaft oil hole "A" with the bushing oil hole "B".



I940H1520074-01

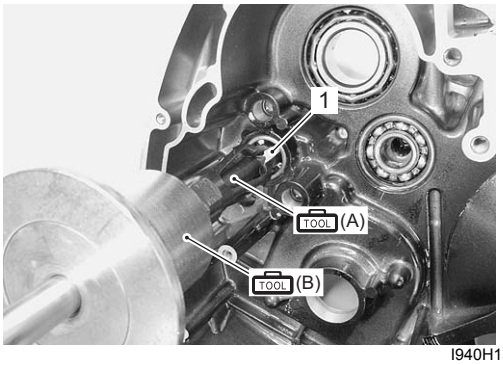
Bearing Removal and Installation

B940H25206005

Removal

1) Remove the countershaft assembly and driveshaft assembly. Refer to "Transmission Removal and Installation (Page 5B-3)".
2) Remove the left gearshift cam bearing (1) with the special tool.

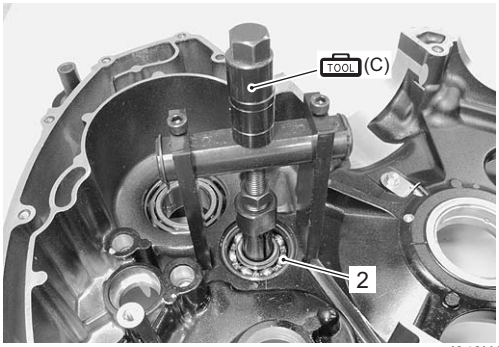
Special tool
TOOL (A): 09923–74511 (Bearing remover)
TOOL (B): 09930–30104 (Rotor remover sliding shaft)



I940H1520028-01

3) Remove the left countershaft bearing (2) with the special tool.

Special tool
TOOL (C): 09921–20240 (Bearing remover set)



I940H1520027-01

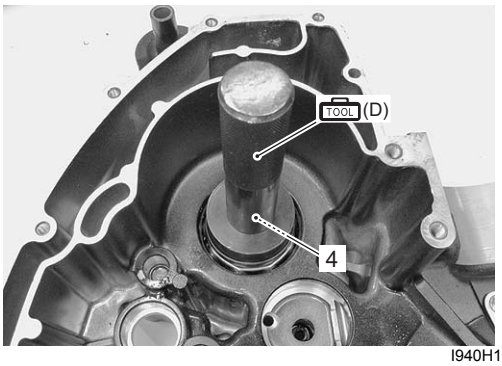
4) Remove the bearing retainers (3).



I940H1520029-01

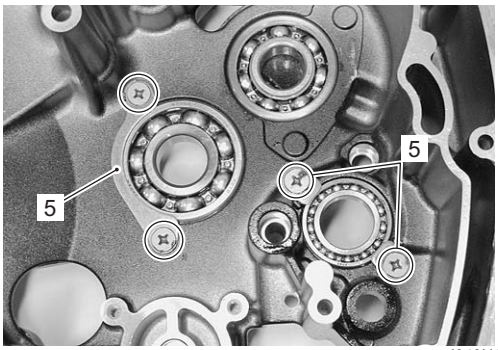
5) Remove the left driveshaft bearing (4) with the special tool.

Special tool
TOOL (D): 09913–70210 (Bearing installer set)



I940H1520030-01

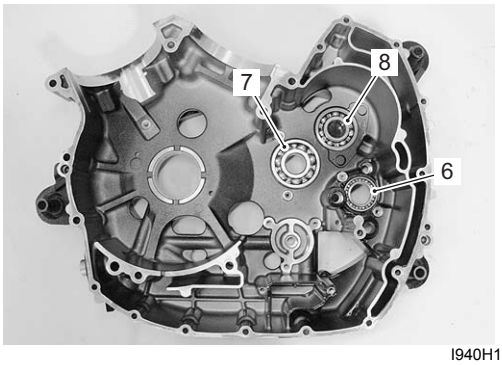
6) Remove the bearing retainers (5).



I940H1520031-01

7) Remove the right gearshift cam bearing (6) by hand.
8) Remove the right countershaft bearing (7) and right driveshaft bearing (8) with the special tool.

Special tool
TOOL : 09921–20240 (Bearing remover set)



I940H1520032-01

Installation
Install the each bearing in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

The removed bearing must be replaced with a new one. (Except for right gearshift cam bearing)

- Install the right driveshaft bearings (1) and countershaft bearing (2) with the special tool and install the right gearshift cam bearing (3) by hand.

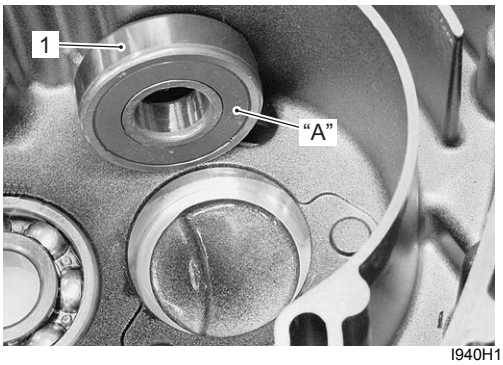
⚠ CAUTION

Use the special tool suitable size for each bearing to prevent damage.

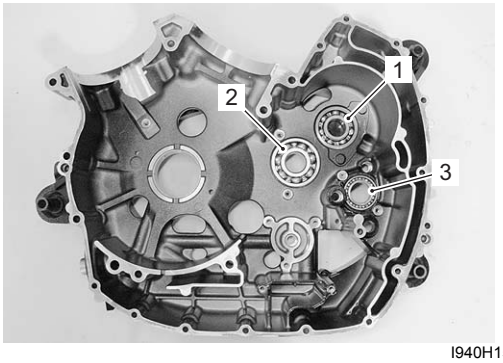
NOTE

- **The sealed side "A" of right driveshaft bearing (1) faces outside of crankcase.**
- **The stamped mark side of the bearing faces inside of crankcase.**

Special tool
TOOL : 09913–70210 (Bearing installer set)



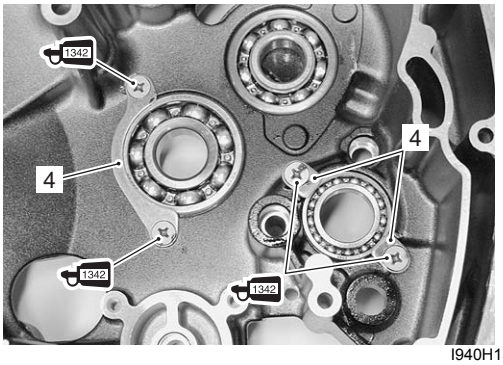
I940H1520033-01



I940H1520034-01

- Apply thread lock to the screws, and install the retainers (4) by tightening them.

1342 : Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)



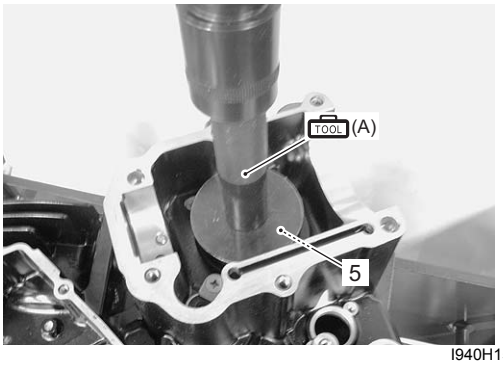
I940H1520035-01

- Install the left driveshaft bearing (5) using the hydraulic press and special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

NOTE

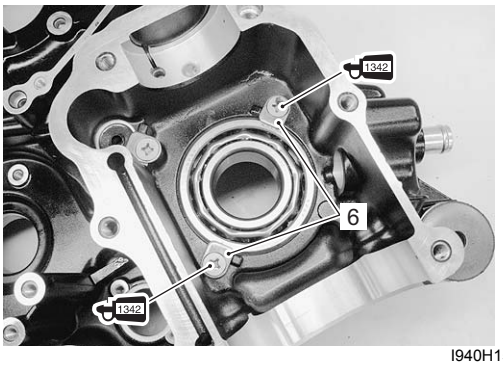
The stamped mark side of bearing faces secondary drive gear side.



I940H1520036-01

- Apply thread lock to the screws, and install the retainers (6) by tightening them.

1342 : Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)



I940H1520037-01

- Install the left countershaft bearings (7) and left gearshift cam bearings (8), with the special tool.

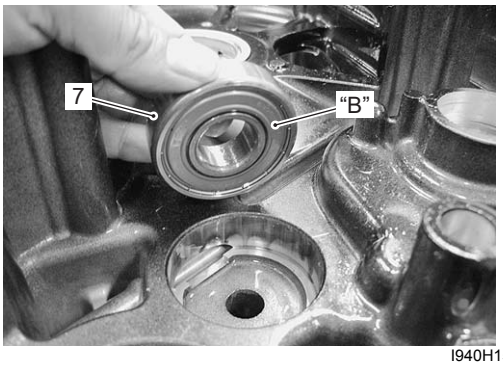
⚠ CAUTION

Use the special tool suitable size for each bearing to prevent damage.

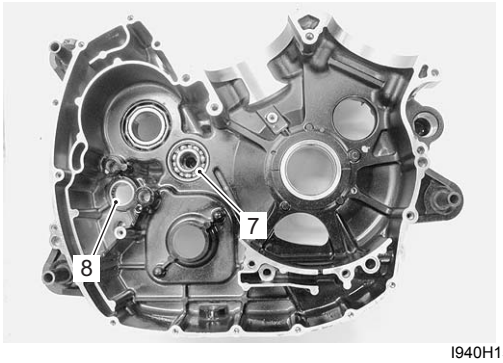
NOTE

- **The sealed side "B" of left countershaft bearing (7) faces outside of crankcase.**
- **The stamped mark side of the bearing faces inside of crankcase.**

Special tool
TOOL : 09913–70210 (Bearing installer set)



I940H1520040-01



I940H1520041-01

Transmission Related Parts Inspection

B940H25206006

Refer to "Transmission Removal and Installation (Page 5B-3)" and "Countershaft Gear / Driveshaft Gear Disassembly and Assembly (Page 5B-5)".

Gearshift Fork to Groove Clearance

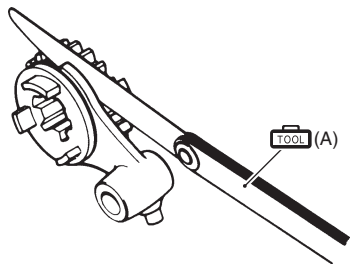
NOTE

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: 0.1 – 0.3 mm (0.004 – 0.012 in)
Service limit: 0.5 mm (0.02 in)

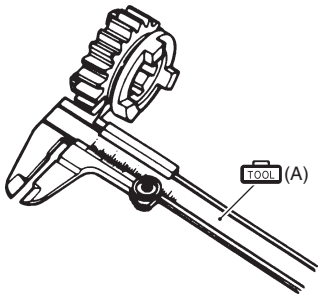


I649G1520056-03

Gearshift Fork Groove Width
Measure the gearshift fork groove width using the vernier calipers.

Special tool
TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Gearshift fork groove width
Standard: 5.0 – 5.1 mm (0.197 – 0.201 in)

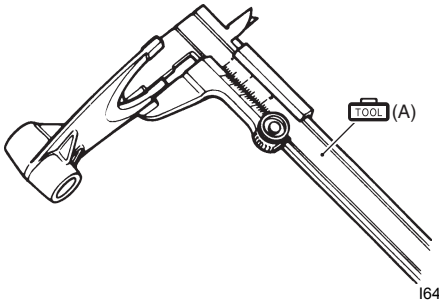


I649G1520057-03

Gearshift Fork Thickness
Measure the gearshift fork thickness using the vernier calipers.

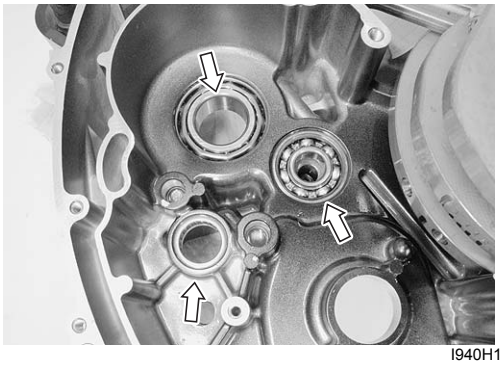
Special tool
TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

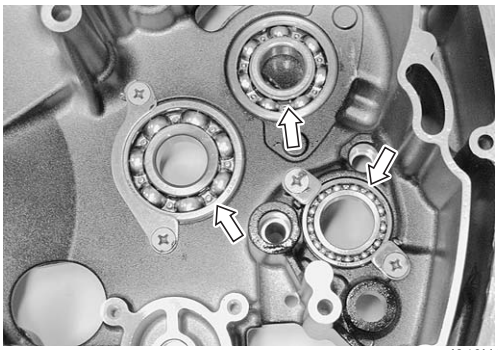
Gearshift fork thickness
Standard: 4.8 – 4.9 mm (0.189 – 0.193 in)



I649G1520058-03

Bearing
Inspect the bearings, left and right for abnormal noise and smooth rotation.
Replace the bearing if there is anything unusual. Refer to “Bearing Removal and Installation (Page 5B-7)”.


I940H1520021-01


I940H1520049-01

Gear Position (GP) Switch Inspection

B940H25206007

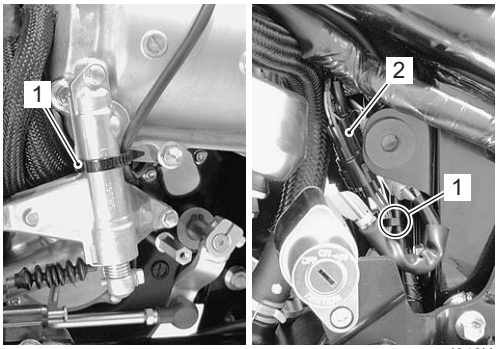
Refer to “Side-stand / Ignition Interlock System Parts Inspection in Section 1I (Page 1I-8)”.

Gear Position (GP) Switch Removal and Installation

B940H25206008

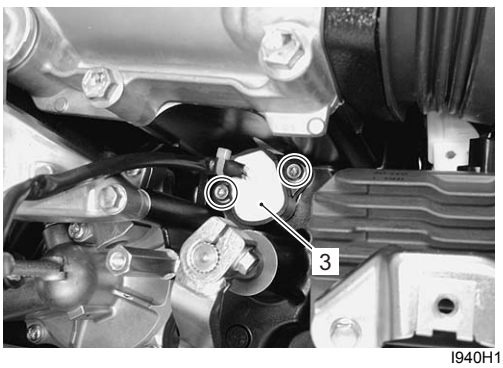
Removal

1) Turn the ignition switch OFF.
2) Remove the right frame side cover, secondary gear case cover and right frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Remove the clamps (1) and disconnect the gear position switch coupler (2).



I940H1520022-01

4) Remove the gear position switch (3).



I940H1520023-01

Installation

Install the gear position switch in the reverse order of removal. Pay attention to the following points:

- Apply grease to the O-ring.

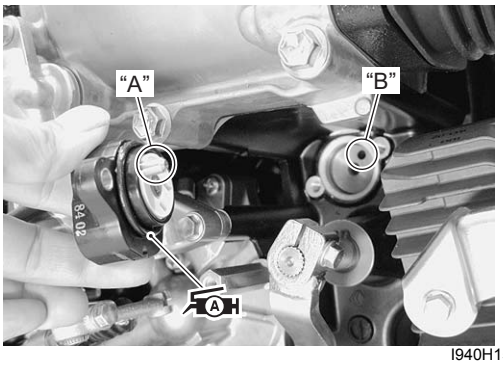
⚠ CAUTION

Replace the O-ring with a new one.

NOTE

Align the gear position switch pin "A" with the gearshift cam hole "B".

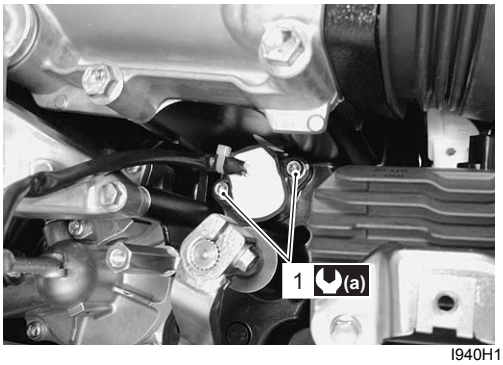
: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I940H1520024-01

- Tighten the gear position switch bolts (1) to the specified torque.

Tightening torque
GP switch mounting bolt (a): 6.5 N·m (0.65 kgf-m, 4.5 lbf-ft)

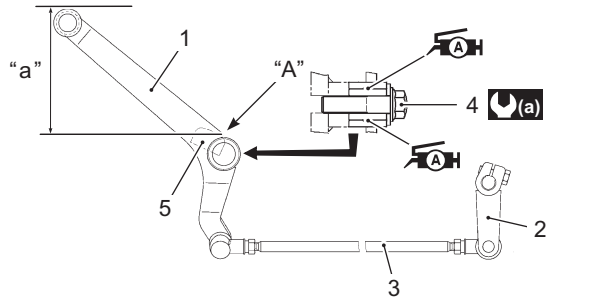


I940H1520025-01

- Route the gear position switch lead wire. Refer to "Wiring Harness Routing Diagram in Section 9A (Page 9A-5)".
- Install the clutch cover. Refer to "Clutch Installation in Section 5C (Page 5C-8)".

Gearshift Lever Construction

B940H25206009



I940H1520042-03

1. Gearshift lever	"A": Footrest top surface
2. Gearshift link arm	"a": 95 – 105 mm (3.7 – 4.1 in)
3. Gearshift link rod	(a): 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
4. Gearshift lever bolt	: Apply grease.
5. Footrest	

Gearshift Lever Removal and Installation

B940H25206010

Removal

1) Remove the frame lower cover and secondary gear case cover. Refer to "Exterior Parts Removal and Installation in Section 9D (Page 9D-5)".
2) Disengage the gearshift link arm by removing the bolt.

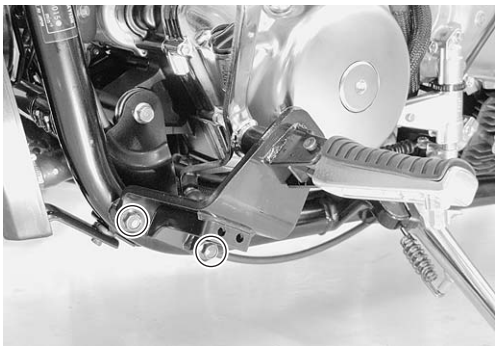
NOTE

Mark the gearshift shaft head at which the gearshift link arm slit set for correct reinstallation.



I940H1520043-01

3) Remove the left footrest along with the gearshift lever.



I940H1520044-01

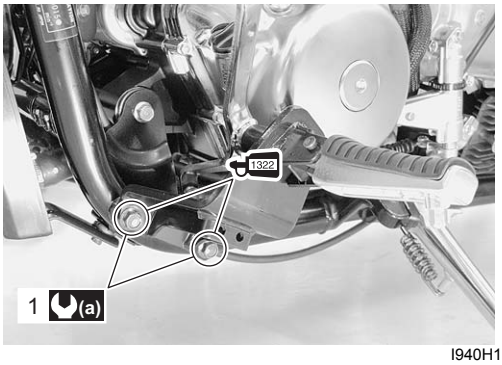
4) Remove the gearshift lever as shown in the gearshift lever construction. Refer to “Gearshift Lever Construction (Page 5B-11)”.

Installation

1) Install the gearshift lever as shown in the gearshift lever construction. Refer to “Gearshift Lever Construction (Page 5B-11)”.
2) Apply thread lock to the right foot bracket bolts (1) and tighten them to the specified torque.

1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque
Front footrest bracket bolt (a): 50 N·m (5.0 kgf-m, 36 lbf-ft)



I940H1520045-02

3) After installing the gearshift lever, check the gearshift lever height. Refer to “Gearshift Lever Height Inspection and Adjustment (Page 5B-12)”.

Gearshift Lever Height Inspection and Adjustment

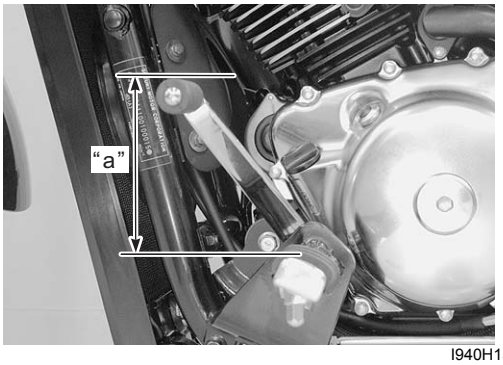
B940H25206011

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.

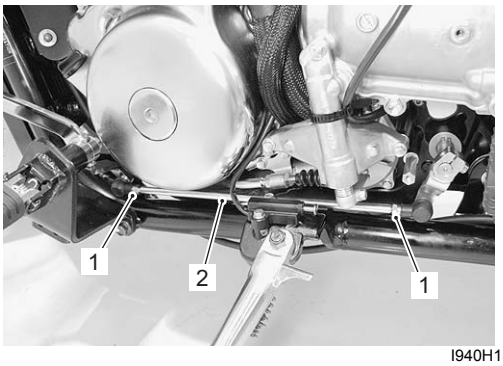
Gearshift lever height “a”
Standard: 95 – 105 (3.7 – 4.1 in)

2) Remove the secondary gear case cover and frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.



I940H1520046-04

3) Remove the frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
4) Loosen the lock-nuts (1).
5) Turn the gearshift link rod (2) until the gearshift lever is 95 – 105 mm (1.6 in) above the top of the footrest.
6) Tighten the lock-nuts securely.

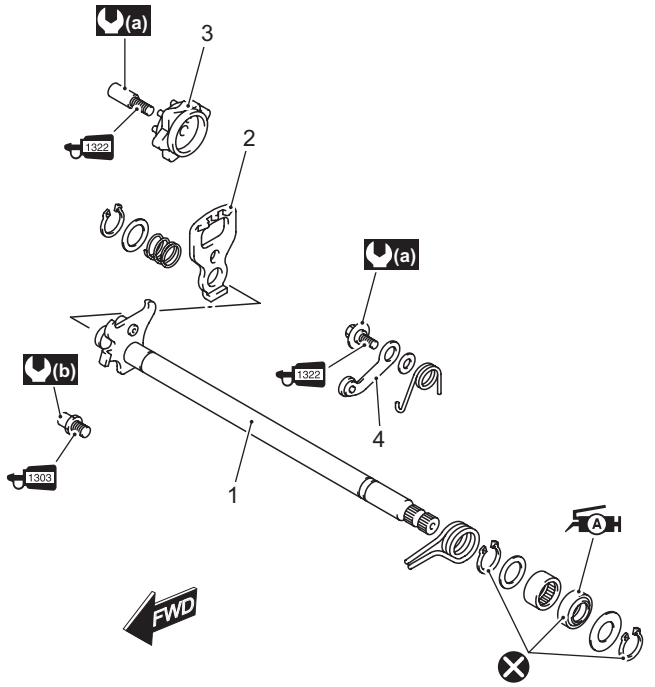


I940H1520047-01

7) Reinstall the removed parts.

Gearshift Shaft / Gearshift Cam Plate Components

B940H25206012



I940H1520073-02

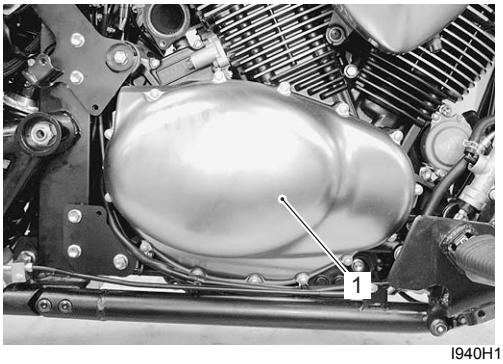
1.	Gearshift shaft
2.	Gearshift cam drive plate
3.	Gearshift cam plate
4.	Gearshift cam stopper
(a) :	10 N·m (1.0 kgf-m, 7.0 lbf-ft)
(b) :	19 N·m (1.9 kgf-m, 13.5 lbf-ft)
1303 :	Apply thread lock to the thread part.
1322 :	Apply thread lock to the thread part.
A H :	Apply grease to oil seal lip.
:	Do not reuse.

Gearshift Shaft / Gearshift Cam Plate Removal and Installation

B940H25206013

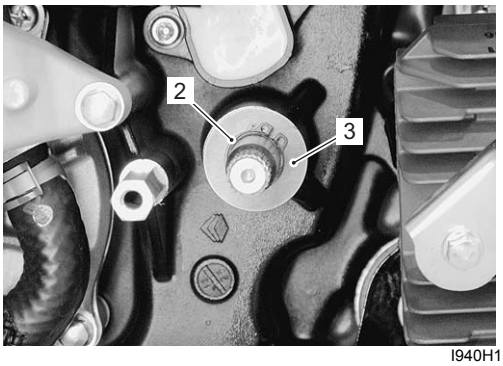
Removal

1) Remove the exhaust pipes and muffler. Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.
2) Remove the clutch component parts (1). Refer to “Clutch Removal in Section 5C (Page 5C-6)”.



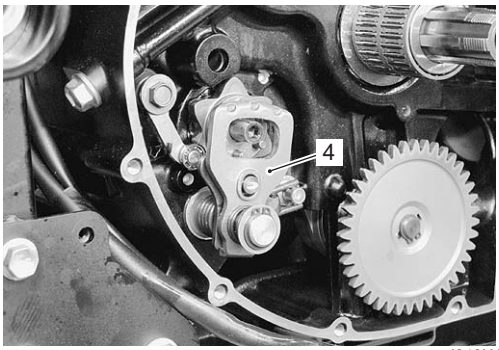
I940H1520048-01

3) Remove the snap ring (2) and washer (3).



I940H1520050-01

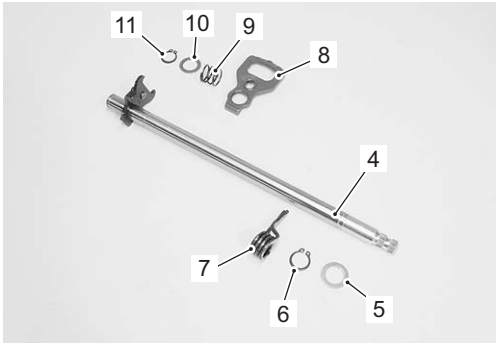
4) Remove the gearshift shaft assembly (4).



I940H1520051-01

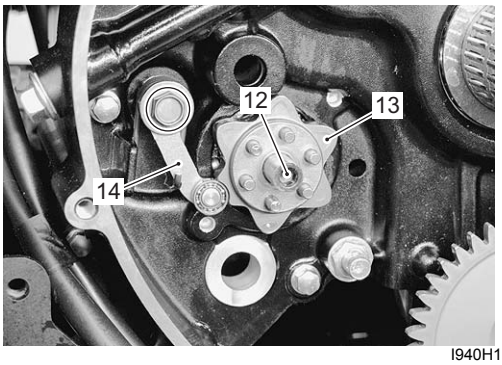
5) Remove the following parts from the gearshift shaft (4).
   - Washer (5)
   - Snap ring (6)
   - Gearshift return spring (7)
   - Gearshift cam drive plate (8)
   - Plate return spring (9)
   - Washer (10)
   - Snap ring (11)

Special tool
TOOL : 09900–06107 (Snap ring pliers)



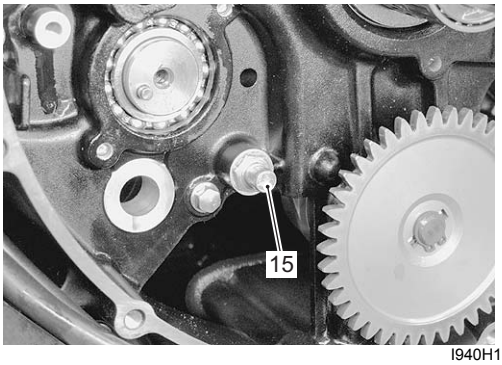
I940H1520052-01

6) Remove the gearshift cam plate bolt (12) and gearshift cam plate (13).
7) Remove the gearshift cam stopper (14).



I940H1520053-02

8) Remove the gearshift arm stopper (15).



I940H1520054-01

Installation
Install the gearshift shaft and gearshift cam plate in the reverse order of removal. Pay attention to the following points:

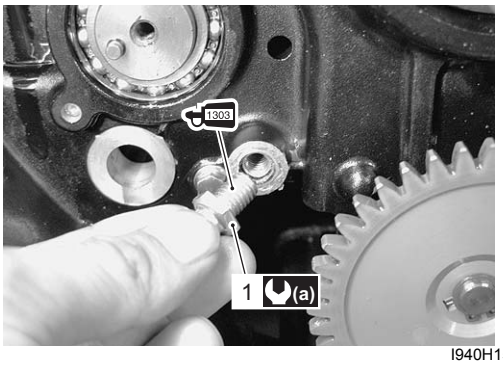
⚠ CAUTION

The removed snap rings must be replaced with the new ones.

- Apply a small quantity of thread lock to the gearshift arm stopper (1) and tighten it to the specified torque.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Gearshift arm stopper (a): 19 N·m (1.9 kgf-m, 13.5 lbf-ft)



I940H1520055-01

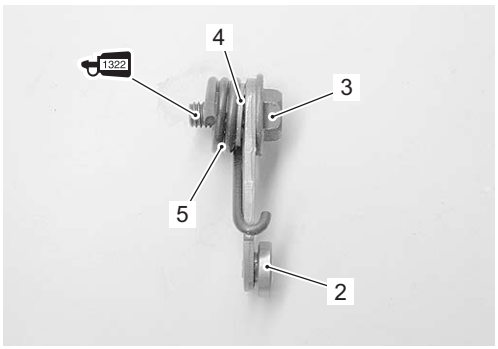
- Install the gearshift cam stopper (2), bolt (3), washer (4) and return spring (5).
- Apply thread lock to the gearshift cam stopper bolt (3) and tighten it to the specified torque.

1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

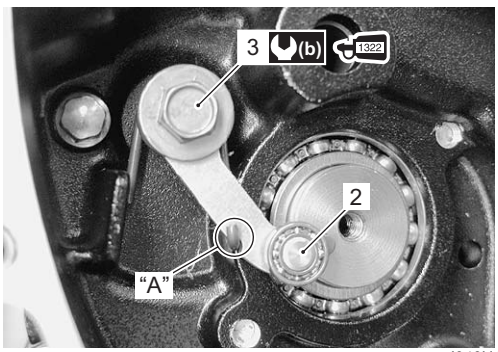
NOTE

Hook the return spring end "A" to the stopper (2).

Tightening torque
Gearshift cam stopper bolt (b): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1520056-03

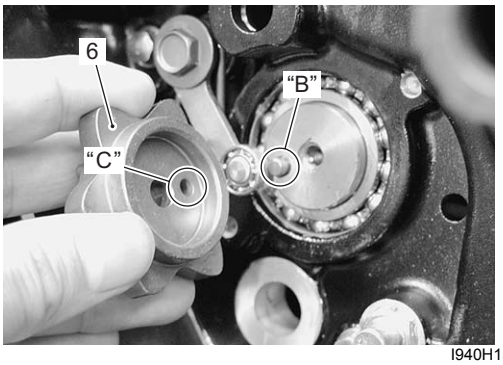


I940H1520057-03

- Check the gearshift cam stopper moves smoothly.
- Locate the gearshift cam in the neutral position.
- Install the gearshift cam stopper plate (6).

