FOREWORD

This manual contains an introductory description on the SUZUKI LT-A750X/P 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 vehicle 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 vehicle 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 vehicle.*
- ** Illustrations in this manual are used to show the basic principles of operation and work procedures. They may not represent the actual vehicle exactly in detail.*
- ** This manual is written for persons who have enough knowledge, skills and tools, including special tools, for servicing SUZUKI vehicles. 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 vehicle unsafe for the rider and passenger.

SUZUKI MOTOR CORPORATION

99500-47021-03E

TABLE OF CONTENTS

SUPPLEMENTS

Section 00

Precautions

CONTENTS

Precautions

Precautions

Warning / Caution / Note

B831G20000001

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

⚠ WARNING

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

⚠ CAUTION

Indicates a potential hazard that could result in vehicle damage.

NOTE

Indicates special information to make maintenance easier or instructions clearer.

Please note, however, that the warnings and cautions contained in this manual cannot possibly cover all potential hazards relating to the servicing, or lack of servicing, of the vehicle. 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

B831G20000002

⚠ WARNING

- **Proper service and repair procedures are important for the safety of the service mechanic and the safety and reliability of the vehicle.**
- **When 2 or more persons work together, pay attention to the safety of each other.**
- **When it is necessary to run the engine indoors, make sure that exhaust gas is forced outdoors.**
- **When working with toxic or flammable materials, make sure that the area you work in is well ventilated and that you follow all of the material manufacturer's instructions.**
- **Never use gasoline as a cleaning solvent.**
- **To avoid getting burned, do not touch the engine, engine oil, radiator 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 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 vehicle and parts.**

Precautions for Electrical Circuit Service

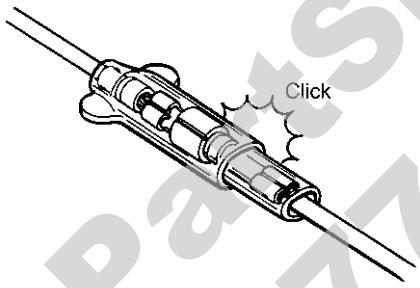
B831G20000003

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

Electrical Parts

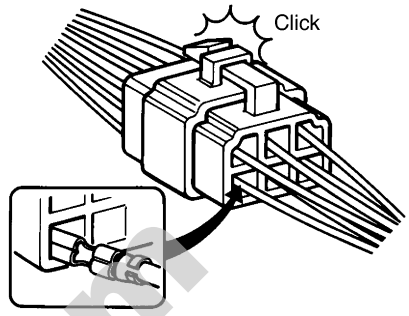
Connector / Coupler

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



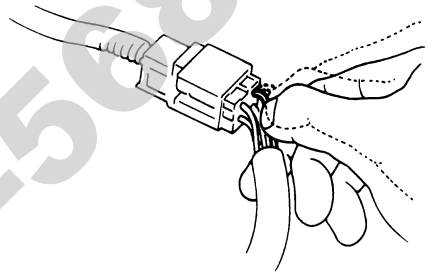
I310G1000001-01

- 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.



I310G1000002-01

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



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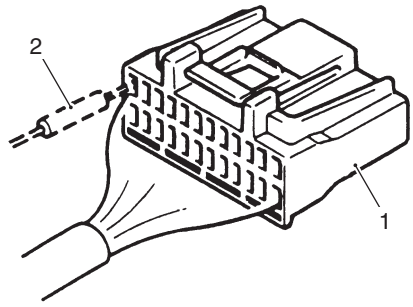
- When taking measurements at electrical connectors using a tester probe, be sure to insert the probe from the wire harness side (backside) of the connector/coupler.

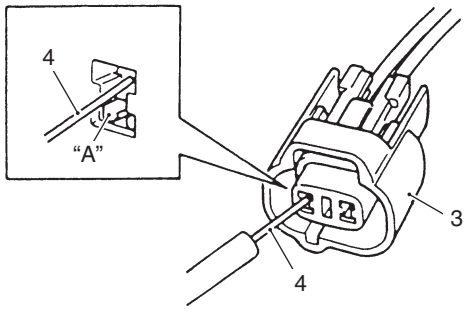


I649G1000013-02

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.

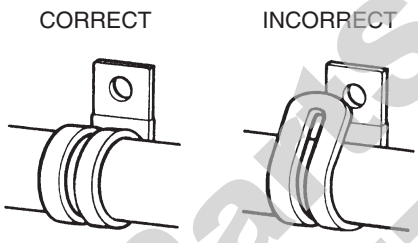


I649G1000030-02

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

Clamp

- Clamp the wire harness at such positions as indicated in "Wiring Harness Routing Diagram in Section 9A (Page 9A-4)".
- 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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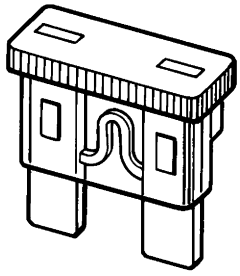
Fuse

- When a fuse blows, 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.



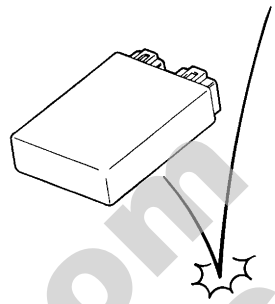
I649G1000001-02

Switch

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

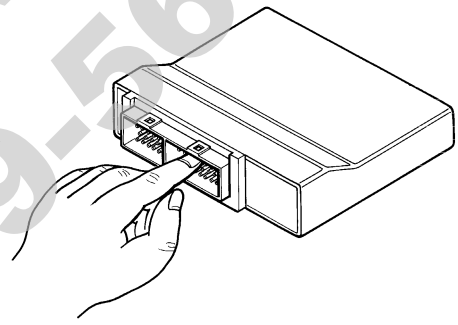
ECM / Various sensors

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



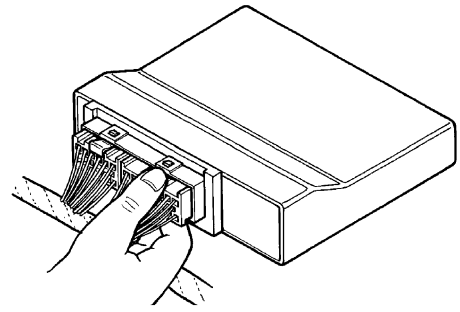
I310G1000007-01

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



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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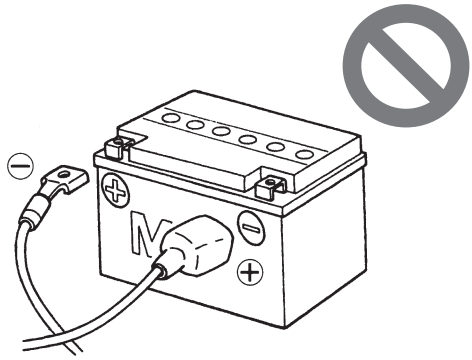
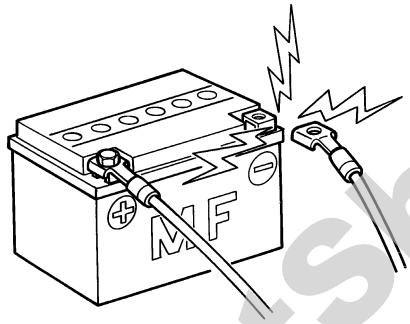
Battery

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



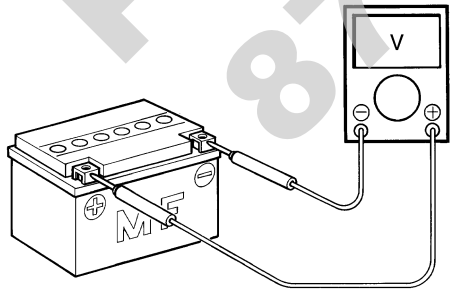
I718H1000004-01

- 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 ECM 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 ECM 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.

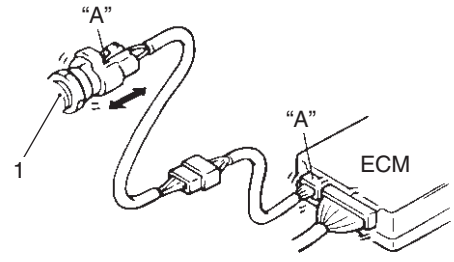
Open circuit check

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.

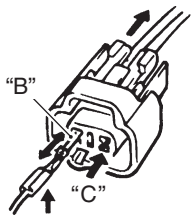
1) Disconnect the negative (–) cable from the battery.
2) Check each connector/coupler at both ends of the circuit being checked for loose connection. Also check for condition of the coupler lock if equipped.



I718H1000005-02

1. Sensor	"A": Check for loose connection

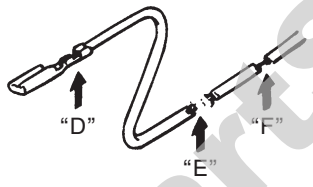
3) Using a test male terminal, check the female terminals of the circuit being checked for contact tension.
Check each terminal visually for poor contact (possibly caused by dirt, corrosion, rust, entry of foreign object, etc.). At the same time, check to make sure that each terminal is fully inserted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

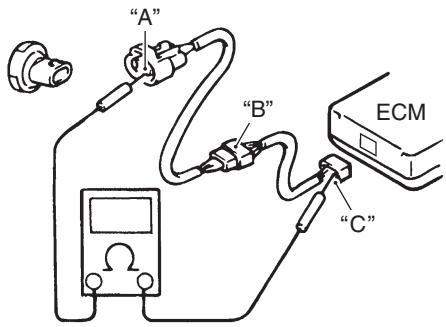


I649G1000028-02

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

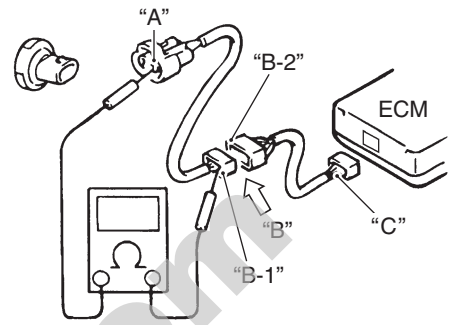
Continuity check

1) Measure resistance across coupler "B" (between "A" and "C" in 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

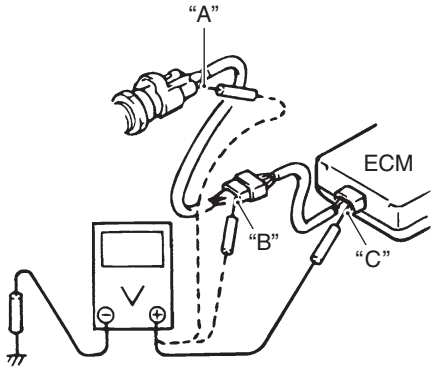
If voltage is supplied to the circuit being checked, voltage check can be used as circuit check.

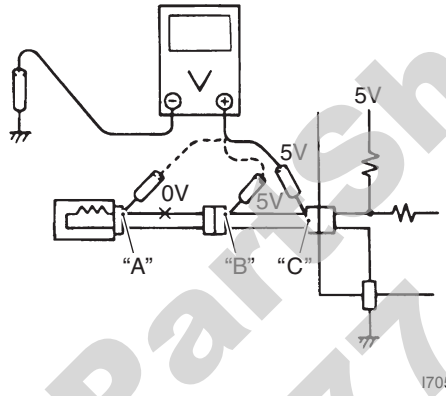
1) With all connectors/couplers connected and voltage applied to the circuit being checked, measure voltage between each terminal and body ground.
2) If measurements were taken as shown in the figure and results were listed in the following, it means that the circuit is open between terminals "A" and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





I705H1000007-01

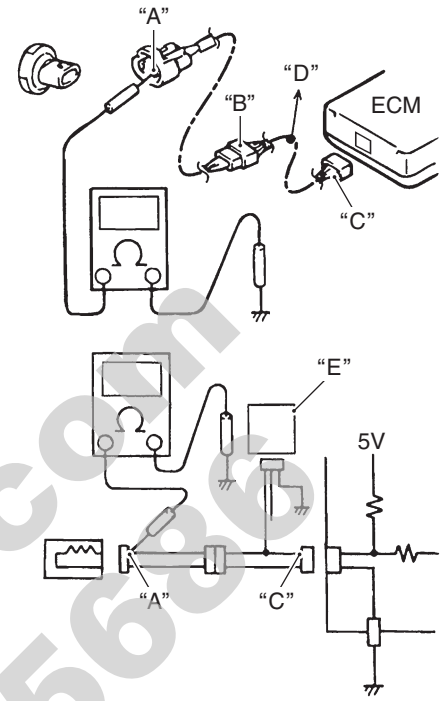
Short circuit check (Wire harness to ground)

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

NOTE

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

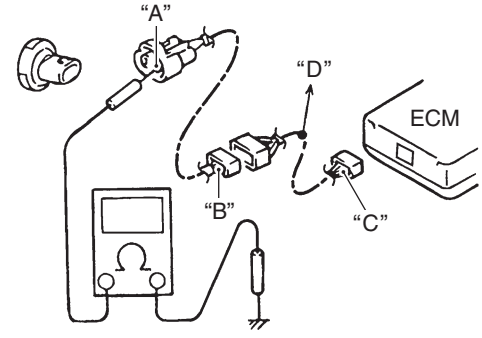
3) Measure resistance between terminal at one end of circuit (“A” terminal in figure) and body ground. If continuity is indicated, there is a short circuit to ground between terminals “A” and “C”.



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”.



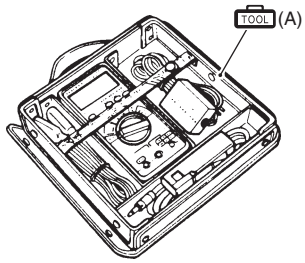
I705H1000009-02

“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)

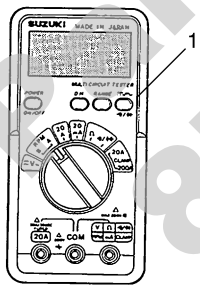


I649G1000024-03

Using the testers

- Incorrectly connecting the (+) and (–) probes may cause the inside of the tester to be burnout.
- If the voltage and current are not known, make measurements using the highest range.
- When measuring the resistance with the multi-circuit tester (1), ∞ will be shown as 10.00 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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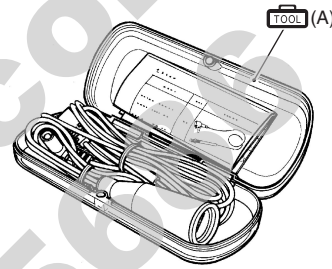
NOTE

- **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)



I649G1000025-03

Section 0

General Information

CONTENTS

General Information

General Description

Symbols

B831G20101001

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 WATER RESISTANCE GREASE. 99000-25160
	Apply SUZUKI SILICONE GREASE or equivalent. 99000-25100
	Apply SUZUKI BOND “1215” or equivalent. 99000-31110
	Apply SUZUKI BOND “1216B” or equivalent. 99000-31230
	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
	Apply or use brake fluid.
	Use special tool.
	Do not reuse.
	Note on reassembly.

Abbreviations

B831G20101002

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
CO: Carbon Monoxide
CPU: Central Processing Unit
D:
DC: Direct Current
DIFF-LOCK Relay: Differential Lock Relay
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)
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
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
P:
PCV: Positive Crankcase Ventilation (Crankcase Breather)
R:
RH: Right Hand
ROM: Read Only Memory
S:
SAE: Society of Automotive Engineers
SDS: Suzuki Diagnosis System
T:
TO Sensor: Tip-over Sensor (TOS)
TP Sensor: Throttle Position Sensor (TPS)

SAE-to-Former SUZUKI Term

B831G20101003

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)
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)
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)
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
P:
Programmable Read Only Memory (PROM): —
R:
Random Access Memory (RAM): —
Read Only Memory (ROM): ROM
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

Vehicle Side View

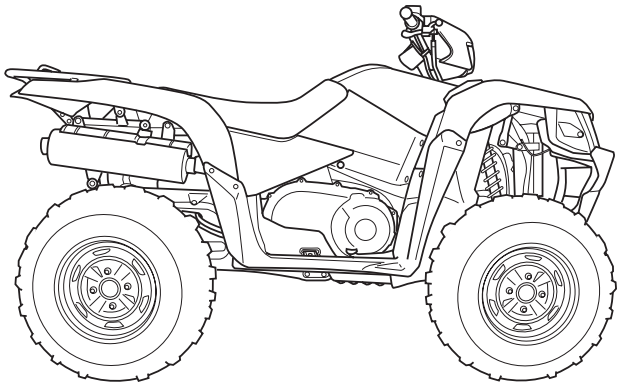
B831G20101004

NOTE

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

SUZUKI LT-A750X (2008-model)

Right Side



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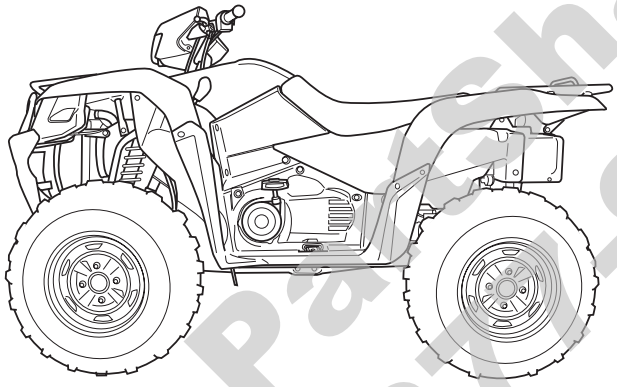
Left Side



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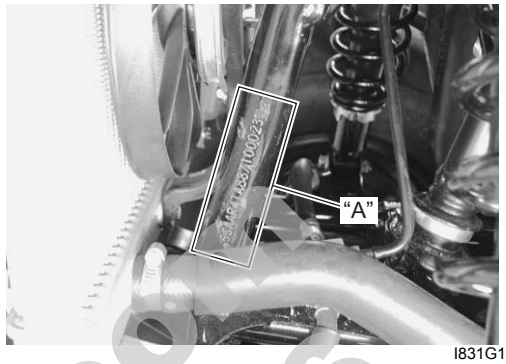
Vehicle Identification Number

B831G20101005

The frame serial number or V.I.N. (Vehicle Identification Number) “A” is stamped on the left side of the front frame 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.



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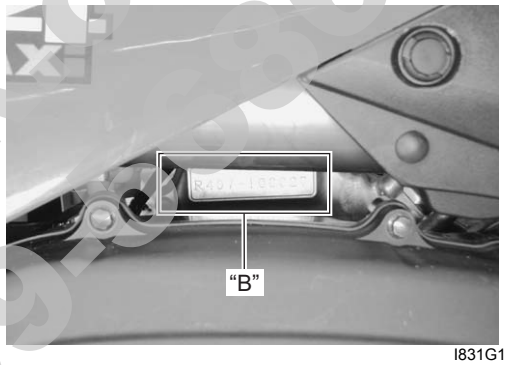

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Fuel and Oil Recommendation

B831G20101006

Fuel (For USA and Canada)

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

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

Fuel (For Other Countries)

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

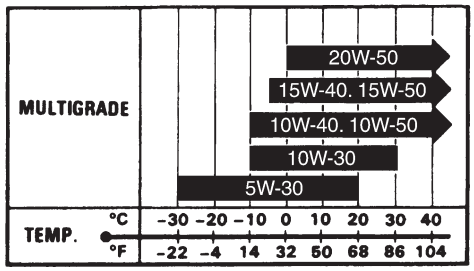
Engine Oil (For USA)

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 an 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.



I831G1010008-01

Front Differential Gear Oil
Use hypoid gear oil that meets the API service classification GL-5 and is rated SAE #90. Use a hypoid gear oil with a rating of SAE #80 if the vehicle is operated where the ambient temperature is below 0 °C (32 °F).

Rear Drive (Final) Gear Oil
Use mobil fluid 424 or equivalent oil.

Brake Fluid
Specification and classification: DOT 4

⚠ WARNING

Since the brake system of this vehicle 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.

Engine Coolant Recommendation

B831G20101007

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)
2 450 ml (2.6/2.2 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

B831G20101008

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 500 km (300 miles): Less than 1/2 throttle

2) Upon reaching an odometer reading of 500 km (300 miles) you can subject the vehicle to full throttle operation, for short periods of time.

Country and Area Codes

B931G20101009

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

Model	Code	Country or Area	Effective Frame No.
LT-A750XK8	P-17	Sweden	5SAAR41A 87100001 –
	P-24	Australia	
	P-28	Canada	
	P-33	U.S.A.	
LT-A750XZK8	P-17	Sweden	
	P-24	Australia	
	P-28	Canada	
	P-33	U.S.A.	
LT-A750XK9	P-17	Sweden	5SAAR41A 97100001 –
	P-24	Australia	
	P-28	Canada	
	P-33	U.S.A.	
LT-A750XZK9	P-17	Sweden	
	P-28	Canada	
	P-33	U.S.A.	

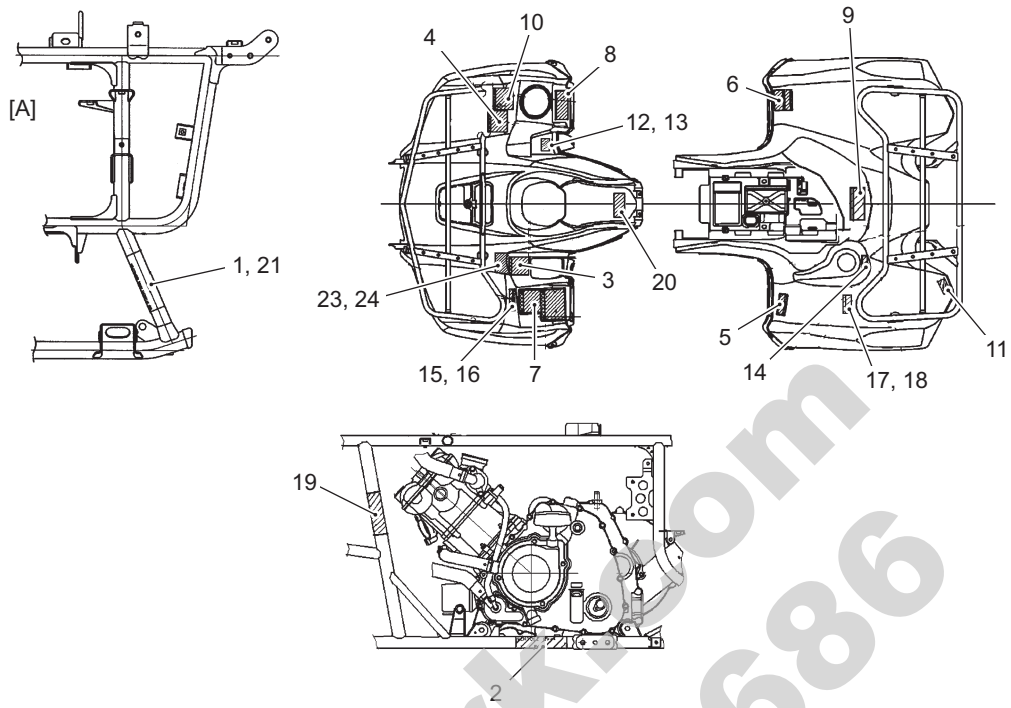
Wire Color Symbols

B931G20101010

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

Warning, Caution and Information Labels Location

B931G20101011



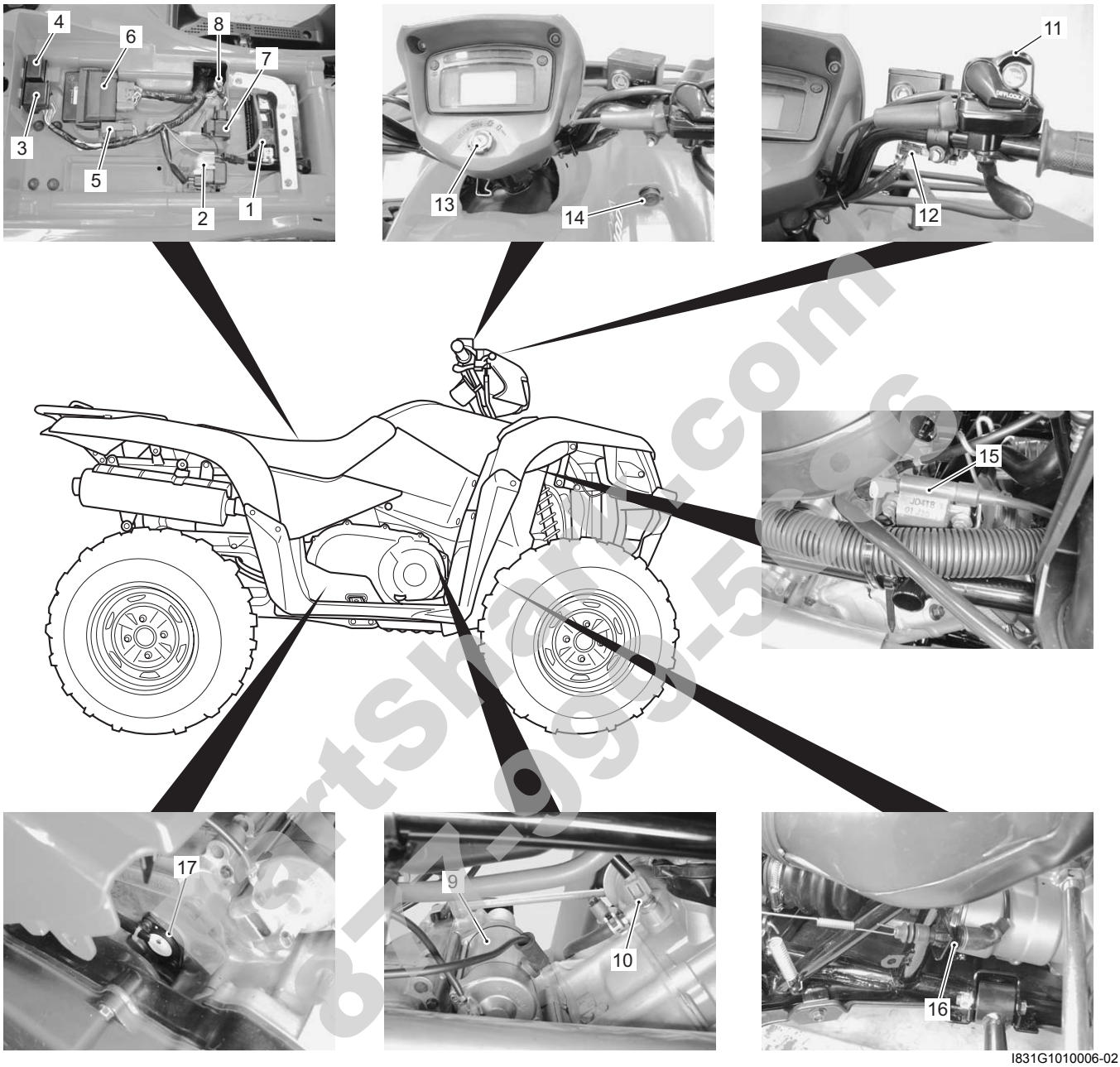
I831G1010005-06

1. Certification plate	For P-24, 33	13. Max AMP caution label	For P-17, 28
2. Information label	For P-33	14. Fuel caution label	For P-24
3. Gearshift label	For P-17, 24, 28, 33	15. Front carrier warning label	For P-24, 33
4. Gearshift label	For P-28	16. Front carrier warning label	For P-17, 28
5. Tire air pressure label	For P-17, 24, 28, 33	17. Rear carrier warning label	For P-24, 33
6. Tire air pressure label and warning no-passenger label	For P-28	18. Rear carrier warning label	For P-17, 28
7. General warning & AGE, 16 label	For P-17, 24, 28, 33	19. ICES Canada label	For P-28
8. General warning label	For P-28	20. Compliance label No.2	For P-28
9. Warning no-passenger label	For P-17, 24, 28, 33	21. I.D. plate	For P-17
10. AGE, 16 label	For P-28	22. Cooling fan label	For P-17, 24, 28, 33
11. Manual notice label	For P-33	23. Compliance label	For P-28
12. Max AMP caution label	For P-24, 33	[A]: Left side of frame	

Component Location

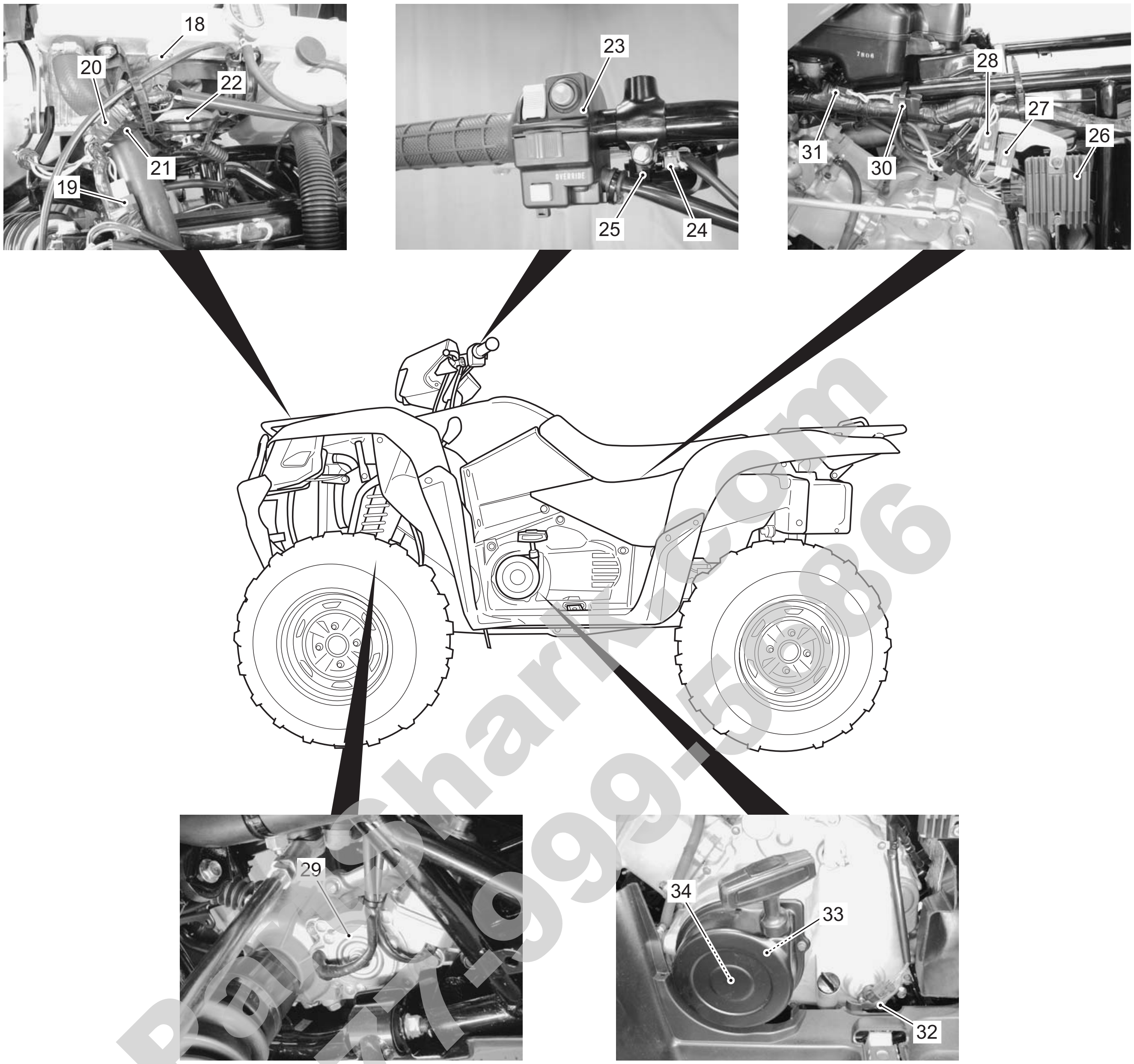
Electrical Components Location

B931G20103001



I831G1010006-02

1. Battery	7. 4WD/Diff-lock relay	13. Ignition switch
2. Starter relay/Main fuse	8. Mode selection switch coupler	14. Power source
3. Fuse box	9. Starter motor	15. Ignition coil
4. Neutral relay	10. ECT sensor	16. Rear brake switch
5. Fuel pump relay	11. 4WD/Diff-lock switch	17. Gear position switch
6. ECM	12. Brake lever switch (R)	



I831G1010007-03

18. Cooling fan thermo-switch	24. Parking brake switch	30. High position diode
19. Resister	25. Brake lever switch	31. Low position diode
20. 4WD/Diff-lock actuator diode	26. Regulator/Rectifier	32. Speed sensor
21. Neutral relay diode	27. Parking brake relay	33. CKP sensor
22. Cooling fan	28. Diff-lock relay	34. Generator
23. Handlebar switch	29. Actuator	

Specifications

Specifications (LT-A750X/ZK8)

B931G20107001

NOTE

These specifications are subject to change without notice.

Dimensions and dry mass

Item	Specification	Remark
Overall length	2 115 mm (83.3 in)	P-28, 33
	2 135 mm (84.1 in)	P-17, 24
Overall width	1 210 mm (47.6 in)	P-28, 33
	1 250 mm (49.2 in)	P-17, 24
Overall height	1 245 mm (49.0 in)	
Wheelbase	1 280 mm (50.4 in)	
Ground clearance	270 mm (10.6 in)	
Seat height	880 mm (34.6 in)	
Dry mass	273 kg (601 lbs)	P-28, 33
	275 kg (606 lbs)	P-17, 24
Front track	930 mm (36.6 in)	
Rear track	940 mm (37.0 in)	

Engine

Item	Specification	Remark
Type	4-stroke, liquid-cooled, DOHC	
Number of cylinders	1	
Bore	104.0 mm (4.094 in)	
Stroke	85.0 mm (3.346 in)	
Displacement	722 cm^3 (44.1 cu.in)	
Compression ratio	10.0 : 1	
Fuel system	Fuel injection	
Air cleaner	Non-woven fabric element	
Starter system	Electric and recoil starter	
Lubrication system	Wet sump	
Idle speed	1 300 $\pm$ 100 r/min	

Drive train

Item		Specification	Remark
Clutch		Wet shoe, automatic, centrifugal type	
Transmission		Automatic variable ratio (V-belt)	
Transfer		2-speed forward with reverse	
Gearshift pattern	Transmission	Automatic	
	Transfer	L-H-N-R (Hand operated)	
Primary reduction ratio (Automatic drive)		Variable change (2.763 – 0.78)	
Secondary reduction ratio		2.158 (40/21 x 17/15)	
Final reduction ratio (Front & Rear)		3.600 (36/10)	
Transfer gear ratio	Low	2.562 (41/16)	
	High	1.240 (31/25)	
	Reverse	1.882 (32/17)	
Drive system		Shaft drive	

Chassis

Item	Specification	Remark
Front suspension	Independent, double wishbone, coil spring, oil damped	
Rear suspension	Independent, double wishbone, coil spring, oil damped	
Front wheel travel	180 mm (7.1 in)	
Rear wheel travel	200 mm (7.9 in)	
Caster	1.6°	
Trail	3.4 mm (0.13 in)	
Toe-out	10 mm (0.39 in)	
Camber	0.64°	
Steering angle	46° (right & left)	
Turning radius	3.1 m (10.2 ft)	
Front brake	Disc brake, twin	
Rear brake	Sealed oil-bathed multi-disc	
Front tire size	AT25 x 8-12☆☆, tubeless	
Rear tire size	AT25 x 10-12☆☆, tubeless	

Electrical

Item	Specification	Remark
Ignition type	Electronic ignition (CDI)	
Ignition timing	7° B.T.D.C. at 1 300 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 35/35 W x 2	
Auxiliary light	12 V 35/35 W	
Brake light/Taillight	12 V 21/5 W	
Revercing light	12 V 21 W	P-17
Speedometer light	LED	
Neutral indicator light	LED	
High beam indicator light	LED	P-17
Coolant temperature/FI indicator light	LED	
Reverse indicator light	LED	
Diff-lock indicator light	LED	

Capacities

Item		Specification	Remark
Fuel tank		17.5 L (4.6/3.8 US/Imp gal)	
Engine oil	Oil change	2 300 ml (2.4/2.0 US/Imp qt)	
	With filter change	2 500 ml (2.6/2.2 US/Imp qt)	
	Overhaul	3 000 ml (3.2/2.6 US/Imp qt)	
Differential gear oil		500 ml (0.5/0.4 US/Imp qt)	
Final gear oil		770 ml (0.7/0.6 US/Imp qt)	
Coolant		2 450 ml (2.6/2.2 US/Imp qt)	

Specifications (LT-A750X/ZK9)

B931G20107002

NOTE

- **These specifications are subject to change without notice.**
- **Any differences between the LT-A750X/ZK8 ('08-model) and LT-A750X/ZK9 ('09-model) in specifications are indicated with an asterisk mark (*).**

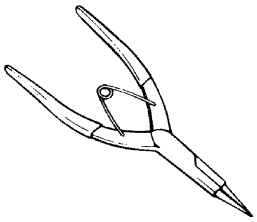
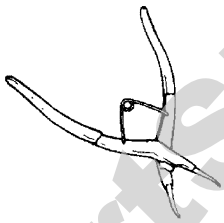
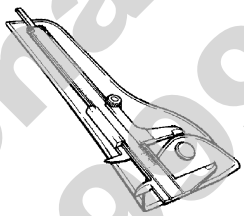
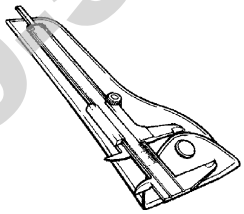
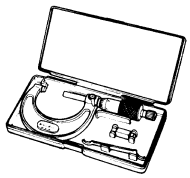
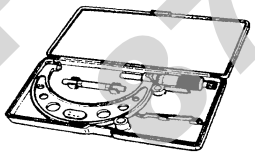
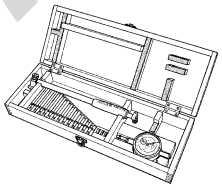
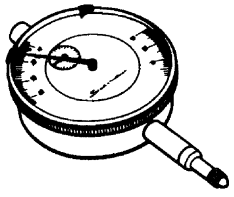
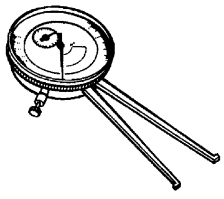
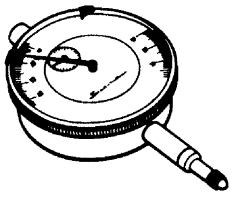
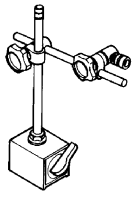
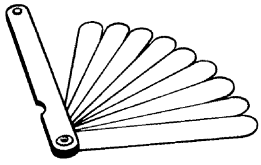
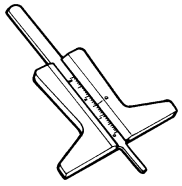
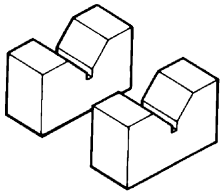
Dimensions and curb mass

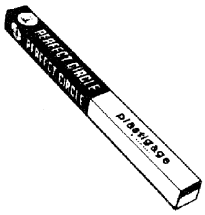
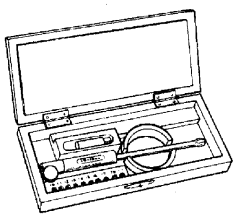
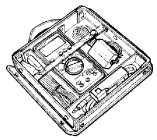
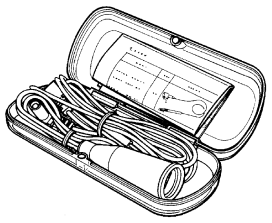
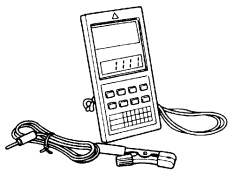
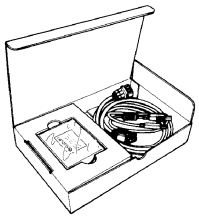
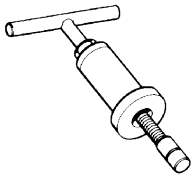
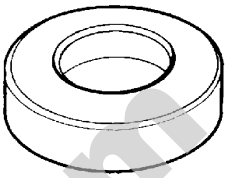
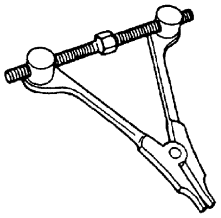
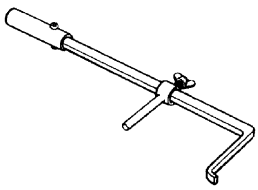
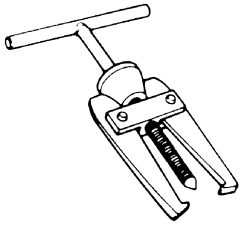
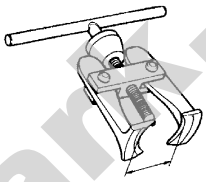
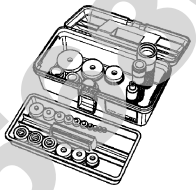
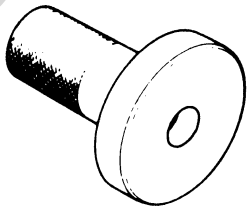
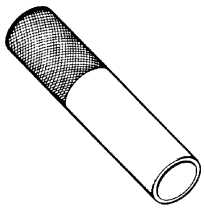
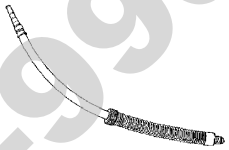
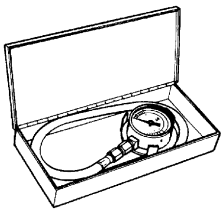
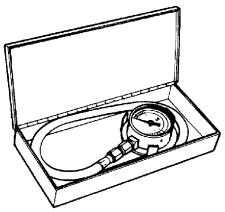
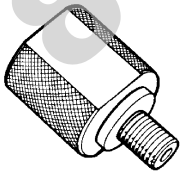
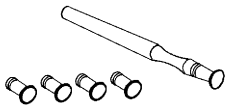
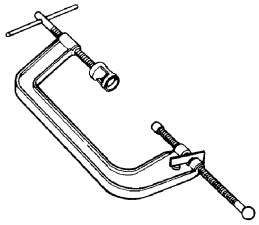
Item	Specification	Remark
Overall length	2 115 mm (83.3 in)	P-28, 33
	2 135 mm (84.1 in)	P-17, 24
Overall width	1 210 mm (47.6 in)	P-28, 33
	1 250 mm (49.2 in)	P-17, 24
Overall height	1 245 mm (49.0 in)	
Wheelbase	1 280 mm (50.4 in)	
Ground clearance	270 mm (10.6 in)	
Seat height	880 mm (34.6 in)	
* Curb mass	302 kg (666 lbs)	P-28, 33
	304 kg (670 lbs)	P-17, 24
Front track	930 mm (36.6 in)	
Rear track	940 mm (37.0 in)	

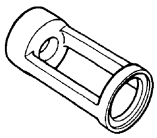
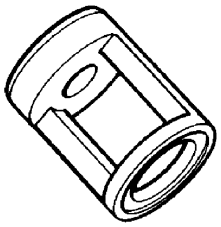
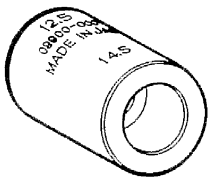
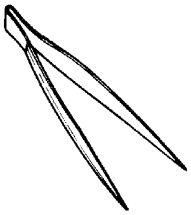
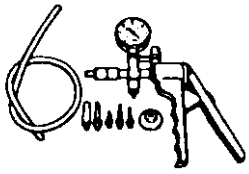
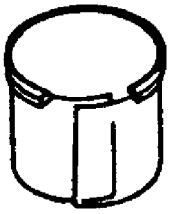
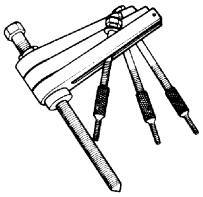
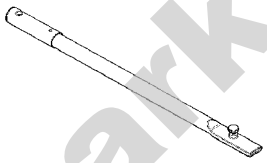
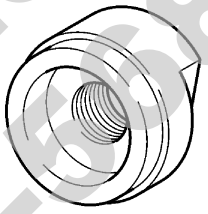
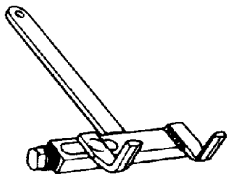
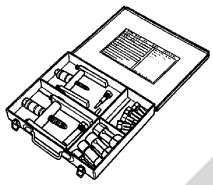
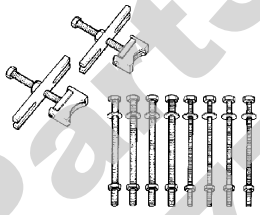
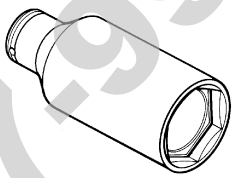
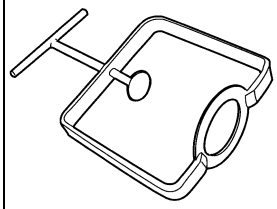
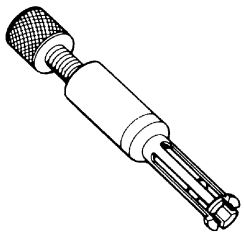
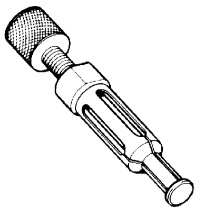
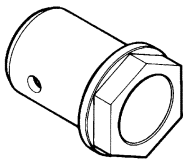
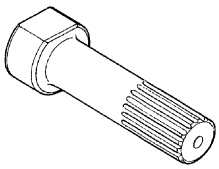
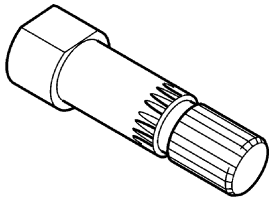
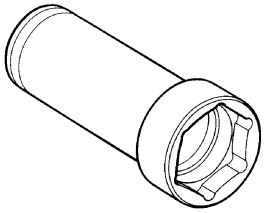
Special Tools and Equipment

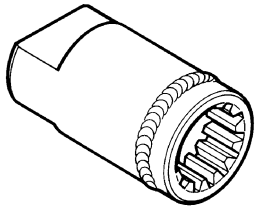
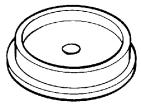
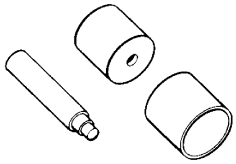
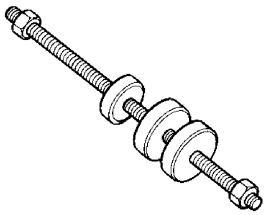
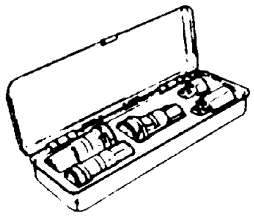
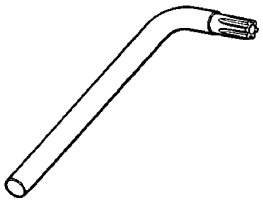
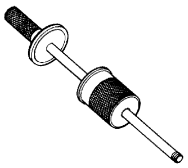
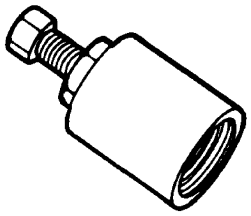
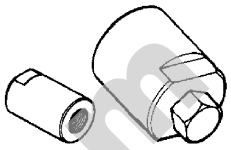
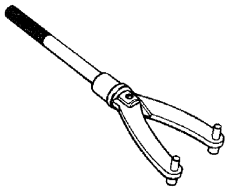
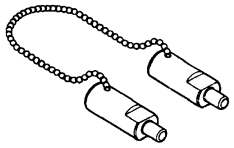
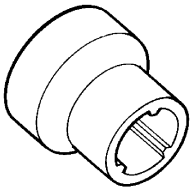
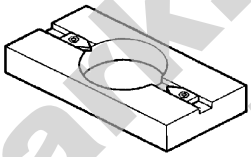
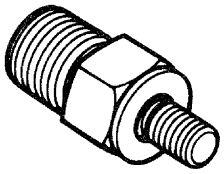
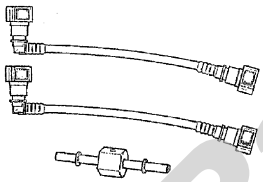
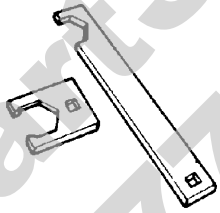
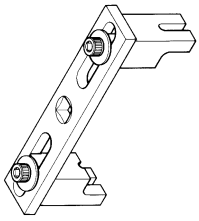
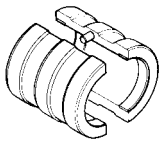
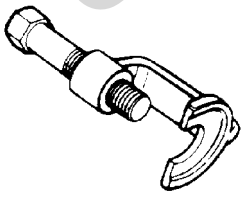
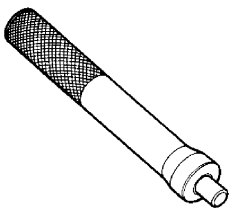
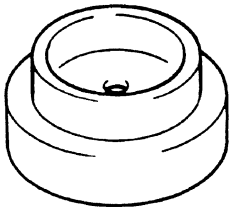
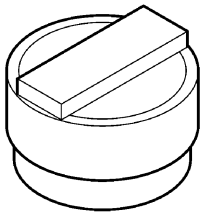
Special Tool

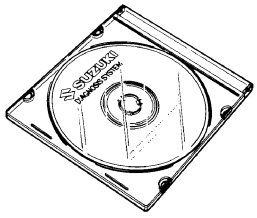
B931G20108001

 **09900–06107** Snap ring pliers	 **09900–06108** Snap ring pliers	 **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)
 **09900–20205** Micrometer (0 – 25 mm)	 **09900–20210** Micrometer (100 – 125 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	 **09900–20803** 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)	 **09904–41010** SDS set	 **09910–32812** Crankshaft installer	 **09910–32860** Attachment	 **09912–34510** Cylinder disassembling tool
 **09913–50121** Oil seal remover	 **09913–60910** Bearing remover	 **09913–61510** Bearing puller	 **09913–70210** Bearing installer set	 **09913–75520** Bearing installer
 **09913–84510** Bearing installer	 **09915–40610** Oil filter wrench	 **09915–63311** Compression gauge attachment	 **09915–64512** Compression gauge	 **09915–74511** Oil pressure gauge set
 **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

 **09916–14521** Valve spring compressor attachment	 **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	 **09916–57360** Attachment	 **09916–84511** Tweezers	 **09917–23711** Ring nut wrench	 **09917–47011** Vacuum pump gauge
 **09919–28610** Sleeve protector	 **09920–13120** Crankcase separating tool	 **09920–31020** Extension handle	 **09920–33540** Clutch shoe remover	 **09920–53740** Clutch sleeve hub holder
 **09921–20240** Bearing remover set	 **09921–21910** Bearing holder	 **09922–21410** Long socket (46 mm)	 **09922–31430** Clutch spring compressor	 **09923–73210** Bearing remover
 **09923–74511** Bearing remover	 **09924–41830** Bearing retainer wrench	 **09924–52420** Secondary bevel gear holder	 **09924–52450** Fixed driven face holder	 **09924–52460** Socket (52 mm)

 **09924–52470** Fixed final drive gear holder	 **09924–74520** Oil seal installer/ remover	 **09924–74570** Final drive gear bearing installer/ remover	 **09924–84521** Bearing installer set	 **09930–10121** Spark plug wrench set
 **09930–11950** Torx wrench	 **09930–30104** Rotor remover sliding shaft	 **09930–30721** Rotor remover	 **09930–31921** Rotor remover	 **09930–40113** Rotor holder
 **09930–40131** Balancer drive sprocket holder	 **09930–73140** Starter torque limiter socket	 **09930–73170** Starter torque limiter holder	 **09930–82720** Mode select switch	 **09940–40211** Fuel pressure gauge adapter
 **09940–40220** Fuel pressure gauge hose attachment	 **09940–92430** Rear axel wrench A	 **09941–34513** Steering race installer	 **09941–51012** Ring locknut wrench	 **09941–53610** Front fork installer hammer
 **09941–64511** Bearing remover	 **09942–72410** Tie-rod end remover	 **09943–88211** Bearing remover/ installer	 **09944–66010** Bearing installer	 **09951–15810** Bearing installer

 **99565–01010–013** CD-ROM Ver.13				

Maintenance and Lubrication

Precautions

Precautions for Maintenance

B931G20200001

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

NOTE

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

General Description

Recommended Fluids and Lubricants

B931G20201001

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

B931G20205001

NOTE

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

Item		Interval		
	km	Initial 200	Every 1 000	Every 2 000
	miles	Initial 100	Every 600	Every 1 200
	months	Initial 1	Every 3	Every 6
Air cleaner element	polyurethane foam element	—	C	C
	non-woven fabric element	—	I	I
Exhaust pipe nuts and muffler mounting bolts		T	T	T
Valve clearance		I	—	I
Spark plug		—	—	I
		Replace every 6 000 km (4 000 miles).		
Spark arrester		—	—	C
Fuel line		—	I	I
		Replace every 4 years.		
Engine oil and oil filter		R	—	R
Front differential gear oil		—	—	I
		Replace every 2 years.		
Final gear oil		—	—	I
		Replace every year.		
Throttle cable play		I	I	I
Throttle body		—	I	I
Engine coolant		Replace every 2 years.		
Radiator		—	I	I
Radiator hose		—	—	I
Drive belt		—	I	R
Drive shaft boots		I	I	I
Brakes		I	I	I
Rear brake plates		Replace every 10 000 km (6 000 miles).		

Item	Interval			
	km	Initial 200	Every 1 000	Every 2 000
	miles	Initial 100	Every 600	Every 1 200
	months	Initial 1	Every 3	Every 6
Brake fluid		—	I	I
		Replace every 2 years.		
Brake hose		—	—	I
		Replace every 4 years.		
Tires		—	I	I
Steering		I	I	I
Suspensions		—	—	I
Chassis nuts and bolts		T	T	T
General lubrications		—	L	L

Lubrication Points

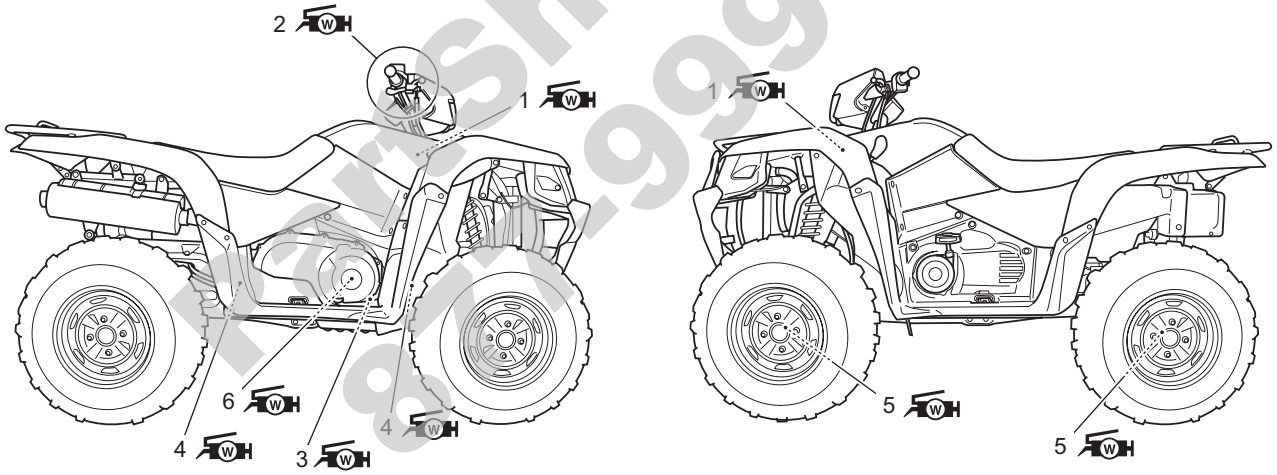
B931G20205002

Proper lubrication is important for smooth operation and long life of each working part of the vehicle. 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 vehicle has been operated under wet or rainy conditions.**

Lubricate exposed parts
Every 1 000 km (600 miles, 3 months)



I831G1020001-03

1. Steering shaft holder	4. Propeller shaft joint spline	: Apply water resistance grease.
2. Brake level holder and throttle lever	5. Drive shaft joint spline	
3. Brake pedal	6. Drive belt cover bearing (Inner race)	

Repair Instructions

Air Cleaner Element Inspection and Cleaning

B931G20206001

Inspect and clean element
Every 1 000 km (600 miles, 3 months)

Inspection

1) Remove the air cleaner element. Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-5)”.
2) Inspect the air cleaner element for clogging. If it is clogged with dirt, clean or replace it with a new one.

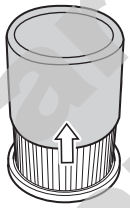
⚠ CAUTION

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

3) After finishing the air cleaner element inspection, reinstall the removed parts.

Cleaning

1) Remove the air cleaner element assembly. Refer to “Air Cleaner Element Removal and Installation in Section 1D (Page 1D-5)”.
2) Separate the polyurethane from element.

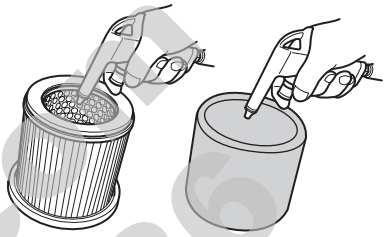


I831G1020002-01

3) Carefully use compressed air to clean the air cleaner element.

⚠ CAUTION

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



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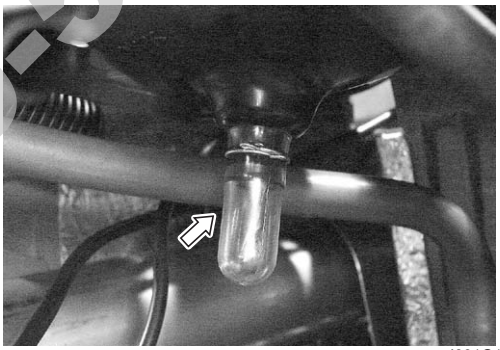
4) After cleaning the air cleaner element, reinstall the removed parts.
5) Drain water from the air cleaner by removing the drain plug.



I831G1020004-01

6) Reinstall the drain plug.

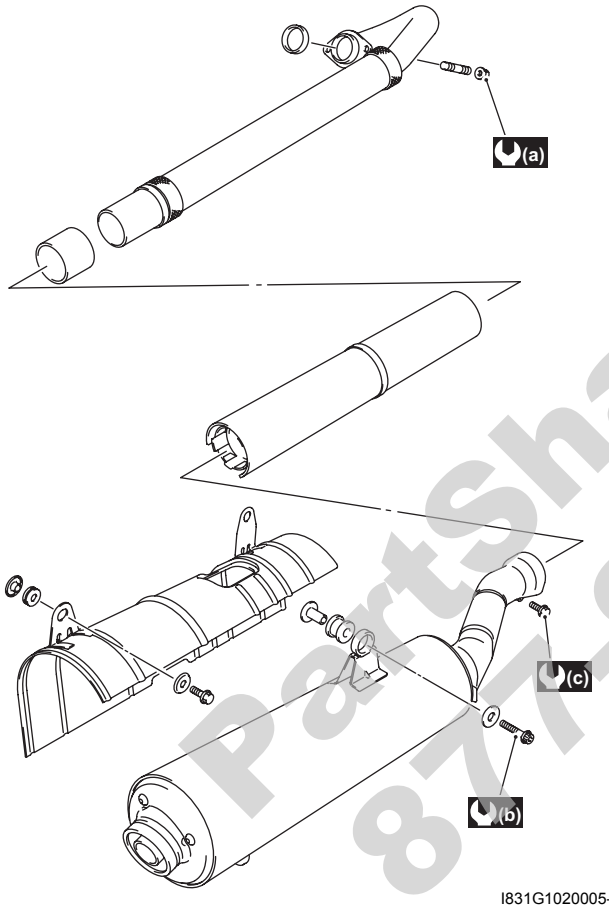
Exhaust Pipe Bolt and Muffler Bolt Inspection

B931G20206002

Tighten exhaust pipe bolts, muffler bolt and nut
Initially at 200 km (100 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter

Check the exhaust pipe bolts, muffler bolts and nut to the specified torque. Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.

Tightening torque
Exhaust pipe nut (a): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Muffler mounting bolt (b): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
Muffler connecting bolt (c): 23 N·m (2.3 kgf-m, 16.5 lbf-ft)



I831G1020005-02

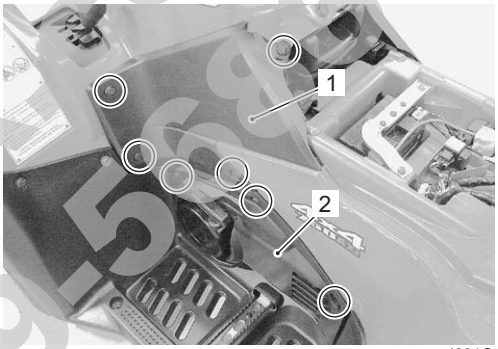
Valve Clearance Inspection and Adjustment

B931G20206003

Inspect valve clearance
Initially at 200 km (100 miles, 1 month) and every 2 000 km (1 200 miles, 6 months) thereafter

Inspection
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 front inner fender (LH & RH). Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Remove the inlet V-belt cooling duct. Refer to “V-belt Cooling Duct Removal and Installation in Section 5A (Page 5A-5)”.
3) Remove the left side cover (1) and engine side cover (2).



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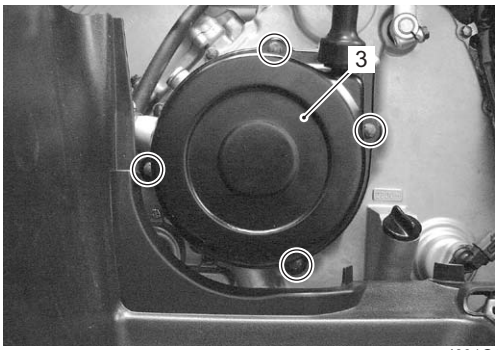
4) Remove the recoil starter (3).



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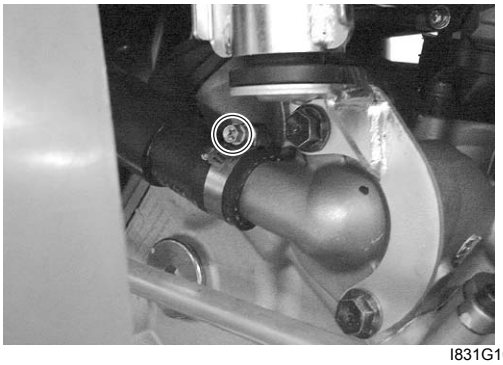
5) Drain a small amount of engine coolant and disconnect the radiator upper hose of thermostat side. Refer to “Cooling System Inspection (Page 0B-15)”.



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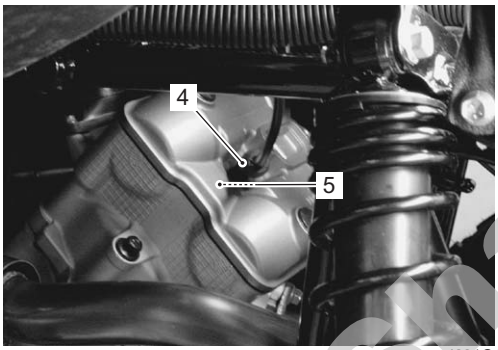
6) Remove the spark plug cap (4) and spark plug (5). Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)”.



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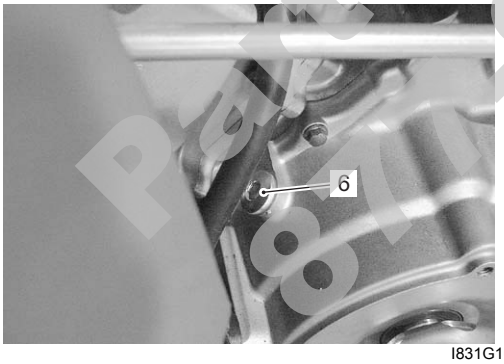
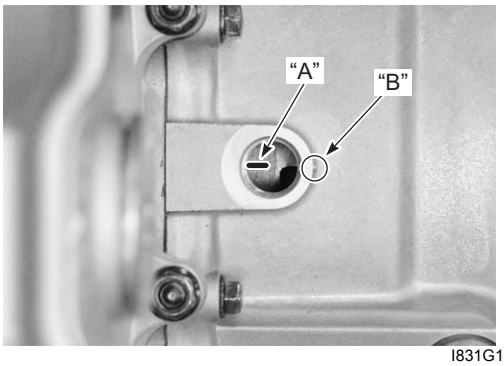
7) Remove the valve timing inspection plug (6).



I831G1020011-02

8) Turn the crankshaft to bring the “TDC” line “A” on the generator rotor to the lug mark “B”.

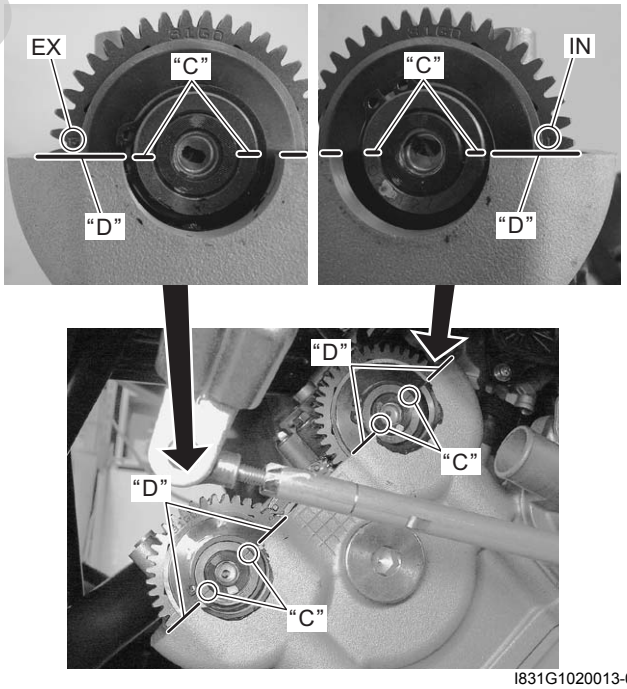


I831G1140086-03

9) Remove the cylinder head cover. Refer to “Engine Top Side Disassembly in Section 1D (Page 1D-17)”.

NOTE

- **Check the engraved lines “C” on the camshafts, so it is parallel with the mating surface “D” on the cylinder head cover.**
- **The valve clearance should be taken cylinder is at Top Dead Center (TDC) of compression stroke.**
- **The clearance specification is for COLD state.**
- **To turn the crankshaft for clearance checking, be sure to use a wrench, and rotate in the normal running direction.**



I831G1020013-03

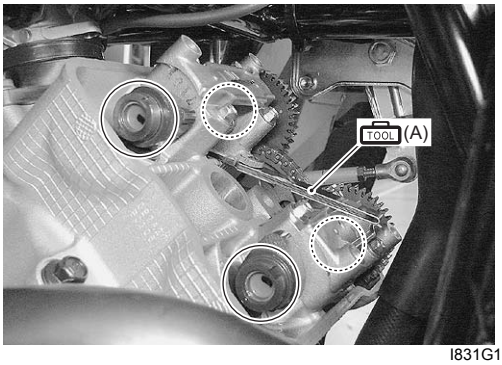
10) Insert the thickness gauge between the tappet and the cam. If the clearance is out of specification, adjust it to the specified range.

NOTE

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

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

Valve clearance (When cold)
IN.: 0.10 – 0.20 mm (0.004 – 0.008 in)
EX.: 0.20 – 0.30 mm (0.008 – 0.012 in)



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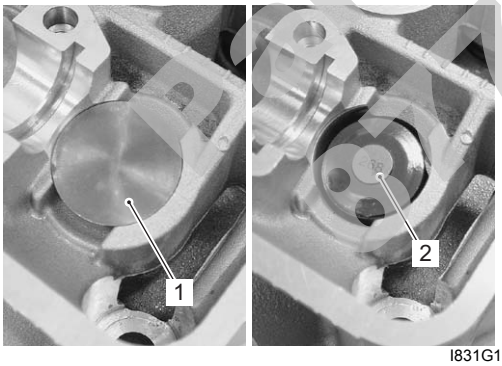
Adjustment
The clearance is adjusted by replacing the existing tappet shim with a thicker or thinner shim.

1) Remove the intake or exhaust camshafts. Refer to "Engine Top Side Disassembly in Section 1D (Page 1D-17)".
2) Remove the tappet (1) and shim (2) by fingers or magnetic hand.



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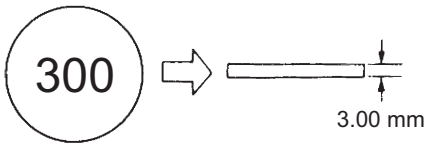
3) Check the figures printed on the shim. These figures indicate the thickness of the shim, as illustrated.



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4) Select a replacement shim that will provide a clearance within the specified range. For the purpose of this adjustment, a total of 25 sizes of tappet shim are available ranging from 2.50 to 3.50 mm in steps of 0.05 mm.

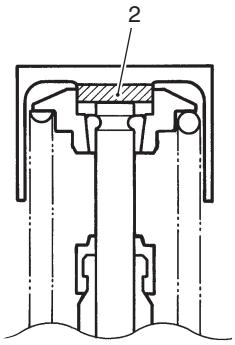
⚠ CAUTION

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

5) Fit the selected shim (2) to the valve stem end, with numbers toward tappet. Be sure to check shim size with micrometer to ensure its size.

NOTE

- **Be sure to apply engine oil to tappet shim top and bottom faces.**
- **When seating the tappet shim, be sure the figure printed surface faces the tappet.**



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(INTAKE SIDE)

TAPPET SHIM SELECTION TABLE [INTAKE]
TAPPET SHIM NO. (12892-41C00-XXX)

Option: 230–245; TAPPET SHIM SET (12800-41810): 250–350

MEASURED VALVE CLEARANCE (mm) \ SUFFIX NO.	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350
PRESENT SHIM SIZE (mm)	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50
0.00 – 0.04			2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.05 – 0.09		2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.10 – 0.20	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																								
0.21 – 0.25	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50	
0.26 – 0.30	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50		
0.31 – 0.35	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50			
0.36 – 0.40	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50				
0.41 – 0.45	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50					
0.46 – 0.50	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50						
0.51 – 0.55	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50							
0.56 – 0.60	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50								
0.61 – 0.65	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50									
0.66 – 0.70	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50										
0.71 – 0.75	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50											
0.76 – 0.80	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50												
0.81 – 0.85	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50													
0.86 – 0.90	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50														
0.91 – 0.95	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50															
0.96 – 1.00	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																
1.01 – 1.05	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																	
1.06 – 1.10	3.25	3.30	3.35	3.40	3.45	3.50	3.50																		
1.11 – 1.15	3.30	3.35	3.40	3.45	3.50	3.50																			
1.16 – 1.20	3.35	3.40	3.45	3.50	3.50																				
1.21 – 1.25	3.40	3.45	3.50	3.50																					
1.26 – 1.30	3.45	3.50	3.50																						
1.31 – 1.35	3.50	3.50																							
1.36 – 1.40	3.50																								

HOW TO USE THIS CHART:

I. Measure valve clearance. “ENGINE IS COLD”
II. Measure present shim size.
III. Match clearance in vertical column with present shim size in horizontal column.

EXAMPLE

Valve clearance is	0.23 mm
Present shim size	2.70 mm
Shim size to be used	2.80 mm

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(EXHAUST SIDE)

TAPPET SHIM SELECTION TABLE [EXHAUST]
TAPPET SHIM NO. (12892-41C00-XXX)

MEASURED VALVE CLEARANCE (mm)	Option				TAPPET SHIM SET (12800-41810)																				
SUFFIX NO.	230	235	240	245	250	255	260	265	270	275	280	285	290	295	300	305	310	315	320	325	330	335	340	345	350
PRESENT SHIM SIZE (mm)	2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50
0.00 – 0.04					2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30
0.05 – 0.09				2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35
0.10 – 0.14			2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40
0.15 – 0.19		2.30	2.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45
0.20 – 0.30	SPECIFIED CLEARANCE/NO ADJUSTMENT REQUIRED																								
0.31 – 0.35	2.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50	
0.36 – 0.40	2.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50		
0.41 – 0.45	2.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50			
0.46 – 0.50	2.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50				
0.51 – 0.55	2.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50					
0.56 – 0.60	2.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50						
0.61 – 0.65	2.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50							
0.66 – 0.70	2.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50								
0.71 – 0.75	2.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50									
0.76 – 0.80	2.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50										
0.81 – 0.85	2.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50											
0.86 – 0.90	2.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50												
0.91 – 0.95	3.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50													
0.96 – 1.00	3.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50														
1.01 – 1.05	3.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50															
1.06 – 1.10	3.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																
1.11 – 1.15	3.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																	
1.16 – 1.20	3.25	3.30	3.35	3.40	3.45	3.50	3.50																		
1.21 – 1.25	3.30	3.35	3.40	3.45	3.50	3.50																			
1.26 – 1.30	3.35	3.40	3.45	3.50	3.50																				
1.31 – 1.35	3.40	3.45	3.50	3.50																					
1.36 – 1.40	3.45	3.50	3.50																						
1.41 – 1.45	3.50	3.50																							
1.46 – 1.50	3.50																								

HOW TO USE THIS CHART:

I. Measure valve clearance. “ENGINE IS COLD”

II. Measure present shim size.

III. Match clearance in vertical column with present shim size in horizontal column.

EXAMPLE

Valve clearance is	0.38 mm
Present shim size	2.90 mm
Shim size to be used	3.05 mm

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6) Install the camshafts. Refer to “Engine Top Side Assembly in Section 1D (Page 1D-21)”.
7) Rotate the engine so that the tappet is depressed fully. This will squeeze out oil trapped between the shim and the tappet that could cause an incorrect measurement, then check the clearance again to confirm that it is within the specified range.
8) After finishing the tappet clearance adjustment, reinstall the removed parts. Refer to “Engine Top Side Assembly in Section 1D (Page 1D-21)”.

Spark Plug Replacement

B931G20206004

Replace spark plug
Every 6 000 km (4 000 miles)

Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)”.

Spark Plug Inspection and Cleaning

B931G20206005

Inspect spark plug
Every 2 000 km (1 200 miles, 6 months)

Heat Range

1) Remove the spark plug. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)”.
2) Check spark plug heat range by observing electrode color.
   If it appears white or glazed, replace the spark plug with colder type one.

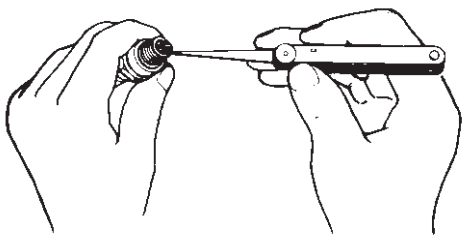
   Heat range

	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 plug. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)”.
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.



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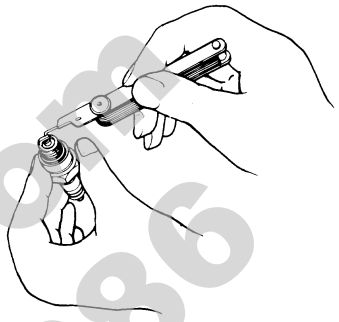
3) After finishing the spark plug inspection, reinstall the removed parts.

Spark Plug Gap

1) Remove the spark plug. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)”.
2) Measure the spark plug gap using a wire gauge. Adjust the spark plug gap if necessary.

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



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

Electrodes Condition

1) Remove the spark plug. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)”.
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.
3) After finishing the spark plug inspection, reinstall the removed parts.

⚠ CAUTION

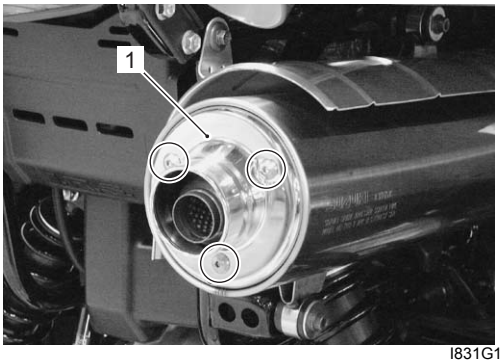
Check the thread size and reach when replacing the spark plug. If the reach is too short, carbon will be deposited on the screw portion of the spark plug hole and engine damage may result.

Spark Arrester Cleaning

B931G20206006

Spark arrester cleaning
Every 2 000 km (1 200 miles, 6 months)

1) Remove the muffler end cover (1).



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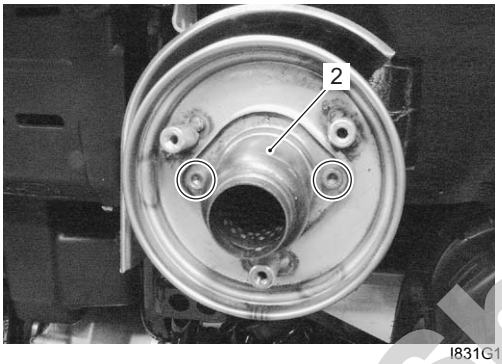
2) Remove the spark arrester (2) from the muffler.



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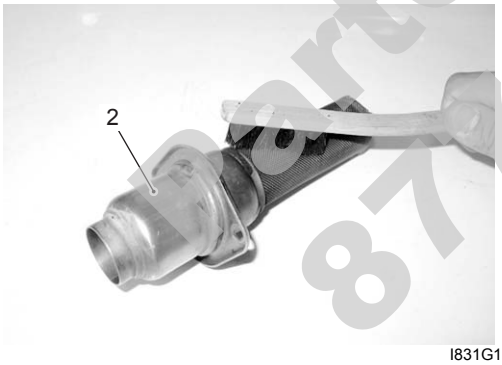
3) Clean the spark arrester (2) with a brush.



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4) After finishing the spark arrester cleaning, reinstall the removed parts.

Fuel Line Inspection

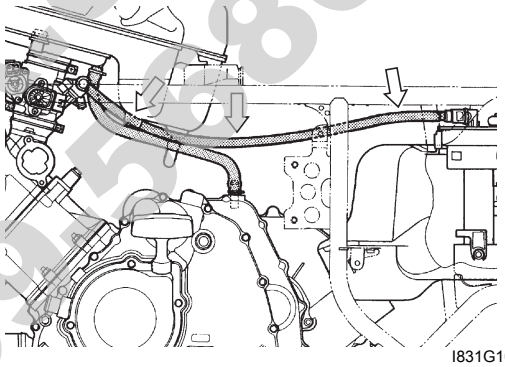
B931G20206007

Inspect fuel line
Every 1 000 km (600 miles, 3 months)

Replace fuel line
Every 4 years

Inspect the fuel line in the following procedures:

1) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Remove the rear fender. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
3) Remove the fuel tank side cover. Refer to “Fuel Tank Removal and Installation in Section 1G (Page 1G-8)”.
4) Inspect the fuel feed hose for damage and fuel leakage. If any defects are found, the fuel feed hose must be replaced.



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

Engine Oil and Filter Replacement

B931G20206008

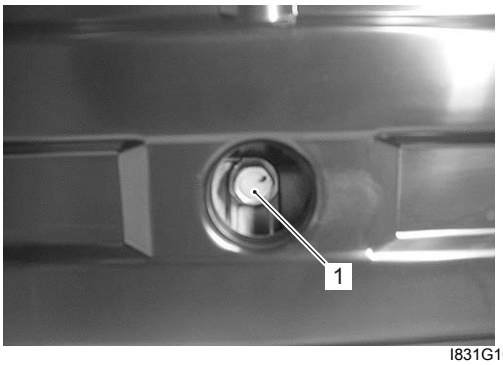
Replace engine oil
Initially at 200 km (100 miles, 1 month) and every 2 000 km (1 200 miles, 6 months) thereafter

Replace oil filter
Initially at 200 km (100 miles, 1 month) and every 2 000 km (1 200 miles, 6 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) Place the vehicle on a level ground and set the brake lock.
2) Remove the engine side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Place an oil pan below the engine, and drain engine oil by removing the oil drain plug (1) and filler cap (2).



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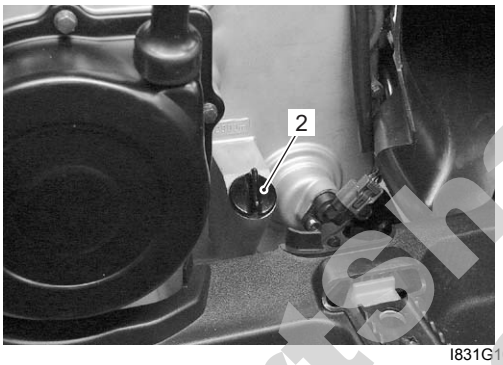

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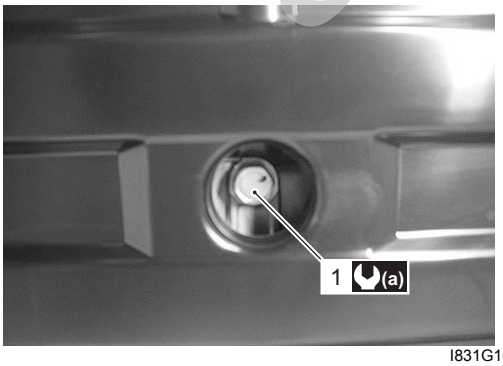
4) Tighten the oil drain plug (1) to the specified torque.

⚠ CAUTION

Replace the gasket washer with a new one.

Tightening torque
Oil drain plug (a): 21 N·m (2.1 kgf-m, 15.0 lbf-ft)



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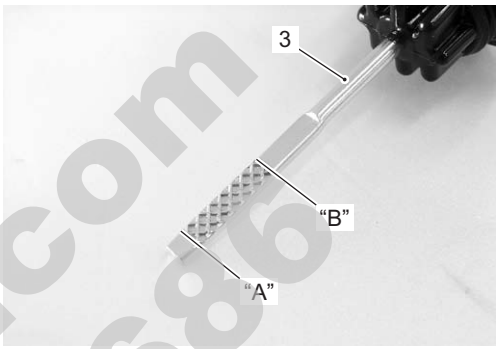
5) Pour new oil through the oil filler. When performing an oil change (without oil filter replacement), the engine will hold about 2.3 L (2.4/2.0 US/Imp qt) of oil. Use of SF/SG or SH/SJ in API with MA in JASO.
6) Start up the engine and allow it to run for several minutes at idling speed after tightening the oil filler cap.
7) Turn off the engine and wait about three minutes, and then check the oil level on the dipstick (3). 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”.



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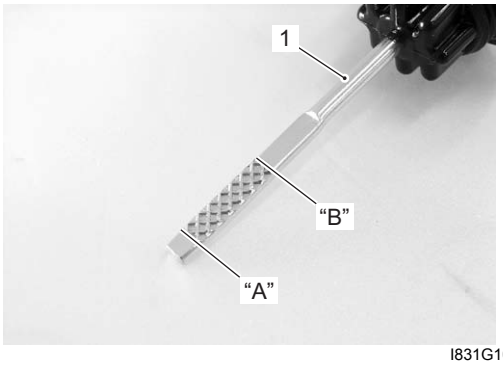
Oil Level Inspection

1) Place the vehicle on a level ground and set the brake lock.
2) Start up the engine and allow it to run for several minutes at idling speed.
3) Turn off the engine and wait about three minutes, then check the oil level on the dipstick (1). If the level is below low level line “A”, add oil to full level line “B”. If the level is above full level line “B”, drain oil to full level line “B”.

NOTE

When inspecting the oil level, the oil filler cap threads are not run in but touching the filler hole upper edge.

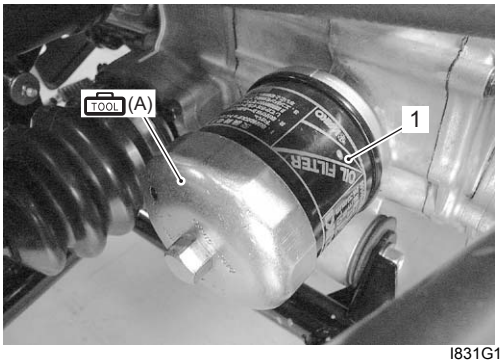


I831G1020024-01

Oil Filter Replacement

1) Drain engine oil as described in the engine oil replacement procedure.
2) Remove left inner cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Remove the oil filter (1) using the special tool.

Special tool
TOOL (A): 09915–40610 (Oil filter wrench)



I831G1020025-01

4) 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 vehicle.

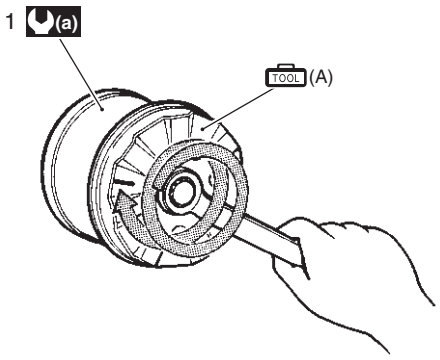
5) Install a new oil filter. Turn it by hand until you feel that the oil filter O-ring contacts the oil filter mounting surface. Then, tighten the oil filter two full turns (or to specified torque) using the special tool.

NOTE

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

Special tool
TOOL (A): 09915–40610 (Oil filter wrench)

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



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

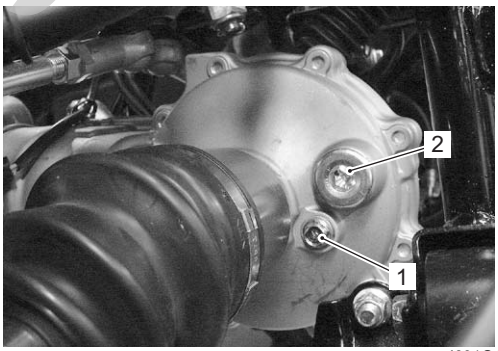
Necessary amount of engine oil
Oil change: 2 300 ml (2.4/2.0 US/Imp qt)
Oil and filter change: 2 500 ml (2.6/2.2 US/Imp qt)
Engine overhaul: 3 000 ml (3.2/2.6 US/Imp qt)

Front Differential Gear Oil Inspection

B931G20206009

Inspect front differential gear oil
Every 2 000 km (1 200 miles, 6 months)

1) Place the vehicle on level ground.
2) Remove the oil level plug (1) and oil filler plug (2), and inspect the oil level. If the oil level is below the level hole, add fresh oil until oil flows from the level hole.



I831G1020036-01

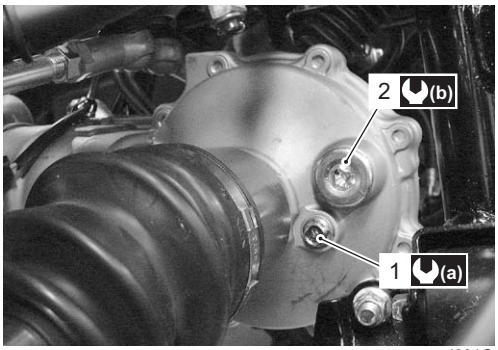
3) Tighten the oil level plug (1) and oil filler plug (2) to the specified torque.

⚠ CAUTION

Replace the gasket washers with new ones.

Tightening torque
Front differential gear oil level plug (a): 8.5 N·m (0.85 kgf-m, 6.0 lbf-ft)

Tightening torque
Front differential gear oil filler plug (b): 35 N·m (3.5 kgf-m, 25.5 lbf-ft)



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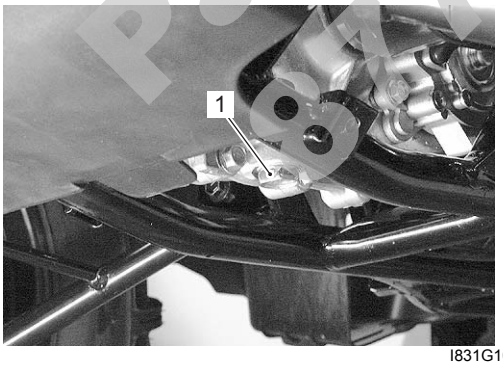
Front Differential Gear Oil Replacement

B931G20206010

Replace front differential gear oil
Every 2 years

1) Place the vehicle on level ground.
2) Remove the front under cover. Refer to "Under Cover Removal and Installation in Section 9D (Page 9D-12)".
3) Drain the front differential gear oil by removing the oil drain plug (1), oil filler plug and oil level plug.



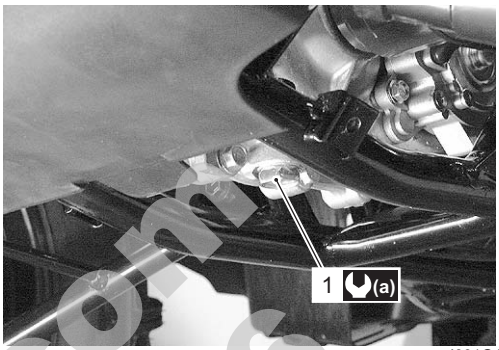
I831G1020038-01

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

⚠ CAUTION

Replace the gasket washers with a new one.

Tightening torque
Front differential gear oil drain plug (a): 32 N·m (3.2 kgf-m, 23.0 lbf-ft)



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5) Pour fresh oil through the oil filler hole until it overflows from the oil level hole. When performing an oil change, the front differential will hold about 500 ml (0.53 US qt, 0.44 Imp qt) of oil. Use hypoid gear oil SAE #90, API grade GL-5.

NOTE

Use hypoid gear oil SAE #80, API grade GL-5, if the vehicle is ridden where the ambient temperature is below 0 °C (32 °F).

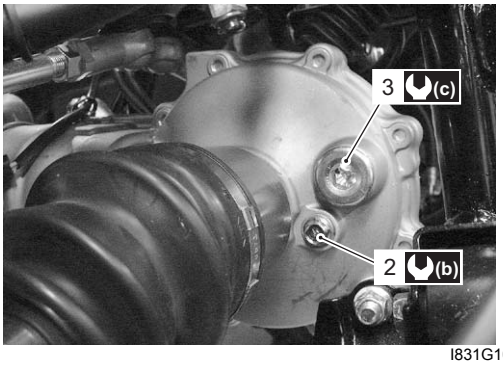
Front differential gear oil capacity
500 ml (0.53 US qt, 0.44 Imp qt)

6) Tighten the oil level plug (2) and oil filler plug (3) to the specified torque.

⚠ CAUTION

Replace the gasket washers with new ones.

Tightening torque
Front differential gear oil level plug (b): 8 N·m (0.8 kgf-m, 5.7 lbf-ft)
Front differential gear oil filler plug (c): 35 N·m (3.5 kgf-m, 25.5 lbf-ft)



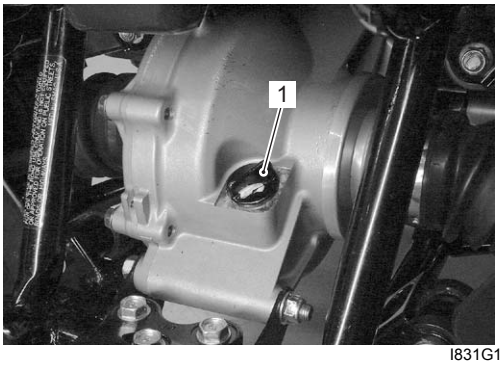
I831G1020039-03

Final Gear Oil Inspection

B931G20206011

Inspect final gear oil
Every 2 000 km (1 200 miles, 6 months)

1) Place the vehicle on a level ground.
2) Remove the filler plug (1), and inspect the oil level. If the oil level is below, add fresh oil until the oil level reaches the bottom tip of the thread.



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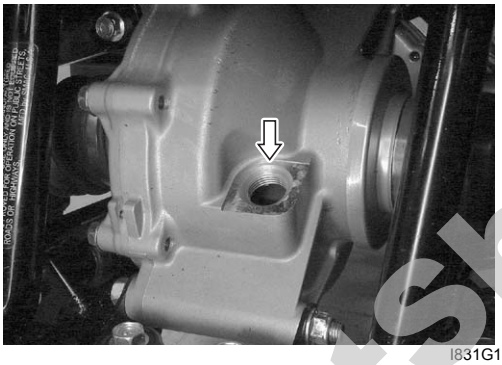


I831G1020041-01

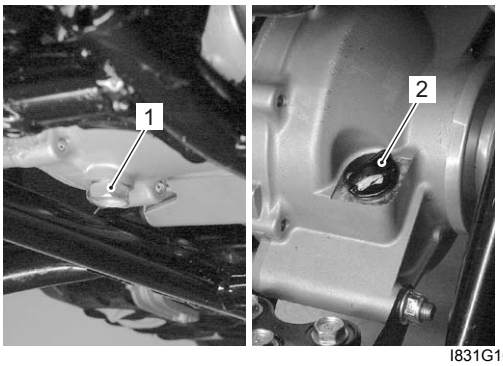
3) Tighten the oil filler plug (1) securely.

Final Gear Oil Replacement

B931G20206012

Replace final gear oil
Every year

1) Place the vehicle on a level ground.
2) Remove the rear under cover. Refer to “Under Cover Removal and Installation in Section 9D (Page 9D-12)”.
3) Place an oil pan below the final gear case.
4) Drain oil by removing the oil drain plug (1) and oil filler plug (2).



I831G1020042-02

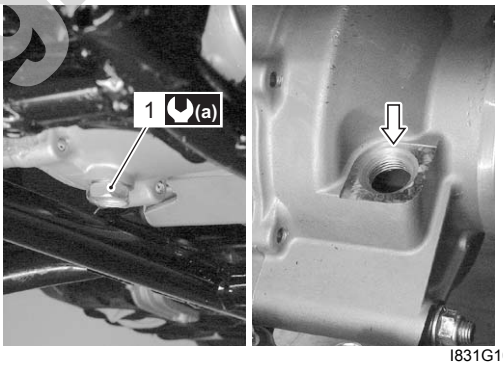
5) Tighten the oil drain plug (1) to the specified torque, and pour fresh oil through the oil filler hole until the oil level reaches the bottom tip of the thread. Use Mobil fluid 424 or equivalent oil.

Final gear oil capacity
770 ml (0.81 US qt, 0.68 Imp qt)

⚠ CAUTION

Replace the gasket with a new one.

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



I831G1020044-02

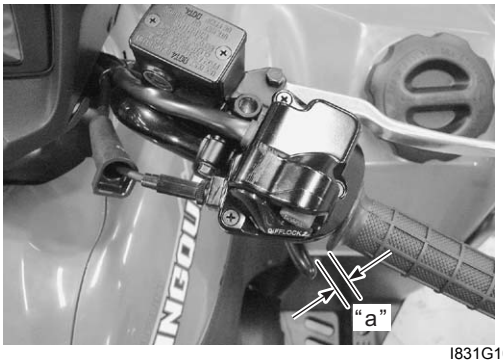
Throttle Cable Play Inspection and Adjustment

B931G20206013

Inspect throttle cable play
Initially at 200 km (100 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter

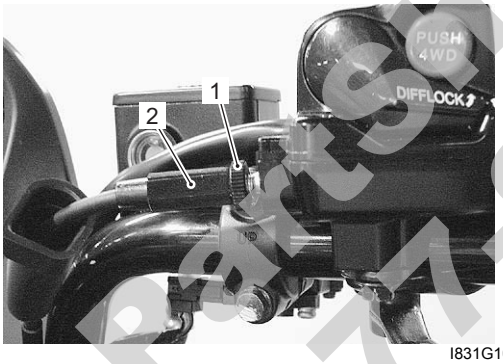
Inspect and adjust the throttle cable play “a” as follows.

Throttle cable play “a”
3.0 – 5.0 mm (0.12 – 0.20 in)



I831G1020026-01

1) Loosen the lock-nut (1) of the throttle cable.
2) Turn the adjuster (2) in or out until the throttle cable play “a” (at the throttle lever) is between 3 – 5 mm (0.12 – 0.20 in).
3) Tighten the lock-nut (1) while holding the adjuster (2).



I831G1020027-01

⚠ WARNING

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

Throttle Body Inspection

B931G20206014

Inspect throttle body
Every 1 000 km (600 miles, 3 months)

Inspect the throttle body periodically for dart or mud. If any dirt or mud is found, clean it. Refer to “Throttle Body Removal and Installation in Section 1D (Page 1D-8)”.

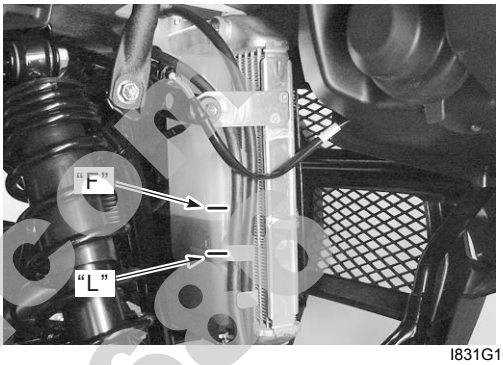
Cooling System Inspection

B931G20206015

Replace engine coolant
Every 2 years

Engine Coolant Level Inspection

1) Place the vehicle on a level ground.
2) 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.



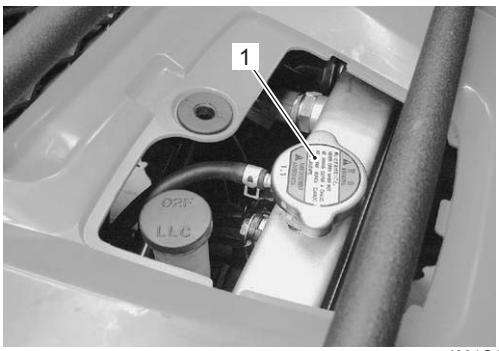
I831G1020028-01

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

⚠ WARNING

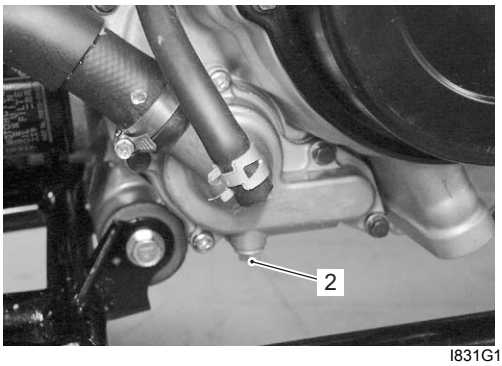
Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor. Engine coolant may be harmful if swallowed or if it comes in contact with skin or eyes. If engine coolant gets into the eyes or in contact with the skin, flush thoroughly with plenty of water.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

1) Remove the radiator cap lid.
2) Remove the radiator cap (1).



I831G1020029-01

3) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
4) Remove the front under cover. Refer to “Under Cover Removal and Installation in Section 9D (Page 9D-12)”.
5) Place a pan below the water pump, and then drain the engine coolant by removing the drain plug (2).



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6) Flush the radiator with fresh water if necessary.
7) Tighten the drain plug (4) to the specified torque.

⚠ CAUTION

Replace the gasket with a new one.

Tightening torque
Engine coolant drain plug (a): 13 N·m (1.3 kgf-m, 9.5 lbf-ft)

I831G1020031-02

8) Pour the specified engine coolant up to the radiator inlet.

Engine coolant capacity (including reservoir)
2 450 ml (2.6/2.2 US/Imp qt)


I831G1020080-01

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

Air Bleeding From the Cooling Circuit

1) Place the vehicle on a level ground and set the brake lock.
2) Pour engine coolant up to the radiator inlet.
3) Slowly swing the vehicle, right and left, to bleed the air trapped in the cooling circuit.
4) Add engine coolant up to the radiator inlet.
5) Start up the engine and bleed air from the radiator inlet completely.
6) Add engine coolant up to the radiator inlet.
7) Repeat the 6), 7) procedures until no air bleeds from the thermostat connector inlet.
8) Close the radiator cap securely.
9) After warming up and cooling down the engine, add the specified engine coolant until the level is between the upper and lower lines on the engine coolant reservoir tank.

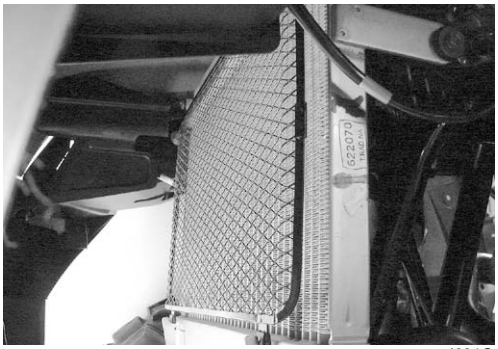

I831G1020032-01

10) Reinstall the removed parts.

Radiator Inspection

Inspect radiator
Every 1 000 km (600 miles, 3 months)

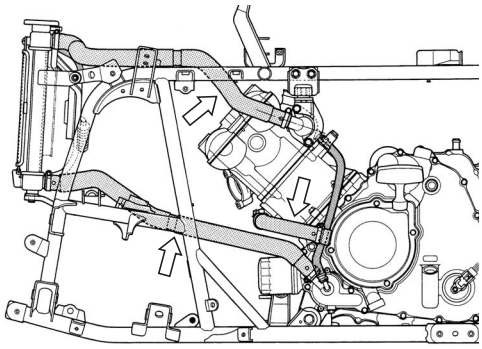
Inspect the radiator for damage and engine coolant leakage. If any defects are found, replace it with a new one.


I831G1020034-01

Radiator Hoses Inspection

Inspect radiator hoses
Every 2 000 km (1 200 miles, 6 months)

Inspect the radiator hoses for damage and engine coolant leakage. If any defects are found, replace them with new ones.



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Drive V-belt Inspection and Replacement

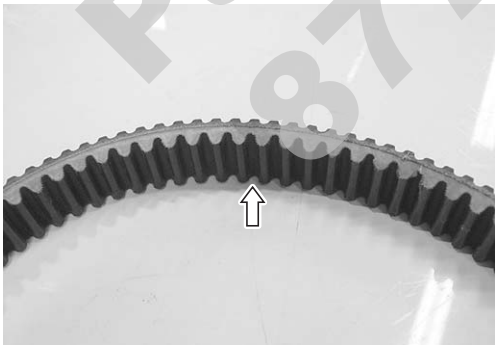
B931G20206016

Inspect drive V-belt
Every 1 000 km (600 miles, 3 months)

Replace drive V-belt
Every 2 000 km (1 200 miles, 6 months)

Inspect the drive V-belt in the following procedures:

1) Remove the drive V-belt. Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.
2) Inspect the drive V-belt for crack or other damage and measure the width of belt if necessary. If any abnormal point are found, replace the drive V-belt with a new one. Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.



I831G1020043-01

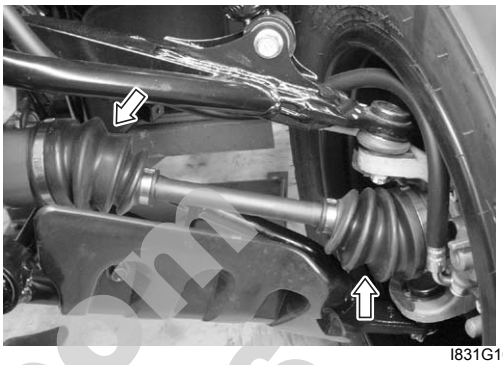
3) Install the removed parts. Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.

Drive Shaft Boots Inspection

B931G20206017

Inspect drive shaft
Initially at 200 km (100 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter

Inspect the boots for wear or damage. If any defects are found, replace them with new ones.



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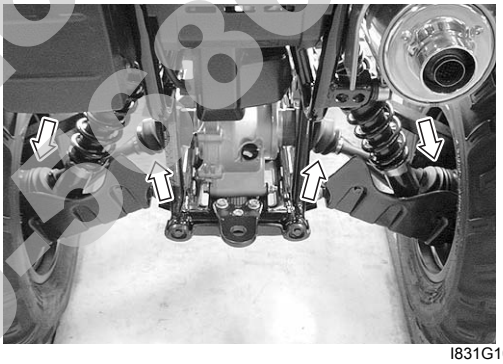


I831G1020046-01

Front Brake System Inspection

B931G20206018

Inspect brake system
Initially at 200 km (100 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter

⚠ WARNING

- **The brake system of this vehicle 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

Inspect brake fluid level
Every 1 000 km (600 miles, 3 months)

1) Place the vehicle on a level ground.
2) Check the brake fluid level by observing the lower limit lines on the brake fluid reservoir. 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)

I831G1020047-01

Brake Fluid Replacement

Replace brake fluid
Every 2 years

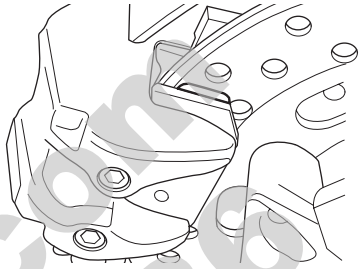
Refer to “Brake Fluid Replacement in Section 4A (Page 4A-6)”.

Air Bleeding from Brake Fluid Circuit
Refer to “Air Bleeding from Front Brake Fluid Circuit in Section 4A (Page 4A-5)”.

Front Brake Pads Check
The extent of front 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)”.

⚠ CAUTION

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



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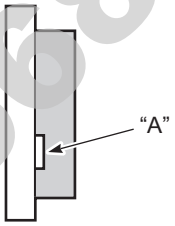

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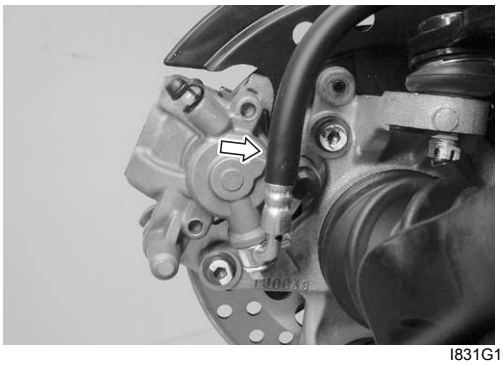
Front Brake Hose Inspection

Inspect brake hose
Every 2 000 km (1 200 miles, 6 months)

1) Turn the handlebars to left or right.
2) Inspect the brake hoses and hose joints for crack, damage or brake oil leakage. If any defects are found, replace the front brake hose with a new one. Refer to “Front Brake Hose Removal and Installation in Section 4A (Page 4A-7)”.



I831G1020035-01

Front Brake Hose Replacement

Replace brake hose
Every 4 years

Refer to “Front Brake Hose Removal and Installation in Section 4A (Page 4A-7)”.

Rear Brake Pedal / Rear Brake (Parking Brake) Lever Inspection and Adjustment

B931G20206019

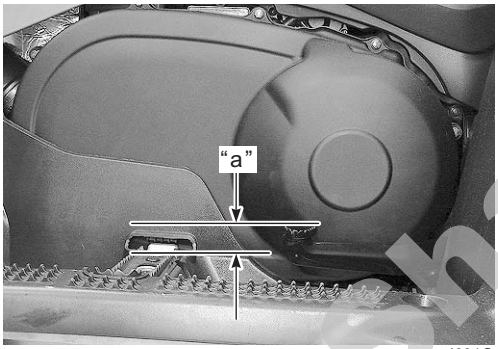
NOTE

Adjust the rear brake by adjusting the brake pedal first and then adjust the brake lever.

Brake Pedal Height

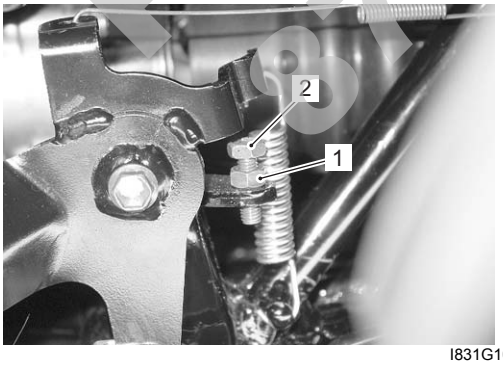
1) Inspect the brake pedal height “a” between the pedal top face and footrest. Adjust the brake pedal height if necessary.

Brake pedal height “a”
12.5 – 22.5 mm (0.5 – 0.9 in)



I831G1020051-02

2) Loosen the lock-nut (1).
3) Turn the adjuster (2) until the brake pedal becomes 12.5 – 22.5 mm (0.5 – 0.9 in) “a” higher from the top of the footrest.
4) Tighten the lock-nut (1) securely.



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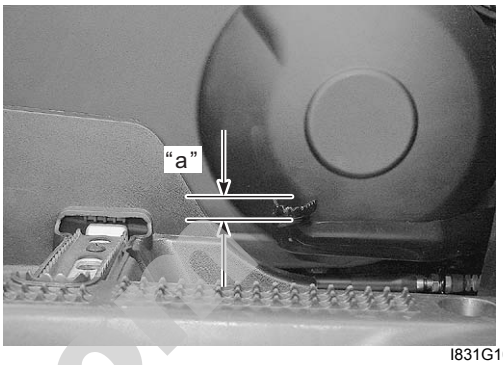
Brake Pedal Free Travel

Inspection

Inspect and adjust the rear brake pedal free travel “a” as follows.

Rear brake pedal free travel “a”
20 – 30 mm (0.8 – 1.2 in)



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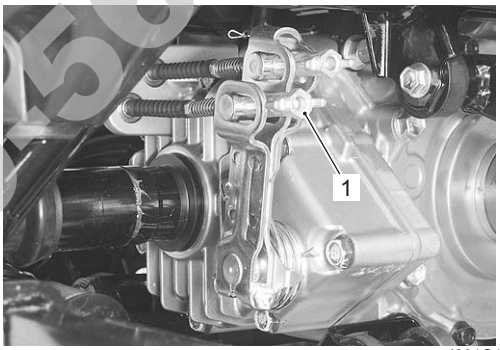
Adjustment

- Turn the adjuster nut (1) so the rear brake pedal has 20 – 30 mm (0.8 – 1.2 in) free travel at the rear brake pedal end before pressure is felt.



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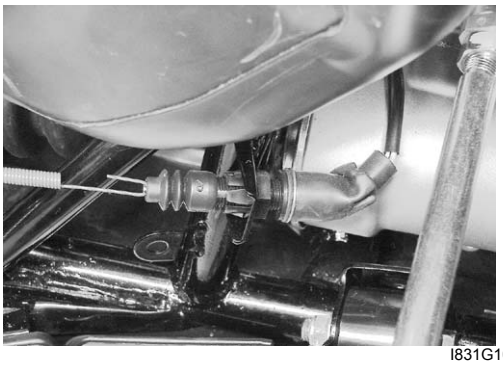
- Adjust the rear brake light switch so that the brake light will come on just before pressure is felt when the brake pedal is depressed.



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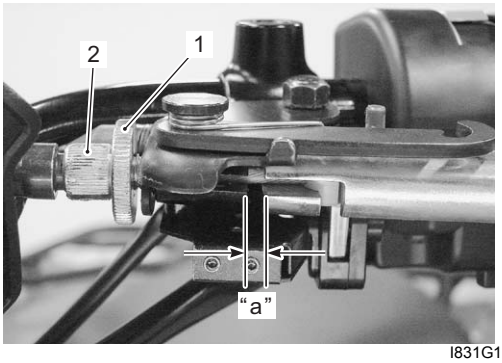
Rear Brake (Parking Brake) Lever Play Adjustment

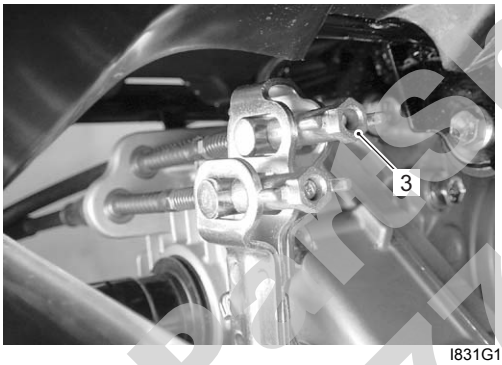
1) After adjusting the brake pedal, check the rear brake lever play “a” The brake lever play “a” as measured at the lever holder should be between 6 – 8 mm (0.2 – 0.3 in) when the lever is lightly pulled in towards the grip. If adjustment is necessary, slacken the cable by loosening the lock-nut (1) and screwing the cable adjuster (2) on the brake lever holder all the way in.

Rear brake lever play “a”
6 – 8 mm (0.2 – 0.3 in)



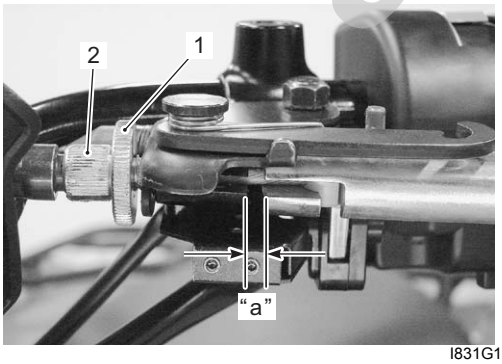
I831G1020093-01

2) Turn the adjust nut (3) so the rear brake lever has 6 – 8 mm (0.2 – 0.3 in) play “a” at the rear brake lever end before pressure is felt.



I831G1020057-03

3) Minor adjustment can be made with the adjuster (2).
4) Tighten the lock-nut (1).



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5) After adjusting the play, check that the rear wheels roll freely without applying the brake, the transmission in neutral and the rear wheels off the ground. Readjust the rear brake lever if the rear wheels could not roll freely.

Rear Brake Friction Plate Wear Limit Inspection

B931G20206020

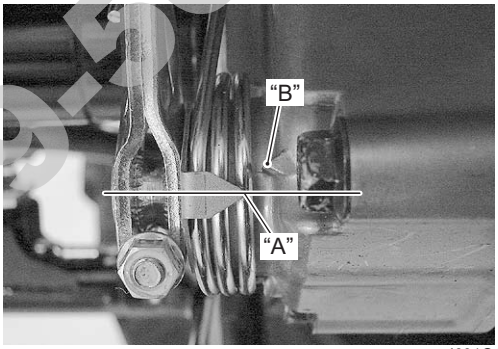
Replace rear brake friction plate
Every 10 000 km (6 000 miles)

After adjusted rear brake pedal and rear brake lever, inspect the rear brake friction plate wear limit.

- While fully applying the rear brake, check to see that the extension line of the index mark “A” is within the limit “B”. If the extension line is out of the limit “B”, replace the friction plates with new ones. Refer to “Rear Brake Disassembly and Assembly in Section 4C (Page 4C-3)”.

⚠ CAUTION

Replace the friction plate as a set, otherwise breaking performance will be adversely affected.



I831G1020049-02

Tire Inspection

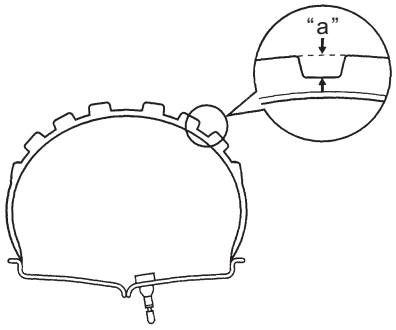
B931G20206021

Inspect tire
Every 1 000 km (600 miles, 3 months)

Tire Tread Condition
Operating the vehicle 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 "a" (Service limit)
Front: 4.0 mm (0.16 in)
Rear: 4.0 mm (0.16 in)



I831G1020084-01

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

Cold inflation tire pressure

	kPa	kgf/cm^2	psi
Front	35	0.35	5.1
Rear	30	0.30	4.4

Vehicle load capacity limit
172 kg (380 lbs)

⚠ CAUTION

To minimize the possibility of tire damage from over-inflation, we strongly recommended that a manual type air pump be used rather than a high pressure air compressor as found in service stations. When filling air into the tires, never exceed 70 kPa (0.7 kgf/cm^2, 10 psi)

⚠ CAUTION

The standard tire fitted on this vehicle is an AT25 x 8-12☆☆ for the front and a AT25 x 10-12☆☆ 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
DUNLOP

- **Front: DUNLOP KT411**
- **Rear: DUNLOP KT415**

Steering System Inspection

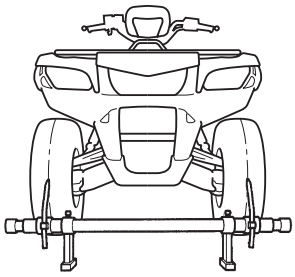
B931G20206022

Inspect steering system
Initially at 200 km (100 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter

Steering should be adjusted properly for smooth turning of handlebars and safe running.

1) Place the vehicle on level ground.
2) Make sure the tire pressure for right and left tires in the same and set to the proper specification.
3) Set the front wheels in the straight position.
4) Place a load of 75 kg (165 lbs) on the seat.
5) Measure the distances ("A" and "B") between the front wheels. Subtract the measurement of "A" from that of "B" to find the toe-out. If the toe-out is not within specification, adjust the tie-rod to the right or left until the toe-out is within the specified range.

Toe-out ("B" – "A")
Standard: 10 ± 4 mm (0.39 ± 0.16 in)



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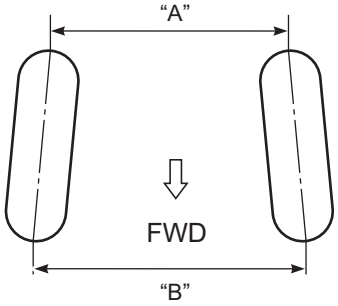


I831G1020059-04

If the toe-out is out of specification, bring it into the specified range. Refer to “Toe Adjustment (Page 0B-22)”.

Toe Adjustment

B931G20206023

Adjust the toe-out as follows:

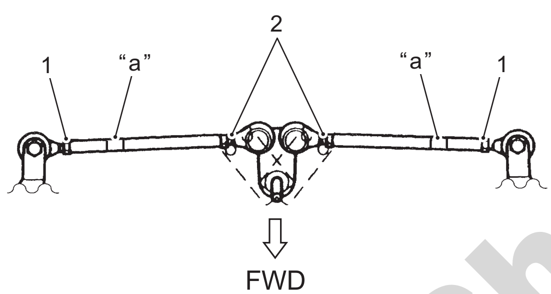
1) Loosen the lock-nuts (1), (2) on each tie-rod.

⚠ CAUTION

- **The lock-nuts (2) have left-hand threads.**
- **When loosening and tightening the lock-nuts, hold the tie-rod end with a open end wrench.**

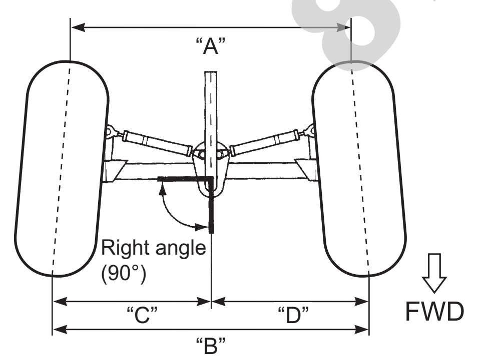
NOTE

Hold the concave part “a” of tie-rod with a wrench.



I831G1020087-03

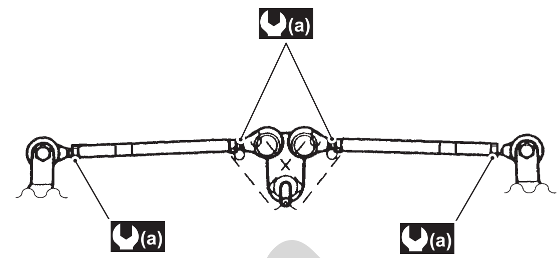
2) Temporarily tighten the four lock-nuts.
3) Check that the distances “C” and “D” are equal, as shown. If the distances are not equal, adjust the tie-rod to the right or left until the toe-out is within specification. Check the toe-out again by measuring distances “A” and “B”.
4) If the toe-out is not within specification, repeat the adjustment as above until the proper tor-out is obtained and distances “C” and “D” become equal.



I831G1020088-04

5) After adjustment has been made, tighten the four lock-nuts to the specified torque.

Tightening torque
Tie-rod lock-nut (a): 45 N·m (4.5 kgf-m, 32.5 lbf-ft)



I831G1020089-01

Suspensions Inspection

B931G20206024

<u>**Inspect suspension**</u>
Every 2 000 km (1 200 miles, 6 months)

1) Support the vehicle with a jack and wooden blocks.
2) Remove the front and rear wheels.
3) Inspect the suspension arm and bearing for scratches, wear, or damage. If any defects are found, replace them with new ones. Refer to “Front Shock Absorber Removal and Installation in Section 2B (Page 2B-3)”.
4) Inspect the front and rear shock absorbers for oil leakage or damage. If any defects are found, replace them with new ones. Refer to “Front Shock Absorber Removal and Installation in Section 2B (Page 2B-3)” and “Rear Shock Absorber Removal and Installation in Section 2C (Page 2C-3)”.

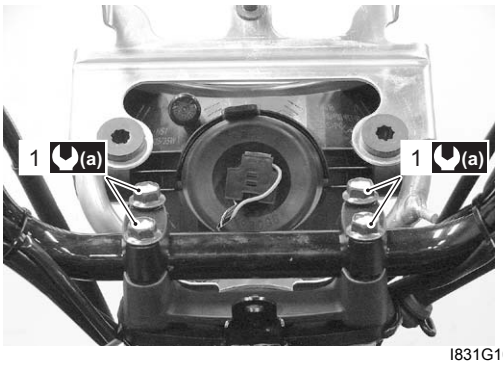
Chassis Bolt and Nut Inspection

B931G20206025

Tighten chassis bolt and nut

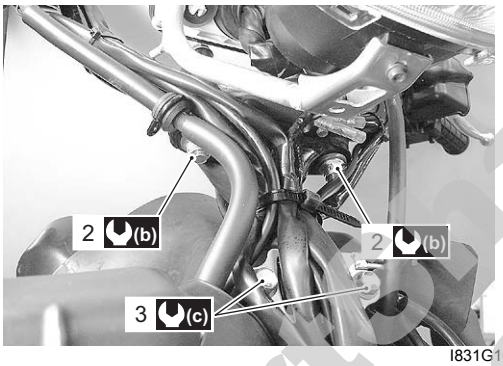
Initially at 200 km (100 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter

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



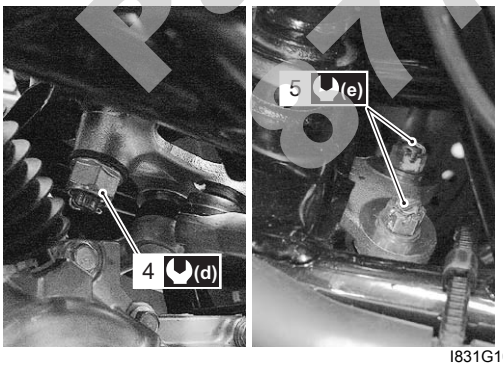
I831G1020062-01

1	(a)	Handlebar upper clamp bolt 26 N·m (2.6 kgf-m, 19.0 lb-ft)



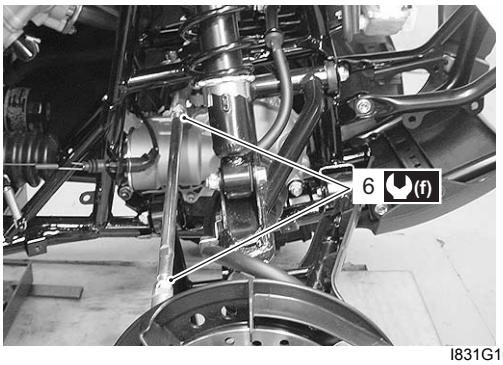
I831G1020063-01

2	(b)	Handlebar holder nut 60 N·m (6.0 kgf-m, 43.5 lb-ft)
3	(c)	Steering shaft holder bolt 23 N·m (2.3 kgf-m, 16.5 lb-ft)



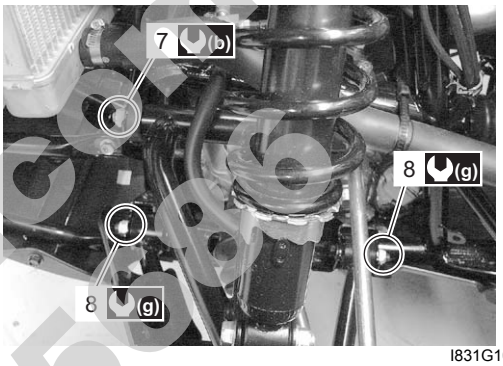
I831G1020064-01

4	(d)	Steering shaft lower nut 162 N·m (16.2 kgf-m, 117.0 lb-ft)
5	(e)	Tie-rod end nut 29 N·m (2.9 kgf-m, 21.0 lb-ft)



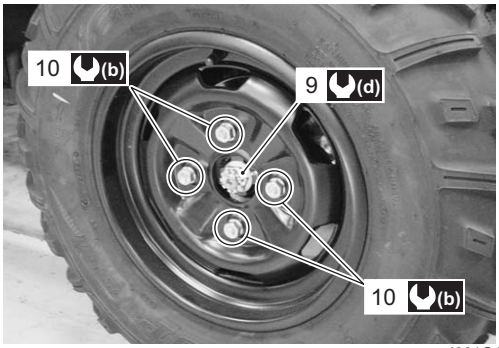
I831G1020065-01

6	(f)	Tie-rod lock-nut 45 N·m (4.5 kgf-m, 32.5 lb-ft)



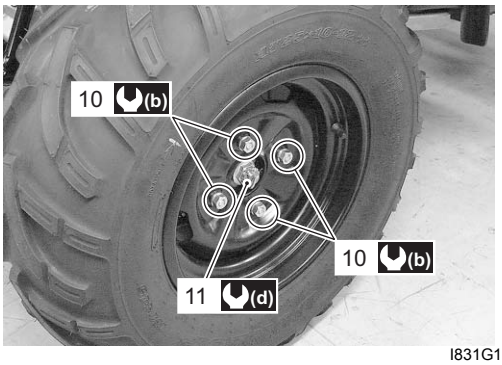
I831G1020060-02

7	(b)	Front suspension arm pivot nut (Upper) 60 N·m (6.0 kgf-m, 43.5 lb-ft)
8	(g)	Front suspension arm pivot nut (Lower) 65 N·m (6.5 kgf-m, 47.0 lb-ft)



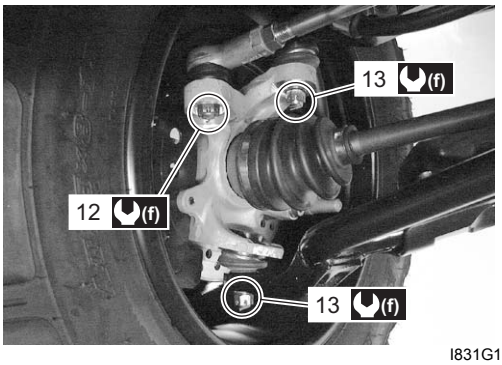
I831G1020066-03

9	(d)	Front hub nut 110 N·m (11.0 kgf-m, 79.5 lb-ft)
10	(b)	Front wheel set nut 60 N·m (6.0 kgf-m, 43.5 lb-ft)



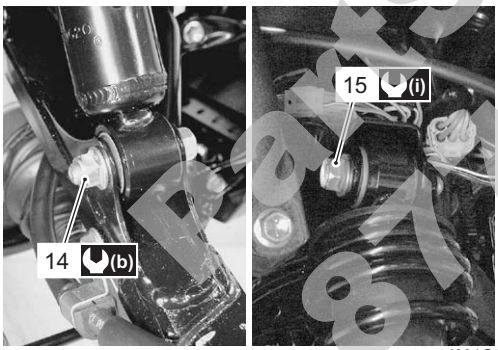
I831G1020067-04

10	(b)	Rear wheel set nut 60 N·m (6.0 kgf-m, 43.5 lb-ft)
11	(d)	Rear hub nut 121 N·m (12.1 kgf-m, 87.5 lb-ft)



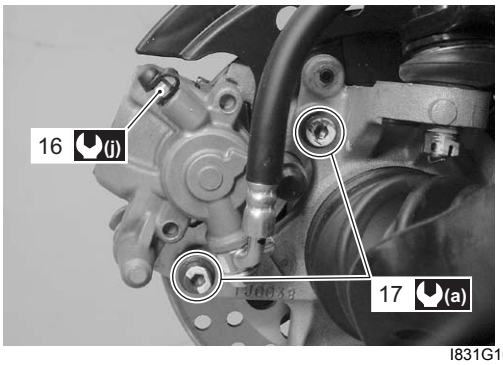
I831G1020068-04

12	(f)	Tie-rod end nut 29 N·m (2.9 kgf-m, 21.0 lb-ft)
13	(f)	Steering knuckle end nut (Upper and Lower) 29 N·m (2.9 kgf-m, 21.0 lb-ft)



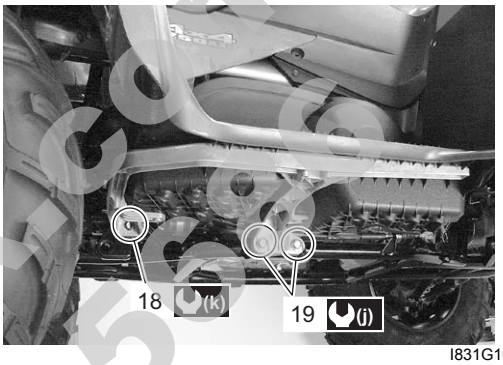
I831G1020069-04

14	(b)	Front shock absorber mounting nut (Lower) 60 N·m (6.0 kgf-m, 43.5 lb-ft)
15	(i)	Front shock absorber mounting bolt (Upper) 55 N·m (5.5 kgf-m, 40.0 lb-ft)



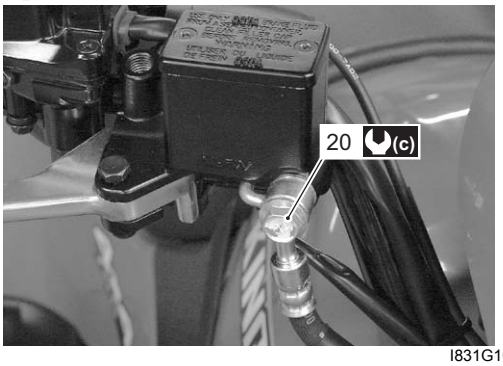
I831G1020070-03

16	(j)	Front brake air bleeder valve 6 N·m (0.6 kgf-m, 4.5 lb-ft)
17	(a)	Front brake caliper mounting bolt 26 N·m (2.6 kgf-m, 19.0 lb-ft)



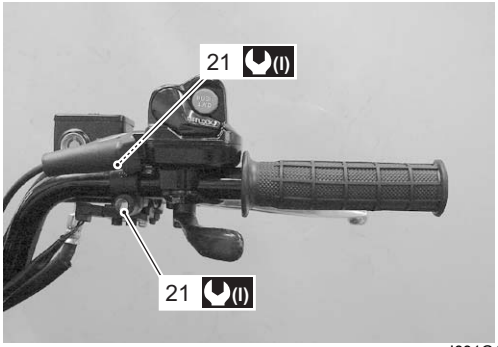
I831G1020071-03

18	(k)	Footrest bar mounting bolt (M8) 26 N·m (2.6 kgf-m, 19.0 lb-ft)
19	(j)	Footrest bar mounting bolt (M10) 55 N·m (5.5 kgf-m, 40.0 lb-ft)



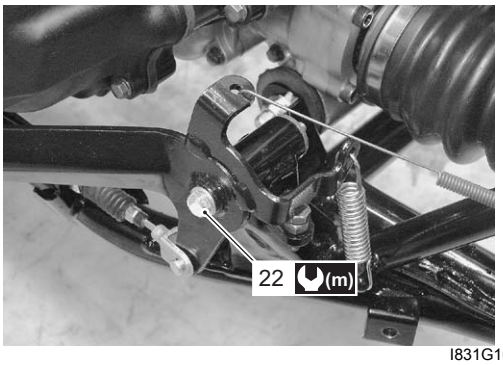
I831G1020072-03

20	(c)	Brake hose union bolt 23 N·m (2.3 kgf-m, 16.5 lb-ft)



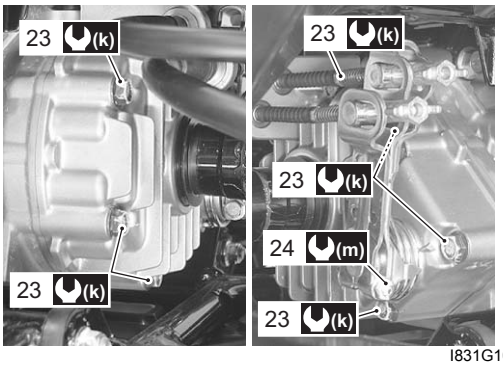
I831G1020073-04

21	(l)	Master cylinder mounting bolt 10 N·m (1.0 kgf-m, 7.0 lb-ft)



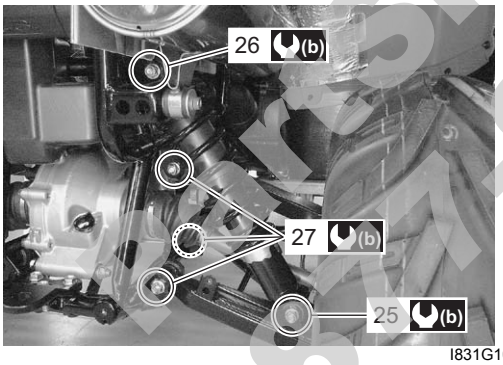
I831G1020074-04

22	(m)	Rear brake pedal pivot bolt 11 N·m (1.1 kgf-m, 8.0 lb-ft)



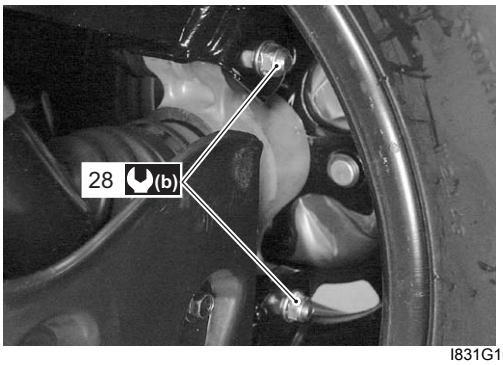
I831G1020075-05

23	(k)	Rear brake case bolt 26 N·m (2.6 kgf-m, 19.0 lb-ft)
24	(m)	Rear brake cam lever nut 11 N·m (1.1 kgf-m, 8.0 lb-ft)



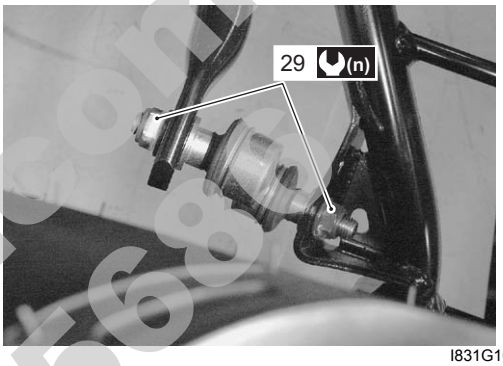
I831G1020076-02

25	(b)	Rear shock absorber mounting nut (Lower) 60 N·m (6.0 kgf-m, 43.5 lb-ft)
26	(b)	Rear shock absorber mounting nut (Upper) 60 N·m (6.0 kgf-m, 43.5 lb-ft)
27	(b)	Rear suspension arm pivot nut (Upper and Lower) 60 N·m (6.0 kgf-m, 43.5 lb-ft)



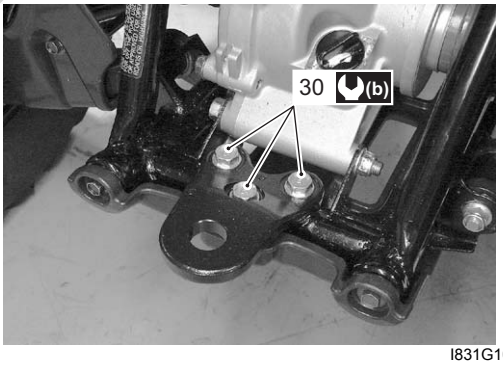
I831G1020077-02

28	(b)	Rear knuckle nut 60 N·m (6.0 kgf-m, 43.5 lb-ft)



I831G1020078-04

29	(n)	Rear stabilizer joint nut [Up to 5SAAR41A497105526: 34 N·m (3.4 kgf-m, 24.5 lb-ft)] [From 5SAAR41A497105527: 60 N·m (6.0 kgf-m, 43.5 lb-ft)]



I831G1020079-02

30	(b)	Trailer towing mounting bolt 60 N·m (6.0 kgf-m, 43.5 lb-ft)

Compression Pressure Check

B931G20206026

Refer to “Compression Pressure Check in Section 1D (Page 1D-2)”.

Oil Pressure Check

B931G20206027

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

SDS Check

B931G20206028

Refer to “SDS Check in Section 1A (Page 1A-15)”.

Automatic Clutch Inspection

B931G20206029

This vehicle is equipped with a centrifugal type automatic clutch.
To insure proper performance and longevity of the clutch assemblies it is essential that the clutches engage smoothly and gradually. Before checking the initial engagement and clutch lock-up two inspection checks must be performed to thoroughly check the operation of the drive train.

Initial Engagement Inspection

1) Warm up the engine.
2) Connect the tachometer or the multi circuit tester onto the spark plug high-tension cord (1).

I831G1020086-01

3) Start the engine.
4) Shift the range lever to the “High” position.
5) Slowly open the throttle and note the engine speed (r/min) when the vehicle begins to move forward.

Special tool
(TOOL) : 09900–26006 (Engine tachometer (solar cell type))
(TOOL) : 09900–25008 (Multi-circuit tester set)

Engagement speed
1 500 – 2 000 r/min

6) Disconnect the tachometer and install the frame front cover.

Clutch “Lock-up” Inspection

Perform this inspection to determine if the clutch is engaging fully and not slipping.

1) Warn up the engine.
2) Connect a tachometer onto the spark plug high-tension code.
3) Start the engine.
4) Shift the range lever to the “High” position.
5) Apply the front and rear brakes as firm as possible.
6) Fully open the throttle fully and note the maximum engine speed sustained during the test cycle.

⚠ CAUTION

Do not apply full power for more than 5 seconds or damage to the clutch or engine may occur.

Lock-up r/min
3 500 – 4 000 r/min

If the lock-up speed (r/min) does not coincide with the standard range, inspect the following items for any abnormalities.
Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.

- Clutch shoe
- Clutch wheel
- Movable drive and driven face

Specifications

Tightening Torque Specifications

B931G20207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Exhaust pipe nut	23	2.3	16.5	☞(Page 0B-4)
Muffler mounting bolt	23	2.3	16.5	☞(Page 0B-4)
Muffler connecting bolt	23	2.3	16.5	☞(Page 0B-4)
Oil drain plug	21	2.1	15.0	☞(Page 0B-11)
Oil filter	20	2.0	14.5	☞(Page 0B-12)
Front differential gear oil level plug	8.5	0.85	6.0	☞(Page 0B-13)
Front differential gear oil filler plug	35	3.5	25.5	☞(Page 0B-13) / ☞(Page 0B-13)
Front differential gear oil drain plug	32	3.2	23.0	☞(Page 0B-13)
Front differential gear oil level plug	8	0.8	5.7	☞(Page 0B-13)
Final gear oil drain plug	23	2.3	16.5	☞(Page 0B-14)
Engine coolant drain plug	13	1.3	9.5	☞(Page 0B-16)
Tie-rod lock-nut	45	4.5	32.5	☞(Page 0B-22)

NOTE

The specified tightening torque is also described in the following.
“Chassis Bolt and Nut Inspection (Page 0B-23)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

B931G20208001

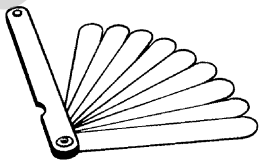
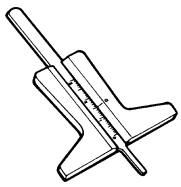
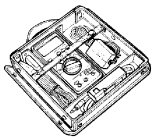
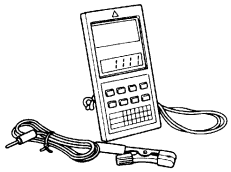
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 0B-18)

NOTE

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

Special Tool

B931G20208002

09900–20803 Thickness gauge ☞(Page 0B-6) 	09900–20805 Tire depth gauge ☞(Page 0B-21) 
09900–25008 Multi-circuit tester set ☞(Page 0B-26) 	09900–26006 Engine tachometer (solar cell type) ☞(Page 0B-26) 

09915–40610 Oil filter wrench ☞(Page 0B-12) / ☞(Page 0B-12)		

Service Data

Specifications

Service Data

B931G20307001

Valve + Valve Guide

Unit: mm (in)

Item	Standard		Limit
Valve diam.	IN.	36.0 (1.42)	—
	EX.	33.0 (1.30)	—
Tappet clearance (When cold)	IN.	0.10 – 0.20 (0.004 – 0.008)	—
	EX.	0.20 – 0.30 (0.008 – 0.012)	—
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 seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	—
Valve head radial runout	IN. & EX.	—	0.03 (0.001)
Valve spring free length	IN. & EX.	—	46.1 (1.81)
Valve spring tension	IN. & EX.	182 – 210 N (18.6 – 21.4 kgf, 41.0 – 47.2 lbs) at length 36.35 mm (1.43 in)	—

Camshaft + Cylinder Head

Unit: mm (in)

Item	Standard		Limit
Cam height	IN.	36.330 – 36.380 (1.4303 – 1.4323)	36.030 (1.4185)
	EX.	35.300 – 35.350 (1.3898 – 1.3917)	35.000 (1.3780)
Camshaft journal oil clearance	IN. & EX.	0.019 – 0.053 (0.0007 – 0.0021)	0.150 (0.0059)
Camshaft journal holder I.D.	IN. & EX.	22.012 – 22.025 (0.8666 – 0.8671)	—
Camshaft journal O.D.	IN. & EX.	21.972 – 21.993 (0.8650 – 0.8659)	—
Camshaft runout	IN. & EX.	—	0.10 (0.004)
Cylinder head distortion	—		0.05 (0.002)
Cam drive idle gear/sprocket thrust clearance	0.15 – 0.27 (0.006 – 0.011)		—

Cylinder + Piston + Piston Ring

Unit: mm (in)

Item	Standard			Limit
Compression pressure (Automatic-decomp. actuated)	Approx. 1 000 kPa (10.0 kgf/cm^2, 142 psi)			—
Piston-to-cylinder clearance	0.030 – 0.040 (0.0012 – 0.0016)			0.120 (0.0047)
Cylinder bore	104.000 – 104.015 (4.0945 – 4.0951)			Nicks or Scratches
Piston diam.	103.965 – 103.980 (4.0931 – 4.0937) Measure at 15 mm (0.6 in) from the skirt end.			103.880 (4.0898)
Cylinder distortion	—			0.05 (0.002)
Piston ring free end gap	1st	R	Approx. 13.1 (0.52)	10.5 (0.41)
	2nd	RN	Approx. 14.6 (0.57)	11.7 (0.46)
Piston ring end gap	1st	R	0.10 – 0.25 (0.004 – 0.010)	0.50 (0.020)
	2nd	RN	0.10 – 0.25 (0.004 – 0.010)	0.50 (0.020)
Piston ring-to-groove clearance	1st		—	0.180 (0.0071)
	2nd		—	0.150 (0.0059)
Piston ring groove width	1st		0.83 – 0.85 (0.0327 – 0.0335) 1.30 – 1.32 (0.0512 – 0.0520)	—
	2nd		1.01 – 1.03 (0.0398 – 0.0406)	—
	Oil		2.01 – 2.03 (0.0791 – 0.0799)	—
Piston ring thickness	1st		0.76 – 0.81 (0.0299 – 0.0319)	—
			1.08 – 1.10 (0.0425 – 0.0433)	—
	2nd		0.97 – 0.99 (0.0382 – 0.0390)	—
Piston pin bore I.D.	23.002 – 23.008 (0.9056 – 0.9058)			23.030 (0.9067)
Piston pin O.D.	22.992 – 23.000 (0.9052 – 0.9055)			22.980 (0.9047)

Conrod + Crankshaft

Unit: mm (in)

Item	Standard	Limit
Conrod small end I.D.	23.006 – 23.014 (0.9057 – 0.9061)	23.040 (0.9071)
Conrod deflection	—	3.0 (0.12)
Conrod big end side clearance	0.10 – 0.75 (0.004 – 0.030)	1.0 (0.04)
Conrod big end width	24.95 – 25.00 (0.982 – 0.984)	—
Crank web to web width	72.9 – 73.1 (2.87 – 2.88)	—
Crankshaft runout	—	0.08 (0.003)

Oil Pump

Item	Standard	Limit
Oil pressure (at 60 °C, 140 °F)	140 – 180 kPa (1.4 – 1.8 kgf/cm^2, 20 – 26 psi) at 3 000 r/min	—

Clutch

Unit: mm (in)

Item	Standard	Limit
Clutch wheel I.D.	140.0 – 140.2 (5.512 – 5.520)	140.5 (5.53)
Clutch shoe	—	No groove at any part
Clutch engagement r/min	1 500 – 2 000 r/min	—
Clutch lock-up r/min	3 500 – 4 000 r/min	—

Drive Train

Unit: mm (in) Except ratio

Item		Standard	Limit
Primary reduction ratio (Automatic drive)		Variable change (2.763 – 0.780)	—
Secondary reduction ratio		2.158 (40/21 x 17/15)	—
Final reduction ratio	Front	3.600 (36/10)	—
	Rear	3.600 (36/10)	—
Transfer gear ratio	Low	2.562 (41/16)	—
	High	1.240 (31/25)	—
	Reverse	1.882 (32/17)	—
Drive V-belt width		34.3 (1.35)	33.3 (1.31)
Movable driven face spring free length		153.0 (6.02)	145.4 (5.72)
Shift fork to groove clearance	Low	0.10 – 0.30 (0.0040 – 0.0120)	0.50 (0.020)
	High	0.10 – 0.30 (0.0040 – 0.0120)	0.50 (0.020)
	Reverse	0.10 – 0.30 (0.0040 – 0.0120)	0.50 (0.020)
Shift fork groove width	Low	5.50 – 5.60 (0.217 – 0.220)	—
	High	5.50 – 5.60 (0.217 – 0.220)	—
	Reverse	5.50 – 5.60 (0.217 – 0.220)	—
Shift fork thickness	Low	5.30 – 5.40 (0.209 – 0.213)	—
	High	5.30 – 5.40 (0.209 – 0.213)	—
	Reverse	5.30 – 5.40 (0.209 – 0.213)	—
Front/Rear output shaft bevel gear backlash		0.03 – 0.15 (0.001 – 0.006)	—
Front drive (differential) gear backlash		0.05 – 0.10 (0.002 – 0.004)	—
Rear drive (final) gear blacklash	Without gear cover specification	0.02 – 0.06 (0.0008 – 0.0024)	—
	Gear cover assembled specification	0.08 – 0.15 (0.0031 – 0.0059)	—
Front differential gear oil type		Hypoid gear oil SAE #90, API grade GL-5	—
Rear drive gear oil type		Mobil 424 or equivalent gear oil	—
Front differential gear oil capacity		500 ml (0.53/0.44 US/Imp qt)	—
Rear drive gear oil capacity		770 ml (0.81/0.68 US/Imp qt)	—

Thermostat + Radiator + Fan + Coolant

Item		Standard	Note
Thermostat valve opening temperature		Approx. 82 °C (180 °F)	—
Thermostat valve lift		8 mm (0.31 in) and over at 95 °C (203 °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		110 – 140 kPa (1.1 – 1.4 kgf/cm^2, 15.6 – 19.9 psi)	—
Cooling fan thermo-switch operating temperature	OFF → ON	Approx. 93 °C (199 °F)	—
	ON → OFF	Approx. 87 °C (189 °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	Approx. 250 ml (0.26/0.22 US/Imp qt)	—
	Engine	Approx. 2 200 ml (2.32/1.94 US/Imp qt)	—

Injector + Fuel Pump + Fuel Pressure Regulator

Item	Specification	Note
Injector resistance	11 – 13 Ω at 20 °C (68 °F)	
Fuel pump discharge amount	55.5 ml (1.88/1.95 US/Imp qt) and more/10 sec.	
Fuel pressure regulator operating set pressure	Approx. 294 kPa (2.9 kgf/cm^2, 41psi)	

FI Sensors + Secondary Throttle Valve Actuator

Item	Specification		Note
CKP sensor resistance	150 – 250 Ω		
CKP sensor peak voltage	5.0 V and more		When cranking
IAP sensor input voltage	4.5 – 5.5 V		
IAP sensor output voltage	Approx. 2.63 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
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	0.15 – 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	0.15 – 4.85 V		
IAT sensor resistance	Approx. 1.60 kΩ at 20 °C (68 °F)		
TO sensor resistance	19 – 20 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	80 V and more		When cranking
ISC valve resistance	Approx. 31 kΩ at 20 °C (68 °F)		

Throttle Body

Item	Specification
Bore size	42 mm
I.D. No.	31G0
Idle r/min	1 300 ± 100 r/min
Fast idle r/min	1 500 – 2 000 r/min (When cold engine)
Throttle cable play	3 – 5 mm (0.12 – 0.20 in)

Electrical

Unit: mm (in)

Item			Specification		Note
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			150 – 250 Ω		
CKP sensor peak voltage			5.0 V and more		
Ignition coil resistance			Primary	0.1 – 0.6 Ω	Terminal – Ground
			Secondary	12 – 19 kΩ	Plug cap – Terminal
Ignition coil primary peak voltage			80 V and more		When cranking
Generator coil resistance			0.4 – 1.0 Ω		
Generator maximum output			Approx. 400 W at 5 000 r/min		
Generator no-load voltage (When engine is cold)			75 V (AC) and more at 5 000 r/min		
Regulated voltage			13.5 – 15.5 V at 5 000 r/min		
Starter motor brush length			Standard	12.5 (0.49)	
			Limit	6.0 (0.24)	
Starter torque limiter slip torque			Standard	41.2 – 62.8 N·m (4.2 – 6.4 kgf-m, 14.5 – 32.5 lb-ft)	
Starter relay resistance			3 – 5 Ω		
Battery	Type designation		YTX20CH-BS		
	Capacity		12 V 64.8 kC (18 Ah)/10 HR		
Fuse size	Headlight	HI	10 A		
		LO	10 A		
	Fuel		10 A		
	Ignition		15 A		
	Power source		10 A		
	Fan		15 A		
	Main		30 A		

Wattage

Unit: W

Item		Specification	
		P-24, 28, 33	P-17
Headlight	HI	35 x 2	←
	LO	35 x 2	←
Auxiliary headlight		35/35	←
Brake light/Taillight		21/5	←
Revercing light		—	21
Speedometer light		LED	←
High beam indicator light		—	LED
Neutral indicator light		LED	←
FI indicator light/Engine coolant temp. indicator light		LED	←
Reverse indicator light		LED	←
Differential lock indicator light		LED	←

Brake + Wheel

Unit: mm (in)

Item	Standard	Limit
Front brake disc thickness	—	3.0 (0.12)
Front brake disc runout	—	0.30 (0.012)
Front master cylinder bore	14.000 – 14.043 (0.5512 – 0.5529)	—
Front master cylinder piston diam.	13.957 – 13.984 (0.5495 – 0.5506)	—
Front brake caliper cylinder bore	33.960 – 34.010 (1.3370 – 1.3390)	—
Front brake caliper piston diam.	33.878 – 33.928 (1.3338 – 1.3357)	—
Rear brake pedal height	12.5 – 22.5 (0.5 – 0.9)	—
Rear brake pedal free travel	20 – 30 (0.8 – 1.2)	—
Rear brake lever play	6 – 8 (0.2 – 0.3)	—
Rear brake outer distance	26.0 – 27.0 (1.02 – 1.06)	—
Brake side plate spring free length	21.3 (0.84)	20.2 (0.80)
Brake fluid type	DOT 4	—
Steering angle	46° (right & left)	—
Turning radius	3.1 m (10.2 ft)	—
Toe-out (With 75 kg, 165 lbs)	10 ± 4 mm (0.39 ± 0.16)	—
Camber	0.64°	—
Caster	1.6°	—

Tire

Unit: mm (in)

Item		Standard	Limit
Cold inflation tire pressure (Solo riding)	Front	35 kPa (0.35 kgf/cm^2, 5.1 psi)	—
	Rear	30 kPa (0.30 kgf/cm^2, 4.4 psi)	—
Tire size	Front	AT25 x 8-12 ☆☆, tubeless	—
	Rear	AT25 x 10-12 ☆☆, tubeless	—
Tire tread depth	Front	—	4.0 (0.16)
	Rear	—	4.0 (0.16)

Suspension

Unit: mm (in)

Item	Standard	Limit
Front shock absorber spring adjustor	2/5 position	—
Rear shock absorber spring adjustor	2/5 position	—

Fuel + Oil

Item	Specification	Note
Fuel type	Use only unleaded gasoline of at least 87 pump octane (R/2 + M/2) or 91 octane or higher rated by the Research Method. Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.	P-28, 33
	Gasoline used should be graded 91 octane or higher. An unleaded gasoline type is recommended.	Others
Fuel tank capacity	17.5 L (4.6/3.8 US/Imp gal)	
Engine oil type	SAE 10 W-40, API SF/SG or SH/SJ with JASO MA	
Engine oil capacity	Change: 2 300 ml (2.4/2.0 US/Imp qt)	
	Filter change: 2 500 ml (2.6/2.2 US/Imp qt)	
	Overhaul: 3 000 ml (3.2/2.6 US/Imp qt)	

Tightening Torque List

B931G20307002

Engine

Item		N·m	kgf-m	lb-ft
Spark plug		11	1.1	8.0
Cylinder head cover bolt	Initial	10	1.0	7.0
	Final	14	1.4	10.5
Cam drive idle gear/sprocket shaft		41	4.1	29.5
Intake pipe bolt		9	0.9	6.5
Cylinder head bolt (M6)		10	1.0	7.0
Cylinder head bolt (L200)	Initial	25	2.5	18.0
	Final	37	3.7	27.0
Cylinder head bolt (L: 70)		10	1.0	7.0
Cylinder head bolt (L: 100)		10	1.0	7.0
Camshaft journal holder bolt		10	1.0	7.0
Cam chain tension adjuster bolt		10	1.0	7.0
Cam chain tension adjuster cap bolt		7	0.7	5.0
Crankcase bolt (M6)		10	1.0	7.0
Crankcase bolt (M8)		26	2.6	19.0
Valve timing inspection plug		23	2.3	16.5
Clutch shoe nut		150	15.0	108.5
Movable drive face bolt		110	11.0	79.5
Movable driven face bolt		110	11.0	79.5
Movable driven face ring nut		110	11.0	79.5
Clutch outer cover bolt		8	0.8	6.0
Clutch inner cover bolt		9	0.9	6.5
Generator rotor nut		160	11.0	115.5
Generator starter set bolt		11	1.1	8.0
Speed sensor bolt		10	1.0	7.0
Starter clutch bolt		26	2.6	19.0
Exhaust pipe nut		23	2.3	16.5
Muffler connecting bolt		23	2.3	16.5
Muffler mounting bolt		23	2.3	16.5
Engine oil drain plug		21	2.1	15.0
Engine coolant drain plug		13	1.3	9.5
Drive bevel gear nut		100	10.0	72.5
Front output shaft nut		100	10.0	72.5
Engine mounting nut		60	6.0	43.5
Engine mounting damper stopper bolt		23	2.3	16.5
Rear output shaft nut		100	10.0	72.5
Crank balancer drive gear nut		150	15.0	108.5
Crank balancer driven gear bolt		50	5.0	36.0
Starter motor mounting bolt		10	1.0	7.0
Starter motor lead wire connecting nut		6	0.6	4.5
Main oil gallery plug		18	1.8	13.0
Air cleaner box mounting bolt		4.5	0.45	3.0
Stater cup nut		38	3.8	27.5
Oil gallery plug (Cylinder head)		10	1.0	7.0
Water bypass union		12	1.2	8.5
Gear shift lever bolt		10	1.0	7.0

Drive Train

Item	N·m	kgf-m	lb-ft
4WD/Diff-lock actuator mounting bolt	22	2.2	16.0
Front drive (Differential) gear case bolt	22	2.2	16.0
Front drive (Differential) gear case mounting nut	50	5.0	36.0
Front drive (Differential) gear oil level plug	8.5	0.85	6.0
Front drive (Differential) gear oil filler plug	35	3.5	25.5
Front drive (Differential) gear oil drain plug	32	3.2	23.0
Front propeller shaft boot clamp screw	1.3	0.13	0.94
Final drive gear nut	100	10.0	72.5
Final drive gear bearing stopper	100	10.0	72.5
Final gear case bolt (M8)	26	2.6	19.0
Final gear case bolt (M10)	55	5.5	40.0
Final gear mounting nut	65	6.5	47.0
Final gear mounting bolt	65	6.5	47.0
Rear propeller shaft boot clamp screw	2	0.2	1.5
Final gear oil drain plug	23	2.3	16.5
Rear propeller shaft coupling nut	100	10.0	72.5
Front output shaft bolt	10	1.0	7.0
Rear output shaft nut	100	10.0	72.5
Rear output shaft drive bevel gear nut	100	10.0	72.5
Rear output shaft driven gear nut	100	10.0	72.5
Front propeller shaft boot clamp screw	1.3	0.13	1.0
Rear propeller shaft boot clamp screw	2	0.2	1.5

FI System, Intake Air System and Fuel System

Item	N·m	kgf-m	lb-ft
CKP sensor mounting bolt	6	0.6	4.5
CKP sensor bracket bolt	6	0.6	4.5
Fuel delivery pipe mounting screw	5	0.5	3.5
Fuel pump retainer	35	3.5	25.5
ECT sensor	18	1.8	13.0
ISC valve mounting screw	2	0.2	1.5
TP sensor mounting screw	2	0.2	1.5

Cooling System

Item	N·m	kgf-m	lb-ft
Water pump cover screw	6	0.6	4.5
Water pump mounting bolt	10	1.0	7.0
Cooling fan thermo-switch	17	1.7	12.5
Thermostat cover bolt	23	2.3	16.5
Cooling fan assembly mounting bolt	8.5	0.85	6.0
Water bypass union	12	1.2	8.5

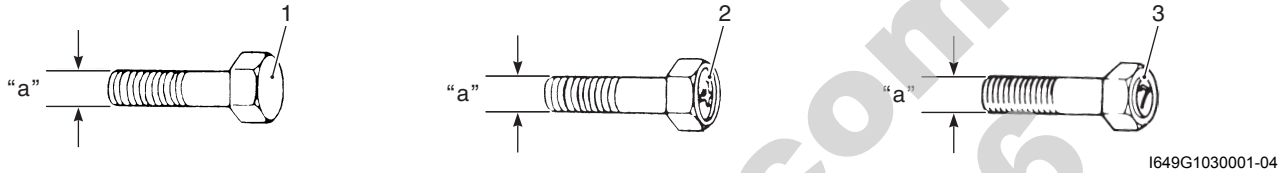
Chassis

Item	N·m	kgf-m	lb-ft
Handlebar clamp bolt	26	2.6	19.0
Handlebar holder nut	60	6.0	43.5
Rear brake lever holder clamp bolt	11	1.1	8.0
Throttle lever case bolt	5	0.5	3.5
Steering shaft holder bolt	23	2.3	16.5
Steering shaft lower nut	162	16.2	117.0
Front suspension arm pivot nut (Upper)	60	6.0	43.5
Front suspension arm pivot nut (Lower)	65	6.5	47.0
Steering knuckle end nut (Upper and Lower)	29	2.9	21.0
Tie-rod end nut	29	2.9	21.0
Tie-rod lock-nut	45	4.5	32.5
Front shock absorber mounting bolt (Upper)	55	5.5	40.0
Front shock absorber mounting nut (Lower)	60	6.0	43.5
Front wheel hub nut	110	11.0	79.5
Rear wheel hub nut	121	12.1	87.5
Wheel set nut (Front and rear)	60	6.0	43.5
Front brake hose union bolt	23	2.3	16.5
Front brake air bleeder valve	6	0.6	4.5
Front brake pad mounting pin	18	1.8	13.0
Front brake caliper mounting bolt	26	2.6	19.0
Caliper holder pin	18	1.8	13.0
Caliper holder slide pin	23	2.3	16.5
Brake pipe flare nut	16	1.6	11.5
Front brake disc mounting bolt	23	2.3	16.5
Brake master cylinder mounting bolt	10	1.0	7.0
Footrest mounting bolt (M8)	26	2.6	19.0
Footrest mounting bolt (M10)	55	5.5	40.0
Rear stabilizer joint nut [Up to 5SAAR41A497105526]	34	3.4	24.5
Rear stabilizer joint nut [From 5SAAR41A497105527]	60	6.0	43.5
Rear shock absorber mounting nut (Upper and Lower)	60	6.0	43.5
Rear suspension arm pivot nut (Upper and Lower)	60	6.0	43.5
Rear knuckle end nut (Upper and Lower)	60	6.0	43.5
Rear brake cam lever nut	11	1.1	8.0
Rear brake case bolt	26	2.6	19.0
Rear brake pedal pivot bolt	11	1.1	8.0
Trailer towing bolt	60	6.0	43.5
Brake lever pivot bolt and nut	6	0.6	4.5
Brake lever pivot bolt lock-nut	6	0.6	4.5
Front propeller shaft boot clamp screw	1.3	0.13	1.0
Rear propeller shaft boot clamp screw	2	0.2	1.5

Tightening Torque Chart

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

Bolt Diameter "a" (mm)	Conventional or "4" marked bolt			"7" marked bolt		
	N·m	kgf-m	lb-ft	N·m	kgf-m	lb-ft
4	1.5	0.15	1.0	2.3	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



I649G1030001-04

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

Section 1

Engine

CONTENTS

Precautions

Precautions

Precautions for Engine

B831G21000001

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

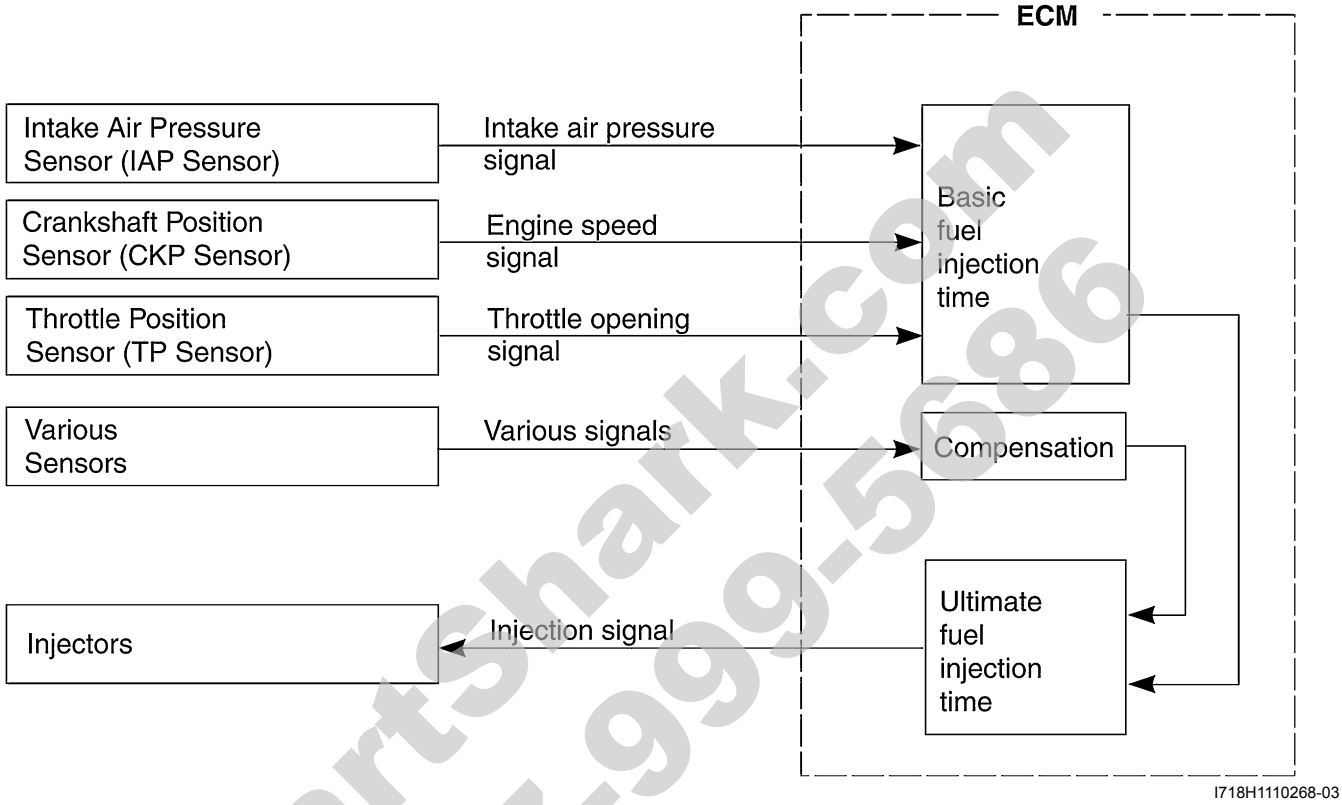
General Description

Injection Timing Description

B831G21101001

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.
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.
ENGINE RPM SIGNAL	At high speed, the injection time (volume) is increased.
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 vehicle 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.

Self-Diagnosis Function
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 prepared. 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”		Clock/Hour meter *1	—	—
“YES”	Engine can start	Clock/Hour meter (*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.

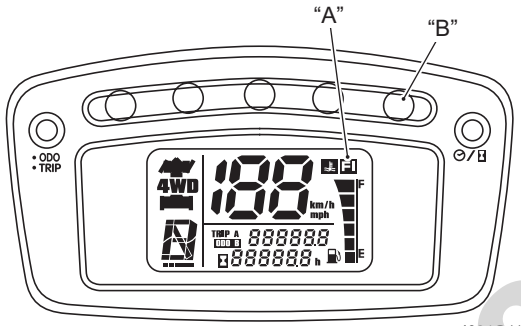
***1**
Current letter displayed any one of the clock/hour meter.
***2**
When one of the signals is not received by ECM, the fail-safe circuit works and injection is not stopped. In this case, “FI” and clock/hour meter (*1) are indicated in the LCD panel and vehicle can run.
***3**
The injection signal is stopped, when the crankshaft position sensor signal, tip-over sensor signal, ignition signal, injector signal, fuel pump relay signal or ignition switch signal is not sent to ECM. In this case, “FI” is indicated in the LCD panel. Vehicle does not run.

“CHEC”:
The LCD panel indications “CHEC” when no communication signal from the ECM is received for 3 seconds.
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 form 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. Ignition fuse is burnt.

NOTE

The FI light turns ON 2 seconds after the ignition switch turns ON.



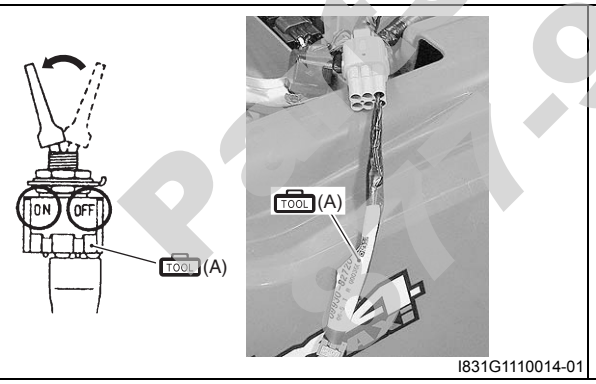
I831G1110001-03

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 form 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)



I831G1110014-01

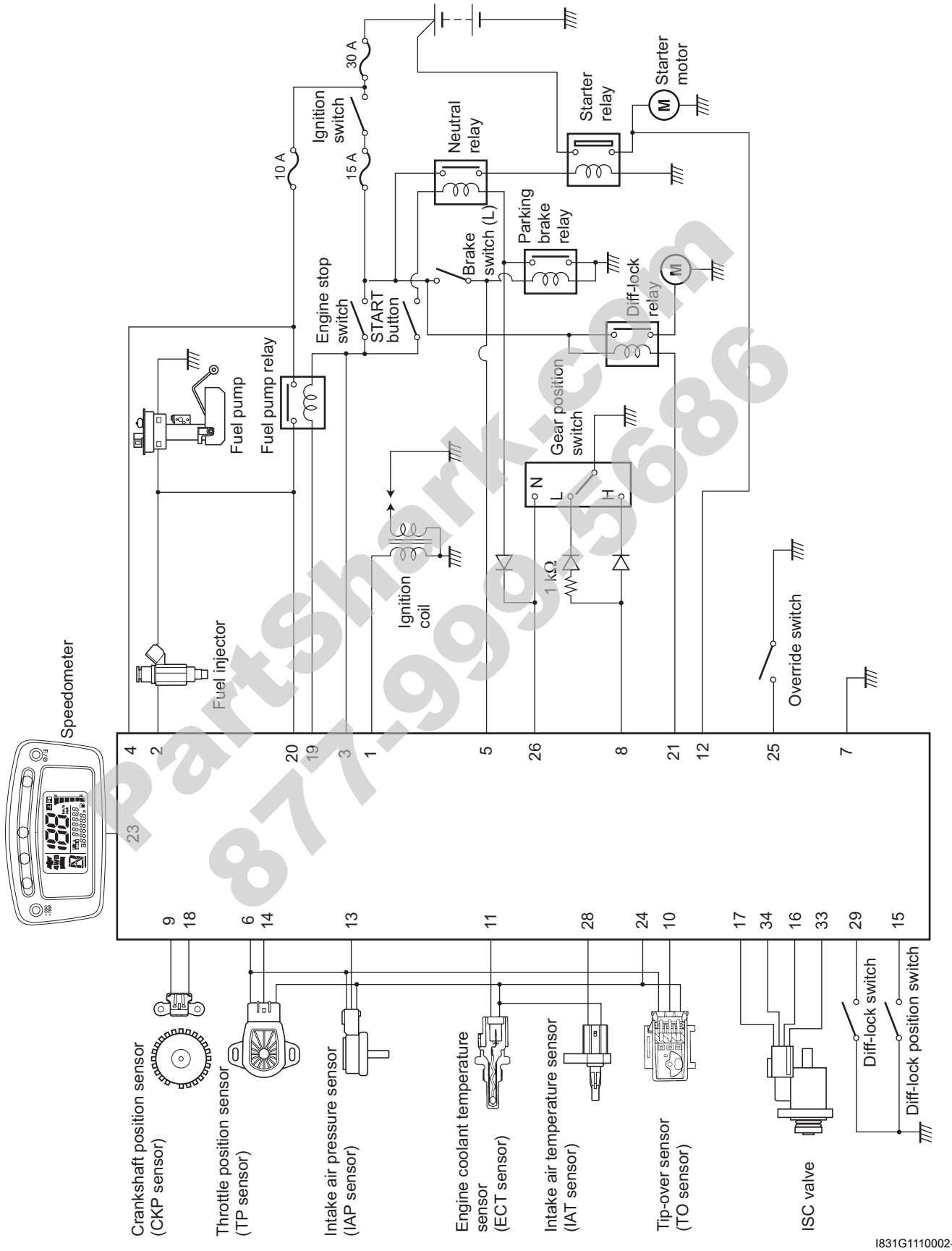
I831G1110015-01

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

B831G21102001



Terminal Alignment of ECM Coupler

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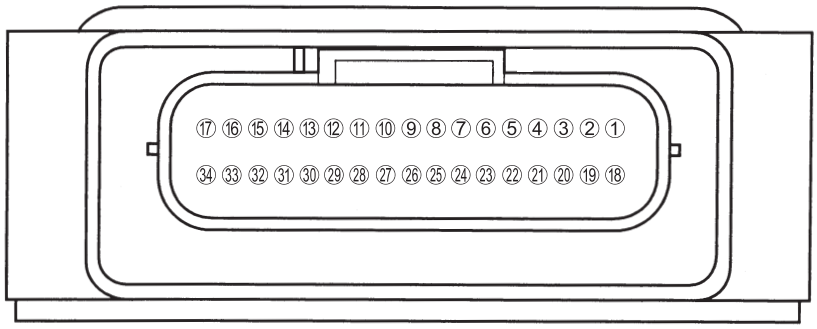

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TERMINAL NO.	CIRCUIT	TERMINAL NO.	CIRCUIT
1	Ignition coil (IG1)	18	CKP sensor signal (CKP-)
2	Fuel injector (#1)	19	Fuel pump relay (FP relay)
3	Power source (+B)	20	Injector power voltage (VM)
4	Back up power (BATT)	21	Diff-lock relay (DL relay)
5	Brake switch (BRK)	22	Serial data for self-diagnosis (SDL)
6	Power source for sensors (VCC)	23	Serial data for speedometer (TECH)
7	ECM ground (E1)	24	Sensor ground (E2)
8	Forward sensor signal (FOW)	25	Override switch (OVR)
9	CKP sensor signal (CKP+)	26	Neutral switch (NT)
10	TO sensor signal (TO)	27	Test switch (TS)
11	ECT sensor signal (ECT)	28	IAT sensor signal (IAT)
12	Starter relay (STR)	29	Diff-lock switch (DL)
13	IAP sensor signal (IAP)	30	—
14	TP sensor signal (TP)	31	—
15	Diff-lock position sensor signal (DLP)	32	—
16	ISC valve (IS2A)	33	ISC valve (IS2B)
17	ISC valve (IS1A)	34	ISC valve (IS1B)

Component Location

FI System Parts Location

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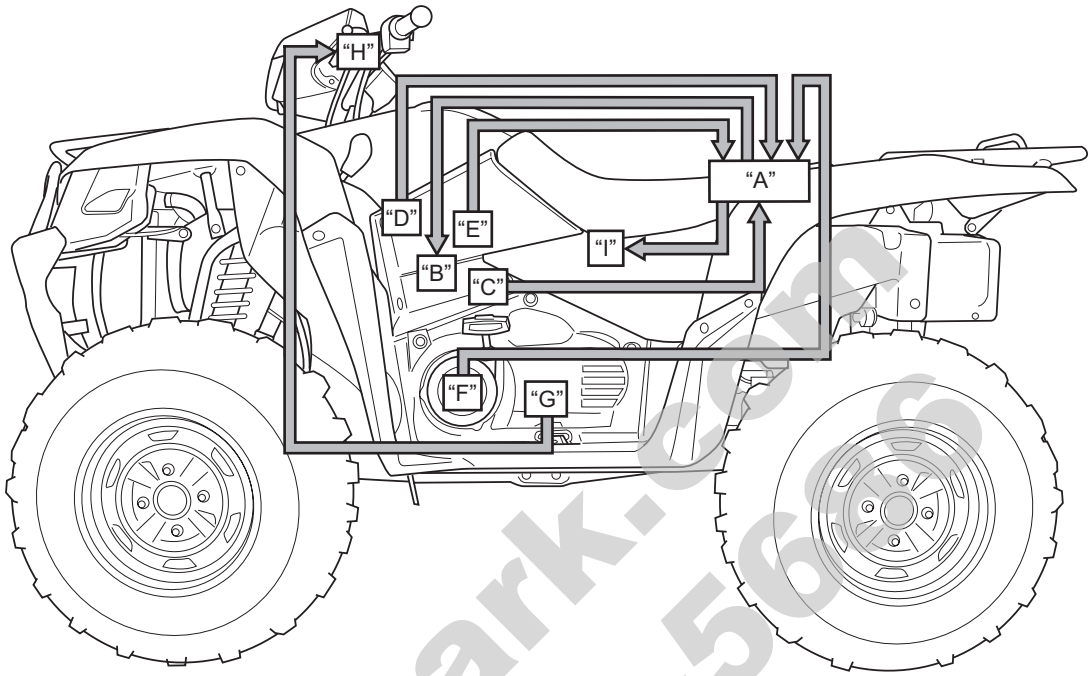
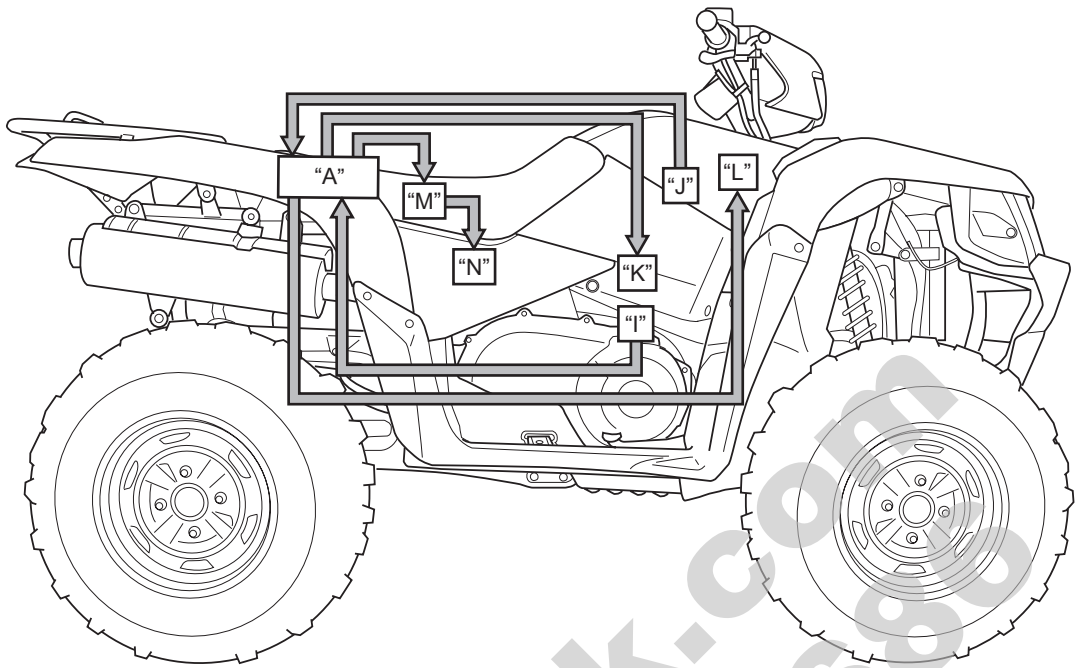


I831G1110004-02

"A": ECM	"C": TP sensor	"E": IAT sensor	"G": Speed sensor	"I": Diff-lock relay
"B": ISC valve	"D": IAP sensor	"F": CKP sensor	"H": Combination meter	



I831G1110005-03

"A": ECM	"J": TO sensor	"L": Ignition coil	"N": Fuel pump
"I": ECT sensor	"K": Fuel injector	"M": FP relay	

Diagnostic Information and Procedures

Engine Symptom Diagnosis

B831G21104001

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 guides or poor seating of valves.	*Repair or replace.*
	Mistimed valves.	*Adjust.*
	Excessively worn piston rings.	*Replace.*
	Worn-down cylinder bore.	*Replace.*
	Starter motor cranks too slowly.	*Refer to "Starting System Diagram in Section 1I (Page 1I-1)".*
	Poor seating of spark plug.	*Retighten.*
Engine will not start or is hard to start (Plugs not speaking)	Fouled spark plug.	*Clean.*
	Wet spark plug.	*Clean and dry.*
	Defective ignition coil.	*Replace.*
	Open or short in high-tension cord.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Open-circuited wiring connections.	*Repair or 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 injector.	*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)	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 sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective IAT sensor.	*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.	*Replace.*
	Defective CKP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	Defective ISC valve.	*Replace.*
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 injector.	*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.*

Condition	Possible cause	Correction / Reference Item
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.*
Engine stalls often (Engine parts improperly operating)	Fouled spark plug.	*Clean.*
	Defective CKP sensor or ECM.	*Replace.*
	Clogged fuel hose.	*Clean.*
	Valve clearance out of adjustment.	*Adjust.*
Engine noisy (Excessive valve chatter)	Too large valve clearance.	*Adjust.*
	Weakened or broken valve springs.	*Replace.*
	Worn tappet or cam surface.	*Replace.*
	Worn and burnt camshaft journal.	*Replace.*
Engine noisy (Noise seems to come from piston)	Worn down pistons or cylinder.	*Replace.*
	Combustion chambers fouled with carbon.	*Clean.*
	Worn piston pin or piston pin bore.	*Replace.*
	Worn piston rings or ring grooves.	*Replace.*
Engine noisy (Noise seems to come from timing chain)	Stretched chain.	*Replace.*
	Worn sprockets.	*Replace.*
	Tension adjuster not working.	*Repair or replace.*
Engine noisy (Noise seems to come from crankshaft)	Rattling bearings due to wear.	*Replace.*
	Worn and burnt journal bearings.	*Replace.*
Engine noisy (Noise seems to come from balancer)	Worn and burnt journal bearings.	*Replace.*
Engine noisy (Noise seems to come from transmission)	Worn or rubbing gears.	*Replace.*
	Worn splines.	*Replace.*
	Worn or rubbing primary gears.	*Replace.*
	Worn bearings.	*Replace.*
Engine noisy (Noise seems to come from water pump)	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 springs.	*Replace.*
	Worn camshafts.	*Replace.*
	Valve timing out of adjustment.	*Adjust.*
	Too narrow spark plug gap.	*Adjust.*
	Ignition not advanced sufficiently due to poorly working timing advance circuit.	*Replace ECM.*
	Defective ignition coil.	*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/STVA.	*Replace.*
Engine runs poorly in high speed range (Defective air flow system)	Clogged air cleaner element.	*Clean or replace.*
	Defective throttle valves.	*Adjust or replace.*
	Defective ISC valve.	*Replace.*
	Sucking air from throttle body joint.	*Repair or replace.*
	Defective ECM.	*Replace.*

Condition	Possible cause	Correction / Reference Item
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 IAP sensor.	*Replace.*
	Defective AP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	TP sensor out of adjustment.	*Adjust.*
	Defective STP sensor/STVA.	*Replace.*
	Defective fuel tank pressure control valve.	*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 cylinder.	*Replace.*
	Poor seating of valves.	*Repair.*
	Fouled spark plug.	*Clean or replace.*
	Incorrect spark plugs.	*Adjust or replace.*
	Clogged injector.	*Clean.*
	TP sensor out of adjustment.	*Adjust.*
	Clogged air cleaner element.	*Clean.*
	Sucking air from throttle valve.	*Replace.*
	Too much engine oil.	*Drain out excess oil.*
	Defective fuel pump or ECM.	*Replace.*
	Defective CKP sensor and ignition coil.	*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 IAP sensor.	*Replace.*
	Defective AP sensor.	*Replace.*
	Defective ECM.	*Replace.*
	TP sensor out of adjustment.	*Adjust.*
	Defective STP sensor or STVA.	*Replace.*
	Defective fuel tank pressure control valve.	*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.*
	Use of incorrect engine oil.	*Change.*
	Sucking air from intake pipe.	*Retighten or replace.*
	Defective cooling system.	*Refer to "Engine Cooling Symptom Diagnosis in Section 1F (Page 1F-4)".*
Engine overheats (Lean fuel/air mixture)	Short-circuited IAP sensor/lead wire.	*Repair or replace.*
	Short-circuited IAT sensor/lead wire.	*Repair or replace.*
	Sucking air from intake pipe joint.	*Repair or replace.*
	Defective fuel injector.	*Replace.*
	Defective ECT sensor.	*Replace.*
Engine overheats (The other factors)	Ignition timing too advanced due to defective timing advance system (ECT sensor, CKP sensor and ECM.)	*Replace.*
Dirty or heavy exhaust smoke	Worn piston rings or cylinders.	*Replace.*
	Too much engine oil in the engine.	*Check and drain excess oil.*
	Worn valve guides.	*Replace.*
	Scored or scuffed cylinder wall.	*Replace.*
	Worn valves stems.	*Replace.*
	Defective stem seals.	*Replace.*
	Worn oil ring side rails.	*Replace.*

Self-Diagnostic Procedures

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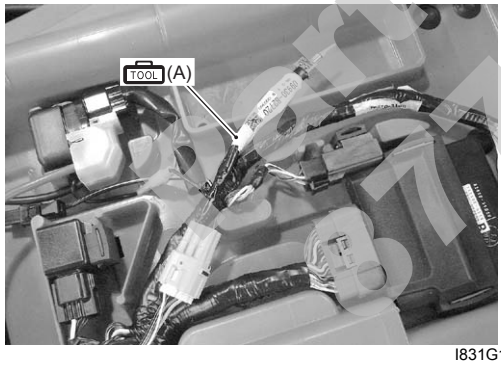
Use of Mode Select Switch

NOTE

- **Do not disconnect coupler from ECM, the battery cable from the battery, ECM ground wire harness from the 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-Diagnostic Procedures (Page 1A-11)".) 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 seat. Refer to "Seat Removal and Installation in Section 9D (Page 9D-11)".
2) Connect the special tool to the mode select switch at the wiring harness.