NOTE

Align the gearshift cam pin “B” with the gearshift cam stopper plate hole “C”.

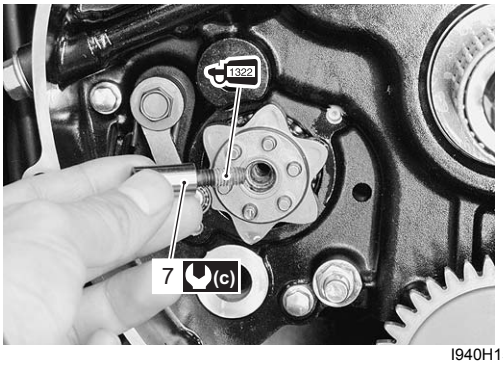


I940H1520058-01

- Apply a small quantity of thread lock to the gearshift cam stopper plate bolt (7) and tighten it to the specified torque.

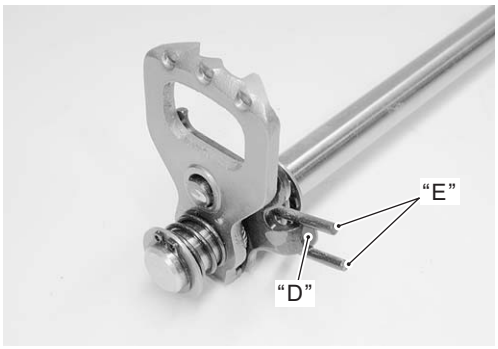
1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque
Gearshift cam stopper plate bolt (c): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1520059-01

- When installing the gearshift shaft return spring, position the stopper “D” of the gearshift arm between shaft return spring ends “E”.



I940H1520060-01

- Apply grease to the lip of the oil seal and install the gearshift shaft (8).

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

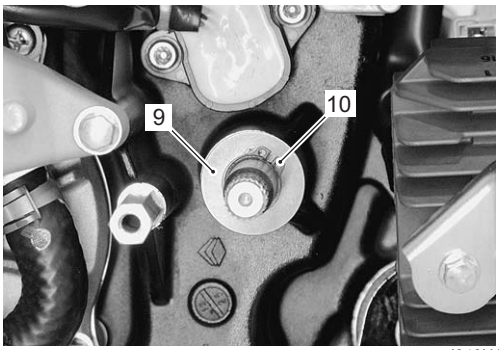


I940H1520061-01

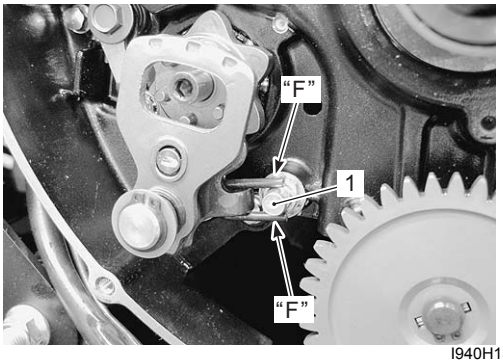
- Install the washer (9) and snap ring (10).

NOTE

Pinch the gearshift arm stopper (1) with return spring ends “F”.

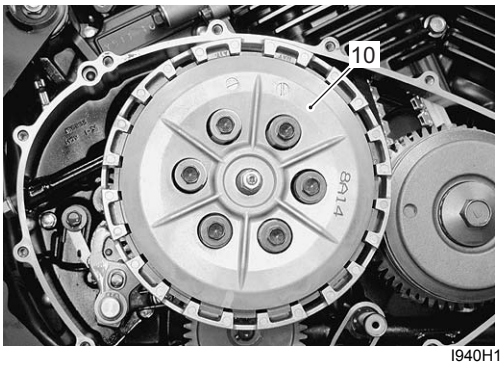


I940H1520062-01



I940H1520063-01

- Install the clutch component parts (10). Refer to “Clutch Installation in Section 5C (Page 5C-8)”.



I940H1520064-01

- Install the exhaust pipes and muffler. Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.

Gearshift Linkage Inspection

B940H25206014

Refer to “Gearshift Shaft / Gearshift Cam Plate Removal and Installation (Page 5B-13)”.

Gearshift Shaft

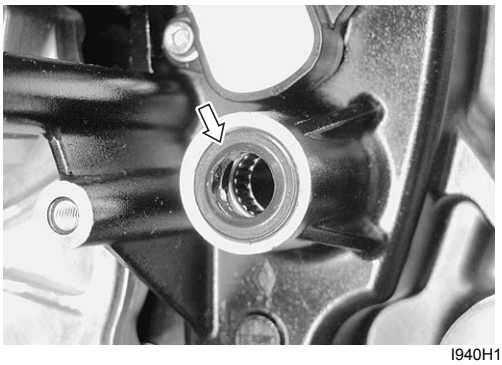
Check the gearshift shaft for bend or wear.
Check the return spring for damage or fatigue.
If any defects are found, replace the defective part(-s).



I940H1520065-01

Gearshift Shaft Oil Seal

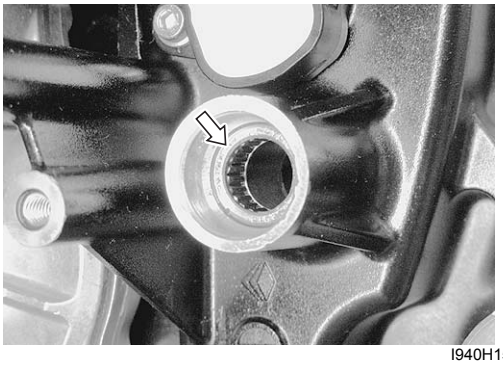
Inspect the gearshift shaft oil seal lip for wear or damage. If any defect is found, replace the oil seal with a new one.



I940H1520066-01

Gearshift Shaft Bearing

Inspect the gearshift shaft bearing for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



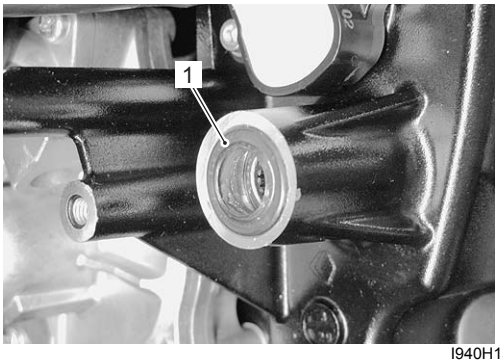
I940H1520067-01

Gearshift Shaft Oil Seal / Bearing Removal and Installation

B940H25206015

Removal

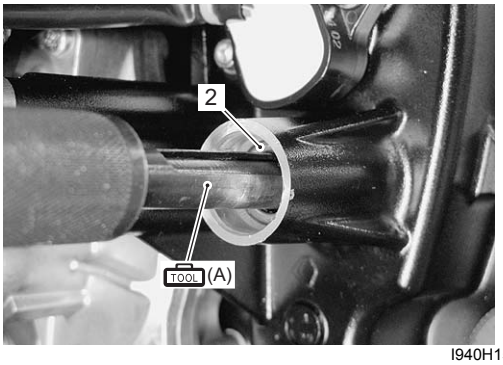
1) Remove the gearshift shaft. Refer to “Gearshift Shaft / Gearshift Cam Plate Removal and Installation (Page 5B-13)”.
2) Remove the gearshift shaft oil seal (1).



I940H1520068-01

3) Remove the bearing (2) with the special tools.

Special tool
TOOL (A): 09921–20210 (Bearing remover)
TOOL : 09930–30104 (Rotor remover sliding shaft)



I940H1520069-02

Installation
Install the oil seal and bearing in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

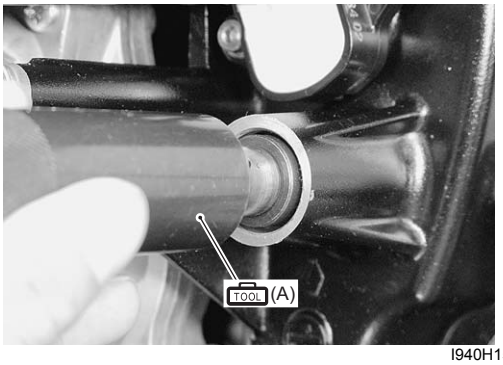
The removed oil seal and bearings must be replaced with new ones.

- Install the bearing with the special tool.

NOTE

The stamped mark side of the gearshift shaft bearing faces outside.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)



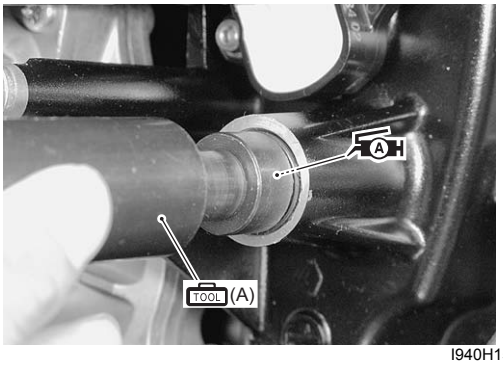
I940H1520070-01

- Install the oil seal with the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

- Apply grease to the oil seal lip.

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



I940H1520071-02

Specifications

Service Data

B940H25207001

Drive Train
Unit: mm (in) Except ratio

Item		Standard	Limit
Primary reduction ratio		1.407 (76/54)	—
Final reduction ratio		3.137 (20/17 x 32/12)	—
Gear ratios	1st	2.187 (35/16)	—
	2nd	1.400 (28/20)	—
	3rd	1.038 (27/26)	—
	4th	0.875 (28/32)	—
	Top	0.787 (26/33)	—
Shift fork to groove clearance		0.1 – 0.3 (0.004 – 0.012)	0.5 (0.02)
Shift fork groove width		5.0 – 5.1 (0.197 – 0.201)	—
Shift fork thickness		4.8 – 4.9 (0.189 – 0.193)	—
Gearshift lever height		95 – 105 (3.7 – 4.1)	—

Tightening Torque Specifications

B940H25207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
GP switch mounting bolt	6.5	0.65	4.5	☞(Page 5B-11)
Front footrest bracket bolt	50	5.0	36	☞(Page 5B-12)
Gearshift arm stopper	19	1.9	13.5	☞(Page 5B-14)
Gearshift cam stopper bolt	10	1.0	7.0	☞(Page 5B-14)
Gearshift cam stopper plate bolt	10	1.0	7.0	☞(Page 5B-15)

NOTE

The specified tightening torque is described in the following.
“Transmission Components (Page 5B-2)”
“Gearshift Lever Construction (Page 5B-11)”
“Gearshift Shaft / Gearshift Cam Plate Components (Page 5B-13)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H25208001

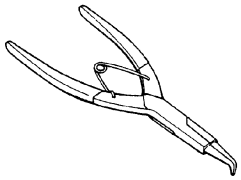
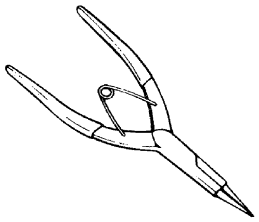
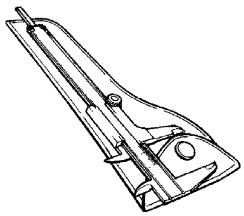
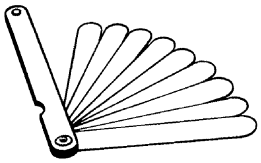
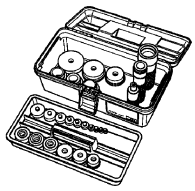
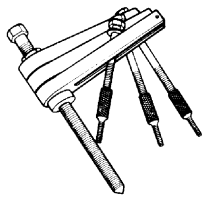
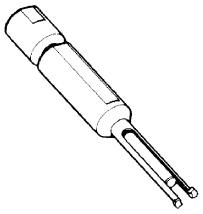
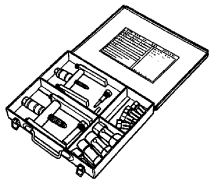
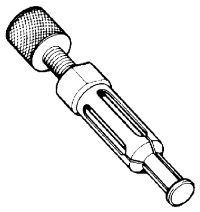
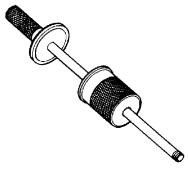
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 5B-6) / ☞(Page 5B-11) / ☞(Page 5B-15) / ☞(Page 5B-17)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 5B-14)
	THREAD LOCK CEMENT 1342 or equivalent	P/No.: 99000–32050	☞(Page 5B-8) / ☞(Page 5B-9)
	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞(Page 5B-12) / ☞(Page 5B-14) / ☞(Page 5B-15)

NOTE

Required service material is also described in the following.
“Transmission Components (Page 5B-2)”
“Gearshift Lever Construction (Page 5B-11)”
“Gearshift Shaft / Gearshift Cam Plate Components (Page 5B-13)”

Special Tool

B940H25208002

09900–06104 Snap ring pliers ☞(Page 5B-5)	
09900–06107 Snap ring pliers ☞(Page 5B-5) / ☞(Page 5B-13)	
09900–20102 Vernier calipers (1/20 mm, 200 mm) ☞(Page 5B-10) / ☞(Page 5B-10)	
09900–20803 Thickness gauge ☞(Page 5B-9)	
09913–70210 Bearing installer set ☞(Page 5B-8) / ☞(Page 5B-8) / ☞(Page 5B-9) / ☞(Page 5B-9) / ☞(Page 5B-17) / ☞(Page 5B-17)	
09920–13120 Crankcase separating tool ☞(Page 5B-3)	
09921–20210 Bearing remover ☞(Page 5B-16)	
09921–20240 Bearing remover set ☞(Page 5B-7) / ☞(Page 5B-8)	
09923–74511 Bearing remover ☞(Page 5B-7)	
09930–30104 Rotor remover sliding shaft ☞(Page 5B-7) / ☞(Page 5B-16)	

Clutch

Precautions

Precautions for Clutch System

B940H25300001

Refer to “General Precautions in Section 00 (Page 00-1)”.

Schematic and Routing Diagram

Clutch Cable Routing Diagram

B940H25302001

Refer to “Throttle Cable Routing Diagram in Section 1D (Page 1D-2)”.

Diagnostic Information and Procedures

Clutch System Symptom Diagnosis

B940H25304001

Condition	Possible cause	Correction / Reference Item
Noise seems to come from clutch	Worn splines of countershaft or hub.	*Replace.*
	Worn teeth of clutch plates.	*Replace.*
	Distorted clutch plates, driven and drive.	*Replace.*
	Worn clutch release bearing.	*Replace.*
	Weakened clutch dampers.	*Replace the primary driven gear.*
Slipping clutch	Weakened clutch springs.	*Replace.*
	Worn or distorted clutch pressure plates.	*Replace.*
	Distorted clutch plates or pressure plates.	*Replace.*
	Clutch release screw out of adjustment.	*Adjust.*
Dragging clutch	Some clutch spring weakened while others are not.	*Replace.*
	Distorted pressure plates or clutch plates.	*Replace.*
	Clutch release screw out of adjustment.	*Adjust.*

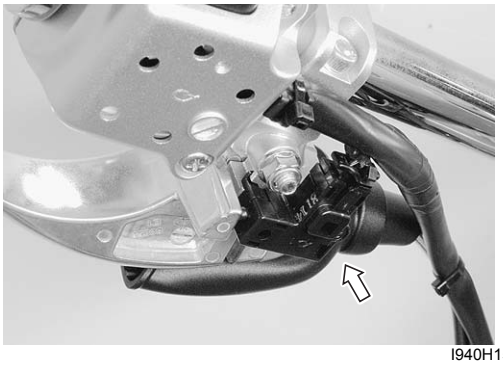
Repair Instructions

Clutch Lever Position Switch Inspection

B940H25306001

Inspect the clutch lever position switch in the following procedures:

1) Disconnect the clutch lever position switch lead wires.



I940H1530001-01

2) Inspect the switch for continuity with a tester. If any abnormality is found, replace the switch with a new one.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity (•))))

Clutch lever position switch

Color / Position	Terminal (B/Y)	Terminal (B/Y)
FREE		
•	○	○

I940H1530076-01

3) Connect the clutch lever position switch lead wires.

Clutch Cable Removal and Installation

B940H25306002

Removal

1) Disconnect the clutch cable from the clutch lever. Refer to “Handlebars Removal and Installation in Section 6B (Page 6B-1)”.
2) Remove the left frame head cover, frame lower cover and secondary gear case cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Remove the clutch cable as shown in the throttle cable diagram. Refer to “Throttle Cable Routing Diagram in Section 1D (Page 1D-2)”.

Installation

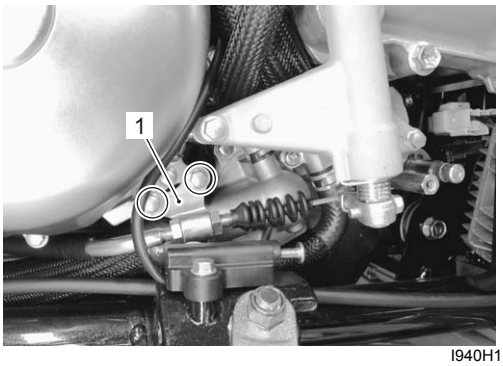
1) Install the clutch cable as shown in the throttle cable diagram. Refer to “Throttle Cable Routing Diagram in Section 1D (Page 1D-2)”.
2) Adjust the clutch cable play. Refer to “Clutch Cable Play Inspection and Adjustment in Section 0B (Page 0B-12)”.
3) Reinstall the removed parts.

Clutch Release Assembly / Push Rod Removal and Installation

B940H25306003

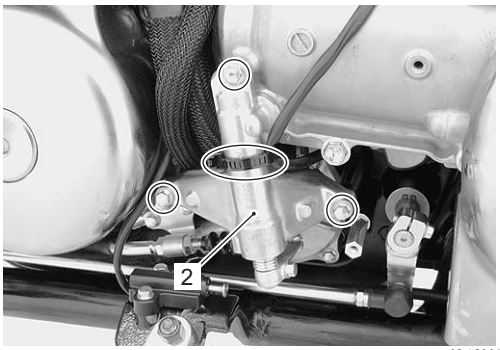
Removal

1) Place a oil pan below the clutch release assembly.
2) Remove the left frame lower cover and secondary gear case cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Remove the clutch cable stopper (1).



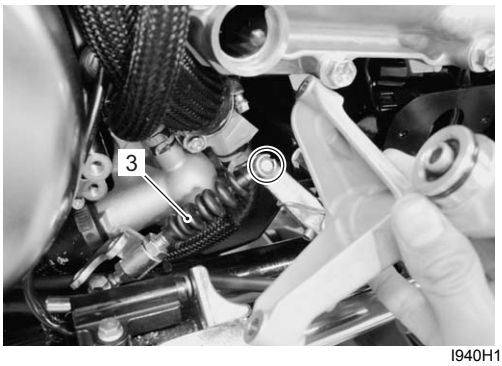
I940H1530002-01

4) Remove the clutch release assembly (2).



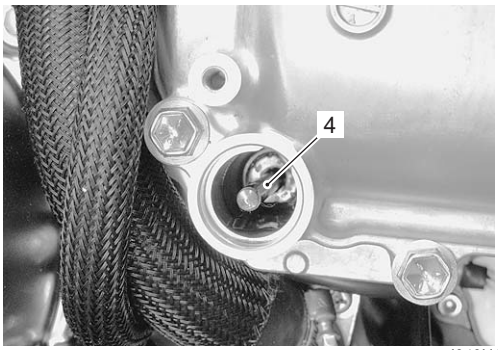
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5) Disconnect the clutch cable (3).



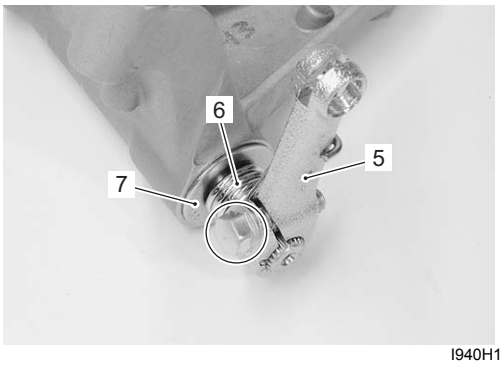
I940H1530004-01

6) Remove the push rod (4).



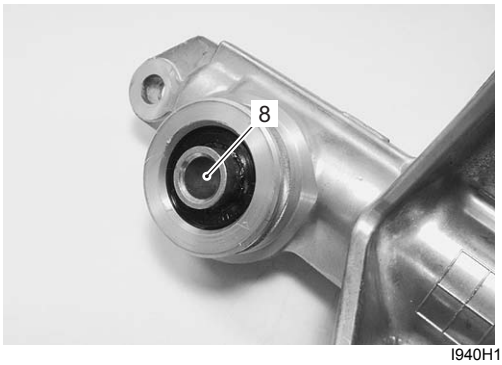
I940H1530005-01

7) Remove the clutch release arm (5), return spring (6) and washer (7) if necessary.



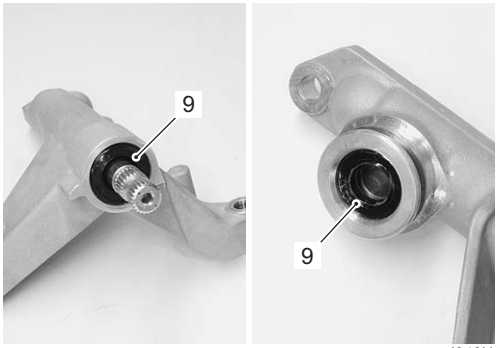
I940H1530067-01

8) Remove the push rod cap (8) if necessary.



I940H1530069-01

9) Remove the oil seals (9) if necessary.



I940H1530068-01

Installation

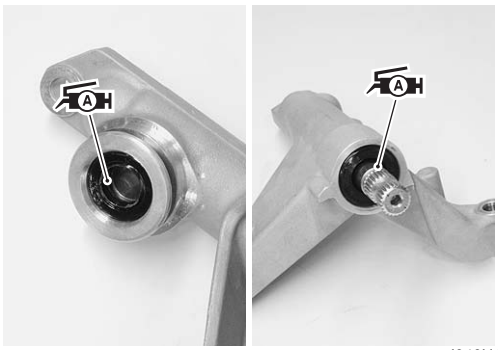
Install the clutch release cylinder in the reverse order of removal. Pay attention to the following points:

- Apply grease to the each oil seal lip.

⚠ CAUTION

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

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

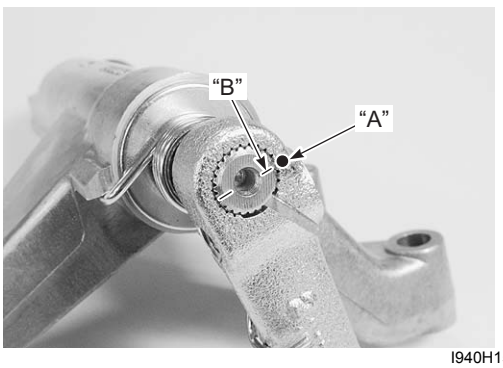


I940H1530071-01

- Install the clutch release arm.

NOTE

Align the release arm punch mark “A” with the notch mark “B” on the release camshaft.



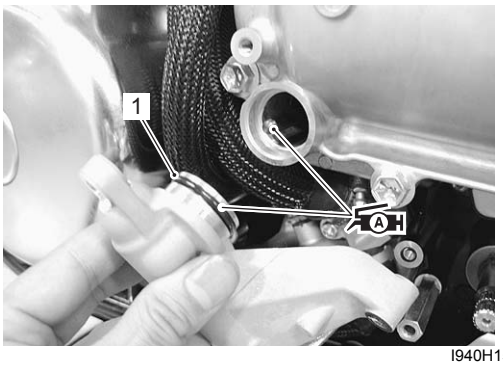
I940H1530070-01

- Apply a small quantity of grease to the O-ring (1) and push rod.

⚠ CAUTION

The O-ring (1) should be replaced with a new one to prevent engine oil leakage.

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



I940H1530006-04

- Inspect the engine oil level and fill the engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.

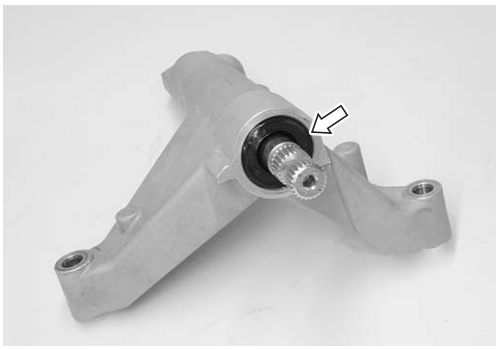
Clutch Release Oil Seal / Dust Seal Inspection

B940H25306004

1) Refer to “Clutch Release Assembly / Push Rod Removal and Installation (Page 5C-2)”.
2) Inspect the oil seal for wear and damage. If any defects are found, replace the oil seal with a new one.



I940H1530073-01



I940H1530074-01

Clutch Push Rod (Left) Inspection

B940H25306005

Inspect the push rod in the following procedures:

1) Remove the clutch push rod. Refer to “Clutch Release Assembly / Push Rod Removal and Installation (Page 5C-2)”.
2) Inspect the push rod for wear or bend. If any defects are found, replace it with a new one.

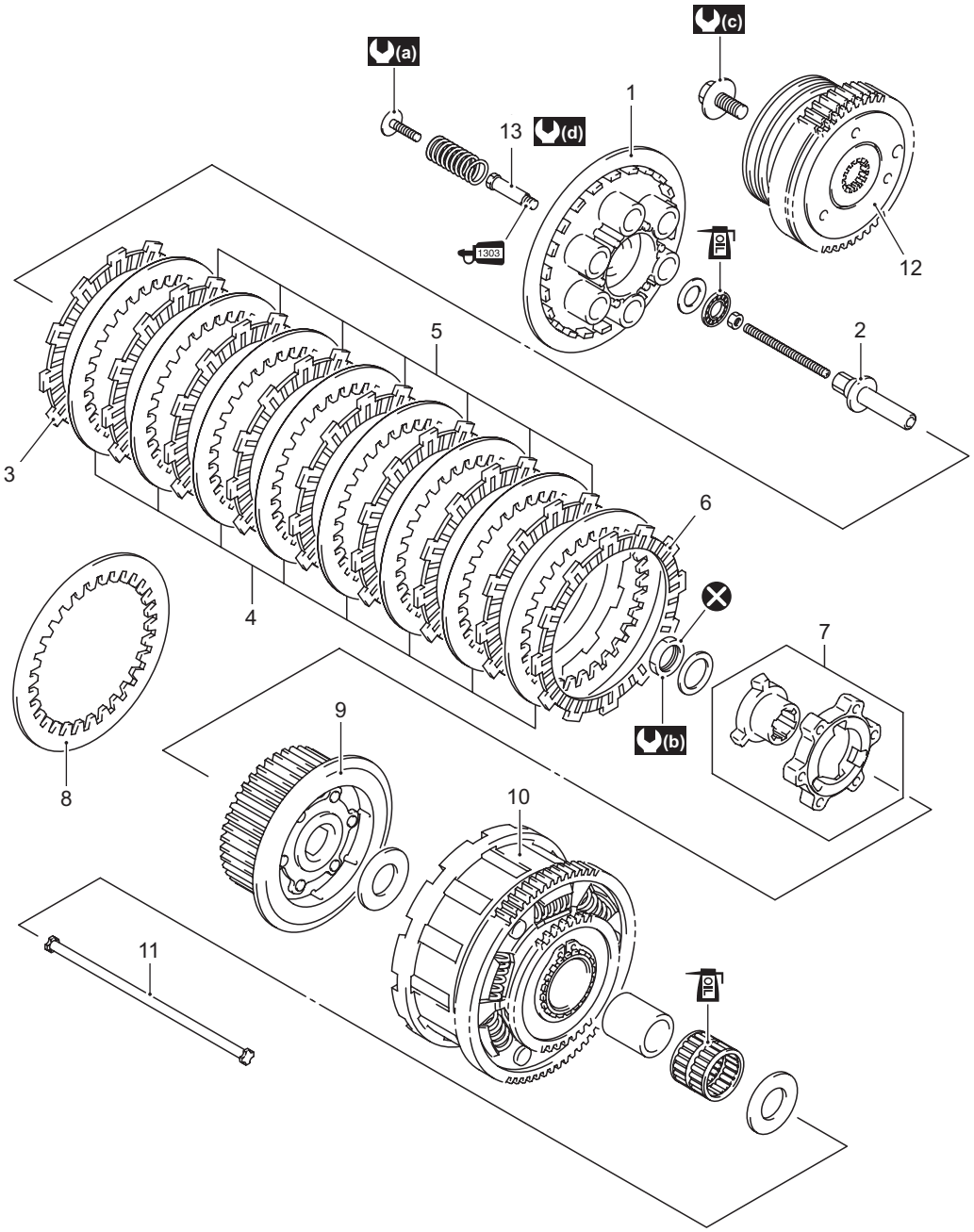


I940H1530007-01

3) Reinstall the removed parts. Refer to “Clutch Release Assembly / Push Rod Removal and Installation (Page 5C-2)”.

Clutch Components

B940H25306006



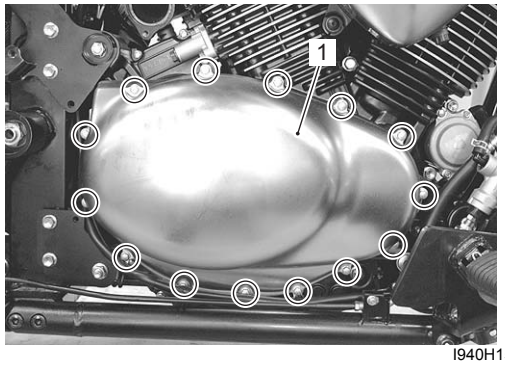
I940H1530075-01

1. Clutch pressure plate	8. Driven plate No. 2	(b) : 95 N·m (9.5 kgf-m, 68.5 lbf-ft)
2. Clutch push piece	9. Clutch sleeve hub	(c) : 150 N·m (15.0 kgf-m, 108.5 lbf-ft)
3. Drive plate No. 3	10. Primary driven gear assembly	(d) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
4. Driven plate No. 1	11. Clutch push rod	1303 : Apply thread lock to the thread part.
5. Drive plate No. 1	12. Primary drive gear assembly	OIL : Apply engine oil.
6. Drive plate No. 2	13. Clutch spring stopper bolt	: Do not reuse.
7. Clutch cam set	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	

Clutch Removal

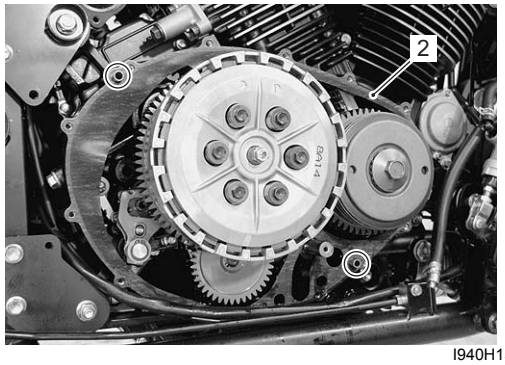
B940H25306007

1) Drain engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.
2) Remove the exhaust pipes and mufflers. Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.
3) Remove the clutch cover (1).



I940H1530008-01

4) Remove the gasket (2) and dowel pins.

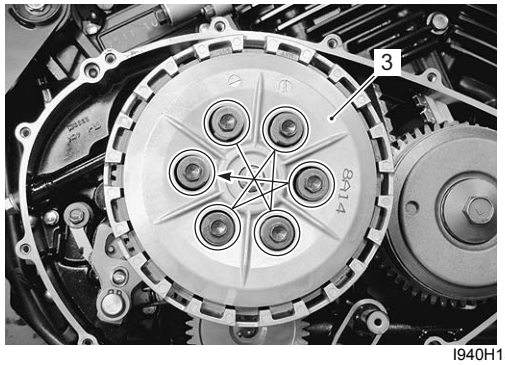


I940H1530009-01

5) Remove the clutch spring set bolts, clutch springs and pressure plate (3).

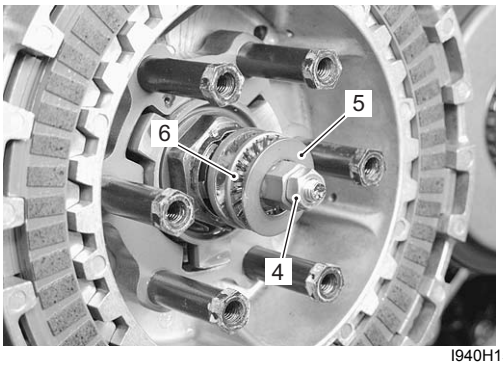
NOTE

Loosen the clutch spring set bolts little by little and diagonally.



I940H1530010-02

6) Remove the clutch push piece (4), thrust washer (5) and bearing (6).



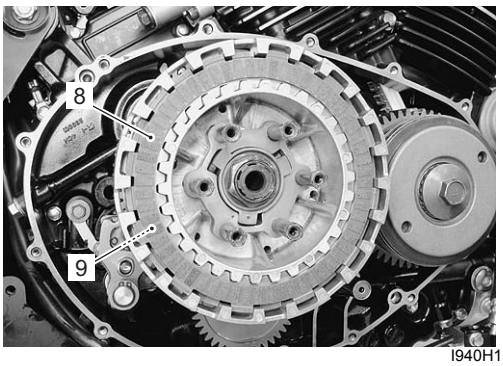
I940H1530039-02

7) Remove the clutch push rod (7).



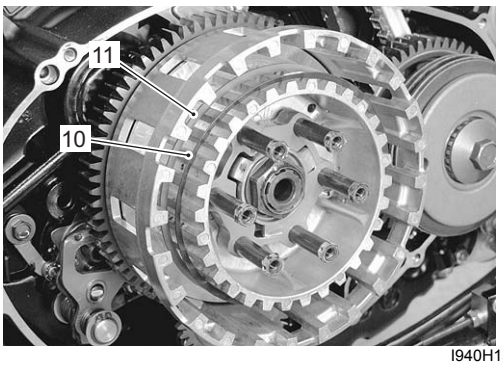
I940H1530011-01

8) Remove the clutch drive plates (8) and driven plates (9).



I940H1530012-01

9) Remove the spring washer (10) and its seat (11).



I940H1530013-01

10) Unlock the clutch sleeve hub nut.


I940H1530014-01

11) Hold the clutch sleeve hub with the special tools.

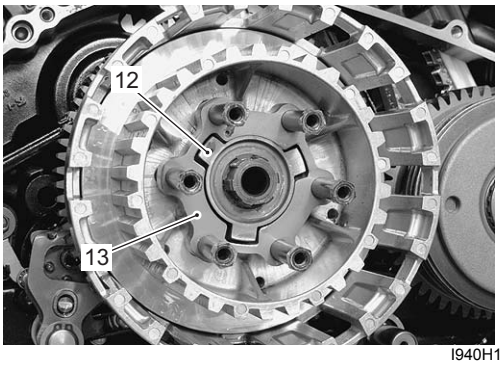
Special tool
(A): 09920–53740 (Clutch sleeve hub holder)
: 09920–31020 (Extension handle)

12) Remove the clutch sleeve hub nut.



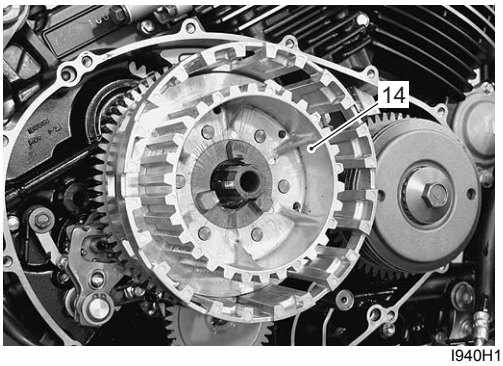
I940H1530015-01

13) Remove the clutch drive cam (12) and clutch driven cam (13).



I940H1530016-01

14) Remove the clutch sleeve hub (14).

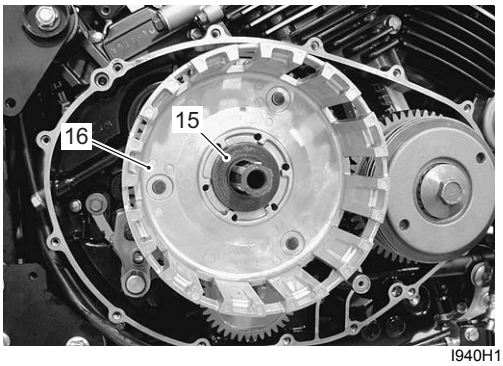


I940H1530017-01

15) Remove the washer (15) and primary driven gear (16).

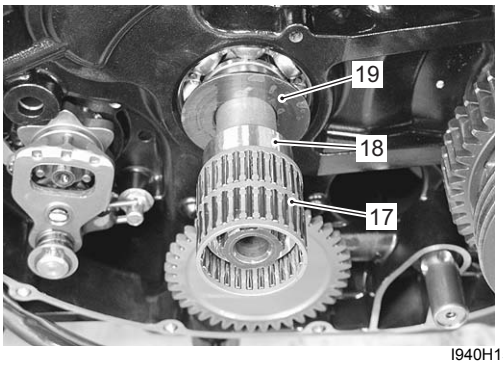
NOTE

If it is difficult to remove the primary driven gear (16), rotate the crankshaft.



I940H1530018-01

16) Remove the needle roller bearing (17), spacer (18) and washer (19).



I940H1530019-01

17) Remove the oil pump driven gear (18).



I940H1530020-01

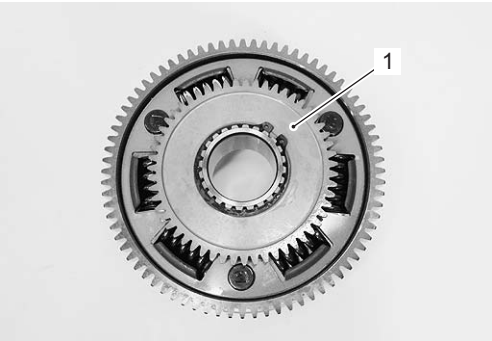
Clutch Installation

B940H25306008

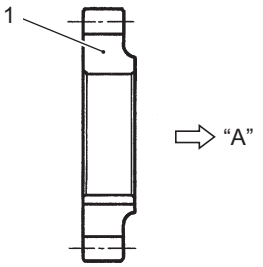
1) Install the oil pump driven gear (1).

NOTE

Use a new snap ring.



I940H1530021-01



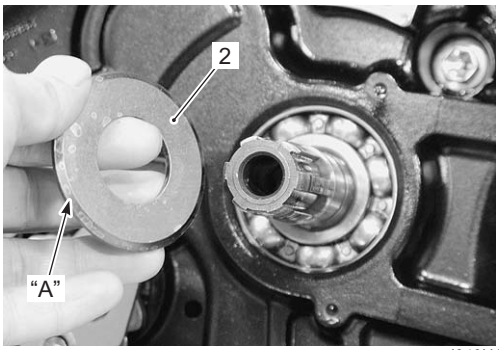
I940H1530022-03

“A”: Primary driven gear side

2) Install the washer (2) onto the countershaft.

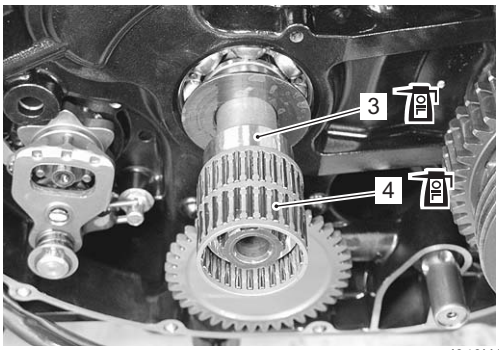
NOTE

The chamfer side “A” of washer should face the crankcase side.



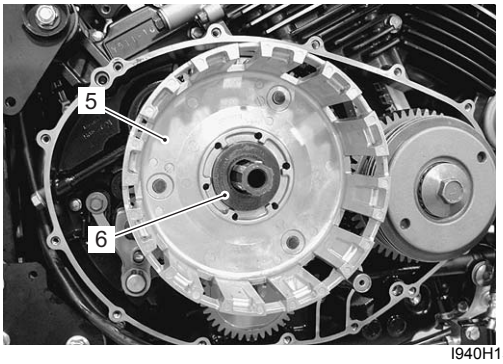
I940H1530023-01

3) Install the spacer (3) and bearing (4) and apply engine oil to them.



I940H1530024-01

4) Install the primary driven gear assembly (5) and thrust washer (6).



I940H1530025-01

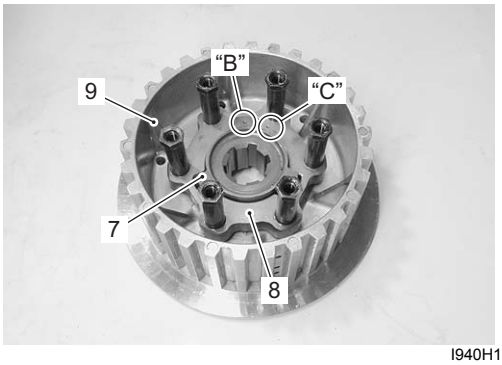
5) Install the clutch lifter drive cam (7), driven cam (8) to the clutch sleeve hub (9).

NOTE

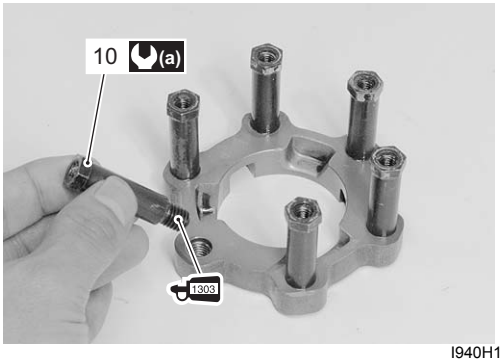
- **Align the punch mark "B" on the clutch lifter drive cam (7) with the punch mark "C" on its driven cam (8).**
- **The clutch lifter drive (7) and driven cams (8) should be replaced as a set.**
- **When replacing the clutch spring support bolts (10), apply thread lock and tighten them to the specified torque.**

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Clutch spring support bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I940H1530060-03

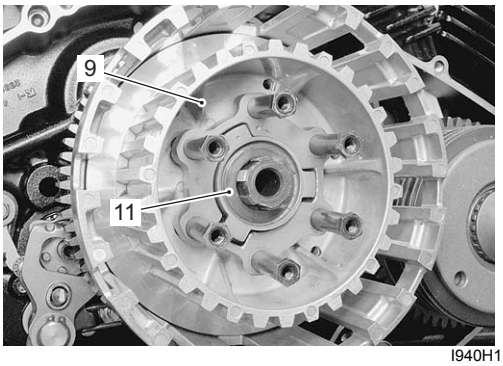


I940H1530026-02

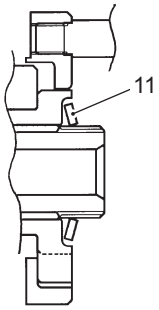
6) Install the clutch sleeve hub (9) and spring washer (11).

NOTE

The conical curve side of spring washer (11) faces outside.



I940H1530027-03



I940H1530040-01

7) Hold the clutch sleeve hub with the special tools.

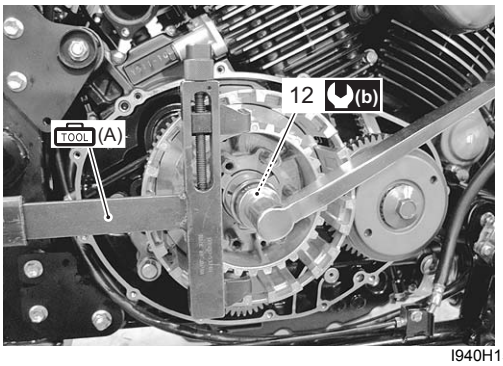
Special tool
TOOL (A): 09920–53740 (Clutch sleeve hub holder)
TOOL : 09920–31020 (Extension handle)

8) Tighten the new clutch sleeve hub nut (12) to the specified torque.

⚠ CAUTION

Do not use the removed clutch sleeve hub nut.

Tightening torque
Clutch sleeve hub nut (b): 95 N·m (9.5 kgf-m, 68.5 lbf-ft)



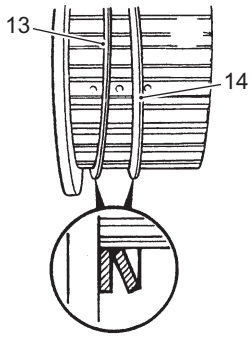
I940H1530029-03

9) Lock the clutch sleeve hub nut with a center punch.



I940H1530014-01

10) Install the spring washer seat (13) and spring washer (14) onto the clutch sleeve hub correctly.

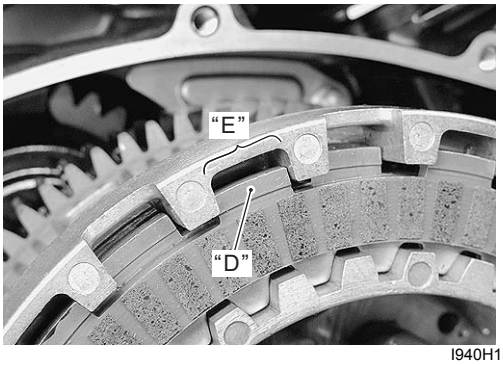


I940H1530028-02

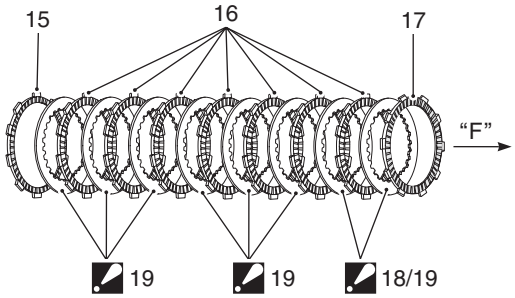
11) Insert the clutch drive plates and driven plates one by one into the clutch sleeve hub in the prescribed order.

NOTE

Insert the outermost No. 2 drive plate claws "D" to the other slits "E" of clutch housing as shown in the figure.



I940H1530030-02

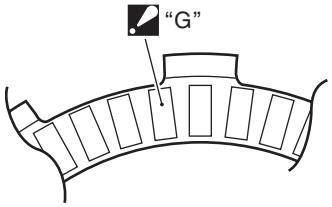


I940H1530065-03

15.	No. 3 drive plate
16.	No. 1 drive plate
17.	No. 2 drive plate
◪ 18.	No. 2 driven plate (0 – 2 pcs.) : The No. 1 and No. 2 driven plates are 8 in total.
◪ 19.	No. 1 drive plate (8 – 6 pcs.) : The No. 1 and No. 2 driven plates are 8 in total.
"F":	Direction of outside

NOTE

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 "G".



I940H1530066-02

"G": Clutch facing
: Make sure to check the numbers of clutch facing, before installing them.

Drive plate	I.D.	Clutch facing "G"
No. 1	127 mm (5.00 in)	48 pcs.
No. 2	127 mm (5.00 in)	60 pcs.
No. 3	135 mm (5.31 in)	60 pcs.

NOTE

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 8 pcs. in total. 6 – 8 pcs. of No. 1 driven plates are used with 2 – 0 pc(-s). of No. 2 driven plate(-s) as a set.
The No. 2 driven plate(-s) must be installed to 4th to 7th position of driven plates order from the sleeve side.

Drive plate	Thickness
No. 1	2.0 mm (0.08 in)
No. 2	2.3 mm (0.09 in)

12) Install the clutch push rod (20).

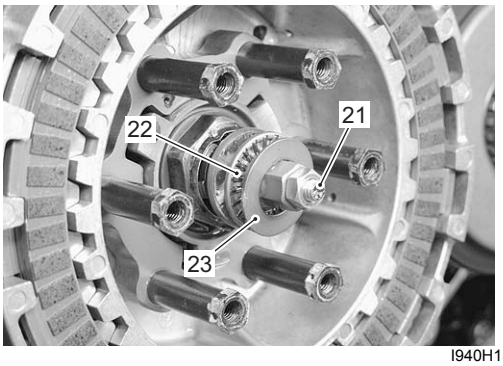


I940H1530031-02

13) Install the clutch push piece (21), bearing (22) and thrust washer (23) to the countershaft.

NOTE

Tighten the washer (23) is located between the pressure plate and bearing (22).



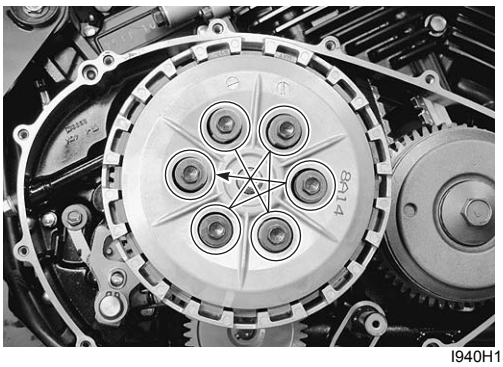
I940H1530032-02

14) Install the pressure plate and clutch springs.
15) Tighten the clutch spring set bolts to the specified torque.

NOTE

Tighten the clutch spring set bolts diagonally.

Tightening torque
Clutch spring set bolt: 10 N·m (1.0 kgf-m, 7.0 lbf-ft)

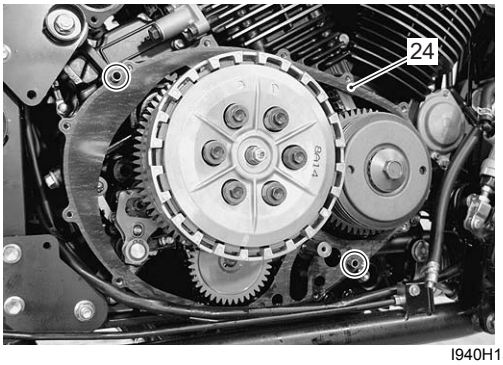


I940H1530033-01

16) After installed pressure plate, adjust the clutch push piece. Refer to “Clutch Cable Play Inspection and Adjustment in Section 0B (Page 0B-12)”.
17) Install the dowel pins and gasket (24).

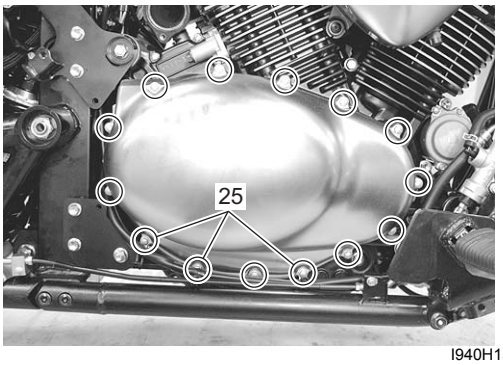
⚠ CAUTION

Use a new gasket to prevent oil leakage.



I940H1530034-02

18) Fit the clamp to the bolts (25).
19) Install the clutch cover and tighten the clutch cover bolts.



I940H1530035-02

20) Pour engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.

Clutch Parts Inspection

B940H25306009

Refer to “Clutch Removal (Page 5C-6)” and “Clutch Installation (Page 5C-8)”.

Clutch Drive and Driven Plate

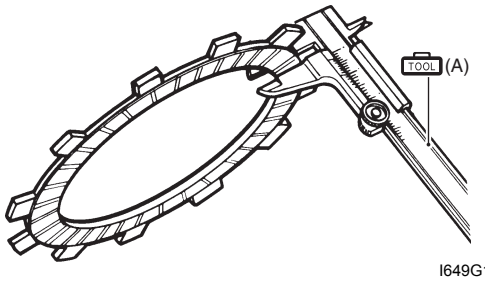
NOTE

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

Measure the thickness of the drive and driven plates with a vernier calipers. If each plate thickness is found to have reached the limit, replace it with a new one.

Special tool
TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Clutch drive plate thickness
Service limit (No. 1, No. 2 and No. 3 drive plate): 3.42 mm (0.103 in)

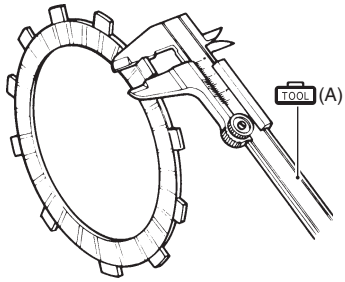


I649G1530056-03

Measure the claw width of the driven plates with a vernier calipers. Replace the drive plates found to have worn down to the limit.

Special tool
TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Clutch driven plate claw width
Service limit (No. 1, No. 2 and No. 3 drive plates): 13.1 mm (0.282 in)

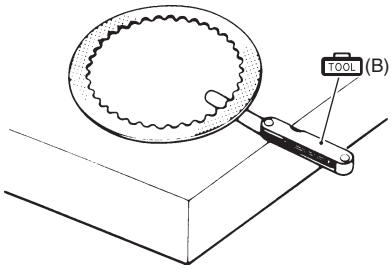


I649G1530057-03

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

Special tool
TOOL (B): 09900–20803 (Thickness gauge)

Clutch driven plate distortion
Service limit: 0.10 mm (0.004 in)

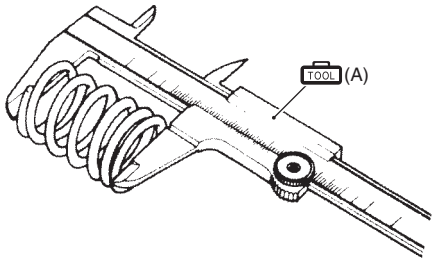


I649G1530058-03

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

Special tool
TOOL (A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Clutch spring free length
Service limit: 36.9 mm (1.45 in)



I718H1530062-01

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.



I940H1530036-01

Push Rod (Right)
Inspect the push rod for wear and damage.
If any defects are found, replace the push rod with a new one.



I940H1530037-02

Clutch Sleeve Hub / Primary Driven Gear Assembly
Inspect the slot of the clutch sleeve hub and primary driven gear assembly for damage or wear caused by the clutch plates. If necessary, replace it with a new one.

⚠ CAUTION

Do not attempt to disassemble the primary driven gear assembly. They are unserviceable.



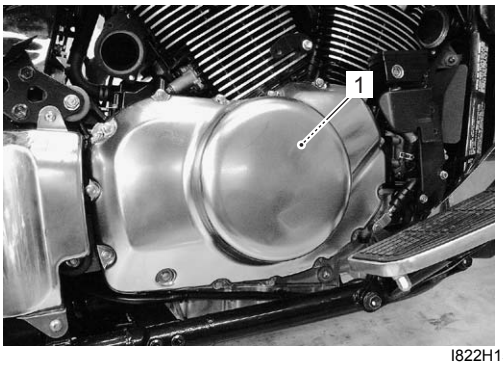
I940H1530038-01

Primary Drive Gear Removal and Installation

B940H25306010

Removal

1) Remove the clutch component parts (1). Refer to “Clutch Removal (Page 5C-6)”.



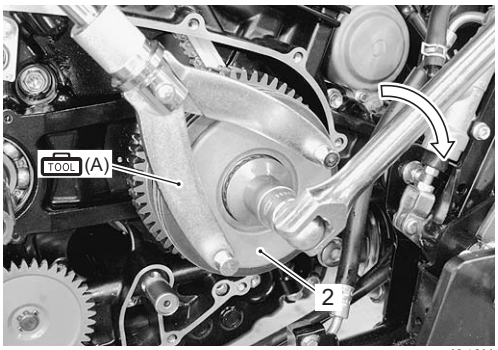
I822H1530037-01

2) Hold the primary drive gear (2) with the special tool and remove the primary drive gear bolt.

⚠ CAUTION

The primary drive gear bolt has left-hand threads.

Special tool
TOOL (A): 09930–40113 (Rotor holder)

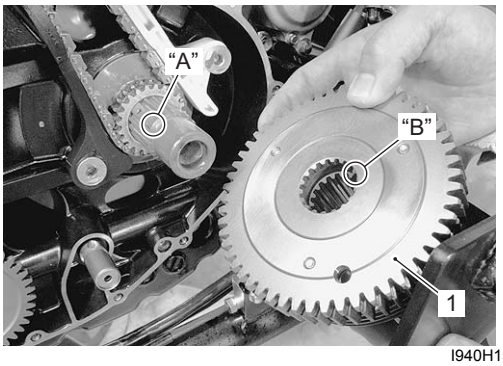


I940H1530041-01

3) Remove the primary drive gear.

Installation
Install the primary driven gear in the reverse order of removal. Pay attention to the following points:

- When installing the primary drive gear (1), align the teeth “A” of the shaft and groove “B” of the primary drive gear.



I940H1530042-01

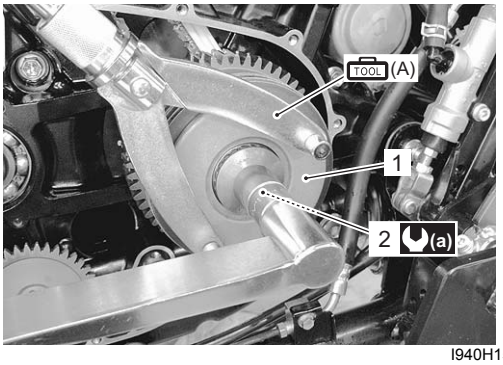
- Hold the primary drive gear (1) with the special tool and tighten the primary drive gear bolt (2) to the specified torque.

NOTE

The primary drive gear bolt (2) has left-hand threads.

Tightening torque
Primary drive gear bolt (a): 150 N·m (15.0 kgf-m, 108.5 lbf-ft)

Special tool
TOOL (A): 09930–40113 (Rotor holder)



I940H1530043-01

Specifications

Service Data

B940H25307001

Clutch
Unit: mm (in)

Item	Standard		Limit
Clutch cable play	10 – 15 (0.4 – 0.6)		—
Clutch release arm play	6.0 (0.24)		2.0 (0.08)
Clutch release screw	1/2 turn back		—
Clutch drive plate thickness	No. 1	3.72 – 3.88 (0.146 – 0.153)	3.42 (0.135)
	No. 2	3.72 – 3.88 (0.146 – 0.153)	3.42 (0.135)
	No. 3	3.72 – 3.88 (0.146 – 0.153)	3.42 (0.135)
Clutch drive plate claw width	No. 1, 2, 3	13.9 – 14.0 (0.154 – 0.551)	13.1 (0.516)
Clutch driven plate distortion	—		0.10 (0.004)
Clutch spring free length	38.79 (1.53)		36.9 (1.45)

Drive Train
Unit: mm (in)

Item	Standard	Limit
Gearshift lever height	95 – 105 (3.7 – 4.1)	—

Tightening Torque Specifications

B940H25307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Clutch spring support bolt	23	2.3	16.5	☞(Page 5C-9)
Clutch sleeve hub nut	95	9.5	68.5	☞(Page 5C-10)
Clutch spring set bolt	10	1.0	7.0	☞(Page 5C-11)
Primary drive gear bolt	150	15.0	108.5	☞(Page 5C-14)

NOTE

The specified tightening torque is described in the following.
"Clutch Components (Page 5C-5)"

Reference:
For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-8)".

Special Tools and Equipment

Recommended Service Material

B940H25308001

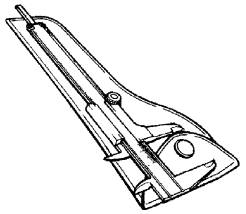
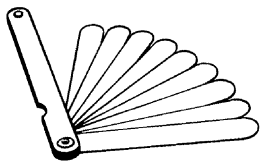
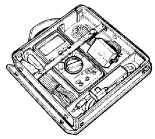
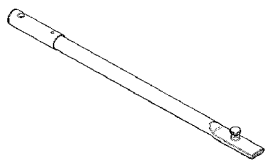
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 5C-3) / ☞(Page 5C-4)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 5C-9)

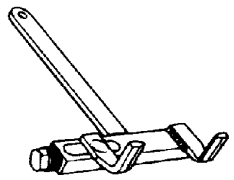
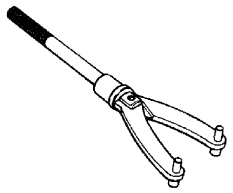
NOTE

Required service material is also described in the following.
"Clutch Components (Page 5C-5)"

Special Tool

B940H25308002

09900–20102 Vernier calipers (1/20 mm, 200 mm) ☞(Page 5C-12) / ☞(Page 5C-12) / ☞(Page 5C-13) 	09900–20803 Thickness gauge ☞(Page 5C-12) 
09900–25008 Multi-circuit tester set ☞(Page 5C-2) 	09920–31020 Extension handle ☞(Page 5C-7) / ☞(Page 5C-9) 

09920–53740 Clutch sleeve hub holder ☞(Page 5C-7) / ☞(Page 5C-9) 	09930–40113 Rotor holder ☞(Page 5C-14) / ☞(Page 5C-14) 

Section 6

Steering

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Precautions

Precautions

Precautions for Steering

B940H26000001

Refer to “General Precautions in Section 00 (Page 00-1)”.