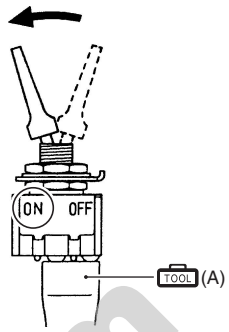
Special tool
TOOL (A): 09930–82720 (Mode select switch)



I831G1110006-01

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-19)".

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



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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 wire coupler of any sensor is disconnected. Therefore, when a 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.
8) Reinstall the seat.

Use of SDS

NOTE

- **Do not disconnect the coupler from ECM, the battery cable from the battery, ECM ground wire harness 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 the 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 seat. Refer to "Seat Removal and Installation in Section 9D (Page 9D-11)".
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): 99565–01010–013 (CD-ROM Ver.13)

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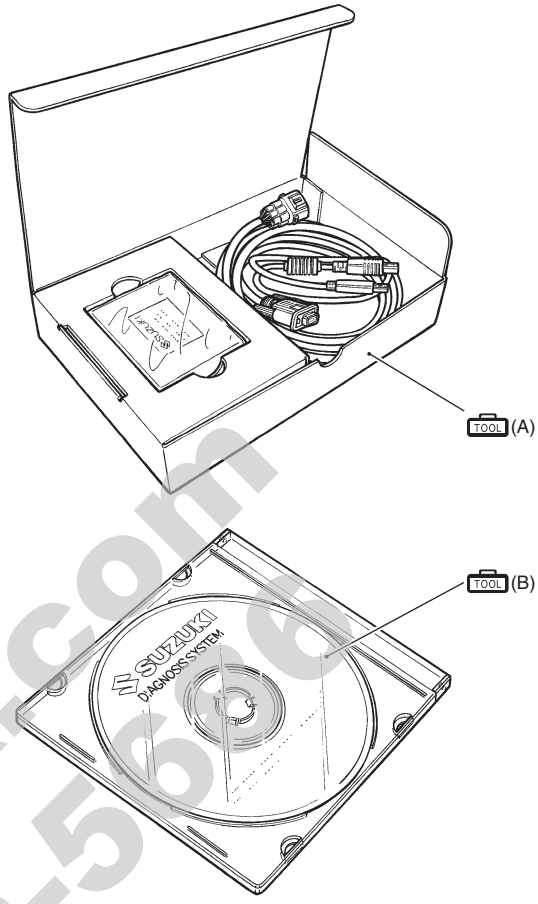

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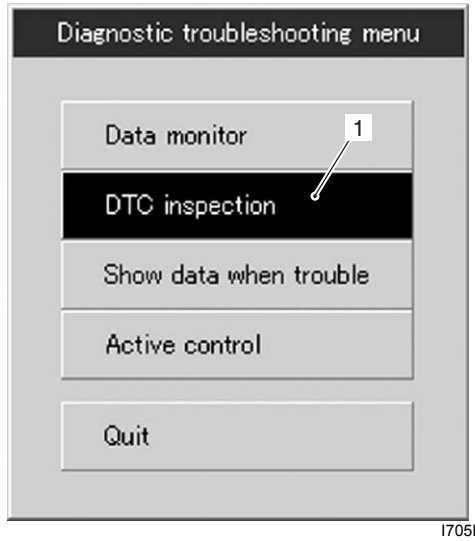
3) Click the DTC inspection button (1).



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-19)”.

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 cover.

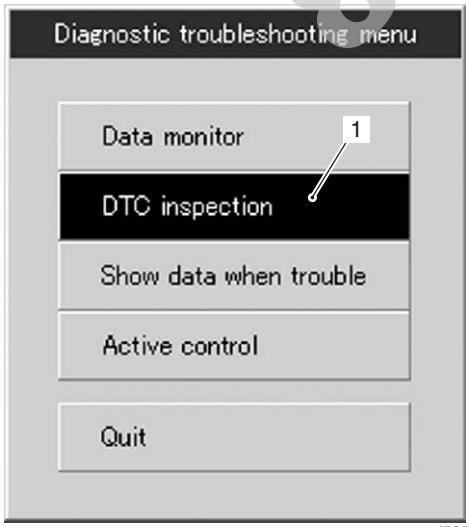
Use of SDS Diagnosis Reset Procedures

B831G21104003

NOTE

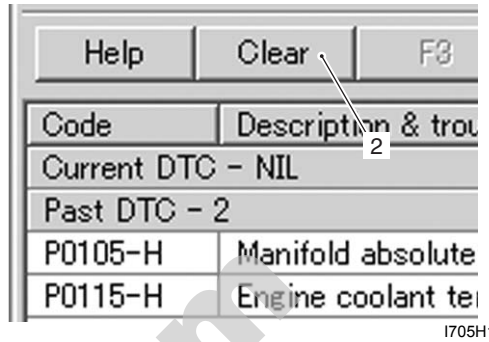
The malfunction code is memorized in the ECM also when the wire coupler of any sensor is disconnected. Therefore, when a wire coupler has been disconnected at the time of diagnosis, erase the stored malfunction history code using SDS.

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



I705H1110003-01

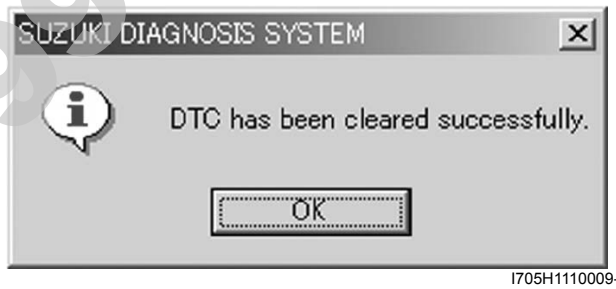
3) Check the DTC.
4) The previous malfunction history code (Past DTC) still remains stored in the ECM. Therefore, erase the history code memorized in the ECM using SDS tool.
5) Click “Clear” (2) to delete history code (Past DTC).



I705H1110005-01

6) Follow the displayed instructions.

I705H1110006-01



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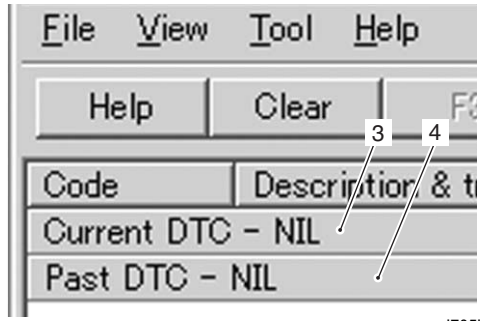
7) Check that both “Current DTC” (3) and “Past DTC” (4) are deleted (NIL).



I705H1110008-01

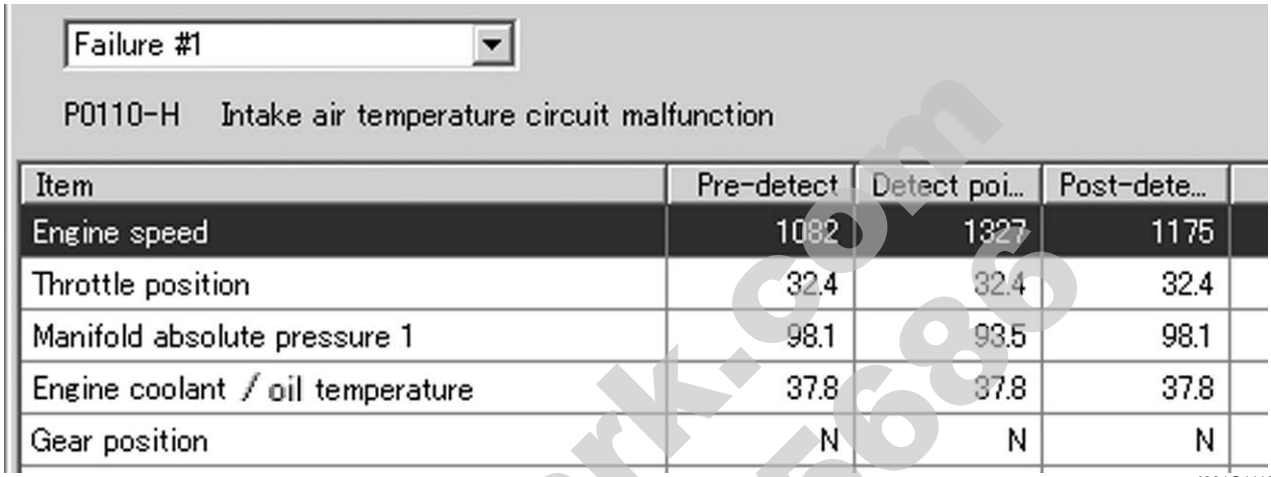
8) Close the SDS tool and turn the ignition switch OFF.
9) Disconnect the SDS tool and install the seat.

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

B831G21104004

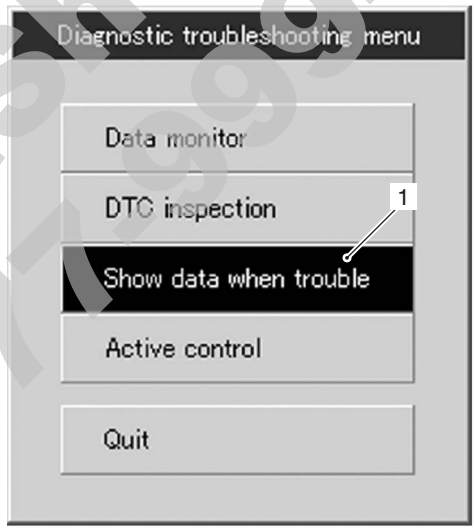
Use of SDS

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.



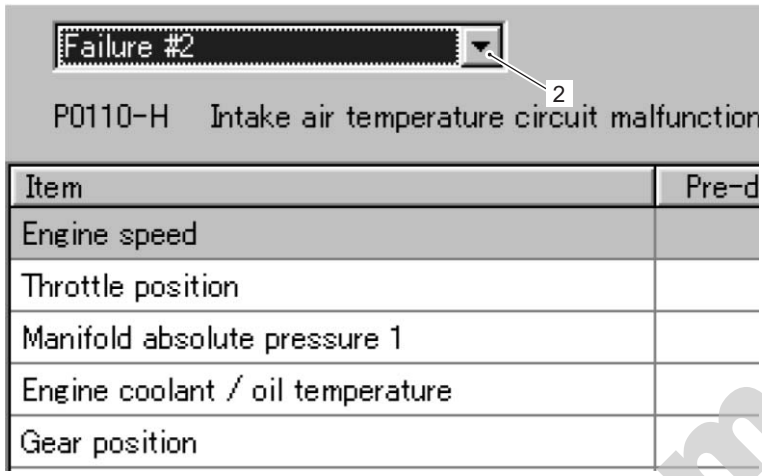
I831G1110016-02

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.



I831G1110017-01

SDS Check

B831G21104005

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 seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)

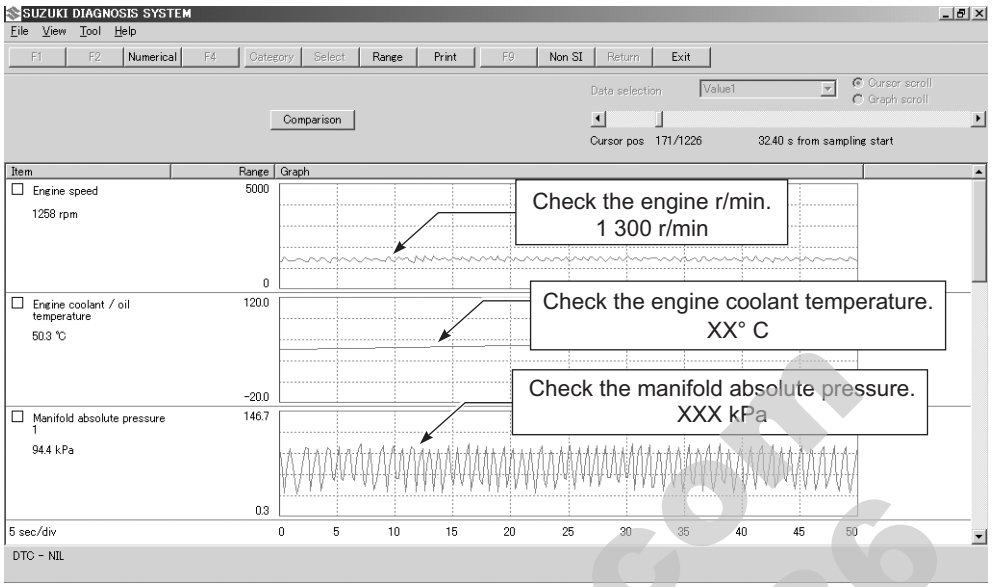
Special tool
(TOOL) : 09904–41010 (SDS set)
(TOOL) : 99565–01010–013 (CD-ROM Ver.13)

NOTE

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

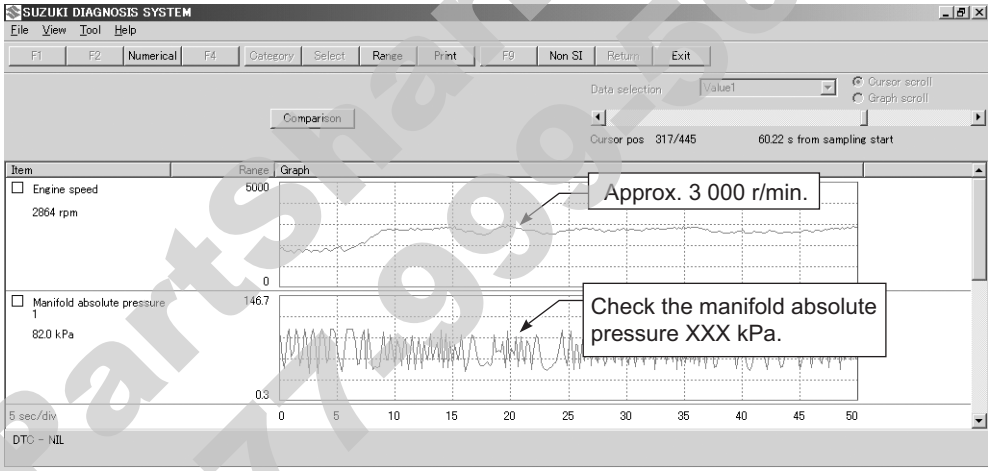
Sample

Data sampled from cold starting through warm-up



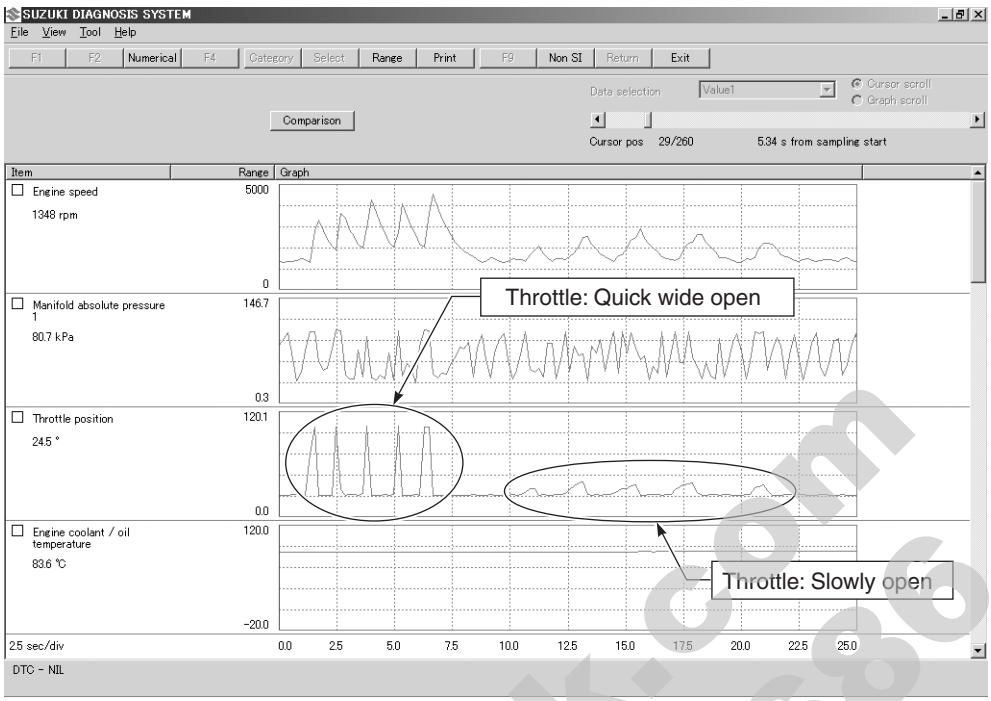
I831G1110009-03

Data at 3 000 r/min under no load



I831G1110010-04

Data at the time of racing



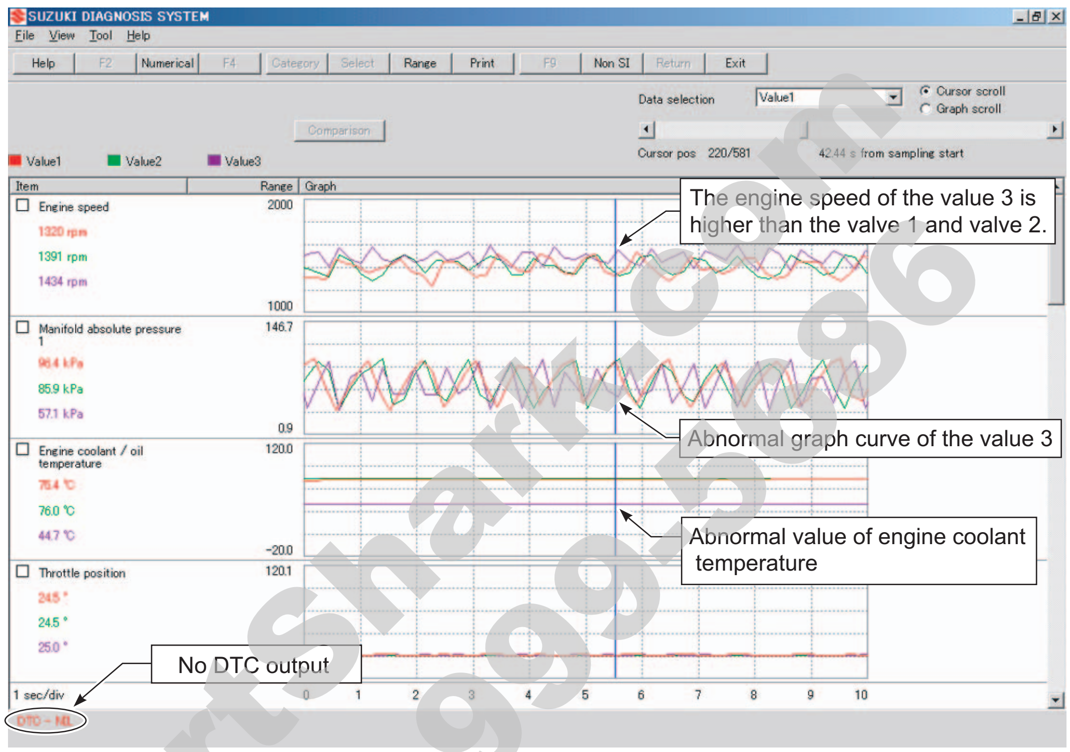
I831G1110011-01

Example of Trouble

Three data; value 1 (current data 1), value 2 (past data 2) and value 3 (past 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 value of engine coolant temperature is found to be lower than the data saved previously, the possible cause may probably lie in a sensor circuit opened, ground circuit opened or influence of internal resistance value changes, etc.



I831G1110012-04

DTC Table

B831G21104006

Code	Malfunction Part	Remarks
C00	None	No defective part
C12 (P0335) ☞(Page 1A-24)	Crankshaft position sensor (CKP sensor)	Pick-up coil signal, signal generator
C13 (P0105-H/L) ☞(Page 1A-27)	Intake air pressure sensor (IAP sensor)	
C14 (P0120-H/L) ☞(Page 1A-34)	Throttle position sensor (TP sensor)	*1
C15 (P0115-H/L) ☞(Page 1A-41)	Engine coolant temperature sensor (ECT sensor)	
C20 (P1752) ☞(Page 1A-47)	Differential lock relay (Diff-lock relay)	
C21(P0110-H/L) ☞(Page 1A-49)	Intake air temperature sensor (IAT sensor)	
C23 (P1651-H/L) ☞(Page 1A-53)	Tip-over sensor (TO sensor)	
C24 (P0351) ☞(Page 1A-59)	Ignition signal (Ignition coil)	
C32 (P0201) ☞(Page 1A-59)	Injector signal (FI)	
C40 (P0505) ☞(Page 1A-59)	Idle speed control valve (ISC valve)	
C41 (P0230-H/L) ☞(Page 1A-59)	Fuel pump control system (FP relay)	Fuel pump, Fuel pump relay

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 three digits, a line appears in any of the position, upper, middle or lower line. If the indication is upper or lower line when engine rpm is 1 300 rpm, slightly turn the throttle position sensor and bring the line to middle.
In the normal condition, the throttle valve stop screw pushes throttle valves slightly, and indication point is middle line.

Fail-Safe Function Table

B831G21104007

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 is fixed to 101 kPa (760 mmHg).	“YES”	“YES”
TP sensor	The throttle opening is fixed to full open position. Ignition timing is also fixed.	“YES”	“YES”
ECT sensor	Engine coolant temperature value is fixed to 80 °C (176 °F).	“YES”	“YES”
IAT sensor	Intake air temperature value is fixed to 40 °C (104 °F).	“YES”	“YES”
Diff-lock relay	Differential position signal is fixed to neutral gear.	“YES”	“YES”

The engine can start and can run even if the above signal 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 vehicle to the workshop for complete repair.

FI System Troubleshooting

B831G21104008

Customer Complaint Analysis

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

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** **☐ OTHERS:**	**☐ Engine Stall when** **☐ Immediately after start** **☐ Throttle valve is opened** **☐ Throttle valve is closed** **☐ Load is applied** **☐ Other**

VEHICLE/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	**☐ Mountainous (☐ Uphill / ☐ Downhill) / ☐ Gravel / ☐ Other**
Vehicle condition	
Engine condition	**☐ Cold / ☐ Warming up phase / ☐ Warmed up / ☐ Always / ☐ Other at starting** **☐ Immediately after start / ☐ Racing without load / ☐ Engine speed (r/min)**
Vehicle condition	**During driving: ☐ Constant speed / ☐ Accelerating / ☐ Decelerating** **☐ Right hand corner / ☐ Left hand corner** **☐ At stop / ☐ Vehicle speed when problem occurs (km/h, mile/h)** **☐ Other:**

NOTE

The above form is a standard sample. The form should be modified according to condition and characteristics of each market.

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-10)”.
- 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-10)”.
- Clogged air cleaner element. Refer to “Air Cleaner Element Inspection and Cleaning in Section 0B (Page 0B-3)”.
- Battery condition.
- Throttle cable play. Refer to “Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-15)”.
- Vacuum hose looseness, bend and disconnection.
- Broken fuse.
- FI light operation. Refer to “Combination Meter Inspection in Section 9C (Page 9C-4)”.
- Each 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-6)”.
- Exhaust gas leakage and noise. Refer to “Exhaust System Inspection in Section 1K (Page 1K-3)”.
- Each coupler disconnection.
- Clogged radiator fins. Refer to “Radiator Inspection and Cleaning in Section 1F (Page 1F-5)”.

Malfunction Code and Defective Condition Table

B831G21104009

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		IAP sensor	The sensor should produce following voltage. 0.5 V ≤ sensor voltage < 4.85 V In other than the above range, C13 (P0105) is indicated.	IAP sensor, lead wire/coupler connection.
P0105	H		Sensor voltage is higher than specified value.	IAP sensor circuit shorted to VCC or ground circuit open.
	L		Sensor voltage is lower than specified value.	IAP sensor circuit open or shorted to the ground or VCC circuit open.
C14		TP sensor	The sensor should produce following voltage. 0.2 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 the ground or VCC circuit open.
C15		ECT sensor	The sensor voltage should be the following. 0.15 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 the ground.
C20 P1752		Diff-lock relay	No voltage is applied to 4WD/diff-lock actuator, although ignition switch is turned ON, or voltage is applied to 4WD/diff-lock actuator, although ignition switch is turned OFF. In this case, the code C20 (P1752) is indicated.	Diff-lock relay circuit open or shorted to ground.
C21		IAT sensor	The sensor voltage should be the following. 0.15 V ≤ sensor voltage < 4.85 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 the ground.
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 < 4.8 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 the ground or VCC circuit open.

Malfunction Code		Detected Item	Detected Failure Condition	Check For
C24		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) is indicated.	Ignition coil, wiring/coupler connection, power supply from the battery.
P0351				
C32		Fuel injector	CKP sensor (pick-up coil) signal is produced, but fuel injector signal is interrupted 4 times or more continuously. In this case, the code C32 (P0201) is indicated.	Fuel injector, wiring/coupler connection, power supply to the injector.
P0201				
C40		ISC valve	The circuit voltage of motor drive is unusual.	ISC valve circuit open or shorted to the ground. Power source circuit open.
P0505				
C41		Fuel pump 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 the fuel pump relay and fuel injectors.
P0230	H		Voltage is applied to the injector and fuel pump relay is turned OFF.	Fuel pump relay switch circuit shorted to power source. Fuel pump relay (switch side).
	L		No voltage is applied to the injector and fuel pump relay is turned ON.	Fuel pump relay circuit open or short. Fuel pump relay (coil side).

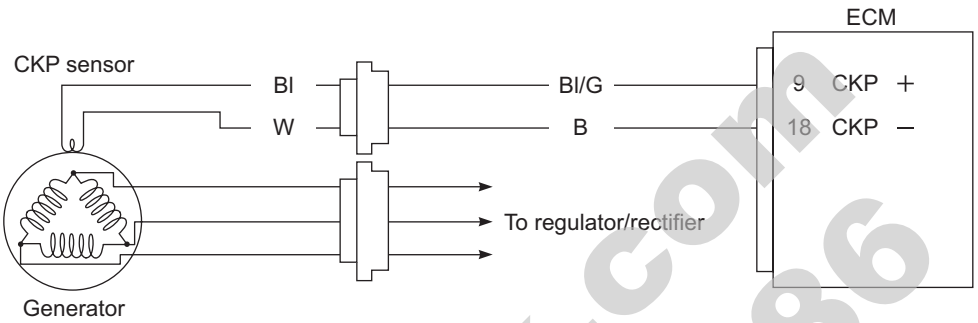
DTC “C12” (P0335): CKP Sensor Circuit Malfunction

B831G21104010

Detected Condition and Possible Cause

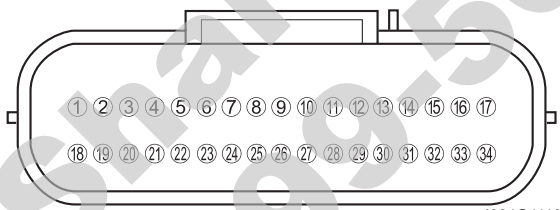
Detected Condition	Possible Cause
The signal does not reach ECM for 3 sec. or more, after receiving the starter signal.	• Metal particles or foreign material being stuck on the CKP sensor and rotor tip. • CKP sensor circuit open or short. • CKP sensor malfunction. • ECM malfunction.

Wiring Diagram



I831G1110018-01

ECM coupler (Harness side)



I831G1110019-01

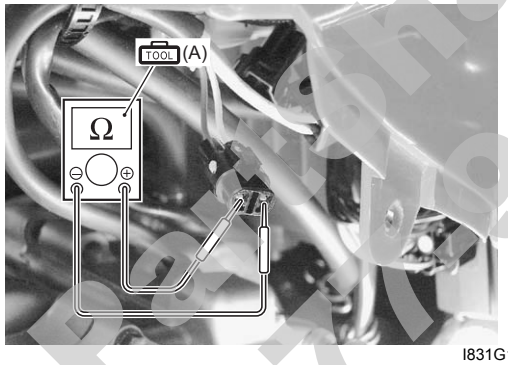
Troubleshooting

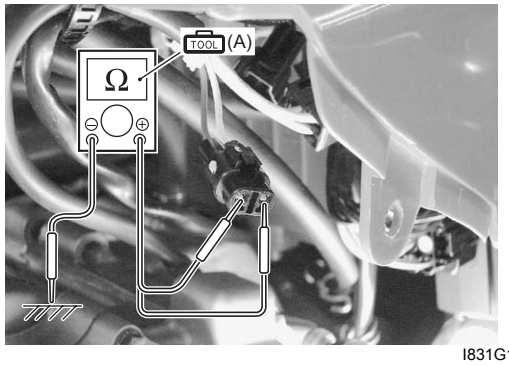
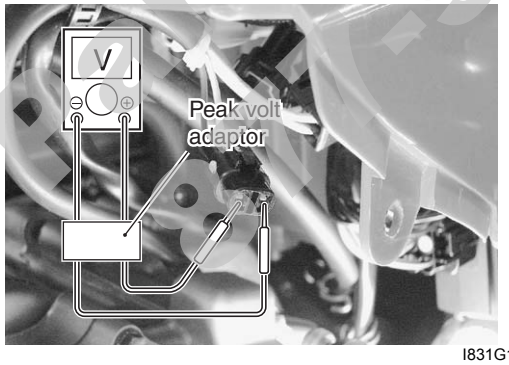
⚠ CAUTION

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

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 CKP sensor coupler for loose or poor contacts. If OK, then measure the CKP sensor resistance.  I831G1110020-02 3) Disconnect the CKP sensor coupler and measure the resistance. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **CKP sensor resistance** **150 – 250 Ω (Bl – W)**  I831G1110007-01	Go to Step 2.	Replace the CKP sensor with a new one.

Step	Action	Yes	No
1	4) 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, W – Ground)**  I831G1110021-01 *Are the resistance and continuity OK?*	Go to Step 2.	Replace the CKP sensor with a new one.
2	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** **5.0 V and more** **((+) terminal: Bl – (–) terminal: W)**  I831G1110022-01 2) Repeat the above test procedure a few times and measure the highest peak voltage. *Is the voltage OK?*	• Bl or W wire open or shorted to the ground, or poor “9” or “18” 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)”.	• 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)”.

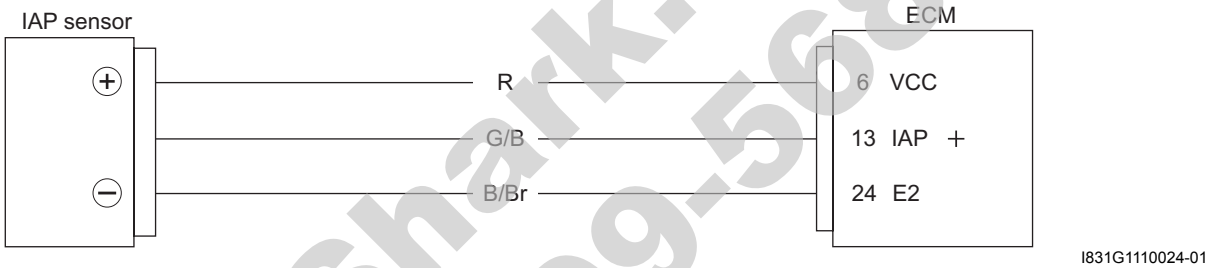
DTC “C13” (P0105-H/L): IAP Sensor Circuit Malfunction

B831G21104011

Detected Condition and Possible Cause

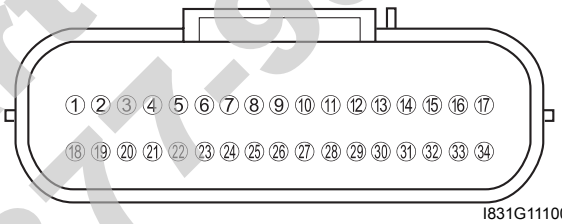
Detected Condition			Possible Cause
C13		IAP sensor voltage is not within the following range. 0.5 V < Sensor voltage ≤ 4.85 V **NOTE** **Note that atmospheric pressure varies depending on weather conditions as well as altitude. Take that into consideration when inspecting voltage.**	• Clogged vacuum 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 the ground. • IAP sensor malfunction. • ECM malfunction.
P0105	H	Sensor voltage is higher than specified value.	• IAP sensor circuit is open or shorted to VCC or ground circuit open.
	L	Sensor voltage is lower than specified value.	• IAP sensor circuit is shorted to the ground or VCC circuit open.

Wiring Diagram



I831G1110024-01

ECM coupler (Harness side)



I831G1110019-01

Troubleshooting

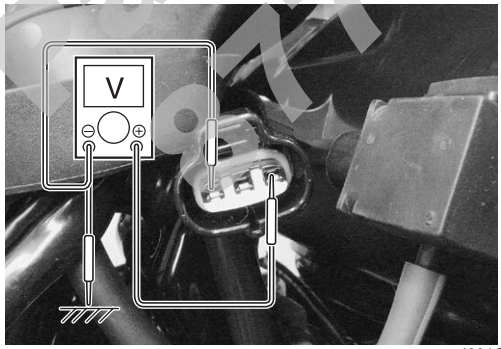
⚠ CAUTION

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

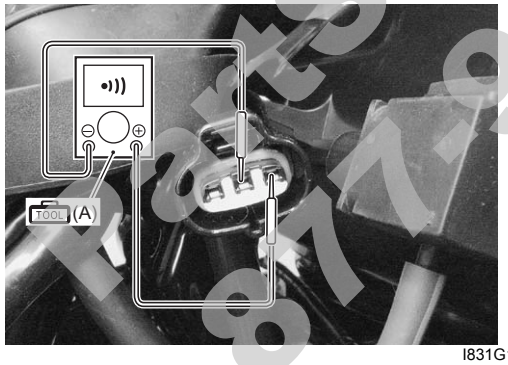
NOTE

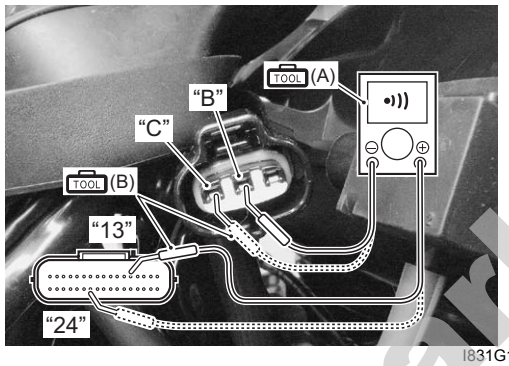
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

C13 (Use of mode select switch)

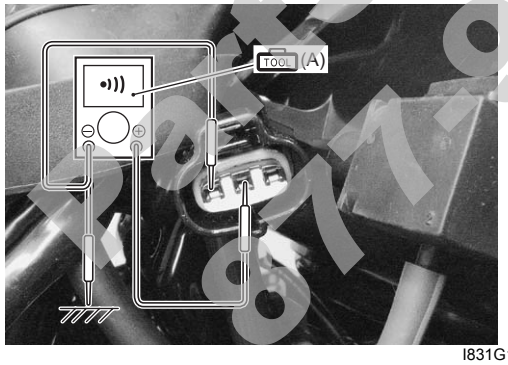
Step	Action	Yes	No
1	1) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch OFF. 3) Check the IAP sensor coupler for loose or poor contacts. If OK, then measure the IAP sensor input voltage.  I831G1110026-01 4) Disconnect the IAP sensor coupler. 5) Turn the ignition switch ON. 6) Measure the voltage at the R wire and ground. If OK, then measure the voltage at the R wire and B/Br wire. **Special 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)**  I831G1110027-01 *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.

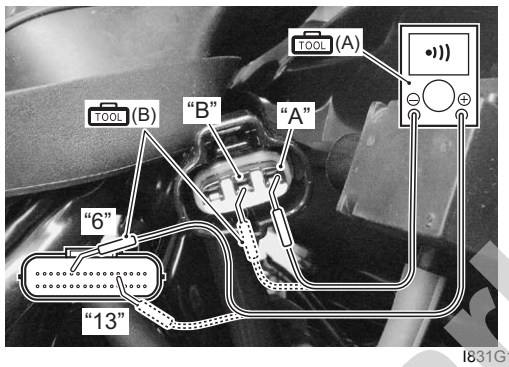
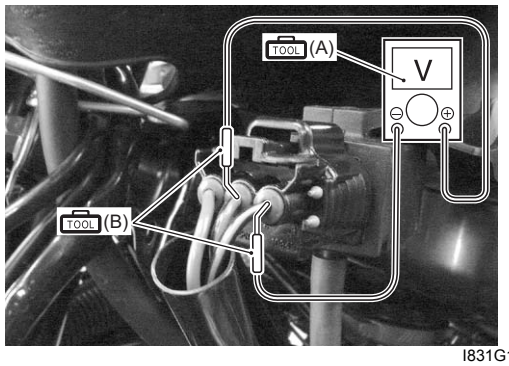
P0105-H for IAP sensor (Use of SDS)

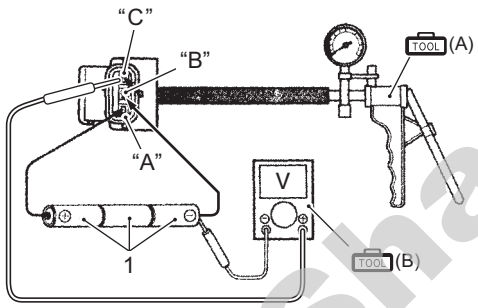
Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 3) Check the IAP sensor coupler for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.  I831G1110026-01 4) Disconnect the IAP sensor coupler. 5) Check the continuity between the R wire and G/B wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity (•)))**  I831G1110028-02	Go to Step 3.	G/B wire shorted to VCC, or B/Br wire open.

Step	Action	Yes	No
1	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. 8) Check the continuity between the G/B wire “B” and terminal “13”. If OK, then check the continuity between the B/Br wire “C” and terminal “24”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity test (•)))** **ECM coupler (Harness side)**  I831G1110090-03 *Is the continuity OK?*	Go to Step 3.	G/B wire shorted to VCC, or B/Br wire open.

P0105-L for IAP sensor (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 3) Check the IAP sensor coupler for loose or poor contacts. If OK, then check the IAP sensor lead wire continuity.  I831G1110026-01 4) Disconnect the IAP sensor coupler. 5) Check the continuity between the G/B wire and ground. Also, check the continuity between the G/B wire and B/Br wire. If the sound is not heard from the tester, the circuit condition is OK. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity (•)))**  I831G1110029-01	Go to Step 2.	R and G/B wire open, G/B wire shorted to the ground.

Step	Action	Yes	No
1	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. 8) Check the continuity between the R wire “A” and terminal “6”. Also, check the continuity between the G/B wire “B” and terminal “13”. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•))))** **ECM coupler (Harness side)**  I831G1110030-03 *Is the continuity OK?*	Go to Step 2.	R and G/B wire open, G/B wire shorted to the ground.
2	1) Turn the ignition switch OFF. 2) Connect the IAP sensor coupler. 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 between G/B wire and B/Br wire. **IAP sensor output voltage** **Approx. 2.63 V at idle speed** **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)**  I831G1110031-02 *Is the voltage OK?*	Go to Step 3.	• Check the vacuum hose for crack or damage. • Open or short circuit in the G/B wire. • If vacuum hose and wire is OK, replace the IAP sensor with a new one. Refer to “IAP Sensor Removal and Installation in Section 1C (Page 1C-2)”.

Step	Action	Yes	No
3	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. Arrange 3 new 1.5 V batteries in series (1) (check that total voltage is 4.5 – 5.5 V) and connect (–) terminal to the ground terminal “B” and (+) terminal to the VCC terminal “A”. 4) Check the voltage between Vout “C” 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)** **Tester knob indication** **Voltage (⎓)**  I831G1110032-01 ALTITUDE (Reference) / ATOMOSPHERIC PRESSURE / OUTPUT VOLTAGE ft | m | mmHg | kPa | V 0 – 2 000 | 0 – 610 | 760 – 707 | 100 – 94 | 3.1 – 3.6 2 001 – 5 000 | 611 – 1 524 | 707 – 634 | 94 – 85 | 2.8 – 3.4 5 001 – 8 000 | 1 525 – 2 438 | 634 – 567 | 85 – 76 | 2.6 – 3.1 8 001 – 10 000 | 2 439 – 3 048 | 567 – 526 | 76 – 70 | 2.4 – 2.9 I831G1110033-01 *Is the voltage OK?*	• G/B, R or B/Br wire open or shorted to ground, or poor “6”, “13” or “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)”.	If check result is not satisfactory, replace IAP sensor with a new one. Refer to “IAT Sensor Removal and Installation in Section 1C (Page 1C-3)”.

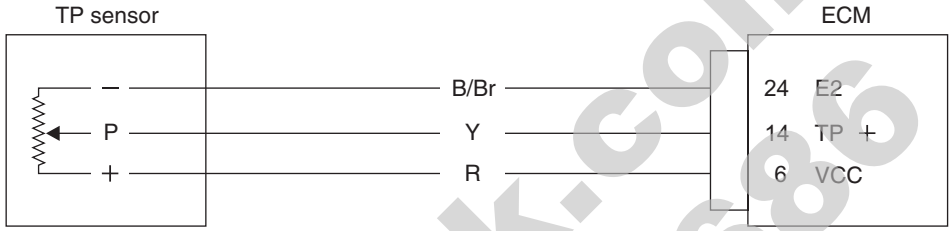
DTC “C14” (P0120-H/L): TP Sensor Circuit Malfunction

B831G21104012

Detected Condition and Possible Cause

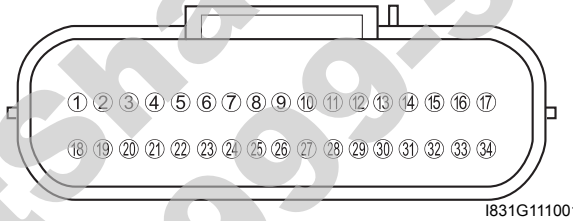
Detected Condition			Possible Cause
C14		Output voltage is not within the following range. Difference between actual throttle opening and opening calculated by ECM is larger than specified value. 0.2 V ≤ Sensor voltage < 4.8 V	• TP sensor maladjusted. • TP sensor circuit open or short. • TP sensor malfunction. • ECM malfunction.
P0120	H	Sensor voltage is higher than specified value.	• TP sensor circuit is shorted to VCC or ground circuit open.
	L	Sensor voltage is lower than specified value.	• TP sensor circuit is open or shorted to the ground or VCC circuit open.

Wiring Diagram



I831G1110025-02

ECM coupler (Harness side)



I831G1110019-01

Troubleshooting

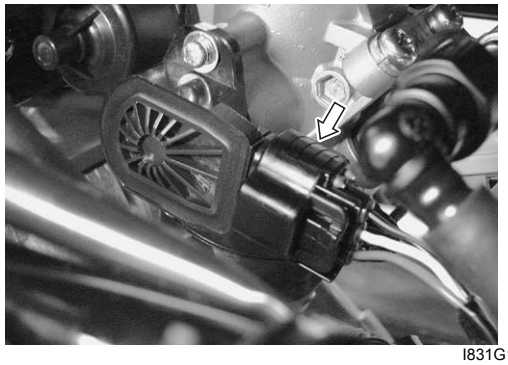
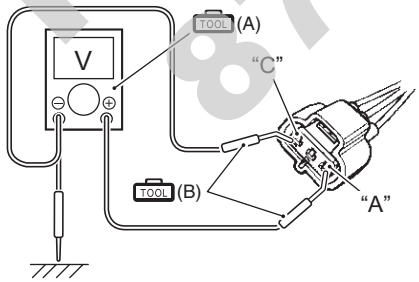
⚠ CAUTION

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

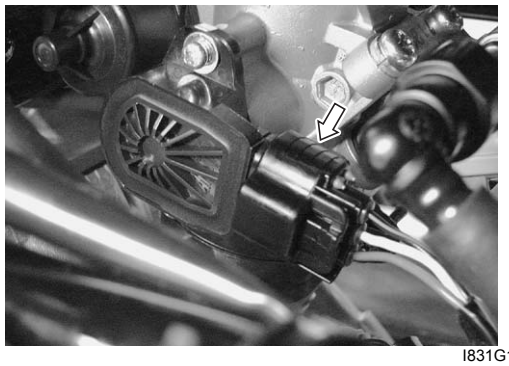
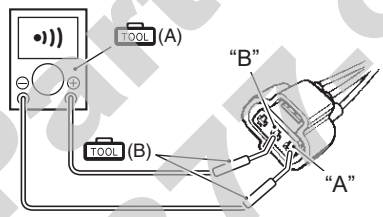
NOTE

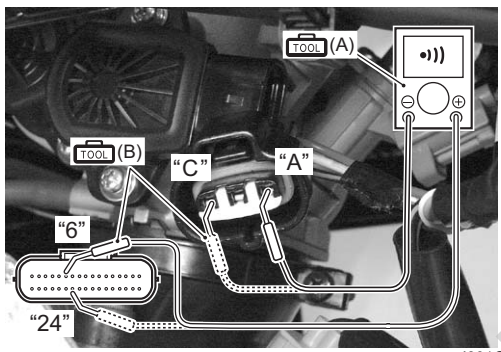
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

C14 (Use of mode select switch)

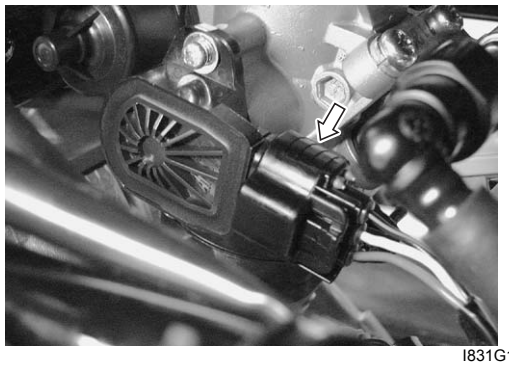
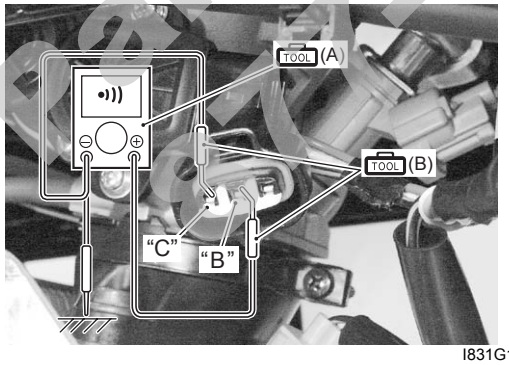
Step	Action	Yes	No
1	1) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch OFF. 3) Check the TP sensor coupler for loose or poor contacts. If OK, then check the TP sensor input voltage. 4) Disconnect the TP sensor coupler.  I831G1110035-01 5) Turn the ignition switch ON. 6) Insert the pointed probes to the lead wire coupler. 7) Measure the input voltage at the R wire “A” and ground. If OK, then measure the input voltage at the R wire “A” and B/Br wire “C”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)** **TP sensor input voltage** **4.5 – 5.5 V** **((+) terminal: R – (–) terminal: Ground, (+) terminal: R – (–) terminal: B/Br)**  I831G1110081-01 *Is the continuity 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.

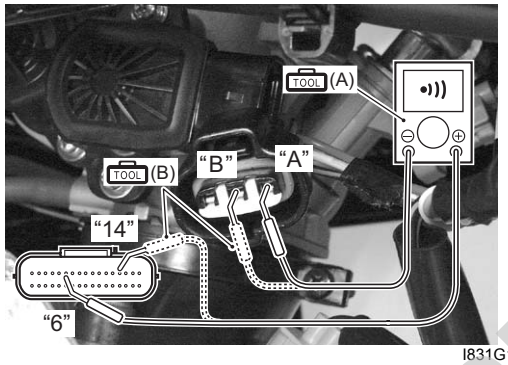
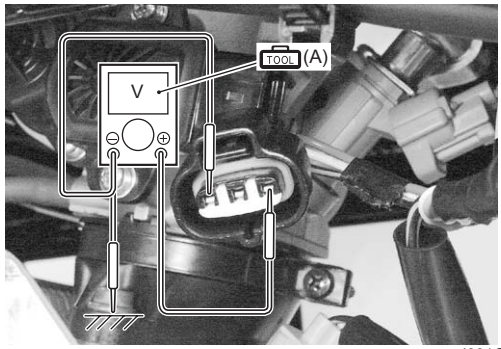
P0120-H (Use of SDS)

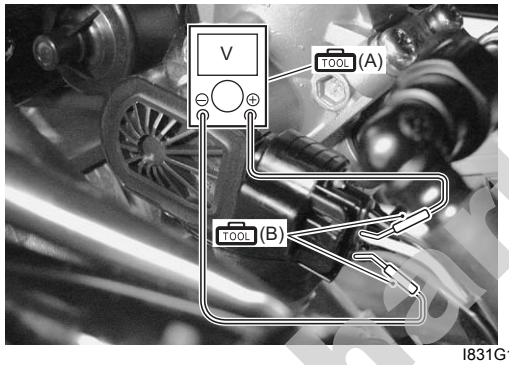
Step	Action	Yes	No
1	1) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch OFF. 3) Check the TP sensor coupler for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.  I831G1110035-01 4) Disconnect the TP sensor coupler. 5) Insert the needle pointed probes to the lead wire coupler. 6) Check the continuity between R wire “A” and Y wire “B”. If sound is not heard from the tester, the circuit condition is OK. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))**  I831G1110080-02	Go to Step 2.	R wire shorted to VCC or B/Br wire open.

Step	Action	Yes	No
1	7) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”. 8) Check the continuity between R wire “A” and terminal “6”. Also, check the continuity between B/Br wire “C” and terminal “24”. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity (•)))** **ECM coupler (Harness side)**  I831G1110036-02 *Is the continuity OK?*	Go to Step 2.	R wire shorted to VCC or B/Br wire open.

P0120-L (Use of SDS)

Step	Action	Yes	No
1	1) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch OFF. 3) Check the TP sensor coupler for loose or poor contacts. If OK, then check the TP sensor lead wire continuity.  I831G1110035-01 4) Disconnect the TP sensor coupler. 5) Insert the needle pointed probes to the lead wire coupler. 6) Check the continuity between Y wire “B” and ground. Also, check the continuity between Y wire “B” and B/Br wire “C”. If sound is not heard from the tester, the circuit condition is OK. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity test (•))))**  I831G1110037-02	Go to Step 2.	Y or R wire open, or Y wire shorted to ground.

Step	Action	Yes	No
1	7) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”. 8) Check the continuity between Y wire “B” and terminal “14”. Also, check the continuity between R wire “A” and terminal “6”. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity test (•)))** **ECM coupler (Harness side)**  I831G1110038-03 *Is the continuity OK?*	Go to Step 2.	Y or R wire open, or Y wire shorted to ground.
2	1) Correct 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** **(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)**  I831G1110039-03 *In the voltage OK?*	Go to Step 3.	R and P/B wire open, or P/B wire shorted to the ground.

Step	Action	Yes	No
3	1) Connect the TP sensor coupler. 2) Insert the needle pointed probes to the lead wire coupler. 3) Turn the ignition switch ON. 4) Measure the TP sensor output voltage at the coupler (between (+) Y wire and (–) B/Br wire) by opening the throttle lever. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)** **TP sensor output voltage** **Throttle valve is closed: Approx. 1.12 V** **Throttle valve is opened: Approx. 4.32 V**  I831G1110040-01 *Is the voltage OK?*	• Y, B/Br or R wire open or shorted to ground, or poor “14”, “24” or “6” 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.	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-10)”.

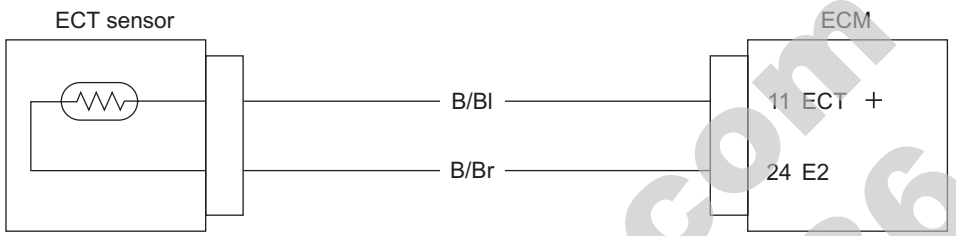
DTC “C15” (P0115-H/L): ECT Sensor Circuit Malfunction

B831G21104013

Detected Condition and Possible Cause

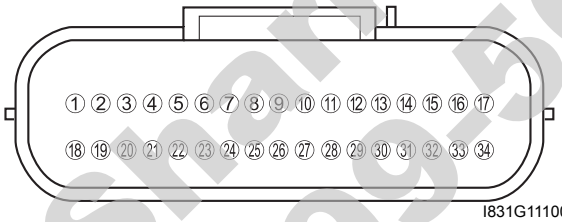
Detected Condition			Possible Cause
C15		Output voltage is not with in the following range. 0.15 V ≤ Sensor voltage < 4.85 V	• ECT sensor circuit open or short. • ECT sensor malfunction. • ECM malfunction.
P0115	H	Sensor voltage is higher than specified value.	• ECT sensor circuit is open or ground circuit open.
	L	Sensor voltage is lower than specified value.	• ECT sensor circuit shorted to the ground.

Wiring Diagram



I831G1110041-01

ECM coupler (Harness side)



I831G1110019-01

Troubleshooting

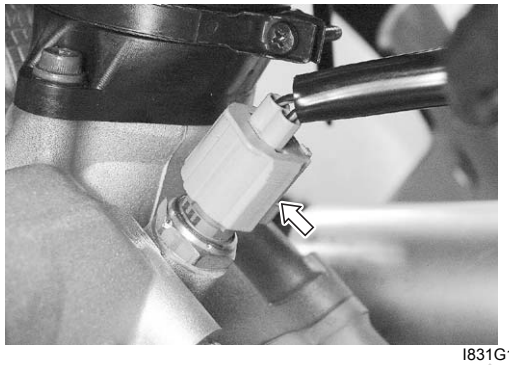
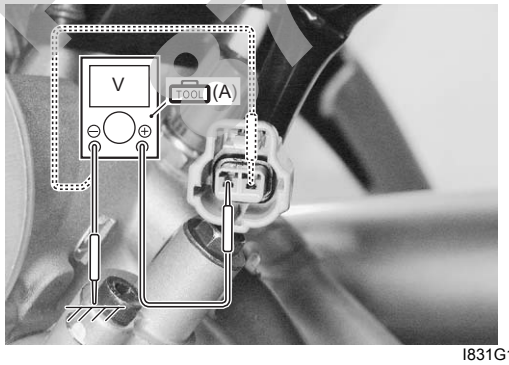
⚠ CAUTION

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

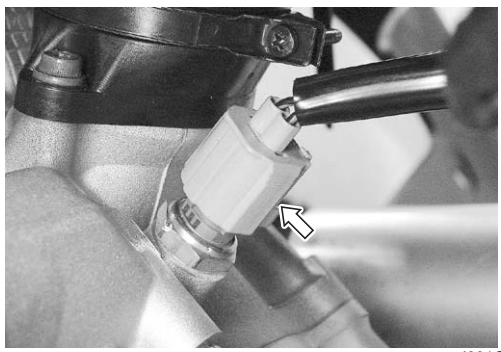
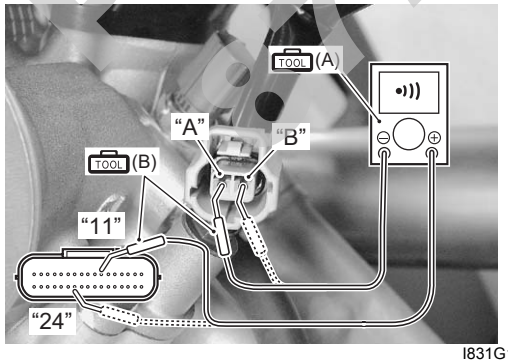
NOTE

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

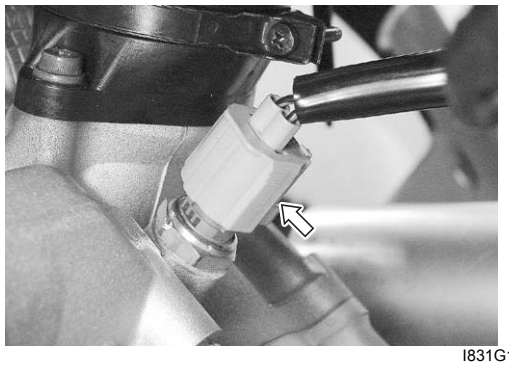
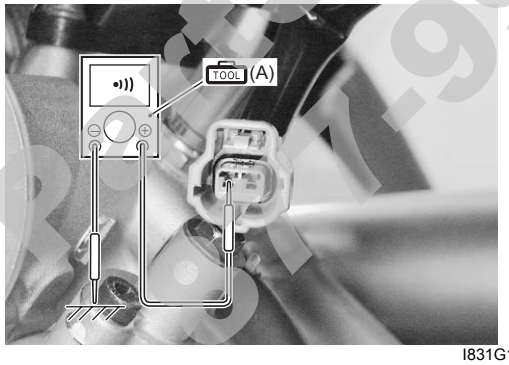
C15 (Use of mode select switch)

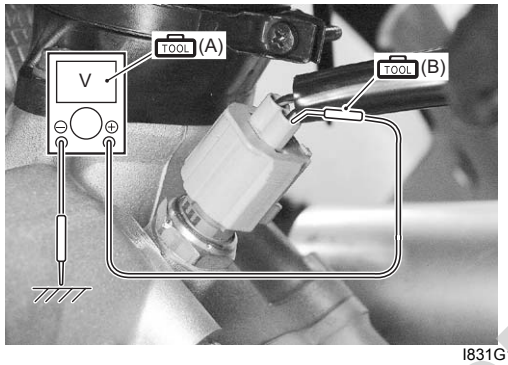
Step	Action	Yes	No
1	1) Remove the left side cover. Refer to "Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)". 2) Turn the ignition switch OFF. 3) Check the ECT sensor coupler for loose or poor contacts. If OK, then measure the ECT sensor voltage at the wire side coupler.  I831G1110042-01 4) Disconnect the coupler and turn the ignition switch ON. 5) Measure the voltage between the B/Bl wire terminal and ground. If OK, then measure the input voltage between B/Bl wire terminal and B/Br wire terminal. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **ECT sensor voltage** **4.5 – 5.5 V** **((+) terminal: B/Bl – (–) terminal: Ground, (+) terminal: B/Bl – (–) terminal: B/Br)**  I831G1110043-02 *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.

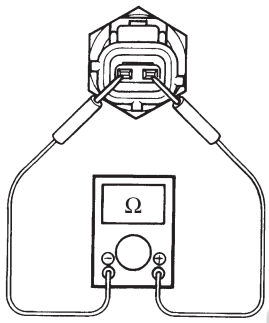
P0115-H (Use of SDS)

Step	Action	Yes	No
1	1) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch OFF. 3) Check the ECT sensor coupler for loose or poor contacts. If OK, then check the ECT sensor lead wire continuity.  I831G1110042-01 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 lead wire coupler. 7) Check the continuity between B/Bl wire “A” and terminal “11”. Also, check the continuity between B/Br wire “B” and terminal “24”. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity test ( ))))** **ECM coupler (Harness side)**  I831G1110044-03 *Is the continuity OK?*	Go to Step 2.	B/Bl or B/Br wire open.

P0115-L (Use of SDS)

Step	Action	Yes	No
1	1) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch OFF. 3) Check the ECT sensor coupler for loose or poor contacts. If OK, then check the ECT sensor lead wire continuity.  I831G1110042-01 4) Disconnect the ECT sensor coupler. 5) Check the continuity between B/Bl wire and ground. If sound is not heard from the tester, the circuit condition is OK. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity test (•)))**  I831G1110045-02 6) Connect the ECT sensor coupler. 7) Insert the needle pointed probes to the lead wire coupler.	Go to Step 2.	• B/Bl wire shorted to ground. • If wire is OK, go to Step 2.

Step	Action	Yes	No
1	8) Turn the ignition switch ON. 9) Measure the output voltage between B/Bl 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 (⎓)** **Output voltage** **0.1 – 4.6 V** **((+) terminal: B/Bl – (–) terminal: Ground)**  I831G1110046-01 *Are the continuity and voltage OK?*	Go to Step 2.	• B/Bl wire shorted to ground. • If wire is OK, go to Step 2.

Step	Action	Yes	No
2	1) Turn the ignition switch OFF. 2) Connect the ECM coupler. 3) Disconnect the ECT sensor coupler. 4) Measure the ECT sensor resistance. Refer to “ECT Sensor Inspection in Section 1C (Page 1C-4)” for details. **Special tool** **TOOL : 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)**  I831G1110047-01 **NOTE** **Refer to “ECT Sensor Inspection in Section 1C (Page 1C-4)” for details.** *Is the resistance OK?*	• B/Br or B/Bl wire open or shorted to ground, or poor “24” or “11” 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 Removal and Installation in Section 1C (Page 1C-4)”.

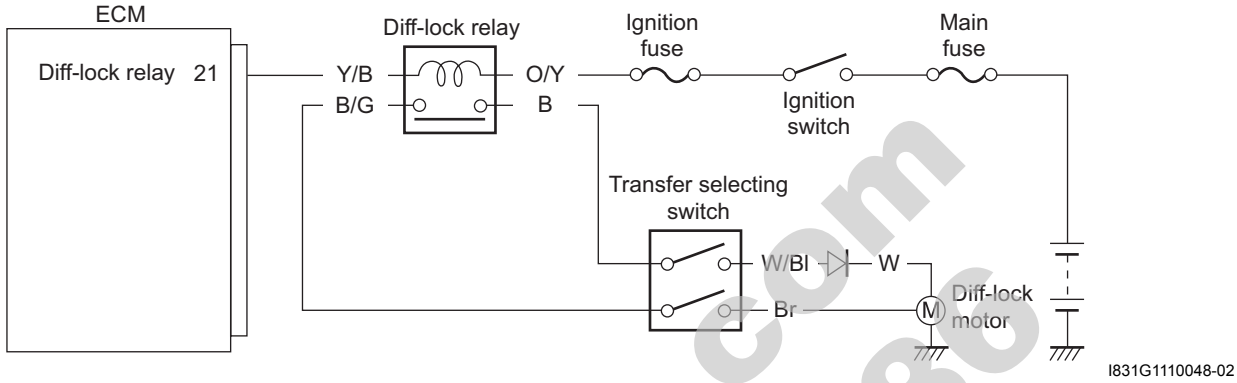
DTC “C20” (P1752): Diff-lock Relay Circuit Malfunction

B831G21104014

Detected Condition and Possible Cause

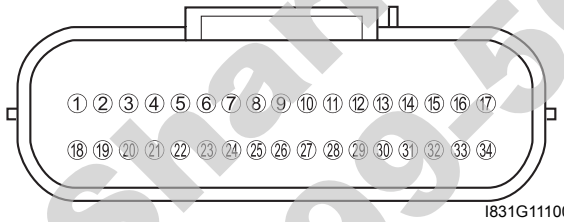
Detected Condition	Possible Cause
No voltage is applied to diff-lock motor, although ignition switch is turned ON, or voltage is applied to diff-lock motor, although ignition switch is turned OFF.	• Diff-lock relay circuit open or short. • Diff-lock relay malfunction. • ECM malfunction.

Wiring Diagram



I831G1110048-02

ECM coupler (Harness side)



I831G1110019-01

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 the terminal damage or terminal bend.

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 rear fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.  I831G1110049-01 2) Connect the disconnected couplers and battery. 3) Turn the ignition switch OFF. 4) Check the diff-lock relay coupler for loose or poor contacts. If OK, then check the diff-lock relay insulation and continuity. Refer to “2WD/4WD/Diff-lock System Inspection in Section 3B (Page 3B-17)”. *Is the diff-lock relay OK?*	• Inspect the 4WD/diff-lock switch. • Y/B wire open or shorted to ground, or poor “21” 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.	Replace the diff-lock relay with a new one.

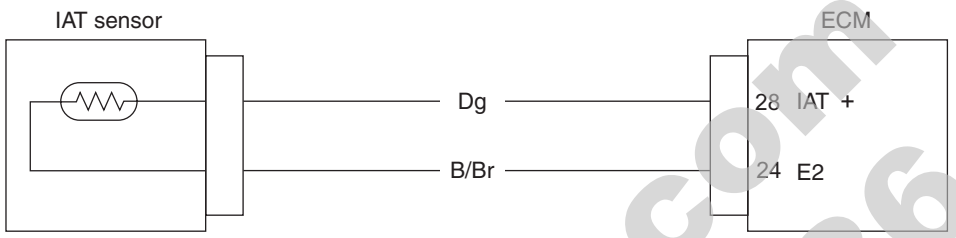
DTC “C21” (P0110-H/L): IAT Sensor Circuit Malfunction

B831G21104015

Detected Condition and Possible Cause

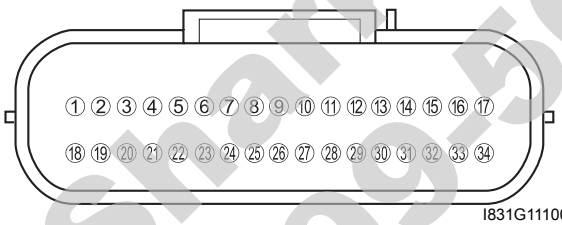
Detected Condition			Possible Cause
C21		Output voltage is not with in the following range. 0.15 V ≤ Sensor voltage < 4.85 V	• IAT sensor circuit open or short. • IAT sensor malfunction. • ECM malfunction.
P0110	H	Sensor voltage is higher than specified value.	• IAT sensor circuit open or ground circuit open.
	L	Sensor voltage is lower than specified value.	• IAT sensor circuit shorted to the ground.

Wiring Diagram



I831G1110082-01

ECM coupler (Harness side)



I831G1110019-01

Troubleshooting

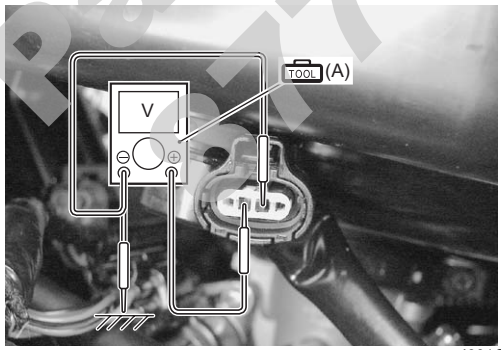
⚠ CAUTION

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

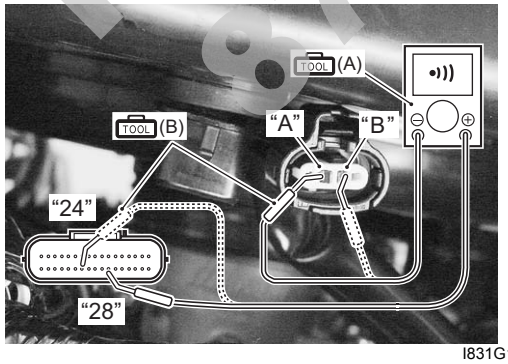
NOTE

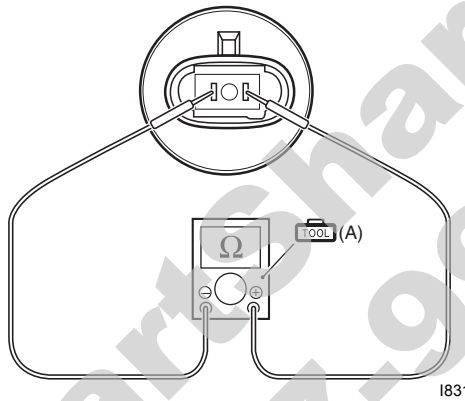
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

C21 (Use of mode select switch)

Step	Action	Yes	No
1	1) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch OFF. 3) Check the IAT sensor coupler for loose or poor contacts. If OK, then measure the IAT sensor voltage.  I831G1110051-01 4) Disconnect the coupler and turn the ignition switch ON. 5) Measure the voltage between the Dg wire terminal and ground. If OK, then measure the input voltage between 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)**  I831G1110052-02 *Is the voltage OK?*	Go to Step 2.	• Loose or poor contacts on the ECM coupler. • Open or short circuit in the Dg wire or B/Br wire.

P0110-H (Use of SDS)

Step	Action	Yes	No
1	1) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch OFF. 3) Check the IAT sensor coupler for loose or poor contacts. If OK, then check the IAT sensor lead wire continuity.  I831G1110051-01 4) Disconnect the IAT sensor coupler. 5) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”. Also, check the continuity between B/Br wire “B” and terminal “24”. 6) Insert the needle pointed probes to the lead wire coupler. 7) Check the continuity between the Dg wire “A” and terminal “28”. Also, check the continuity between the B/Br wire “B” and terminal “24”. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity test (•)))** **ECM coupler (Harness side)**  I831G1110050-01 *Is the continuity OK?*	Connect the ECM coupler and go to step 2.	Dg or B/Br wire open.

Step	Action	Yes	No
2	1) Turn the ignition switch OFF. 2) Measure the IAT sensor resistance.  I831G1110051-01 **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **IAT sensor resistance** **Approx. 1.6 kΩ at 20 °C (68 °F) (Terminal — Terminal)**  I831G1110083-03 **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-4)".** *Is the resistance OK?*	• Dg or B/Br wire open or shorted to ground, or poor "28" or "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 IAT sensor with a new one. Refer to "IAP Sensor Removal and Installation in Section 1C (Page 1C-2)".

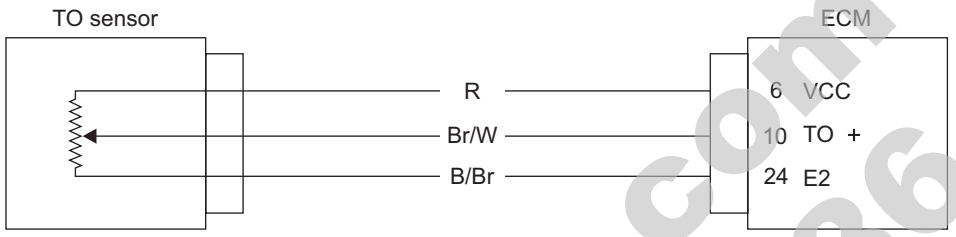
DTC “C23” (P1651-H/L): TO Sensor Circuit Malfunction

B831G21104016

Detected Condition and Possible Cause

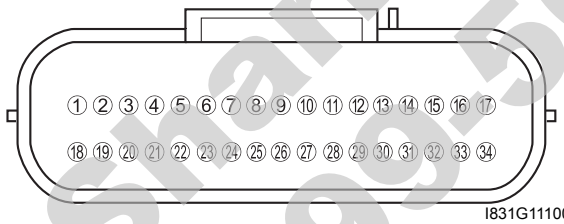
Detected Condition			Possible Cause
C23		The sensor voltage should be the following for 2 sec. and more, after ignition switch is turned ON. 0.2 V ≤ Sensor voltage < 4.8 V	• TO sensor circuit open or short. • TO sensor malfunction. • ECM malfunction.
P1651	H	Sensor voltage is higher than specified value.	• TO sensor circuit open or shorted to VCC or ground circuit open. • TO sensor circuit shorted to ground or VCC circuit open.
	L	Sensor voltage is lower than specified value.	

Wiring Diagram



I831G1110054-01

ECM coupler (Harness side)



I831G1110019-01

Troubleshooting

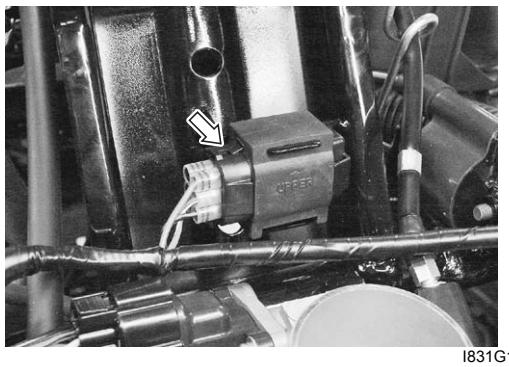
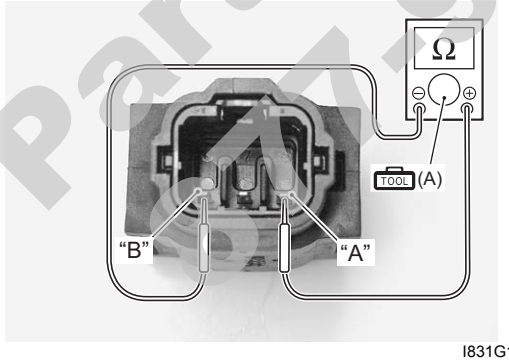
⚠ CAUTION

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

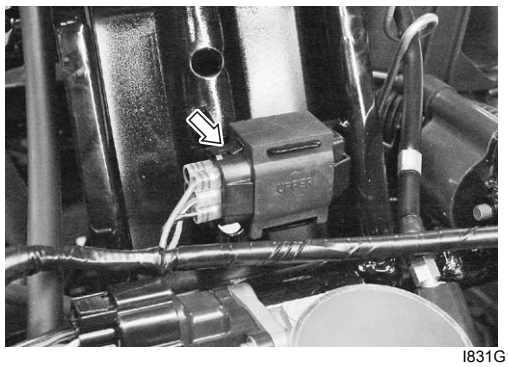
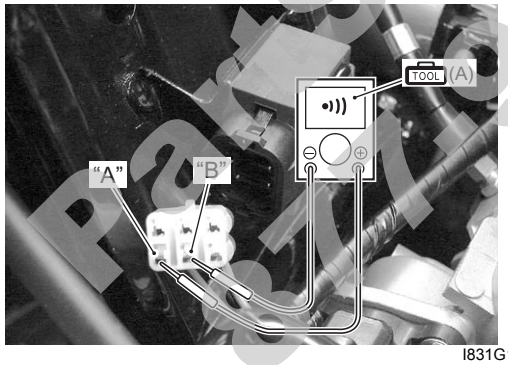
NOTE

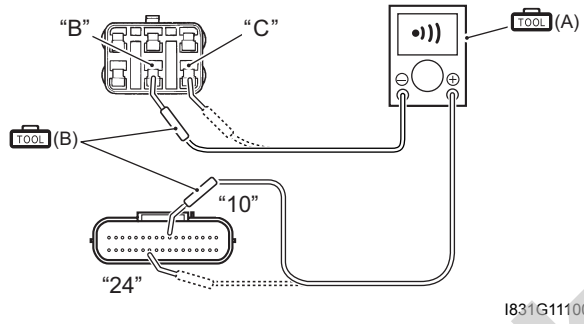
After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.

C23 (Use of mode select switch)

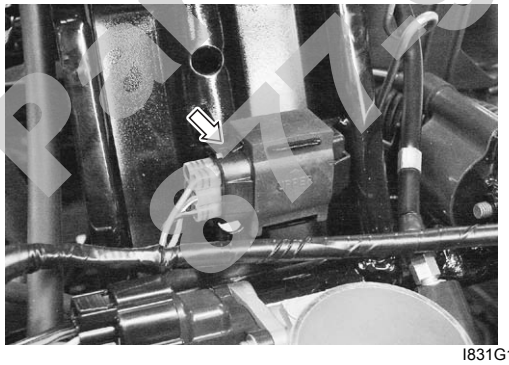
Step	Action	Yes	No
1	1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation in Section 1D (Page 1D-5)”. 2) Turn the ignition switch OFF. 3) Check the TO sensor coupler for loose or poor contacts. If OK, then measure the TO sensor resistance.  I831G1110055-01 4) Remove the TO sensor. 5) Disconnect the TO sensor coupler. 6) Measure the resistance between terminal “A” and terminal “B”. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Resistance (Ω)** **TO sensor resistance** **19.0 – 20.0 kΩ** **(Terminal “A” – Terminal “B”)**  I831G1110056-03 *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)”.

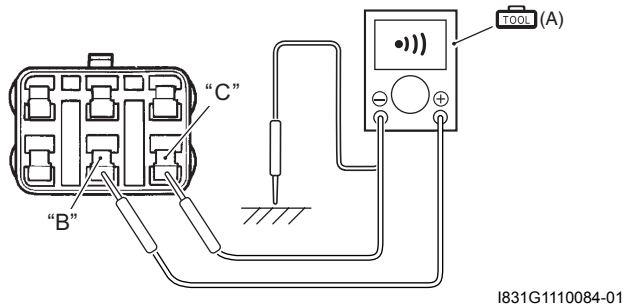
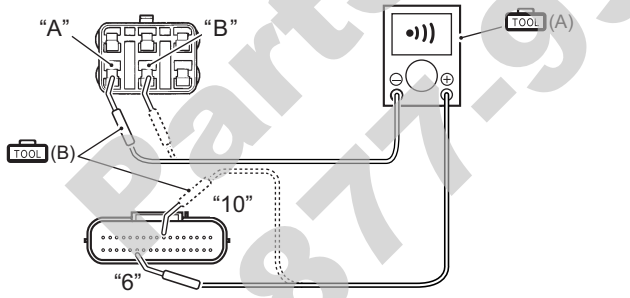
P1651-H (Use of SDS)

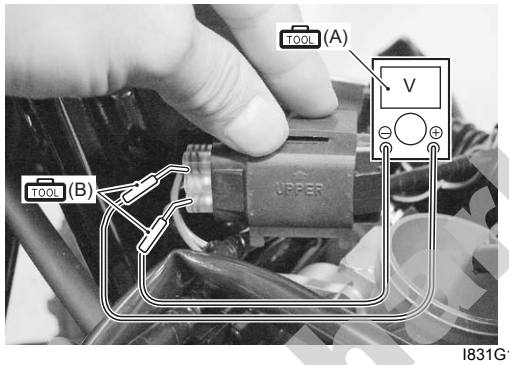
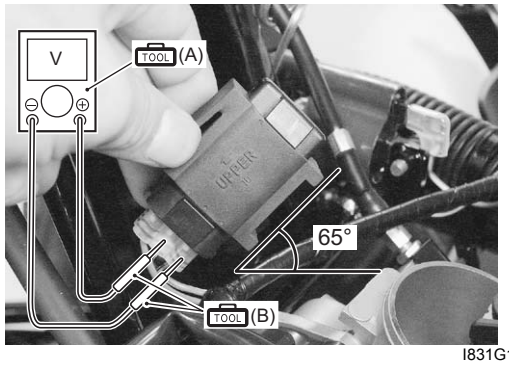
Step	Action	Yes	No
1	1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation in Section 1D (Page 1D-5)”. 2) Turn the ignition switch OFF. 3) Check the TO sensor coupler for loose or poor contacts. If OK, then check the TO sensor lead wire continuity.  I831G1110055-01 4) Remove the TO sensor. 5) Disconnect the TO sensor coupler. 6) Check the continuity between the R 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 test (•)))**  I831G1110057-02	Go to Step 2.	Br/W wire shorted to VCC, or B/Br wire open.

Step	Action	Yes	No
1	7) Disconnect the ECM coupler. 8) Check the continuity between Br/W wire “B” and terminal “10”. Also, check the continuity between B/Br wire “C” and terminal “24”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity test (•))))** **ECM coupler (Harness side)**  I831G1110058-03 *Is the continuity OK?*	Go to Step 2.	Br/W wire shorted to VCC, or B/Br wire open.

P1651-L (Use of SDS)

Step	Action	Yes	No
1	1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation in Section 1D (Page 1D-5)”. 2) Turn the ignition switch OFF. 3) Check the TO sensor coupler for loose or poor contacts. If OK, then check the TO sensor lead wire continuity.  I831G1110055-01	Go to Step 2.	R or B wire open, or Br/W wire shorted to the ground.

Step	Action	Yes	No
1	4) Remove the TO sensor. 5) Disconnect the TO sensor coupler. 6) Insert the needle pointed probes to the lead wire coupler. 7) Check the continuity between Br/W wire “B” and ground. Also, check the continuity between Br/W wire “B” and B/Br wire “C”. If sound is not heard from the tester, the circuit condition is OK.  I831G1110084-01 8) Disconnect the ECM coupler. Refer to “ECM Removal and Installation in Section 1C (Page 1C-1)”. 9) Check the continuity between R wire “A” and terminal “6”. Also, then check the continuity between Br/W wire “B” and terminal “10”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **TOOL (B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Continuity test (•)))**  I831G1110085-02 *Is the continuity OK?*	Go to Step 2.	R or B wire open, or Br/W wire shorted to the ground.

Step	Action	Yes	No
2	1) Connect the TO sensor coupler. 2) Insert the needle pointed probes to the lead wire coupler. 3) Turn the ignition switch ON. 4) Measure the voltage at the wire side coupler between Br/W and B/Br wires. Also, measure the voltage when learning the vehicle. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)** **TO sensor voltage** **0.4 – 1.4 V** **((+) terminal: Br/W – (–) terminal: B/Br)**  I831G1110059-01 5) Dismount the TO sensor from its bracket and measure the voltage when it is learned 65° and more, left and right, from the horizontal level. **Special tool** **(A): 09900–25008 (Multi-circuit tester set)** **(B): 09900–25009 (Needle pointed probe set)** **Tester knob indication** **Voltage (⎓)** **TO sensor voltage** **3.7 – 4.4 V** **((+) terminal: Br/W – (–) terminal: B/Br)**  I831G1110060-01 *Is the voltage OK?*	• R, B/Br or Br/W wire open or shorted to ground, or poor “6”, “24” or “10” 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. • Open or short circuit. • Replace the TO sensor with a new one.

DTC “C24” (P0351): Ignition Coil Circuit Malfunction

B831G21104017

NOTE

Refer to “No Spark or Poor Spark in Section 1H (Page 1H-2)” for details.

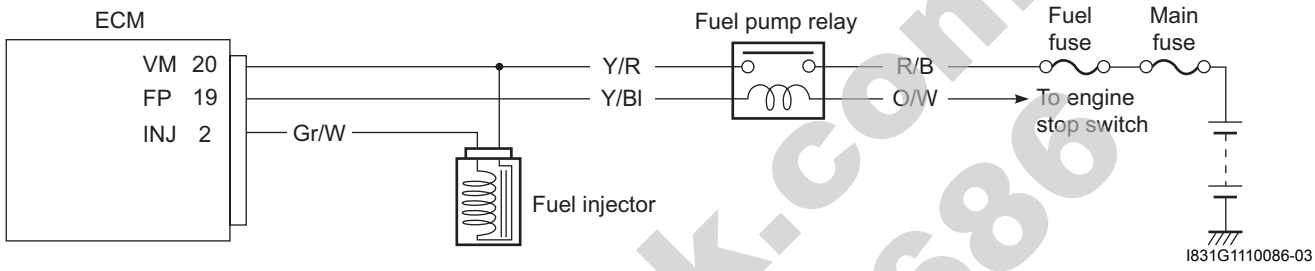
DTC “C32” (P0201): Fuel Injector Circuit Malfunction

B831G21104018

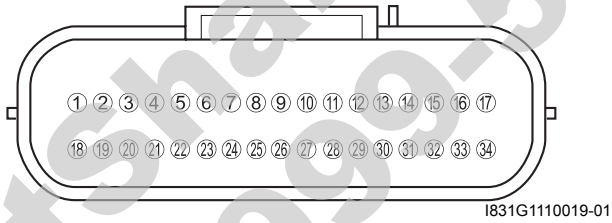
Detected Condition and Possible Cause

Detected Condition	Possible Cause
CKP signal is produced but fuel injector signal is interrupted by 4 times or more continuity.	• Injector circuit open or short. • Injector malfunction. • ECM malfunction.

Wiring Diagram



ECM coupler (Harness side)



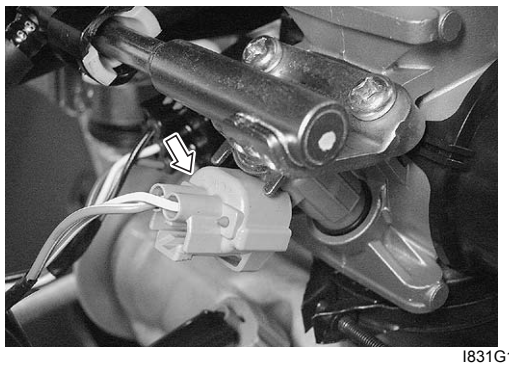
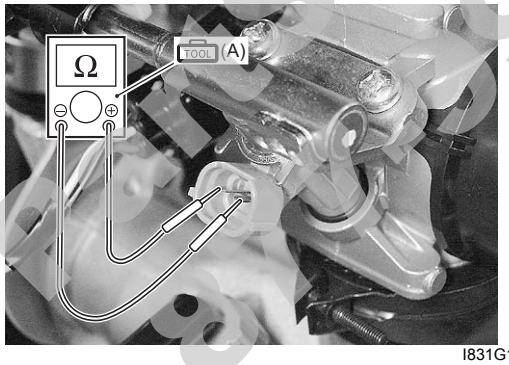
Troubleshooting

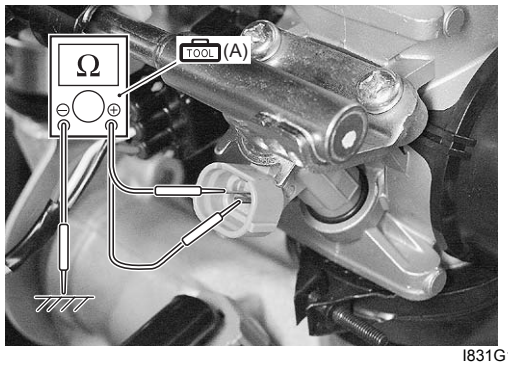
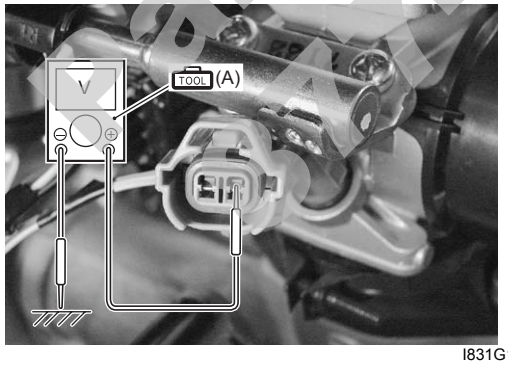
⚠ CAUTION

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

NOTE

- **After repairing the trouble, clear the DTC using SDS tool. Refer to “Use of SDS Diagnosis Reset Procedures (Page 1A-13)”.**
- **Injector voltage can be detected only for 3 seconds after ignition switch is turned ON.**

Step	Action	Yes	No
1	1) Remove the side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch OFF. 3) Check the injector coupler for loose or poor contacts. If OK, then measure the injector resistance.  I831G1110087-01 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** **Approx. 11 – 13 Ω at 20 °C (68 °F)** **(Terminal – Terminal)**  I831G1110088-01	Go to Step 2.	Replace the injector with a new one. Refer to “Throttle Body Disassembly and Assembly in Section 1D (Page 1D-10)”.

Step	Action	Yes	No
1	5) If OK, then check the continuity between each terminal and ground. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Injector continuity** **∞ Ω (Infinity)** **(Terminal – Ground)**  I831G1110089-01 *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-10)".
2	1) Turn the ignition switch ON. 2) Measure the injector voltage between Y/R wire and ground. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Injector voltage** **Battery voltage** **((+) terminal: Y/R – (–) terminal: Ground)**  I831G1110061-02 *Is the voltage OK?*	• Gr/W or Y/R wire open or shorted to ground, or poor "2" or "20" connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and poor connection. • Replace the ECM with a known good one, and inspect it again.	Open circuit in the Y/R wire.

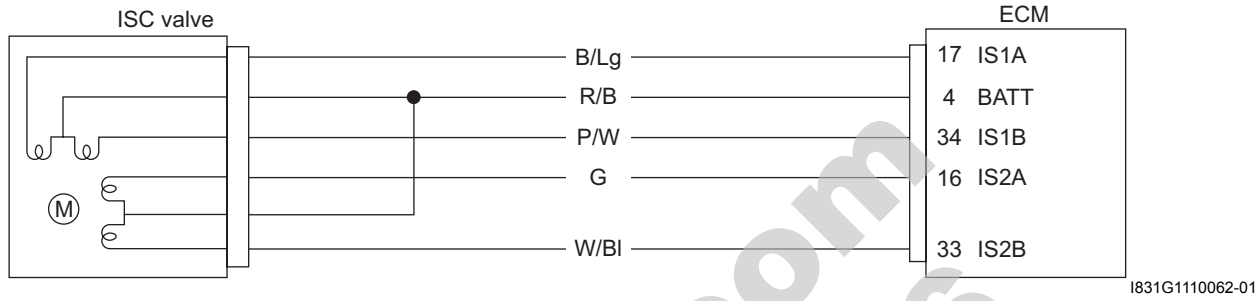
DTC “C40” (P05057): ISC Valve Circuit Malfunction

B831G21104019

Detected Condition and Possible Cause

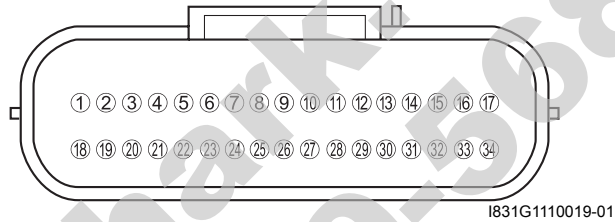
Detected Condition	Possible Cause
No voltage is applied to ISC valve motor, although ignition switch is turned ON, or voltage is applied to ISC valve motor, although ignition switch is turned OFF.	• ISC valve circuit open or shorted to the ground. • ISC valve malfunction. • ECM malfunction.

Wiring Diagram



I831G1110062-01

ECM coupler (Harness side)



I831G1110019-01

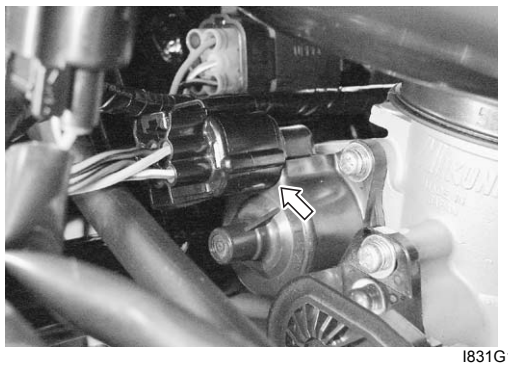
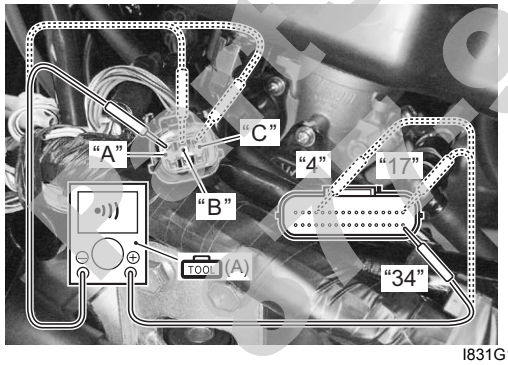
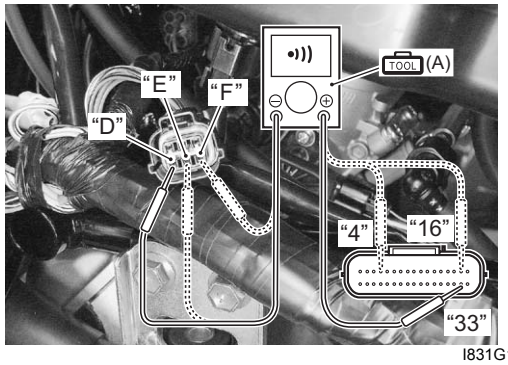
Troubleshooting

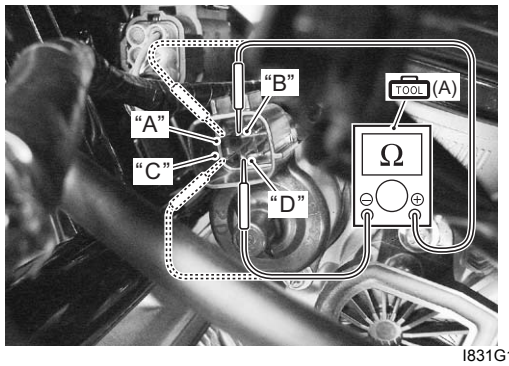
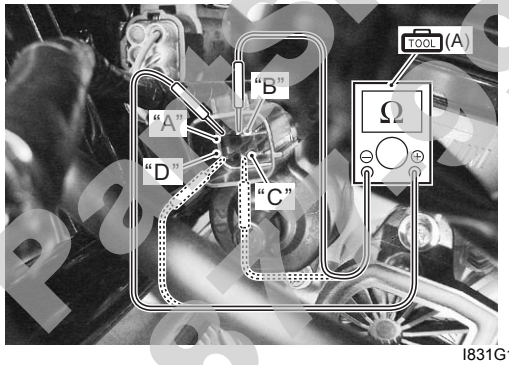
⚠ CAUTION

- **Be careful not to disconnect at lease 3 seconds after ignition switch is turned to OFF. If the ECM coupler is disconnected within 3 seconds after ignition switch is turned to OFF, there is a possibility of an usual valve being written in 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 the terminal damage or terminal bend.**

NOTE

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

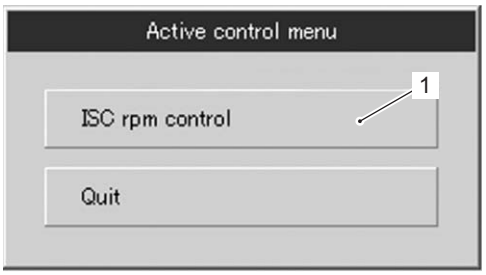
Step	Action	Yes	No
1	1) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch OFF. 3) Check the ISC valve coupler for loose or poor contacts. If OK, then check the ISC valve lead wire continuity.  I831G1110063-01 4) Disconnect the ISC valve coupler. 5) Check the continuity between terminals “A” and “34”, terminals “B” and “4”, terminals “C” and “17”, terminals “D” and “33”, terminals “E” and “4” and terminals “F” and “16”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **Tester knob indication** **Continuity test (•)))** **ECM coupler (Harness side)**  I831G1110064-02  I831G1110065-02 *Is the continuity OK?*	Go to Step 2.	B/Lg, R/B, P/W, G or W/Bl wire open.

Step	Action	Yes	No
2	1) Measure the resistance between terminals “A” and “C”, terminals “B” and “D”. **Special tool** **TOOL (A): 09900–25008 (Multi-circuit tester set)** **ISC valve resistance** **Approx. ∞** **(Terminal “A” – Terminal “C”)** **(Terminal “B” – Terminal “D”)**  I831G1110066-02 2) If OK, then measure the resistance between terminals “A” and “B”, terminals “C” and “D”. **ISC valve resistance** **Approx. 31 kΩ at 20 °C** **(Terminal “A” – Terminal “B”)** **(Terminal “C” – Terminal “D”)**  I831G1110067-03 *Is the resistance OK?*	If wire is OK, intermittent trouble or faulty ECM.	Replace the ISC valve with a new one.

ACTIVE CONTROL INSPECTION (ISC RPM CONTROL)

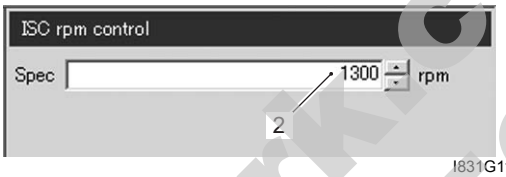
Check 1

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).

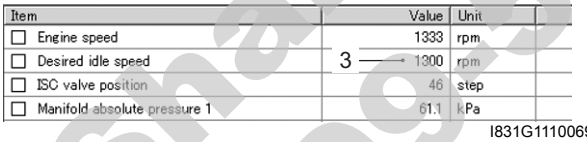


I831G1110070-02

5) Check that the “Spec” (2) is idle speed 1 300 ± 100 rpm.
6) Check that the “Desired idle speed” (3) is within the specified idle rpm.



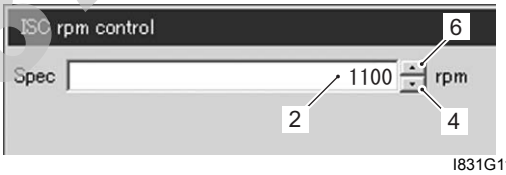
I831G1110068-02



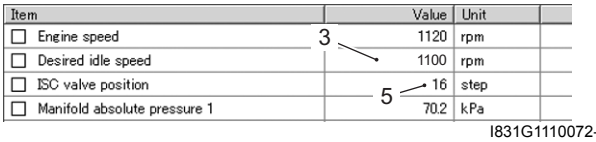
I831G1110069-02

Check 2

1) Click the button (4) and decrease the “Spec” (2) to 1 100 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.



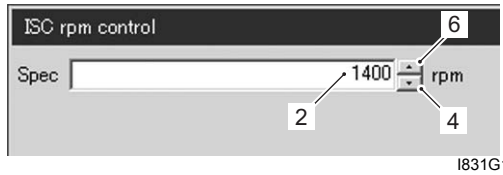
I831G1110071-05



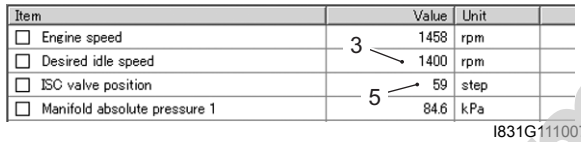
I831G1110072-02

Check 3

1) Click the button (6) and increase the “Spec” (2) to 1 400 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.



I831G1110073-01



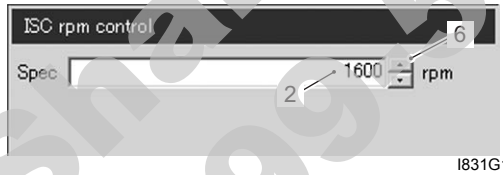
I831G1110074-01

Check 4

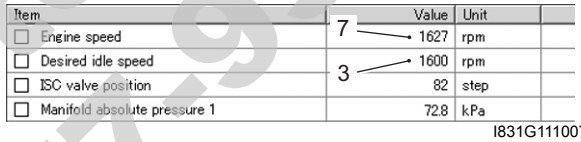
1) Click the button (6) and increase the “Spec” (2) to 1 600 rpm.
2) Check that the “Desired idle speed” (3) is approx. 1 600 rpm.
3) Check that the “Engine speed” (7) is close to 1 600 rpm.

NOTE

Be careful not to increase the “Spec” to 1 650 rpm, or the “Engine speed” may reach the upper limit.



I831G1110076-01



I831G1110075-01

If the ISC valve does not function properly, replace the ISC valve or inspect the ISC valve. Refer to “Throttle Body Disassembly and Assembly in Section 1D (Page 1D-10)”.

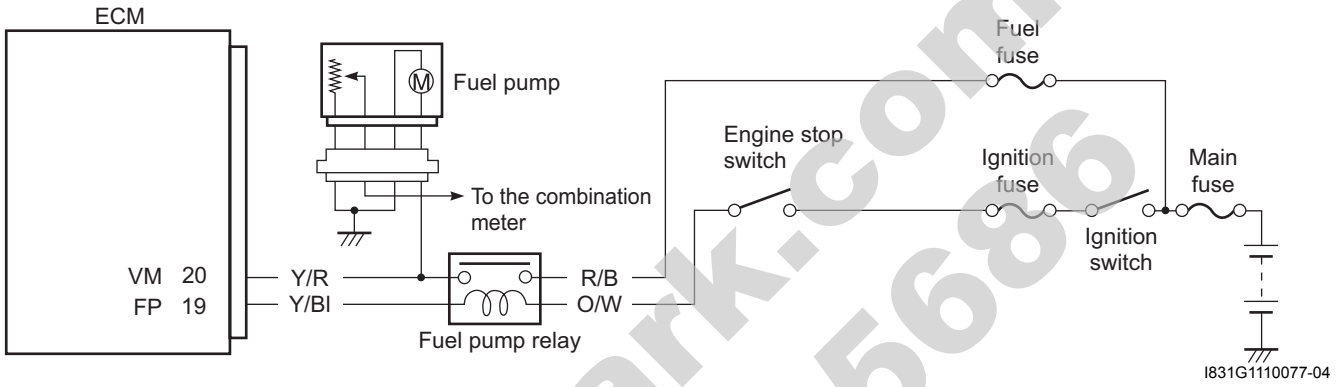
DTC “C41” (P230-H/L): FP Relay Circuit Malfunction

B831G21104020

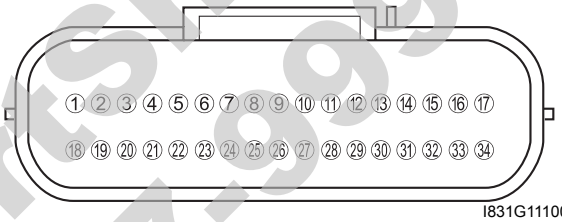
Detected Condition and Possible Cause

Detected Condition			Possible Cause
C41		No voltage is applied to 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 circuit open or short. • Fuel pump relay malfunction. • ECM malfunction.
P0230	H	Voltage is applied to fuel pump although fuel pump relay is turned OFF.	• Fuel pump relay switch circuit shorted to power source. • Faulty fuel pump relay (switch side).
	L	No voltage is applied to fuel pump although fuel pump relay is turned ON.	• Fuel pump relay coil circuit open or short. • Faulty fuel pump relay (coil side).

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 the terminal damage or terminal bend.

NOTE

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

C41 (Use of mode select switch)

Step	Action	Yes	No
1	1) Remove the seat. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch to OFF. 3) Check the FP relay coupler for loose or poor contacts. If OK, then check the FP relay. Refer to “Fuel Pump Relay Inspection in Section 1G (Page 1G-7)”. *Is the FP relay OK?*	• Y/Bl or O/W wire open or shorted to ground, or poor “19” connection. • Y/R or R/B wire open or shorted to ground, or poor “20” connection. • If wire and connection are OK, intermittent trouble or faulty ECM. • Recheck each terminal and wire harness for open circuit 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.

P0230-H (Use of SDS)

Step	Action	Yes	No
1	1) Remove the seat. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 2) Turn the ignition switch to OFF. 3) Check the FP relay coupler for loose or poor contacts. If OK, then check the FP relay. Refer to “Fuel Pump Relay Inspection in Section 1G (Page 1G-7)”.  I831G1110078-01 *Is the FP relay OK?*	• Y/R wire shorted to power source. • Y/Bl wire 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.	Replace the FP relay with a new one.

P0230-L (Use of SDS)

Step	Action	Yes	No
1	1) Turn the ignition switch to OFF. 2) Remove the seat. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”. 3) Check the FP relay coupler for loose or poor contacts. If OK, then check the FP relay. Refer to “Fuel Pump Relay Inspection in Section 1G (Page 1G-7)”.  I831G1110078-01 *Is the FP relay OK?*	• Y/Bl wire open or poor “19” connection. • O/W wire open or shorted to ground. • R/B or Y/R wire open or shorted to ground or poor “16” 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.	Replace the FP relay with a new one.

Specifications

Service Data

B831G21107001

Injector

Item	Specification	Note
Injector resistance	11 – 13 Ω at 20 °C (68 °F)	—

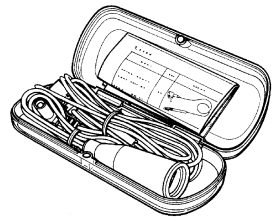
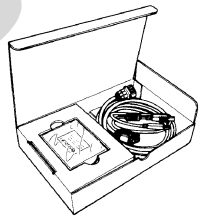
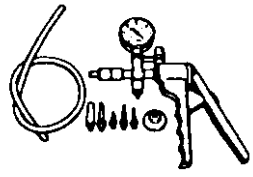
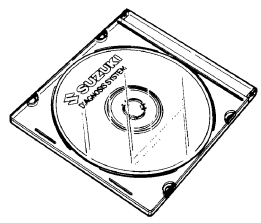
FI Sensors + Secondary Throttle Valve Actuator

Item	Specification		Note
CKP sensor resistance	150 – 250 Ω		
CKP sensor peak voltage	5.0 V and more		When cranking
IAP sensor input voltage	4.5 – 5.5 V		
IAP sensor output voltage	Approx. 2.63 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
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	0.15 – 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	0.15 – 4.85 V		
IAT sensor resistance	Approx. 1.60 kΩ at 20 °C (68 °F)		
TO sensor resistance	19 – 20 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	80 V and more		When cranking
ISC valve resistance	Approx. 31 kΩ at 20 °C (68 °F)		

Special Tools and Equipment

Special Tool

B831G21108001

09900–25008 Multi-circuit tester set ☞(Page 1A-25) / ☞(Page 1A-26) / ☞(Page 1A-26) / ☞(Page 1A-28) / ☞(Page 1A-29) / ☞(Page 1A-30) / ☞(Page 1A-31) / ☞(Page 1A-32) / ☞(Page 1A-32) / ☞(Page 1A-33) / ☞(Page 1A-35) / ☞(Page 1A-36) / ☞(Page 1A-37) / ☞(Page 1A-38) / ☞(Page 1A-39) / ☞(Page 1A-39) / ☞(Page 1A-40) / ☞(Page 1A-42) / ☞(Page 1A-43) / ☞(Page 1A-44) / ☞(Page 1A-45) / ☞(Page 1A-46) / ☞(Page 1A-50) / ☞(Page 1A-51) / ☞(Page 1A-52) / ☞(Page 1A-54) / ☞(Page 1A-55) / ☞(Page 1A-56) / ☞(Page 1A-57) / ☞(Page 1A-58) / ☞(Page 1A-58) / ☞(Page 1A-60) / ☞(Page 1A-61) / ☞(Page 1A-61) / ☞(Page 1A-63) / ☞(Page 1A-64)	
09900–25009 Needle pointed probe set ☞(Page 1A-30) / ☞(Page 1A-32) / ☞(Page 1A-32) / ☞(Page 1A-35) / ☞(Page 1A-36) / ☞(Page 1A-37) / ☞(Page 1A-38) / ☞(Page 1A-39) / ☞(Page 1A-40) / ☞(Page 1A-43) / ☞(Page 1A-45) / ☞(Page 1A-51) / ☞(Page 1A-56) / ☞(Page 1A-57) / ☞(Page 1A-58) / ☞(Page 1A-58)	
09904–41010 SDS set ☞(Page 1A-12) / ☞(Page 1A-15)	
09917–47011 Vacuum pump gauge ☞(Page 1A-33)	
09930–82720 Mode select switch ☞(Page 1A-3) / ☞(Page 1A-11) / ☞(Page 1A-11)	
99565–01010–013 CD-ROM Ver.13 ☞(Page 1A-12) / ☞(Page 1A-15)	

Emission Control Devices

Precautions

Precautions for Emission Control Devices

B831G21200001

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

Repair Instructions

Crankcase Breather (PCV) Hose Inspection

B831G21206001

Inspect the PCV hose in the following procedures:

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Inspect the PCV hose (1) for wear or damage. If it is worn or damaged, replace the PCV hose with a new one.
   Check that the PCV hose (1) is securely connected.

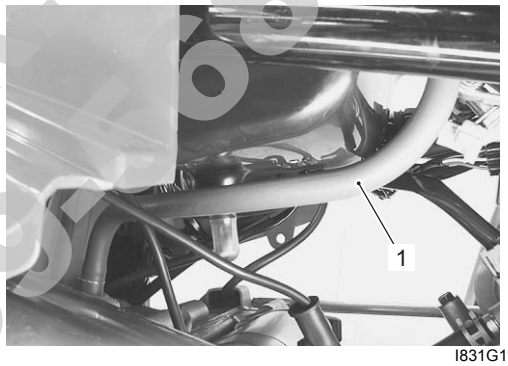
I831G1120001-01

Crankcase Breather (PCV) Hose Removal and Installation

B831G21206002

Removal

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Disconnect the PCV hose (1).



I831G1120001-01

Installation

1) Install the PCV hose as shown in the fuel hose routing diagram. Refer to “Fuel Hose Routing Diagram in Section 1G (Page 1G-3)”.
2) Reinstall the removed parts.

Engine Electrical Devices

Precautions

Precautions for Engine Electrical Device

B831G21300001

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

B831G21303001

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

Diagnostic Information and Procedures

Engine Symptom Diagnosis

B831G21304001

Refer to “Engine Symptom Diagnosis in Section 1A (Page 1A-8)”.

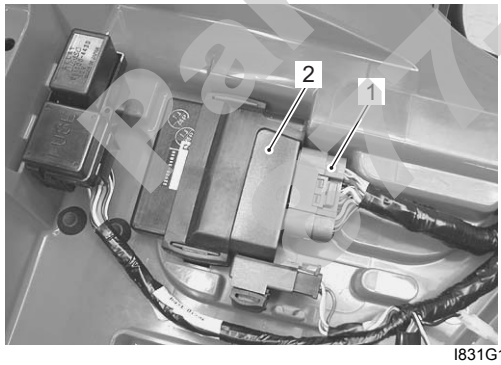
Repair Instructions

ECM Removal and Installation

B831G21306001

Removal

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the battery (–) lead wire.
3) Disconnect the ECM coupler (1) and remove the ECM (2).



I831G1130001-02

Installation

NOTE

When replacing the ECM, turn the ignition switch ON and OFF.

Install the ECM in the reverse order of removal.

CKP Sensor Inspection

B831G21306002

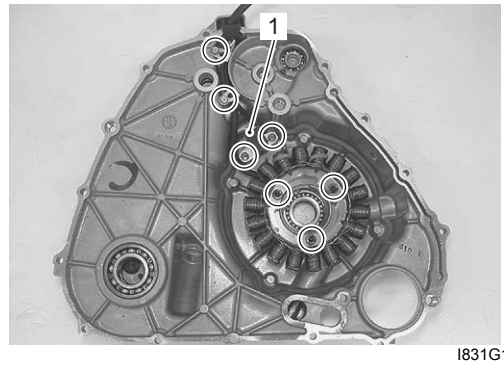
Refer to “CKP Sensor Inspection in Section 1H (Page 1H-5)”.

CKP Sensor Removal and Installation

B831G21306003

Removal

1) Remove the generator cover. Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.
2) Remove the CKP sensor (1) along with generator starter.



I831G1130002-01

Installation

Install the CKP sensor in the reverse order of removal. Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.

IAP Sensor Inspection

B831G21306004

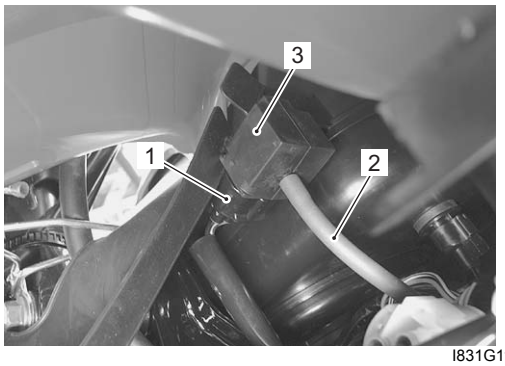
Refer to “DTC “C13” (P0105-H/L): IAP Sensor Circuit Malfunction in Section 1A (Page 1A-27)”.

IAP Sensor Removal and Installation

B831G21306005

Removal

1) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the IAP sensor coupler (1) and vacuum hose (2).
3) Remove the IAP sensor (3).



I831G1130003-01

Installation

Install the IAP sensor in the reverse order of removal.

TP Sensor Inspection

B831G21306006

Refer to “DTC “C14” (P0120-H/L): TP Sensor Circuit Malfunction in Section 1A (Page 1A-34)”.

TP Sensor Removal and Installation

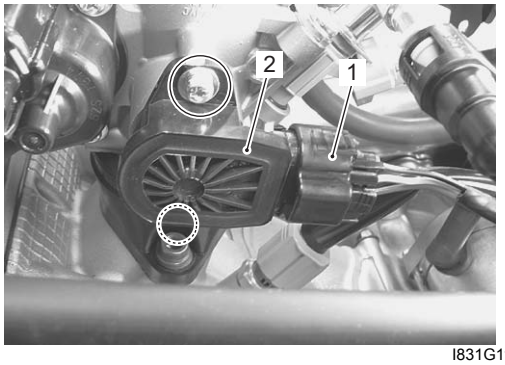
B831G21306007

Removal

NOTE

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

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation in Section 1D (Page 1D-5)”.
2) Disconnect the TP sensor coupler (1) and remove the TP sensor (2).



I831G1130004-01

Installation

NOTE

When replacing the TP sensor, turn the ignition switch ON and OFF.

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

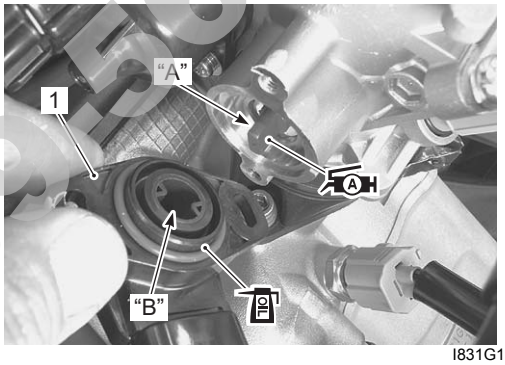
- Apply a thin coat of engine oil to the O-ring.
- Install the TP sensor (1) and tighten the TP sensor mounting screw to the specified torque.

NOTE

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

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

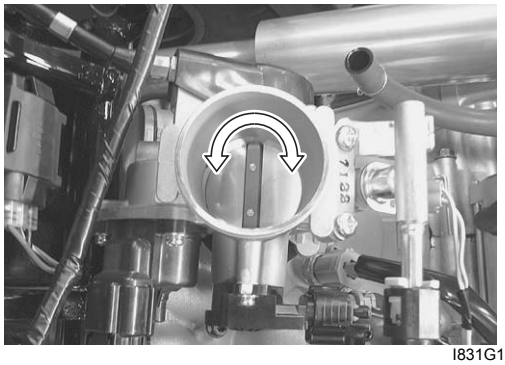
Tightening torque
TP sensor mounting screw: 2 N·m (0.2 kgf-m, 1.5 lb-ft)



I831G1130005-01

NOTE

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



I831G1130006-01

TP Sensor Adjustment

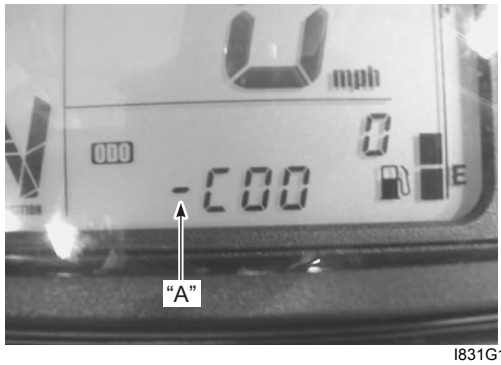
B831G21306008

Adjust the TP sensor in the following procedures:

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

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

2) Warm up the engine and keep it running in idling speed.
3) Turn the mode select switch ON.
4) Check the position of the bar “A” in the left of C code displayed on the LCD panel.



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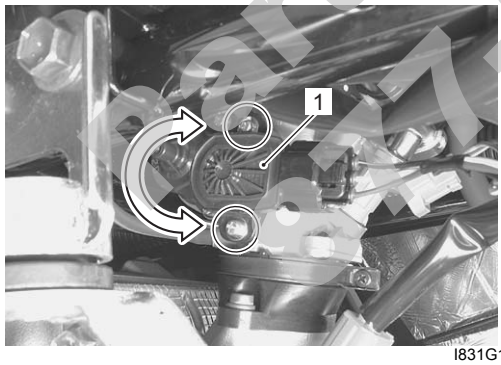
5) If the TP sensor adjustment is necessary, remove the left side cover and loosen the TP sensor mounting screw. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
6) Slide the TP sensor (1) and bring the line to the middle.



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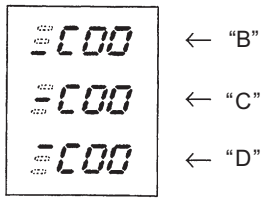


I831G1130016-01

“B”: Incorrect position	“D”: Incorrect position
“C”: Correct position	

7) Tighten the TP sensor mounting screw.

   Tightening torque
   TP sensor mounting screw: 2 N·m (0.2 kgf-m, 1.5 lb-ft)

8) Turn the ignition switch OFF and disconnect the mode select switch.
9) Reinstall the removed parts.

IAT Sensor Inspection

B831G21306009

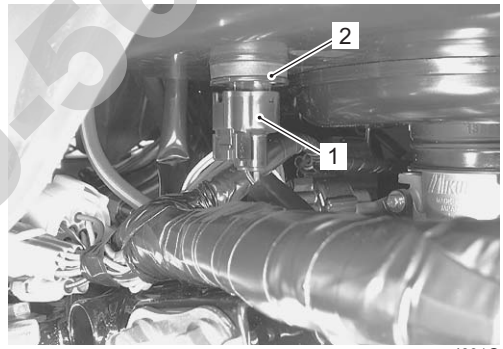
Refer to “DTC “C21” (P0110-H/L): IAT Sensor Circuit Malfunction in Section 1A (Page 1A-49)”.

IAT Sensor Removal and Installation

B831G21306010

Removal

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Disconnect the coupler (1) and remove the IAT sensor (2).



I831G1130009-01

Installation

Install the IAT sensor in the reverse order of removal.

ECT Sensor Removal and Installation

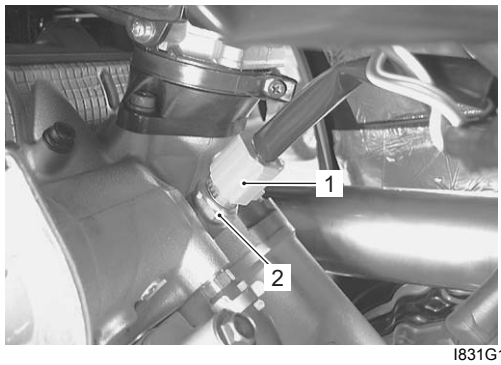
B831G21306011

Removal

1) Drain engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.
2) Disconnect the coupler (1) and remove the ECT sensor (2).

⚠ CAUTION

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



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Installation

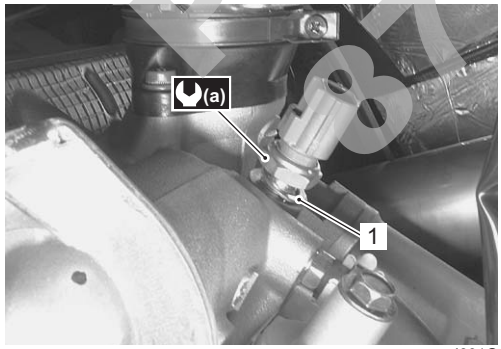
Install the ECT sensor in the reverse order of removal.
Pay attention to the following points:

- Tighten the ECT sensor to the specified torque.

⚠ CAUTION

Use the new gasket washer (1) to prevent engine coolant leakage.

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



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- Pour engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.

ECT Sensor Inspection

B831G21306012

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

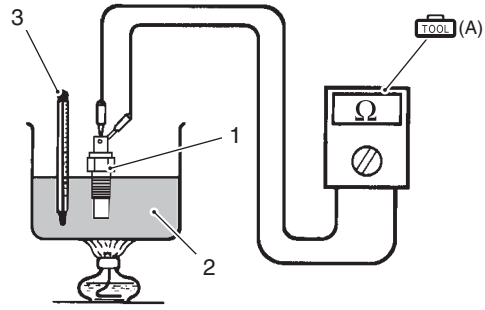
Do not contact the ECT sensor and the column thermometer with a pan.

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



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

TO Sensor Inspection

B831G21306013

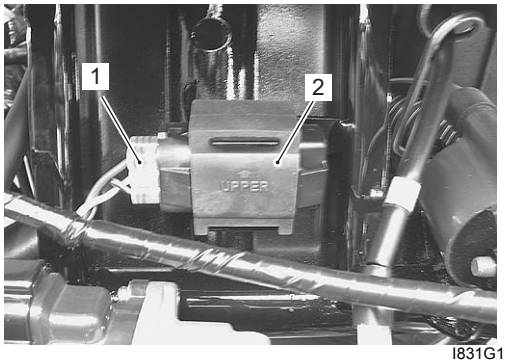
Refer to “DTC “C23” (P1651-H/L): TO Sensor Circuit Malfunction in Section 1A (Page 1A-53)”.

TO Sensor Removal and Installation

B831G21306014

Removal

1) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation in Section 1D (Page 1D-5)”.
2) Disconnect the coupler (1) and remove the TO sensor (2).



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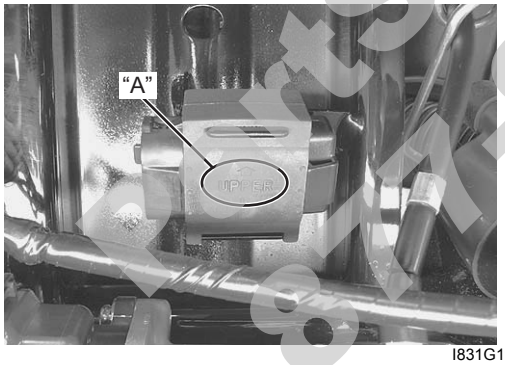
Installation

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.



I831G1130013-01

ISC Valve Inspection

B831G21306015

Refer to “DTC “C40” (P05057): ISC Valve Circuit Malfunction in Section 1A (Page 1A-62)”.

ISC Valve Removal and Installation

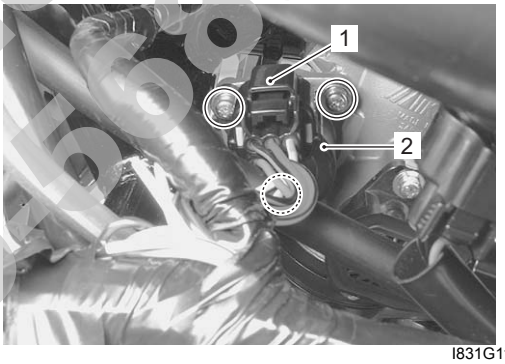
B831G21306016

Removal

⚠ CAUTION

Be careful not to disconnect the ISC valve coupler at least 3 seconds after ignition switch is turned to OFF. If the ECM coupler or ISC valve coupler is disconnected within 3 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.

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Disconnect the ISC valve coupler (1) and remove the ISC valve (2).



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Installation

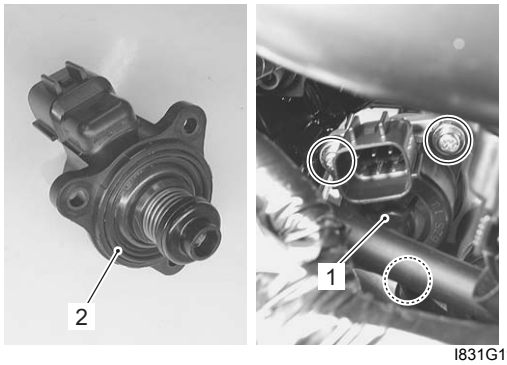
NOTE

When replacing the ISC valve, turn the ignition switch ON and OFF.

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

- Install the new O-ring (1).
- Install the ISC valve (2) and tighten the ISC valve mounting screws to the specified torque.

Tightening torque
ISC valve mounting screw: 2 N·m (0.2 kgf-m, 1.5 lb-ft)



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GP Switch Inspection

B831G21306017

Refer to “Gear Position Switch Inspection in Section 1I (Page 1I-9)”.

GP Switch Removal and Installation

B831G21306018

Refer to “Gear Position (GP) Switch Removal and Installation in Section 3C (Page 3C-13)”.

Specifications

Service Data

B831G21307001

FI Sensors

Item	Specification		Note
CKP sensor resistance	150 – 250 Ω		
CKP sensor peak voltage	5.0 V and more		When cranking
IAP sensor input voltage	4.5 – 5.5 V		
IAP sensor output voltage	Approx. 2.63 V at idle speed		
TP sensor input voltage	4.5 – 5.5 V		
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	0.15 – 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	0.15 – 4.85 V		
IAT sensor resistance	Approx. 1.60 kΩ at 20 °C (68 °F)		
TO sensor resistance	19 – 20 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	80 V and more		When cranking
ISC valve resistance	Approx. 31 kΩ at 20 °C (68 °F)		

Tightening Torque Specifications

B831G21307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
TP sensor mounting screw	2	0.2	1.5	☞(Page 1C-2) / ☞(Page 1C-3)
ECT sensor	18	1.8	13.0	☞(Page 1C-4)
ISC valve mounting screw	2	0.2	1.5	☞(Page 1C-6)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

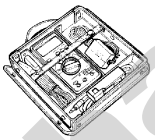
B831G21308001

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

Special Tool

B831G21308002

09900–25008
Multi-circuit tester set
☞(Page 1C-4)



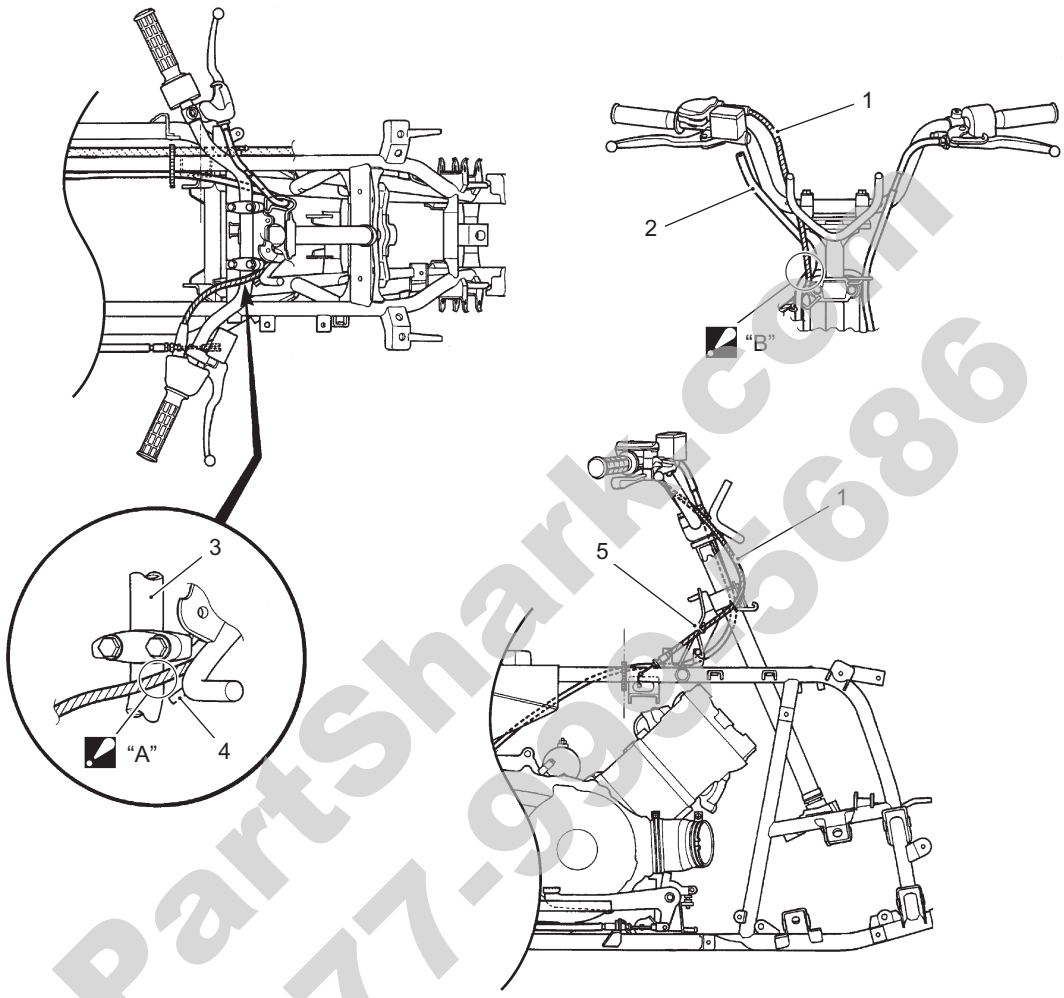
09930–82720
Mode select switch
☞(Page 1C-3)

Engine Mechanical

Schematic and Routing Diagram

Throttle Cable Routing Diagram

B831G21402001



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1. Throttle cable	5. Throttle cable guide
2. Brake hose	"A": Pass through the throttle cable inside of pin.
3. Handlebar	"B": Pass through the throttle cable inside of brake hose.
4. Pin	

Diagnostic Information and Procedures

Engine Mechanical Symptom Diagnosis

B831G21404001

Refer to “Engine Symptom Diagnosis in Section 1A (Page 1A-8)”.

Compression Pressure Check

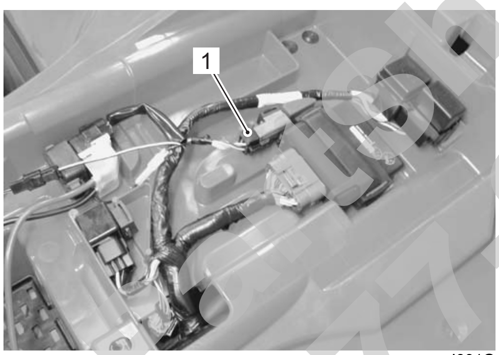
B831G21404002

The compression pressure reading of a cylinder is a good indicator of its internal condition.
Periodic maintenance records kept at your dealership should include compression readings for each maintenance service.

NOTE

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

1) Warm up the engine.
2) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
3) Disconnect the fuel pump relay coupler (1).



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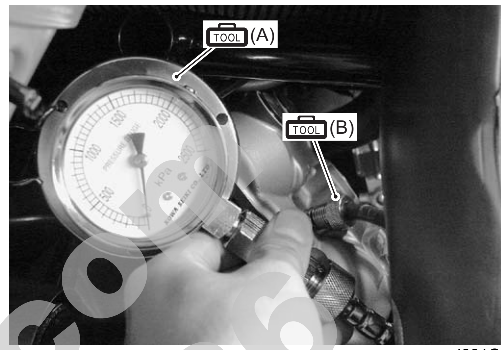
4) Remove the spark plug. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)”.
5) Install the compression gauge and adaptor in the spark plug hole. Make sure that the connection is tight.

Special tool
TOOL (A): 09915–64512 (Compression gauge)
TOOL (B): 09915–63311 (Compression gauge attachment)



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

I831G1140005-01

7) Press the starter button and crank the engine for a few seconds. Record the maximum gauge reading as the cylinder compression.

Compression pressure specification

Standard
Approx. 1 000 kPa (10.0 kgf/cm², 142 psi) (Automatic decompression actuated)

Low compression pressure can indicate any of the following conditions:

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

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

Repair Instructions

Engine Components Removable with the Engine in Place

B831G21406001

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
Starter motor	Refer to “Starter Motor Removal and Installation in Section 1I (Page 1I-4)”.	Refer to “Starter Motor Inspection in Section 1I (Page 1I-5)”.	Refer to “Starter Motor Removal and Installation in Section 1I (Page 1I-4)”.
Air cleaner	Refer to “Air Cleaner Element Removal and Installation (Page 1D-5)”.	Refer to “Air Cleaner Element Inspection and Cleaning (Page 1D-5)”.	Refer to “Air Cleaner Element Removal and Installation (Page 1D-5)”.
Oil filter	Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.	—	Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.
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-3)”.	Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.
Throttle body	Refer to “Throttle Body Removal and Installation (Page 1D-9)”.	Refer to “Throttle Body Inspection and Cleaning (Page 1D-13)”.	Refer to “Throttle Body Removal and Installation (Page 1D-9)”.
Cylinder head	Refer to “Engine Top Side Disassembly (Page 1D-17)”.	Refer to “Cylinder Head Related Parts Inspection (Page 1D-35)”.	Refer to “Engine Top Side Assembly (Page 1D-21)”.
Cam chain tension adjuster	Refer to “Engine Top Side Disassembly (Page 1D-17)”.	Refer to “Cam Chain Tension Adjuster Inspection (Page 1D-30)”.	Refer to “Engine Top Side Assembly (Page 1D-21)”.
Spark plug	Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)”.	Refer to “Spark Plug Inspection and Cleaning in Section 1H (Page 1H-3)”.	Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)”.
Cylinder head cover	Refer to “Valve Clearance Inspection and Adjustment in Section 0B (Page 0B-4)”.	—	Refer to “Engine Top Side Assembly (Page 1D-21)”.
Camshaft	Refer to “Engine Top Side Disassembly (Page 1D-17)”.	Refer to “Camshaft Inspection (Page 1D-28)”.	Refer to “Engine Top Side Assembly (Page 1D-21)”.
Valve	Refer to “Cylinder Head Disassembly and Assembly (Page 1D-31)”.	Refer to “Cylinder Head Related Parts Inspection (Page 1D-35)”.	Refer to “Cylinder Head Disassembly and Assembly (Page 1D-31)”.
Cylinder	Refer to “Engine Top Side Disassembly (Page 1D-17)”.	Refer to “Cylinder Inspection (Page 1D-41)”.	Refer to “Engine Top Side Assembly (Page 1D-21)”.
Piston	Refer to “Engine Top Side Disassembly (Page 1D-17)”.	Refer to “Piston and Piston Ring Inspection (Page 1D-43)”.	Refer to “Engine Top Side Assembly (Page 1D-21)”.

Engine Right Side

Item	Removal	Inspection	Installation
Fixed drive face	Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.	Refer to “Movable / Fixed Drive Face Parts Inspection in Section 5A (Page 5A-15)”.	Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.
Movable drive face	Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.	Refer to “Movable / Fixed Drive Face Parts Inspection in Section 5A (Page 5A-15)”.	Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.
Clutch housing/Clutch shoe	Refer to “Clutch Shoe Removal and Installation in Section 5A (Page 5A-16)”.	Refer to “Clutch Parts Inspection in Section 5A (Page 5A-20)”.	Refer to “Clutch Shoe Removal and Installation in Section 5A (Page 5A-16)”.
Movable driven face assembly	Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.	Refer to “Movable / Fixed Driven Face Parts Inspection in Section 5A (Page 5A-15)”.	Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.
Drive V-belt	Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.	Refer to “Drive V-belt Inspection in Section 5A (Page 5A-14)”.	Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.
Gear position switch	Refer to “Gear Position (GP) Switch Removal and Installation in Section 3C (Page 3C-13)”.	Refer to “Gear Position Switch Inspection in Section 1I (Page 1I-9)”.	Refer to “Gear Position (GP) Switch Removal and Installation in Section 3C (Page 3C-13)”.

Engine Left Side

Item	Removal	inspection	Installation
Generator	Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.	Refer to “Generator Inspection in Section 1J (Page 1J-3)”.	Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.
Starter clutch	Refer to “Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)”.	Refer to “Starter Related Parts Inspection in Section 1I (Page 1I-12)”.	Refer to “Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)”.
Starter idle gear	Refer to “Engine Bottom Side Disassembly (Page 1D-45)”.	—	Refer to “Engine Bottom Side Assembly (Page 1D-51)”.
Starter torque limiter	Refer to “Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)”.	Refer to “Starter Related Parts Inspection in Section 1I (Page 1I-12)”.	Refer to “Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)”.
Balancer driven gear	Refer to “Engine Bottom Side Disassembly (Page 1D-45)”.	—	Refer to “Engine Bottom Side Assembly (Page 1D-51)”.
Oil pump driven gear	Refer to “Oil Pump Removal and Installation in Section 1E (Page 1E-5)”.	—	Refer to “Oil Pump Removal and Installation in Section 1E (Page 1E-5)”.
Oil pump	Refer to “Oil Pump Removal and Installation in Section 1E (Page 1E-5)”.	Refer to “Oil Pump Inspection in Section 1E (Page 1E-7)”.	Refer to “Oil Pump Removal and Installation in Section 1E (Page 1E-5)”.
CKP sensor	Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.	Refer to “CKP Sensor Inspection in Section 1H (Page 1H-5)”.	Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.
Water pump	Refer to “Water Pump Removal and Installation in Section 1F (Page 1F-13)”.	Refer to “Water Pump Related Parts Inspection in Section 1F (Page 1F-18)”.	Refer to “Water Pump Removal and Installation in Section 1F (Page 1F-13)”.

Air Cleaner Element Removal and Installation

B831G21406002

Removal

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the air cleaner box cover (1).

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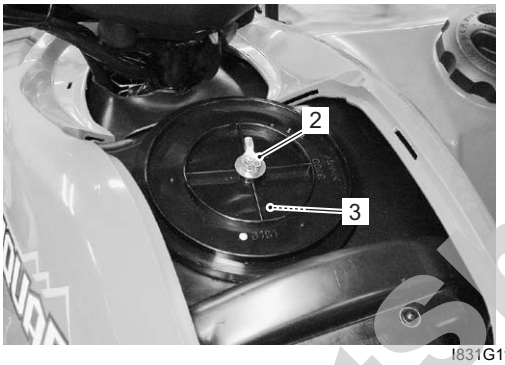
3) Remove the air cleaner element bolt (2).
4) Remove the air cleaner element (3).



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Installation

Installation in the reverse order of removal.

Air Cleaner Element Inspection and Cleaning

B831G21406003

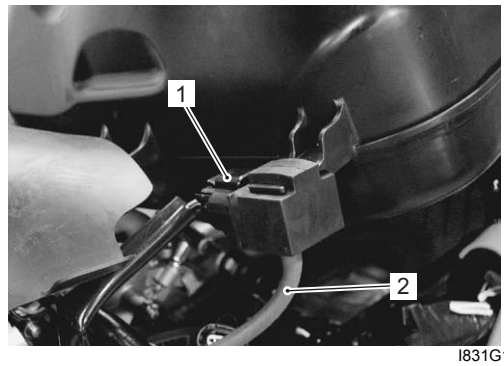
Refer to “Air Cleaner Element Inspection and Cleaning in Section 0B (Page 0B-3)”.

Air Cleaner Box Removal and Installation

B831G21406004

Removal

1) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the IAP sensor lead wire coupler (1) and vacuum hose (2).



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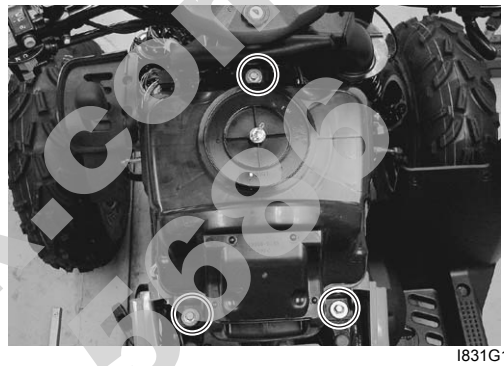
3) Remove the air cleaner box mounting bolts.



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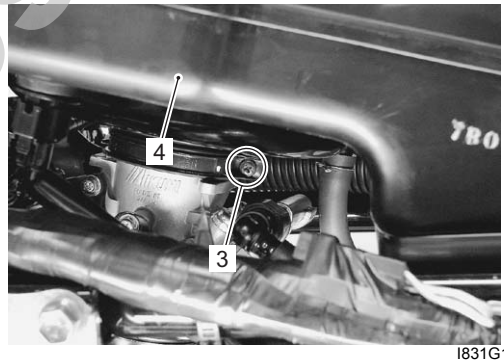
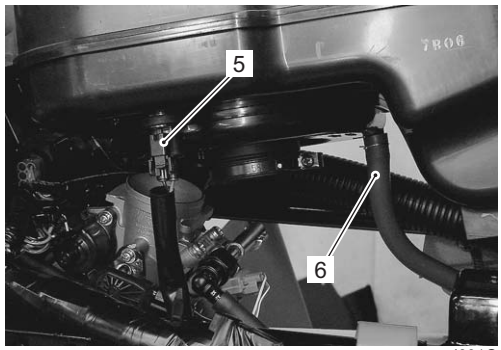
4) Loosen the throttle body clamp screw (3) and remove the air cleaner box (4).



I831G1140013-01

5) Remove the IAT sensor coupler (5) and PCV hose (6).



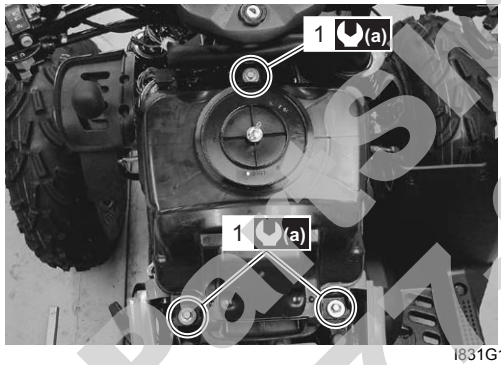
I831G1140014-01

Installation

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

- Install the air cleaner box (1) and tighten the throttle body clamp screw. Refer to “Throttle Body Construction (Page 1D-8)”.
- Tighten the air cleaner box mounting bolts to the specified torque.

  Tightening torque
  Air cleaner box mounting bolt (a): 4.5 N·m (0.45 kgf-m, 3.0 lb-ft)



I831G1140015-02

- Install the removed parts.

Throttle Cable Removal and Installation

B831G21406005

Removal

1) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Remove the right handlebar switch box. Refer to “Handlebars Removal and Installation in Section 6B (Page 6B-3)”.
3) Remove the throttle cable as shown in the cable routing diagram. Refer to “Throttle Cable Routing Diagram (Page 1D-1)”.

Installation

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

- Install the throttle cable as shown in the cable routing diagram. Refer to “Throttle Cable Routing Diagram (Page 1D-1)”.
- Check the throttle cable play and proper operation.

Throttle Cable Inspection

B831G21406006

Check that the throttle lever moves smoothly from full open to full close. If it does not move smoothly, lubricate the throttle cable.

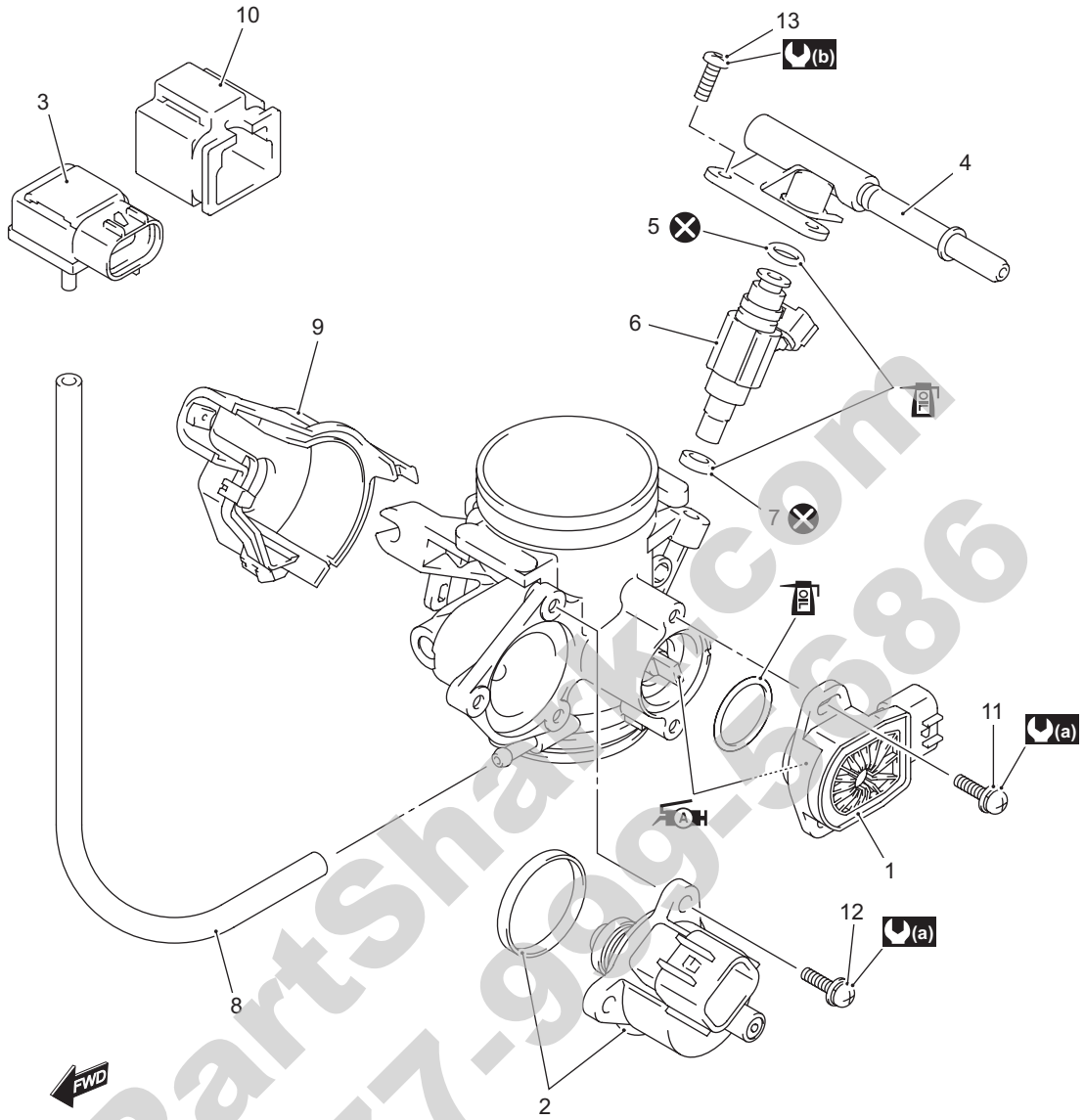
Throttle Cable Play Inspection and Adjustment

B831G21406007

Refer to “Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-15)”.

Throttle Body Components

B831G21406008

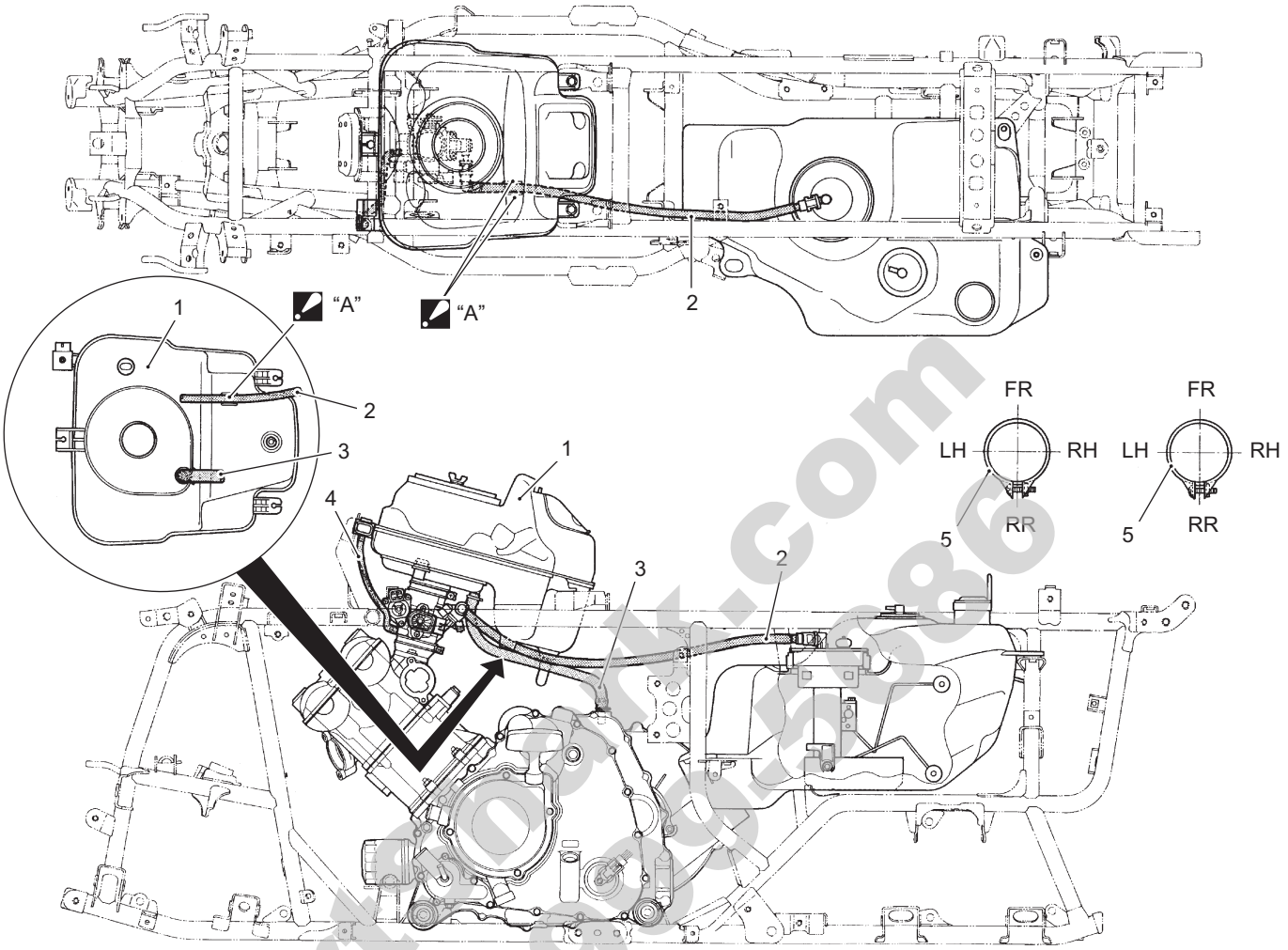


I831G1140016-05

1. TP sensor	6. Fuel injector	11. TP sensor mounting screw	: Apply grease.
2. ISC valve	7. Cushion seal	12. ISC valve mounting screw	: Apply engine oil.
3. IAP sensor	8. Vacuum hose	13. Fuel delivery pipe mounting screw	: Do not reuse.
4. Fuel delivery pipe	9. Throttle linkage cover	(a) : 2 N·m (0.2 kgf-m, 1.5 lb-ft)	
5. O-ring	10. IAP sensor cover	(b) : 5 N·m (0.5 kgf-m, 3.5 lb-ft)	

Throttle Body Construction

B831G21406009



I831G1140018-01

1. Air cleaner box	4. IAP sensor hose
2. Fuel hose	5. Clamp
3. PCV hose	"A": Pass through the fuel hose between air cleaner guide ribs.

Throttle Body Removal and Installation

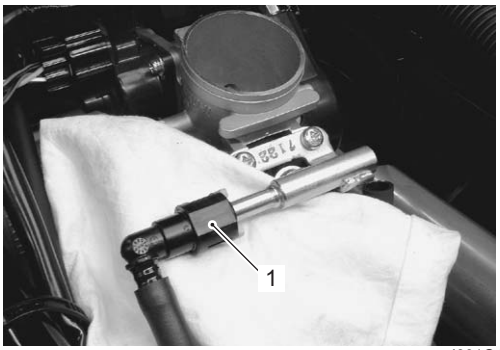
B831G21406010

Removal

1) Remove the air cleaner box. Refer to "Air Cleaner Box Removal and Installation (Page 1D-5)".
2) Place a rug under the fuel feed hose (1) and disconnect the fuel feed hose (1) from the fuel delivery pipe.

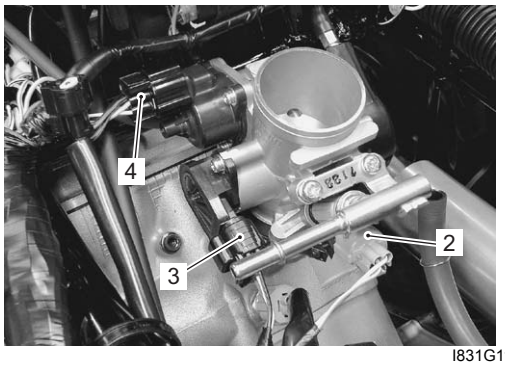
⚠ WARNING

Gasoline is highly flammable and explosive. Keep heat, spark and flame away.



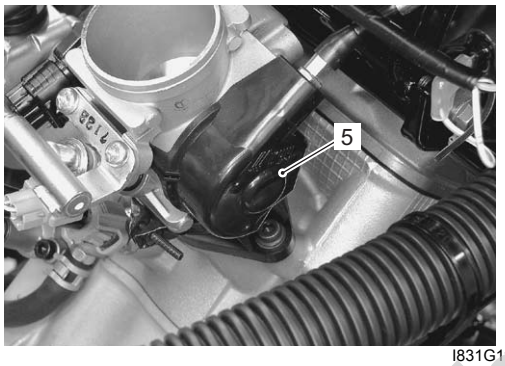
I831G1140019-01

3) Disconnect the fuel injector coupler (2) and TP/IAP/IAT sensor coupler (3).
4) Disconnect the ISC valve coupler (4).



I831G1140020-01

5) Remove the throttle cable cover (5).

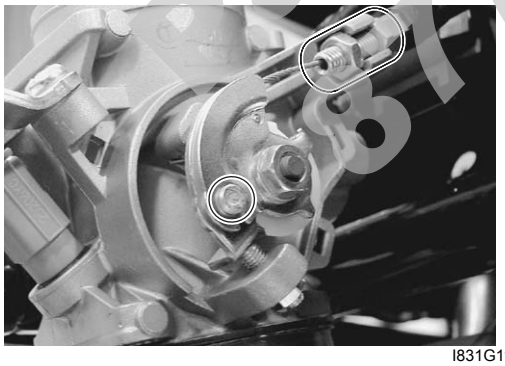


I831G1140021-01

6) Disconnect the throttle cable.

⚠ CAUTION

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



I831G1140025-02

7) Loosen the throttle body clamp screw and remove the throttle body assembly.

I831G1140022-01

Installation

NOTE

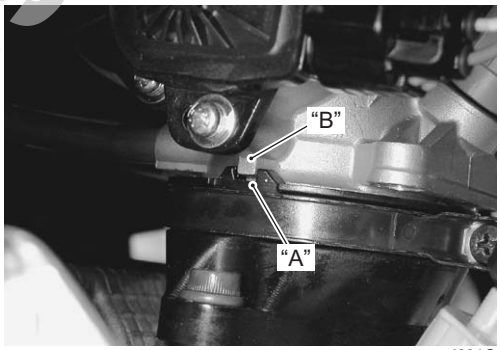
When replacing the throttle body, turn the ignition switch ON and OFF.

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

- Install the throttle body.

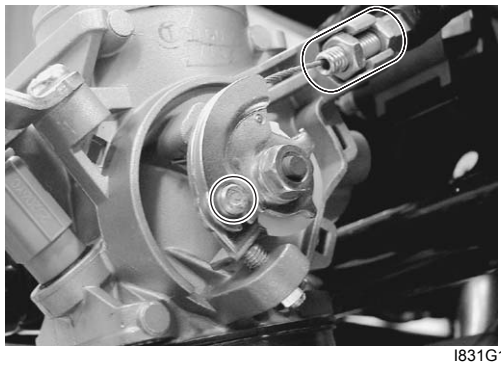
NOTE

When installing the throttle body, fit the concave part "A" of the intake pipe onto the convex part "B" of the throttle body.



I831G1140026-01

- Connect the throttle cable.



I831G1140027-01

- Tighten the throttle body clamp screws. Refer to “Throttle Body Construction (Page 1D-8)”.

I831G1140028-01

- After installed throttle cable, adjust the throttle cable play. Refer to “Throttle Cable Play Inspection and Adjustment in Section 0B (Page 0B-15)”.

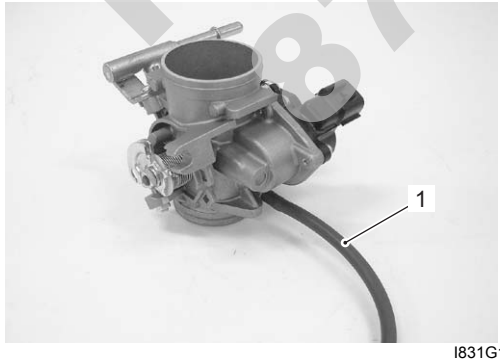
Throttle Body Disassembly and Assembly

B831G21406011

Refer to “Throttle Body Removal and Installation (Page 1D-9)”.

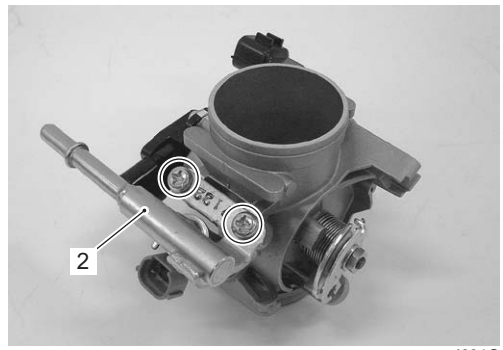
Disassembly

1) Disconnect the vacuum hose (1).



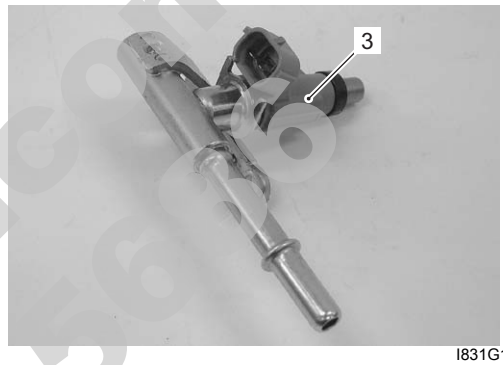
I831G1140030-01

2) Remove the fuel delivery pipe assembly (2) by removing its mounting screws.



I831G1140031-01

3) Remove the fuel injector (3).



I831G1140033-01

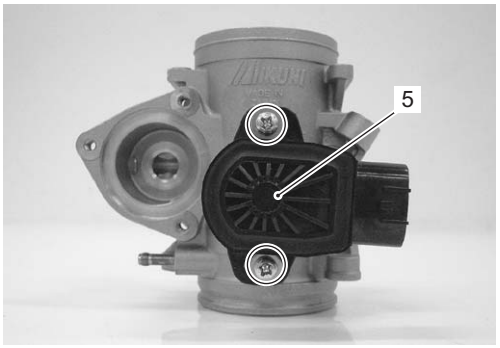
4) Remove the ISC valve (4).

I831G1140034-01

5) Remove the TP sensor (5).

NOTE

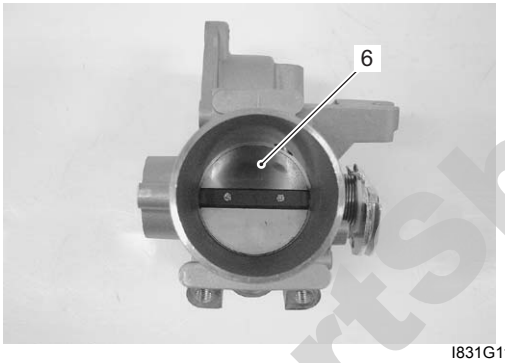
Prior to disassembly, mark the TP sensors original position with a paint or scribe for accurate reinstallation.



I831G1140035-01

⚠ CAUTION

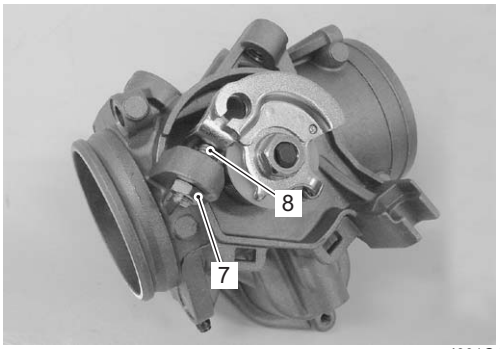
Never remove the throttle valve (6).



I831G1140038-01

⚠ CAUTION

- **Do not loosen the lock-nut (7).**
- **The fast idle screw (8) is factory-adjusted at the time of delivery and therefore avoid removing or turning it unless otherwise necessary.**



I831G1140039-01

Assembly

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

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

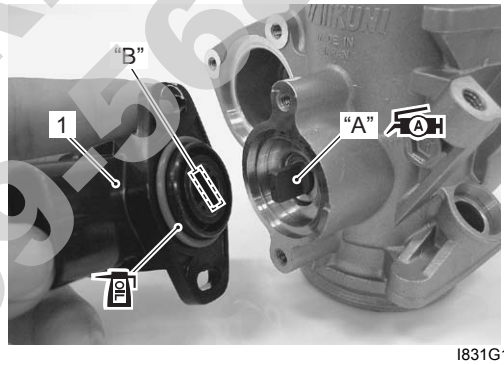
: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

Special tool

: 09930–11950 (Torx wrench)

Tightening torque

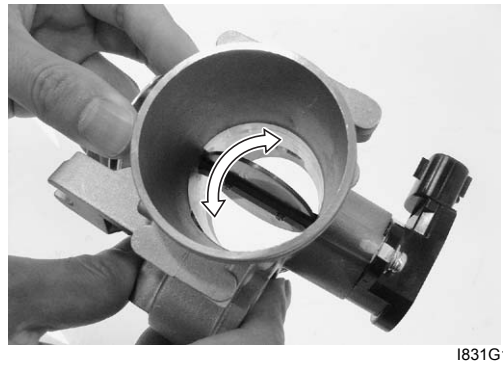
TP sensor mounting screw: 2 N·m (0.2 kgf-m, 1.5 lb-ft)



I831G1140040-01

NOTE

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



I831G1140042-01

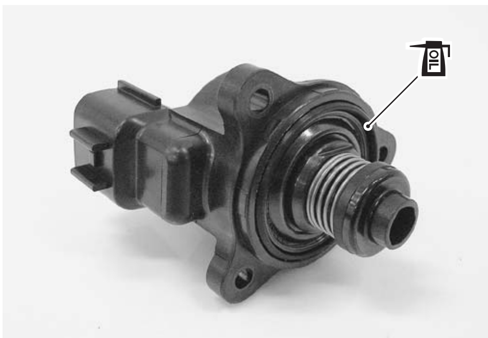
- Apply a thin coat of engine oil to the O-ring and install the ISC valve assembly.

⚠ CAUTION

Replace the O-ring with a new one.

Special tool
TOOL : 09930–11950 (Torx wrench)

Tightening torque
ISC valve mounting screw (a): 2 N·m (0.2 kgf-m, 1.5 lb-ft)

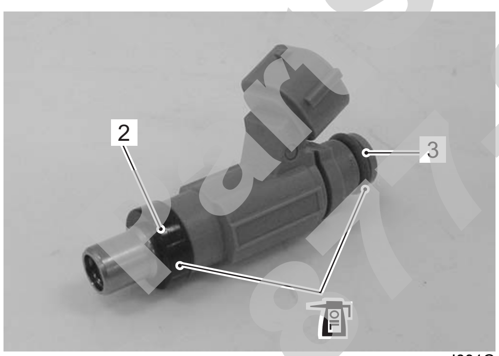


I831G1140044-01

- Apply a thin coat of engine oil to the new cushion seal (2) and the O-ring (3).

⚠ CAUTION

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

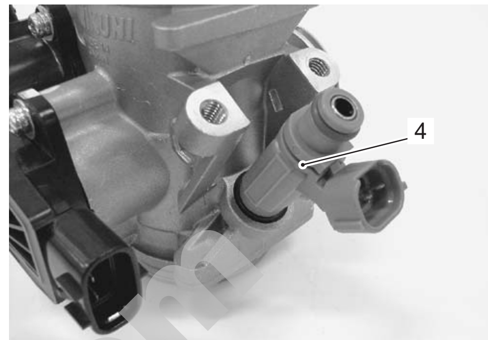


I831G1140046-01

- Install the fuel injector (4) by pushing it straight to the throttle body.

⚠ CAUTION

Never turn the injector while pushing it.



I831G1140047-01

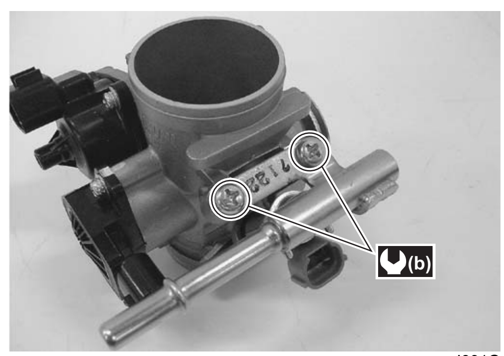
- Install the fuel delivery pipe assembly (5) to the fuel injector.

⚠ CAUTION

Never turn the fuel injector while installing them.

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

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



I831G1140048-01

Throttle Body Inspection and Cleaning

B831G21406012

Refer to “Throttle Body Disassembly and Assembly (Page 1D-10)”.

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

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
- Vacuum hose

ISC Valve Visual Inspection

Check the ISC valve for carbon deposits or other damage. If carbon is deposited, remove it with a brush and clean with a compressed air.

⚠ 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 new one.

I831G1140049-02

Engine Assembly Removal

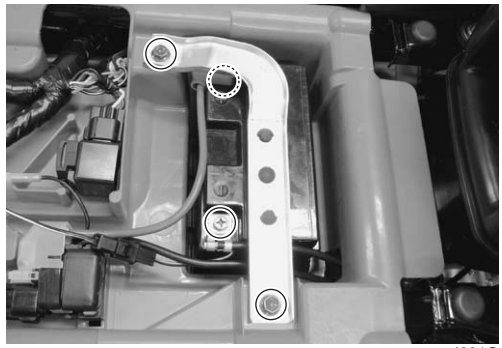
B831G21406013

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

1) Drain engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.
2) Drain engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.
3) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
4) Disconnect the battery lead wires.

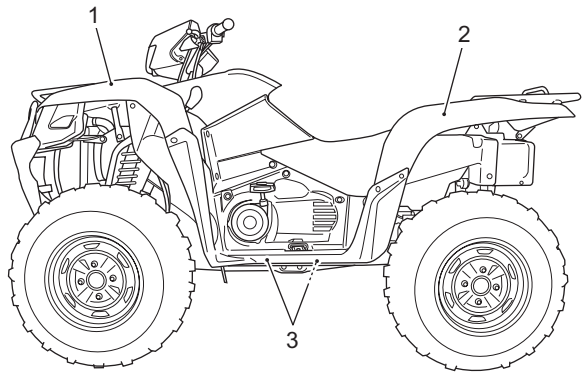
⚠ CAUTION

When disconnecting the battery lead wires, be sure to disconnect the battery (–) lead wire first.



I831G1140050-01

5) Remove the following parts from the vehicle.
   - Front fender (1). Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
   - Rear fender (2). Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
   - Mud guard (Left and Right) (3). Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.



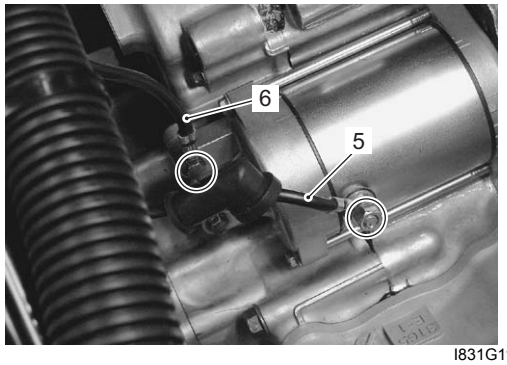
I831G1140052-02

6) Remove the shift lever assembly. Refer to “Shift Lever Assembly Removal and Installation in Section 5A (Page 5A-24)”.

7) Disconnect the spark plug cap (4).

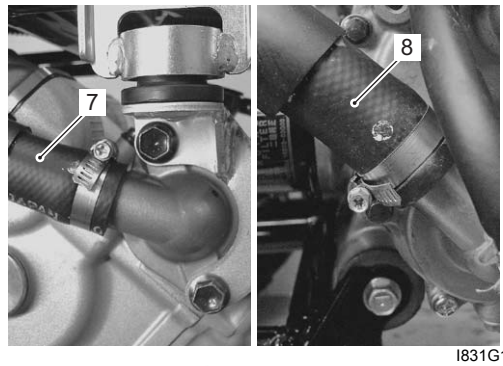
I831G1140053-01

8) Disconnect the starter motor lead wire (5) and ground lead wire (6).



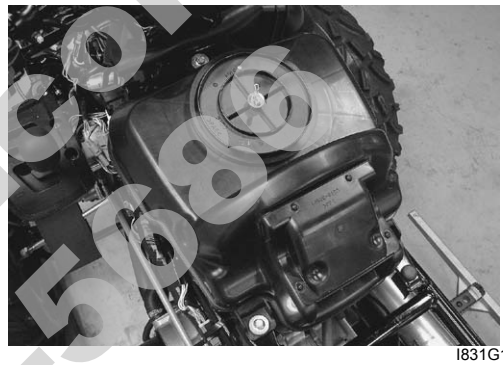
I831G1140054-01

9) Disconnect the radiator inlet hose (7) and outlet hose (8).



I831G1140055-02

10) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation (Page 1D-5)”.

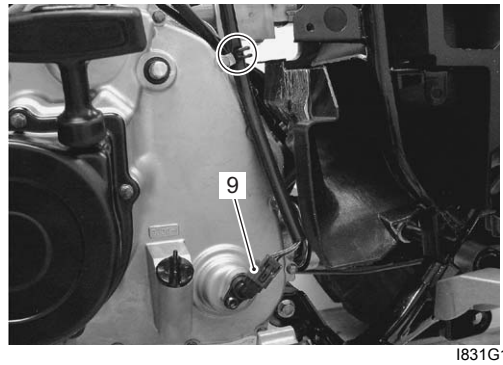


I831G1140056-01

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

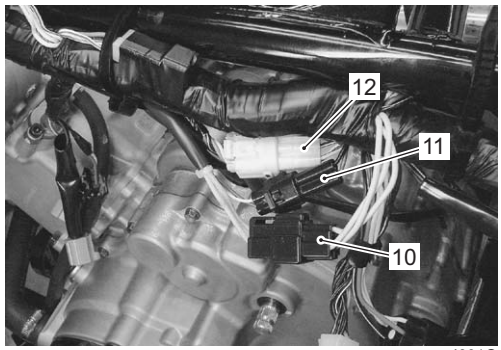
I831G1140057-01

12) Disconnect the speed sensor coupler (9) and clamp.



I831G1140058-02

13) Disconnect the generator coupler (10), CKP sensor coupler (11) and gear position sensor coupler (12).



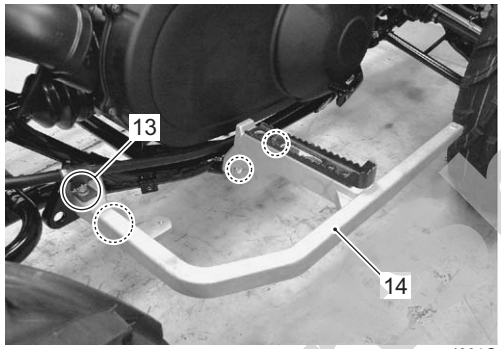
I831G1140060-02

14) Remove the V-belt cooling ducts. Refer to “V-belt Cooling Duct Removal and Installation in Section 5A (Page 5A-5)”.

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

16) Remove the rear brake cable clamp bolt (13).

17) Remove the right footrest (14).

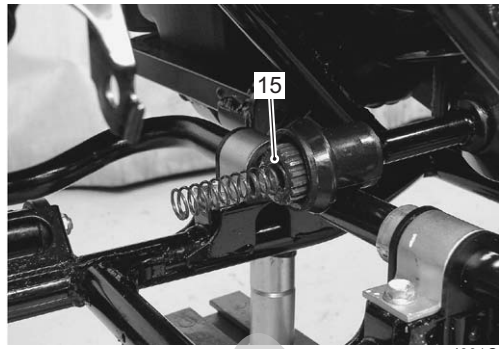


I831G1140061-02

18) Remove the rear brake pedal. Refer to “Rear Brake Pedal Removal and Installation in Section 4A (Page 4A-14)”.

I831G1140062-01

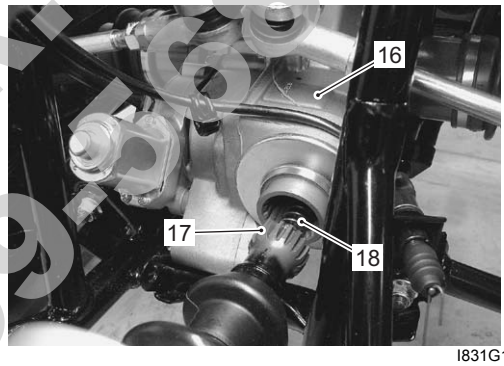
19) Remove the rear propeller shaft (15). Refer to “Rear Propeller Shaft Removal and Installation in Section 3D (Page 3D-17)”.



I831G1140063-03

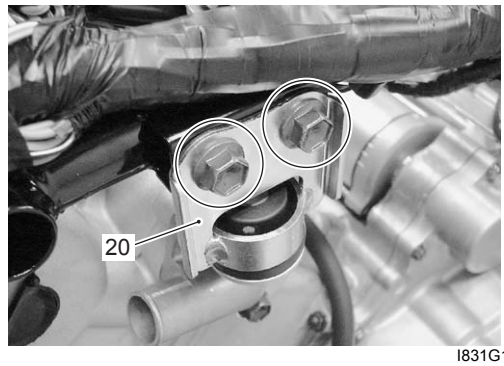
20) Remove the front differential mounting bolts and slide the front differential assembly (16) forward. Refer to “Front Drive (Differential) Assembly Removal and Installation in Section 3B (Page 3B-4)”.

21) Remove the front propeller shaft (17) and spring (18).



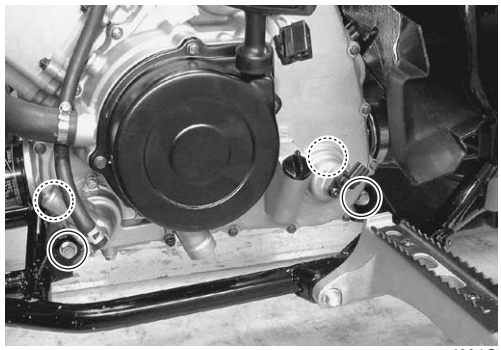
I831G1140064-02

22) Remove the dumper stopper (20) by removing the mounting bolts.



I831G1140065-02

23) Support engine with a jack and remove the engine mounting bolts and nuts.



I831G1140066-01

24) Remove the engine from the right side.

⚠ WARNING

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

Engine Assembly Installation

B831G21406014

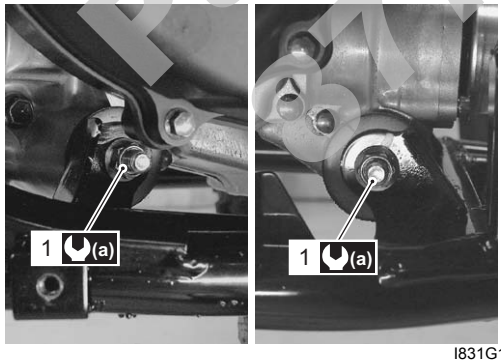
Reinstall the engine in the reverse order of engine removal. Pay attention to the following points:

- Tighten the engine mounting nuts (1) to the specified torque.

Tightening torque
Engine mounting nut (a): 60 N·m (6.0 kgf-m, 43.5 lb-ft)

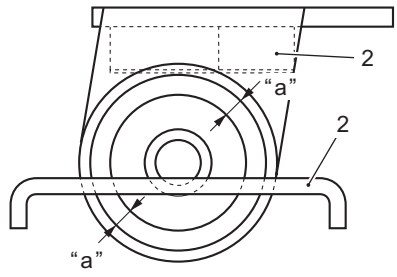
NOTE

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



I831G1140067-03

- When installing the engine mounting damper stopper (2), keep that the clearance are equal.

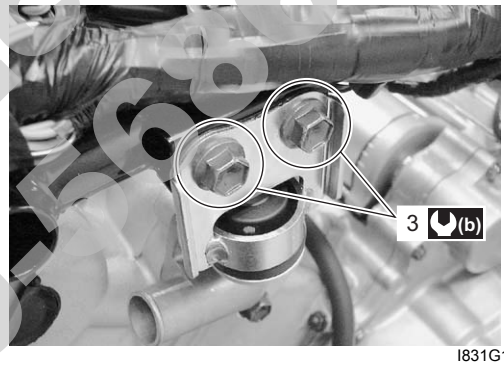


I831G1140068-03

"a": Clearance

- Tighten the engine mounting damper stopper bolts (3) to the specified torque.

Tightening torque
Engine mounting damper stopper bolt (b): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



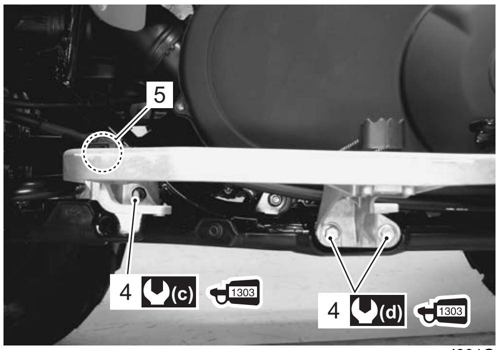
I831G1140070-05

- Install the front propeller shaft and front differential assembly. Refer to "Front Drive (Differential) Assembly Removal and Installation in Section 3B (Page 3B-4)".
- Install the rear propeller shaft and rear differential assembly. Refer to "Final Gear Assembly Removal and Installation in Section 3B (Page 3B-23)".
- Apply thread lock to the footrest bolts (4), and tighten them to the specified torque.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Footrest mounting bolt (M8) (c): 26 N·m (2.6 kgf-m, 19.0 lb-ft)
Footrest mounting bolt (M10) (d): 55 N·m (5.5 kgf-m, 40.0 lb-ft)

- Install the rear brake cable clamp (5).



I831G1140071-04

- Install the rear brake pedal. Refer to “Rear Brake Pedal Removal and Installation in Section 4A (Page 4A-14)”.
- Install the exhaust pipe assembly and muffler. Refer to “Exhaust Pipe / Muffler Removal and Installation in Section 1K (Page 1K-2)”.
- Install the shift lever assembly. Refer to “Shift Lever Assembly Removal and Installation in Section 5A (Page 5A-24)”.
- Install the throttle body. Refer to “Throttle Body Removal and Installation (Page 1D-9)”.
- After remounting the engine, route the wiring harness, cable and hoses properly. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-4)”, “Throttle Cable Routing Diagram (Page 1D-1)” and “Water Hose Routing Diagram in Section 1F (Page 1F-3)”.
- Pour engine coolant and engine oil. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)” and “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.
- 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-15)”.
  – Rear brake cable play
    Refer to “Rear Brake Pedal / Rear Brake (Parking Brake) Lever Inspection and Adjustment in Section 0B (Page 0B-19)”.
  – Parking Brake cable play
    Refer to “Rear Brake Pedal / Rear Brake (Parking Brake) Lever Inspection and Adjustment in Section 0B (Page 0B-19)”.
  – Engine oil and coolant leakage
    Refer to “Cooling Circuit Inspection in Section 1F (Page 1F-4)”.

Engine Top Side Disassembly

B831G21406015

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

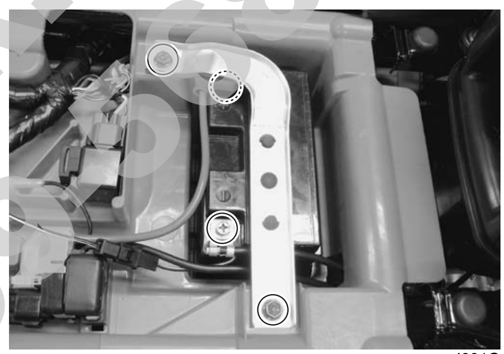
⚠ **CAUTION**

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.

1) Drain engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.
2) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
3) Remove the battery.

⚠ **CAUTION**

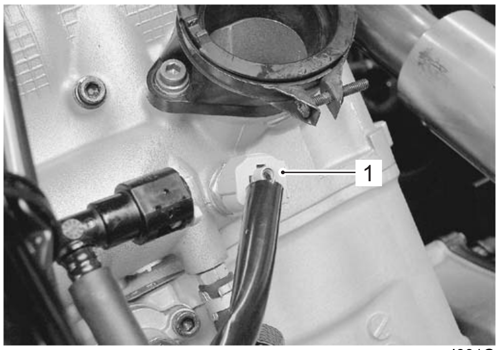
When disconnecting the battery lead wires, be sure to disconnect the battery (–) lead wire first.



I831G1140072-01

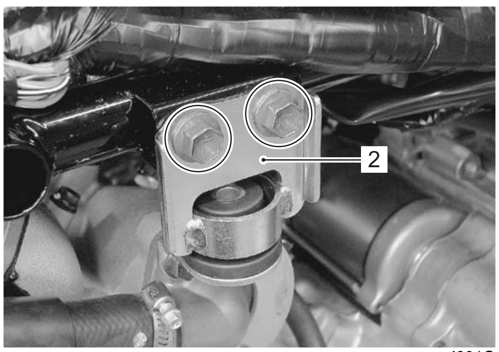
4) Remove the front fender and left mud guard. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)” and “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
5) Remove the shift lever assembly. Refer to “Shift Lever Assembly Removal and Installation in Section 5A (Page 5A-24)”.
6) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation (Page 1D-5)”.
7) Remove the throttle body. Refer to “Throttle Body Removal and Installation (Page 1D-9)”.

8) Disconnect the ECT sensor coupler (1).



I831G1140073-01

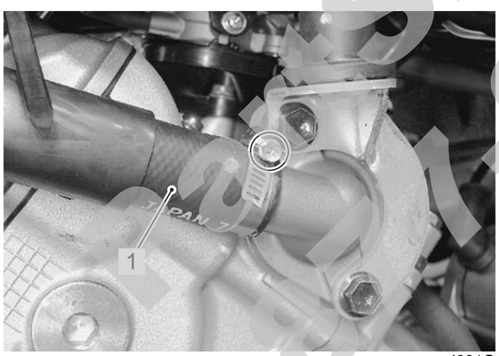
9) Remove the engine mounting dumper stopper (2).



I831G1140076-01

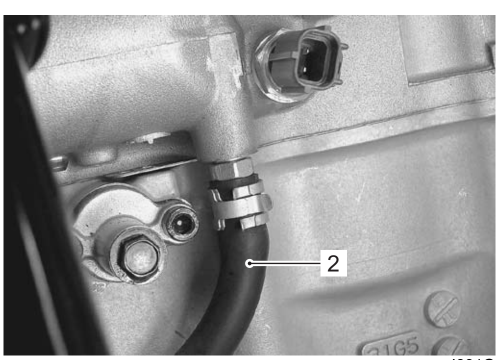
Water Hose

1) Disconnect the radiator inlet hose (1) of the thermostat.



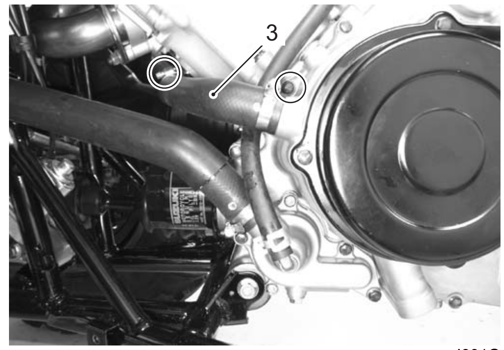
I831G1140079-01

2) Disconnect the water bypass hose (2) of the cylinder head side.



I831G1140080-03

3) Remove the water pump outlet hose (3).



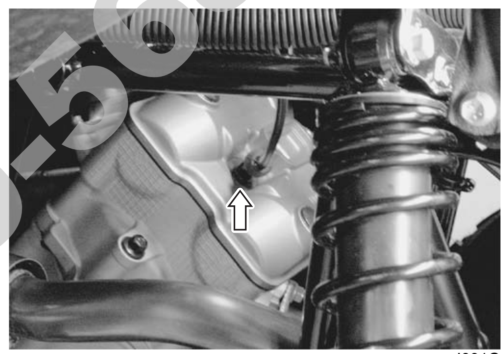
I831G1140081-03

Exhaust Pipe

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

Spark Plug Cap / Spark Plug

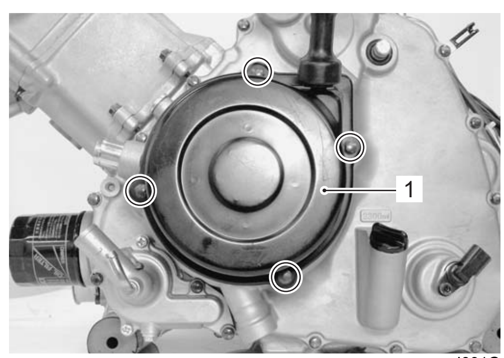
Remove the spark plug cap and spark plug. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)”.



I831G1140082-01

Recoil Starter

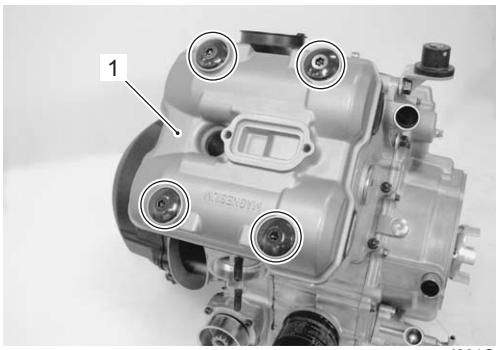
Remove the recoil starter (1) by removing the bolts.



I831G1140083-01

Cylinder Head Cover

Remove the cylinder head cover (1) and its gasket.



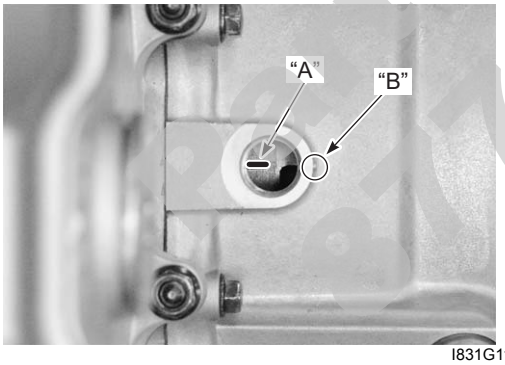
I831G1140084-02

Cam Shaft

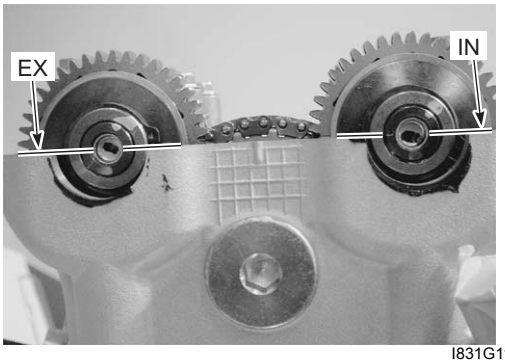
1) Remove the valve timing inspection plug.

I831G1140085-02

2) Turn the crankshaft and align the match mark “A” on the crankshaft with the mark “B” of the crankcase. Also position each of the camshaft as shown.



I831G1140086-03

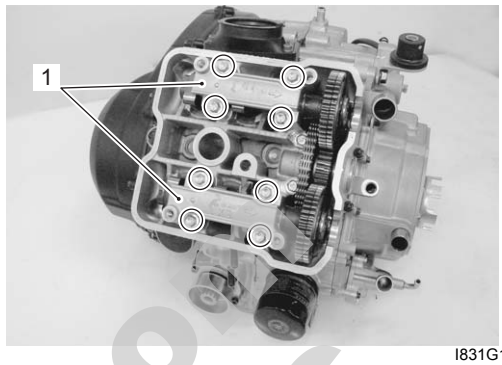


I831G1140087-03

3) Remove the camshaft journal holders (1).

⚠ CAUTION

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

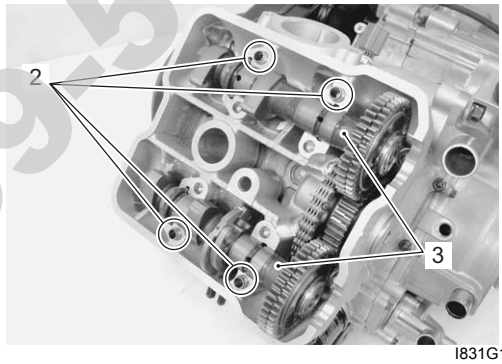


I831G1140088-01

4) Remove the dowel pins (2) and camshafts (3).

NOTE

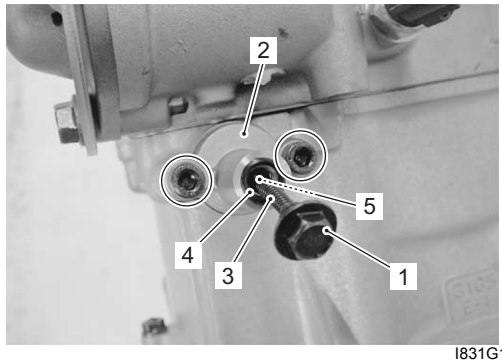
Be careful not to drop the dowel pins into the crankcase.



I831G1140089-01

Cam Chain Tension Adjuster

1) Remove the cam chain tension adjuster cap bolt (1).
2) Remove the cam chain tension adjuster (2) with the spring (3), O-ring (4) and bar (5).



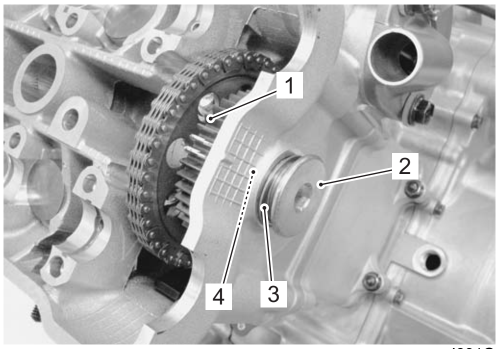
I831G1140090-02

Cylinder Head

1) Remove the cam drive idle gear/sprocket (1) by removing its shaft (2) with the idle shaft gasket (3) and cam chain idle shim (4).

NOTE

Be careful not to drop the cam chain idle shim (4) into the crankcase.

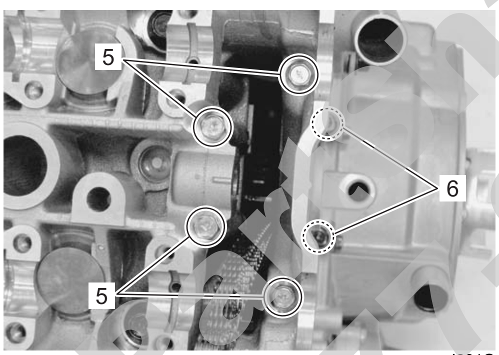


I831G1140091-01

2) Remove the cylinder head bolts (M6) (5).

NOTE

Sightly loosen the cylinder nuts (6) to facilitate later disassembly.



I831G1140186-01

3) Remove the cylinder head bolts (M10) and washers.

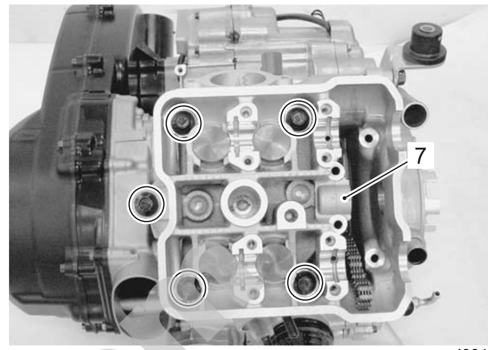
NOTE

When loosening the cylinder head bolts, loosen each bolt little by little diagonally.

4) Remove the cylinder head (7).

NOTE

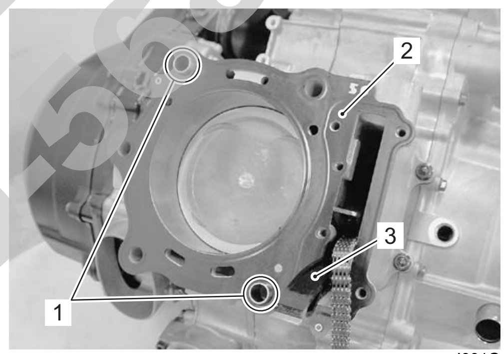
If the cylinder head does not come off easily, lightly tap using a plastic hammer.



I831G1140093-01

Cylinder

1) Remove the dowel pins (1) and gasket (2).
2) Remove the cam chain guide (3).

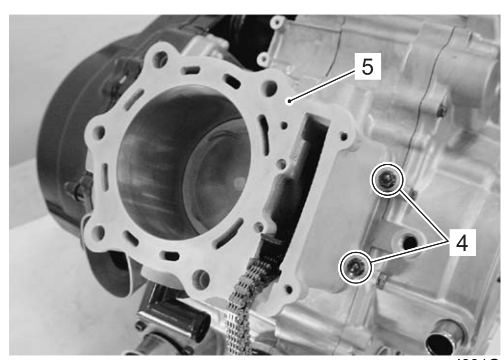


I831G1140096-01

3) Remove the cylinder (5) by removing the cylinder nuts (4).

NOTE

If the cylinder does not come off easily, lightly top using a plastic hammer.

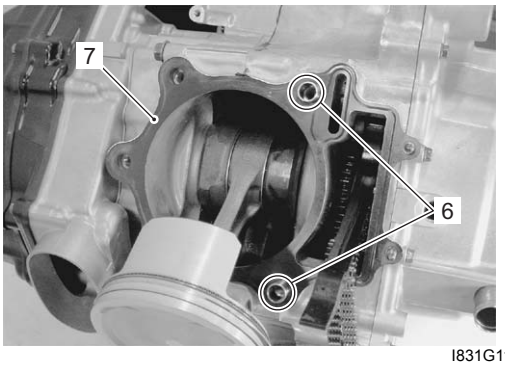


I831G1140097-01

4) Remove the dowel pins (6) and gasket (7).

NOTE

Be careful not to drop the dowel pins (6) into the crankcase.



I831G1140098-01

Piston

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).

I831G1140103-01

3) Draw out the piston pin (2) and remove the piston (3).

I831G1140104-01

Engine Top Side Assembly

B831G21406016

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

⚠ CAUTION

When turning the crankshaft, pull the cam chain upward, or the chain will be caught between the crankcase and the cam drive sprocket.

Piston

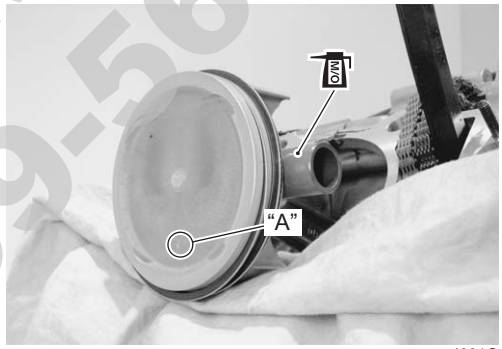
- When installing the piston pin, apply a light coat molybdenum oil solution onto piston pin.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

- Install the piston and piston pin.

NOTE

When installing the piston, the indent "A" on the piston head must be faced to exhaust side.



I831G1140105-01

- Place a clean rag over the cylinder base so as not to drop the piston pin circlip (1) into the crankcase.
- Install the piston pin circlip (1).

⚠ CAUTION

Use new piston pin circlip (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.

I831G1140106-02

- Apply molybdenum oil solution to the sliding surface of the piston.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

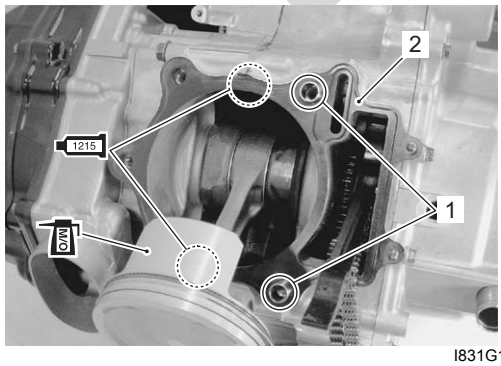
- Apply bond lightly to the mating surfaces of crankcases.

1215 : Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)

- Fit the dowel pins (1) and the new gasket (2).

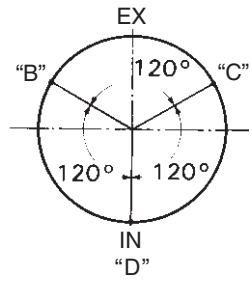
⚠ CAUTION

Replace the cylinder gasket (2) with a new one.



I831G1140108-03

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



I718H1140051-01

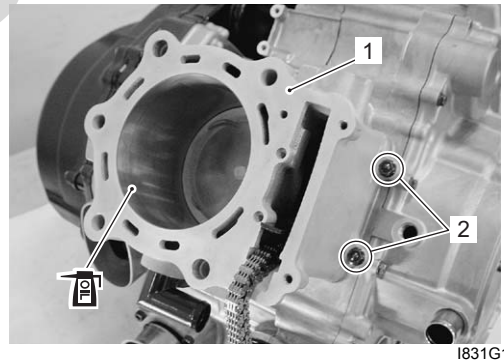
"B":	2nd ring and lower side rail
"C":	Upper side rail
"D":	1st ring and spacer

Cylinder

- Insert the piston into the cylinder (1).
- Temporarily tighten the cylinder base nuts (2).
- Apply engine oil to sliding surface of the cylinder.

⚠ CAUTION

When installing the cylinder, pull the cam chain upward, or the chain will be caught between the crankcase and cam drive sprocket.



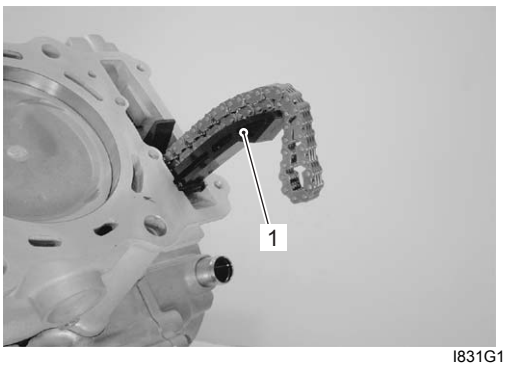
I831G1140109-02

Cam Chain Guide

- Install the cam chain guide (1).

⚠ CAUTION

Be sure that the cam chain guide (1) is installed properly.



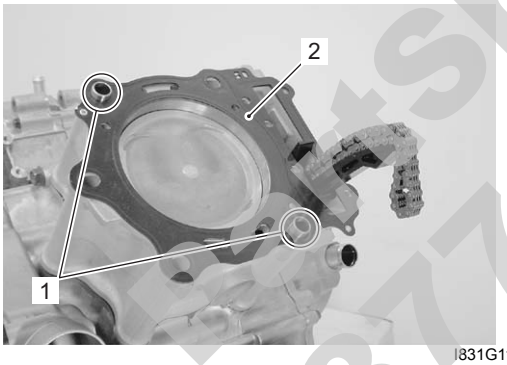
I831G1140110-01

Cylinder Head

- Fit the dowel pins (1) and new cylinder head gasket (2).

⚠ CAUTION

Replace the cylinder head gasket (2) with a new one.

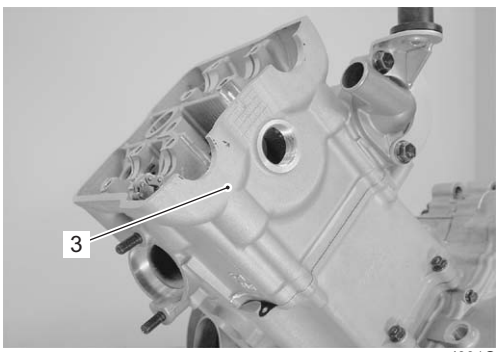


I831G1140111-02

- Place the cylinder head (3) on the cylinder.

NOTE

When installing the cylinder head (3), keep the cam chain taut.



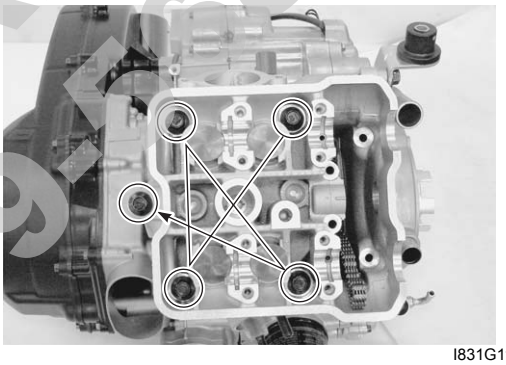
I831G1140112-01

- Apply the engine oil to the threads and both sides of washers.

I831G1140113-01

- Tighten the cylinder head bolts to the specified two-step torque with a torque wrench sequentially and diagonally.

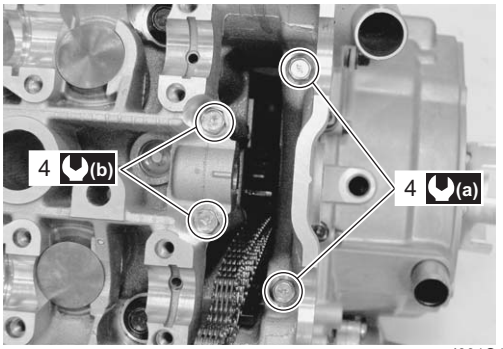
Tightening torque
Cylinder head bolt (L: 200) (Initial): 25 N·m (2.5 kgf-m, 18.0 lb-ft)
Cylinder head bolt (L: 200) (Final): 37 N·m (3.7 kgf-m, 27.0 lb-ft)



I831G1140114-02

- After firmly tightening the cylinder head bolts (4), install the cylinder head bolts.

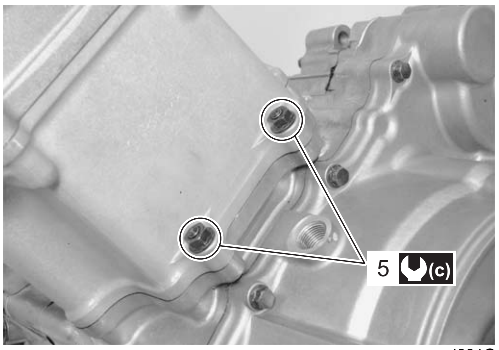
Tightening torque
Cylinder head bolt (L: 70) (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)
Cylinder head bolt (L: 100) (b): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I831G1140115-02

- Tighten the cylinder base nuts (5) to the specified torque.

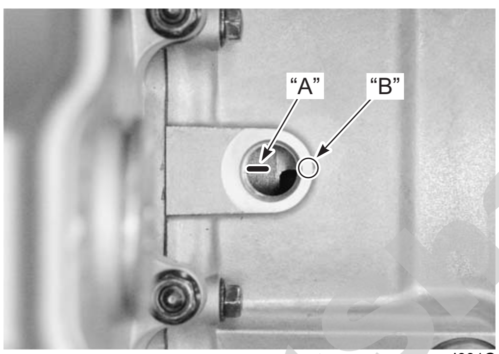
  Tightening torque
  Cylinder base nut (c): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I831G1140116-02

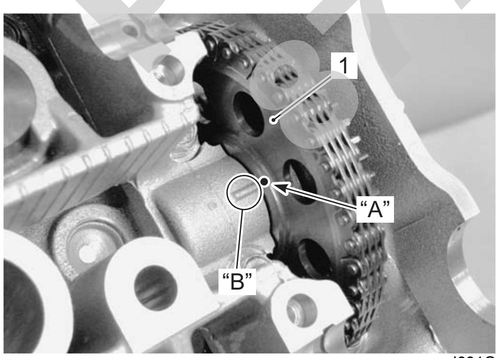
Cam Drive Idle Gear / Sprocket

- Align the match mark “A” on the generator rotor with the mark “B” on the crankcase.



I831G1140117-02

- Install the cam drive idle gear/sprocket (1) onto the cylinder head and cam chain on it. When installing the cam drive idle gear/sprocket, align the punched mark “A” on the cam drive gear/sprocket (1) with the embossed line “B” on the cylinder head.

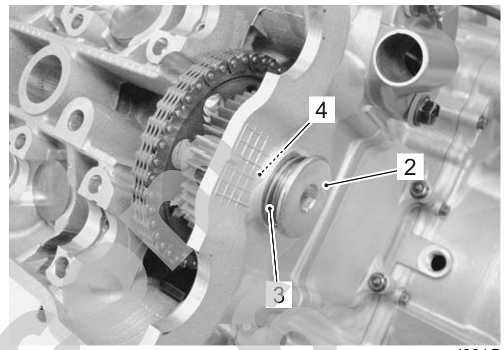


I831G1140118-01

- Install the cam drive idle gear/sprocket shaft (2), copper washer (3) and shim (4).

⚠ CAUTION

When checking the positions, remove the cam chain slack at the cam chain guide side by holding the cam drive idle gear/sprocket by hand.



I831G1140119-01

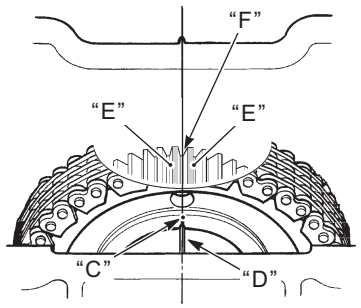
NOTE

Due to special valve train mechanism, aligning of the three elements; the punched mark “C”, embossed line “D” and the gear tooth root on the cam drive idle gear/ sprocket; can occur once every other rotation of crankshaft.

⚠ CAUTION

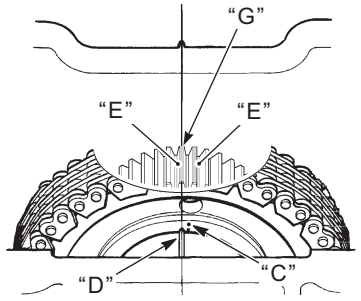
If the punched mark “C” does not align the embossed line “D”, turn the crankshaft 360° (1 turn) to bring the line on the generator rotor to the index mark on the crankcase again and reinstall the cam drive idle gear/ sprocket to the correct position as shown in the figure.

CORRECT



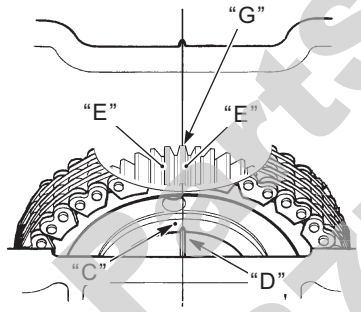
I831G1140120-03

INCORRECT



I831G1140121-04

INCORRECT

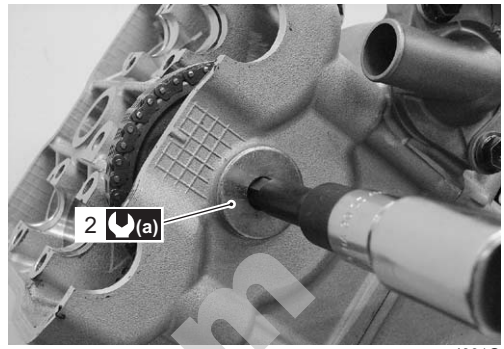


I831G1140122-03

"C": Punched mark	"F": Root of tooth
"D": Embossed line	"G": Top of tooth
"E": White paint	

- Tighten the cam drive idle gear/sprocket shaft (2) to the specified torque.

Tightening torque
Cam drive idle gear/sprocket shaft (a): 41 N·m (4.1 kgf-m, 29.5 lb-ft)



I831G1140328-01

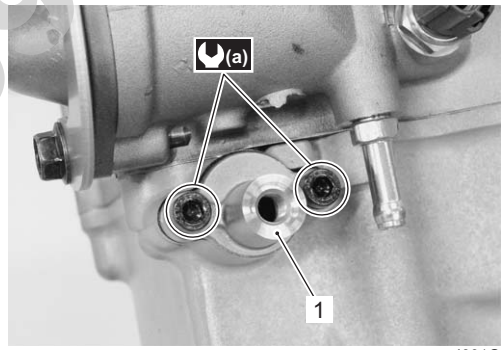
Cam Chain Tension Adjuster

- Install the cam chain tension adjuster (1) and tighten the its mounting bolts to the specified torque.

⚠ CAUTION

Use a new gasket to prevent oil leakage.

Tightening torque
Cam chain tension adjuster bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I831G1140123-01

- Install the new O-ring (2), spring (3) and bar (4).

⚠ CAUTION

Use a new O-ring to prevent oil leakage.

- Install the cam chain tension adjuster cap bolt (5).

NOTE

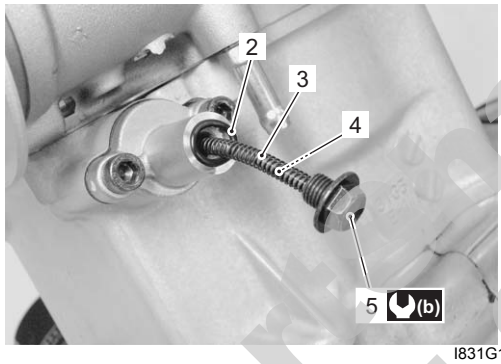
Click sound is heard when the cam chain tension adjuster cap bolt is installed.

- Tighten the cam chain tension adjuster cap bolt (5) to the specified torque.

Tightening torque
Cam chain tension adjuster cap bolt (b): 7 N·m (0.7 kgf-m, 5.0 lb-ft)

⚠ CAUTION

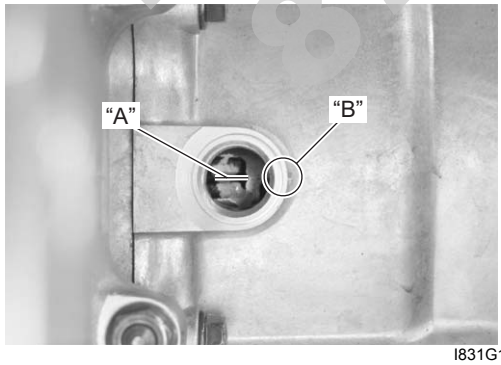
After installing the cam chain tension adjuster, check to be sure that the adjuster works properly by checking the slack of cam chain.



I831G1140124-01

Camshaft

- Align the line “A” on the generator rotor with the index mark “B” on the crankcase.

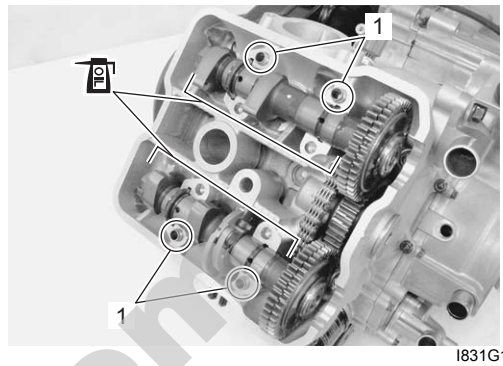


I831G1140125-01

- Install the dowel pins (1).
- The camshafts are identified by the engraved letters.
- Before replacing the camshafts on cylinder head, apply engine oil to their journals and cam faces.
- Apply engine oil to the camshaft journal holders.

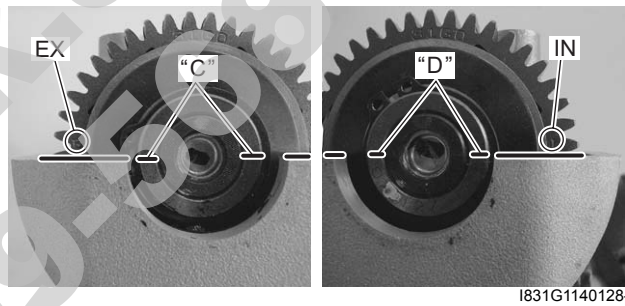
NOTE

Before installing the camshaft, check that the tappets are installed correctly.



I831G1140126-01

- Align the engraved mark “C” and “D” on the camshaft sprockets so it is parallel with the matching surface of the cylinder head cover.



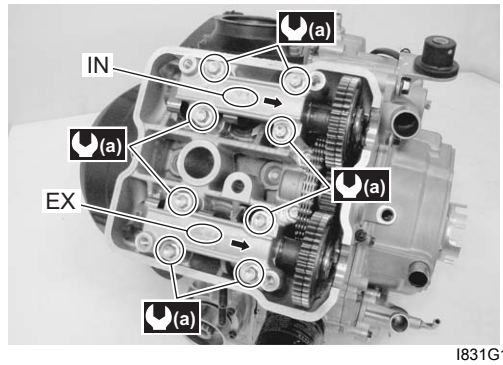
I831G1140128-05

- Tighten the journal holder bolts to the specified torque.

NOTE

- **Each camshaft journal holder is identified with an embossed letter.**
- **The arrow mark of the camshaft journals camshaft sprocket side.**

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



I831G1140127-03

- Be sure to check and adjust the valve clearance. Refer to “Valve Clearance Inspection and Adjustment in Section 0B (Page 0B-4)”.
- Before assemble the cylinder head cover, pour a small amount of engine oil in oil pocket in the cylinder head.

Cylinder Head Cover

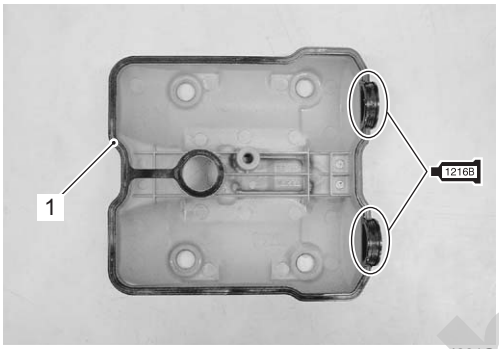
- Install a new gasket (1) to the cylinder head cover.

⚠ CAUTION

Use a new gasket (1) to prevent oil leakage.

- Apply bond to the cam end caps of the gasket as shown in the figure.

1216B : Sealant 99000–31230 (SUZUKI BOND No.1216B or equivalent)

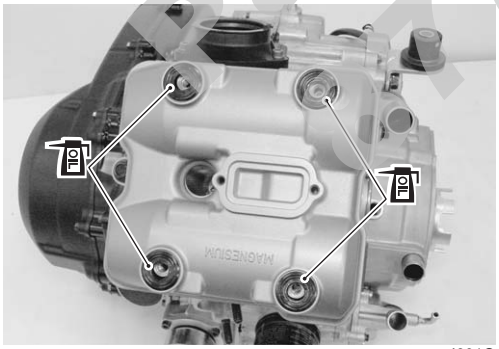


I831G1140129-01

⚠ CAUTION

Use the gaskets with new ones to prevent oil leakage.

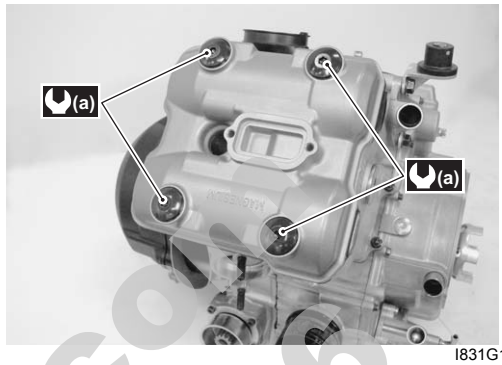
- Apply engine oil to the both sides of head cover washers.



I831G1140130-01

- Tighten the head cover bolts to the specified two-step torque with a torque wrench sequentially and diagonally.

Tightening torque
Head cover bolt (Initial) (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)
Head cover bolt (Final) (a): 14 N·m (1.4 kgf-m, 10.0 lb-ft)



I831G1140131-01

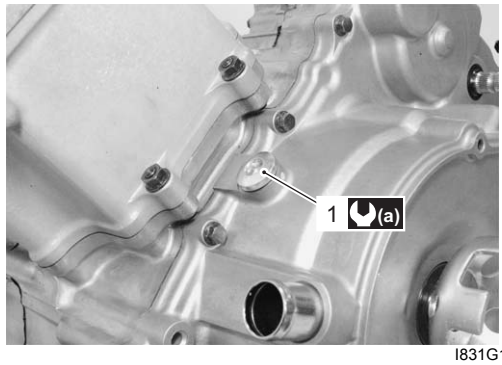
Spark plug

- Install the spark plug. Refer to “Spark Plug Cap and Spark Plug Removal and Installation in Section 1H (Page 1H-3)”.

Valve Timing Inspection Plug

- Tighten the valve timing inspection plug (1) to the specified torque.

Tightening torque
Valve timing inspection plug (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I831G1140329-01

Throttle Body

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

Valve Clearance Inspection and Adjustment

B831G21406017

Refer to “Valve Clearance Inspection and Adjustment in Section 0B (Page 0B-4)”.

Camshaft Inspection

B831G21406018

Refer to “Engine Top Side Disassembly (Page 1D-17)”.
Refer to “Engine Top Side Assembly (Page 1D-21)”.

Camshaft Identification

The exhaust camshaft has the automatic decompression (1).

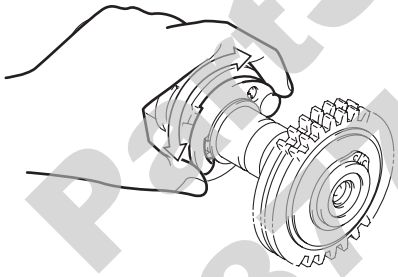
I831G1140132-03

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 camshaft/automatic decompression assembly.
It is not serviceable.



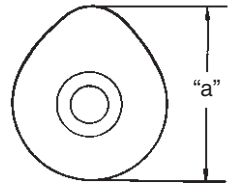
I831G1140133-01

Cam Wear

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

Special tool
TOOL : 09900–20202 (Micrometer (1/100 mm, 25 – 50 mm))

Cam height “a”
Service limit (IN.): 36.030 mm (1.4185 in)
Service limit (EX.): 35.000 mm (1.3780 in)



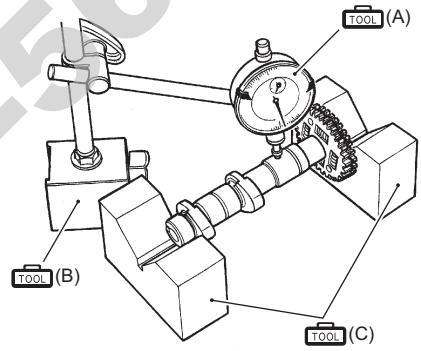
I649G1140199-02

Camshaft Runout

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

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))

Camshaft runout (IN. & EX.)
Service limit: 0.10 mm (0.004 in)



I831G1140134-01

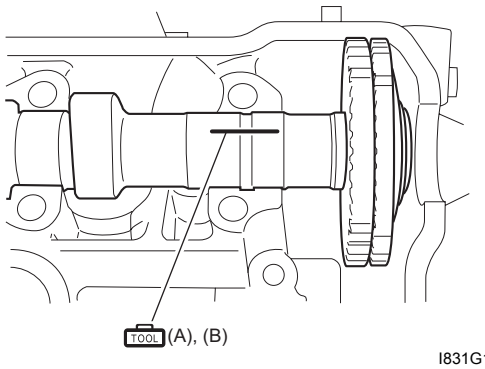
Camshaft Journal Wear

Inspect the camshaft journal wear in the following procedures:

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

2) Use the plastigauge to read the clearance at the widest portion, which is specified as follows.

Special tool
(A): 09900–22301 (Plastigauge (0.025 – 0.076 mm))
(B): 09900–22302 (Plastigauge (0.051 – 0.152 mm))



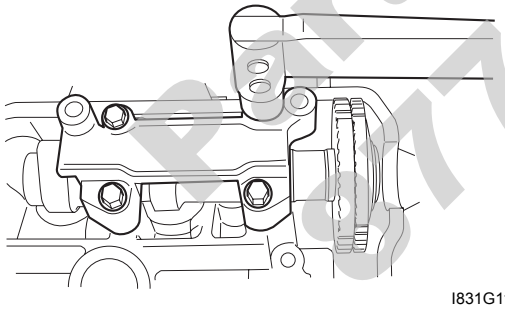
I831G1140331-01

3) Install each camshaft journal holder to its original position. Refer to “Engine Top Side Assembly (Page 1D-21)”.
4) Tighten the camshaft journal holder bolts evenly and diagonally to the specified torque. Refer to “Engine Top Side Assembly (Page 1D-21)”.

NOTE

Do not rotate the camshafts with the plastigauge in place.

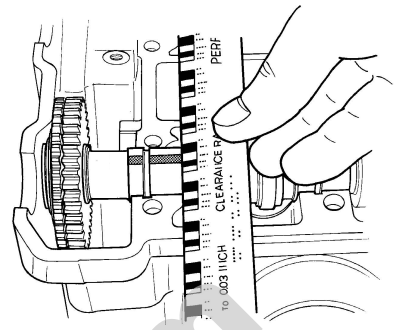
Tightening torque
Camshaft journal holder bolt: 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I831G1140332-01

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

Camshaft journal oil clearance (IN. & EX.)
Service limit: 0.150 mm (0.0059 in)



I831G1140137-01

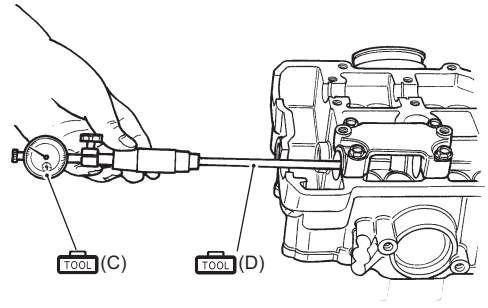
7) If the camshaft journal oil clearance exceeds the limit, measure the inside diameter of the camshaft journal holder and the outside diameter of the camshaft journal. Replace the camshaft or the cylinder head depending upon which one exceeds the specification.

Special tool
(C): 09900–20602 (Dial gauge (1/1000 mm, 1 mm))
(D): 09900–22403 (Small bore gauge (18 – 35 mm))

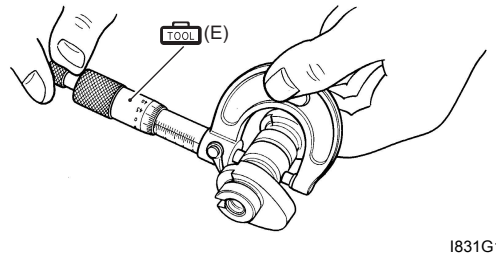
Camshaft journal holder I.D. (IN. & EX.)
Standard: 22.012 – 22.025 mm (0.8666 – 0.8671 in)

Special tool
(E): 09900–20205 (Micrometer (0 – 25 mm))

Camshaft journal O.D. (IN. & EX.)
Standard: 21.972 – 21.993 mm (0.8650 – 0.8659 in)



I831G1140138-01



I831G1140139-01

Camshaft Sprocket Inspection

B831G21406019

Inspect the camshaft sprocket in the following procedures:

1) Remove the intake and exhaust camshafts. Refer to “Engine Top Side Disassembly (Page 1D-17)”.
2) Inspect the teeth of each camshaft sprocket for wear or damage.
   If they are worn or damaged, replace the camshaft and cam chain as a set.

⚠ CAUTION

- **Do not disassemble the camshaft sprocket.**
- **The camshaft sprocket and cam shaft is available only as an assembly.**

I831G1140140-01

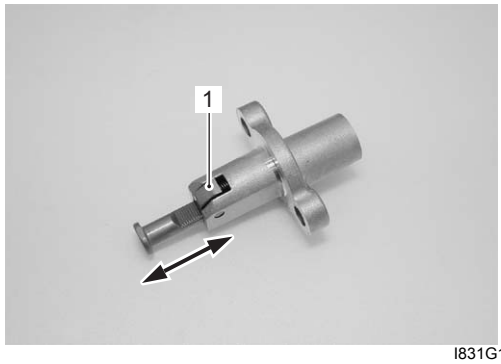
3) Install the camshafts. Refer to “Engine Top Side Assembly (Page 1D-21)”.

Cam Chain Tension Adjuster Inspection

B831G21406020

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

1) Remove the cam chain tension adjuster. Refer to “Engine Top Side Disassembly (Page 1D-17)”.
2) Check that the push rod slides smoothly when releasing stopper (1). If it does not slide smoothly, replace the cam chain tension adjuster with a new one.



I831G1140141-01

3) Install the cam chain tension adjuster. Refer to “Engine Top Side Assembly (Page 1D-21)”.

Cam Chain Guide Removal and Installation

B831G21406021

Removal

1) Remove the cylinder head. Refer to “Engine Top Side Disassembly (Page 1D-17)”.
2) Remove the cam chain guide (1).

NOTE

Be careful not to drop the chain into the crankcase.

I831G1140142-01

Installation

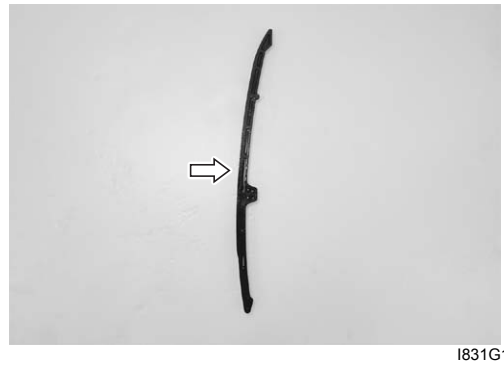
Install the cam chain guide in the reverse order of removal.

Cam Chain Guide Inspection

B831G21406022

Inspect the cam chain guide in the following procedures:

- Remove the cam chain guides. Refer to “Cam Chain Guide Removal and Installation (Page 1D-30)”.
- Check the contacting surface of the cam chain guide. If it is worn or damaged, replace it with a new one.



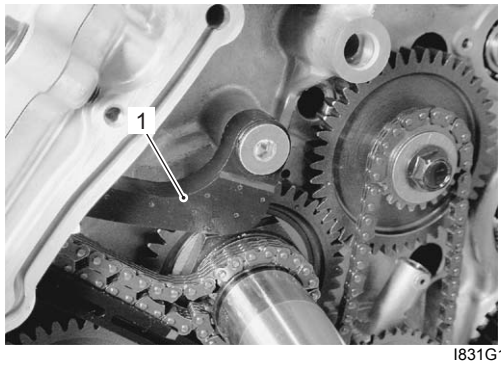
I831G1140143-01

Cam Chain Tensioner Inspection

B831G21406023

Inspect the cam chain tensioner in the following procedures:

1) Remove the cylinder head. Refer to “Engine Top Side Disassembly (Page 1D-17)”.
2) Remove the starter driven gear. Refer to “Engine Bottom Side Disassembly (Page 1D-45)”.
3) Remove the cam chain tensioner (1).



I831G1140144-02

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

I831G1140145-01

5) Install the cam chain tensioner.
6) Reinstall the starter driven gear. Refer to “Engine Bottom Side Assembly (Page 1D-51)”.
7) Reinstall the cylinder head cover. Refer to “Engine Top Side Assembly (Page 1D-21)”.
8) Reinstall the removed parts.

Cylinder Head Disassembly and Assembly

B831G21406024

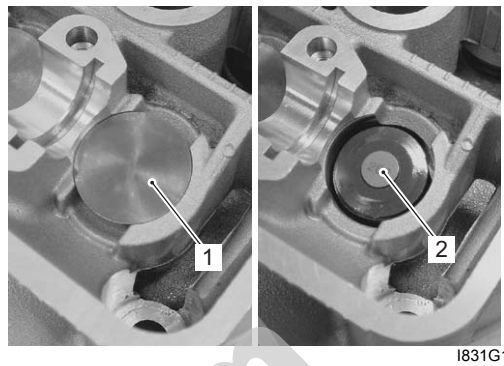
Refer to “Engine Top Side Disassembly (Page 1D-17)”.

⚠ CAUTION

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

Disassembly

1) Remove the tappet (1) and shim (2) by fingers or magnetic hand.



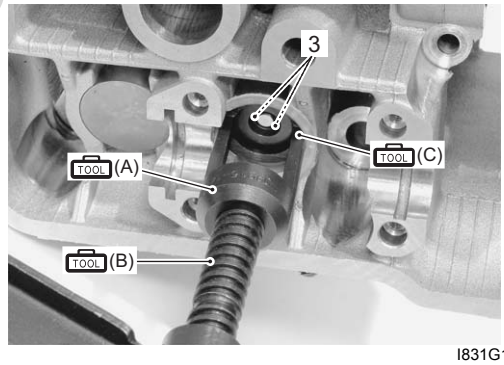
I831G1140188-02

2) Using the special tools, compress the valve spring and remove the two cotter halves (3) from the valve stem.

⚠ CAUTION

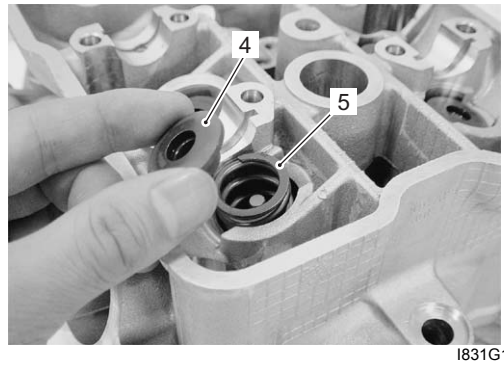
To prevent damage of the tappet sliding surface with the special tool, use the sleeve protector.

Special tool
TOOL (A): 09916–14510 (Valve spring compressor)
TOOL (B): 09916–14521 (Valve spring compressor attachment)
TOOL : 09916–84511 (Tweezers)
TOOL (C): 09919–28610 (Sleeve protector)



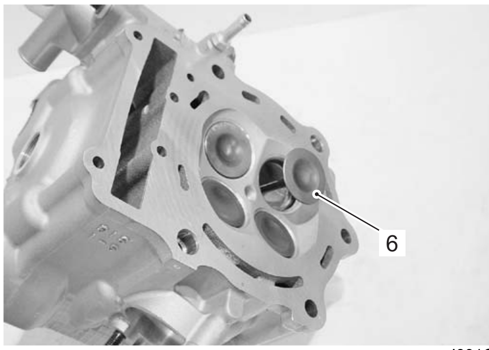
I831G1140146-02

3) Remove the valve spring retainer (4) and valve spring (5).



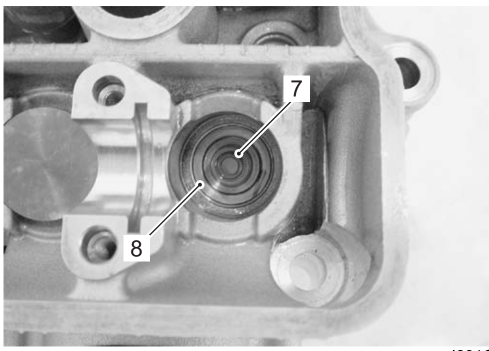
I831G1140147-01

4) Pull out the valve (6) from the combustion chamber side.



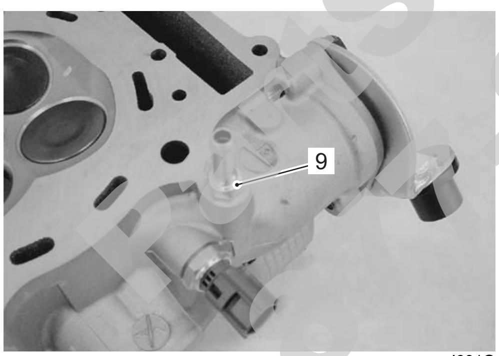
I831G1140148-01

5) Remove the oil seal (7) and spring seat (8).



I831G1140149-01

6) Remove the other valves in the same manner as described previously.
7) Remove the bypass union (9).

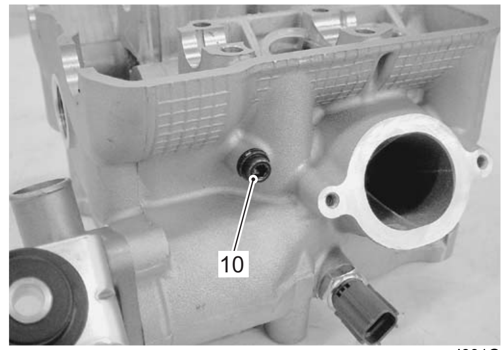


I831G1140150-01

8) Remove the intake pipe.

I831G1140151-01

9) Remove the oil gallery plug (cylinder head) (10).



I831G1140152-01

10) Remove the ECT sensor. Refer to "ECT Sensor Removal and Installation in Section 1C (Page 1C-4)".
11) Remove the thermostat. Refer to "Thermostat Removal and Installation in Section 1F (Page 1F-11)".

Assembly

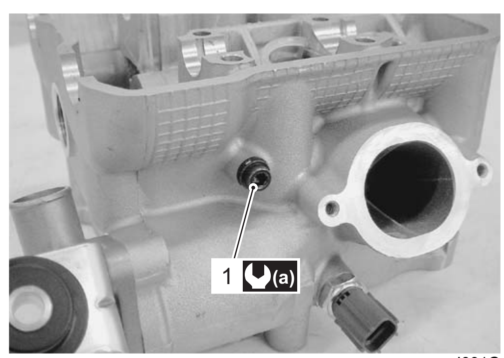
Assembly is in the reverse order of disassembly. Pay attention to the following points:

- Install the thermostat. Refer to "Thermostat Removal and Installation in Section 1F (Page 1F-11)".
- Instal the ECT sensor. Refer to "ECT Sensor Removal and Installation in Section 1C (Page 1C-4)".
- Tighten the oil gallery plug (1) (cylinder head) to the specified torque.

Tightening torque
Oil gallery plug (Cylinder head) (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)

⚠ CAUTION

Replace the gasket with new ones.



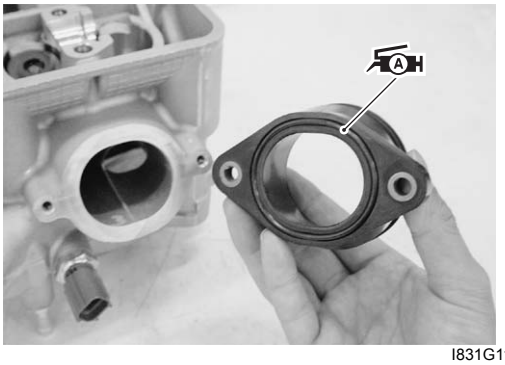
I831G1140153-02

- Apply grease to the O-ring of the intake pipe.

⚠ CAUTION

Replace the O-ring with new ones.

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



I831G1140156-01

- Apply a small quantity of thread lock to the intake pipe mounting bolts and tighten them to the specified torque.

NOTE

Make sure that the "UP" mark faces up.

Tightening torque
Intake pipe bolt (b): 9 N·m (0.9 kgf-m, 6.5 lb-ft)

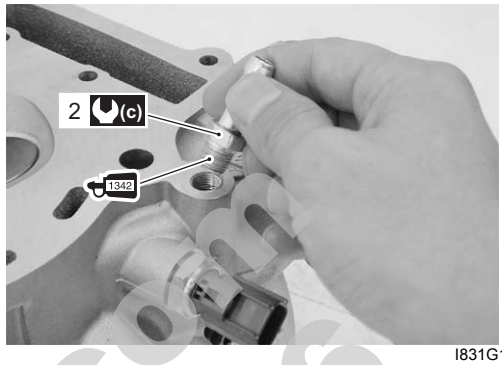
: Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)

I831G1140157-02

- Apply thread lock to the water bypass union (2) and tighten it to the specified torque.

Tightening torque
Water bypass union (c): 12 N·m (1.2 kgf-m, 8.5 lb-ft)

: Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)

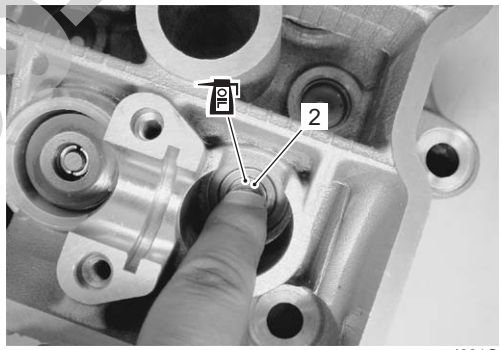


I831G1140158-04

- Install the valve spring seat.
- Apply engine oil to the oil seal (2), and press-fit it into position.

⚠ CAUTION

Do not reuse the removed oil seal.



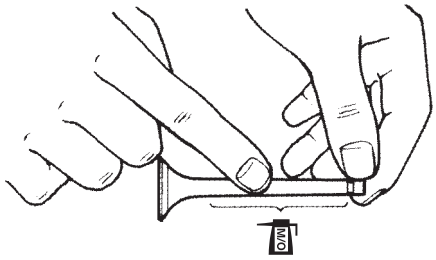
I831G1140159-05

- Insert the valve, with its stem coated with molybdenum oil all around and along the full stem length without any break.

⚠ CAUTION

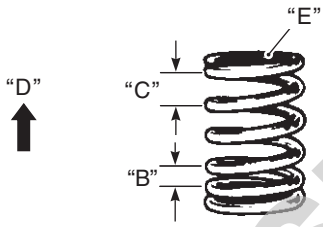
When inserting the valve, take care not to damage the lip of the oil seal.

M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I705H1140165-01

- Install the valve spring with the small-pitch portion "B" facing cylinder head.



I718H1140004-01

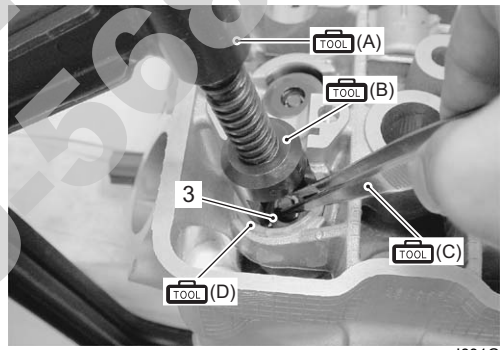
"B": Small-pitch portion	"D": UPWARD
"C": Large-pitch portion	"E": Paint

- 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 halves to wedge in between retainer and stem.

⚠ CAUTION

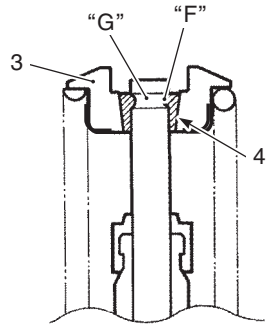
- **Be sure to restore each spring and valve to their original positions.**
- **Be careful not to damage the valve and valve stem when handling them.**
- **To prevent damage of the tappet sliding surface with the special tool, use the sleeve protector.**

Special tool
TOOL (A): 09916–14510 (Valve spring compressor)
TOOL (B): 09916–14910 (Valve spring compressor attachment)
TOOL (C): 09916–84511 (Tweezers)
TOOL (D): 09919–28610 (Sleeve protector)



I831G1140160-03

- Be sure that the rounded lip "F" of the cotter fits snugly into the groove "G" in the stem end.



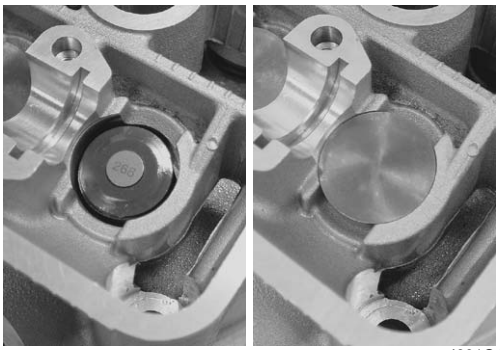
I831G1140161-02

3. Valve spring retainer	4. Cotter

- Install the other valves and springs in the same manner as described previously.
- Install the tappet shims and the tappets to their original positions.

NOTE

- **Apply engine oil to the stem end, shim and tappet before fitting them.**
- **When seating the tappet shim, be sure the figure printed surface faces the tappet.**



I831G1140162-01

Cylinder Head Related Parts Inspection

B831G21406025

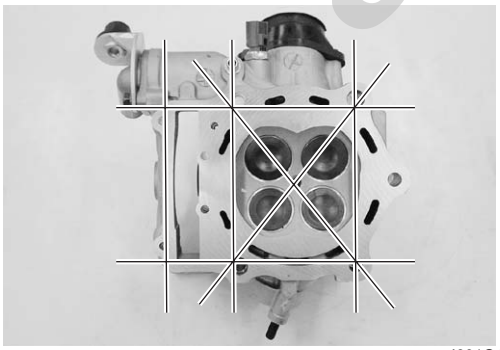
Refer to “Cylinder Head Disassembly and Assembly (Page 1D-31)”.

Cylinder Head Distortion

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

Special tool
TOOL : 09900–20803 (Thickness gauge)

Cylinder head distortion
Service limit: 0.05 mm (0.002 in)



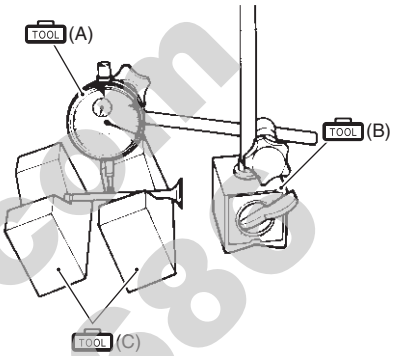
I831G1140163-01

Valve Stem Runout

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

Special tool
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))

Valve stem runout (IN. & EX.)
Service limit: 0.05 mm (0.002 in)



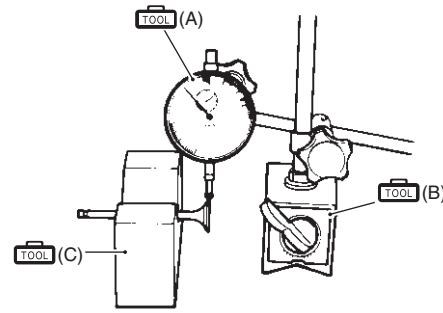
I649G1140231-03

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
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))

Valve head radial runout (IN. & EX.)
Service limit: 0.03 mm (0.001 in)

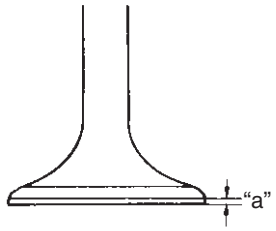


I649G1140232-03

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

Special tool
TOOL : 09900–20101 (Vernier calipers (1/15 mm, 150 mm))

Valve head thickness “a” (IN. & EX.)
Service limit: 0.5 mm (0.02 in)

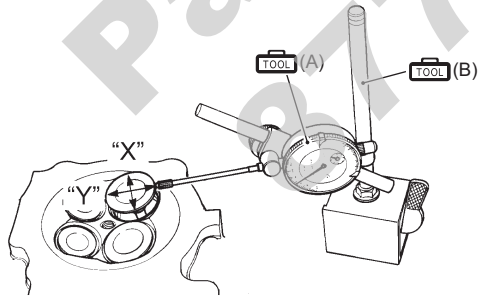


I649G1140233-02

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

Special tool
TOOL (A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL (B): 09900–20701 (Magnetic stand)

Valve stem deflection (IN. & EX.)
Service limit: 0.35 mm (0.014 in)



I831G1140164-02

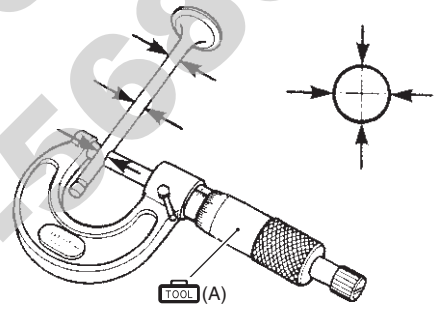
Valve Stem Wear
Measure the valve stem O.D. using the micrometer. If it is out of specification, replace the valve with a new one. If the valve stem O.D. is within specification but the valve stem deflection is not, replace the valve guide. After replacing the valve or valve guide, recheck the deflection.

Special tool
TOOL (A): 09900–20205 (Micrometer (0 – 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-38)”.



I718H1140122-01

Valve Spring

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

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

Special tool

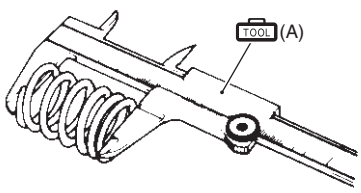
TOOL (A): 09900–20101 (Vernier calipers (1/15 mm, 150 mm))

Valve spring free length (IN. & EX.)

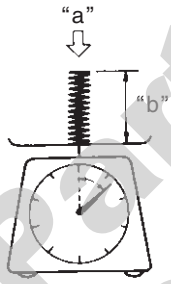
Service limit: 46.1 mm (1.81 in)

Valve spring tension (IN. & EX.)

Standard: 182 – 210 N (18.6 – 21.4 kgf, 41.0 – 47.2 lbs)/36.35 mm (1.43 in)



I649G1140237-03



I649G1140238-03

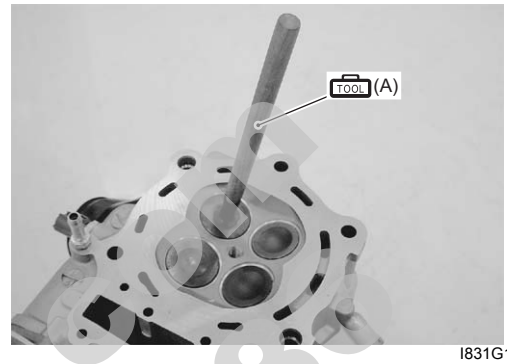
Tension “a”	Length “b”
182 – 210 N (18.6 – 21.4 kgf, 41.0 – 47.2 lbs)	36.35 mm (1.43 in)

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

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

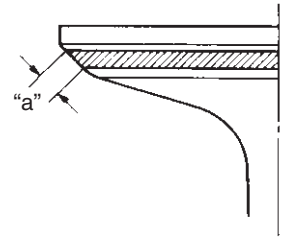


I831G1140165-01

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-40)”.

Valve seat width “a” (IN. & EX.)

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



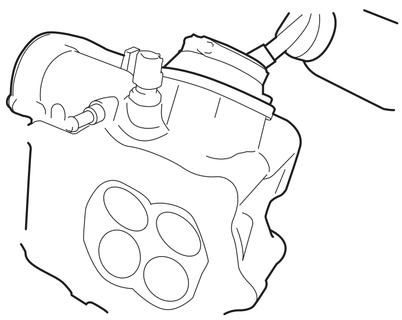
I649G1140246-02

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-40)".

⚠ WARNING

Always use extreme caution when handling gasoline.



I831G1140334-02

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-4)".

Valve Guide Replacement

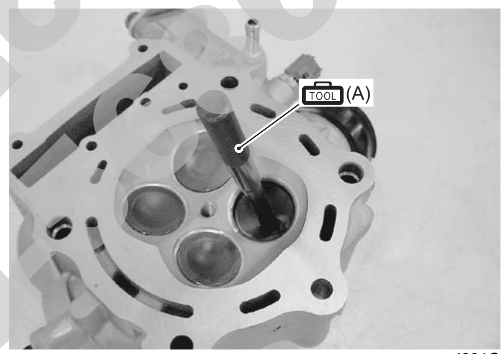
B831G21406026

1) Remove the cylinder head. Refer to "Engine Top Side Disassembly (Page 1D-17)".
2) Remove the valves. Refer to "Cylinder Head Disassembly and Assembly (Page 1D-31)".
3) Using the valve guide remover, drive the valve guide out toward the intake or exhaust camshaft side.

Special tool
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)**



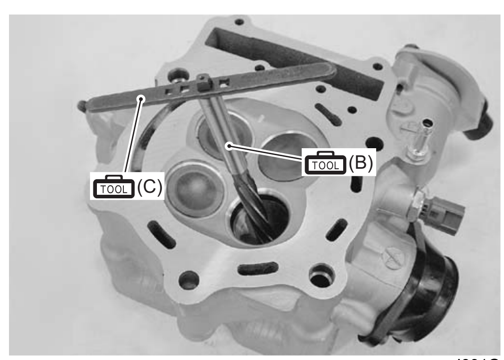
I831G1140166-01

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)



I831G1140167-01

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.

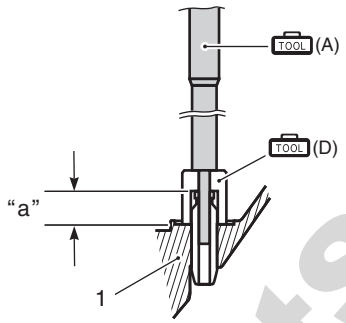
6) Apply engine oil to each valve guide and valve guide hole.

7) Drive the guide into the guide hole using the valve guide installer.

⚠ CAUTION

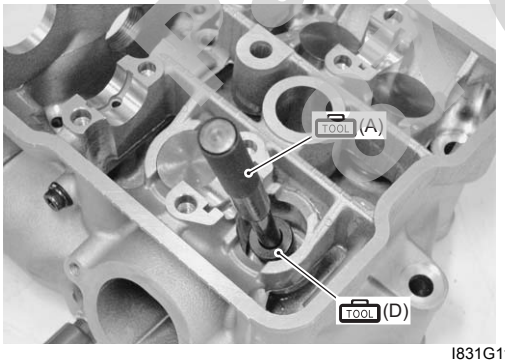
Failure to oil the valve guide hole before driving the new guide into place may result in a damaged guide or head.

Special tool
TOOL (A): 09916–44910 (Valve guide remover/ installer)
TOOL (D): 09916–57360 (Attachment)



I718H1140127-01

1. Cylinder head	"a": IN.: 14.5 mm (0.57 in) EX.: 12.5 mm (0.49 in)



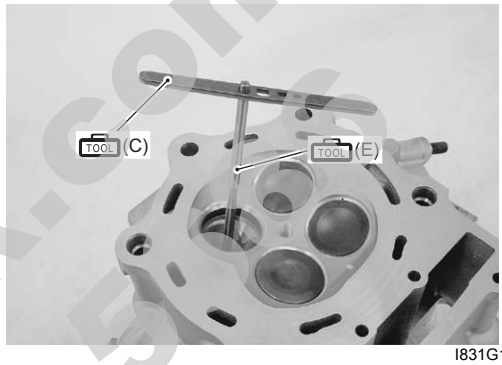
I831G1140168-01

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 (C): 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.**



I831G1140169-01

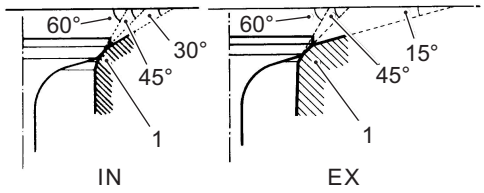
9) Reassemble the cylinder head. Refer to "Cylinder Head Disassembly and Assembly (Page 1D-31)".

10) Install the cylinder head assembly. Refer to "Engine Top Side Assembly (Page 1D-21)".

Valve Seat Repair

B831G21406027

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°.



I831G1140170-02

	Intake	Exhaust
Seat angle	30°/45°/60°	15°/45°/60°
Seat width	0.9 – 1.1 mm (0.035 – 0.043 in)	←
Valve diameter	36 mm (1.42 in)	33 mm (1.30 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-4)".

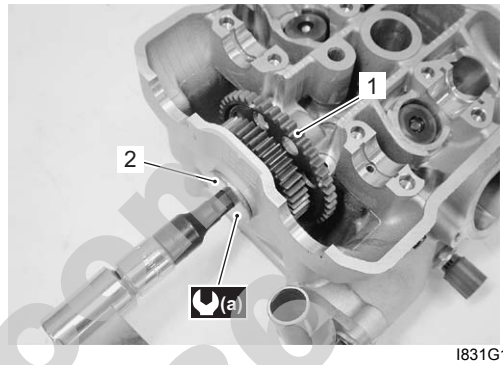
Cam Drive Idle Gear / Sprocket Thrust Clearance Inspection and Adjustment

B831G21406028

Inspection

- Install the cam drive idle gear/sprocket (1) and tighten the shaft (2) to the specified torque.

Tightening torque
Cam drive idle gear/sprocket shaft (a): 41 N·m (4.1 kgf-m, 29.5 lb-ft)

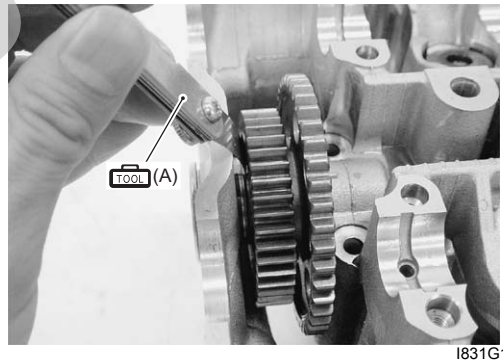


I831G1140171-01

- Measure the thrust clearance between the idle gear and shim by using a thickness gauge.

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

Cam drive idle gear/sprocket thrust clearance
Standard: 0.15 – 0.27 mm (0.006 – 0.011 in)

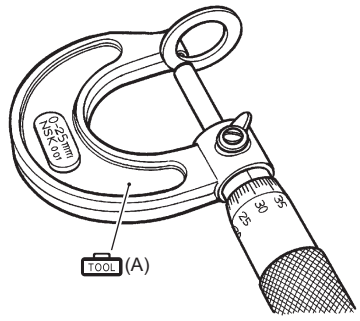


I831G1140172-01

Adjustment
If the thrust clearance is exceed the standard, adjust the thrust clearance by the following procedures:

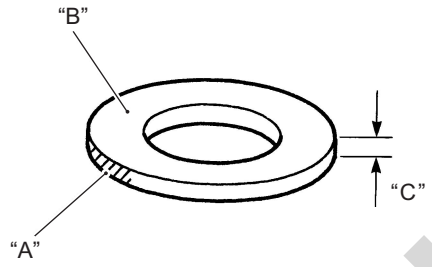
- Remove the shim, and measure its thickness with a micrometer.

Special tool
(A): 09900–20205 (Micrometer (0 – 25 mm))



I831G1140173-01

- Replace the sim with a other size.



I831G1140174-01

Color "A"/Mark "B" (part No.)	Shim thickness "C"
Dark blue (09181-15182)	1.38 – 1.42 (0.054 – 0.056)
Yellow (09181-15181)	1.28 – 1.32 (0.050 – 0.052)
Light blue (09181-15176)	1.18 – 1.22 (0.046 – 0.048)
Light green (09181-15172)	1.08 – 1.12 (0.043 – 0.044)
Brown (09181-15166)	0.98 – 1.02 (0.039 – 0.040)
"J" mark (09181-15164)	0.88 – 0.92 (0.035 – 0.036)

- Recheck the thrust clearance.

Cylinder Disassembly and Assembly

B831G21406029

Disassembly
Refer to "Engine Top Side Disassembly (Page 1D-17)".

Assembly
Assembly is in the reverse order of disassembly. Pay attention to the following points:

- Apply engine coolant to O-ring of water union.

⚠ CAUTION

Replace the O-ring with a new one.

I831G1140175-01

- Tighten the water union bolt.

Cylinder Inspection

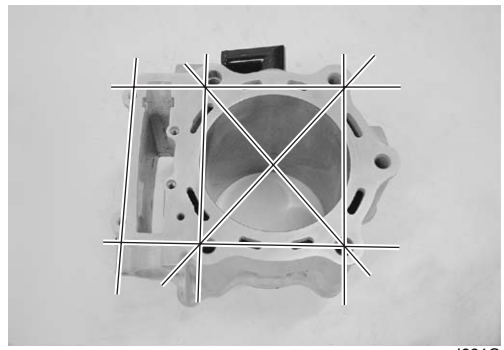
B831G21406030

Refer to "Engine Top Side Disassembly (Page 1D-17)".
Refer to "Engine Top Side Assembly (Page 1D-21)".

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

Special tool
: 09900–20803 (Thickness gauge)

Cylinder distortion
Service limit: 0.05 mm (0.102 in)

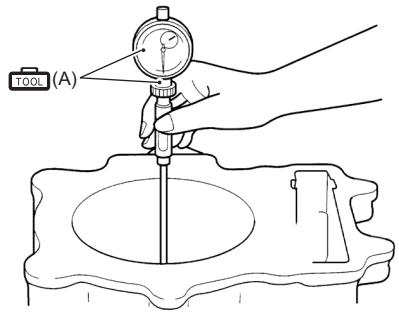


I831G1140176-01

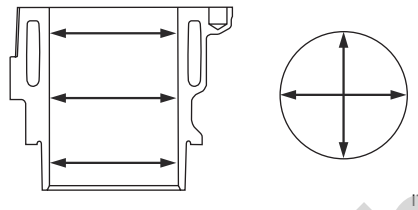
Cylinder Bore
Inspect the cylinder wall for any scratches, nicks or other damage. If any defects are found, replace the cylinder with a new one.
Measure the cylinder bore diameter at six places.

Special tool
(A): 09900–20530 (Cylinder gauge set)

Cylinder bore
Standard: 104.000 – 104.015 mm (4.0945 – 4.0951 in)



I831G1140177-01


I718H1140141-01

Piston-to-cylinder Clearance
Refer to “Piston and Piston Ring Inspection (Page 1D-43)”.

Piston Ring Removal and Installation

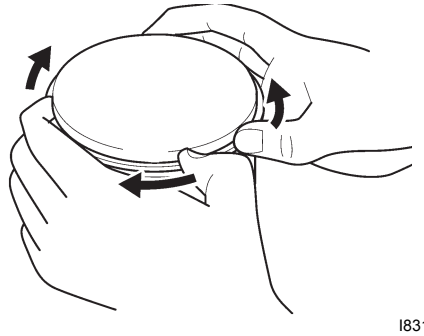
B831G21406031

Removal

1) Draw out the piston pin and remove the piston. Refer to “Engine Top Side Disassembly (Page 1D-17)”.
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.


I831G1140178-01

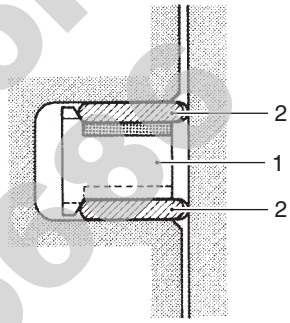
3) Remove the 2nd ring and oil ring in the same manner.

Installation

NOTE

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

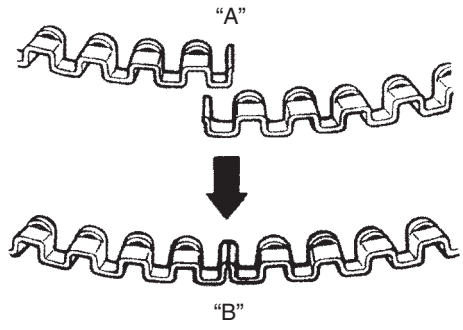
1) Install the piston rings in the order of the oil ring, second ring and top ring.
   a) The first member to go into the oil ring groove is a spacer (1).
   After placing the spacer, fit the two side rails (2).



I718H1140143-02

⚠ CAUTION

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



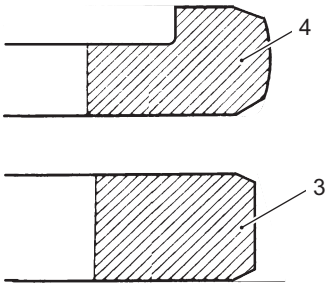
I705H1140170-02

“A”: INCORRECT	“B”: CORRECT

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

NOTE

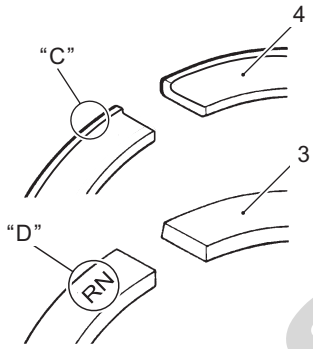
1st ring (4) and 2nd ring (3) differ in shape.



I831G1140179-02

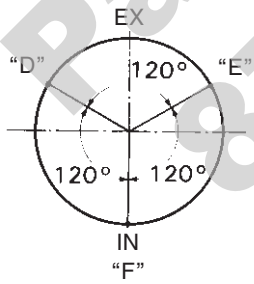
NOTE

Face the side with the edge "C" and stamped mark "D" upward when assembling.



I831G1140180-01

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.



I831G1140181-03

"D":	2nd ring and lower side rail
"E":	Upper side rail
"F":	1st ring and spacer

3) Install the piston and piston pin. Refer to "Engine Top Side Assembly (Page 1D-21)".

Piston and Piston Ring Inspection

B831G21406032

Refer to "Piston Ring Removal and Installation (Page 1D-42)".

Piston Diameter

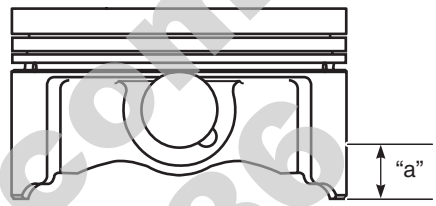
Measure the piston diameter using the micrometer at 15 mm (0.6 in) "a" from the skirt end. If the piston diameter is less than the service limit, replace the piston.

Special tool

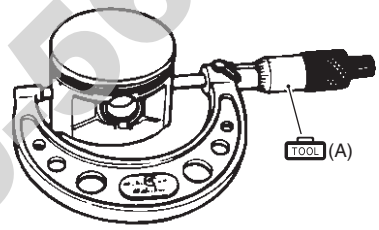
TOOL (A): 09900–20210 (Micrometer (100 – 125 mm))

Piston diameter

Service limit: 103.880 mm (4.0898 in)



I831G1140335-02



I831G1140337-01

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)

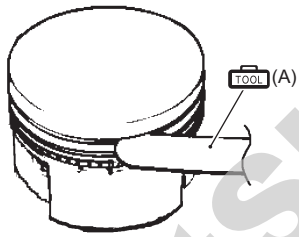
Piston Ring-to-groove Clearance
Measure the side clearances of the 1st and 2nd piston rings using the thickness gauge. If any of the clearances exceed the limit, replace both the piston and piston rings.

Special tool
(A): 09900–20803 (Thickness gauge)
(B): 09900–20205 (Micrometer (0 – 25 mm))

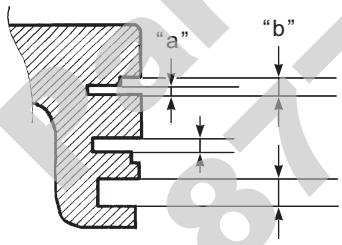
Piston ring-to-groove clearance
Service limit: (1st): 0.180 mm (0.0071 in)
Service limit: (2nd): 0.150 mm (0.0059 in)

Piston ring groove width
"a": Standard: (1st): 0.83 – 0.85 mm (0.0327 – 0.0335 in)
"b": Standard: (1st): 1.30 – 1.32 mm (0.0512 – 0.0520 in)
Standard: (2nd): 1.01 – 1.03 mm (0.0398 – 0.0406 in)
Standard: (Oil): 2.01 – 2.03 mm (0.0791 – 0.0799 in)

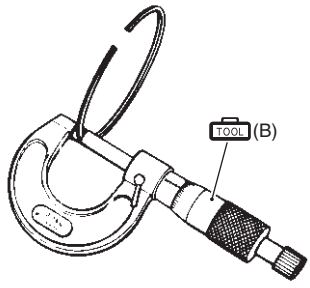
Piston ring thickness
Standard: (1st):0.76 – 0.81 mm (0.0299 – 0.0319)
Standard: (1st):1.08 – 1.10 mm (0.0425 – 0.0433)
Standard: (2nd): 0.97 – 0.99 mm (0.0382 – 0.0390 in)



I831G1140183-03



I831G1140336-01



I649G1140264-03

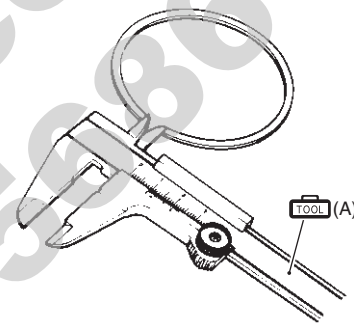
Piston Ring Free End Gap and Piston Ring End Gap
Measure the piston ring free end gap using vernier calipers. Next, fit the piston ring squarely into the cylinder and measure the piston ring end gap using the thickness gauge. If any of the measurements exceed the service limit, replace the piston ring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

Special tool
(A): 09900–20101 (Vernier calipers (1/15 mm, 150 mm))

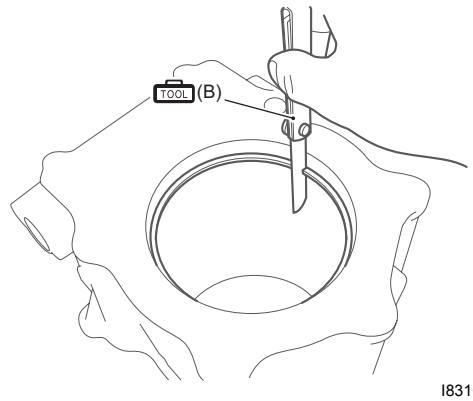
Piston ring free end gap
Service limit: (1st): 10.5 mm (0.41 in)
Service limit: (2nd): 11.7 mm (0.46 in)

Special 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

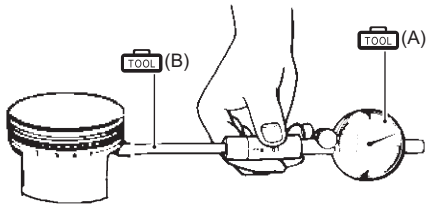


I831G1140184-02

Piston Pin and 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
(A): 09900–20602 (Dial gauge (1/1000 mm, 1 mm))
(B): 09900–22403 (Small bore gauge (18 – 35 mm))

Piston pin bore I.D.
Service limit: 23.030 mm (0.9067 in)

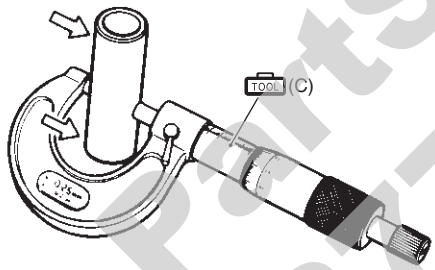


I831G1140185-02

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

Special tool
(C): 09900–20205 (Micrometer (0 – 25 mm))

Piston pin O.D.
Service limit: 22.980 mm (0.9047 in)



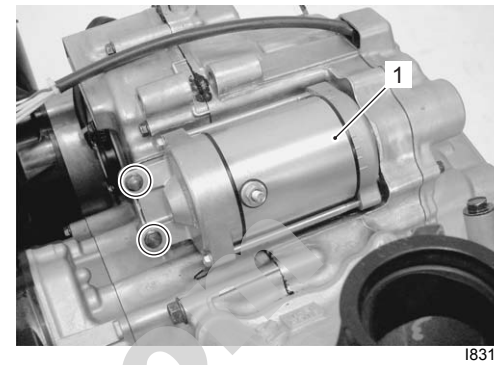
I649G1140268-03

Engine Bottom Side Disassembly

B831G21406033

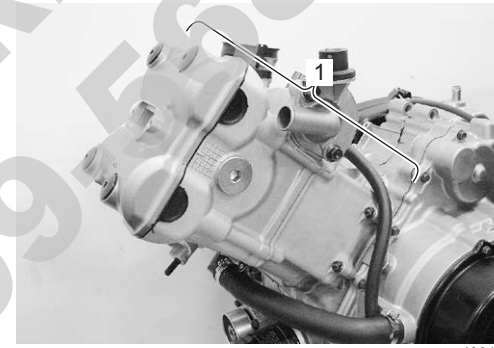
Remove the engine assembly. Refer to “Engine Assembly Removal (Page 1D-13)”.

Starter Motor
Remove the starter motor (1).



I831G1140189-01

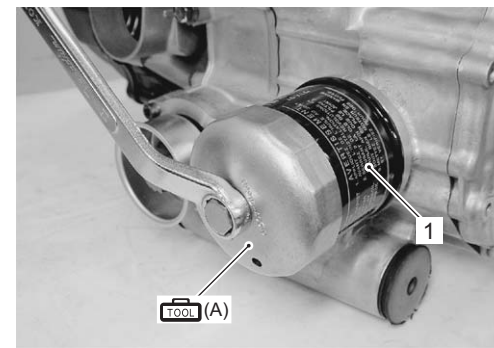
Engine Top Side
Remove the engine top side (1). Refer to “Engine Top Side Disassembly (Page 1D-17)”.



I831G1140333-01

Oil Filter
Remove the oil filter (1) with the special tool.

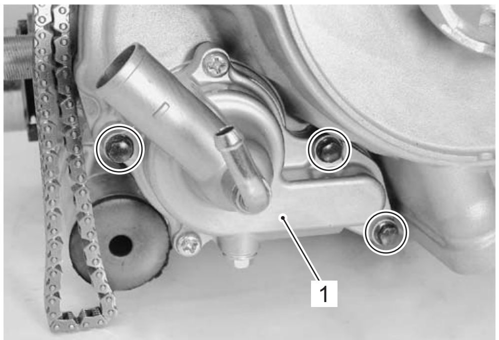
Special tool
(A): 09915–40610 (Oil filter wrench)



I831G1140191-01

Water Pump

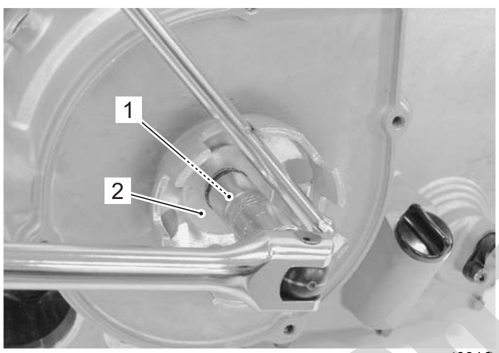
Remove the water pump (1).



I831G1140192-01

Starter Cup

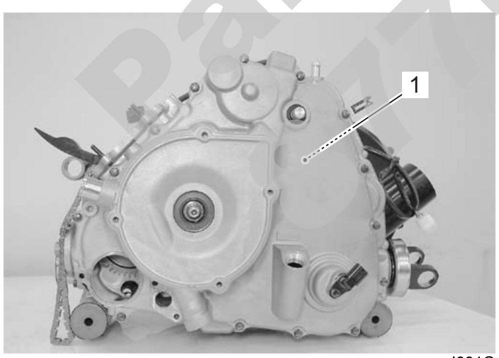
1) Remove the starter cup nut (1) with a suitable bar.
2) Remove the starter cup (2).



I831G1140193-01

Generator

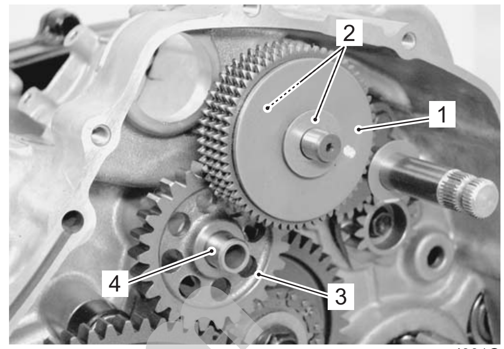
Remove the generator component parts (1). Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.



I831G1140194-01

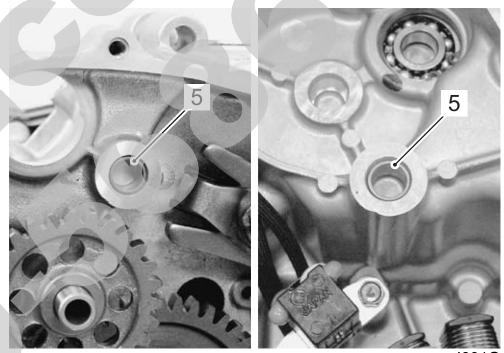
Starter Torque Limiter / Starter Idle Gear

1) Remove the starter torque limiter (1) with the washers (2).
2) Remove the starter idle gear (3) and shaft (4).



I831G1140196-02

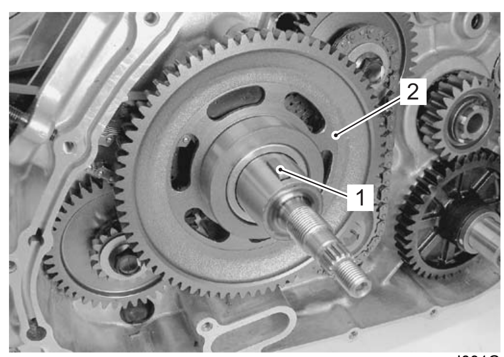
3) Remove the bushings (5) from the crankcase and generator cover.



I831G1140197-01

Starter Driven Gear

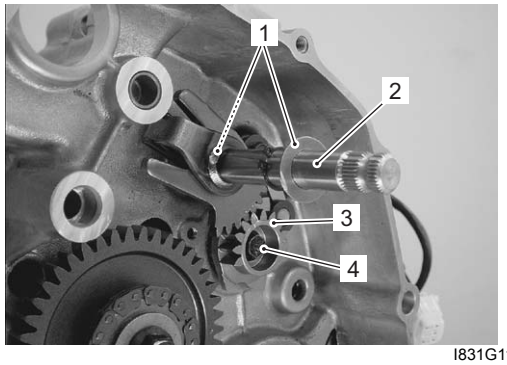
Remove the key (1) and starter driven gear (2).



I831G1140195-01

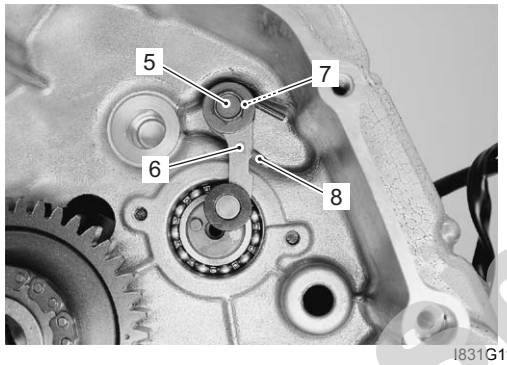
Gear Shift System

1) Remove the washers (1) and gearshift shaft (2).
2) Remove the cam driven gear (3) by removing its bolt (4).



I831G1140198-02

3) Remove the gear shift cam stopper bolt (5) and gear shift cam stopper (6), washer (7) and return spring (8).

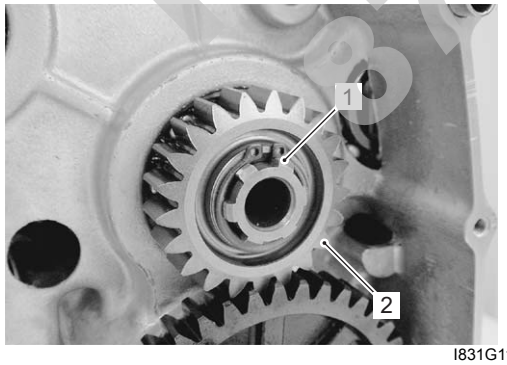


I831G1140199-01

Transfer Output Drive Gear

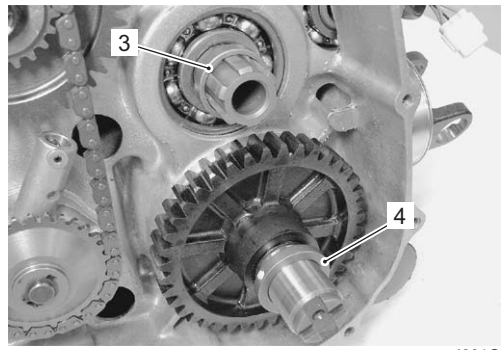
1) Remove the snap ring (1) and transfer output drive gear (2).

Special tool
TOOL : 09900–06107 (Snap ring pliers)



I831G1140203-01

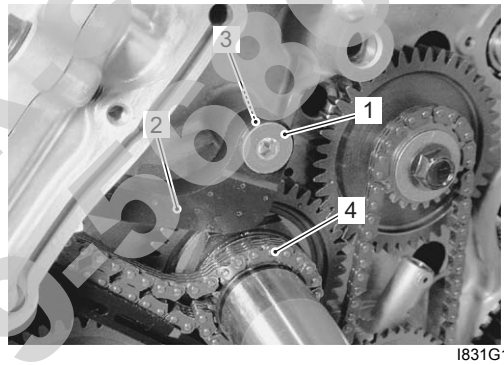
2) Remove the drive gear spacer (3) and output shaft spacer (4).



I831G1140204-01

Cam Chain / Cam Chain Tensioner

1) Remove the cam chain tensioner bolt (1), cam chain tensioner (2) and washer (3).
2) Remove the cam chain (4).



I831G1140205-01

Oil Pump

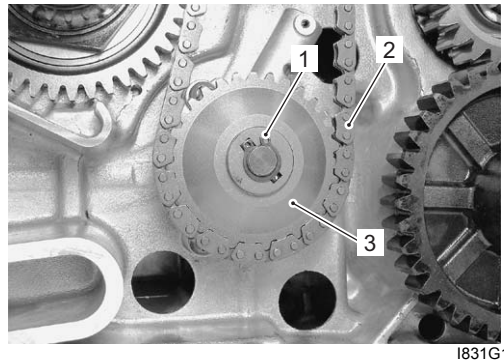
1) Remove the snap ring (1).

NOTE

Do not drop the snap ring (1) into the crankcase.

Special tool
TOOL : 09900–06107 (Snap ring pliers)

2) Remove the oil pump drive chain (2) and oil pump driven gear (3) from the oil pump.

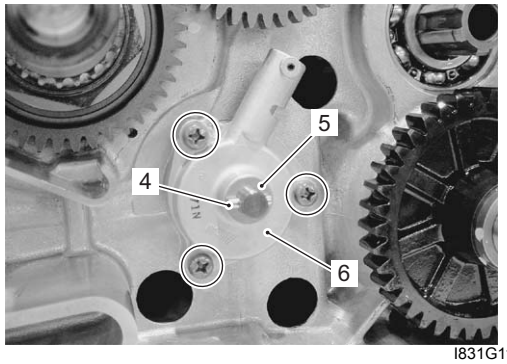


I831G1140207-01

3) Remove the pin (4) and washer (5).
4) Remove the oil pump (6).

NOTE

Do not drop the pin (4) and washer (5) into the crankcase.

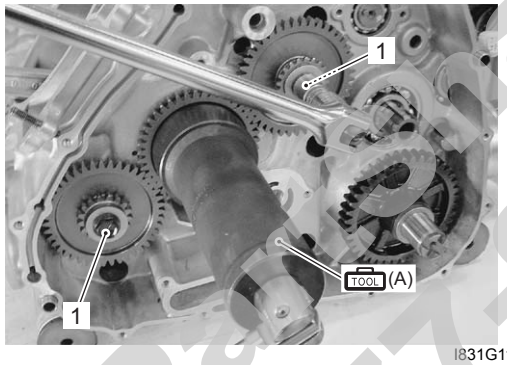


I831G1140209-01

Balancer Shaft Drive / Driven Gear

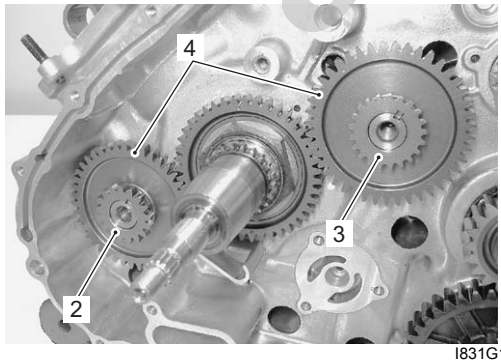
1) Remove the balancer shaft driven gear bolts (1) by holding the crankshaft with the special tool.

Special tool
TOOL : 09924–52460 (Socket (52 mm))



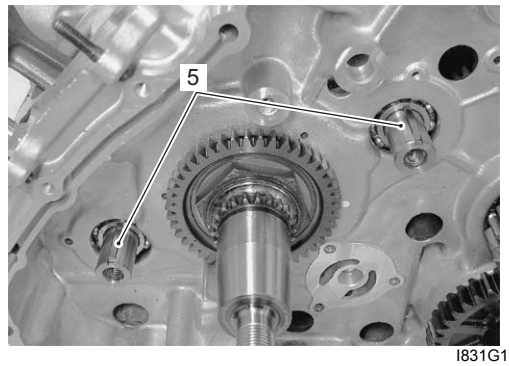
I831G1140210-01

2) Remove the water pump drive gear (2) and oil pump drive gear (3).
3) Remove the crank balancer shaft driven gears (4).



I831G1140211-01

4) Remove the keys (5).



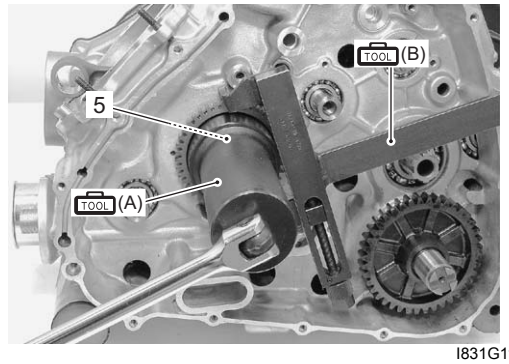
I831G1140212-01

5) Unlock the crank balancer drive gear nut.


I831G1140213-02

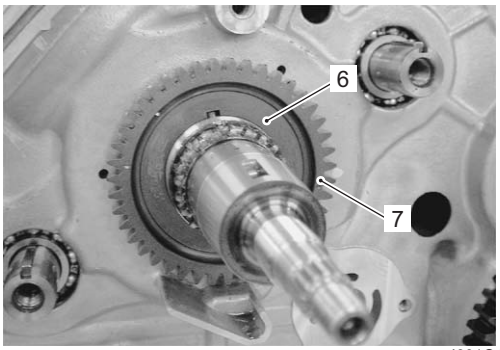
6) Remove the crank balancer drive gear nut (5) with the special tools.

Special tool
TOOL (A): 09924–52460 (Socket (52 mm))
TOOL (B): 09920–53740 (Clutch sleeve hub holder)
TOOL : 09920–31020 (Extension handle)



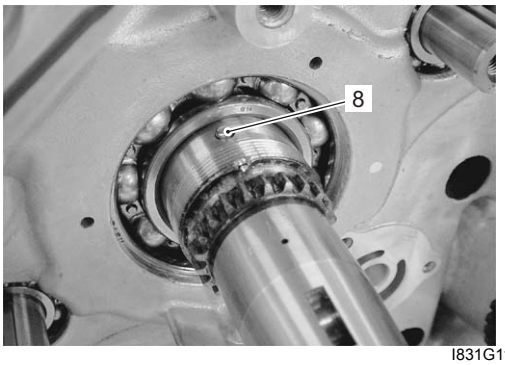
I831G1140214-01

7) Remove the washer (6) and crank balancer drive gear (7).



I831G1140215-01

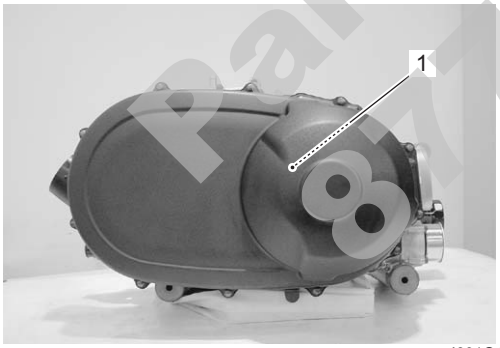
8) Remove the pin (8).



I831G1140216-01

Automatic Transmission

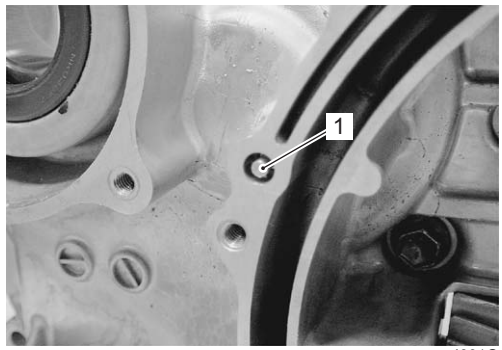
Remove the automatic component parts (1). Refer to "V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)" and "Clutch Shoe Removal and Installation in Section 5A (Page 5A-16)".



I831G1140217-01

Oil Jet

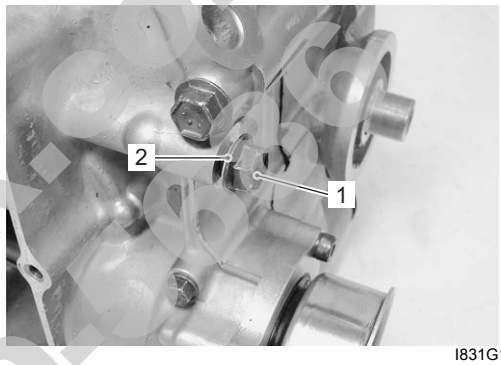
Remove the oil jet (1) from crankcase.



I831G1140218-01

Oil Gallery Plug

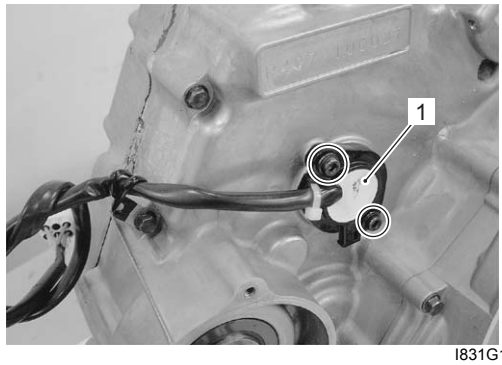
Remove the oil gallery plug (1) and gasket (2).



I831G1140219-01

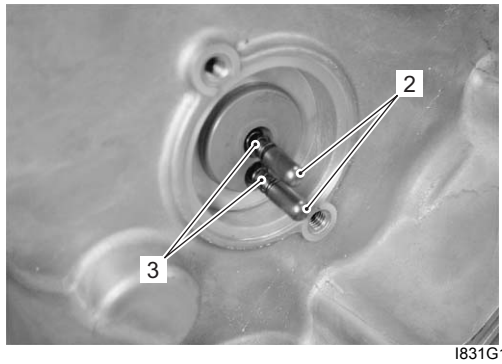
Gear Position Switch

1) Remove the gear position switch (1).



I831G1140220-01

2) Remove the gear position switch contacts (2) and its springs (3).



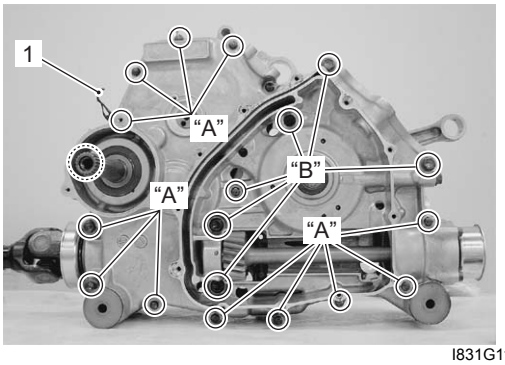
I831G1140221-01

Crankcase

1) Remove the crankcase bolts “A” and clamp (1).
2) Remove the crankcase bolts “B”.

NOTE

Loosen the crankcase bolts diagonally with the smaller sizes first.



I831G1140222-02

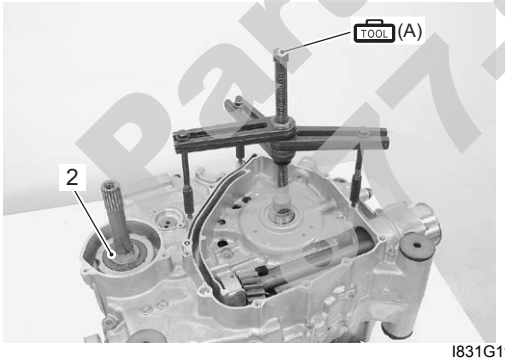
3) Separate the crankcase with the special tool.

NOTE

- **The crankcase separator plate is parallel with the end face of the crankcase.**
- **The crankshaft must remain in the left crankcase half.**

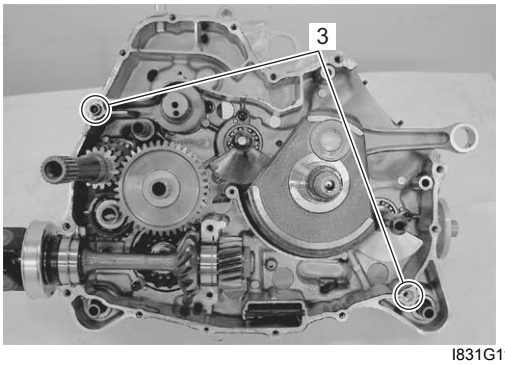
Special tool
TOOL (A): 09920–13120 (Crankcase separating tool)

4) Remove the collar (2).



I831G1140224-01

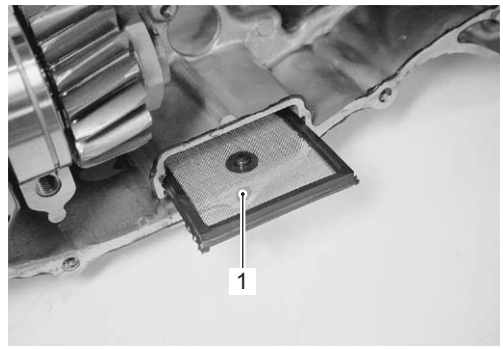
5) Remove the dowel pins (3).



I831G1140225-01

Oil Strainer

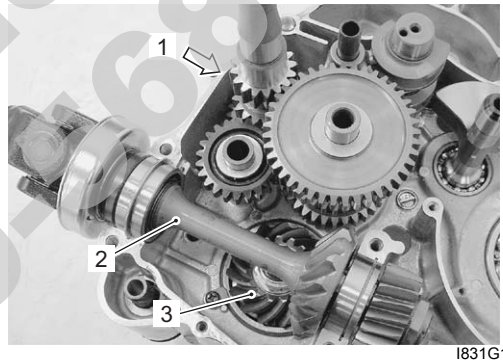
Remove the oil strainer (1).



I831G1140229-01

Transfer / Rear Output Shaft / Rear Output Shaft Bevel Gear

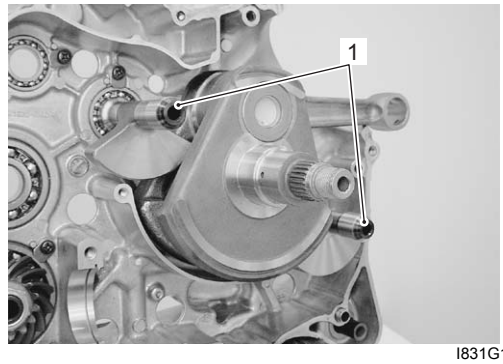
Remove the transfer component parts (1), rear output shaft (2) and rear output shaft bevel gear component parts (3). Refer to “Transfer Removal and Installation in Section 3C (Page 3C-3)”.



I831G1140230-03

Crank Balancer

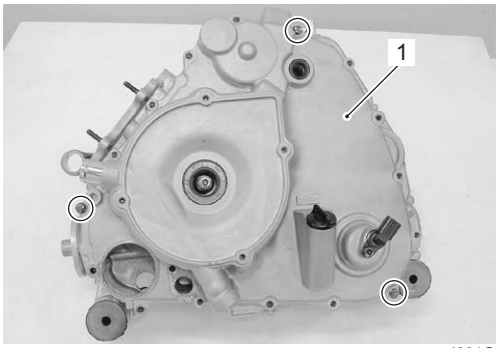
Remove the crank balancer shafts (1).



I831G1140233-01

Crankshaft

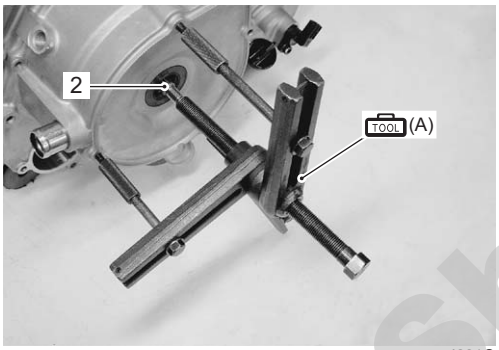
1) Install the removed generator cover (1) and tighten the bolts at three places.



I831G1140234-01

2) Remove the crankshaft (2) with the special tool.

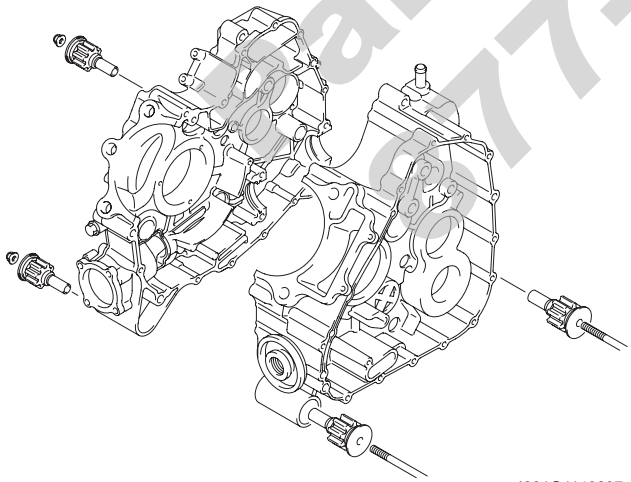
Special tool
TOOL (A): 09920–13120 (Crankcase separating tool)



I831G1140236-01

Engine Mount Bushing

Remove the engine mount bushings if necessary.



I831G1140237-01

Engine Bottom Side Assembly

B831G21406034

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

NOTE

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

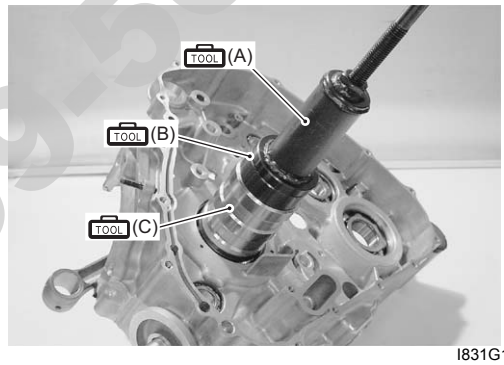
Crankshaft

⚠ CAUTION

Never fit the crankshaft into the crankcase by striking it with a plastic mallet.
Always use the special tool, otherwise the accuracy of the crankshaft alignment will be affected.

- Install the crankshaft to left crankcase with the special tools.

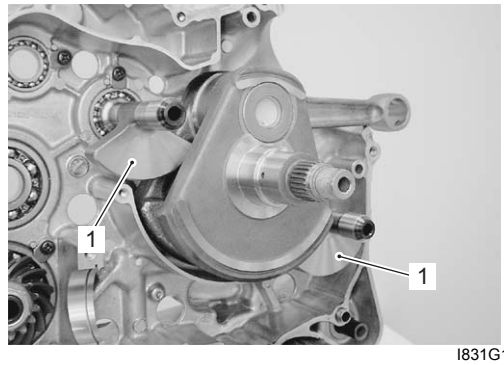
Special tool
TOOL (A): 09910–32812 (Crankshaft installer)
TOOL (B): 09910–32860 (Attachment)
TOOL (C): 09941–53610 (Front fork installer hammer)



I831G1140239-01

Crank Balancer

- Install the crank balancer shafts (1).



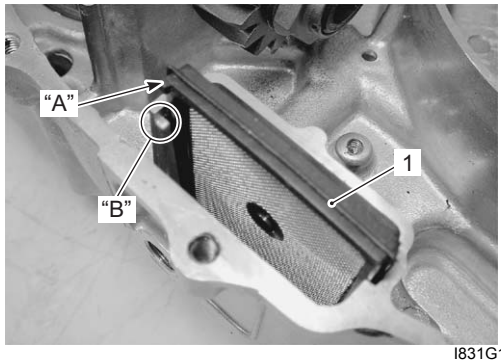
I831G1140241-01

Oil Strainer

- Install the oil strainer (1).

NOTE

Fit the convex part "A" of the oil strainer in the concave part "B" of the crankcase.



I831G1140246-01

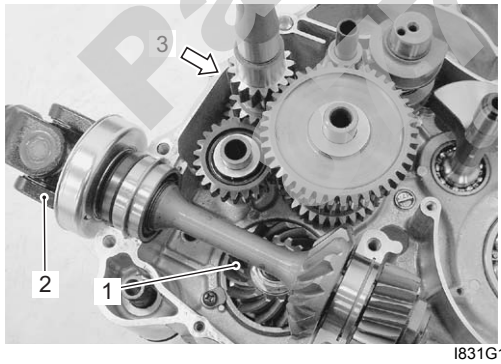
Transfer / Rear Output Shaft / Rear Output Shaft Bevel Gear

- Install the rear output shaft bevel gear (1) and rear output shaft (2). Refer to "Transfer Removal and Installation in Section 3C (Page 3C-3)".

NOTE

Measure the backlash before installing the transfer component parts (3). Refer to "Rear Output Shaft Drive Bevel Gear Shim Inspection and Adjustment in Section 3D (Page 3D-11)".

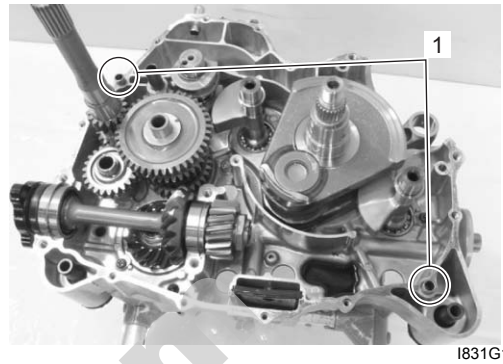
- Install the transfer component parts (3). Refer to "Transfer Removal and Installation in Section 3C (Page 3C-3)".



I831G1140247-02

Crankcase

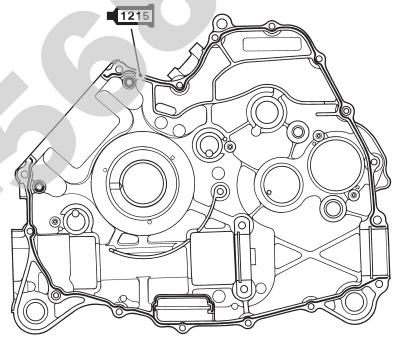
- Wipe the crankcase mating surface (both surfaces).
- Insert the dowel pins (1) onto the left crankcase.
- Apply engine oil to the conrod big end and each gear.



I831G1140248-03

- Apply bond to the mating surface of the right crankcase.

1215 : Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)

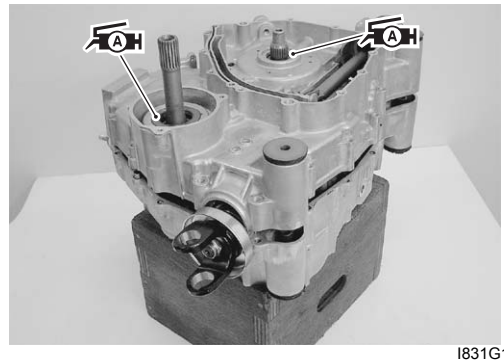


I831G1140252-01

- Apply grease to the oil seals.

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

- Assemble the crankcase with in few minutes.



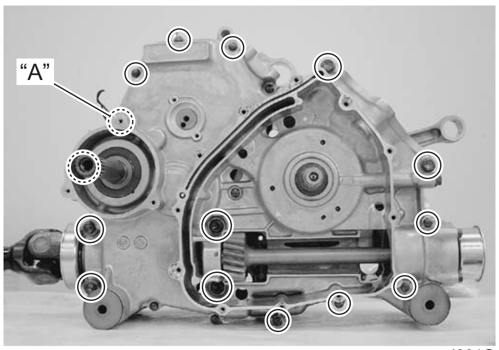
I831G1140250-01

- Tighten the crankcase bolts a little at a time to equalize the pressure.
- Tighten the crankcase bolts to the specified torque.

NOTE

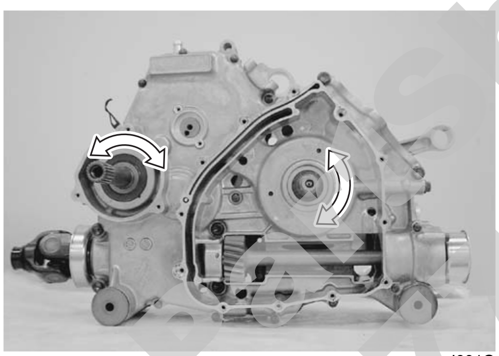
- **Tighten the larger diameter crankcase bolts first and then smaller ones diagonally and evenly.**
- **Fit the cramp to the bolt “A”.**

Tightening torque
Crankcase bolt (M6): 10 N·m (1.0 kgf-m, 7.0 lb-ft)
Crankcase bolt (M8): 26 N·m (2.6 kgf-m, 19.0 lb-ft)



I831G1140253-01

- After the crankcase bolts have been tightened, check if the each shaft rotate smoothly.



I831G1140255-01

I831G1140256-02

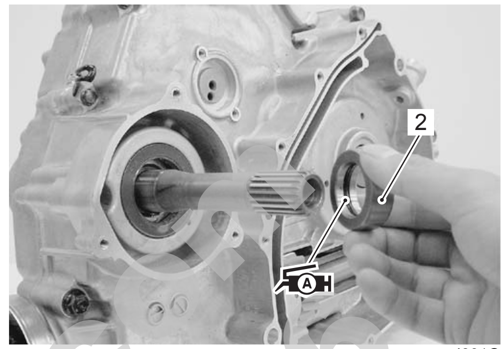
- Apply grease to the O-ring.

⚠ CAUTION

Use the new O-ring to prevent oil leakage.

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

- Install the collar (2).



I831G1140258-03

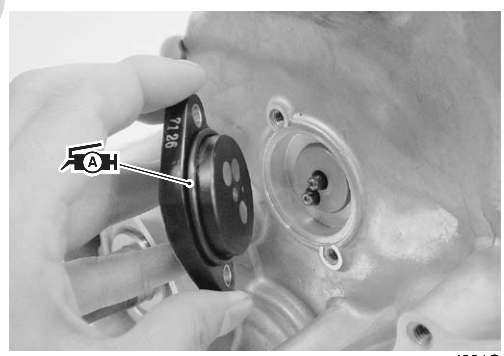
Gear Position Switch

- Install each gear shift switch contact and spring.
- Apply grease to the O-ring.

⚠ CAUTION

Replace the O-ring with a new one.

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

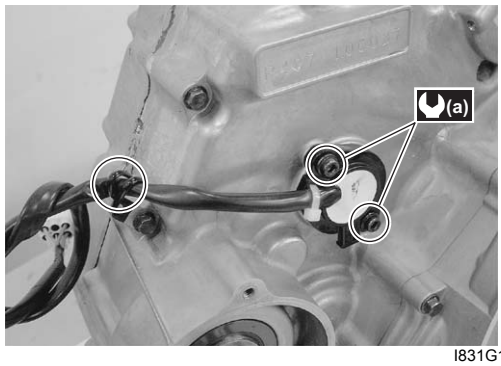


I831G1140260-01

- Tighten the gear position switch mounting bolts.

⚠ CAUTION

- **Be careful not to tighten the bolts too much.**
- **Clamp the read wire firmly.**



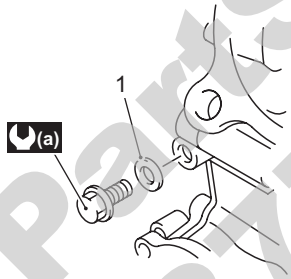
I831G1140261-03

Oil Gallery Plug
Install the oil gallery plug to the specified torque.

⚠ CAUTION

Use a new gasket (1) to prevent oil pressure leak.

Tightening torque
Main oil gallery plug (a): 18 N·m (1.8 kgf-m, 13.0 lb-ft)



I831G1140339-01

Oil Jet
When installing the oil jet, apply grease to the O-ring.

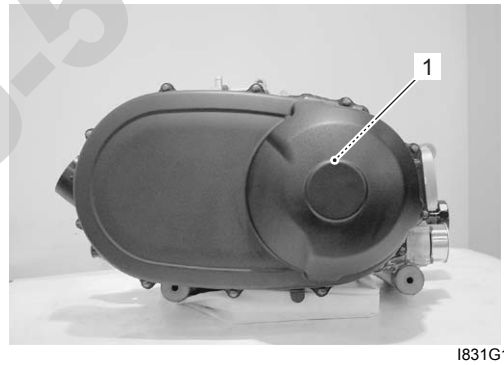
⚠ CAUTION

Use a new O-ring to prevent oil pressure leak.

I831G1140262-01

Automatic Transmission

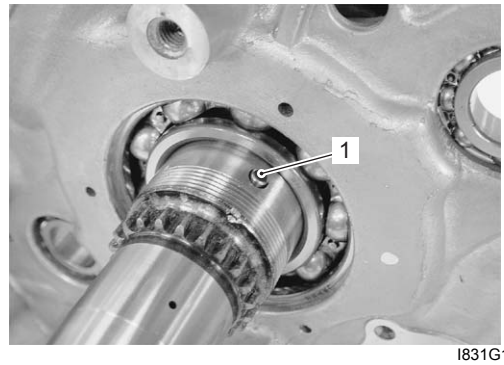
- Install the automatic transmission component parts (1). Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)” and “Clutch Shoe Removal and Installation in Section 5A (Page 5A-16)”.



I831G1140263-01

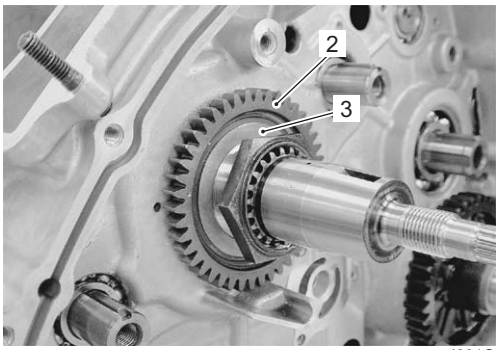
Crank Balancer Drive / Driven Gear

- Install the pin (1).



I831G1140264-02

- Install the crank balancer drive gear (2) and washer (3).



I831G1140265-02

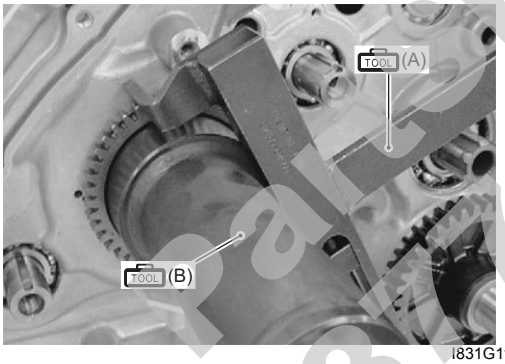
- Hold the crank balancer drive gear with the special tools and tighten the drive gear nut to the specified torque with the special tool.

⚠ CAUTION

Do not reuse the balancer drive gear nut.

Special tool
(A): 09920–53740 (Clutch sleeve hub holder)
(B): 09924–52460 (Socket (52 mm))
: 09920–31020 (Extension handle)

Tightening torque
Crank balancer drive gear nut: 150 N·m (15.0 kgf-m, 108.5 lb-ft)

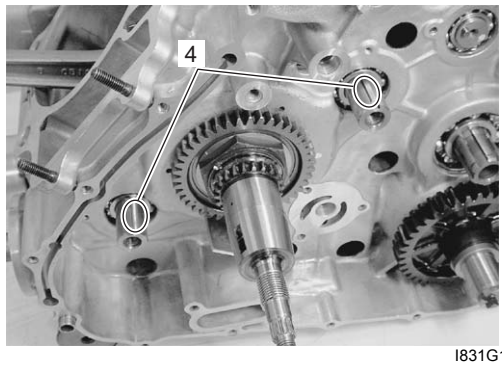


I831G1140266-02

- Lock the crank balancer drive gear nut with a center punch.

I831G1140267-02

- Install the keys (4).

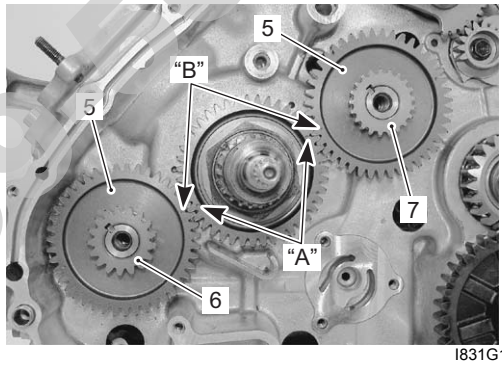


I831G1140268-01

- Install the crank balancer driven gears (5) water pump drive gear (6) and oil pump drive gear (7).

NOTE

- **Align the punch mark “A” of crank balancer drive gear with the punch marks “B” of each crank balancer driven gear as shown.**
- **Be careful direction of the oil pump drive gear.**



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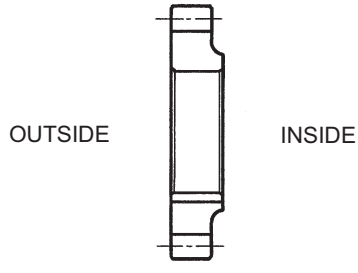


I831G1140270-02

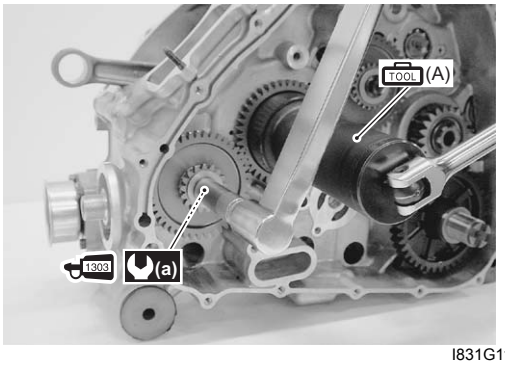
- Apply thread lock to the balancer driven gear bolts.

  1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

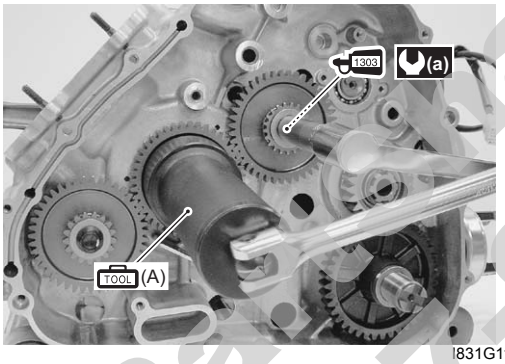
- Hold the crank balancer drive gear nut with the special tool and tighten bolts to the specified torque.

  Special tool
  TOOL (A): 09924–52460 (Socket (52 mm))

  Tightening torque
  Crank balancer driven gear bolt (a): 50 N·m (5.0 kgf-m, 36.0 lb-ft)



I831G1140271-02



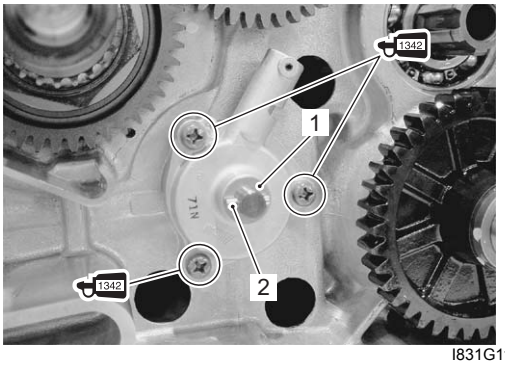
I831G1140272-01

Oil Pump

- Apply thread lock to the oil pump mounting bolts and tighten the bolts.

  1342 : Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)

- Install the washer (1) and pin (2).

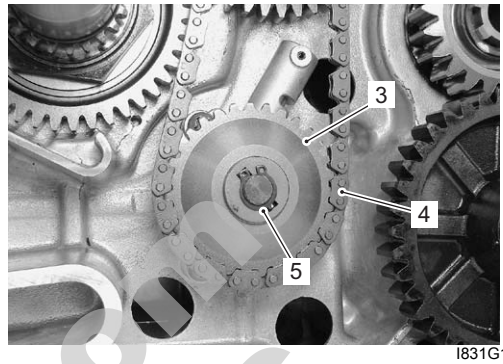


I831G1140273-01

- Install the oil pump drive gear (3) with chain (4).
- Install the snap ring (5).

NOTE

Be careful not to drop the snap ring (5) into the crankcase.

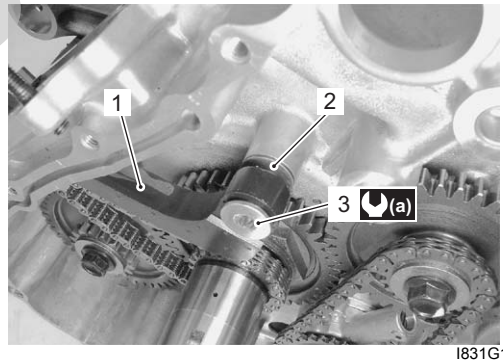


I831G1140274-01

Cam Chain Tensioner

- Install the cam chain tensioner (1) along with the washer (2).
- Tighten the cam chain tensioner bolt (3) to the specified torque.

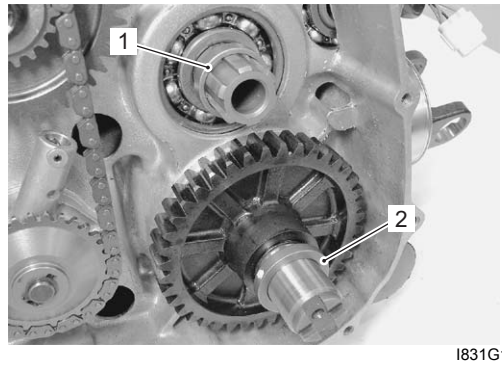
  Tightening torque
  Cam chain tensioner bolt (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I831G1140275-01

Transfer Output Drive Gear

- Install the spacer (1) and (2).



I831G1140276-01

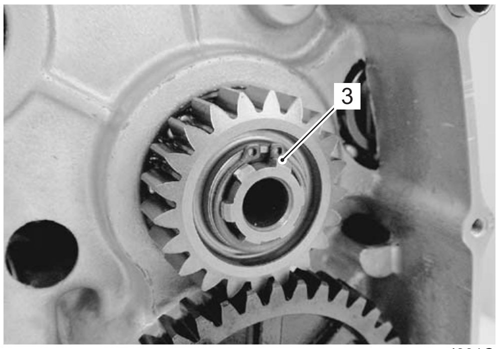
- Install the snap ring (3).

⚠ CAUTION

The removed snap ring must be replaced with a new one.

Special tool

TOOL : 09900–06107 (Snap ring pliers)



I831G1140277-01

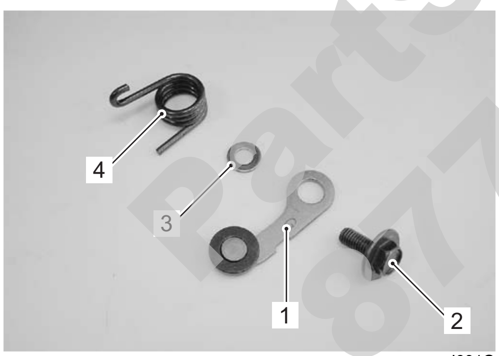
Gearshift System

- Install the gearshift cam stopper (1), bolt (2), washer (3) and return spring (4).

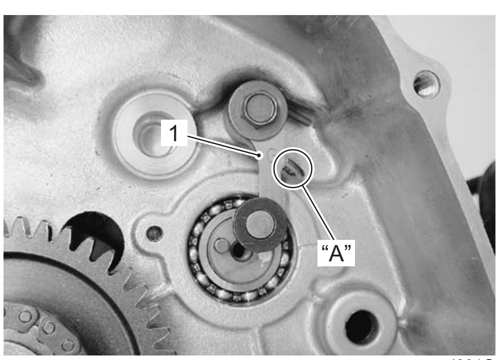
NOTE

Hook the return spring end “A” to the stopper (1).

- Check the gearshift cam stopper moves smoothly.
- Locate the gearshift cam in the neutral position.



I831G1140278-01

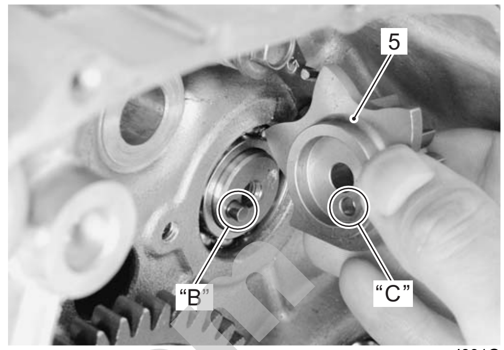


I831G1140279-02

- Install the gearshift cam stopper plate (5).

NOTE

Align the gearshift cam pin “B” with the gearshift cam stopper plate hole “C”.

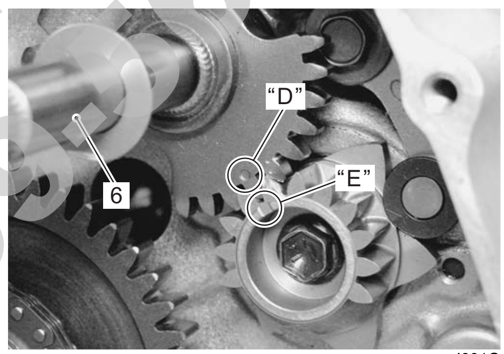


I831G1140280-01

- Install the gearshift shaft (6).

NOTE

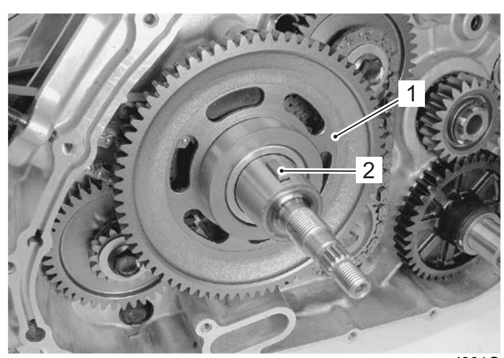
Align the punch mark “D” with the concave mark “E” of gearshift cam of surface.



I831G1140282-01

Starter Driven Gear

- Install the starter driven gear (1) and key (2).

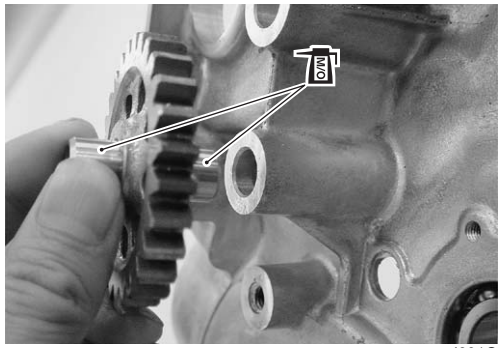


I831G1140323-01

Starter Torque Limiter / Starter Idle Gear

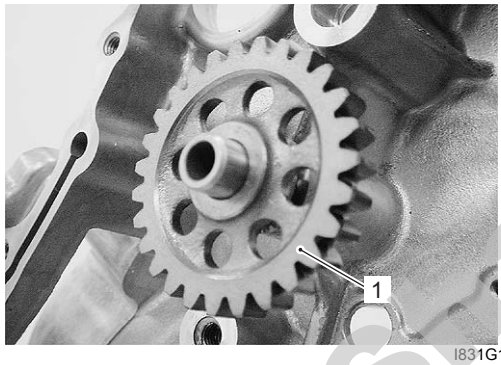
- Apply molybdenum oil solution to the starter idle gear pin.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I831G1140283-01

- Install the starter idle gear (1).



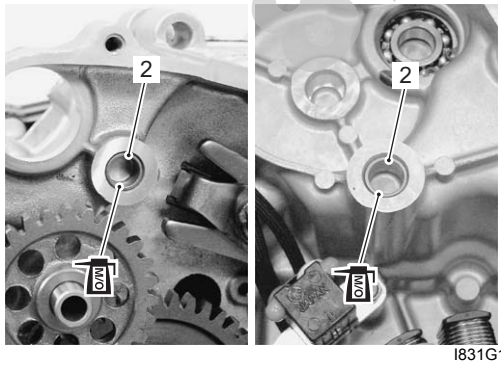
I831G1140284-01

- Install the bushings (2) into the crankcase and generator cover.

  NOTE

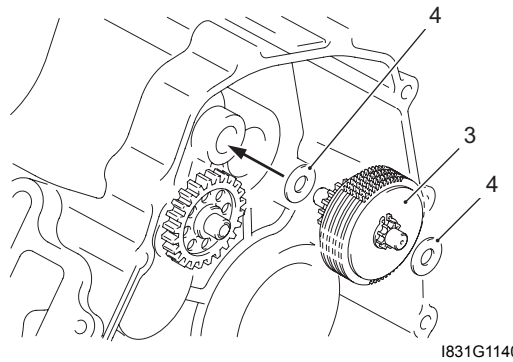
  Apply molybdenum oil solution to the inside of the bushings.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I831G1140285-01

- Install the starter torque limiter (3) with washers (4).



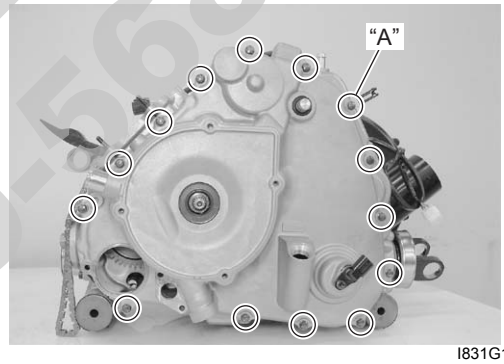
I831G1140286-02

Generator

- Install the generator component parts. Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".

  NOTE

  Fit the clamp to the bolt "A".

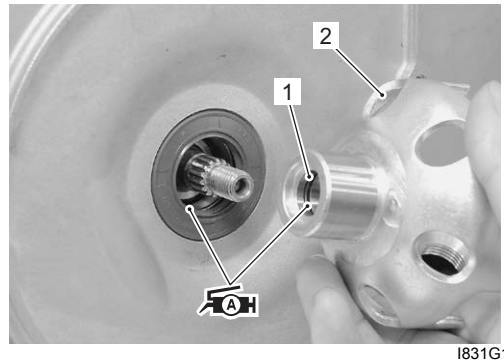


I831G1140287-02

Starter Cup

- Apply grease to the O-ring and lip of the oil seal.
- Install the starter cup (1).

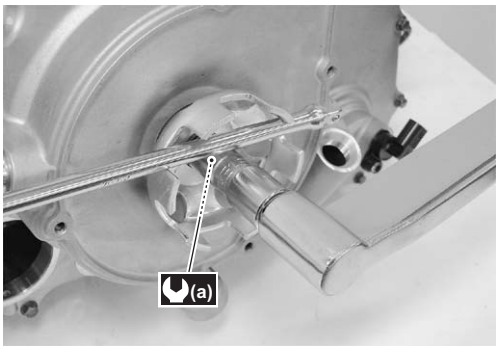
  : Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I831G1140288-01

- Tighten the starter cup nut to the specified torque by holding starter cup with the suitable bar (2).

Tightening torque
Starter cup nut (a): 38 N·m (3.8 kgf-m, 27.5 lb-ft)



I831G1140289-01

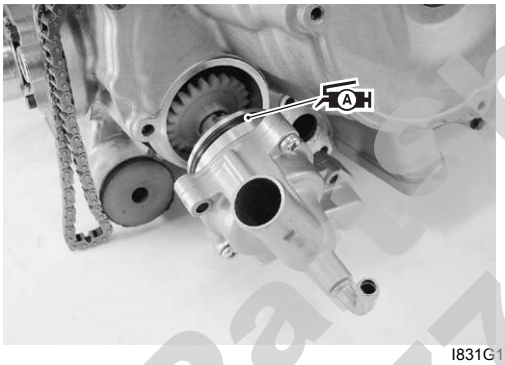
Water Pump

- Apply grease to the O-ring.

⚠ CAUTION

Replace the O-ring with a new one.

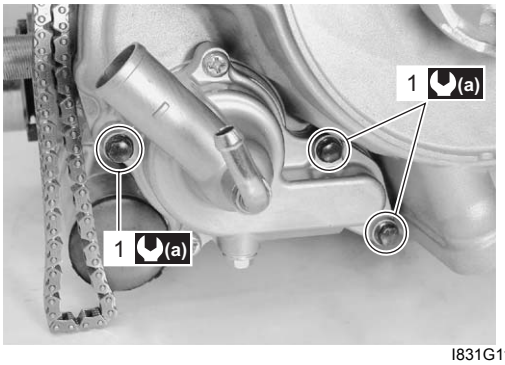
: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I831G1140290-01

- Tighten the water pump mounting bolts (1) to the specified torque.

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



I831G1140291-02

Starter Motor
Install the starter motor. Refer to “Starter Motor Removal and Installation in Section 1I (Page 1I-4)”.

Engine Top Side
Assemble the engine top side. Refer to “Engine Top Side Assembly (Page 1D-21)”.

Conrod and Crankshaft Inspection

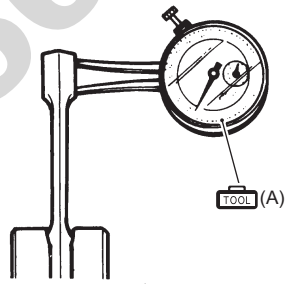
B831G21406035

Refer to “Engine Bottom Side Disassembly (Page 1D-45)”.

Conrod Small End I.D.
Measure the conrod small end inside diameter with the dial calipers.
If conrod small end inside diameter exceeds the service limit, replace the conrod.

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

Conrod small end I.D.
Service limit: 23.040 mm (0.9071 in)



I831G1140292-02

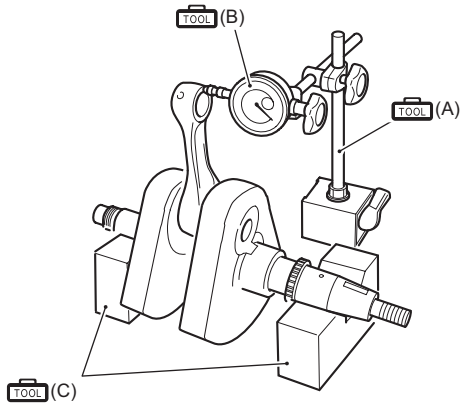
Conrod Deflection

Wear On the big end of the conrod can be estimated by checking the movement of the small end of the rod. This method can also check the extent of ware on the parts of the conrod's big end.

Special tool

(A): 09900–20701 (Magnetic stand)
(B): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
(C): 09900–21304 (V-block (100 mm))

Conrod deflection
Service Limit: 3.0 mm (0.12 in)



I831G1140293-01

Conrod Big End Side Clearance

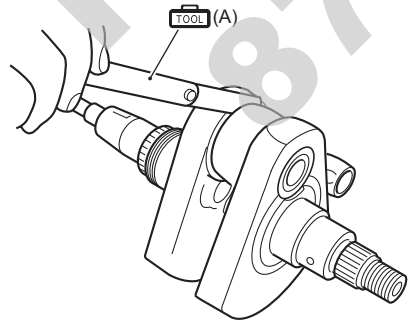
1) Check the conrod big end side clearance with the thickness gauge.

Special tool

(A): 09900–20803 (Thickness gauge)

Conrod big end side clearance
Service limit: 1.0 mm (0.04 in)

2) If the clearance exceeds the limit, replace the crankshaft assembly and conrod with a new one.



I831G1140294-01

Crankshaft Runout

- Measure the crankshaft runout with V-blocks and dial gauge.

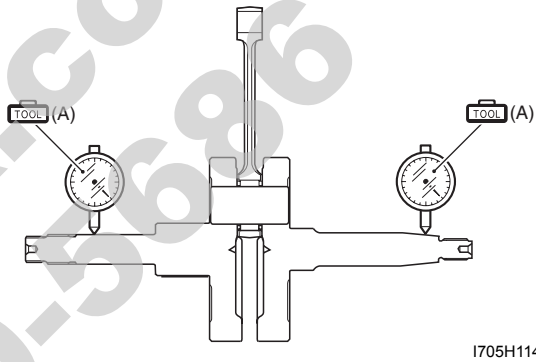
NOTE

- **Place the crankshaft onto the V-blocks so that it becomes horizontally.**
- **Measure the runout from the tips of the crankshaft.**

Crankshaft runout
Service limit: 0.08 mm (0.003 in)

Special tool

(A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
: 09900–20701 (Magnetic stand)
: 09900–21304 (V-block (100 mm))



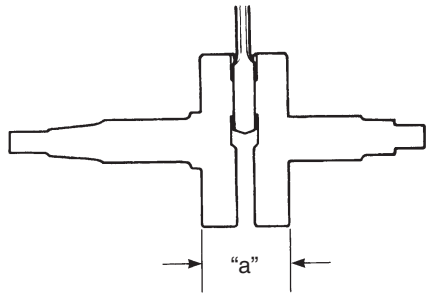
I705H1140241-01

Width Between Crankshaft Webs

B831G21406036

Measure the width between crankshaft webs "a".

Width between crankshaft webs "a"
Standard: 72.9 – 73.1 mm (2.87 – 2.88 in)

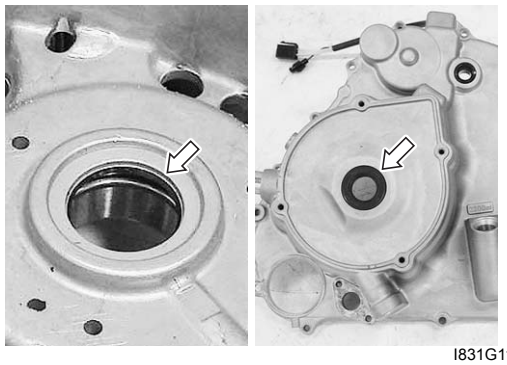


I705H1140149-04

Crankshaft Oil Seal Inspection

B831G21406037

Check the oil seal for damage. If any damage is found, replace the oil seal with a new one. Refer to “Engine Bottom Side Disassembly (Page 1D-45)” and “Bearing Removal and Installation (Page 1D-61)”.



I831G1140296-01

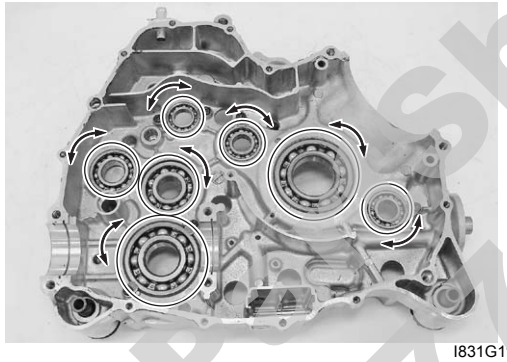
Bearing Inspection

B831G21406038

Refer to “Engine Bottom Side Disassembly (Page 1D-45)”.

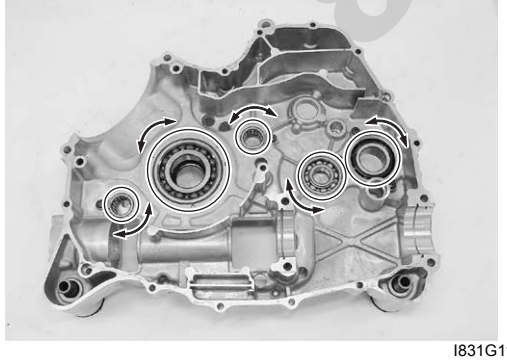
Rotate the bearing inner race by finger to inspect for abnormal play, noise and smooth rotation while the bearings are in the crankcase. Replace the bearing if there is anything unusual.

Left crankcase



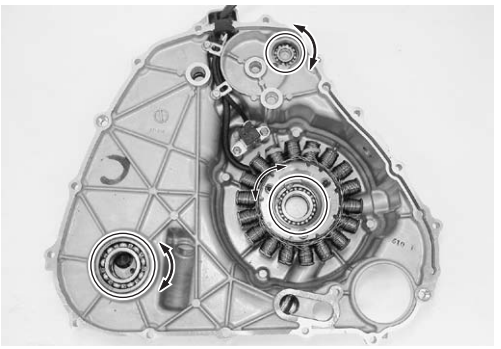
I831G1140299-03

Right crankcase



I831G1140300-03

Generator cover



I831G1140301-03

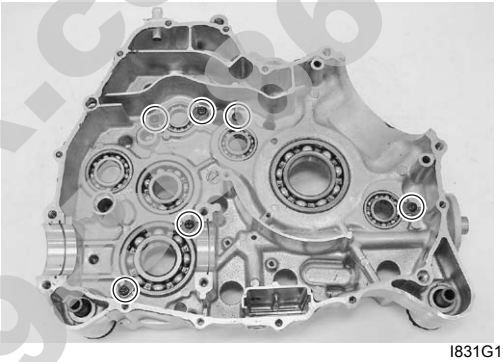
Bearing Removal and Installation

B831G21406039

Removal

Left crankcase

1) Remove the each bearing retainers.

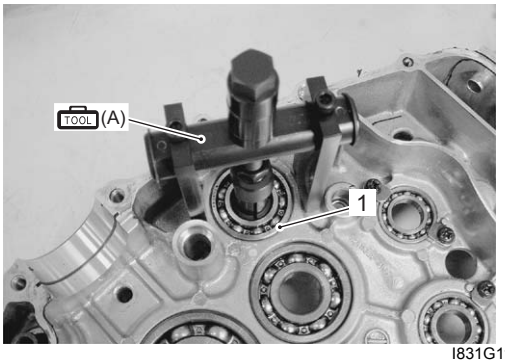


I831G1140302-01

2) Remove the drive shaft bearing (1) with the special tool.

Special tool

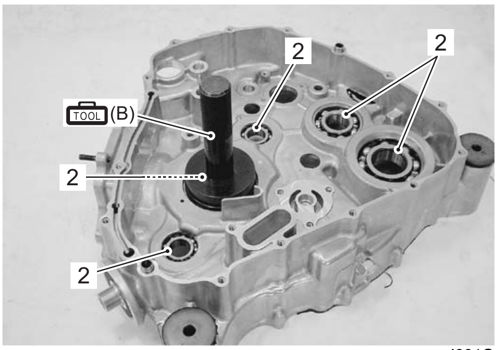
TOOL (A): 09921–20240 (Bearing remover set)



I831G1140303-01

3) Remove the other bearings (2) with the special tool.

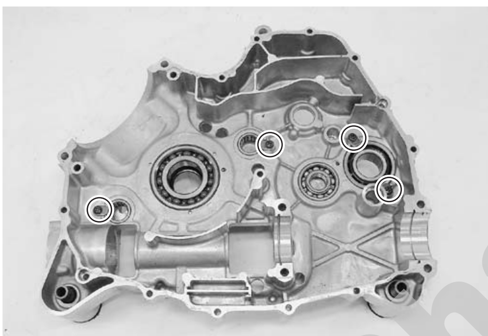
Special tool
TOOL **(B): 09913–70210 (Bearing installer set)**



I831G1140304-01

Right crankcase

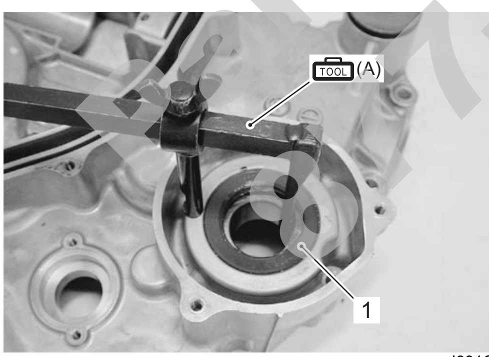
1) Remove the bearing retainers.



I831G1140305-01

2) Remove the oil seal (1) with the special tool.

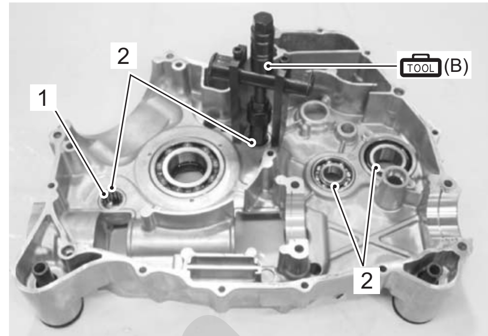
Special tool
TOOL **(A): 09913–50121 (Oil seal remover)**



I831G1140306-01

3) Remove the each bearing (2) with the special tool.

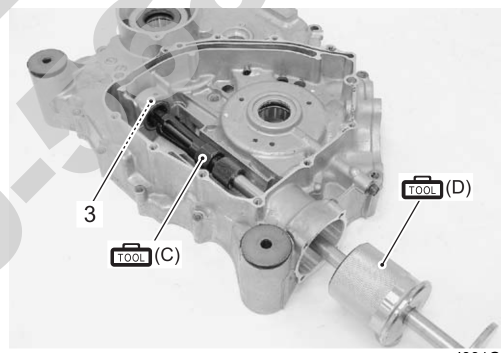
Special tool
TOOL **(B): 09921–20240 (Bearing remover set)**



I831G1140307-03

4) Remove the front output shaft bearing (3) with the special tools.

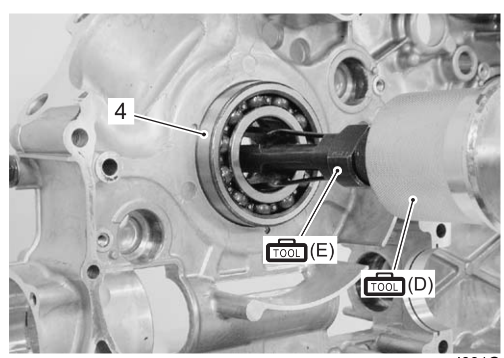
Special tool
TOOL **(C): 09923–74511 (Bearing remover)**
TOOL **(D): 09930–30104 (Rotor remover slide shaft)**



I831G1140308-01

5) Remove the crankshaft bearing (4) with the special tools.

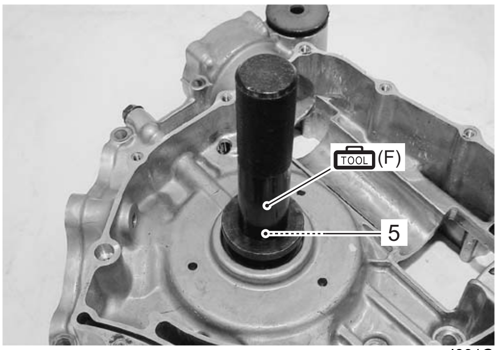
Special tool
TOOL **(D): 09930–30104 (Rotor remover slide shaft)**
TOOL **(E): 09941–64511 (Bearing remover)**



I831G1140309-01

6) Remove the oil seal (5) with the special tool.

Special tool
TOOL **(F): 09913–70210 (Bearing installer set)**

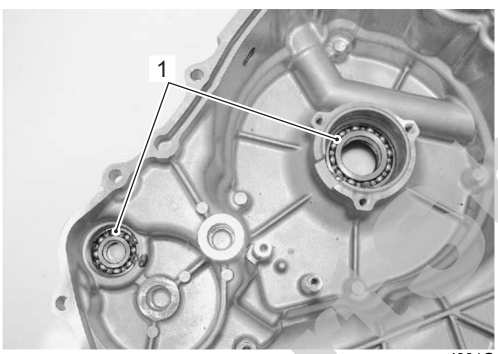


I831G1140310-01

Generator cover

1) Remove the magnet stator. Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.
2) Remove the snap rings (1) with the special tool.

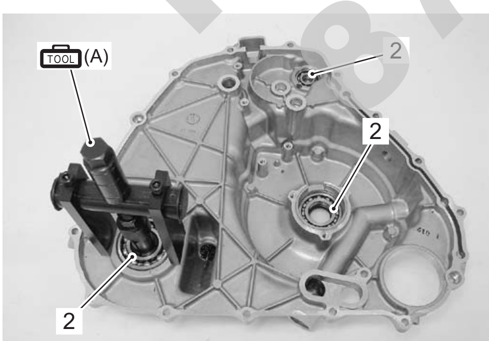
Special tool
TOOL **: 09900–06108 (Snap ring pliers)**



I831G1140311-01

3) Remove the each bearings (2) with the special tool.

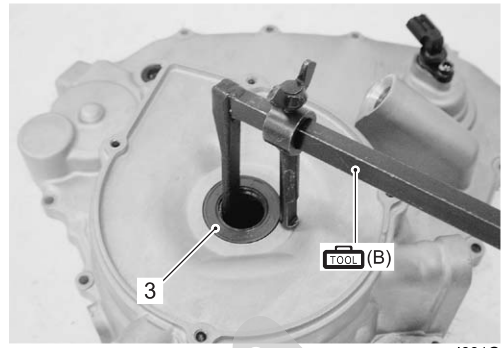
Special tool
TOOL **(A): 09921–20240 (Bearing remover set)**



I831G1140312-01

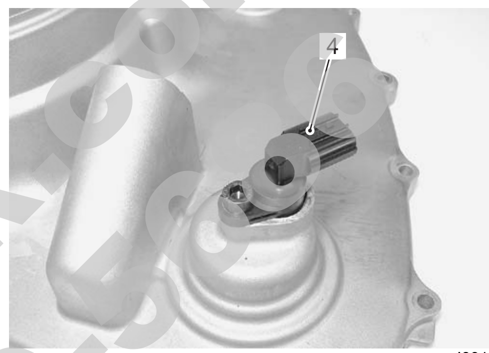
4) Remove the oil seal (3) with the special tool.

Special tool
TOOL **(B): 09913–50121 (Oil seal remover)**



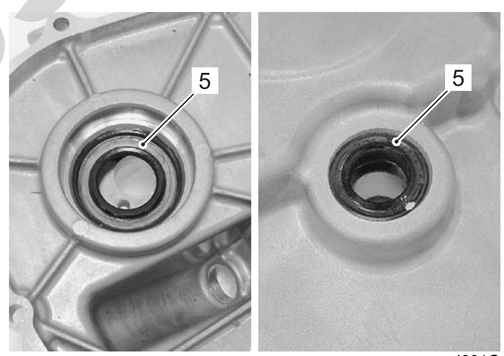
I831G1140313-01

5) Remove the speed sensor (4).



I831G1140314-01

6) Remove the oil seals (5).



I831G1140315-01

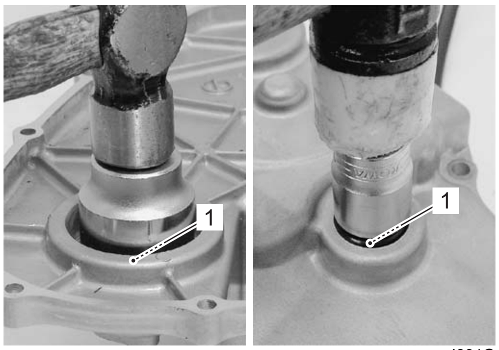
Installation

⚠ **CAUTION**

The removed bearings and oil seals must be replaced with new ones.

Generator cover

1) Install the oil seals (1) with suitable tool.



I831G1140316-01

2) Install the each bearing (2) with a special tool.

⚠ **CAUTION**

Use the special tool suitable size for each bearing to prevent damage.

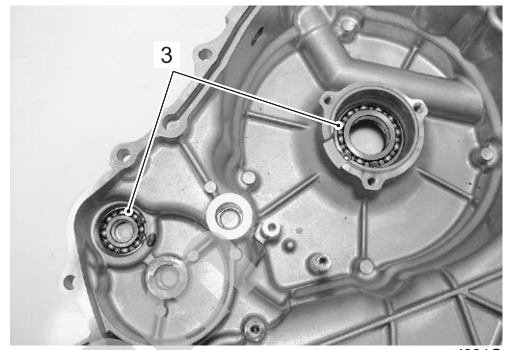
Special tool
TOOL (A): 09913–70210 (Bearing installer set)

I831G1140317-02

3) Install the snap rings (3).

⚠ **CAUTION**

The removed snap rings must be replaced with new ones.



I831G1140325-01

4) Apply grease to O-ring and install the speed sensor (4).

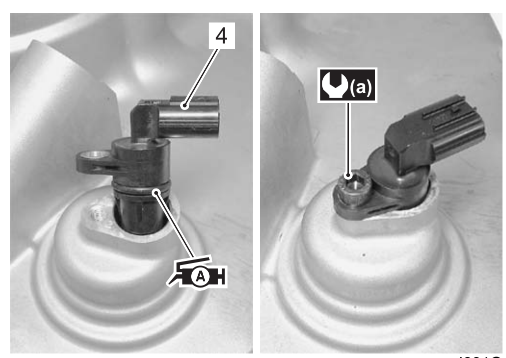
⚠ **CAUTION**

Replace the O-ring with a new one.

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

5) Tighten the bolt to the specified torque.

Tightening torque
Speed sensor bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



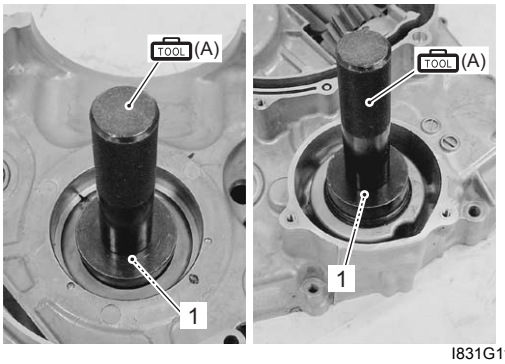
I831G1140318-01

6) Install the removed parts. Refer to "Generator Removal and Installation in Section 1J (Page 1J-4)".

Right crankcase

1) Install the oil seals (1) with the special tool.

Special tool
TOOL : 09913–70210 (Bearing installer set)



I831G1140319-02

2) Install the bearings (2) with the special tool.

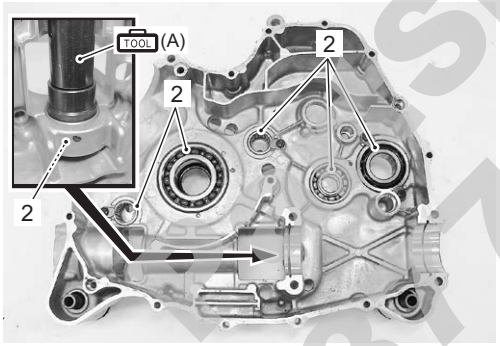
⚠ CAUTION

Use the special tool suitable size for each bearing to prevent damage.

NOTE

The stamped mark side of the bearing faces inside of crankcase.

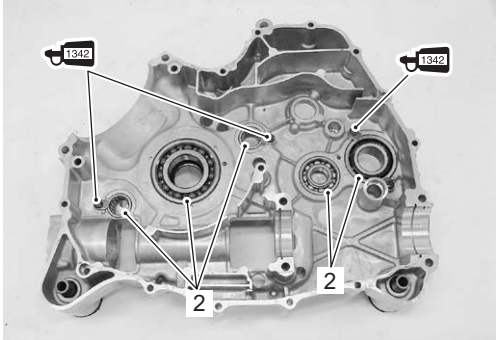
Special tool
TOOL (A): 09913–70210 (Bearing installer set)



I831G1140338-02

3) Apply thread lock to the screws and tighten them.

1342 : Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)



I831G1140320-01

Left crankcase

1) Install the bearings (1) with the special tool.

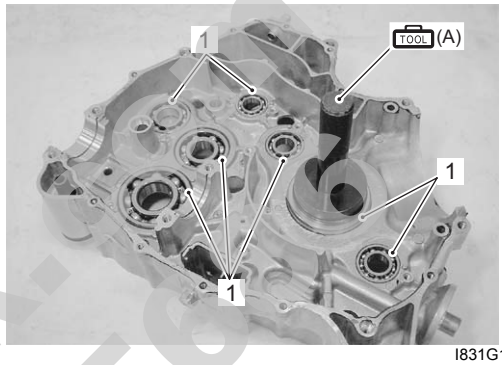
⚠ CAUTION

Use the special tool suitable size for each bearing to prevent damage.

NOTE

The stamped mark side of the bearing faces inside of crankcase.

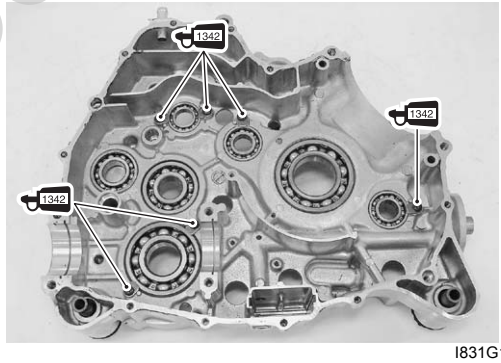
Special tool
TOOL (A): 09913–70210 (Bearing installer set)



I831G1140321-01

2) Apply thread lock to the screws, and install the retainers by tightening them.