Steering General Diagnosis

Diagnostic Information and Procedures

Steering Symptom Diagnosis

B940H26104001

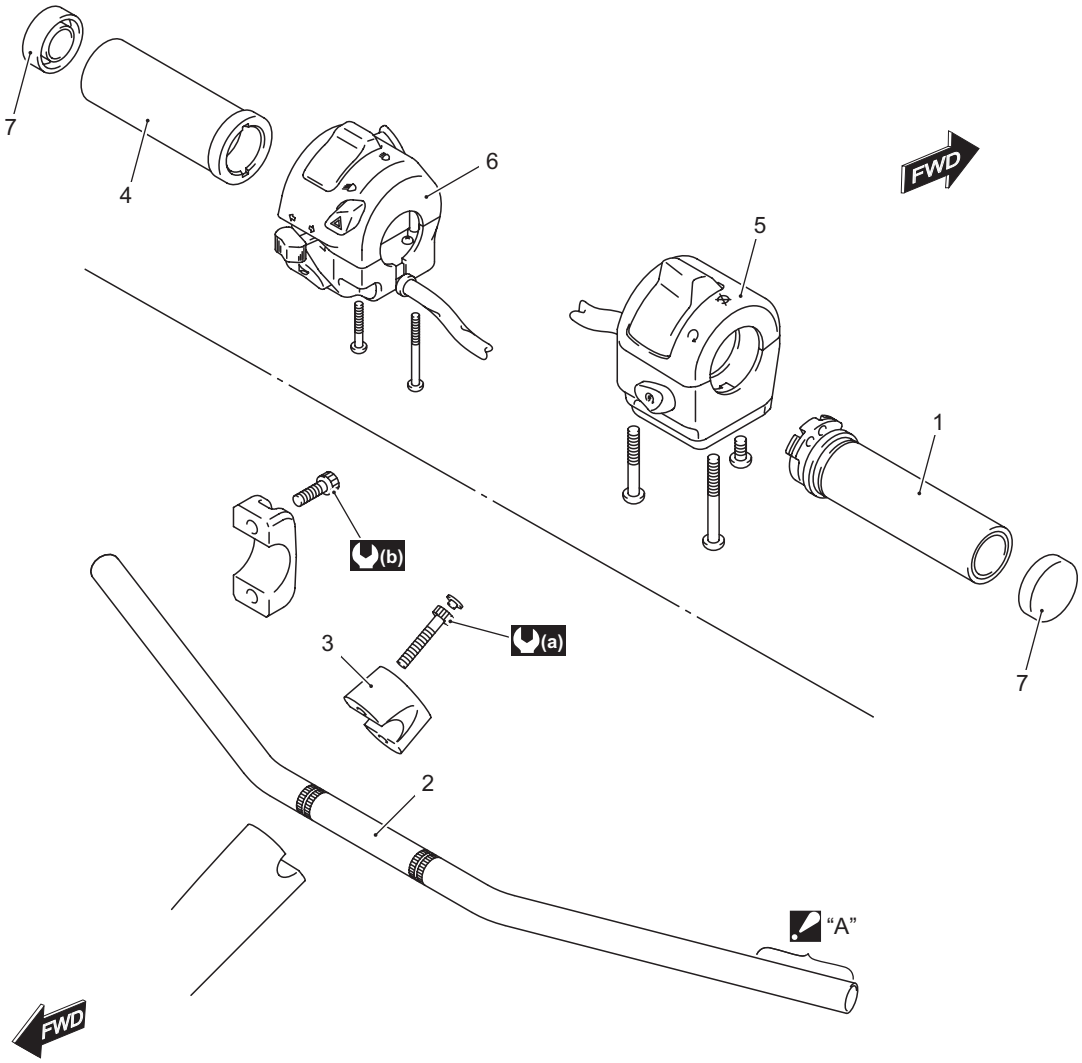
Condition	Possible cause	Correction / Reference Item
Heavy Steering	Over tightened steering stem nut.	*Adjust.*
	Broken bearing in steering stem.	*Replace.*
	Distorted steering stem.	*Replace.*
	Not enough pressure in tires.	*Adjust.*
Wobbly Handlebars	Loss of balance between right and left front forks.	*Replace fork or adjust fork oil level or replace spring.*
	Distorted front fork.	*Repair or replace.*
	Distorted front axle or crooked tire.	*Replace.*
	Loose steering stem nut.	*Adjust.*
	Worn or incorrect tire or wrong tire pressure.	*Adjust or replace.*
	Worn bearing/race in steering stem.	*Replace.*

Steering / Handlebar

Repair Instructions

Handlebars Components

B940H26206001



I940H1620023-01

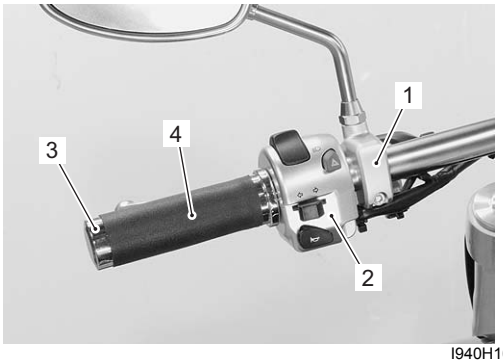
1. Throttle grip	5. Right handlebar switch box	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
2. Handlebars	6. Left handlebar switch box	(b) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
3. Handlebar clamp	7. Grip end cap	
4. Left handlebar grip	"A": Apply handle grip bond.	

Handlebars Removal and Installation

B940H26206002

Removal

1) Remove the following parts from the left handlebar.
   a) Clutch lever (1)
   b) Left handlebar switch box (2)
   c) Grip end cap (3)
   d) Handlebar grip (4)



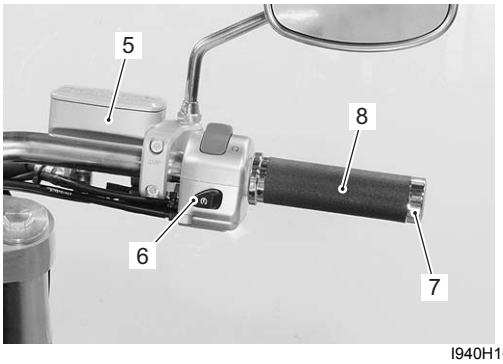
I940H1620001-01

2) Remove the following parts from the right handlebar.
   a) Front brake master cylinder/Front brake lever (5)

⚠ CAUTION

Do not turn the front brake master cylinder upside down.

   b) Right handlebar switch box (6)
   c) Grip end cap (7)
   d) Throttle grip (8)



I940H1620002-01

3) Remove the caps and handlebar clamp bolts.

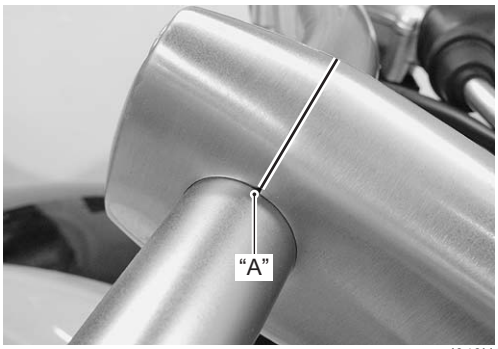


I940H1620003-01

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.



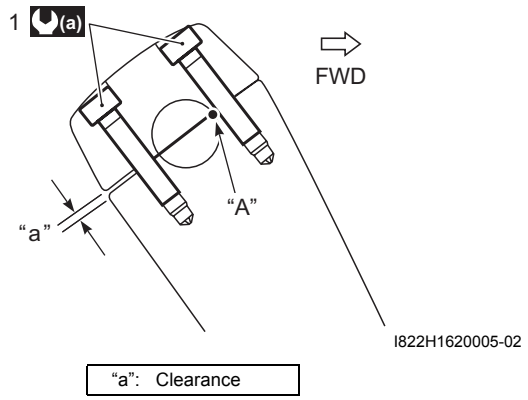
I940H1620004-01

- Tighten the handlebar clamp bolts (1) to the specified torque.

NOTE

First tighten the handlebar clamp bolts (front ones).

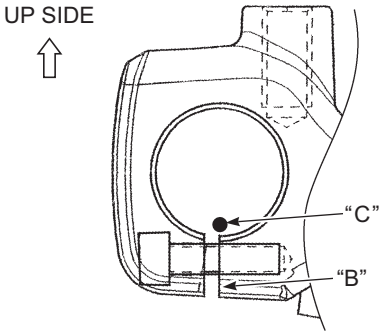
Tightening torque
Handlebar clamp bolt (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I822H1620005-02

“a”: Clearance

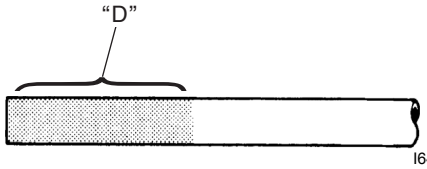
- Install the clutch lever holder, align the holder’s mating surface “B” with punched mark “C” on the handlebars.



I822H1620006-08

- Apply a handle grip bond “D” onto the left handlebars before installing the handlebar grip.

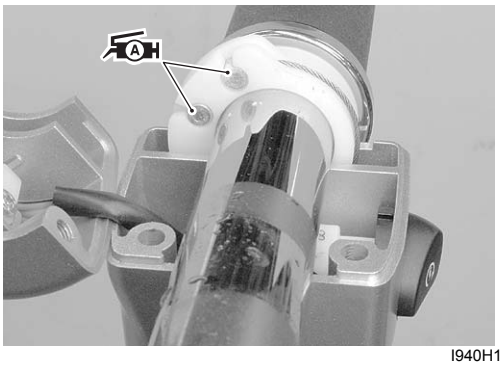
BOND : Handle grip bond (Handle Grip Bond (commercially available))



I649G1620008-03

- Apply grease to the end of the throttle cables and cable pulley.

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



I940H1620005-02

- Insert the projection “E” of the right handlebar switch box into the hole of the handlebars.

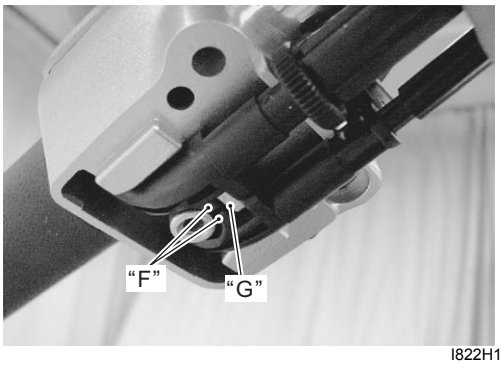


I940H1620006-02

- Set the throttle cables as shown in the figure.

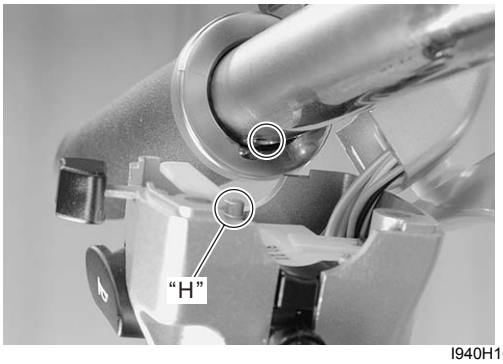
NOTE

When setting the throttle cables, fit the concave part “F” of the throttle cables to the convex part “G” of the switch box.



I822H1620009-03

- Install the front brake master cylinder. Refer to “Front Brake Master Cylinder Assembly Removal and Installation in Section 4A (Page 4A-10)”.
- Insert the projection “H” of the left handlebar switch box into the hole of the handlebars.



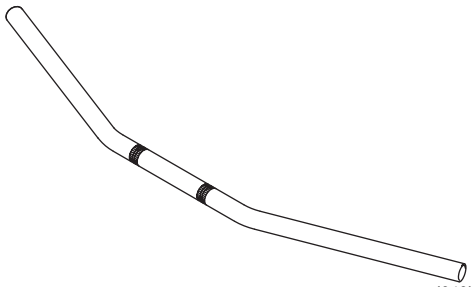
I940H1620008-01

- After installing the steering, the following adjustments are required before driving.
  - Cable routing (Refer to “Throttle Cable Routing Diagram in Section 1D (Page 1D-2)”.)
  - Throttle cable play (Refer to “Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-10)”.)
  - Clutch cable play (Refer to “Clutch Cable Play Inspection and Adjustment in Section 0B (Page 0B-12)”.)

Handlebars Inspection

B940H26206003

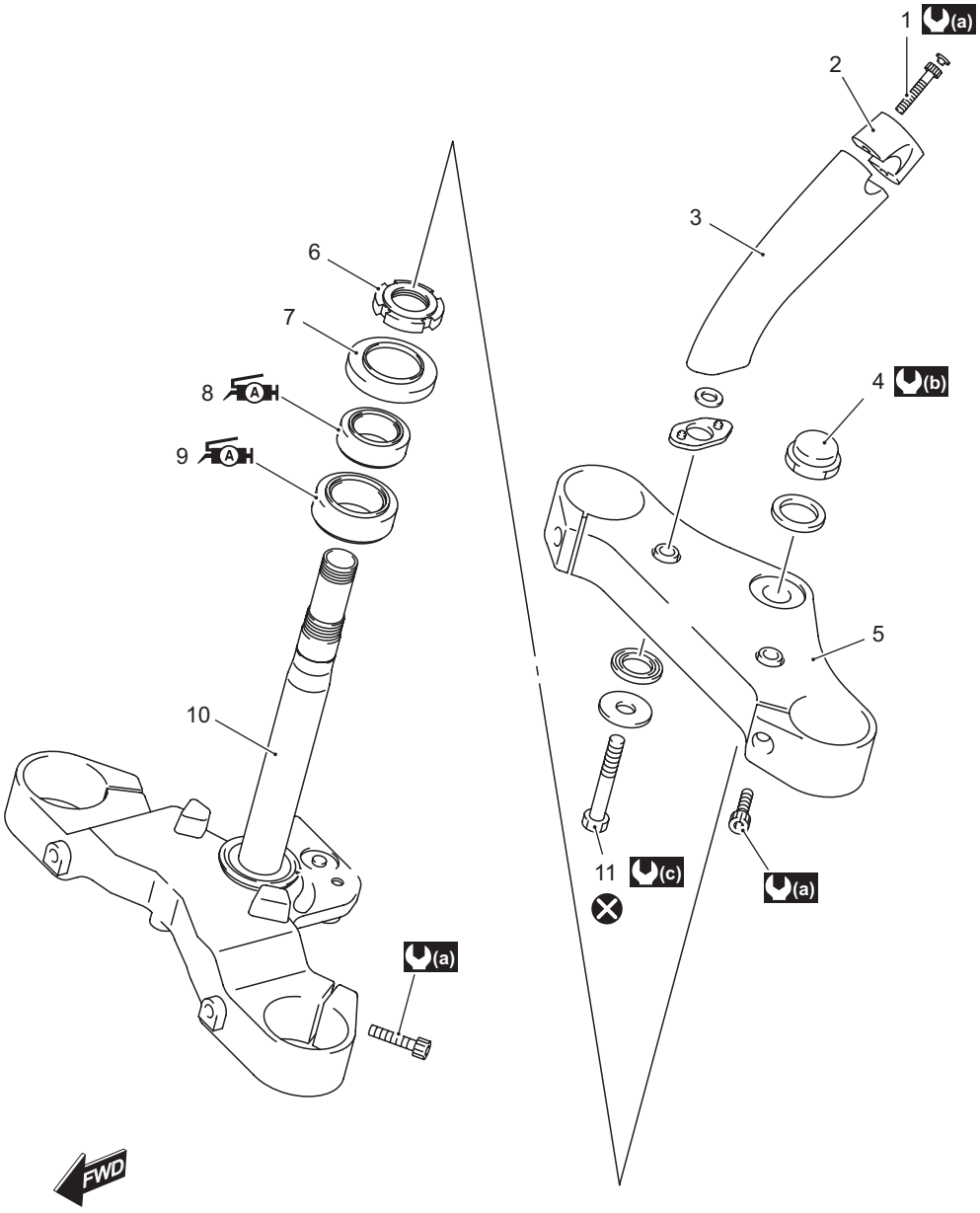
Refer to “Handlebars Removal and Installation (Page 6B-1)”.
Inspect the handlebars for distortion and damage.
If any defect is found, replace the handlebars with a new one.



I940H1620009-02

Steering Components

B940H26206004



I940H1620024-02

1. Handlebar clamp bolt	7. Dust seal	(b) : 90 N·m (9.0 kgf-m, 65.0 lbf-ft)
2. Handlebar clamp	8. Steering stem upper bearing	(c) : 45 N·m (4.5 kgf-m, 32.5 lbf-ft)
3. Handlebar holder	9. Steering stem lower bearing	A H : Apply grease.
4. Steering stem head nut	10. Steering stem	: Do not reuse.
5. Steering stem upper bracket	11. Handlebar holder bolt	
6. Steering stem nut	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)	

Steering Removal and Installation

B940H26206005

Removal

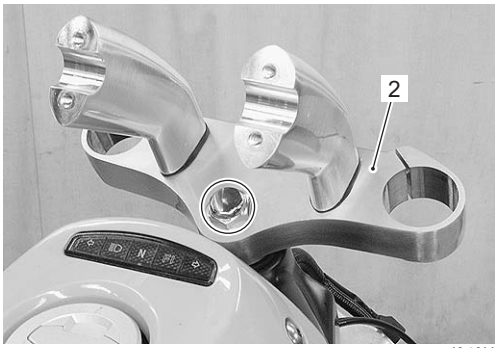
1) Support the motorcycle with a jack or a wooden block.
2) Remove the front wheel assembly. Refer to “Front Wheel Assembly Removal and Installation in Section 2D (Page 2D-3)”.
3) Remove the headlight. Refer to “Headlight Removal and Installation in Section 9B (Page 9B-2)”.
4) Remove the combination meter. Refer to “Combination Meter Removal and Installation in Section 9C (Page 9C-2)”.
5) Remove the front turn signal left and right and turn signal cover. Refer to “Front Turn Signal Light Removal and Installation in Section 9B (Page 9B-8)”.

6) Remove the wire harness, brake hose and each cables. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-5)”, “Front Brake Hose Routing Diagram in Section 4A (Page 4A-1)” and “Throttle Cable Routing Diagram in Section 1D (Page 1D-2)”.
7) Remove the handlebars. Refer to “Handlebars Removal and Installation (Page 6B-1)”.
8) Remove the headlight housing brace (1).



I940H1620010-01

9) Remove the front forks. Refer to “Front Fork Removal and Installation in Section 2B (Page 2B-2)”.
10) Remove the steering stem upper bracket (2).



I940H1620011-01

11) 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.

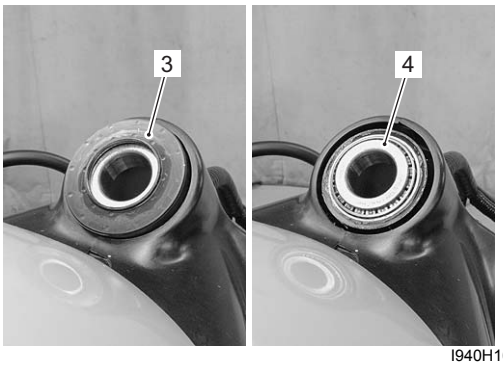
Special tool
TOOL (A): 09940–14911 (Steering stem nut wrench)

12) Remove the steering stem lower bracket.



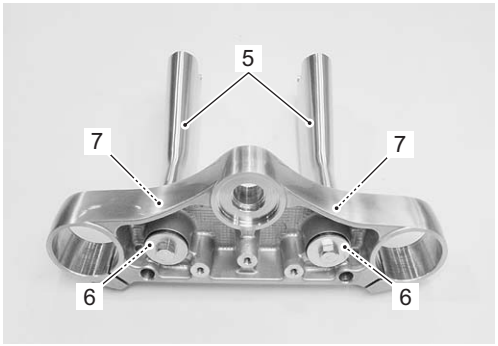
I940H1620012-01

13) Remove the dust seal (3) and steering stem upper bearing (4).



I940H1620013-01

14) Remove the handlebar holders (5), holder rubbers (6) and rubber seats (7).



I940H1620014-01

Installation
Install the steering in the reverse order of removal.
Pay attention to the following points:

- Temporarily tighten the handlebar holder bolts.

⚠ CAUTION

Use new precoated bolts.

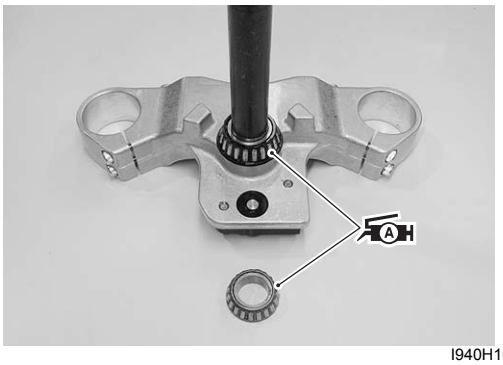


I940H1620015-01

Bearing

- Apply grease to the bearings, races and dust seals before remounting the steering stem.

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



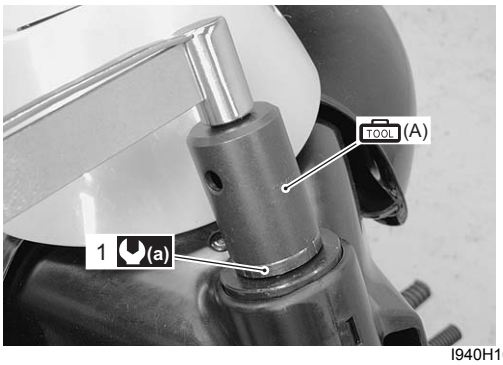
I940H1620016-01

Steering stem nut

- Tighten the steering stem nut (1) to the specified torque using the special tool.

Special tool
TOOL (A): 09940–14911 (Steering stem nut wrench)

Tightening torque
Steering stem nut (a): 45 N·m (4.5 kgf-m, 32.5 lbf-ft) then turn back 1/2 – 1/4

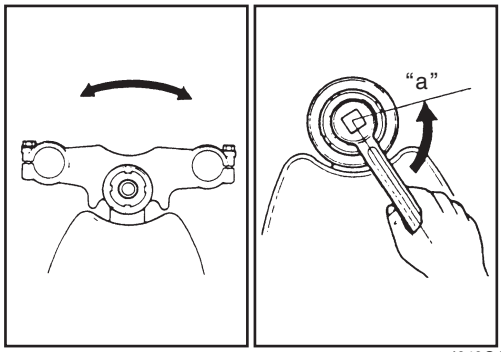


I940H1620017-01

- Turn the steering stem lower bracket about five or six times to the left and right so that the taper roller bearings seat properly.
- Loosen the steering stem nut 1/4 – 1/2 turn “a”.

NOTE

This adjustment will vary from motorcycle to motorcycle.



I649G1620026-02

Steering stem upper bracket
Install the front forks and steering stem upper bracket in the following steps:

1) Install the steering stem upper bracket, washer and steering stem head nut (1).
2) Install the front forks. Refer to “Front Fork Removal and Installation in Section 2B (Page 2B-2)”.
3) Tighten the steering stem head nut (1).

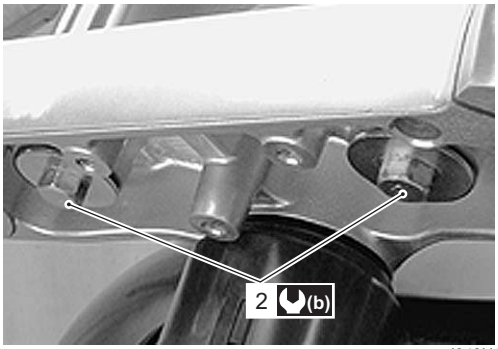
Tightening torque
Steering stem head nut (a): 90 N·m (9.0 kgf-m, 65.0 lbf-ft)



I940H1620025-01

4) Temporary install the handlebars and tighten the handlebar bolts (2) to the specified torque.

Tightening torque
Handlebar holder bolt (b): 45 N·m (4.5 kgf-m, 32.5 lbf-ft)



I940H1620026-01

Handlebars

- Install the handlebars. Refer to “Handlebars Removal and Installation (Page 6B-1)”.

Inspection after installation

- Check the steering tension. Refer to “Steering Tension Adjustment (Page 6B-8)”.

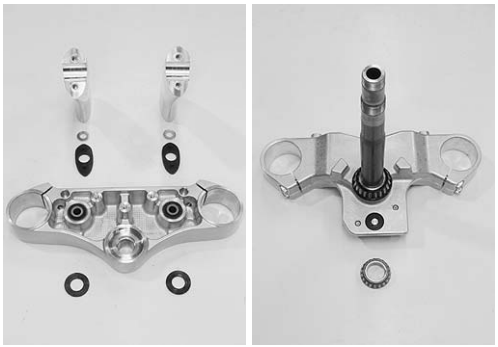
Steering Related Parts Inspection

B940H26206006

Refer to “Steering Removal and Installation (Page 6B-4)”.
Inspect the removed parts for the following abnormalities:

- Distortion of the steering stem
- Bearing wear or damage
- Abnormal bearing noise
- Race wear or damage
- Bearing lower seal damage
- Rubber seat and damper bushing wear or damage

If any abnormal points are found, replace defective parts with new ones.



I940H1620020-01



I940H1620021-01

Steering System Inspection

B940H26206007

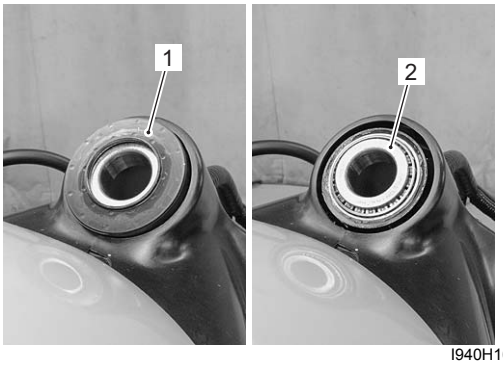
Refer to “Steering System Inspection in Section 0B (Page 0B-17)”.

Steering Stem Bearing Removal and Installation

B940H26206008

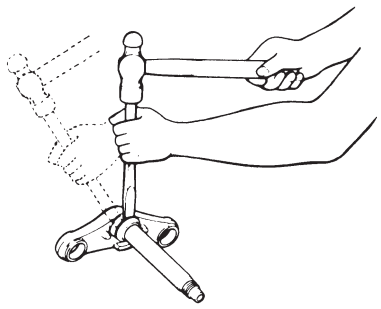
Removal

1) Remove the steering stem lower bracket. Refer to “Steering Removal and Installation (Page 6B-4)”.
2) Remove the dust seal (1) and steering stem upper bearing (2).



I940H1620022-01

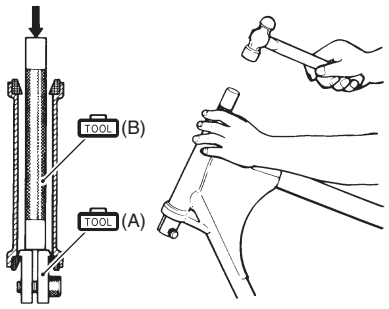
3) Remove the steering stem lower bearing and inner race using a chisel.



I649G1620033-02

4) Remove the steering stem upper and lower bearing races using the special tools.

Special tool
(A): 09941–54911 (Bearing outer race remover)
(B): 09941–74911 (Steering bearing installer)



I649G1620034-03

Installation
Install the steering stem bearings in the reverse order of removal. Pay attention to the following points:

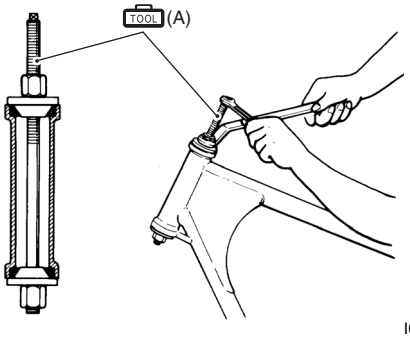
⚠ CAUTION

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)

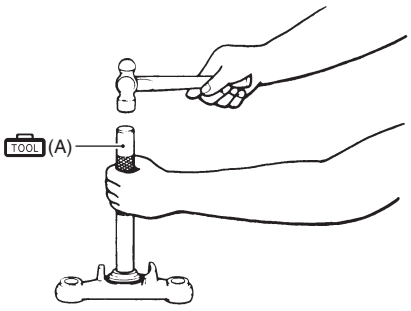


I649G1620035-03

Inner race

- Press in the lower inner race using the special tool and install the bearing.

Special tool
(A): 09941–74911 (Steering bearing installer)



I649G1620036-03

- Install the steering. Refer to “Steering Removal and Installation (Page 6B-4)”.

Steering Tension Adjustment

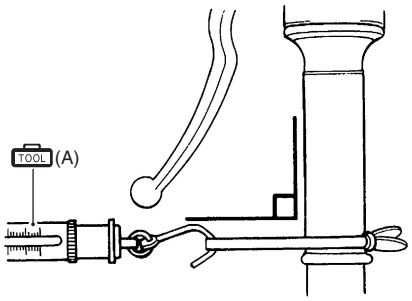
B940H26206009

Check the steering movement in the following procedures:

1) By supporting the motorcycle with a jack, lift the front wheel until it is off the floor 20 – 30 mm (0.8 – 1.2 in).
2) Check to make sure that the cables and wire harnesses are properly routed.
3) 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 handlebars start moving.

Initial force
200 – 500 grams

Special tool
(A): 09940–92720 (Spring scale)



I649G1620040-02

4) Do the same on the other grip end.
5) If the initial force read on the scale when the handlebars start turning is either too heavy or too light, adjust it till it satisfies the specification.
   a) First, loosen the front fork upper clamp bolts and steering stem head nut, and then adjust the steering stem nut by loosening or tightening it.
   b) Tighten the steering stem nut, stem head nut and front fork upper 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

B940H26207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Handlebar clamp bolt	23	2.3	16.5	☞(Page 6B-2)
Steering stem nut	45 N·m (4.5 kgf-m, 32.5 lbf-ft) then turn back 1/2 – 1/4			☞(Page 6B-6)
Steering stem head nut	90	9.0	65.0	☞(Page 6B-6)
Handlebar holder bolt	45	4.5	32.5	☞(Page 6B-7)

NOTE

The specified tightening torque is described in the following.
“Handlebars Components (Page 6B-1)”
“Steering Components (Page 6B-4)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H26208001

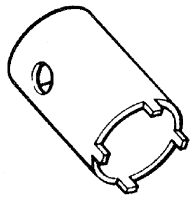
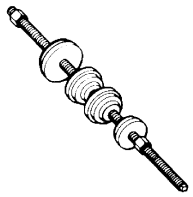
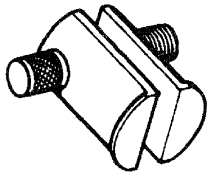
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 6B-3) / ☞(Page 6B-6)
Handle grip bond	Handle Grip Bond (commercially available)	—	☞(Page 6B-2)

NOTE

Required service material is also described in the following.
“Steering Components (Page 6B-4)”

Special Tool

B940H26208002

09940–14911 Steering stem nut wrench ☞(Page 6B-5) / ☞(Page 6B-6) 	09940–92720 Spring scale ☞(Page 6B-8) 
09941–34513 Steering race installer ☞(Page 6B-8) 	09941–54911 Bearing outer race remover ☞(Page 6B-8) 
09941–74911 Steering bearing installer ☞(Page 6B-8) / ☞(Page 6B-8) 	

Section 9

Body and Accessories

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Precautions

Precautions

Precautions for Electrical System

B940H29000001

Refer to “General Precautions in Section 00 (Page 00-1)” and “Precautions for Electrical Circuit Service in Section 00 (Page 00-2)”.

Component Location

Electrical Components Location

B940H29003001

Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.