1342 : Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)



I831G1140322-01

Specifications

Service Data

B831G21407001

Valve + Valve Guide

Unit: mm (in)

Item	Standard		Limit
Valve diam.	IN.	36.0 (1.42)	—
	EX.	33.0 (1.30)	—
Tappet clearance (when cold)	IN.	0.10 – 0.20 (0.004 – 0.008)	—
	EX.	0.20 – 0.30 (0.008 – 0.012)	—
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 seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	—
Valve head radial runout	IN. & EX.	—	0.03 (0.001)
Valve spring free length	IN. & EX.	—	46.1 (1.81)
Valve spring tension	IN. & EX.	182 – 210 N (18.6 – 21.4 kgf, 41.0 – 47.2 lbs) at length 36.35 mm (1.43 in)	—

Camshaft + Cylinder Head

Unit: mm (in)

Item	Standard		Limit
Cam height	IN.	36.330 – 36.380 (1.4303 – 1.4323)	36.030 (1.4185)
	EX.	35.300 – 35.350 (1.3898 – 1.3917)	35.000 (1.3780)
Camshaft journal oil clearance	IN. & EX.	0.019 – 0.053 (0.0007 – 0.0021)	0.150 (0.0059)
Camshaft journal holder I.D.	IN. & EX.	22.012 – 22.025 (0.8666 – 0.8671)	—
Camshaft journal O.D.	IN. & EX.	21.972 – 21.993 (0.8650 – 0.8659)	—
Camshaft runout	IN. & EX.	—	0.10 (0.004)
Cylinder head distortion	—		0.05 (0.002)
Cam drive idle gear/sprocket thrust clearance	0.15 – 0.27 (0.006 – 0.011)		—

Cylinder + Piston + Piston Ring
Unit: mm (in)

Item	Standard			Limit
Compression pressure (Automatic-decomp. actuated)	Approx. 1 000 kPa (10.0 kgf/cm^2, 142 psi)			—
Piston-to-cylinder clearance	0.030 – 0.040 (0.0012 – 0.0016)			0.120 (0.0047)
Cylinder bore	104.000 – 104.015 (4.0945 – 4.0951)			Nicks or Scratches
Piston diam.	103.965 – 103.980 (4.0931 – 4.0937) Measure at 15 mm (0.6 in) from the skirt end.			103.880 (4.0898)
Cylinder distortion	—			0.05 (0.102)
Piston ring free end gap	1st	R	Approx. 13.1 (0.52)	10.5 (0.41)
	2nd	RN	Approx. 14.6 (0.57)	11.7 (0.46)
Piston ring end gap	1st	R	0.10 – 0.25 (0.004 – 0.010)	0.50 (0.020)
	2nd	RN	0.10 – 0.25 (0.004 – 0.010)	0.50 (0.020)
Piston ring-to-groove clearance	1st		—	0.180 (0.0071)
	2nd		—	0.150 (0.0059)
Piston ring groove width	1st		0.83 – 0.85 (0.0327 – 0.0335) 1.30 – 1.32 (0.0512 – 0.0520)	—
	2nd		1.01 – 1.03 (0.0398 – 0.0406)	—
	Oil		2.01 – 2.03 (0.0791 – 0.0799)	—
Piston ring thickness	1st		0.76 – 0.81 (0.0299 – 0.0319)	—
			1.08 – 1.10 (0.0425 – 0.0433)	—
	2nd		0.97 – 0.99 (0.0382 – 0.0390)	—
Piston pin bore I.D.	23.002 – 23.008 (0.9056 – 0.9058)			23.030 (0.9067)
Piston pin O.D.	22.992 – 23.000 (0.9052 – 0.9055)			22.980 (0.9047)

Conrod + Crankshaft
Unit: mm (in)

Item	Standard	Limit
Conrod small end I.D.	23.006 – 23.014 (0.9057 – 0.9061)	23.040 (0.9071)
Conrod deflection	—	3.0 (0.12)
Conrod big end side clearance	0.10 – 0.75 (0.004 – 0.030)	1.0 (0.04)
Conrod big end width	24.95 – 25.00 (0.982 – 0.984)	—
Crank web to web width	72.9 – 73.1 (2.87 – 2.88)	—
Crankshaft runout	—	0.08 (0.003)

Tightening Torque Specifications

B831G21407002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Air cleaner box mounting bolt	4.5	0.45	3.0	☞(Page 1D-6)
TP sensor mounting screw	2	0.2	1.5	☞(Page 1D-11)
ISC valve mounting screw	2	0.2	1.5	☞(Page 1D-12)
Fuel delivery pipe mounting screw	5	0.5	3.5	☞(Page 1D-12)
Engine mounting nut	60	6.0	43.5	☞(Page 1D-16)
Engine mounting damper stopper bolt	23	2.3	16.5	☞(Page 1D-16)
Footrest mounting bolt (M8)	26	2.6	19.0	☞(Page 1D-16)
Footrest mounting bolt (M10)	55	5.5	40.0	☞(Page 1D-16)
Cylinder head bolt (L: 200) (Initial)	25	2.5	18.0	☞(Page 1D-23)
Cylinder head bolt (L: 200) (Final)	37	3.7	27.0	☞(Page 1D-23)
Cylinder head bolt (L: 70)	10	1.0	7.0	☞(Page 1D-23)
Cylinder head bolt (L: 100)	10	1.0	7.0	☞(Page 1D-23)
Cylinder base nut	10	1.0	7.0	☞(Page 1D-24)
Cam drive idle gear/sprocket shaft	41	4.1	29.5	☞(Page 1D-25) / ☞(Page 1D-40)
Cam chain tension adjuster bolt	10	1.0	7.0	☞(Page 1D-25)
Cam chain tension adjuster cap bolt	7	0.7	5.0	☞(Page 1D-26)
Camshaft journal holder bolt	10	1.0	7.0	☞(Page 1D-26) / ☞(Page 1D-29)
Head cover bolt (Initial)	10	1.0	7.0	☞(Page 1D-27)
Head cover bolt (Final)	14	1.4	10.0	☞(Page 1D-27)
Valve timing inspection plug	23	2.3	16.5	☞(Page 1D-27)
Oil gallery plug (Cylinder head)	10	1.0	7.0	☞(Page 1D-32)
Intake pipe bolt	9	0.9	6.5	☞(Page 1D-33)
Water bypass union	12	1.2	8.5	☞(Page 1D-33)
Crankcase bolt (M6)	10	1.0	7.0	☞(Page 1D-53)
Crankcase bolt (M8)	26	2.6	19.0	☞(Page 1D-53)
Main oil gallery plug	18	1.8	13.0	☞(Page 1D-54)
Crank balancer drive gear nut	150	15.0	108.5	☞(Page 1D-55)
Crank balancer driven gear bolt	50	5.0	36.0	☞(Page 1D-56)
Cam chain tensioner bolt	23	2.3	16.5	☞(Page 1D-56)
Starter cup nut	38	3.8	27.5	☞(Page 1D-59)
Water pump mounting bolt	10	1.0	7.0	☞(Page 1D-59)
Speed sensor bolt	10	1.0	7.0	☞(Page 1D-64)

NOTE

The specified tightening torque is also described in the following.
“Throttle Body Components (Page 1D-7)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

B831G21408001

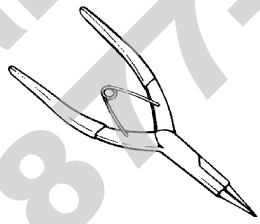
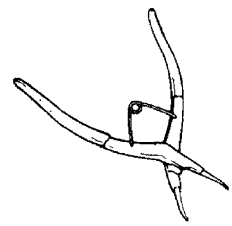
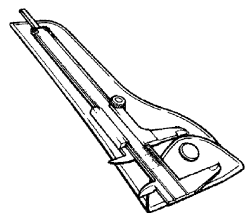
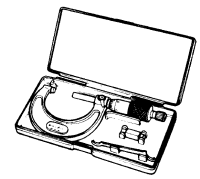
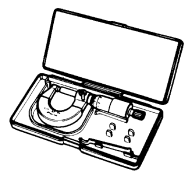
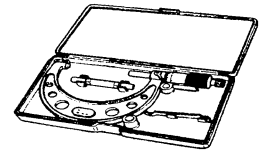
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 1D-11) / ☞(Page 1D-33) / ☞(Page 1D-52) / ☞(Page 1D-53) / ☞(Page 1D-53) / ☞(Page 1D-58) / ☞(Page 1D-59) / ☞(Page 1D-64)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 1D-21) / ☞(Page 1D-22) / ☞(Page 1D-34) / ☞(Page 1D-58) / ☞(Page 1D-58)
Sealant	SUZUKI BOND No.1215 or equivalent	P/No.: 99000–31110	☞(Page 1D-22) / ☞(Page 1D-52)
	SUZUKI BOND No.1216B or equivalent	P/No.: 99000–31230	☞(Page 1D-27)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 1D-16) / ☞(Page 1D-56)
	THREAD LOCK CEMENT 1342 or equivalent	P/No.: 99000–32050	☞(Page 1D-33) / ☞(Page 1D-33) / ☞(Page 1D-56) / ☞(Page 1D-65) / ☞(Page 1D-65)

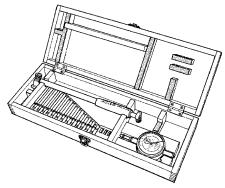
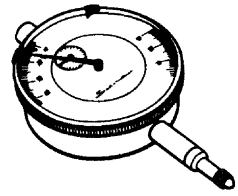
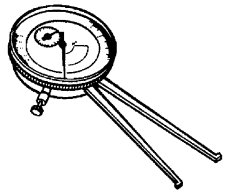
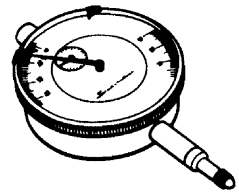
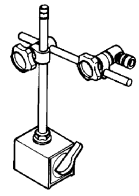
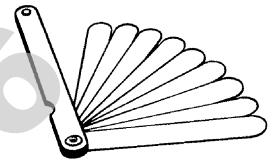
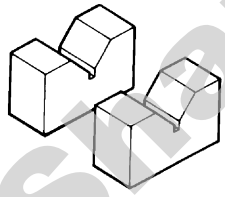
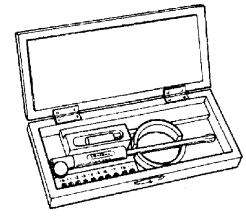
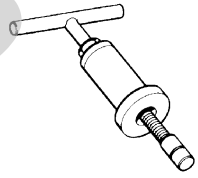
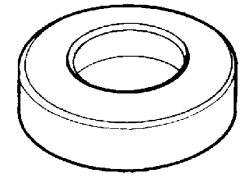
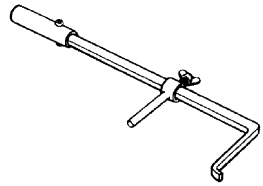
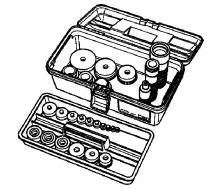
NOTE

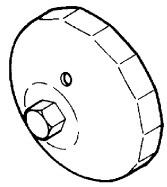
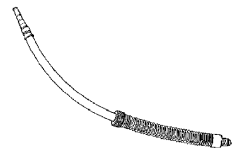
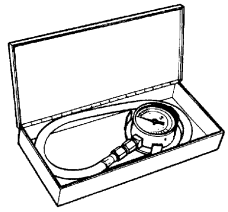
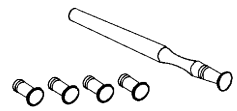
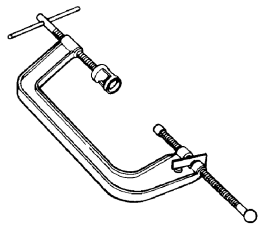
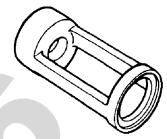
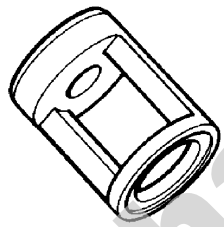
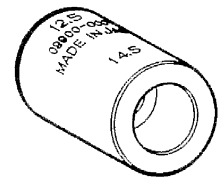
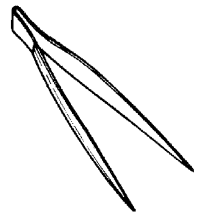
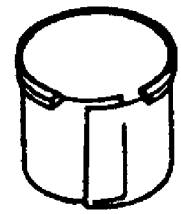
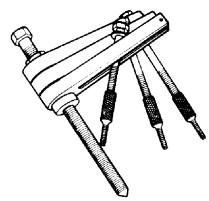
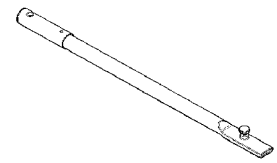
Required service material is also described in the following.
“Throttle Body Components (Page 1D-7)”

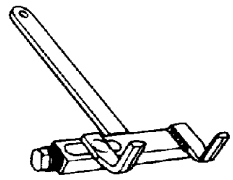
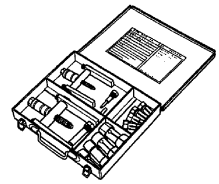
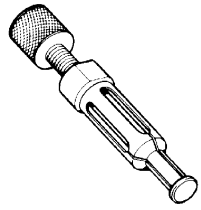
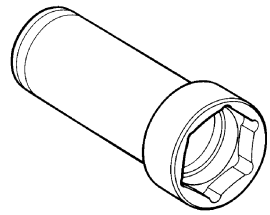
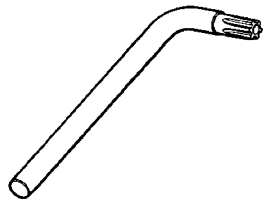
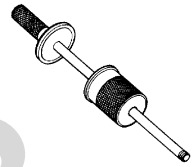
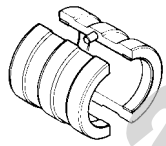
Special Tool

B831G21408002

09900–06107 Snap ring pliers ☞(Page 1D-47) / ☞(Page 1D-47) / ☞(Page 1D-57)		09900–06108 Snap ring pliers ☞(Page 1D-63)	
09900–20101 Vernier calipers (1/15 mm, 150 mm) ☞(Page 1D-36) / ☞(Page 1D-37) / ☞(Page 1D-44)		09900–20202 Micrometer (1/100 mm, 25 – 50 mm) ☞(Page 1D-28)	
09900–20205 Micrometer (0 – 25 mm) ☞(Page 1D-29) / ☞(Page 1D-36) / ☞(Page 1D-41) / ☞(Page 1D-44) / ☞(Page 1D-45)		09900–20210 Micrometer (100 – 125 mm) ☞(Page 1D-43)	

09900–20530 Cylinder gauge set ☞(Page 1D-42) 	09900–20602 Dial gauge (1/1000 mm, 1 mm) ☞(Page 1D-29) / ☞(Page 1D-45) 
09900–20605 Dial calipers (1/100 mm, 10 – 34 mm) ☞(Page 1D-59) 	09900–20607 Dial gauge (1/100 mm, 10 mm) ☞(Page 1D-28) / ☞(Page 1D-35) / ☞(Page 1D-35) / ☞(Page 1D-36) / ☞(Page 1D-60) / ☞(Page 1D-60) 
09900–20701 Magnetic stand ☞(Page 1D-28) / ☞(Page 1D-35) / ☞(Page 1D-35) / ☞(Page 1D-36) / ☞(Page 1D-60) / ☞(Page 1D-60) 	09900–20803 Thickness gauge ☞(Page 1D-35) / ☞(Page 1D-40) / ☞(Page 1D-41) / ☞(Page 1D-44) / ☞(Page 1D-44) / ☞(Page 1D-60) 
09900–21304 V-block (100 mm) ☞(Page 1D-28) / ☞(Page 1D-35) / ☞(Page 1D-35) / ☞(Page 1D-60) / ☞(Page 1D-60) 	09900–22301 Plastigauge (0.025 – 0.076 mm) ☞(Page 1D-29) 
09900–22302 Plastigauge (0.051 – 0.152 mm) ☞(Page 1D-29) 	09900–22403 Small bore gauge (18 – 35 mm) ☞(Page 1D-29) / ☞(Page 1D-45) 
09910–32812 Crankshaft installer ☞(Page 1D-51) 	09910–32860 Attachment ☞(Page 1D-51) 
09913–50121 Oil seal remover ☞(Page 1D-62) / ☞(Page 1D-63) 	09913–70210 Bearing installer set ☞(Page 1D-62) / ☞(Page 1D-63) / ☞(Page 1D-64) / ☞(Page 1D-65) / ☞(Page 1D-65) / ☞(Page 1D-65) 

09915–40610 Oil filter wrench ☞(Page 1D-45) 	09915–63311 Compression gauge attachment ☞(Page 1D-2) 
09915–64512 Compression gauge ☞(Page 1D-2) 	09916–10911 Valve lapper set ☞(Page 1D-37) 
09916–14510 Valve spring compressor ☞(Page 1D-31) / ☞(Page 1D-34) 	09916–14521 Valve spring compressor attachment ☞(Page 1D-31) 
09916–14910 Valve spring compressor attachment ☞(Page 1D-34) 	09916–34542 Reamer handle ☞(Page 1D-38) / ☞(Page 1D-39) 
09916–34550 Valve guide reamer (5.5 mm) ☞(Page 1D-39) 	09916–34580 Valve guide reamer (10.8 mm) ☞(Page 1D-38) 
09916–44910 Valve guide remover/ installer ☞(Page 1D-38) / ☞(Page 1D-39) 	09916–57360 Attachment ☞(Page 1D-39) 
09916–84511 Valve adjuster driver ☞(Page 1D-31) / ☞(Page 1D-34) 	09919–28610 Sleeve protector ☞(Page 1D-31) / ☞(Page 1D-34) 
09920–13120 Crankcase separating tool ☞(Page 1D-50) / ☞(Page 1D-51) 	09920–31020 Extension handle ☞(Page 1D-48) / ☞(Page 1D-55) 

09920–53740 Clutch sleeve hub holder ☞(Page 1D-48) / ☞(Page 1D-55) 	09921–20240 Bearing remover set ☞(Page 1D-61) / ☞(Page 1D-62) / ☞(Page 1D-63) 
09923–74511 Bearing remover ☞(Page 1D-62) 	09924–52460 Socket (52 mm) ☞(Page 1D-48) / ☞(Page 1D-48) / ☞(Page 1D-55) / ☞(Page 1D-56) 
09930–11950 Torx wrench ☞(Page 1D-11) / ☞(Page 1D-12) 	09930–30104 Rotor remover slide shaft ☞(Page 1D-62) / ☞(Page 1D-62) 
09941–53610 Front fork installer hammer ☞(Page 1D-51) 	09941–64511 Bearing remover ☞(Page 1D-62) 

Engine Lubrication System

Precautions

Precautions for Engine Oil

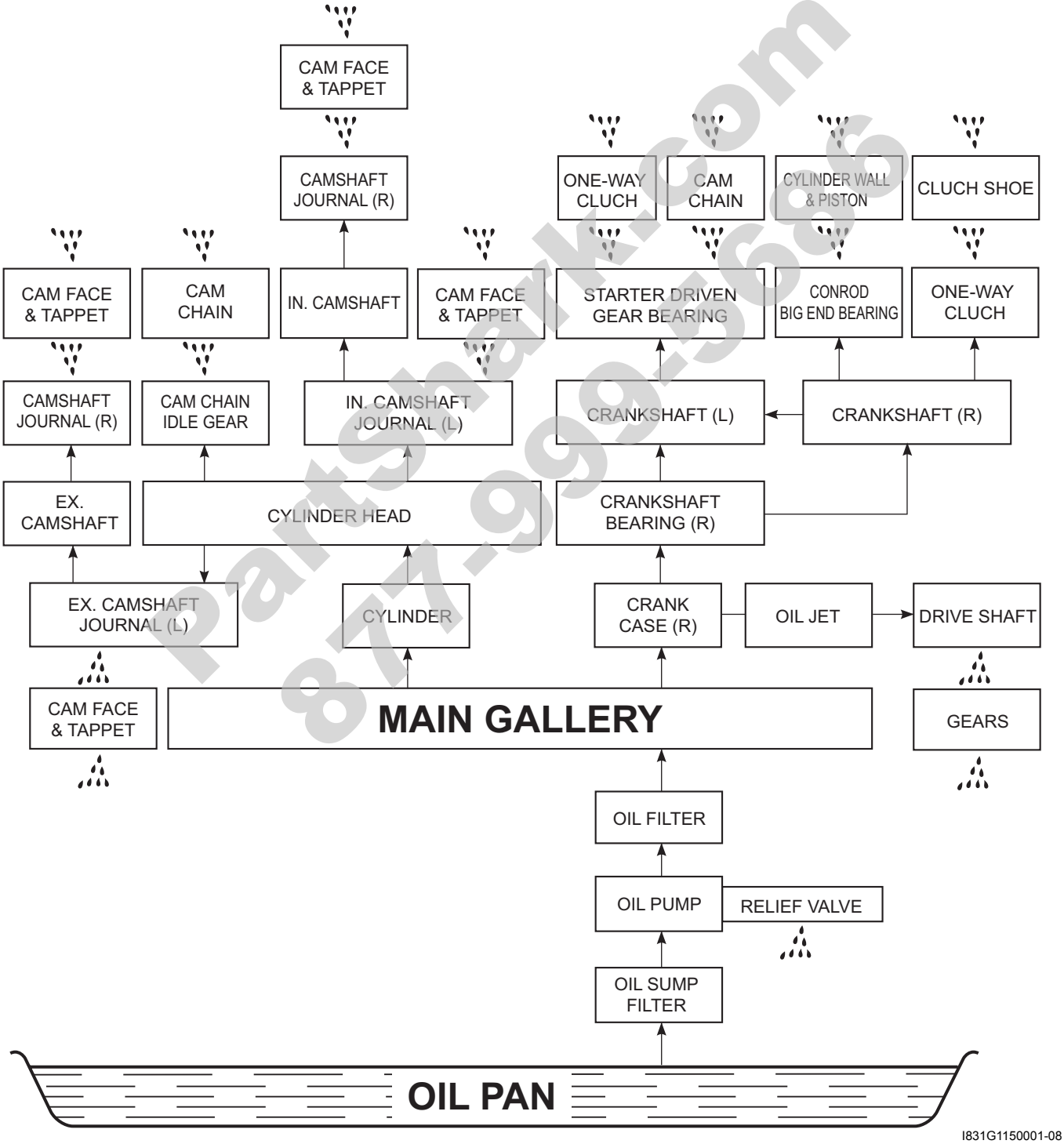
B831G21500001

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

Schematic and Routing Diagram

Engine Lubrication System Chart Diagram

B831G21502001



I831G1150001-08

Diagnostic Information and Procedures

Engine Lubrication Symptom Diagnosis

B831G21504001

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.*
	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

B831G21504002

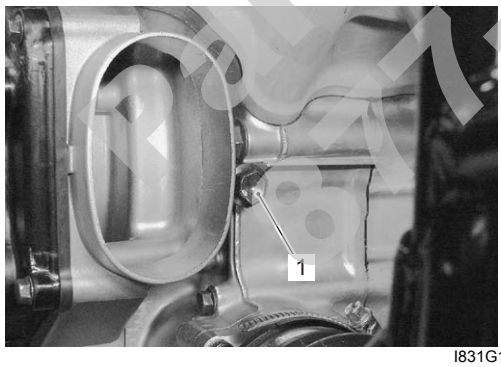
Check the engine oil pressure periodically. This will give a good indication of the condition of the moving parts.

NOTE

Before checking the oil pressure, check the following.

- **Oil level (Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-10)".)**
- **Oil leaks (If leak is found, repair it.)**
- **Oil quality (If oil is discolored or deteriorated, replace it.)**

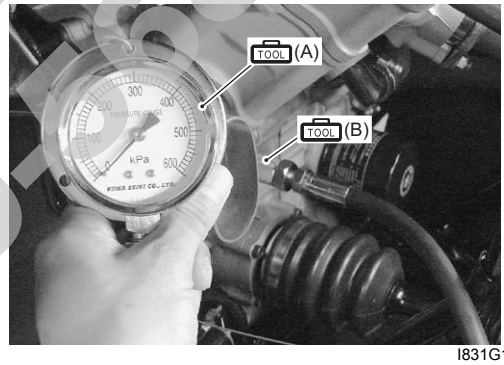
1) Remove the right inner fender. Refer to "Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".
2) Remove the belt cooling intake duct. Refer to "V-belt Cooling Duct Removal and Installation in Section 5A (Page 5A-5)".
3) Remove the main oil gallery plug (1).



I831G1150002-01

4) Install the oil pressure gauge and attachment into the main oil gallery.
5) Connect the tachometer to the high-tension cord.

Special tool
(A): 09915–74511 (Oil pressure gauge set)
(B): 09915–74533 (Oil pressure gauge attachment)
: 09900–26006 (Engine tachometer (solar cell type))



I831G1150003-02

6) Warm up the engine as follows:
Summer: 10 min. at 2 000 r/min
Winter: 20 min. at 2 000 r/min

7) 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
140 – 180 kPa (1.4 – 1.8 kgf/cm², 20 – 26 psi) at 3 000 r/min, Oil temp. at 60 °C (140 °F)

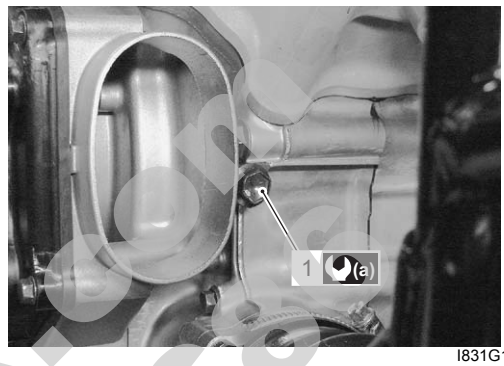
High oil pressure	Low oil pressure
• Engine oil viscosity is too high. • Clogged oil passage. • Combination of the above items.	• Clogged oil filter. • Oil leakage from the oil passage. • Damaged O-ring. • Defective oil pump. • Combination of the above items.

8) Stop the engine and remove the oil pressure gauge and attachment.
9) 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
Main oil gallery plug (a): 18 N·m (1.8 kgf-m, 13.0 lb-ft)



I831G1150004-02

10) Check the engine oil level. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.
11) Reinstall the removed parts.

Repair Instructions

Engine Oil and Filter Replacement

B831G21506001

Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.

Engine Oil Level Inspection

B831G21506002

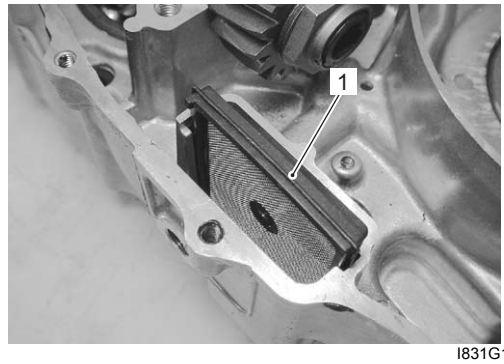
Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.

Oil Sump Filter Removal and Installation

B831G21506003

Removal

1) Remove the engine assembly from the frame. Refer to “Engine Assembly Removal in Section 1D (Page 1D-13)”.
2) Disassemble the engine top side. Refer to “Engine Top Side Disassembly in Section 1D (Page 1D-17)”.
3) Separate the left and right crankcase. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-45)”.
4) Remove the oil sump filter (1).



I831G1150005-01

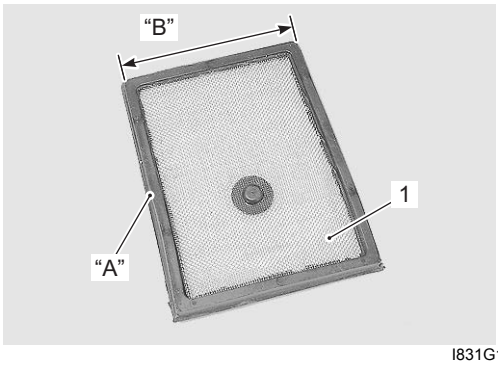
Installation

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.**



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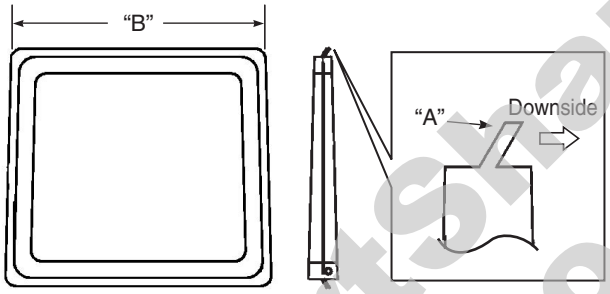


I705H1150004-01

"A": Lip	"B": Shorter side

Oil Sump Filter Inspection and Cleaning

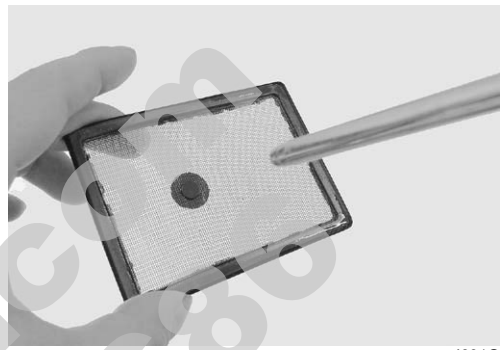
B831G21506004

Inspect the oil sump filter in the following procedures:

1) Remove the oil sump filter. Refer to "Oil Sump Filter Removal and Installation (Page 1E-3)".
2) 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.



I831G1150007-01

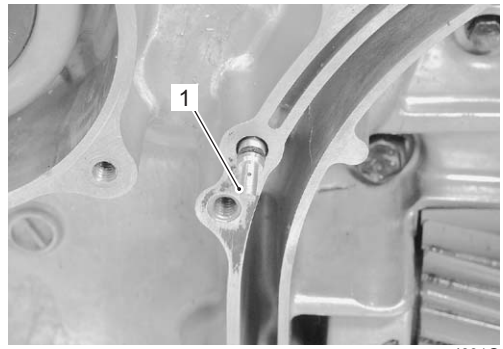
3) Install the oil sump filter. Refer to "Oil Sump Filter Removal and Installation (Page 1E-3)".

Oil Jet Removal and Installation

B831G21506005

Removal

1) Remove the clutch shoe housing case and gasket. Refer to "Clutch Shoe Removal and Installation in Section 5A (Page 5A-16)".
2) Remove the oil jet (1).



I831G1150008-01

Installation
Install the oil jet 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.

I831G1150009-03

Oil Jet Inspection

B831G21506006

Refer to “Oil Jet Removal and Installation (Page 1E-4)”. Make sure that the oil jet is not clogged. If it is clogged, clean the oil passage using a wire of the proper size and compressed air.

I831G1150010-02

Oil Pump Removal and Installation

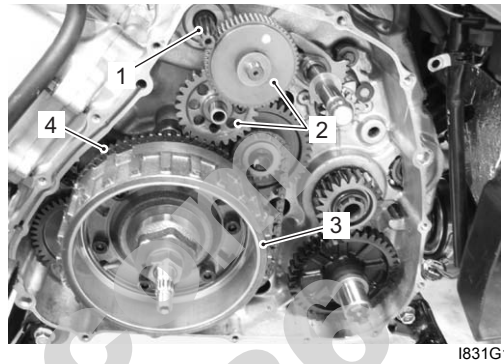
B831G21506007

Removal

NOTE

Do not drop the each parts into the crankcase.

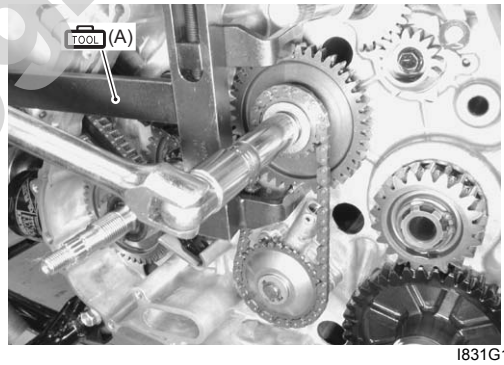
1) Drain the engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.
2) Remove the starter motor (1). Refer to “Starter Motor Removal and Installation in Section 1I (Page 1I-4)”.
3) Remove the starter torque limiter and starter idle gear (2). Refer to “Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)”.
4) Remove the generator rotor assembly (3) and starter driven gear (4). Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)” and “Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)”.



I831G1150011-01

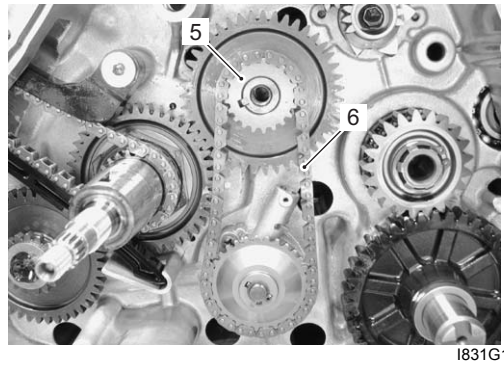
5) Hold the crank balancer driven gear with the special tool and remove the oil pump drive gear bolt and washer.

Special tool
TOOL (A): 09920–53740 (Clutch sleeve hub holder)



I831G1150012-01

6) Remove the oil pump drive gear (5) along with the chain (6).



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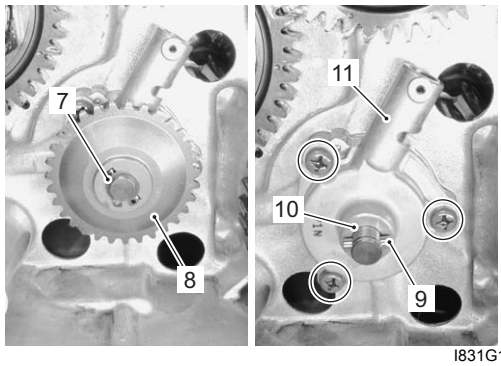
7) Remove the snap ring (7) and oil pump driven gear (8).

Special tool
TOOL : 09900–06107 (Snap ring pliers)

8) Remove the pin (9), washer (10) and oil pump (11).

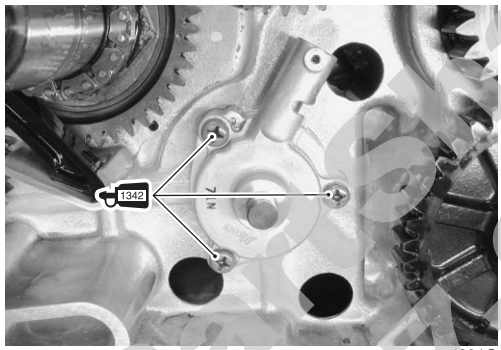


I831G1150014-01

Installation
Install the oil pump in the reverse order of removal. Pay attention to the following points:

- Apply thread lock to the oil pump bolts.

1342 : Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)



I831G1150015-02

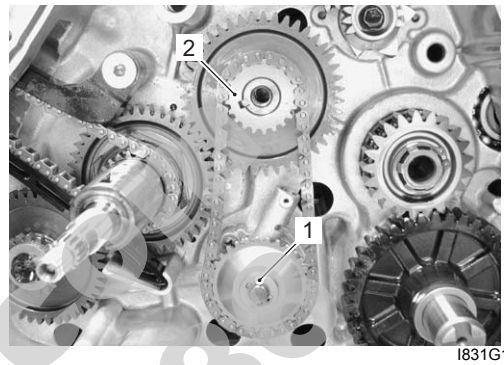
- Install the new snap ring (1).

Special tool
TOOL : 09900–06107 (Snap ring pliers)

- Install the oil pump drive gear (2) with chain.

NOTE

The flange side of the oil pump drive gear (2) inside.



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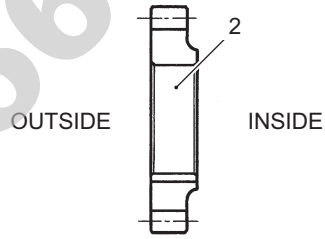
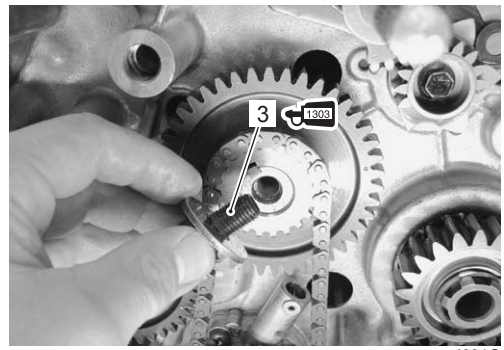


I831G1150016-07

2. Oil pump drive gear

- Apply thread lock super to the oil pump drive gear bolt (3).

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

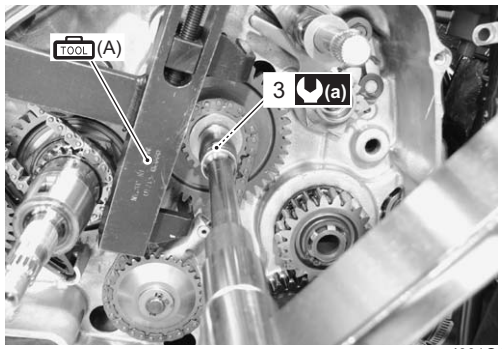


I831G1150017-02

- Hold the crank balancer driven gear with the special tool and tighten the oil pump drive gear bolt (3) to the specified torque.

  Special tool
  (A): 09920–53740 (Clutch sleeve hub holder)

  Tightening torque
  Oil pump drive gear/Crank balancer driven gear bolt (a): 50 N·m (5.0 kgf-m, 36.0 lb-ft)



I831G1150018-03

Oil Pump Inspection

B831G21506008

Inspect the oil pump in the following procedures:

1) Remove the oil pump. Refer to “Oil Pump Removal and Installation (Page 1E-5)”.
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.


I831G1150019-01

3) Install the oil pump. Refer to “Oil Pump Removal and Installation (Page 1E-5)”.

Specifications

Service Data

B831G21507001

Oil Pump

Item	Standard	Limit
Oil pressure (at 60 °C, 140 °F)	140 – 180 kPa (1.4 – 1.8 kgf/cm², 20 – 26 psi) at 3 000 r/min	—

Oil

Item	Specification		Note
Engine oil type	SAE 10 W-40, API SF/SG or SH/SJ with JASO MA		
Engine oil capacity	Change	2 300 ml (2.4/2.0 US/Imp qt)	
	Filter change	2 500 ml (2.6/2.2 US/Imp qt)	
	Overhaul	3 000 ml (3.2/2.6 US/Imp qt)	

Tightening Torque Specifications

B831G21507002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Main oil gallery plug	18	1.8	13.0	☞(Page 1E-3)
Oil pump drive gear/Crank balancer driven gear bolt	50	5.0	36.0	☞(Page 1E-7)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

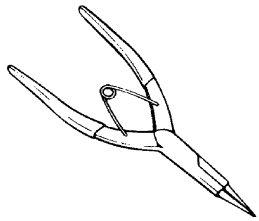
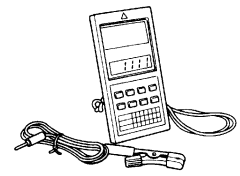
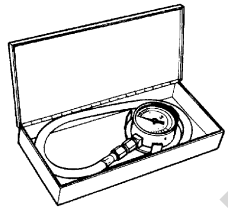
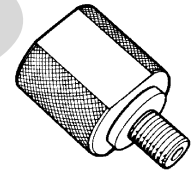
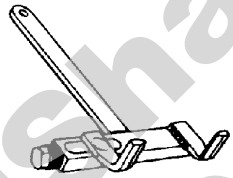
Recommended Service Material

B831G21508001

Material	SUZUKI recommended product or Specification		Note
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 1E-6)
	THREAD LOCK CEMENT 1342 or equivalent	P/No.: 99000–32050	☞(Page 1E-6)

Special Tool

B831G21508002

09900–06107 Snap ring pliers ☞(Page 1E-6) / ☞(Page 1E-6) 	09900–26006 Engine tachometer (solar cell type) ☞(Page 1E-2) 
09915–74511 Oil pressure gauge set ☞(Page 1E-2) 	09915–74533 Oil pressure gauge attachment ☞(Page 1E-2) 
09920–53740 Clutch sleeve hub holder ☞(Page 1E-5) / ☞(Page 1E-7) 	

Engine Cooling System

Precautions

Precautions for Engine Cooling System

B831G21600001

⚠ 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

B831G21600002

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

General Description

Engine Coolant Description

B831G21601001

⚠ 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

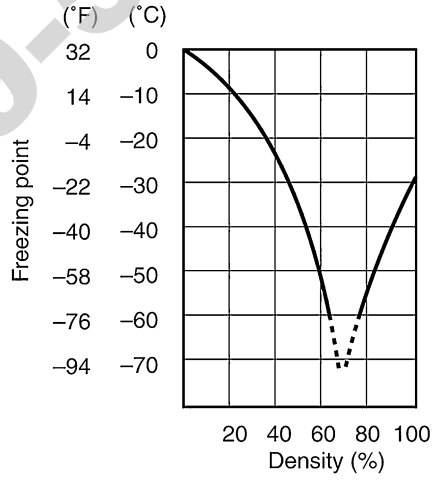


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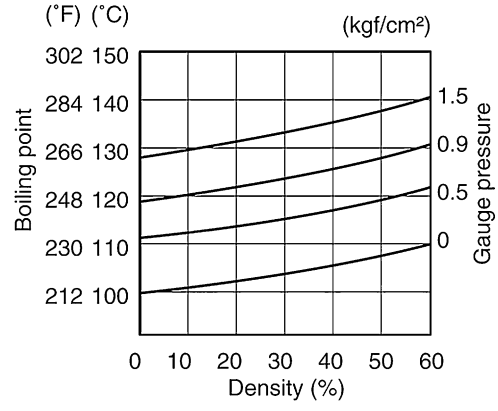
Fig.2: Engine coolant density-boiling point curve



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Schematic and Routing Diagram

Cooling Circuit Diagram

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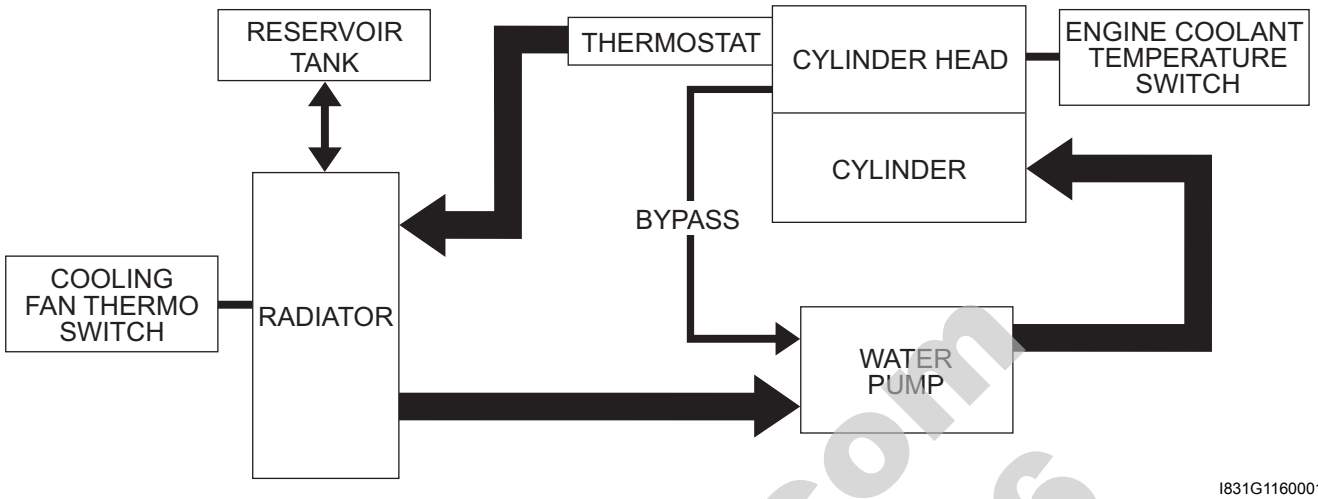

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Water Hose Routing Diagram

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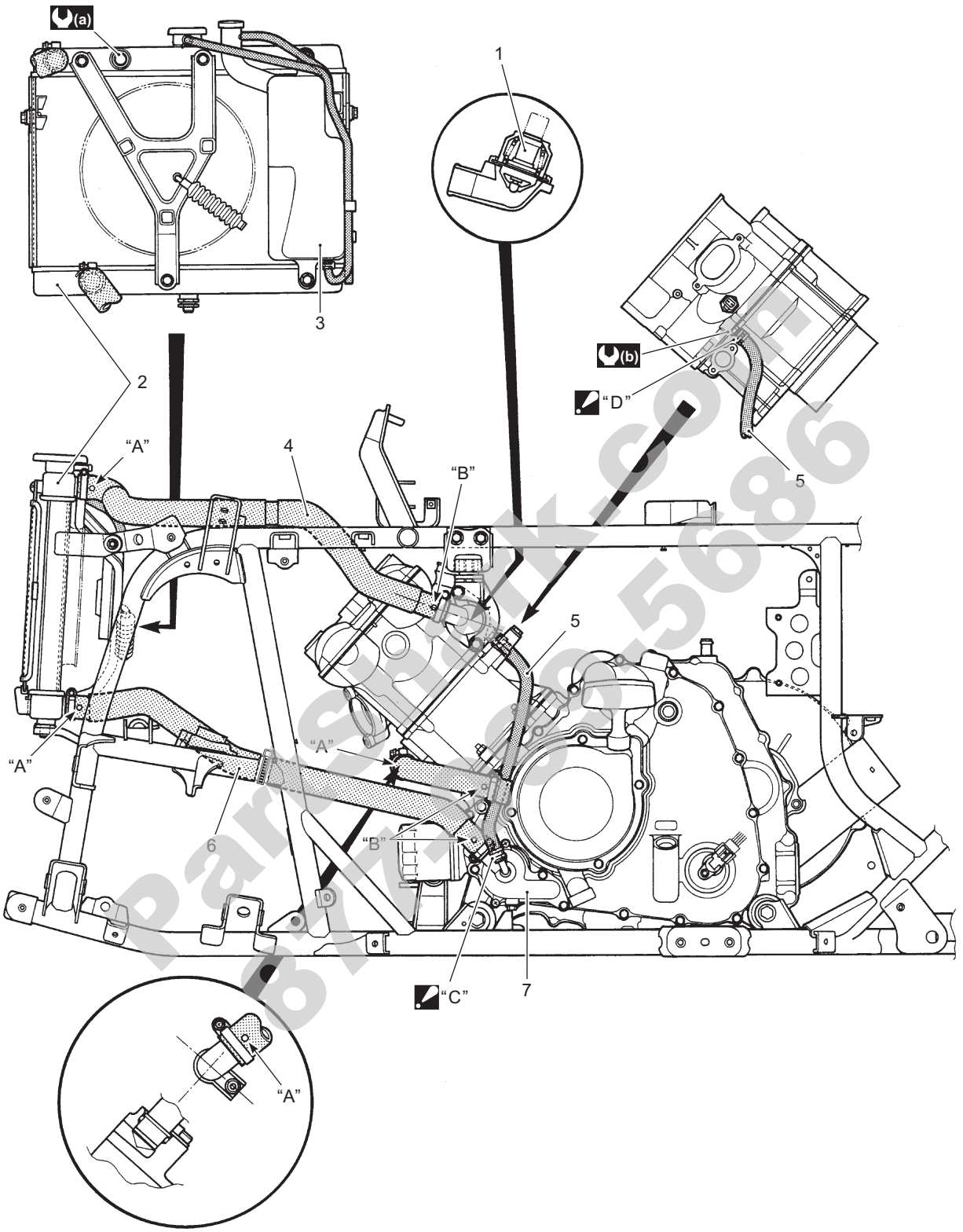

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1. Thermostat	6. Radiator outlet hose	"D": Face the tip of the clip to upper.
2. Radiator	7. Water pump	(a) : 17 N·m (1.7 kgf-m, 12.5 lb-ft)
3. Reservoir tank	"A": Yellow mark	(b) : 12 N·m (1.2 kgf-m, 8.5 lb-ft)
4. Radiator inlet hose	"B": White mark	
5. Bypass hose	"C": Face the tip of the clip to forward.	

Diagnostic Information and Procedures

Engine Cooling Symptom Diagnosis

B831G21604001

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 thermo-switch.	*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 thermo-switch.	*Replace.*
	Extremely cold weather.	*Put on radiator cover.*
	Defective thermostat.	*Replace.*
	Defective ECT sensor.	*Replace.*
	Defective ECM.	*Replace.*

Repair Instructions

Cooling Circuit Inspection

B831G21606001

⚠ WARNING

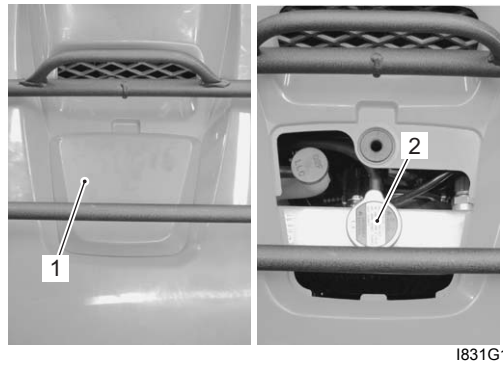
- **Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.**
- **When removing the radiator cap tester, put a rag on the filler to prevent the engine coolant from spraying out.**

Inspect the cooling circuit in the following procedures:

1) Remove the radiator cap lid (1) and radiator cap (2).
2) Connect the radiator tester (3) 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.



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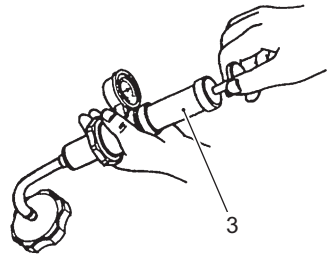

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4) After finishing the cooling circuit inspection, reinstall the removed parts.

Radiator Cap Inspection

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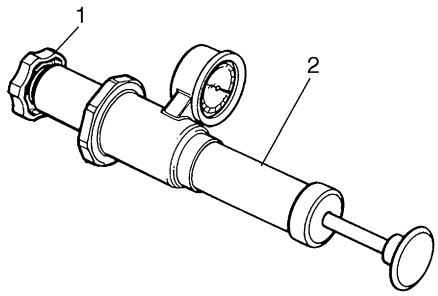
Inspect the radiator cap in the following procedures:

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.



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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
   110 – 140 kPa (1.1 – 1.4 kgf/cm², 15.6 – 19.9 psi)

4) After finishing the radiator cap inspection, reinstall the removed parts.

Radiator Inspection and Cleaning

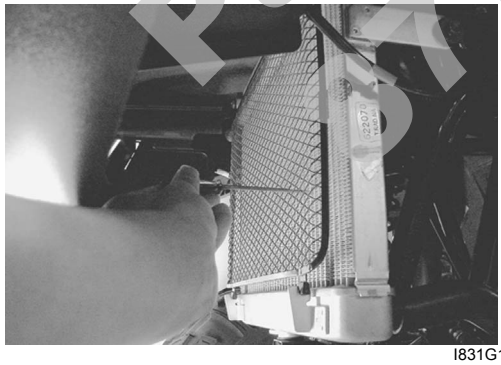
B831G21606003

Radiator Hose

Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.

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.



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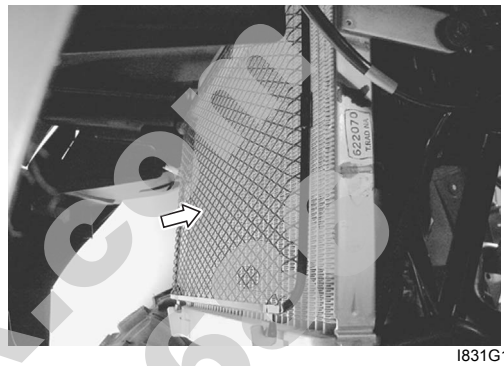
Radiator Cleaning

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.**



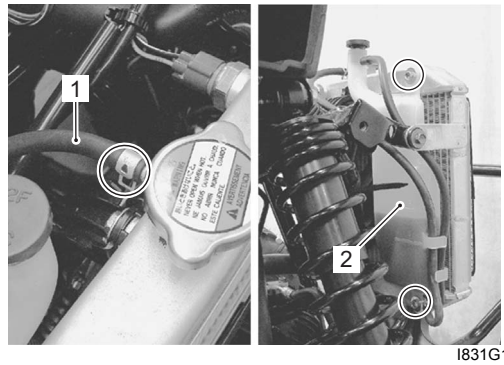
I831G1160062-01

Cooling Fan Assembly / Radiator Removal and Installation

B831G21606004

Removal

1) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the hoses (1).
3) Remove the reservoir tank (2).



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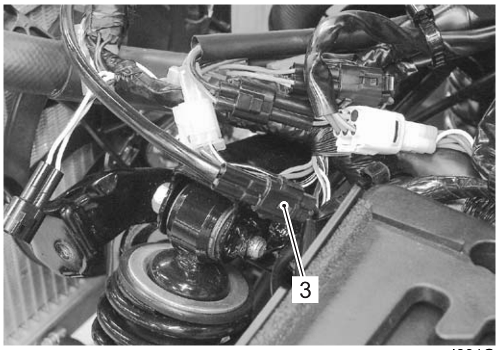
4) Disconnect the cooling fan motor coupler (3).



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5) Remove the cooling fan assembly (4) by removing the bolts.

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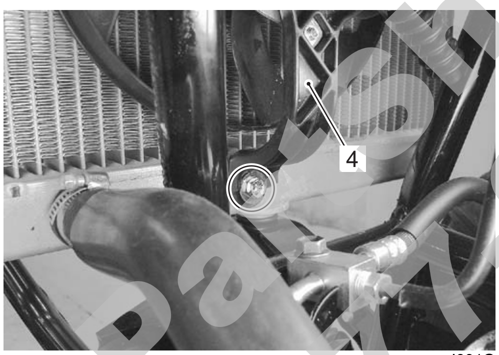

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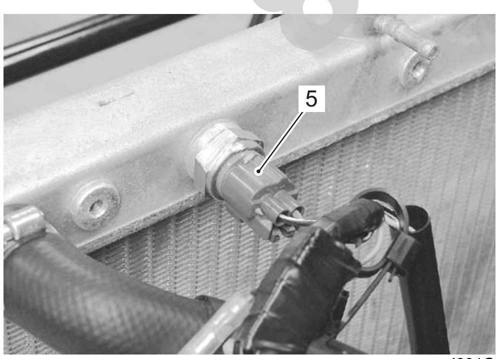
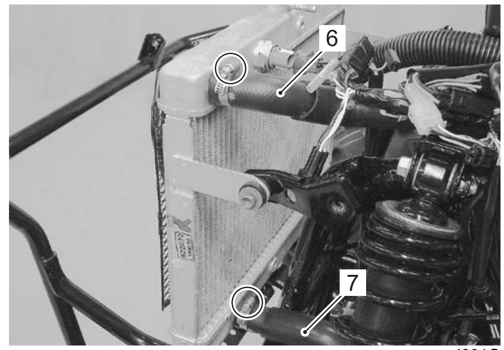
6) Disconnect the cooling fan thermo-switch (5).



I831G1160008-01

7) Disconnect the inlet hose (6) and outlet hose (7).



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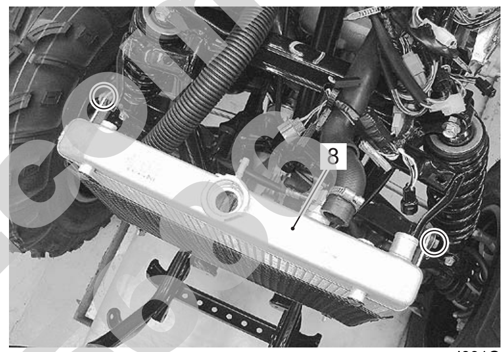
8) Remove the radiator (8) by removing the bolts.



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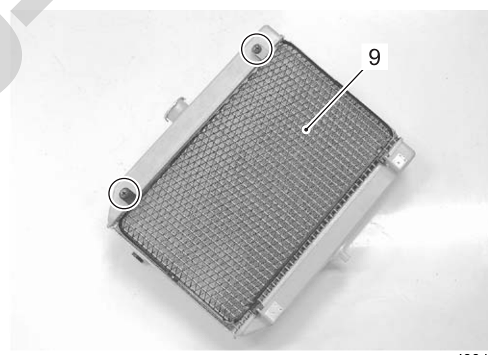
9) Remove the radiator cover (9).



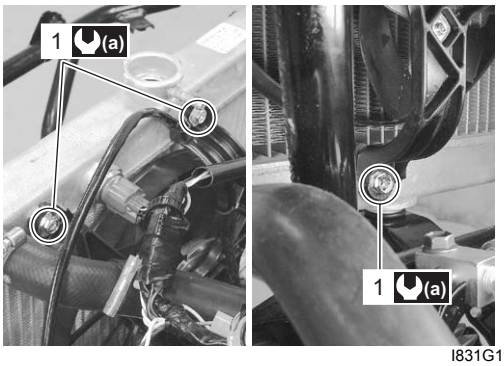
I831G1160011-02

Installation

Install the cooling fan assembly and radiator in the reverse order of removal. Pay attention to the following points:

- Connect the radiator hoses securely. Refer to “Water Hose Routing Diagram (Page 1F-3)”.
- Tighten the cooling fan assembly mounting bolts (1) to the specified torque.

Tightening torque
Cooling fan assembly mounting bolt (a): 8.5 N·m (0.85 kgf-m, 6.0 lbf-ft)



I831G1160012-03

- Pour engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.
- Bleed air from the cooling circuit. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.

Water Hose Removal and Installation

B931G21606005

Removal

1) Drain engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.
2) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) 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-15)”.
3) Reinstall the removed parts.

Cooling Fan Inspection

B931G21606006

Inspect the cooling fan in the following procedures:

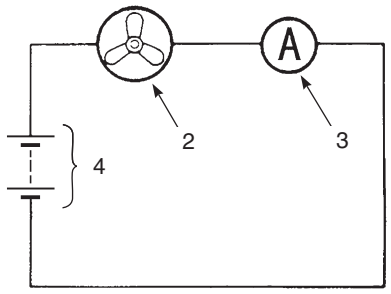
1) Disconnect the cooling fan motor coupler (1).

I831G1160018-02

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 “Cooling Fan Assembly / Radiator 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 8 A.**



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2. Fan motor	3. Ammeter	4. Battery

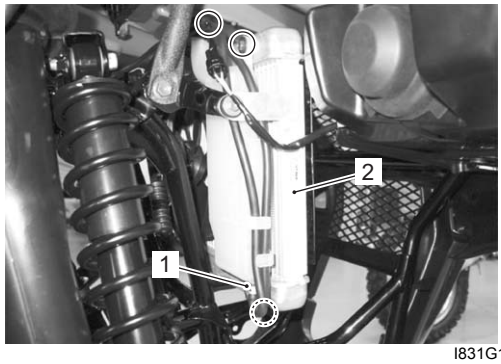
3) Connect the cooling fan motor coupler.

Radiator Reservoir Tank Removal and Installation

B831G21606007

Removal

1) Remove the right inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Remove the reservoir tank mounting bolts.
3) Disconnect the hoses (1) and drain the engine coolant.
4) Remove the reservoir tank (2).

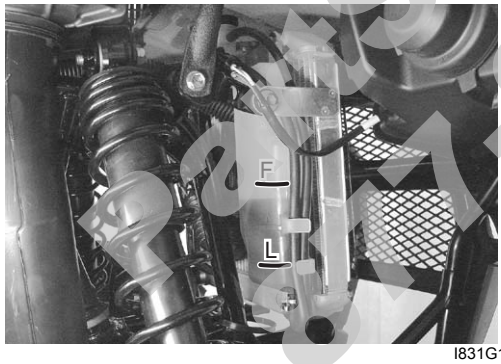


I831G1160019-02

Installation

Install radiator reservoir tank in the reverse order of removal. Pay attention to the following points:

- Connect the radiator reservoir tank hoses securely. Refer to “Water Hose Routing Diagram (Page 1F-3)”.
- Fill the reservoir tank to the upper level.



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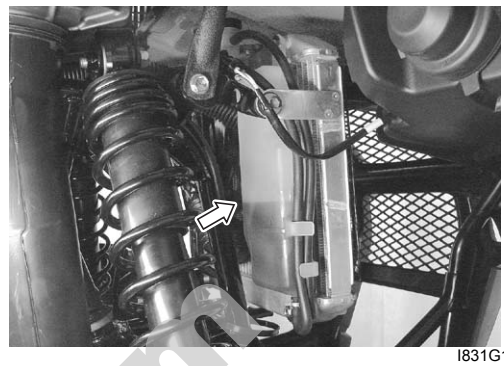
Radiator Reservoir Tank Inspection

B831G21606008

Inspect the radiator reservoir tank cooling leaks. If any defects are found, replace the radiator reservoir tank with a new one.



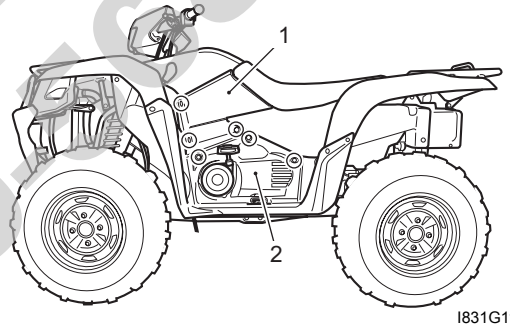
I831G1160021-01

Water Hose Inspection

B831G21606009

Inspect the water hoses in the following procedures:

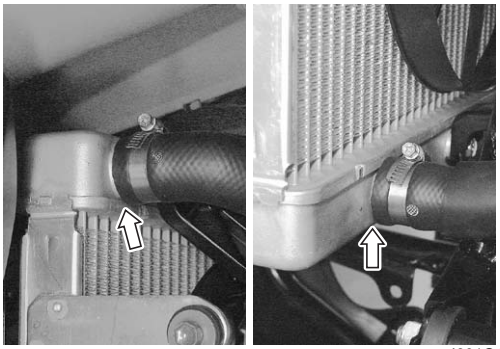
1) Remove the left side cover (1) and engine side cover (2).



I831G1160064-02

2) Check the water hoses for crack, damage or engine coolant leakage. If any defects are found, replace the radiator hose with a new one.

3) Any leakage from the connecting section should be corrected by proper tightening. Refer to “Water Hose Routing Diagram (Page 1F-3)”.



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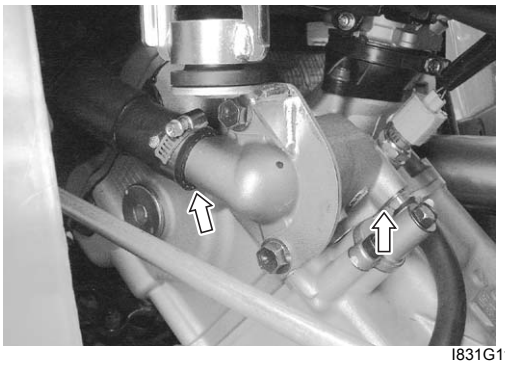

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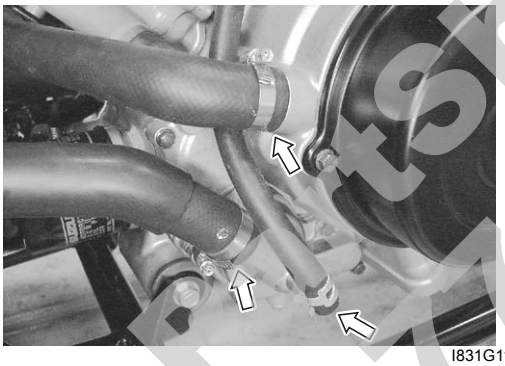

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4) After finishing the water hose inspection, reinstall the removed parts.

ECT Sensor Removal and Installation

B831G21606010

Refer to “ECT Sensor Removal and Installation in Section 1C (Page 1C-4)”.

ECT Sensor Inspection

B831G21606011

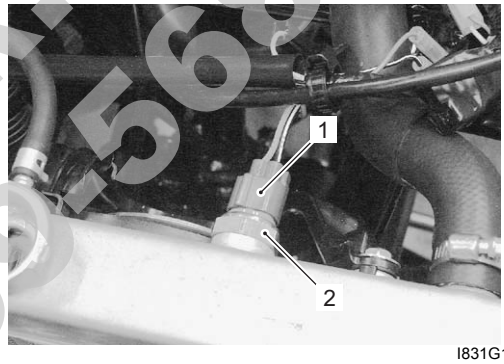
Refer to “ECT Sensor Inspection in Section 1C (Page 1C-4)”.

Cooling Fan Thermo-switch Removal and Installation

B831G21606012

Removal

1) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Drain engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.
3) Disconnect the cooling fan thermo-switch lead wire coupler (1).
4) Remove the cooling fan thermo-switch (2).



I831G1160025-02

Installation
Install the cooling fan thermo-switch in the reverse order of removal. Pay attention to the following points:

- Apply engine coolant to the O-ring.

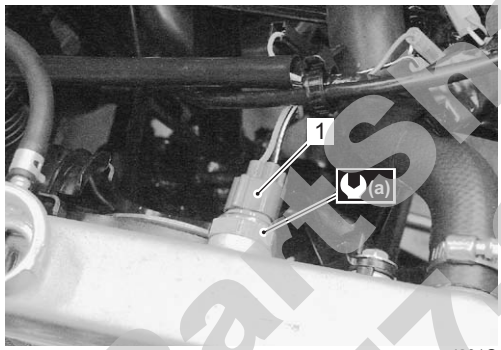
⚠ CAUTION

Replace the removed O-ring with a new one.

I831G1160026-01

- Tighten the cooling fan thermo-switch to the specified torque and connect the coupler (1).

Tightening torque
Cooling fan thermo-switch (a): 17 N·m (1.7 kgf-m, 12.5 lb-ft)



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- Pour engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-15)".
- Bleed air from the cooling circuit. Refer to "Cooling System Inspection in Section 0B (Page 0B-15)".

Cooling Fan Thermo-switch Inspection

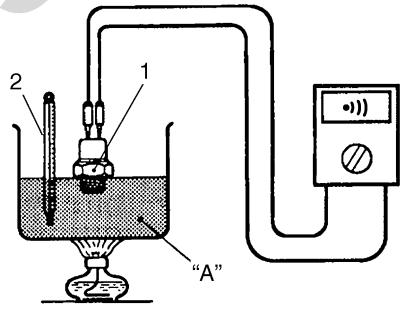
B831G21606013

Inspect the cooling fan thermo-switch in the following procedures:

1) Remove the cooling fan thermo-switch. Refer to "Cooling Fan Thermo-switch Removal and Installation (Page 1F-9)".
2) Check the thermo-switch closing or opening temperatures by testing it at the bench as shown in the figure.
3) Connect the thermo-switch (1) to a circuit tester and place it in the water "A" contained in a pan, which is placed on the stove.
4) Heat the water to raise its temperature slowly and read the column thermometer (2) when the switch closes or opens. If any abnormality is found, replace the cooling fan thermo-switch with a new one.

⚠ CAUTION

- **Take special care when handling the cooling fan thermo-switch. Do not subject it to strong blows or allow it to be dropped.**
- **Do not contact the cooling fan thermo-switch (1) and the column thermometer (2) with a pan.**



I705H1160033-03

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

Tester knob indication
Continuity test (•)))

Cooling fan thermo-switch operating temperature
Standard (OFF → ON): Approx. 93 °C (199 °F)
Standard (ON → OFF): Approx. 87 °C (189 °F)

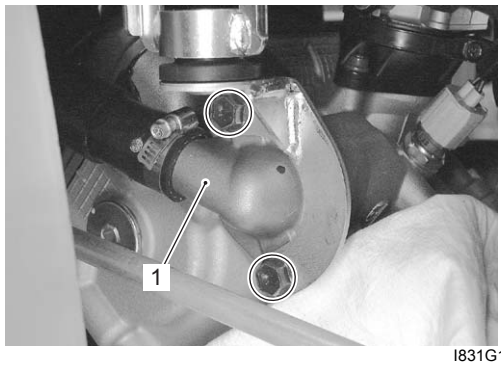
5) Reinstall the cooling fan thermo-switch. Refer to "Cooling Fan Thermo-switch Removal and Installation (Page 1F-9)".

Thermostat Removal and Installation

B831G21606014

Removal

1) Drain a small amount of engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-15)".
2) Place a rag under the thermostat cover (1).
3) Remove the thermostat case (1).



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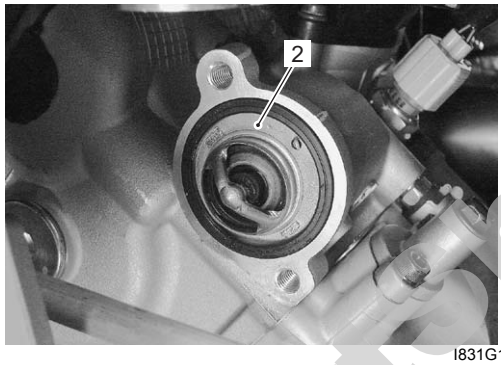
4) Remove the thermostat (2).



I831G1160028-01

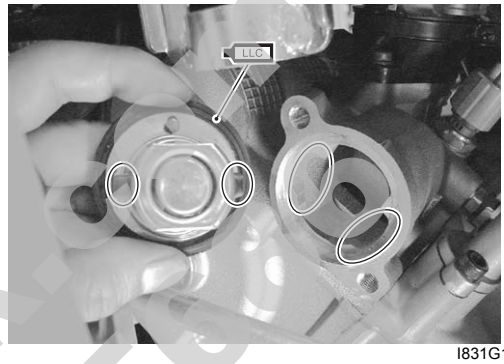
Installation

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

- Apply engine coolant to the rubber seal on the thermostat.
- Install the thermostat.

NOTE

- **Align the protrusions on the thermostat with the groove on the cylinder head.**
- **The jiggle valve of the thermostat faces upside.**



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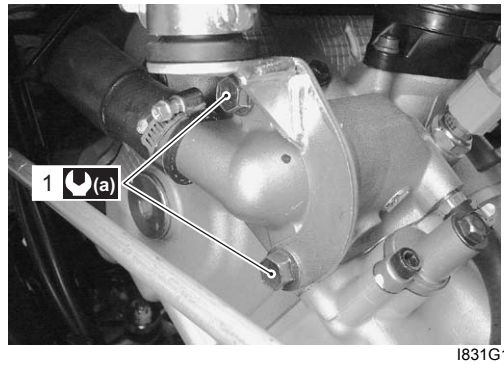
I831G1160030-02

- Tighten the thermostat cover bolts (1) to the specified torque.

Tightening torque
Thermostat cover bolt (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



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- Pour engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.
- Bleed air from the cooling circuit. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.

Thermostat Inspection

B831G21606015

Inspect the thermostat in the following procedures:

1) Remove the thermostat. Refer to “Thermostat Removal and Installation (Page 1F-11)”.
2) Inspect the thermostat pellet for signs of cracking.

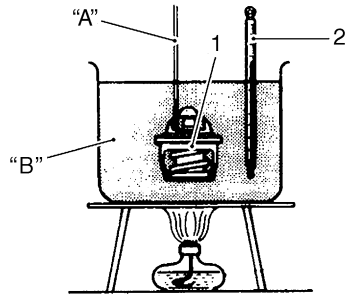
I831G1160032-01

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

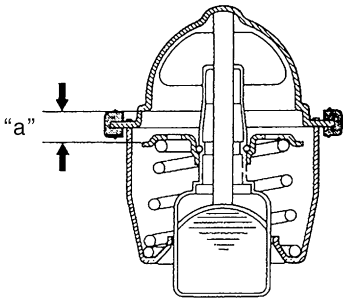
“A”: String	“B”: Water

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. 82 °C (180 °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 (0.31 in) and over at 95 °C (203 °F)

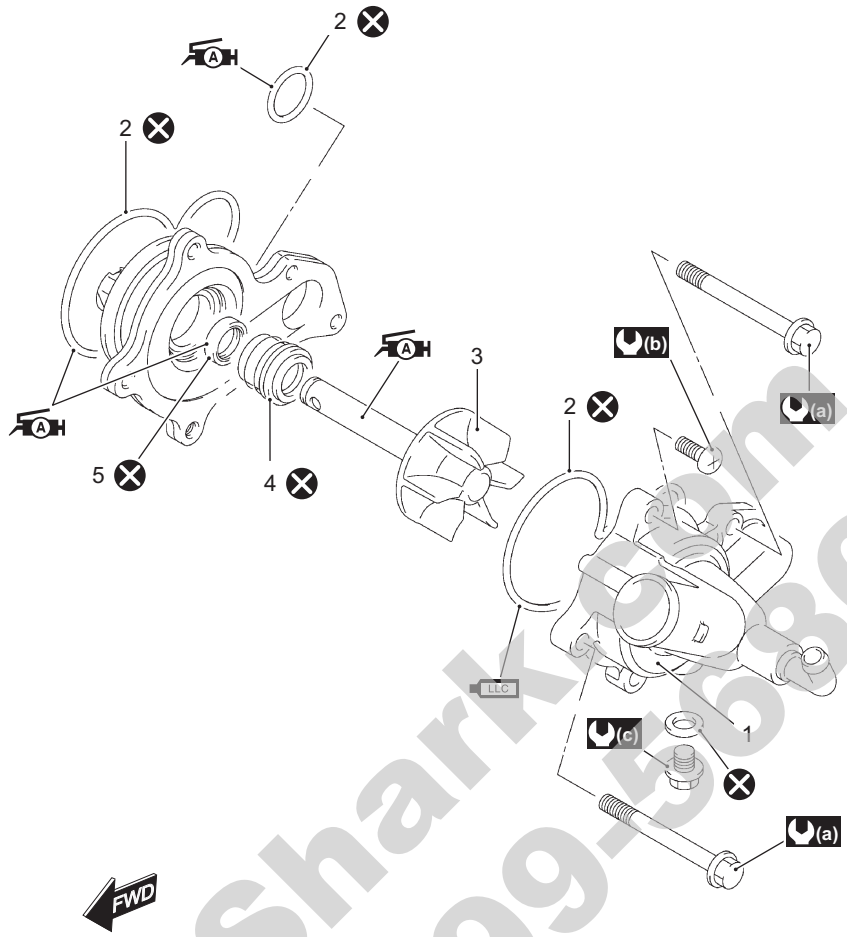


I705H1160031-04

9) Install the thermostat. Refer to “Thermostat Removal and Installation (Page 1F-11)”.

Water Pump Components

B831G21606016



I831G1160033-05

1. Water pump cover	4. Mechanical seal	(b) : 6 N·m (0.6 kgf-m, 4.5 lb-ft)	LLC : Apply engine coolant.
2. O-ring	5. Oil seal	(c) : 13 N·m (1.3 kgf-m, 9.5 lb-ft)	: Do not reuse.
3. Impeller	(a) : 10 N·m (1.0 kgf-n, 7.0 lb-ft)	: Apply grease.	

Water Pump Removal and Installation

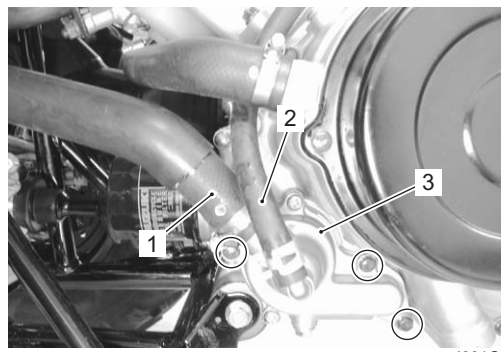
B831G21606017

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-18)".

1) Remove the left inner fender. Refer to "Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".
2) Remove the left mud guard. Refer to "Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".
3) Drain engine oil and coolant. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-10)" and "Cooling System Inspection in Section 0B (Page 0B-15)".
4) Disconnect the outlet hose (1) and water bypass hose (2).
5) Remove the water pump assembly (3).



I831G1160034-01

Installation
Install the water pump in the reverse order of removal. Pay attention to the following points:

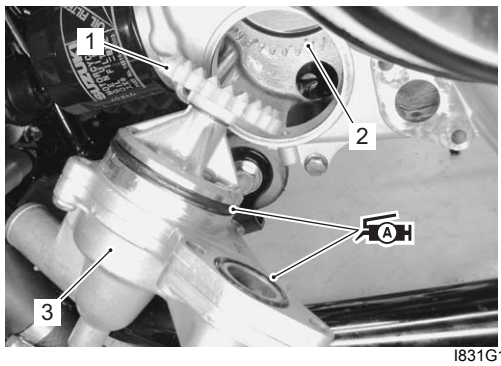
- Apply grease to the O-rings.

⚠ CAUTION

Replace the O-rings with the new ones.

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

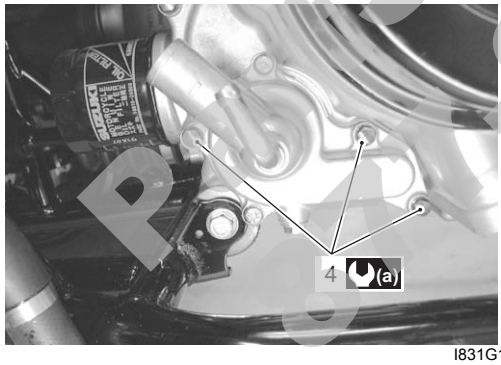
- Set the water pump driven gear (1) to the water pump drive gear (2) and install the water pump assembly (3).



I831G1160035-01

- Tighten the water pump mounting bolts (4) to the specified torque.

Tightening torque
Water pump mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I831G1160036-01

- 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-10)” and “Cooling System Inspection in Section 0B (Page 0B-15)”.
- Bleed air from the cooling circuit. Refer to “Front Differential Gear Oil Inspection in Section 0B (Page 0B-12)”.

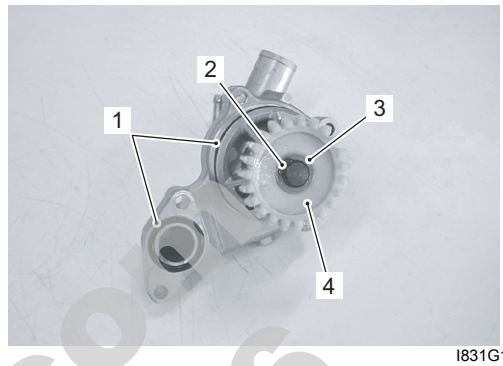
Water Pump Disassembly and Assembly

B831G21606018

Refer to “Water Pump Removal and Installation (Page 1F-13)”.

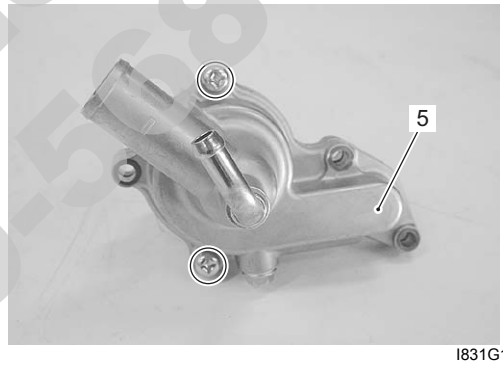
Disassembly

1) Remove the O-rings (1), snap ring (2), washer (3) and water pump driven gear (4).



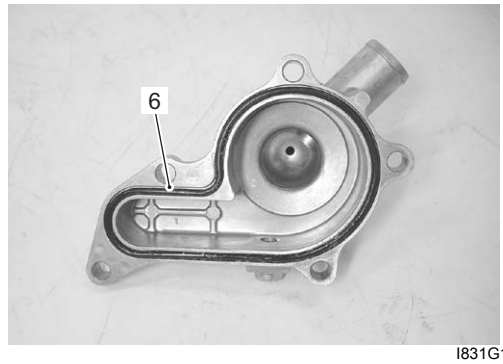
I831G1160037-02

2) Remove the water pump cover (5).



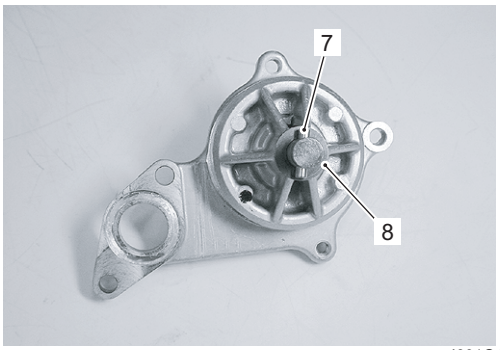
I831G1160038-01

3) Remove the O-ring (6).



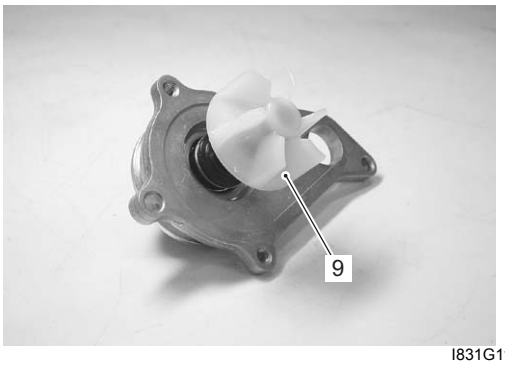
I831G1160039-01

4) Remove the pin (7) and washer (8).



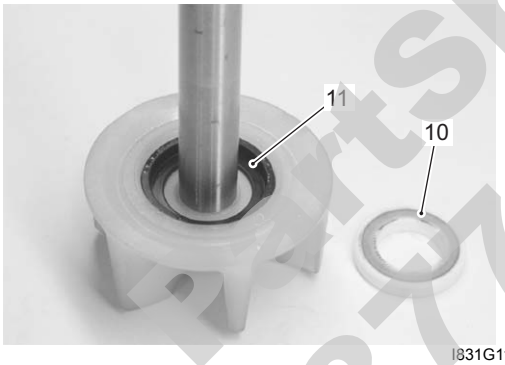
I831G1160040-02

5) Remove the impeller (9).



I831G1160041-01

6) Remove the mechanical seal ring (10) and rubber seal (11) from the impeller.



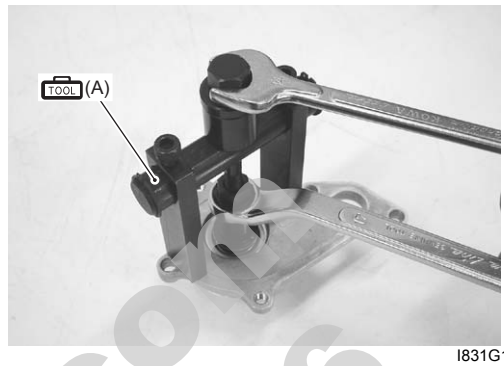
I831G1160042-01

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)



I831G1160043-01

8) Remove the oil seal (12).

NOTE

If there is no abnormal condition, the oil seal removal is not necessary.

I831G1160044-01

Assembly

1) Install the oil seal with the special tool.

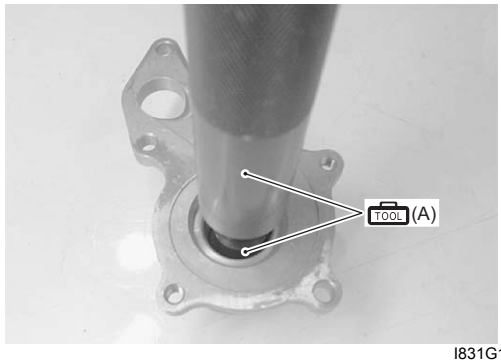
⚠ CAUTION

Replace the oil seal with a new one.

NOTE

The stamped mark on the oil seal should face mechanical seal side.

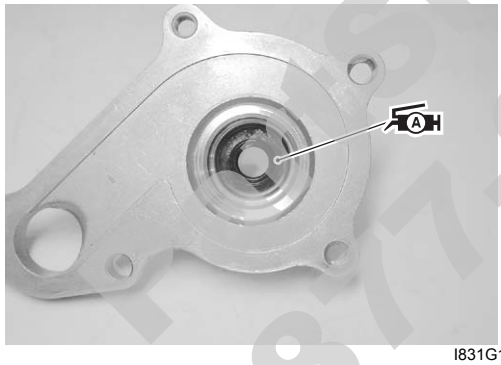
Special tool
(A): 09913–70210 (Bearing installer set)



I831G1160045-01

2) Apply a small quantity of the grease to the oil seal lip.

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



I831G1160046-01

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.

I831G1160047-01

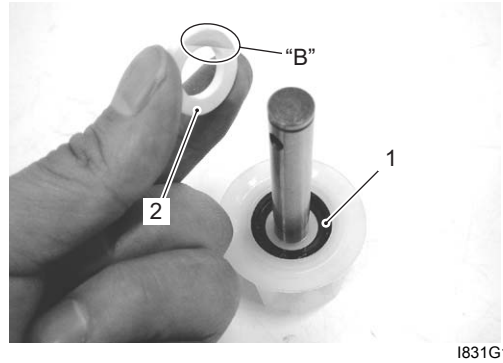
I831G1160048-01

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.

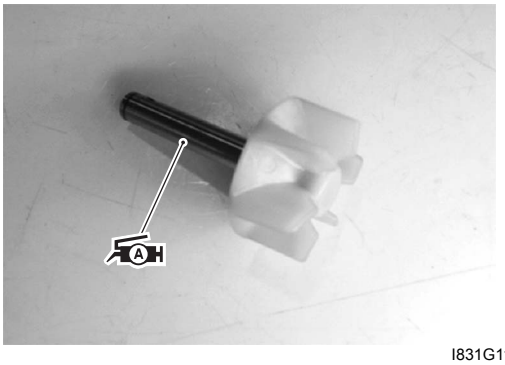


I831G1160049-02

6) Apply grease to the impeller shaft.

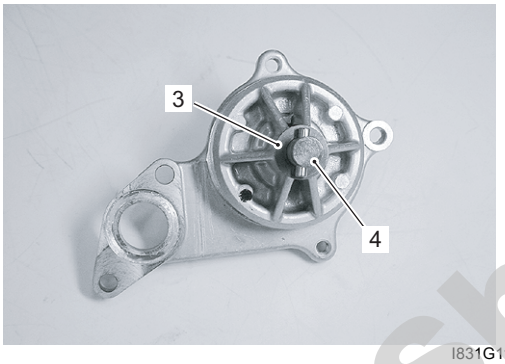
: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

7) Install the impeller shaft to the water pump body.



I831G1160051-01

8) Install the washer (3) and pin (4) to the impeller shaft.

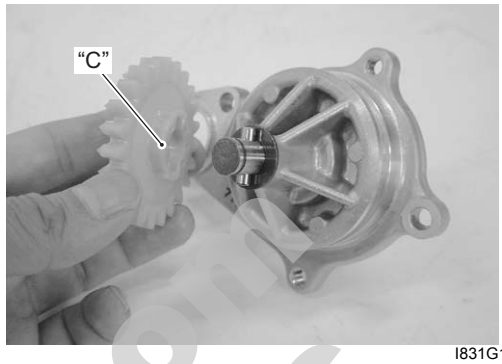


I831G1160050-02

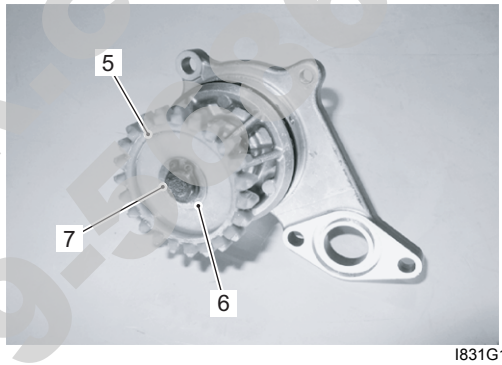
9) Install the water pump driven gear (5), washer (6) and snap ring (7).

⚠ CAUTION

The convex part "C" of water pump driven gear should face the water pump side.



I831G1160052-02

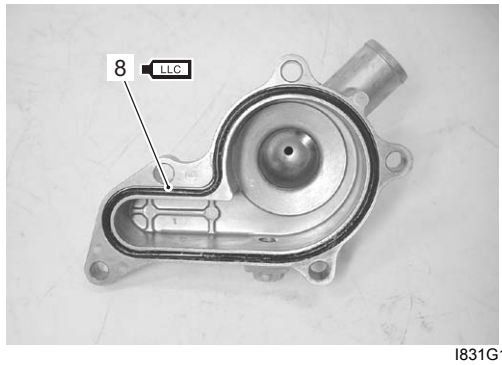


I831G1160053-04

10) Install a new O-ring (8) and apply engine coolant to it.

⚠ CAUTION

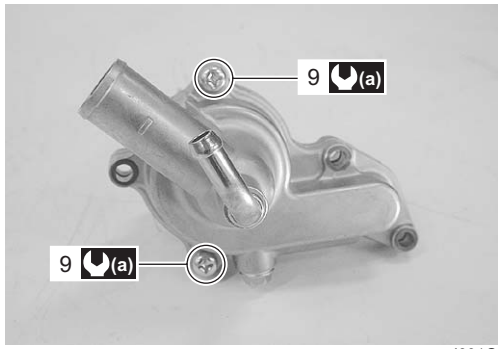
Use a new O-ring to prevent engine coolant leakage.



I831G1160054-02

11) Fit the water pump cover and tighten the water pump cover screws (9) to the specified torque.

Tightening torque
Water pump cover screw (a): 6 N·m (0.6 kgf-m, 4.5 lb-ft)



I831G1160056-04

Water Pump Related Parts Inspection

B831G21606019

Refer to "Water Pump Disassembly and Assembly (Page 1F-14)".

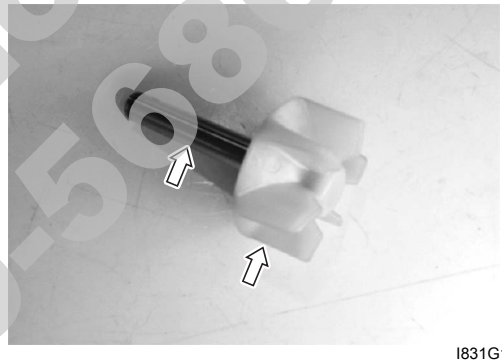
Mechanical Seal
Visually inspect the mechanical seal for damage, with particular attention given to the sealing face.
Replace the mechanical seal that shows indications of leakage.

I831G1160057-01

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.

I831G1160058-02

Impeller
Visually inspect the impeller and its shaft for damage.
Replace the impeller if necessary.



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Impeller Shaft Journal
Visually inspect the journal for damage or scratch.
Replace the water pump body if necessary.

I831G1160060-01

Specifications

Service Data

B831G21607001

Thermostat + Radiator + Fan + Coolant

Item	Standard		Note
Thermostat valve opening temperature	Approx. 82 °C (180 °F)		—
Thermostat valve lift	8 mm (0.31 in) and over at 95 °C (203 °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	110 – 140 kPa (1.1 – 1.4 kgf/cm^2, 15.6 – 19.9 psi)		—
Cooling fan thermo-switch operating temperature	OFF → ON	Approx. 93 °C (199 °F)	—
	ON → OFF	Approx. 87 °C (189 °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	Approx. 250 ml (0.26/0.22 US/Imp qt)	—
	Engine	Approx. 2 200 ml (2.32/1.94 US/Imp qt)	—

Tightening Torque Specifications

B831G21607002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Cooling fan assembly mounting bolt	8.5	0.85	6.0	☞(Page 1F-7)
Cooling fan thermo-switch	17	1.7	12.5	☞(Page 1F-10)
Thermostat cover bolt	23	2.3	16.5	☞(Page 1F-11)
Water pump mounting bolt	10	1.0	7.0	☞(Page 1F-14)
Water pump cover screw	6	0.6	4.5	☞(Page 1F-18)

NOTE

The specified tightening torque is also described in the following.
“Water Hose Routing Diagram (Page 1F-3)”
“Water Pump Components (Page 1F-13)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

B831G21608001

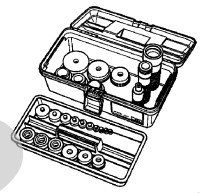
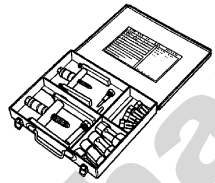
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 1F-14) / ☞(Page 1F-16) / ☞(Page 1F-17)

NOTE

Required service material is also described in the following.
"Water Pump Components (Page 1F-13)"

Special Tool

B831G21608002

09900–25008 Multi-circuit tester set ☞(Page 1F-10) 	09913–70210 Bearing installer set ☞(Page 1F-16) 
09921–20240 Bearing remover set ☞(Page 1F-15) 	

Fuel System

Precautions

Precautions for Fuel System

B831G21700001

⚠ 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

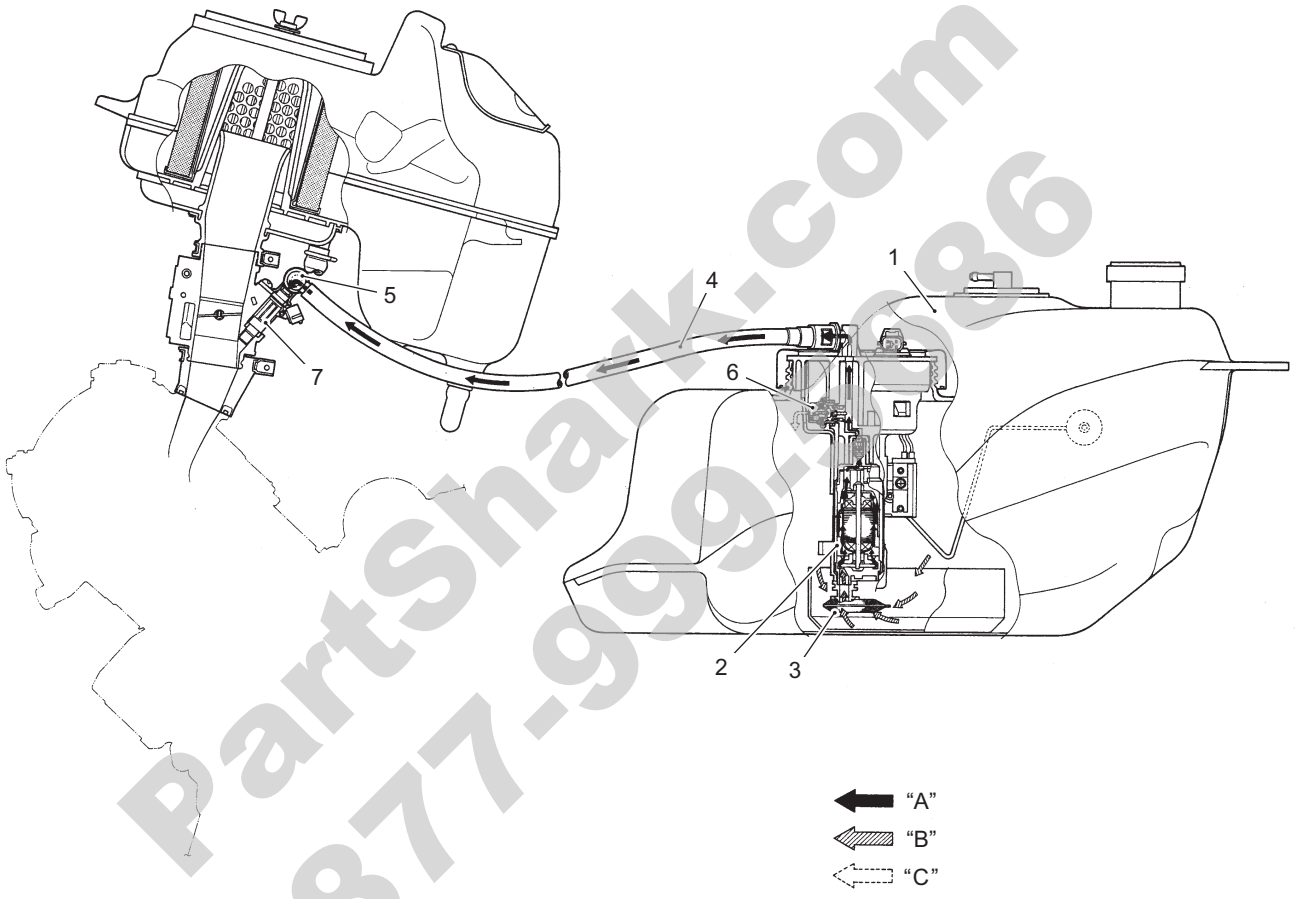
Fuel System Description

B831G21701001

Fuel System

The fuel delivery system consists of the fuel tank (1), fuel pump (2), fuel mesh filter (3), fuel feed hose (4), fuel delivery pipe (5) (including fuel injector) and fuel pressure regulator (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 (5). Fuel pressure is regulated by the fuel pressure regulator (6). 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 (6) flows back to the fuel tank (1).



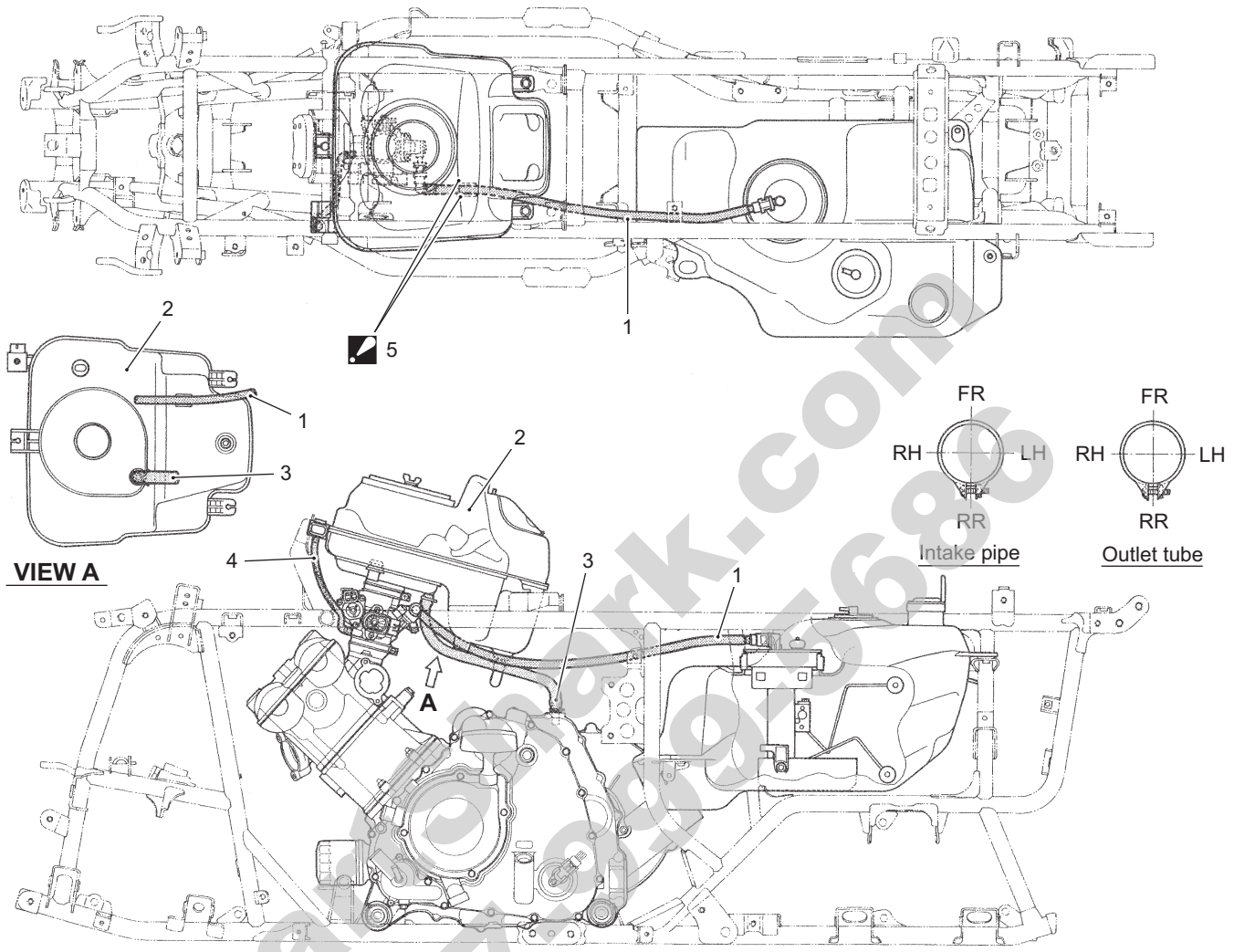
I831G1170001-01

1. Fuel tank	4. Fuel feed hose	7. Fuel injector	"C": Relieved fuel
2. Fuel pump	5. Fuel delivery pipe	"A": Pressurized fuel	
3. Fuel mesh filter	6. Fuel pressure regulator	"B": Before-pressurized fuel	

Schematic and Routing Diagram

Fuel Hose Routing Diagram

B831G21702001

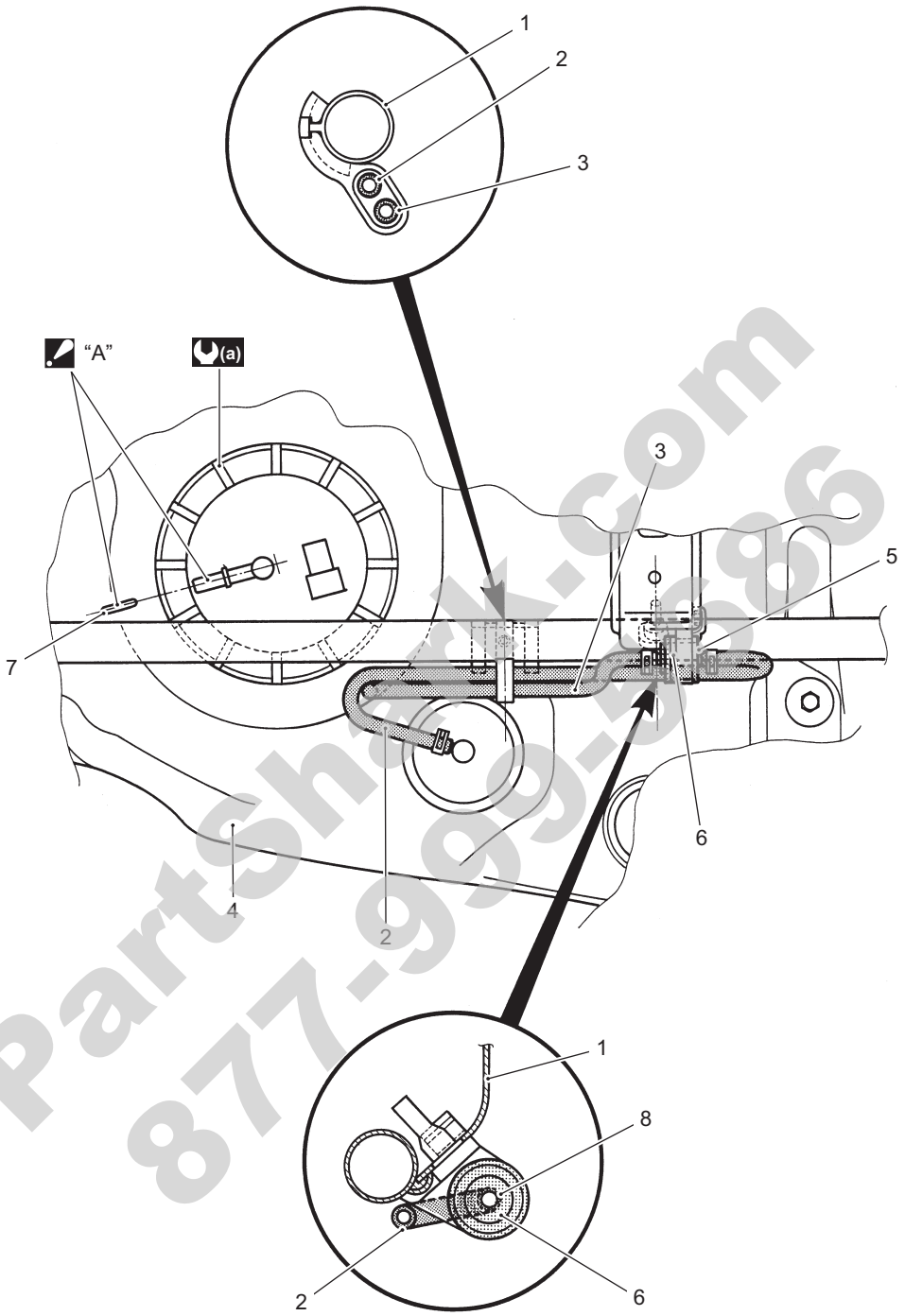


I831G1170002-04

1. Fuel hose	4. IAP sensor hose
2. Air cleaner box	5. Pass the fuel hose between the air cleaner guide.
3. PCV hose	

Fuel Tank Breather Hose Routing Diagram

B831G21702002



I831G1170003-04

1. Frame	5. Valve (Black)	"A": Align the fuel pump nipple with the mark.
2. Fuel tank breather hose	6. Valve (Orange)	(a) : 35 N·m (3.5 kgf-m, 25.5 lb-ft)
3. Check valve hose	7. Mark	
4. Fuel tank	8. Fuel tank pressure control valve	

Diagnostic Information and Procedures

Fuel System Diagnosis

B831G21704001

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 CKP sensor.	*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 IAP sensor.	*Replace.*
	Defective ECM.	*Replace.*

Repair Instructions

Fuel Pressure Inspection

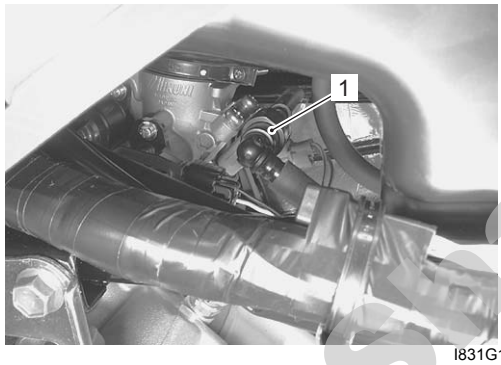
B831G21706001

⚠ 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:

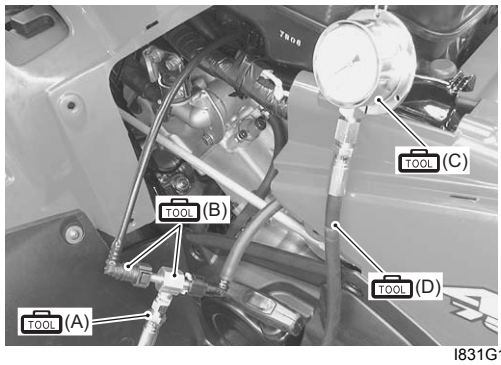
1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Place a rag under the fuel feed hose and disconnect fuel feed hose (1) from the fuel delivery pipe.



I831G1170005-02

4) 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)



I831G1170007-01

5) Turn the ignition ON and check for fuel pressure.

Fuel pressure
Approx. 294 kPa (2.9 kgf/cm², 41 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

6) Remove the special tools.

⚠ WARNING

Before removing the special tools, turn the ignition switch OFF and release the fuel pressure slowly.

7) Reinstall the removed parts.

Fuel Pump Inspection

B831G21706002

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-7)” and “TO Sensor Inspection in Section 1C (Page 1C-5)”.
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 Removal and Installation (Page 1G-9)”.

Fuel Discharge Amount Inspection

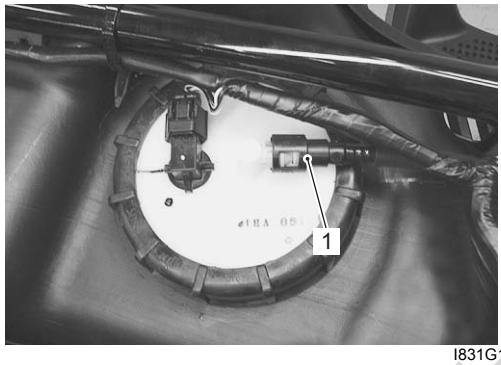
B831G21706003

⚠ WARNING

- **Keep away from fire or spark.**
- **Spilled gasoline should be wiped off immediately.**
- **Work in a well-ventilated area.**

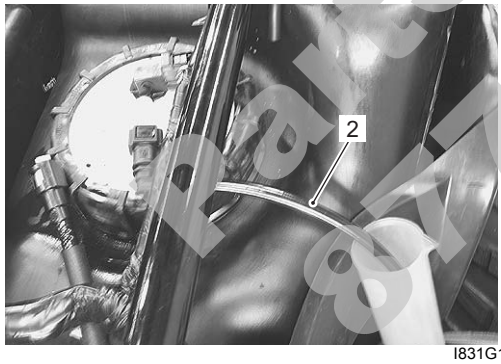
Inspect the fuel discharge amount in the following procedures:

1) Remove the rear fender. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
2) Place a rag under the fuel feed hose (1) and disconnect fuel feed hose from the fuel pump.



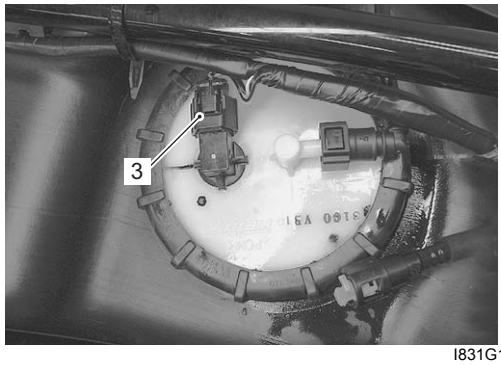
I831G1170008-01

3) Connect a proper fuel hose (2) to the fuel pump.
4) Place the measuring cylinder and insert the fuel hose end into the measuring cylinder.



I831G1170009-01

5) Disconnect the fuel pump lead wire coupler (3).



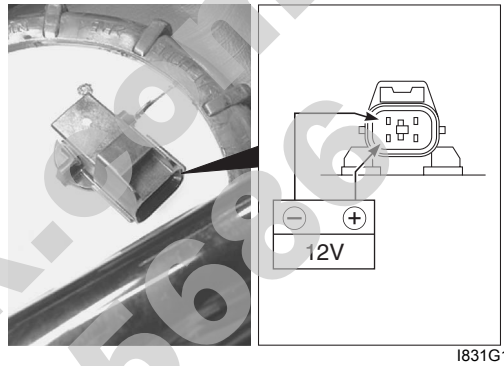
I831G1170010-01

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 (+) Y/R wire and (–) B/W 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
55.5 ml (1.88/1.95 US/Imp oz) and more/10 sec.



I831G1170012-02

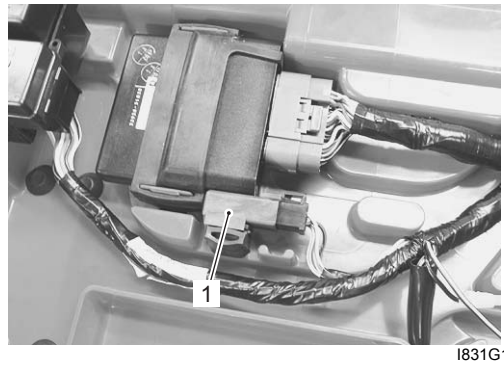
7) After finishing the fuel discharge inspection, reinstall the rear fender. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.

Fuel Pump Relay Inspection

B831G21706004

Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.
Inspect the fuel pump relay in the following procedures:

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the fuel pump relay (1).

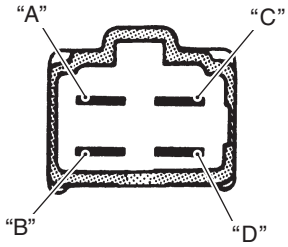


I831G1170013-01

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

B831G21706005

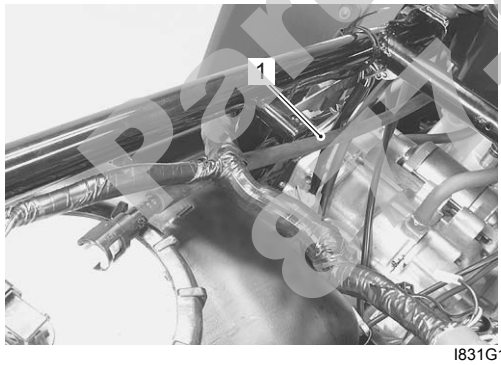
Refer to “Fuel Line Inspection in Section 0B (Page 0B-10)”.

Fuel Feed Hose Removal and Installation

B831G21706006

Removal

1) Remove the rear fender. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
2) Disconnect the fuel feed hose (1).



I831G1170014-01

Installation

1) Install the fuel feed hose as shown in the fuel hose routing diagram. Refer to “Fuel Hose Routing Diagram (Page 1G-3)”.
2) Install the rear fender. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.

Fuel Level Gauge Inspection

B831G21706007

Refer to “Fuel Level Gauge Inspection in Section 9C (Page 9C-6)”.

Fuel Level Indicator Inspection

B831G21706008

Refer to “Fuel Level Indicator Inspection in Section 9C (Page 9C-5)”.

Fuel Tank Removal and Installation

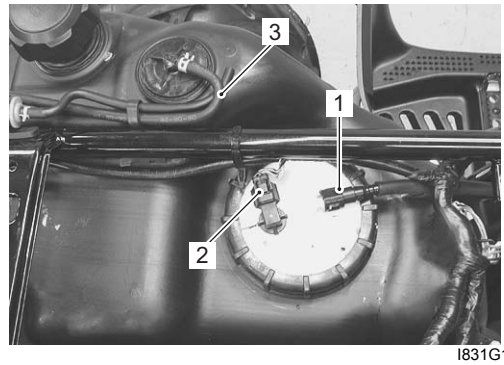
B831G21706009

Removal

⚠ WARNING

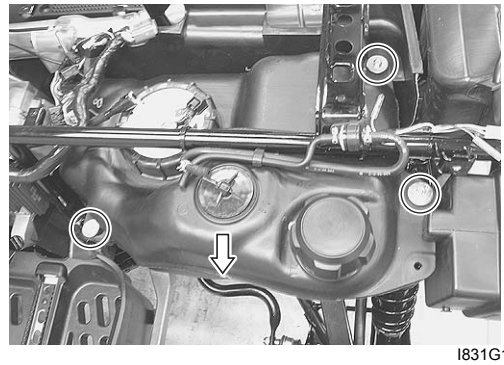
- **Keep away from fire or spark.**
- **Spilled gasoline should be wiped off immediately.**
- **Work in a well-ventilated area.**

1) Remove the rear fender. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
2) Remove the fuel tank outer cover. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
3) Place a rag under the fuel feed hose and disconnect the fuel feed hose (1) from the fuel pump.
4) Disconnect the fuel tank coupler (2) and fuel tank breather hose (3).



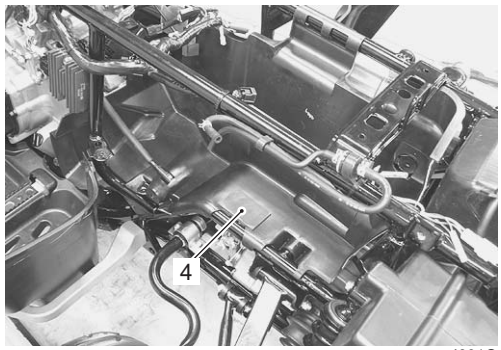
I831G1170015-01

5) Remove the fuel tank mounting bolts.
6) Remove the fuel tank from the left side.



I831G1170016-01

7) Remove the fuel tank lower cover (4).

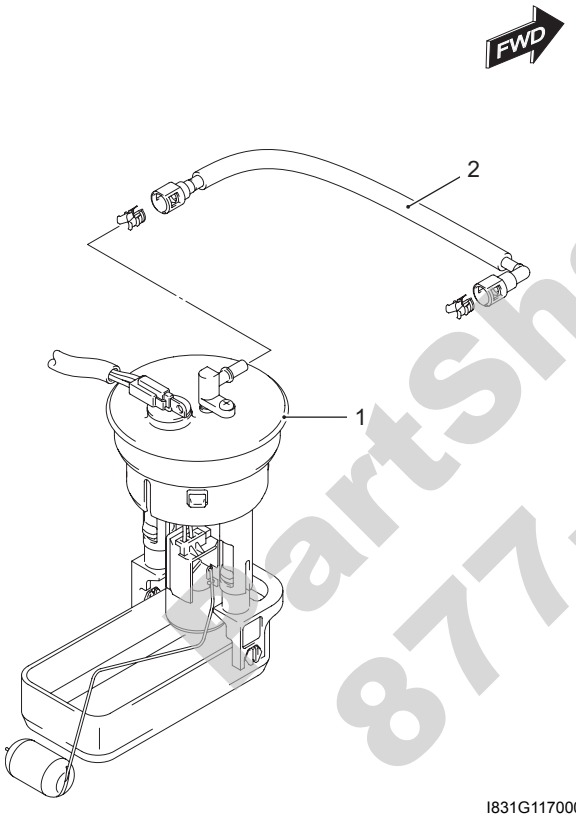


I831G1170017-01

Installation
Install the fuel tank in the reverse order of removal.

Fuel Pump Components

B831G21706010



I831G1170004-01

1. Fuel pump	2. Fuel feed hose

Fuel Pump Assembly Removal and Installation

B831G21706011

Removal

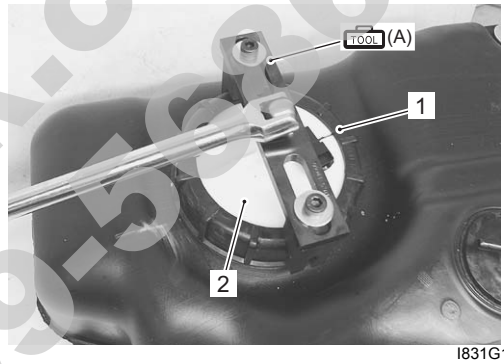
⚠ WARNING

- **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-8)”.
2) Remove the fuel pump retainer (1) with the special tool.

Special tool
TOOL : 09941–51012 (Ring locknut wrench)

3) Remove the fuel pump assembly (2).



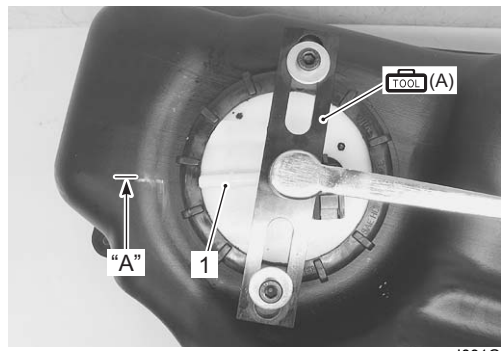
I831G1170018-01

Installation
Install the fuel pump assembly in the reverse order of removal.
Pay attention the following points:

- Align the fuel pump nipple (1) with alignment mark “A” on the fuel tank.
- Tighten the fuel pump retainer with the special tool to the specified torque.

Special tool
TOOL (A): 09941–51012 (Ring locknut wrench)

Tightening torque
Fuel pump retainer: 35 N·m (3.5 kgf-m, 25.5 lb-ft)



I831G1170019-01

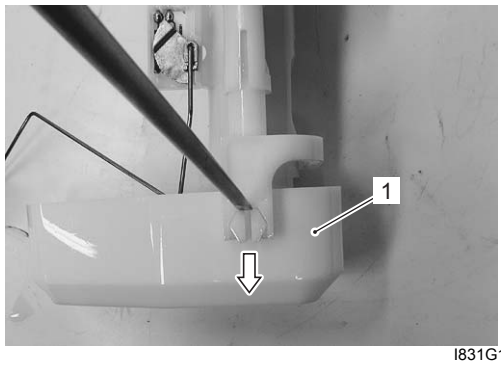
Fuel Pump Disassembly and Assembly

B831G21706012

Refer to “Fuel Pump Assembly Removal and Installation (Page 1G-9)”.

Disassembly

Remove the fuel cup holder (1) with a (–) screw driver.



I831G1170020-01

Assembly

Assemble the fuel tank pump in the reverse order of the disassembly.

Fuel Mesh Filter Inspection and Cleaning

B831G21706013

Inspect the fuel mesh filter in the following procedures:

1) Remove the fuel cup holder. Refer to “Fuel Pump Disassembly and Assembly (Page 1G-10)”.
2) If the fuel mesh filter is clogged with foreign particles, it hinders smooth gasoline flow resulting in loss of engine power. Such a filter should be cleaned by blowing with compressed air.

NOTE

When the fuel mesh filter is dirtied excessively, replace the fuel mesh filter with a new one.

I831G1170021-01

3) After finishing the fuel mesh filter inspection, reinstall the fuel cup holder and fuel pump assembly. Refer to “Fuel Pump Assembly Removal and Installation (Page 1G-9)”.

Fuel Injector Inspection and Cleaning

B831G21706014

Inspect the fuel injector in the following procedures:

1) Remove the fuel injector. Refer to “Fuel Injector / Fuel Delivery Pipe Removal and Installation (Page 1G-10)”.
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.

I831G1170022-01

3) Install the fuel injector. Refer to “Fuel Injector / Fuel Delivery Pipe Removal and Installation (Page 1G-10)”.

Fuel Injector / Fuel Delivery Pipe Removal and Installation

B831G21706015

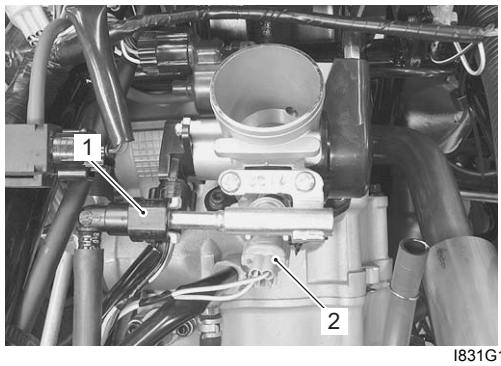
Removal

⚠ WARNING

- **Spilled gasoline should be wiped off immediately.**
- **Keep away from fire or spark.**
- **Work in a well-ventilated area.**

1) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation in Section 1D (Page 1D-5)”.
3) Place a rug under the fuel feed hose (1) and disconnect the fuel feed hose (1) from the fuel delivery pipe.

4) Disconnect the injector coupler (2).



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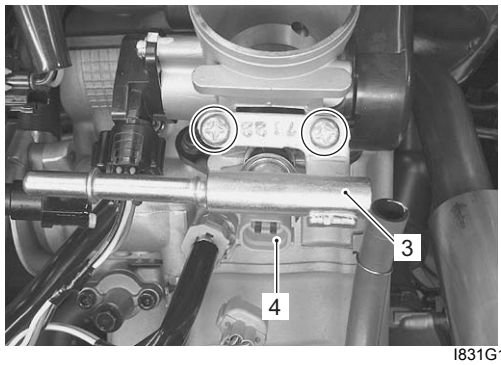
5) Remove the fuel delivery pipe (3) with the injector (4).



I831G1170024-01

6) Remove the fuel injector (4) from the fuel delivery pipe.

I831G1170025-02

Installation

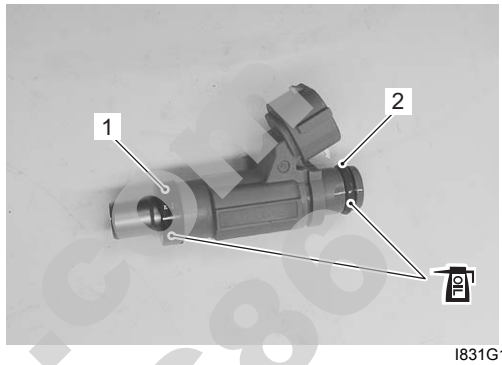
Install the fuel injector / fuel delivery pipe in the reverse order of removal.

Pay attention to the following points:

- Apply a thin coat of engine oil to the new cushion seal (1) and O-ring (2).

⚠ CAUTION

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



I831G1170026-01

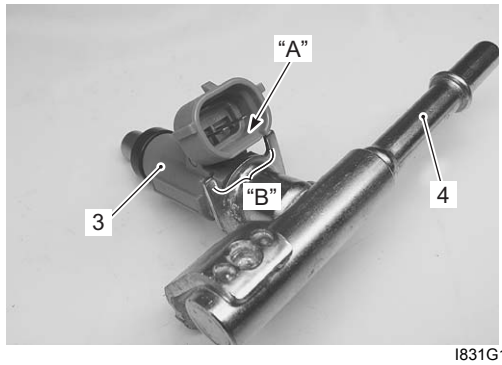
- Install the fuel injector (3) by pushing it straight to the delivery pipe (4).

⚠ CAUTION

Never turn the injector while pushing it.

NOTE

Align the coupler "A" of injector with boss "B" of the delivery pipe.



I831G1170027-01

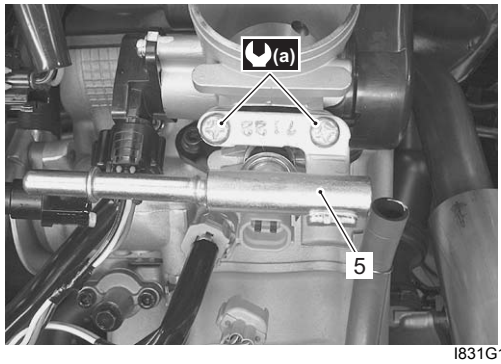
- Install the fuel delivery pipe assembly (5) to the throttle body assembly.

⚠ CAUTION

Never turn the fuel injector while installing it.

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

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



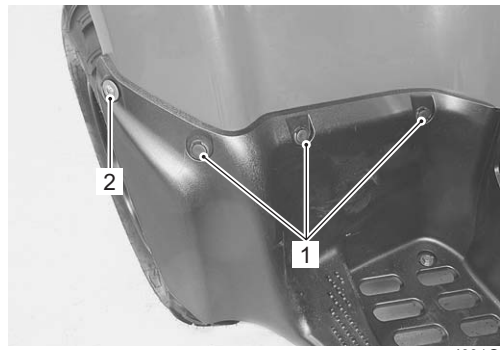
I831G1170028-01

Fuel Tank Pressure Control (FTPC) Valve Removal and Installation

B831G21706016

Removal

1) Remove the rear carrier. Refer to “Rear Carrier Removal and Installation in Section 9E (Page 9E-5)”.
2) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
3) Remove the side covers, left and right. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
4) Remove the engine side cover. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
5) Remove the mad guard mounting fasteners (1) and screws (2).



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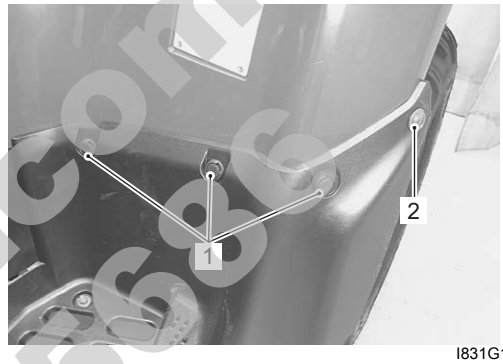

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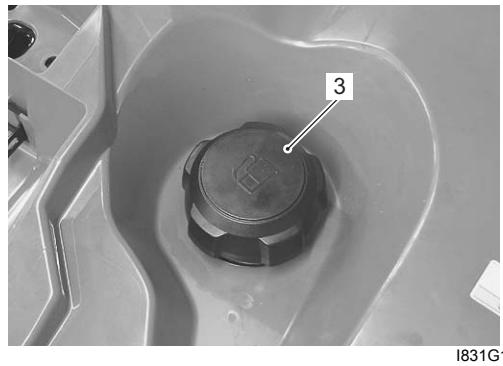
6) Remove the fuel tank cap (3).

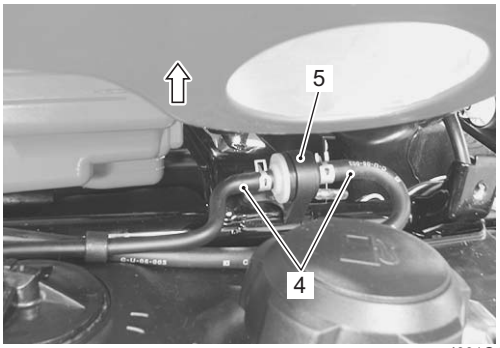
⚠ CAUTION

To prevent the fuel tank from contamination with foreign particles, blind opening.



I831G1170031-01

7) Move the rear fender upside.
8) Disconnect the breather hoses (4) and remove the FTPC valve (5).



I831G1170032-01

Installation

Install the FTPC valve in the reverse order of removal, pay attention to the following points.

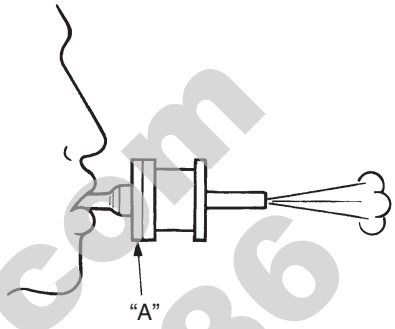
- Install the FTPC valve as shown in the fuel tank breather hose routing diagram. Refer to “Fuel Tank Breather Hose Routing Diagram (Page 1G-4)”.

Fuel Tank Pressure Control (FTPC) Valve Inspection

B831G21706017

Inspect the FTPC valve in the following procedures:

1) Remove the FTPC valve. Refer to “Fuel Tank Pressure Control (FTPC) Valve Removal and Installation (Page 1G-12)”.
2) Check the FTPC valve if air can pass through smoothly when blown from the orange color side and not from the other side. If abnormal condition is found, replace the FTPC valve with a new one.



I705H1170014-02

“A”: Orange

3) After finishing the FTPC valve inspection, reinstall the FTPC valve. Refer to “Fuel Tank Pressure Control (FTPC) Valve Removal and Installation (Page 1G-12)”.

Specifications

Service Data

B831G21707001

Injector + Fuel Pump + Fuel Pressure Regulator

Item	Specification	Note
Injector resistance	11 – 13 Ω at 20 °C (68 °F)	—
Fuel pump discharge amount	55.5 ml (1.88/1.95 US/Imp oz) and more/10 sec.	—
Fuel pressure regulator operating set pressure	Approx. 294 kPa (2.9 kgf/cm^2, 41 psi)	—

Fuel

Item	Specification	Note
Fuel type	Use only unleaded gasoline of at least 87 pump octane (R/2 + M/2) or 91 octane or higher rated by the Research Method. Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.	P-28, 33
	Gasoline used should be graded 91 octane or higher. An unleaded gasoline type is recommended.	Others
Fuel tank capacity	17.5 L (4.6/3.8 US/Imp gal)	

Tightening Torque Specifications

B831G21707002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Fuel pump retainer	35	3.5	25.5	☞(Page 1G-9)
Fuel delivery pipe mounting screw	5	0.5	3.5	☞(Page 1G-12)

NOTE

The specified tightening torque is also described in the following.
"Fuel Tank Breather Hose Routing Diagram (Page 1G-4)"

Reference:
For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

Special Tools and Equipment

Special Tool

B831G21708001

09900–25008 Multi-circuit tester set ☞(Page 1G-8)	09915–74521 Oil pressure gauge hose ☞(Page 1G-6)
09915–77331 Meter (for high pressure) ☞(Page 1G-6)	09940–40211 Fuel pressure gauge adapter ☞(Page 1G-6)
09940–40220 Fuel pressure gauge hose attachment ☞(Page 1G-6)	09941–51012 Ring locknut wrench ☞(Page 1G-9) / ☞(Page 1G-9)

Ignition System

General Description

Override Switch Description

B831G21801001

The override switch allows the rider to increase the power available by overriding the normal speed limiter in forward Differential Lock or Reverse. For example, the rider may need to use extra power when stuck in the mud. To override the normal speed limiter the rider must push the override button and hold it in. When the switch button is released, engine speed will once again be limited by the speed limiter.
In forward Differential Lock made, the override mode can be used for an indefinite period of time simply by holding the button in continuously.

I831G1180013-01

Operation

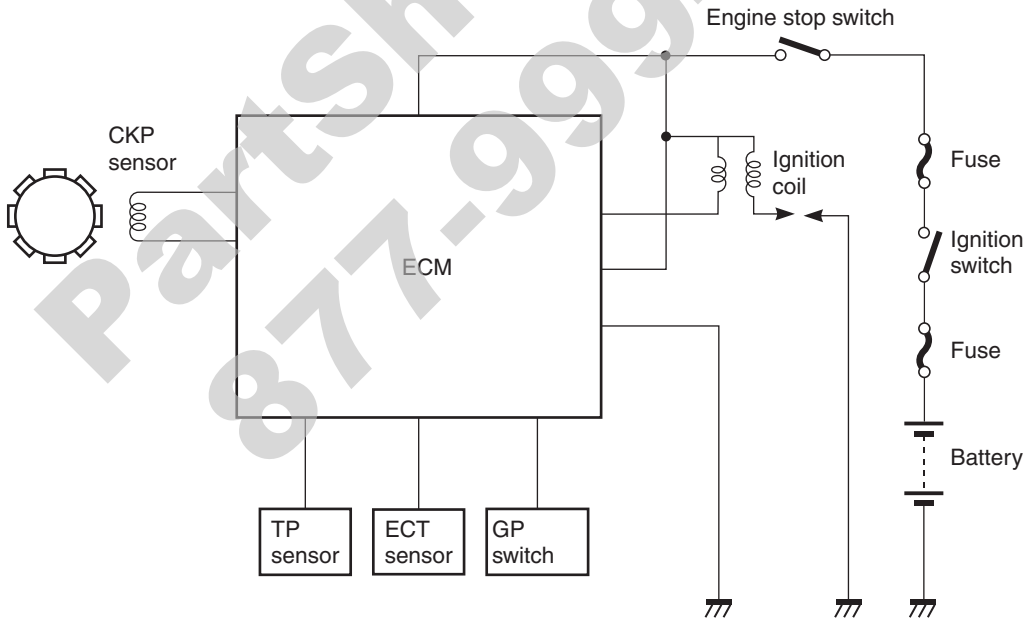
1) Set the diff-lock position or “R” (Reverse) position.
2) Operate the override switch while pushing it.

Schematic and Routing Diagram

Ignition System Diagram

B831G21802001

Refer to “Wire Color Symbols in Section 0A (Page 0A-5)”.



I831G1180004-04

Ignition System Components Location

B831G21802002

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

Diagnostic Information and Procedures

Ignition System Symptom Diagnosis

B831G21804001

Condition	Possible cause	Correction / Reference Item
Spark plug not sparking	Damaged spark plug.	*Replace.*
	Fouled spark plug.	*Clean or replace.*
	Wet spark plug.	*Clean and dry or replace.*
	Defective ignition coil.	*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 plug.	*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.	*Change to correct spark plug.*
Spark plug quickly becomes fouled with oil or carbon	Worn piston rings.	*Replace.*
	Worn piston.	*Replace.*
	Worn cylinder.	*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 correct spark plug.*
	Overheated engine.	*Tune-up.*
	Loose spark plug.	*Tighten.*
	Excessively lean air/fuel mixture.	*Inspect FI system.*

No Spark or Poor Spark

B831G21804002

Troubleshooting

NOTE

Check that the transfer is in neutral and the engine stop switch is in the "RUN" position. 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 (O/W and B/W) at the ECM with the ignition switch in the "ON" position. *Is the voltage OK?*	Go to Step 3.	• Faulty ignition switch. • Faulty wire harness. • 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-3)". **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.

Step	Action	Yes	No
4	Inspect the spark plug. Refer to “Spark Plug Inspection and Cleaning in Section 0B (Page 0B-9)”. *Is the spark plug OK?*	Go to Step 5.	Faulty spark plug.
5	Inspect the ignition coil. Refer to “Ignition Coil and Plug Cap Inspection (Page 1H-3)”. *Is the ignition coil OK?*	Go to step 6.	Faulty ignition coil.
6	Measure the CKP sensor peak voltage and its resistance. Refer to “CKP Sensor Inspection (Page 1H-5)”. **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 wire harness.	• 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

B831G21806001

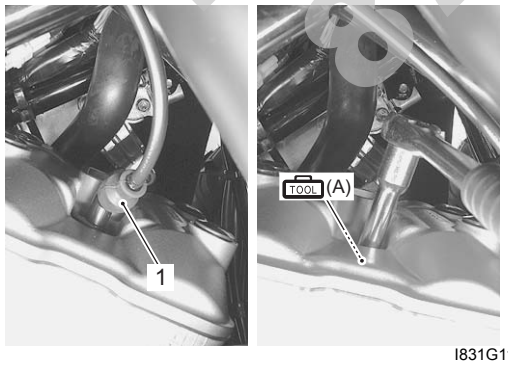
Removal

⚠ 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 right side cover and right inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Disconnect the spark plug cap (1).
4) Remove the spark plug with a spark plug wrench.

Special tool
TOOL : 09930–10121 (Spark plug wrench set)



I831G1180001-01

Installation

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

- Screw the spark plug 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 : 09930–10121 (Spark plug wrench set)

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

Spark Plug Inspection and Cleaning

B831G21806002

Refer to “Spark Plug Inspection and Cleaning in Section 0B (Page 0B-9)”.

Ignition Coil and Plug Cap Inspection

B831G21806003

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

Ignition Coil Primary Peak Voltage

1) Remove the right side cover and right inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the spark plug cap. Refer to “Spark Plug Cap and Spark Plug Removal and Installation (Page 1H-3)”.

3) Connect the new spark plug to spark plug cap and ground it to the cylinder head.

NOTE

Be sure that the spark plug is connected properly and the battery used is in fully-charged condition.

I831G1180005-01

4) Connect the multi-circuit tester with the peak voltage adaptor as follows:

⚠ CAUTION

Before using the multi-circuit tester and peak voltage adaptor, refer to the appropriate instruction manual.

NOTE

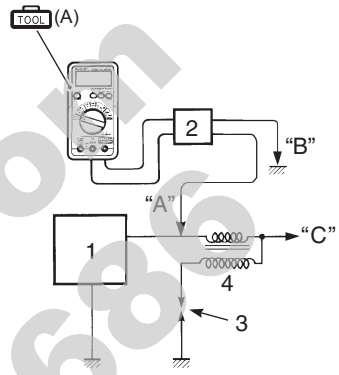
Do not disconnect the ignition coil lead wires.

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

Tester knob indication: Voltage (⎓)

	((+) Probe)	((-) Probe)
Ignition coil	W/Bl lead wire terminal	B/W lead wire terminal or Ground

I831G1180006-01



I831G1180002-01

1. ECM	"A": (+) probe
2. Peak voltage adaptor	"B": (–) probe
3. New spark plug	"C": Battery
4. Ignition coil	

5) Measure the ignition coil primary peak voltage in the following procedures:
   a) Shift the transfer to the neutral, turn the ignition switch ON.
   b) Press the starter button and allow the engine to crank for a few seconds, and then measure the ignition coil primary peak voltage.
6) Repeat the b) procedure few times and measure the highest peak voltage.
   If the voltage is lower than standard range, inspect the ignition coil and the CKP sensor.

   Ignition coil primary peak voltage
   80 V and more

7) After measuring the ignition coil primary peak voltage, reinstall the removed parts.

Ignition Coil Resistance

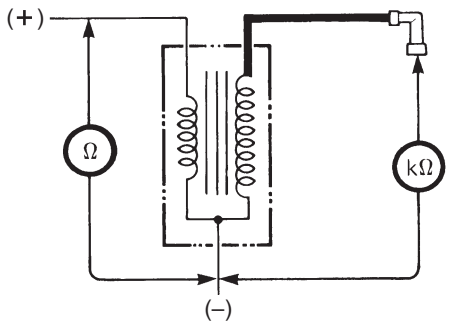
1) Disconnect the spark plug cap. Refer to "Ignition Coil and Plug Cap Inspection (Page 1H-3)".
2) Disconnect the ignition coil lead wire.

3) Measure the ignition coil resistance in both the primary and secondary coils. 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: 0.1 – 0.6 Ω ((+) terminal – (–) Ground)
Secondary: 12 – 19 kΩ (Spark plug cap – (–) terminal)



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4) After measuring the ignition coil resistance, reinstall the removed parts.

CKP Sensor Inspection

B831G21806004

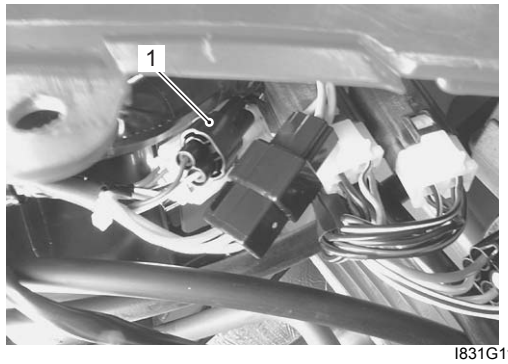
Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.

CKP Sensor Peak Voltage

1) Remove the left side cover and engine side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the CKP sensor coupler (1).

NOTE

Be sure that all of the couplers are connected properly and the battery is fully-charged.



I831G1180008-01

3) Connect the multi-circuit tester with the peak volt adaptor as follows:

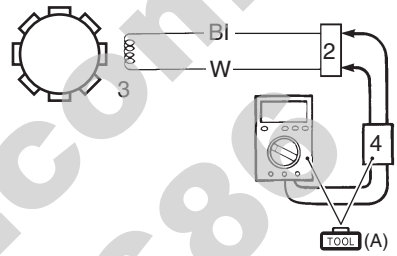
⚠ CAUTION

Before using the multi-circuit tester and peak voltage adaptor, refer to the appropriate instruction manual.

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

Tester knob indication: Voltage (⎓)

CKP sensor	(+) Probe	(–) Probe
	BI	W



I831G1180003-01

2. CKP sensor coupler	4. Peak voltage adaptor
3. CKP sensor	

4) Measure the CKP sensor peak voltage in the following procedures:
   a) Shift the transfer to the neutral, turn the ignition switch ON.
   b) Press the starter button and allow the engine to crank for a few seconds, and then measure the CKP sensor peak voltage.
5) Repeat the b) procedure a few times and measure the highest CKP sensor peak voltage.

CKP sensor peak voltage
5.0 V and more (Blue – White)

6) If the peak voltage is within the specification, check the continuity between the CKP sensor coupler and ECM coupler.

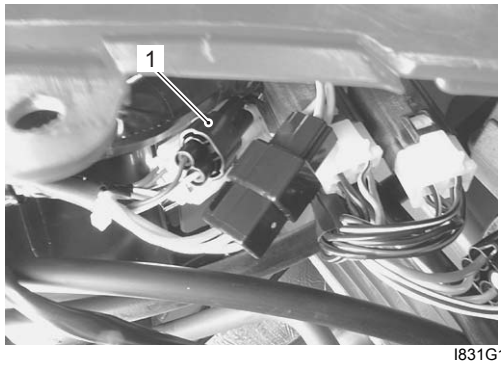
⚠ CAUTION

Normally, use the needle pointed probe to the backside of the lead wire coupler to prevent the terminal bend and terminal alignment.

7) After measuring the CKP sensor peak voltage, reinstall the removed parts.

CKP Sensor Resistance

1) Remove the left side cover and engine side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the CKP sensor coupler (1).



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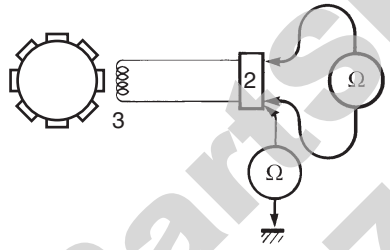
3) Measure the resistance between the lead wires and ground. If the resistance is not within the standard range, replace the CKP sensor with a new one. Refer to “CKP Sensor Removal and Installation (Page 1H-6)”.

Tester knob indication
Resistance (Ω)

CKP sensor resistance
150 – 250 Ω (Blue – Green)
∞ Ω (Blue – Ground)



I718H1180008-02

2. CKP sensor coupler	3. CKP sensor

4) After measuring the CKP sensor resistance, reinstall the removed parts.

CKP Sensor Removal and Installation

B831G21806005

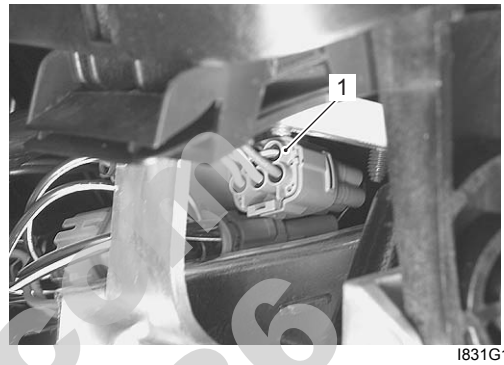
Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.

Engine Stop Switch Inspection

B831G21806006

Inspect the engine stop switch in the following procedures:

1) Turn the ignition switch OFF.
2) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Disconnect the handlebar switch coupler (1).



I831G1180010-01

4) Inspect the engine stop switch for continuity with a tester.
If any abnormality is found, replace the handlebar switch assembly with a new one. Refer to “Handlebars Removal and Installation in Section 6B (Page 6B-3)”.

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

Tester knob indication
Continuity (•))))

Color / Position	O	O/W
RUN ( )	○	○
OFF ( )		

I831G1180009-01

5) After finishing the engine stop switch inspection, reinstall the removed parts.

Ignition Switch Inspection

B831G21806007

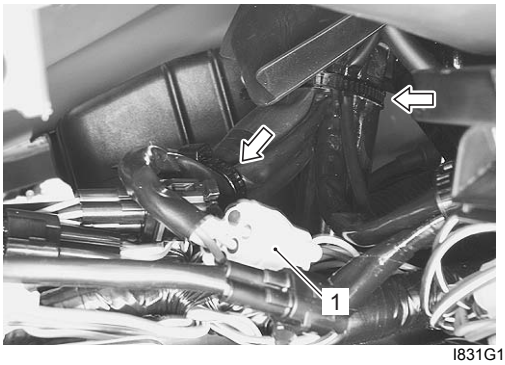
Refer to “Ignition Switch Inspection in Section 9C (Page 9C-7)”.

Ignition Switch Removal and Installation

B831G21806008

Removal

1) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Remove the combination meter cover. Refer to “Combination Meter Removal and Installation in Section 9C (Page 9C-3)”.
3) Disconnect the clamps and ignition switch coupler (1).



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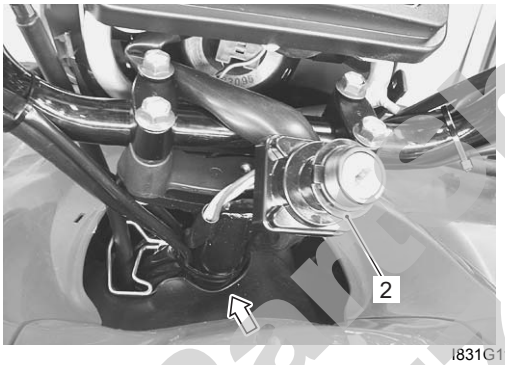
4) Disconnect the clamp and remove the ignition switch (2).



I831G1180012-01

Installation

Install the ignition switch in the reverse order of removal. Pay attention to the following point:

- Route the wiring harness properly. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-4)”.

Override Switch Inspection

B831G21806009

1) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the override switch read wire coupler.
3) Check the continuity B/W wire and Br wire of the override switch and pushing the override switch. If any abnormality is found, replace the left handle switch assembly with a new one.

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

Tester knob indication
Continuity (•)))

I831G1180013-01

Color / Position	B/W	Bl/B
●		
PUSH	○———	———○

I831G1180014-02

Specifications

Service Data

B831G21807001

Electrical

Unit: mm (in)

Item	Specification		Note
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	150 – 250 Ω		
CKP sensor peak voltage	5.0 V and more		
Ignition coil resistance	Primary	0.1 – 0.6 Ω	Terminal – Ground
	Secondary	12 – 19 kΩ	Plug cap – Terminal
Ignition coil primary peak voltage	80 V and more		When cranking

Tightening Torque Specifications

B831G21807002

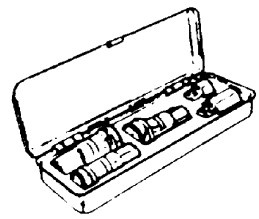
Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Spark plug	11	1.1	8.0	☞(Page 1H-3)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Special Tool

B831G21808001

09900–25008 Multi-circuit tester set ☞(Page 1H-4) / ☞(Page 1H-5) / ☞(Page 1H-5) / ☞(Page 1H-6) / ☞(Page 1H-7)		09930–10121 Spark plug wrench set ☞(Page 1H-3) / ☞(Page 1H-3)	

Starting System

Schematic and Routing Diagram

Starting System Diagram

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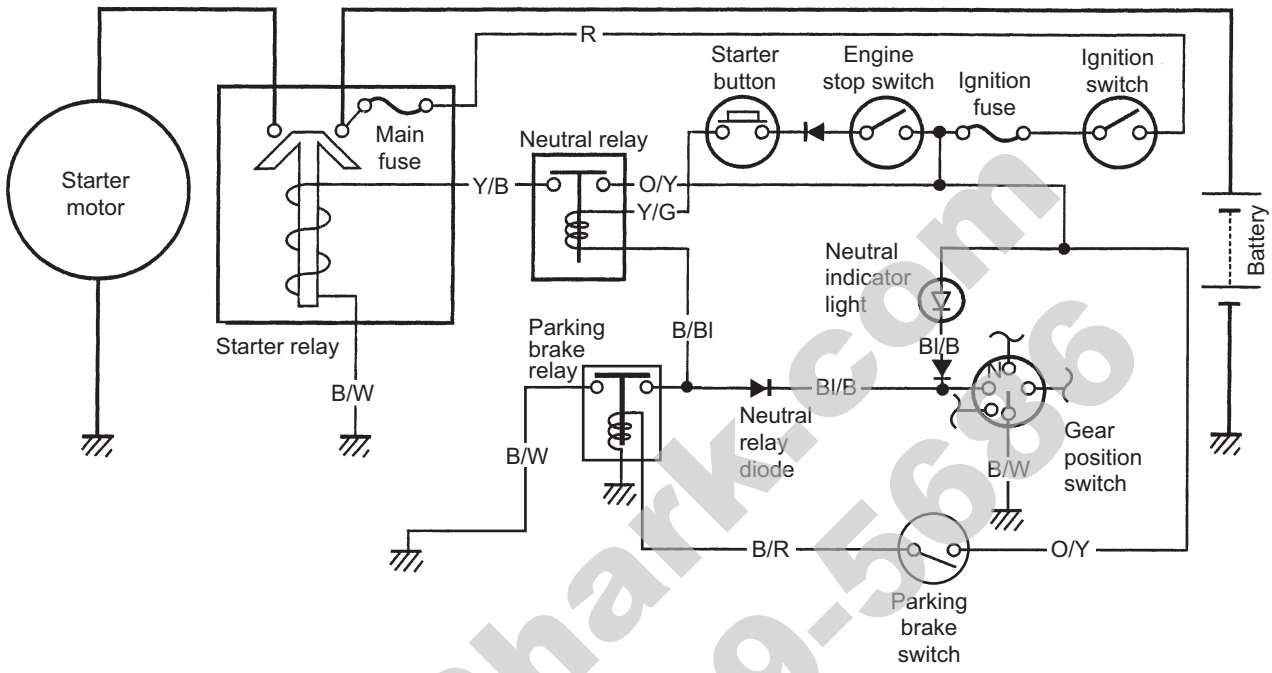
Refer to “Wire Color Symbols in Section 0A (Page 0A-5)”.



I831G1190001-01

Component Location

Starting System Components Location

B831G21903001

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

Diagnostic Information and Procedures

Starting System Symptom Diagnosis

B831G21904001

Condition	Possible cause	Correction / Reference Item
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 neutral relay.	*Replace.*
	Defective main fuse or ignition fuse.	*Replace.*

Starter Motor will not Run

B831G21904002

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 transfer to neutral. 2) 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/B (+) and B/W (–)) when the starter button is pushed. *Is the voltage OK?*	Go to Step 4.	• Faulty ignition switch. • Faulty engine stop switch. • Faulty neutral relay. • Faulty starter button. • 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

B831G21904003

The starter motor runs when the transfer is in neutral, but does not run when the transfer is in any position other than neutral, with the parking lever grasped firmly.

Step	Action	Yes	No
1	Check the parking brake switch. Refer to "Parking Brake Switch Inspection (Page 1I-9)". *Is the parking brake switch OK?*	Go to Step 2.	Faulty parking brake switch.
2	Check the parking brake relay. Refer to "Parking Brake Relay Inspection (Page 1I-9)". *Is the parking brake relay OK?*	• Open circuit in wire harness. • Poor contact of connector.	• Faulty parking brake relay.

Engine Does not Turn Though the Starter Motor Runs

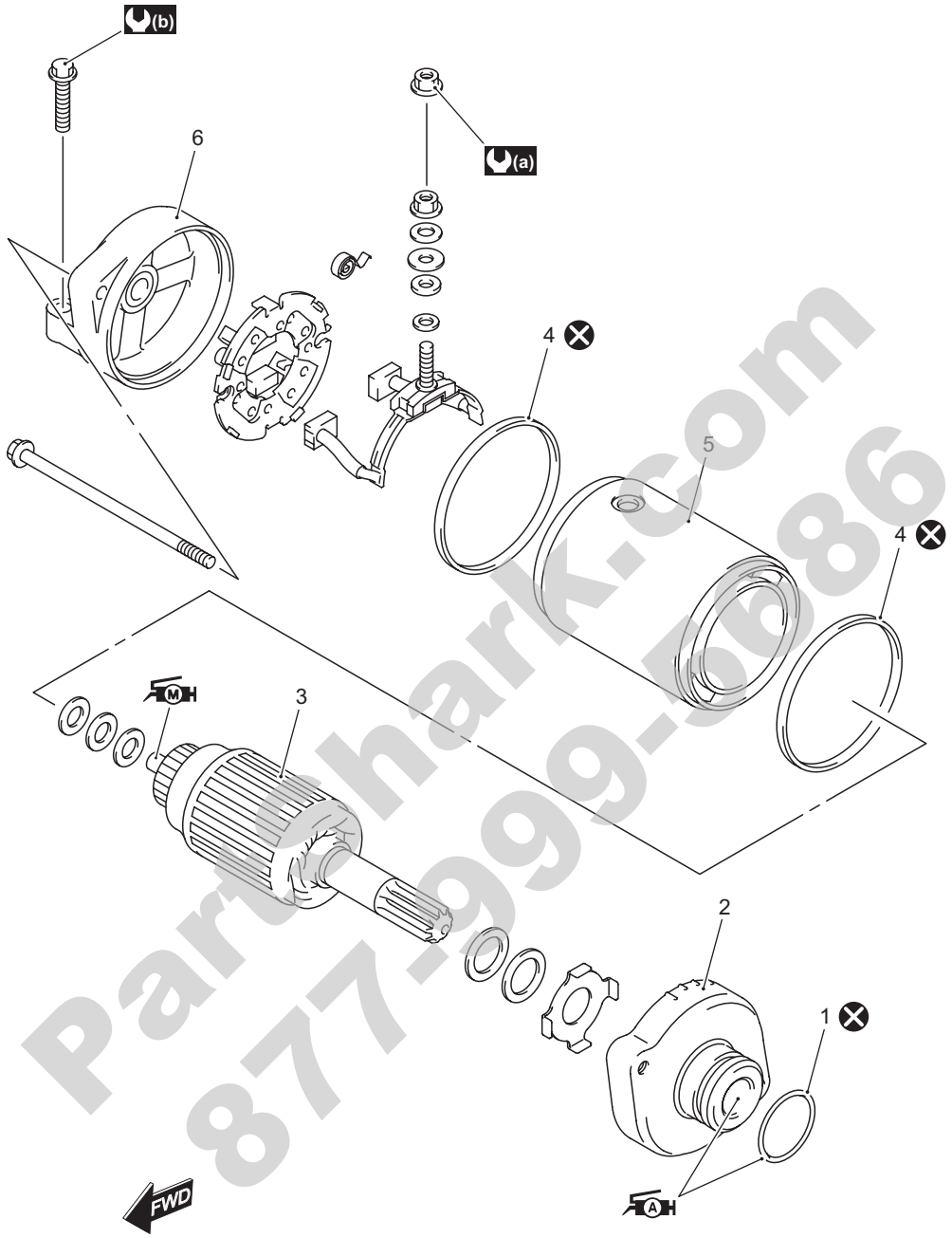
B831G21904004

- Faulty starter clutch

Repair Instructions

Starter Motor Components

B831G21906001



I831G1190002-04

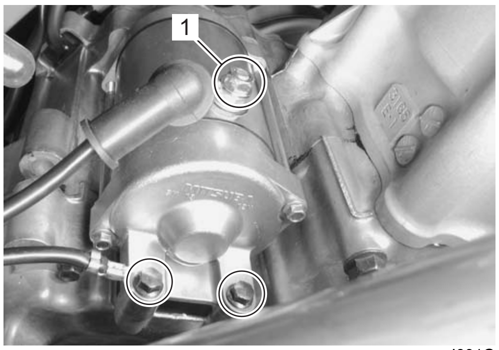
1. O-ring	5. Starter motor case	: Apply grease to sliding surface.
2. Housing end (Inside)	6. Housing end (Outside)	: Apply moly paste to sliding surface.
3. Armature	(a) : 6 N·m (0.6 kgf-m, 4.5 lb-ft)	: Do not reuse.
4. O-ring	(b) : 10 N·m (1.0 kgf-m, 7.0 lb-ft)	

Starter Motor Removal and Installation

B831G21906002

Removal

1) Turn the ignition switch OFF and disconnect the battery (–) lead wire. Refer to “Battery Removal and Installation in Section 1J (Page 1J-12)”.
2) Remove the right side cover. Refer to“Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Remove the starter motor lead wire (1).



I831G1190003-01

4) Remove the starter motor.

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)

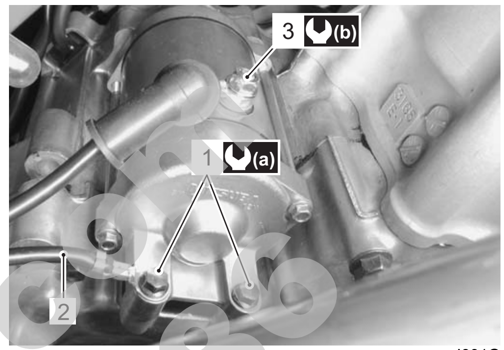
⚠ **CAUTION**

Replace the O-ring with a new one.

I831G1190004-01

- Tighten the starter motor mounting bolts (1) with the battery (–) lead wire (2) and starter motor lead wire mounting nut (3) to the specified torque. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-4)”.

Tightening torque
Starter motor mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)
Starter motor lead wire mounting nut (b): 6 N·m (0.6 kgf-m, 4.5 lb-ft)



I831G1190005-01

Starter Motor Disassembly and Assembly

B831G21906003

Refer to “Starter Motor Removal and Installation (Page 1I-4)”.

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-rings with new ones to prevent oil leakage and moisture.

- Apply grease to the lip of the oil seal and bearing.

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

I831G1190006-02

- Fit the washer to the housing end correctly as shown in the figure.

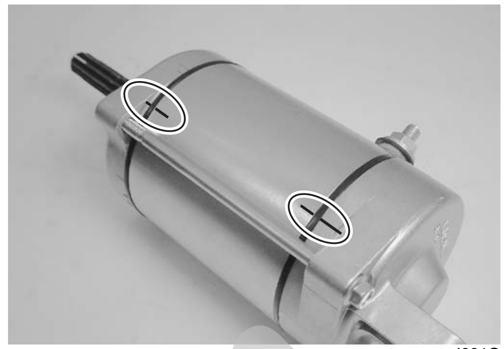
I831G1190007-01

- Apply a small quantity of moly paste to the armature shaft.

  : Moly paste 99000–25140 (SUZUKI Moly paste or equivalent)

I831G1190008-01

- Align the match mark on the starter motor case with the match mark on the housing end.
- Tighten the starter motor housing bolts.



I831G1190009-01

Starter Motor Inspection

B831G21906004

Refer to “Starter Motor Disassembly and Assembly (Page 1I-4)”.

Carbon Brush

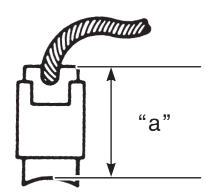
Inspect the carbon brushes for abnormal wear, cracks or smoothness in the brush holder.

If either carbon brush is defective, replace the brush holder set with a new one.

Measure the length “a” of the carbon brushes using a vernier calipers. If the measurement is less than the service limit, replace the housing end assembly with a new one.

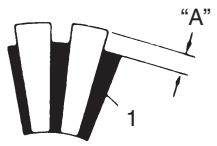
Brush length “a”
Service limit: 6.0 mm (0.24 in)

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.

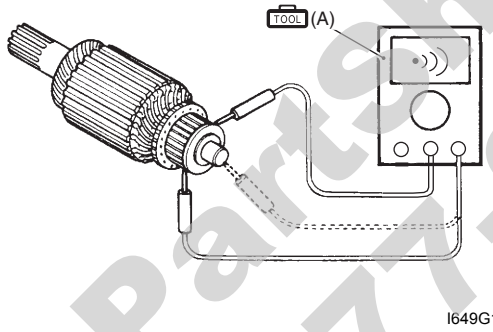


I649G1190016-02

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

Tester knob indication
Continuity set (•)))



I649G1190017-03

Oil Seal
Check the seal lip for damage. If any damage is found, replace the housing end (Inside).

I831G1190010-01

Bearing
Check the bearing of housing end for damage.
If any damage is found, replace the housing end.

I831G1190011-01

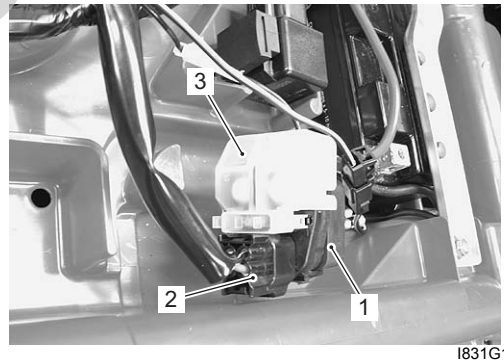
Starter Relay Removal and Installation

B831G21906005

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

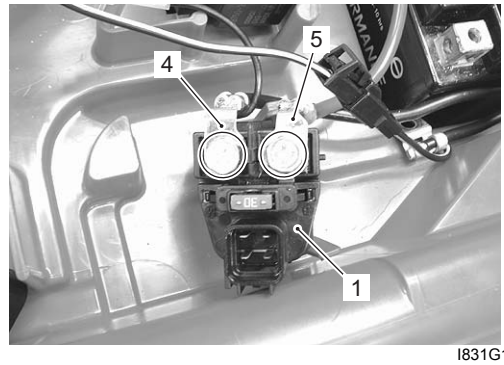
Removal

1) Turn the ignition switch OFF position.
2) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
3) Disconnect the battery (–) lead wire from the battery.
4) Pull the starter relay (1).
5) Disconnect the starter relay coupler (2) and remove the starter relay cover (3).



I831G1190013-01

6) Disconnect the starter motor lead wire (4) and battery (+) lead wire (5).
7) Remove the starter relay (1).



I831G1190012-01

Installation
Install the starter relay in the reverse order of removal.

Starter Relay Inspection

B831G21906006

Inspect the starter relay in the following procedures:

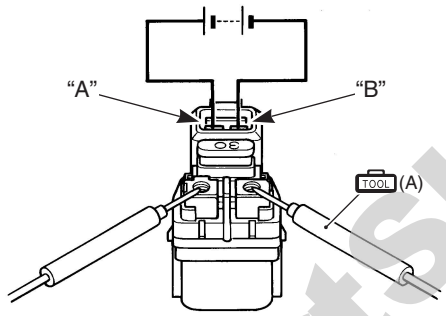
1) Remove the starter relay. Refer to “Starter Relay Removal and Installation (Page 1I-6)”.
2) Apply 12 V to “A” and “B” terminals and check for continuity between the positive and negative terminals using the multi-circuit tester. If the starter relay clicks and continuity is found, the relay is OK.

⚠ CAUTION

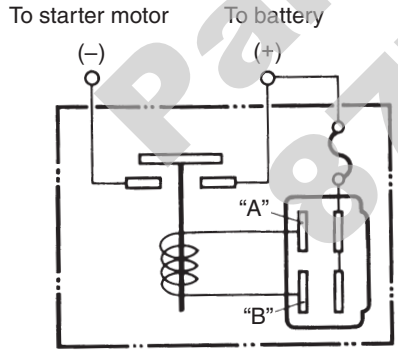
Do not apply battery voltage to the starter relay for five seconds and more, since the relay coil may overheat and get damaged.

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

Tester knob indication
Continuity test (•)))



I649G1190021-04

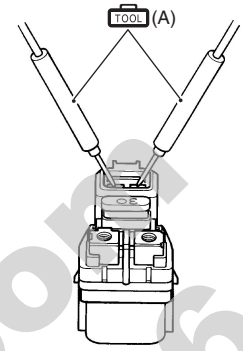


I823H1190040-02

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

Starter relay resistance
3 – 5 Ω



I649G1190023-03

4) Install the starter relay. Refer to “Starter Relay Removal and Installation (Page 1I-6)”.

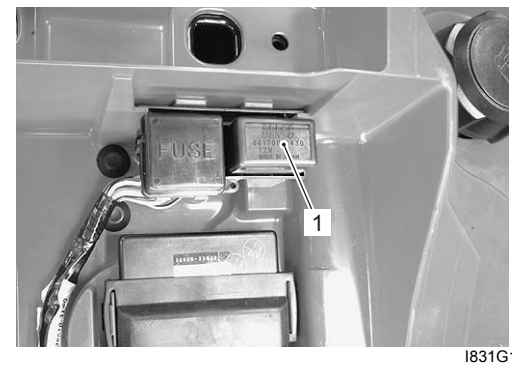
Neutral Relay Removal and Installation

B831G21906007

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

Removal

1) Turn the ignition switch OFF position.
2) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
3) Remove the neutral relay (1).



I831G1190014-01

Installation
Install the neutral relay in the reverse order of removal.

Neutral Relay Inspection

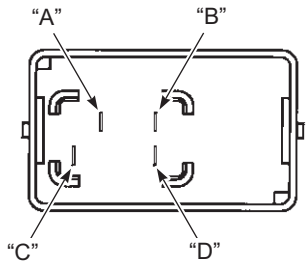
B831G21906008

Inspect the neutral relay in the following procedures:

1) Remove the neutral relay. Refer to “Neutral Relay Removal and Installation (Page 1I-7)”.
2) Check the insulation between “A” and “B” terminals using the multi-circuit tester.
3) Apply 12 V to terminals “C” and “D” ((+) to “C” and (–) to “D”) and check the continuity between “A” and “B”. If there is no continuity, replace the neutral relay with a new one.

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

Tester knob indication
Continuity test (•))))



I831G1190016-02

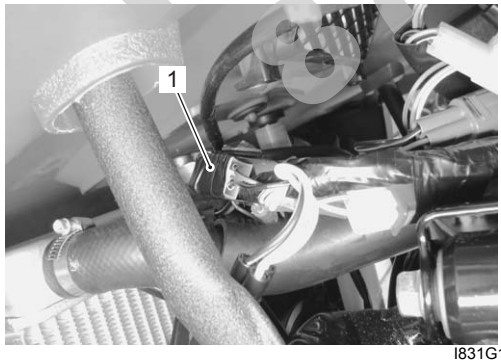
4) Install the neutral relay. Refer to “Neutral Relay Removal and Installation (Page 1I-7)”.

Neutral Relay Diode Inspection

B831G21906009

Refer to “Electrical Components Location in Section 0A (Page 0A-7)”.
Inspect the neutral relay diode in the following procedures:

1) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the neutral relay diode (1).

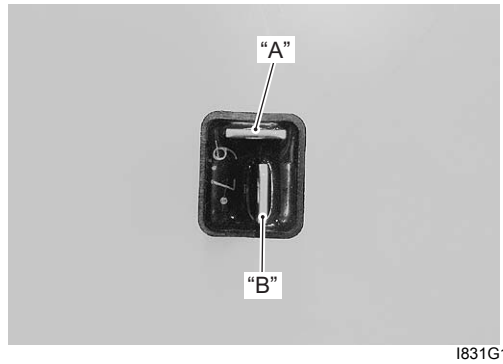


I831G1190015-01

3) Measure the voltage between the “A” and “B” terminals using the multi-circuit tester.

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

Tester knob indication
Diode test (⊣◀–)



I831G1190017-01

		⊕ Probe of tester to:	
		“B”	“A”
⊖ Probe of tester to:	“B”	—	1.4 V and more (Tester’s battery voltage)
	“A”	0.3 – 0.6 V	—

I831G1190018-03

NOTE

If the multi circuit tester reads 1.4 V and below when the tester probes are not connected, replace its battery.

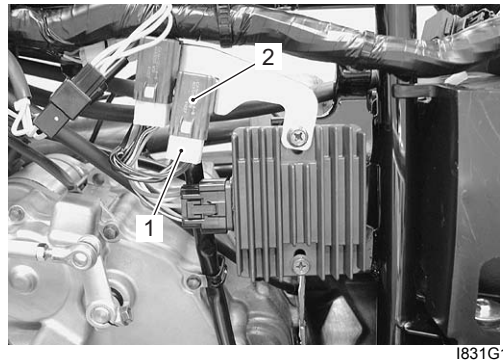
4) Connect the neutral relay diode.
5) Install the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.

Parking Brake Relay Removal and Installation

B831G21906010

Removal

1) Remove the rear fender. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
2) Disconnect the coupler (1) and remove the parking brake relay (2).



I831G1190019-01

Installation

Install the parking brake relay in the reverse order of removal.

Parking Brake Relay Inspection

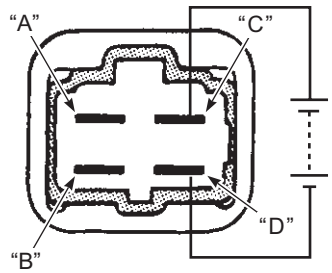
B831G21906011

Inspect the parking brake relay in the following procedures:

1) Remove the parking brake relay. Refer to “Parking Brake Relay Removal and Installation (Page 1I-8)”.
2) Check the insulation between “A” and “B” terminals using the multi-circuit tester.
3) Apply 12 V to terminals “C” and “D” ((+) to “C” and (–) to “D”) and check the continuity between “A” and “B”. If there is no continuity, replace the parking brake relay with a new one.

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

Tester knob indication
Continuity test (•)))



I831G1190020-01

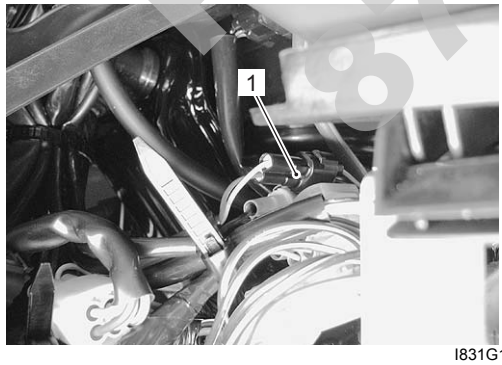
4) Install the parking brake relay in the reverse order of removal.

Parking Brake Switch Inspection

B831G21906012

Inspect the parking brake switch in the following procedures:

1) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the brake switch coupler (1).



I831G1190021-01

3) Inspect the parking brake switch for continuity with a tester. If any abnormality is found, replace the parking brake switch with a new one. Refer to “Handlebars Removal and Installation in Section 6B (Page 6B-3)”.

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

Tester knob indication
Continuity (•)))

Position \ Color	W	Bl
ON	○	○
OFF		

I831G1190022-01

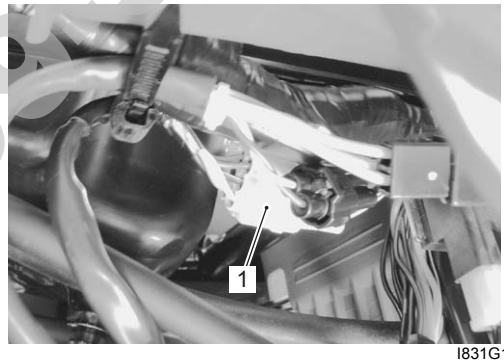
4) After finishing the parking brake switch inspection, reinstall the removed parts.

Gear Position Switch Inspection

B831G21906013

Inspect the gear position switch in the following procedures:

1) Remove the left side cover and engine side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the gear position switch coupler (1).



I831G1190023-01

3) Inspect the gear position switch for continuity with a tester. If any abnormality is found, replace the gear position switch with a new one. Refer to “Gear Position (GP) Switch Removal and Installation in Section 3C (Page 3C-13)”.

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

Tester knob indication
Continuity (•)))

Position \ Color	W	B	Bl	G	R
H		○		○	
L	○	○			
N		○	○		
R		○			○

I831G1190024-02

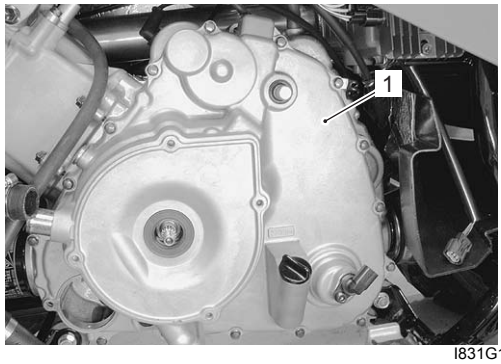
4) After finishing the gear position switch inspection, reinstall the removed parts.

Starter Torque Limiter / Starter Clutch Removal and Installation

B831G21906014

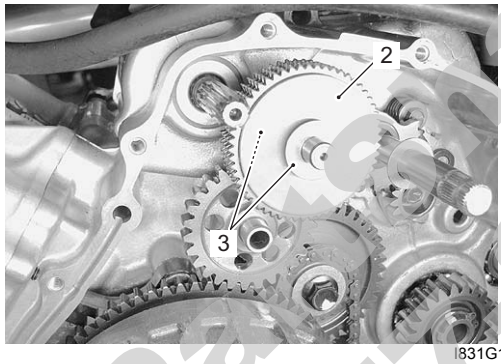
Removal

1) Drain engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.
2) Remove the generator cover (1). Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.



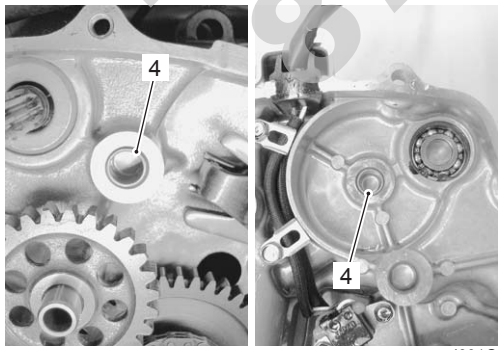
I831G1190025-01

3) Remove the starter torque limiter (2) with the washers (3).



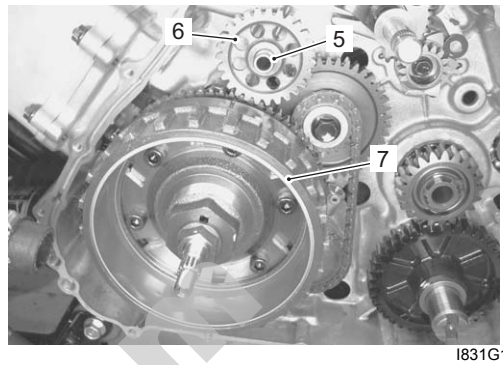
I831G1190026-02

4) Remove the bushings (4) from the crankcase and generator cover.



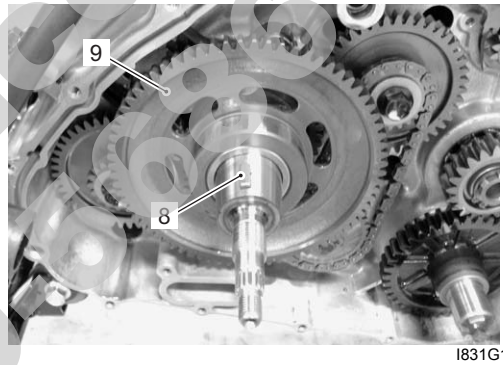
I831G1190027-02

5) Remove the idle gear shaft (5) and starter idle gear (6).
6) Remove the generator rotor assembly (7). Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.



I831G1190028-01

7) Remove the key (8) and starter driven gear (9).

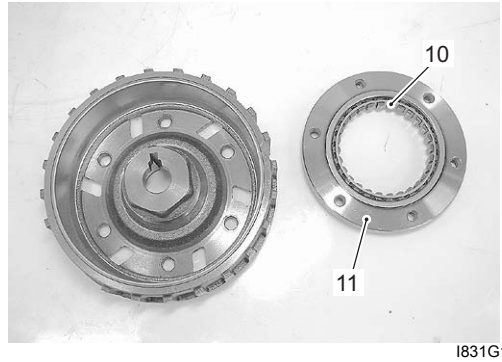


I831G1190030-01

8) Hold the generator rotor with a 41 mm offset wrench and remove the starter clutch bolts.

I831G1190031-01

9) Remove the one way clutch (10) from the guide (11).



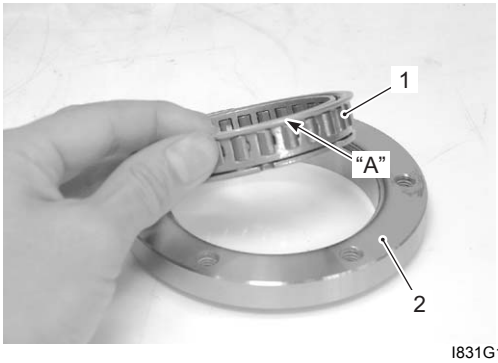
I831G1190032-01

Installation
Install the starter clutch in the reverse order of removal. Pay attention to the following points:

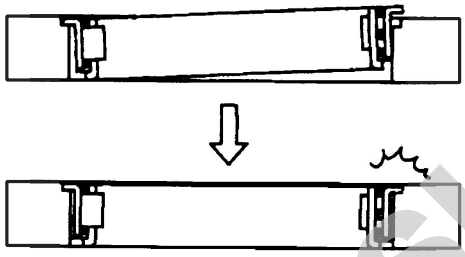
- When inserting the one way clutch (1) into the guide (2), fit the flange “A” in the step of the guide (2).

NOTE

Be sure to seat the flange “A” of the one way clutch (1) to the guide (2).



I831G1190033-01



I718H1190031-01

- Install the guide to the generator rotor.

NOTE

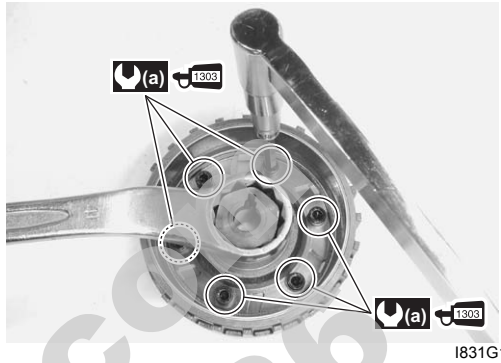
The arrow mark “B” must face the generator rotor side.

I831G1190034-01

- Apply thread lock to the bolts, and then tighten them to the specified torque.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Starter clutch bolt (a): 26 N·m (2.6 kgf-m, 19.0 lb-ft)

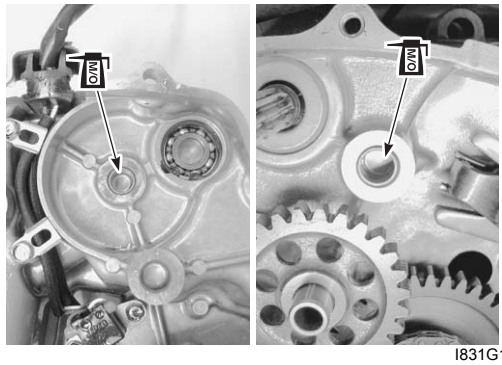


I831G1190035-01

- Apply engine oil to the bearing of the starter driven gear.

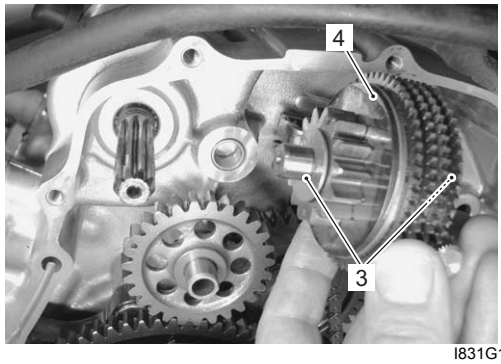
I831G1190036-01

- Install the generator rotor assembly onto crankshaft. Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.
- Apply molybdenum oil solution to the inside of bushings.



I831G1190037-02

- Fit the washers (3) onto the starter torque limiter (4).
- Install the starter torque limiter (4) to the crankcase.



I831G1190038-01

Starter Driven Gear Bearing Removal and Installation

B831G21906015

Removal

1) Remove the starter driven gear. Refer to “Starter Torque Limiter / Starter Clutch Removal and Installation (Page 1I-10)”.
2) Remove the bearing with the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

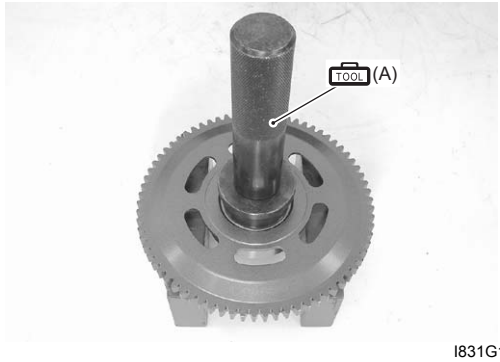
I831G1190039-01

Installation

Install the starter driven gear bearing in the reverse order of removal. Pay attention to following point:

- Install the bearing with the special tool.

Special tool
TOOL : 09913–70210 (Bearing installer set)



I831G1190039-01

Starter Related Parts Inspection

B831G21906016

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 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 the one way clutch with a new one.


I831G1190041-01

Starter Driven Gear Bearing

Inspect the starter driven gear bearing for wear or damage. If necessary, replace it with a new one.


I831G1190042-01

Starter Torque Limiter

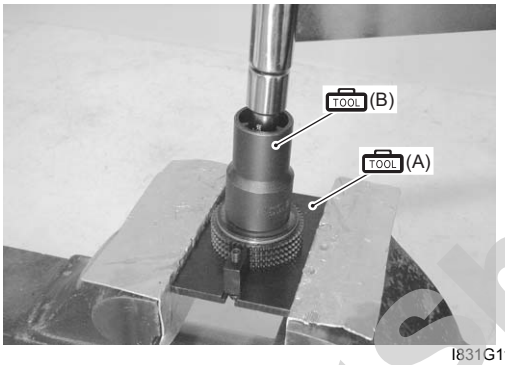
⚠ CAUTION

Do not attempt to disassemble the starter torque limiter. The starter torque limiter is available only as an assembly.

1) Set the starter torque limiter to the special tools and vise.
2) Turn the starter torque limiter and check the slip torque.

Special tool
(A): 09930–73170 (Starter torque limiter holder)
(B): 09930–73140 (Starter torque limiter socket)

Starter torque limiter slip torque
Standard: 41.2 – 62.8 N·m (4.2 – 6.4 kgf-m, 14.5 – 32.5 lb-ft)



I831G1190043-01

Starter Idle Gear

Inspect the starter idle gear for wear or damage. If any damage is found, replace it with a new one.

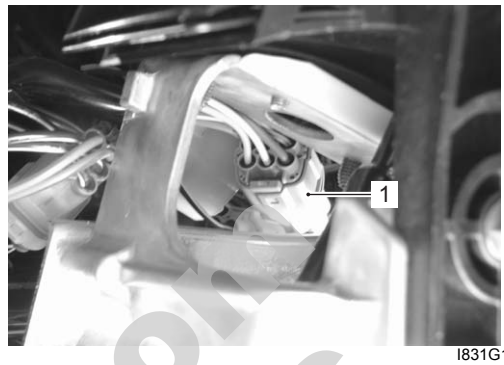

I831G1190044-01

Starter Button Inspection

B831G21906017

Inspect the starter button in the following procedures:

1) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the handlebar switch coupler (1).



I831G1190045-02

3) Measure the voltage between Y/G and O lead wires.

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

Tester knob indication
Diode test ( )

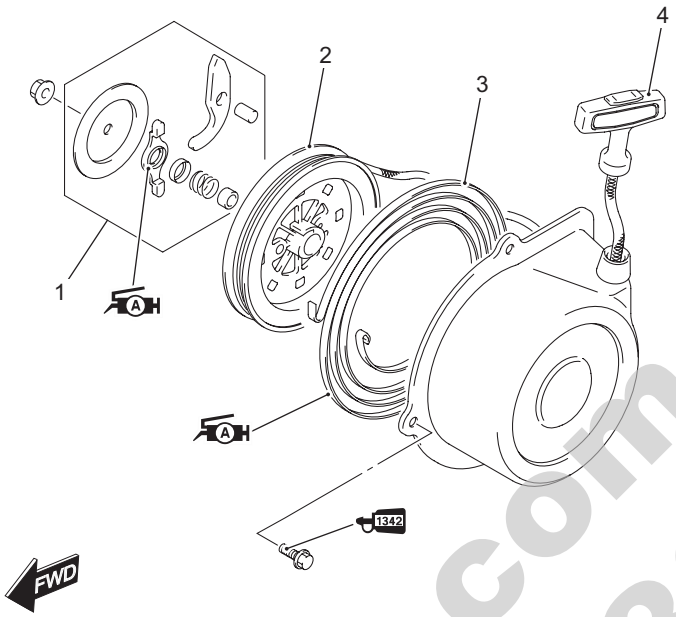
	Y/G ((+) probe)	O ((–) probe)
ON	0.4 – 0.6 V	
OFF	1.4 V and more (Tester’s battery voltage)	

NOTE

If the tester reads 1.4 V and below when the tester probes are not connected, replace its battery.

Recoil Starter Components

B831G21906018



I831G1190046-04

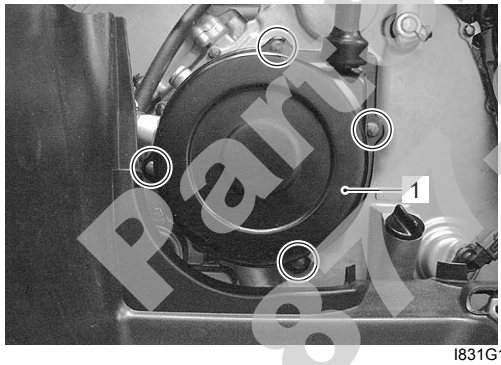
1. Ratchet set	3. Spiral spring	A : Apply grease.
2. Reel	4. Rope assembly	1342 : Apply thread lock to the thread part.

Recoil Starter Assembly Removal and Installation

B831G21906019

Removal

- Remove the recoil starter (1).



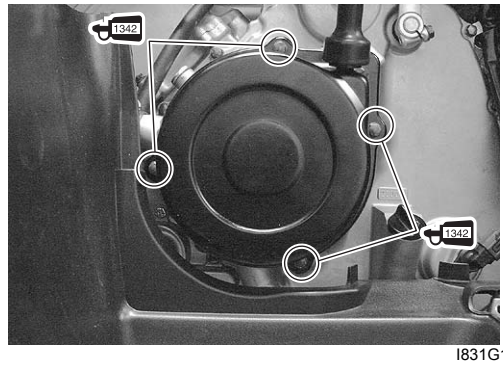
I831G1190047-02

Installation

Install the recoil starter assembly in the reverse order of removal. Pay attention to the following point:

- Apply a small quantity of thread lock to the recoil starter bolts.

1342 : Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)



I831G1190048-04

Recoil Starter Disassembly and Assembly

B831G21906020

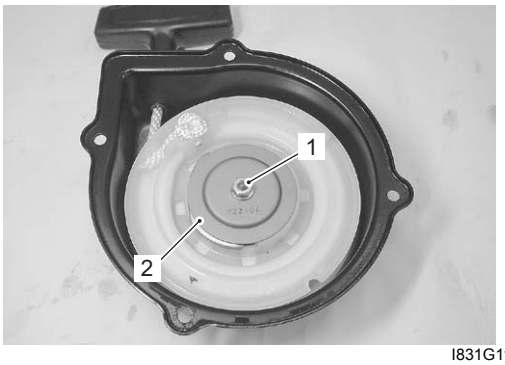
Refer to “Recoil Starter Assembly Removal and Installation (Page 1I-14)”.

Disassembly

⚠ WARNING

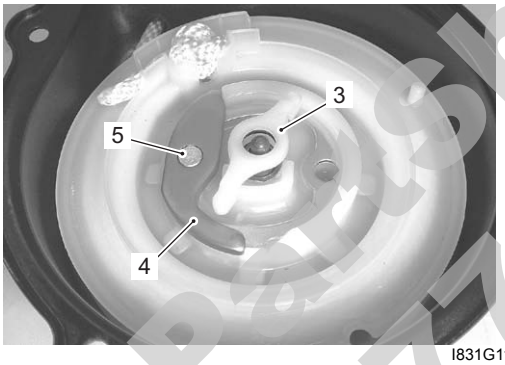
Wear hand and eye protection when removing the reel, since the spring may quickly unwind and cause an injury.

1) Remove the nut (1) and friction plate (2).



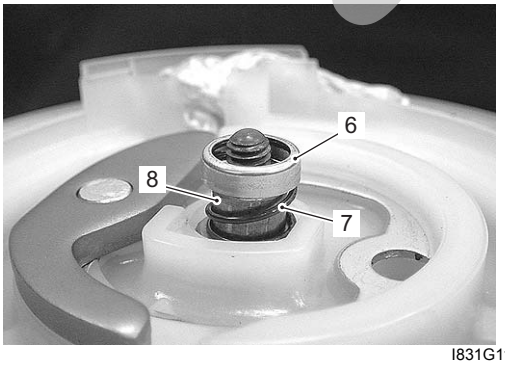
I831G1190049-03

2) Remove the ratchet guide (3), ratchet (4) and ratchet pin (5).



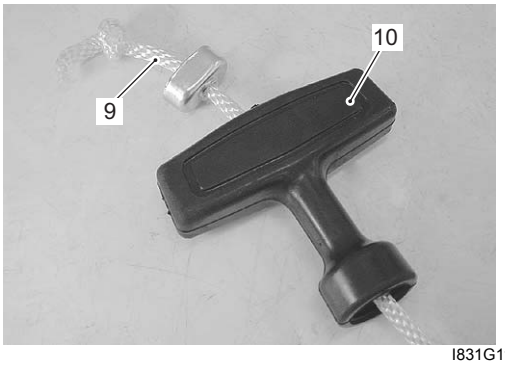
I831G1190050-02

3) Remove the spring cover (6), spring (7) and spacer (8).



I831G1190051-02

4) Disengage the rope (9) from the handle (10).

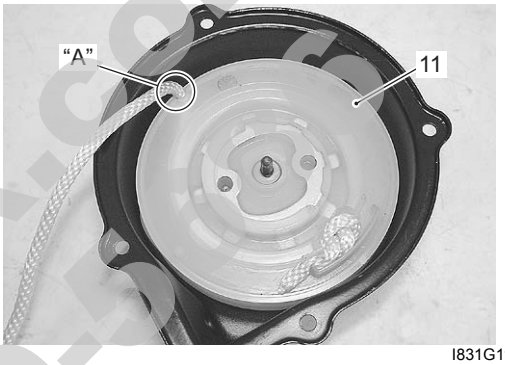


I831G1190052-02

5) Hook the rope to groove “A” of the reel (11).

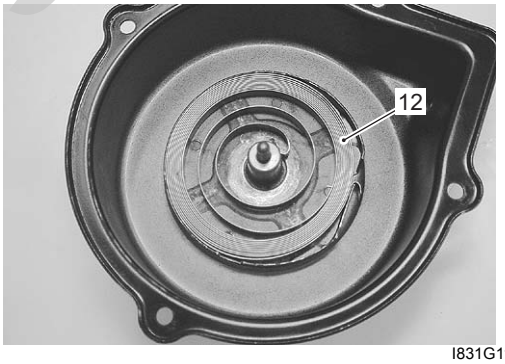
6) Turn the rope on the reel (11) properly.

7) Remove the reel (11).



I831G1190053-02

8) Remove the spiral spring (12).



I831G1190054-01

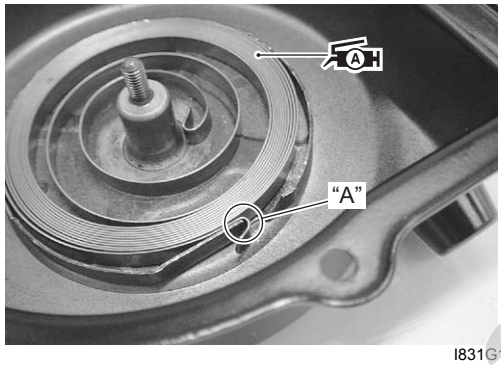
Assembly
Assemble the recoil starter in the reverse order of disassembly. Pay attention to the following points:

⚠ WARNING

Wear hand and eye protection when installing the reel, since the spring may quickly unwind and cause an injury.

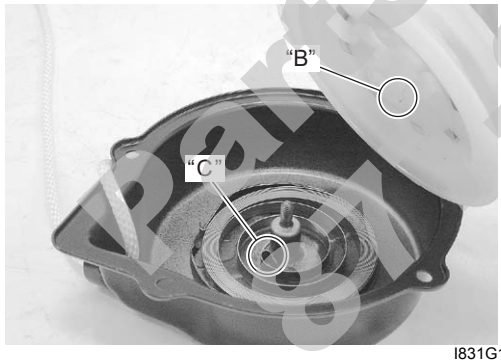
- When installing the spiral spring, hook the spiral spring end “A” with the recoil starter case as shown in the figure.
- Apply grease to the spiral spring.

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



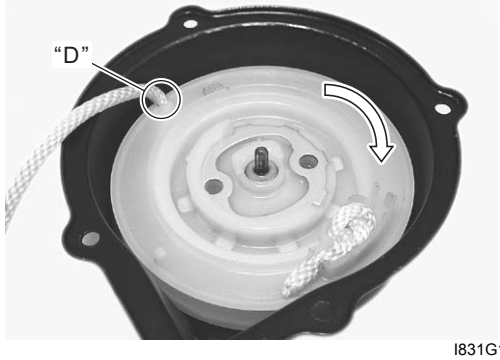
I831G1190055-01

- Turn the rope on the reel properly.
- After installing the spiral spring, engage the part “B” of the reel with the spiral spring end “C”.



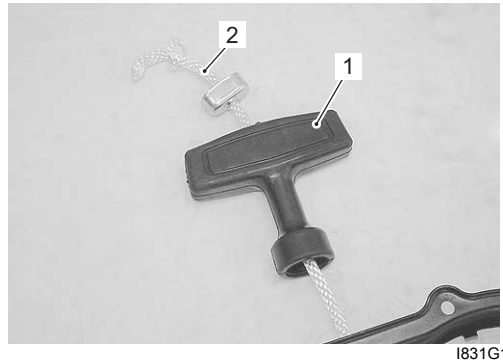
I831G1190056-01

- Hook the rope onto the hook part “D” of the reel, turn the reel clockwise five or six times with the rope.



I831G1190057-01

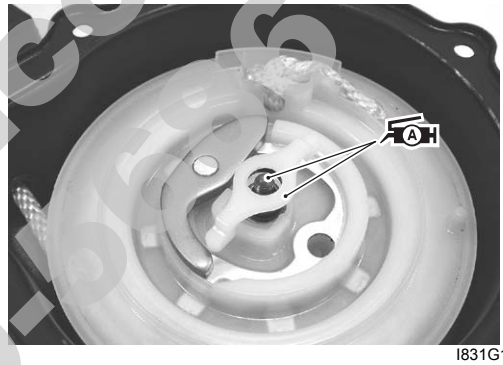
- Connect the handle (1) to the rope (2).



I831G1190058-02

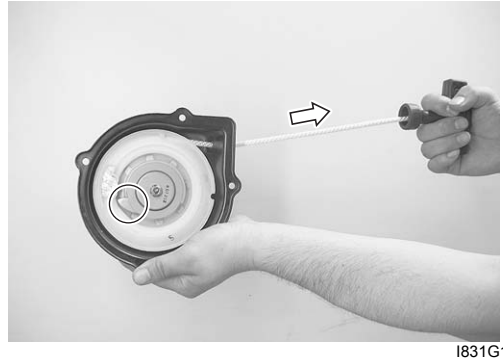
- Install the ratchet related parts.
- Apply grease to the shaft and ratchet guide.

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



I831G1190059-01

- Pull the rope and check that the ratchet is pushed out.



I831G1190060-02

Recoil Starter Inspection

B831G21906021

Ratchet Set

Inspect the ratchet set for wear or damage. If any defects are found, replace the ratchet set with a new one.

I831G1190061-01

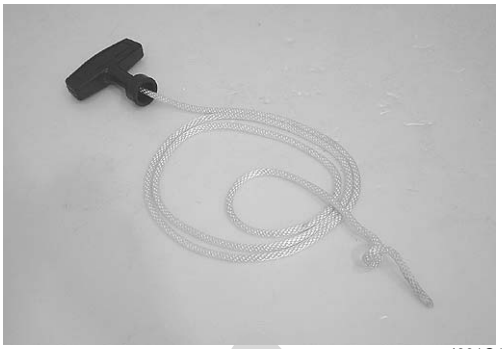
Reel

Inspect the reel for wear or damage. If any defects are found, replace the reel with a new one.

I831G1190062-02

Rope

Inspect the rope for damage. If any defects are found, replace the rope with a new one.



I831G1190063-01

Specifications

Service Data

B831G21907001

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	41.2 – 62.8 N·m (4.2 – 6.4 kgf-m, 14.5 – 32.5 lb-ft)	
Starter relay resistance	3 – 5 Ω		

Tightening Torque Specifications

B831G21907002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Starter motor mounting bolt	10	1.0	7.0	☞(Page 1I-4)
Starter motor lead wire mounting nut	6	0.6	4.5	☞(Page 1I-4)
Starter clutch bolt	26	2.6	19.0	☞(Page 1I-11)

NOTE

The specified tightening torque is also 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-7)".

Special Tools and Equipment

Recommended Service Material

B831G21908001

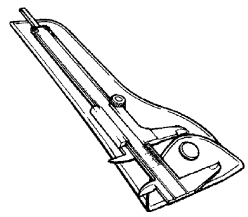
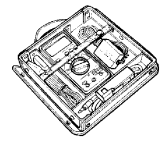
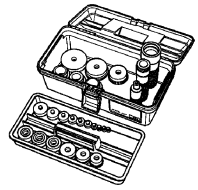
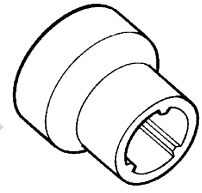
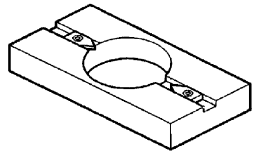
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 1I-4) / ☞(Page 1I-5) / ☞(Page 1I-16) / ☞(Page 1I-16)
Moly paste	SUZUKI Moly paste or equivalent	P/No.: 99000–25140	☞(Page 1I-5)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 1I-11)
	THREAD LOCK CEMENT 1342 or equivalent	P/No.: 99000–32050	☞(Page 1I-14)

NOTE

Required service material is also described in the following.
"Starter Motor Components (Page 1I-3)"
"Recoil Starter Components (Page 1I-14)"

Special Tool

B831G21908002

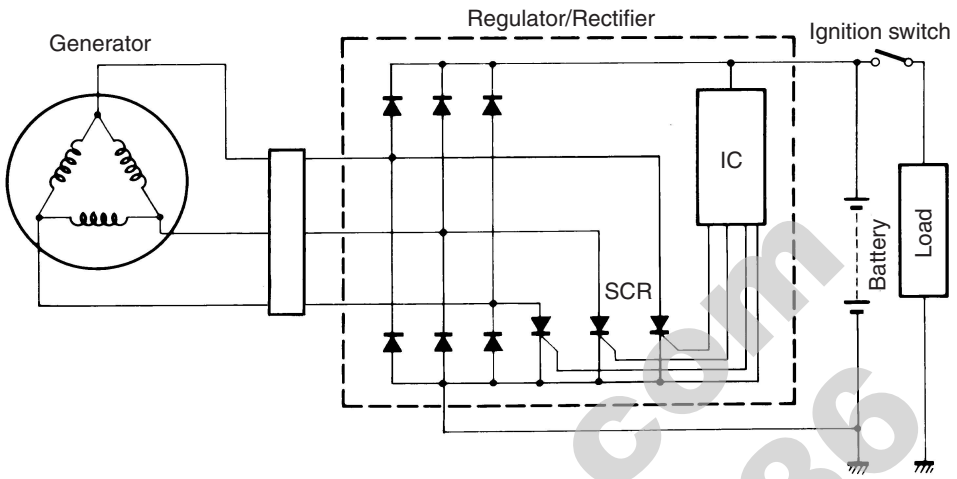
09900–20102 Vernier calipers (1/20 mm, 200 mm) ☞(Page 1I-5) 	09900–25008 Multi-circuit tester set ☞(Page 1I-6) / ☞(Page 1I-7) / ☞(Page 1I-7) / ☞(Page 1I-8) / ☞(Page 1I-8) / ☞(Page 1I-9) / ☞(Page 1I-9) / ☞(Page 1I-9) / ☞(Page 1I-13) 
09913–70210 Bearing installer set ☞(Page 1I-12) / ☞(Page 1I-12) 	09930–73140 Starter torque limiter socket ☞(Page 1I-13) 
09930–73170 Starter torque limiter holder ☞(Page 1I-13) 	

Charging System

Schematic and Routing Diagram

Charging System Diagram

B831G21A02001



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Component Location

Charging System Components Location

B831G21A03001

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

Diagnostic Information and Procedures

Charging System Symptom Diagnosis

B831G21A04001

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.*

Condition	Possible cause	Correction / Reference Item
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.*

Battery Runs Down Quickly

B831G21A04002

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-3)". *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-3)". *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-3)". *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

B831G21A06001

Inspect the battery current leakage in the following procedures:

1) Turn the ignition switch OFF.
2) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
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.

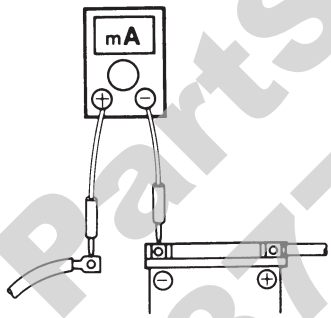
⚠ CAUTION

- **In case of a large current leak, turn the tester to high range first to avoid tester damage.**
- **Do not turn the ignition switch ON when measuring current.**

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

Tester knob indication
Current (⎓ , 20 mA)

Battery current (Leak)
Under 2.6 mA



I649G11A0002-02

5) Connect the (–) battery terminal and install the seat.

Regulated Voltage Inspection

B831G21A06002

Inspect the regulated voltage in the following procedures:

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Start the engine and keep it running at 5 000 r/min with the dimmer switch turned HI position.
3) Measure the DC voltage between the (+) and (–) battery terminals using the multi-circuit tester. If the voltage is not within the specified value, inspect the generator and regulator/rectifier. Refer to “Generator Inspection (Page 1J-3)” and “Regulator / Rectifier Inspection (Page 1J-8)”.

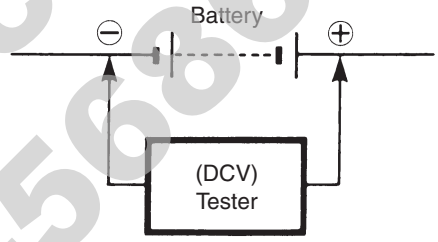
NOTE

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

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

Tester knob indication
Voltage (⎓)

Regulated voltage (Charging output)
Standard: 13.5 – 15.0 V at 5 000 r/min



I649G11A0003-02

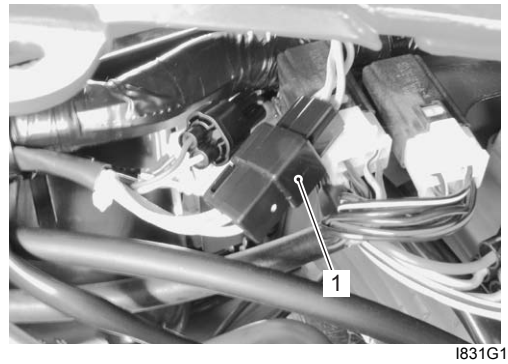
4) Install the seat.

Generator Inspection

B831G21A06003

Generator Coil Resistance

1) Remove the left side cover and engine side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the generator coupler (1).



I831G11A0001-01

3) 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.

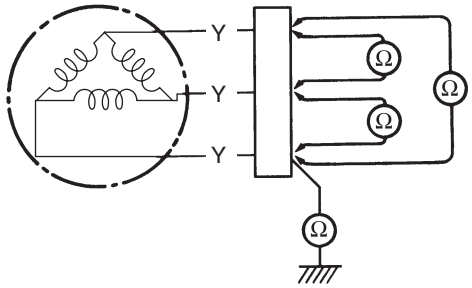
NOTE

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

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

Tester knob indication
Resistance (Ω)

Generator coil resistance
0.4 – 1.0 Ω (Y – Y)
∞ Ω (Y – Ground)

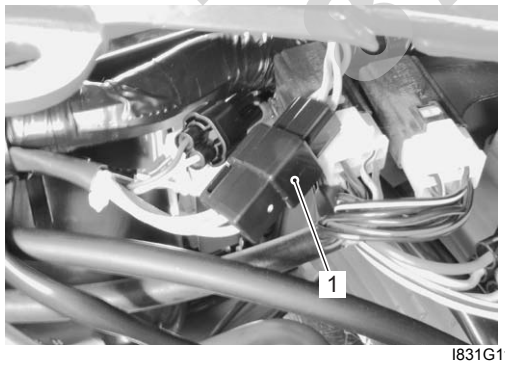


I831G11A0002-01

4) After finishing the inspection, reinstall the removed parts.

No-load Performance

1) Remove the side covers, left and right. Refer to "Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".
2) Connect the tachometer onto the spark plug high-tension cord.
3) Disconnect the generator coupler (1).



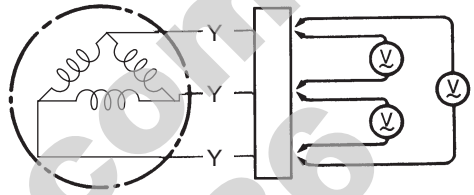
I831G11A0001-01

4) Start the engine and keep it running at 5 000 r/min.
5) 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)
75 V (AC) and more at 5 000 r/min



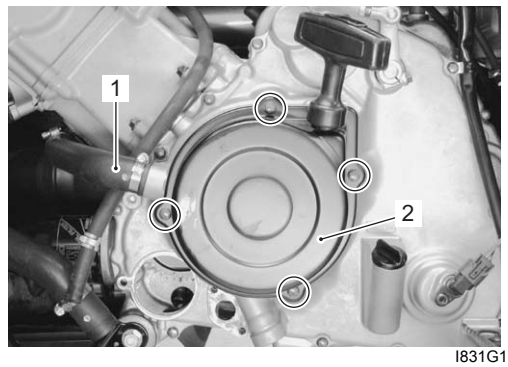
I831G11A0003-01

Generator Removal and Installation

B831G21A06004

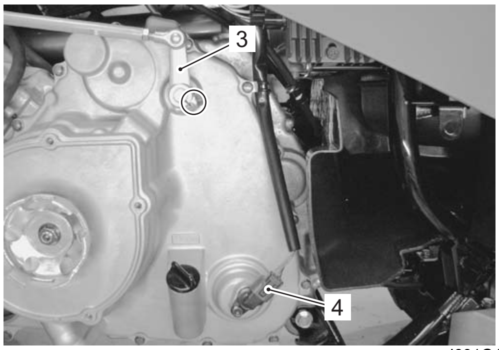
Removal

1) Disconnect the (–) battery lead wire. Refer to "Battery Removal and Installation (Page 1J-12)".
2) Drain engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-10)".
3) Remove the left inner fender. Refer to "Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".
4) Remove the left mud guard. Refer to "Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)".
5) Drain engine coolant. Refer to "Cooling System Inspection in Section 0B (Page 0B-15)".
6) Remove the water pump assembly. Refer to "Water Pump Removal and Installation in Section 1F (Page 1F-13)".
7) Disconnect the water hose (1) and remove the recoil starter (2).



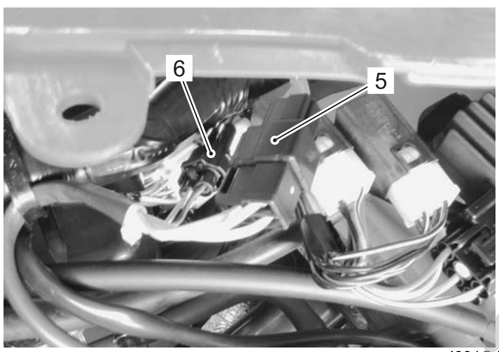
I831G11A0004-02

8) Disconnect the gearshift lever arm (3) and speed sensor coupler (4).



I831G11A0015-01

9) Disconnect the CKP sensor coupler (5) and generator coupler (6).



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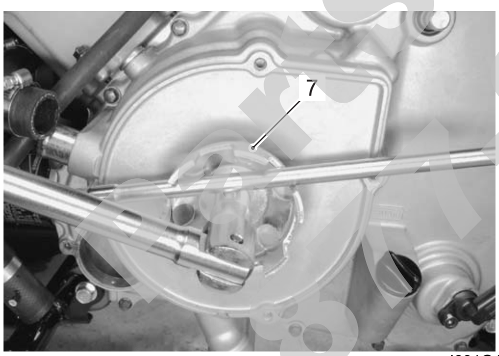
10) Remove the starter cup nut with a suitable bar.

11) Remove the starter cup (7).



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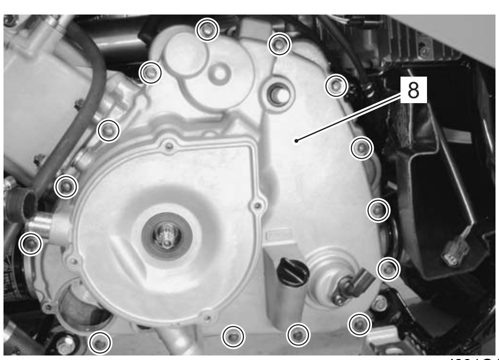
12) Remove the generator cover (8).



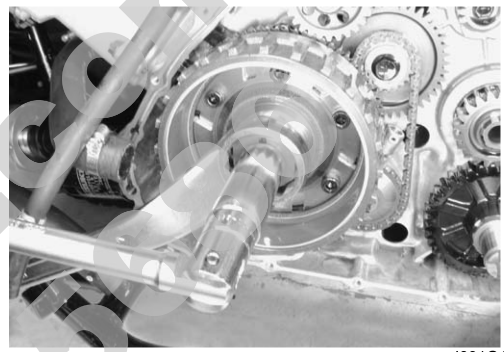
I831G11A0008-03

13) Remove the gasket (9) and dowel pins.

I831G11A0009-01

14) Hold the generator rotor with a 41 mm offset wrench.

15) Remove the generator rotor nut.

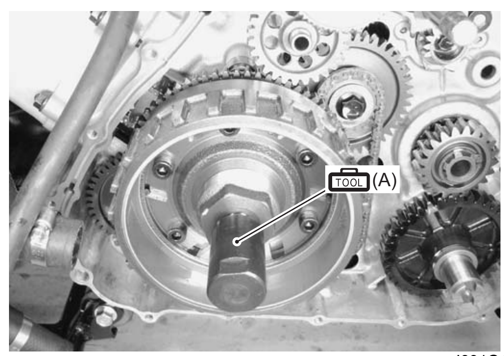


I831G11A0010-01

16) Install the special tool to the crankshaft end.

Special tool

TOOL (A): 09930–31921 (Rotor remover)



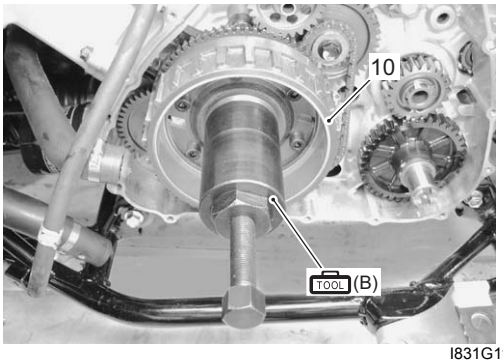
I831G11A0011-01

17) Remove the generator rotor assembly (10) with the special tool.

NOTE

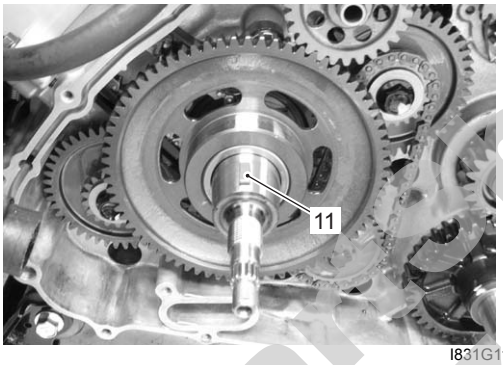
Remove the starter clutch if necessary. Refer to "Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)".

Special tool
TOOL (B): 09930–30721 (Rotor remover)



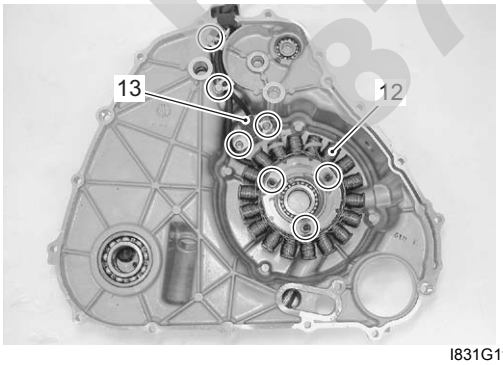
I831G11A0012-01

18) Remove the key (11).



I831G11A0013-02

19) Remove the generator stator (12) along with the CKP sensor (13).



I831G11A0014-02

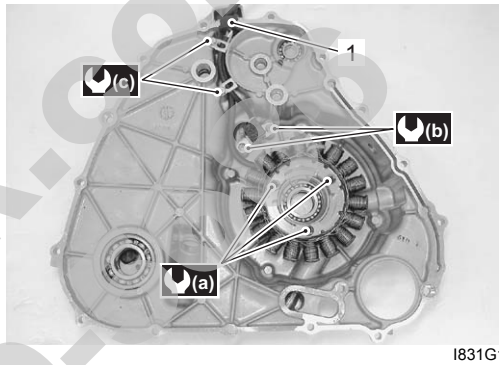
Installation
Install the generator in the reverse order of removal. Pay attention to the following points:

- Tighten the generator stator set bolts and CKP sensor mounting bolts to the specified torque.

NOTE

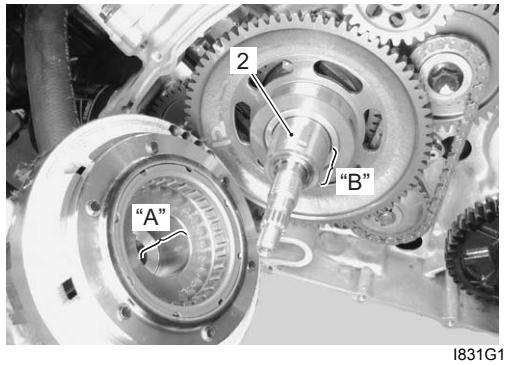
Be sure the grommet (1) is set to the generator cover.

Tightening torque
Generator stator set bolt (a): 11 N·m (1.1 kgf-m, 8.0 lb-ft)
CKP sensor mounting bolt (b): 6 N·m (0.6 kgf-m, 4.5 lb-ft)
Lead wire clamp bolt (c): 6 N·m (0.6 kgf-m, 4.5 lb-ft)



I831G11A0016-03

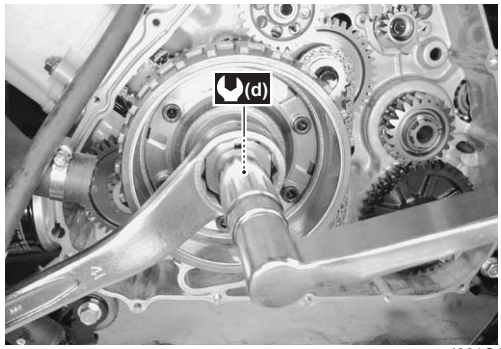
- Degrease the tapered portion "A" of generator rotor assembly and also the crankshaft "B". Use nonflammable cleaning solvent to wipe off oily or greasy matter to make these surfaces completely dry.
- Fit the key (2) in the key slot on the crankshaft.
- Install the generator rotor assembly onto crankshaft.



I831G11A0017-04

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

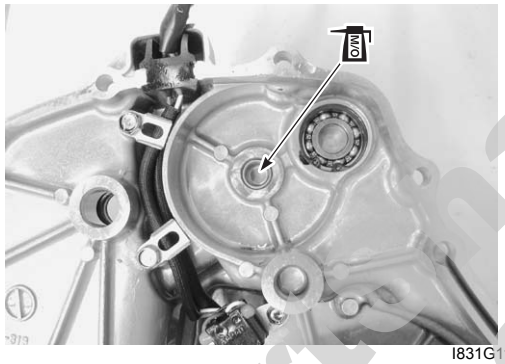
  Tightening torque
  Generator rotor nut (d): 160 N·m (16.0 kgf-m, 115.5 lb-ft)



I831G11A0018-05

- Apply molybdenum oil solution to the inside of the bush.

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)



I831G11A0019-01

- Install the dowel pins and new gasket (3).

⚠ CAUTION

Use a new gasket to prevent oil leakage.

I831G11A0020-03

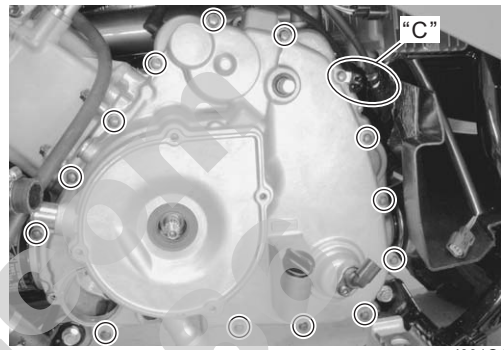
- Install the generator cover and tighten the generator cover bolts.

⚠ WARNING

Be careful not to pinch the finger between the generator cover and the crankcase.

⚠ CAUTION

Fit the clamp to the bolt “C”.



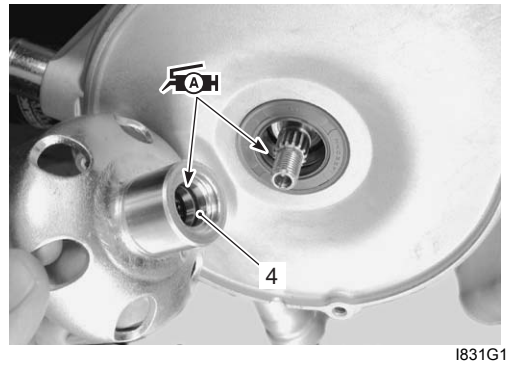
I831G11A0021-02

- Apply grease to the O-ring (4) and oil seal lip.

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

⚠ CAUTION

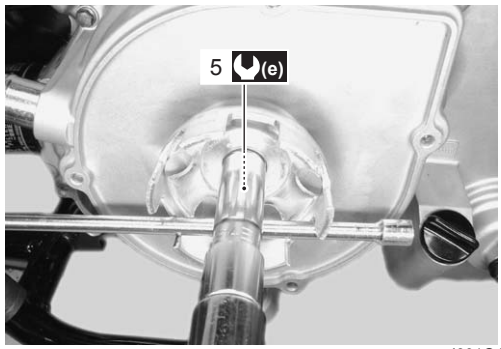
Replace the O-ring (4) with a new one.



I831G11A0022-03

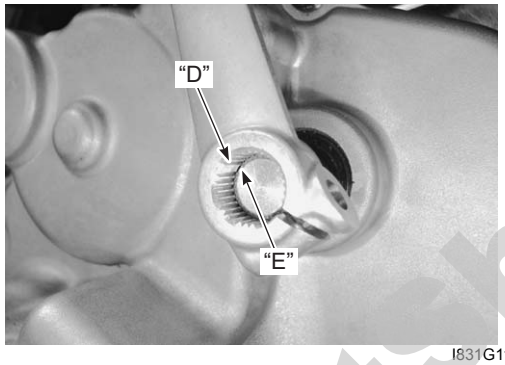
- Tighten the starter cup nut (5) to the specified torque.

  Tightening torque
  Starter cup nut (e): 38 N·m (3.8 kgf-m, 27.5 lb-ft)



I831G11A0023-05

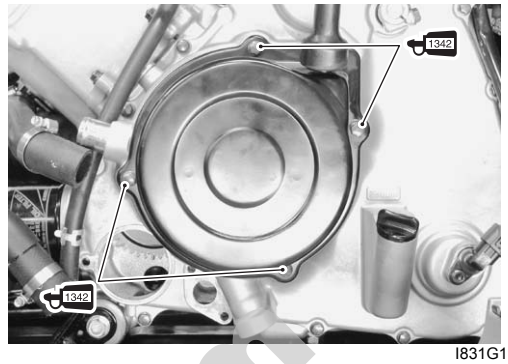
- When installing the gearshift lever arm, align the wide spline teeth “D” with “E”. Refer to “Shift Lever Disassembly and Assembly in Section 5A (Page 5A-25)”.



I831G11A0024-02

- Apply a small quantity of thread lock to the bolts.

  1342 : Thread lock cement 99000–32050
  (THREAD LOCK CEMENT 1342 or equivalent)



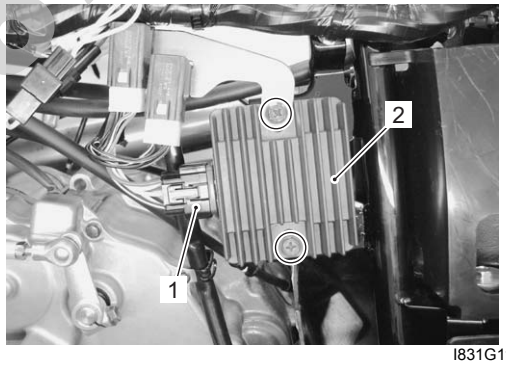
I831G11A0025-02

Regulator / Rectifier Inspection

B831G21A06005

Inspect the regulator/rectifier in the following procedures:

1) Turn the ignition switch OFF.
2) Remove the rear fender. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
3) Disconnect the regulator/rectifier coupler (1) and remove the regulator/rectifier (2).



I831G11A0026-01

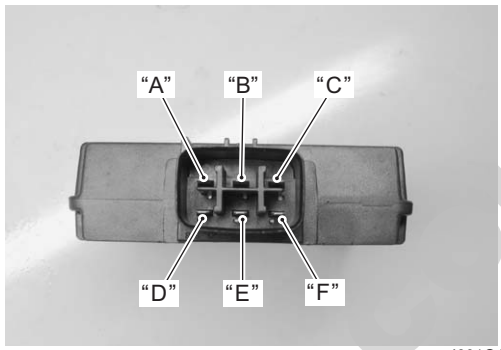
4) Measure the voltage between the terminals using the multi-circuit tester as indicated in the following table. If the voltage is not within the specified value, replace the regulator/rectifier with a new one.

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 (⊣◀)



I831G11A0027-01

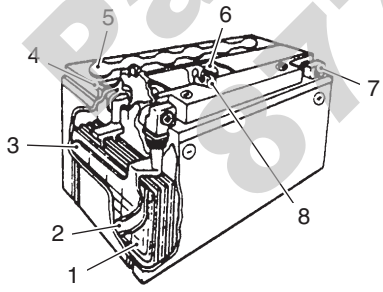
Unit: V

		"A"	"B"	"C"	"D"	"E"	"F"
(–) probe of tester to:	"A"	—	*	0.4 – 1.2	0.3 – 0.7	0.3 – 0.7	0.3 – 0.7
	"B"	*	—	*	*	*	*
	"C"	*	*	—	*	*	*
	"D"	*	*	0.3 – 0.7	—	*	*
	"E"	*	*	0.3 – 0.7	*	—	*
	"F"	*	*	0.3 – 0.7	*	*	—
*1.4 V and more (tester's battery voltage)							

5) Connect the regulator/rectifier coupler and reinstall the removed parts.

Battery Components

B831G21A06006



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

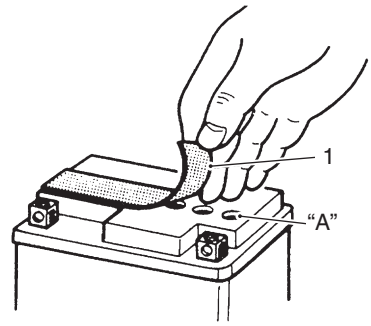
B831G21A06007

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".

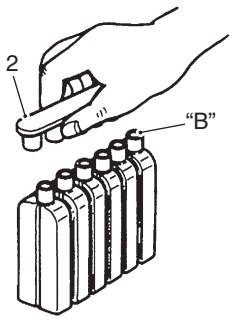


I649G11A0039-03

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.**



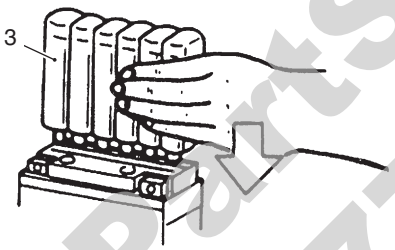
I649G11A0040-03

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.

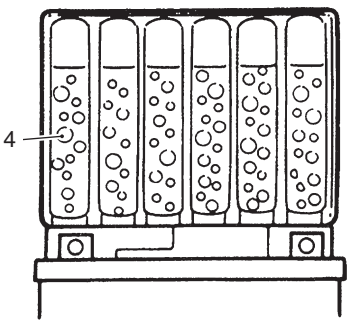
NOTE

Do not allow any of the electrolyte to spill.



I649G11A0041-03

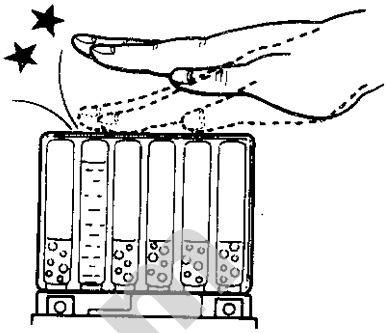
5) Make sure that air bubbles (4) rise to the top of each electrolyte container, and leave in this position for about more than 20 minutes.



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

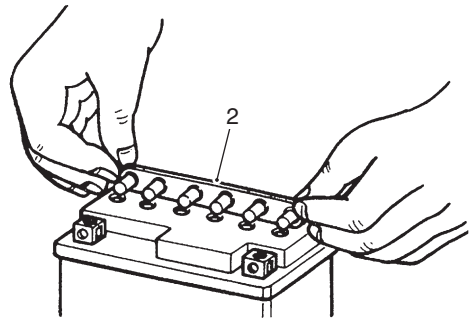
6) After confirming that the electrolyte has entered the battery completely, remove the electrolyte containers from the battery.

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.

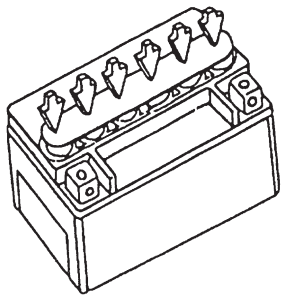
⚠ CAUTION

- **Once the caps are installed to the battery, do not remove the caps.**
- **Do not tap the caps with a hammer when installing them.**

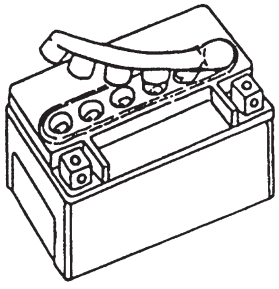


I718H11A0027-01

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

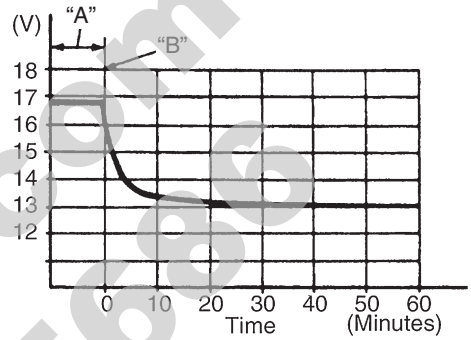
When the vehicle is not used for a long period, check the battery every 1 month to prevent the battery discharge.

1) Remove the battery from the vehicle. Refer to "Battery Removal and Installation (Page 1J-12)".

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 hour

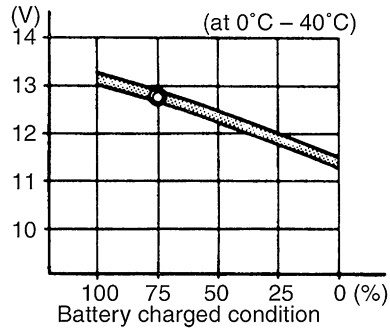
3) After recharging, wait at least 30 minutes and then measure the battery voltage using the multi-circuit tester.
   If the battery voltage is less than 12.5 V, recharge the battery again.
   If the battery voltage is still less than 12.5 V after recharging, replace the battery with a new one.



I649G11A0045-02

"A": Charging period	"B": Stop charging

4) Install the battery to the vehicle. Refer to "Battery Removal and Installation (Page 1J-12)".



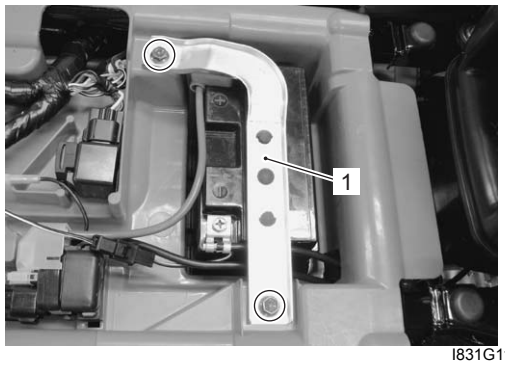
I705H11A0029-02

Battery Removal and Installation

B831G21A06008

Removal

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the battery stay (1).



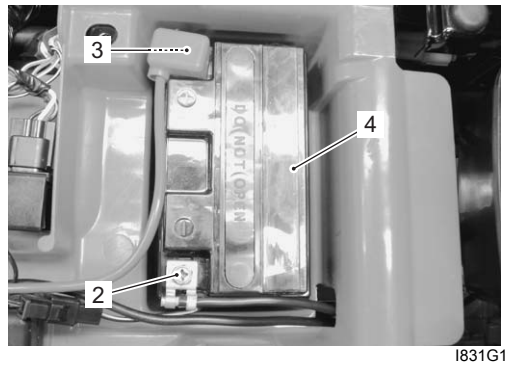
I831G11A0028-02

3) Disconnect the battery (–) lead wire (2).
4) Disconnect the battery (+) lead wire (3).

NOTE

Be sure to disconnect the battery (–) lead wire (2) first, then disconnect the battery (+) lead wire (3).

5) Remove the battery (4).



I831G11A0029-02

Installation

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

⚠ CAUTION

Never use anything except the specified battery.

- Tighten the battery lead wire mounting bolts securely.

Battery Visual Inspection

B831G21A06009

Inspect the battery in the following procedures:

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
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.

Specifications

Service Data

B831G21A07001

Battery

⚠ CAUTION

Never use anything except the specified battery.

Item	Specification	Note
Type designation	YTX20CH-BS	
Capacity	12 V, 64.8 kC (18 Ah)/10 HR	

Generator

Item	Specification	Note
Generator coil resistance	0.4 – 1.0 Ω	
Generator maximum output	Approx. 400 W at 5 000 r/min	
Generator no-load voltage (When engine is cold)	75 V (AC) and more at 5 000 r/min	
Regulated voltage	13.5 – 15.5 V at 5 000 r/min	

Tightening Torque Specifications

B831G21A07002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Generator stator set bolt	11	1.1	8.0	☞(Page 1J-6)
CKP sensor mounting bolt	6	0.6	4.5	☞(Page 1J-6)
Lead wire clamp bolt	6	0.6	4.5	☞(Page 1J-6)
Generator rotor nut	160	16.0	115.5	☞(Page 1J-7)
Starter cup nut	38	3.8	27.5	☞(Page 1J-8)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

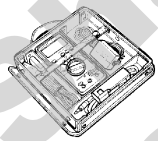
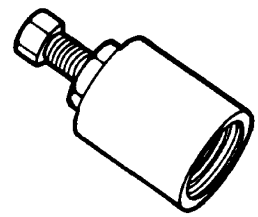
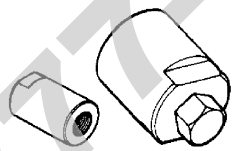
Recommended Service Material

B831G21A08001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 1J-7)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 1J-7)
Thread lock cement	THREAD LOCK CEMENT 1342 or equivalent	P/No.: 99000–32050	☞(Page 1J-8)

Special Tool

B831G21A08002

09900–25008 Multi-circuit tester set ☞(Page 1J-3) / ☞(Page 1J-3) / ☞(Page 1J-4) / ☞(Page 1J-4) / ☞(Page 1J-9) 	09930–30721 Rotor remover ☞(Page 1J-6) 
09930–31921 Rotor remover ☞(Page 1J-5) 	

Exhaust System

Precautions

Precautions for Exhaust System

B831G21B00001

⚠ 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.

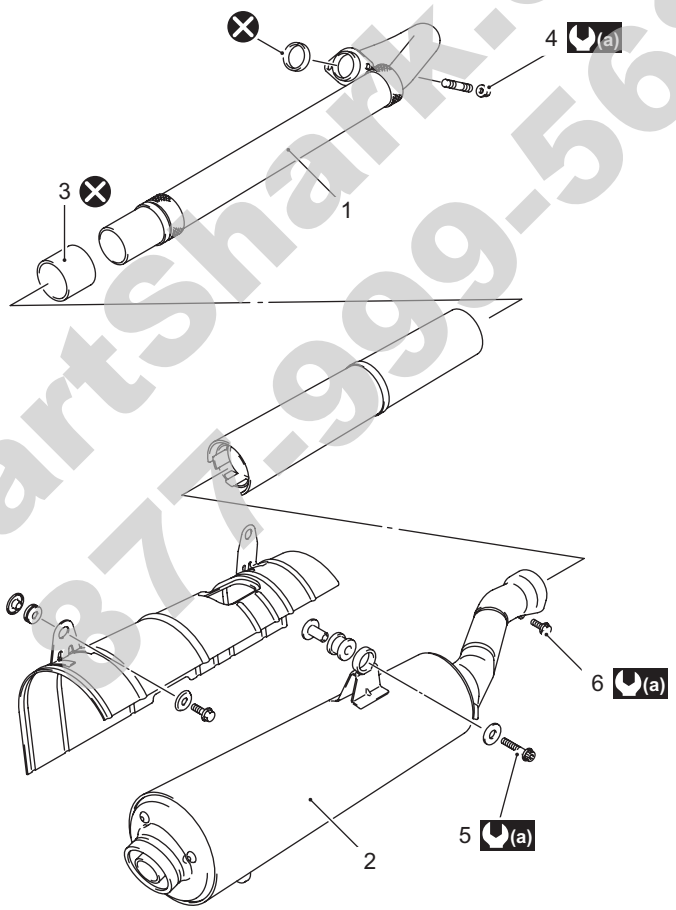
⚠ CAUTION

Make sure that the exhaust pipe and muffler have enough clearance from the rubber parts and plastic parts to avoid melting.

Repair Instructions

Exhaust System Construction

B831G21B06001



I831G11B0001-03

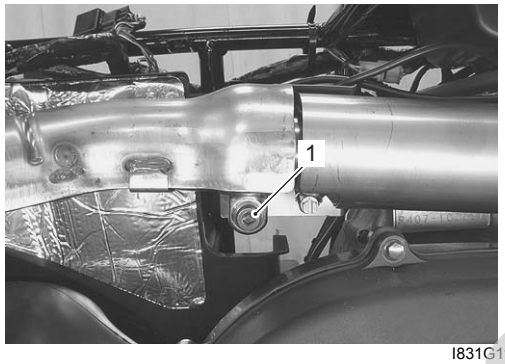
1. Exhaust pipe	4. Exhaust pipe nut	(a) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)
2. Muffler	5. Exhaust pipe mounting bolt	⊗ : Do not reuse.
3. Connector	6. Muffler connecting bolt	

Exhaust Pipe / Muffler Removal and Installation

B831G21B06002

Removal

1) Remove the inner fenders and side covers, left and right. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Remove the rear carrier. Refer to “Rear Carrier Removal and Installation in Section 9E (Page 9E-5)”.
3) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
4) Remove the engine side cover and rear fender. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
5) Loosen the muffler connecting bolt (1).

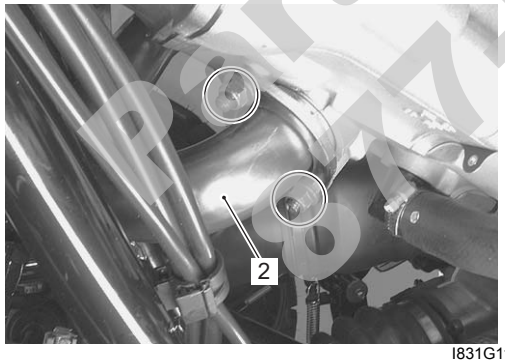


I831G11B0002-02

6) Remove the exhaust pipe (2).

NOTE

Support the exhaust pipe to prevent it from falling.

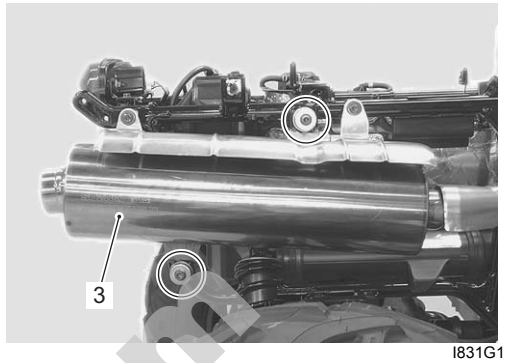


I831G11B0003-01

7) Remove the muffler (3).

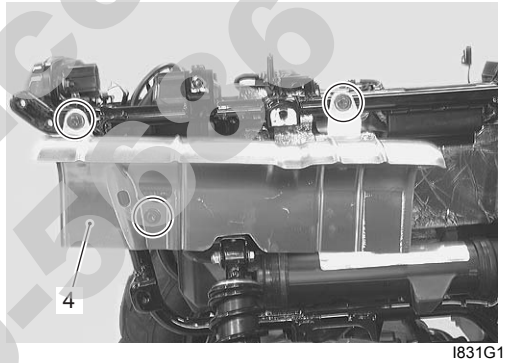
NOTE

Support the muffler to prevent it from falling.



I831G11B0004-03

8) Remove the muffler cover (4).



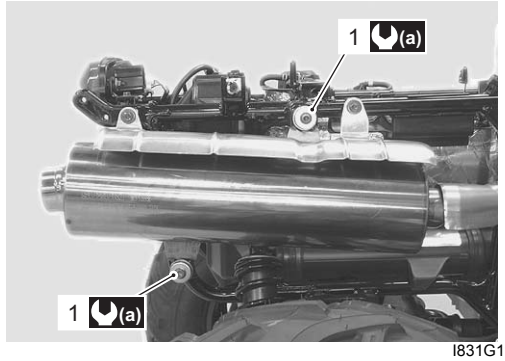
I831G11B0005-02

Installation

Install the exhaust pipe/muffler in the reverse order of removal.
Pay attention to the following points:

- Tighten the muffler mounting bolts (1) to the specified torque.

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

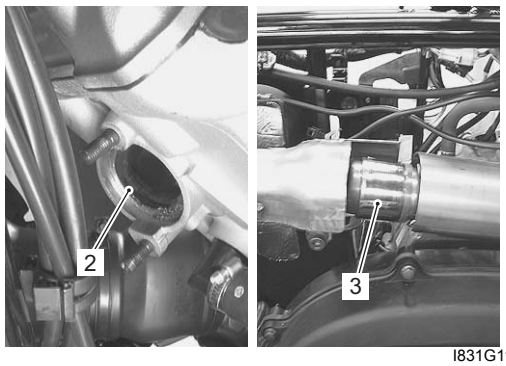


I831G11B0006-03

- Install the exhaust pipe gasket (2) and connector (3).

⚠ CAUTION

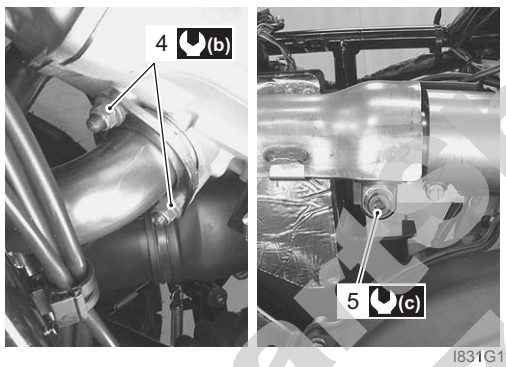
Replace the gasket and connector with new ones.



I831G11B0007-05

- Tighten the exhaust pipe nuts (4) and muffler connecting mounting bolt (5) to the specified torque.

Tightening torque
Exhaust pipe nut (b): 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Muffler connecting bolt (c): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



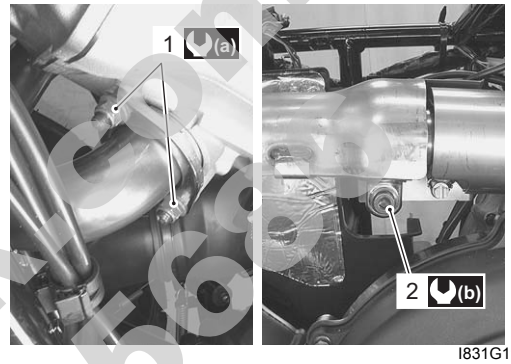
I831G11B0008-04

Exhaust System Inspection

B831G21B06003

Inspect the exhaust pipe connection and muffler connection for exhaust gas leakage and mounting condition. If any defect are found, replace the exhaust pipe assembly or muffler with a new one.
Check the exhaust pipe nuts (1), muffler connecting bolt (2) and muffler mounting bolts (3) are tightened to their specified torque.

Tightening torque
Exhaust pipe nut (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Muffler connecting bolt (b): 23 N·m (2.3 kgf-m, 16.5 lb-ft)
Muffler mounting bolt (c): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I831G11B0009-03

I831G11B0010-02

Spark Arrester Inspection

B831G21B06004

Refer to “Spark Arrester Cleaning in Section 0B (Page 0B-10)”.

Specifications

Tightening Torque Specifications

B831G21B07001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Muffler mounting bolt	23	2.3	16.5	☞(Page 1K-2) / ☞(Page 1K-3)
Exhaust pipe nut	23	2.3	16.5	☞(Page 1K-3) / ☞(Page 1K-3)
Muffler connecting bolt	23	2.3	16.5	☞(Page 1K-3) / ☞(Page 1K-3)

NOTE

The specified tightening torque is also 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-7)”.

Section 2

Suspension

CONTENTS

Precautions

Precautions

Precautions for Suspension

B831G22000001

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.

NOTE

The right and left suspension related parts (shock absorbers, suspension arms and knuckles) are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

Suspension General Diagnosis

Diagnostic Information and Procedures

Suspension and Wheel Symptom Diagnosis

B831G22104001

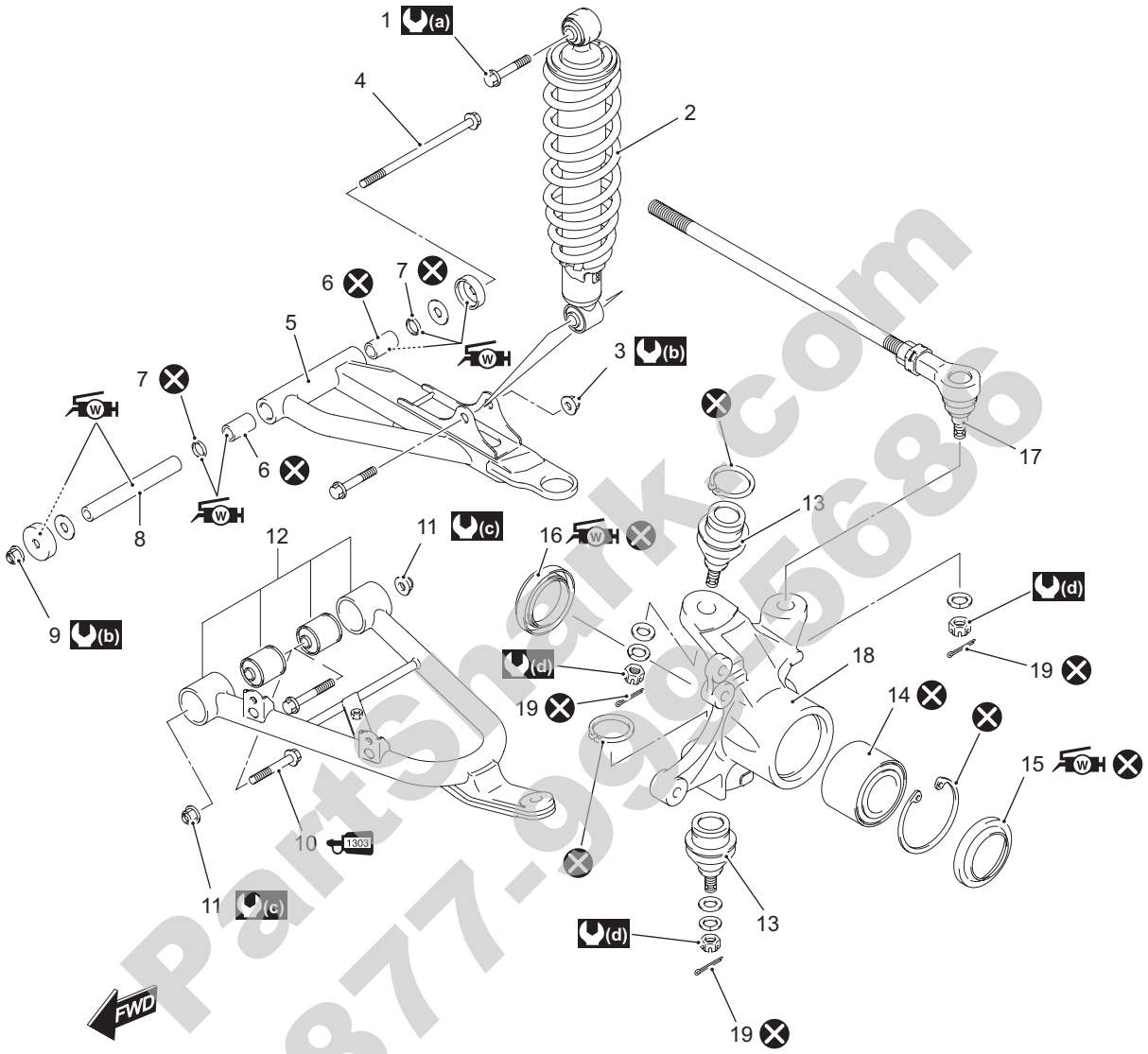
Condition	Possible cause	Correction / Reference Item
Wobbly front wheel	Distorted wheel rim.	*Replace.*
	Worn hub bearings.	*Replace.*
	Defective or incorrect tire.	*Replace.*
	Loose front wheel nut.	*Tighten.*
	Worn front suspension bushings.	*Replace.*
	Loose front suspension fastener.	*Tighten.*
Front suspension too soft	Weak front shock absorber spring.	*Replace.*
	Front shock absorber leaks oil.	*Replace.*
	Improperly suspension setting.	*Adjust.*
Front suspension too stiff	Bent front shock absorber shaft.	*Replace.*
	Bent front upper or lower suspension arm.	*Replace.*
	Improperly suspension setting.	*Adjust.*
Front suspension too noisy	Loose front suspension fastener.	*Tighten.*
	Worn front suspension related bushings.	*Replace.*
Wobbly rear wheel	Distorted wheel rim.	*Replace.*
	Worn hub bearings.	*Replace.*
	Defective or incorrect tire.	*Replace.*
	Loose rear wheel nut.	*Tighten.*
	Worn rear suspension bushings.	*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	Bent rear shock absorber shaft.	*Replace.*
	Bent rear upper or lower suspension arm.	*Replace.*
	Improperly suspension setting.	*Adjust.*
Rear suspension too noisy	Loose rear suspension fastener.	*Tighten.*
	Worn rear suspension related bushings.	*Replace.*

Front Suspension

Repair Instructions

Front Suspension Components

B831G22206001

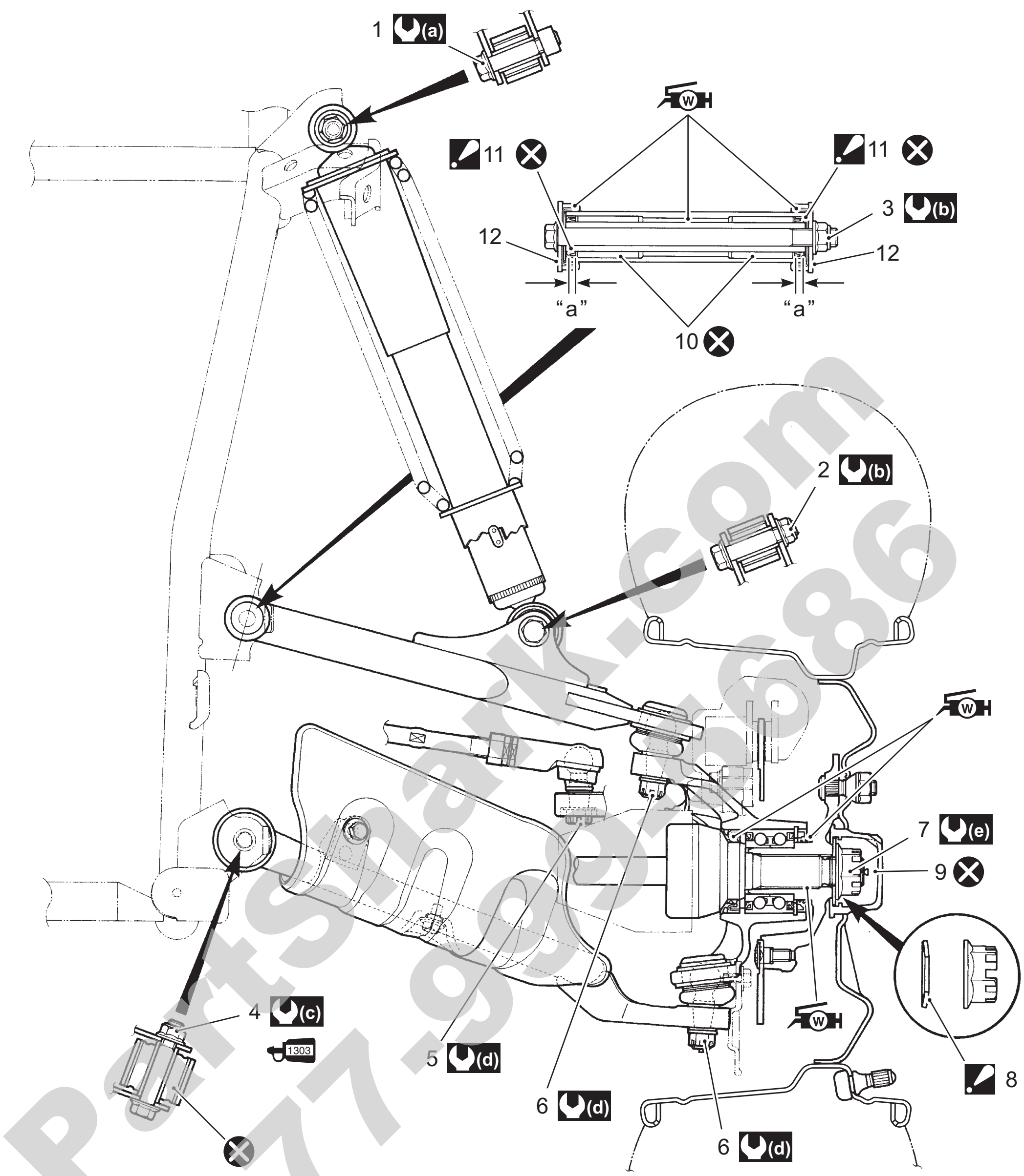


I831G1220002-08

1. Front shock absorber mounting bolt	10. Suspension arm bolt (Lower)	19. Cotter pin
2. Front shock absorber	11. Suspension arm pivot nut (Lower)	(a) : 55 N·m (5.5 kgf-m, 40.0 lb-ft)
3. Front shock absorber mounting nut	12. Suspension lower arm set	(b) : 60 N·m (6.0 kgf-m, 43.5 lb-ft)
4. Suspension arm bolt (Upper)	13. Knuckle end	(c) : 65 N·m (6.5 kgf-m, 47.0 lb-ft)
5. Suspension upper arm	14. Hub bearing	(d) : 29 N·m (2.9 kgf-m, 21.0 lb-ft)
6. Bushing	15. Outer dust seal	W : Apply water resistance grease.
7. Inner dust seal	16. Inner dust seal	1303 : Apply thread lock to the thread part.
8. Spacer	17. Tie-rod end	: Do not reuse.
9. Suspension arm pivot nut (Upper)	18. Steering knuckle	

Front Suspension Assembly Construction

B831G22206002



I831G1220001-06

1.	Front shock absorber mounting bolt	11.	Inner dust seal : Align the surface of dust seal with the edge of suspension arm.
2.	Front shock absorber mounting nut	12.	Outer dust seal
3.	Front suspension arm pivot nut (Upper)	"a":	Position of the bushing (7.0 mm (0.28 in) from edge of suspension arm)
4.	Front suspension arm pivot nut (Lower)	(a) :	55 N·m (5.5 kgf-m, 40.0 lb-ft)
5.	Tie-rod end nut	(b) :	60 N·m (6.0 kgf-m, 43.5 lb-ft)
6.	Steering knuckle end nut (Upper / Lower)	(c) :	65 N·m (6.5 kgf-m, 47.0 lb-ft)
7.	Front wheel hub nut	(d) :	29 N·m (2.9 kgf-m, 21.0 lb-ft)
8.	Washer : The conical side of washer faces outside.	(e) :	110 N·m (11.0 kgf-m, 79.5 lb-ft)
9.	Cotter pin	W :	Apply water resistance grease.
10.	Bushing	⊗ :	Do not reuse.

Front Shock Absorber Removal and Installation

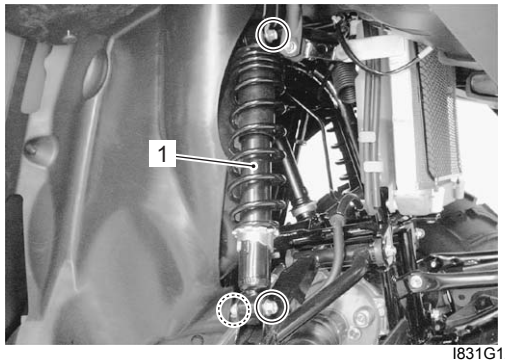
B831G22206003

⚠ CAUTION

Make sure that the vehicle is supported securely.

Removal

1) Remove the front wheel. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
2) Remove the front shock absorber upper mounting bolt.
3) Remove the front shock absorber lower mounting nut and bolt.
4) Remove the front shock absorber (1).



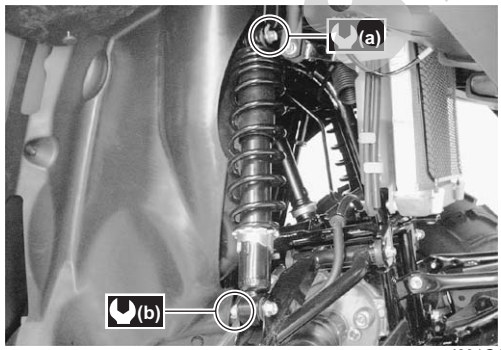
I831G1220003-02

Installation

Install the front shock absorber in the reverse order of removal. Pay attention to the following point:

- Tighten the mounting bolt and nut to the specified torque.

Tightening torque
Front shock absorber mounting bolt (Upper) (a): 55 N·m (5.5 kgf-m, 40.0 lb-ft)
Front shock absorber mounting nut (Lower) (b): 60 N·m (6.0 kgf-m, 43.5 lb-ft)



I831G1220004-02

Front Suspension Inspection

B831G22206004

Refer to “Suspensions Inspection in Section 0B (Page 0B-22)”.

Front Shock Absorber Inspection

B831G22206005

Inspect the front shock absorber in the following procedures:

1) Remove the front shock absorber. Refer to “Front Shock Absorber Removal and Installation (Page 2B-3)”.
2) Inspect the front shock absorber for damage and oil leakage, and absorber bushing for wear or damage. If any defects are found, replace the front shock absorber with a new one.

⚠ CAUTION

Do not attempt to disassemble the front shock absorber. It is unserviceable.

I831G1220005-01

3) Install the front shock absorber. Refer to “Front Shock Absorber Removal and Installation (Page 2B-3)”.

Spring Pre-load Adjustment

B831G22206006

⚠ WARNING

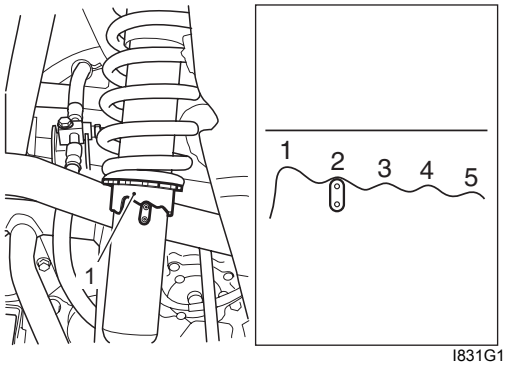
Be sure to adjust the spring pre-load on the both suspensions equally.

- Turn the spring tension ring (1) to the desired position.

NOTE

Position 1 provides the softest spring tension and position 5 provides the stiffest.

STD position
2nd position



I831G1220058-01

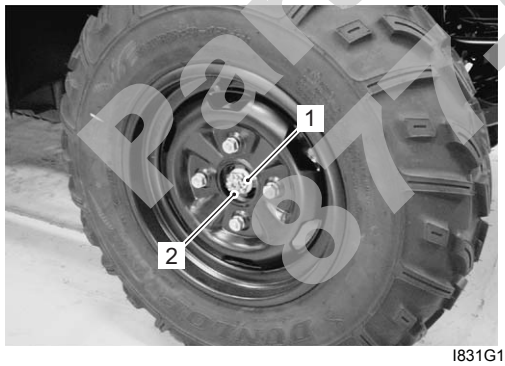
- Install the removed parts.

Front Wheel Hub / Steering Knuckle Removal and Installation

B831G22206007

Removal

1) Remove the cotter pin (1) and loosen the hub nut (2).



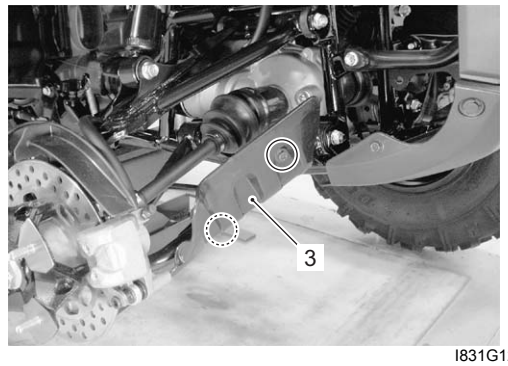
I831G1220006-01

2) Remove the front wheel assembly. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.

⚠ CAUTION

Make sure that the vehicle is supported securely.

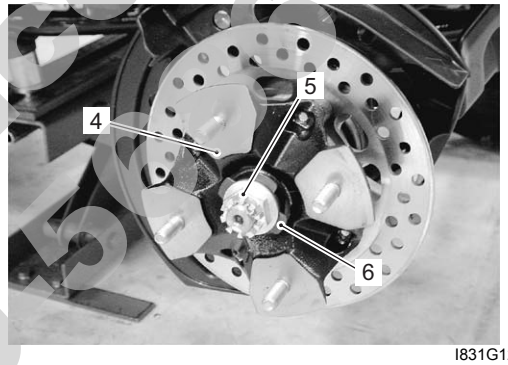
3) Remove the front drive shaft cover (3).



I831G1220007-01

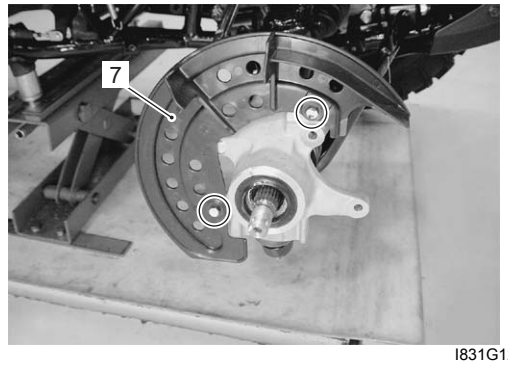
4) Remove the brake caliper. Refer to “Front Brake Caliper Removal and Installation in Section 4B (Page 4B-3)”.

5) Remove the front wheel hub (4) by removing hub nut (5) and washer (6).



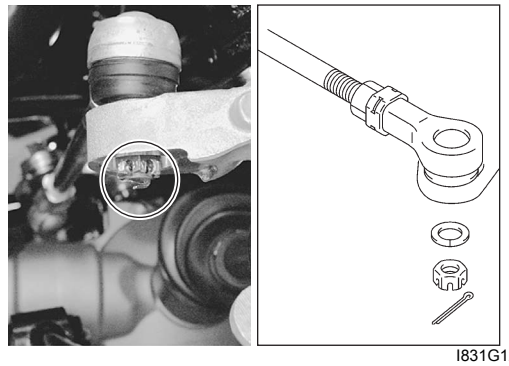
I831G1220008-01

6) Remove the front disc cover (7).



I831G1220010-01

7) Remove the cotter pin, tie-rod end nut and washer.



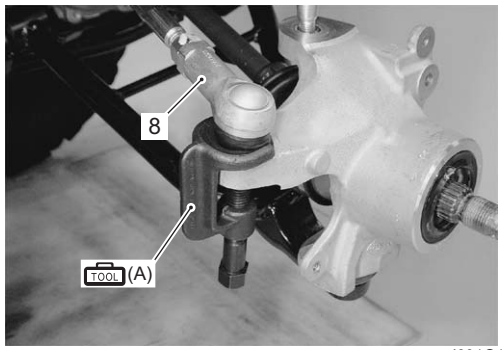
I831G1220011-03

8) Disengage the tie-rod end (8) with the special tool.

⚠ WARNING

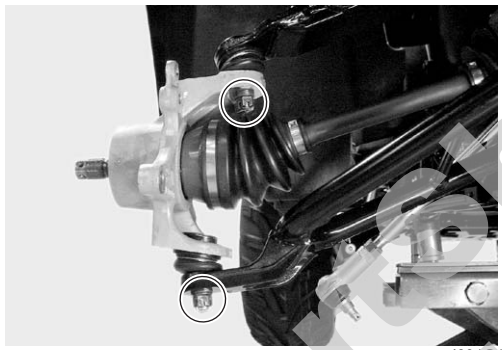
When using the tie-rod end remover, keep clear of the tie-rod end because it may come loose with some force and could strike you.

Special tool
TOOL (A): 09942–72410 (Tie rod end remover)



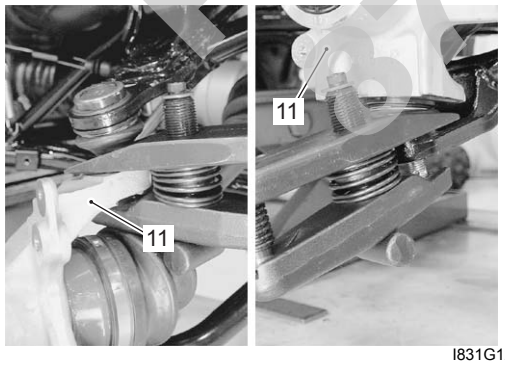
I831G1220012-02

9) Remove the cotter pins, knuckle end nuts and washers.



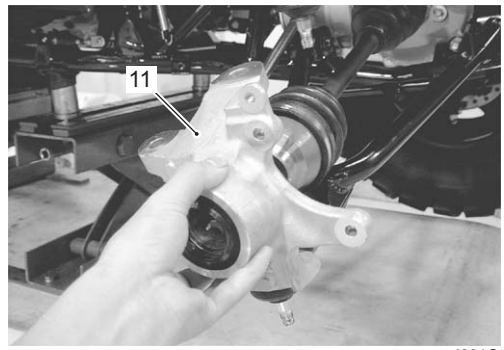
I831G1220013-02

10) Remove the steering knuckle (11) with a commercially available bearing joint remover.



I831G1220014-02

11) Remove the steering knuckle (11).



I831G1220015-02

Installation
Install the steering knuckle in the reverse order of removal. Pay attention to the following points:

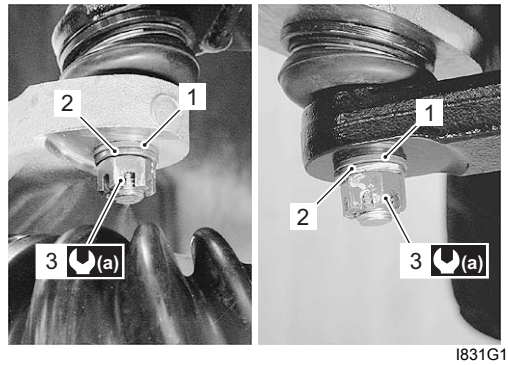
- Apply grease to the lip of inner dust seal.

  W/H : Grease 99000–25160 (Water resistance grease)

I831G1220016-01

- Install the washer (1) and lock washer (2) and tighten the knuckle end nuts (3) to the specified torque.

  Tightening torque
  Steering knuckle end nut (a): 29 N·m (2.9 kgf-m, 21.0 lb-ft)

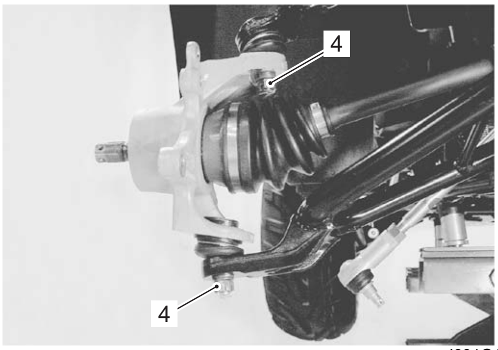


I831G1220017-01

- Install the cotter pins (4).

⚠ **CAUTION**

The removed cotter pins (4) must be replaced with new ones.



I831G1220018-01

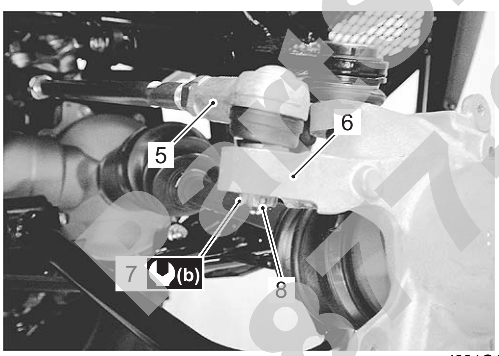
- Connect the tie-rod end (5) to the steering knuckle (6) and tighten the tie-rod end nut (7) to the specified torque.

Tightening torque
Tie-rod end nut (b): 29 N·m (2.9 kgf-m, 21.0 lb-ft)

- Install the cotter pin (8).

⚠ **CAUTION**

The removed cotter pin (8) must be replaced with a new one.

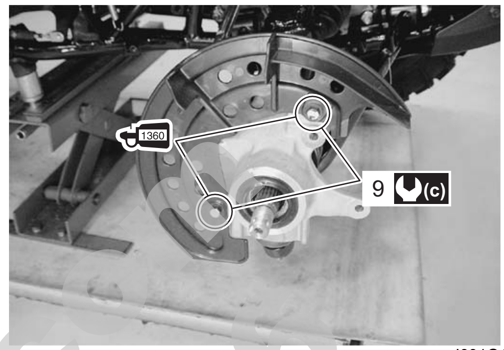


I831G1220019-01

- Apply thread lock to the brake disc cover mounting bolts (9) and tighten them to the specified torque.

1360 : Thread lock cement 99000–32130 (THREAD LOCK CEMENT SUPER 1360 or equivalent)

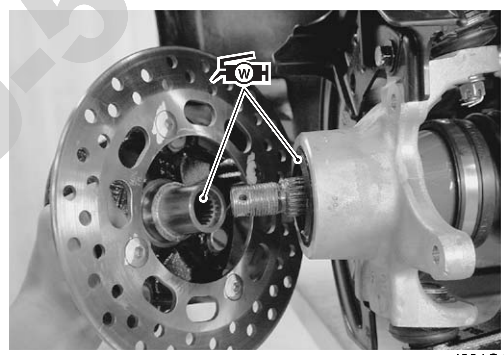
Tightening torque
Brake disc cover mounting bolt (c): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I831G1220020-01

- Apply grease to the wheel hub spline and lip of dust seal.

WH : Grease 99000–25160 (Water resistance grease)

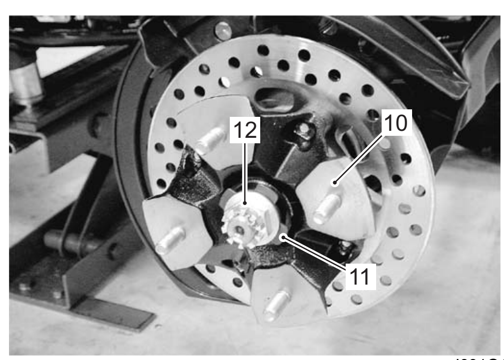


I831G1220021-01

- Install the wheel hub (10), washer (11) and front hub nut (12).

NOTE

The conical side of washer (11) faces out side. Refer to “Front Suspension Assembly Construction (Page 2B-2)”.



I831G1220022-01

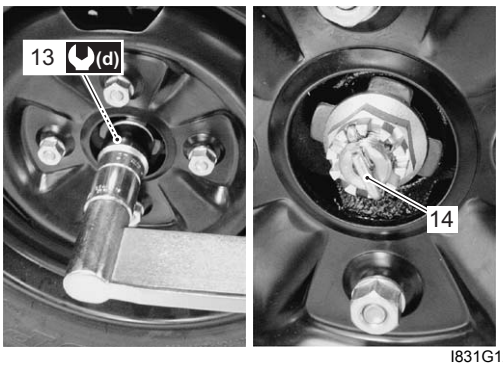
- Install the brake caliper. Refer to “Front Brake Caliper Removal and Installation in Section 4B (Page 4B-3)”.
- Install the front wheel assembly. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
- Tighten the front hub nut (13) to the specified torque.

  Tightening torque
  Front hub nut (d): 110 N·m (11.0 kgf-m, 79.5 lb-ft)

- Install the cotter pin (14).

⚠ CAUTION

The removed cotter pin (14) must be replaced with a new one.

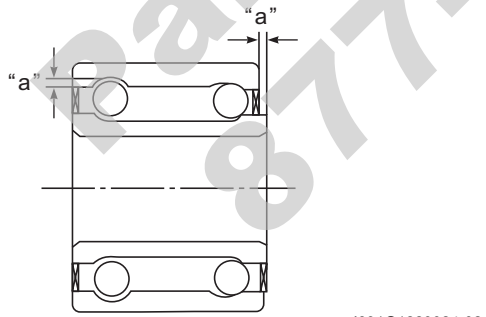


I831G1220023-02

Front Hub Bearing Inspection

B831G22206008

Inspect the inner race play of the front hub bearing by hand while they are in the steering knuckle.
Rotate the inner races by hand to inspect for abnormal noise and smooth rotation. If there is anything unusual, replace the front hub bearing with a new one.



I831G1220024-02

“a”: Play

Front Hub Bearing Removal and Installation

B831G22206009

Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation (Page 2B-4)”.

Removal

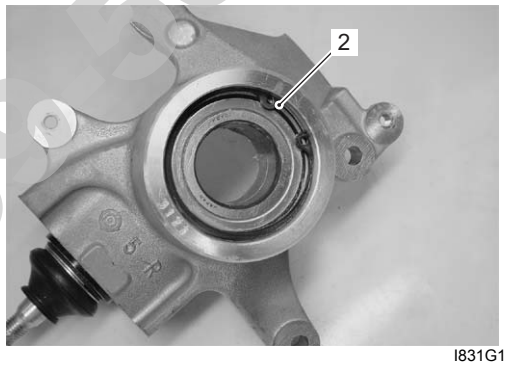
1) Remove the outer dust seal (1) with the special tool.

Special tool
TOOL (A): 09913–50121 (Oil seal remover)

I831G1220025-03

2) Remove the snap ring (2) with the special tool.

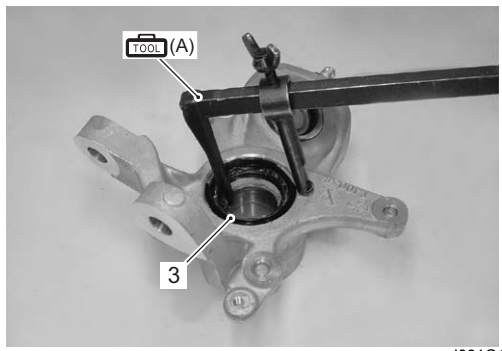
Special tool
TOOL : 09900–06108 (Snap ring pliers)



I831G1220026-02

3) Remove the inner dust seal (3) with the special tool.

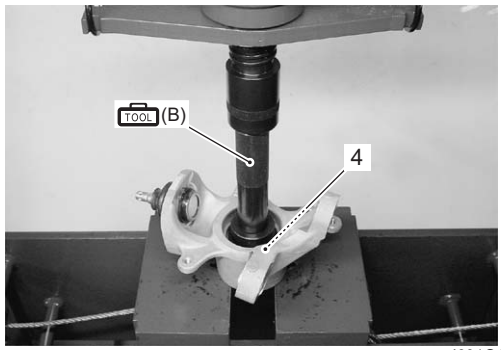
Special tool
TOOL (A): 09913–50121 (Oil seal remover)



I831G1220027-02

4) Remove the wheel hub bearing (4), using the hydraulic press and special tool.

Special tool
(B): 09913–70210 (Bearing installer set)



I831G1220028-02

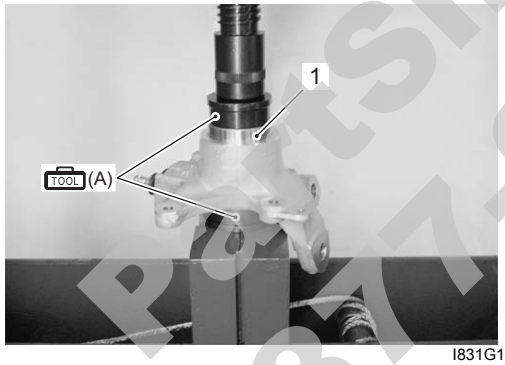
Installation
Install the wheel hub bearing in the reverse order of removal. Pay attention to the following points:

- Install the wheel hub bearing (1), using the hydraulic press and special tool.

⚠ CAUTION

Never reuse wheel hub bearing (1).

Special tool
(A): 09913–70210 (Bearing installer set)



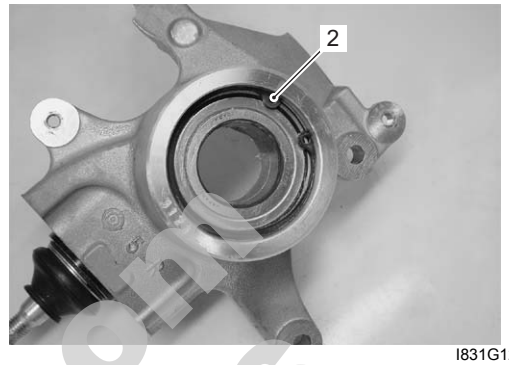
I831G1220029-03

- Install the snap ring (2) with the special tool.

⚠ CAUTION

Never reuse snap ring (2).

Special tool
: 09900–06108 (Snap ring pliers)



I831G1220032-02

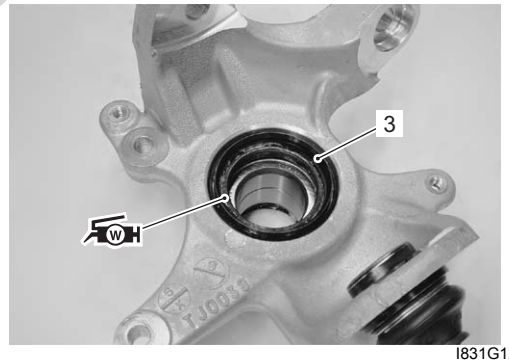
- Install a new inner dust seal (3) using a suitable size socket wrench.

⚠ CAUTION

Replace the inner dust seal (3) with a new one.

- Apply grease to the lip of inner dust seal.

: Grease 99000–25160 (Water resistance grease)



I831G1220030-02

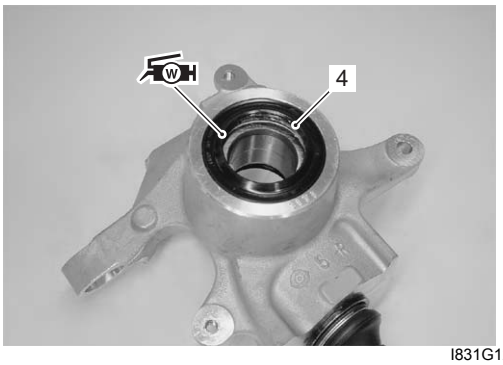
- Install a new outer dust seal (4) using a suitable size socket wrench.

⚠ CAUTION

Replace the outer dust seal (4) with a new one.

- Apply grease to the lip of outer dust seal (4).

: Grease 99000–25160 (Water resistance grease)



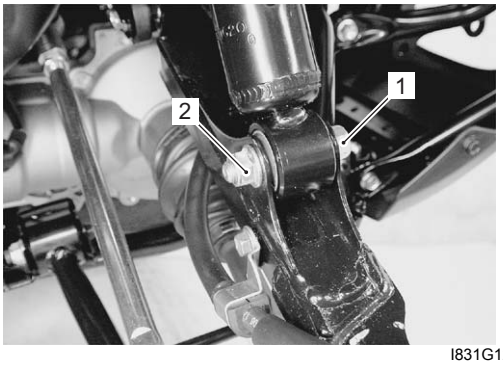
I831G1220031-02

Front Suspension Upper / Lower Arm Removal and Installation

B831G22206010

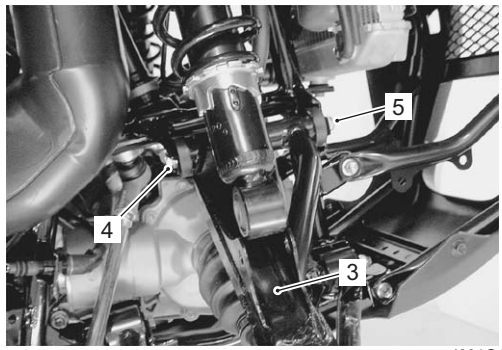
Removal

1) Remove the front wheel assembly. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
2) Remove the inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Disconnect the brake hose. Refer to “Front Brake Hose Removal and Installation in Section 4A (Page 4A-7)”.
4) Remove the steering knuckle. Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation (Page 2B-4)”.
5) Remove the shock absorber mounting lower bolt (1) and nut (2).



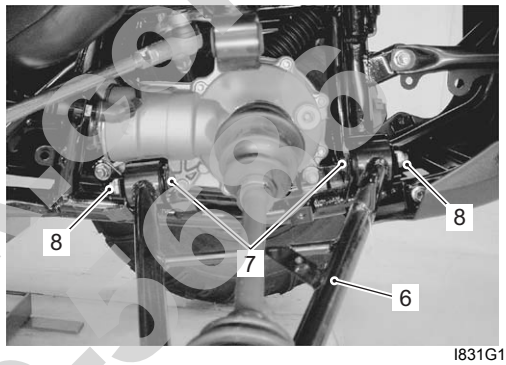
I831G1220033-01

6) Remove the suspension upper arm (3) by removing the suspension upper bolt (4) and pivot nut (5).



I831G1220034-01

7) Remove the suspension lower arm (6) by removing suspension lower bolts (7) and pivot nuts (8).



I831G1220035-01

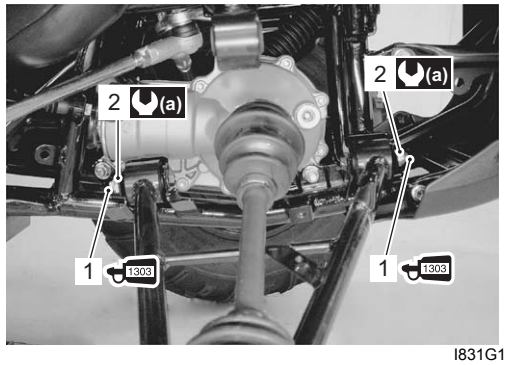
Installation

1) Apply thread lock to the suspension arm bolts (lower) (1).

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

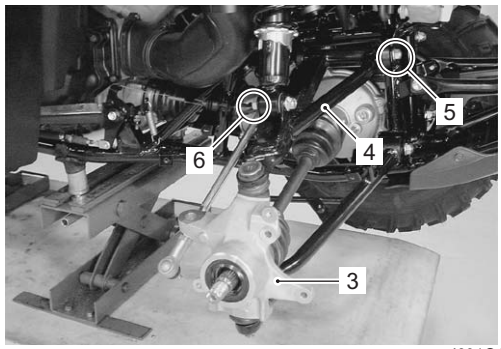
2) Tighten the suspension arm pivot nuts (lower) (2) to the specified torque.

Tightening torque
Suspension arm pivot nut (Lower) (a): 65 N·m (6.5 kgf-m, 47.0 lb-ft)



I831G1220036-02

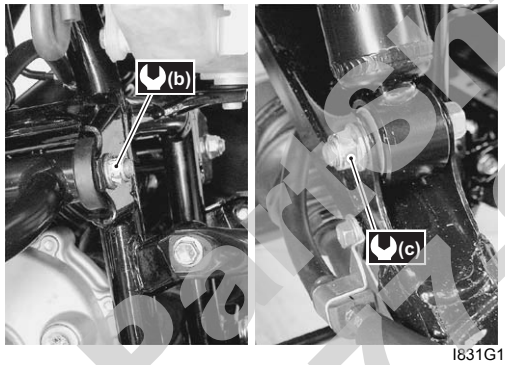
3) Set the steering knuckle (3) and install the suspension upper arm (4).
4) Temporarily tighten the suspension arm pivot nut (upper) (5) and shock absorber mounting nut (6).



I831G1220037-02

5) Tighten the steering knuckle end nut and tie-rod end nut, and then install the wheel hub. Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation (Page 2B-4)”.
6) Tighten the nuts to the specified torque.

Tightening torque
Suspension arm pivot nut (Upper) (b): 60 N·m (6.0 kgf-m, 43.5 lb-ft)
Shock absorber mounting nut (c): 60 N·m (6.0 kgf-m, 43.5 lb-ft)



I831G1220038-02

7) Install the brake hose. Refer to “Front Brake Hose Removal and Installation in Section 4A (Page 4A-7)”.
8) Install the inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
9) Install the front wheel assembly. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.

Steering Knuckle End Inspection

B831G22206011

- Inspect the steering knuckle end for wear or damage. If any defects are found, replace the front lower knuckle end with a new one.
- Inspect front lower knuckle end for movement. If there are any abnormalities, replace the front lower knuckle end with a new one.

UPPER

I831G1220039-01

LOWER

I831G1220040-01

Steering Knuckle End Removal and Installation

B831G22206012

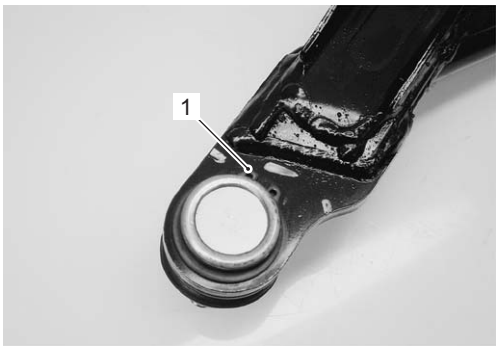
Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation (Page 2B-4)” and “Front Suspension Upper / Lower Arm Removal and Installation (Page 2B-9)”.

Removal

Upper

- Remove the snap ring (1) with the special tool.

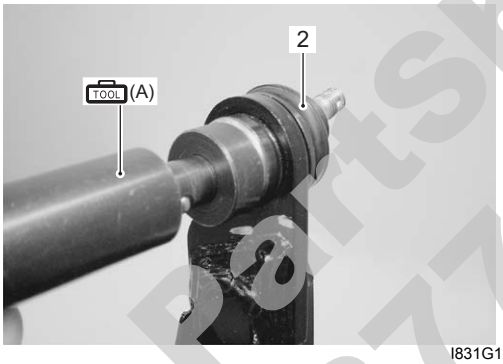
Special tool
TOOL : 09900–06107 (Snap ring pliers)



I831G1220041-01

- Remove the knuckle end (2) with the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

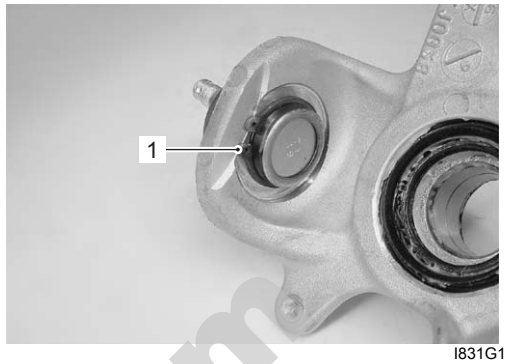


I831G1220042-01

Lower

- Remove the snap ring (1) with the special tool.

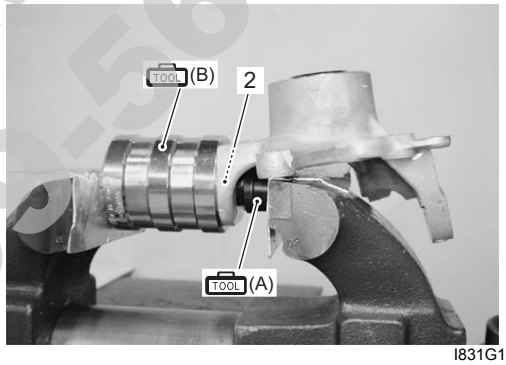
Special tool
TOOL : 09900–06107 (Snap ring pliers)



I831G1220043-01

- Remove the front lower knuckle end (2) with the special tools and vise as shown in the figure.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)
TOOL (B): 09941–53610 (Front fork installer hammer)



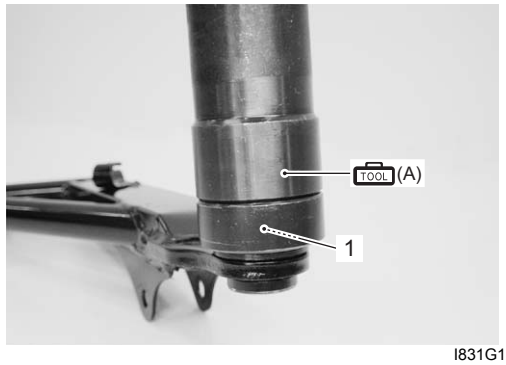
I831G1220044-02

Installation

Upper

- Install the knuckle end (1) with the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)



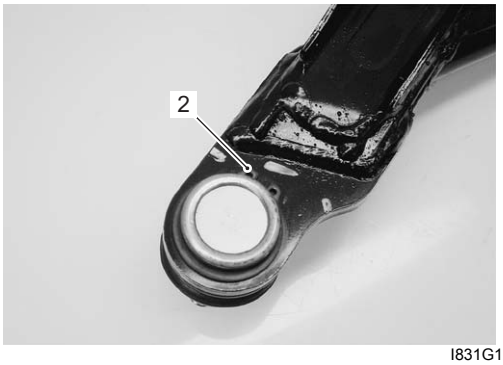
I831G1220045-01

- Install the snap ring (2) with the special tool.

⚠ CAUTION

Replace the snap ring (2) with a new one.

Special tool
TOOL : 09900–06107 (Snap ring pliers)



I831G1220047-01

Lower

- Install the knuckle end (1) with the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

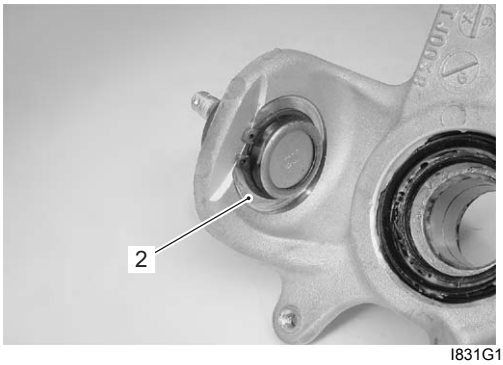
I831G1220046-01

- Install the snap ring (2) with the special tool.

⚠ CAUTION

Replace the snap ring (2) with a new one.

Special tool
TOOL : 09900–06107 (Snap ring pliers)



I831G1220048-01

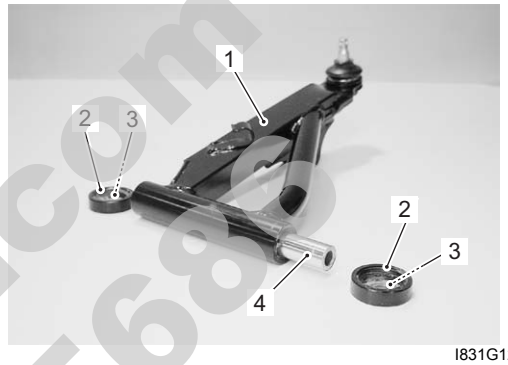
Front Suspension Arm Related Parts Inspection

B831G22206013

Refer to “Front Suspension Upper / Lower Arm Removal and Installation (Page 2B-9)”.

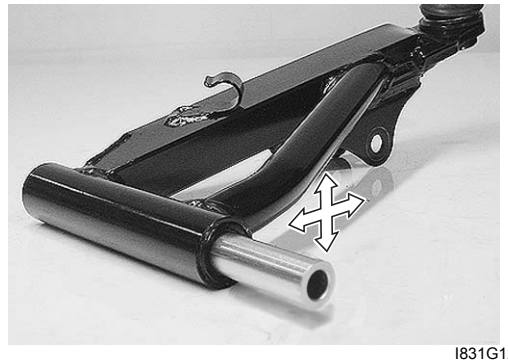
Upper arm

1) Inspect the following parts for wear or damage. If any defects are found, replace defective parts with new ones.
   - Upper arm (1)
   - Dust seal (2)
   - Washer (3)
   - Spacer (4)



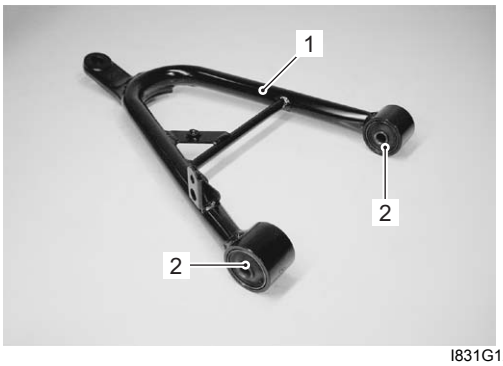
I831G1220049-02

2) Insert the spacer into bushings.
3) Check the play by moving the spacer up and down. If excessive play is noted, replace the bushing with a new one. Refer to “Front Suspension Upper Arm Bushing and Inner Dust Seal Removal and Installation (Page 2B-13)”.



I831G1220050-02

Lower arm
Inspect the front lower arm (1) and bushings (2) for bend or damage. If any defects are found, replace the defective parts with new ones. Refer to “Front Suspension Lower Arm Bushing Removal and Installation (Page 2B-14)”.

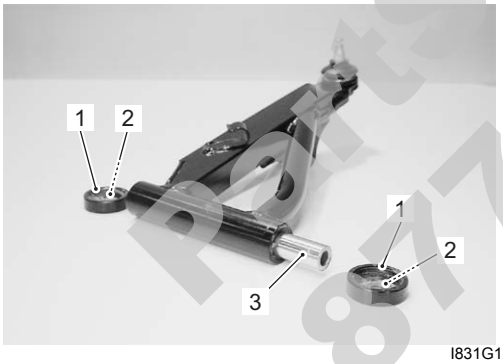


I831G1220051-01

Front Suspension Upper Arm Bushing and Inner Dust Seal Removal and Installation

B831G22206014
Refer to “Front Suspension Upper / Lower Arm Removal and Installation (Page 2B-9)”.

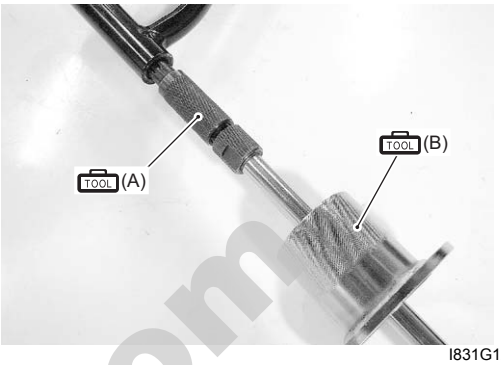
Removal
1) Remove the following parts from the front upper arm.
- Dust seal (1)
- Washer (2)
- Spacer (3)



I831G1220052-01

2) Remove the front upper arm bushings along with inner dust seals.

Special tool
TOOL (A): 09923–73210 (Bearing remover)
TOOL (B): 09930–30104 (Rotor remover slide shaft)



I831G1220053-01

Installation
1) Install the front upper arm bushings and inner dust seals with the special tool and suitable socket wrench.

NOTE
Position the bushings and dust seals by referring to “Front Suspension Assembly Construction (Page 2B-2)”.

⚠ CAUTION
The removed bushings and dust seals must be replaced with new ones.

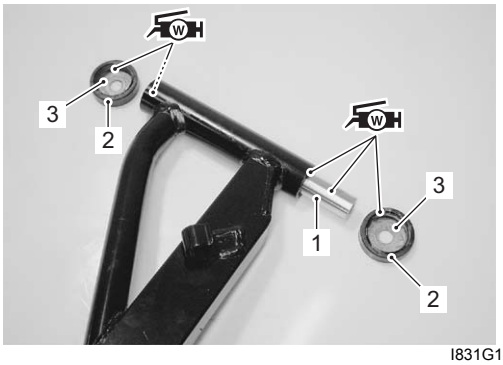
Special tool
TOOL (A): 09941–34513 (Steering race installer)

I831G1220054-01

2) Apply grease to the lip of inner dust seals, spacer (1) and inside of dust seals (2).

: Grease 99000–25160 (Water resistance grease)

3) Install the washers (3) to the dust seals (2) and install the spacer (1) and dust seals (2) to the front suspension upper arm.



I831G1220055-01

Front Suspension Lower Arm Bushing Removal and Installation

B831G22206015

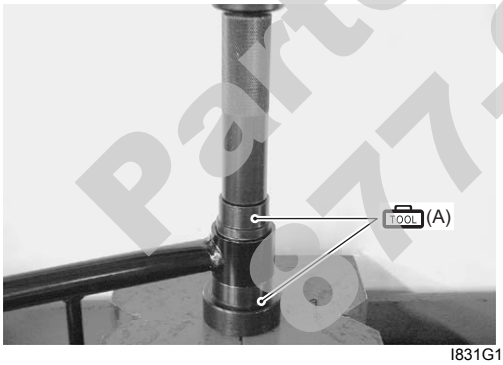
Refer to “Front Suspension Upper / Lower Arm Removal and Installation (Page 2B-9)”.

Removal

Remove the front suspension lower arm bushings with the special tool and hydraulic press.

Special tool

(A): 09913–70210 (Bearing installer set)



I831G1220056-01

Installation

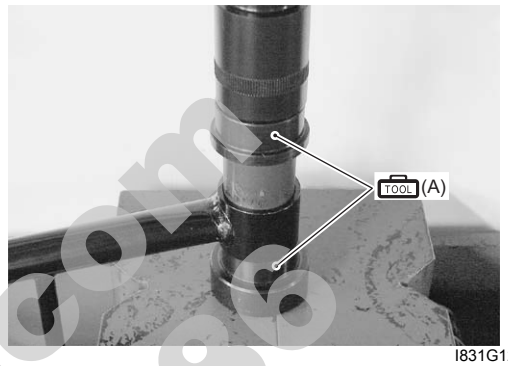
Install the front suspension lower arm bushings with the special tool and hydraulic press.

⚠ CAUTION

The removed bushings must be replaced with a new one.

Special tool

(A): 09913–70210 (Bearing installer set)



I831G1220057-01

Specifications

Service Data

B831G22207001

Suspension

Item	Standard	Limit
Front shock absorber spring adjustor	2/5 position	—

Tightening Torque Specifications

B831G22207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Front shock absorber mounting bolt (Upper)	55	5.5	40.0	☞(Page 2B-3)
Front shock absorber mounting nut (Lower)	60	6.0	43.5	☞(Page 2B-3)
Steering knuckle end nut	29	2.9	21.0	☞(Page 2B-5)
Tie-rod end nut	29	2.9	21.0	☞(Page 2B-6)
Brake disc cover mounting bolt	10	1.0	7.0	☞(Page 2B-6)
Front hub nut	110	11.0	79.5	☞(Page 2B-7)
Suspension arm pivot nut (Lower)	65	6.5	47.0	☞(Page 2B-9)
Suspension arm pivot nut (Upper)	60	6.0	43.5	☞(Page 2B-10)
Shock absorber mounting nut	60	6.0	43.5	☞(Page 2B-10)

NOTE

The specified tightening torque is also described in the following.
“Front Suspension Components (Page 2B-1)”
“Front Suspension Assembly Construction (Page 2B-2)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

B831G22208001

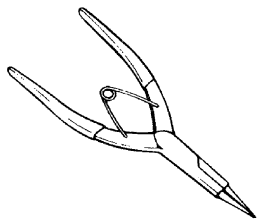
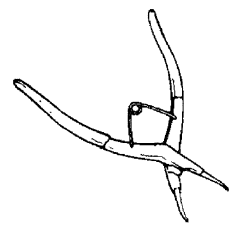
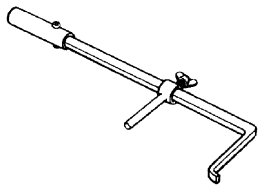
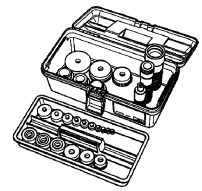
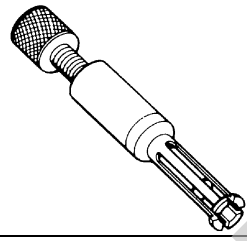
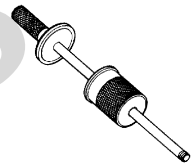
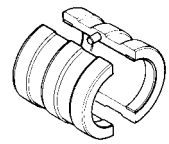
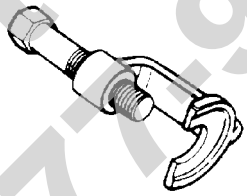
Material	SUZUKI recommended product or Specification		Note
Grease	Water resistance grease	P/No.: 99000–25160	☞(Page 2B-5) / ☞(Page 2B-6) / ☞(Page 2B-8) / ☞(Page 2B-9) / ☞(Page 2B-14)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 2B-9)
	THREAD LOCK CEMENT SUPER 1360 or equivalent	P/No.: 99000–32130	☞(Page 2B-6)

NOTE

Required service material is also described in the following.
“Front Suspension Components (Page 2B-1)”
“Front Suspension Assembly Construction (Page 2B-2)”

Special Tool

B831G22208002

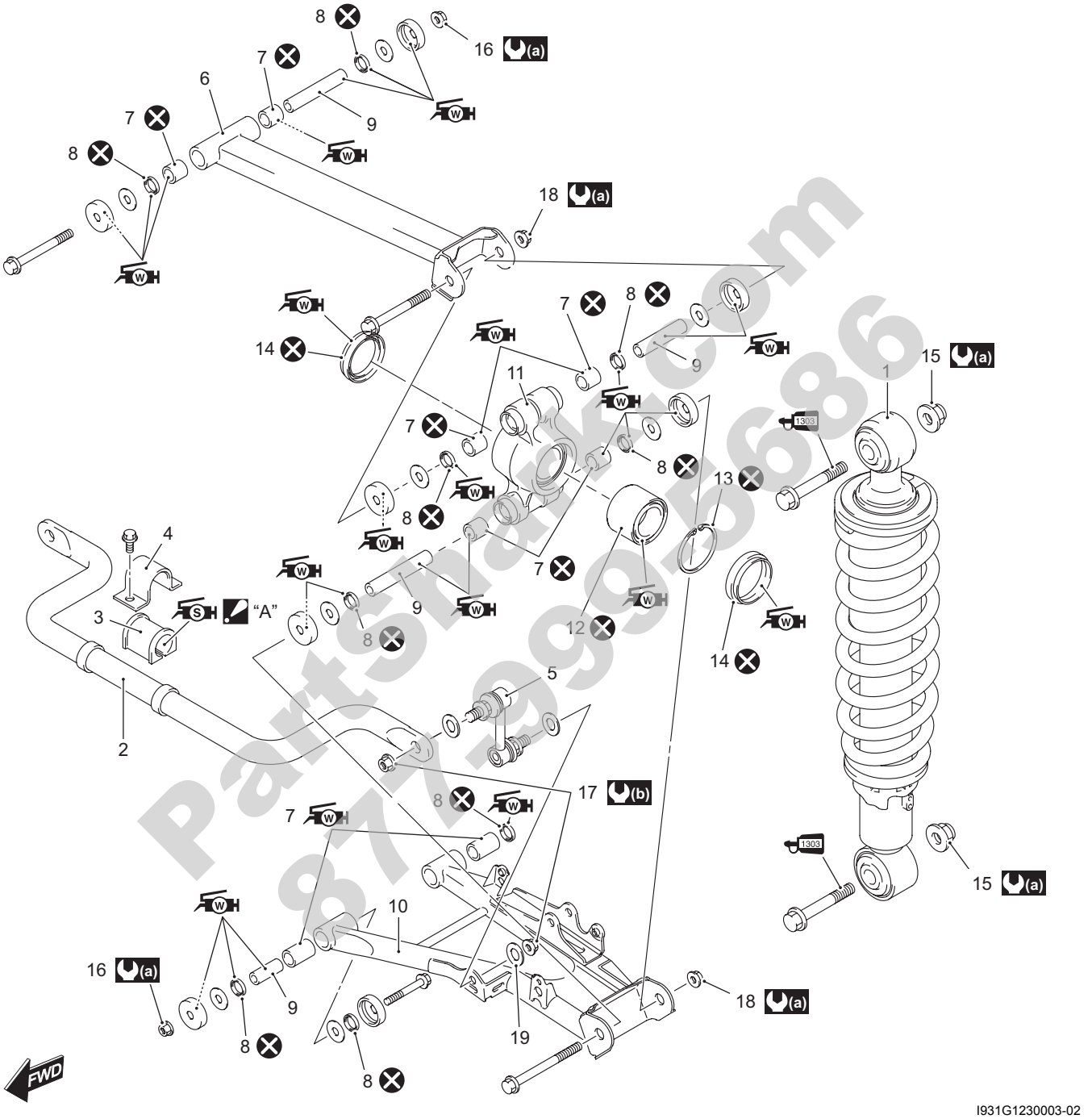
09900–06107 Snap ring pliers ☞(Page 2B-11) / ☞(Page 2B-11) / ☞(Page 2B-12) / ☞(Page 2B-12) 	09900–06108 Snap ring pliers ☞(Page 2B-7) / ☞(Page 2B-8) 
09913–50121 Oil seal remover ☞(Page 2B-7) / ☞(Page 2B-7) 	09913–70210 Bearing installer set ☞(Page 2B-8) / ☞(Page 2B-8) / ☞(Page 2B-11) / ☞(Page 2B-11) / ☞(Page 2B-11) / ☞(Page 2B-12) / ☞(Page 2B-14) / ☞(Page 2B-14) 
09923–73210 Bearing remover ☞(Page 2B-13) 	09930–30104 Rotor remover slide shaft ☞(Page 2B-13) 
09941–34513 Steering race installer ☞(Page 2B-13) 	09941–53610 Front fork installer hammer ☞(Page 2B-11) 
09942–72410 Tie rod end remover ☞(Page 2B-5) 	

Rear Suspension

Repair Instructions

Rear Suspension Components

B931G22306001

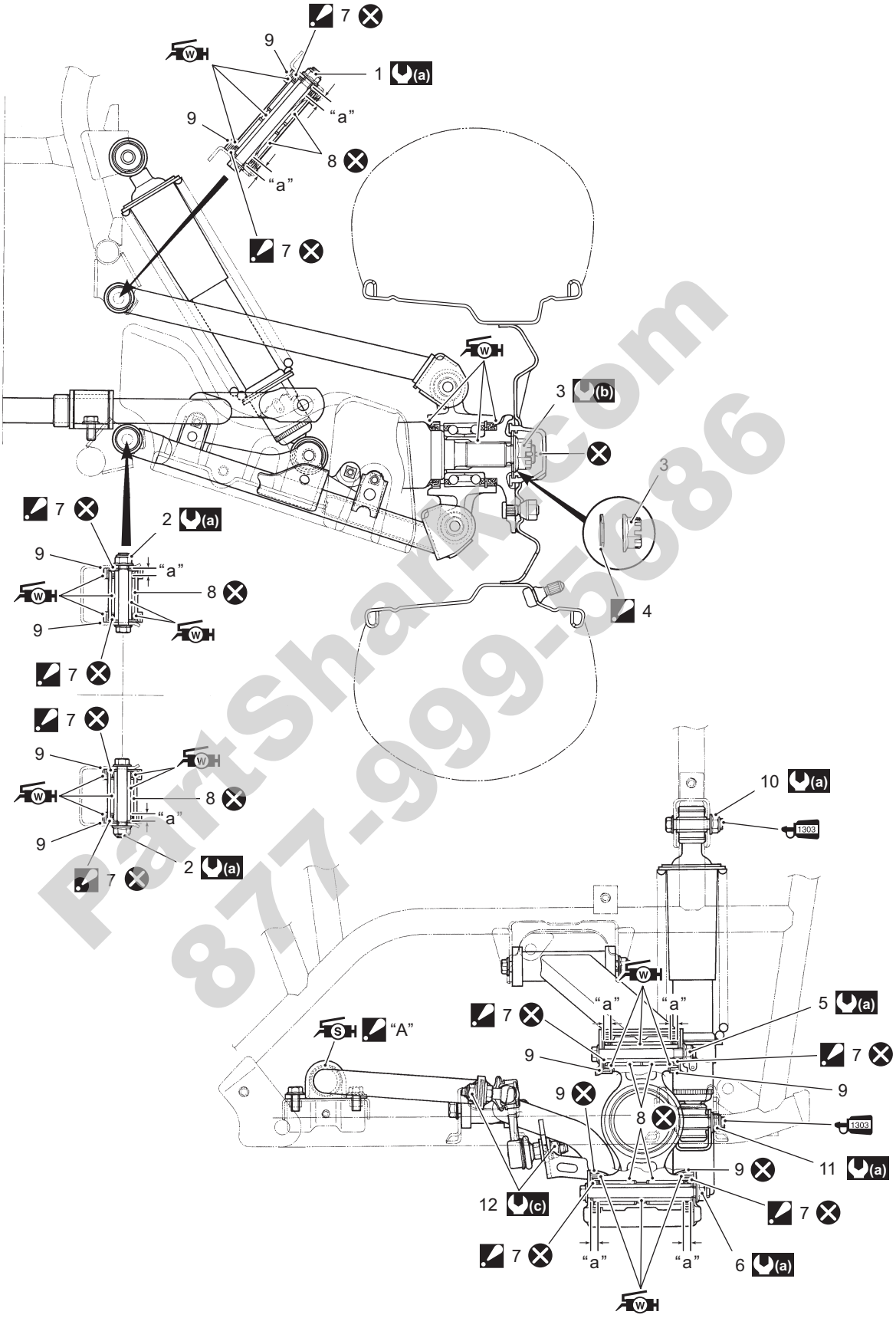


I931G1230003-02

1. Rear shock absorber	10. Rear suspension arm (lower)	19. Washer [From 5SAAR41A497105527]
2. Rear stabilizer bar	11. Rear suspension knuckle	"A": Do not apply grease. [From 5SAAR41A197105887]
3. Rear stabilizer bushing	12. Hub bearing	(a) : 60 N·m (6.0 kgf-m, 43.5 lb-ft)
4. Rear stabilizer bracket	13. Snap ring	(b) : Up to 5SAAR41A497105526: 34 N·m (3.4 kgf-m, 24.5 lb-ft) From 5SAAR41A497105527: 60 N·m (6.0 kgf-m, 43.5 lb-ft)
5. Rear stabilizer joint	14. Dust seal	(W) : Apply water resistance grease.
6. Rear suspension arm (upper)	15. Rear shock absorber mounting nut	(S) : Apply silicone grease. [Up to 5SAAR41A197105886]
7. Bushing	16. Rear suspension arm pivot nut	1303 : Apply thread lock to thread part.
8. Inner dust seal	17. Rear stabilizer joint nut	: Do not reuse.
9. Spacer	18. Rear suspension knuckle nut	

Rear Suspension Assembly Construction

B931G22306002



I931G1230001-04

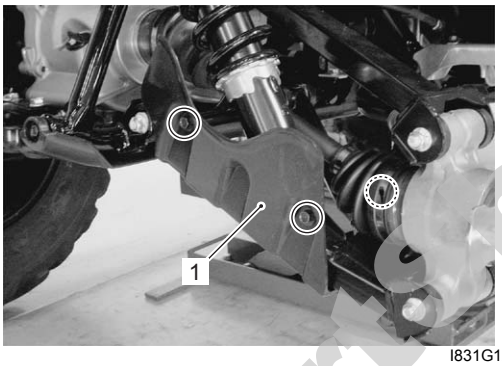
1. Rear suspension arm pivot nut (upper)	11. Rear shock absorber mounting nut (lower)
2. Rear suspension arm pivot nut (lower)	12. Stabilizer joint nut
3. Rear wheel hub nut	"A": Do not apply grease. [From 5SAAR41A197105887]
4. Washer : The conical side of washer faces outside.	(a) : 60 N·m (6.0 kgf-m, 43.5 lb-ft)
5. Suspension knuckle mounting nut (upper)	(b) : 121 N·m (12.1 kgf-m, 87.5 lb-ft)
6. Suspension knuckle mounting nut (lower)	(c) : Up to 5SAAR41A497105526: 34 N·m (3.4 kgf-m, 24.5 lb-ft) From 5SAAR41A497105527: 60 N·m (6.0 kgf-m, 43.5 lb-ft)
7. Inner dust seal : Align the surface of dust seal with the edge of suspension arm.	(W) : Apply water resistance grease.
8. Bushing	(S) : Apply silicone grease. [Up to 5SAAR41A197105886]
9. Outer dust seal	1303 : Apply thread lock to the thread part.
10. Rear shock absorber mounting nut (upper)	: Do not reuse.

Rear Shock Absorber Removal and Installation

B931G22306003

Removal

1) Place the vehicle on level ground and support the vehicle with a jack.
2) Remove the rear wheel assembly. Refer to "Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)".
3) Remove the rear drive shaft cover (1).



I831G1230004-01

4) Remove the shock absorber (2) by removing the shock absorber upper and lower mounting bolt and nut.

I831G1230005-01

Installation

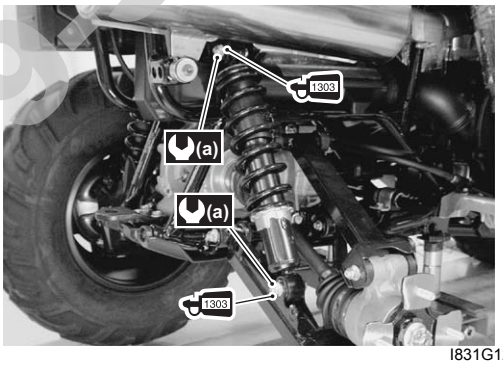
Install the rear shock absorber in the reverse order of removal. Pay attention to the following points:

- Apply thread lock to the rear shock absorber mounting bolts.

  1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

- Tighten the rear shock absorber upper/lower mounting bolts and nuts.

  Tightening torque
  Rear shock absorber mounting nut (a): 60 N·m (6.0 kgf-m, 43.5 lbf-ft)



I831G1230062-03

- Install the rear wheel assembly. Refer to "Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)".

Rear Suspension Inspection

B931G22306004

Refer to “Suspensions Inspection in Section 0B (Page 0B-22)”.

Rear Shock Absorber Inspection

B931G22306005

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-3)”.
2) Inspect the rear shock absorber for damage and oil leakage, and absorber bushing for wear or damage. If any defects are found, replace the rear shock absorber with a new one.

⚠ CAUTION

Do not attempt to disassemble the rear shock absorber. It is unserviceable.

I831G1230006-01

3) Install the rear shock absorber. Refer to “Rear Shock Absorber Removal and Installation (Page 2C-3)”.

Spring Pre-load Adjustment

B931G22306006

⚠ WARNING

Be sure to adjust the spring pre-load on the both suspensions equally.

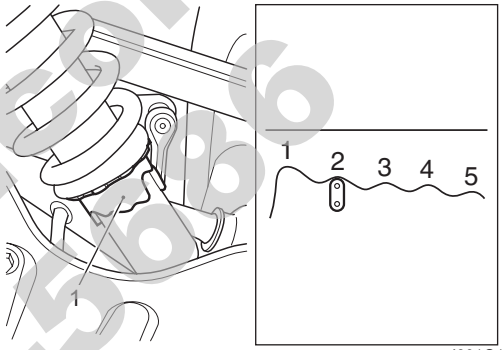
After installing the rear suspension, adjust the spring pre-load as follows:

- Turn the spring tension ring (1) to the desired position.

NOTE

Position 1 provides the softest spring tension and position 5 provides the stiffest.

STD Position
2nd position



I831G1230063-01

Rear Wheel Hub / Suspension Knuckle Removal and Installation

B931G22306007

NOTE

The right and left suspension parts are installed procedure for one side is the same as that for the other side.

Removal

1) Remove the cotter pin (1) and loosen the hub nut (2).

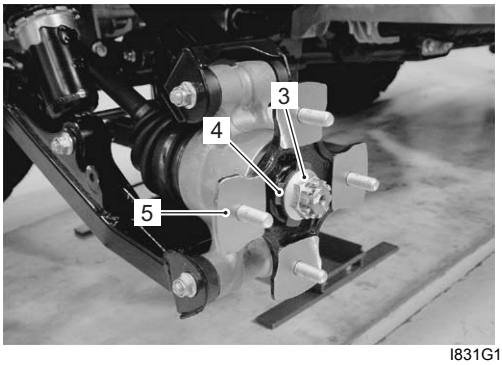
I831G1230007-01

2) Remove the rear wheel assembly. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.

⚠ CAUTION

Make sure that the vehicle is supported securely.

3) Remove the hub nut (3), washer (4) and rear wheel hub (5).



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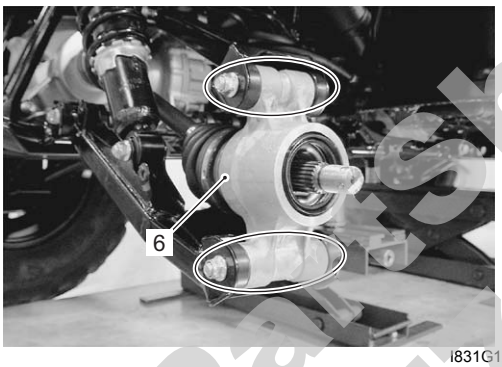
4) Remove the suspension knuckle upper and lower bolts and nuts.

5) Remove the rear suspension knuckle (6).



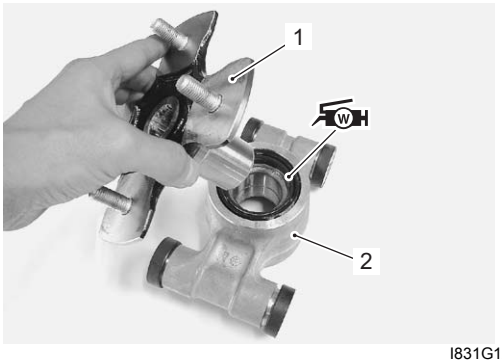
I831G1230009-01

Installation

- Apply grease to the lip of outer dust seal.

  : Grease 99000–25160 (Water resistance grease or equivalent)

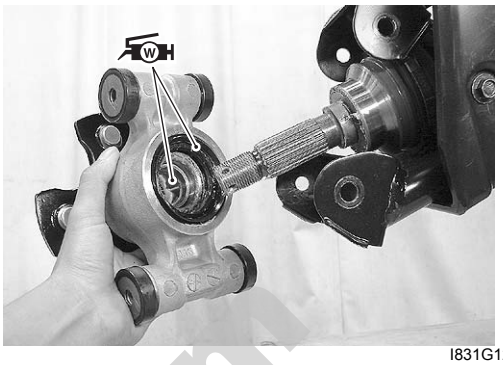
- Install the rear wheel hub (1) to the rear suspension knuckle (2).



I831G1230066-01

- Apply grease to the lip of outer dust seal and rear wheel hub spline.

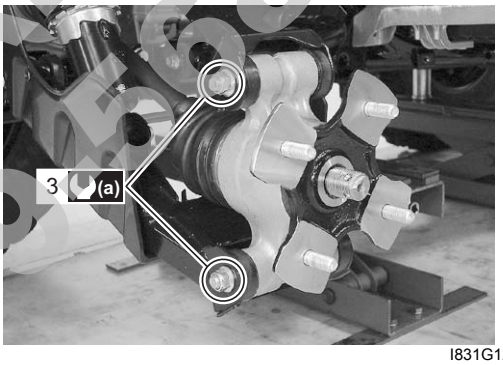
  : Grease 99000–25160 (Water resistance grease or equivalent)



I831G1230067-01

- Tighten the rear knuckle nuts (3) to the specified torque.

  Tightening torque
  Rear knuckle end nut (Upper and Lower) (a): 60 N·m (6.0 kgf-m, 43.5 lbf-ft)

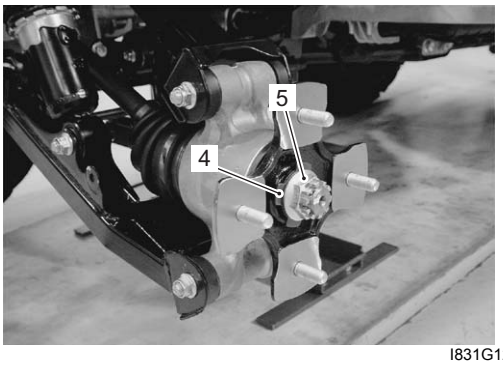


I831G1230068-01

- Install the washer (4) and hub nut (5).

NOTE

The conical side of washer (4) faces outside. Refer to “Rear Suspension Assembly Construction (Page 2C-2)”.



I831G1230013-03

- Install the rear wheel assembly. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
- Tighten the hub nut (5) to the specified torque.

  Tightening torque
  Rear wheel hub nut (b): 121 N·m (12.1 kgf-m, 87.5 lbf-ft)

- Install the cotter pin (6).

⚠ CAUTION

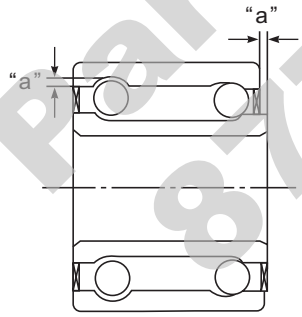
The removed cotter pin (6) must be replaced with a new one.

I831G1230014-01

Rear Hub Bearing Inspection

B931G22306008

Inspect the inner race play of the rear hub bearing by hand while it is in the rear knuckle.
Rotate the inner race by hand to inspect for abnormal noise and smooth rotation. If there is anything unusual, replace the rear hub bearing with a new one.



I831G1220024-02

“a”: Play

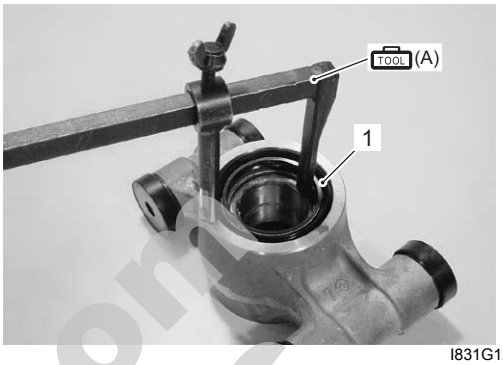
Rear Hub Bearing Removal and Installation

B931G22306009

Removal

1) Remove the outer dust seal (1) with the special tool.

Special tool
TOOL (A): 09913–50121 (Oil seal remover)



I831G1230016-01

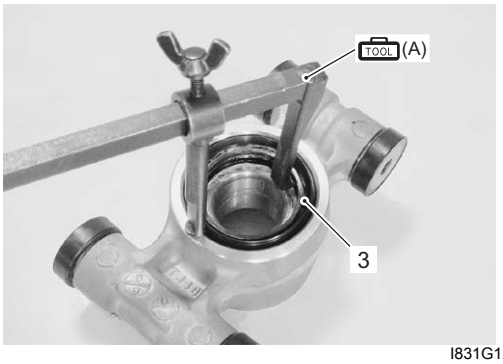
2) Remove the snap ring (2) with the special tool.

Special tool
TOOL : 09900–06108 (Snap ring pliers)

I831G1230017-01

3) Remove the inner dust seal (3) with the special tool.

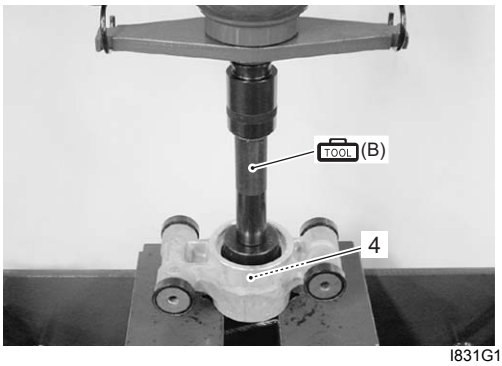
Special tool
TOOL (A): 09913–50121 (Oil seal remover)



I831G1230018-01

4) Remove the hub bearing (4) using the hydraulic press and special tool.

Special tool
TOOL (B): 09913–70210 (Bearing installer set)



I831G1230064-02

Installation
Install the hub bearing in the reverse order of removal. Pay attention to the following points:

- Install the hub bearing (1) using the hydraulic press and special tool.

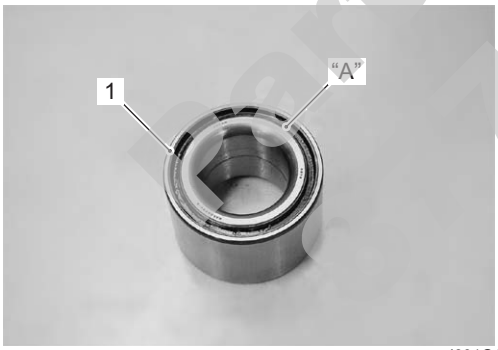
⚠ CAUTION

Never reuse wheel hub bearing.

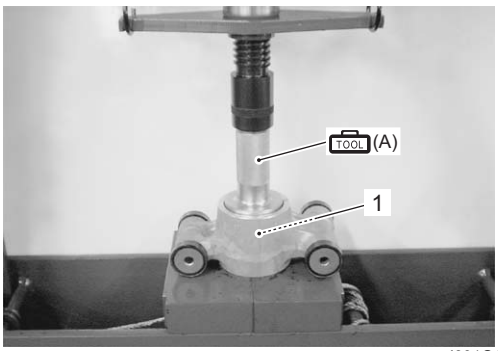
NOTE

The sealed side "A" of hub bearing (1) faces inside.

Special tool
TOOL (A): 09913–75520 (Bearing installer)



I831G1230019-01



I831G1230020-01

- Install the snap ring (2) with the special tool.

⚠ CAUTION

Never reuse snap ring (2).

Special tool
TOOL : 09900–06108 (Snap ring pliers)

I831G1230021-01

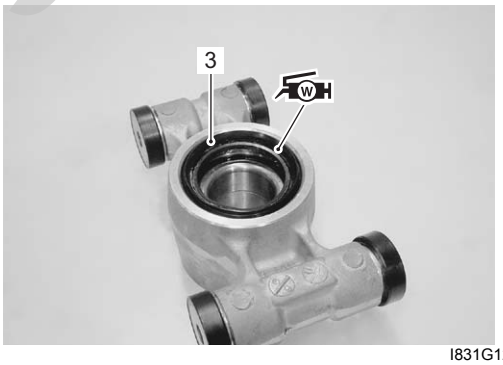
- Install a new inner dust seal (3) using a suitable size socket wrench.

⚠ CAUTION

Replace the inner dust seal (3) with a new one.

- Apply grease to the lip of inner dust seal (3).

WH : Grease 99000–25160 (Water resistance grease or equivalent)



I831G1230022-01

- Install a new outer dust seal (4) using a suitable size socket wrench.

⚠ CAUTION

Replace the outer dust seal (4) with a new one.

- Apply grease to the lip of outer dust seal (4).

: Grease 99000–25160 (Water resistance grease or equivalent)

I831G1230023-02

Rear Suspension Arm Upper / Lower Removal and Installation

B931G22306010

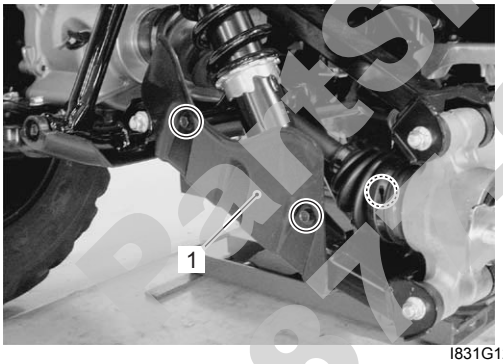
Removal

1) Remove the rear wheel assembly. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.

⚠ CAUTION

Make sure that the vehicle is supported securely.

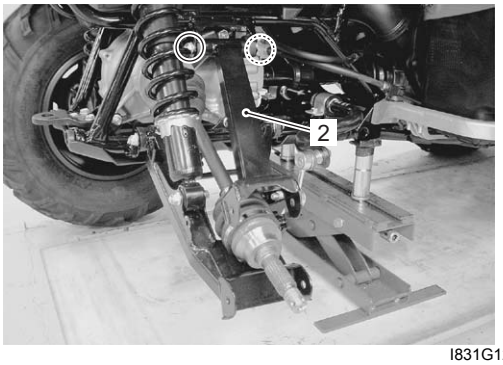
2) Remove the rear drive shaft cover (1).



I831G1230024-01

3) Remove the rear suspension knuckle. Refer to “Rear Wheel Hub / Suspension Knuckle Removal and Installation (Page 2C-4)”.

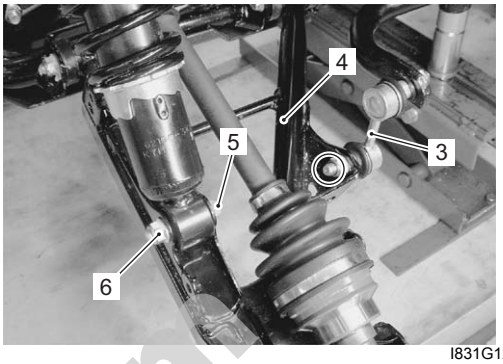
4) Remove the rear upper suspension arm (2).



I831G1230025-01

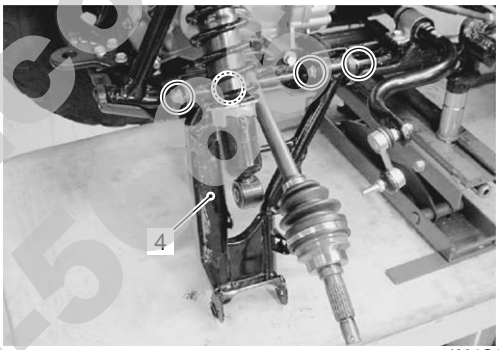
5) Disconnect the stabilizer joint (3) from the rear suspension lower arm (4).

6) Remove the shock absorber mounting lower bolt (5) and nut (6).



I831G1230026-01

7) Remove the rear suspension lower arm (4).



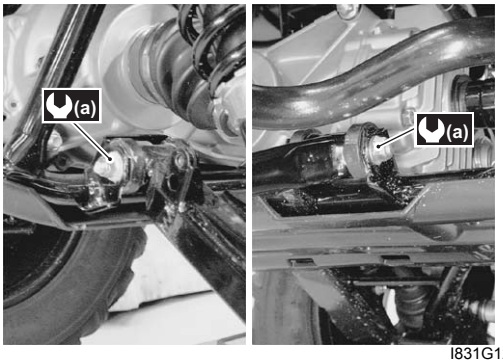
I831G1230027-02

Installation

Install the suspension arms in the reverse order of removal. Pay attention to the following points.

- Tighten the suspension arm pivot nuts to the specified torque.

Tightening torque
Suspension arm lower pivot nut (a): 60 N·m (6.0 kgf-m, 43.5 lbf-ft)



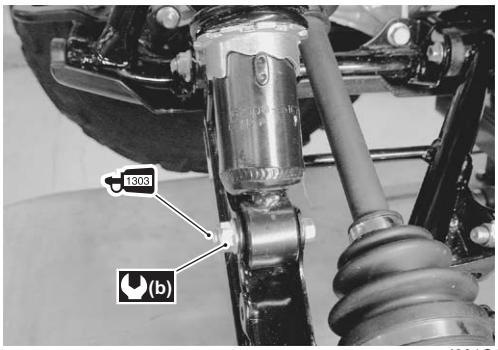
I831G1230028-01

- Apply thread lock to the shock absorber mounting bolts.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

- Tighten the shock absorber mounting lower bolt and nut to the specified torque.

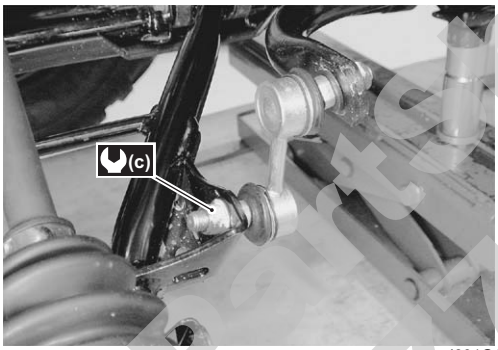
  Tightening torque
  Rear shock absorber mounting nut (b): 60 N·m (6.0 kgf-m, 43.5 lbf-ft)



I831G1230029-02

- Connect the stabilizer joint by tightening the joint nut to the specified torque.

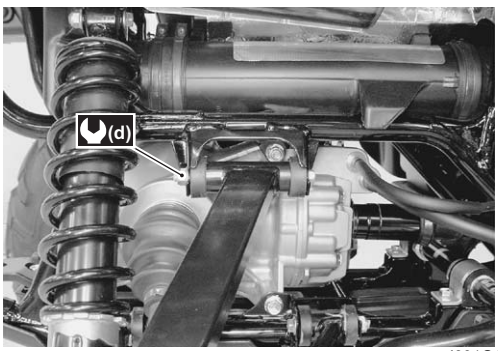
  Tightening torque
  Rear stabilizer joint nut [Up to 5SAAR41A497105526] (c): 34 N·m (3.4 kgf-m, 24.5 lbf-ft)
  Rear stabilizer joint nut [From 5SAAR41A497105527] (c): 60 N·m (6.0 kgf-m, 43.5 lbf-ft)



I831G1230030-01

- Tighten the suspension arm upper bolt and pivot nut to the specified torque.

  Tightening torque
  Suspension arm upper pivot nut (d): 60 N·m (6.0 kgf-m, 43.5 lbf-ft)



I831G1230031-01

- Install the rear suspension knuckle arm and wheel hub. Refer to “Rear Wheel Hub / Suspension Knuckle Removal and Installation (Page 2C-4)”.

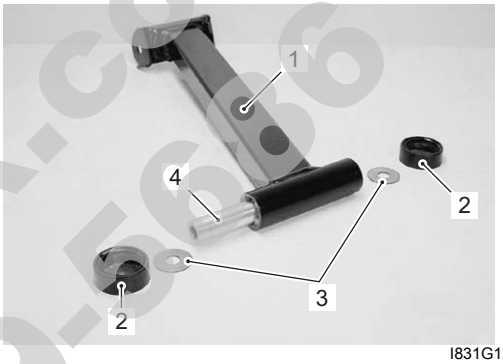
Rear Suspension Arm Related Parts Inspection

B931G22306011

Refer to “Rear Suspension Arm Upper / Lower Removal and Installation (Page 2C-8)”.

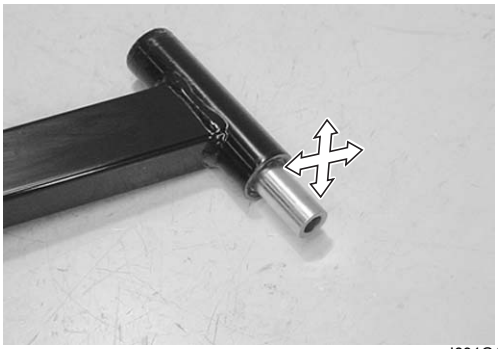
Upper Arm

1) Inspect the following parts for wear or damage. If any defects are found, replace defective parts with new ones.
   - Suspension upper arm (1)
   - Dust seal (2)
   - Washer (3)
   - Spacer (4)



I831G1230032-01

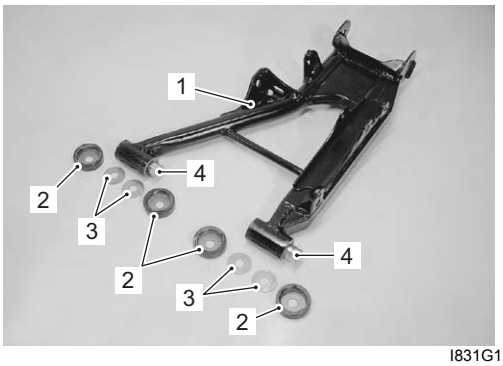
2) Insert the spacer into bushings.
3) Check the play by moving the spacer up and down. If excessive play is noted, replace the bushings with a new one. Refer to “Rear Suspension Upper Arm Bushing Removal and Installation (Page 2C-11)”.



I831G1230033-02

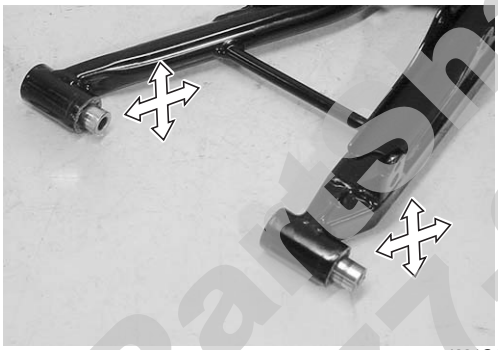
Lower Arm

1) Inspect the following parts for wear or damage. If any defects are found, replace defective parts with new ones.
   - Suspension lower arm (1)
   - Dust seal (2)
   - Washer (3)
   - Spacer (4)



I831G1230034-01

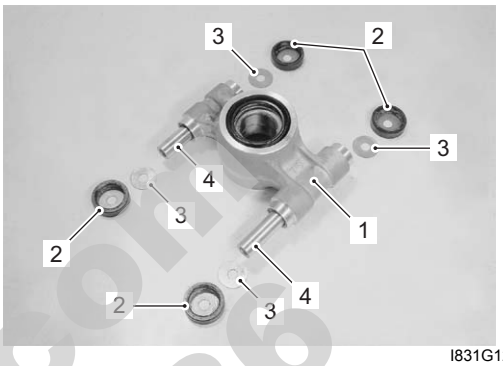
2) Insert the spacer into bushings.
3) Check the play by moving the spacer up and down. If excessive play is noted, replace the bushings with a new one. Refer to “Rear Suspension Lower Arm Bushing Removal and Installation (Page 2C-12)”.



I831G1230035-02

Suspension Knuckle

1) Inspect the following parts for wear or damage. If any defects are found, replace defective parts with new ones.
   - Suspension knuckle (1)
   - Dust seal (2)
   - Washer (3)
   - Spacer (4)



I831G1230036-02

2) Insert the spacer into bushings.
3) Check the play by moving the spacer up and down. If excessive play is noted, replace the bushings with a new one. Refer to “Rear Suspension Upper Arm Bushing Removal and Installation (Page 2C-11)”.

I831G1230037-02

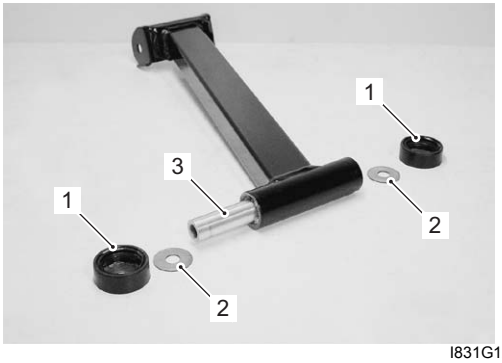
Rear Suspension Upper Arm Bushing Removal and Installation

B931G22306012

Refer to “Rear Suspension Arm Upper / Lower Removal and Installation (Page 2C-8)”.

Removal

1) Remove the following parts from the rear suspension upper arm.
   - Dust seal (1)
   - Washer (2)
   - Spacer (3)



I831G1230065-01

2) Remove the rear upper suspension arm bushings along with inner dust seals with the special tools.

Special tool
TOOL (A): 09923–73210 (Bearing remover)
TOOL : 09930–30104 (Rotor remover sliding shaft)

I831G1230038-01

Installation

1) Install the rear suspension upper arm bushing and inner dust seal with the special tool and suitable socket wrench.

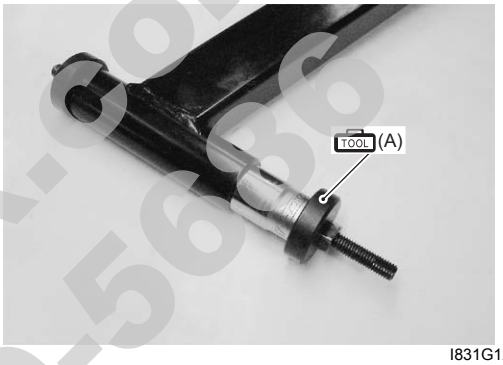
NOTE

Position the bushing and dust seals by referring to “Rear Suspension Assembly Construction (Page 2C-2)”.

⚠ CAUTION

The removed bushings and dust seals must be replaced with new ones.

Special tool
TOOL (A): 09941–34513 (Steering race installer)

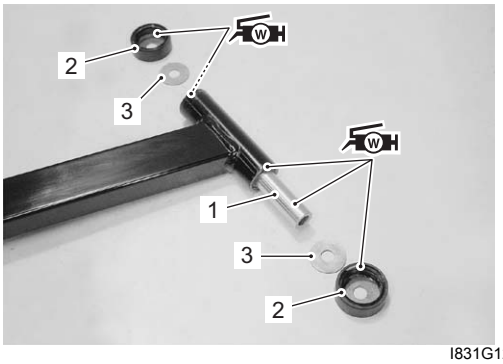


I831G1230039-01

2) Apply grease to the lip of inner dust seals, spacer (1) and inside of dust seals (2).

W : Grease 99000–25160 (Water resistance grease or equivalent)

3) Install the washers (3) and dust seals (2) to the rear suspension upper arm.



I831G1230040-01

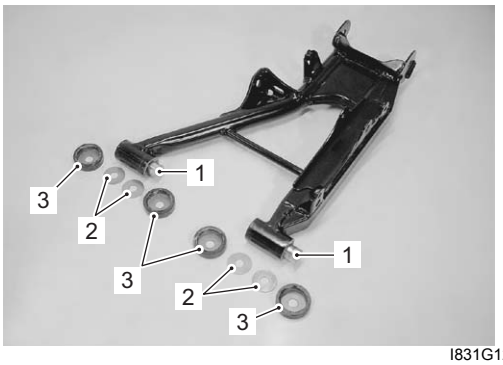
Rear Suspension Lower Arm Bushing Removal and Installation

B931G22306013

Refer to “Rear Suspension Arm Upper / Lower Removal and Installation (Page 2C-8)”.

Removal

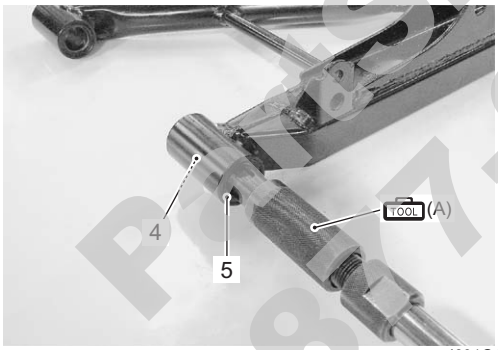
1) Remove the following parts from the rear suspension lower arm.
   - Dust seal (1)
   - Washer (2)
   - Spacer (3)



I831G1230041-01

2) Remove the rear suspension lower arm bushing (4) along with inner dust seal (5) with the special tools.

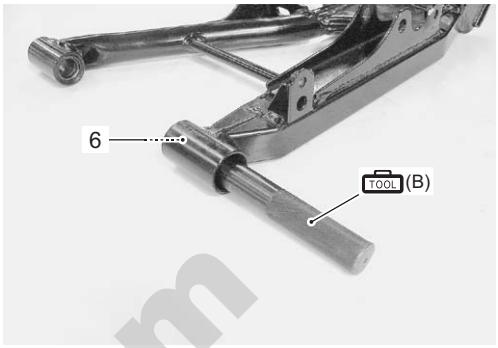
Special tool
TOOL (A): 09923–73210 (Bearing remover)
TOOL : 09930–30104 (Rotor remover sliding shaft)



I831G1230043-03

3) Remove the another inner dust seal (6) with the special tool.

Special tool
TOOL (B): 09943–88211 (Bearing remover/ installer)



I831G1230044-03

Installation

1) Install the rear lower arm bushings (1) and inner dust seals (2) with the special tool and suitable socket.

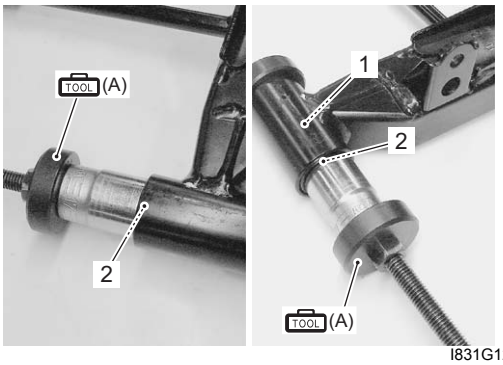
NOTE

Position the bushings and dust seals by referring to “Rear Suspension Assembly Construction (Page 2C-2)”.

⚠ CAUTION

The removed bushings and dust seals must be replaced with new ones.

Special tool
TOOL (A): 09941–34513 (Steering race installer)

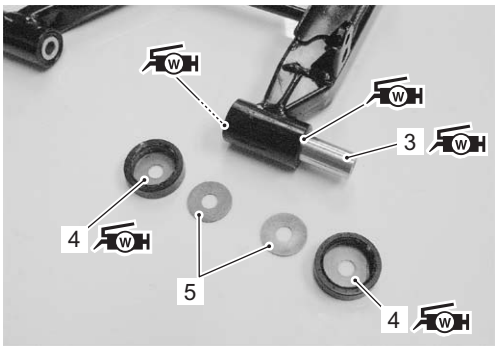


I831G1230045-01

2) Apply grease to the lip of inner dust seals, spacer (3) and inside of dust seals (4).

: Grease 99000–25160 (Water resistance grease or equivalent)

3) Install the spacer (3), dust seals (4) and washers (5) to the rear suspension lower arm.



I831G1230046-02

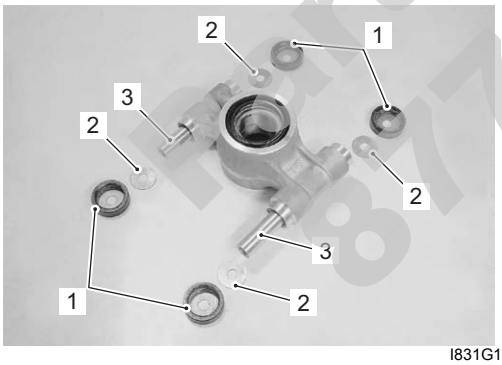
Rear Suspension Knuckle Bushing Removal and Installation

B931G22306014

Refer to “Rear Wheel Hub / Suspension Knuckle Removal and Installation (Page 2C-4)”.

Removal

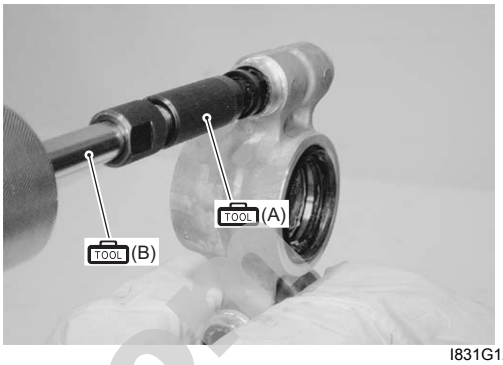
1) Remove the following parts from the suspension knuckle.
   - Dust seal (1)
   - Washer (2)
   - Spacer (3)



I831G1230047-01

2) Remove the suspension knuckle bushings along with inner dust seals with the special tools.

Special tool
(A): 09923–73210 (Bearing remover)
(B): 09930–30104 (Rotor remover sliding shaft)



I831G1230048-03

Installation

1) Install the suspension knuckle bushing and inner dust seal with the special tool and suitable socket wrench.

NOTE

Position the bushing s and dust seals by referring to “Rear Suspension Assembly Construction (Page 2C-2)”.

⚠ CAUTION

The removed bushings and dust seals must be replaced with new ones.

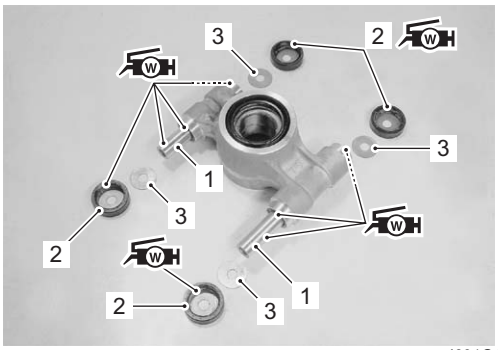
Special tool
(A): 09941–34513 (Steering race installer)

I831G1230049-01

2) Apply grease to the lip of the inner dust seals, spacer (1) and inside of dust seals (2).

: Grease 99000–25160 (Water resistance grease or equivalent)

3) Install the spacers (1), dust seals (2) and washers (3) to the rear suspension knuckle.



I831G1230050-01

Rear Stabilizer Removal and Installation

B931G22306015

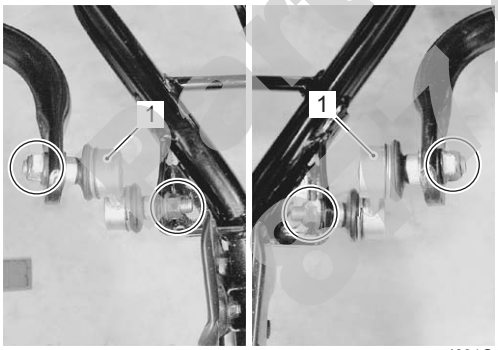
Removal

1) Remove the rear wheels. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.

⚠ CAUTION

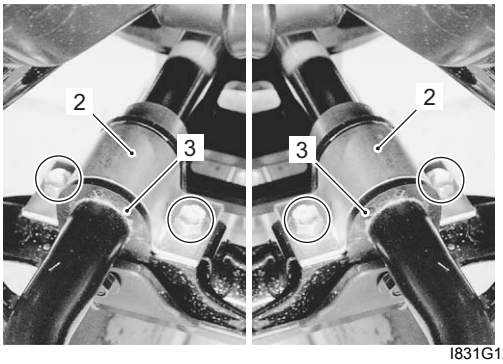
Make sure that the vehicle is supported securely.

2) Disconnect the stabilizer joints (1) from the rear suspension lower arm and stabilizer bar.



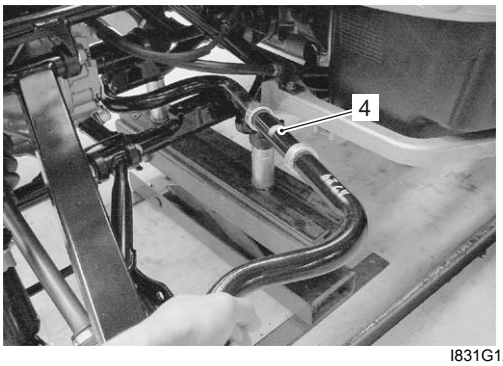
I831G1230055-01

3) Remove the stabilizer plates (2) and bushings (3).



I831G1230052-02

4) Remove the stabilizer bar (4).



I831G1230053-01

Installation

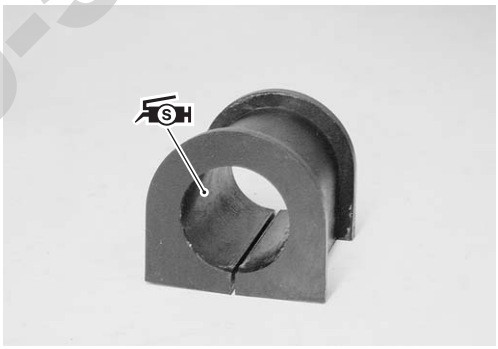
Install the stabilizer in the reverse order of removal. Pay attention to the following points:

Applicable model
Up to 5SAAR41A197105886

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

- Apply grease to the inside of stabilizer bushing.

: Grease 99000–25100 (SUZUKI SILICONE GREASE or equivalent)

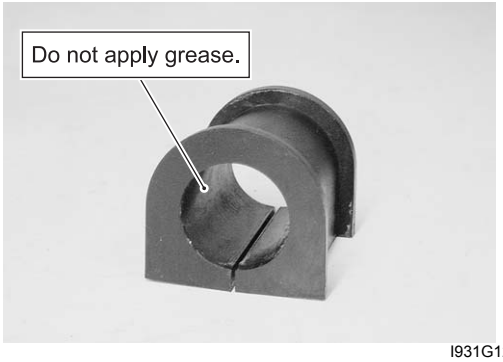


I831G1230051-03

Applicable model
From 5SAAR41A197105887

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

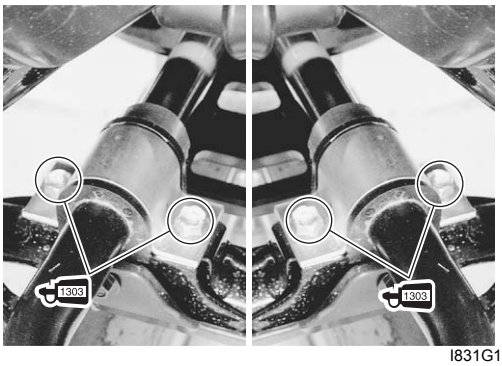
- Do not apply grease to the inside of stabilizer bushing.



I931G1230002-02

- Apply thread lock to the stabilizer plate mounting bolts and tighten the bolts securely.

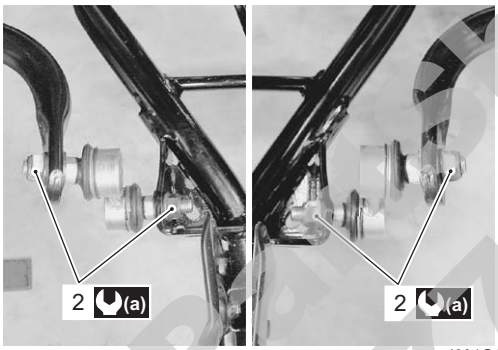
  1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)



I831G1230056-03

- Tighten the stabilizer joint nuts (2) to the specified torque.

  Tightening torque
  Rear stabilizer joint nut [Up to 5SAAR41A497105526] (a): 34 N·m (3.4 kgf-m, 24.5 lbf-ft)
  Rear stabilizer joint nut [From 5SAAR41A497105527] (a): 60 N·m (6.0 kgf-m, 43.5 lbf-ft)



I831G1230057-01

Stabilizer Parts Inspection

B931G22306016

Refer to “Rear Stabilizer Removal and Installation (Page 2C-14)”.

Stabilizer Bar
Inspect for damage or deformation. If any defects are found, replace the stabilizer bar with a new one.

I831G1230058-01

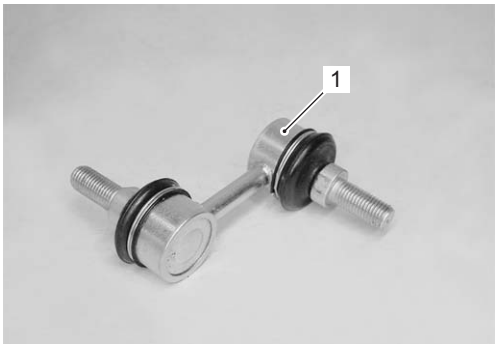
Stabilizer Bushing / Plate
Inspect the bushing and plate for wear or damage. If any defects are found, replace the bushing and/or plate with a new one.

I831G1230059-01

Stabilizer Joint
Inspect the stabilizer joint for wear or damage. If any defects are found, replace the stabilizer joint with a new one.
Inspect the stabilizer joint smooth movement. If there are any abnormalities, replace the stabilizer joint with a new one.

NOTE

Stabilizer joint (1) cannot be disassembled.



I831G1230060-01

Specifications

Service Data

B931G22307001

Suspension

Unit: mm (in)

Item	Standard	Limit
Rear shock absorber spring adjustor	2/5 position	—

Tightening Torque Specifications

B931G22307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear shock absorber mounting nut	60	6.0	43.5	☞(Page 2C-3) / ☞(Page 2C-9)
Rear knuckle end nut (Upper and Lower)	60	6.0	43.5	☞(Page 2C-5)
Rear wheel hub nut	121	12.1	87.5	☞(Page 2C-6)
Suspension arm lower pivot nut	60	6.0	43.5	☞(Page 2C-8)
Rear stabilizer joint nut [Up to 5SAAR41A497105526]	34	3.4	24.5	☞(Page 2C-9) / ☞(Page 2C-15)
Rear stabilizer joint nut [From 5SAAR41A497105527]	60	6.0	43.5	☞(Page 2C-9) / ☞(Page 2C-15)
Suspension arm upper pivot nut	60	6.0	43.5	☞(Page 2C-9)

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-7)”.

Special Tools and Equipment

Recommended Service Material

B931G22308001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SILICONE GREASE or equivalent	P/No.: 99000–25100	☞(Page 2C-14)
	Water resistance grease or equivalent	P/No.: 99000–25160	☞(Page 2C-5) / ☞(Page 2C-5) / ☞(Page 2C-7) / ☞(Page 2C-8) / ☞(Page 2C-11) / ☞(Page 2C-13) / ☞(Page 2C-14)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 2C-3) / ☞(Page 2C-8) / ☞(Page 2C-15)

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

B931G22308002

09900–06108 Snap ring pliers ☞(Page 2C-6) / ☞(Page 2C-7)	09913–50121 Oil seal remover ☞(Page 2C-6) / ☞(Page 2C-6)
09913–70210 Bearing installer set ☞(Page 2C-7)	09913–75520 Bearing installer ☞(Page 2C-7)
09923–73210 Bearing remover ☞(Page 2C-11) / ☞(Page 2C-12) / ☞(Page 2C-13)	09930–30104 Rotor remover sliding shaft ☞(Page 2C-11) / ☞(Page 2C-12) / ☞(Page 2C-13)
09941–34513 Steering race installer ☞(Page 2C-11) / ☞(Page 2C-12) / ☞(Page 2C-13)	09943–88211 Bearing remover/installer ☞(Page 2C-12)

Wheels and Tires

Precautions

Precautions for Wheel and Tire

B831G22400001

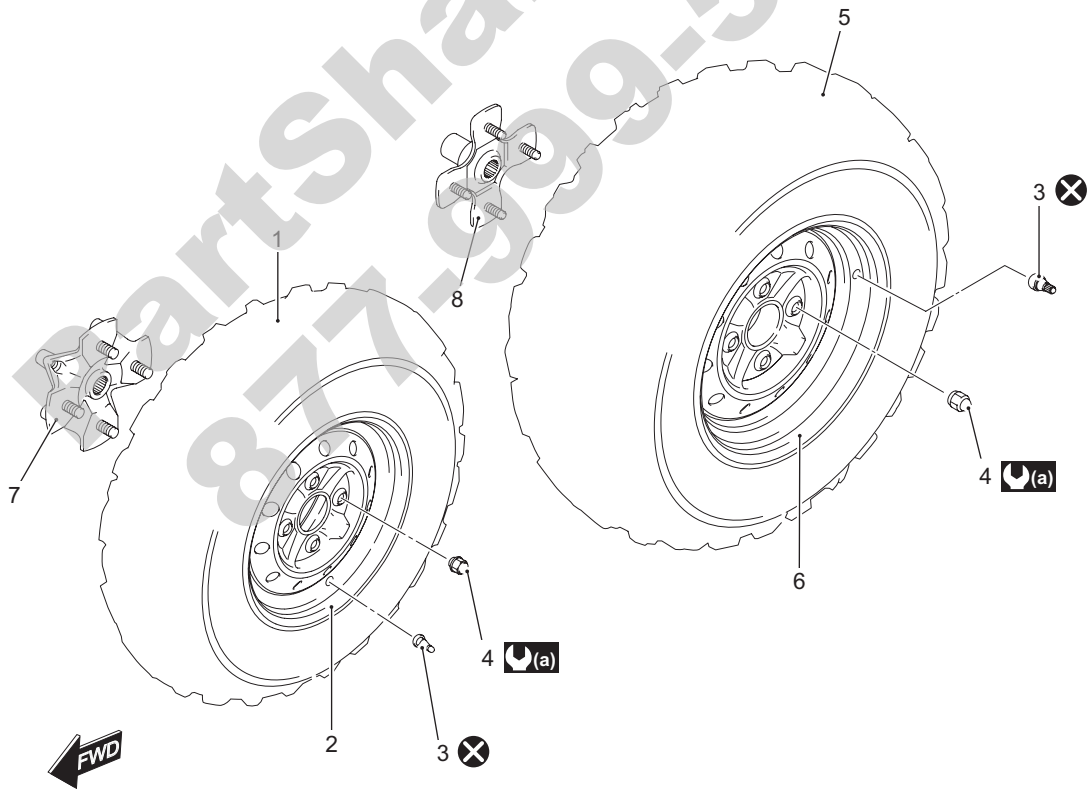
⚠ WARNING

- **Proper tire pressure and proper tire loading are important factors. Over loading tire can lead to tire failure and loss of vehicle control.**
- **Under-inflated tires make smooth cornering difficult, and can result in rapid tire wear.**
- **Over-inflated tires have a smaller amount of tire in contact with the load, which can contribute to skidding and loss of control.**
- **Replace the wheel if find damage such as crack, nick or scratch.**
- **When tire replacement is necessary, the original equipment type tire should be used.**
- **Do not mix different types of tires on the same vehicle except in emergencies, because handling may be seriously affected and may result in loss of control.**
- **Replacement wheel must be equivalent to the original equivalent wheel.**

Repair Instructions

Front and Rear Wheel Components

B831G22406001



I831G1240001-01

1. Front tire	6. Rear wheel
2. Front wheel	7. Front wheel hub
3. Front wheel air valve	8. Rear wheel hub
4. Wheel nut	(a) : 60 N·m (6.0 kgf-m, 43.5 lb-ft)
5. Rear tire	⊗ : Do not reuse.

Front / Rear Wheel Removal and Installation

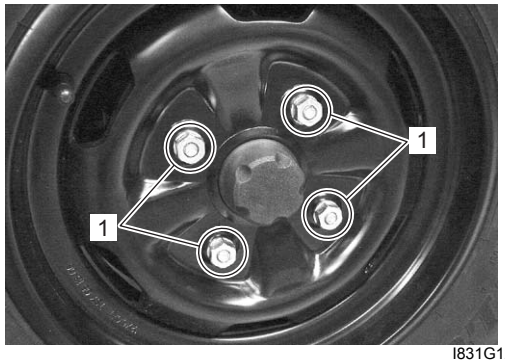
B831G22406002

NOTE

The front and rear wheels are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

Removal

1) Place the vehicle on level ground.
2) Support the vehicle with a jack or wooden block.
3) Remove the wheel nuts (1).



I831G1240002-01

4) Remove the wheel.

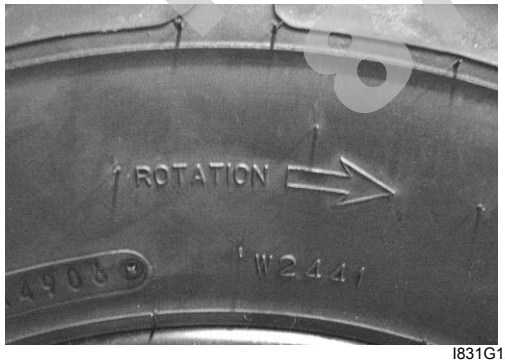
Installation

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

- Install the wheel and tighten the wheel nuts temporarily.

⚠ WARNING

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



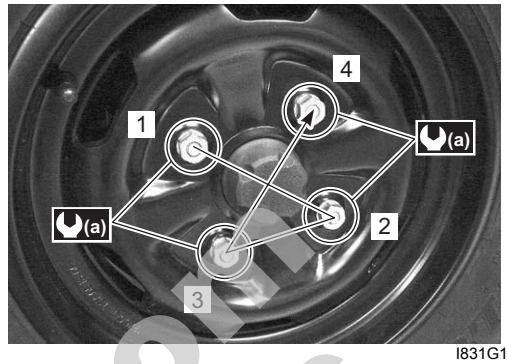
I831G1240003-01

- Tighten the wheel nuts to the specified torque.

NOTE

Tighten the wheel nuts diagonally.

Tightening torque
Wheel nut (a): 60 N·m (6.0 kgf-m, 43.5 lb-ft)

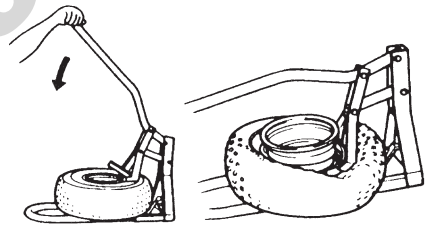


I831G1240004-01

Tire Removal and Installation

B831G22406003

1) Remove the wheel from vehicle. Refer to “Front / Rear Wheel Removal and Installation (Page 2D-2)”.
2) After removing the air valve caps, release the tire pressure by depressing the valves.
3) Dismount the bead from the rim completely as shown in the figure.

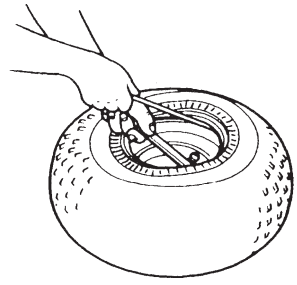


I831G1240005-01

4) Separate the tire from the rim using a set of tire levers and rim protectors.

⚠ CAUTION

When using the tire levers, do not scratch or hit the sealing portion (hump) of the wheel or it may cause air-leakage.

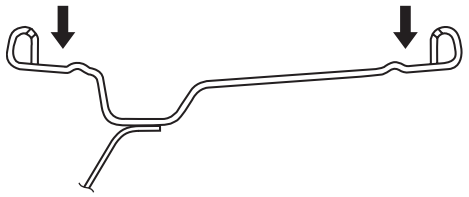


I831G1240006-01

5) After removing the tire, inspect the wheel if necessary.

Installation

1) Clean up the sealing portion of the rim.

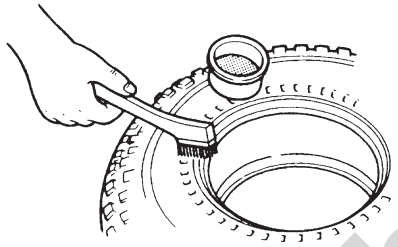


I831G1240007-02

2) Apply tire lubricant to the tire bead and the flange of the rim.

⚠ CAUTION

Never apply grease, oil or gasoline to the tire bead because they will deteriorate the tire.

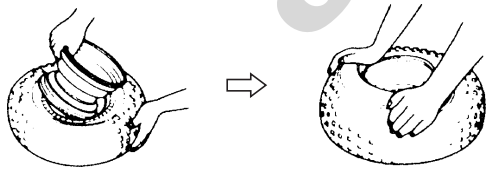


I831G1240008-01

⚠ CAUTION

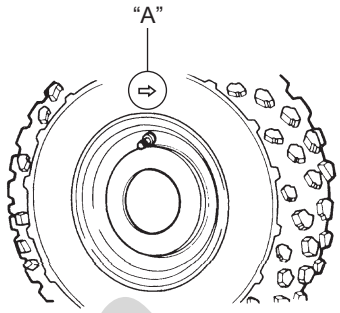
The standard tire fitted on this vehicle is AT25 x 8-12 ☆☆ for the front and AT25 x 10-12 ☆☆ for the rear. The use of tires other than the standard may cause instability. It is highly recommended to use the specified tire.

3) Mount the tire on the rim by hand as shown in the figure.