Wiring Systems

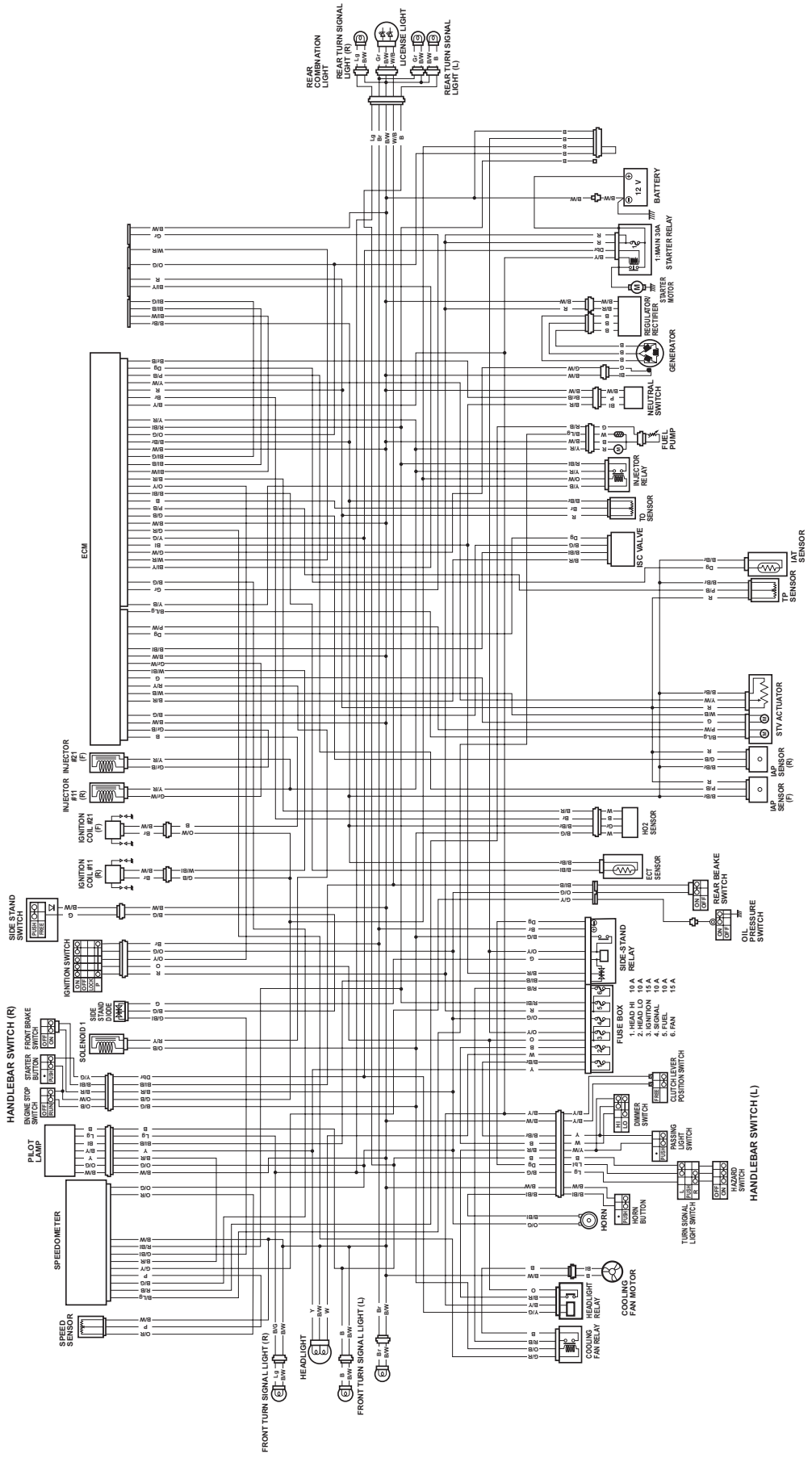
Schematic and Routing Diagram

Wiring Diagram

B940H29102001

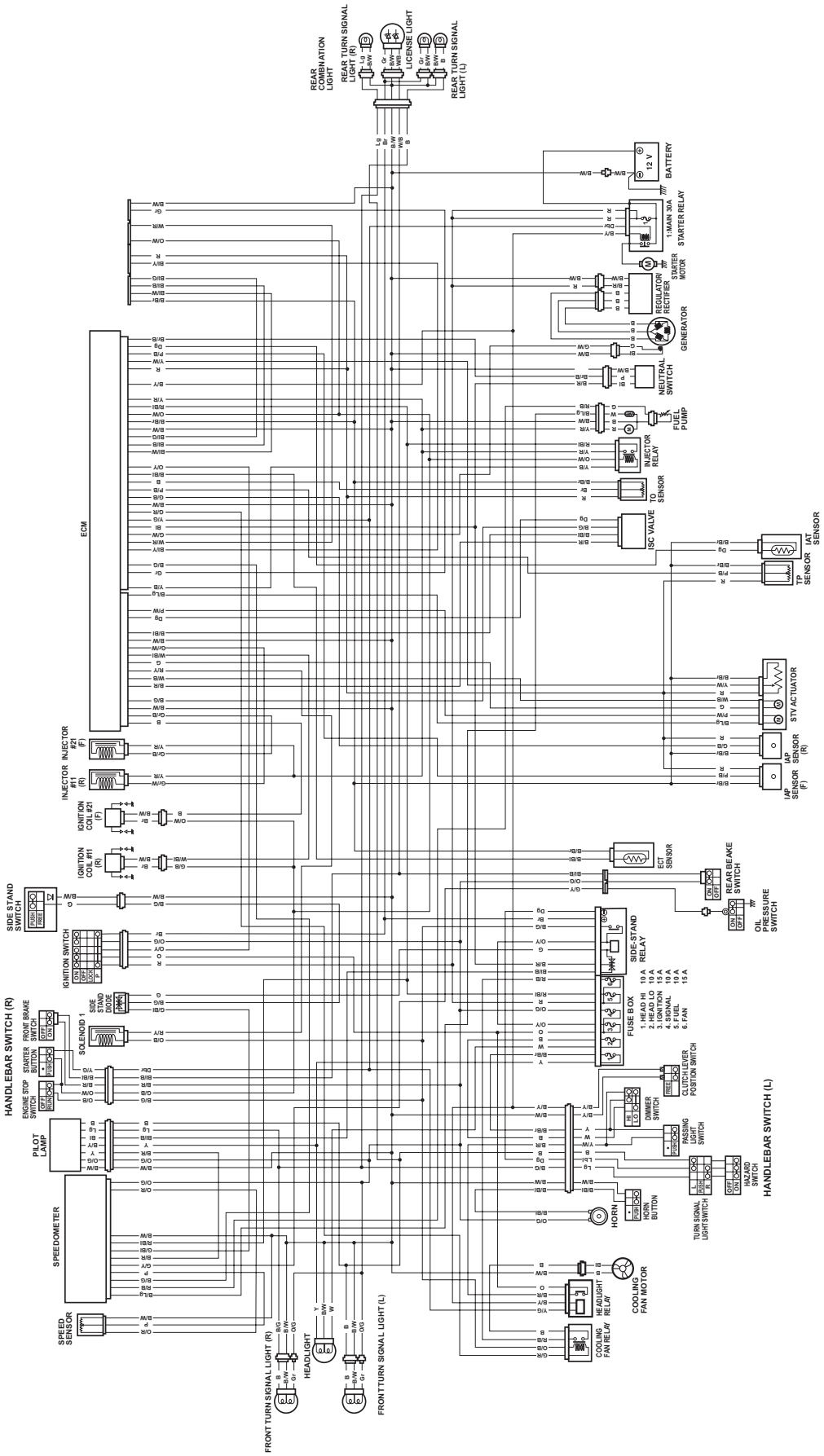
Refer to “Wire Color Symbols in Section 0A (Page 0A-5)”.

For E-02, 19, 24



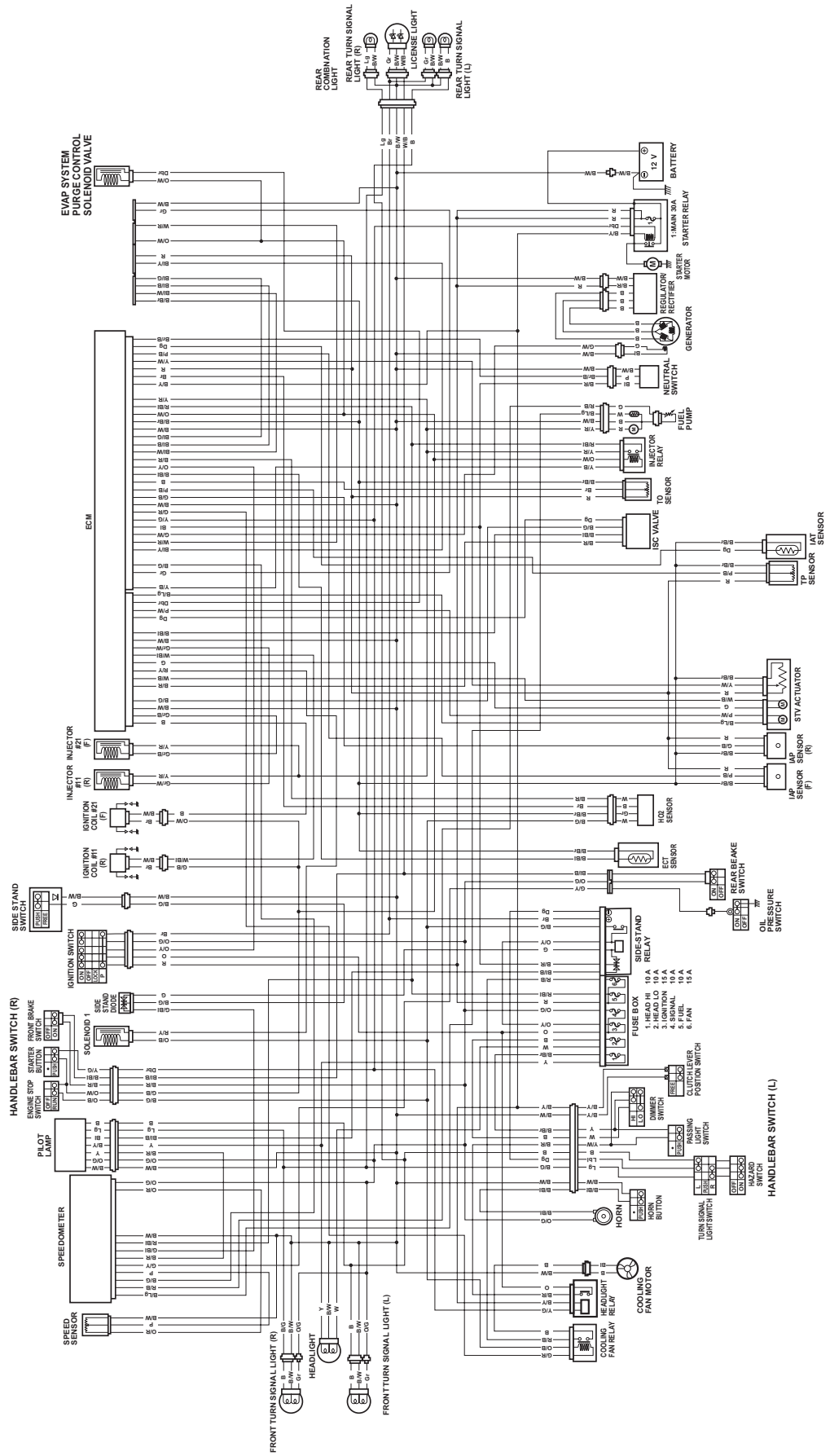
I940H2910901-01

For E-03, 28



I940H2910902-01

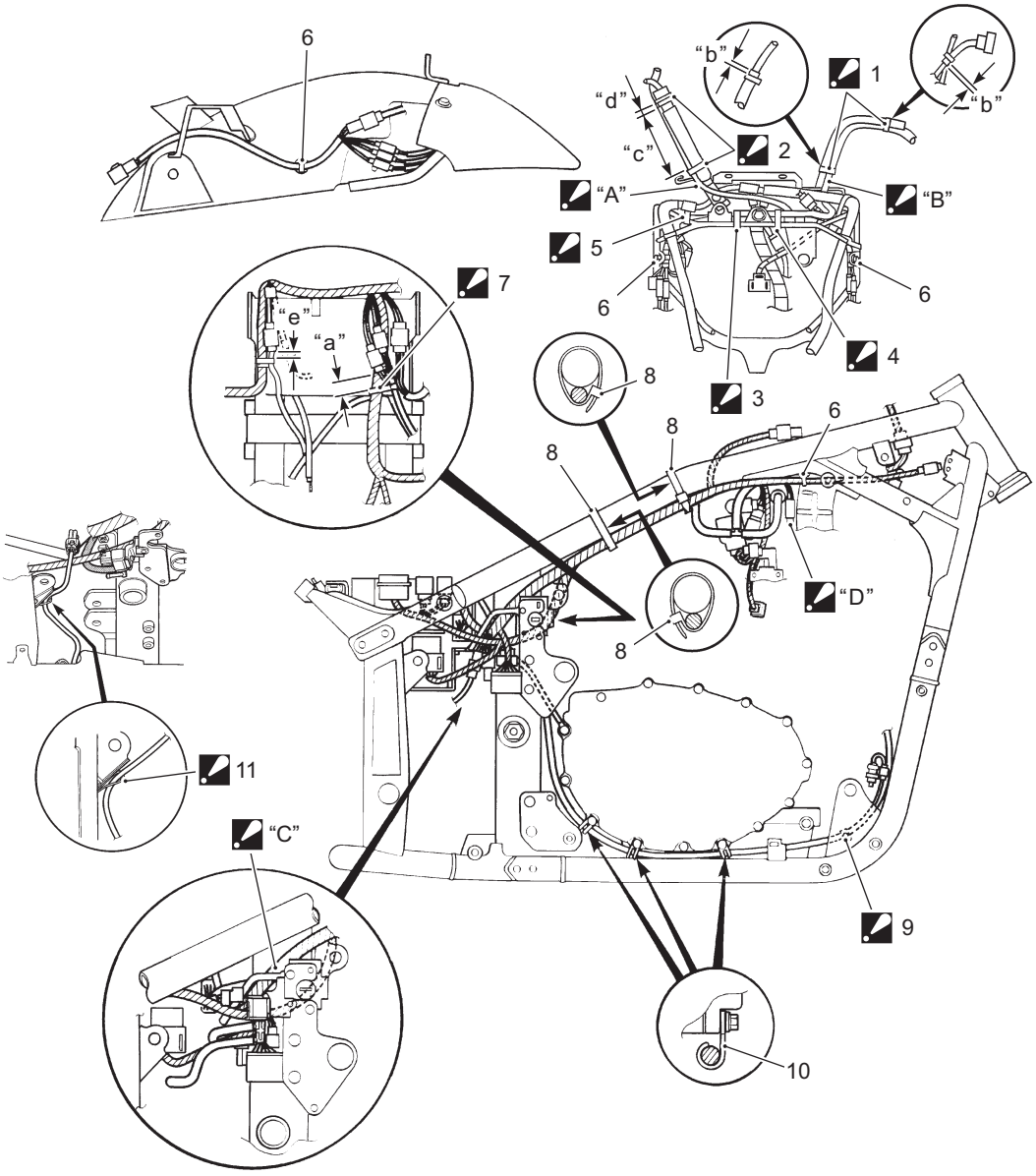
For E-33



I940H2910903-01

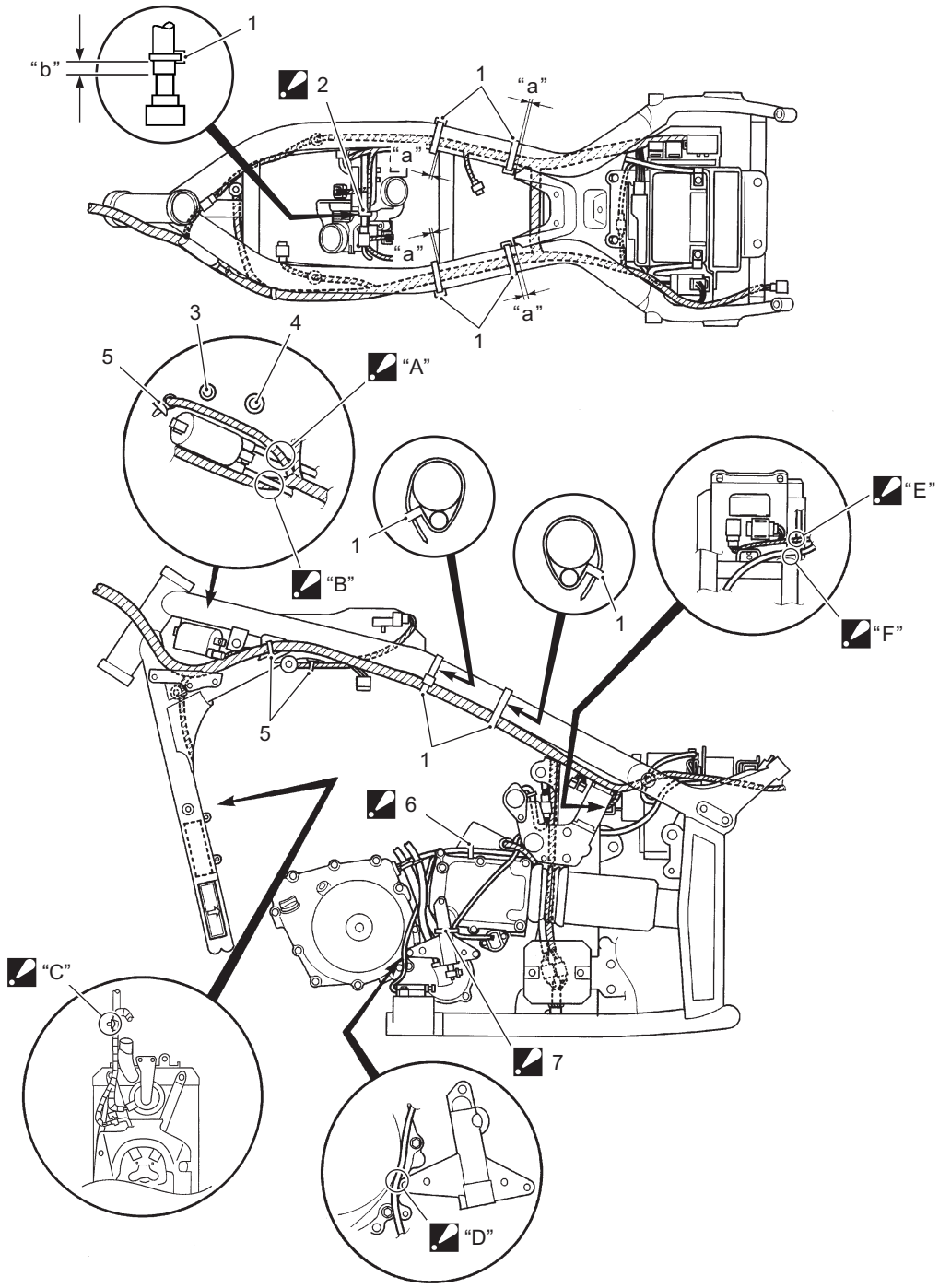
Wiring Harness Routing Diagram

B940H29102002



I940H1910907-08

1. Clamp : Bind the handlebar switch (L) lead wire and clutch cable with the clamp. Cut the tip of clamp after clamping.	11. Clamp : Bind the HO2 sensor lead wire with the clamp.
2. Clamp : Bind the handlebar switch (R) lead wire and brake hose with the clamp. Cut the tip of clamp after clamping.	"A": Pass the handlebar switch (R) lead wire in front of the guide.
3. Clamp : Bind the wiring harness with the clamp.	"B": Pass the handlebar switch (L) lead wire in front of the guide.
4. Clamp : Bind the handlebar switch harness (L & R) and wiring harness with the clamp.	"C": Pass the wiring harness inside of the seat lock cable.
5. Clamp : Bind the handlebar switch harness (L & R) with the clamp.	"D": Set the coupler between fuel feed hose and air cleaner tube.
6. Clamp	"a": 15 – 25 mm (0.6 – 1.0 in)
7. Clamp : Bind the GP switch lead wire, side stand switch lead wire and wiring harness with the clamp.	"b": 5 – 10 mm (0.2 – 0.4 in)
8. Clamp	"c": 130 – 140 mm (5.1 – 5.5 in)
9. Clamp : Bind the rear brake light switch lead wire and starter motor lead wire with the clamp.	"d": 5 – 15 mm (0.2 – 0.6 in)
10. Clamp	"e": 10 – 20 mm (0.4 – 0.8 in)



I940H1910909-04

1. Clamp	"B": Pass the wiring harness under the high tension cord.
2. Clamp : Cut the tip of clamp after clamping.	"C": Pass the wiring harness backward of the clutch cable.
3. Reservoir inlet hose	"D": Pass the wiring harness between the clutch release assembly and generator cover.
4. Conduction hose	"E": Pass the wiring harness in front of the hose.
5. Clamp	"F": Pass the starter motor lead wire between the hose and battery holder.
6. Clamp : Bind the generator lead wire and side stand switch lead wire with the clamp.	"a": 0 – 20 mm (0 – 0.8 in)
7. Clamp : Bind the GP switch and clutch release assembly with the clamp.	"b": 0 – 10 mm (0 – 0.4 in)
"A": Pass the wiring harness over the high tension cord.	

Specifications

Service Data

B940H2910S001

Electrical

Unit: mm (in)

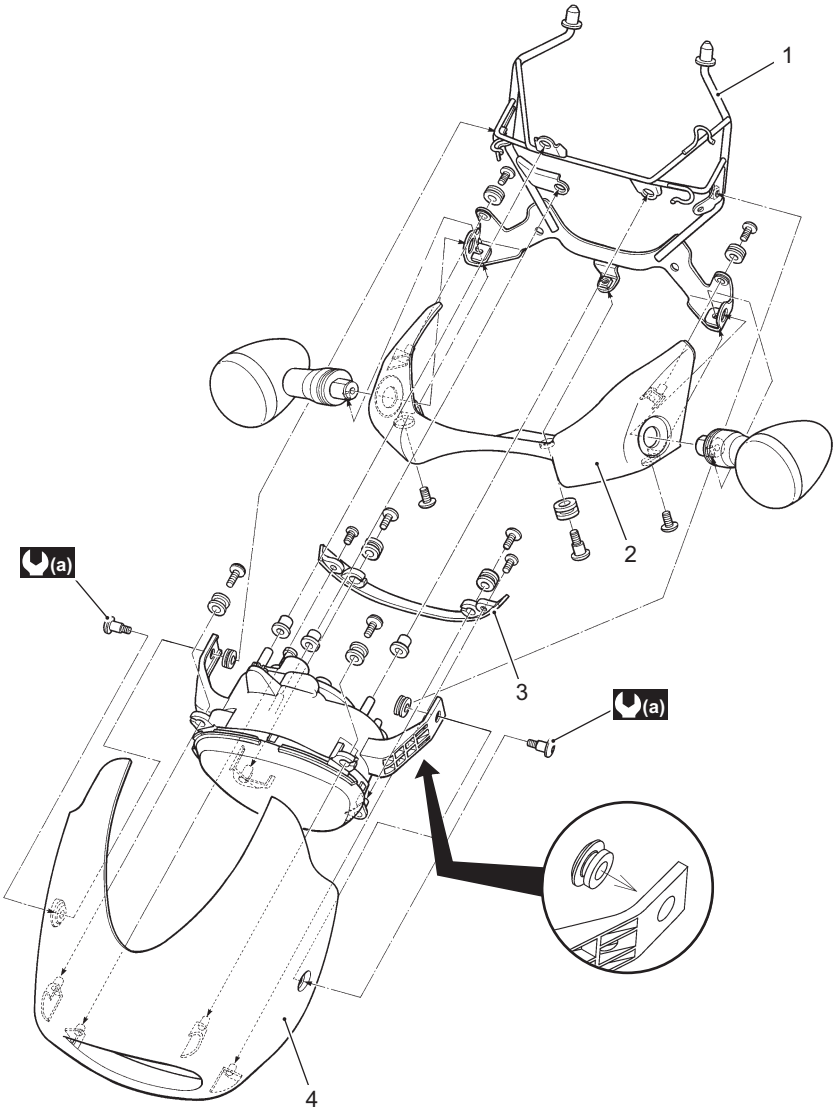
Item			Specification	Note
Fuse size	Headlight	HI	10 A	
		LO	10 A	
	Fuel		10 A	
	Ignition		15 A	
	Signal		10 A	
	Fan motor		15 A	
	Main		30 A	

Lighting Systems

Repair Instructions

Front Lighting System Construction

B940H29206001

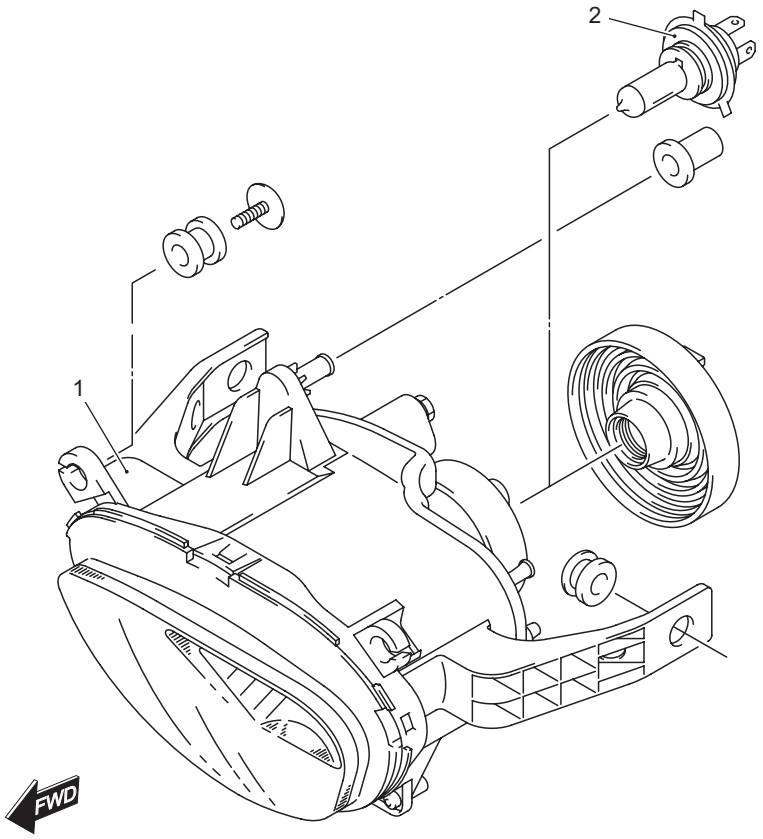


I940H1920033-04

1. Headlight housing brace	3. Headlight cover plate	(a) : 8.5 N·m (0.85 kgf-m, 6.0 lbf-ft)
2. Front turn signal cover	4. Headlight front cover	

Headlight Components

B940H29206002



I940H1920045-02

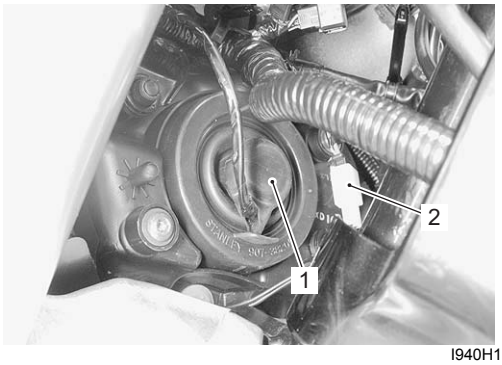
1. Headlight unit	2. Headlight bulb (12 V 60/55 W, H4)

Headlight Removal and Installation

B940H29206003

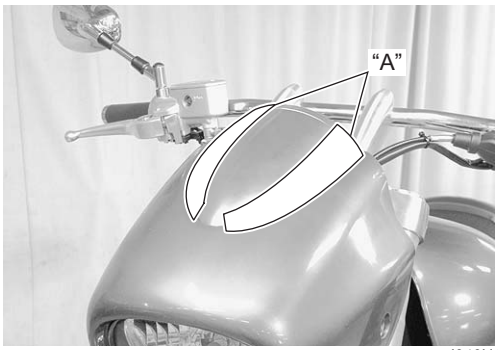
Removal

1) Disconnect the headlight coupler (1).
2) Disconnect the position light coupler (2) (For E-02, 19, 24).

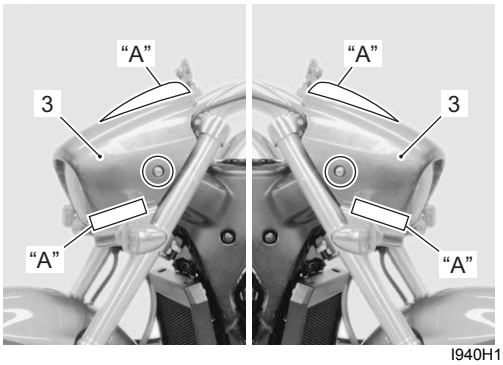


I940H1920001-02

3) Protect the speedometer assembly and headlight cover with a tape to prevent damage.
4) Remove the headlight assembly (3).



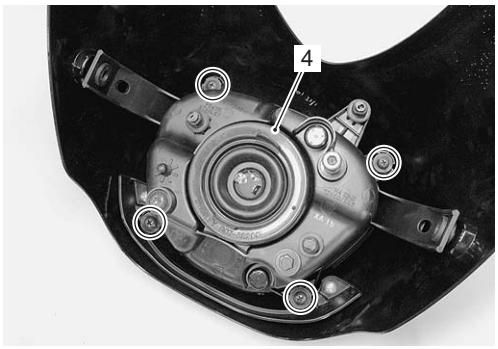
I940H1920037-03



I940H1920038-04

"A": Protect point

5) Remove the headlight unit (4).



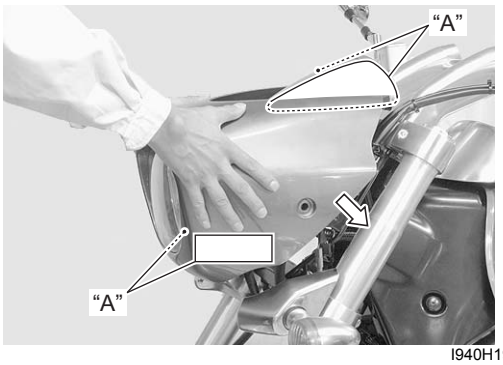
I940H1920003-03

Installation
Install the headlight in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

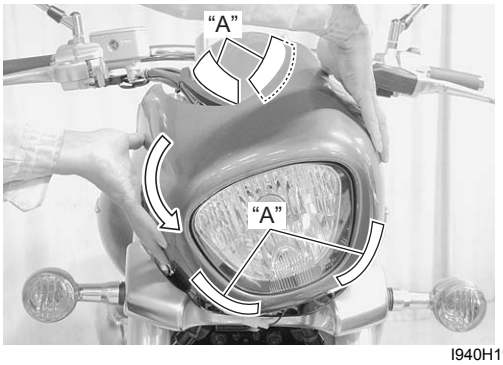
Protect the part "A" of the speedometer assembly and headlight cover with a tape to prevent damage.

- Install the headlight assembly as shown.



I940H1920039-04

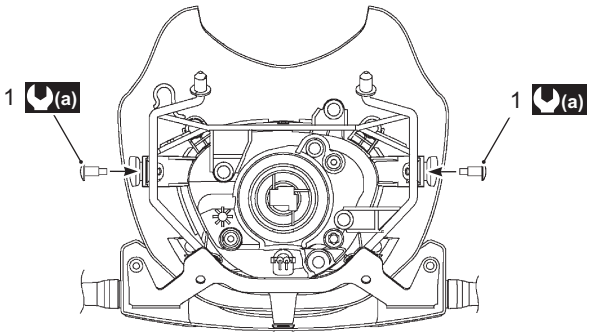
- Rotate the headlight assembly as shown. Next fit the headlight assembly and brace.



I940H1920040-03

- Tighten the bolts (1) to the specified torque.

Tightening torque
Headlight cover mounting bolt (a): 8.5 N·m (0.85 kgf-m, 6.0 lbf-ft)



I940H1920041-02

- After installing, be sure to inspect the headlight beam. Refer to "Headlight Beam Adjustment (Page 9B-4)".

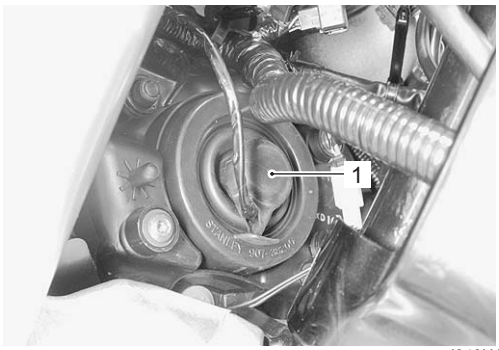
Headlight Bulb Replacement

B940H29206004

⚠ CAUTION

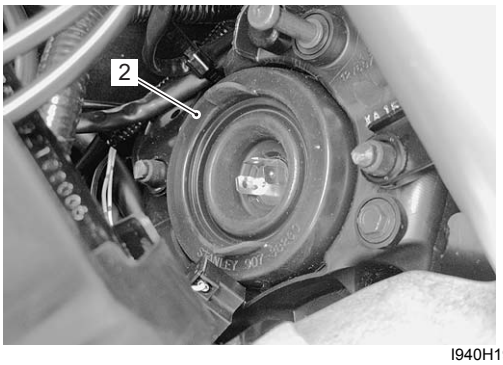
When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soap water to prevent premature bulb failure.