I831G1240009-02

4) When installing each tire, make sure the arrow “A” on the tire points in the direction of rotation. Also, make sure the outer side of the wheel rim is facing outward.



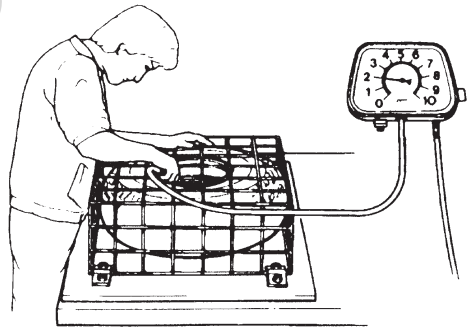
I831G1240010-01

5) Inflate the tire to seat the tire bead.

Maximum tire bead seat pressure
Front: 250 kPa (2.5 kgf/cm^2, 36psi)
Rear: 250 kPa (2.5 kgf/cm^2, 36 psi)

⚠ CAUTION

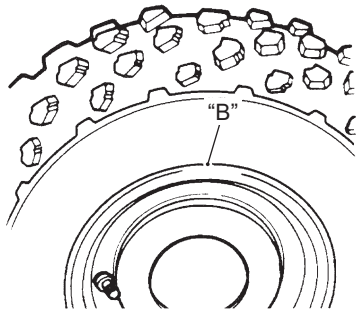
Place the tire under a protective tire cage or similar protective covering device before inflating the tire. To minimize the possibility of tire damage when seating the tire bead, never exceed the MAXIMUM TIRE BEAD SEAT PRESSURE rating shown on the tire.



I831G1240011-02

NOTE

Check the "rim line" "B" cast on the tire sidewalls. It must be equidistant from the wheel rim all the way around. If the distance between the rim line and the wheel rim varies, this indicates that the bead is not properly seated. If this is so, deflate the tire completely, and unseat the tire bead on both sides. Then, coat the bead with clean water, and re-seat the tire.



I831G1240012-02

6) Adjust the tire pressure to the specified pressure.

Cold inflation tire pressure
Front: 35 kPa (0.35 kgf/cm², 5.1 psi)
Rear: 30 kPa (0.30 kgf/cm², 4.4 psi)

Vehicle load capacity
172 kg (380 lbs)

⚠ CAUTION

Before inflating the tire, check the MAXIMUM OPERATING PRESSURE rating of the tire. This is indicated by a "☆" following the tire size shown on the sidewall. The number of "☆" on the tire indications the maximum operating pressure.

Maximum operating pressure
☆: 25 kPa (0.25 kgf/cm², 3.6 psi)
☆☆: 35 kPa (0.35 kgf/cm², 5.1 psi)
☆☆☆: 45 kPa (0.45 kgf/cm², 6.5 psi)

Specifications

Service Data

B831G22407001

Tire

Item		Standard	Limit
Cold inflation tire pressure (Solo riding)	Front	35 kPa (0.35 kgf/cm², 5.1 psi)	—
	Rear	30 kPa (0.30 kgf/cm², 4.4 psi)	—
Tire size	Front	AT25 x 8-12 ☆☆, tubeless	—
	Rear	AT25 x 10-12 ☆☆, tubeless	—
Tire tread depth	Front	—	4.0 (0.16)
	Rear	—	4.0 (0.16)

Tightening Torque Specifications

B831G22407002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Wheel nut	60	6.0	43.5	☞(Page 2D-2)

NOTE

The specified tightening torque is also described in the following.
"Front and Rear Wheel Components (Page 2D-1)"

Reference:
For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

Section 3

Driveline / Axle

CONTENTS

Precautions

Precautions

Precautions for Driveline / Axle

B831G23000001

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

⚠ WARNING

Support the vehicle with a jack or wooden block when servicing the drive shafts and drive train.

Drive Chain / Drive Train / Drive Shaft

Diagnostic Information and Procedures

Drive Shaft Symptom Diagnosis

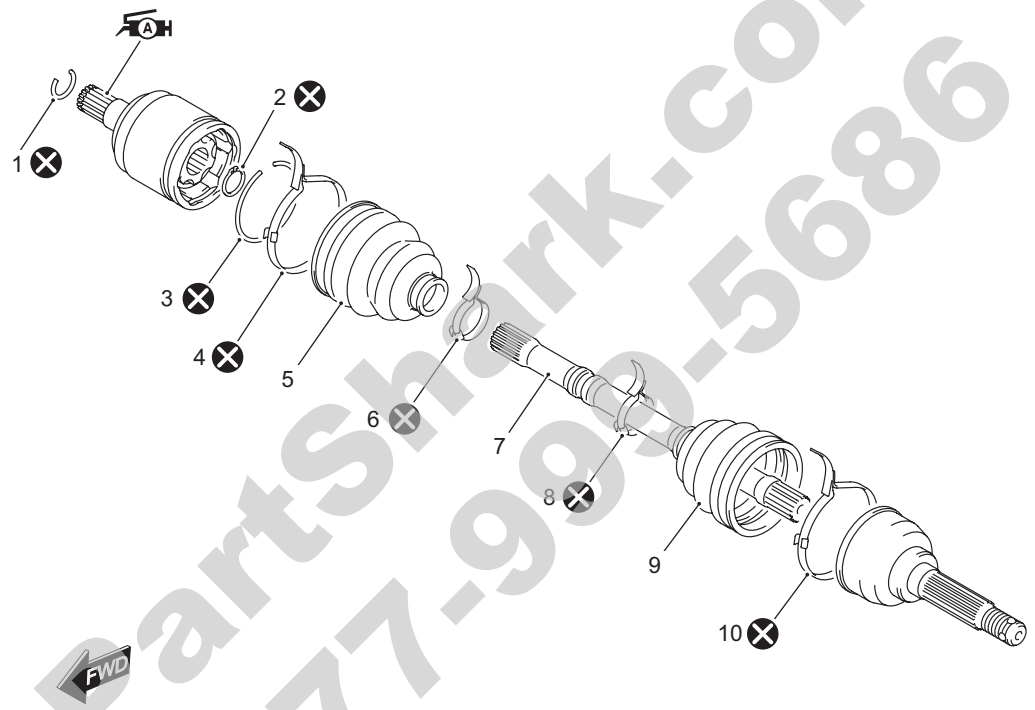
B831G23104001

Condition	Possible cause	Correction / Reference Item
Noisy Drive Shaft	Worn drive shaft joints.	*Replace.*
	Worn wheel hub bearings.	*Replace.*
	Loose wheel nuts.	*Tighten.*

Repair Instructions

Front Drive Shaft Components

B831G23106001



I831G1310001-05

1. Circlip	5. Inner boot	9. Outer boot
2. Snap ring	6. Inner boot band (Small)	10. Outer boot band (Large)
3. Stopper ring	7. Drive shaft	A : Apply grease.
4. Inner boot band (Large)	8. Outer boot band (Small)	⊗ : Do not reuse.

Front Drive Shaft Assembly Removal and Installation

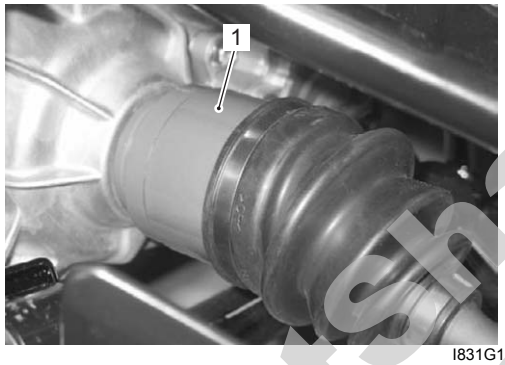
B831G23106002

Removal

1) Drain the front differential gear oil. Refer to “Front Differential Gear Oil Inspection in Section 0B (Page 0B-12)”.
2) Remove the front wheel. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
3) Remove the steering knuckle. Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation in Section 2B (Page 2B-4)”.
4) Hold the inboard joint (1) of the front drive shaft and tug the drive shaft horizontally.

NOTE

If it is difficult to remove the front drive shaft from the front differential gear case, use the suitable tool.



I831G1310003-01

Installation

Install the front drive shaft assembly in the reverse order of removal. Pay attention to the following points:

- Install a new circlip into the groove of front differential gear spline.

⚠ CAUTION

The removed circlip must be replaced with a new one.

- Apply grease to the spline of the front drive shafts and install the front drive shafts to the front differential gear case.

: Grease 99000–25160 (Water resistance grease)

⚠ CAUTION

Be careful not to damage the front differential gear case oil seals.

NOTE

After installing both drive shafts, make sure the stopper rings are seated properly by pulling both inboard joints lightly.

I831G1310004-02

- Install the steering knuckle. Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation in Section 2B (Page 2B-4)”.
- Install the front wheel. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
- Pour the front differential gear oil. Refer to “Front Differential Gear Oil Inspection in Section 0B (Page 0B-12)”.

Front Drive Shaft Disassembly and Assembly

B831G23106003

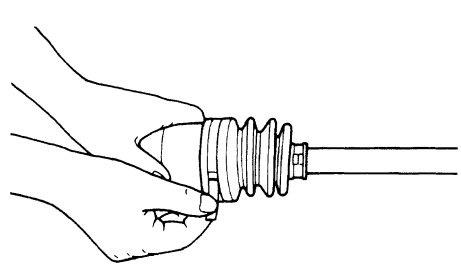
Refer to “Front Drive Shaft Assembly Removal and Installation (Page 3A-2)”.

Disassembly

⚠ CAUTION

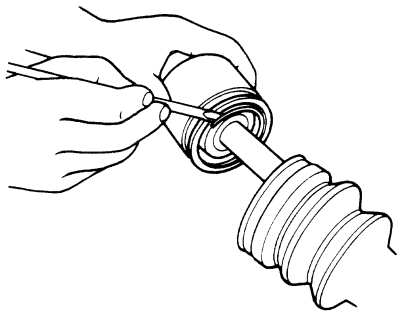
Do not disassemble the wheel side joint. If any damages are found, replace it with a new one.

1) Remove the boot band of the differential side joint.



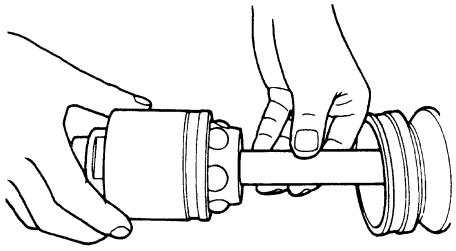
I831G1310005-01

2) Slide the boot toward the center of the front drive shaft and remove the stopper ring from the outer race.



I831G1310006-01

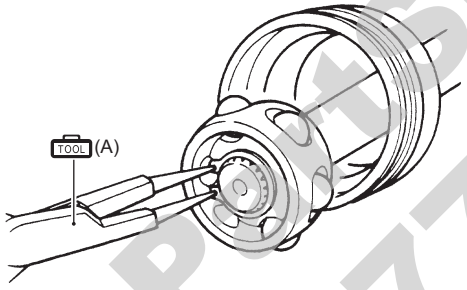
3) Remove the outer race from the front drive shaft.



I831G1310007-01

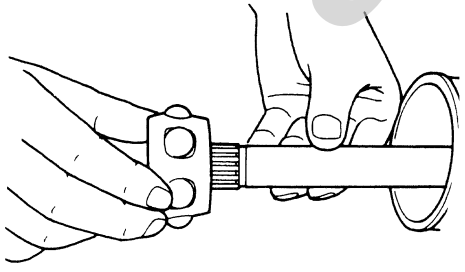
4) Wipe off any grease and remove the snap ring.

Special tool
(A): 09900–06107 (Snap ring pliers)



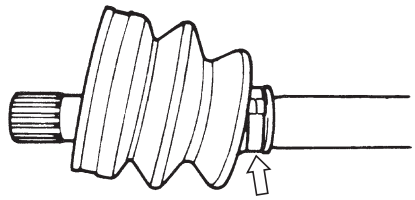
I831G1310022-01

5) Remove the cage from the front drive shaft.



I831G1310009-01

6) Remove the boot band of the small diameter side.



I831G1310011-02

Assembly

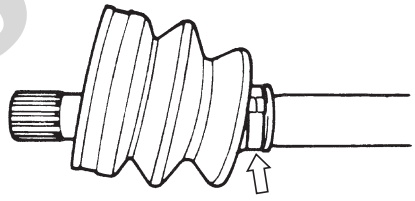
⚠ CAUTION

- **Wash all parts before installation, clean the inside and outside of the boots with a cloth.**
- **Do not wash the boots in any commercially available degreaser, such as gasoline or kerosene. Washing in a degreaser causes deterioration of the boots.**

1) Fit a boot on the drive shaft end, fitting the small diameter side of the boot to the shaft groove, fix its end with a new boot band.

⚠ CAUTION

Replace the boot band with a new one.

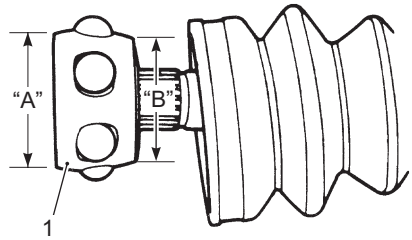


I831G1310011-02

2) Install the cage (1) on the shaft.

⚠ CAUTION

Install the cage with the large diameter side "A" facing the shaft end.



I831G1310012-02

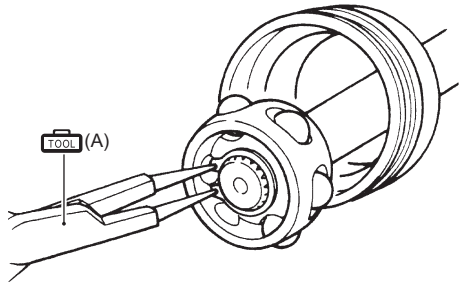
"A": Large diameter	"B": Small diameter

3) Install the new snap ring to the cage.

⚠ CAUTION

Replace the snap ring with a new one.

Special tool
TOOL (A): 09900–06107 (Snap ring pliers)



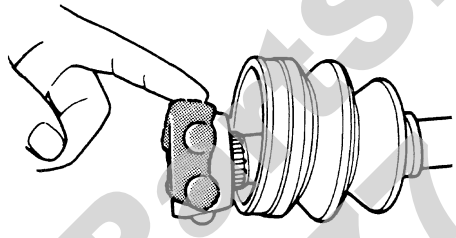
I831G1310023-01

4) Apply grease to the entire surface of the cage and the inside of the outer race.

	Position	
	Wheel side	Differential side
Grease: Quantity	45 g	85 g

NOTE

The tube of joint grease is included in the wheel side boot set or wheel side joint assembly of spare parts.



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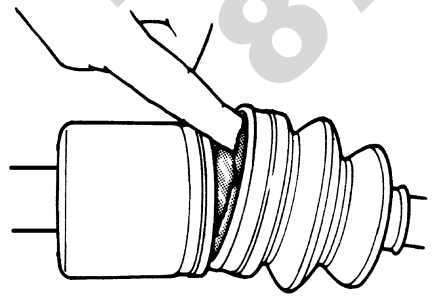
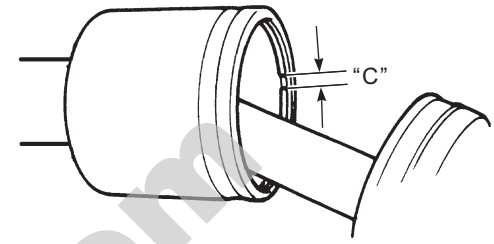


I831G1310014-01

5) Insert the cage into the outer race and install the new stopper ring to the groove of the outer race.

⚠ CAUTION

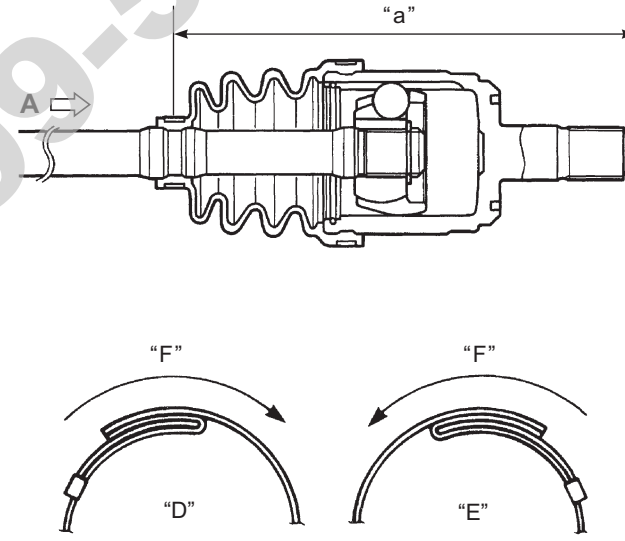
- **Replace the stopper ring with a new one.**
- **Position the opening of stopper ring "C" so that it will not be lined up with a ball.**



I831G1310015-01

6) After installing the boot on the outer race, insert a screw driver into the boot on the outer race side and allow air to enter the boot so that the air pressure in the boot becomes the same as the atmospheric pressure at the positions indicated in the figure.

7) Fix the boot on the outer race with a new boot band, taking care not to distort the boot.



VIEW A

I831G1310016-02

"D": Right side	"F": Rotation direction
"E": Left side	"a": 188 – 198 mm (7.4 – 7.8 in)

8) Install the circlip (2) into the groove of front drive shaft spline.

⚠ CAUTION

The removed circlip must be replaced with a new one.

I831G1310017-02

9) Inspect the axle play by using a push-and-pull motion given to the axle shaft and wheel spindle.

I831G1310018-01

Front Drive Shaft Inspection

B831G23106004

Inspect the front drive shaft in the following procedures:

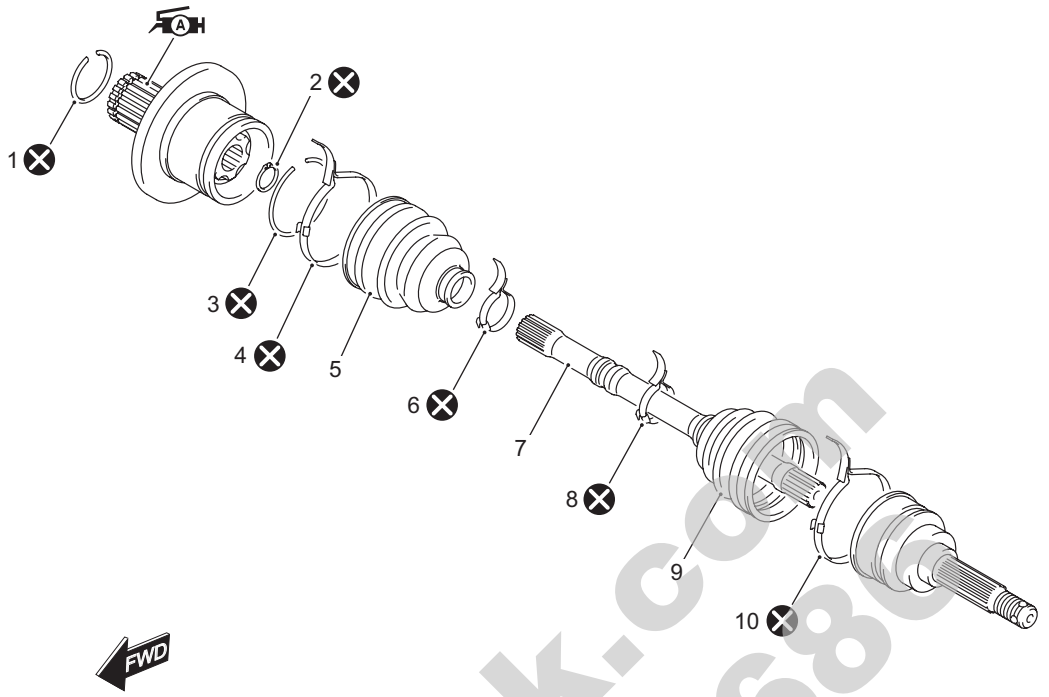
1) Remove the front drive shaft assembly. Refer to “Front Drive Shaft Assembly Removal and Installation (Page 3A-2)”.
2) Inspect the boots, circlip and boot bands for wear or damage. If any damages are found, replace them with new ones.

I831G1310019-01

3) Install the front drive shaft assembly. Refer to “Front Drive Shaft Assembly Removal and Installation (Page 3A-2)”.

Rear Drive Shaft Components

B831G23106005



I831G1310002-05

1. Circlip	5. Inner boot	9. Outer boot
2. Snap ring	6. Inner boot band (Small)	10. Outer boot band (Large)
3. Stopper ring	7. Drive shaft	A : Apply grease.
4. Inner boot band (Large)	8. Outer boot band (Small)	⊗ : Do not reuse.

Rear Drive Shaft Assembly Removal and Installation

B831G23106006

Removal

1) Drain the rear final gear oil. Refer to “Final Gear Oil Inspection in Section 0B (Page 0B-14)”.
2) Remove the rear wheel. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
3) Remove the rear wheel hub and rear suspension arm. Refer to “Rear Wheel Hub / Suspension Knuckle Removal and Installation in Section 2C (Page 2C-4)”.
4) Hold the in board joint (1) of the rear drive shaft and tug the drive shaft horizontally.

NOTE

If it is difficult to remove the rear drive shaft from the rear differential gear case, using the suitable tool.

I831G1310020-04

Installation
Install the rear drive shaft in the reverse order of removal. Pay attention to the following points:

- Install a new circlip (1) into the groove of drive shaft spline.

⚠ CAUTION

The removed circlip must be replaced with a new one.

- Apply grease to the spline of the rear drive shafts and install the rear drive shafts to the rear final gear case.

: Grease 99000–25160 (Water resistance grease)

⚠ CAUTION

Be careful not to damage the front drive case oil seal.

NOTE

After installing both drive shafts, make sure the circlips (1) is seated properly by pulling both inboard joints lightly.

I831G1310021-04

Rear Drive Shaft Disassembly and Assembly
B831G23106007
Refer to “Rear Drive Shaft Assembly Removal and Installation (Page 3A-6)”.
Rear drive shaft disassembly and assembly as the same manner of front drive shaft.

Rear Drive Shaft Inspection
B831G23106008
Refer to “Rear Drive Shaft Assembly Removal and Installation (Page 3A-6)”.
Rear drive shaft inspection as the same manner of front drive shaft.

Special Tools and Equipment

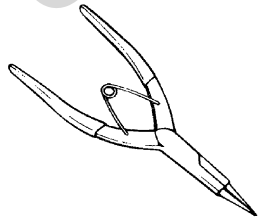
Recommended Service Material
B831G23108001

Material	SUZUKI recommended product or Specification		Note
Grease	Water resistance grease	P/No.: 99000–25160	☞(Page 3A-2) / ☞(Page 3A-7)

NOTE

Required service material is also described in the following.
“Front Drive Shaft Components (Page 3A-1)”
“Rear Drive Shaft Components (Page 3A-6)”

Special Tool
B831G23108002

09900–06107 Snap ring pliers ☞(Page 3A-3) / ☞(Page 3A-4)		

Differential

Diagnostic Information and Procedures

Drive Train Symptom Diagnosis

B831G23204001

Condition	Possible cause	Correction / Reference Item
Engine noisy (Noise seems to came from front/ rear output shaft bevel gear, front drive (differential) bevel gear and rear drive bevel gear)	Worn or damage drive and driven bevel gears.	*Replace.*
	Excessive backlash.	*Adjust.*
	Improper tooth contact.	*Adjust.*
	Damage bearing.	*Replace.*
	Worn or rubbing gears.	*Replace.*
	Worn output shaft spline.	*Replace output shaft.*
	Too large front drive gear thrust clearance.	*Adjust or replace.*
	Too large rear drive gear thrust clearance.	*Adjust or replace.*
Power will not transmit from the engine to the front wheel	Broken drive and driven bevel gear teeth.	*Replace.*
	Worn or broken propeller shaft serration.	*Replace.*
	Broken or damaged front drive (differential) gear or pinion.	*Replace.*
	Improperly operated front differential shifting motor.	*Repair or replace.*
	Worn or damaged shifting sleeve, shaft and fork of the 2WD/4WD and diff-lock shifting.	*Replace.*
	Worn or damaged universal joint.	*Replace.*
	Worn or damaged front drive shaft or universal joint serration.	*Replace.*
Power will not transmit from the engine to the rear wheel	Broken drive and driven bevel gear teeth.	*Replace.*
	Broken rear output shaft.	*Replace.*
	Worn or broken rear drive shaft serration.	*Replace.*
	Worn or damaged coupling joint serration.	*Replace.*
	Broken or damaged rear drive and driven bevel gears.	*Replace.*
	Worn or damaged universal joint.	*Replace.*

DTC “C20” (P1752) Diff-lock Relay Circuit Malfunction

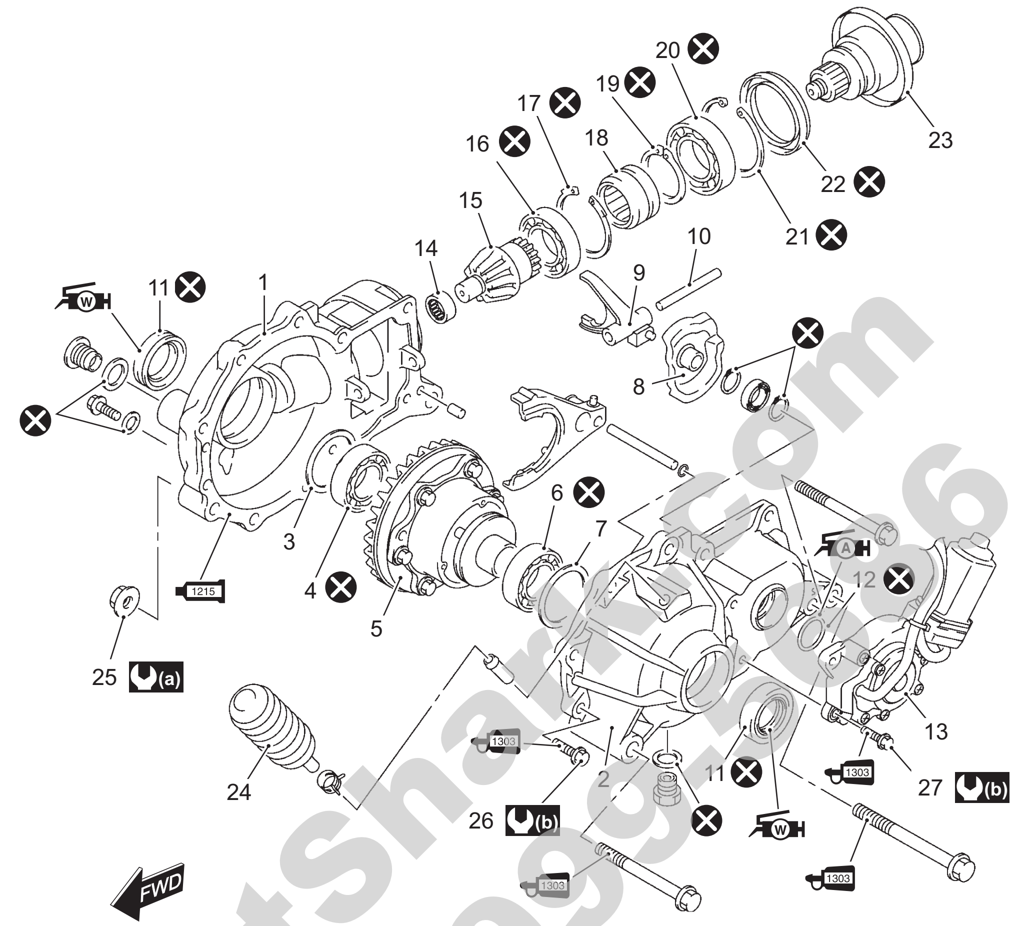
B831G23204002

Refer to “DTC “C20” (P1752): Diff-lock Relay Circuit Malfunction in Section 1A (Page 1A-47)”.

Repair Instructions

Front Drive (Differential) Components

B831G23206001

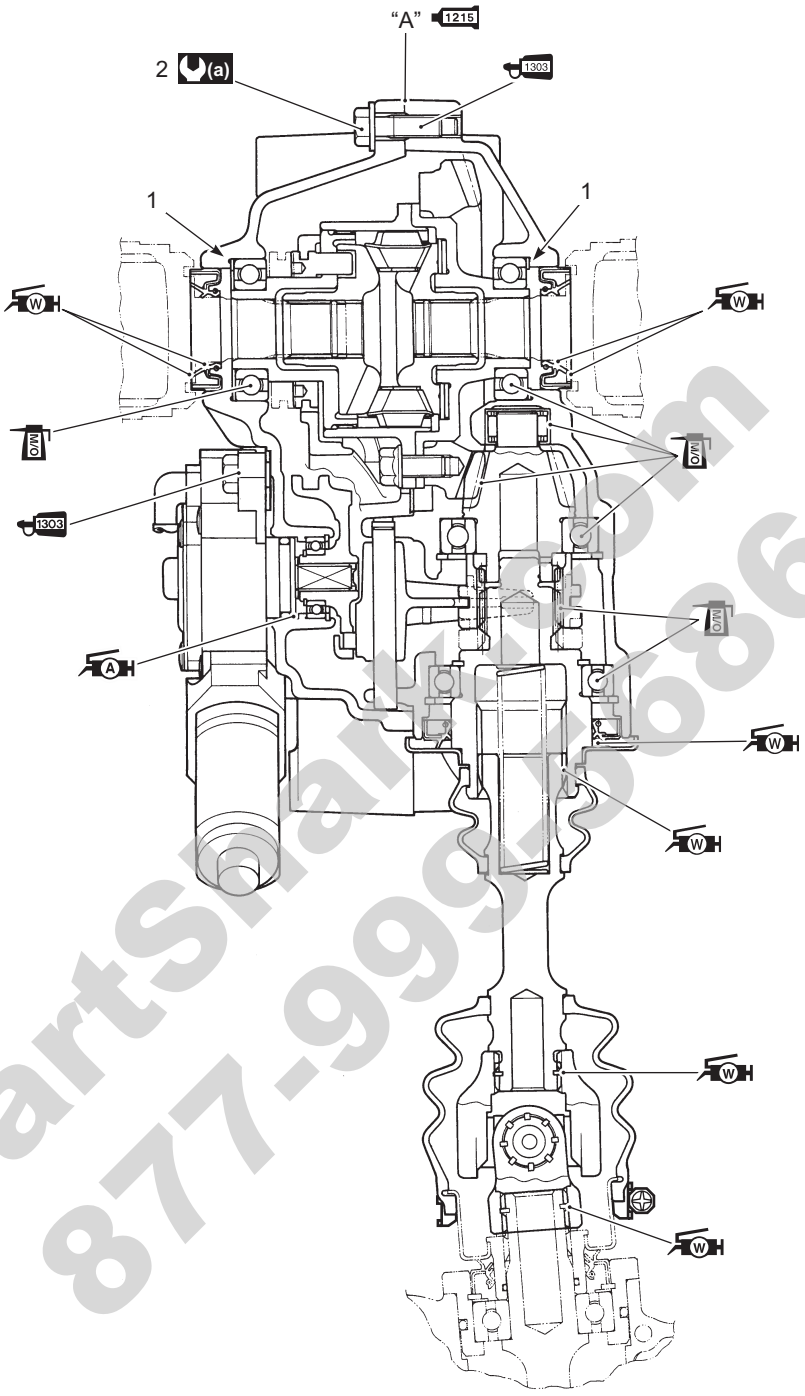


I831G1320001-06

1. Front drive (differential) gear case	12. O-ring	23. Input shaft
2. Front drive (differential) gear case cover	13. 4WD/Diff-lock Actuator	24. Breather rubber case
3. Shim (Right side)	14. Bearing	25. Front drive (differential) gear case mounting nut
4. Bearing	15. Drive bevel gear	26. Front drive (differential) gear case cover bolt
5. Front drive (differential) gear case	16. Bearing	27. Actuator mounting bolt
6. Bearing	17. Snap ring	(a) : 50 N·m (5.0 kgf-m, 36.0 lb-ft)
7. Shim (Left Side)	18. 2WD/4WD shifting sleeve	(b) : 22 N·m (2.2 kgf-m, 16.0 lb-ft)
8. 2WD/4WD shifting cam	19. Snap ring	W : Apply water resistance grease.
9. 2WD/4WD shifting fork	20. Bearing	1215 : Apply bond.
10. 2WD/4WD shifting fork shaft	21. Snap ring	1303 : Apply thread lock to the thread part.
11. Oil seal	22. Oil seal	

Front Drive (Differential) Construction

B831G23206002



I831G1320002-07

1. Shim	(a) : 1.3 N·m (0.13 kgf-m, 0.94 lb-ft)	1303 : Apply thread lock to the thread part.
2. Front drive (differential) case cover bolt	A : Apply grease.	1215 : Apply bond to matching surface.
"A": Matching surface	W : Apply water resistance grease.	O/M : Apply molybdenum oil solution.

Front Drive (Differential) Gear Oil Level Inspection

B831G23206003

Refer to “Front Differential Gear Oil Inspection in Section 0B (Page 0B-12)”.

Front Drive (Differential) Gear Oil Replacement

B831G23206004

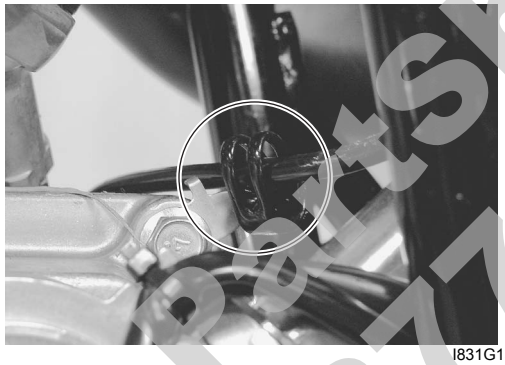
Refer to “Front Differential Gear Oil Inspection in Section 0B (Page 0B-12)”.

Front Drive (Differential) Assembly Removal and Installation

B831G23206005

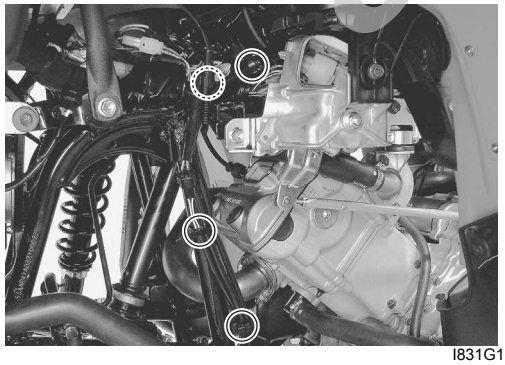
Removal

1) Remove the front wheels. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
2) Drain front differential gear oil. Refer to “Front Differential Gear Oil Inspection in Section 0B (Page 0B-12)”.
3) Remove the inner fender (left and right). Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
4) Remove the drive shaft. Refer to “Front Drive Shaft Assembly Removal and Installation in Section 3A (Page 3A-2)”.
5) Disconnect the rear brake light switch lead wire.



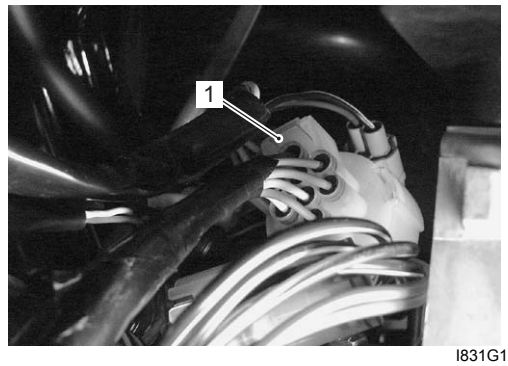
I831G1320003-01

6) Remove the lead wire clamps.



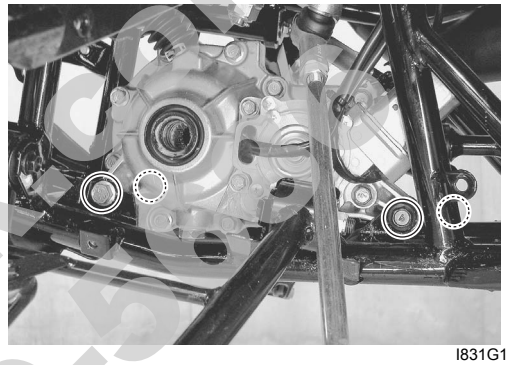
I831G1320004-01

7) Disconnect the 2WD/4WD/diff-lock actuator lead wire coupler (1).



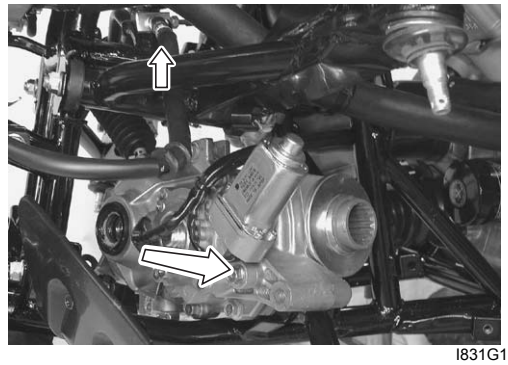
I831G1320005-02

8) Remove the front drive (differential) mounting bolts and nuts.



I831G1320006-02

9) Remove the front shock absorber. Refer to “Front Shock Absorber Removal and Installation in Section 2B (Page 2B-3)”.
10) Move the suspension upper arm upward and remove the front drive (differential) assembly.



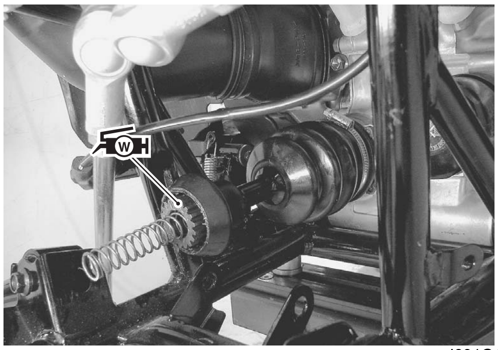
I831G1320146-01

Installation

Install the front drive (differential) assembly in the reverse order of removal. Pay attention to the following points:

- Apply 4.5 gram of grease to spline of the front propeller shaft.

  : Grease 99000–25160 (Water resistance grease)

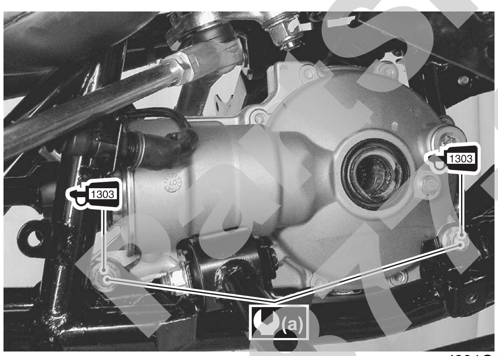


I831G1320144-01

- Apply thread lock to the bolts and tighten them to the specified torque.

  : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

  Tightening torque
  Front drive (differential) mounting nut (a): 50 N·m (5.0 kgf-m, 36.0 lb-ft)



I831G1320007-02

- Attach the boot (1) to the input shaft.

I831G1320147-01

- After installing the front drive (differential), check the wiring harness routing and pour the front differential gear oil. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-4)” and “Front Differential Gear Oil Inspection in Section 0B (Page 0B-12)”.

Front Drive (Differential) Assembly Disassembly and Assembly

B831G23206006

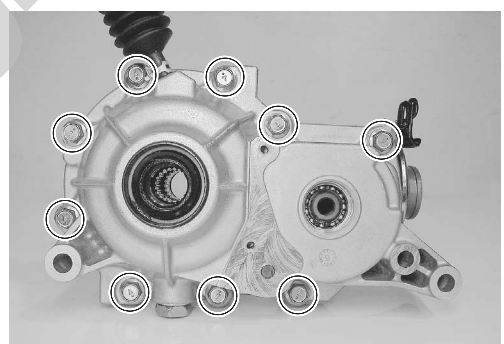
Refer to “Front Drive (Differential) Assembly Removal and Installation (Page 3B-4)”.

Disassembly

1) Remove the 2WD/4WD/diff-lock actuator assembly.

I831G1320008-01

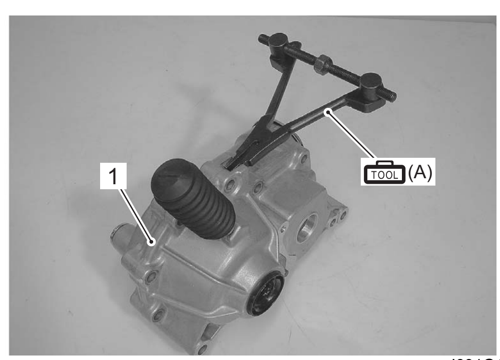
2) Remove the front drive (differential) case cover bolts diagonally and evenly.



I831G1320009-01

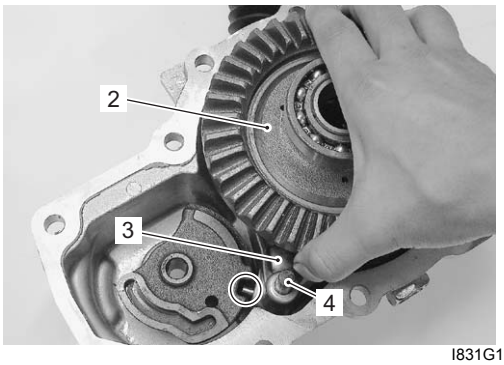
3) Remove the front drive (differential) case housing (1).

   Special tool
   (A): 09912–34510 (Cylinder disassembling tool)



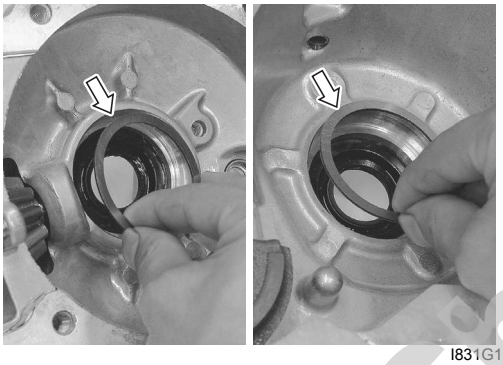
I831G1320010-01

4) Align the concave part of 2WD/4WD shifting cam and convex part of diff-lock shift fork.
5) Remove the front drive (differential) gear assembly (2), diff-lock shifting fork (3) and shifting fork shaft (4).



I831G1320011-02

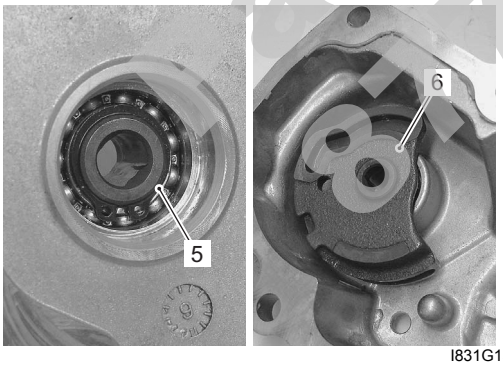
6) Remove the shims from the housing and cover.


I831G1320012-01

7) Remove the snap ring (5).

Special tool
(TOOL) : 09900–06108 (Snap ring pliers)

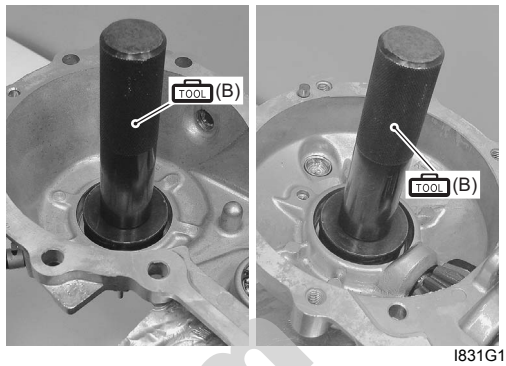
8) Remove the 2WD/4WD shifting cam (6).



I831G1320013-01

9) Remove the oil seals.

Special tool
(TOOL) (B): 09913–70210 (Bearing installer set)



I831G1320014-01

10) Remove the snap ring (7).

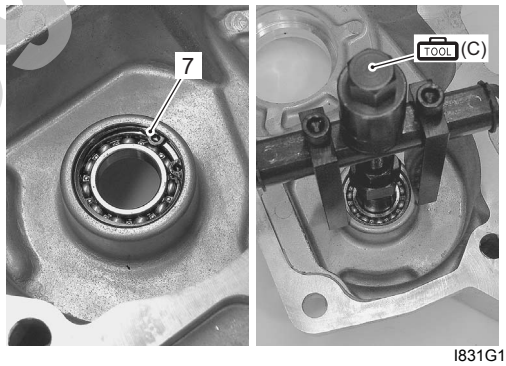
Special tool
(TOOL) : 09900–06108 (Snap ring pliers)

11) Remove the 2WD/4WD shifting cam bearing with the special tool.

NOTE

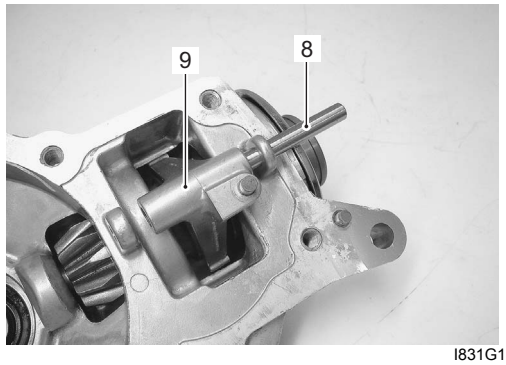
If there is no abnormal noise, the bearing removal is not necessary.

Special tool
(TOOL) (C): 09921–20240 (Bearing remover set)



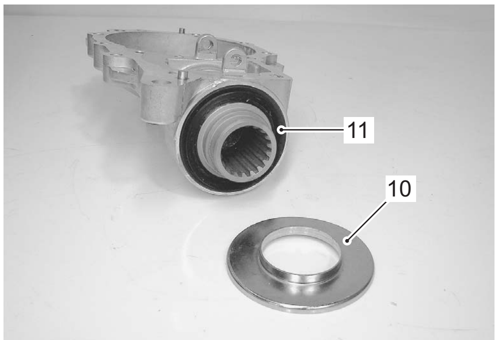
I831G1320015-02

12) Remove 2WD/4WD gear shifting fork shaft (8) and 4WD/diff-lock shifting fork (9).



I831G1320016-01

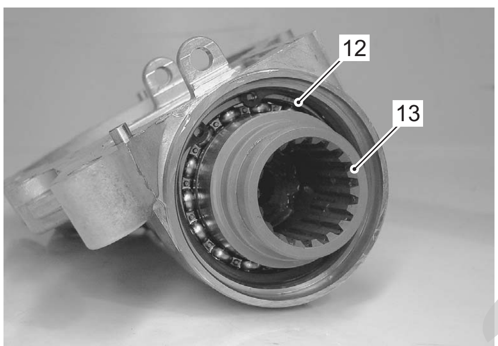
13) Remove the oil seal cap (10) and oil seal (11).



I831G1320017-01

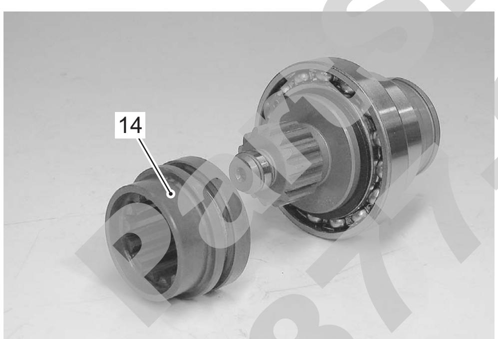
- Remove the snap ring (12) and input shaft (13).

Special tool
TOOL : 09900–06108 (Snap ring pliers)



I831G1320018-01

14) Remove 2WD/4WD shifting sleeve (14).



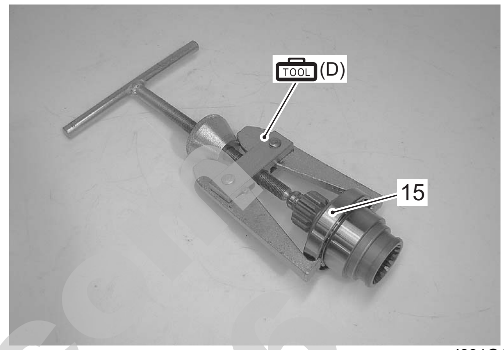
I831G1320019-01

15) Remove the input shaft bearing (15) with the special tool.

NOTE

If there is no abnormal noise, the bearing removal is not necessary.

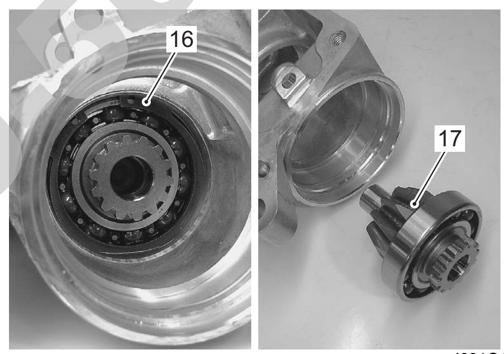
Special tool
TOOL (D): 09913–60910 (Bearing remover)



I831G1320020-01

16) Remove the snap ring (16) and pinion gear (17).

Special tool
TOOL : 09900–06108 (Snap ring pliers)



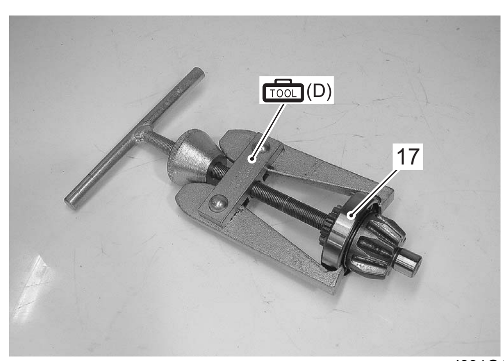
I831G1320021-01

17) Remove the pinion gear bearing with the special tool.

NOTE

If there is no abnormal noise, the bearing removal is not necessary.

Special tool
TOOL (D): 09913–60910 (Bearing remover)



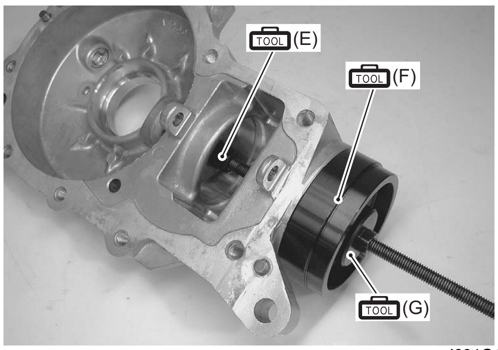
I831G1320022-01

18) Remove the pinion gear pilot bearing with the special tools.

NOTE

If there is no abnormal noise, the bearing removal is not necessary.

Special tool
TOOL (E): 09921–20240 (Bearing remover set)
TOOL (F): 09944–66010 (Bearing installer)
TOOL (G): 09924–84521 (Bearing installer set)



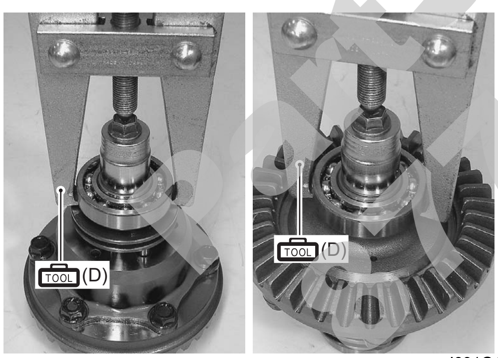
I831G1320023-02

19) Remove the front drive (differential) gear bearing with the special tool, as shown in the figure.

NOTE

If there is no abnormal noise, the bearing removal is not necessary.

Special tool
TOOL (D): 09913–60910 (Bearing remover)



I831G1320024-01

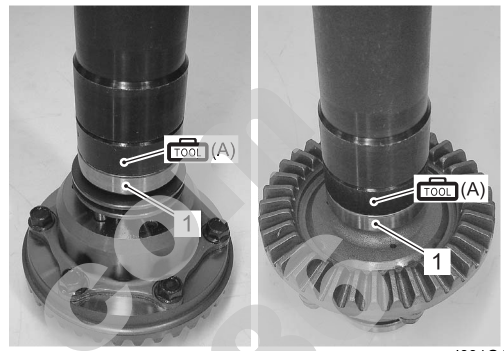
Assembly

⚠ CAUTION

The removed oil seals, snap rings and bearings must be replaced with new ones.

1) Install the bearings (1) to the front drive (differential) gear assembly with the special tool.

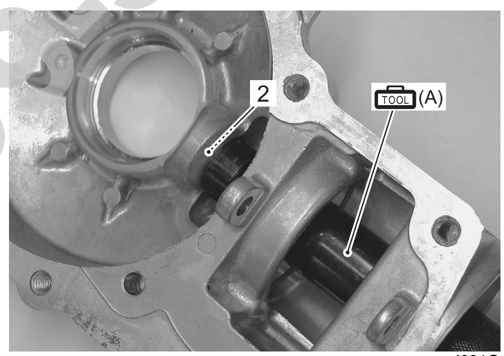
Special tool
TOOL (A): 09913–70210 (Bearing installer set)



I831G1320025-01

2) Install the pinion gear pilot bearing (2) into the front drive (differential) gear case with the special tool.

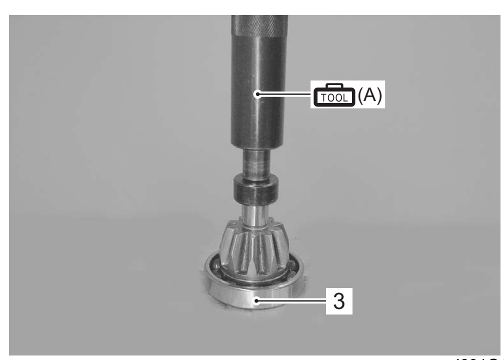
Special tool
TOOL (A): 09913–70210 (Bearing installer set)



I831G1320026-01

3) Install the pinion gear bearing (3) onto the gear shaft with the special tool.

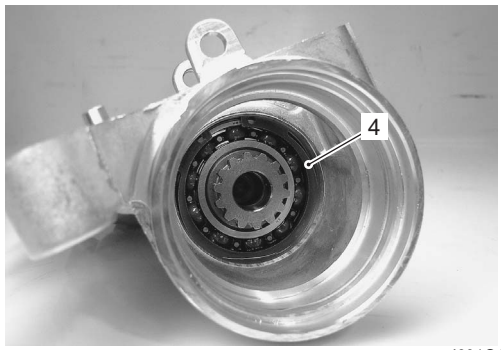
Special tool
TOOL (A): 09913–70210 (Bearing installer set)



I831G1320027-01

4) Install the pinion gear into the front drive train (differential) gear case and fix the snap ring (4).

Special tool
TOOL : 09900–06108 (Snap ring pliers)



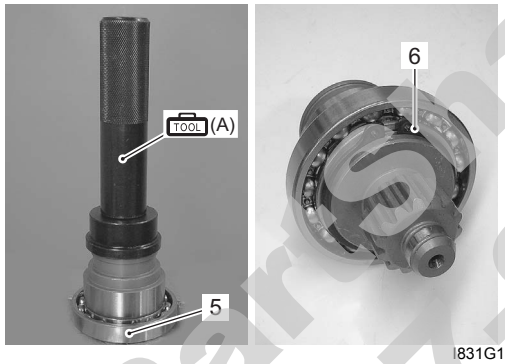
I831G1320028-01

5) Install the input shaft bearing (5) onto the input shaft with the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

6) Install the snap ring (6).

Special tool
TOOL : 09900–06108 (Snap ring pliers)



I831G1320029-01

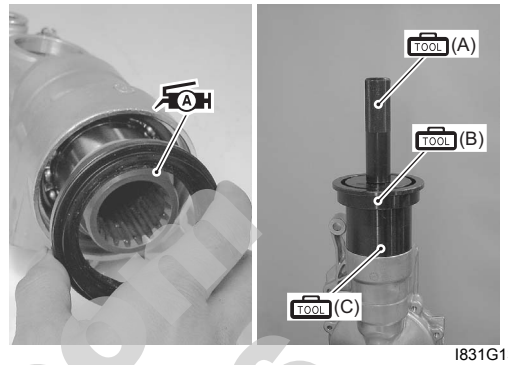
7) Install the input shaft.

8) Apply a small quantity of grease to the oil seal lip.

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

9) Install the oil seal with the special tool.

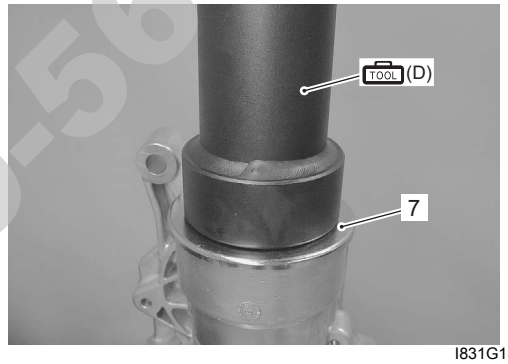
Special tool
TOOL (A): 09913–70210 (Bearing installer set)
TOOL (B): 09924–74520 (Oil seal installer/ remover)
TOOL (C): 09924–74570 (Final drive gear bearing installer/remover)



I831G1320030-03

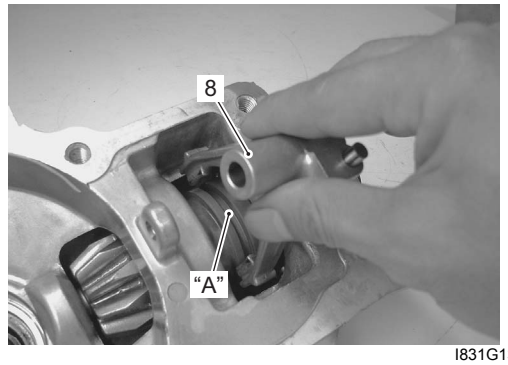
10) Install the oil seal cap (7) with the special tool.

Special tool
TOOL (D): 09922–21410 (Long socket (46 mm))



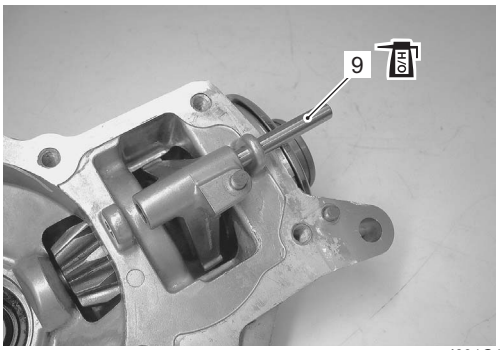
I831G1320031-01

11) Install the 4WD/diff-lock shifting fork (8), onto the groove of the 2WD/4WD shifting sleeve “A”.



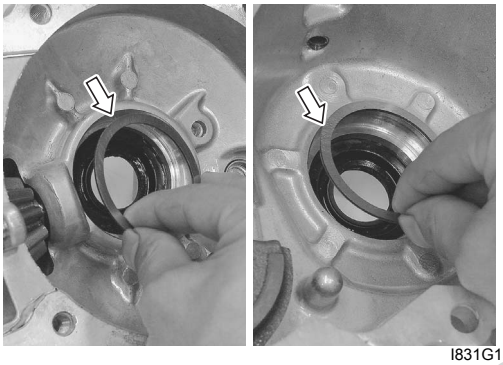
I831G1320032-01

12) Apply front differential gear oil to the 2WD/4WD sifting fork shaft (9).



I831G1320033-02

13) Install the left and right side shims into the case cover and case.



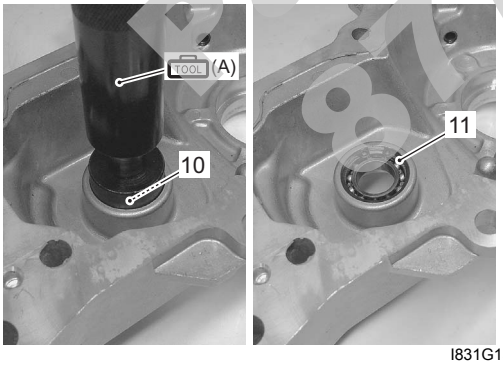
I831G1320034-01

14) Install the 2WD/4WD sifting cam bearing (10) with special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

15) Install the snap ring (11).

Special tool
TOOL : 09900–06108 (Snap ring pliers)



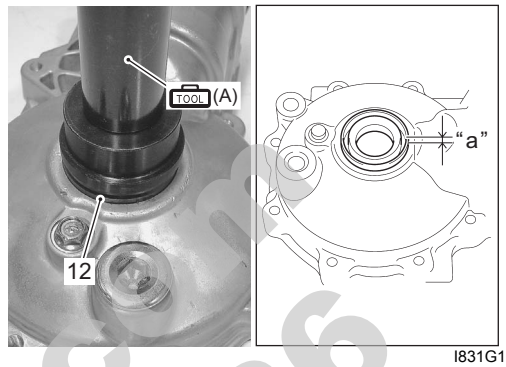
I831G1320035-01

16) Install the oil seals (12) into the front drive (differential) gear case cover with the special tool.

NOTE

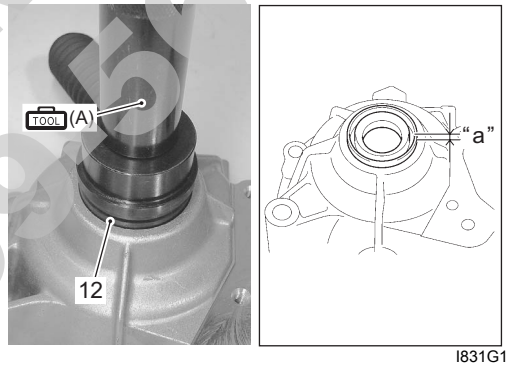
Insert the oil seal until the specified value as shown in the figure.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)



I831G1320036-02

"a": 4 mm (0.1574 in)



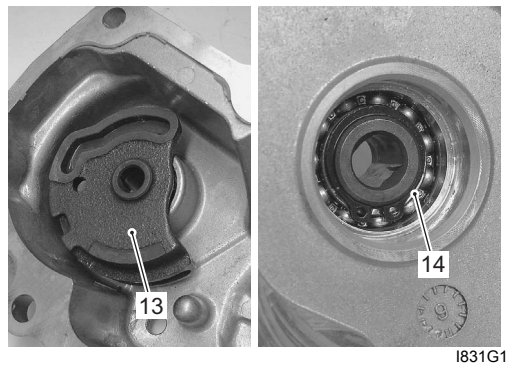
I831G1320037-02

"a": 4 mm (0.1574 in)

17) Install the 2WD/4WD shifting cam (13).

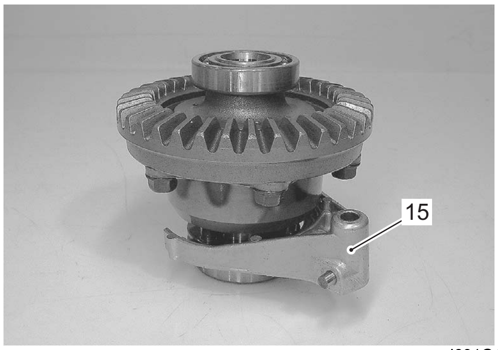
18) Install the snap ring (14).

Special tool
TOOL : 09900–06108 (Snap ring pliers)



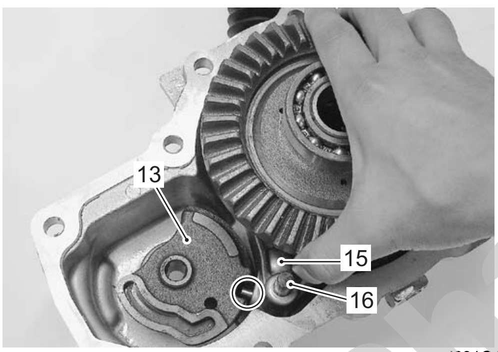
I831G1320038-01

19) Install the diff-lock shifting fork (15) to the shifting sleeve.



I831G1320039-01

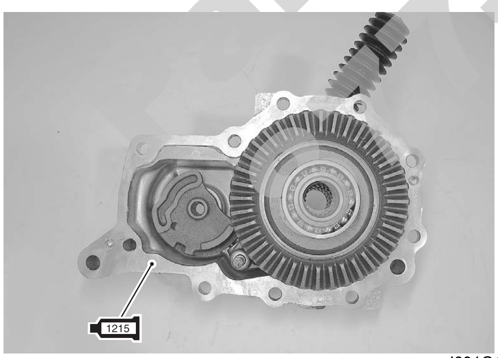
20) Install the front drive (differential) gear assembly, diff-lock shifting fork (15) and shifting fork shaft (16).
21) Align the shifting fork pin with the groove of the 2WD/4WD shifting cam (13).



I831G1320040-01

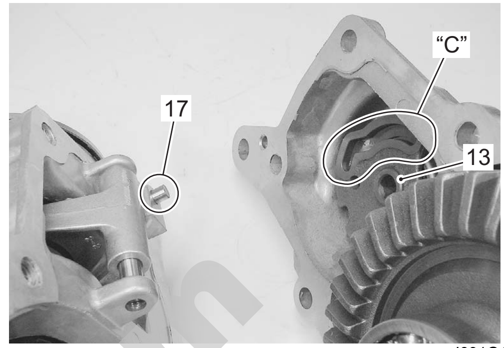
22) Apply bond to the mating surface of the front drive (differential) case.

1215 : Sealant 99000–31110 (SUZUKI BOND No.1215 or equivalent)



I831G1320041-01

23) Turn the 2WD/4WD shifting cam (13) clockwise, and install 2WD/4WD shifting fork pin to the bottom.
24) Align the 2WD/4WD shifting fork pin (17) with the groove “C” of the 2WD/4WD shifting cam when reassembling.



I831G1320042-02

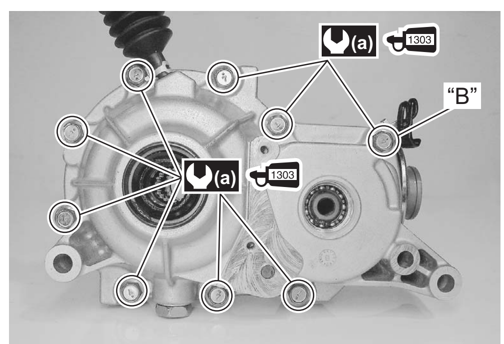
25) Apply a small quantity of thread lock to the front drive (differential) case cover bolts and tighten then to the specified torque diagonally.

NOTE

Fit clamp to the bolt “B”.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Front drive (differential) case cover bolt (a): 22 N·m (2.2 kgf-m, 16.0 lb-ft)



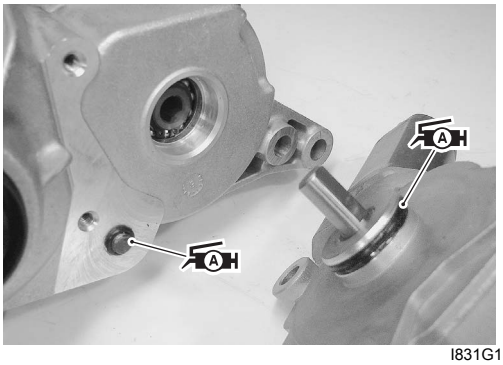
I831G1320043-02

26) Apply grease to the O-rings.

⚠ CAUTION

Replace the O-rings with new ones.

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



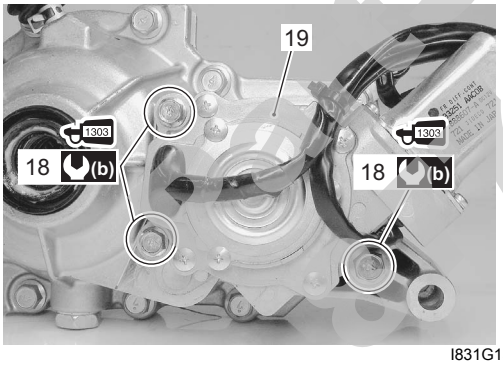
I831G1320044-01

27) Apply a small quantity of thread lock to the 4WD/diff-lock actuator mounting bolts (18).

28) Install the 2WD/4WD/diff-lock actuator assembly (19) and tighten its mounting bolts (18) to the specified torque.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
4WD/Diff-lock actuator mounting bolt (b): 22 N·m (2.2 kgf-m, 16.0 lb-ft)



I831G1320045-01

29) Check the backlash and tooth contact. Refer to "Front Drive (Differential) Gear Shim Inspection and Selection (Page 3B-14)".

30) Install the Front drive (differential) assembly. Refer to "Front Drive (Differential) Assembly Removal and Installation (Page 3B-4)".

Front Drive (Differential) Related Parts Inspection

B831G23206007

Refer to "Front Drive (Differential) Assembly Disassembly and Assembly (Page 3B-5)".

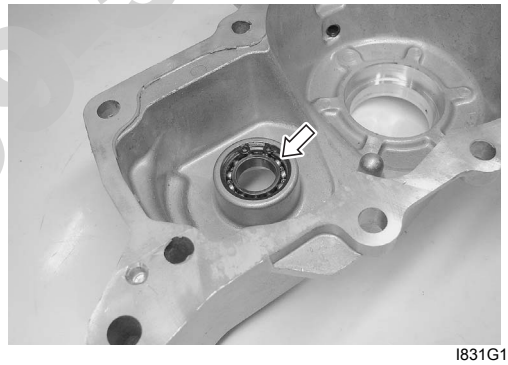
Front Drive Gear Oil Seals

Inspect the lip of oil seal for wear or damage. If any defect is found, replace the oil seal with a new one.

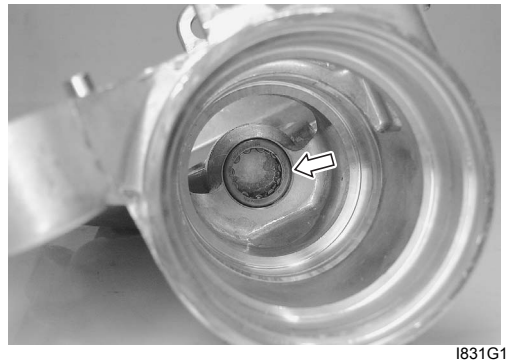
I831G1320047-01

2WD/4WD Shifting Cam Bearing and Pinion Gear Pilot Bearing

Inspect the bearings for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.



I831G1320048-01



I831G1320049-01

Diff-lock Shifting Shaft and 2WD/4WD Shifting Shaft
Inspect the 2WD/4WD shifting fork shafts for wear or damage. If any defects are found, replace the shifting fork shafts with new ones.

I831G1320050-01

Diff-lock Shifting Fork and 2WD/4WD Shifting Fork
Inspect the shifting forks for wear or damage. If any defects are found, replace the shifting forks with new ones.

I831G1320051-01

I831G1320052-01

2WD/4WD Shifting Cam
Inspect the 2WD/4WD shifting cam for wear or damage. If any defects are found, replace the 2WD/4WD shifting cam with new ones.

I831G1320143-01

2WD/4WD Shifting Sleeve
Inspect the 2WD/4WD shifting sleeve for wear or damage. If any defects are found, replace the 2WD/4WD shifting sleeve with new one.

I831G1320054-01

Input Shaft
Inspect the input shaft for wear or damage.
Inspect the input shaft bearing for abnormal noise and smooth rotation. If any defects are found, replace defective parts.

I831G1320055-01

Pinion Gear
Inspect the pinion gear for wear or damage.
Inspect the pinion gear bearing for abnormal noise and smooth rotation. If any defects are found, replace defective parts.


I831G1320056-01

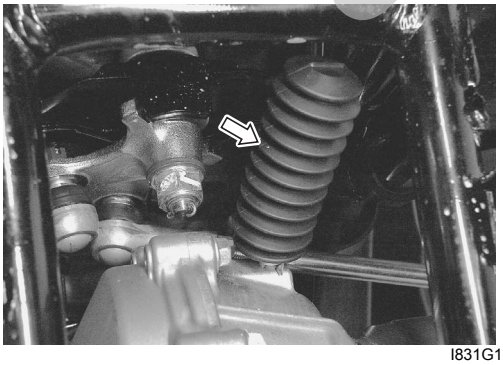
Front Drive (Differential) Gear
Inspect the front drive (differential) gear for stick or damage.
Inspect the front drive (differential) gear bearing for abnormal noise and smooth rotation. If any defects are found, replace defective parts.


I831G1320057-01

Breather Rubber Case Inspection

B831G23206008

Inspect the breathe rubber case for wear or damage. If any defects are found, replace the breather rubber case with new one.


I831G1320058-01

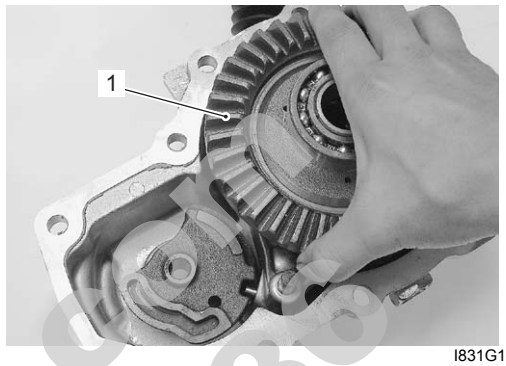
Front Drive (Differential) Gear Shim Inspection and Selection

B831G23206009

Refer to “Front Drive (Differential) Assembly Disassembly and Assembly (Page 3B-5)”.

Backlash

- Install the pinion gear, input shaft, left and right side shim(s) and front drive (differential) gear assembly (1).



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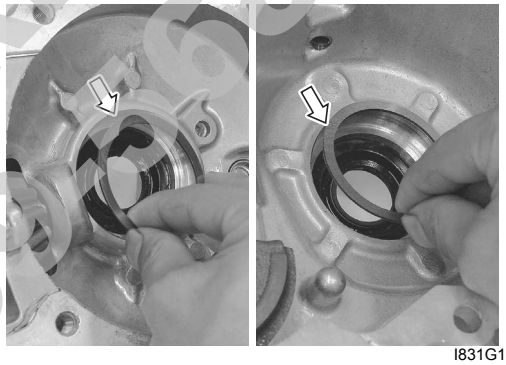
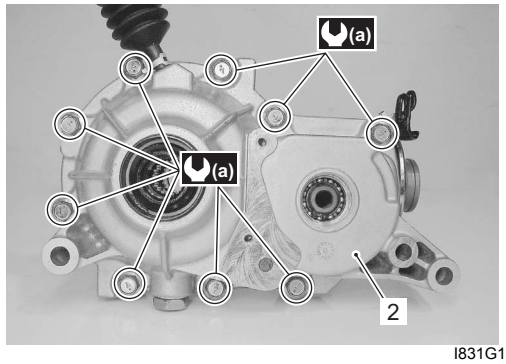

I831G1320034-01

- Install the front drive (differential) case (2) and tighten the bolts to the specified torque diagonally.

NOTE

At this time, it is not necessary to apply a sealant to the mating surface of the gear case.

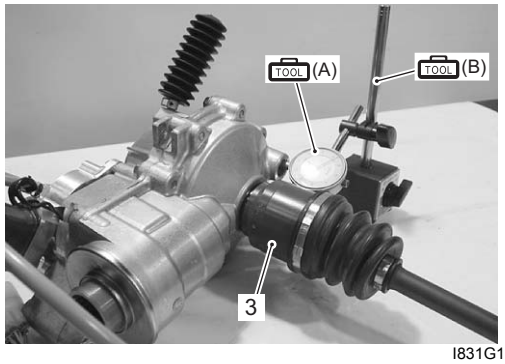
Tightening torque
Front drive (differential) case bolt (a): 22 N·m (2.2 kgf-m, 16.0 lb-ft)



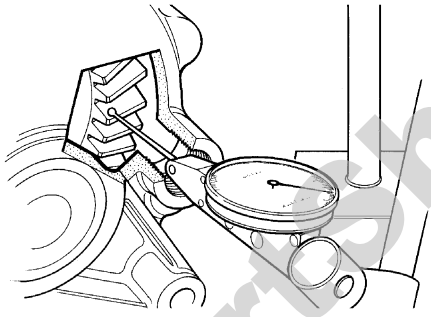
I831G1320060-02

- Remove the oil filler cap and measure the backlash of the differential ring gear using the horizontal type dial gauge and drive shaft (3) as shown in the figure.
- Take backlash readings at three places while turning the front drive (differential) gear slightly in each direction and securely holding the pinion gear. Rear the total backlash on the dial gauge.

Special tool
(A): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
(B): 09900–20701 (Magnetic stand)



I831G1320061-01


I831G1320062-01

Front drive (differential) gear backlash
Standard: 0.05 – 0.10 mm (0.0020 – 0.0040 in)

- Remove the dial gauge and turn the front drive (differential) gear 120°, then measure the backlash. Repeat this procedure once more and compare the difference of the three measurements. If the backlash should be re-checked until the backlash is within specification. Check the table at the appropriate shim thickness.

NOTE

Adjust the backlash by referring to the table at using the thickness of the removed shims a guide.

Backlash	Shim adjustment
Under 0.05 mm (0.0020 in)	Increase shim thickness
0.05 – 0.10 mm (0.0020 – 0.0040 in)	Correct
Over 0.10 mm (0.0040 in)	Decrease shim thickness

List of shims (for right side)

Part No.	Shim thickness
27445-38FA0 (Shim set: 15 pcs.)	0.75 mm (0.0295 in)
	0.80 mm (0.0315 in)
	0.85 mm (0.0335 in)
	0.90 mm (0.0354 in)
	0.95 mm (0.0374 in)
	1.00 mm (0.0394 in)
	1.05 mm (0.0413 in)
	1.10 mm (0.0433 in)
	1.15 mm (0.0453 in)
	1.20 mm (0.0472 in)
	1.25 mm (0.0492 in)
	1.30 mm (0.0512 in)
	1.35 mm (0.0531 in)
	1.40 mm (0.0551 in)
	1.45 mm (0.0571 in)

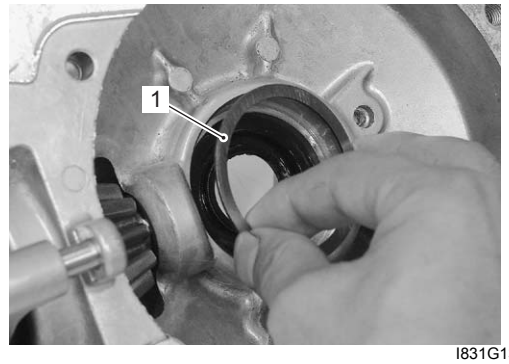
- If the backlash is too small, replace the right side shim(s) with a thicker one. If the backlash is too large, replace the right side shim(s) with a thinner one. If the right side shim was changed with a 0.10 mm thicker shim, replace the left side shim with one that is 0.10 mm thinner.

Left Side Shim Selection

- Install the right side shim(s) (1) and front drive (differential) gear assembly.

NOTE

Do not install the left side shim(s) at this time.



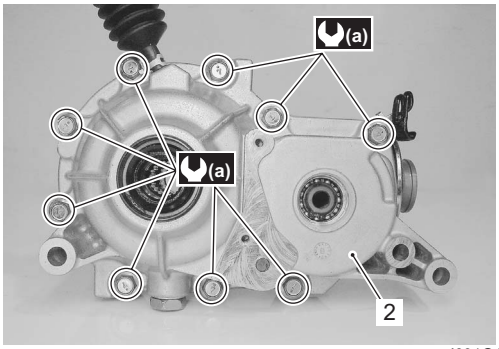
I831G1320064-01

- Put a few pieces of solder (O.D.: 1.2 – 1.5 mm x L: 6 mm) on the bearing outer race, as shown in the figure.


I831G1320065-01

- Install the front drive (differential) case (2) and tighten the bolts to the special torque diagonally.

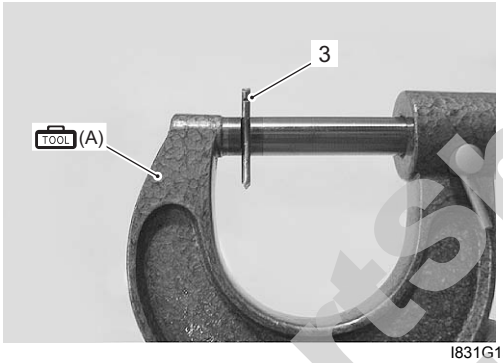
  Tightening torque
  Front drive (differential) case bolt (a): 22 N·m (2.2 kgf-m, 16.0 lb-ft)



I831G1320060-02

- Remove the front drive (differential) case.
- Measure the thickness of compressed solder (3) with the micrometer.

  Special tool
  (A): 09900–20205 (Micrometer (0 – 25 mm))



I831G1320066-01

- Select the proper size of shim(s) from the table, according the compressed solder thickness.

List of shims (for left side)

Part No.	Shim thickness
27445-38FA0 (Shim set: 15 pcs.)	0.75 mm (0.0295 in)
	0.80 mm (0.0315 in)
	0.85 mm (0.0335 in)
	0.90 mm (0.0354 in)
	0.95 mm (0.0374 in)
	1.00 mm (0.0394 in)
	1.05 mm (0.0413 in)
	1.10 mm (0.0433 in)
	1.15 mm (0.0453 in)
	1.20 mm (0.0472 in)
	1.25 mm (0.0492 in)
	1.30 mm (0.0512 in)
	1.35 mm (0.0531 in)
	1.40 mm (0.0551 in)
	1.45 mm (0.0571 in)

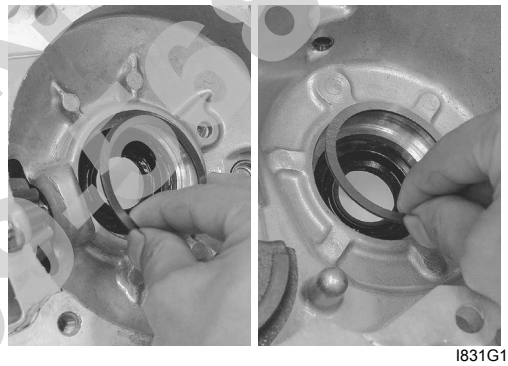
- After selecting the proper size of shim(s), check or adjust the backlash and tooth contact.

Tooth Contact

⚠ CAUTION

Make sure to check the backlash after the tooth contact has been adjusted, since it may have changed. Adjust the tooth contact and backlash until they are both within specification. If the correct tooth contact cannot be maintained when adjusting the backlash, replace the pinion gear and final drive (differential) gear as a set.

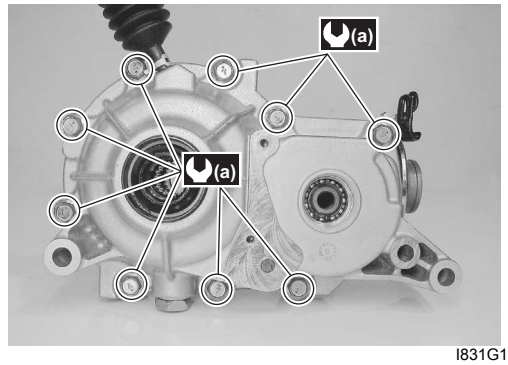
- Clean and degreas several teeth on the final drive (differential) gear and pinion gear, and the apply a coating of machinist's layout dye or paste to several teeth of the pinion gear.
- Install the left and right side shims and front drive (differential) assembly.



I831G1320067-01

- Install the front drive (differential) case and tighten the bolts to the specified torque diagonally.

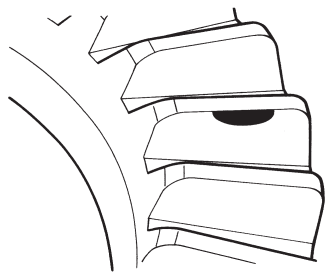
  Tightening torque
  Front drive (differential) case bolt (a): 22 N·m (2.2 kgf-m, 16.0 lb-ft)



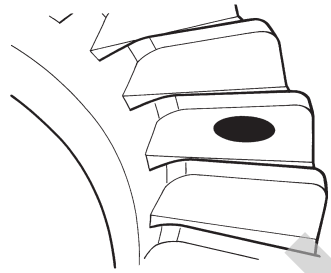
I831G1320068-01

- Rotate the final drive (differential) gear several turns in each direction. This will provide a contact pattern on the coated teeth of final drive (differential) gear.
- Remove the final drive (differential) gear and compare the coated teeth to the examples shown in [A], [B] and [C].
- If tooth contact is found to be incorrect (example [A] and [C]), the shim must be changed and the tooth contact should be re-check until correct (example [B]).

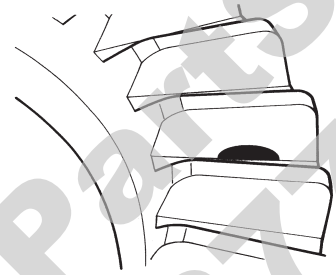
[A]



[B]



[C]



I831G1320046-01

[A]:	Incorrect (Contact at tooth top)
[B]:	Correct
[C]:	Incorrect (Contact at tooth root)

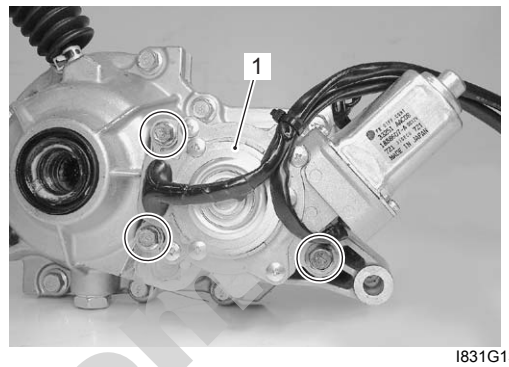
2WD/4WD/Diff-lock System Inspection

B831G23206010

Actuator

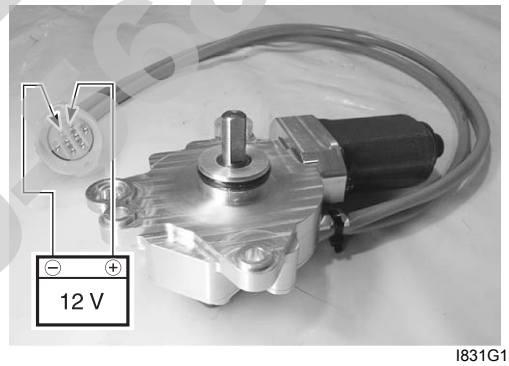
Refer to “Front Drive (Differential) Assembly Removal and Installation (Page 3B-4)”.

1) Remove the actuator assembly (1).



I831G1320069-01

2) Connect the 12 V battery to the actuator lead wires (Bl wire and Y wire). If the motor does not run, replace the diff-lock/transfer actuator assembly with a new one.

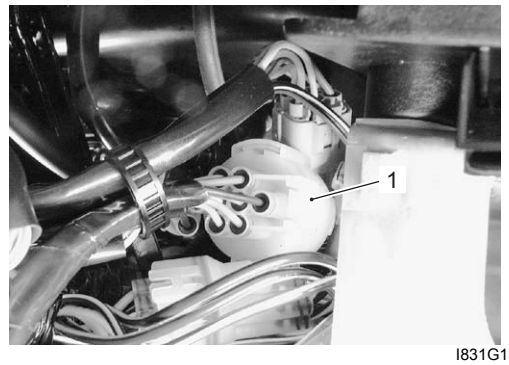


I831G1320070-01

2WD/4WD/Diff-lock Switch

Continuity check

1) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the 2WD/4WD/diff-lock actuator coupler (1).



I831G1320071-01

3) Inspect the 2WD/4WD/diff-lock 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-3)”.

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

Tester knob indication
Continuity (•)))

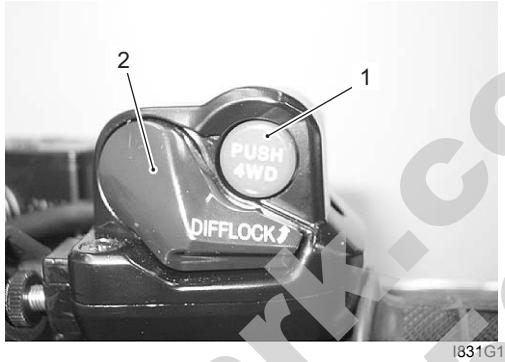
Position \ Color	Bl/R	O	B	W/Bl	Br	B/G	B/Y	B/W
2WD	○	○			○			
4WD	○	○	○	○				
Diff-lock			○	○	○	○	○	○

I831G1320053-01

4) After finishing the 4WD/diff-lock inspection, reinstall the removed parts.

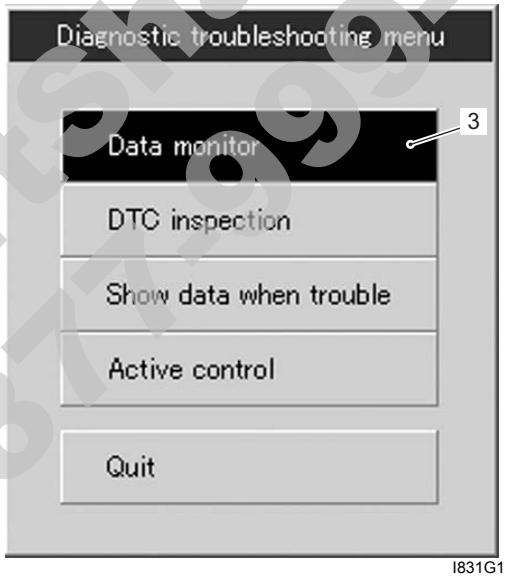
SDS Operation Check

1) Check that the transfer selecting switch (diff-lock position switch (1) and diff-lock switch (2)) is turned OFF.
2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)



I831G1320072-01

3) Click the “Date monitor” button (3).



I831G1320073-02

4) Check that both “Differential lock position switch signal” and “Differential lock switch signal” are “Open”.

☐ Differential lock relay	Off
☐ Fuel pump relay	On
☐ Starter signal	Off
☐ Neutral switch signal	GND
☐ Brake switch signal	Off
☐ Override switch signal	Open
☐ Ignition switch signal	On
☐ Differential lock position switch signal	Open
☐ Differential lock switch signal	Open

I831G1320074-01

5) Turn the transfer selecting switch (diff-lock position switch and diff-lock switch) ON position.
6) Check that both “Differential lock position switch signal” and “Differential lock switch signal” are “GND”.

☐ Differential lock relay	On
☐ Fuel pump relay	On
☐ Starter signal	Off
☐ Neutral switch signal	GND
☐ Brake switch signal	Off
☐ Override switch signal	Open
☐ Ignition switch signal	On
☐ Differential lock position switch signal	GND
☐ Differential lock switch signal	GND

I831G1320075-01

If the transfer selecting switch dose not function properly, inspect the 4WD/diff-lock switch for continuity check.

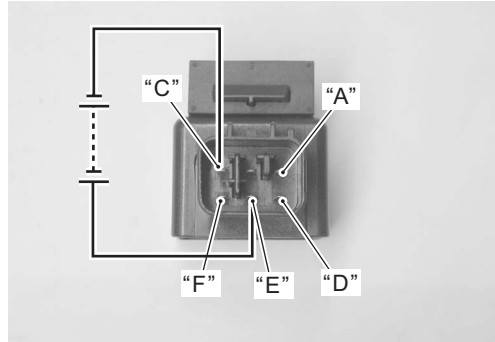
Drive Relay

1) Remove the seat. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Remove the drive relay (1).

I831G1320076-01

3) Check the continuity between “A” and “D”, between “D” and “F” terminals with the multi-circuit tester. Check the insulation between “A” and “E”, between “E” and “F”. Apply 12 V to the terminals “C” and “E” ((+) to “E” and (–) to “C”), check the insulation between “D” and “F”.

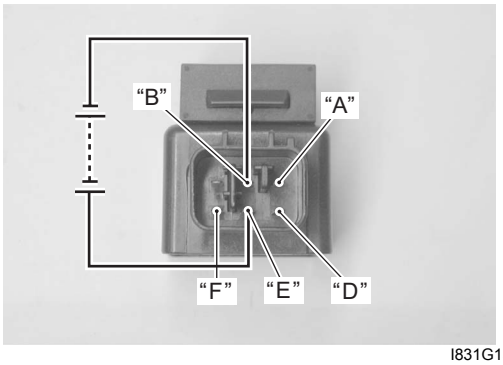
Special tool
TOOL : 09900–25008 (Multi-circuit tester set)



I831G1320077-03

4) Apply 12 V to the terminal “B” and “E” ((+) to “E” and (–) to “B”), check the insulation between “A” and “D”. If any abnormality is found, replace the 4WD/diff-lock relay with a new one.

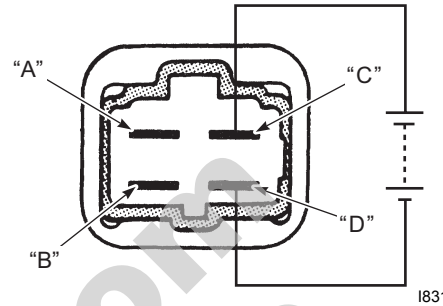
Special tool
TOOL : 09900–25008 (Multi-circuit tester set)



I831G1320078-03

Diff-lock Relay
Check the insulation between “A” and “B” terminals with the multi-circuit tester. Then Apply 12 V to the terminal “C” and “D” ((+) to “C” and (–) to “D”), check the continuity between “A” and “B”. If there is no continuity, replace the diff-lock relay with a new one.

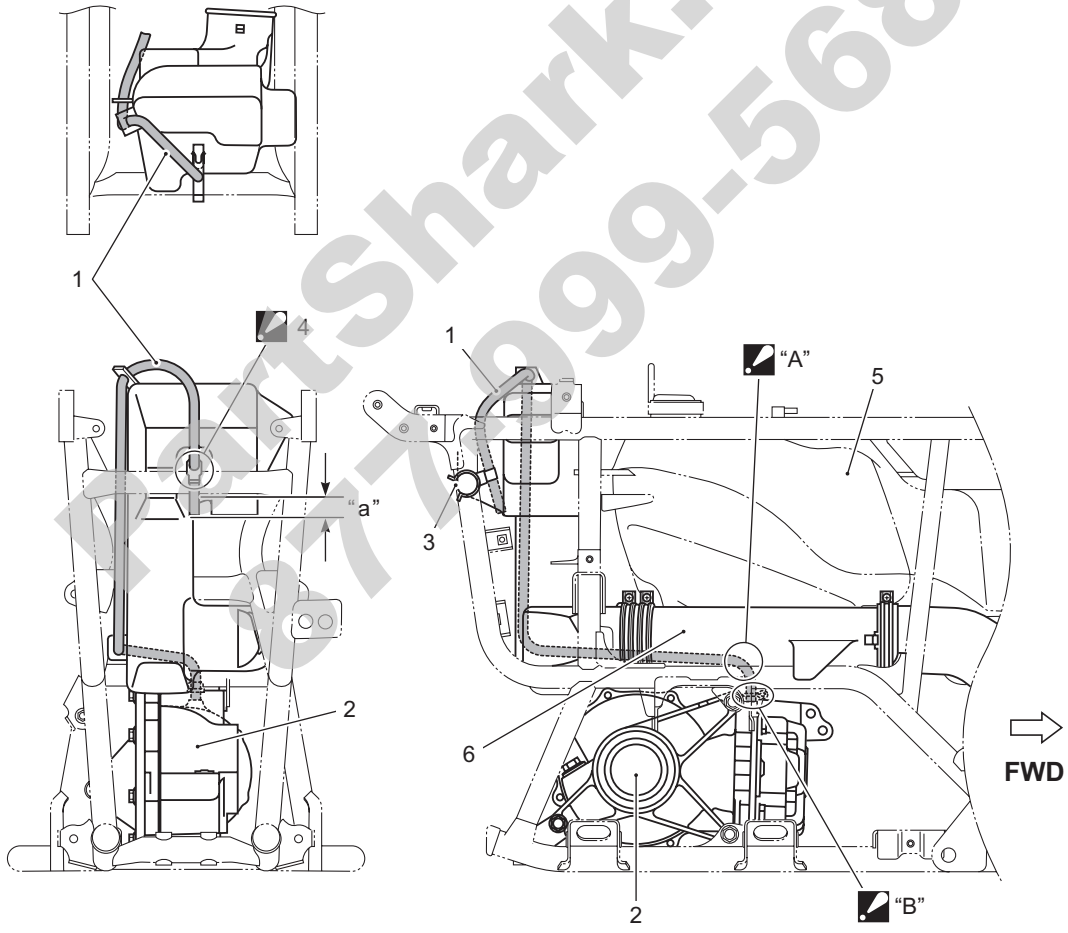
Special tool
TOOL : 09900–25008 (Multi-circuit tester set)



I831G1320079-02

Rear Drive Breather Hose Routing Diagram

B831G23206011

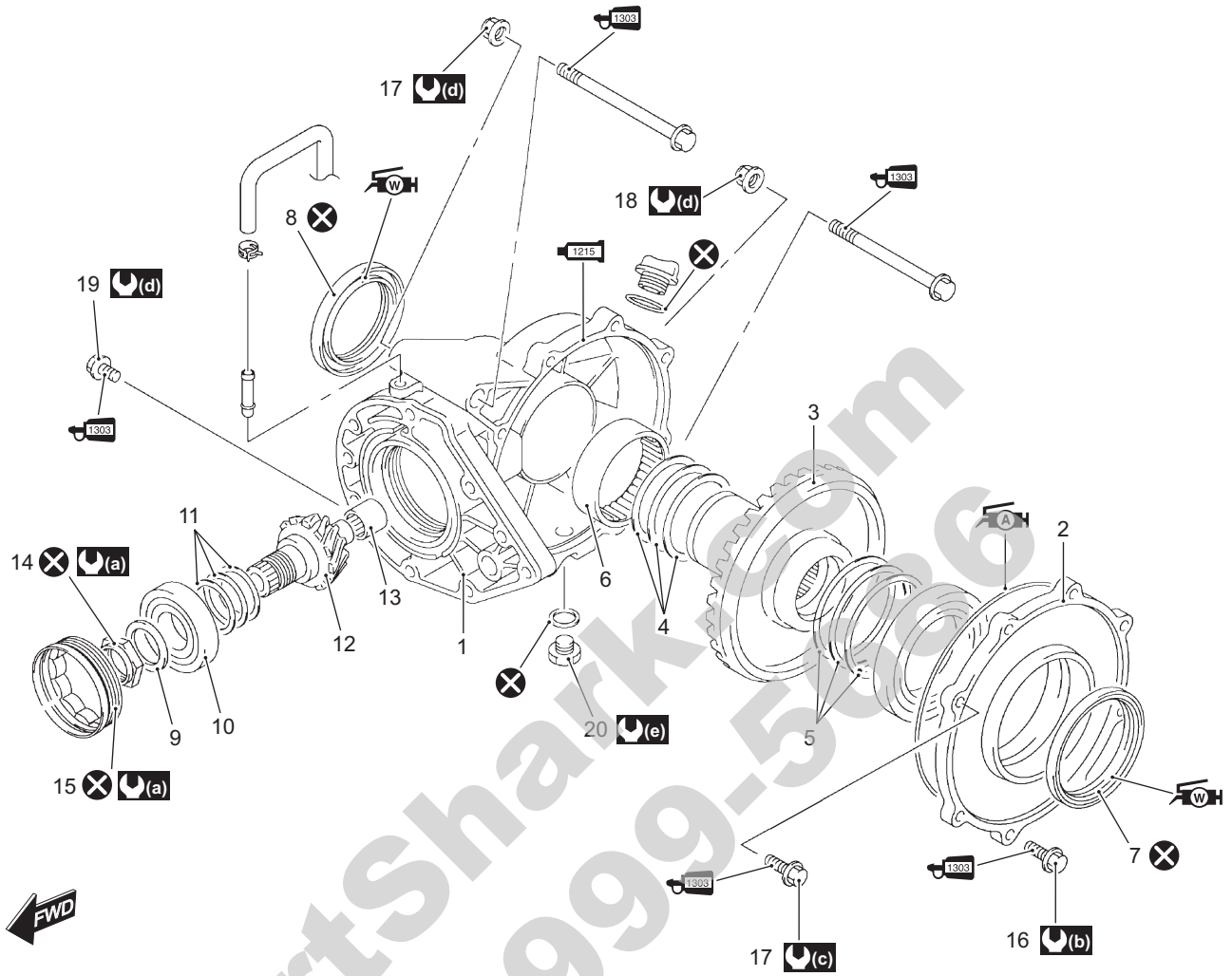


I831G1320145-02

1. Breather hose	6. V-belt cooling duct
2. Rear drive assembly	“A”: Press the breather hose between the fuel tank lower cover and belt cooling duct.
3. Clamp	“B”: Face the tip of clip to forward.
4. Clamp : Set the clamp to the concave of belt cooling duct.	“a”: 20 – 30 mm (0.79 – 1.18 in)
5. Fuel tank	

Final Gear Components

B831G23206012

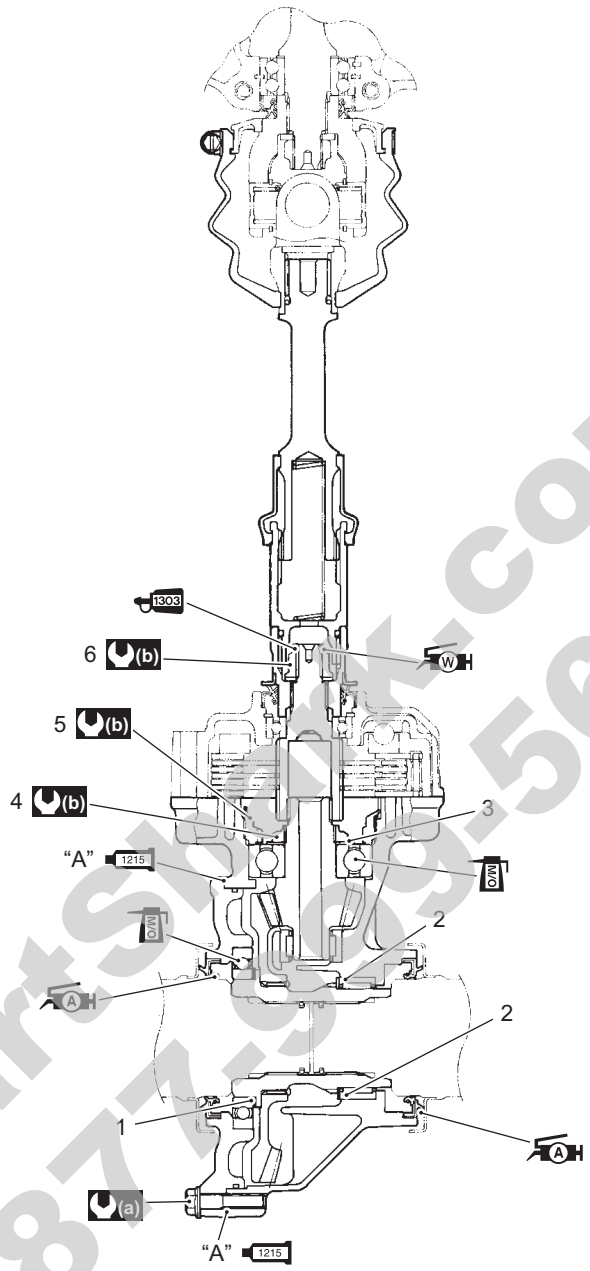


I831G1320080-08

1. Final gear case	11. Shim	(a) : 100 N·m (10.0 kgf-m, 72.0 lb-ft)
2. Final gear case cover	12. Pinion gear	(b) : 26 N·m (2.6 kgf-m, 19.0 lb-ft)
3. Ring gear	13. Bearing	(c) : 55 N·m (5.5 kgf-m, 40.0 lb-ft)
4. Shim (Right side)	14. Pinion gear nut	(d) : 65 N·m (6.5 kgf-m, 47.0 lb-ft)
5. Shim (Left side)	15. Bearing stopper	(e) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)
6. Bearing	16. Final drive gear case cover bolt (M8)	A : Apply grease.
7. Oil seal	17. Final drive gear case cover bolt (M10)	W : Apply water resistance grease.
8. Oil seal	18. Final gear case mounting nut	1303 : Apply thread lock to the thread part.
9. Washer	19. Final gear case mounting bolt	1215 : Apply bond to matching surface.
10. Bearing	20. Oil drain bolt	: Do not reuse.

Final Gear Construction

B831G23206013



I831G1320081-04

1. Shim (Left side)	6. Lock-nut	: Apply water resistance grease.
2. Shim (Right side)	"A": Matching surface	1303 : Apply thread lock to thread part.
3. Pinion gear shim(s)	(a) : 26 N·m (2.6 kgf-m, 19.0 lb-ft)	1215 : Apply bond.
4. Pinion gear nut	(b) : 100 N·m (10.0 kgf-m, 72.5 lb-ft)	: Apply molybdenum oil solution.
5. Final drive bearing stopper	: Apply grease.	

Final Gear Oil Level Inspection

B831G23206014

Refer to “Final Gear Oil Inspection in Section 0B (Page 0B-14)”.

Final Gear Oil Replacement.

B831G23206015

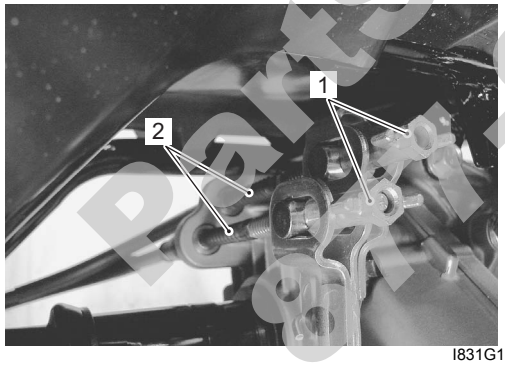
Refer to “Final Gear Oil Inspection in Section 0B (Page 0B-14)”.

Final Gear Assembly Removal and Installation

B831G23206016

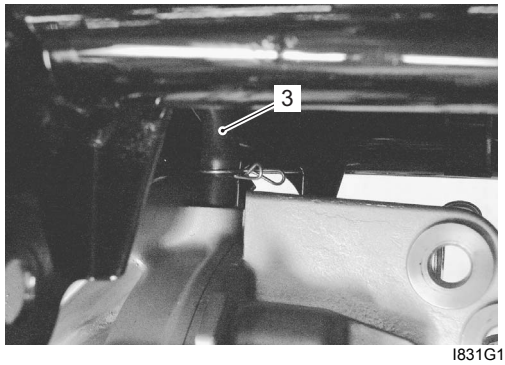
Removal

1) Remove the trailer towing. Refer to “Trailer Towing Removal and Instruction in Section 9E (Page 9E-7)”.
2) Remove the rear under cover. Refer to “Under Cover Removal and Installation in Section 9D (Page 9D-12)”.
3) Drain the final gear oil. Refer to “Final Gear Oil Inspection in Section 0B (Page 0B-14)”.
4) Remove the rear wheel. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
5) Remove the rear suspension upper arms. Refer to “Rear Suspension Arm Upper / Lower Removal and Installation in Section 2C (Page 2C-8)”.
6) Remove the rear drive shaft. Refer to “Rear Drive Shaft Assembly Removal and Installation in Section 3A (Page 3A-6)”.
7) Remove the rear brake adjust nuts (1) and brake cables (2).



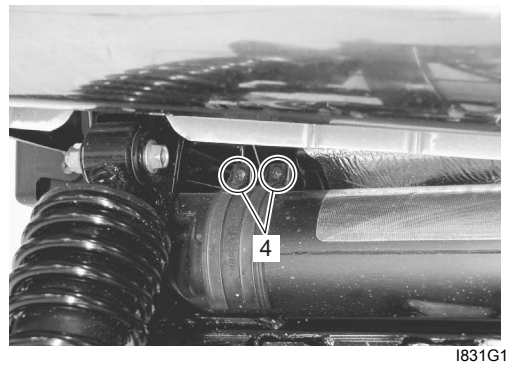
I831G1320083-02

8) Disconnect the breather hose (3).



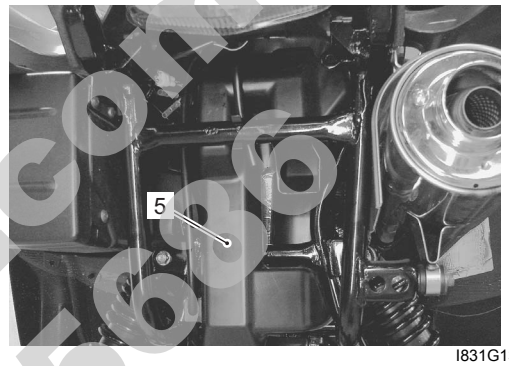
I831G1320084-03

9) Loosen the outlet pipe connecting screws (4).



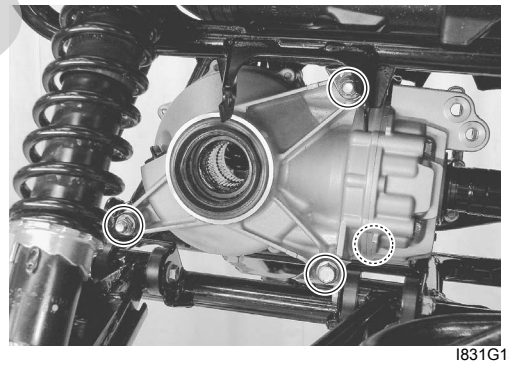
I831G1320085-02

10) Remove the V-belt outlet cooling duct (5).



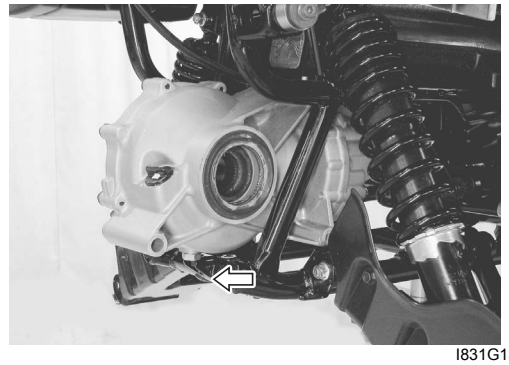
I831G1320086-03

11) Remove the final gear assembly mounting bolts and nuts.



I831G1320087-02

12) Remove the rear final gear assembly for backward.



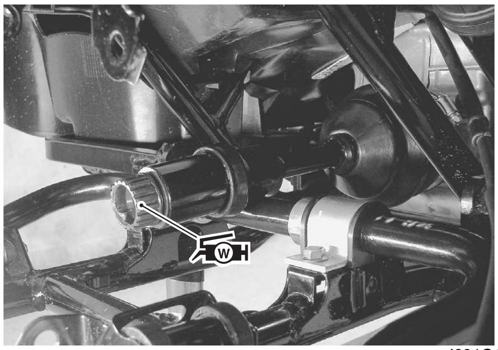
I831G1320088-01

Installation

Installation the final gear assembly in the reverse order of removal. Pay attention to the following points:

- Apply 4.5 gram water resistance grease to the spline of the rear propeller shaft.

: Grease 99000–25160 (Water resistance grease)

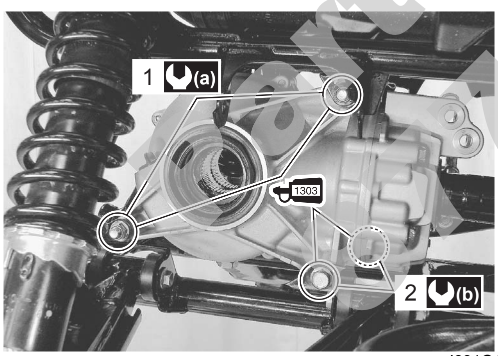


I831G1320089-01

- Install the final gear case assembly to the frame.
- Apply thread lock to the mounting bolts and tighten the rear final gear case mounting nuts (1) and bolts (2) to the specified torque.

Tightening torque
Final gear case mounting nut (a): 65 N·m (6.5 kgf-m, 47.0 lb-ft)
Final gear case mounting bolt (b): 65 N·m (6.5 kgf-m, 47.0 lb-ft)

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)



I831G1320090-06

- Install the rear drive shaft (left and right). Refer to “Rear Drive Shaft Assembly Removal and Installation in Section 3A (Page 3A-6)”.
- Install the suspension upper arms. Refer to “Front Suspension Upper / Lower Arm Removal and Installation in Section 2B (Page 2B-9)”.
- Install the trailer towing. Refer to “Trailer Towing Removal and Instruction in Section 9E (Page 9E-7)”.
- Adjust the rear brake pedal free travel. Refer to “Rear Brake Pedal / Rear Brake (Parking Brake) Lever Inspection and Adjustment in Section 0B (Page 0B-19)”.
- Adjust the parking brake lever play. Refer to “Rear Brake Pedal / Rear Brake (Parking Brake) Lever Inspection and Adjustment in Section 0B (Page 0B-19)”.
- Pour the final gear oil. Refer to “Final Gear Oil Inspection in Section 0B (Page 0B-14)”.

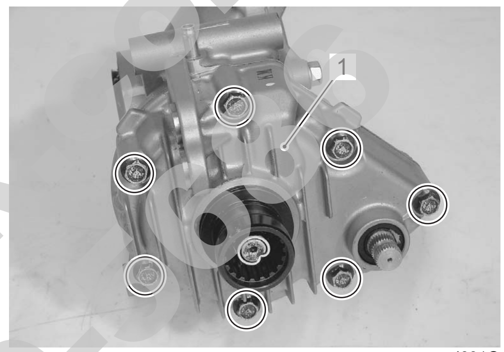
Final Gear Assembly Disassembly and Assembly

B831G23206017

Refer to “Final Gear Assembly Removal and Installation (Page 3B-23)”.

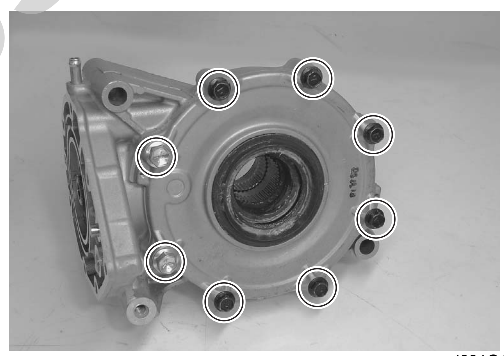
Disassembly

1) Remove the rear brake assembly (1). Refer to “Rear Brake Assembly Removal and Installation in Section 4C (Page 4C-2)”.



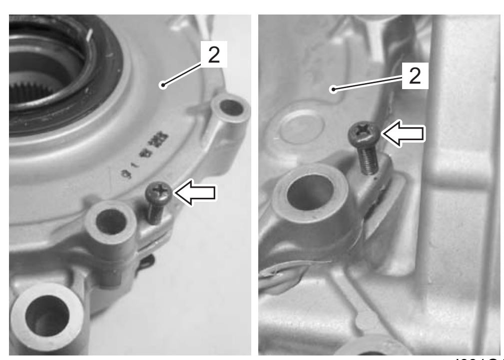
I831G1320092-01

2) Remove the final gear cover bolts.



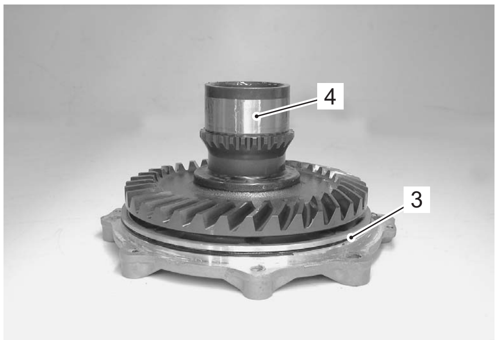
I831G1320093-01

3) Remove the final gear cover (2) from the final gear case, by using two 5 mm screws.



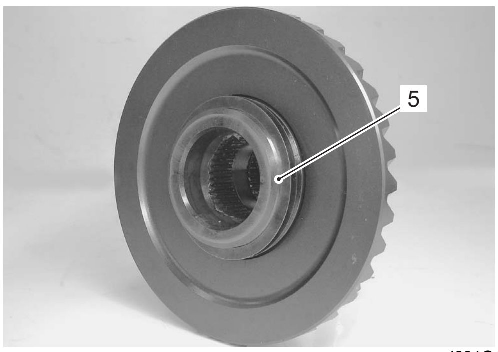
I831G1320094-02

4) Remove the O-ring (3) and final driven gear (4).



I831G1320095-01

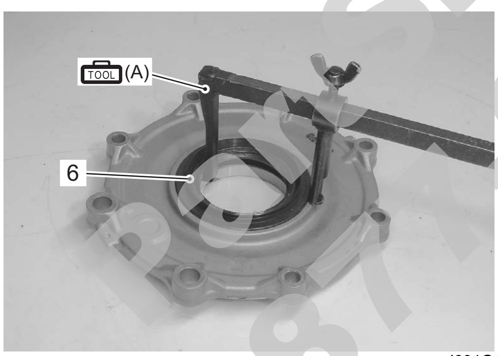
5) Remove the shim(s) (5).



I831G1320096-02

6) Remove the oil seal (6) with the special tool.

Special tool
TOOL **(A): 09913–50121 (Oil seal remover)**



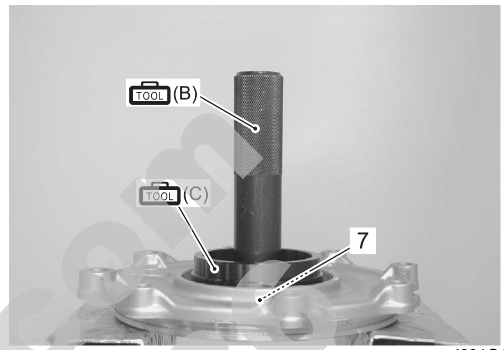
I831G1320097-01

7) Remove the final driven gear bearing (7) with the special tool.

NOTE

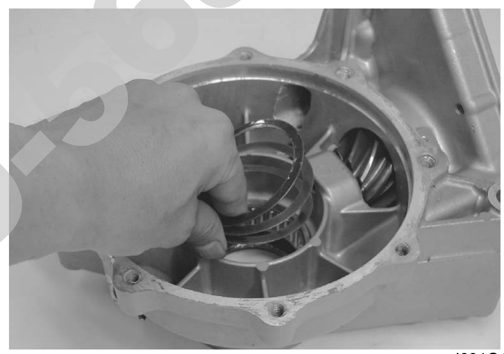
If there is no abnormal condition, the bearing removal is not necessary.

Special tool
TOOL **(B): 09913–70210 (Bearing installer set)**
TOOL **(C): 09944–66010 (Bearing installer)**



I831G1320098-01

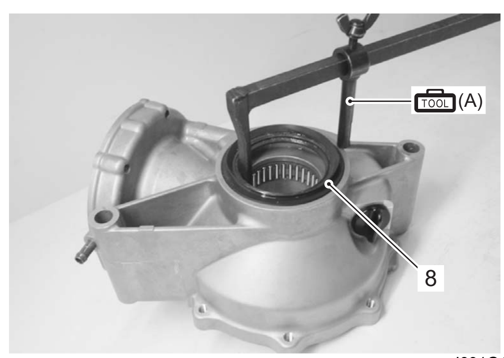
8) Remove the shim(s).



I831G1320099-01

9) Remove the oil seal (8) with the special tool.

Special tool
TOOL **(A): 09913–50121 (Oil seal remover)**

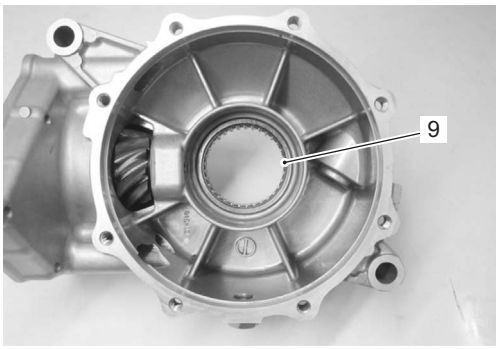


I831G1320100-01

10) Remove the final driven gear bearing (9) with the suitable tool.

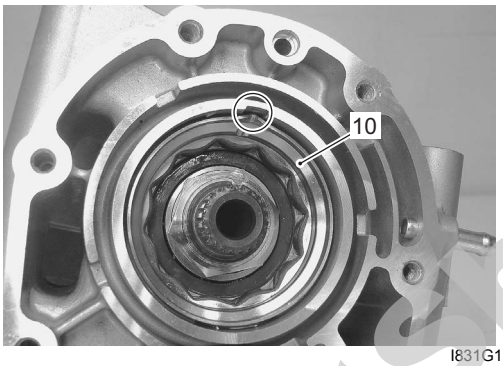
NOTE

If there is no abnormal condition, the bearing removal is not necessary.



I831G1320101-01

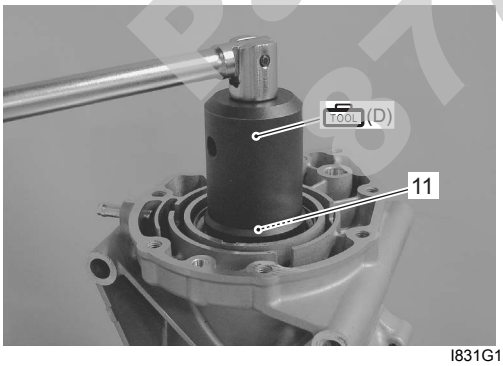
11) Unlock the final drive stopper (10) with a chisel.



I831G1320102-01

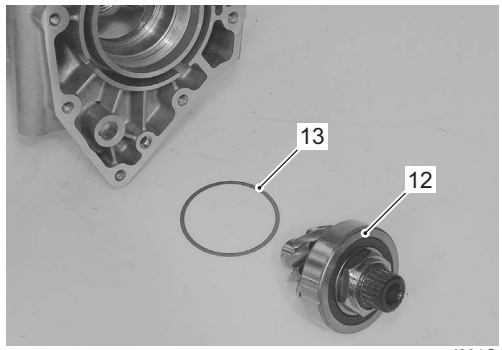
12) Remove the final drive stopper (11) with the special tool.

Special tool
(D): 09924–41830 (Bearing retainer wrench)



I831G1320103-01

13) Remove the final drive gear (12) and shim(s) (13).



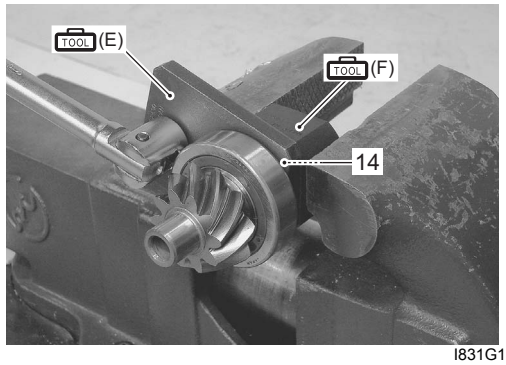
I831G1320104-01

14) Unlock the rear final drive nut (14) with a chisel.

I831G1320105-01

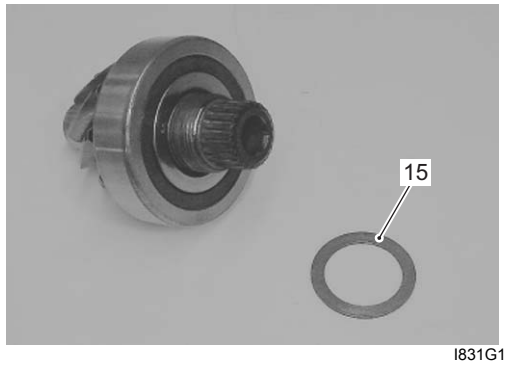
15) Remove the final drive gear nut (14) with the special tool.

Special tool
(E): 09924–52470 (Fixed final drive gear holder)
(F): 09940–92430 (Rear axel wrench A)



I831G1320106-02

16) Remove the washer (15).



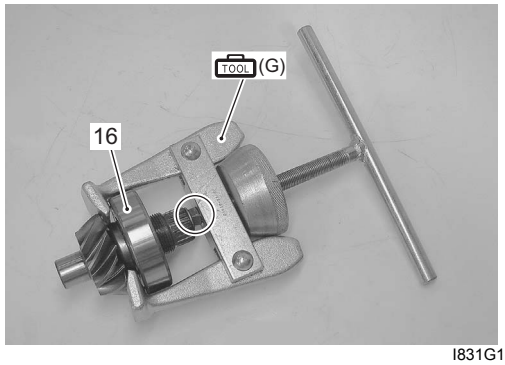
I831G1320107-02

17) Remove the bearing (16) and the upper inner race from the pinion gear with the special tool and suitable tool.

NOTE

If there is no abnormal condition, the bearing removal is not necessary.

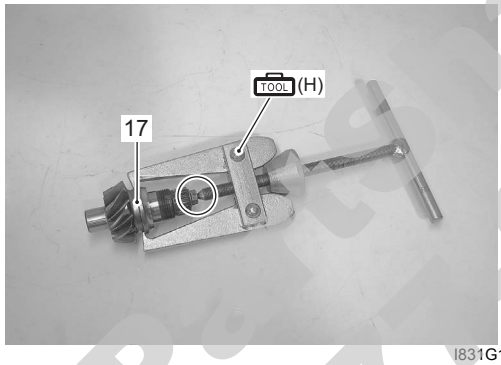
Special tool
TOOL (G): 09913–61510 (Bearing puller)



I831G1320108-01

18) Remove the lower inner race (17) with the special tool.

Special tool
TOOL (H): 09913–60910 (Bearing remover)



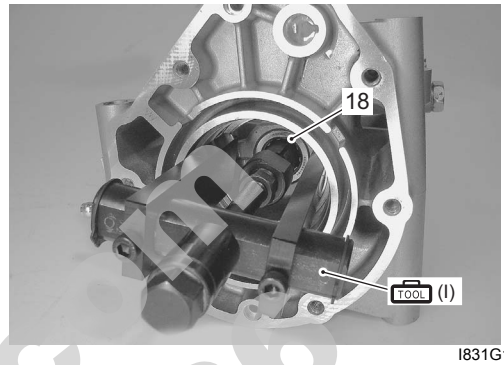
I831G1320110-01

19) Remove the final drive gear bearing (18) with the special tool.

NOTE

If there is no abnormal condition, the bearing removal is not necessary.

Special tool
TOOL (I): 09921–20240 (Bearing remover set)



I831G1320111-01

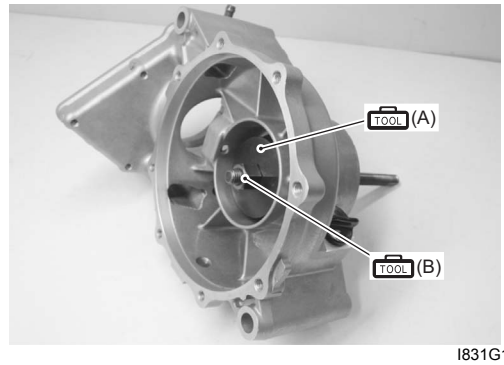
Assembly

⚠ CAUTION

The removed oil seals, O-rings and bearings must be replaced with new ones.

- Install the gear case bearing to the gear case with the special tool.

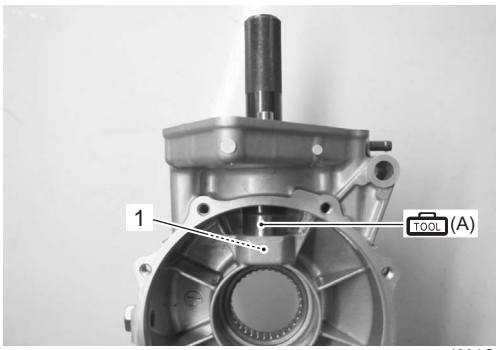
Special tool
TOOL (A): 09913–70210 (Bearing installer set)
TOOL (B): 09924–84521 (Bearing installer set)



I831G1320112-01

- Install the final drive gear bearing (1) to the final gear case with the special tool.

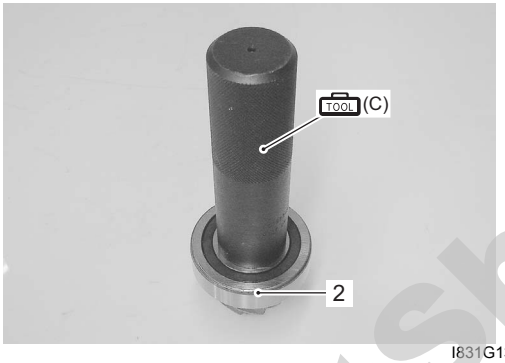
  Special tool
  TOOL (A): 09913–70210 (Bearing installer set)



I831G1320113-01

- Install the final drive bearing (2) with the special tool.

  Special tool
  TOOL (C): 09913–84510 (Bearing installer)

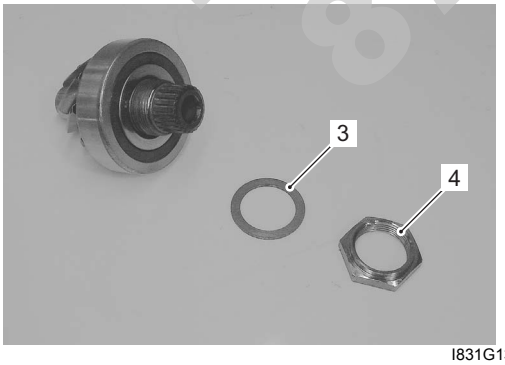


I831G1320114-03

- Install the washer (3) and lock-nut (4) to the final drive gear.

⚠ CAUTION

The removed lock-nut (4) must be replaced with a new one.

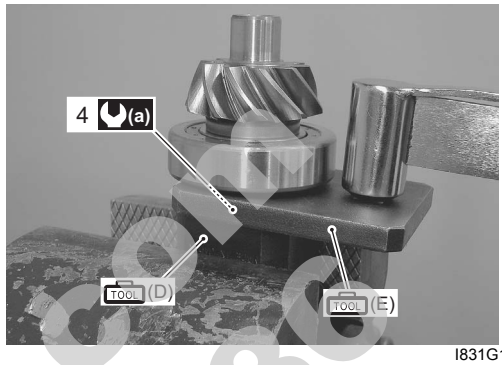


I831G1320115-01

- Tighten the lock-nut (4) to the specified torque with the special tool.

  Tightening torque
  Final drive lock-nut (a): 100 N·m (10.0 kgf-m, 72.5 lb-ft)

  Special tool
  TOOL (D): 09924–52470 (Fixed final drive gear holder)
  TOOL (E): 09940–92430 (Rear axel wrench A)

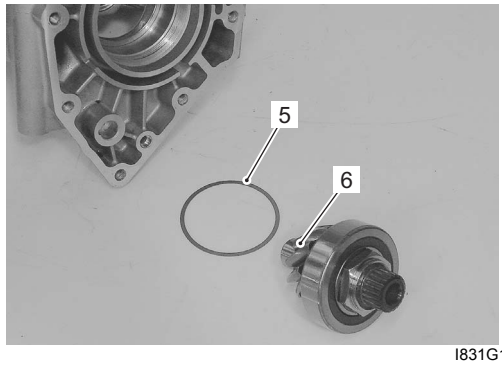


I831G1320116-02

- Lock the nut with a center punch.

I831G1320117-01

- Install the shim(s) (5) and final drive gear (6) to the final gear case.



I831G1320118-02

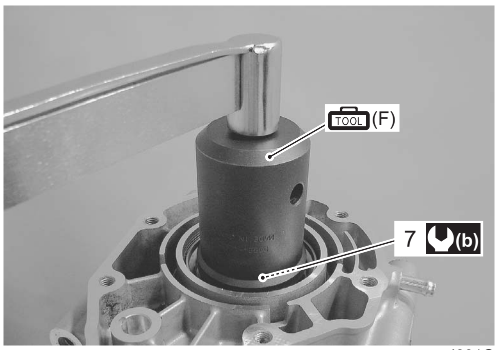
- Tighten the final drive gear bearing stopper (7) to the specified torque with the special tool.

⚠ **CAUTION**

The removed final drive gear bearing stopper must be replaced with a new one.

Tightening torque
Final drive gear bearing stopper (b): 100 N·m (10.0 kgf-m, 72.5 lb-ft)

Special tool
TOOL (F): 09924–41830 (Bearing retainer wrench)

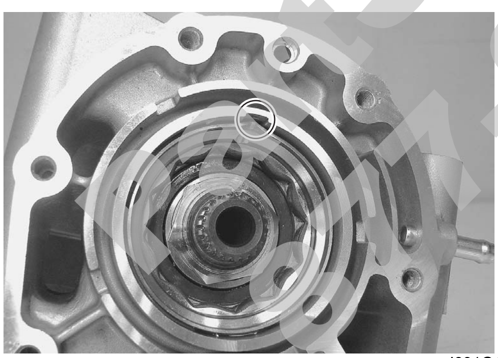


I831G1320119-02

- Lock the bearing stopper with a center punch.

NOTE

After the backlash and tooth contact have been checked or adjusted, stake the collar of bearing stopper into the notch.



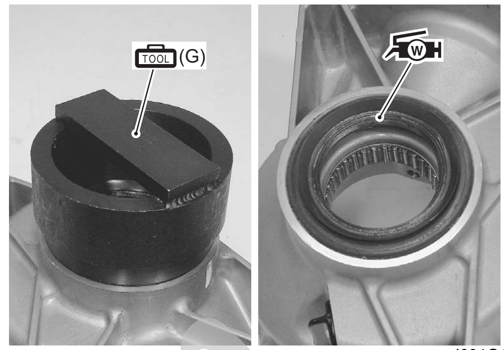
I831G1320120-01

- Install the oil seal to the final gear case with the special tool.

Special tool
TOOL (G): 09951–15810 (Bearing installer)

- Apply a small quantity of grease to the oil seal lip.

WH: Grease 99000–25160 (Water resistance grease)



I831G1320121-03

- Install the final driven gear bearing cover with the special tool.

Special tool
TOOL (G): 09951–15810 (Bearing installer)

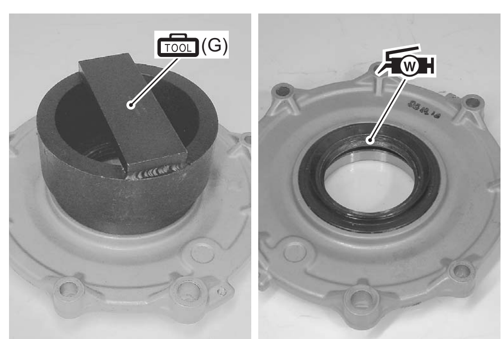
I831G1320122-02

- Install the oil seal with the special tool.

Special tool
TOOL (G): 09951–15810 (Bearing installer)

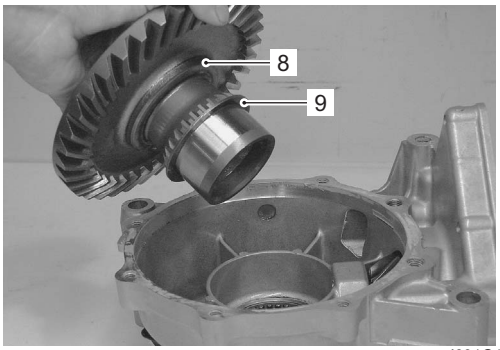
- Apply a small quantity of grease to the oil seal lip.

WH: Grease 99000–25160 (Water resistance grease)



I831G1320123-03

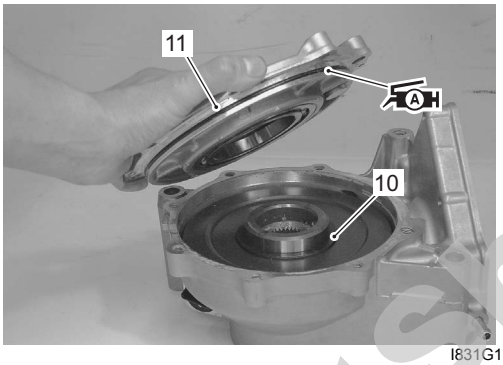
- Install the final driven gear (8) and shim(s) (9) into the final gear case.



I831G1320124-01

- Install the shim(s) (10).
- Install the O-ring to the final gear cover (11).
- Apply a small quantity of grease to the O-ring.

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

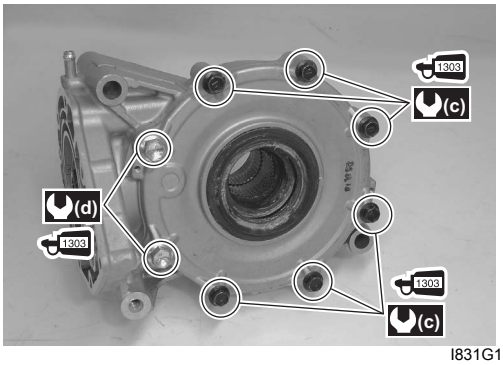


I831G1320125-01

- Apply a small quantity of thread lock to the final gear cover tools and tighten them to the specified torque diagonally.

: Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

Tightening torque
Final gear cover bolt (M8) (c): 26 N·m (2.6 kgf-m, 19.0 lb-ft)
Final gear cover bolt (M10) (d): 55 N·m (5.5 kgf-m, 40.0 lb-ft)



I831G1320126-01

- Check the backlash and tooth contact. Refer to “Final Gear Shim Inspection and Selection (Page 3B-31)”.
- Install the rear brake assembly. Refer to “Rear Brake Assembly Removal and Installation in Section 4C (Page 4C-2)”.

Final Gear Related Parts Inspection

B831G23206018

Refer to “Final Gear Assembly Removal and Installation (Page 3B-23)”.

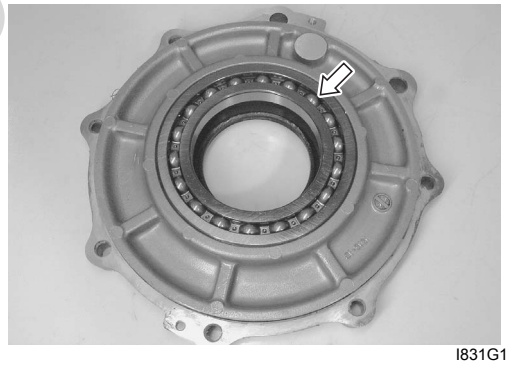
Final Driven Gear Oil Seal

Inspect the oil seals lip for damage or wear. If any defect are found, replace the oil seals with new ones.

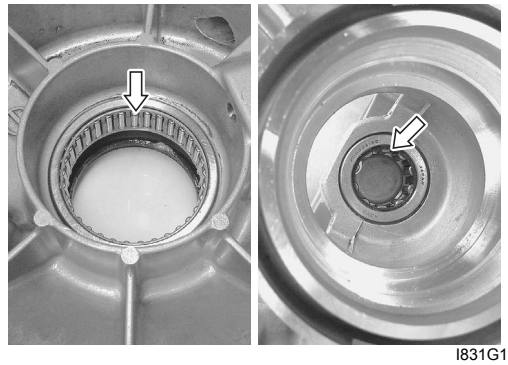
I831G1320127-01

Final Driven / Drive Gear Bering

Inspect the bearings for abnormal noise and smooth rotation. Replace the bearings if there is anything unusual.

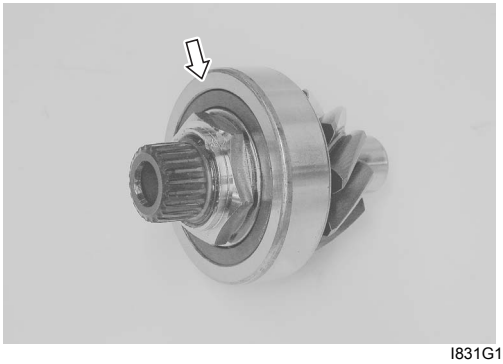


I831G1320128-01



I831G1320129-01

Final Drive Gear
Inspect the final drive gear for wear or damage. Inspect the final drive gear bearing for abnormal noise and smooth rotation. If any defects are found, replace defective parts.


I831G1320130-01

Final Driven Gear
Inspect the final driven gear for wear or damage. If any defects are found, replace drive and driven gear as a set.


I831G1320131-01

Final Gear Shim Inspection and Selection
B831G23206019

Refer to “Final Gear Assembly Removal and Installation (Page 3B-23)”.

Backlash

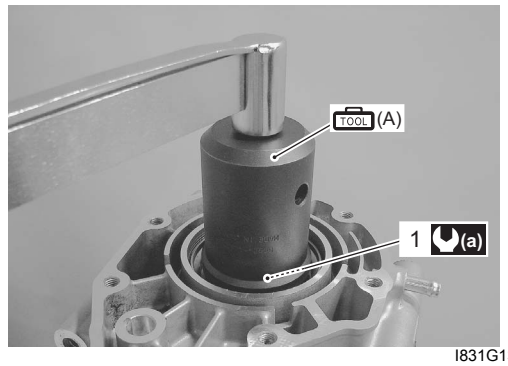
- Install the shim(s), final drive gear assembly and new final drive gear bearing stopper.
- Tighten the final drive gear bearing stopper (1) to the specified torque with the special tool.

NOTE

As this time, it is not necessary to bend the bearing stopper collar.

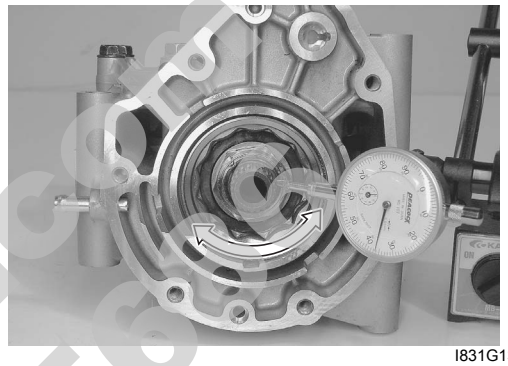
Special tool
TOOL (A): 09924–41830 (Bearing retainer wrench)

Tightening torque
Final drive gear bearing stopper (a): 100 N·m (10.0 kgf-m, 72.5 lb-ft)



I831G1320132-01

- Install the left side shim(s) and final driven gear.


I831G1320133-01

Special tool
TOOL : 09900–20607 (Dial gauge (1/100 mm, 10 mm))
TOOL : 09900–20701 (Magnetic stand)

Final gear backlash
Standard: 0.02 – 0.06 mm (0.0008 – 0.0024 in) (without gear cover specification)
Standard: 0.08 – 0.15 mm (0.0031 – 0.0059 in) (Gear cover assembled specification)

Measure the backlash with the dial gauge, as shown. Take backlash readings at several places while turning the gear shift in each direction and securely holding the final driven gear. If the backlash is not within specification, the shim must be changed and the backlash should be re-checked until the backlash is within specification. Check to the table for the appropriate shim thickness.

NOTE

Adjust the backlash by referring to the table at using the thickness of the removed shims as a guide.

Backlash	Shim adjustment
Under 0.02 mm (0.0008 in)	Increase shim thickness
0.02 – 0.06 mm (0.0008 – 0.0024 in)	Correct
Over 0.06 mm (0.0024 in)	Decrease shim thickness

- Check the left side shim selection.

Left Side Shim Selection

Put a few pieces of solder (O.D.: 1.2 – 1.5 mm x L: 6 mm) on the back side of final driven gear, as shown in the figure.

NOTE

Do not install the left side shim(s) at this time.

I831G1320134-01

- Install the final gear cover and tighten its bolts to the specified torque diagonally. Refer to “Final Gear Assembly Disassembly and Assembly (Page 3B-24)”.

NOTE

- **Do not install the new O-ring to the gear cover.**
- **Do not apply a thread lock to the bolts.**

I831G1320135-01

- Remove the final gear cover.
- Measure the thickness of compressed solder with the micrometer.

Special tool

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

Shim thickness

Compressed solder thickness + 0.10 mm

I831G1320136-01

- Select the proper size of shim(s) from the table, according as the compressed solder thickness.

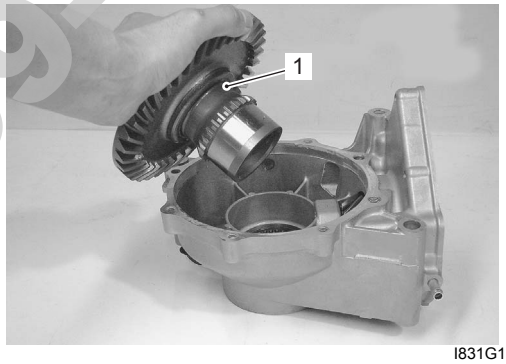
LIst of shims (for left side)

Part No.	Shim thickness
27326-31G00-030	0.30 mm (0.0118 in)
27326-31G00-035	0.35 mm (0.0138 in)
27326-31G00-040	0.40 mm (0.0157 in)
27326-31G00-050	0.50 mm (0.0197 in)
27326-31G00-060	0.60 mm (0.0236 in)

After selecting the proper size of shim(s), check or adjust the backlash and tooth contact.

Tooth Connect

- Remove the final driven gear assembly (1).

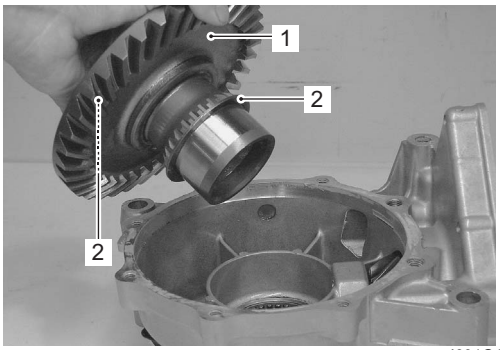


I831G1320137-01

- Clean and degreas several teeth on the final drive gear and final driven gear, and then apply a coating of machinist’s layout dye or paste to several teeth of the final drive gear.

I831G1320138-01

- Install the left and right side shim(s) (2) and final driven gear assembly (1).



I831G1320139-01

- Install the final gear cover, and then tighten the bolts to the specified torque diagonally. Refer to “Final Gear Assembly Disassembly and Assembly (Page 3B-24)”.

NOTE

At this time, it is not necessary to install the gear case cover’s O-ring.

I831G1320140-01

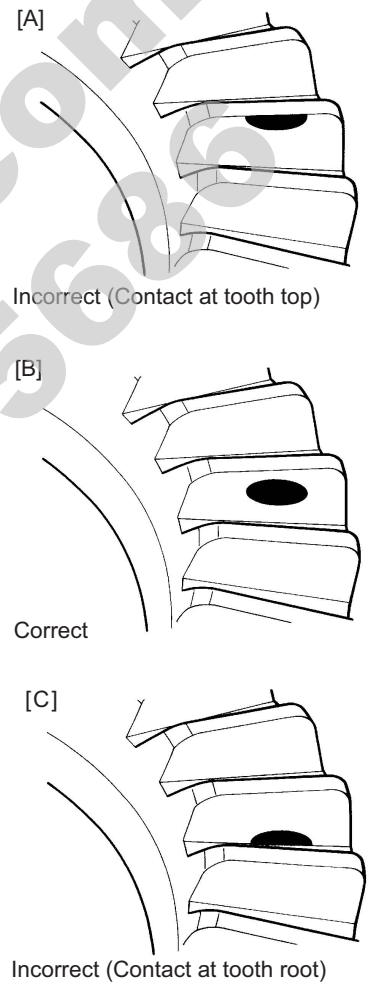
I831G1320141-01

- Rotate the final driven gear several turns in each direction. This will provide connect pattern on the coated teeth of the gear.
- Remove the final drive gear and compare the coated teeth to the examples shown in [A], [B] and [C].
  If tooth contact is found to be incorrect (examples [A] and [C]), the shim between the final drive gear bearing and gear case must be changed and the tooth contact should be re-checked until the tooth contact is found to be correct (example [B]).

Tooth contact	Shim adjustment
Contact at tooth top [A]	Decrease shim thickness
Contact at tooth top [C]	Increase shim thickness

⚠ CAUTION

Make sure to check the backlash and shim thickness after the tooth contact has been adjusted, since it may have changed. Adjust the tooth contact and backlash until they are both within specification. If the correct tooth contact cannot be maintained when adjusting the backlash, replace the final drive gear and final driven gear as a set.



I831G1320142-02

List of shims (for final drive gear)

Part No.	Shim thickness
27445-24A01-030	0.30 mm (0.0118 in)
27445-24A01-035	0.35 mm (0.0138 in)
27445-24A01-040	0.40 mm (0.0157 in)
27445-24A01-050	0.50 mm (0.0197 in)
27445-24A01-060	0.60 mm (0.0236 in)

Specifications

Service Data

B831G23207001

Drive Train

Unit: mm (in)

Item		Standard	Limit
Front drive (differential) gear backlash		0.05 – 0.10 (0.0020 – 0.0040)	—
Front gear backlash	Without gear cover specification	0.02 – 0.06 (0.0008 – 0.0024)	—
	Gear cover assembled specification	0.08 – 0.15 (0.0031 – 0.0059)	—

Tightening Torque Specifications

B831G23207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Front drive (differential) mounting nut	50	5.0	36.0	☞(Page 3B-5)
Front drive (differential) case cover bolt	22	2.2	16.0	☞(Page 3B-11)
4WD/Diff-lock actuator mounting bolt	22	2.2	16.0	☞(Page 3B-12)
Front drive (differential) case bolt	22	2.2	16.0	☞(Page 3B-14) / ☞(Page 3B-16) / ☞(Page 3B-16)
Final gear case mounting nut	65	6.5	47.0	☞(Page 3B-24)
Final gear case mounting bolt	65	6.5	47.0	☞(Page 3B-24)
Final drive lock-nut	100	10.0	72.5	☞(Page 3B-28)
Final drive gear bearing stopper	100	10.0	72.5	☞(Page 3B-29) / ☞(Page 3B-31)
Final gear cover bolt (M8)	26	2.6	19.0	☞(Page 3B-30)
Final gear cover bolt (M10)	55	5.5	40.0	☞(Page 3B-30)

NOTE

The specified tightening torque is also described in the following.
“Front Drive (Differential) Components (Page 3B-2)”
“Front Drive (Differential) Construction (Page 3B-3)”
“Final Gear Components (Page 3B-21)”
“Final Gear Construction (Page 3B-22)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

B831G23208001

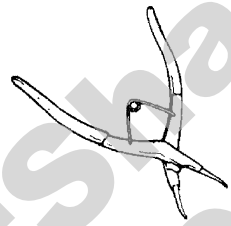
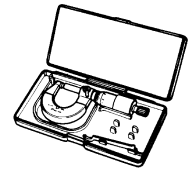
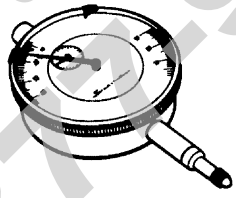
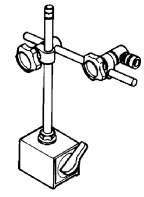
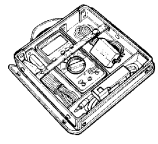
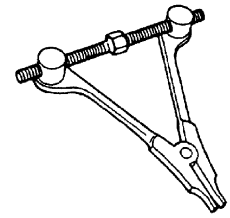
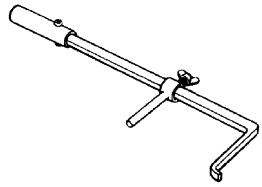
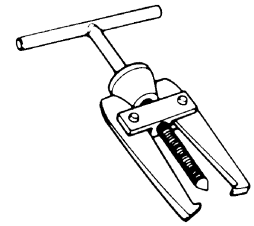
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 3B-9) / ☞(Page 3B-12) / ☞(Page 3B-30)
	Water resistance grease	P/No.: 99000–25160	☞(Page 3B-5) / ☞(Page 3B-24) / ☞(Page 3B-29) / ☞(Page 3B-29)
Sealant	SUZUKI BOND No.1215 or equivalent	P/No.: 99000–31110	☞(Page 3B-11)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 3B-5) / ☞(Page 3B-11) / ☞(Page 3B-12) / ☞(Page 3B-24) / ☞(Page 3B-30)

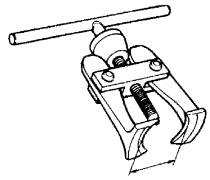
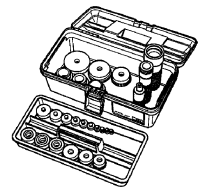
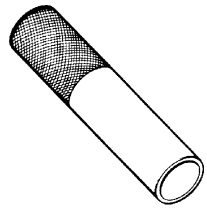
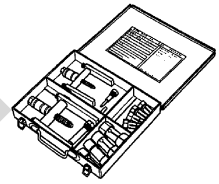
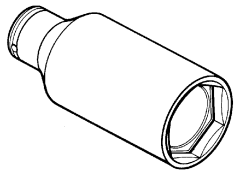
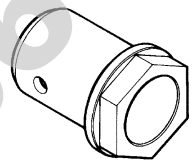
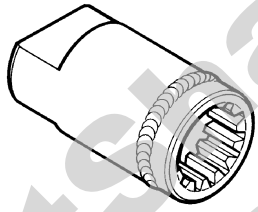
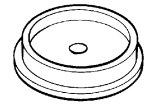
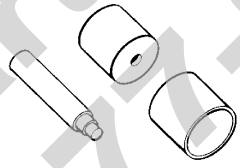
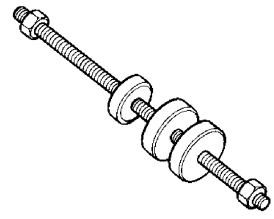
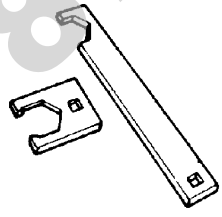
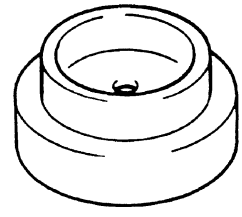
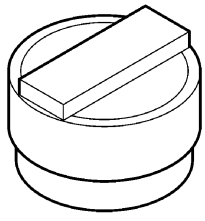
NOTE

Required service material is also described in the following.
“Front Drive (Differential) Components (Page 3B-2)”
“Front Drive (Differential) Construction (Page 3B-3)”
“Final Gear Components (Page 3B-21)”
“Final Gear Construction (Page 3B-22)”

Special Tool

B831G23208002

09900–06108 Snap ring pliers ☞(Page 3B-6) / ☞(Page 3B-6) / ☞(Page 3B-7) / ☞(Page 3B-7) / ☞(Page 3B-9) / ☞(Page 3B-9) / ☞(Page 3B-10) / ☞(Page 3B-10) 	09900–20205 Micrometer (0 – 25 mm) ☞(Page 3B-16) / ☞(Page 3B-32) 
09900–20607 Dial gauge (1/100 mm, 10 mm) ☞(Page 3B-15) / ☞(Page 3B-31) 	09900–20701 Magnetic stand ☞(Page 3B-15) / ☞(Page 3B-31) 
09900–25008 Multi-circuit tester set ☞(Page 3B-18) / ☞(Page 3B-19) / ☞(Page 3B-20) / ☞(Page 3B-20) 	09912–34510 Cylinder disassembling tool ☞(Page 3B-5) 
09913–50121 Oil seal remover ☞(Page 3B-25) / ☞(Page 3B-25) 	09913–60910 Bearing remover ☞(Page 3B-7) / ☞(Page 3B-7) / ☞(Page 3B-8) / ☞(Page 3B-27) 

09913–61510 Bearing puller ☞(Page 3B-27) 	09913–70210 Bearing installer set ☞(Page 3B-6) / ☞(Page 3B-8) / ☞(Page 3B-8) / ☞(Page 3B-8) / ☞(Page 3B-9) / ☞(Page 3B-9) / ☞(Page 3B-10) / ☞(Page 3B-10) / ☞(Page 3B-25) / ☞(Page 3B-27) / ☞(Page 3B-28) 
09913–84510 Bearing installer ☞(Page 3B-28) 	09921–20240 Bearing remover set ☞(Page 3B-6) / ☞(Page 3B-8) / ☞(Page 3B-27) 
09922–21410 Long socket (46 mm) ☞(Page 3B-9) 	09924–41830 Bearing retainer wrench ☞(Page 3B-26) / ☞(Page 3B-29) / ☞(Page 3B-31) 
09924–52470 Fixed final drive gear holder ☞(Page 3B-26) / ☞(Page 3B-28) 	09924–74520 Oil seal installer/remover ☞(Page 3B-9) 
09924–74570 Final drive gear bearing installer/remover ☞(Page 3B-9) 	09924–84521 Bearing installer set ☞(Page 3B-8) / ☞(Page 3B-27) 
09940–92430 Rear axel wrench A ☞(Page 3B-26) / ☞(Page 3B-28) 	09944–66010 Bearing installer ☞(Page 3B-8) / ☞(Page 3B-25) 
09951–15810 Bearing installer ☞(Page 3B-29) / ☞(Page 3B-29) / ☞(Page 3B-29) 	

Transfer

Diagnostic Information and Procedures

Transfer Symptom Diagnosis

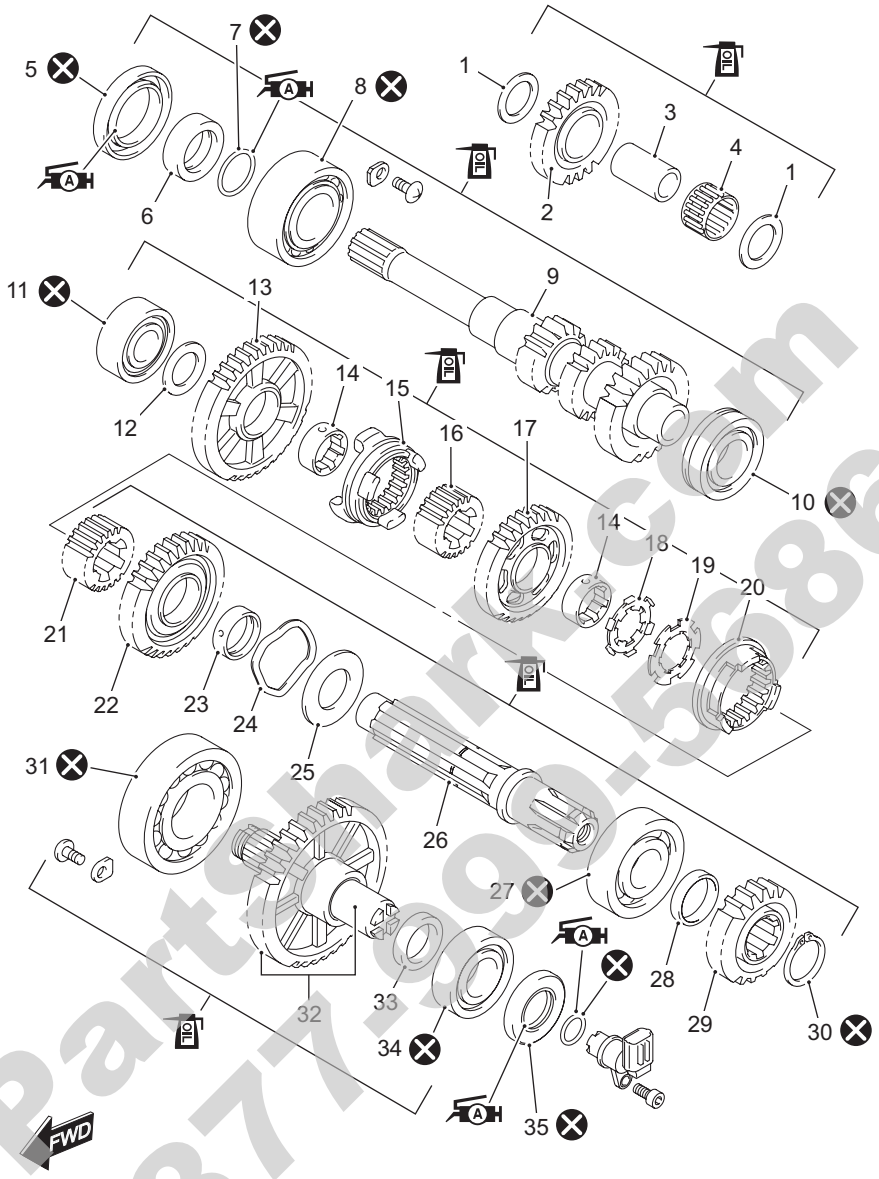
B831G23304001

Condition	Possible cause	Correction / Reference Item
Engine is noisy (Noise seems to come from the transfer)	Worn or rubbing gear.	*Replace.*
	Worn transfer input/output shaft.	*Replace shaft.*
	Worn bearing.	*Replace.*
	Worn splines.	*Replace.*
Transfer will not shift back	Broken return spring on shift shaft.	*Replace.*
	Distorted gearshift forks.	*Replace.*
	Worn gearshift shaft.	*Replace.*
	Broken gearshift cam.	*Replace.*
	Improperly adjusted gearshift cable.	*Adjust.*
Transfer jumps out of gear	Worn shifting gears on drive shaft or counter shaft.	*Replace.*
	Distorted or worn gearshift forks.	*Replace.*
	Weakened return spring on gearshift stopper.	*Replace.*
	Worn gearshift stopper cam plate.	*Replace.*

Repair Instructions

Transfer Components

B831G23306001



I831G1330001-09

1. Washer	14. Driven gear bushing	27. Counter shaft bearing (Left side)
2. Reverse idle gear	15. Select sliding dog	28. Spacer
3. Reverse idle gear shaft	16. Reverse select spacer	29. Drive gear No. 2
4. Reverse idle gear bearing	17. Reverse driven gear	30. Snap ring
5. Oil seal	18. Lock washer	31. Output shaft bearing (Right side)
6. Spacer	19. Lock washer	32. Transfer output drive gear/shaft
7. O-ring	20. High gearshift dog	33. Spacer
8. Drive shaft bearing (Right side)	21. Select spacer	34. Output shaft bearing (Left side)
9. Drive shaft	22. High driven gear	35. Oil seal
10. Drive shaft bearing (Left side)	23. High driven gear bushing	: Apply grease.
11. Counter shaft bearing (Right Side)	24. Wave washer	: Apply engine oil.
12. Washer	25. Washer	: Do not reuse.
13. Low driven gear	26. Counter shaft	

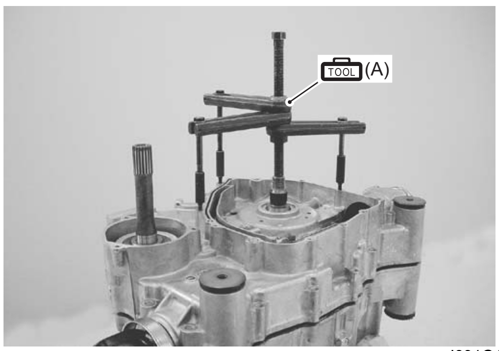
Transfer Removal and Installation

B831G23306002

Removal

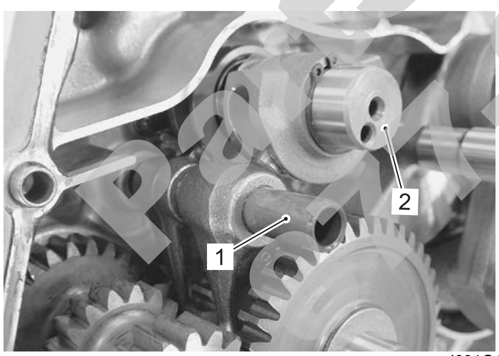
1) Remove the engine assembly from the frame. Refer to “Engine Assembly Removal in Section 1D (Page 1D-13)”.
2) Disassemble the engine top side. Refer to “Engine Top Side Disassembly in Section 1D (Page 1D-17)”.
3) Separate the crank case with the special tool. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-45)”.

Special tool
TOOL (A): 09920–13120 (Crankcase separating tool)



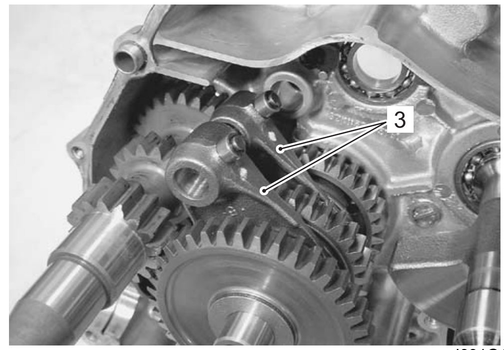
I831G1330006-03

4) Remove the torque limiter and starter idle gear No. 2. Refer to “Starter Torque Limiter / Starter Clutch Removal and Installation in Section 1I (Page 1I-10)”.
5) Remove the gearshift fork shaft (1) and gearshift cam (2).



I831G1330007-01

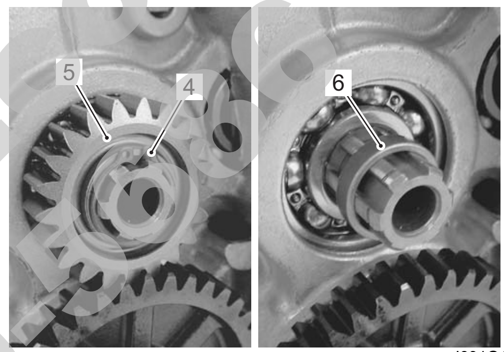
6) Remove the gearshift forks (3).



I831G1330008-01

7) Remove the snap ring (4), drive gear No. 2 (5) and spacer (6).

Special tool
TOOL : 09900–06107 (Snap ring pliers)



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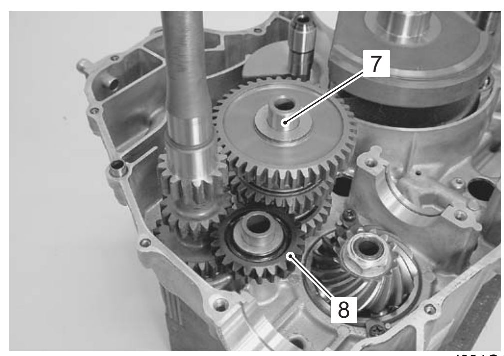
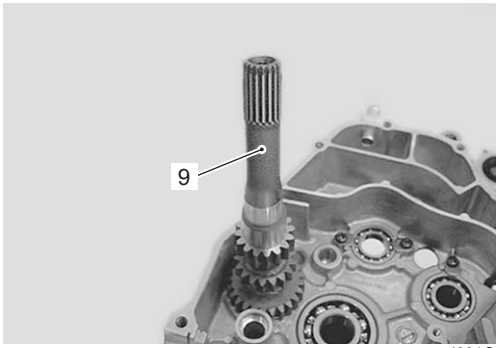
8) Remove the counter shaft assembly (7), reverse idle gear (8) with shaft.



I831G1330010-02

9) Remove the drive shaft (9) with a plastic mallet by installing a suitable washer with the drive face bolt.

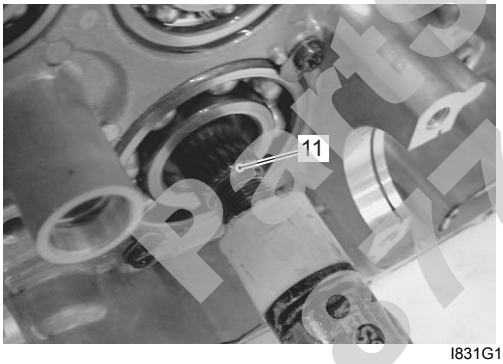


I831G1330011-02

10) Remove the drive bevel gear (10). Refer to “Rear Output Shaft Removal and Installation in Section 3D (Page 3D-6)”.

I831G1330012-02

11) Remove the output shaft (11) with a plastic mallet.



I831G1330013-01

⚠ CAUTION

- **Do not disassemble the transfer output shaft.**
- **The transfer output driven gear and transfer output shaft is available only as an assembly.**

I831G1330014-01

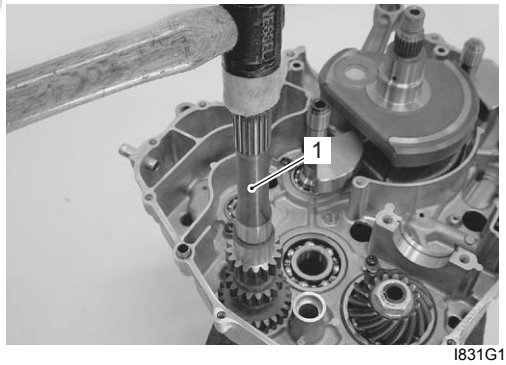
Installation

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

⚠ CAUTION

Apply engine oil to each gears and shafts.

- Install the bevel gear. Refer to “Rear Output Shaft Removal and Installation in Section 3D (Page 3D-6)”.
- Install the drive shaft (1) with the plastic mallet.



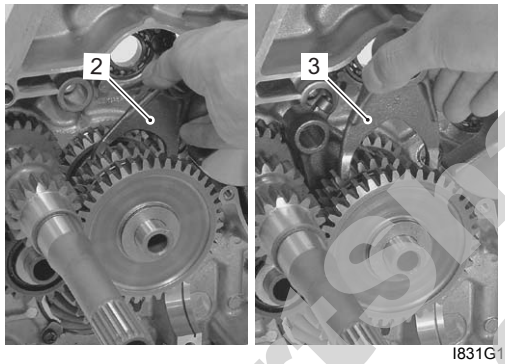
I831G1330015-01

- Install the transfer output shaft assembly and reverse idle gear. Refer to “Transfer Components (Page 3C-2)”.
- Install the gearshift fork (2) and reverse gearshift fork (3).

NOTE

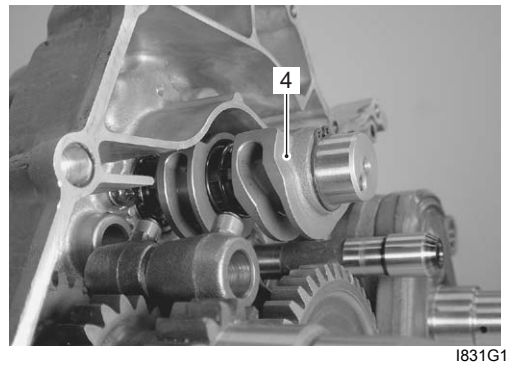
Identify the shape of the shift forks and install them properly.

I831G1330016-01



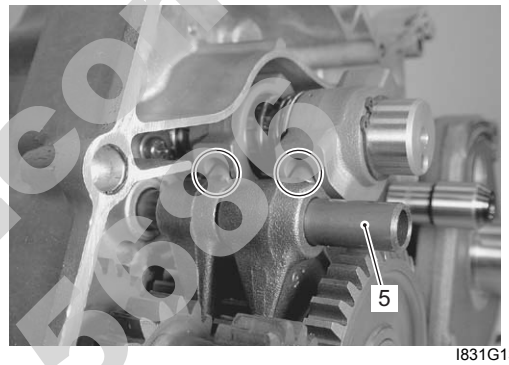
I831G1330017-01

- Install the gearshift cam (4).



I831G1330018-01

- With engaging each fork and to the cam groove, insert the fork shaft (5).

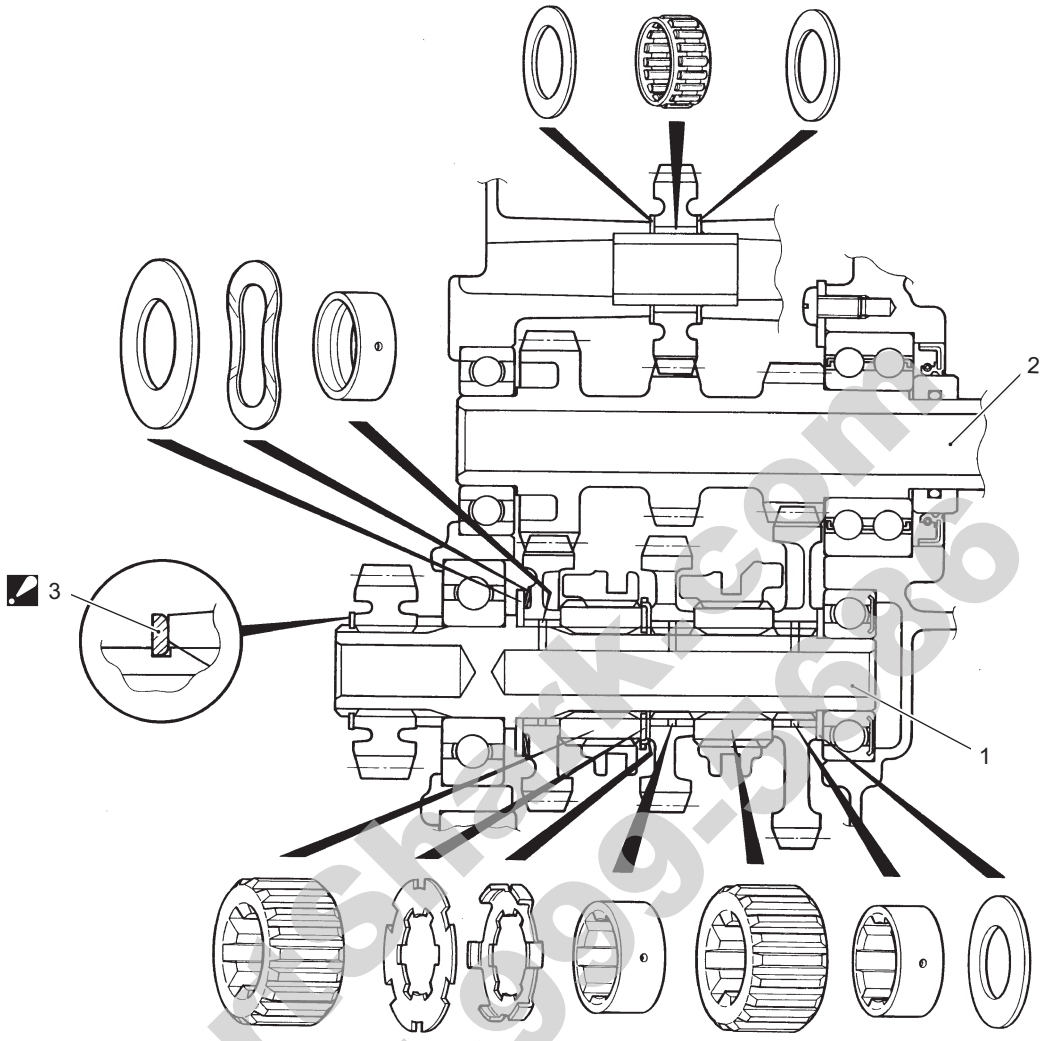


I831G1330019-01

- Assemble the engine. Refer to “Engine Bottom Side Assembly in Section 1D (Page 1D-51)”.
- Remount engine assembly. Refer to “Engine Assembly Installation in Section 1D (Page 1D-16)” and “Engine Top Side Assembly in Section 1D (Page 1D-21)”.

Transfer Construction

B831G23306003



I831G1330002-03

1. Counter shaft	2. Drive shaft	3. Snap ring : Assembly snap ring with edge side out.

Counter Shaft / Reverse Idle Gear Disassembly and Assembly

B831G23306004

⚠ CAUTION

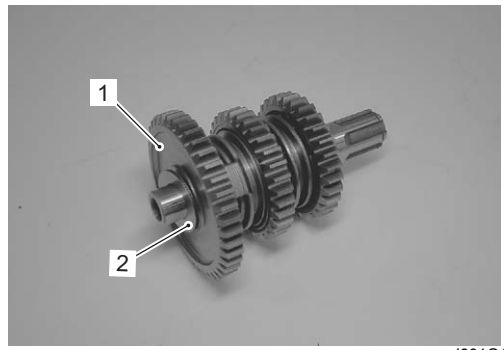
Identify the position of each removed part. Organize the parts in their respective groups so that they can be reinstalled in their original position.

Disassembly

Refer to “Transfer Removal and Installation (Page 3C-3)”.

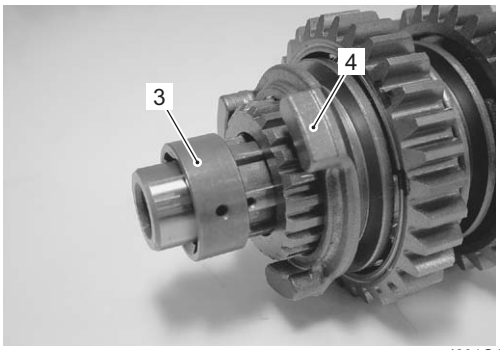
Counter shaft

1) Remove the counter shaft assembly. Refer to “Transfer Removal and Installation (Page 3C-3)”.
2) Remove the low driven gear (1) and washer (2).



I831G1330020-01

3) Remove the low driven gear bushing (3) and select sliding dog (4).

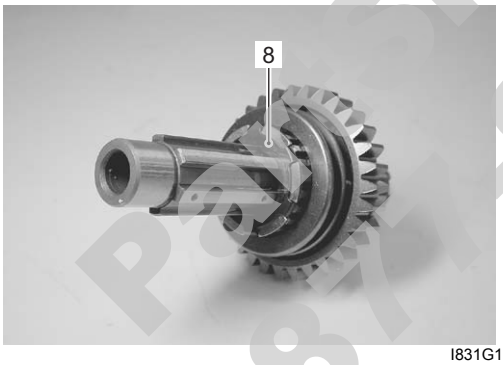


I831G1330021-01

4) Remove the reverse select spacer (5), reverse gear (6) and reverse driven gear bushing (7).

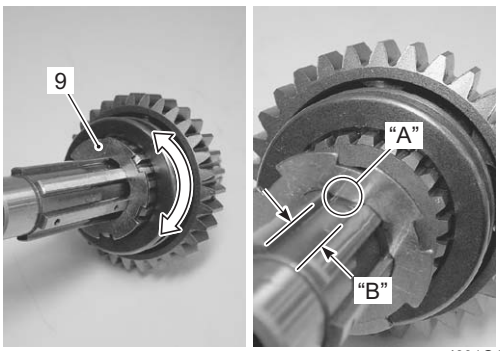
I831G1330022-01

5) Remove the lock washer (8).



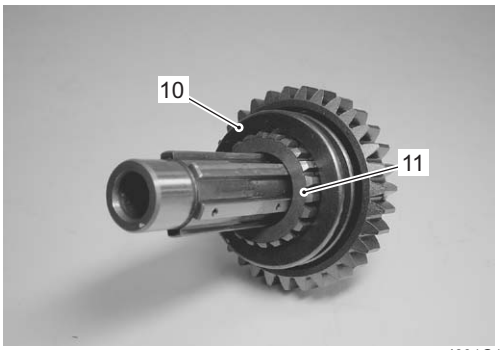
I831G1330023-01

6) Remove the lock washer (9) by aligning the teeth “A” of the lock washer with the spline grooves “B”.



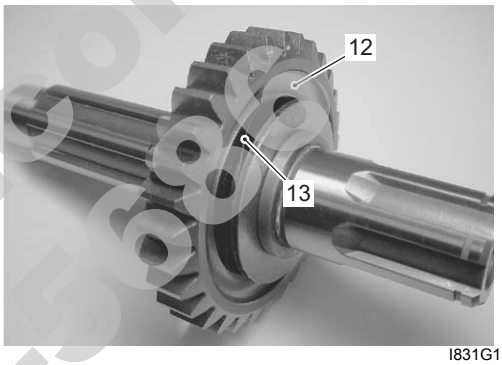
I831G1330024-02

7) Remove the high gearshift dog (10) and select spacer (11).



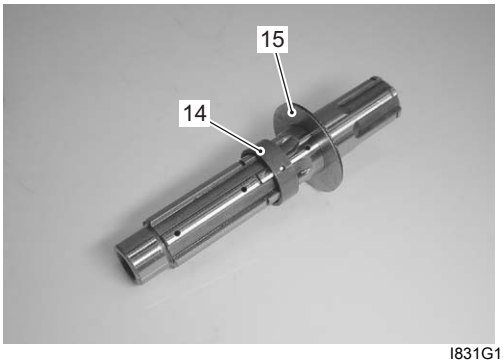
I831G1330025-01

8) Remove the high driven gear (12) with the wave washer (13).