1) Disconnect the headlight coupler (1).



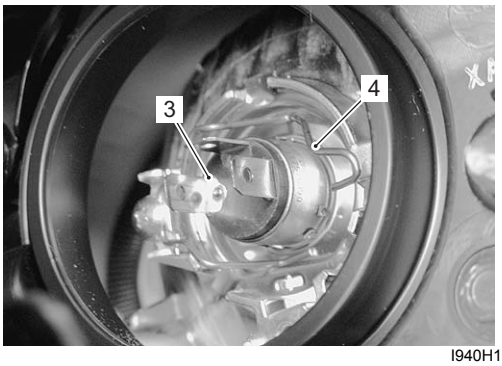
I940H1920004-01

2) Remove the bulb socket rubber cap (2).



I940H1920005-01

3) Replace the headlight bulb (3) by unhooking the bulb holder spring (4).



I940H1920006-01

4) Install the headlight assembly and headlight cover. Refer to “Headlight Removal and Installation (Page 9B-2)”.

Headlight Beam Adjustment

B940H29206005

1) Insert hexagon wrench as shown in the figure and adjust the headlight beam vertically.



I940H1920007-02

2) Adjust the headlight beam horizontally with a hexagon wrench.



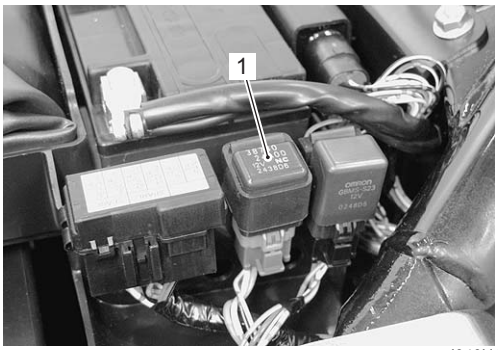
I940H1920008-01

Headlight Relay Inspection

B940H29206006

Inspect the headlight relay in the following procedures:

1) Remove the front seat. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the headlight relay (1).

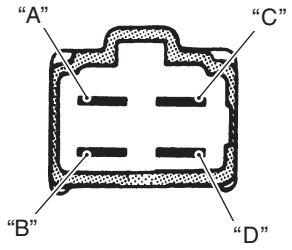


I940H1920009-01

3) First, check for continuity with the tester between terminals “A” and “B”. Next, check for continuity between “A” and “B” with 12 V voltage applied, positive (+) to terminal “C” and negative (–) to terminal “D”. If the continuity is found when 12 V is applied, replace the relay with a new one.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

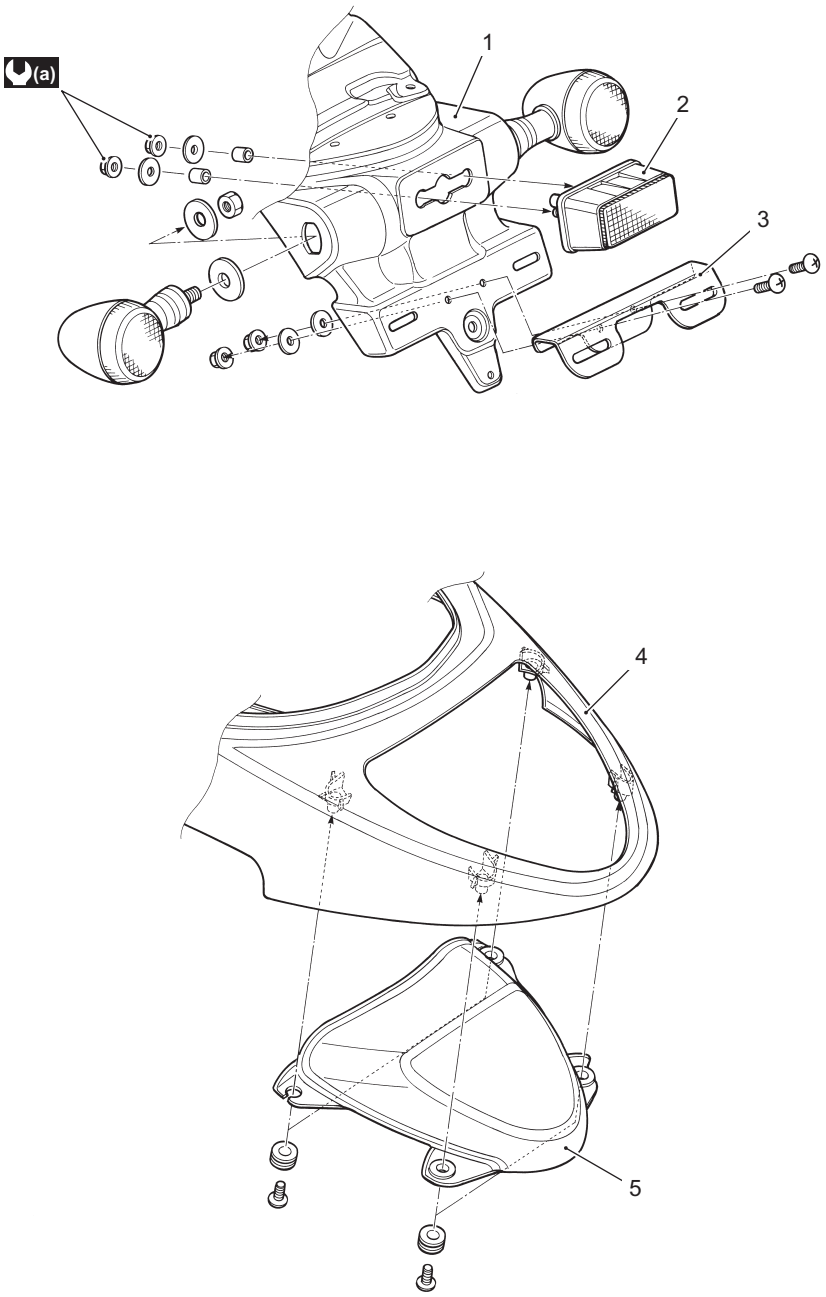
Tester knob indication
Continuity test (•))))



I718H1170013-01

Rear Lighting System Construction

B940H29206007



I940H1920034-01

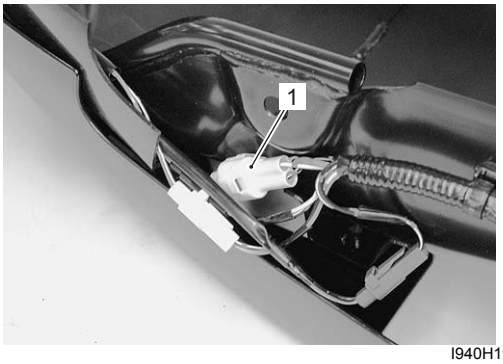
1. Rear fender extension	3. License plate bracket (E-02, 19, 24 only)	5. Brake light/Tail light
2. License plate light	4. Rear fender	(a) : 5 N·m (0.5 kgf-m, 3.5 lbf-ft)

Rear Combination Light Removal and Installation

B940H29206008

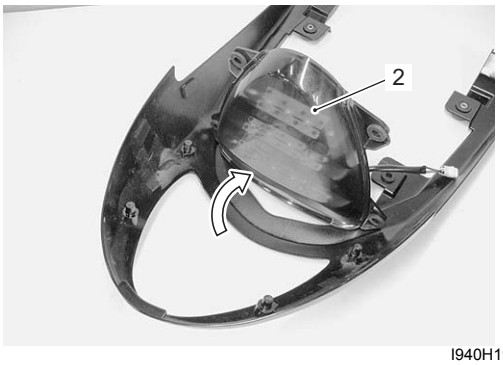
Removal

1) Remove the rear fender assembly. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Disconnect the rear combination light coupler (1).



I940H1920010-01

3) Remove the rear fender from the rear fender brace. Refer to “Rear Fender Construction in Section 9D (Page 9D-4)”.
4) Remove the rear combination light (2).

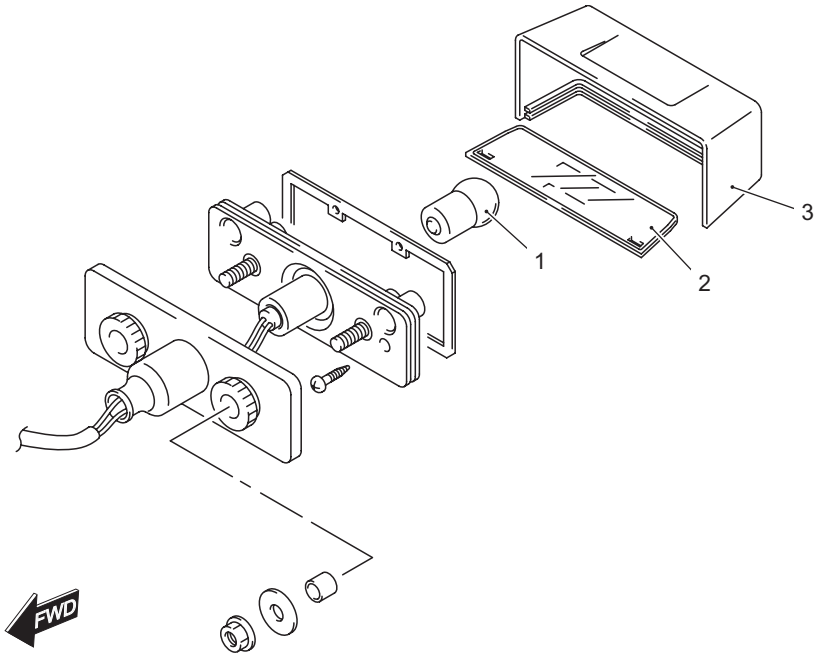


I940H1920012-02

Installation
Install the rear combination light in the reverse order of removal.

License Plate Light Components

B940H29206009



I940H1920046-01

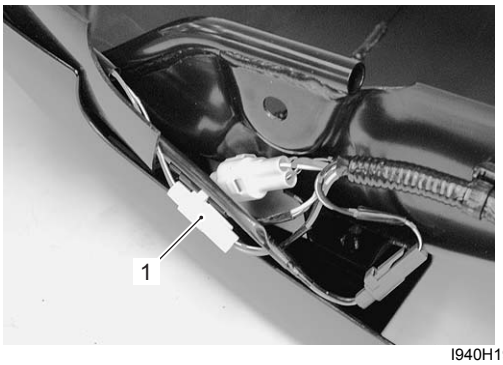
1. License plate light bulb (12 V 5 W)	2. Lens	3. Lens cover

License Plate Light Removal and Installation

B940H29206010

Removal

1) Remove the rear fender extension. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Disconnect the licence plate light coupler (1).



I940H1920013-01

3) Remove the license plate light by removing the nuts.



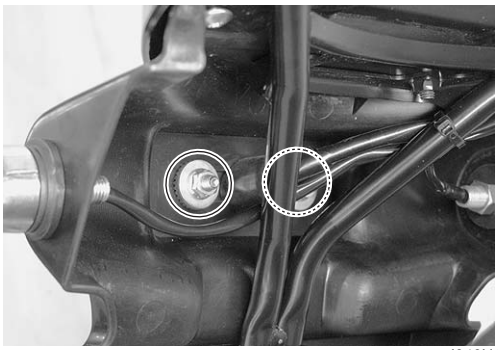
I940H1920014-01

Installation
Install the license plate light in the reverse order of removal.

License Plate Light Bulb Replacement

B940H29206011

1) Remove the license plate light by removing the nuts.



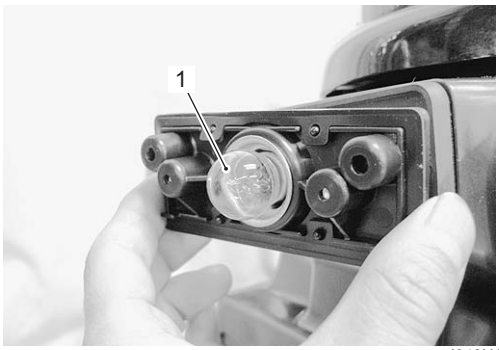
I940H1920015-01

2) Remove the lens by removing the screws.



I940H1920016-01

3) Replace the bulb (1).

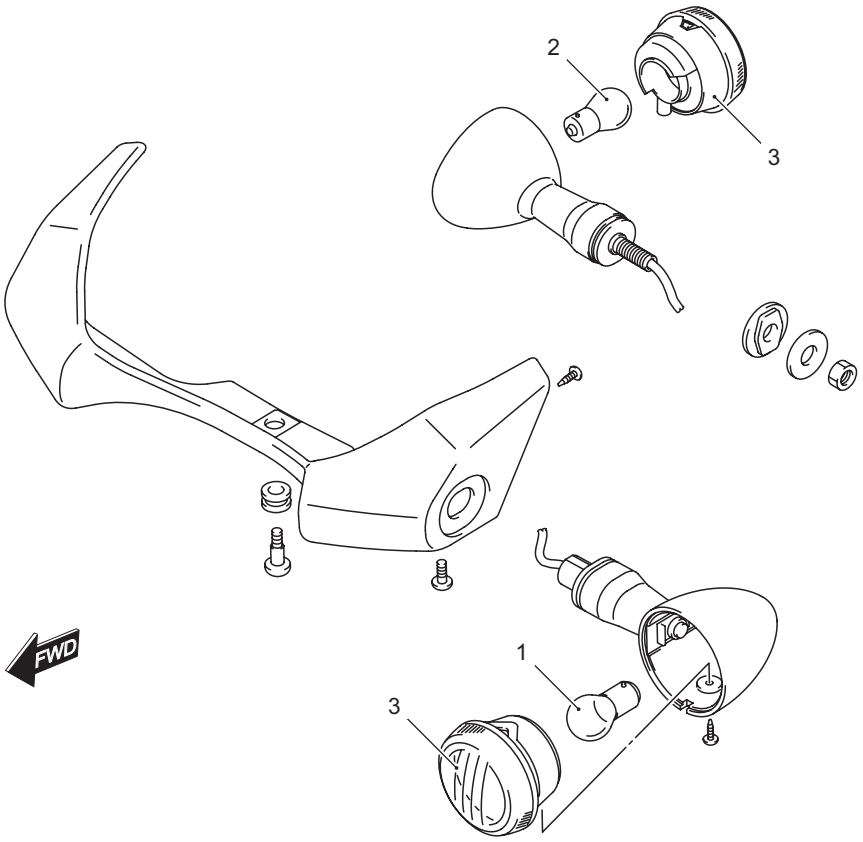


I940H1920017-01

4) Reinstall the lens.

Turn Signal Light Components

B940H29206012



I940H1920048-02

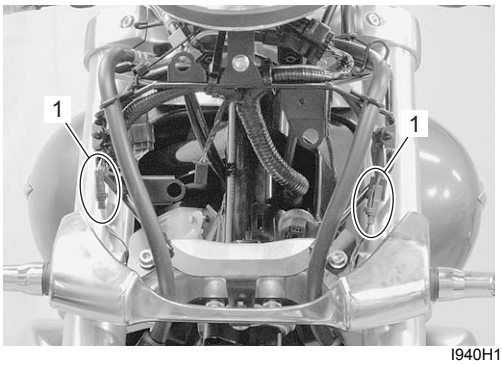
1. Front turn signal light bulb (12 V 21/5 W x 2 for E-03, 28, 33) Front turn signal light bulb (12 V 21 W x 2 for E-02, 19, 24)	3. Lens
2. Rear turn signal light bulb (12 V 21 W x 2)	

Front Turn Signal Light Removal and Installation

B940H29206013

Removal

1) Remove the headlight assembly. Refer to “Headlight Removal and Installation (Page 9B-2)”.
2) Disconnect the turn signal light couplers (1).



I940H1920042-02

3) Remove the turn signal light (2) by removing the mounting bolt (3) (left and right).



I940H1920043-02

Installation

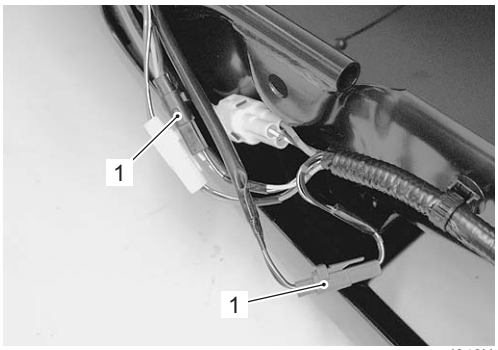
Install the front turn signal light in the reverse order of removal.

Rear Turn Signal Light Removal and Installation

B940H29206014

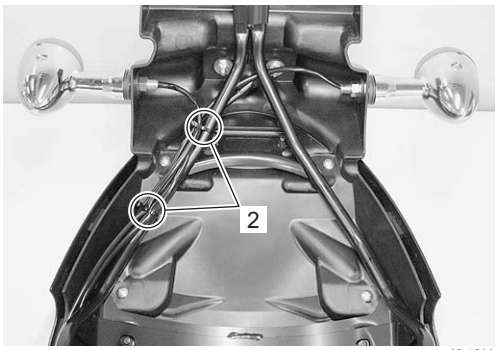
Removal

1) Remove the rear fender. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the rear fender from the rear fender brace. Refer to “Rear Fender Construction in Section 9D (Page 9D-4)”.
3) Disconnect the rear turn signal light coupler (RH: Black LH: Gray) (1).



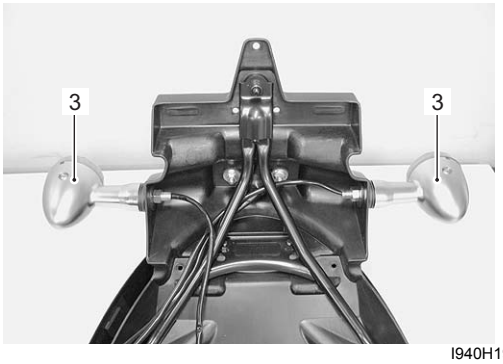
I940H1920023-01

4) Remove the clamps (2).



I940H1920024-01

5) Remove the rear turn signal (3).



I940H1920025-01

Installation

Install the rear turn signal light in the reverse order of removal.

Turn Signal Light Bulb Replacement

B940H29206015

⚠ CAUTION

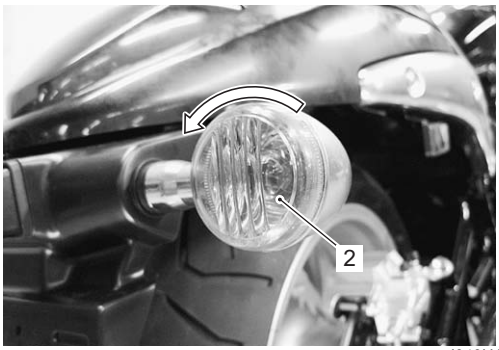
When you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soap water to prevent premature bulb failure.

1) Remove the screw (1).



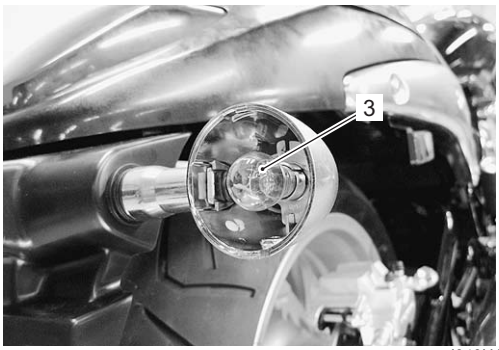
I940H1920026-01

2) Remove the rear turn signal lens (2).



I940H1920027-01

3) Replace the bulb (3).



I940H1920028-01

4) Reinstall the lens.

Turn Signal / Side-stand Relay Inspection

B940H29206016

Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.

NOTE

Make sure that the battery is fully charged.

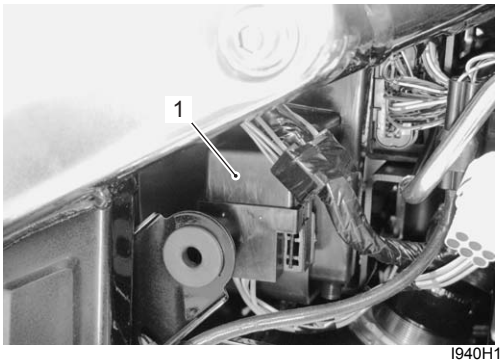
Before removing the turn signal/side-stand relay, check the operation of the turn signal light.
If the turn signal light does not illuminate, inspect the bulb, turn signal switch and circuit connection.
If the bulb, turn signal switch and circuit connection are OK, the turn signal relay may be faulty; therefore, replace the turn signal/side-stand relay with a new one. Refer to “Turn Signal / Side-stand Relay Removal and Installation (Page 9B-10)”.

Turn Signal / Side-stand Relay Removal and Installation

B940H29206017

Removal

1) Remove the right frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the turn signal/side-stand relay (1).



I940H1920044-01

Installation

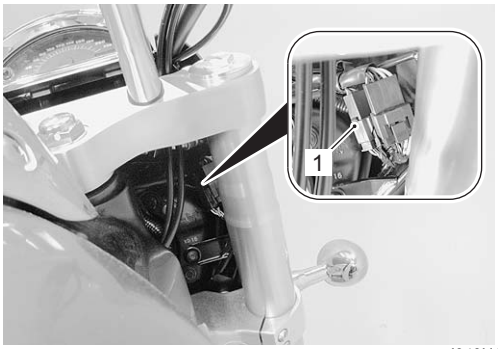
Install the turn signal/side-stand relay in the reverse order of removal.

Hazard Switch Inspection

B940H29206018

Inspect the hazard switch in the following procedures:

1) Disconnect the left handlebar switch coupler (1).



I940H1920035-01

2) 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 (Page 6B-1)”.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity (•))))

Position \ Color	B	Lbl	Lg
OFF			
ON	○	○	○

I822H1920024-01

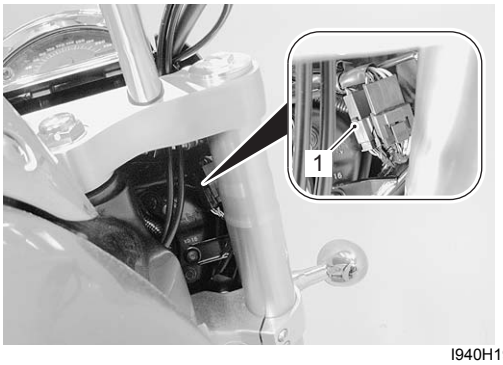
3) After finishing the hazard switch inspection, reinstall the removed parts.

Turn Signal Switch Inspection

B940H29206019

Inspect the turn signal switch in the following procedures:

1) Disconnect the left handlebar switch coupler (1).



I940H1920035-01

2) 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 (Page 6B-1)”.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity (•))))

Position \ Color	Lg	Lbl	B
L		○	○
PUSH			
R	○	○	

I822H1920026-01

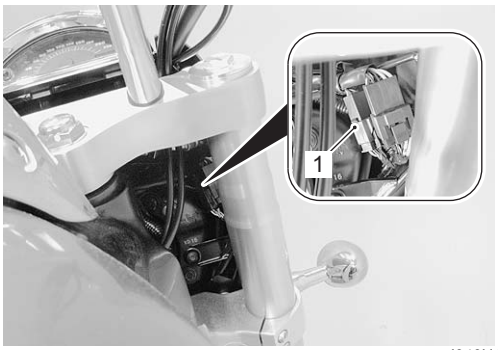
3) After finishing the turn signal switch inspection, reinstall the removed parts.

Passing Light Switch Inspection

B940H29206020

Inspect the passing light switch in the following procedures:

1) Disconnect the left handlebar switch coupler (1).



I940H1920035-01

2) 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 (Page 6B-1)”.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity (•)))

Color / Position	Y/W	Y
•		
PUSH	○———	———○

I822H1920028-02

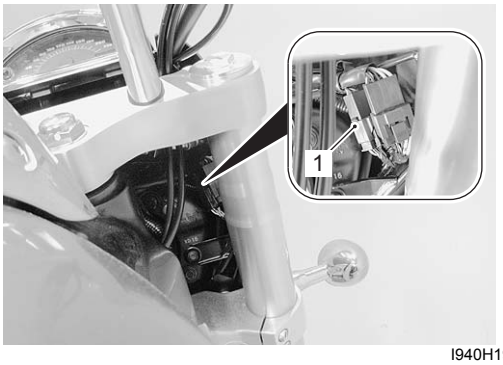
3) After finishing the passing light switch inspection, reinstall the removed parts.

Dimmer Switch Inspection

B940H29206021

Inspect the dimmer switch in the following procedures:

1) Disconnect the left handlebar switch coupler (1).



I940H1920035-01

2) 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 (Page 6B-1)”.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity (•)))

Color / Position	W	Y	Y/W
HI (≣D)		○———	———○
LO (≣D)	○———		———○

I822H1920030-03

3) After finishing the dimmer switch inspection, reinstall the removed parts.

Specifications

Service Data

B940H29207001

Wattage
Unit: W

Item		Specification	
		E-03, 28, 33	E-02, 19, 24
Headlight	HI	60	←
	LO	55	←
Position light		—	5
Front turn signal light/Position light		21/5	—
Front turn signal light		—	21
Rear turn signal light		21	←
License plate light		5	←

Tightening Torque Specifications

B940H29207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Headlight cover mounting bolt	8.5	0.85	6.0	☞(Page 9B-3)

NOTE

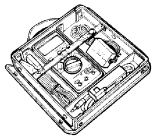
The specified tightening torque is described in the following.
“Front Lighting System Construction (Page 9B-1)”
“Rear Lighting System Construction (Page 9B-5)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Special Tool

B940H29208001

09900–25008 Multi-circuit tester set ☞(Page 9B-4) / ☞(Page 9B-10) / ☞(Page 9B-10) / ☞(Page 9B-11) / ☞(Page 9B-11)		

Combination Meter / Fuel Meter / Horn

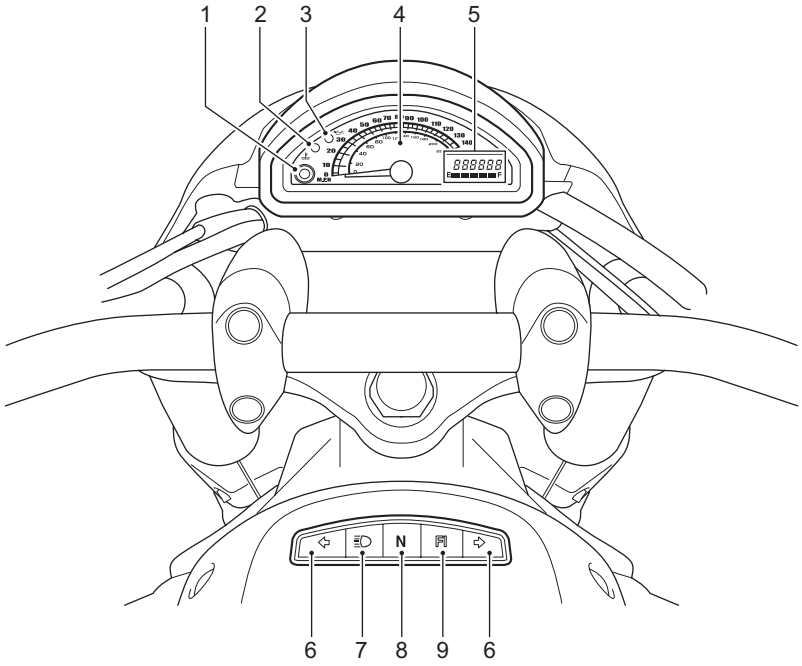
General Description

Combination Meter System Description

B940H29301001

This combination meter mainly consists of the stepping motor, LCD (Liquid Crystal Display) and LED (Light Emitting Diode).
The pointer is driven by the stepping motor.
The LCDs indicate, Odo / Trip A / Trip B, Fuel level indicator and Clock / FI (DTC) respectively.

LED (Light Emitting Diode)
LED is used for the illumination light and each indicator light.
LED is maintenance free. LED is less power consuming and more resistant to vibration resistance compared to the bulb.



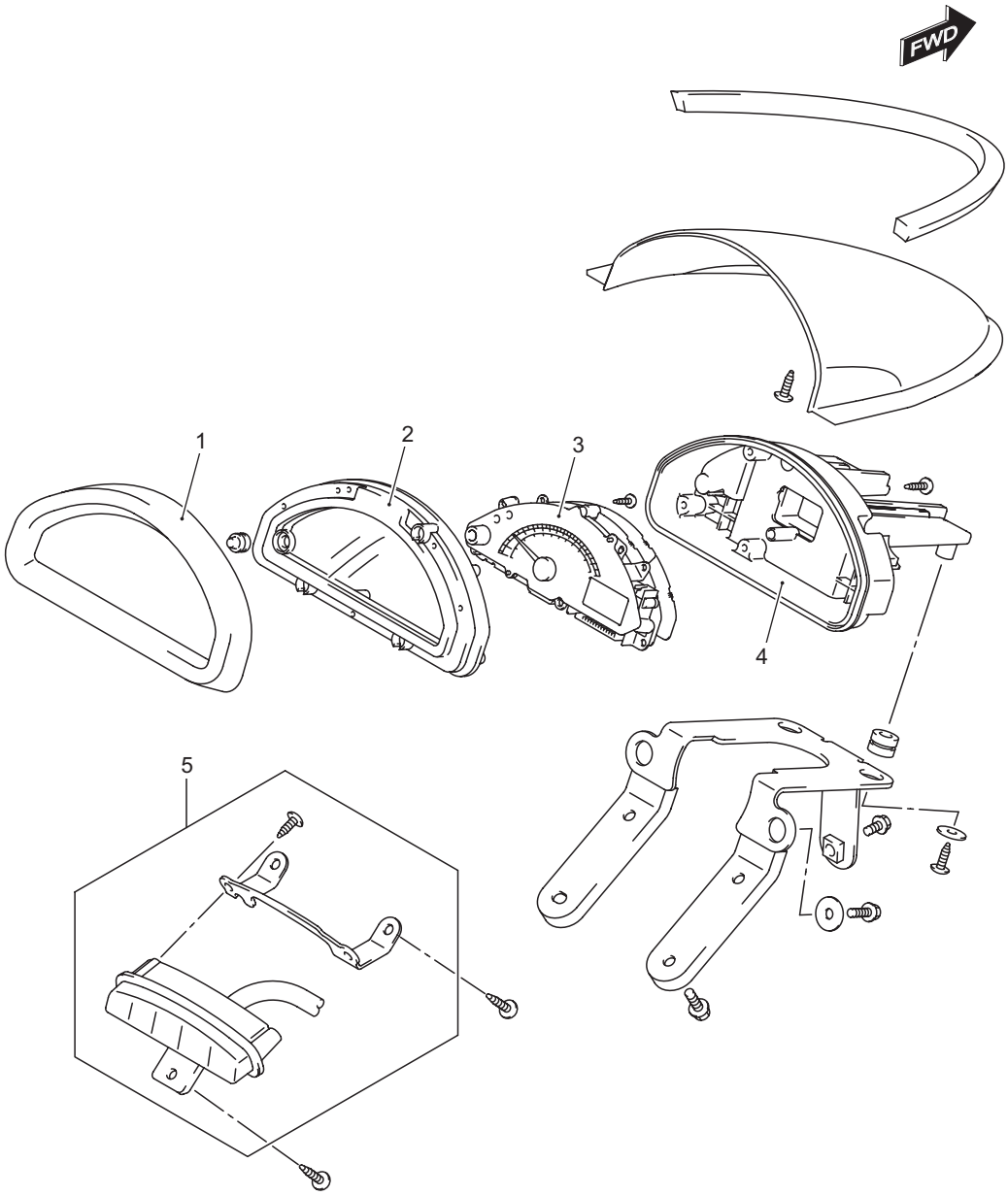
I940H1930001-02

1. Adjust switch (Odo / Trip / Clock)	6. LED (Turn signal indicator light)
2. LED (Coolant temperature indicator)	7. LED (High-beam indicator light)
3. LED (Oil pressure indicator light)	8. LED (Neutral indicator light)
4. Speedometer	9. LED (FI indicator light)
5. LCD (Odo / Trip A / Trip B / Clock / Fuel level)	

Repair Instructions

Combination Meter Components

B940H29306001



I940H1930032-01

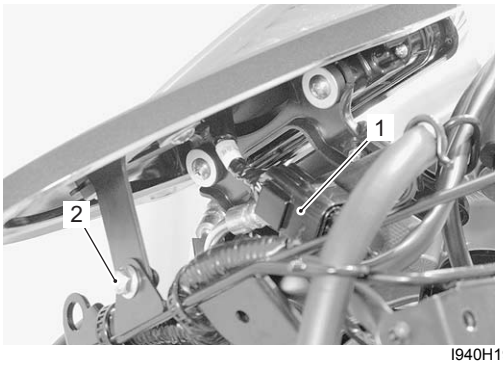
1. Upper cover	3. Combination meter	5. Pilot lamp assembly
2. Upper case assembly	4. Lower case	

Combination Meter Removal and Installation

B940H29306002

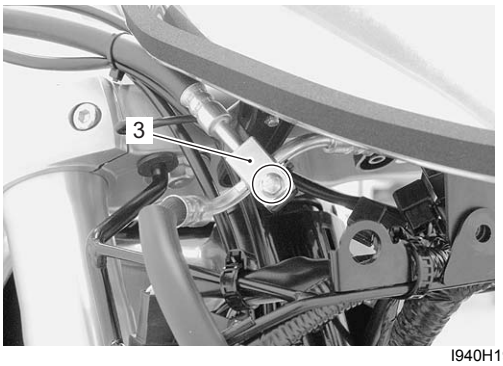
Removal

1) Remove the headlight assembly. Refer to “Headlight Removal and Installation in Section 9B (Page 9B-2)”.
2) Disconnect the combination meter coupler (1)
3) Remove the bolt (2).