I831G1330026-01

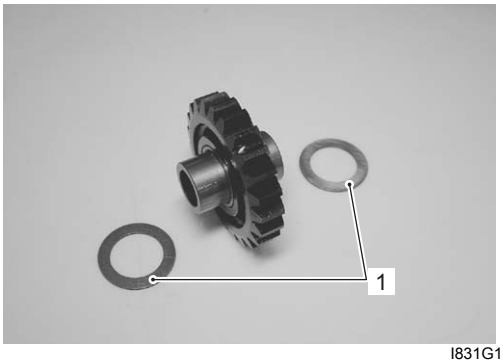
9) Remove the high driven gear bushing (14) and washer (15).



I831G1330027-02

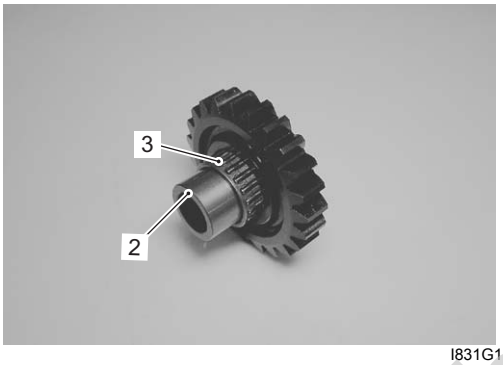
Reverse idle gear

1) Remove the washers (1).



I831G1330028-01

2) Remove the reverse idle gear shaft (2) and bering (3).



I831G1330029-01

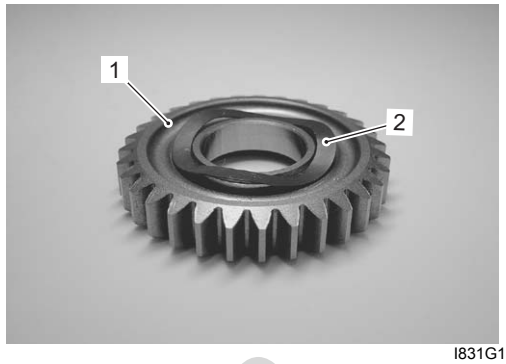
Assembly

NOTE

- **When reassembling the driven gears, attention must be given to the locations and positions of washers. The cross sectional view shows the correct position of the snap ring. Refer to "Transfer Construction (Page 3C-6)".**
- **Before installing the gears, coat lightly engine oil to the counter shaft component parts.**

Assemble the counter shaft and reverse idle gear in the reverse order of disassembly. Pay attention the following points:

- Before installing the high driven gear (1), set the wave washer (2) as shown in the figure.

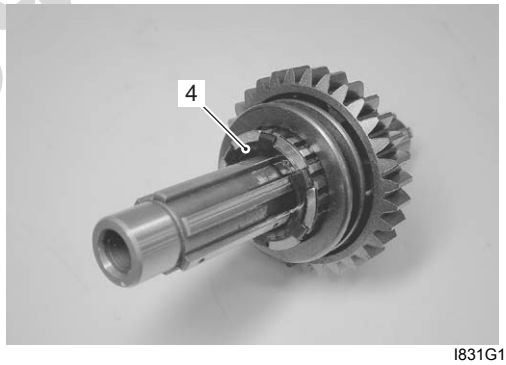


I831G1330030-01

- Install the lock washer (3).

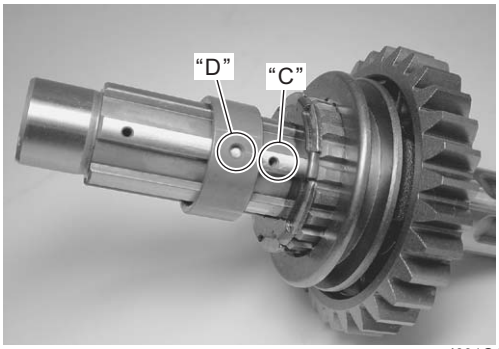
I831G1330063-01

- Install the lock washer (4).

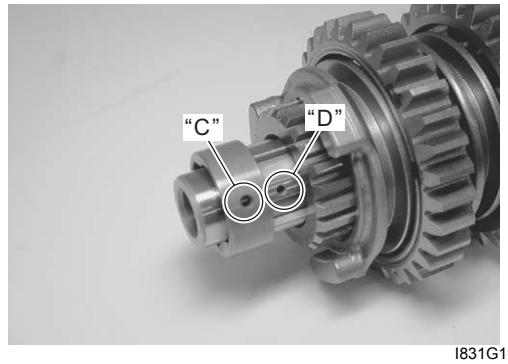


I831G1330064-01

- When installing the gear bushing onto the counter shaft, align the shaft oil hole “C” with the bushing oil hole “D” as shown in the figure.



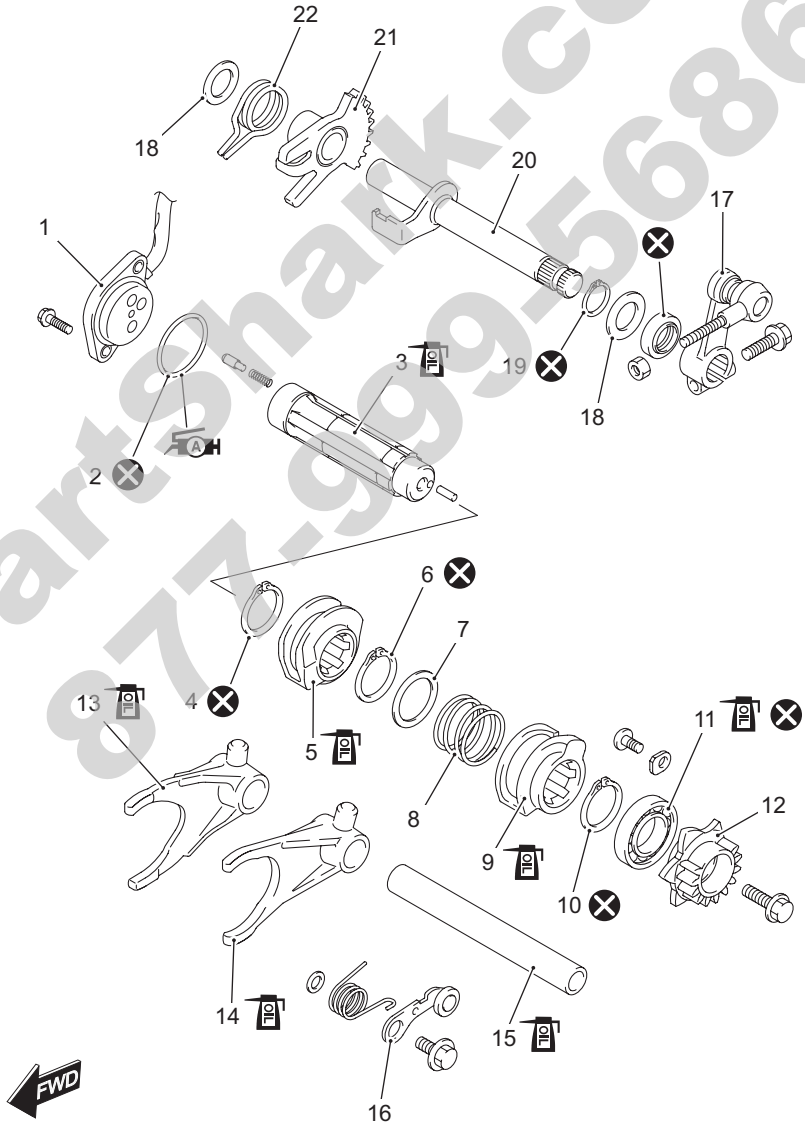
I831G1330033-05



I831G1330034-03

Gearshift Cam Components

B831G23306005



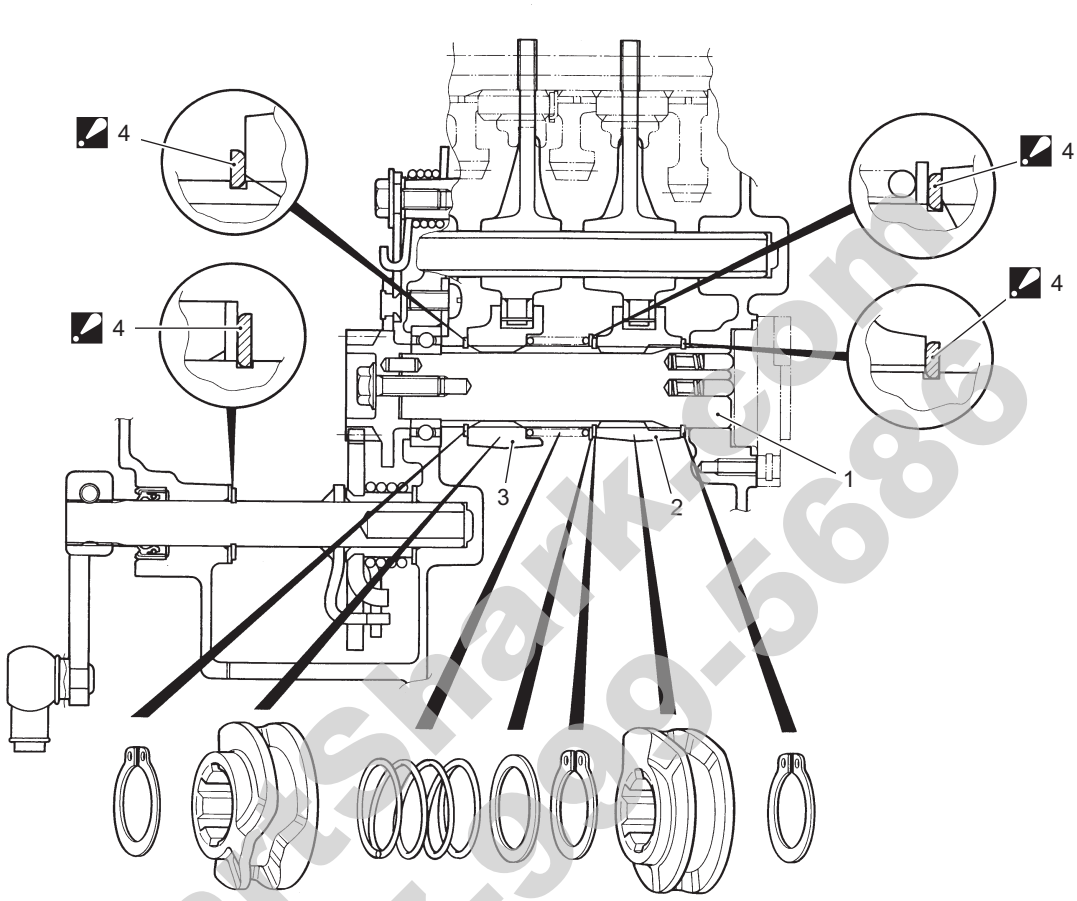
I831G1330003-05

1. Gear position switch	10. Snap ring	19. Snap ring
2. O-ring	11. Bearing	20. Gearshift shaft No. 2
3. Gearshift shaft No. 1	12. Gearshift cam stopper plate	21. Shift gear
4. Snap ring	13. Reverse gearshift fork	22. Shift arm return spring
5. Reverse gearshift cam	14. High/Low gearshift fork	: Apply grease.

6. Snap ring	15. Gearshift fork shaft	: Apply engine oil.
7. Washer	16. Gearshift cam stopper	: Do not reuse.
8. Spring	17. Gearshift arm	
9. Gearshift cam	18. Washer	

Gearshift System Construction

B831G23306006



I831G1330004-04

1. Gearshift shaft	3. Gearshift cam
2. Reverse gearshift cam	4. Snap ring : Assemble snap ring with sharp edge side out.

Gearshift Cam Disassembly and Assembly

B831G23306007

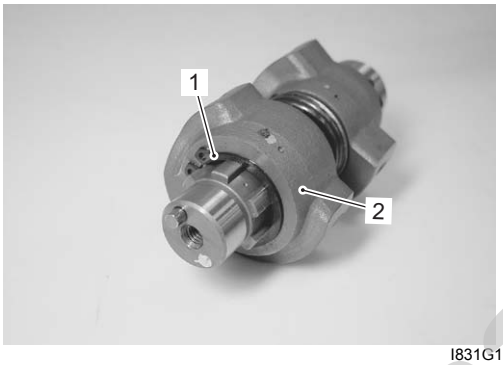
Disassembly

⚠ 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.

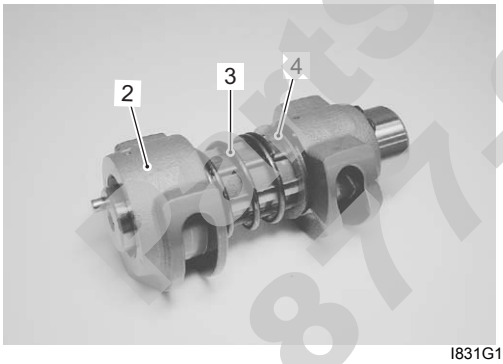
- Remove the gearshift cam assembly. Refer to "Transfer Removal and Installation (Page 3C-3)".
- Remove the snap ring (1) with the special tool by holding the gearshift cam (2).

Special tool
TOOL : 09900–06107 (Snap ring pliers)



I831G1330035-01

- Remove the gearshift cam (2), spring (3) and washer (4).



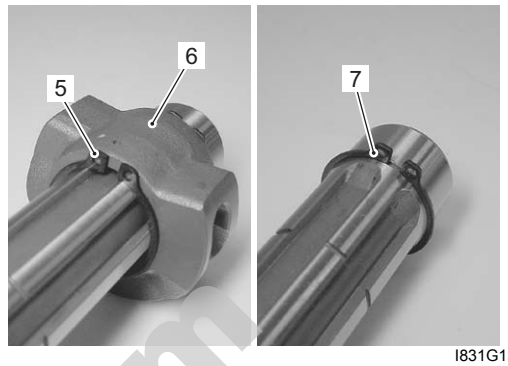
I831G1330036-01

- Remove the snap ring (5) with the special tool.

Special tool
TOOL : 09900–06107 (Snap ring pliers)

- Remove the reverse gearshift cam (6) and snap ring (7).

Special tool
TOOL : 09900–06107 (Snap ring pliers)



I831G1330037-01

Assembly

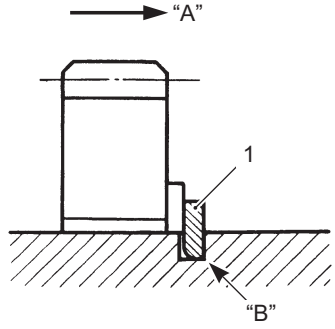
NOTE

When reassembling the gearshift cams, attention must be given to the locations and positions of washer and snap rings. The cross sectional view shows the correct position of the cams, washer and snap rings. Refer to "Gearshift System Construction (Page 3C-10)".

⚠ 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.**

- 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.



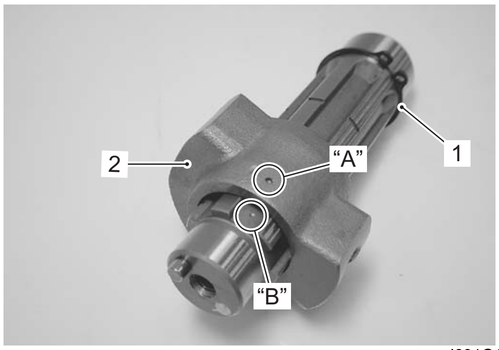
I831G1330039-01

1. Snap ring	"A": Thrust	"B": Sharp edge

- Install the snap ring (1) and gearshift cam (2).

⚠ **CAUTION**

- **Align the punch mark "A" of the gearshift cam with the punch mark "B" of the shaft.**

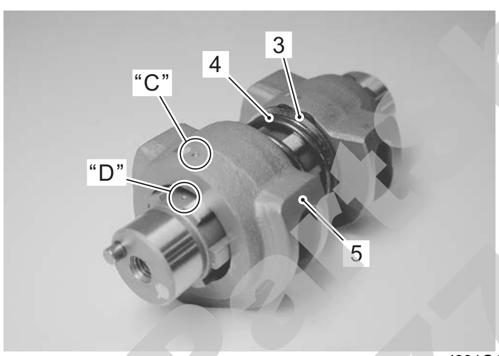


I831G1330038-03

- Install the washer (3), spring (4) and reverse shift cam (5).

⚠ **CAUTION**

- **Align the punch mark "C" of the reverse shift cam with the punch mark "D" of the shaft.**



I831G1330040-01

- Install the snap ring.

Transfer Gear Bearing Removal and Installation

B831G23306008

Refer to "Bearing Removal and Installation in Section 1D (Page 1D-61)".

Transfer Gear Bearing Inspection

B831G23306009

- Inspect the reverse idle gear shaft bearing for abnormal noise and smooth rotation. Replace the bearing if there is anything unusual.

I831G1330067-01

- Inspect the other bearings as shown in the bearing inspection. Refer to "Bearing Inspection in Section 1D (Page 1D-61)".

Transfer Related Parts Inspection

B831G23306010

Refer to "Transfer Removal and Installation (Page 3C-3)" and "Counter Shaft / Reverse Idle Gear Disassembly and Assembly (Page 3C-6)".

Gearshift Fork to Groove Clearance

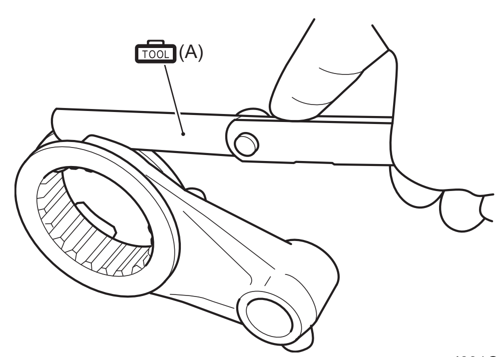
NOTE

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, replace the fork or its dog, or both.

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

<u>Gearshift fork to gearshift fork groove clearance</u>
Standard: 0.10 – 0.30 mm (0.0040 – 0.0120 in)
Service limit: 0.50 mm (0.020 in)

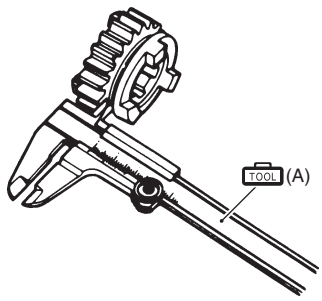


I831G1330066-01

Gearshift Fork Groove Width
Measure the gearshift fork groove width using the vernier calipers.

Special tool
(A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Gearshift fork groove width
Standard (Reverse/Low & High): 5.5 – 5.6 mm (0.217 – 0.220 in)

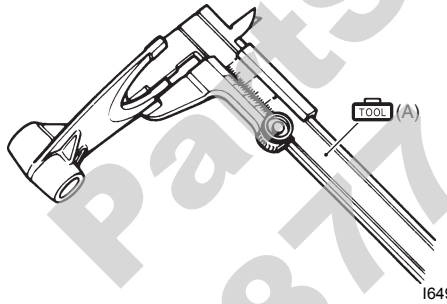


I649G1520057-03

Gearshift Fork Thickness
Measure the gearshift fork thickness using the vernier calipers.

Special tool
(A): 09900–20102 (Vernier calipers (1/20 mm, 200 mm))

Gearshift fork thickness
Standard (Reverse/Low & High): 5.3 – 5.4 mm (0.209 – 0.213 in)



I649G1520058-03

Transfer Related Bearing Inspection

B831G23306011

Refer to “Bearing Inspection in Section 1D (Page 1D-61)”.

Gear Position (GP) Switch Inspection

B831G23306012

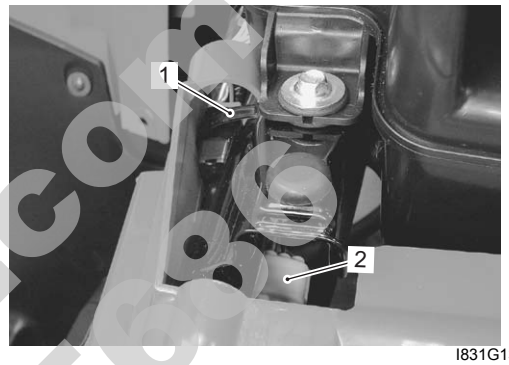
Refer to “Gear Position Switch Inspection in Section 1I (Page 1I-9)”.

Gear Position (GP) Switch Removal and Installation

B831G23306013

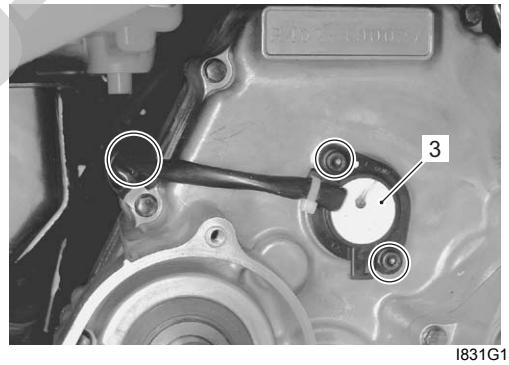
Removal

1) Turn the ignition switch OFF.
2) Remove the left and right side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Remove the drive V-belt inner cover. Refer to “Clutch Shoe Removal and Installation in Section 5A (Page 5A-16)”.
4) Remove the clamp (1) and disconnect the gear position switch coupler (2).



I831G1330044-01

5) Disconnect the clamp and remove the gear position switch (3).



I831G1330045-01

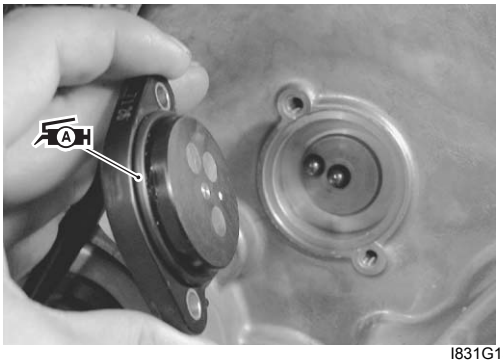
Installation
Install the gear position switch in the reverse order of removal. Pay attention to the following points:

- Apply grease to the O-ring.

⚠ CAUTION

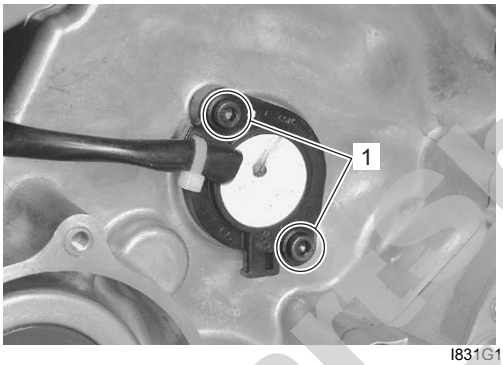
Replace the O-ring with a new one.

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



I831G1330046-01

- Tighten the gear position switch bolts (1).



I831G1330047-03

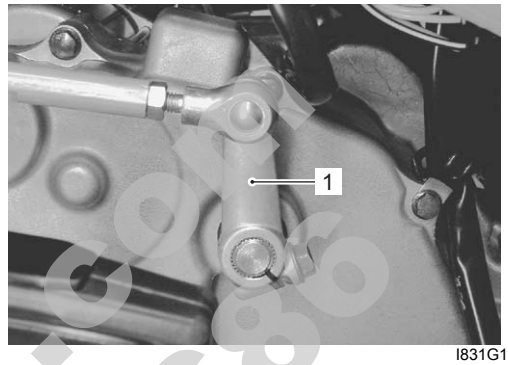
- Route the gear position switch lead wire. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-4)”.
- Install the V-belt inner cover. Refer to “Clutch Shoe Removal and Installation in Section 5A (Page 5A-16)”.
- Install the drive V-belt. Refer to “V-belt Type Continuously Variable Automatic Transmission Removal and Installation in Section 5A (Page 5A-5)”.
- Install the removed parts.

Gearshift Shaft No. 2 / Gearshift Cam Plate Removal and Installation

B831G23306014

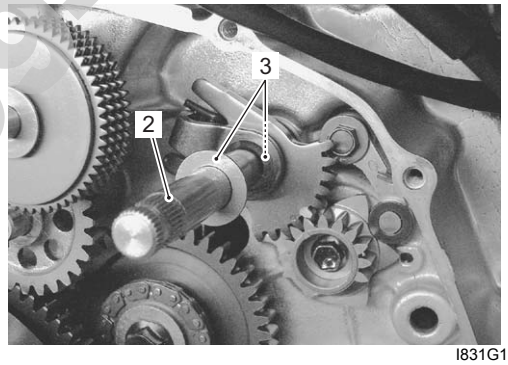
Removal
Refer to “Shift Lever Assembly Removal and Installation in Section 5A (Page 5A-24)”.

1) Drain engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.
2) Drain engine coolant. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)”.
3) Remove the gearshift arm (1).



I831G1330048-01

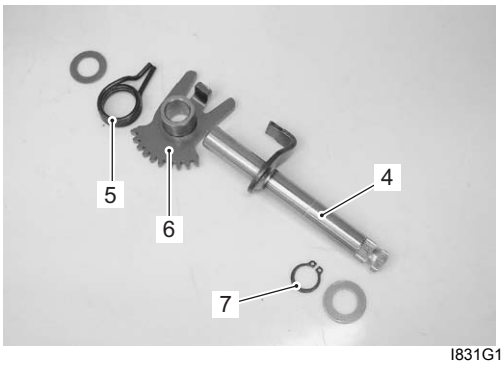
4) Remove the generator cover. Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.
5) Remove the gearshift shaft assembly (2) and washers (3).



I831G1330049-02

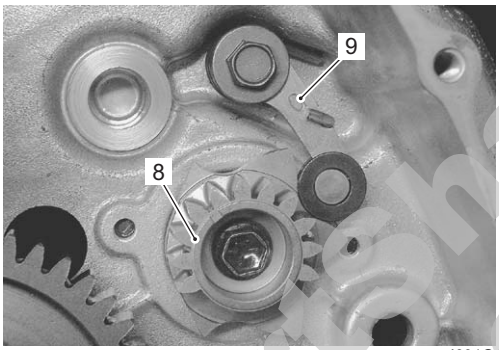
6) Remove the following parts from the gearshift shaft (4).
   - Gearshift return spring (5)
   - Shift gear (6)
   - Snap ring (7)

   Special tool
   TOOL : 09900–06107 (Snap ring pliers)



I831G1330050-03

7) Remove the gearshift cam stopper plate (8).
8) Remove the gearshift cam stopper (9).



I831G1330062-02

Installation
Install the gearshift shaft and gearshift cam plate in the reverse order of removal. Pay attention to the following points:

- Install the gearshift cam stopper (1), bolt (2), washer (3) and return spring (4).

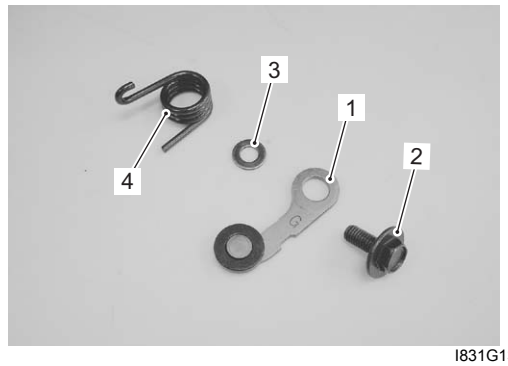
NOTE

Hook the return spring end “A” to the gearshift cam stopper.

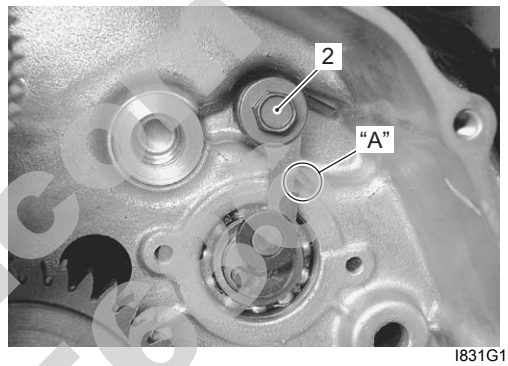
⚠ CAUTION

Make sure that the gearshift cam stopper moves smoothly.

- Tighten the gearshift cam stopper bolt (2) securely.



I831G1330051-01



I831G1330052-02

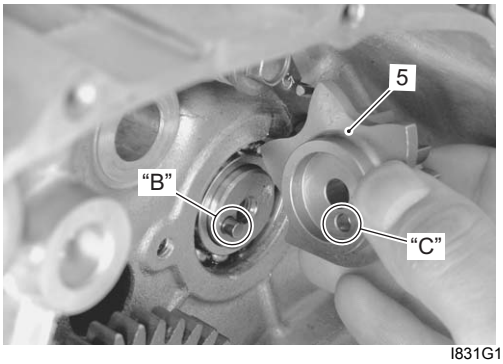
- Check the gearshift cam stopper moves smoothly.
- Locate the gearshift cam in the neutral position.

- Install the gearshift cam stopper plate (5).

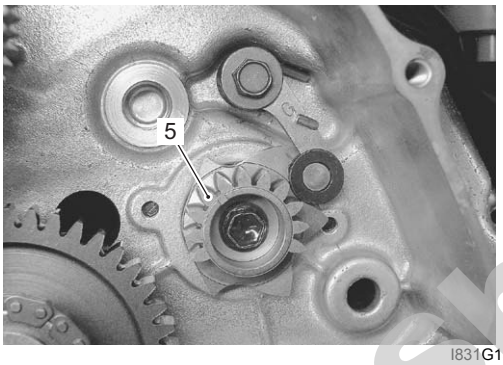
NOTE

- **Align the gearshift cam pin “B” with the gearshift cam stopper plate hole “C”.**

- Tighten the gearshift cam stopper plate bolt securely.

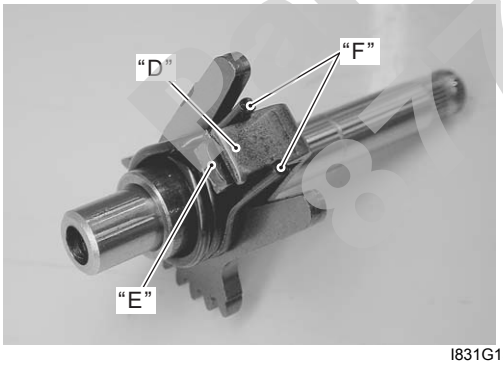


I831G1330053-02



I831G1330054-02

- When installing the shift arm return spring, position the stopper “D” of gearshift shaft No. 2 and stopper “E” of shift gear between the return spring ends “F”.

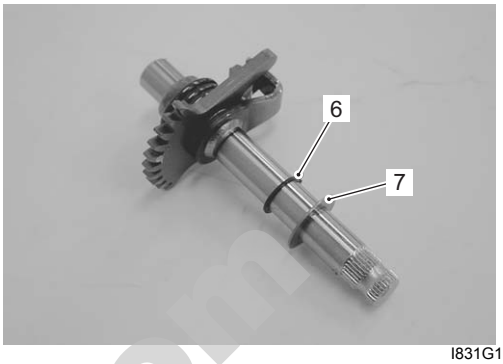


I831G1330055-01

- Install the snap ring (6) and washer (7).

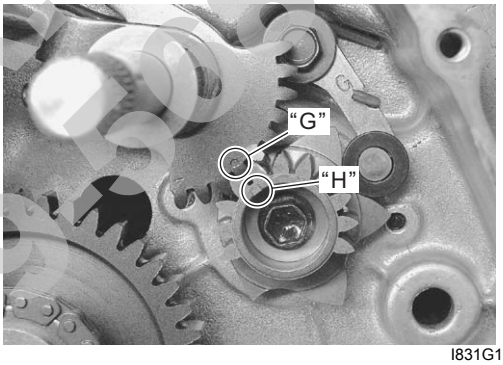
⚠ CAUTION

the removed snap ring (6) must be replaced with new one.



I831G1330056-01

- Install the gearshift assembly by aligning the punch mark “G” of shift gear with the match mark “H” of gearshift cam stopper plate.



I831G1330057-03

- Install the generator cover. Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.
- Pour engine coolant and engine oil. Refer to “Cooling System Inspection in Section 0B (Page 0B-15)” and “Engine Oil and Filter Replacement in Section 0B (Page 0B-10)”.

Gearshift Linkage Inspection

B831G23306015

Refer to “Gearshift Shaft No. 2 / Gearshift Cam Plate Removal and Installation (Page 3C-14)”.

Gearshift Shaft

Check the gearshift for bend or wear.
Check the return spring for damage or fatigue.
If any defects are found, replace the defective part(-s).

I831G1330058-01

Gearshift Shaft Oil Seal

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

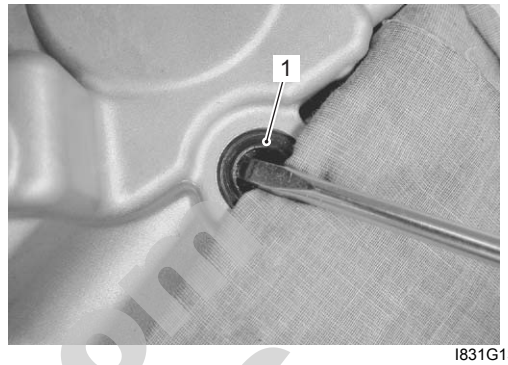
I831G1330059-01

Gearshift Shaft Oil Seal Removal and Installation

B831G23306016

Removal

- Remove the generator cover. Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.
- Remove the gearshift shaft oil seal (1).



I831G1330060-01

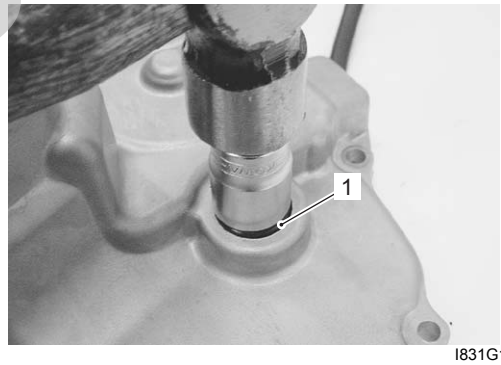
Installation

Install the oil seal in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

The removed oil seal must be replaced with new one.

- Install the oil seal (1) with a suitable socket wrench.



I831G1330061-01

- Install the generator cover. Refer to “Generator Removal and Installation in Section 1J (Page 1J-4)”.

Specifications

Service Data

B831G23307001

Drive Train

Unit: mm (in) Except ratio

Item		Standard	Limit
Primary reduction ratio (Automatic drive)		Variable change (2.763 – 0.780)	—
Secondary reduction ratio		2.158 (40/21 x 17/15)	—
Final reduction ratio	Front	3.600 (36/10)	—
	Rear	3.600 (36/10)	—
Transfer gear ratio	Low	2.562 (41/16)	—
	High	1.240 (31/25)	—
	Reverse	1.882 (32/17)	—
Shift fork to groove clearance	Low	0.10 – 0.30 (0.0040 – 0.0120)	0.50 (0.020)
	High	0.10 – 0.30 (0.0040 – 0.0120)	0.50 (0.020)
	Reverse	0.10 – 0.30 (0.0040 – 0.0120)	0.50 (0.020)
Shift fork groove width	Low	5.50 – 5.60 (0.217 – 0.220)	—
	High	5.50 – 5.60 (0.217 – 0.220)	—
	Reverse	5.50 – 5.60 (0.217 – 0.220)	—
Shift fork thickness	Low	5.30 – 5.40 (0.209 – 0.213)	—
	High	5.30 – 5.40 (0.209 – 0.213)	—
	Reverse	5.30 – 5.40 (0.209 – 0.213)	—

Special Tools and Equipment

Recommended Service Material

B831G23308001

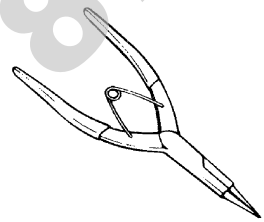
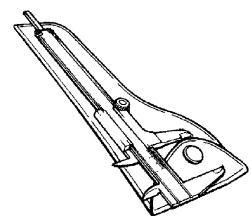
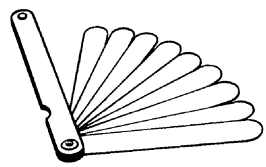
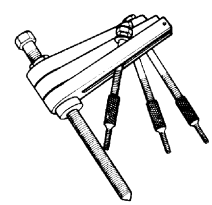
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 3C-14)

NOTE

Required service material is also described in the following.
"Transfer Components (Page 3C-2)"
"Gearshift Cam Components (Page 3C-9)"

Special Tool

B831G23308002

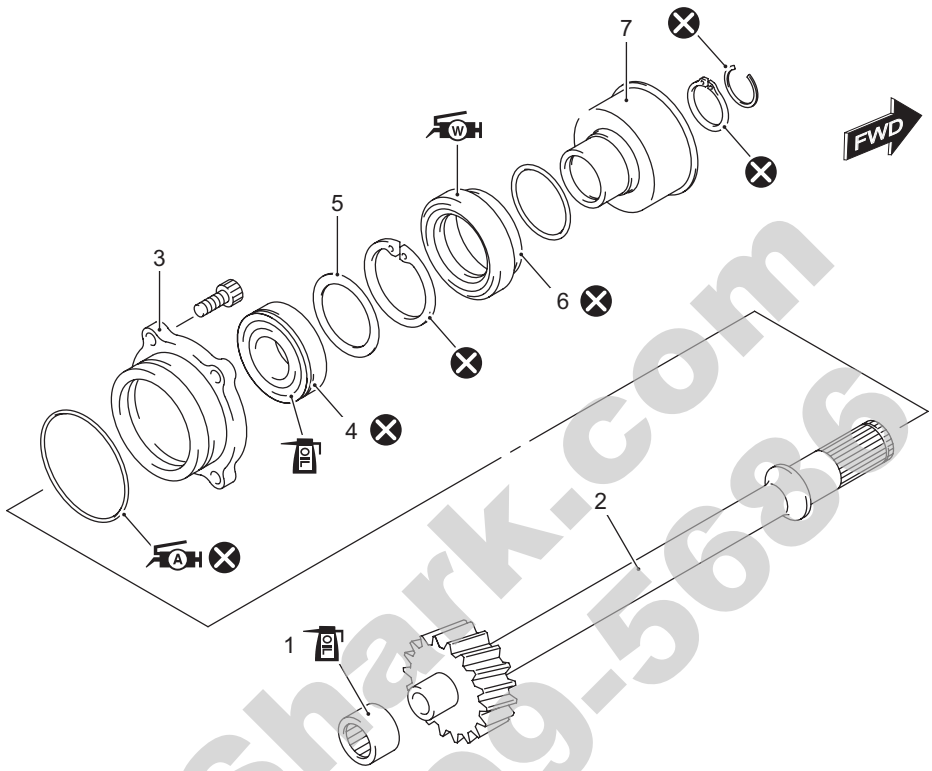
09900–06107 Snap ring pliers ☞(Page 3C-3) / ☞(Page 3C-11) / ☞(Page 3C-11) / ☞(Page 3C-11) / ☞(Page 3C-15) 	09900–20102 Vernier calipers (1/20 mm, 200 mm) ☞(Page 3C-13) / ☞(Page 3C-13) 
09900–20803 Thickness gauge ☞(Page 3C-12) 	09920–13120 Crankcase separating tool ☞(Page 3C-3) 

Propeller Shafts

Repair Instructions

Front Output Shaft Components

B831G23406001



I831G1340001-03

1. Front output shaft bearing (Rear)	7. Front drive collar assembly
2. Front output shaft	: Apply grease.
3. Front output shaft housing	: Apply water resistance grease.
4. Front output shaft bearing (Front)	: Apply engine oil.
5. Shim(s)	: Do not reuse.
6. Oil seal	

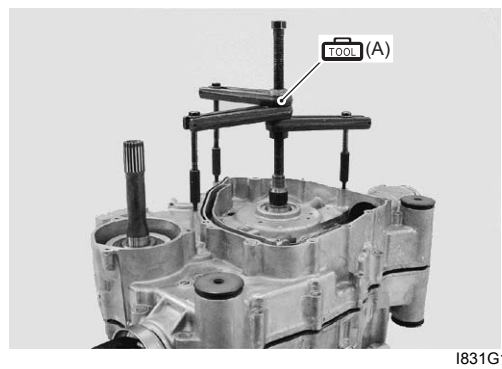
Front Output Shaft Removal and Installation

B831G23406002

Removal

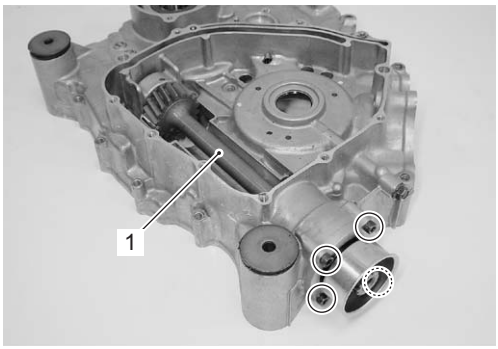
1) Remove the engine assembly from the frame. Refer to “Engine Assembly Removal in Section 1D (Page 1D-13)”.
2) Disassemble the engine top side. Refer to “Engine Top Side Disassembly in Section 1D (Page 1D-17)”.
3) Separate the crankcase with the special tool. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-45)”.

Special tool
(A): 09920–13120 (Crankcase separating tool)



I831G1340002-03

4) Remove the front output shaft (1) from the right crankcase.

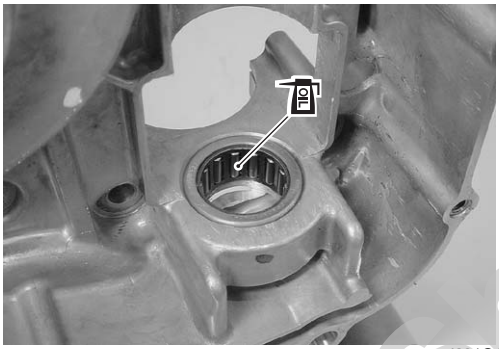


I831G1340003-02

Installation

Install the front output shaft in the reverse order of removal. Pay attention to the following point:

- Apply engine oil to the front output bearing (rear).



I831G1340097-01

- Apply a small quantity of grease to the O-ring (1).

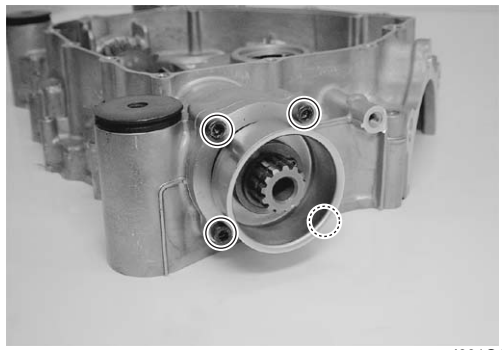
⚠ CAUTION

Replace a O-ring (1) with a new one.

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

I831G1340098-01

- Install the front output shaft to the right crankcase. Tighten the front output shaft bolts.



I831G1340004-02

Front Output Shaft Disassembly and Assembly

B831G23406003

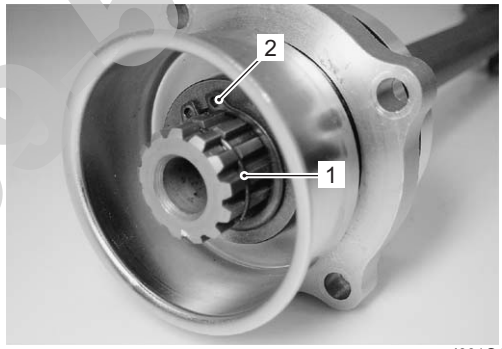
Refer to “Front Output Shaft Removal and Installation (Page 3D-1)”.

Disassembly

1) Remove the C-ring (1) and snap ring (2).

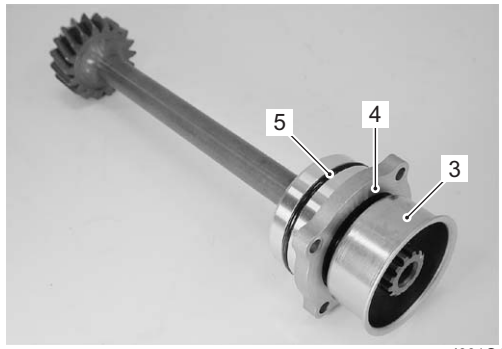
Special tool

: 09900–06107 (Snap ring pliers)



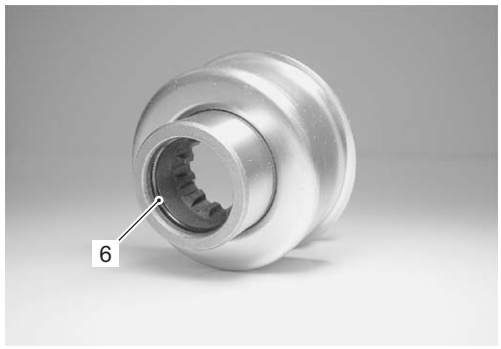
I831G1340005-02

2) Remove the front drive collar (3), front drive output shaft housing (4) and O-ring (5).



I831G1340006-02

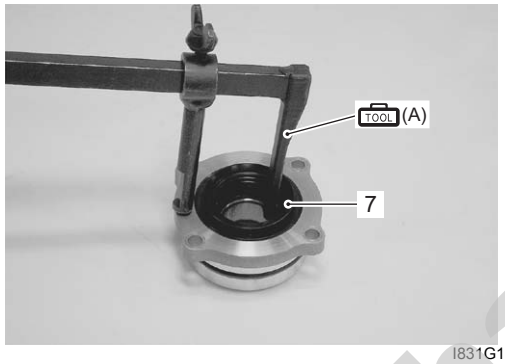
3) Remove the O-ring (6).



I831G1340007-02

4) Remove the oil seal (7) with the special tool.

Special tool
TOOL (A): 09913–50121 (Oil seal remover)



I831G1340008-01

5) Remove the snap ring (8) and washer (9).

Special tool
TOOL : 09900–06108 (Snap ring pliers)

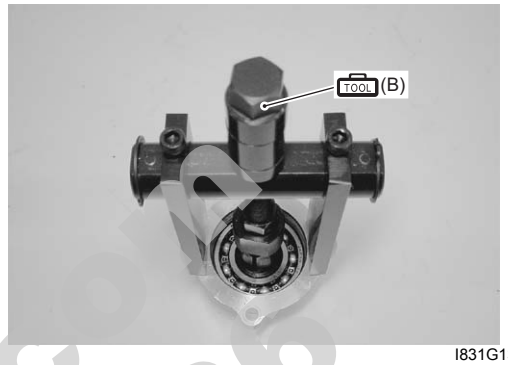
I831G1340009-01

6) Remove the front output shaft bearing (front) with the special tool.

NOTE

If there is no abnormal noise, the bearing removed is not necessary.

Special tool
TOOL (B): 09921–20240 (Bearing remover set)



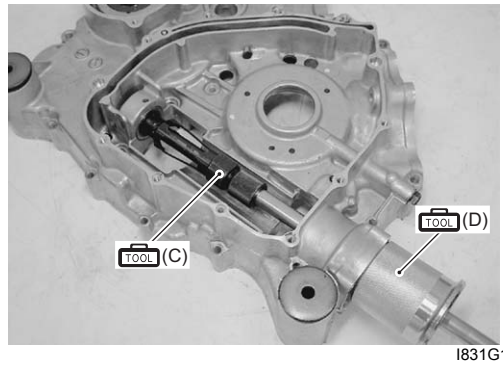
I831G1340010-01

7) Remove the front output shaft bearing (rear) with the special tool.

NOTE

If there is no abnormal noise, the bearing removed is not necessary.

Special tool
TOOL (C): 09923–74511 (Bearing remover)
TOOL (D): 09930–30104 (Rotor remover slide shaft)



I831G1340011-01

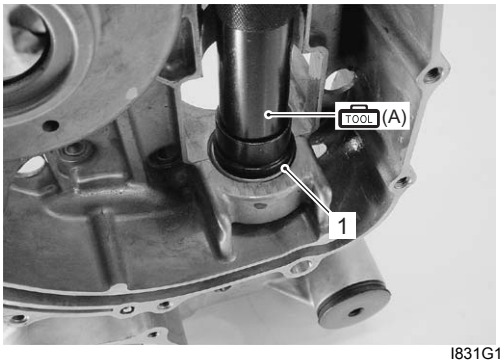
Assembly

⚠ CAUTION

The removed bearing, snap rings, oil seal, C-ring and O-rings must be replaced with new ones.

1) Install the front output shaft bearing (rear) (1) to the right crankcase with the special tool.

Special tool
(A): 09913–70210 (Bearing installer set)



I831G1340012-01

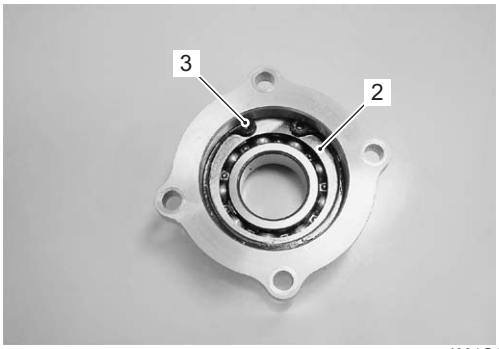
2) Install the front output shaft bearing (front) to the front output shaft housing with the special tool.

Special tool
(A): 09913–70210 (Bearing installer set)

I831G1340013-01

3) Install the washer (2) and snap ring (3).

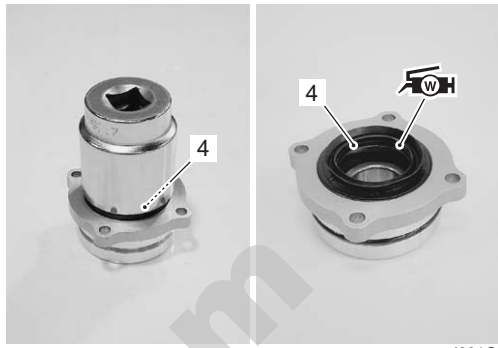
Special tool
: 09900–06108 (Snap ring pliers)



I831G1340014-02

4) Install the oil seal (4) with the suitable socket wrench.
5) Apply grease to the oil seal lip.

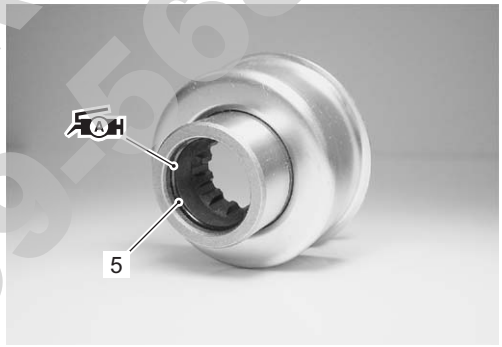
: Grease 99000–25160 (Water resistance grease)



I831G1340015-04

6) Install the O-ring (5) to the front drive collar.
7) Apply grease to the O-ring (5).

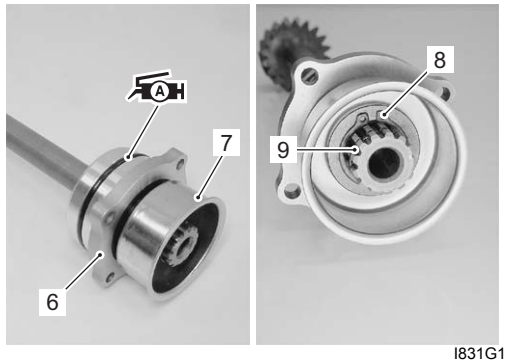
: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I831G1340016-02

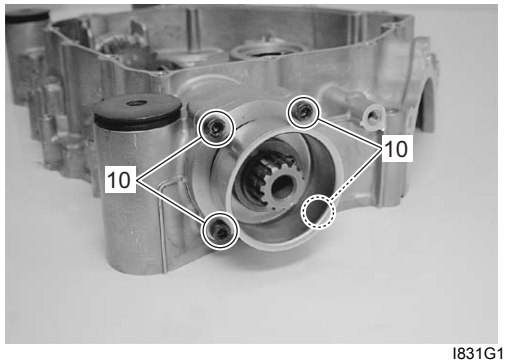
8) Install the output shaft housing (6) and front drive collar assembly (7) to the front output shaft.
9) Install the snap ring (8), C-ring (9) and O-ring.
10) Apply a small quantity of grease to the O-ring.

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



I831G1340017-02

11) Install the front output shaft to the right crankcase.
12) Tighten the front output shaft bolts (10).



I831G1340018-03

13) Assemble the engine. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-45)” and “Engine Top Side Assembly in Section 1D (Page 1D-21)”.
14) Remount the engine assembly. Refer to “Engine Assembly Installation in Section 1D (Page 1D-16)”.

Front Output Shaft Related Parts Inspection

B831G23406004

Refer to “Front Output Shaft Disassembly and Assembly (Page 3D-2)”.

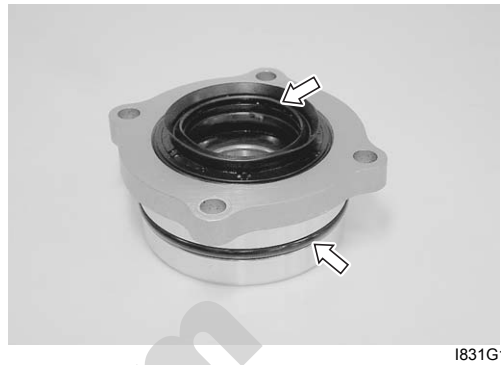
Front Output Shaft

Inspect the front output shaft for distortion.
If distortion is found, replace the front output shaft with a new one.
Inspect the gear of the front output shaft for wear or damage. If any defects are found, replace the drive and driven bevel gears as a set.

I831G1340019-01

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.



I831G1340020-01

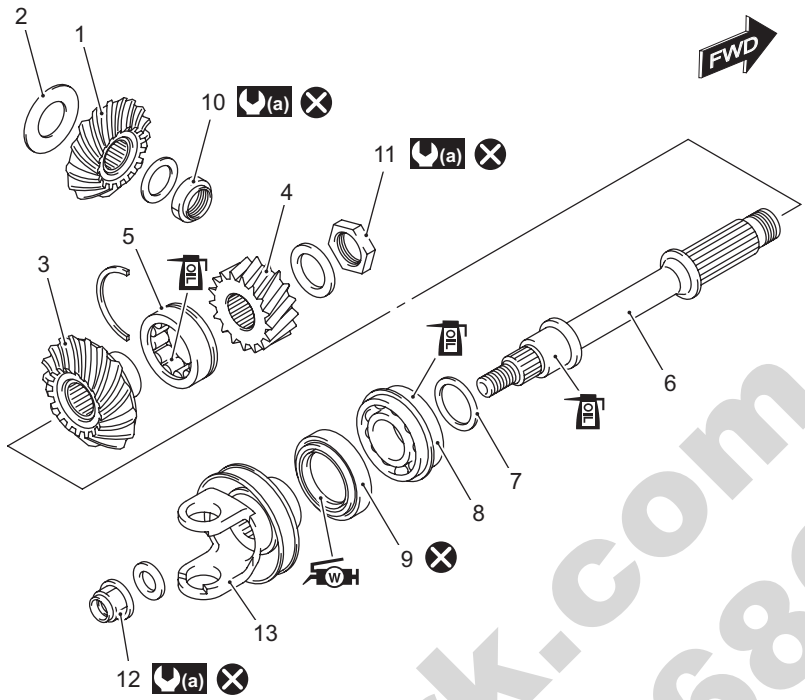
Front Output Shaft Bearing

Inspect the front output shaft bearings for abnormal noise and smooth rotation.
Replace the bearings if there is anything unusual.

I831G1340021-01

Rear Output Shaft Components

B831G23406005



I831G1340022-05

1. Rear output shaft drive bevel gear	7. Shim(s)	13. Rear output shaft yoke
2. Shim(s)	8. Bearing	(a) : 100 N·m (10.0 kgf-m 72.5 lb-ft)
3. Rear output shaft driven bevel gear	9. Oil seal	W H : Apply water resistance grease.
4. Front output shaft drive gear	10. Drive bevel gear nut	OIL : Apply engine oil.
5. Bearing	11. Rear output shaft nut	: Do not reuse.
6. Rear output shaft	12. Output shaft nut	

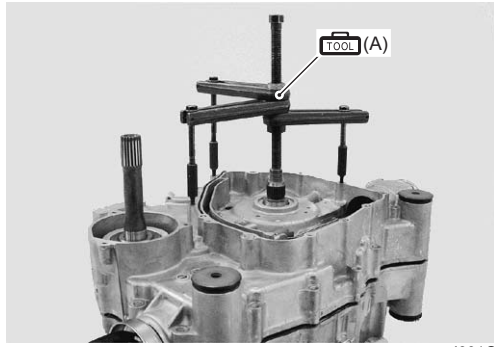
Rear Output Shaft Removal and Installation

B831G23406006

Removal

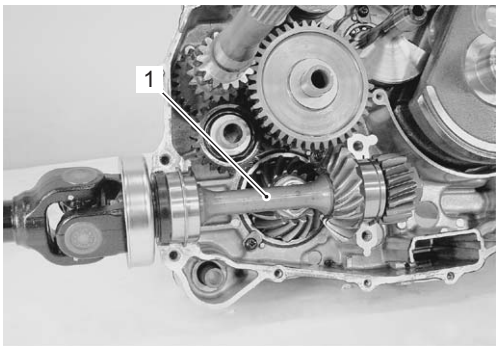
1) Remove the engine assembly from the frame. Refer to “Engine Assembly Removal in Section 1D (Page 1D-13)”.
2) Disassemble the engine top side. Refer to “Engine Top Side Disassembly in Section 1D (Page 1D-17)”.
3) Separate the crankcase with the special tool. Refer to “Engine Bottom Side Disassembly in Section 1D (Page 1D-45)”.

Special tool
TOOL (A): 09920–13120 (Crankcase separating tool)



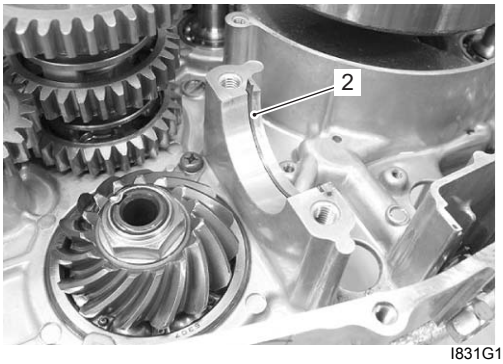
I831G1340002-03

4) Remove the rear output shaft (1).



I831G1340023-01

5) Remove the C-ring (2).



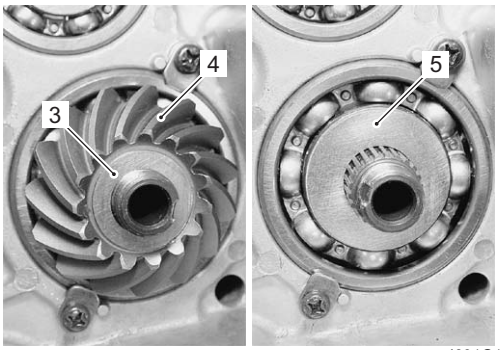
I831G1340090-01

6) Remove the drive shaft, counter shaft assembly and reverse idle gear. Refer to “Transfer Removal and Installation in Section 3C (Page 3C-3)”.
7) Unlock the drive bevel gear nut with a chisel.
8) Hold the transfer output driving gear with the special tool and remove the drive bevel gear nut.

Special tool
TOOL (A): 09920–53740 (Clutch sleeve hub holder)

I831G1340024-01

9) Remove the washer (3), drive bevel gear (4) and shim (5).



I831G1340026-02

Installation
Install the rear output shaft in the reverse order of removal. Pay attention to the following points:

- Hold the transfer output driven gear with the special tool and tighten the drive bevel gear nut to the specified torque.

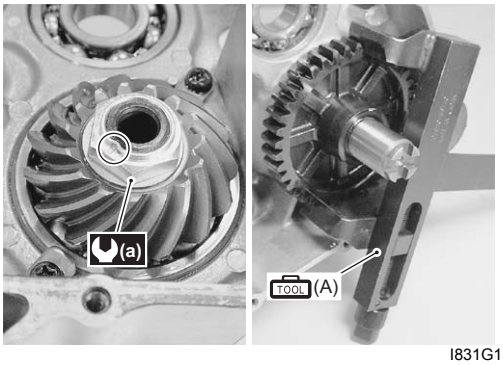
⚠ CAUTION

The removed drive bevel gear nut must be replaced with a new one.

Special tool
TOOL (A): 09920–53740 (Clutch sleeve hub holder)

Tightening torque
Rear output shaft drive bevel gear nut (a): 100 N·m (10.0 kgf-m, 72.5 lb-ft)

- Lock the drive bevel gear nut with a center punch.

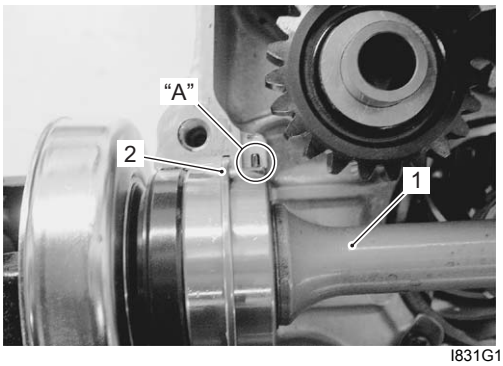


I831G1340027-01

- Install the rear output shaft (1).

NOTE

Be sure to fit the C-ring (2) and bearing knock-pin "A" on the bearing to the groove of the crankcase.



I831G1340028-03

- After installed rear output shaft, inspect the backlash and tooth contact. Refer to "Rear Output Shaft Drive Bevel Gear Shim Inspection and Adjustment (Page 3D-11)".

Rear Output Shaft Disassembly and Assembly

B831G23406007

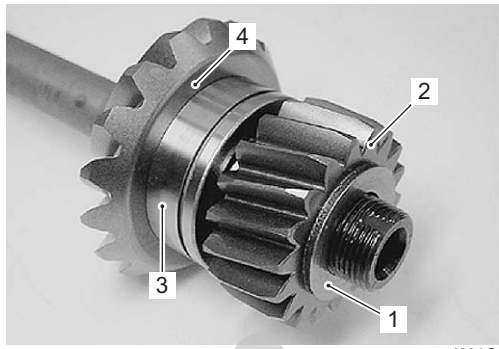
Refer to "Rear Output Shaft Removal and Installation (Page 3D-6)".

Disassembly

1) Using a chisel, unlock the nut. Remove the rear output shaft nut.

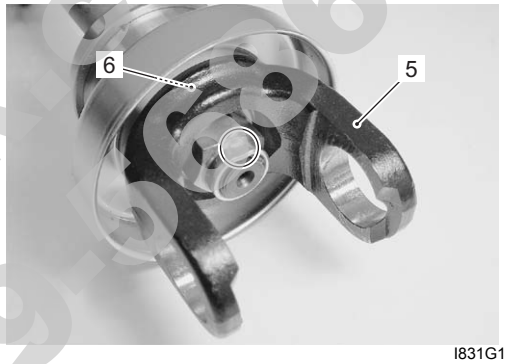
I831G1340031-05

2) Remove the washer (1), rear output shaft driven gear (2), bearing (3) and rear output shaft driven bevel gear (4).



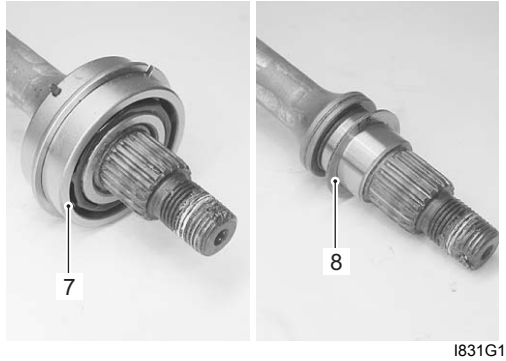
I831G1340032-06

3) Remove the rear output shaft yoke (5) and oil seal (6).
Refer to "Rear Propeller Shaft Removal and Installation (Page 3D-17)".



I831G1340029-03

4) Remove the bearing (7) and shim (8).



I831G1340030-03

Assembly
Assemble the rear output shaft in the reverse order of disassembly. Pay attention to the following points:

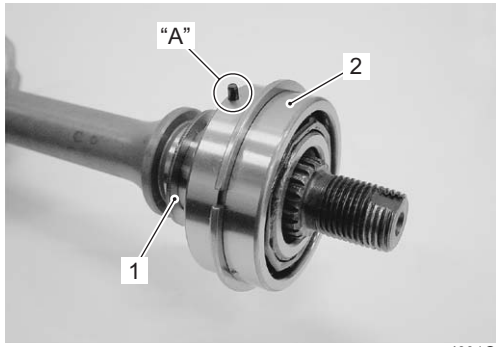
NOTE

Apply engine oil to each running part before reassembling.

- Install the shim(s) (1) and bearing (2).

NOTE

The bearing knock-pin "A" should be positioned inside.



I831G1340035-02

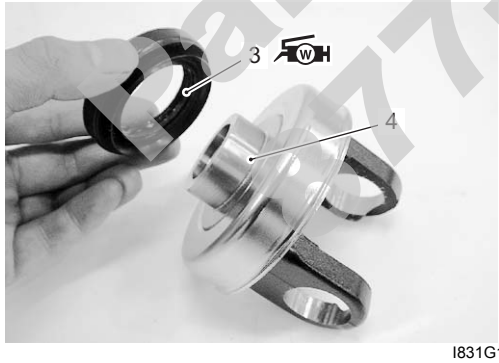
- Apply grease to the oil seal (3).

: Grease 99000–25160 (Water resistance grease)

- Install the oil seal to the rear output shaft yoke (4).

⚠ CAUTION

Replace the oil seal (3) with a new one.



I831G1340101-02

- Apply thread lock to the thread part of the output shaft.

: Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

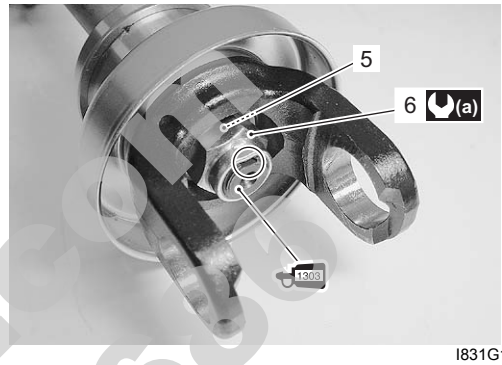
- After installed rear output shaft yoke to the rear output shaft, install the washer (5) and tighten the output shaft nut (6) to the specified torque.

⚠ CAUTION

Do not reuse the output shaft nut (6).

Tightening torque
Rear output shaft nut (a): 100 N·m (10.0 kgf-m, 72.5 lb-ft)

- Lock the rear output shaft nut with a center punch.

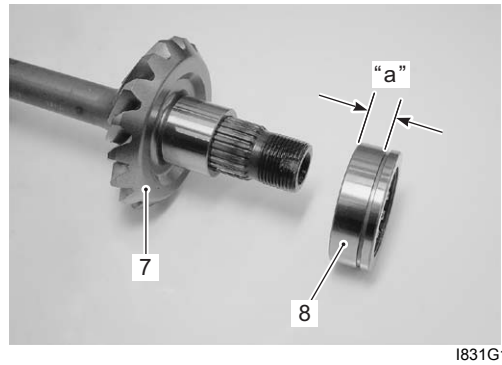


I831G1340102-03

- Install the rear output shaft driven bevel gear (7) and bearing (8).

NOTE

The wider side "a" of the bearing should be positioned bevel gear side.



I831G1340033-02

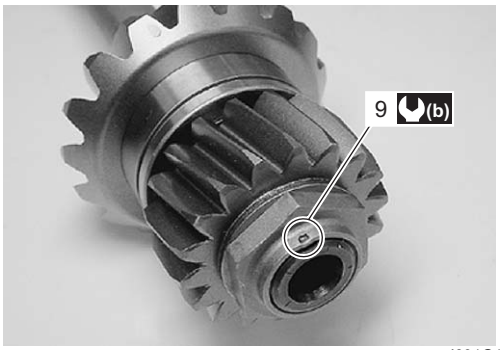
- With the rear output shaft held immovable with a vise, tighten the rear output shaft driven gear nut (9) to the specified torque.

⚠ CAUTION

The removed nut must be replaced with a new one.

Tightening torque
Rear output shaft driven gear nut (b): 100 N·m (10.0 kgf-m, 72.5 lb-ft)

- Lock the rear output shaft driven gear nut (9) with a center punch.



I831G1340034-03

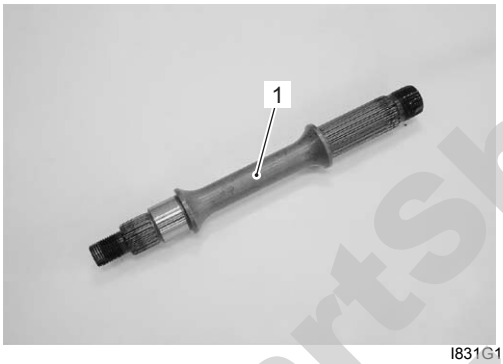
Rear Output Shaft Related Parts Inspection

B831G23406008

Refer to “Rear Output Shaft Disassembly and Assembly (Page 3D-8)”.

Rear Output shaft

Inspect the rear output shaft (1) for wear or damage. If any defects are found, replace the rear output shaft with a new one.



I831G1340036-01

Rear Output Shaft Bevel Gear

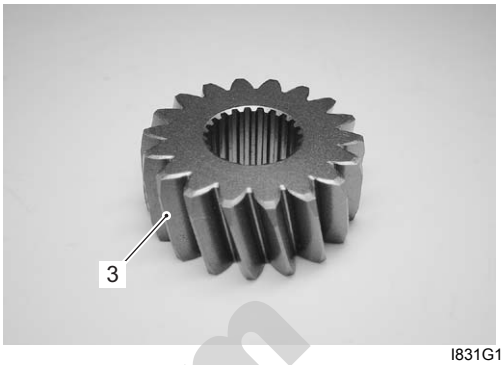
Inspect the drive and driven bevel gear for wear or damage.

- If any defects are found, replace the drive and driven bevel gears as a set.

I831G1340037-01

Rear Output Shaft Gear

Inspect the rear output shaft gear for wear or damage. If any defects are found, replace the rear output shaft gear with the new one.



I831G1340038-01

Bearing

Inspect the rear output shaft bearing and rear driven bevel gear bearing for abnormal noise and smooth rotation.

I831G1340039-01

Rear Output Shaft Drive Bevel Gear Shim Inspection and Adjustment

B831G23406009

Refer to “Rear Output Shaft Removal and Installation (Page 3D-6)”.

Backlash

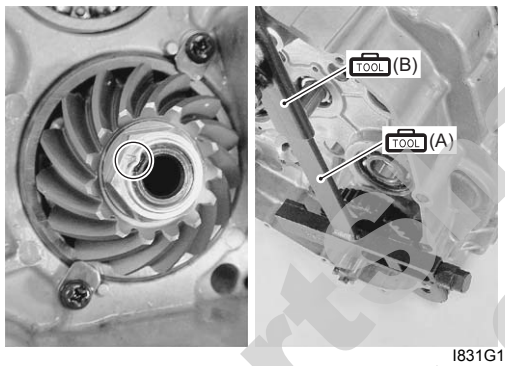
- Install the shim, drive bevel gear, washer and new drive bevel gear nut.
- Hold the transfer output driven gear with the special tool and tighten the drive bevel gear nut to the specified torque.

NOTE

At this time, it is not necessary to bend the drive bevel gear nut collar.

Special tool
(A): 09920–53740 (Clutch sleeve hub holder)
(B): 09920–31020 (Extension handle)

Tightening torque
Rear output shaft drive bevel gear nut: 100 N·m (10.0 kgf-m, 72.5 lb-ft)

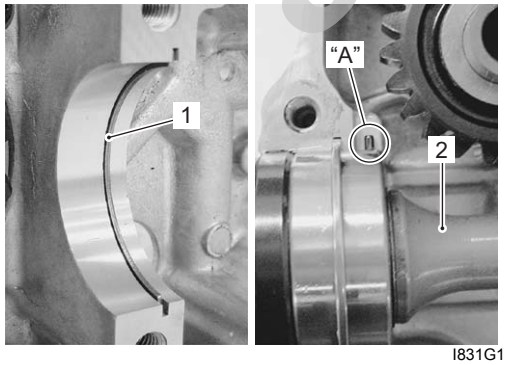


I831G1340040-01

- Install the C-ring (1) and rear output shaft (2).

NOTE

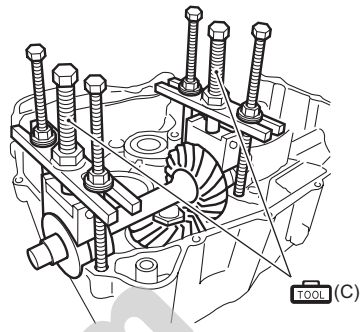
Be sure to fit the bearing knock-pin “A” on the bearing to the groove of the crankcase.



I831G1340041-01

- Place the rear output shaft on the left crankcase half and hold bearings with the special tool.

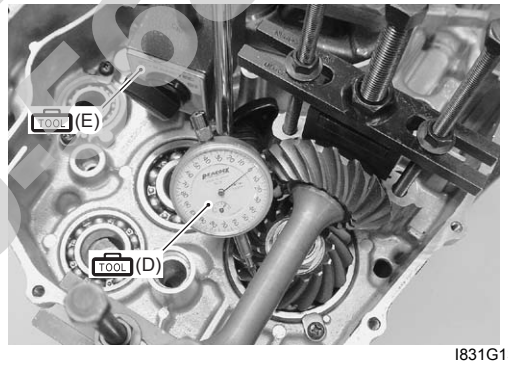
Special tool
(C): 09921–21910 (Bearing holder)



I831G1340099-03

- Set the dial gauge on the drive bevel gear as shown in the figure.

Special tool
(D): 09900–20607 (Dial gauge (1/100 mm, 10 mm))
(E): 09900–20701 (Magnetic stand)



I831G1340043-04

- Measure the backlash by turning the drive bevel gear shaft in each direction, reading the total backlash with the dial gauge. If the backlash is not within specification, the shim must be changed and backlash should be re-checked until correct. Check the table at the appropriate shim thickness.

NOTE

Adjust the backlash by referring to the table at the using the thickness of the removed shims as a guide.

Rear output shaft bevel gear backlash
Standard: 0.03 – 0.15 mm (0.0001 – 0.006 in)

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)

Part No.	Shim thickness
24945-03G50-055	0.550 mm (0.022 in)
24945-03G50-058	0.575 mm (0.023 in)
24945-03G50-060	0.600 mm (0.024 in)
24945-03G50-063	0.625 mm (0.025 in)
24945-03G50-065	0.650 mm (0.026 in)
24945-03G50-068	0.675 mm (0.027 in)
24945-03G50-070	0.700 mm (0.028 in)
24945-03G50-073	0.725 mm (0.029 in)
24945-03G50-075	0.750 mm (0.030 in)
24945-03G50-078	0.775 mm (0.031 in)
24945-03G50-080	0.800 mm (0.031 in)
24945-03G50-083	0.825 mm (0.032 in)
24945-03G50-085	0.850 mm (0.033 in)
24945-03G50-088	0.875 mm (0.034 in)
24945-03G50-090	0.900 mm (0.035 in)
24945-03G50-093	0.925 mm (0.036 in)
24945-03G50-095	0.950 mm (0.037 in)
24945-03G50-098	0.975 mm (0.038 in)
24945-03G50-100	1.000 mm (0.039 in)
24945-03G50-103	1.025 mm (0.040 in)
24945-03G50-105	1.050 mm (0.041 in)
24945-03G50-108	1.075 mm (0.042 in)
24945-03G50-110	1.100 mm (0.043 in)
24945-03G50-113	1.125 mm (0.044 in)
24945-03G50-115	1.150 mm (0.045 in)
24945-03G50-118	1.175 mm (0.046 in)
24945-03G50-120	1.200 mm (0.047 in)
24945-03G50-123	1.225 mm (0.048 in)
24945-03G50-125	1.250 mm (0.049 in)
24945-03G50-128	1.275 mm (0.050 in)
24945-03G50-130	1.300 mm (0.051 in)
24945-03G50-133	1.330 mm (0.052 in)
24945-03G50-135	1.350 mm (0.053 in)
24945-03G50-138	1.380 mm (0.054 in)
24945-03G50-140	1.400 mm (0.055 in)

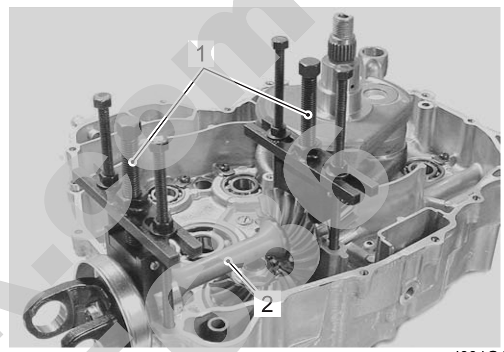
- Check the tooth contact.

Tooth Contact

⚠ **CAUTION**

Make sure to check the backlash after the tooth contact has been adjusted, since it may have changed. Adjust the tooth contact and backlash until they are both within specification. If the correct tooth contact cannot be maintained when adjusting the backlash, replace the rear output shaft drive and driven bevel gears.

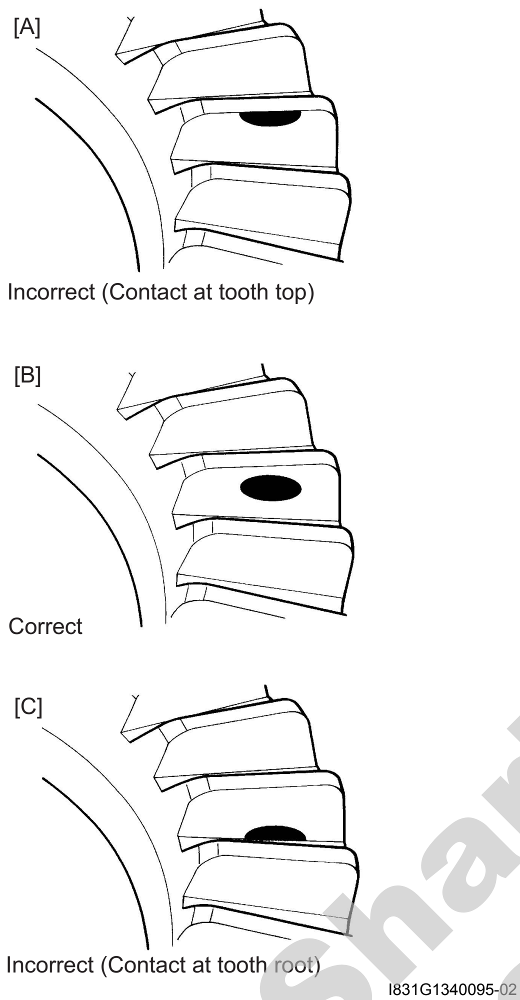
- Remove the special tool (1) and rear output shaft (2) from the left crankcase.



I831G1340044-02

- Clean and degrease several teeth of the drive and driven bevel gears, and then apply a coating of machinist's layout dye or paste to several teeth of the rear output shaft driven bevel gear.
- Install the rear output shaft.
- Rotate the rear output shaft driven bevel gear several turns in both directions.
- Remove the output shaft and inspect the coated teeth of the rear output shaft drive bevel gear. The tooth contact pattern should be as shown in [A], [B] and [C]. If tooth contact is found to be incorrect (examples [A] and [C]), the shim thickness between the rear output shaft drive bevel gear and bearing must be changed and the tooth contact re-checked until correct (examples [B]).

Tooth contact	Shim adjustment
Contact at tooth top [A]	Increase shim thickness
Contact at tooth root [C]	Decrease shim thickness



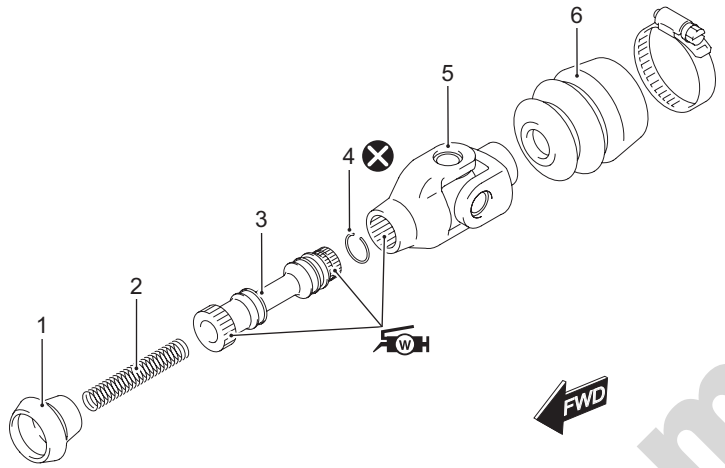
List of shims (for drive bevel gear)

Part No.	Shim thickness	
24935-19B00-025: 0.25 mm (0.0098 in)	Combined shim	0.25+0.25=0.50 mm (0.0197 in)
		0.25+0.30=0.55 mm (0.0217 in)
		0.30+0.30=0.60 mm (0.0236 in)
		0.30+0.35=0.65 mm (0.0256 in)
24935-19B00-030: 0.30 mm (0.0118 in)		0.35+0.35=0.70 mm (0.0276)
		0.25+0.25+ 0.25=0.75 mm (0.0295 in)
24935-19B00-035: 0.35 mm (0.0138 in)		0.25+0.25+0.30=0.80 mm (0.0315 in)
		0.25+0.25+0.35=0.85 mm (0.0335 in)

Part No.	Shim thickness
24935-03G50-055	0.550 mm (0.0217 in)
24935-03G50-058	0.575 mm (0.0226 in)
24935-03G50-060	0.600 mm (0.0236 in)
24935-03G50-063	0.625 mm (0.0246 in)
24935-03G50-065	0.650 mm (0.0256 in)
24935-03G50-068	0.675 mm (0.0266 in)
24935-03G50-070	0.700 mm (0.0276 in)
24935-03G50-073	0.725 mm (0.0285 in)
24935-03G50-075	0.750 mm (0.0295 in)
24935-03G50-078	0.775 mm (0.0305 in)
24935-03G50-080	0.800 mm (0.0315 in)
24935-03G50-083	0.825 mm (0.0325 in)
24935-03G50-085	0.850 mm (0.0335 in)
24935-03G50-088	0.875 mm (0.0344 in)
24935-03G50-090	0.900 mm (0.0354 in)
24935-03G50-093	0.925 mm (0.0364 in)
24935-03G50-095	0.950 mm (0.0374 in)
24935-03G50-098	0.975 mm (0.0384 in)
24935-03G50-100	1.000 mm (0.0394 in)
24935-03G50-103	1.025 mm (0.0404 in)
24935-03G50-105	1.050 mm (0.0413 in)
24935-03G50-108	1.075 mm (0.0423 in)
24935-03G50-110	1.100 mm (0.0433 in)
24935-03G50-113	1.125 mm (0.0443 in)
24935-03G50-115	1.150 mm (0.0453 in)
24935-03G50-118	1.175 mm (0.0463 in)
24935-03G50-120	1.200 mm (0.0472 in)
24935-03G50-123	1.225 mm (0.0482 in)
24935-03G50-125	1.250 mm (0.0492 in)
24935-03G50-128	1.275 mm (0.0502 in)
24935-03G50-130	1.300 mm (0.0512 in)

Front Propeller Shaft Components

B831G23406010



I831G1340045-04

1. Boot	5. Universal joint
2. Front propeller shaft spring	6. Boot
3. Front propeller shaft	W : Apply water resistance grease.
4. Circlip	⊗ : Do not reuse.

Front Propeller Shaft Removal and Installation

B831G23406011

Refer to “Front Propeller Shaft Components (Page 3D-14)” and “Front Drive (Differential) Construction in Section 3B (Page 3B-3)”.

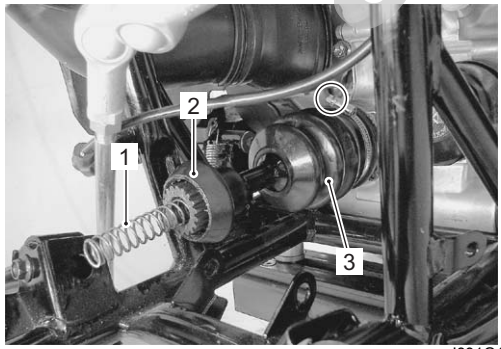
Removal

Remove the front drive (differential) assembly.
Refer to “Front Drive (Differential) Assembly Removal and Installation in Section 3B (Page 3B-4)”.

1) Remove the front propeller shaft spring (1) and front propeller shaft boot (2).
2) Loosen the boot clamp screw and remove the universal joint boot (3).

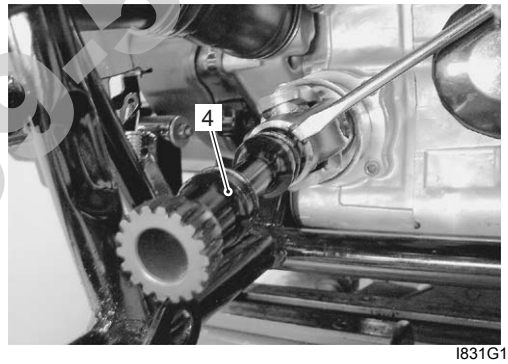
NOTE

Apply oil to the removing direction of the universal joint boot before removing.



I831G1340046-01

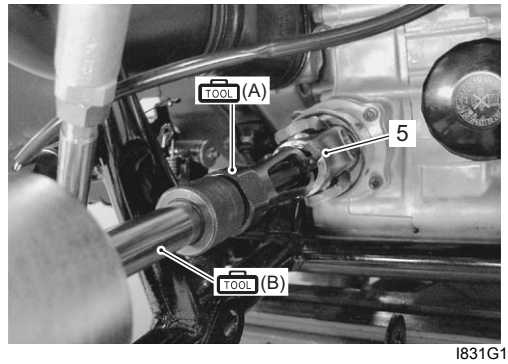
3) Using a (–) screwdriver or the like into a notch of the universal joint and remove the front propeller shaft (4).



I831G1340047-01

4) Remove the universal joint (5) from the joint portion (at the engine side) with special tools.

Special tool
TOOL (A): 09923–74511 (Bearing remover)
TOOL (B): 09930–30104 (Rotor remover slide shaft)



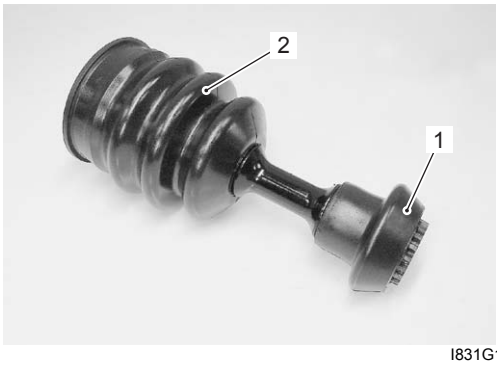
I831G1340048-01

Installation

⚠ CAUTION

The removed circlips must be replaced with new ones.

1) Fit the front propeller shaft boot (1) and universal joint boot (2) to the front propeller shaft groove.

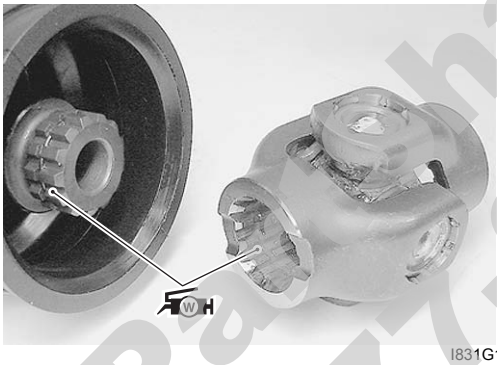


I831G1340049-02

2) Apply grease (approx. 4 grams) to the spline of universal joint and spline of the front propeller shaft.

: Grease 99000–25160 (Water resistance grease)

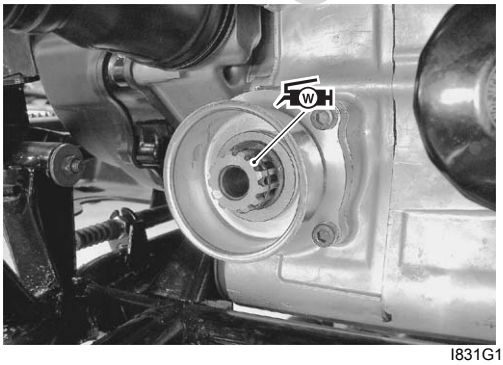
3) Connect the propeller shaft to the universal joint.



I831G1340050-02

4) Apply grease (approx. 4 grams) to the spline.

: Grease 99000–25160 (Water resistance grease)



I831G1340051-01

5) Connect the universal joint to the joint portion (at the engine side).

6) Attach the boot to the front drive collar and tighten the boot clamp screw to the specified torque.

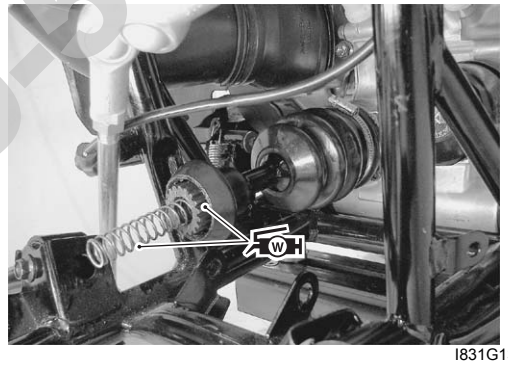
Tightening torque
Front propeller shaft boot clamp screw: 1.3 N·m (0.13 kgf-m, 1.0 lb-ft)

I831G1340100-01

7) Install the front propeller shaft spring.

8) Apply grease (approx. 4 grams) to the spline of front propeller shaft and spring.

: Grease 99000–25160 (Water resistance grease)



I831G1340052-01

9) Install the front drive (differential) assembly. Refer to “Front Drive (Differential) Assembly Removal and Installation in Section 3B (Page 3B-4)”.

Front Propeller Shaft Related Parts Inspection

B831G23406012

Refer to “Front Propeller Shaft Removal and Installation (Page 3D-14)”.

Front Propeller Shaft

Inspect the front propeller shaft for wear or damage. If any defects are found, replace the front propeller shaft with a new one.

I831G1340053-01

Front Propeller Shaft Spring

Inspect the front propeller shaft spring for damage or fatigue. If any defects are found, replace the front propeller shaft spring with a new one.

I831G1340054-01

Universal Joint

Inspect the play by turning the universal joint. If excessive play is noted, replace it with a new one.

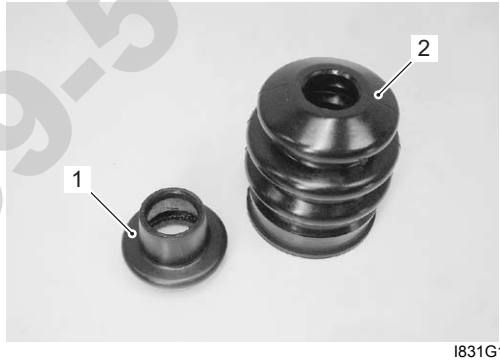
⚠ CAUTION

Do not attempt to disassemble the universal joint.

I831G1340055-01

Boots

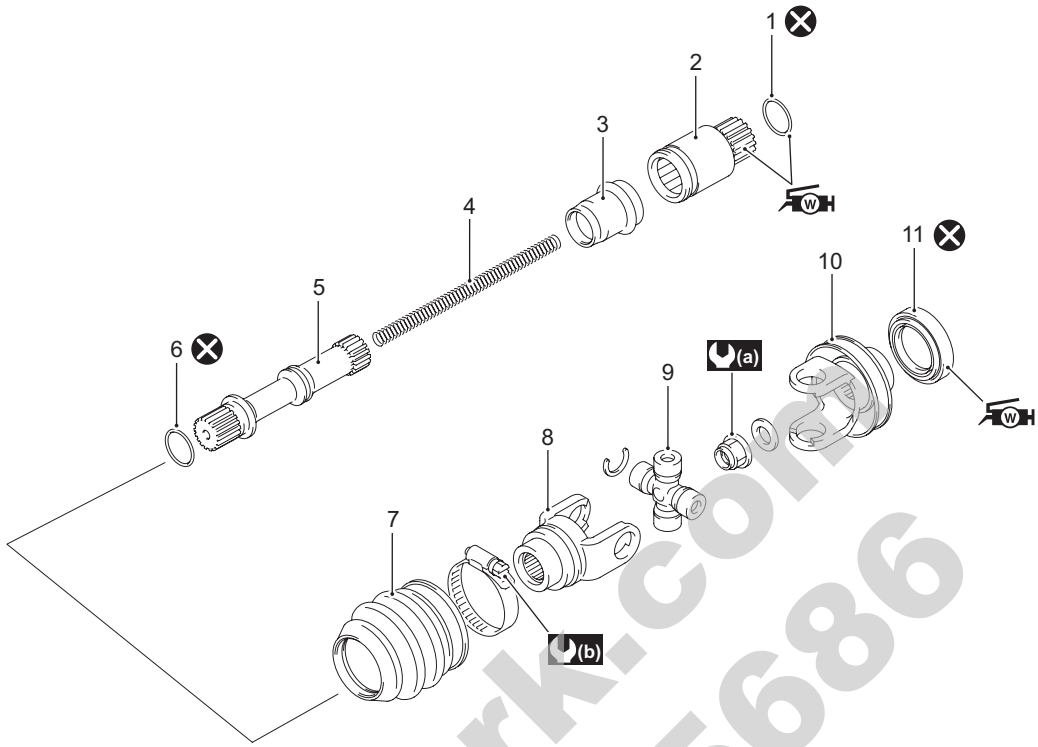
Inspect the front propeller shaft boot (1) and universal joint boot (2) for crack or damage. If any defects are found, replace the boot part with a new one.



I831G1340056-01

Rear Propeller Shaft Components

B831G23406013



I831G1340057-04

1. O-ring	9. Universal joint set
2. Rear propeller shaft joint	10. Rear output shaft yoke
3. Rear propeller shaft boot	11. Oil seal
4. Rear propeller shaft spring	(a) : 100 N·m (10.0 kgf-m, 72.5 lb-ft)
5. Rear propeller shaft	(b) : 2 N·m (0.2 kgf-m, 1.5 lb-ft)
6. O-ring	W : Apply water resistance grease.
7. Rear propeller shaft boot	: Do not reuse.
8. Rear propeller shaft yoke	

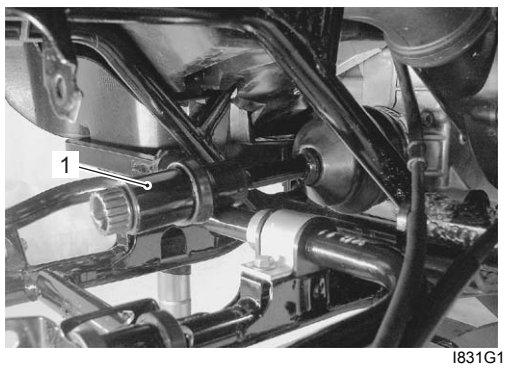
Rear Propeller Shaft Removal and Installation

B831G23406014

Refer to “Rear Propeller Shaft Components (Page 3D-17)”.
Refer to “Final Gear Construction in Section 3B (Page 3B-22)”.

Removal

1) Remove the final gear assembly. Refer to “Final Gear Assembly Removal and Installation in Section 3B (Page 3B-23)”.
2) Remove the rear propeller shaft joint (1).

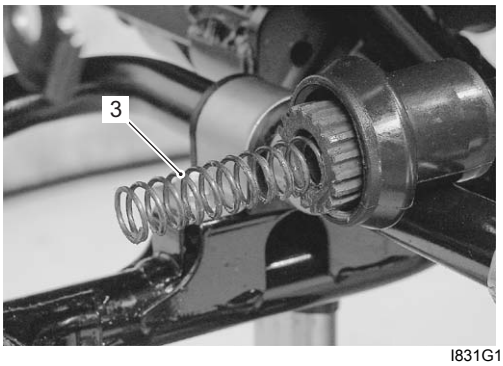


I831G1340059-01

3) Remove the O-ring (2).

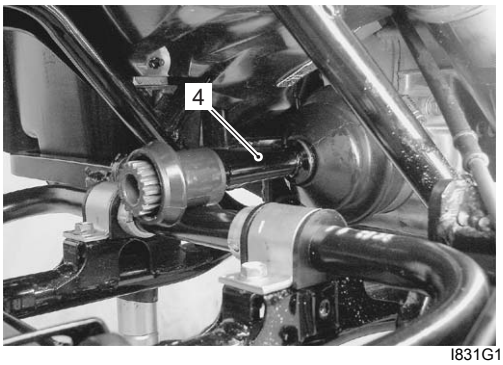
I831G1340060-01

4) Remove the rear propeller shaft spring (3).



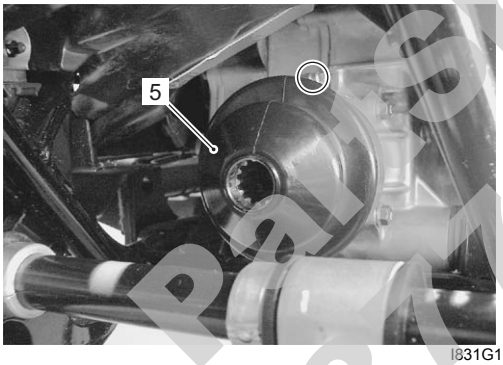
I831G1340061-01

5) Draw out the rear propeller shaft (4) horizontally.



I831G1340062-01

6) Loosen the boot clamp screw and remove the rear propeller shaft boot (5).

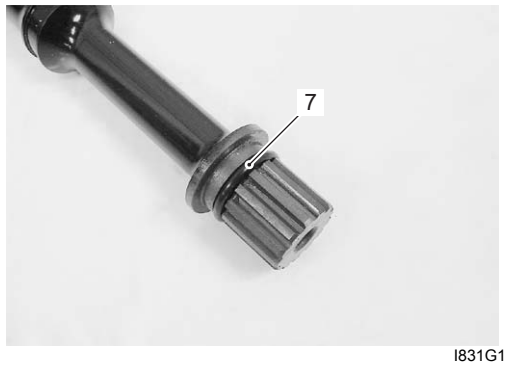


I831G1340063-01

7) Remove the rear propeller shaft joint boot (6).

I831G1340064-01

8) Remove the O-ring (7).



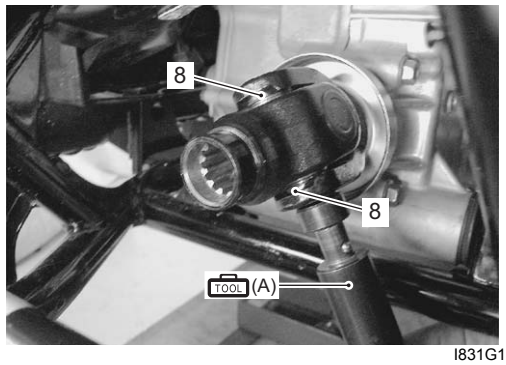
I831G1340065-01

9) Remove the circlips from the universal joint.

I831G1340066-03

10) Remove the bearings (8) by tapping with the special tool and remove the universal joint and propeller shaft yoke.

Special tool
(A): 09913–70210 (Bearing installer set)

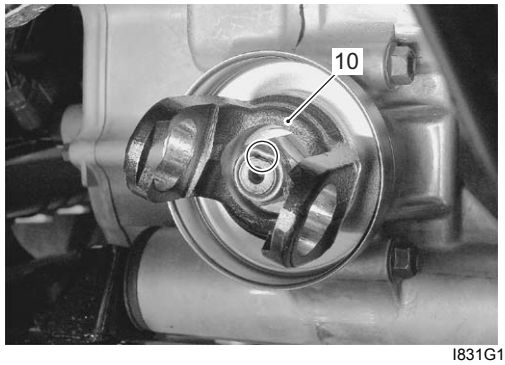


I831G1340067-03

11) Remove the circlips and joint (9).

I831G1340068-04

12) Unlock the nut with a chisel.
13) Shift into the reverse gear.
14) Remove the rear output shaft yoke (10).



I831G1340069-02

15) Remove the oil seal.


I831G1340070-01

Installation

⚠ CAUTION

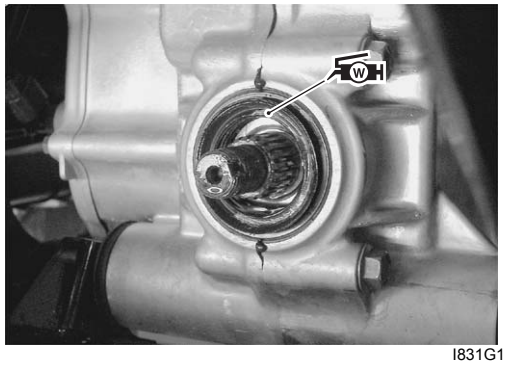
The removed oil seal, nut, circlips and O-ring must be replaced with a new ones.

1) Install the oil seal into the final gear case with the special tool.

Special tool
TOOL : 09913–70210 (Bearing installer set)

2) Apply grease to lip of the oil seal.

W : Grease 99000–25160 (Water resistance grease)



I831G1340071-01

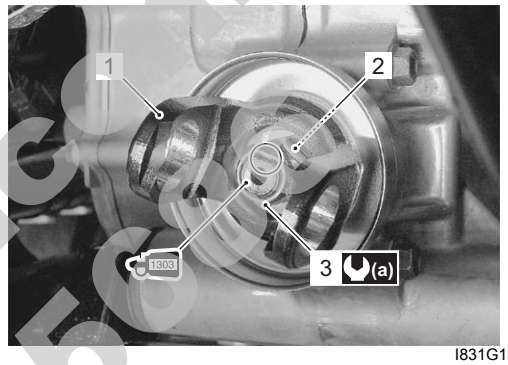
3) Shift into the low gear.
4) Apply thread lock to the rear output shaft.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

5) Install the rear output shaft yoke (1) and washer (2). Tighten the rear output shaft nut (3) to the specified torque.

Tightening torque
Rear output shaft nut (a): 100 N·m (10.0 kgf-m, 72.5 lb-ft)

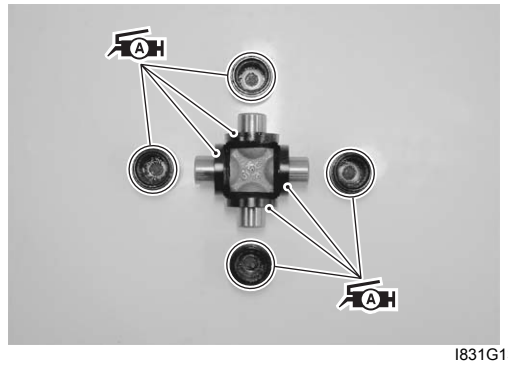
6) Lock the rear output shaft nut (3) with a center punch.



I831G1340072-02

7) Apply grease to the bearings and dust seal lip.

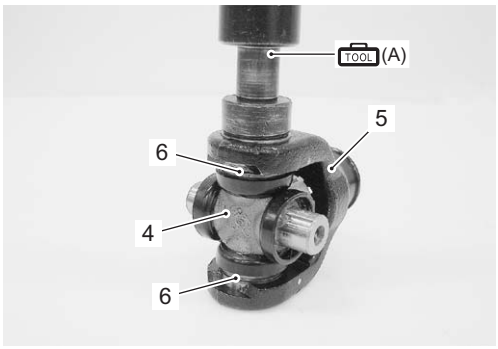
A : Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I831G1340073-01

8) Install the universal joint (4) to the yoke (5) and bearings (6) with the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)



I831G1340074-03

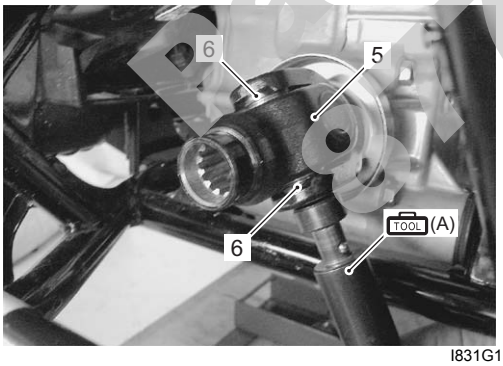
9) Install the circlips.

I831G1340075-01

10) Install the yoke (5).

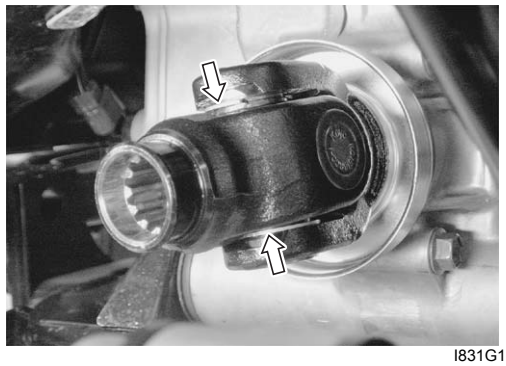
11) Install the bearings (6) by tapping with the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)



I831G1340076-04

12) Install the circlips to the universal joint.



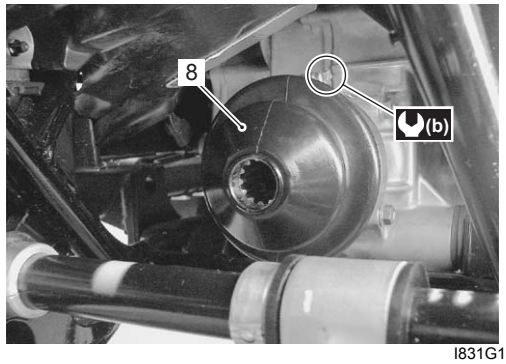
I831G1340077-02

13) Install the O-ring (7) to the rear propeller shaft.

I831G1340078-02

14) Install the rear propeller shaft boot (8) and tighten the clamp screw to the specified torque.

Tightening torque
Rear propeller shaft boot clamp screw (b): 2 N·m (0.2 kgf-m, 1.5 lb-ft)



I831G1340079-03

15) Fit the rear propeller shaft joint boot (9) to the rear propeller shaft groove.

I831G1340096-02

16) Apply resistance grease (approx. 4 grams) to the splines of the rear propeller shaft.

: Grease 99000–25160 (Water resistance grease)

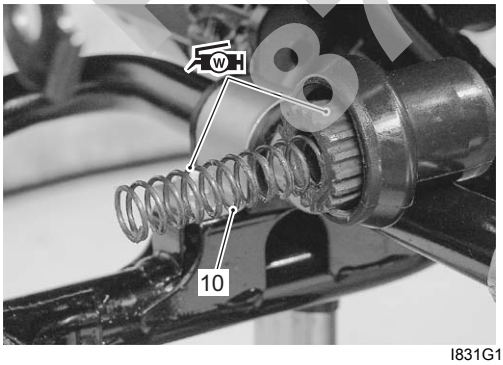
I831G1340080-01

17) Install the rear propeller shaft.

18) Apply grease (approx. 4 grams) to the spline of rear propeller shaft and propeller shaft spring (10).

: Grease 99000–25160 (Water resistance grease)

19) Install the rear propeller shaft spring (10).



I831G1340081-03

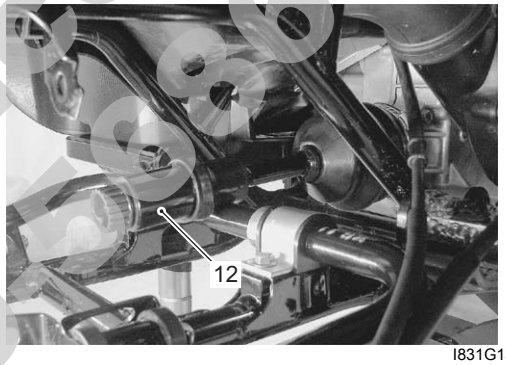
20) Install the O-ring (11) to the rear propeller shaft joint.

21) Apply grease (approx. 4 grams) to the spline of rear propeller shaft joint.

: Grease 99000–25160 (Water resistance grease)

I831G1340082-03

22) Install the rear propeller shaft joint (12).



I831G1340083-04

23) Install the final gear assembly. Refer to “Final Gear Assembly Removal and Installation in Section 3B (Page 3B-23)”.

Rear Propeller Shaft Related Parts Inspection

B831G23406015

Refer to “Rear Propeller Shaft Removal and Installation (Page 3D-17)”.

Rear Propeller Shaft / Rear Propeller Shaft Joint

Inspect the rear propeller shaft and rear propeller shaft joint for wear or damage. If any defects are found, replace it with a new one.

I831G1340084-01

I831G1340085-01

Boots

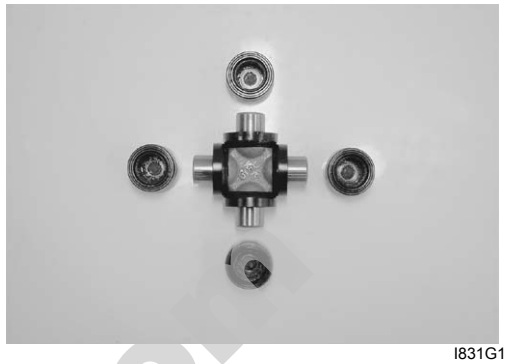
Inspect the rear output joint boot (1) and propeller shaft joint boot (2) for crack or damage. If any defects are found, replace the boot with a new one.

I831G1340086-01

Universal Joint

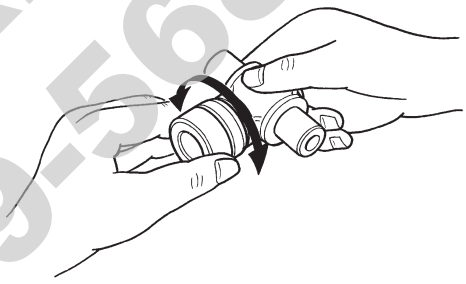
Inspect the universal joint in the following procedures:

1) Inspect the universal joint and outer surface of the bearing for scuffing, wear or damage. If any defects are found, replace the bearings and universal joint as a set.



I831G1340087-01

2) Insert the universal joint to the bearing and check the play by turning the universal joint, as shown in the figure. If excessive play is found, replace the bearings and universal joint as a set.



I831G1340094-01

Rear Propeller Shaft Spring

Inspect the rear propeller shaft spring for wear or damage. If any defects are found, replace it with a new one.

I831G1340089-01

Specifications

Service Data

B831G23407001

Drive Train
Unit: mm (in)

Item	Standard	Limit
Front/Rear output shaft bevel gear backlash	0.03 – 0.15 (0.001 – 0.006)	—

Tightening Torque Specifications

B831G23407002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Rear output shaft drive bevel gear nut	100	10.0	72.5	☞(Page 3D-7) / ☞(Page 3D-11)
Rear output shaft nut	100	10.0	72.5	☞(Page 3D-9) / ☞(Page 3D-19)
Rear output shaft driven gear nut	100	10.0	72.5	☞(Page 3D-9)
Front propeller shaft boot clamp screw	1.3	0.13	1.0	☞(Page 3D-15)
Rear propeller shaft boot clamp screw	2	0.2	1.5	☞(Page 3D-20)

NOTE

The specified tightening torque is also described in the following.
“Rear Output Shaft Components (Page 3D-6)”
“Rear Propeller Shaft Components (Page 3D-17)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

B831G23408001

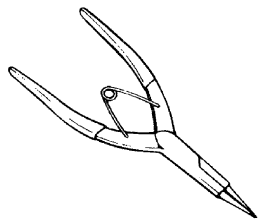
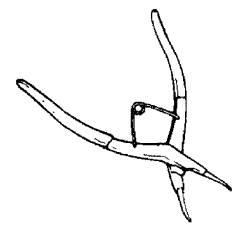
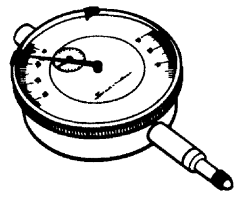
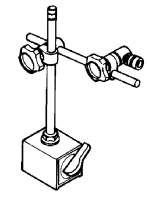
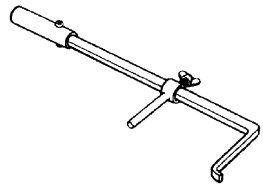
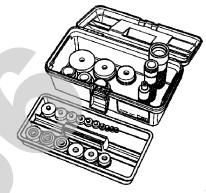
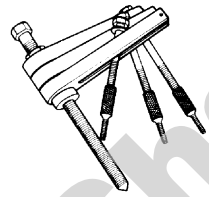
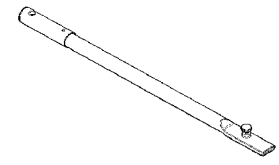
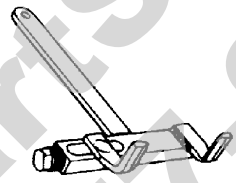
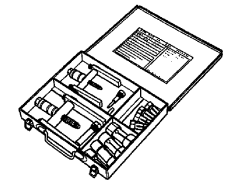
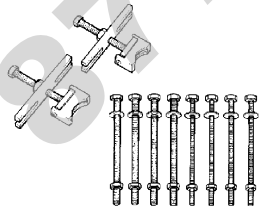
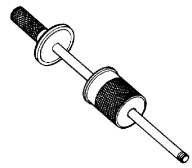
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 3D-2) / ☞(Page 3D-4) / ☞(Page 3D-4) / ☞(Page 3D-19)
	Water resistance grease	P/No.: 99000–25160	☞(Page 3D-4) / ☞(Page 3D-9) / ☞(Page 3D-15) / ☞(Page 3D-15) / ☞(Page 3D-15) / ☞(Page 3D-19) / ☞(Page 3D-21) / ☞(Page 3D-21) / ☞(Page 3D-21)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 3D-9) / ☞(Page 3D-19)

NOTE

Required service material is also described in the following.
“Front Output Shaft Components (Page 3D-1)”
“Rear Output Shaft Components (Page 3D-6)”
“Front Propeller Shaft Components (Page 3D-14)”
“Rear Propeller Shaft Components (Page 3D-17)”

Special Tool

B831G23408002

09900–06107 Snap ring pliers ☞(Page 3D-2)	
09900–06108 Snap ring pliers ☞(Page 3D-3) / ☞(Page 3D-4)	
09900–20607 Dial gauge (1/100 mm, 10 mm) ☞(Page 3D-11)	
09900–20701 Magnetic stand ☞(Page 3D-11)	
09913–50121 Oil seal remover ☞(Page 3D-3)	
09913–70210 Bearing installer set ☞(Page 3D-4) / ☞(Page 3D-4) / ☞(Page 3D-18) / ☞(Page 3D-19) / ☞(Page 3D-20) / ☞(Page 3D-20)	
09920–13120 Crankcase separating tool ☞(Page 3D-1) / ☞(Page 3D-6)	
09920–31020 Extension handle ☞(Page 3D-11)	
09920–53740 Clutch sleeve hub holder ☞(Page 3D-7) / ☞(Page 3D-7) / ☞(Page 3D-11)	
09921–20240 Bearing remover set ☞(Page 3D-3)	
09921–21910 Bearing holder ☞(Page 3D-11)	
09923–74511 Bearing remover ☞(Page 3D-3) / ☞(Page 3D-14)	
09930–30104 Rotor remover slide shaft ☞(Page 3D-3) / ☞(Page 3D-14)	

Section 4

Brake

CONTENTS

Precautions

Precautions

Precautions for Brake System

B831G24000001

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

Brake Fluid Information

B831G24000002

⚠ 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

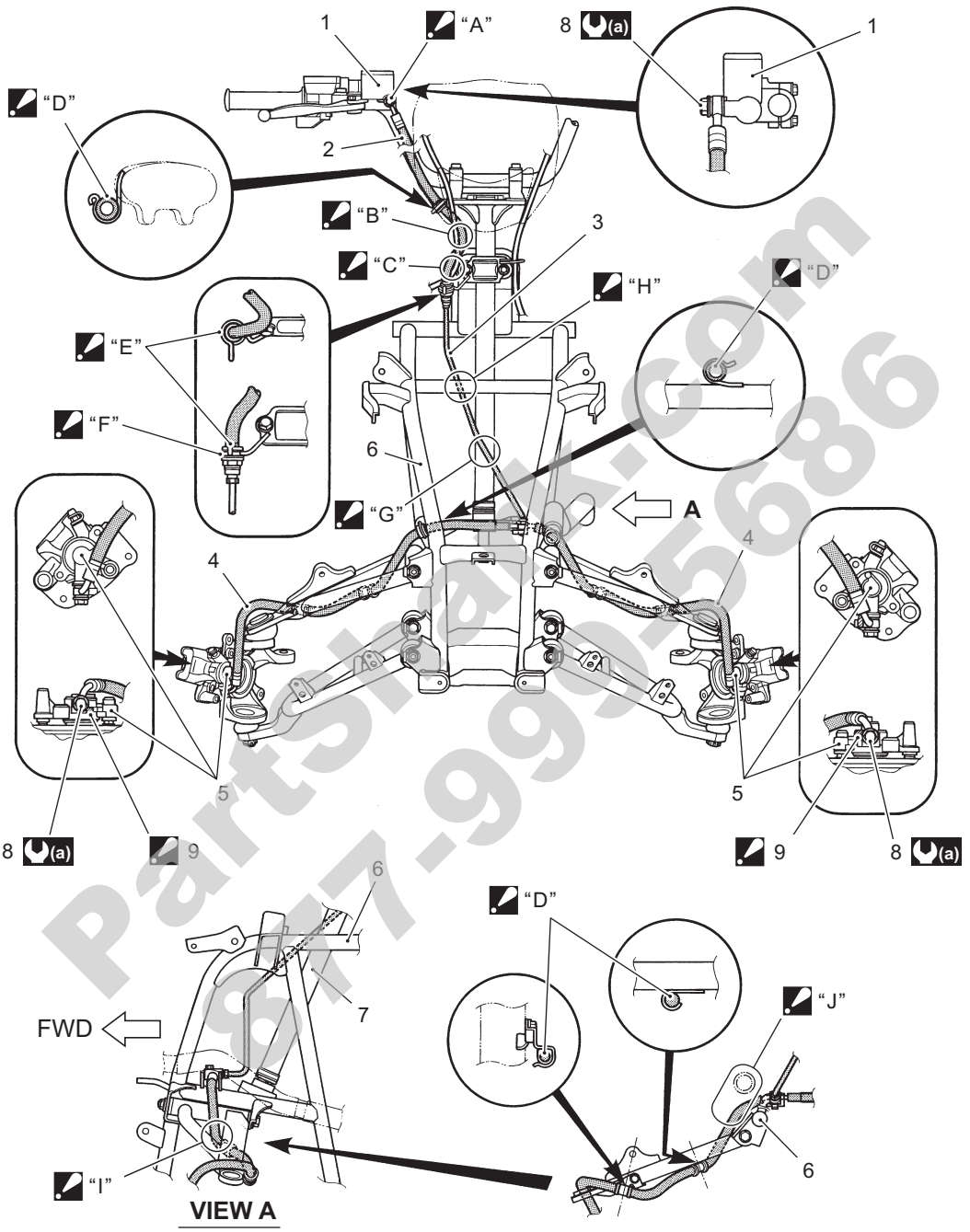
Immediately and completely wipe off any brake fluid contacting any part of the vehicle. The brake fluid reacts chemically with paint, plastics and rubber materials, etc., and will damage them severely.

Brake Control System and Diagnosis

Schematic and Routing Diagram

Front Brake Hose Routing Diagram

B831G24102001

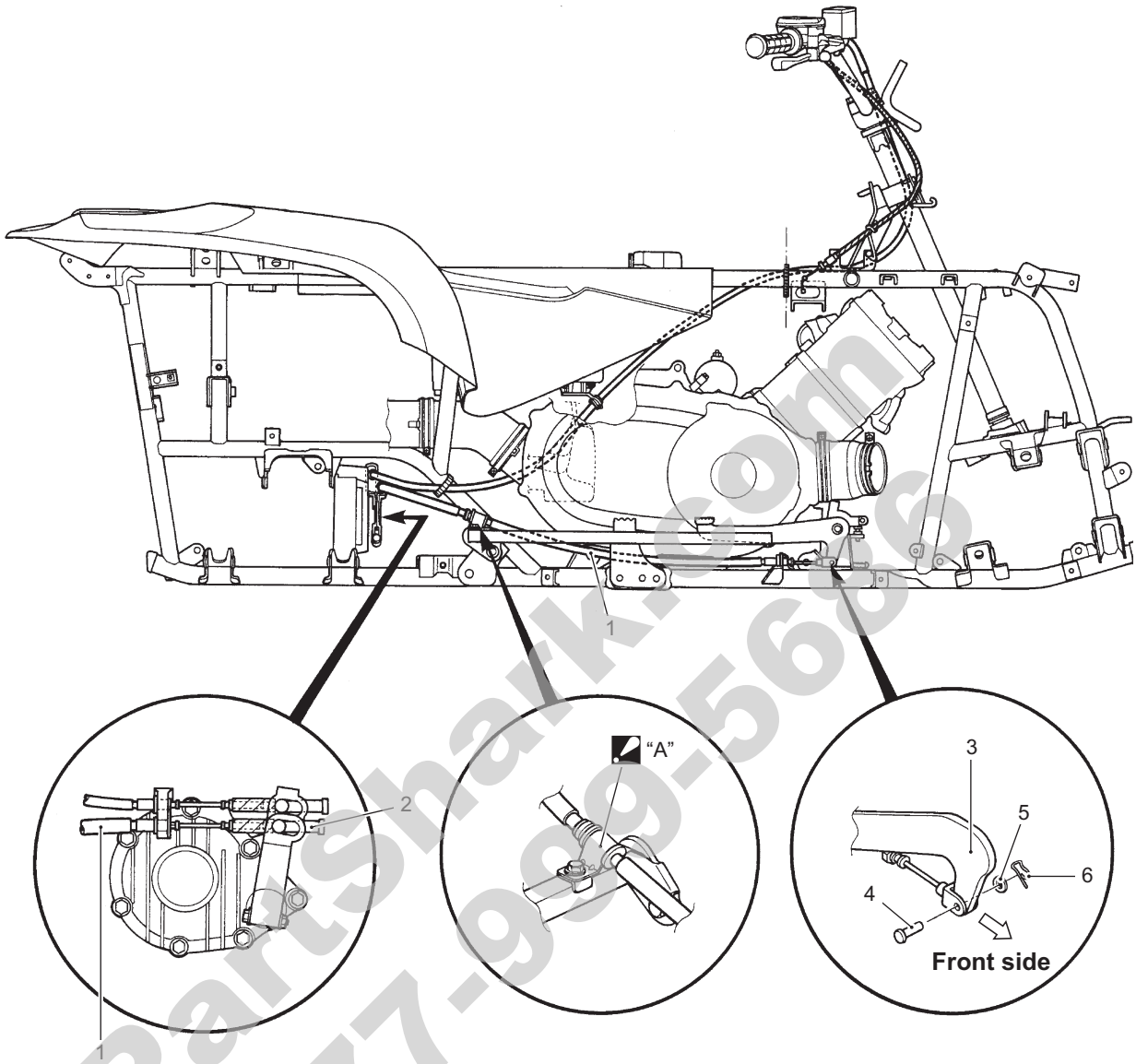


I831G1410001-09

1. Master cylinder reservoir	"B": Pass the brake hose inside the throttle cable.
2. Front brake hose No. 1	"C": Pass the brake hose outside the throttle cable.
3. Front brake pipe	"D": Fix the brake hose to the it guide firmly.
4. Front brake hose No. 2	"E": Face the black mark on the brake hose to forward.
5. Front brake caliper	"F": Tighten flare nut firmly.
6. Frame	"G": Pass the brake pipe front of the steering shaft.
7. Steering shaft	"H": Pass the brake pipe behind the frame bridge.
8. Union bolt	"I": Pass the brake hose inside of the suspension arm.
9. Stopper : After the brake hose union has contacted the stopper, tighten the union bolt.	"J": Pass the brake hose under the radiator hose.
"A": After the brake hose union has contacted the reservoir bottom.	(a) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)

Rear Blake Cable Routing Diagram

B831G24102002



I831G1410035-05

1. Rear brake cable	3. Rear brake pedal	5. Washer	"A": Fix the rear brake cable to the footrest bar with clamp.
2. Adjust nut	4. Pin	6. Cotter pin	

Diagnostic Information and Procedures

Brake Symptom Diagnosis

B831G24104001

Condition	Possible cause	Correction / Reference Item
Insufficient brake power	Leakage of brake fluid from hydraulic system.	*Repair or replace.*
	Worn pads or friction plate.	*Replace.*
	Oil adhesion on friction surface of pads.	*Clean disc and pads.*
	Worn disc.	*Replace.*
	Air in hydraulic system.	*Bleed air.*
	Not enough brake fluid in the reservoir.	*Replenish.*
	Defective adjustment of rear brake.	*Adjust.*
Brake squeaking	Carbon adhesion on pad surface.	*Repair surface with sandpaper.*
	Tilted pad.	*Correct pad fitting or replace.*
	Damaged hub bearing.	*Replace.*
	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

B831G24106001

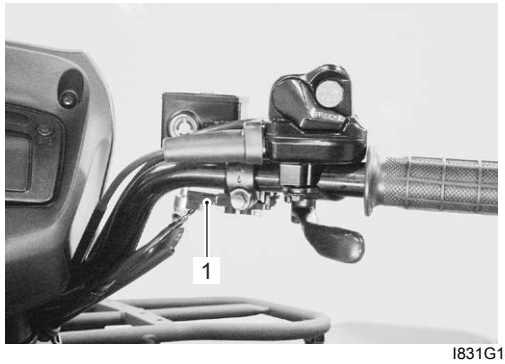
Refer to “Rear Brake Pedal / Rear Brake (Parking Brake) Lever Inspection and Adjustment in Section 0B (Page 0B-19)”.

Front Brake Light Switch Inspection

B831G24106002

Inspect the front brake light switch in the following procedures:

1) Disconnect the front brake light switch coupler (1).



I831G1410002-01

2) Inspect the switch for continuity with a tester.
If any abnormality is found, replace the front brake light switch with a new one. Refer to “Front Brake Master Cylinder / Brake Lever Disassembly and Assembly (Page 4A-11)”.

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

Tester knob indication
Continuity (•)))

Color / Position	Terminal (B)	Terminal (B)
ON	○	○
OFF		

I831G1410003-02

3) Connect the front brake light switch coupler.

Rear Brake Light Switch Inspection

B831G24106003

Inspect the rear brake light switch in the following procedures:

1) Remove the left front inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the rear brake light switch lead wire coupler (1).

I831G1410034-01

3) 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 (•)))

Color / Position	Terminal (O)	Terminal (W/B)
ON	○	○
OFF		

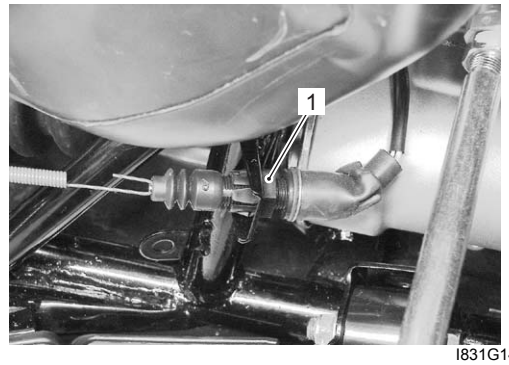
I831G1410032-03

4) Connect the rear brake light switch lead wire coupler (1).

Rear Brake Switch Inspection and Adjustment

B831G24106004

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.



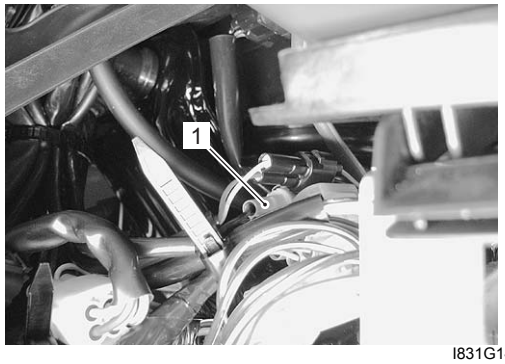
I831G1410005-01

Parking / Rear Brake Light Switch Inspection

B831G24106005

Inspect the parking/rear brake light switch in the following procedures:

1) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the parking/rear brake light switch lead wire coupler (1).



I831G1410043-01

3) Inspect the parking/rear brake light switch for continuity with a tester. If any abnormality is found, replace the parking/rear brake lever assembly with a new one. Refer to “Handlebars Removal and Installation in Section 6B (Page 6B-3)”.

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

Tester knob indication
Continuity (•)))

Color / Position	B	B
ON	○	○
OFF		

I831G1410044-01

Parking Brake Lever Switch Inspection

B831G24106006

Refer to “Parking Brake Switch Inspection in Section 1I (Page 1I-9)”.

Brake Fluid Level Check

B831G24106007

Refer to “Front Brake System Inspection in Section 0B (Page 0B-17)”.

Front Brake Hose Inspection

B831G24106008

Refer to “Front Brake System Inspection in Section 0B (Page 0B-17)”.

Air Bleeding from Front Brake Fluid Circuit

B831G24106009

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

- **Make sure that the vehicle is supported securely.**
- **Handle brake fluid with care: the fluid reacts chemically with paint, plastic, rubber materials, etc.**

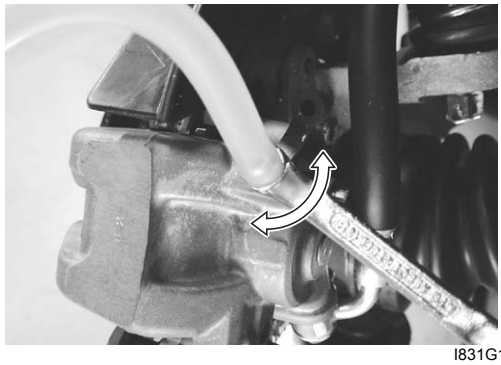
1) Fill the master cylinder reservoir to the top of the inspection window. Place the reservoir cap to prevent dirt from entering.

I831G1410009-01

2) Attach a 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.

I831G1410010-01

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.



I831G1410011-01

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
Front brake air bleeder valve: 6 N·m (0.6 kgf-m, 4.5 lb-ft)

8) Fill the reservoir with brake fluid to the upper mark of the reservoir.

I831G1410008-01

9) Install the reservoir cap.

Brake Fluid Replacement

B831G24106010

⚠ CAUTION

- **Make sure that the vehicle is supported securely.**
- **Handle brake fluid with care: the fluid reacts chemically with paint, plastic, rubber materials, etc.**

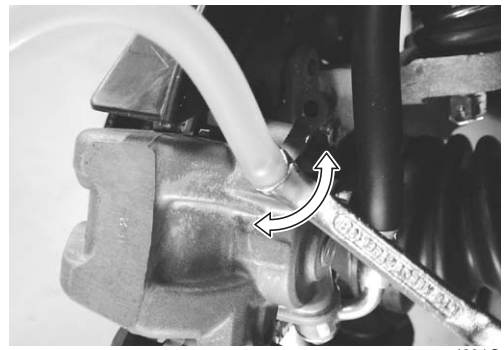
1) Support the vehicle on a level surface with a jack and keep the handlebars straight.
2) Remove the front wheels. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
3) Remove the brake fluid reservoir cap and diaphragm.
4) Suck up the old brake fluid as much as possible.

I831G1410008-01

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.



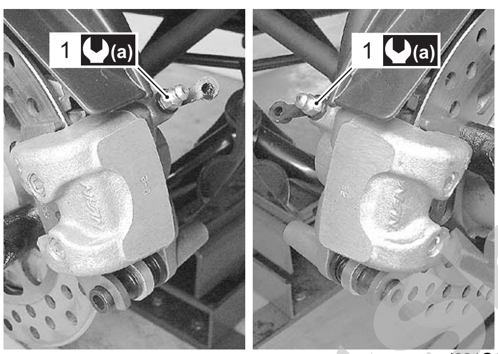
I831G1410011-01

7) Loosen the air bleeder valve and pump the brake lever until the old brake fluid flows out of the brake system.

I831G1410012-01

8) Close the air bleeder valve (1) and disconnect the clear hose.

Tightening torque
Front brake air bleeder valve (a): 6 N·m (0.6 kgf-m, 4.5 lb-ft)



I831G1410013-01

9) Fill the reservoir with brake fluid.

I831G1410036-01

10) Install the reservoir cap.
11) Install the front wheels. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.

Front Brake Hose Removal and Installation

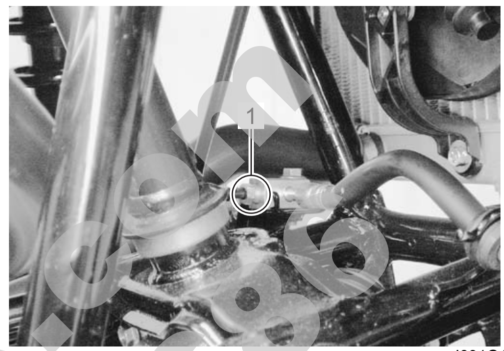
B831G24106011

Removal

⚠ **CAUTION**

Make sure that the vehicle is supported securely.

1) Drain brake fluid. Refer to “Brake Fluid Replacement (Page 4A-6)”.
2) Loosen the flare nuts (1) and disconnect the brake pipe.



I831G1410014-01

3) Remove the front brake hoses as shown in the front brake hose routing diagram. Refer to “Front Brake Hose Routing Diagram (Page 4A-1)”.

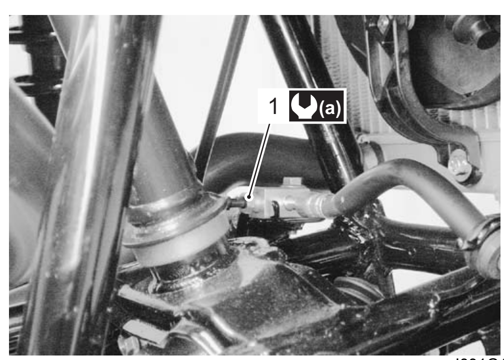
Installation

⚠ **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) Tighten the brake flare nut (1) to the specified torque.

Tightening torque
Brake pipe flare nut (a): 16 N·m (1.6 kgf-m, 11.5 lb-ft)



I831G1410015-01

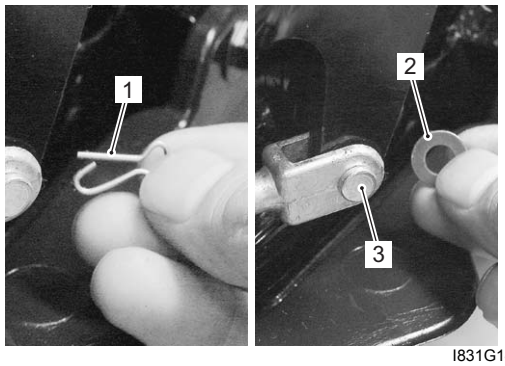
3) Bleed air from the front brake system. Refer to “Air Bleeding from Front Brake Fluid Circuit (Page 4A-5)”.

Rear Brake Cable Removal and Installation

B831G24106012

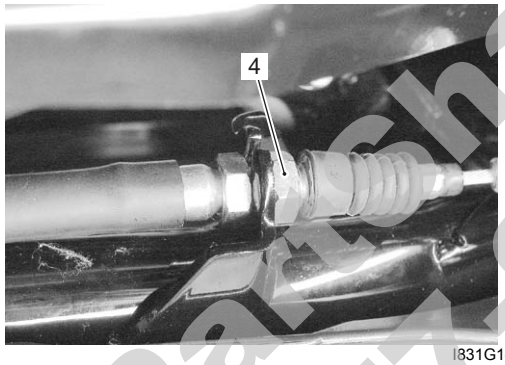
Removal

1) Remove the right inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Remove the right mud guard. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
3) Remove the cotter pin (1), washer (2) and rear brake cable pin (3).



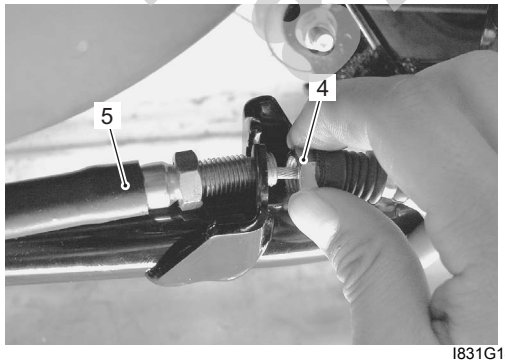
I831G1410016-02

4) Loosen the rear brake cable holder nut (4).



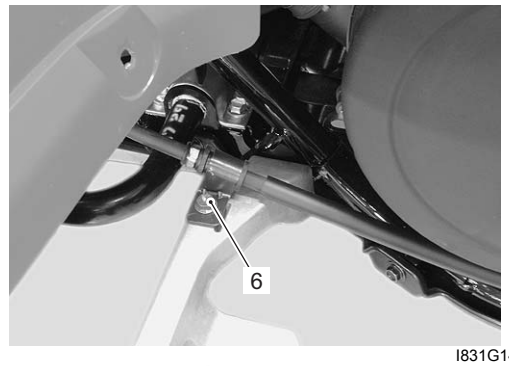
I831G1410017-01

5) Remove the rear brake holder nut (4) and brake cable (5).



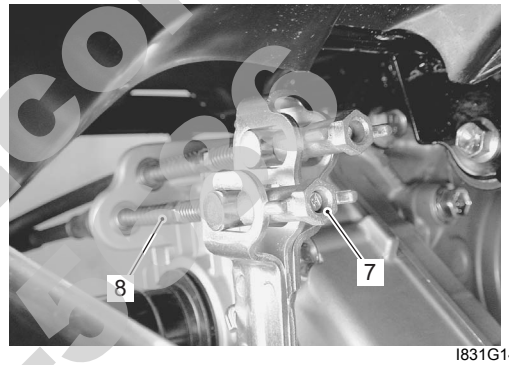
I831G1410033-04

6) Remove the rear brake cable bolt (7) from the right footrest.



I831G1410018-02

7) Remove the rear brake cable adjuster nut (7) and cable (8).



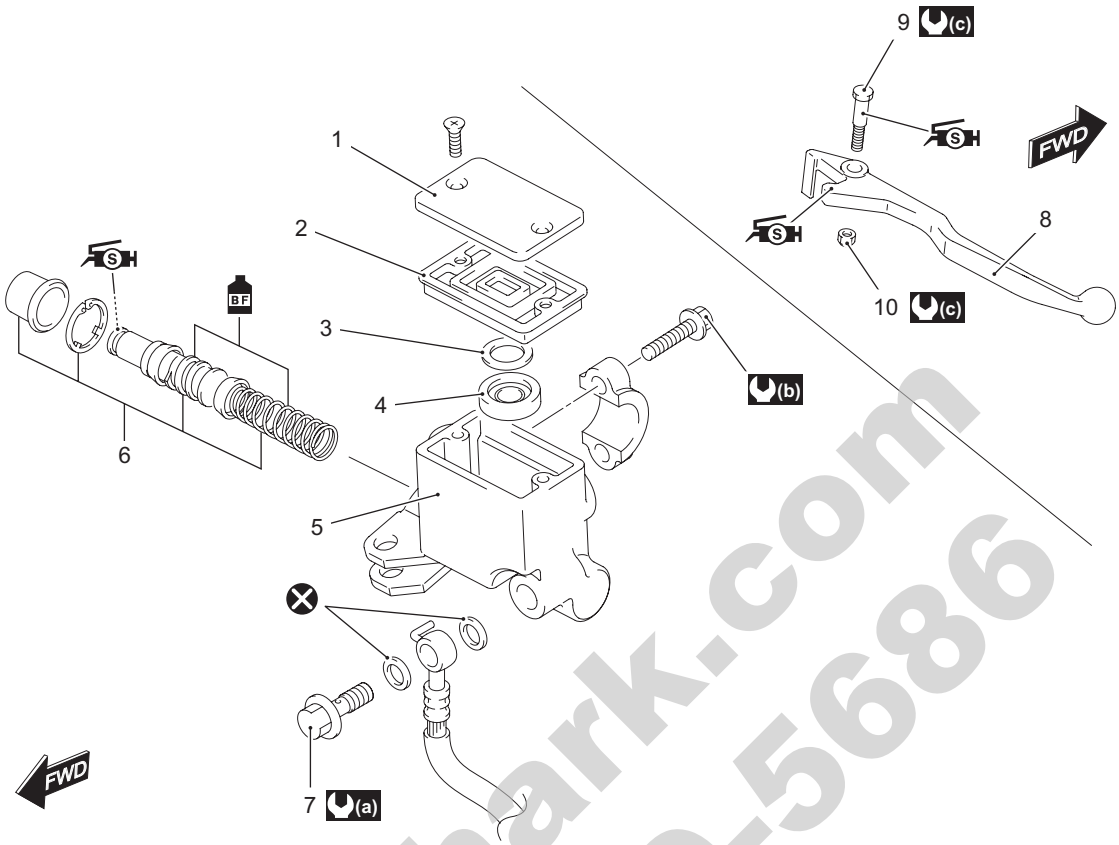
I831G1410037-03

Installation

1) Install the rear brake cable as shown in the rear brake cable routing diagram. Refer to “Rear Blake Cable Routing Diagram (Page 4A-2)”.
2) After installed rear brake cable, adjust the adjuster nut. Refer to “Rear Brake Pedal / Rear Brake (Parking Brake) Lever Inspection and Adjustment in Section 0B (Page 0B-19)”.
3) Install the removed parts.

Front Brake Master Cylinder Components

B831G24106013



I831G1410019-04

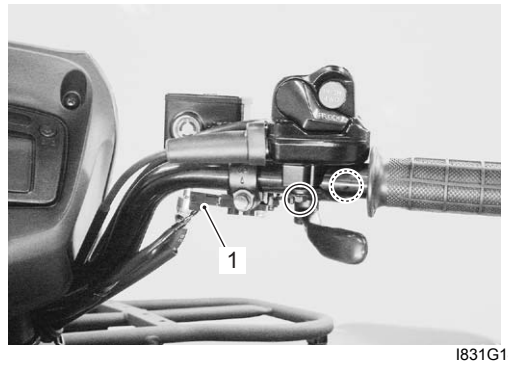
1. Reservoir cap	7. Brake hose union bolt	(c) : 6 N·m (0.6 kgf-m, 4.5 lb-ft)
2. Diaphragm	8. Brake lever	: Apply silicone grease.
3. Plate	9. Brake lever pivot bolt	BF : Apply brake fluid.
4. Separator	10. Brake lever pivot bolt lock-nut	: Do not reuse.
5. Master cylinder	(a) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)	
6. Piston/Cup set	(b) : 10 N·m (1.0 kgf-m, 7.0 lb-ft)	

Front Brake Master Cylinder Assembly Removal and Installation

B831G24106014

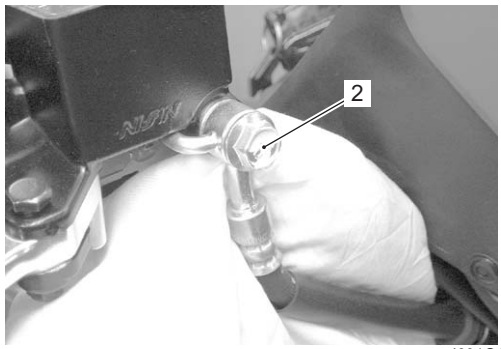
Removal

1) Drain brake fluid. Refer to “Brake Fluid Replacement (Page 4A-6)”.
2) Remove the throttle case assembly. Refer to “Handlebars Removal and Installation in Section 6B (Page 6B-3)”.
3) Disconnect the front brake light switch coupler (1).



I831G1410020-01

4) Place a rag underneath the brake hose union bolt (2) on the master cylinder to catch any spilt brake fluid.
5) Remove the brake hose union bolt (2) and disconnect the brake hose.



I831G1410021-01

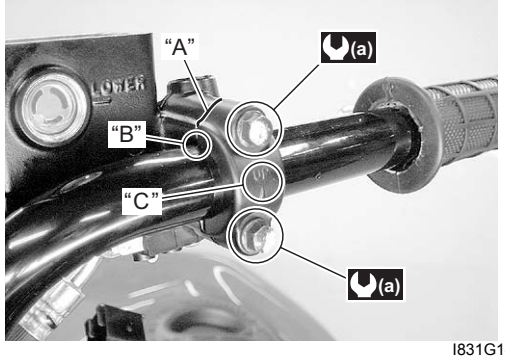
6) Remove the master cylinder assembly (3).

I831G1410022-01

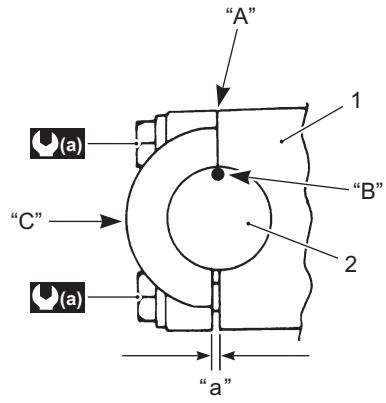
Installation
Install the front brake master cylinder in the reverse order of removal. Pay attention to the following points:

- 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. Refer to "Steering / Handlebars Assembly Construction in Section 6B (Page 6B-2)".

  Tightening torque
  Master cylinder holder bolt (Upper and Lower)
  (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I831G1410023-02



I831G1410024-02

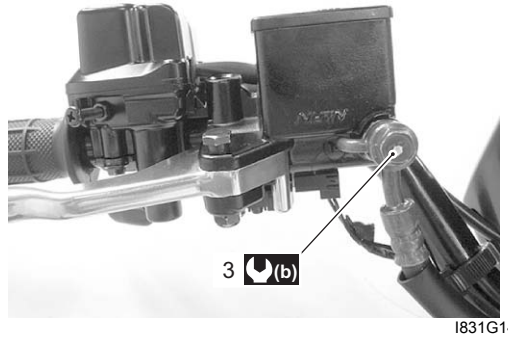
"C": Up mark	"a": Clearance

- Set the brake hose union as shown in the front brake hose routing diagram. Refer to "Front Brake Hose Routing Diagram (Page 4A-1)".
- 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 lb-ft)



I831G1410025-02

- Install the throttle case assembly. Refer to "Handlebars Removal and Installation in Section 6B (Page 6B-3)".
- Bleed air from the brake system. Refer to "Air Bleeding from Front Brake Fluid Circuit (Page 4A-5)".

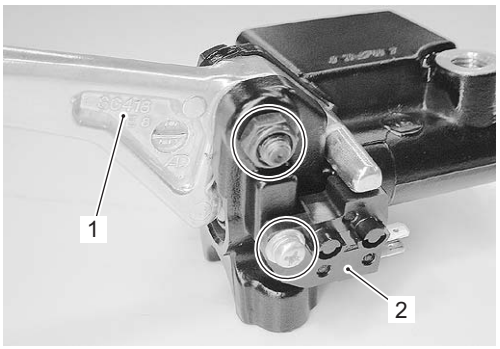
Front Brake Master Cylinder / Brake Lever Disassembly and Assembly

B831G24106015

Refer to “Front Brake Master Cylinder Assembly Removal and Installation (Page 4A-9)”.

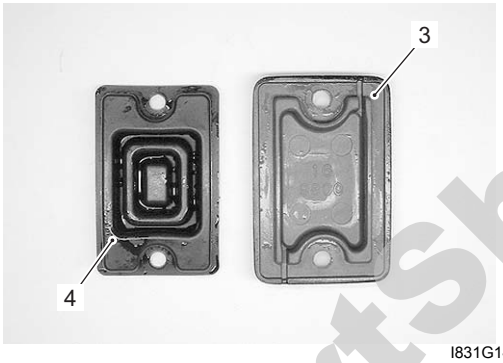
Disassembly

1) Remove the brake lever (1) and brake light switch (2).



I831G1410026-01

2) Remove the reservoir cap (3) and diaphragm (4).

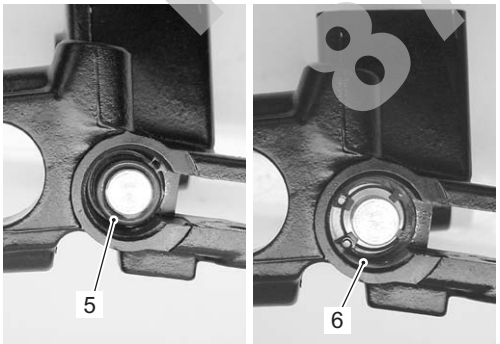


I831G1410027-01

3) Pull out the dust boot (5) and remove the snap ring (6) with a special tool.

Special tool

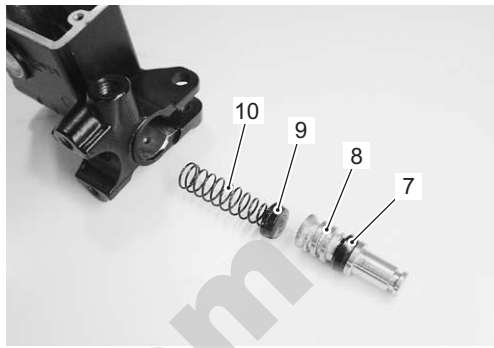
TOOL : 09900–06108 (Snap ring pliers)



I831G1410028-01

4) Remove the following parts from the master cylinder.

- Secondary cup (7)
- Piston (8)
- Primary cup (9)
- Spring (10)



I831G1410029-01

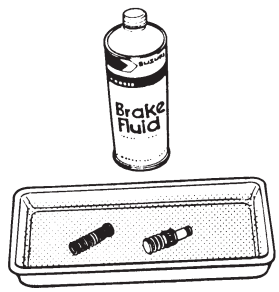
Assembly

Assemble the master cylinder in the reverse order of disassembly. Pay attention to the following points:

⚠ CAUTION

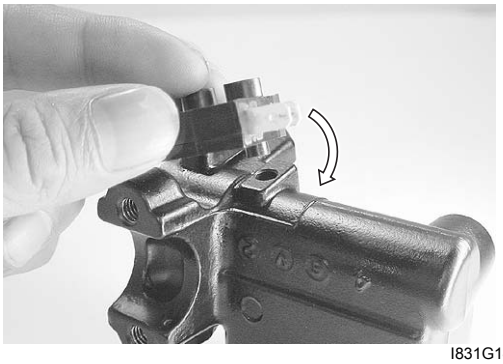
- **Wash the master cylinder components with new brake fluid before reassembly.**
- **Do not wipe the brake fluid off after washing the components.**
- **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvents such as gasoline, kerosine, etc.**
- **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

- When installing the brake light switch, align the projection on the switch with the hole in the master cylinder.



I831G1410030-01

- 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)

I831G1410031-01

- Tighten the pivot bolt and lock-nut to the specified torque.

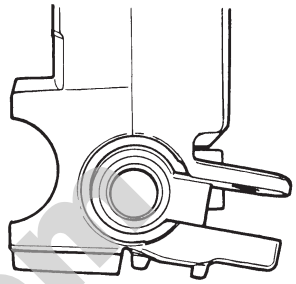
Tightening torque
Brake lever pivot bolt: 6 N·m (0.6 kgf-m, 4.5 lb-ft)
Brake lever pivot bolt lock-nut: 6 N·m (0.6 kgf-m, 4.5 lb-ft)

Front Brake Master Cylinder Parts Inspection

B831G24106016

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.



I649G1410027-02

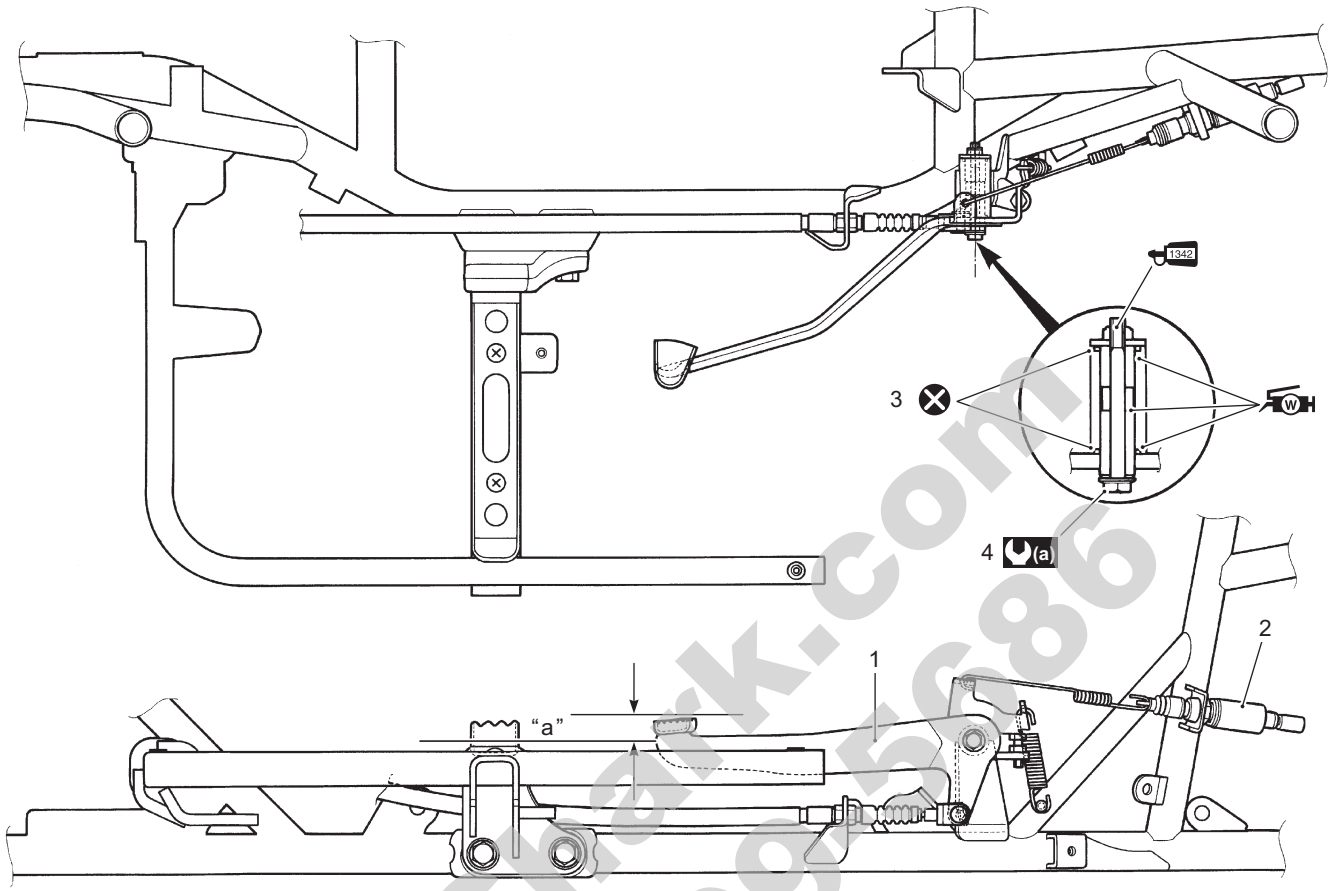
Piston
Inspect the piston surface for any scratches or other damage.

Rubber Parts
Inspect the primary cup, secondary cup and dust boot for wear or damage.

I649G1410028-02

Rear Brake Pedal Construction

B831G24106017



I831G1410038-04

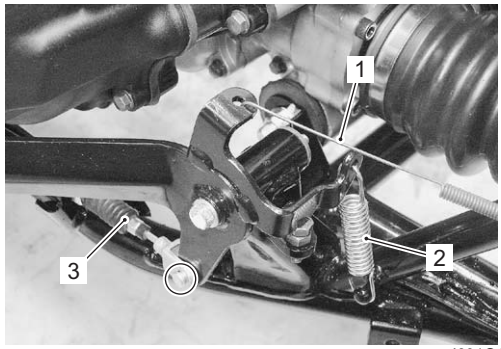
1. Brake pedal	4. Brake pedal pivot bolt	W : Apply water resistance grease.
2. Brake light switch	"a": 17.5 mm (0.69 in)	1342 : Apply thread lock to the thread part.
3. O-ring	(a) : 11 N·m (1.1 kgf-m, 8.0 lb-ft)	: Do not reuse.

Rear Brake Pedal Removal and Installation

B831G24106018

Removal

1) Remove the right inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Remove the right mud guard. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
3) Remove the spring (1) and (2).
4) Disconnect the rear brake cable (3). Refer to “Rear Brake Cable Removal and Installation (Page 4A-8)”.



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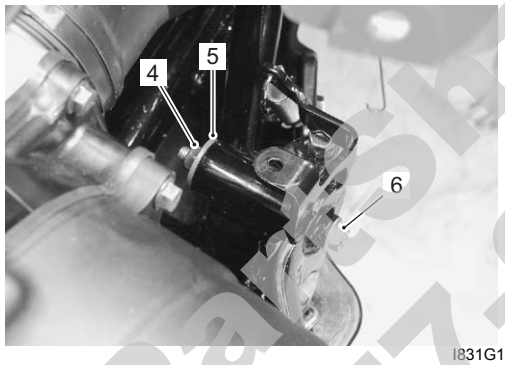
5) Remove the nut (4), washer (5) and bolt (6).



I831G1410040-02

6) Remove the rear brake pedal.

Installation

Install the rear brake pedal in the reverse order of removal. Pay attention to the following points:

- Apply grease to the O-rings as shown in the rear brake pedal construction. Refer to “Rear Brake Pedal Construction (Page 4A-13)”.

⚠ CAUTION

Replace the O-rings with new ones.

: Grease 99000–25160 (Water resistance grease)

- Apply grease to the pivot part of brake pedal.

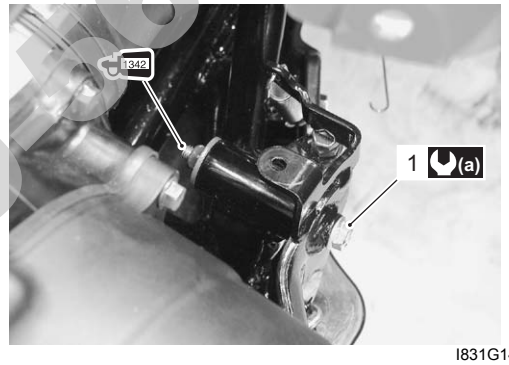
: Grease 99000–25160 (Water resistance grease)

I831G1410041-01

- Apply thread lock to the bolt (1) and tighten to the specified torque.

1342 : Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)

Tightening torque
Rear brake pedal pivot nut (a): 11 N·m (1.1 kgf-m, 8.0 lb-ft)



I831G1410042-02

- After installed rear brake cable, adjust the adjuster nut. Refer to “Rear Brake Pedal / Rear Brake (Parking Brake) Lever Inspection and Adjustment in Section 0B (Page 0B-19)”.
- Install the removed parts.

Specifications

Service Data

B831G24107001

Brake

Unit: mm (in)

Item	Standard	Limit
Rear brake pedal height	12.5 – 22.5 (0.5 – 0.9)	—
Front master cylinder bore	14.000 – 14.043 (0.5512 – 0.5529)	—
Front master cylinder piston diam.	13.957 – 13.984 (0.5495 – 0.5506)	—

Oil

Item	Specification	Note
Brake fluid type	DOT 4	

Tightening Torque Specifications

B831G24107002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Front brake air bleeder valve	6	0.6	4.5	☞(Page 4A-6) / ☞(Page 4A-7)
Brake pipe flare nut	16	1.6	11.5	☞(Page 4A-7)
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)
Brake lever pivot bolt	6	0.6	4.5	☞(Page 4A-12)
Brake lever pivot bolt lock-nut	6	0.6	4.5	☞(Page 4A-12)
Rear brake pedal pivot nut	11	1.1	8.0	☞(Page 4A-14)

NOTE

The specified tightening torque is also described in the following.
“Front Brake Hose Routing Diagram (Page 4A-1)”
“Front Brake Master Cylinder Components (Page 4A-9)”
“Rear Brake Pedal Construction (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-7)”.

Special Tools and Equipment

Recommended Service Material

B831G24108001

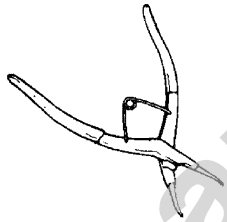
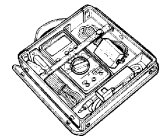
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4A-6) / ☞(Page 4A-11)
Grease	SUZUKI Silicone Grease or equivalent	P/No.: 99000–25100	☞(Page 4A-12)
	Water resistance grease	P/No.: 99000–25160	☞(Page 4A-14) / ☞(Page 4A-14)
Thread lock cement	THREAD LOCK CEMENT 1342 or equivalent	P/No.: 99000–32050	☞(Page 4A-14)

NOTE

Required service material is also described in the following.
“Front Brake Master Cylinder Components (Page 4A-9)”
“Rear Brake Pedal Construction (Page 4A-13)”

Special Tool

B831G24108002

09900–06108 Snap ring pliers ☞(Page 4A-11)		09900–25008 Multi-circuit tester set ☞(Page 4A-4) / ☞(Page 4A-4) / ☞(Page 4A-5)	

Front Brakes

Precautions

Precautions for Front Brakes

B831G24200001

⚠ WARNING

When servicing the front brake system, place the vehicle on a level ground and support the vehicle with a jack.

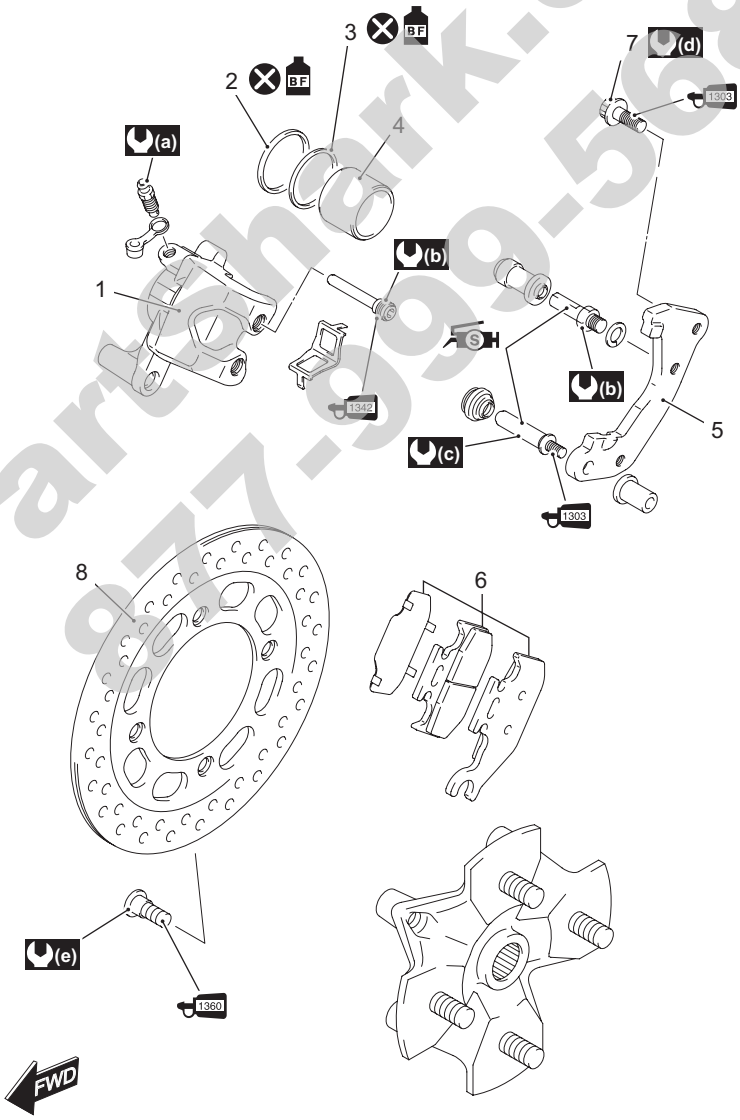
NOTE

The right and left calipers, brake pads and discs are installed symmetrically and therefore the removal procedure for one side is the same as that for the other side.

Repair Instructions

Front Brake Components

B831G24206001



I831G1420001-11

1. Front brake caliper	7. Brake caliper mounting bolt	(e) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)
2. Piston seal	8. Front brake disk	1303 : Apply thread lock to the thread part.
3. Dust seal	(a) : 6 N·m (0.6 kgf-m, 4.5 lb-ft)	1342 : Apply thread lock to the thread part.
4. Piston	(b) : 18 N·m (1.8 kgf-m, 13.0 lb-ft)	1360 : Apply thread lock to the thread part.
5. Brake caliper holder	(c) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)	BF : Apply brake fluid.
6. Front brake pad set	(d) : 26 N·m (2.6 kgf-m, 19.0 lb-ft)	: Do not reuse.

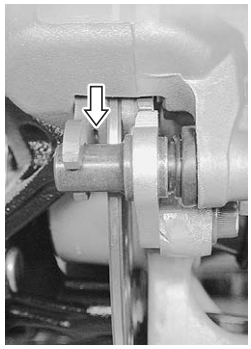
Front Brake Pad Inspection

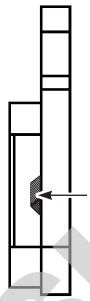
B831G24206002

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.





I831G1420002-01

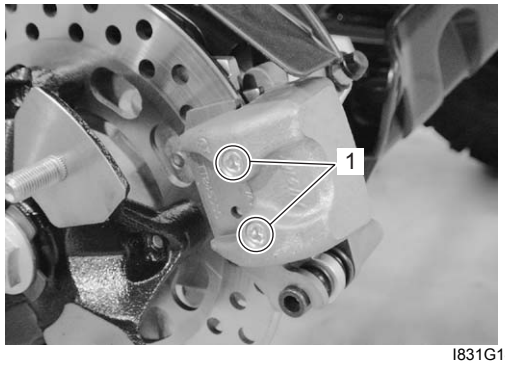
Front Brake Pad Replacement

B831G24206003

1) Remove the front wheel assembly. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
2) Remove the pad mounting pins (1).

NOTE

When removing the pads, push the piston all the way into the brake caliper.

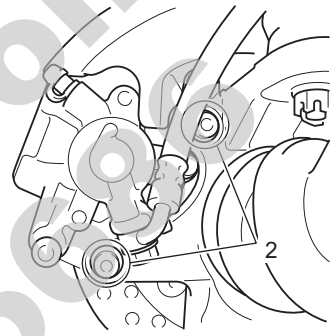


I831G1420004-02

⚠ CAUTION

Do not operate the brake lever while dismounting the pads.

3) Remove the front brake caliper by removing the brake caliper mounting bolts (2). Refer to “Front Brake Caliper Removal and Installation (Page 4B-3)”.

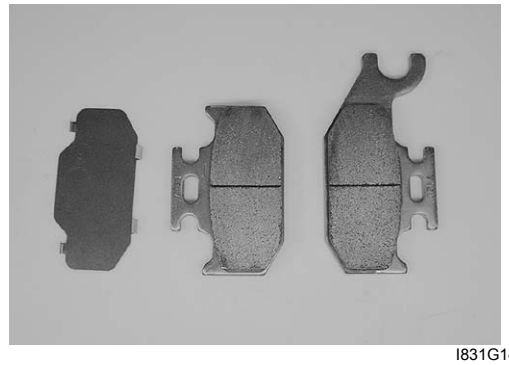


I831G1420031-01

4) Remove the brake pads.
5) Clean up the caliper especially around the caliper piston.
6) Install the new brake pads.

⚠ CAUTION

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



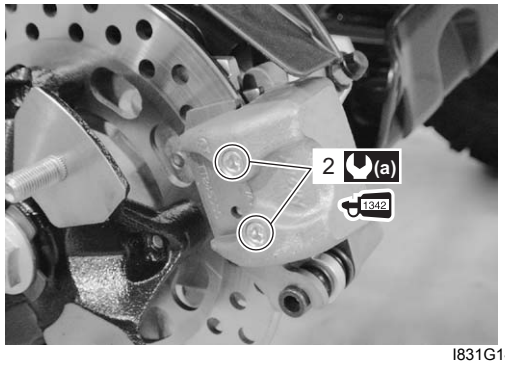
I831G1420005-01

7) Apply a small quantity of thread lock to the brake pad mounting pins (2).

1342 : Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)

8) Tighten the front brake pad mounting pins (2) to the specified torque.

Tightening torque
Front brake pad mounting pin (a): 18 N·m (1.8 kgf-m, 13.0 lb-ft)



I831G1420006-08

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.

9) Install the front wheel assembly.

Front Brake Caliper Removal and Installation

B831G24206004

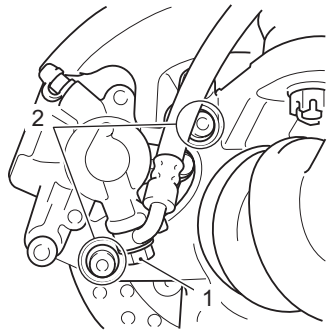
Removal

1) Remove the front wheel assembly.
2) Drain brake fluid. Refer to "Brake Fluid Replacement in Section 4A (Page 4A-6)".
3) 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.

4) Remove the brake caliper by removing the brake caliper mounting bolts (2).



I831G1420032-01

Installation

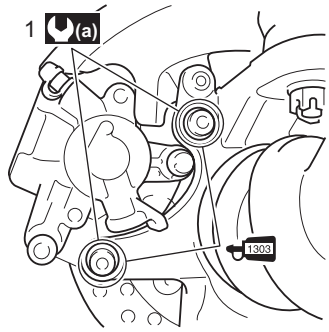
Install the brake caliper in the reverse order of removal. Pay attention to the following points:

- Apply a small quantity of thread lock to the front brake caliper mounting bolts (1).

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

- Tighten the brake caliper mounting bolts (1) to the specified torque.

Tightening torque
Brake caliper mounting bolt (a): 26 N·m (2.6 kgf-m, 19.0 lb-ft)



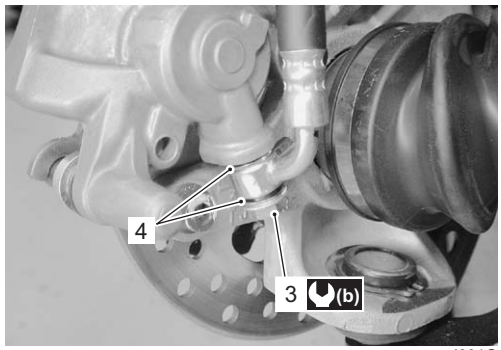
I831G1420033-01

- After setting the brake hose union to the stopper, tighten the union bolt (3) to the specified torque.

⚠ CAUTION

The seal washers (4) should be replaced with the new ones to prevent fluid leakage.

Tightening torque
Front brake hose union bolt (b): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I831G1420011-05

- Bleed air from the brake system after installing the caliper. Refer to “Air Bleeding from Front Brake Fluid Circuit in Section 4A (Page 4A-5)”.
- Install the front wheel assembly. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
- 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.

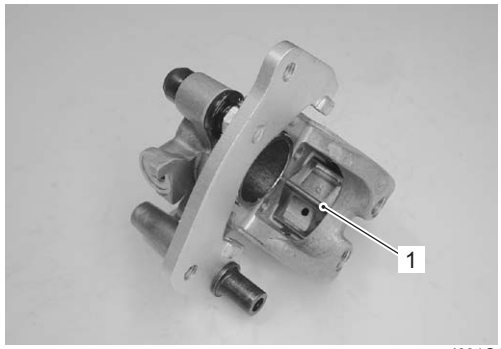
Front Brake Caliper Disassembly and Assembly

B831G24206005

Refer to “Front Brake Caliper Removal and Installation (Page 4B-3)”.

Disassembly

1) Remove the brake caliper. Refer to “Front Brake Caliper Removal and Installation (Page 4B-3)”.
2) Remove the pad spring (1).



I831G1420012-03

3) Place a rag over the brake caliper piston to prevent it from popping out and then force out the piston using compressed air.

⚠ CAUTION

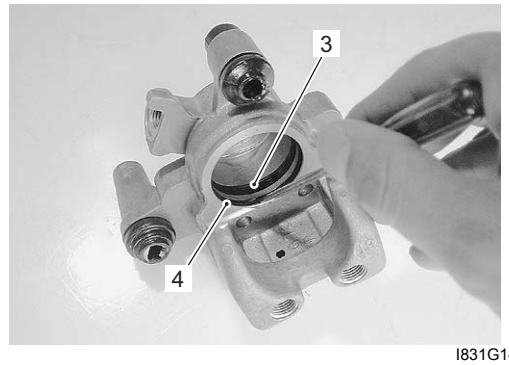
Do not use high pressure air to prevent brake caliper piston damage.

I831G1420013-02

4) Remove the caliper holder (2) from brake caliper.

I831G1420014-01

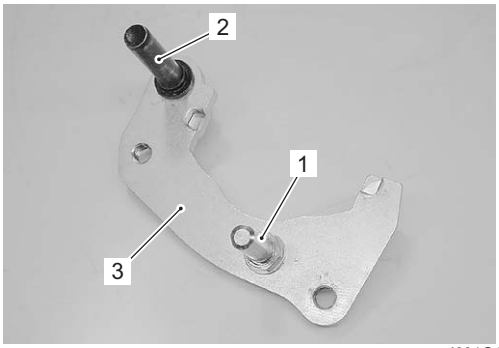
5) Remove the piston seal (3) and dust seal (4).



I831G1420015-02

Brake Caliper Holder

- Remove the caliper holder pin (1) and caliper holder slide pin (2) from caliper holder (3).



I831G1420016-01

Assembly

Assemble the caliper in the reverse order of disassembly. Pay attention to the following points:

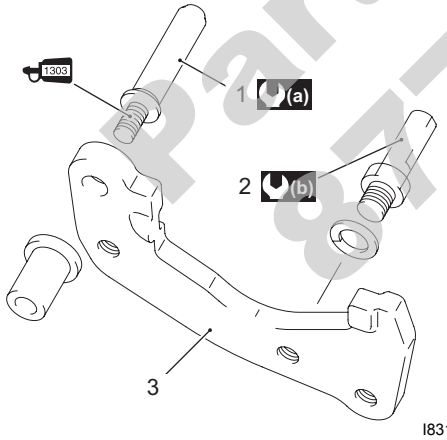
Brake caliper holder

- Apply thread lock to the caliper holder slide pin (1).

  1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

- Tighten the caliper holder slide pin (1) and caliper holder pin (2) to the holder (3) to the specified torque.

  Tightening torque
  Caliper holder slide pin (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)
  Caliper holder pin (b): 18 N·m (1.8 kgf-m, 13.0 lb-ft)



I831G1420017-04

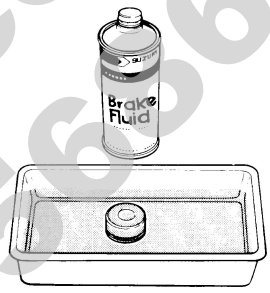
Brake caliper

- Wash the caliper bores and pistons with specified brake fluid. Particularly wash the dust seal groove and piston seal groove.

  BF: Brake fluid (DOT 4)

⚠ CAUTION

- **Wash the caliper components with fresh brake fluid before reassembly. Never use cleaning solvent or gasoline to wash them.**
- **Do not wipe the brake fluid off after washing the components.**
- **When washing the components, use the specified brake fluid. Never use different types of fluid or cleaning solvent such as gasoline, kerosine or the others.**



I649G1430018-02

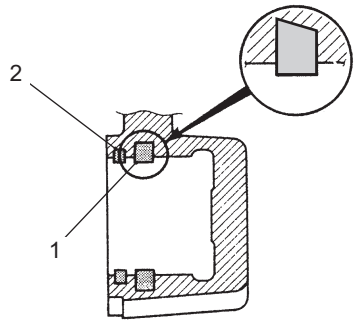
- Apply the brake fluid to piston seal (1) and dust seal (2).

⚠ CAUTION

Replace the piston seal (1) and dust seal (2) with new ones.

BF: Brake fluid (DOT 4)

- Install the piston seal as shown in the figure.

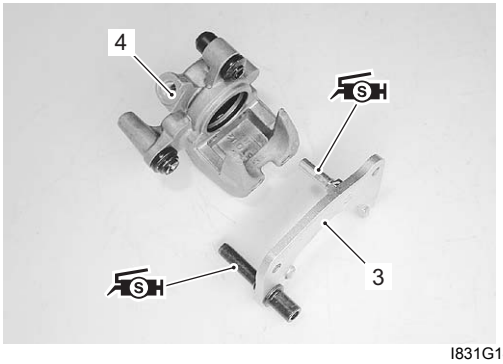


I831G1420018-03

- Apply silicon grease to the two pins.

  : Grease 99000–25100 (SUZUKI SILICONE GREASE or equivalent)

- Install the brake caliper holder (3) to the brake caliper (4).



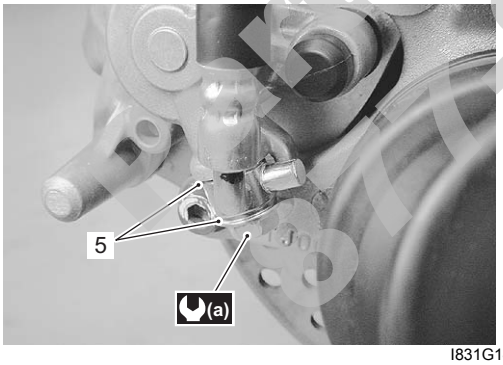
I831G1420019-01

- 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)”
- Tighten the union bolt to the specified torque.

⚠ CAUTION

Replace the gaskets (5) with new ones.

Tightening torque
Front brake hose union bolt (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I831G1420022-01

Front Brake Caliper Parts Inspection

B831G24206006

Refer to “Front Brake Caliper Disassembly and Assembly (Page 4B-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.

I831G1420025-01

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.

I831G1420021-01

Boots
Inspect the boots for damage or wear. If any defects are found, replace them with new ones.

I831G1420020-03

Brake Pad Mounting Pin
Inspect the brake pad mounting pin for wear or other damage. If any damage is found, replace the mounting pin with a new one.

I831G1420023-01

Brake Pad Spring
Inspect the brake pad springs for damage or excessive bend. If any defects are found, replace them with new ones.

I831G1420024-01

Brake Caliper Holder
Inspect the brake caliper holder for damage. If any damage is found, replace the caliper holder with a new one.

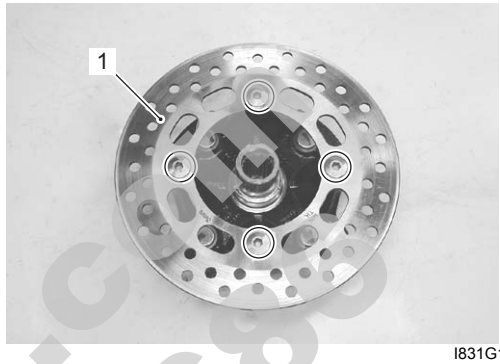
I831G1420026-01

Front Brake Disc Removal and Installation

B831G24206007

Removal

1) Remove the front wheel assembly. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
2) Remove the front wheel hub. Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation in Section 2B (Page 2B-4)”.
3) Remove the brake disc (1) from the front wheel hub.