I940H1930002-01

4) Remove the front brake hose joint (3).



I940H1930003-01

5) Remove the combination meter by removing the bolts (4).

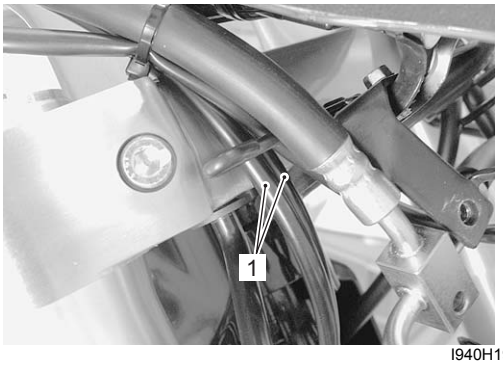


I940H1930004-01

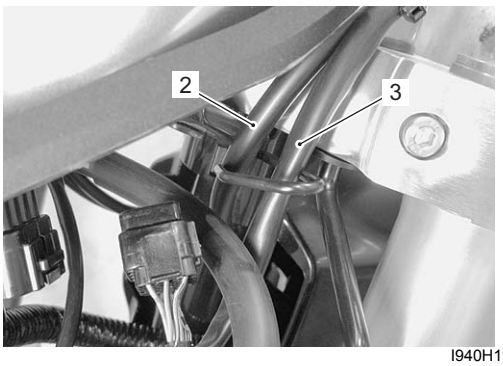
Installation

Install the combination meter in the reverse order of removal. Pay attention to the following points:

- Before install the combination meter, pass the throttle cables (1), clutch cable (2), left handle switch lead wire (3) as shown.



I940H1930005-01



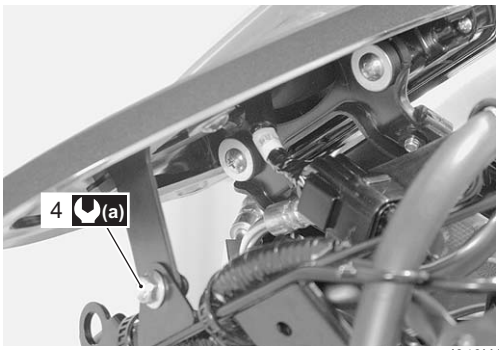
I940H1930006-01

- Install the combination meter and tighten the bolts (4) to the specified torque.

Tightening torque
Combination meter mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)



I940H1930007-01



I940H1930008-01

Combination Meter Disassembly and Assembly

B940H29306003

Refer to “Combination Meter Removal and Installation (Page 9C-2)”.

Disassembly

Disassemble the combination meter as shown in the combination meter components. Refer to “Combination Meter Components (Page 9C-2)”.

Assembly

Assemble the combination meter as shown in the combination meter components. Refer to “Combination Meter Components (Page 9C-2)”.

NOTE

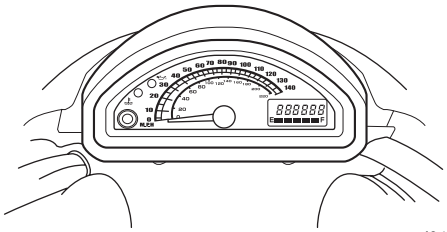
Fix the boot of the combination meter coupler properly.

Combination Meter Inspection

B940H29306004

LED Inspection

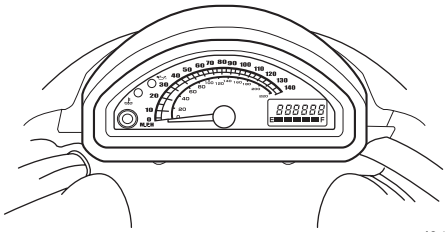
Check that the LEDs (FI indicator light, Oil pressure/ Engine coolant temperature indicator light and Meter panel illumination) immediately light up when the ignition switch is turned to ON.
Check that other LEDs (Neutral indicator light, High-beam indicator light and Turn signal indicator lights) light 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. Refer to “Combination Meter Removal and Installation (Page 9C-2)”.



I940H1930009-02

Stepping Motor Inspection and Adjustment

1) Check that the pointer calibrates itself immediately after turning the ignition switch on and stops at zero point.
   If abnormal condition is found, replace the combination meter unit with a new one after checking its wire harness/coupler.

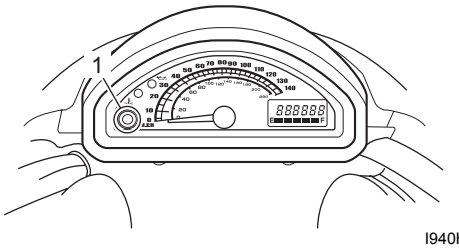


I940H1930009-02

NOTE

- **The pointer may not return to the proper position even turning the ignition switch on under low temperature condition. In that case, you can reset the pointer to the proper position by the following instruction.**
- **Complete the operation within 10 seconds after the ignition switch has been turned ON.**

2) With the adjuster switch (1) pressed, turn the ignition switch ON.
3) Hold the adjuster switch (1), 3 to 5 seconds after turning the ignition switch ON.
4) Release the adjuster switch (1) and rap the adjuster switch (1) twice (within 1 second). → Reset



I940H1930010-03

Time	Ignition switch	Adjuster switch (1)
	OFF	PUSH
0	ON	
•		
•		
3 sec.		
•		
5 sec.		Release
•		Push
•		
•		Push→Reset
•		
10 sec.		

I718H1930006-01

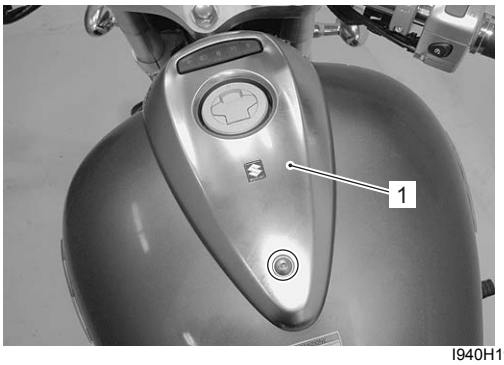
5) Pointer will return to the starting point right after the completion of the operation. In the case of the pointer not returning to the proper position after doing above, replace the combination meter unit. Refer to “Combination Meter Removal and Installation (Page 9C-2)”.

Pilot Lamp Removal and Installation

B940H29306005

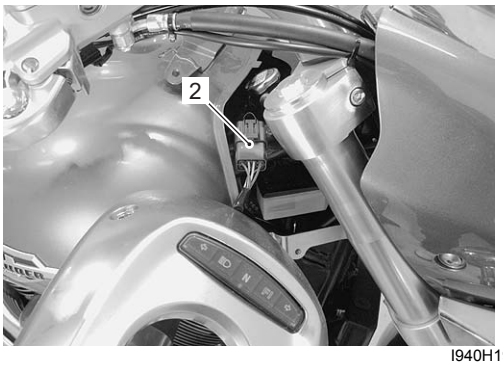
Removal

1) Remove the right frame head cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the fuel tank cover (1).



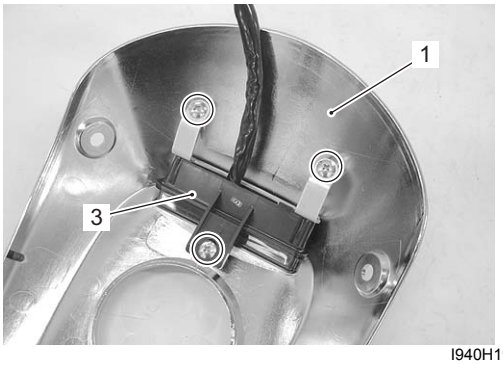
I940H1930011-01

3) Disconnect the pilot lamp lead wire coupler (2).



I940H1930012-01

4) Remove the pilot lamp (3) from the fuel tank cover (1).



I940H1930013-01

Installation

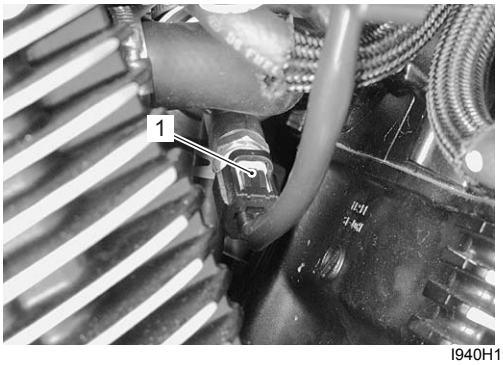
Install the pilot lamp in the reverse order of removal.

Engine Coolant Temperature Indicator Light Inspection

B940H29306006

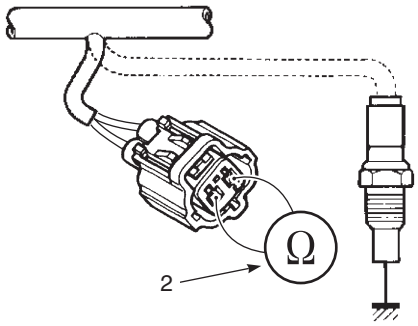
Inspect the engine coolant temperature indicator light in the following procedures:

1) Remove the right air cleaner box. Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-6)”.
2) Disconnect the ECT sensor coupler (1).



I940H1930014-01

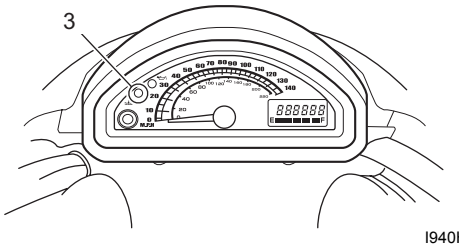
3) Connect the variable resistor (2) between the terminals.



I718H1930009-05

4) Turn the ignition switch ON.
5) Check the LED operations when the resistance is adjusted to the specified values.
   If either one or all indications are abnormal, replace the combination meter with a new one. Refer to “Combination Meter Removal and Installation (Page 9C-2)”.

Resistance	LED (3)	Water temperature
0.11 kΩ and over	OFF	120 °C below
0.11 kΩ and below	ON	120 °C and over



I940H1930015-02

6) Connect the ECT sensor coupler.

Engine Coolant Temperature Removal and Installation

B940H29306007

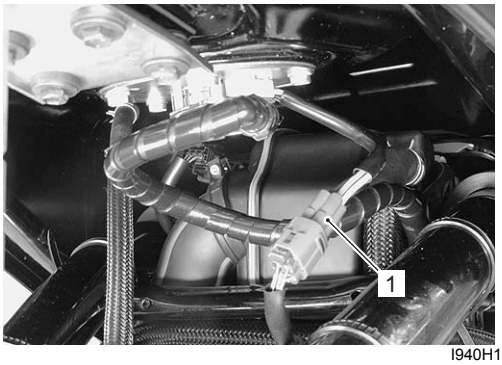
Refer to “ECT Sensor Removal and Installation in Section 1C (Page 1C-4)”.

Fuel Level Indicator Inspection

B940H29306008

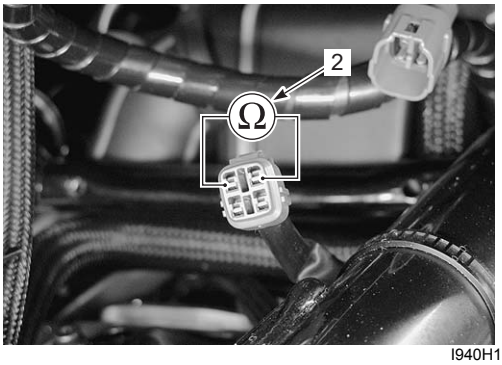
Inspect the fuel level indicator in the following procedures:

1) Support the motorcycle with a jack or wooden block.
2) Lift and support the fuel tank. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.
3) Disconnect the fuel level gauge coupler (1).



I940H1930033-01

4) Connect variable resistor (2) between the B/Lg and B/W lead wires from the wire harness.



I940H1930017-01

5) Turn the ignition switch ON.
6) Check the display of fuel level indicator (LCD) as shown in the figure.
   If any abnormality is found, replace the combination meter with a new one. Refer to “Combination Meter Removal and Installation (Page 9C-2)”.

NOTE

Side-stand is “ON” (side-stand up) position when inspecting it.

Resistance	Thermistor	Fuel level meter
—	ON	Flicker E□□□□□F
More than 134 Ω	OFF	E■□□□□F
78 – 134 Ω	OFF	E■■□□□F
38.3 – 78 Ω	OFF	E■■■□□F
16.6 – 38.3 Ω	OFF	E■■■■□F
Less than 16.6 Ω	OFF	E■■■■■F

I940H1930018-04

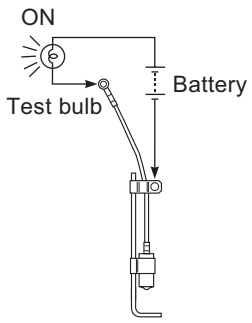
7) Connect the fuel level gauge coupler and reinstall the fuel tank.
   Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-9)”.

Fuel Level Indicator Switch (Thermistor) Inspection

B940H29306009

Inspect the fuel level indicator switch in the following procedures:

1) Remove the fuel pump. Refer to “Fuel Pump Assembly / Fuel Level Gauge Removal and Installation in Section 1G (Page 1G-12)”.
2) Remove the thermistor from the fuel pump. Refer to “Fuel Pump Disassembly and Assembly in Section 1G (Page 1G-13)”.
3) Connect 12 V battery and test bulb (12 V, 3.4 W) to the fuel level indicator switch as shown in the figure. The bulb should come on after one minutes if the switch is in good condition.

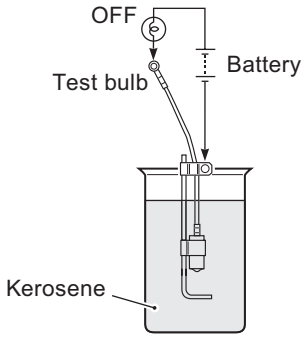


I822H1930010-03

4) When the switch is immersed in kerosene, the bulb should go out. If the bulb remains lit, replace the unit with a new one.

NOTE

- **When the bulb turns off, immediately pick up the switch from kerosene.**
- **After the check has been completed, wash the switch with gasoline.**



I822H1930011-03

5) Reinstall the removed parts. Refer to “Fuel Pump Disassembly and Assembly in Section 1G (Page 1G-13)”.

Fuel Level Gauge Inspection

B940H29306010

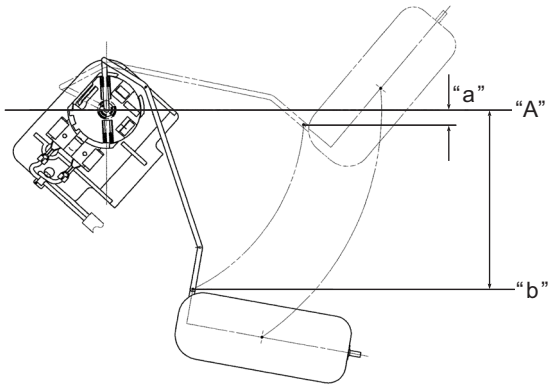
Inspect the fuel level gauge in the following procedures:

1) Remove the fuel level gauge. Refer to “Fuel Pump Assembly / Fuel Level Gauge Removal and Installation in Section 1G (Page 1G-12)”.
2) Measure the resistance at each fuel level gauge in float position. If the resistance is incorrect, replace fuel level gauge with a new one.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Resistance (Ω)

Float position	Resistance
Full “a”	Approx. 10 Ω
Empty “b”	Approx. 216 Ω



I940H1930031-02

“a”: 6.5 mm (0.26 in)	“b”: 72.1 mm (2.84 in)	“A”: Horizontal

3) Install the fuel level gauge. Refer to “Fuel Pump Assembly / Fuel Level Gauge Removal and Installation in Section 1G (Page 1G-12)”.

Speedometer Inspection

B940H29306011

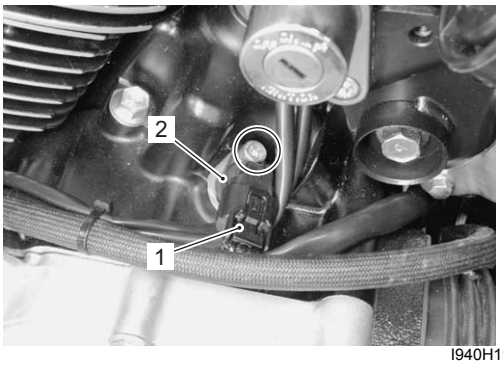
If the speedometer, odometer or tripmeter does not function properly, inspect the speed sensor and the coupler connections. If the speed sensor and coupler connections are OK, replace the combination meter unit with a new one. Refer to “Combination Meter Removal and Installation (Page 9C-2)”.

Speed Sensor Removal and Installation

B940H29306012

Removal

1) Remove the secondary gear case cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Remove the left frame lower cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
3) Disconnect the speed sensor coupler (1).
4) Remove the speed sensor (2).



I940H1930019-01

Installation

Install the speed sensor in the reverse order of removal. Pay attention to the following points:

- Apply grease to the O-ring.

⚠ CAUTION

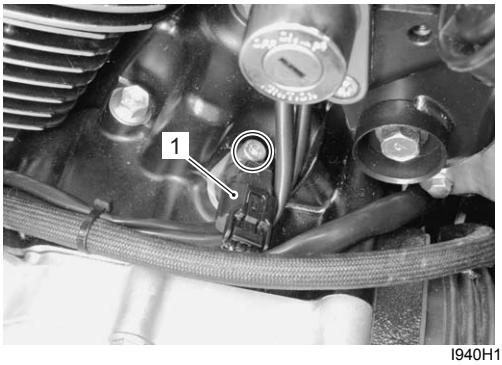
Use a new O-ring to prevent oil leakage.

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



I940H1930020-01

- Tighten the speed sensor (1).



I940H1930021-01

Speed Sensor Inspection

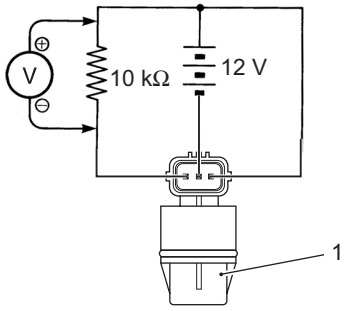
B940H29306013

Inspect the speed sensor in the following procedures:

1) Remove the speed sensor. Refer to “Speed Sensor Removal and Installation (Page 9C-7)”.
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 in the figure.

Special tool
: 09900–25008 (Multi-circuit tester set)

Tester knob indication
Voltage (⎓)



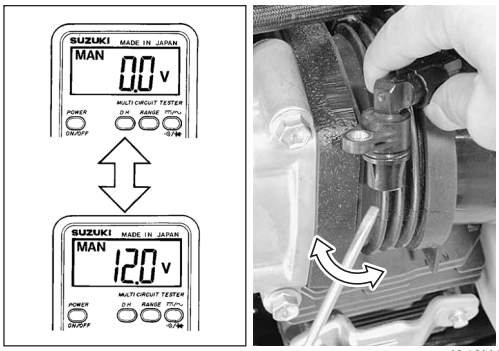
I831G1930018-05

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).



I940H1930022-01

Oil Pressure Indicator Inspection

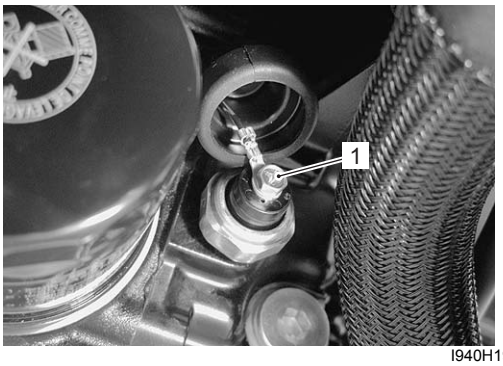
B940H29306014

Inspect the oil pressure indicator in the following procedures:

NOTE

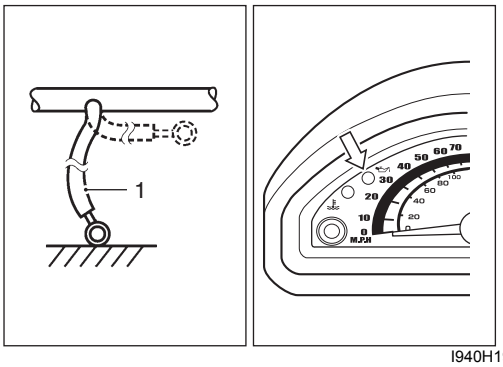
Before inspecting the oil pressure switch, check if the engine oil level is correct. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-8)”.

1) Disconnect the oil pressure switch lead wire (1) from the oil pressure switch.



I940H1930023-01

2) Turn the ignition switch ON.
3) Check if the oil pressure indicator (LED) and LCD will light up when grounding the lead wire (1).
If the oil pressure indicator does not light up, replace the combination meter unit with a new one after checking the connection of couplers.



I940H1930024-03

Oil Pressure Switch Removal and Installation

B940H29306015

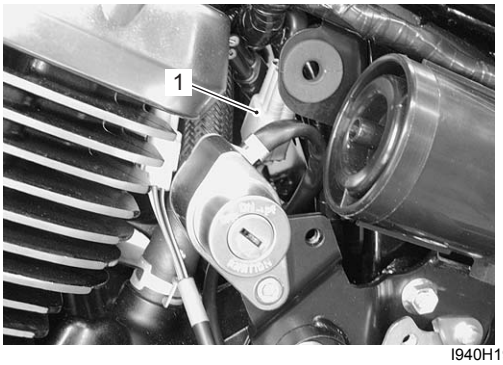
Refer to “Oil Pressure Switch Removal and Installation in Section 1E (Page 1E-5)”.

Ignition Switch Inspection

B940H29306016

Inspect the ignition switch in the following procedures:

1) Remove the left frame side cover. Refer to “Exterior Parts Removal and Installation in Section 9D (Page 9D-5)”.
2) Disconnect the ignition switch coupler (1).



I940H1930025-01

3) Inspect the ignition switch for continuity with a tester. If any abnormality is found, replace the ignition switch with a new one.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

Tester knob indication
Continuity (•))))

Position \ Color	R	O	O/Y	Gr	Br
OFF					
ON	○	○	○	○	○
P	○				○

I822H1930021-06

4) After finishing the ignition switch inspection, reinstall the removed parts.

Ignition Switch Removal and Installation

B940H29306017

Refer to “Ignition Switch Removal and Installation in Section 1H (Page 1H-10)”.

Horn Inspection

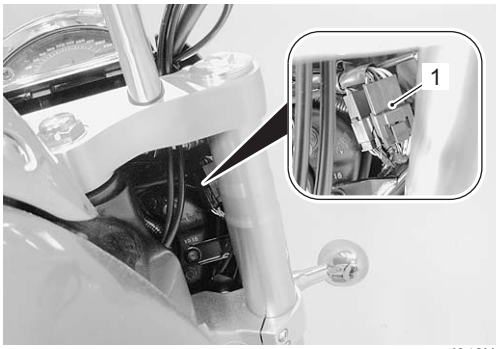
B940H29306018

NOTE

If the horn sound condition is normal, it is not necessary to inspect the horn button continuity.

Horn Button Inspection

1) Turn the steering to the left.
2) Disconnect the left handlebar switch coupler (1).



I940H1180014-03

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 (Page 6B-1)”.

Special tool
TOOL : 09900–25008 (Multi-circuit tester set)

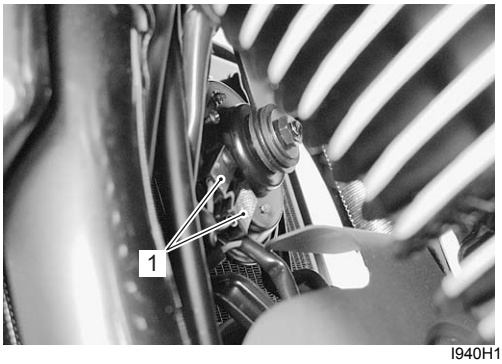
Tester knob indication
Continuity (•)))

Color / Position	B/Bl	B/W
•		
PUSH	○———	———○

I822H1930030-02

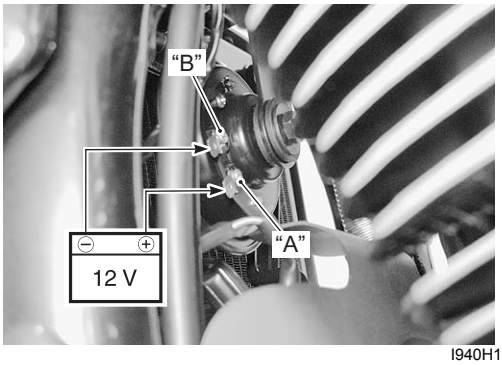
Horn Inspection

1) Disconnect the horn couplers (1).



I940H1930027-01

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.



I940H1930028-01

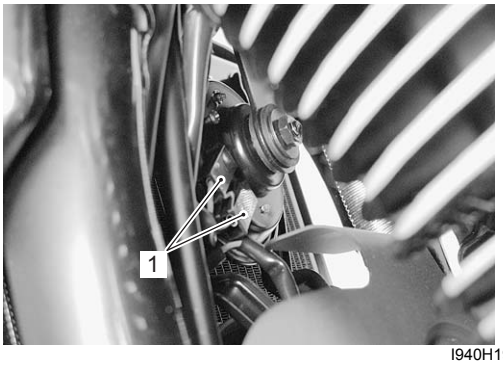
3) Connect the horn coupler.

Horn Removal and Installation

B940H29306019

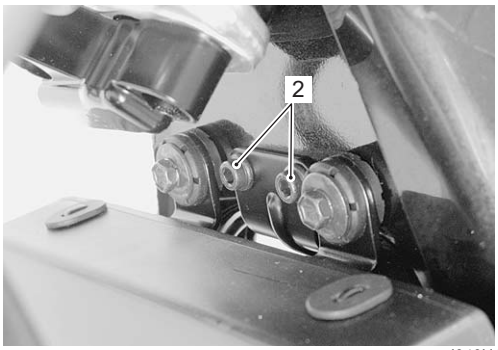
Removal

1) Disconnect the horn couplers (1).



I940H1930027-01

2) Remove the horn by removing the mounting bolts (2).



I940H1930030-01

Installation

Install the horn in the reverse order of removal.

Specifications

Service Data

B940H29307001

Wattage

Unit: W

Item	Specification
Brake light/Taillight	LED
Speedometer light	LED
Turn signal indicator light	LED
High beam indicator light	LED
Neutral position indicator light	LED
Coolant temperature indicator light	LED
Oil pressure indicator light	LED
FI indicator light	LED

Tightening Torque Specifications

B940H29307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Combination meter mounting bolt	10	1.0	7.0	☞(Page 9C-3)

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

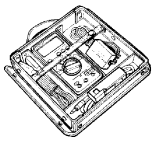
Recommended Service Material

B940H29308001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 9C-8)

Special Tool

B940H29308002

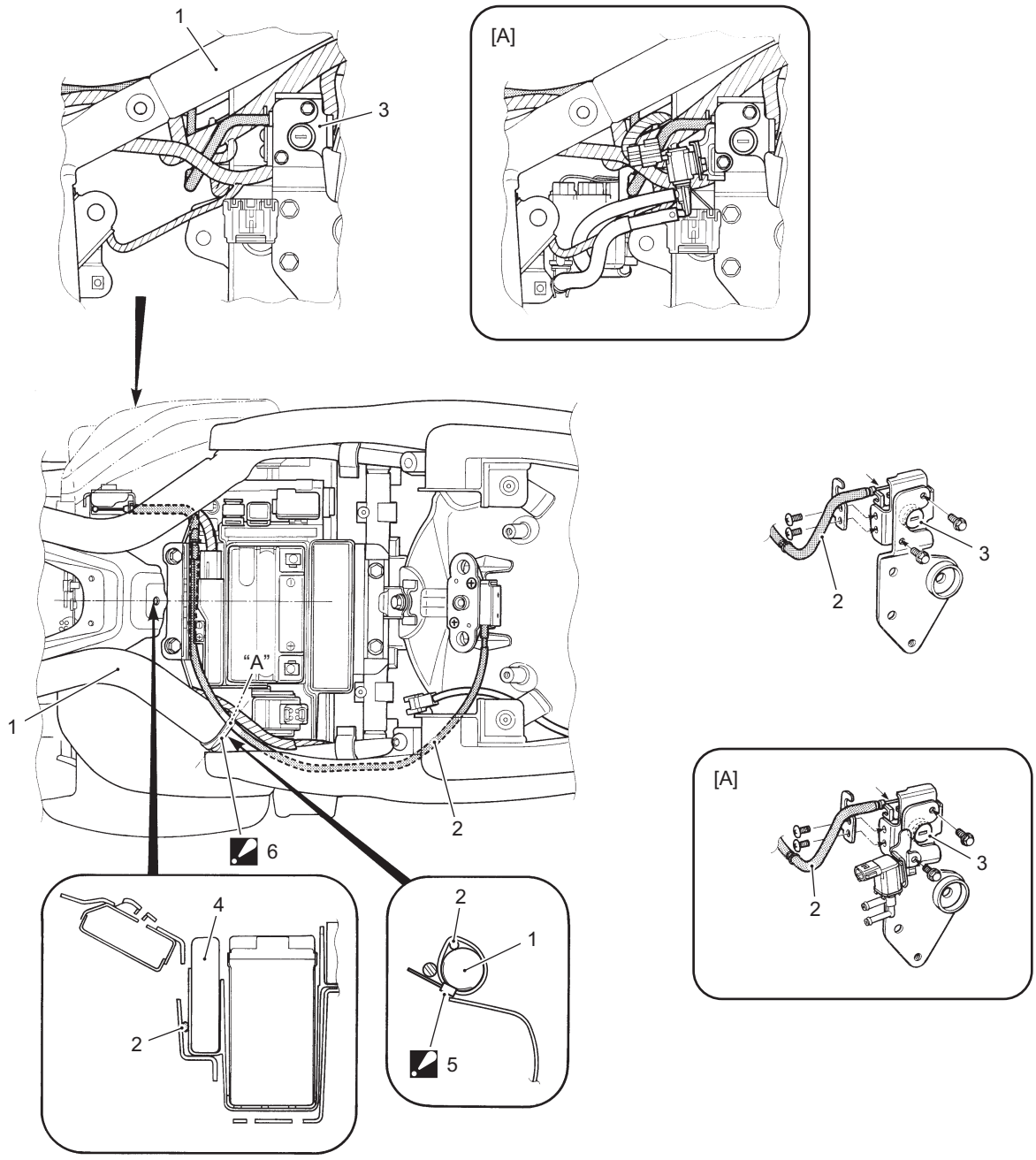
09900–25008 Multi-circuit tester set ☞(Page 9C-7) / ☞(Page 9C-8) / ☞(Page 9C-9) / ☞(Page 9C-10)		

Exterior Parts

Schematic and Routing Diagram

Seat Lock Cable Routing Diagram

B940H29402001



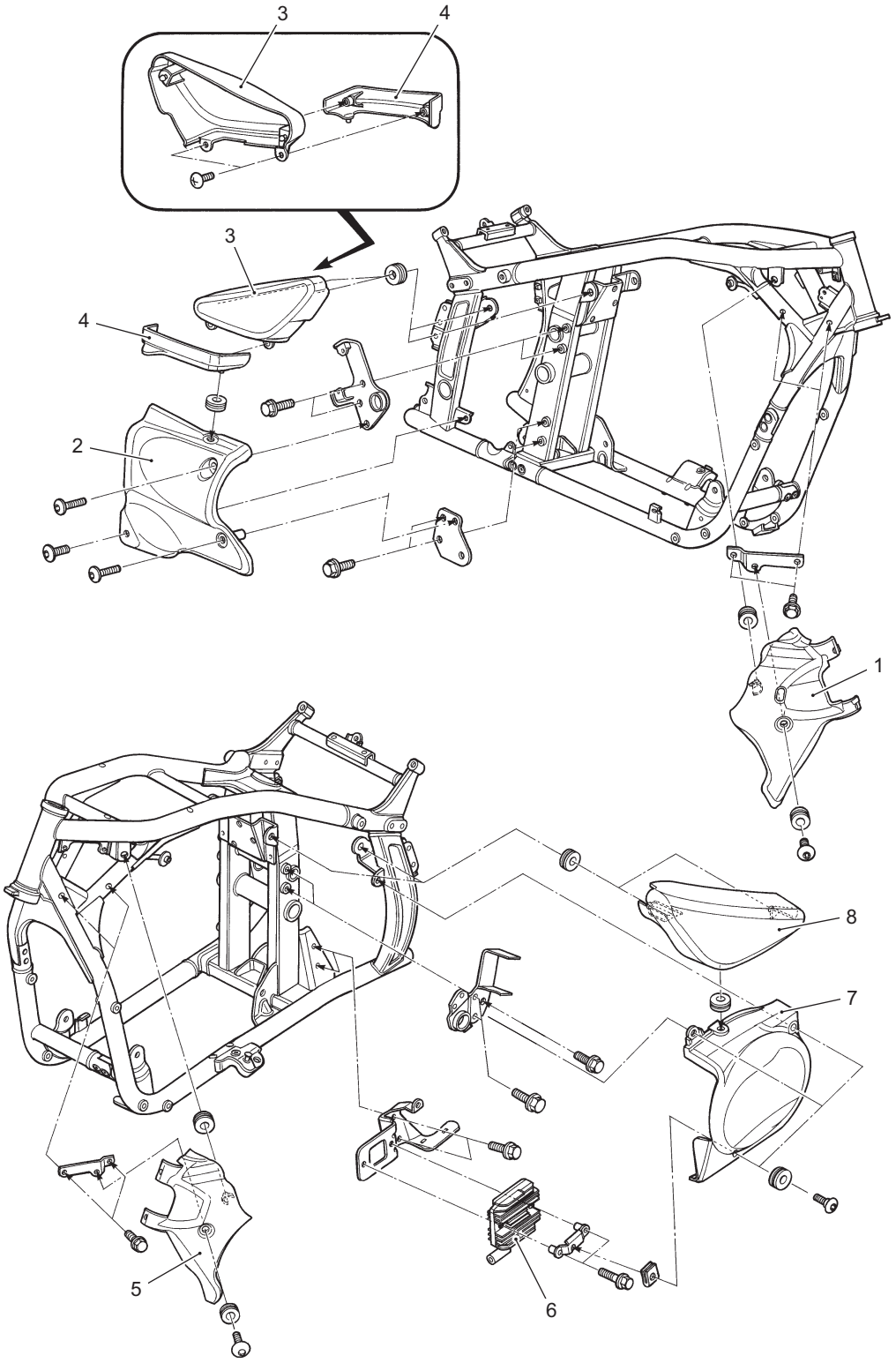
I940H1940018-03

1. Frame	3. Seat lock	5. Clamp : Clamp the seat lock cable only.	"A": White tape
2. Seat lock cable	4. ECM	6. Clamp : Clamp the seat lock cable at the white tape.	[A]: E-33 only

Repair Instructions

Exterior Parts Construction

B940H29406001

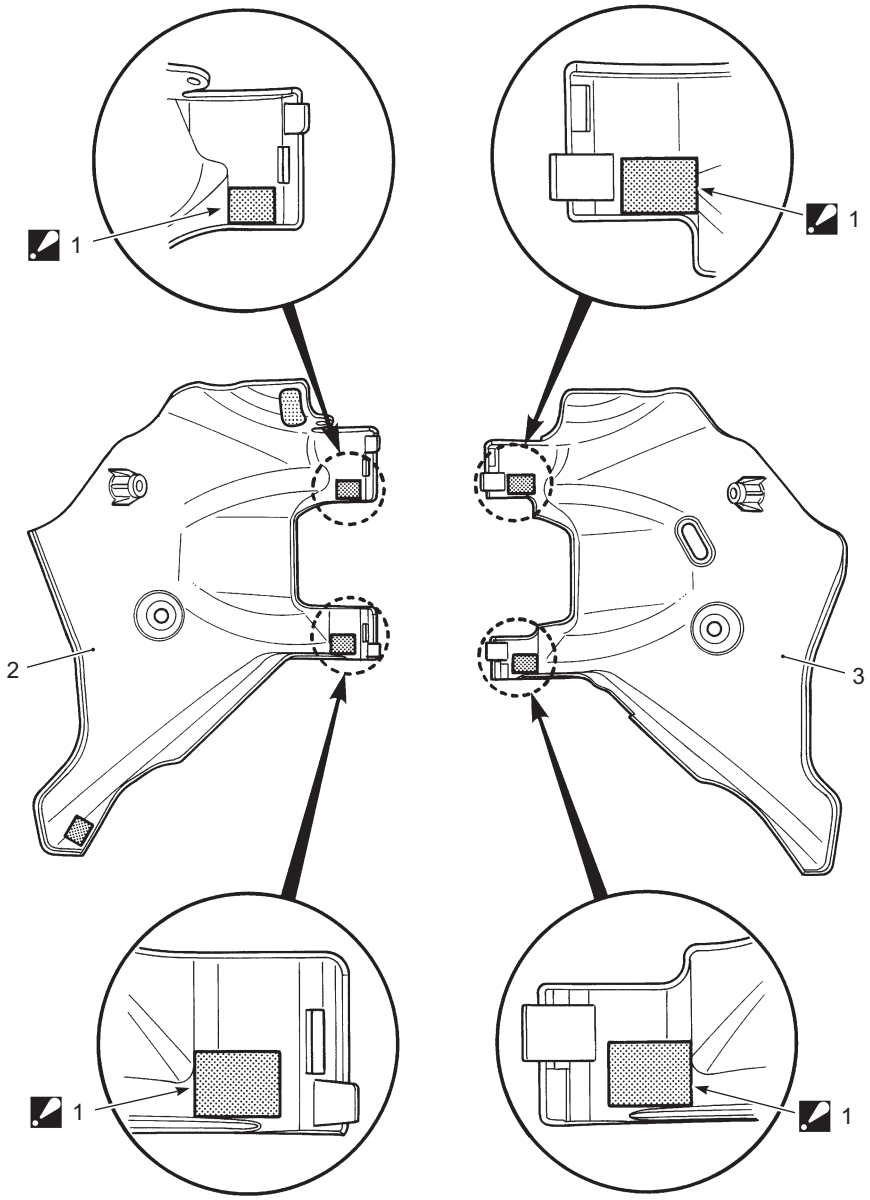


I940H1940014-03

1. Frame head cover	5. Frame head cover
2. Frame lower cover (RH)	6. Regulator/Rectifier
3. Frame side cover (RH)	7. Frame lower cover (LH)
4. Frame side lower cover (RH)	8. Frame side cover (LH)

Frame Head Cover Cushion Construction

B940H29406002

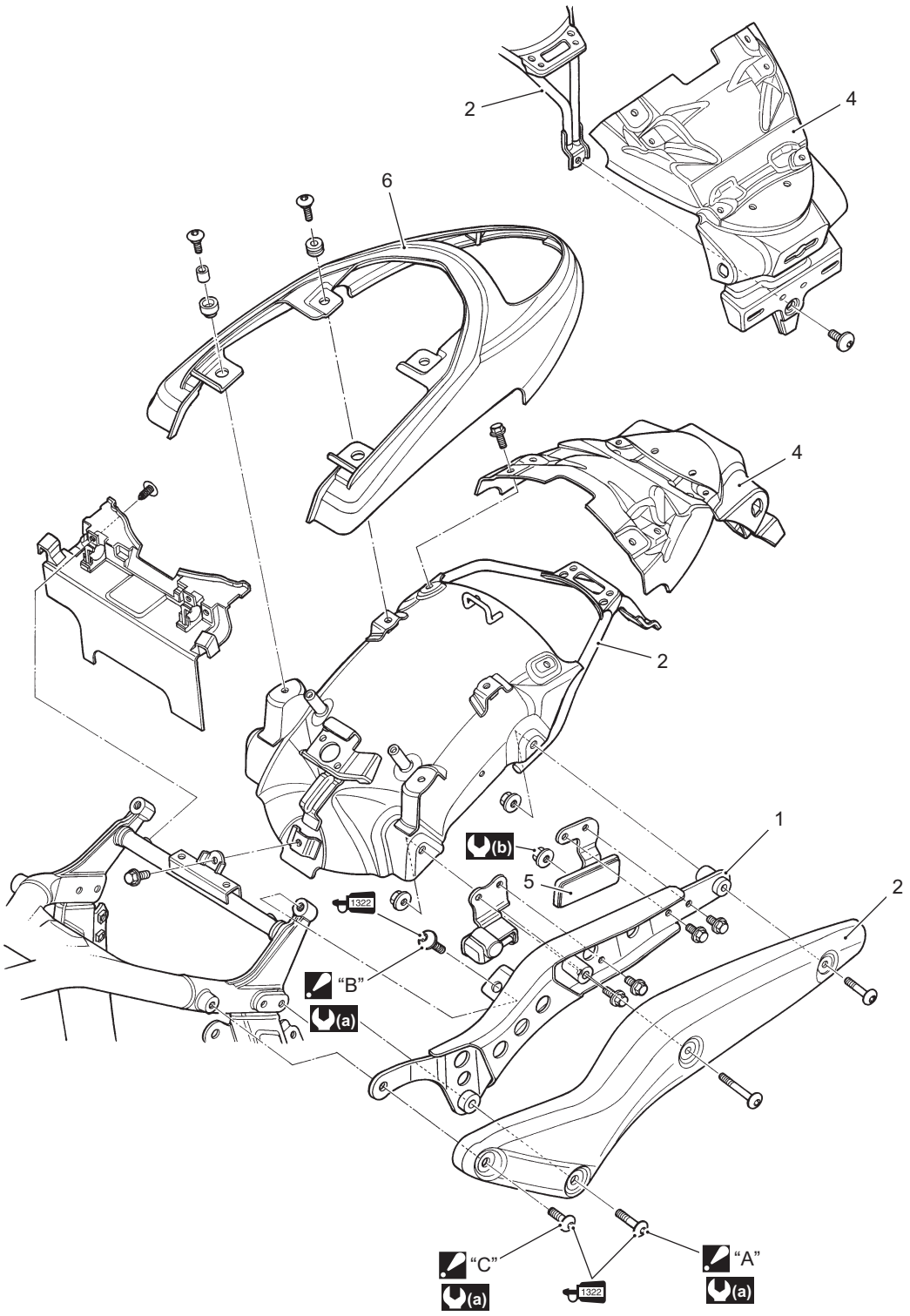


I940H1940015-02

1. Cushion : When sticking the cushion on the frame head cover, align the cushion edge with the extension of stopping line.	3. Frame head cover (RH)
2. Frame head cover (LH)	

Rear Fender Construction

B940H29406003



I940H1940016-07

1. Rear frame	6. Rear fender
2. Rear fender brace	"ABC": After temporary tightening, tighten the bolts to the specified torque in order of "A" → "B" → "C".
3. Rear frame plate	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
4. Rear fender extension	(b) : 1.8 N·m (0.18 kgf-m, 1.3 lbf-ft)
5. Rear reflex refractor (For E-03, 28, 33)	1322 : Apply thread lock to the thread part.

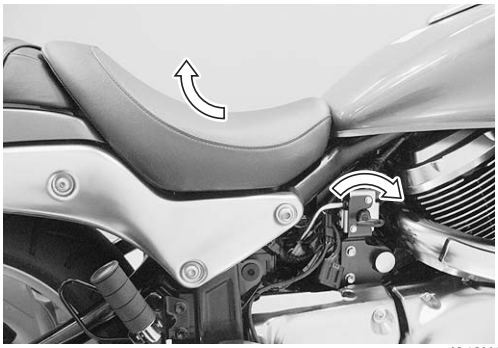
Exterior Parts Removal and Installation

B940H29406004

Front Seat

Removal

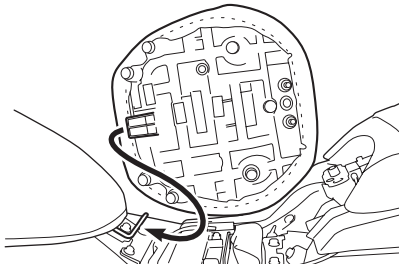
1) Remove the right frame side cover. Refer to “Exterior Parts Removal and Installation (Page 9D-5)”.
2) Remove the seat with the ignition key.



I940H1940001-01

Installation

Slide the seat hooks into the seat hook retainers on the frame and tighten the bolts securely.

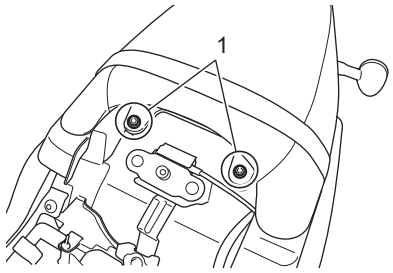


I940H1940002-02

Rear Seat / Seat Tail Cover

Removal

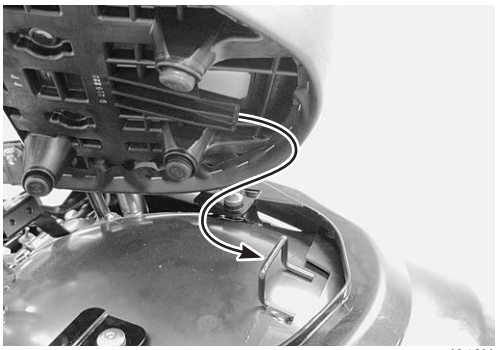
1) Remove the front seat.
2) Remove the rear seat by removing the bolts (1).



I940H1940003-01

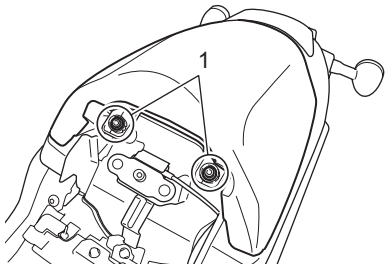
Installation

1) Slide the hook into the seat hook retainer.



I940H1940004-01

2) Tighten the bolts (1) securely.

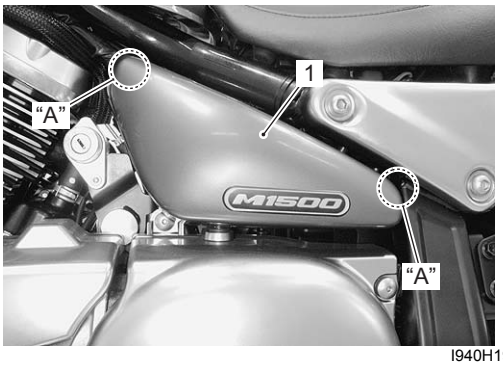


I940H1940013-01

Frame Side Cover

Removal

Remove the frame cover (1).

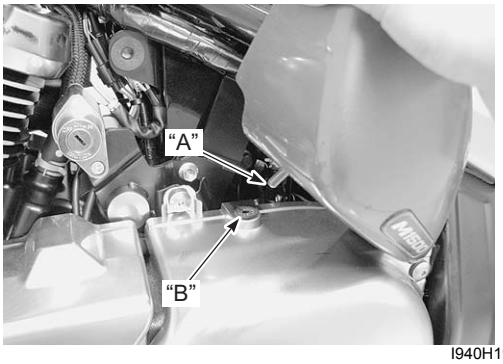


I940H1940005-01

“A”: Hooked point

Installation
Install the frame covers in the reverse order of removal. Pay attention following point:

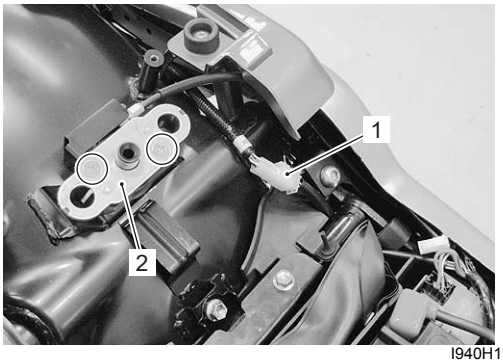
- When installing the frame cover, insert the convex part "A" of the frame cover to the hole "B" of the frame lower cover.



I940H1940006-01

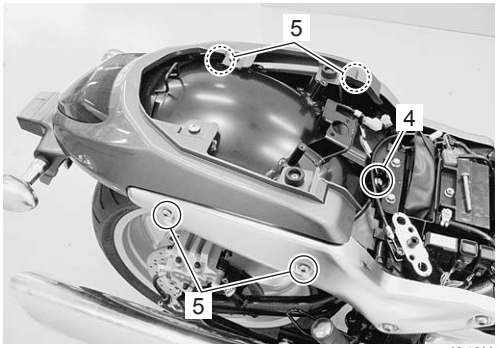
Rear Fender
Removal

1) Remove the front and rear seat.
2) Disconnect the rear combination light coupler (1).
3) Remove the seat lock (2).



I940H1940007-01

4) Remove the rear fender brace bolt (4) and rear frame mounting bolts, left and right (5).



I940H1940008-02

5) Remove the rear fender brace, rear fender extension and rear fender as shown rear fender construction. Refer to "Rear Fender Construction (Page 9D-4)".

Installation
Install the rear fender in the reverse order of removal.

Front Fender
Removal

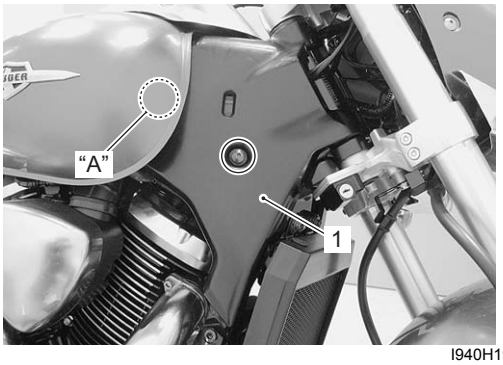
- Remove the front fender mounting bolts.
- Remove the front fender.


I940H1940009-01

Installation
Install the front fender in the reverse order of removal.

Frame Head Cover
Removal

1) Move the fuel tank backward. Refer to "Fuel Tank Removal and Installation in Section 1G (Page 1G-9)".
2) Remove the frame head covers (1), left and right.



I940H1940010-01

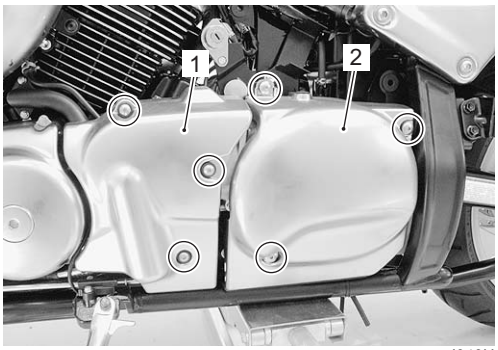
"A": Hooked point

Installation
Install the frame head covers in the reverse order of removal.

Secondary Gear Case Cover / Left Frame Lower Cover

Removal

1) Remove the left frame side cover. Refer to “Exterior Parts Removal and Installation (Page 9D-5)”.
2) Remove the secondary gear case cover (1).
3) Remove the left frame lower cover (2).



I940H1940011-01

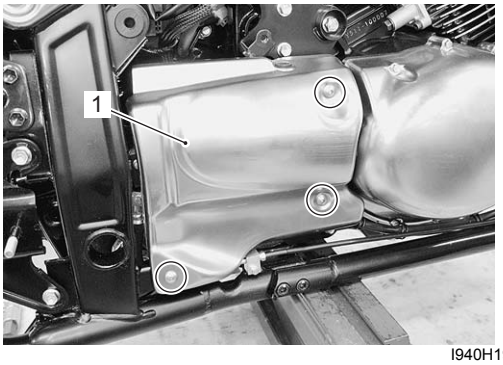
Installation

Install the covers in the reverse order of removal.

Right Frame Lower Cover

Removal

1) Remove the exhaust pipe and muffler. Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.
2) Remove the right frame lower cover (1).



I940H1940012-01

Installation

Install the right frame lower cover in the reverse order of removal. Pay attention to the following point:

- Apply thread lock to the right frame lower cover mounting screws.

  1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Specifications

Tightening Torque Specifications

B940H29407001

NOTE

The specified tightening torque is described in the following.
“Rear Fender Construction (Page 9D-4)”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H29408001

Material	SUZUKI recommended product or Specification		Note
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞(Page 9D-7)

NOTE

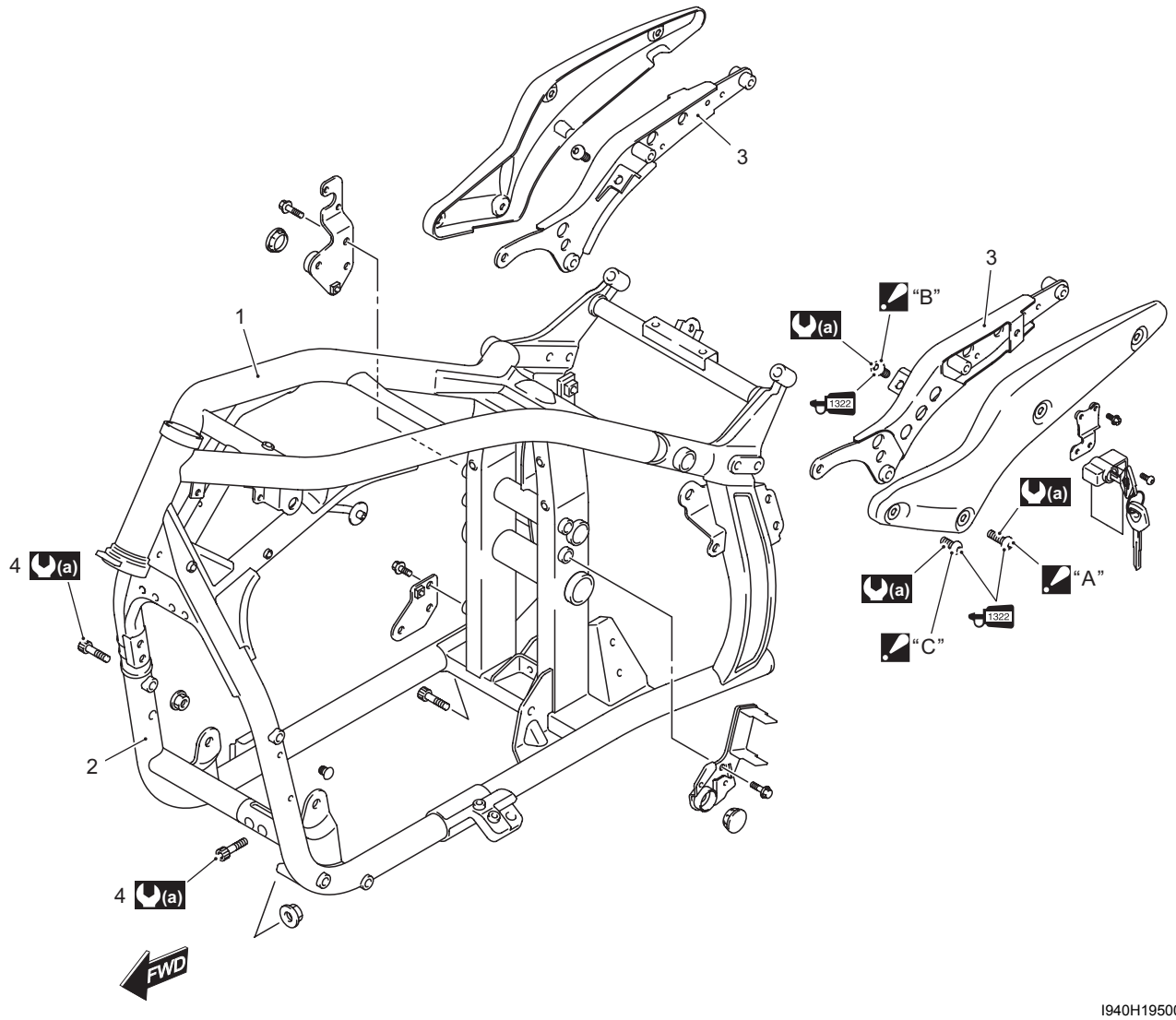
Required service material is also described in the following.
“Rear Fender Construction (Page 9D-4)”

Body Structure

Repair Instructions

Body Frame Construction

B940H29506001

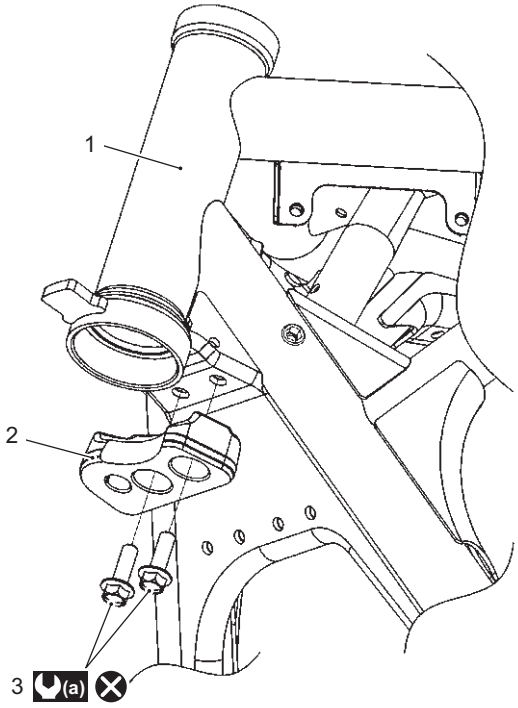


I940H1950003-02

1. Frame	"ABC": After temporary tightening, tighten the bolts to the specified torque in order of "A" → "B" → "C".
2. Frame down tube	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)
3. Rear frame	1322 : Apply thread lock to the thread part.
4. Frame down tube bolt	

Steering Lock Bracket Construction

B940H29506002

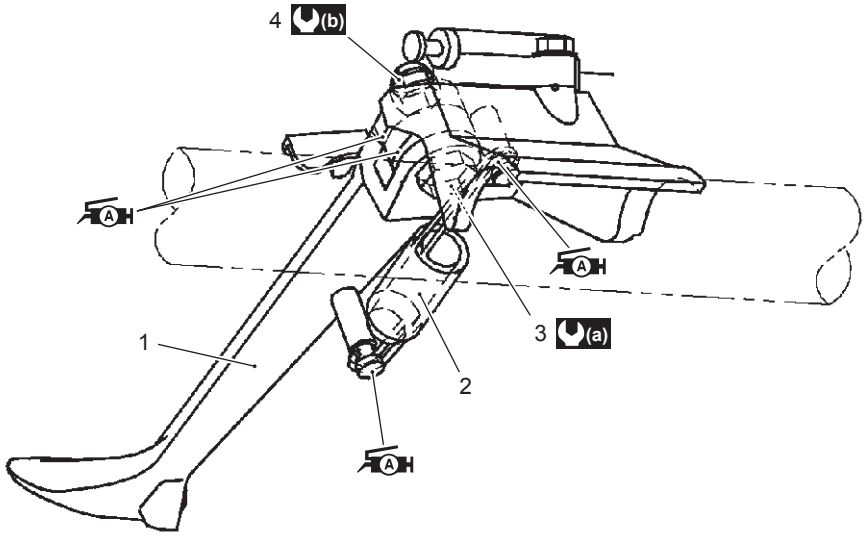


I940H1950001-02

1. Frame	3. Steering lock bracket bolt	: Do not reuse.
2. Steering lock bracket	(a) : 26 N·m (2.6 kgf-m, 19.0 lbf-ft)	

Side-stand Construction

B940H29506003



I940H1950002-01

1. Side-stand	3. Side-stand bolt	(a) : 50 N·m (5.0 kgf-m, 36.0 lbf-ft)	: Apply grease to sliding surface.
2. Spring	4. Side-stand nut	(b) : 40 N·m (4.0 kgf-m, 29.0 lbf-ft)	

Side-stand Removal and Installation

B940H29506004

Removal

1) Support the motorcycle with the jack or wooden block.
2) Remove the side-stand as shown in the side-stand construction. Refer to “Side-stand Construction (Page 9E-2)”.

Installation

Install the side-stand as shown in the side-stand construction. Refer to “Side-stand Construction (Page 9E-2)”.

Specifications

Tightening Torque Specifications

B940H29507001

NOTE

The specified tightening torque is described in the following.
“Body Frame Construction (Page 9E-1)”
“Steering Lock Bracket Construction (Page 9E-2)”
“Side-stand Construction (Page 9E-2)”

Reference:

For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-8)”.

Special Tools and Equipment

Recommended Service Material

B940H29508001

NOTE

Required service material is also described in the following.
“Body Frame Construction (Page 9E-1)”
“Side-stand Construction (Page 9E-2)”

Prepared by
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