I831G1420027-02

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 lb-ft)

I831G1420028-02

Front Brake Disc Inspection

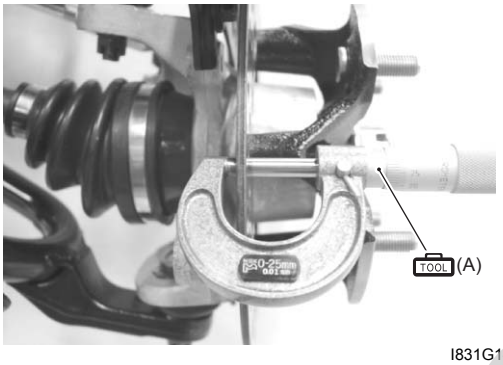
B831G24206008

Brake Disc Thickness

1) Dismount the front brake caliper. Refer to “Front Brake Caliper Removal and Installation (Page 4B-3)”.
2) Check the brake disc for damage or cracks and measure the thickness using the micrometer.
3) Replace the brake disc if the thickness is less than the service limit or if detect is found.

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

Brake disc thickness
Service limit: 3.0 mm (0.12 in)



I831G1420029-02

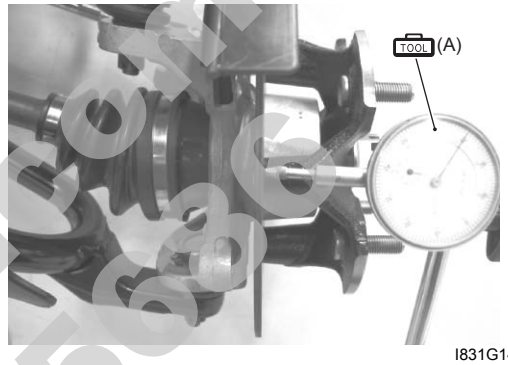
4) Remount the front brake caliper. Refer to “Front Brake Caliper Removal and Installation (Page 4B-3)”.

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)



I831G1420030-01

3) Remount the front brake caliper. Refer to “Front Brake Caliper Removal and Installation (Page 4B-3)”.

Specifications

Service Data

B831G24207001

Brake

Unit: mm (in)

Item	Standard	Limit
Front brake disc thickness	—	3.0 (0.12)
Front brake disc runout	—	0.30 (0.012)
Front brake caliper cylinder bore	33.960 – 34.010 (1.3370 – 1.3390)	—
Front brake caliper piston diam.	33.878 – 33.928 (1.3338 – 1.3357)	—

Oil

Item	Specification	Note
Brake fluid type	DOT 4	

Tightening Torque Specifications

B831G24207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Front brake pad mounting pin	18	1.8	13.0	☞(Page 4B-3)
Brake caliper mounting bolt	26	2.6	19.0	☞(Page 4B-3)
Front brake hose union bolt	23	2.3	16.5	☞(Page 4B-4) / ☞(Page 4B-6)
Caliper holder slide pin	23	2.3	16.5	☞(Page 4B-5)
Caliper holder pin	18	1.8	13.0	☞(Page 4B-5)
Brake disc bolt	23	2.3	16.5	☞(Page 4B-7)

NOTE

The specified tightening torque is also 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-7)".

Special Tools and Equipment

Recommended Service Material

B831G24208001

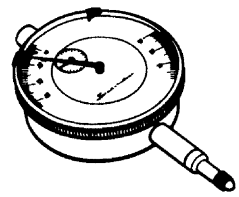
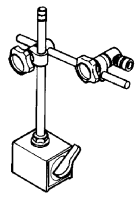
Material	SUZUKI recommended product or Specification		Note
Brake fluid	DOT 4	—	☞(Page 4B-5) / ☞(Page 4B-5)
Grease	SUZUKI SILICONE GREASE or equivalent	P/No.: 99000–25100	☞(Page 4B-6)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 4B-3) / ☞(Page 4B-5)
	THREAD LOCK CEMENT 1342 or equivalent	P/No.: 99000–32050	☞(Page 4B-3)
	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

B831G24208002

09900–20205 Micrometer (0 – 25 mm) ☞(Page 4B-8) 	09900–20607 Dial gauge (1/100 mm, 10 mm) ☞(Page 4B-8) 
09900–20701 Magnetic stand ☞(Page 4B-8) 	

Rear Brakes

Precautions

Precautions for Rear Brake

B831G24300001

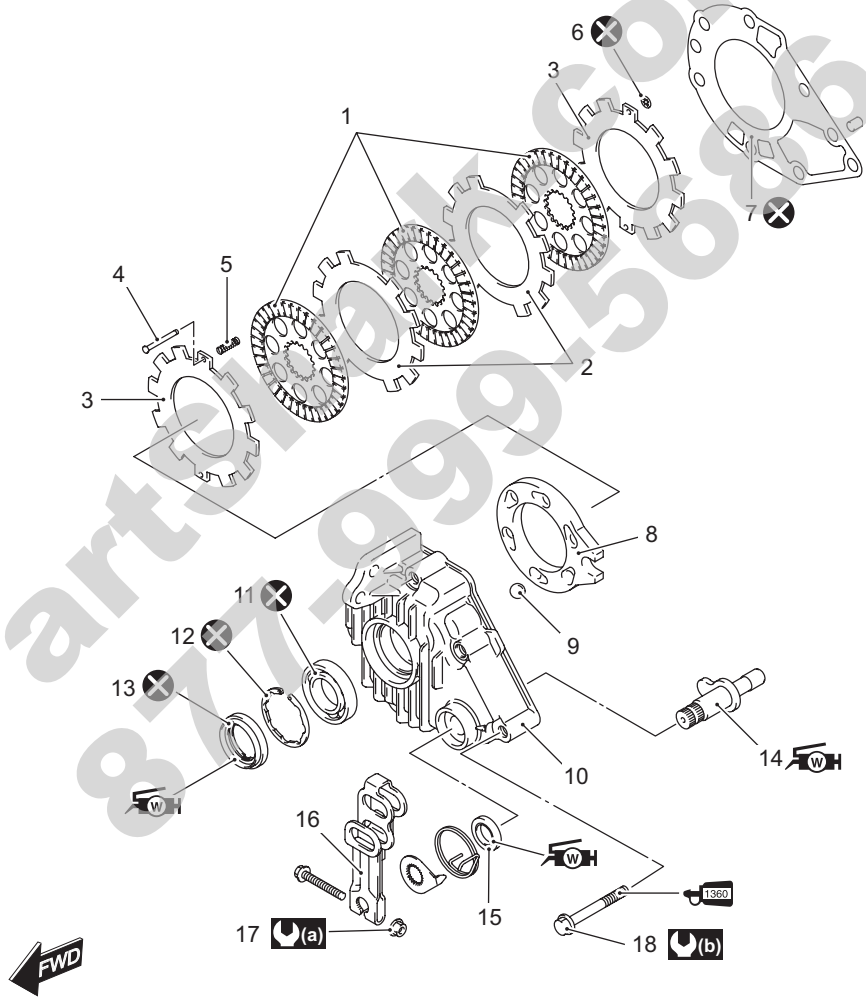
⚠ WARNING

When servicing the rear brake system, place the vehicle on a level ground and support the vehicle with a jack.

Repair Instructions

Rear Brake Components

B831G24306001



I831G1430001-06

1. Friction plate	9. Ball	17. Rear brake cam lever nut
2. Separator plate	10. Rear brake case	18. Rear brake case mounting bolt
3. Side plate	11. Bearing	(a) : 11 N·m (1.1 kgf-m, 8.0 lb-ft)
4. Side plate pin	12. Snap ring	(b) : 26 N·m (2.6 kgf-m, 19.0 lb-ft)
5. Side plate spring	13. Oil seal	W : Apply water resistance grease.
6. Side plate stopper	14. Rear brake cam shaft	1360 : Apply thread lock to the thread part.
7. Gasket	15. Oil seal	: Do not reuse.
8. Pressure plate	16. Rear brake cam lever	

Rear Brake Friction Plate Inspection

B831G24306002

Refer to “Rear Brake Friction Plate Wear Limit Inspection in Section 0B (Page 0B-20)”.

Rear Brake Friction Plate Replacement

B831G24306003

Refer to “Rear Brake Disassembly and Assembly (Page 4C-3)”.

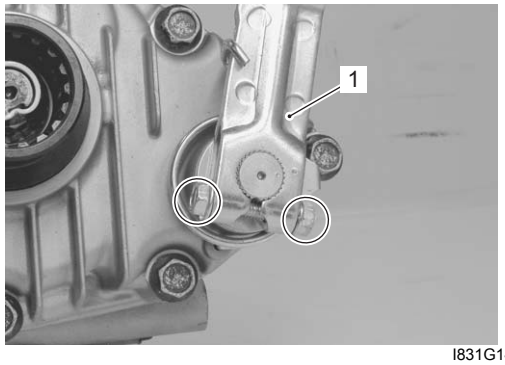
Rear Brake Assembly Removal and Installation

B831G24306004

Refer to “Final Gear Assembly Removal and Installation in Section 3B (Page 3B-23)”.

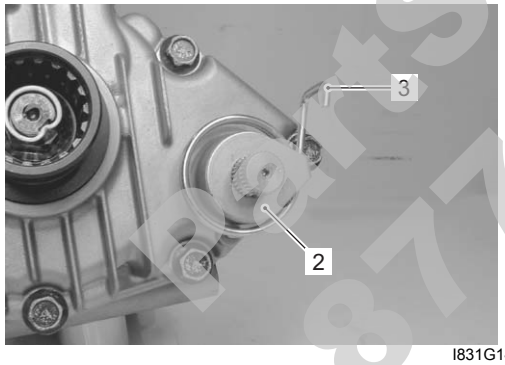
Removal

1) Remove the rear brake cam lever (1).



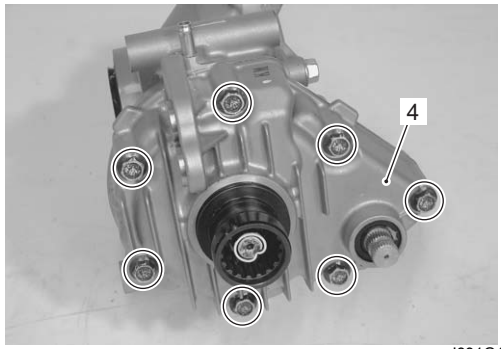
I831G1430003-01

2) Remove the brake lining indicator (2) and rear brake cam lever return spring (3).



I831G1430004-01

3) Remove the rear brake case (4).



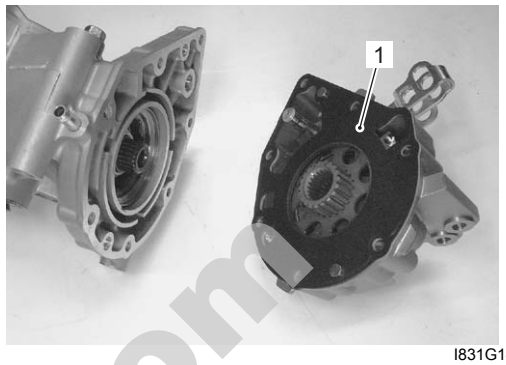
I831G1430005-01

Installation

- Fit the rear brake case gasket (1).

⚠ CAUTION

Replace the gasket (1) with a new one.

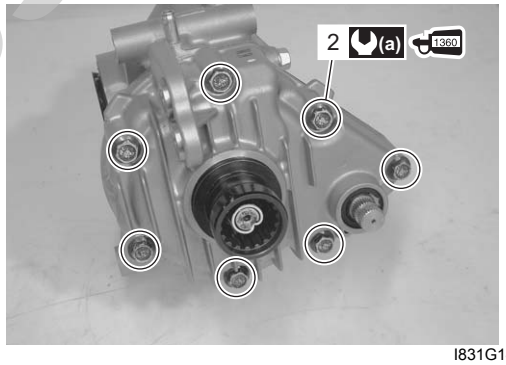


I831G1430006-01

- Install the rear brake case.
- Apply a small quantity thread lock to the rear brake case bolts (2).
- Tighten the bolts diagonally to the specified torque.

Tightening torque
Rear brake case bolt (a): 26 N·m (2.6 kgf-m, 19.0 lb-ft)

1360 : Thread lock cement 99000–32130 (THREAD LOCK CEMENT SUPER 1360 or equivalent)

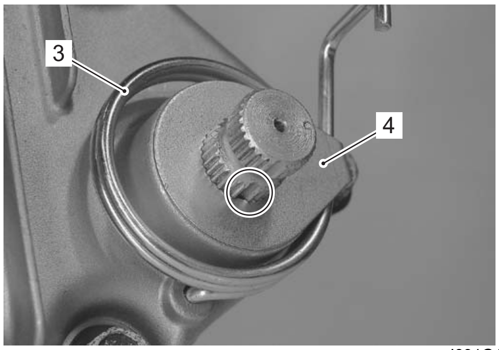


I831G1430007-02

- Install the return spring (3) and lining indicator (4).

NOTE

Align the boss of lining indicator (4) with wide spline on the brake cam shaft.



I831G1430008-01

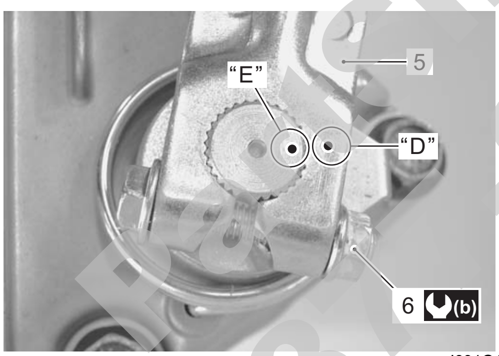
- Install the rear brake cam lever (5) to the rear brake cam shaft.

NOTE

When installing the brake cam lever, align the punched mark “D” with “E”.

- Tighten the cam lever nut (6) to the specified torque.

Tightening torque
Rear brake cam lever nut (b): 11 N·m (1.1 kgf-m, 8.0 lb-ft)



I831G1430009-02

- Install the final gear assembly to the vehicle. Refer to “Final Gear Assembly Removal and Installation in Section 3B (Page 3B-23)”.

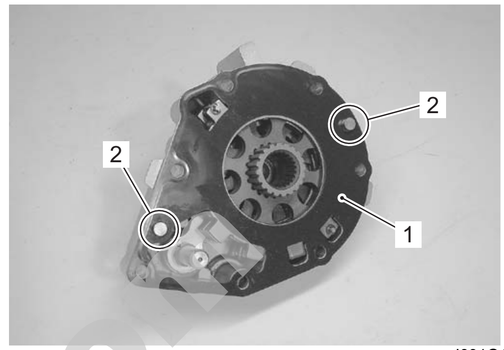
Rear Brake Disassembly and Assembly

B831G24306005

Refer to “Rear Brake Assembly Removal and Installation (Page 4C-2)”.

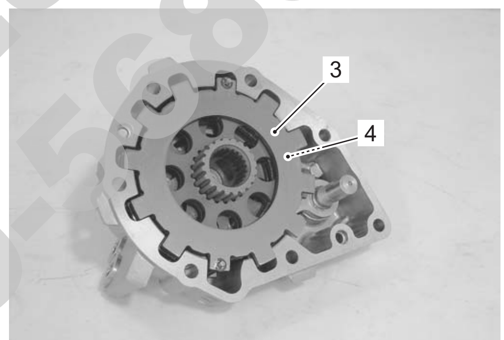
Disassembly

1) Remove the gasket (1) and dowel pins (2).



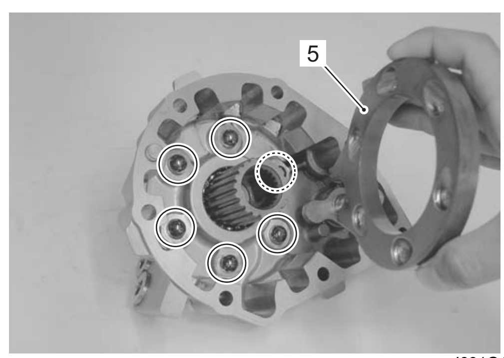
I831G1430010-02

2) Remove the rear brake steel plates (3) along with the friction plates (4).



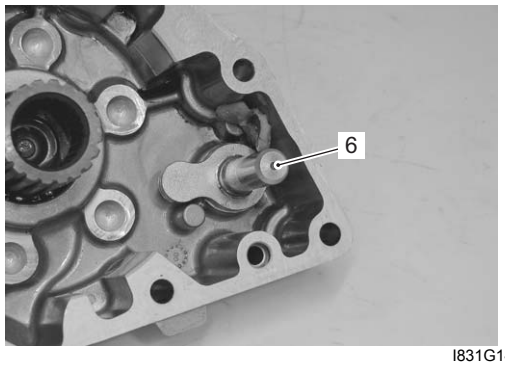
I831G1430011-01

3) Remove the rear brake pressure plate (5) and balls.



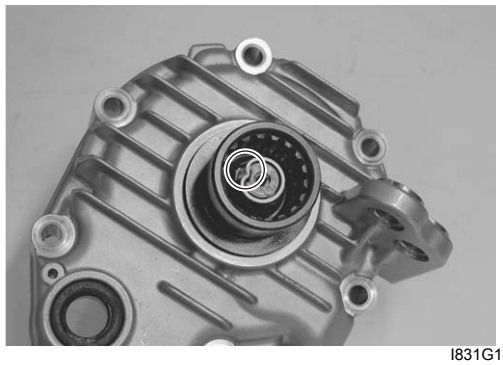
I831G1430012-01

4) Remove the rear bake cam shaft (6).



I831G1430013-01

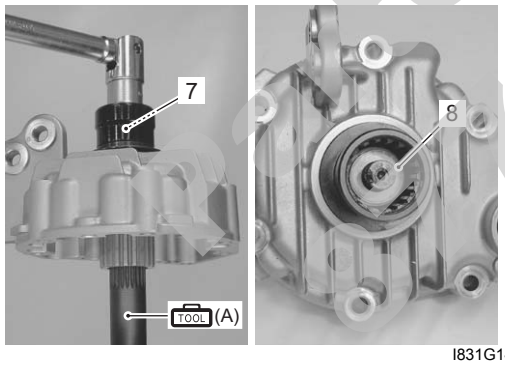
5) Unlock the nut with a chisel.



I831G1430014-01

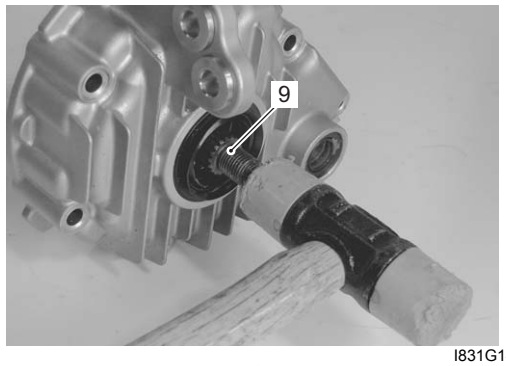
6) Remove the rear drive gear shaft nut (7) with the special tool and remove the washer (8).

Special tool
(A): 09924–52420 (Secondary bevel gear holder)



I831G1430015-01

7) Remove the rear drive gear shaft (9), with plastic mallet.

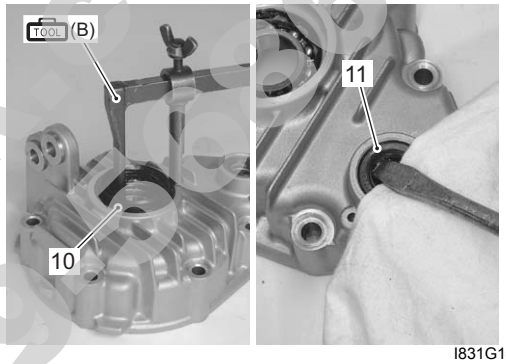


I831G1430016-01

8) Remove the oil seal (10) with the special tool.

Special tool
(B): 09913–50121 (Oil seal remover)

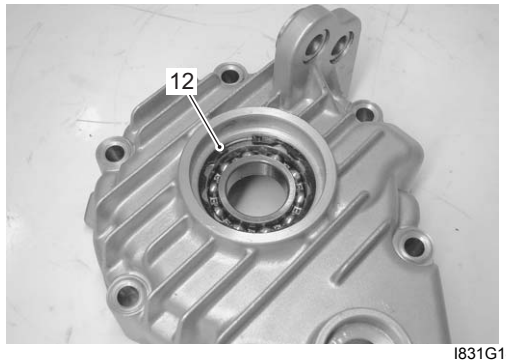
9) Remove the oil seal (11).



I831G1430017-01

10) Remove the snap ring (12) with the special tool.

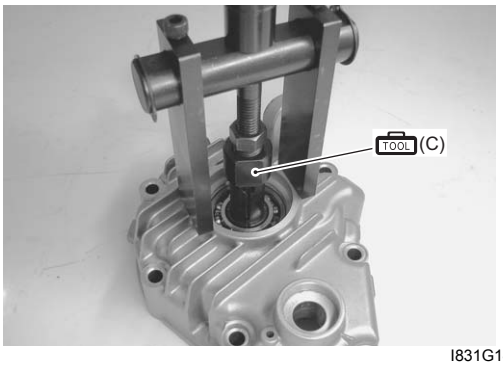
Special tool
: 09900–06108 (Snap ring pliers)



I831G1430018-01

11) Remove the bearing with the special tool.

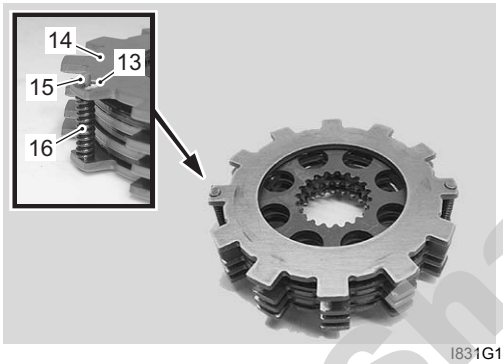
Special tool
TOOL (C): 09921–20240 (Bearing remover set)



I831G1430019-02

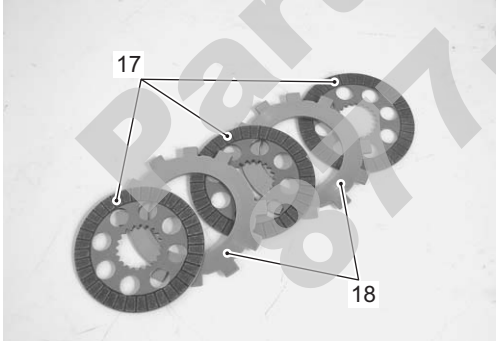
12) Remove the side plate stopper (13).

13) Remove the side plate (14), pins (15) and springs (16).



I831G1430043-03

14) Separate the friction plates (17) and separator plates (18).



I831G1430021-01

Assembly

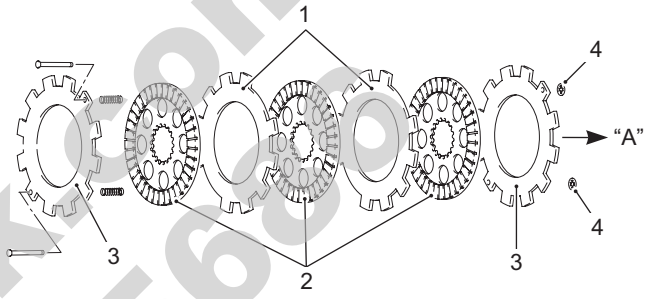
⚠ CAUTION

The removed oil seal, bearing and snap ring must be replaced with new ones.

- Install the rear brake in the reverse order of disassembly. Pay attention to the following points:
- Assemble the rear brake plates as shown in the figure.

⚠ CAUTION

Replace the remove side plate stopper (4) with a new one.



I831G1430022-04

1. Separator plate	4. Side plate stopper
2. Friction plate	"A": Direction of out side
3. Side plate	

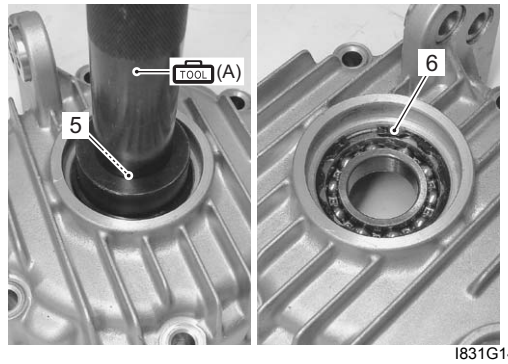
- Apply final gear oil to the bearing (5) before installing it.
- Install the bearing with the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

NOTE

The stamped mark of bearing faces outside.

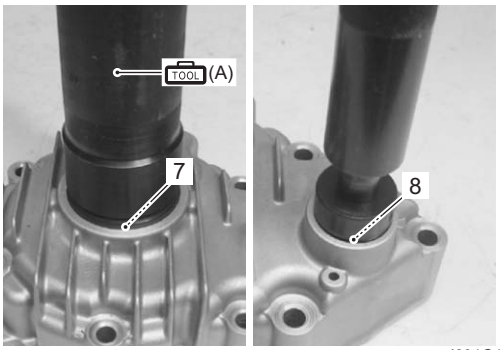
- Install the snap ring (6).



I831G1430023-03

- Install the oil seals (7) and (8) with the special tool.

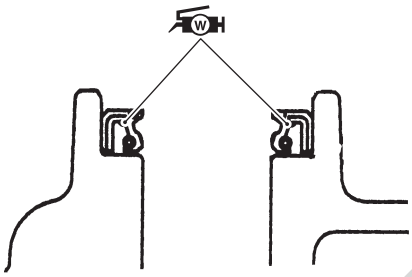
Special tool
(A): 09913–70210 (Bearing installer set)



I831G1430024-05

- Apply grease to the lip of cam shaft oil seal.

: Grease 99000–25160 (Water resistance grease)

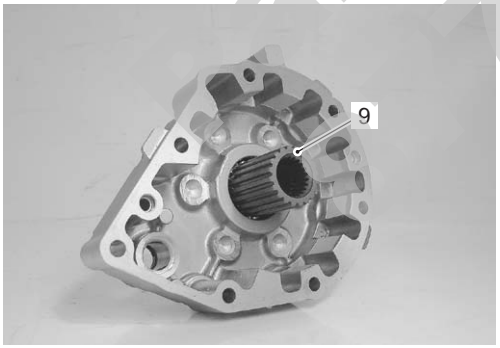


I831G1430025-03

- Install the rear final drive gear shaft (9).

NOTE

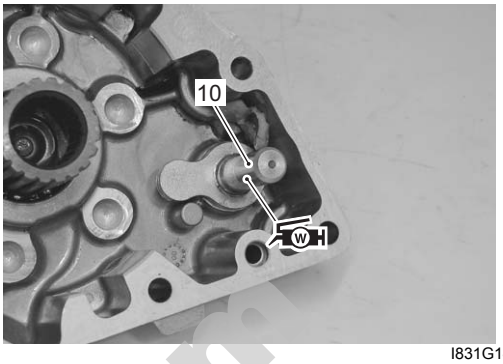
If the rear final drive gear shaft not install easily, lightly tap it using a plastic mallet.



I831G1430026-04

- Install the rear brake cam shaft (10).
- Apply grease to the rear brake cam shaft.

: Grease 99000–25160 (Water resistance grease)



I831G1430027-05

- Install the rear propeller shaft coupling (11).
- Install the washer (12) and rear drive gear shaft nut (13).

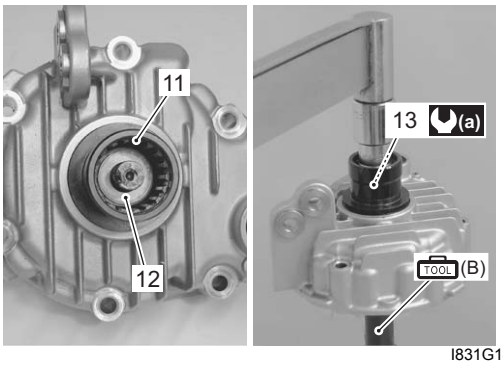
⚠ CAUTION

The removed nut (13) must be replaced with a new one.

- Tighten the rear drive gear shaft nut (13) to the specified torque with the special tool.

Special tool
(B): 09924–52420 (Secondary bevel gear holder)

Tightening torque
Rear propeller shaft coupling nut (a): 100 N·m (10.0 kgf-m, 72.5 lb-ft)



I831G1430028-06

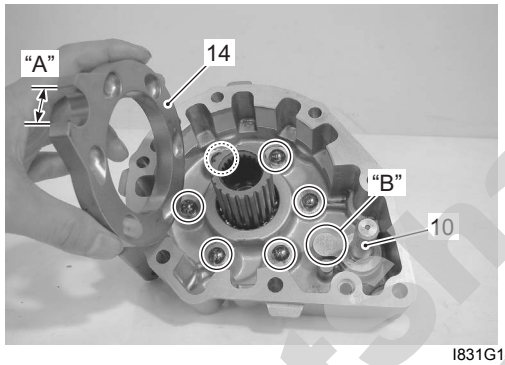
- Bend the collar of the nut to the notch on the shaft of the rear propeller shaft coupling.

I831G1430029-01

- Install the balls and rear brake pressure plate (14).

NOTE

When installing the rear brake pressure plate (14), align its groove "A" with the cam "B" of rear brake cam shaft (10).

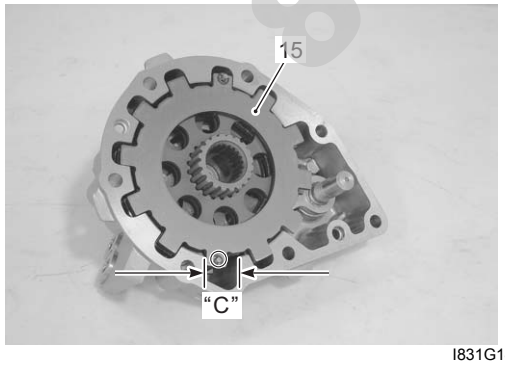


I831G1430030-04

- Install the rear brake plates (15), aligning the grooves "C" of the case.

NOTE

Align the side plate pin with groove "C" of the case as shown in the figure.

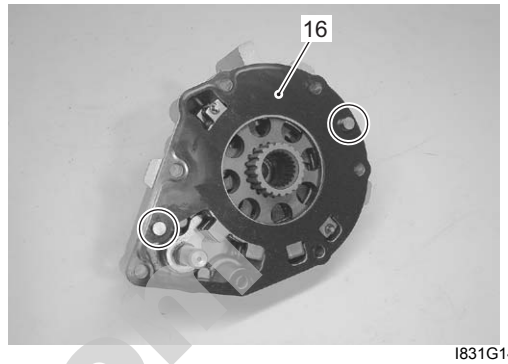


I831G1430031-05

- Install the dowel pins and gasket (16).

⚠ CAUTION

The removed gasket must be replaced with a new one.



I831G1430032-03

Rear Brake Parts Inspection

B831G24306006

Refer to "Rear Brake Disassembly and Assembly (Page 4C-3)".

Rear Brake Cam Lever

Inspect the rear brake cam lever for wear or damage. If any wear or damage is found, replace it with a new one Inspect the rear brake cam lever return spring for wear or damage. If any wear or damage is found, replace it with a new one.

I831G1430033-01

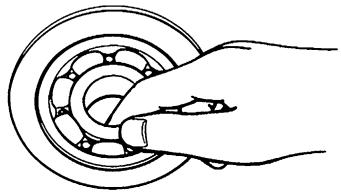
Oil Seal

Inspect the oil seals for wear or damage. If any wear or damage is found, replace it with a new one.

I831G1430034-01

Bearing
Inspect the inner race play of the bearing by hand while it is in the rear brake case.
Turn the inner race by hand to inspect for abnormal noise or smooth rotation.

- If there is anything unusual, replace it with a new one.



I649G1240015-02

Rear Brake Cam Shaft
Inspect the rear brake cam shaft for wear or damage. If any wear or damage is found, replace it with a new one.

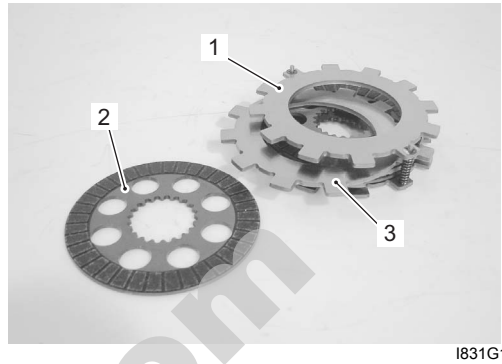
I831G1430036-01

Rear Drive Gear Shaft
Inspect the rear drive gear shaft for wear or damage. If any defects are found, replace rear drive gear shaft with a new one.

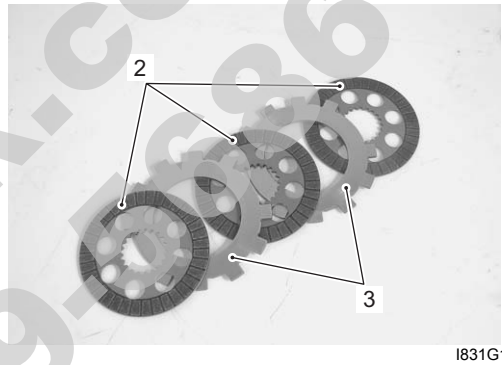
I831G1430037-01

Rear Brake Side Plate / Rear Brake Friction Plate / Steel Plate

- Inspect the rear brake side plates (1), rear brake friction plates (2) and separator plates (3) for wear or damage. If any defects are found, replace them as a set.



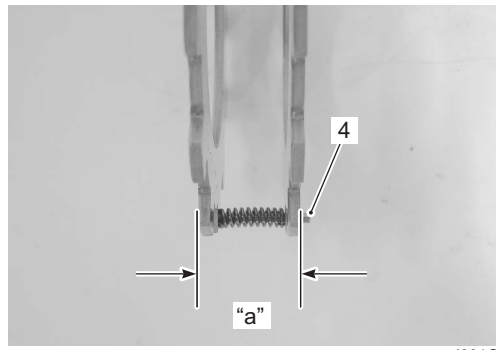
I831G1430038-01



I831G1430039-01

- Measure the outer distance “a” between the side plates as shown in the figure. If the distance “a” is less than the specification, reassemble the rear brake plates using the new plate stoppers (4).

Outer distance “a”
Standard: 26.0 – 27.0 mm (1.02 – 1.06 in)

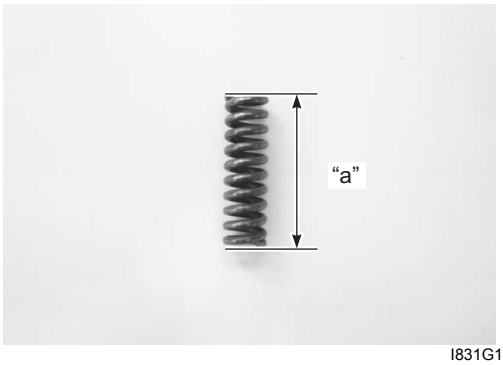


I831G1430040-04

Brake Side Plate Spring

- Measure the free length “a”.
- If the free length “a” is shorter than the limit, replace the spring with a new one.

Brake side plate spring free length “a”
Service limit: 20.2 mm (0.80 in)



I831G1430041-02

Rear Brake Pressure Plate

Inspect the rear brake pressure plate for wear or damage. If any wear or damage is found, replace it with a new one.
Inspect the balls for wear or damage. If any wear or damage is found, replace them with new ones.

I831G1430042-01

Specifications

Service Data

B831G24307001

Brake
Unit: mm (in)

Item	Standard	Limit
Rear brake pedal free travel	20 – 30 (0.8 – 1.2)	—
Rear brake lever play	6 – 8 (0.2 – 0.3)	—
Rear brake outer distance	26.0 – 27.0 (1.02 – 1.06)	—
Brake side plate spring free length	21.3 (0.84)	20.2 (0.80)

Tightening Torque Specifications

B831G24307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Rear brake case bolt	26	2.6	19.0	☞(Page 4C-2)
Rear brake cam lever nut	11	1.1	8.0	☞(Page 4C-3)
Rear propeller shaft coupling nut	100	10.0	72.5	☞(Page 4C-6)

NOTE

The specified tightening torque is also 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-7)”.

Special Tools and Equipment

Recommended Service Material

B831G24308001

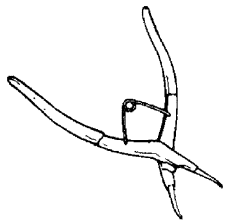
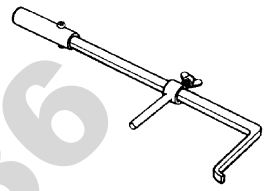
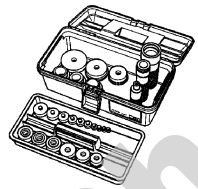
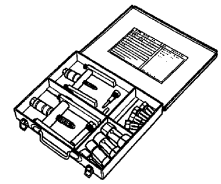
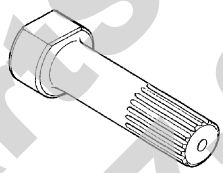
Material	SUZUKI recommended product or Specification		Note
Grease	Water resistance grease	P/No.: 99000–25160	☞(Page 4C-6) / ☞(Page 4C-6)
Thread lock cement	THREAD LOCK CEMENT SUPER 1360 or equivalent	P/No.: 99000–32130	☞(Page 4C-2)

NOTE

Required service material is also described in the following.
"Rear Brake Components (Page 4C-1)"

Special Tool

B831G24308002

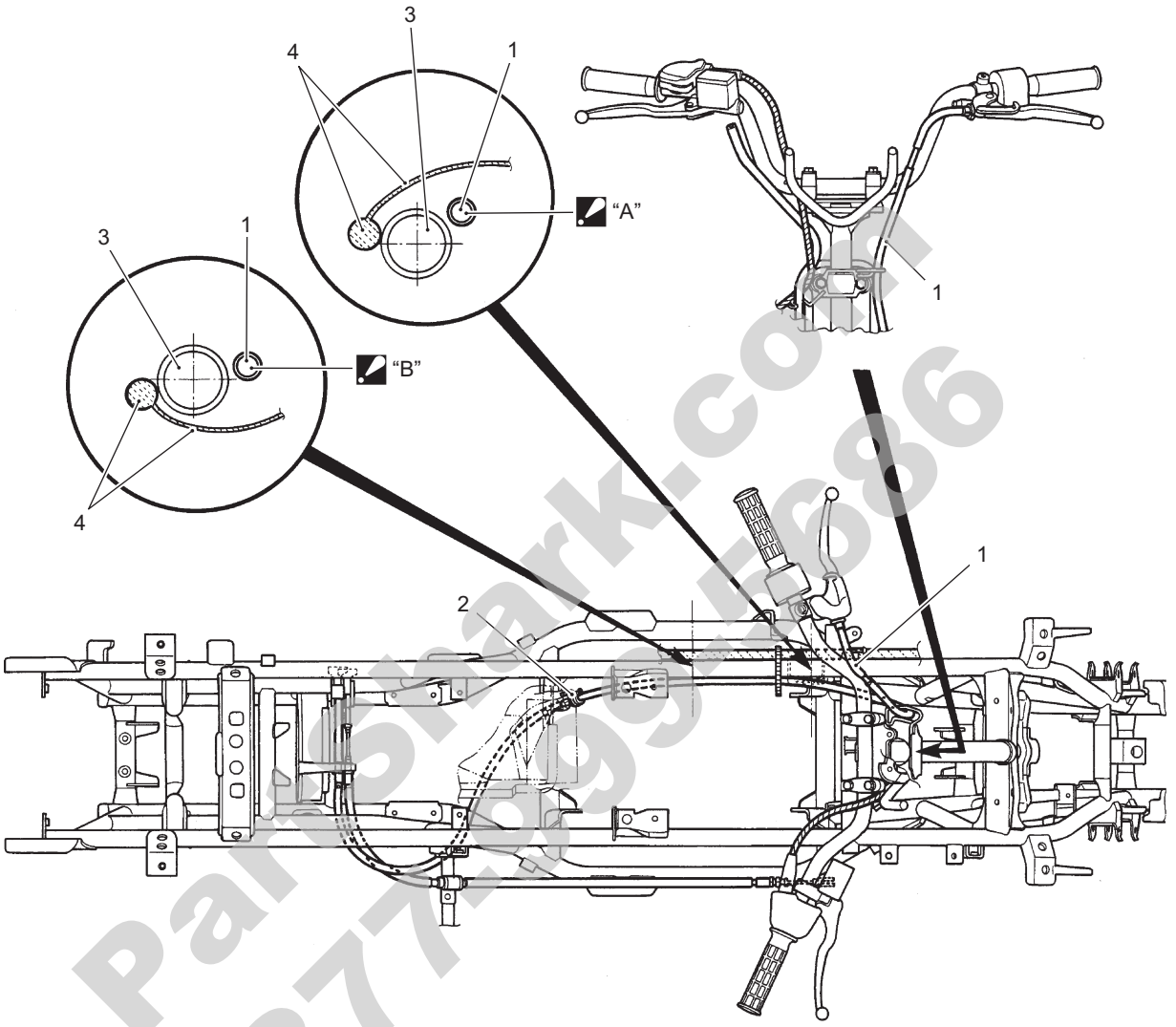
09900–06108 Snap ring pliers ☞(Page 4C-4) 	09913–50121 Oil seal remover ☞(Page 4C-4) 
09913–70210 Bearing installer set ☞(Page 4C-5) / ☞(Page 4C-6) 	09921–20240 Bearing remover set ☞(Page 4C-5) 
09924–52420 Secondary bevel gear holder ☞(Page 4C-4) / ☞(Page 4C-6) 	

Parking Brake

Schematic and Routing Diagram

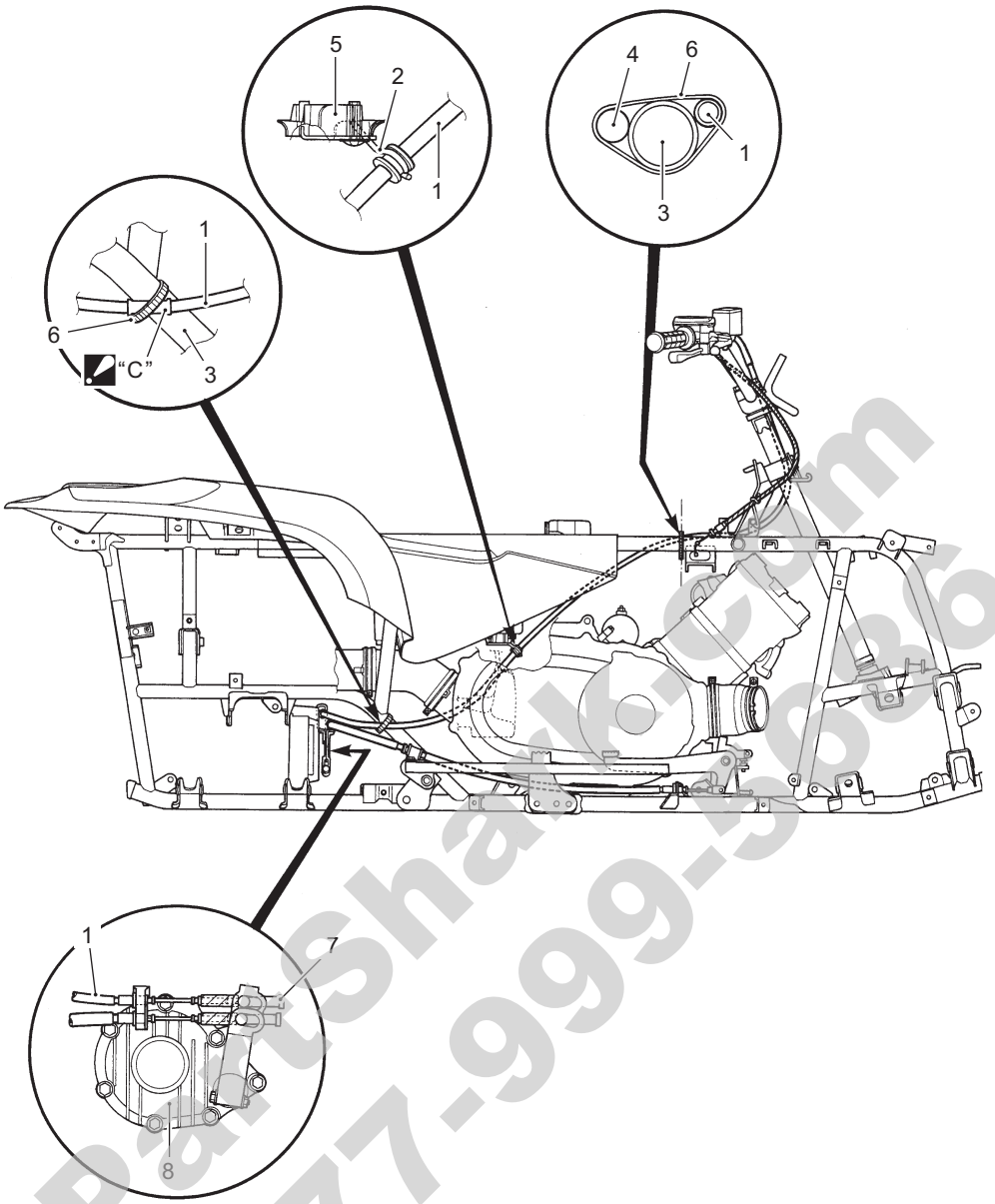
Parking / Rear Brake Cable Routing Diagram

B831G24402001



I831G1440001-02

1. Parking brake cable	4. Wiring harness
2. Parking brake cable guide	"A": Pass the parking brake cable under the wiring harness.
3. Frame	"B": Pass the parking brake cable over the wiring harness.



I831G1440002-03

1. Parking brake cable	6. Clamp
2. Parking brake cable guide	7. Parking brake cable adjust nut
3. Frame	8. Rear brake assembly
4. Wiring harness	"C": Fix the rubber of parking brake cable with clamp.
5. Rear fender	

Repair Instructions

Parking / Rear Brake Inspection and Adjustment

B831G24406001

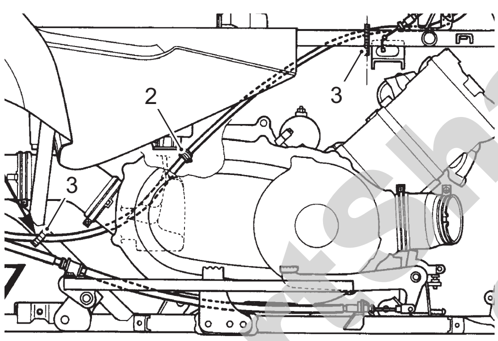
Refer to “Rear Brake Pedal / Rear Brake (Parking Brake) Lever Inspection and Adjustment in Section 0B (Page 0B-19)”.

Parking / Rear Brake Cable Removal and Installation

B831G24406002

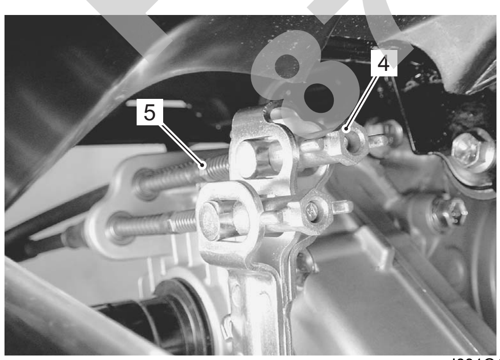
Removal

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)” and “Front Carrier Removal and Installation in Section 9E (Page 9E-4)”.
3) Remove the air cleaner box. Refer to “Air Cleaner Box Removal and Installation in Section 1D (Page 1D-5)”.
4) Remove the clamps (3) and parking brake cable from the cable guide (2).



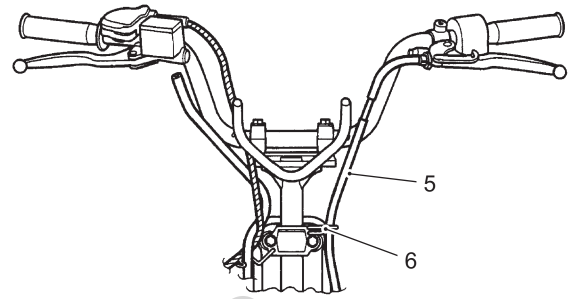
I831G1440003-01

5) Remove the parking brake cable adjuster nut (4) and parking brake cable (5).



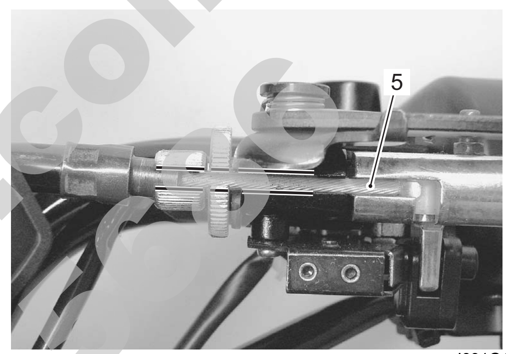
I831G1440004-01

6) Remove the parking brake cable (5) from the cable guide (6).



I831G1440005-03

7) Disconnect the parking brake cable (5).



I831G1440006-02

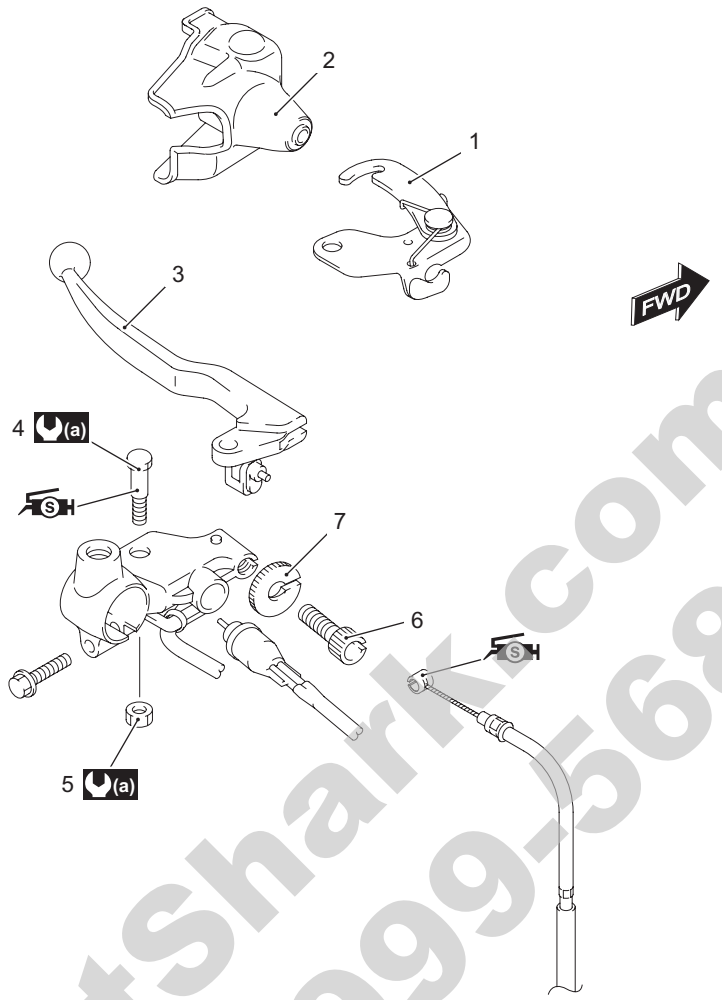
8) Remove the parking brake cable from vehicle.

Installation

1) Install the parking brake cable as shown in the parking brake cable routing diagram. Refer to “Parking / Rear Brake Cable Routing Diagram (Page 4D-1)”.
2) Reinstall the removed parts.
3) After installing the parking brake cable, inspect or adjust the parking brake cable. Refer to “Rear Brake Pedal / Rear Brake (Parking Brake) Lever Inspection and Adjustment in Section 0B (Page 0B-19)”.

Parking / Rear Brake Lever Components

B831G24406003



I831G1440007-01

1. Brake lever lock	4. Brake lever pivot bolt	7. Lock-nut
2. Brake lever cover	5. Brake lever pivot nut	(a) : 6 N·m (0.6 kgf-m, 4.5 lb-ft)
3. Brake lever	6. Adjuster	: Apply silicone grease.

Parking / Rear Brake Lever Removal and Installation

B831G24406004

Removal

Refer to “Handlebars Removal and Installation in Section 6B (Page 6B-3)”.

Installation

Refer to “Handlebars Removal and Installation in Section 6B (Page 6B-3)”.

Parking / Rear Brake Light Switch Inspection

B831G24406005

Refer to “Parking / Rear Brake Light Switch Inspection in Section 4A (Page 4A-5)”.

Parking / Rear Brake Relay Inspection

B831G24406006

Refer to “Parking Brake Relay Inspection in Section 1I (Page 1I-9)”.

Specifications

Tightening Torque Specifications

B831G24407001

NOTE

The specified tightening torque is also described in the following.
“Parking / Rear Brake Lever Components (Page 4D-4)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

B831G24408001

NOTE

Required service material is also described in the following.
“Parking / Rear Brake Lever Components (Page 4D-4)”

Section 5

Transmission / Transaxle

CONTENTS

Precautions

Precautions

Precautions for Transmission / Transaxle

B831G25000001

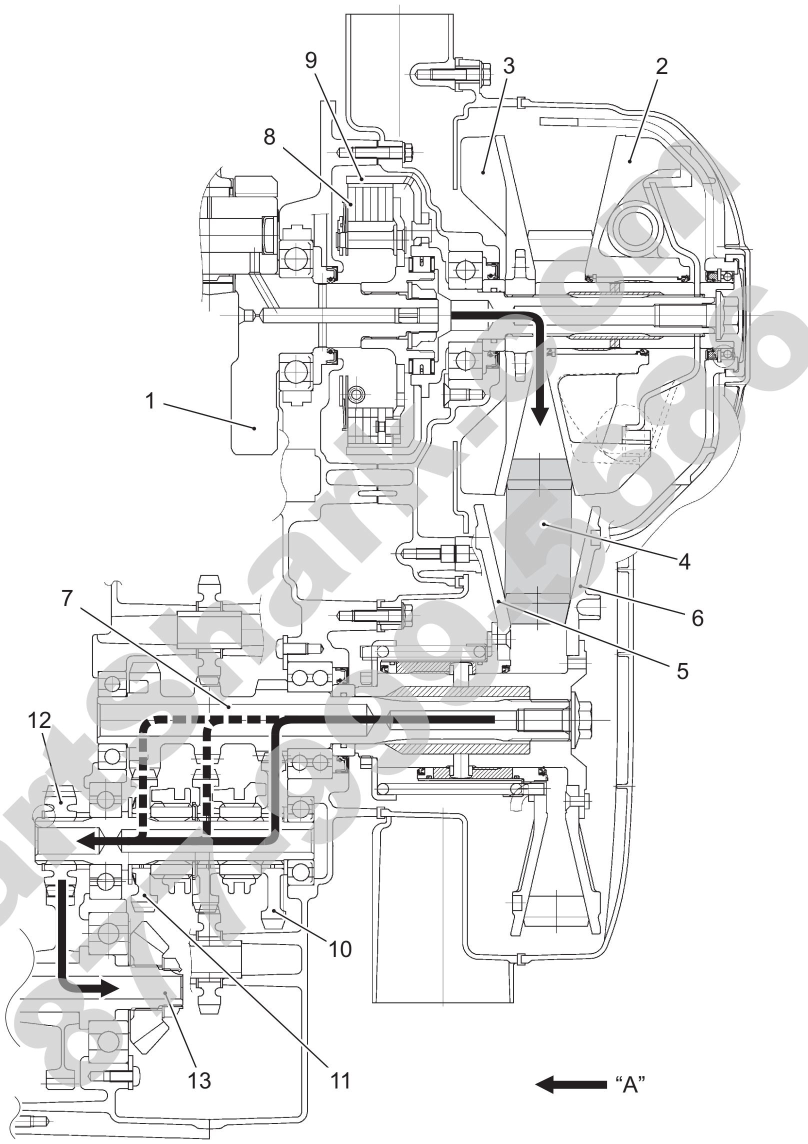
Refer to “General Precautions in Section 00 (Page 00-1)”.

Automatic Transmission

Schematic and Routing Diagram

Drive Train System

B831G25102001



I831G1510001-04

1. Crankshaft	6. Fixed driven face	11. High driven gear
2. Movable drive face	7. Transfer input shaft	12. Transfer output drive gear
3. Fixed drive face	8. Clutch shoe	13. Transfer output driven gear shaft
4. V-belt	9. Clutch housing	"A": Drive train route
5. Movable driven face	10. Low driven gear	

Diagnostic Information and Procedures

Automatic Transmission Symptom Diagnosis

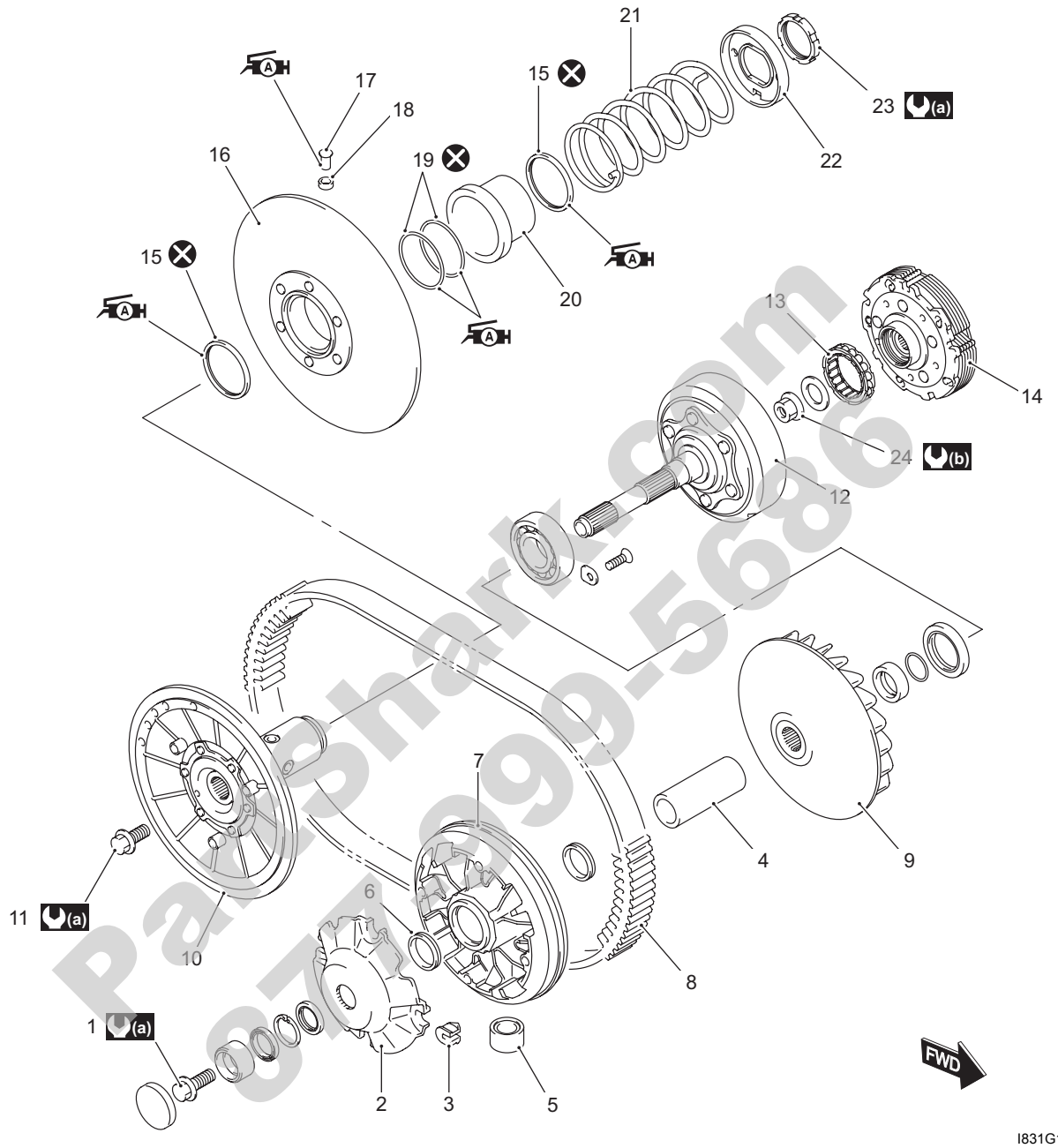
B831G25104001

Condition	Possible cause	Correction / Reference Item
Excessive engine noise	Gear worn or abnormal contact.	*Replace.*
	Spline worn.	*Replace.*
	Bearing worn or burned.	*Replace.*
V-belt slipping	V-belt slipping.	*Replace.*
	Pulley face worn.	*Replace.*
Clutch slipping	Clutch shoe worn.	*Replace.*
	Centrifugal weight operation failure.	*Repair or replace.*
	V-belt worn.	*Replace.*
Clutch dragging	Clutch shoe spring fatigued.	*Replace.*
	Movable driven face distorted.	*Replace.*

Repair Instructions

Automatic Transmission Components

B831G25106001

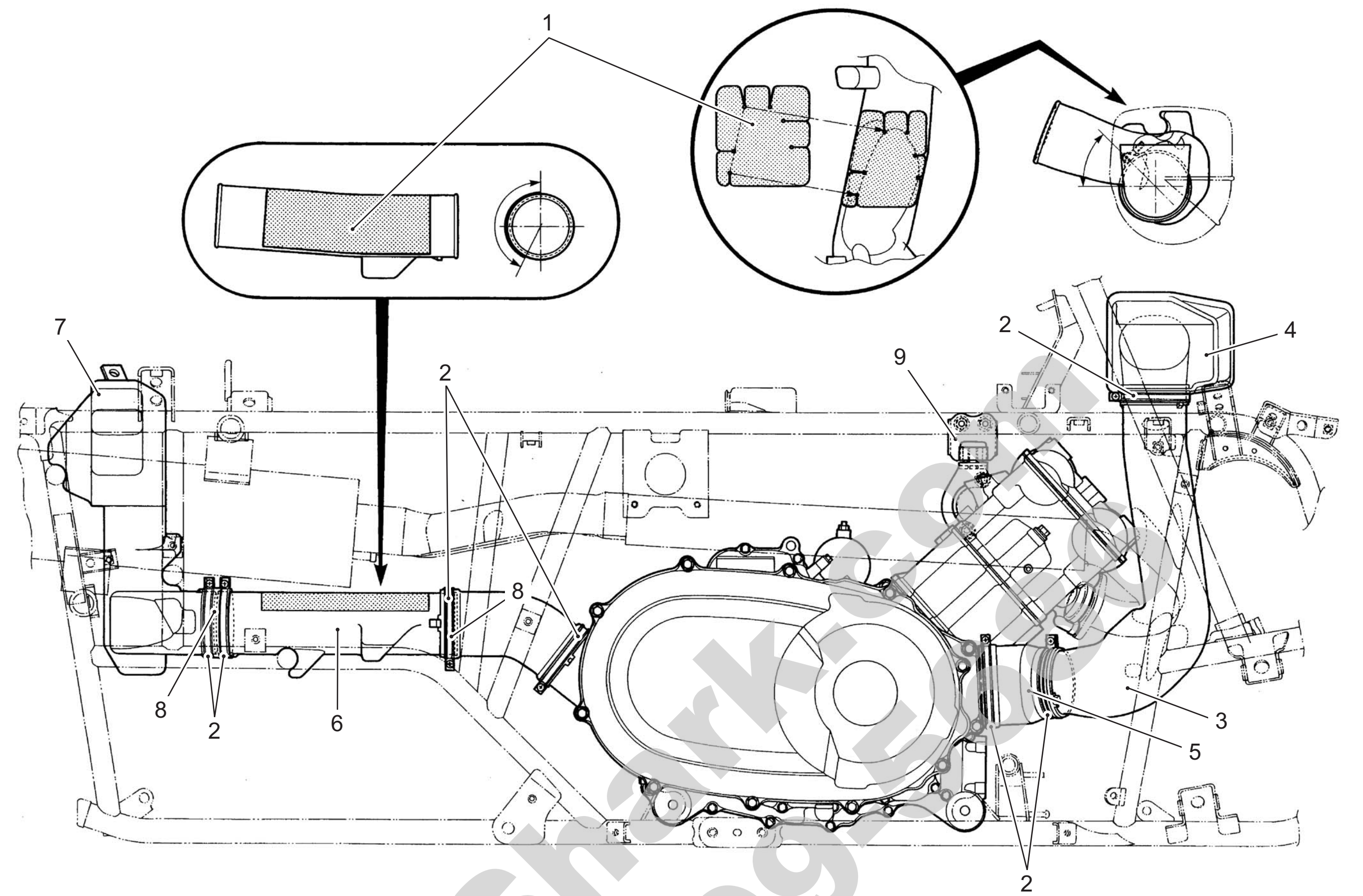


I831G1510002-03

1. Movable drive face bolt	11. Movable driven face bolt	21. Spring
2. Movable drive plate	12. Clutch housing	22. Spring plate
3. Damper	13. One way clutch	23. Movable driven face ring nut
4. Spacer	14. Clutch shoe assembly	24. Clutch shoe nut
5. Roller	15. Oil seal	(a) : 110 N·m (11.0 kgf-m, 79.5 lb-ft)
6. Oil seal	16. Movable driven face	(b) : 150 N·m (15.0 kgf-m, 108.5 lb-ft)
7. Movable drive face	17. Pin	A : Apply grease.
8. Drive V-belt	18. Spacer	: Do not reuse.
9. Fixed drive face	19. O-ring	
10. Fixed driven face	20. Spring seat	

V-belt Cooling Duct Construction

B831G25106002



I831G1510003-06

1. Heat shield	3. Belt cooling inlet duct No. 1	5. Belt cooling inlet duct connector	7. Belt cooling outlet duct No. 2
2. Clamp	4. Belt cooling inlet duct No. 2	6. Belt cooling outlet duct No. 1	8. Belt cooling outlet duct connector

V-belt Cooling Duct Removal and Installation

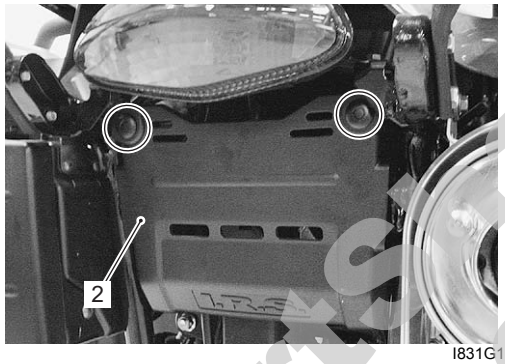
B831G25106003

Removal

1) Remove the right inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Loosen the clamp screw and remove the inlet cooling duct assembly (1).

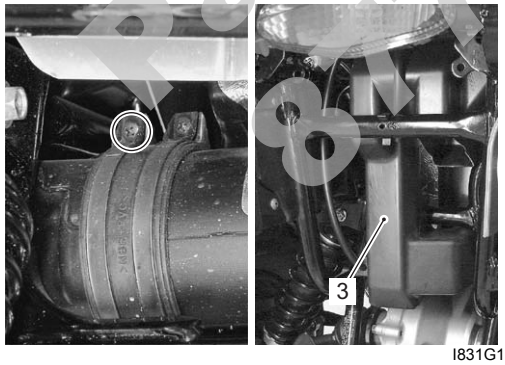
I831G1510004-01

3) Remove the rear cover (2).



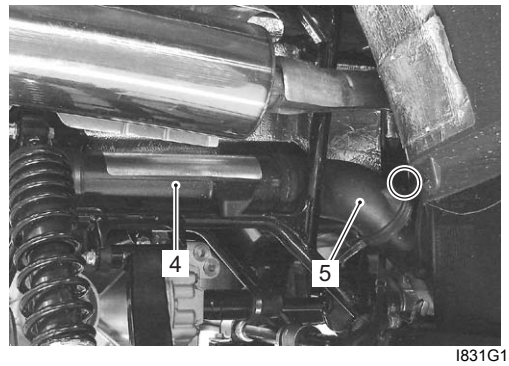
I831G1510005-01

4) Loosen the clamp and remove the outlet belt cooling duct No. 2 (3).



I831G1510006-01

5) Remove the outlet belt cooling duct No. 1 (4) along with outlet belt cooling duct connector (5).



I831G1510007-03

Installation

1) Install the V-belt cooling duct as shown in the V-belt cooling duct construction. Refer to “V-belt Cooling Duct Construction (Page 5A-4)”.
2) Install the removed parts.

Clutch Engagement and Lock-up Speed Inspection

B831G25106004

Refer to “Automatic Clutch Inspection in Section 0B (Page 0B-26)”.

V-belt Type Continuously Variable Automatic Transmission Removal and Installation

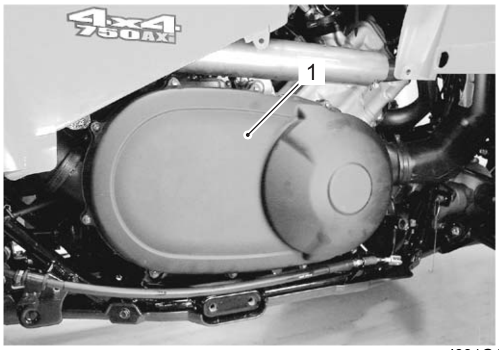
B831G25106005

Removal

V-belt outer cover

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the right cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Remove the inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
4) Removal the footrest. Refer to “Footrest Removal and Installation in Section 9E (Page 9E-2)”.
5) Remove the brake pedal. Refer to “Rear Brake Pedal Removal and Installation in Section 4A (Page 4A-14)”.

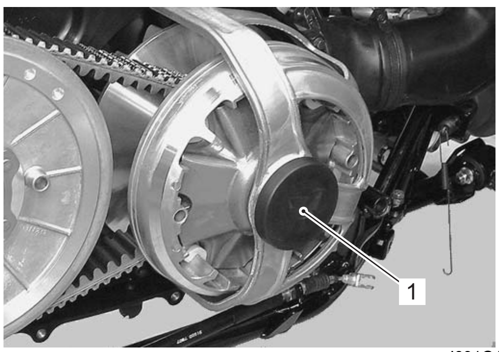
6) Remove the V-belt outer cover (1).



I831G1510008-01

Movable drive face

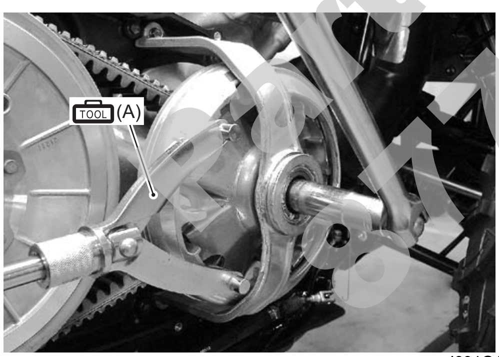
1) Remove the cap (1).



I831G1510009-01

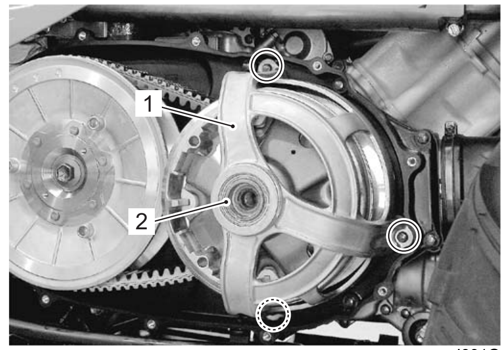
2) Remove the movable drive face bolt with the special tool.

Special tool
TOOL (A): 09930–40113 (Rotor holder)



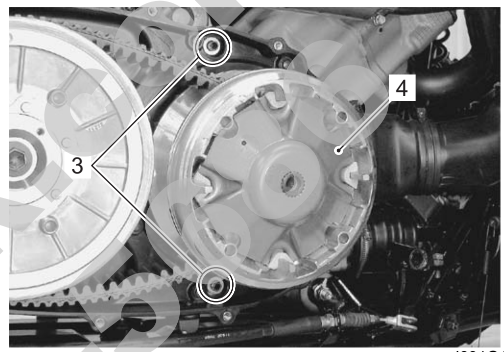
I831G1510010-01

3) Remove the movable drive face cover (1) and collar (2).



I831G1510011-01

4) Remove the dowel pins (3).
5) Remove the movable drive face (4).

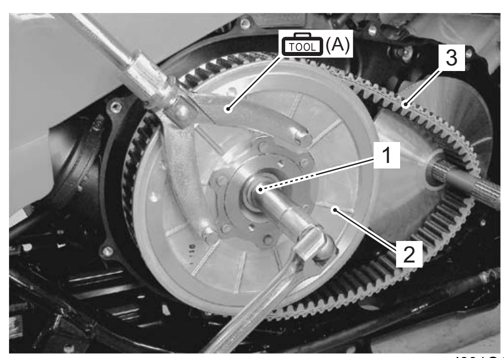


I831G1510012-01

Movable driven face

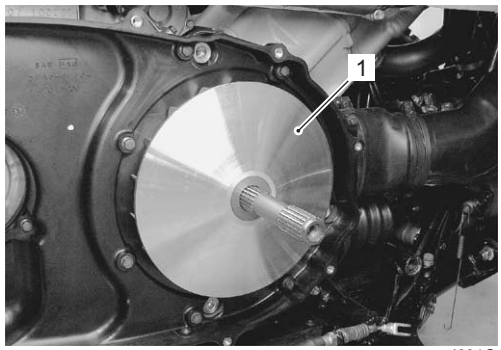
1) Remove the movable driven face bolt (1) with the special tool.
2) Remove the movable driven face assembly (2) and drive belt (3).

Special tool
TOOL (A): 09930–40113 (Rotor holder)



I831G1510013-02

Fixed drive face
Remove the fixed drive face (1).



I831G1510014-01

Installation
Install the automatic transmission component parts in the reverse order of removal. Pay attention to the following points:

Fixed drive face
Install the fixed drive face (1).

⚠ CAUTION

Degrease the fixed drive face. Use nonflammable cleaning solvent to wipe off oily or greasy matter and make its surfaces completely dry.

I831G1510014-01

Movable driven face / drive V-belt

- Install the drive belt (1), as low as possible, between the movable driven face and fixed driven face by tapping with a plastic mallet.

⚠ CAUTION

- **The drive belt should be installed so that the arrows on the drive belt periphery point in the normal turning direction.**
- **The drive belt contact surface of the driven face should be thoroughly cleaned.**

I831G1510015-01

- Apply grease in the groove of fixed driven face.

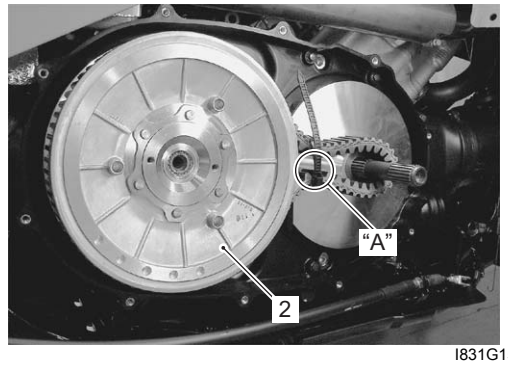
: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

I831G1510016-01

- Install the movable driven face assembly (2).

⚠ CAUTION

Pull the center area “A” of upper and lower belt lines to be close to each other to prevent the belt from expanding.

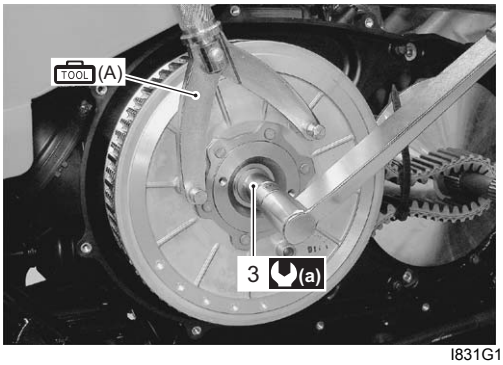


I831G1510017-01

- Tighten the movable driven face bolt (3) to the specified torque with the special tool.

  Tightening torque
  Movable driven face bolt (a): 110 N·m (11.0 kgf-m, 79.5 lb-ft)

  Special tool
  TOOL (A): 09930–40113 (Rotor holder)



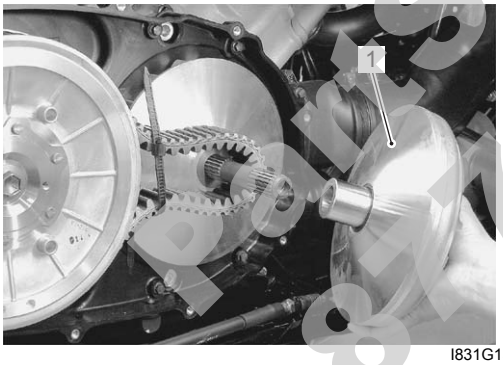
I831G1510018-01

Movable Drive Face

- Install the movable drive face assembly (1).

⚠ CAUTION

Degrease the movable drive face assembly (1). Use nonflammable cleaning solvent to wipe off oily or greasy matter and make its surfaces completely dry.



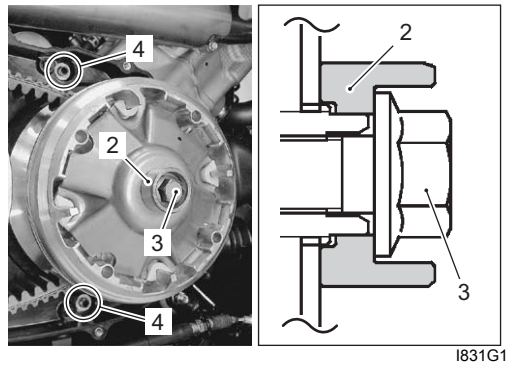
I831G1510019-01

- Install the collar (2) and movable drive face bolt (3).

NOTE

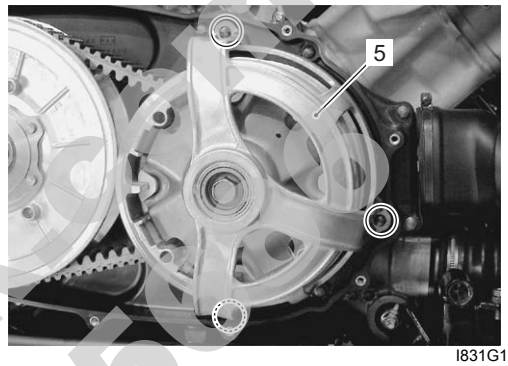
The deep concave of the collar (2) faces outside.

- Install the dowel pins (4).



I831G1510020-02

- Install the movable drive face cover (5).



I831G1510021-01

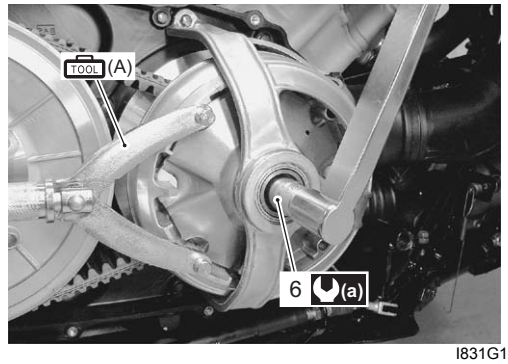
- Tighten the movable drive face bolt (6) to the specified torque with the special tool.

  Tightening torque
  Movable drive face bolt (a): 110 N·m (11.0 kgf-m, 79.5 lb-ft)

  Special tool
  TOOL (A): 09930–40113 (Rotor holder)

NOTE

Turn the fixed drive face until the belt is seated in and driven faces will move together smoothly without slip.



I831G1510022-01

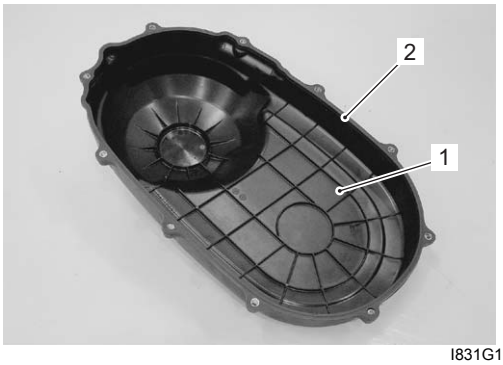
- Install the cap.

V-belt Outer Cover

- Install the V-belt outer cover (1).

⚠ CAUTION

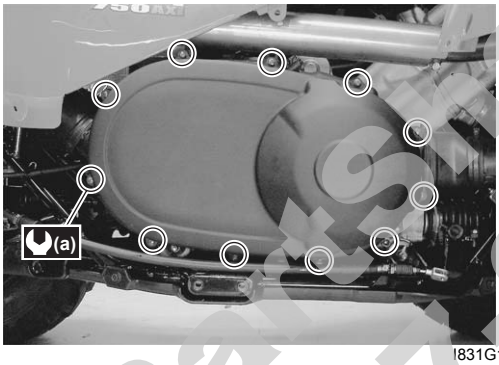
If there are wear or damage, replace the gasket (2) with a new one.



I831G1510023-01

- Tighten the V-belt outer cover bolts to the specified torque.

Tightening torque
V-belt outer cover bolt (a): 8 N·m (0.8 kgf-m, 6.0 lb-ft)



I831G1510111-02

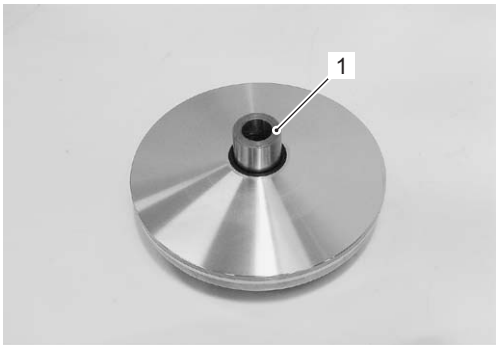
Movable Drive Face Disassembly and Assembly

B831G25106006

Refer to “Automatic Transmission Components (Page 5A-3)” and “V-belt Type Continuously Variable Automatic Transmission Removal and Installation (Page 5A-5)”.

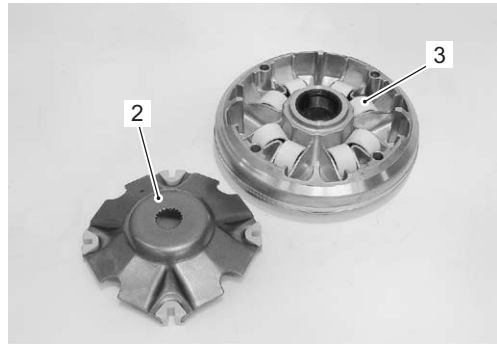
Disassembly

1) Remove the spacer (1).



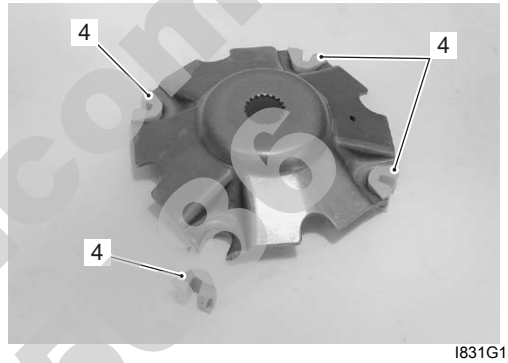
I831G1510024-01

2) Remove the movable drive plate (2) and rollers (3).



I831G1510025-01

3) Remove the dampers (4).

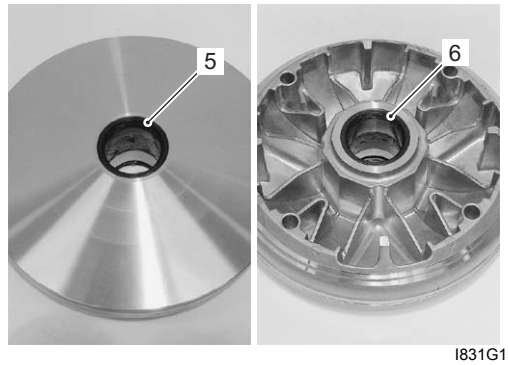


I831G1510026-01

4) Remove the oil seals (5) and (6).

NOTE

If there are no abnormal conditions, the oil seals removal are not necessary.



I831G1510027-01

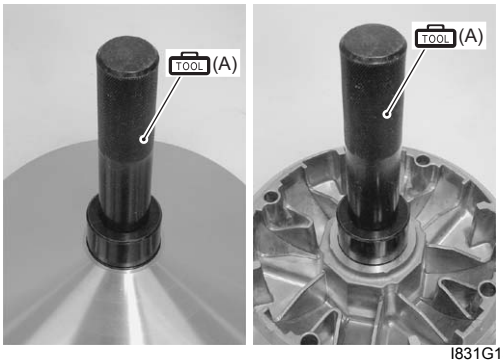
Assembly

1) Install the oil seals with the special tool.

Special tool
(A): 09913–70210 (Bearing installer set)

NOTE

The removed oil seals must be replaced with new ones.



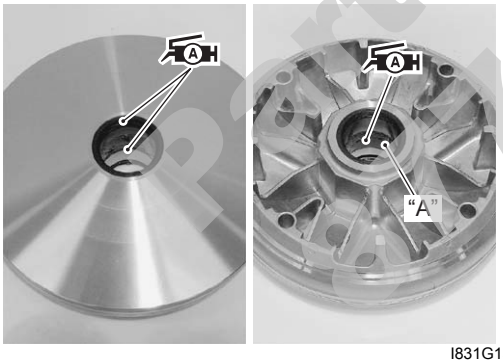
I831G1510028-01

2) Apply grease to the lip of oil seals and inside grease groove “A” of the movable drive face.

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

⚠ CAUTION

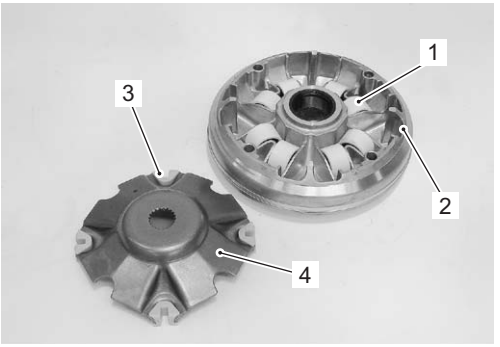
- **Wipe off any excess grease thoroughly.**
- **Take care not to apply grease to the contact surface of the drive belt.**



I831G1510029-02

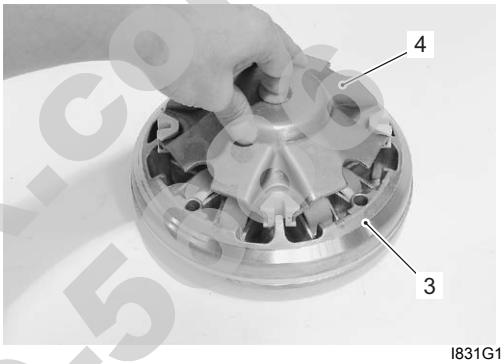
3) Assemble the rollers (1) to the movable drive face (2).

4) Assemble the four dampers (3) to the movable drive plate (4).



I831G1510030-01

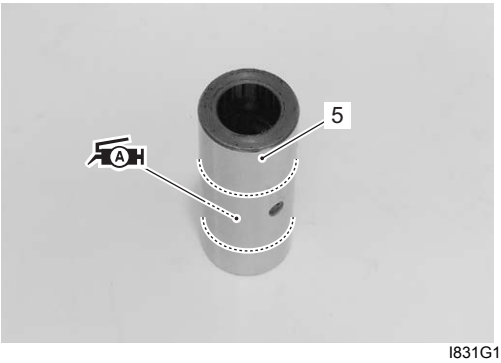
5) Assemble the movable plate (4) to the movable drive face (3).



I831G1510031-01

6) Apply grease to the inside groove of the spacer (5).

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

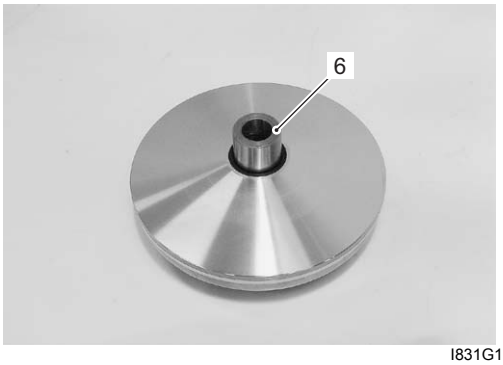


I831G1510032-02

7) Install the spacer (6).

NOTE

When installing the spacer, press down the movable drive face plate so as not to cause the rollers to come out of position.



I831G1510033-01

Movable Driven Face Disassembly and Assembly

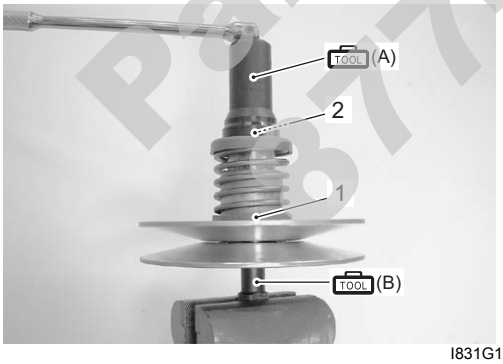
B831G25106007

1) Hold the movable driven face assembly (1) with the special tool and vise, loosen the movable driven face ring nut (2) with the special tool.

⚠ WARNING

Do not remove the movable driven face ring nut before attaching the clutch spring compressor.

Special tool
TOOL (A): 09917–23711 (Ring nut wrench)
TOOL (B): 09924–52450 (Fixed driven face holder)



I831G1510034-01

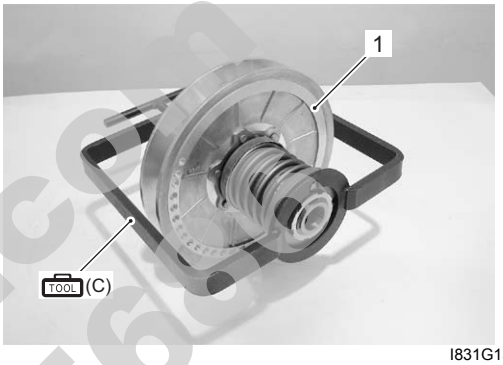
2) Set the special tool to the movable driven face assembly (1) and compress the movable driven face assembly by turning in the special tool handle.

NOTE

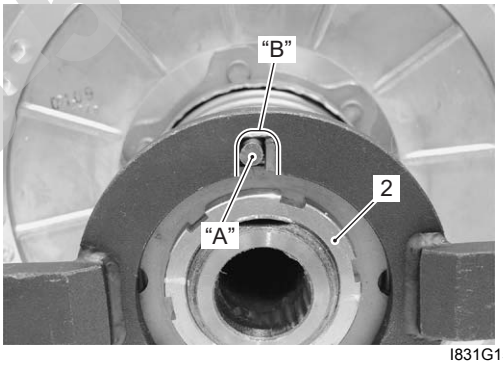
Make sure to insert the spring end "A" into the slot "B" of the special tool as shown in the figure.

Special tool
TOOL (c): 09922–31430 (Clutch spring compressor)

3) Remove the movable driven face ring nut (2).



I831G1510035-01

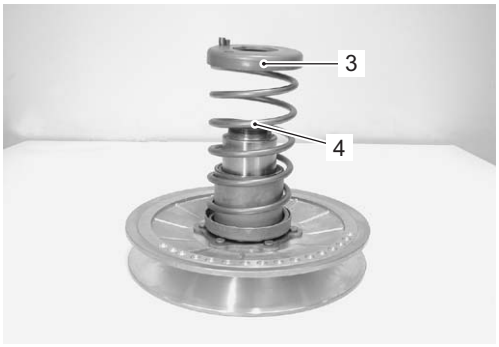


I831G1510036-02

⚠ WARNING

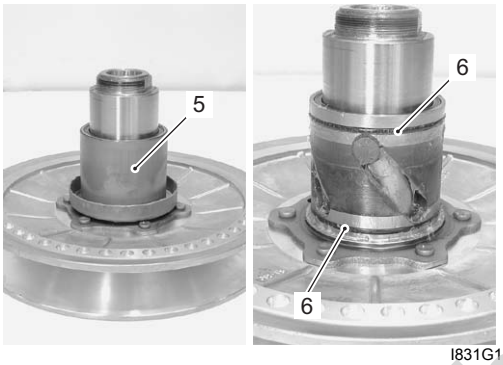
Since a high spring force applies to the movable driven face, care must be used so as not to cause the movable driven face to come off abruptly.

4) Loosen the special tool handle slowly and remove the special tool.
5) Remove the spring plate (3) and spring (4).



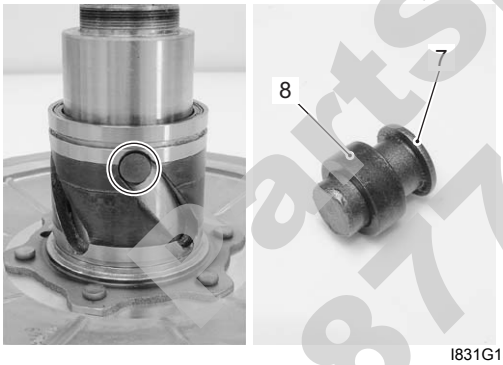
I831G1510037-01

6) Remove the spring seat (5) and O-rings (6).



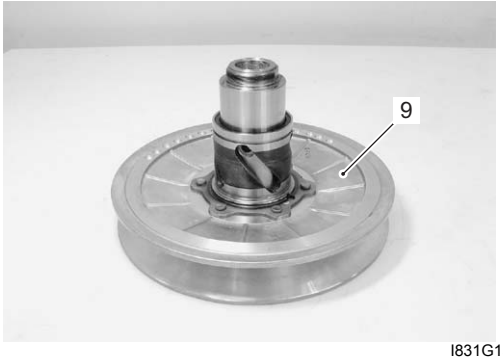
I831G1510038-01

7) Remove the pins (7) and rollers (8).



I831G1510039-01

8) Remove the movable driven face (9).

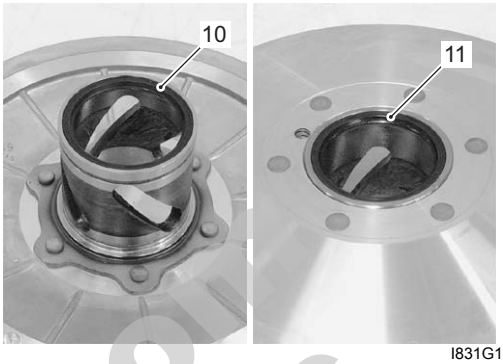


I831G1510040-01

9) Remove the oil seals (10) and (11) from the movable driven face.

NOTE

If there are no abnormal conditions, the oil seals removal are not necessary.



I831G1510041-01

Assembly

Assemble the movable driven face in the reverse order of disassembly. Pay attention to the following points:

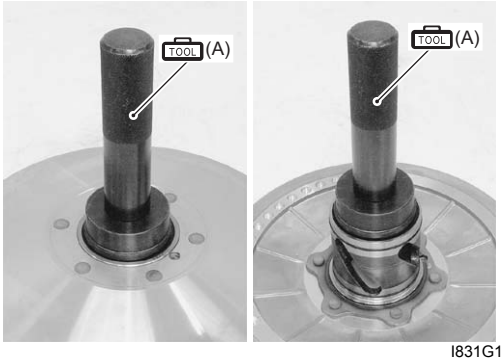
- Install the oil seals with the special tool.

Special tool

TOOL (A): 09913–70210 (Bearing installer set)

⚠ CAUTION

The removed oil seals must be replaced with new ones.



I831G1510042-01

- Install the O-rings (1) to the movable driven face.
- Apply grease to the oil seal lips, O-rings and inside groove of movable driven face.

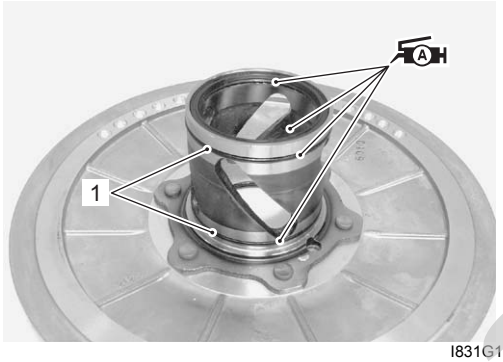
⚠ CAUTION

Replace the O-rings (1) with new ones.

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

⚠ CAUTION

- **Wipe off any excess grease thoroughly.**
- **Take care not to apply grease to the contact surface of the drive belt.**



I831G1510043-01

- Install the movable driven face (2) to the fixed driven face (3).
- Apply grease to the pin grooves of the movable driven face.

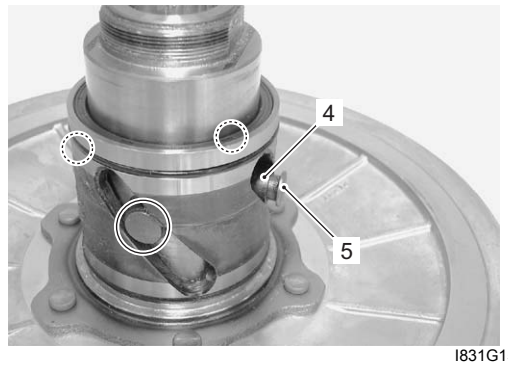
: Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)

⚠ CAUTION

To prevent damaging the oil seal lip from during installation, slide the lip using a 0.1-mm steel sheet as a guide.

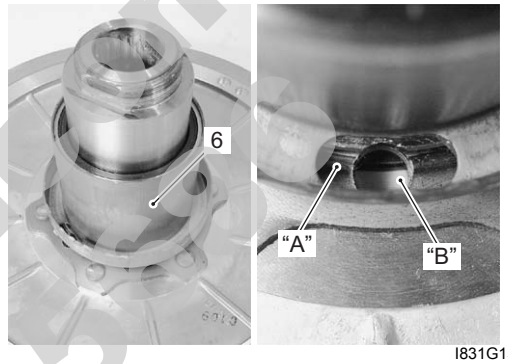
I831G1510116-01

- Install the rollers (4) and pins (5).



I831G1510044-02

- Install the spring seat (6) aligning the hole “A” with the hole “B”.



I831G1510045-01

- Install the spring (7) and spring plate (8) by aligning the spring ends with the holes.

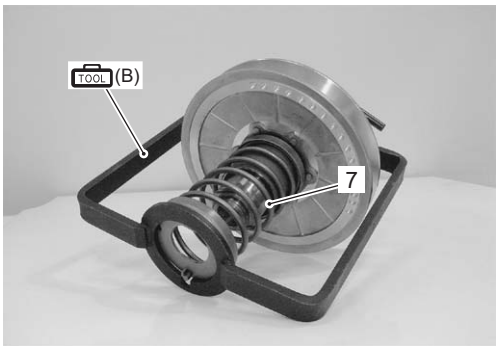
I831G1510046-01

- Compress the spring (7) with the special tool.

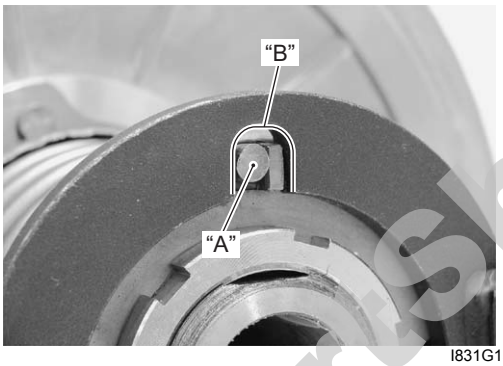
Special tool
(B): 09922–31430 (Clutch spring compressor)

NOTE

Make sure to insert the spring end "A" into the slot "B" of the special tool as shown in the figure.

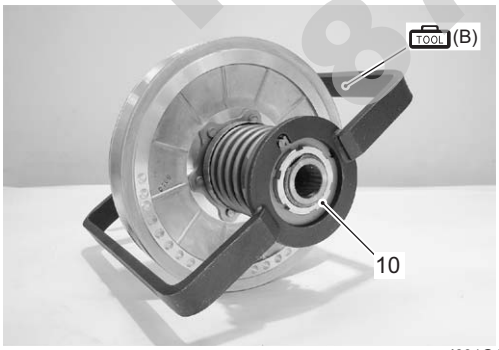


I831G1510047-02



I831G1510048-01

- Tighten the movable driven face ring nut (10) temporarily.
- Remove the special tool from the movable driven face assembly.

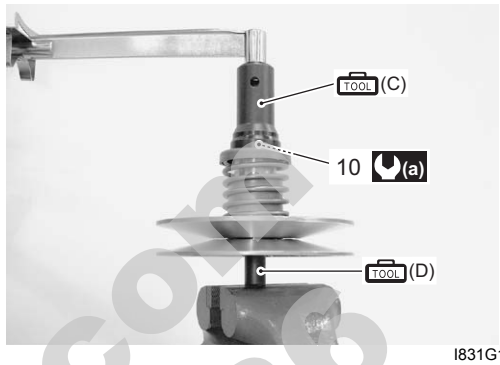


I831G1510049-01

- Tighten the movable driven face ring nut (10) to the specified torque with the special tools.

Tightening torque
Movable driven face ring nut (a): 110 N·m (11.0 kgf-m, 79.5 lb-ft)

Special tool
(C): 09917–23711 (Ring nut wrench)
(D): 09924–52450 (Fixed driven face holder)



I831G1510050-01

Drive V-belt Inspection

B831G25106008

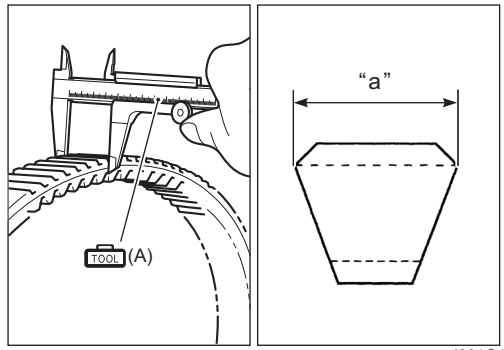
Inspect that the drive belt is free from any greasy substance.
Inspect the contact surface of the drive belt for cracks or damage and measure the width of the drive belt with the vernier calipers.
If any defects are found or measurement exceeds the service limit, replace the drive belt with a new one.

⚠ CAUTION

If grease or oil is present on the surface of the drive belt, degrease the belt thoroughly.

Drive V-belt width
Standard: 34.3 (1.35 in)
Service limit: 33.3 mm (1.31 in)

Special tool
(A): 09900–20101 (Vernier calipers (1/15 mm, 150 mm))



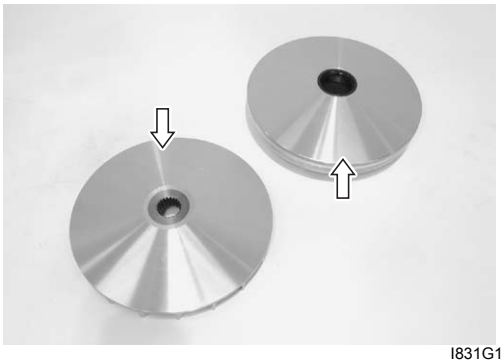
I831G1510051-02

Movable / Fixed Drive Face Parts Inspection

B831G25106009

Movable / Fixed Drive Face

Inspect the drive faces for any abnormal conditions such as stepped wear or discoloration caused by burning.
If any damages are found, replace the drive faces with new ones.



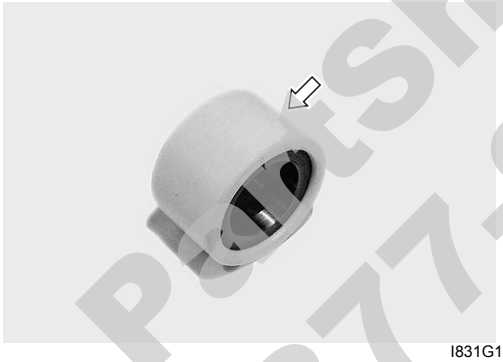
I831G1510053-01

Roller

Inspect each roller and their sliding surface for wear or damage.
If any defects are found, replace the rollers as a set.

NOTE

The rollers must always be changed as a set.



I831G1510054-01

Damper

Inspect the dampers for wear or damage.
If any defects are found, replace the dampers with new ones.

I831G1510055-01

Oil Seal

Inspect the lip of the oil seal for wear or damage.
If any damages are found, replace the oil seal with a new one.
Refer to “Movable Driven Face Disassembly and Assembly (Page 5A-11)”.

I831G1510056-01

Movable / Fixed Driven Face Parts Inspection

B831G25106010

Movable / Fixed Driven Face

Inspect the driven face for any abnormal conditions, such as stepped wear or discoloration caused by burning.
If any defects are found, replace them with new ones.

I831G1510057-01

Movable Driven Pin and Spacer

Inspect the movable driven pin and spacer for abnormal wear or damage. If any defects are found, replace the pin and spacer with a new one.

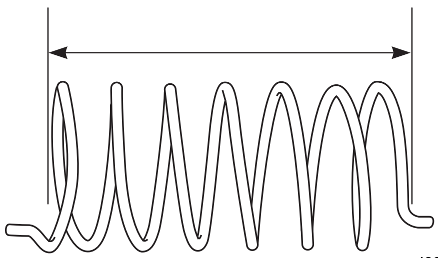
I831G1510058-01

Movable Driven Spring

Measure the spring free length with the vernier calipers.

- If the length is shorter than the service limit, replace the spring with a new one.

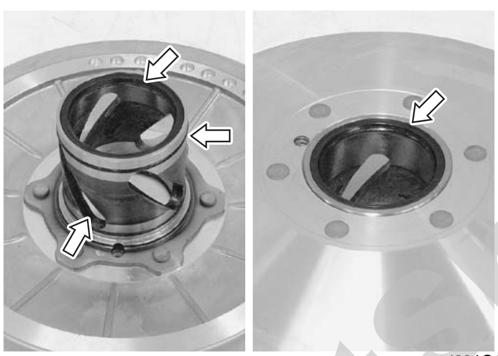
Movable driven face spring free length
Service limit: 145.4 mm (5.72 in)



I831G1510059-02

O-ring and Oil Seal

Inspect the O-rings and oil seals for wear or damage. If any defects are found, replace the O-rings and oil seals with new ones.



I831G1510060-01

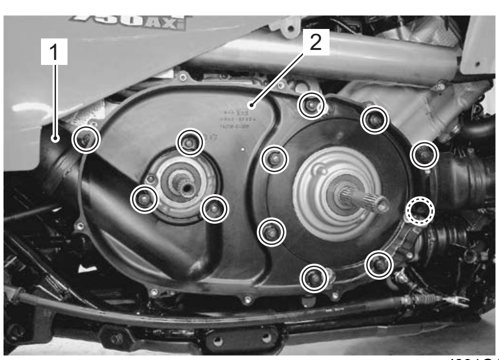
Clutch Shoe Removal and Installation

B831G25106011

Refer to "V-belt Type Continuously Variable Automatic Transmission Removal and Installation (Page 5A-5)".

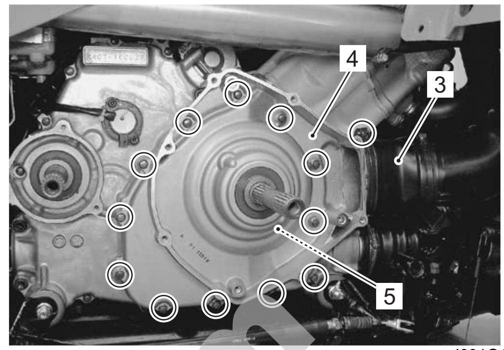
Removal

1) Drain the engine oil. Refer to "Engine Oil and Filter Replacement in Section 0B (Page 0B-10)".
2) Remove the outlet cooling duct connector (1) from the V-belt inner cover (2).
3) Remove the V-belt inner cover (2).



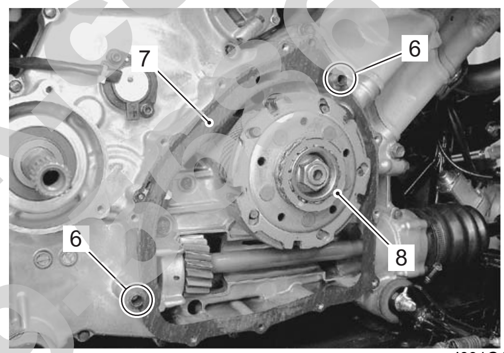
I831G1510061-01

4) Remove the inlet cooling duct connector (3) from the clutch housing case (4).
5) Remove the clutch housing case (4) along with the clutch housing (5).



I831G1510062-02

6) Remove the dowel pins (6) and gasket (7).
7) Remove the one way clutch (8).



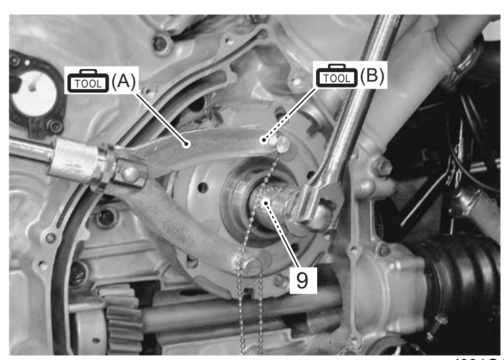
I831G1510063-02

8) Remove the clutch shoe nut (9) with the special tools.

⚠ **CAUTION**

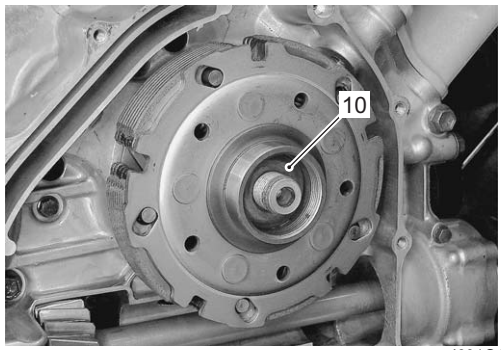
The clutch shoe nut (9) has left-hand threads.

Special tool
TOOL **(A): 09930–40113 (Rotor holder)**
TOOL **(B): 09930–40131 (Balancer drive sprocket holder)**



I831G1510064-02

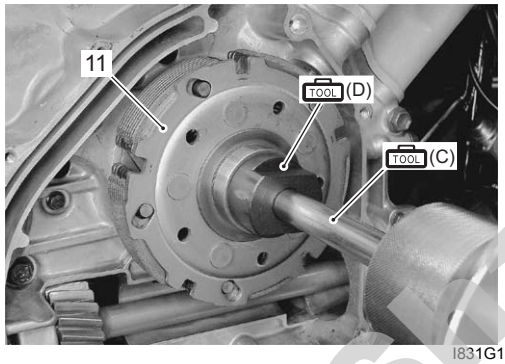
9) Remove the washer (10).



I831G1510065-02

10) Remove the clutch shoe (11) with the special tools.

Special tool
TOOL (C): 09930–30104 (Rotor remover slide shaft)
TOOL (D): 09920–33540 (Clutch shoe remover)



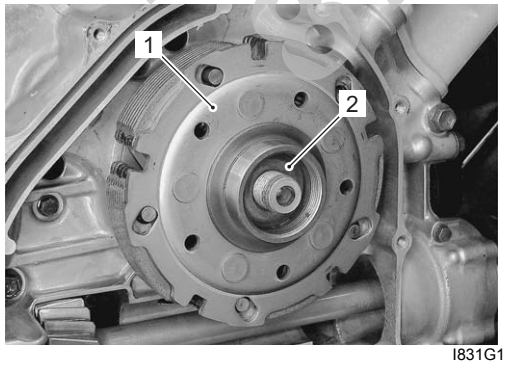
I831G1510066-02

Installation
Install the clutch shoe in the reverse order of removal.
Pay attention to the following points:

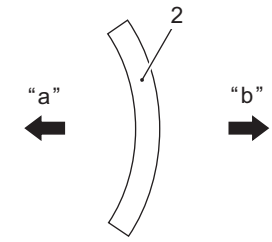
- Install the clutch shoe (1) and washer (2).

NOTE

Install the washer (2) as shown in the figure.



I831G1510067-01



I831G1510068-01

“a”: Clutch shoe side	“b”: Clutch shoe nut side

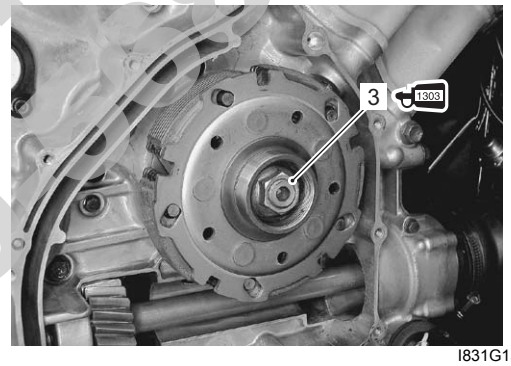
- Apply a small quantity of thread lock to the clutch shoe nut (3).

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

- Install the clutch shoe nut (3).

NOTE

The clutch shoe nut (3) has left-hand threads.

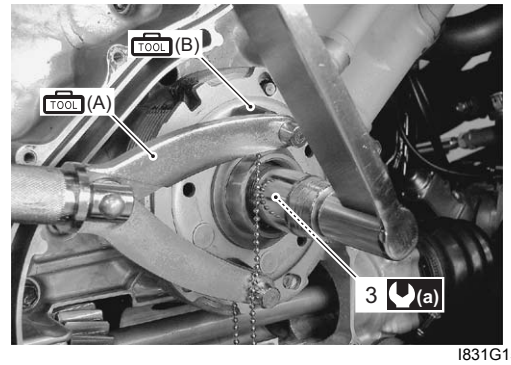


I831G1510069-02

- Tighten the clutch shoe nut (3) to the specified torque with the special tools.

Tightening torque
Clutch shoe nut (a): 150 N·m (15.0 kgf-m, 108.5 lb-ft)

Special tool
TOOL (A): 09930–40113 (Rotor holder)
TOOL (B): 09930–40131 (Balancer drive sprocket holder)

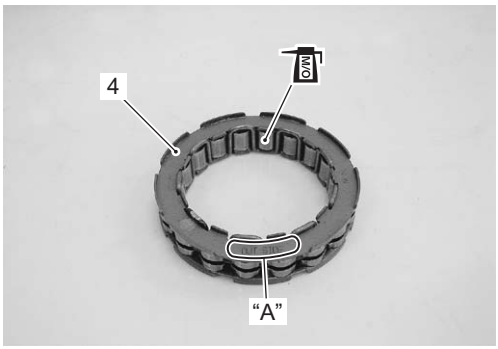


I831G1510070-01

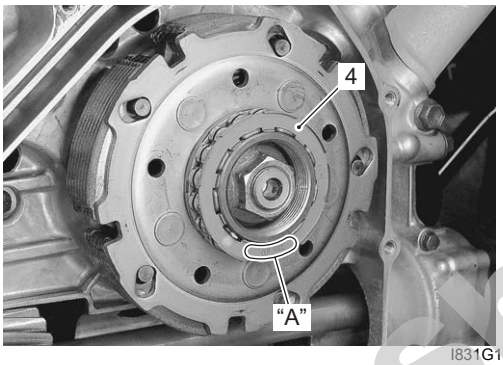
- Apply molybdenum oil solution to the inside of the one way clutch (4).

  M/O: Molybdenum oil (MOLYBDENUM OIL SOLUTION)

- Install the one way clutch (4) with facing the “OUTSIDE” mark “A” outside.



I831G1510071-02

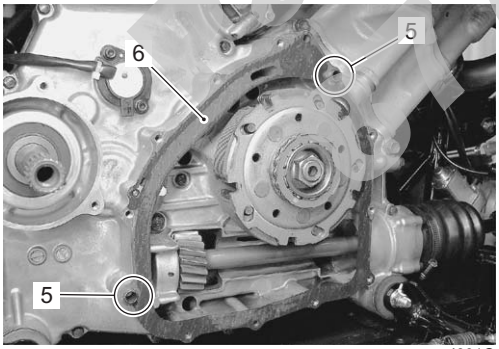


I831G1510072-02

- Install the dowel pins (5) and gasket (6).

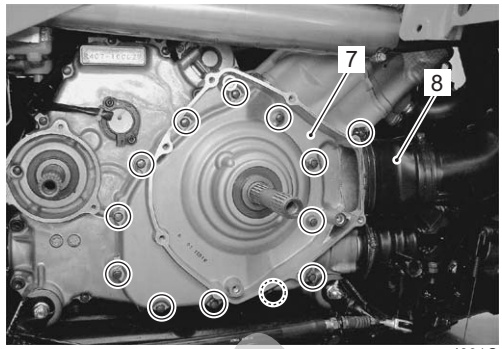
⚠ CAUTION

Use a new gasket (6) to prevent oil leakage.



I831G1510114-02

- Install the clutch housing case (7) and inlet belt cooling duct connector (8) and tighten the bolts diagonally.



I831G1510112-01

- Install the V-belt inner cover (9).

⚠ CAUTION

If there are wear or damage, replace the gaskets (10) with new ones.

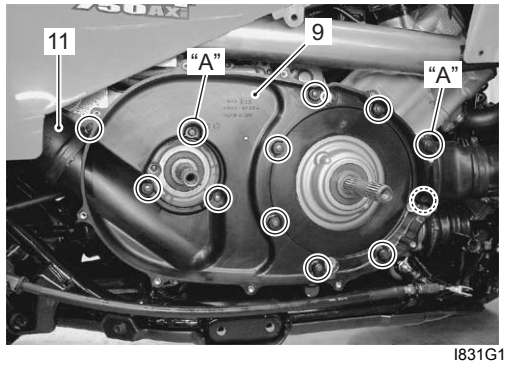
I831G1510113-01

⚠ CAUTION

Tighten the clutch inner cover bolts “A” first and then other ones diagonally.

Tightening torque
V-belt inner cover bolt: 9 N·m (0.9 kgf-m, 6.5 lb-ft)

- Install the outlet belt cooling duct connector (11).



I831G1510073-01

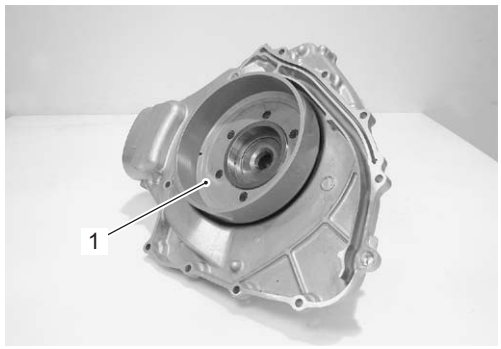
Clutch Housing Case Disassembly and Assembly

B831G25106012

Refer to “Clutch Shoe Removal and Installation (Page 5A-16)”.

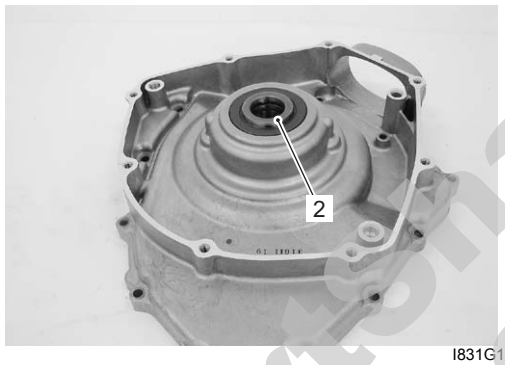
Disassembly

- Remove the clutch housing (1) from clutch housing case.



I831G1510074-01

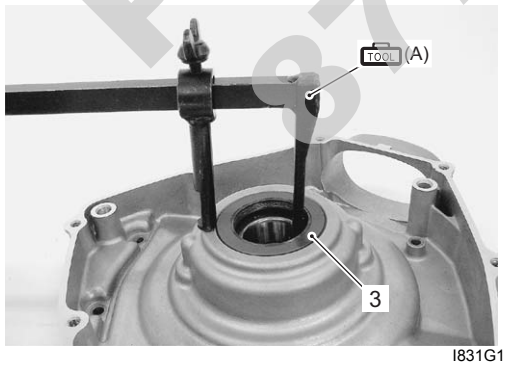
- Remove the collar (2).



I831G1510075-01

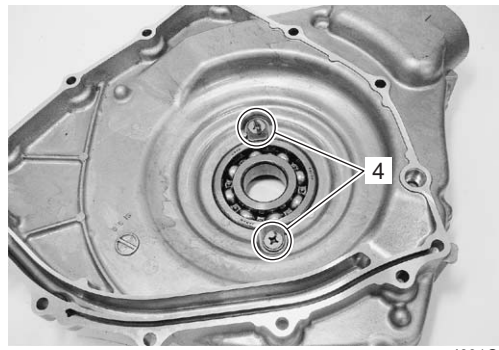
- Remove the oil seal (3) with the special tool.

Special tool
TOOL (A): 09913–50121 (Oil seal remover)



I831G1510076-01

- Remove the retainers (4).



I831G1510077-01

- Remove the bearing (5) with the special tool.

Special tool
TOOL (B): 09921–20240 (Bearing remover set)

NOTE

If there is no abnormal noise, the bearing removal is not necessary.

I831G1510078-01

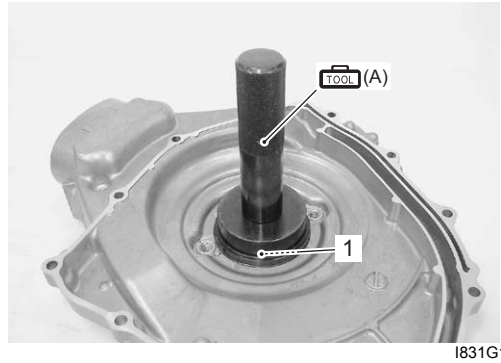
Assembly

- Install the bearing (1) with the special tool.

Special tool
TOOL (A): 09913–70210 (Bearing installer set)

⚠ CAUTION

The removed bearing must be replaced with a new one.



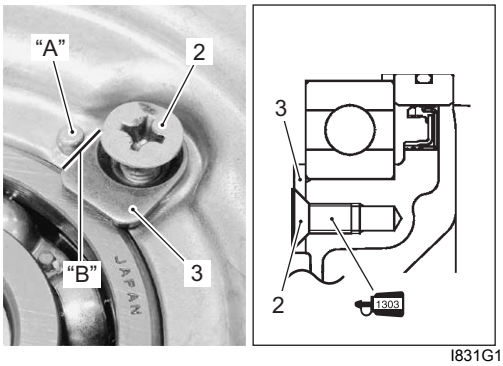
I831G1510079-01

- Apply a small quantity of thread lock to the bearing retainer screws (2), and tighten them securely.

  1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

  NOTE

  - **When installing the bearing retainer (3), align the convex part "A" of clutch housing case with the edge "B" of bearing retainer.**



I831G1510080-02

- Install the oil seal (4) with the special tool.

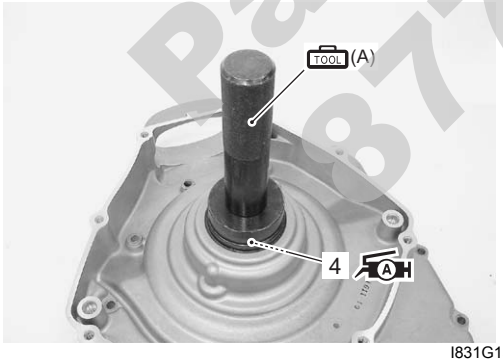
  ⚠ CAUTION

  The removed oil seal (4) must be replaced with a new one.

  Special tool
  TOOL (A): 09913–70210 (Bearing installer set)

- Apply grease to the rip of the oil seal (4).

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



I831G1510081-01

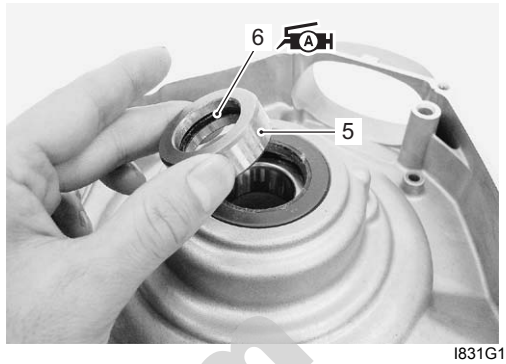
- Install the collar (5).

  ⚠ CAUTION

  Replace a O-ring (6) with a new one.

- Apply grease to the O-ring (6).

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



I831G1510082-01

- Install the clutch housing (7).

I831G1510083-01

- After installed the clutch housing, check if the clutch housing rotates smoothly.

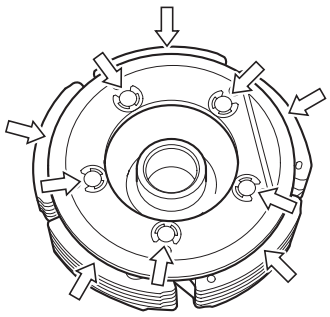
I831G1510052-01

Clutch Parts Inspection

B831G25106013

Refer to "Clutch Housing Case Disassembly and Assembly (Page 5A-19)".

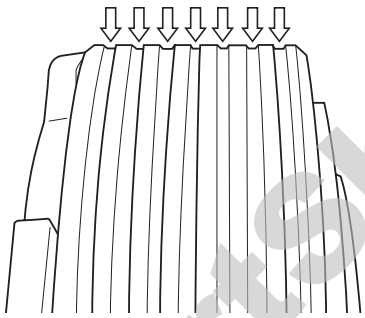
Clutch Shoe
Inspect the boss and centrifugal weight fulcrum sections for looseness, damage and operation.
Inspect the clutch shoe for damage and fouling with oil on the surface.
If any defects are found, replace the clutch shoe assembly with a new one.



I831G1510084-01

Measure the thickness of the clutch shoe at the center position. If the thickness is less than the service limit, replace the clutch shoe assembly with a new one.

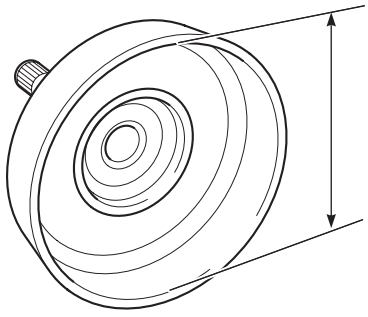
Clutch shoe thickness
Service limit: No groove at any part



I831G1510085-01

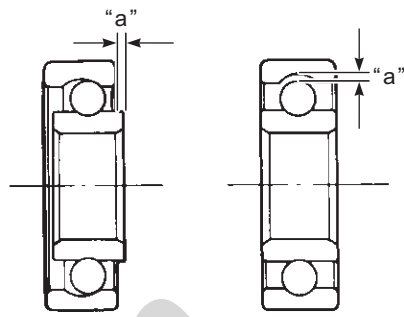
Clutch housing
Inspect the clutch housing for any abnormal surface damage. Measure the inside diameter of the clutch housing. If the measurement exceeds the service limit, replace the clutch housing with a new one.

Clutch housing I.D.
Service limit: 140.5 mm (5.53 in)



I831G1510086-01

Left Clutch Housing Bearing
Rotate the inner race by finger to inspect for abnormal play, noise and smooth rotation. If there is anything unusual, replace the bearing with a new one.



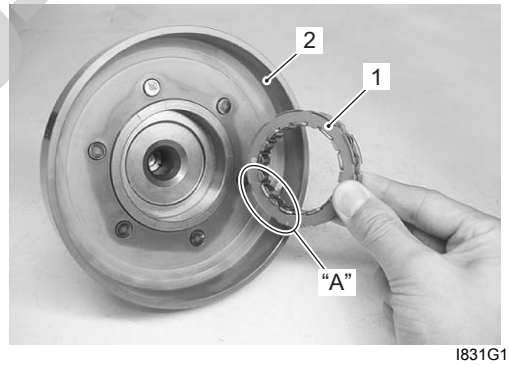
I831G1510087-01

"a": play

One Way Clutch
Install the one way clutch (1) onto the proper direction as shown.

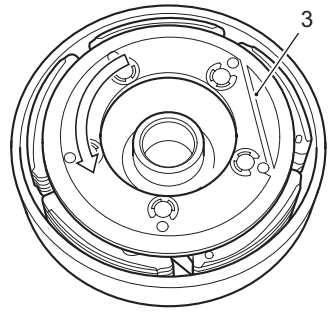
NOTE

When Installing the one way clutch (1) onto the clutch housing (2), make sure that the "OUTSIDE" mark "A" in the one way clutch faces to the clutch housing.



I831G1510088-01

- Install the clutch shoe (3) onto the clutch housing and turn the clutch shoe by hand to inspect the one way clutch for a smooth movement. The clutch shoe turns one direction only. If a large resistance is felt to rotation, inspect the one way clutch for damage or one way clutch contacting surface of the clutch shoe for wear or damage. If any defects are found, replace them with new ones.



I831G1510089-01

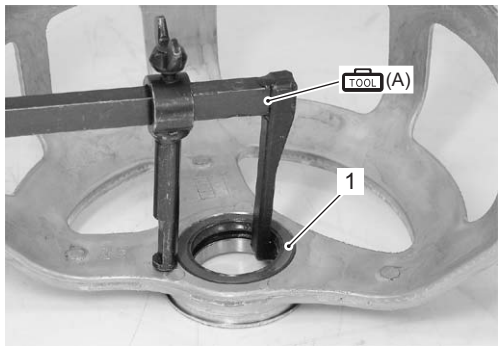
Movable Drive Face Cover Disassembly and Assembly

B831G25106014

Disassembly

- Remove the oil seal (1) with the special tool.

Special tool
(A): 09913–50121 (Oil seal remover)



I831G1510090-01

- Remove the snap ring (2).

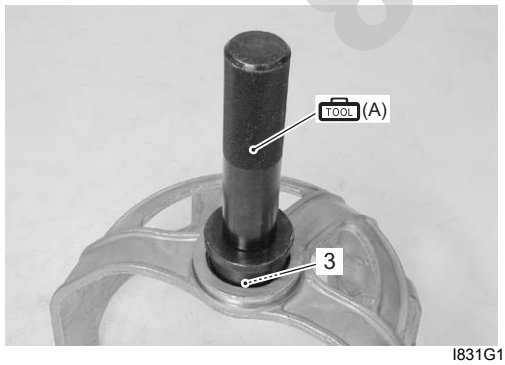
I831G1510091-01

- Remove the bearing (3) with the special tool.

NOTE

If there is no abnormal noise, the bearing removal is not necessary.

Special tool
(A): 09913–70210 (Bearing installer set)



I831G1510092-01

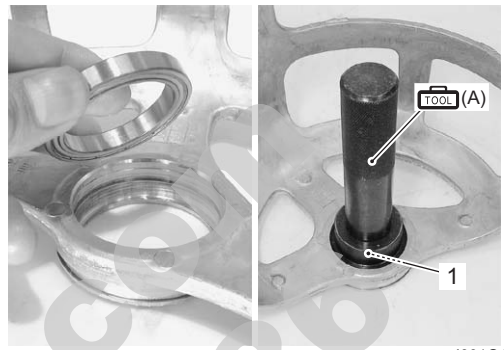
Assembly

- Press the bearing (1) with the special tool.

Special tool
(A): 09913–70210 (Bearing installer set)

⚠ CAUTION

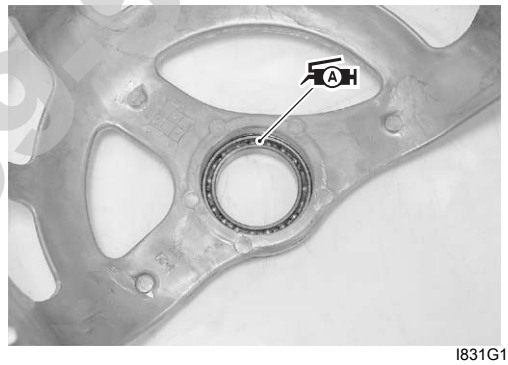
- **The sealed cover of the bearing must face outside.**



I831G1510094-01

- Apply grease to the bearing.

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

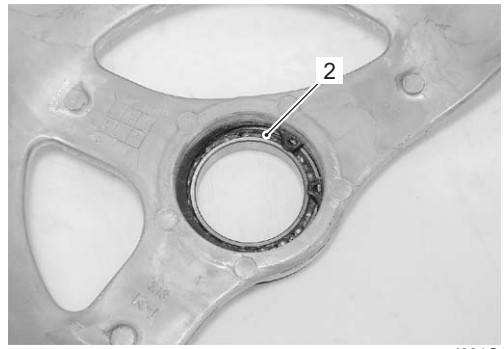


I831G1510095-01

- Install the snap ring (2).

⚠ CAUTION

The removed snap ring must be replaced with a new one.



I831G1510091-01

- Install the oil seal (3) with the special tool.

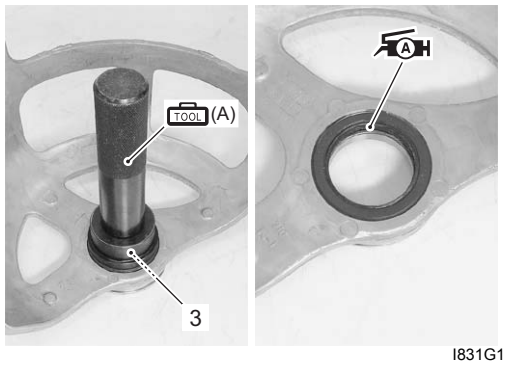
  Special tool
  (A): 09913–70210 (Bearing installer set)

  ⚠ CAUTION

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

- Apply grease to the lip of oil seal.

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



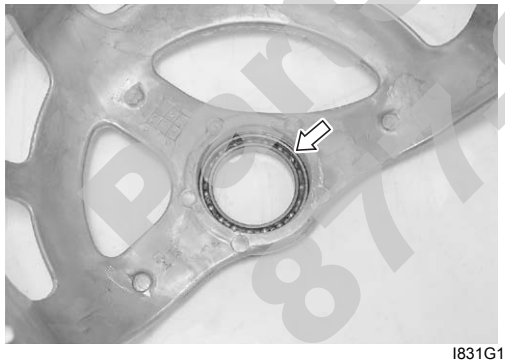
I831G1510100-01

Clutch Housing Cover Parts Inspection

B831G25106015

Right Clutch Housing Bearing

Rotate the inner race by finger to inspect for abnormal play, noise and smooth rotation. If there is anything unusual, replace the bearing with a new one.



I831G1510099-01

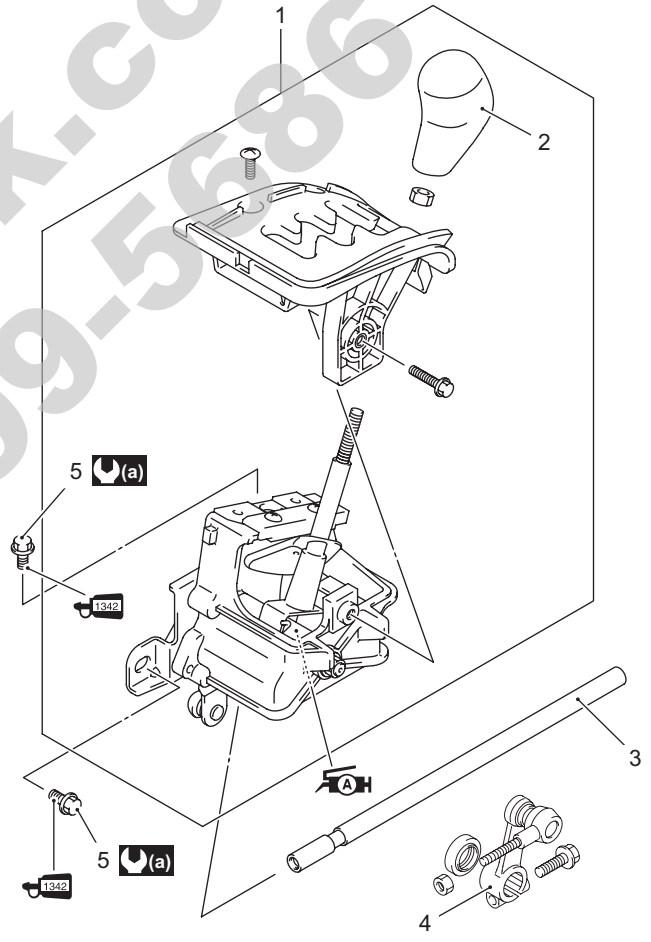
Oil Seal

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

I831G1510101-01

Shift Lever Assembly Components

B831G25106016



I831G1510102-02

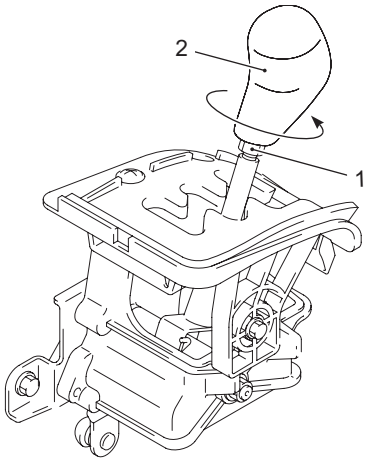
1.	Transfer gear shift lever assembly
2.	Gear shift knob
3.	Rod
4.	Gear shift arm
5.	Bolt
(a)	: 10 N·m (1.0 kgf-m, 7.0 lb-ft)
	: Apply grease.
1342	: Apply thread lock to the thread part.

Gear Shift Knob Removal and Installation

B831G25106017

Removal

1) Loosen the lock-nut (1).
2) Remove the gear shift knob (2).



I831G1510115-01

Installation

Install the gear shift knob in the reverse order of removal.

NOTE

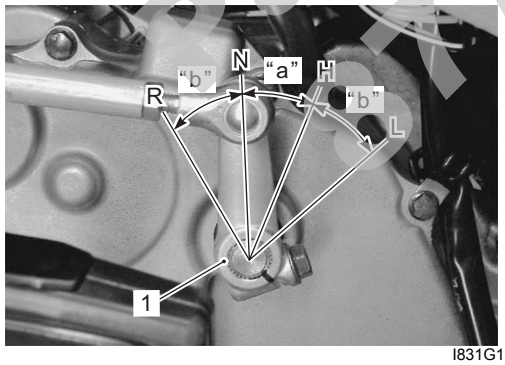
Tighten the lock-nut securely.

Shift Lever Assembly Removal and Installation

B831G25106018

Removal

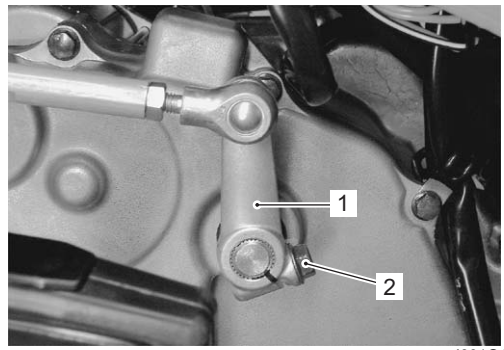
1) Keep the vehicle on a level ground.
2) Remove the front fender. Refer to "Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)".
3) Keep the gear shift arm (1) in the neutral position.



I831G1510104-03

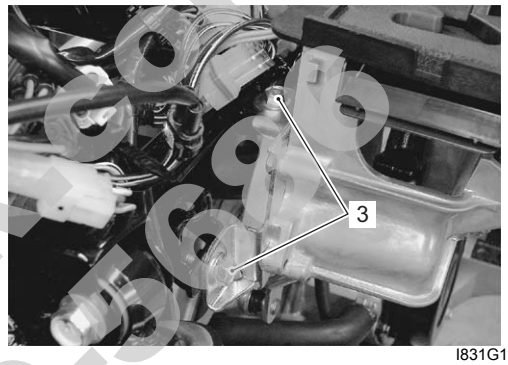
"a": 30°	"b": 33°

4) Loosen the bolt (2) and remove the gear shift arm (1).



I831G1510105-03

5) Remove the transfer gear shift lever mounting bolts (3).



I831G1510103-02

6) Remove the shift lever assembly.

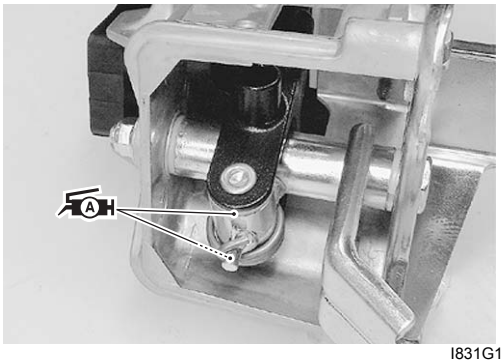
I831G1510106-01

Installation

Install the gear shift lever in the reverse order of removal. Pay attention to the following points:

- Apply grease to pivot.

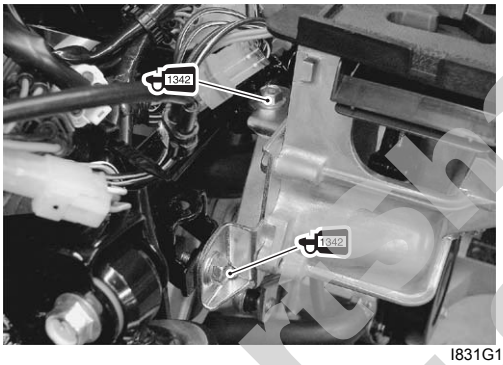
  : Grease 99000–25010 (SUZUKI SUPER GREASE A or equivalent)



I831G1510107-03

- Apply thread lock to the shift lever assembly mounting bolts.

  : Thread lock cement 99000–32050 (THREAD LOCK CEMENT 1342 or equivalent)

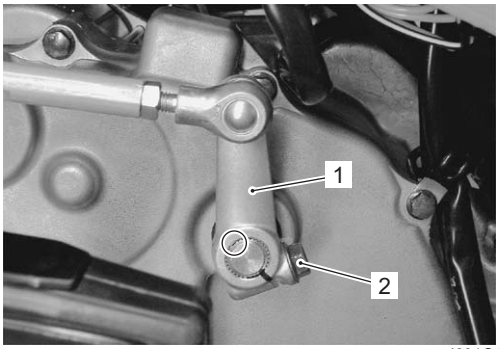


I831G1510108-02

- Install the gear shift arm (1) to the gear shift shaft in the correct position.
- Tighten the bolt (2) securely.

⚠ CAUTION

Make sure the operating angle of the gear shift arm is accurate.



I831G1510109-01

- Install the removed parts. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.

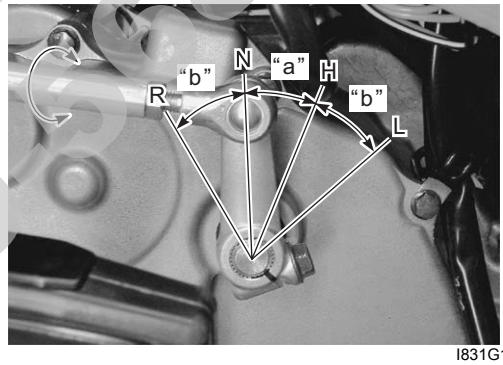
Shift Lever Disassembly and Assembly

B831G25106019

1) Removed the shift lever assembly. Refer to “Shift Lever Assembly Removal and Installation (Page 5A-24)”.
2) Disassemble the shift lever assembly as shown in the shift lever components. Refer to “Shift Lever Assembly Components (Page 5A-23)”.

Assembly

1) Assemble the shift lever as shown in the shift lever components. Refer to “Shift Lever Assembly Components (Page 5A-23)”.
2) Install the shift lever assembly. Refer to “Shift Lever Assembly Components (Page 5A-23)”.
3) After installing the gear shift lever assembly, adjust the shift rod. Refer to “Shift Rod Adjustment (Page 5A-25)”.



I831G1510110-03

“a”: 30°	“b”: 33°

Shift Rod Adjustment

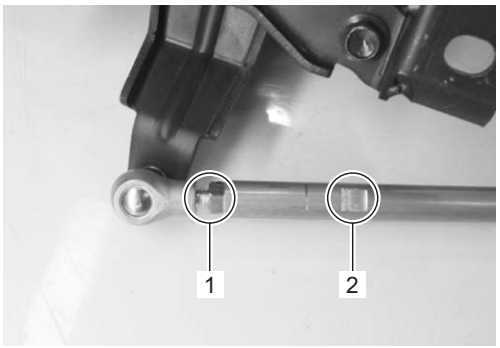
B831G25106020

1) Holding the rod (2), loosen the lock-nuts (1).
2) Turning the rod (2), adjust the length of the rod.
3) Tighten the lock-nuts (1).

NOTE

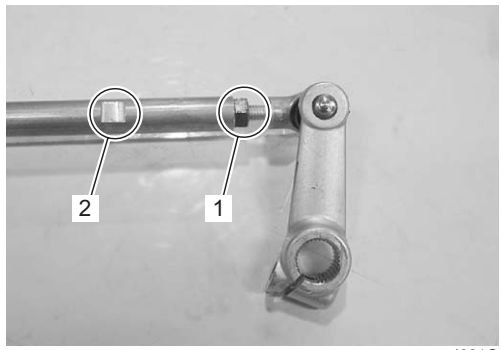
Be careful not to separate the rod from the joint by turning the rod too much.

Shift lever side



I831G1510117-01

Shift arm side



I831G1510118-01

Specifications

Service Data

B831G25107001

Clutch

Unit: mm (in)

Item	Standard	Limit
Clutch wheel I.D.	140.0 – 140.2 (5.512 – 5.520)	140.5 (5.53)
Clutch shoe	—	No groove at any part
Clutch engagement r/min	1 500 – 2 000 r/min	—
Clutch lock-up r/min	3 500 – 4 000 r/min	—

Drive Train

Unit: mm (in) Except ratio

Item		Standard	Limit
Primary reduction ratio (Automatic drive)		Variable change (2.763 – 0.780)	—
Secondary reduction ratio		2.158 (40/21 x 17/15)	—
Final reduction ratio	Front	3.600 (36/10)	—
	Rear	3.600 (36/10)	—
Transfer gear ratio	Low	2.562 (41/16)	—
	High	1.240 (31/25)	—
	Reverse	1.882 (32/17)	—

Transmission

Unit: mm (in)

Item	Standard	Limit
Drive V-belt width	34.3 (1.35)	33.3 (1.31)
Movable driven face spring free length	153.0 (6.02)	145.4 (5.72)

Tightening Torque Specifications

B831G25107002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Movable driven face bolt	110	11.0	79.5	☞(Page 5A-8)
Movable drive face bolt	110	11.0	79.5	☞(Page 5A-8)
V-belt outer cover bolt	8	0.8	6.0	☞(Page 5A-9)
Movable driven face ring nut	110	11.0	79.5	☞(Page 5A-14)
Clutch shoe nut	150	15.0	108.5	☞(Page 5A-17)
V-belt inner cover bolt	9	0.9	6.5	☞(Page 5A-18)

NOTE

The specified tightening torque is also described in the following.
"Automatic Transmission Components (Page 5A-3)"
"Shift Lever Assembly Components (Page 5A-23)"

Reference:
For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

Special Tools and Equipment

Recommended Service Material

B831G25108001

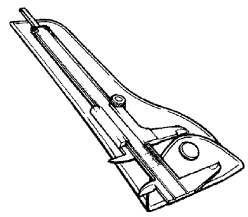
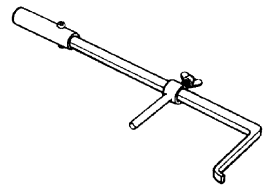
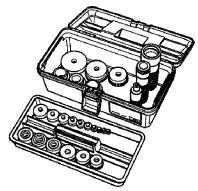
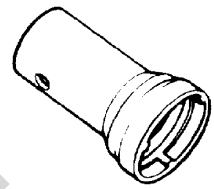
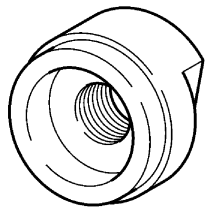
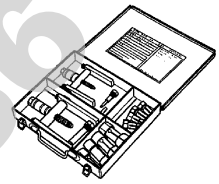
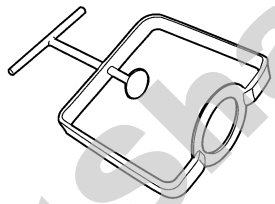
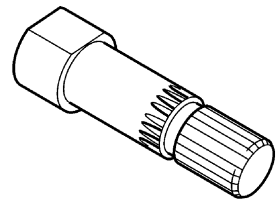
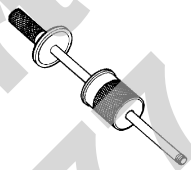
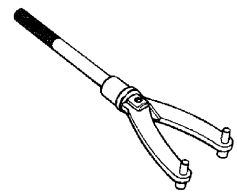
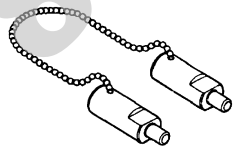
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE A or equivalent	P/No.: 99000–25010	☞(Page 5A-7) / ☞(Page 5A-10) / ☞(Page 5A-10) / ☞(Page 5A-13) / ☞(Page 5A-13) / ☞(Page 5A-20) / ☞(Page 5A-20) / ☞(Page 5A-22) / ☞(Page 5A-23) / ☞(Page 5A-25)
Molybdenum oil	MOLYBDENUM OIL SOLUTION	—	☞(Page 5A-18)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 5A-17) / ☞(Page 5A-20)
	THREAD LOCK CEMENT 1342 or equivalent	P/No.: 99000–32050	☞(Page 5A-25)

NOTE

Required service material is also described in the following.
"Automatic Transmission Components (Page 5A-3)"
"Shift Lever Assembly Components (Page 5A-23)"

Special Tool

B831G25108002

09900–20101 Vernier calipers (1/15 mm, 150 mm) ☞(Page 5A-14) 	09913–50121 Oil seal remover ☞(Page 5A-19) / ☞(Page 5A-22) 
09913–70210 Bearing installer set ☞(Page 5A-10) / ☞(Page 5A-12) / ☞(Page 5A-19) / ☞(Page 5A-20) / ☞(Page 5A-22) / ☞(Page 5A-22) / ☞(Page 5A-23) 	09917–23711 Ring nut wrench ☞(Page 5A-11) / ☞(Page 5A-14) 
09920–33540 Clutch shoe remover ☞(Page 5A-17) 	09921–20240 Bearing remover set ☞(Page 5A-19) 
09922–31430 Clutch spring compressor ☞(Page 5A-11) / ☞(Page 5A-14) 	09924–52450 Fixed driven face holder ☞(Page 5A-11) / ☞(Page 5A-14) 
09930–30104 Rotor remover slide shaft ☞(Page 5A-17) 	09930–40113 Rotor holder ☞(Page 5A-6) / ☞(Page 5A-6) / ☞(Page 5A-8) / ☞(Page 5A-8) / ☞(Page 5A-16) / ☞(Page 5A-17) 
09930–40131 Balancer drive sprocket holder ☞(Page 5A-16) / ☞(Page 5A-17) 	

Section 6

Steering

CONTENTS

Precautions

Precautions

Precautions for Steering

B831G26000001

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

Steering General Diagnosis

Diagnostic Information and Procedures

Steering Symptom Diagnosis

B831G26104001

Condition	Possible cause	Correction / Reference Item
Heavy Steering	Distorted steering shaft.	*Replace.*
	Improper front wheel alignment.	*Adjust.*
	Insufficiently lubricated.	*Lubricate.*
	Not enough pressure in tires.	*Adjust.*
	Worn or incorrect tire or wrong tire pressure.	*Adjust or replace.*
Wobbly Handlebars	Distorted front steering shaft.	*Replace.*
	Crooked tire.	*Replace.*
	Worn or incorrect tire or wrong tire pressure.	*Adjust or replace.*
	Worn bearing/race in steering stem.	*Replace.*
	Worn steering shaft holder bushing.	*Replace.*
	Worn steering knuckle ends or ball stud.	*Replace.*
	Worn front wheel hub bearings.	*Replace.*

Steering / Handlebar

Repair Instructions

Steering / Handlebars Components

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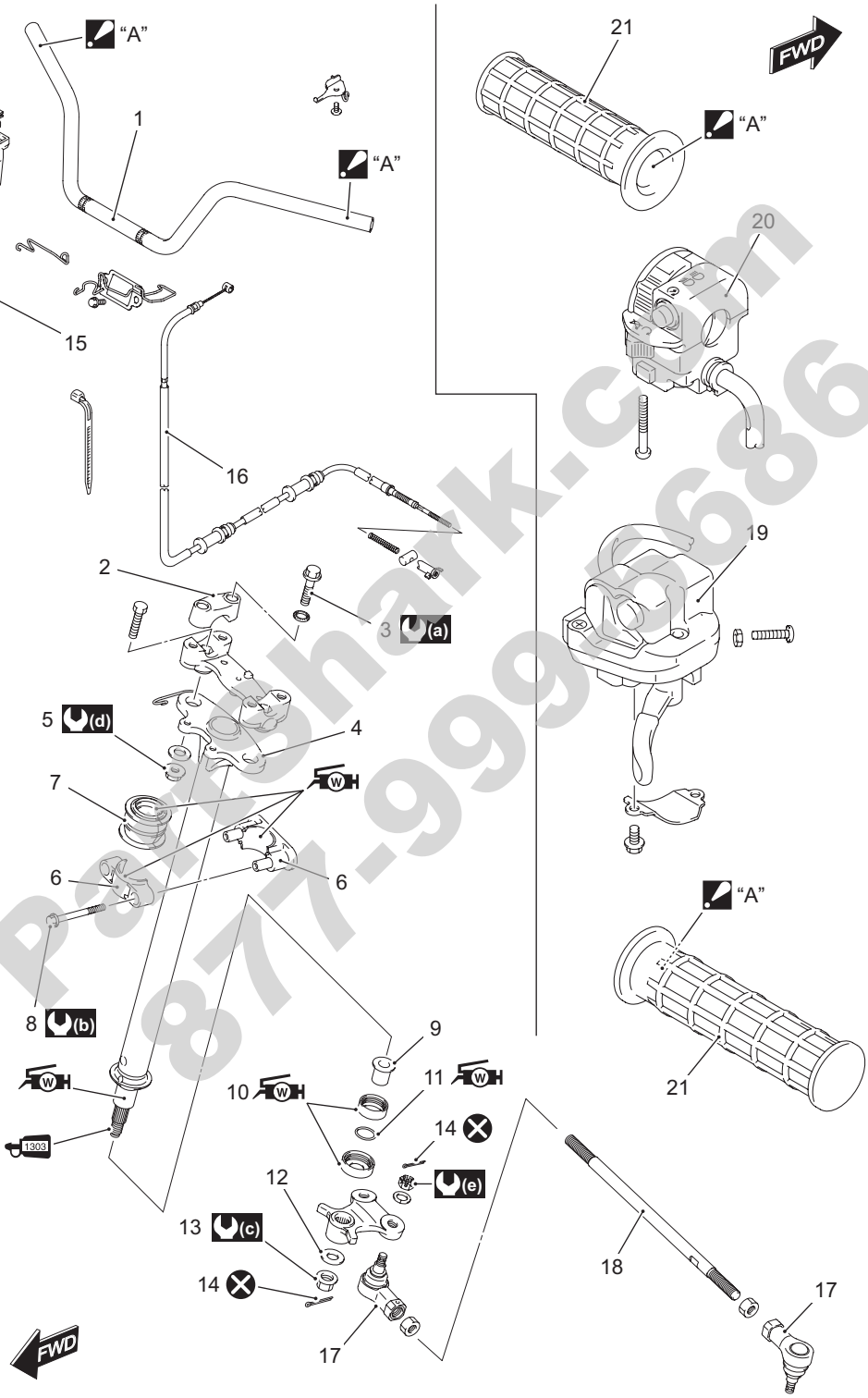
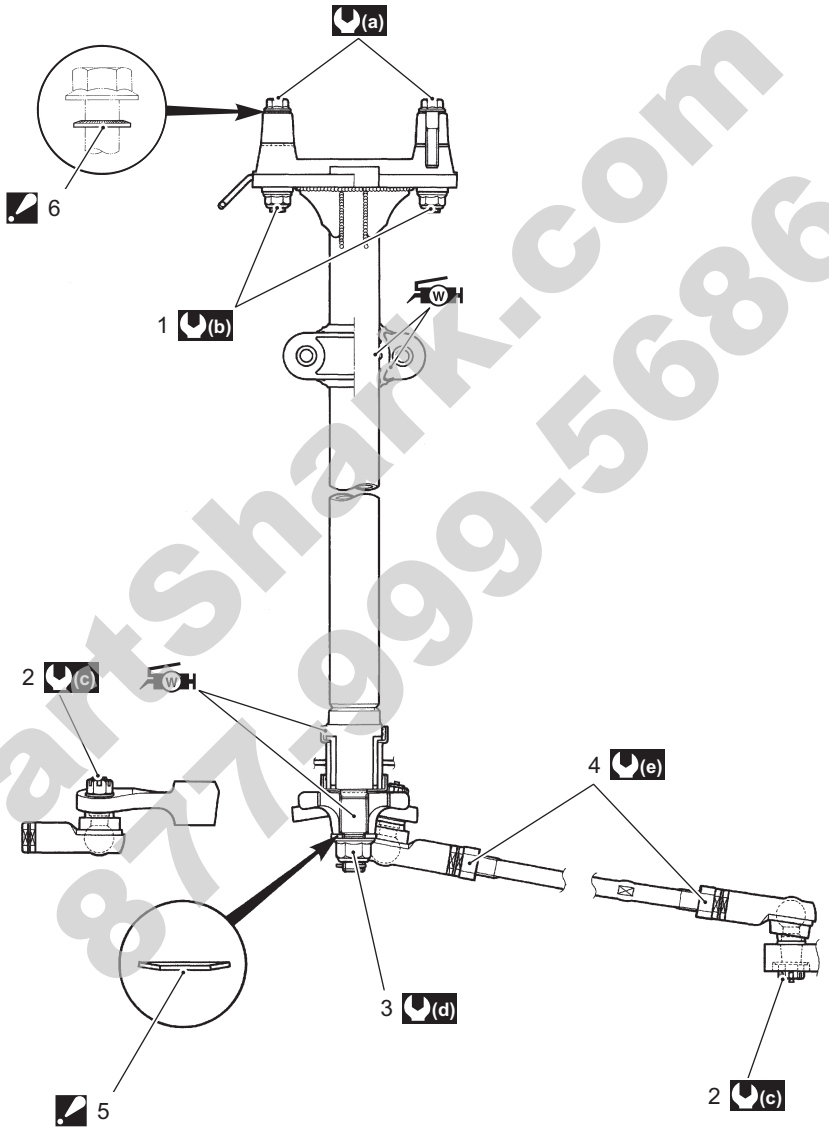


I831G1620001-17

1. Handlebars	11. O-ring	21. Handle grip
2. Handlebar upper clamp	12. Washer	"A": Apply grip bond.
3. Handlebar clamp bolt	13. Steering shaft lower nut	(a) : 26 N·m (2.6 kgf-m, 19.0 lb-ft)
4. Steering shaft	14. Cotter pin	(b) : 23 N·m (2.3 kgf-m, 16.5 lb-ft)
5. Handlebar holder nut	15. Throttle cable	(c) : 162 N·m (16.2 kgf-m, 117.0 lb-ft)
6. Steering shaft holder	16. Parking brake cable	(d) : 60 N·m (6.0 kgf-m, 43.5 lb-ft)
7. Steering shaft holder dust seal	17. Tie-rod end	(e) : 29 N·m (2.9 kgf-m, 21.0 lb-ft)
8. Steering shaft holder bolt	18. Tie-rod	1303 : Apply thread lock to the thread part.
9. Steering shaft bushing	19. Throttle case assembly	W : Apply water resistance grease.
10. Dust seal	20. Handlebar left switch assembly	: Do not reuse.

Steering / Handlebars Assembly Construction

B831G26206002



I831G1620002-06

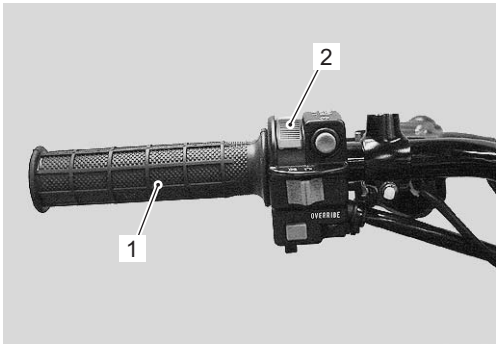
1. Handlebar holder nut	5. Washer : The conical side of washer faces outside.	(c) : 29 N·m (2.9 kgf-m, 21.0 lb-ft)
2. Tie-rod end nut	6. Washer : The conical side of washer faces outside.	(d) : 162 N·m (16.2 kgf-m, 117.0 lb-ft)
3. Steering lower nut	(a) : 26 N·m (2.6 kgf-m, 19.0 lb-ft)	(e) : 45 N·m (4.5 kgf-m, 32.5 lb-ft)
4. Tie-rod nut	(b) : 60 N·m (6.0 kgf-m, 43.5 lb-ft)	W : Apply water resistance grease.

Handlebars Removal and Installation

B831G26206003

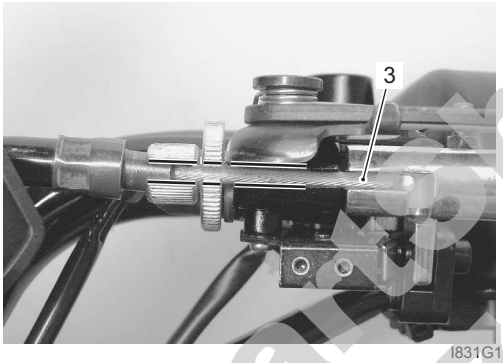
Removal

1) Remove the combination meter. Refer to “Combination Meter Removal and Installation in Section 9C (Page 9C-3)”.
2) Remove the following parts from left handlebar.
   a) Left grip (1)
   b) Left switch box (2)



I831G1620003-03

3) Disconnect the parking brake cable (3) from parking brake lever.

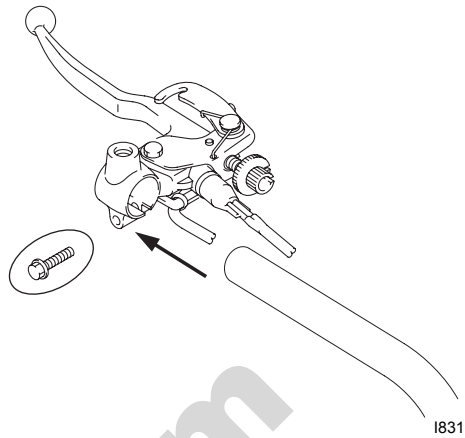


I831G1620004-02

4) Remove the clamp.

I831G1620005-02

5) Remove the parking brake lever from the handlebar by removing mounting bolt.



I831G1620006-05

6) Remove the clamp.

I831G1620007-02

7) Disconnect the brake hose from the hose guide.

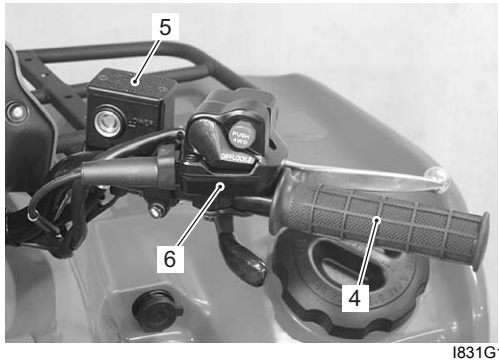
I831G1620008-02

8) Remove the following parts from the right handlebar.
   a) Right grip (4)
   b) Front brake master cylinder/Front brake lever (5)

⚠ CAUTION

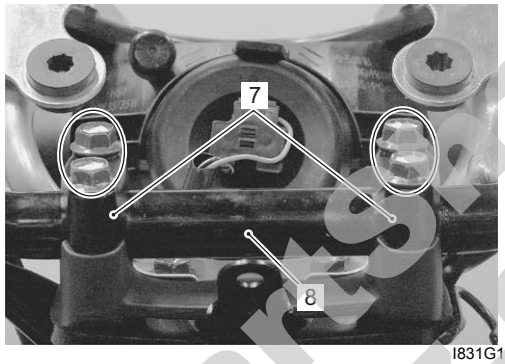
Do not turn the front brake master cylinder upside down.

   c) Throttle lever case (6)



I831G1620009-01

9) Remove the handlebar upper clamps (7) and handlebars (8).

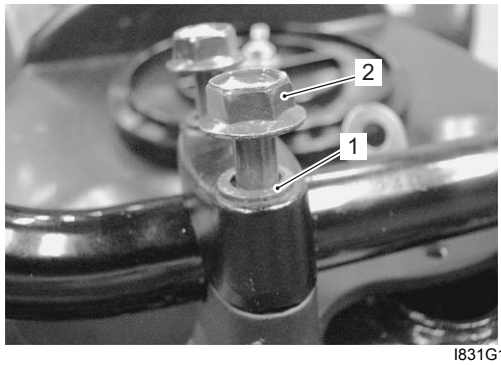


I831G1620010-01

Installation

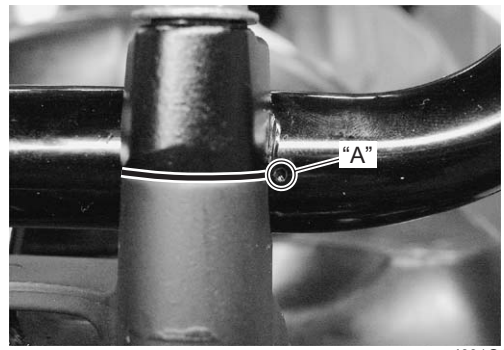
Install the handlebars in the reverse order of removal. Pay attention to the following points:

- Install the washers (1) and bolts (2) as shown in the steering/handlebars construction. Refer to “Steering / Handlebars Assembly Construction (Page 6B-2)”.



I831G1620011-01

- Set the handlebars so that its punch mark “A” aligns with the mating surface of the left handlebar holder.



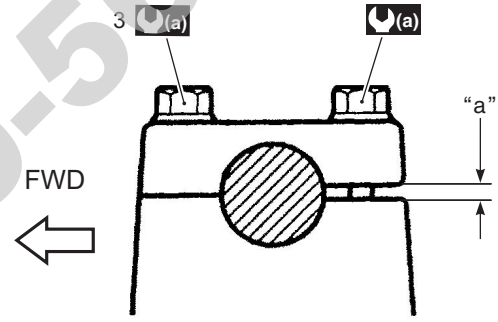
I831G1620012-02

- Tighten the handlebar holder bolts (3) to the specified torque.

NOTE

First tighten the handlebar holder bolts (3) (front ones) to the specified torque.

Tightening torque
Handlebar clamp bolt (a): 26 N·m (2.6 kgf-m, 19.0 lb-ft)

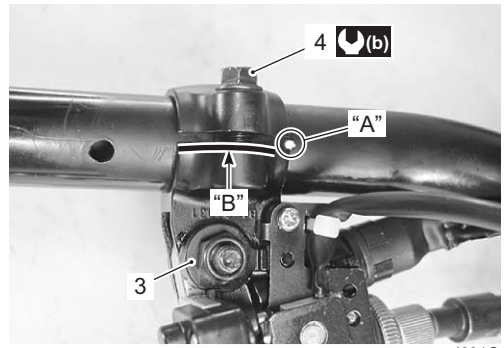


I831G1620013-01

“a”: Clearance

- Align the punch mark “A” on the handlebars with the mating surface “B” of rear brake lever assembly.
- Tighten the rear brake lever holder clamp bolt (4) to the specified torque.

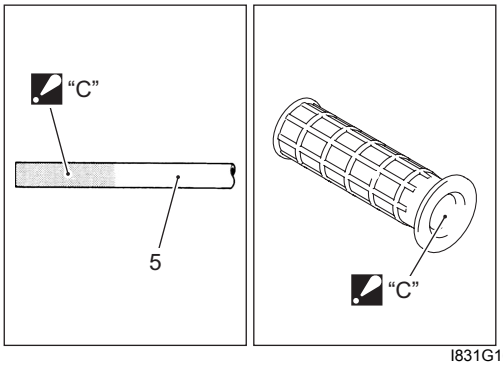
Tightening torque
Rear brake lever holder clamp bolt (b): 11 N·m (1.1 kgf-m, 8.0 lb-ft)



I831G1620049-01

- Apply adhesive agent to the handlebar right and left end and right and left grip inner wall.

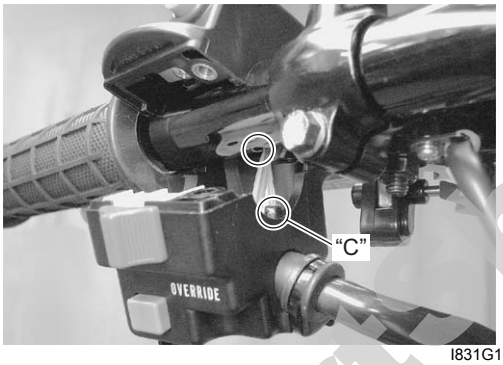
  BOND : Handle grip bond (Handle Grip Bond (commercially available))



I831G1620014-02

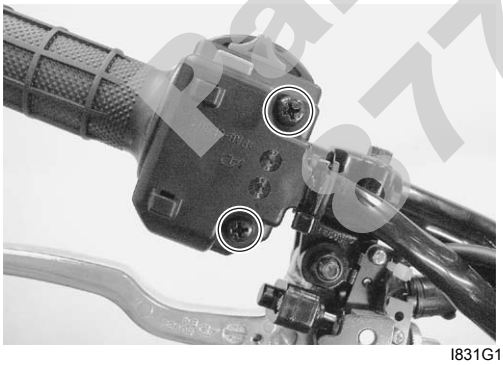
5.	Handlebar
"C":	Apply handle grip bond.

- Insert the projection "D" of the left switch assembly into the hole of the handlebars.



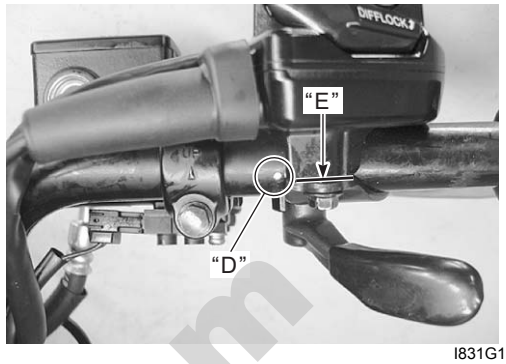
I831G1620015-02

- Tighten the left handlebar switch screws.



I831G1620016-01

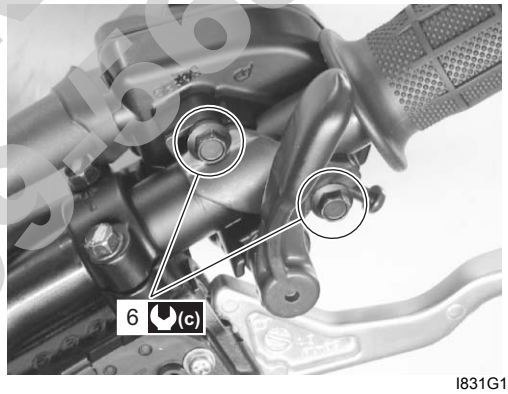
- Install the master cylinder. Refer to "Front Brake Master Cylinder Assembly Removal and Installation in Section 4A (Page 4A-9)".
- Align the punch mark "D" on the handlebars with the mating surface "E" of the throttle lever case.



I831G1620017-03

- Tighten the throttle lever case bolts (6) to the specified torque.

  Tightening torque
  Throttle lever case bolt (c): 5 N·m (0.5 kgf-m, 3.5 lb-ft)

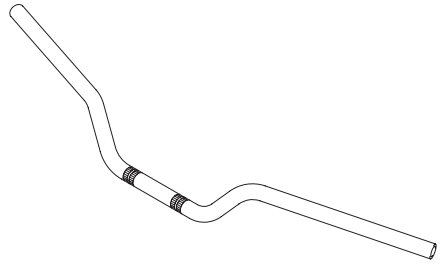


I831G1620018-03

Handlebars Inspection

B831G26206004

Refer to "Handlebars Removal and Installation (Page 6B-3)".
Inspect the handlebars for distortion or damage.
If any defects are found, replace the handlebars with a new one.



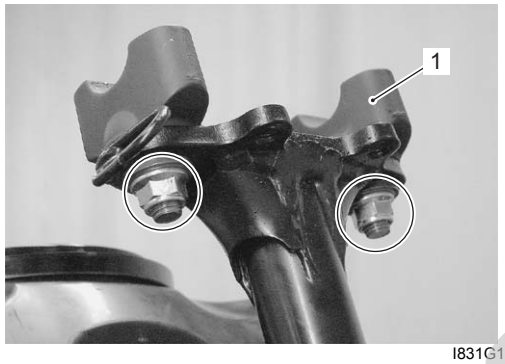
I831G1620019-02

Steering Shaft Removal and Installation

B831G26206005

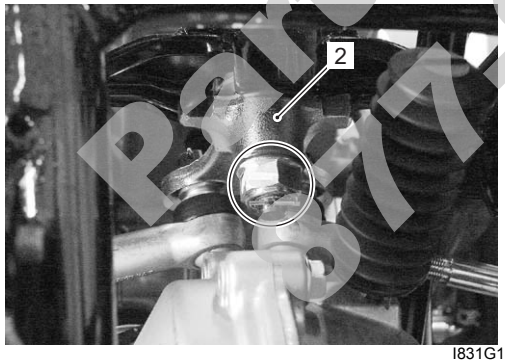
Removal

1) Remove the front wheels. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
2) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Remove the handlebars. Refer to “Handlebars Removal and Installation (Page 6B-3)”.
4) Remove the auxiliary headlight. Refer to “Auxiliary Headlight Removal and Installation in Section 9B (Page 9B-3)”.
5) Remove the handlebar holder (1).



I831G1620020-01

6) Disconnect the tie-rod ends. Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation in Section 2B (Page 2B-4)”.
7) Remove the steering lower arm plate (2) by removing cotter pin, nut and washer.

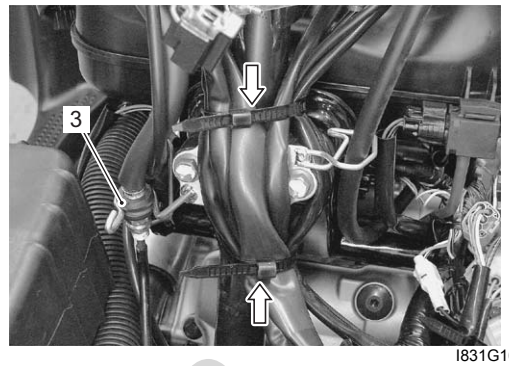


I831G1620021-01

8) Remove the center cover.

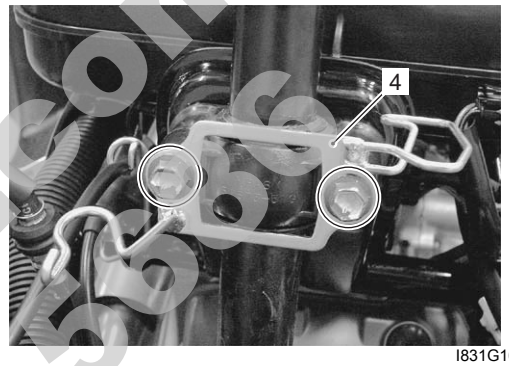
I831G1620023-01

9) Disconnect the brake hose (3) from the hose guide.
10) Remove the read wire clamps.



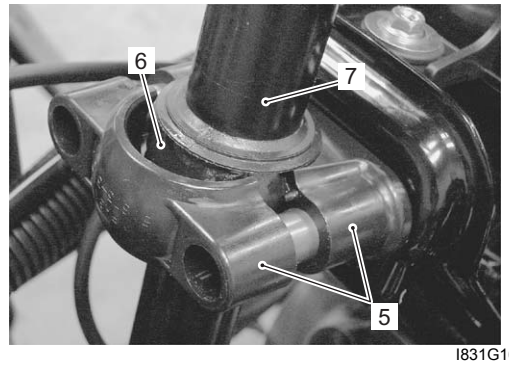
I831G1620024-03

11) Remove the steering shaft plate (4).



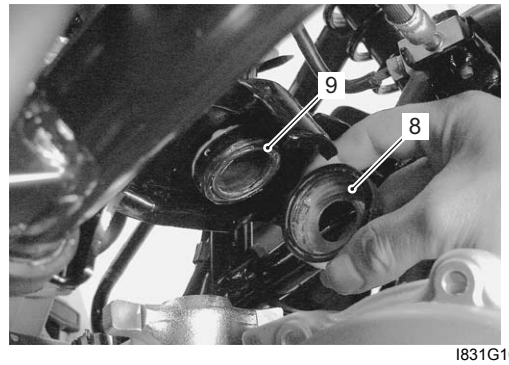
I831G1620025-03

12) Remove the steering shaft holders (5) and dust seal (6).
13) Remove the steering shaft (7) from the vehicle.



I831G1620026-03

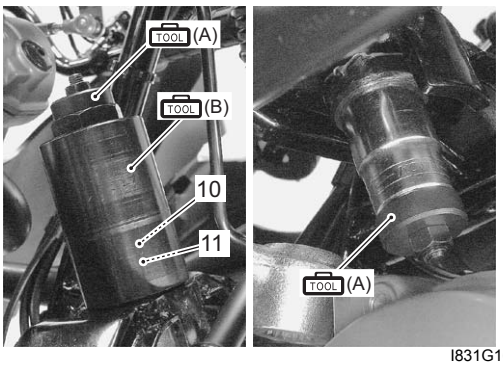
14) Remove the dust seal (8) and O-ring (9).



I831G1620022-03

15) Remove the steering shaft bushing (10) and dust seal (11) with the special tools and suitable socket wrench.

Special tool
(A): 09924–84521 (Bearing installer set)
(B): 09930–30721 (Rotor remover)

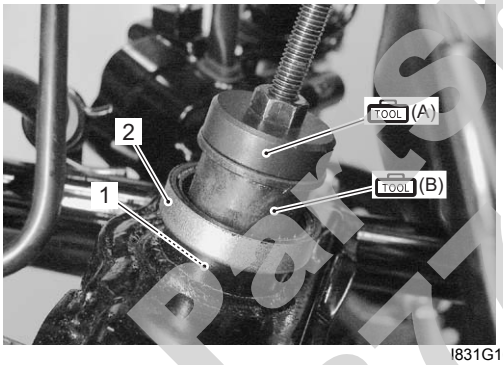


I831G1620027-04

Installation
Install the steering shaft in the reverse order of removal. Pay attention to the following points:

- Install the steering shaft lower bushing (1) along with dust seal (2) with the special tools.

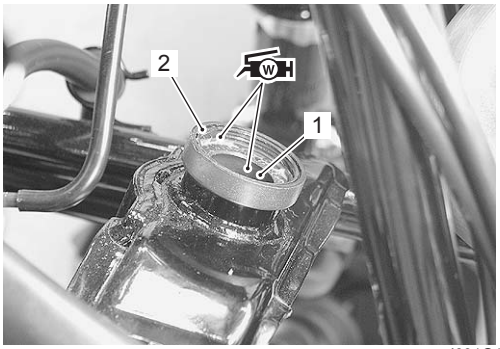
Special tool
(A): 09924–84521 (Bearing installer set)
(B): 09913–70210 (Bearing installer set)



I831G1620048-01

- Apply grease to the steering shaft lower bushing (1) and dust seal (2).

: Grease 99000–25160 (Water resistance grease)



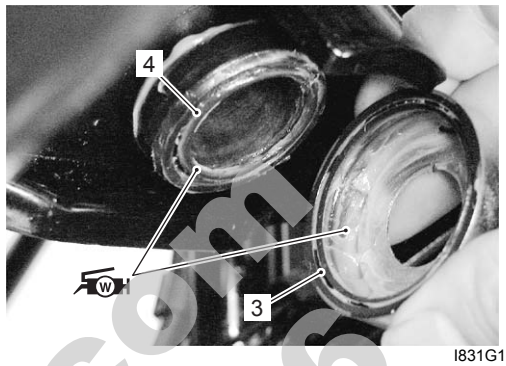
I831G1620029-02

- Apply grease to the dust seal (3) and O-ring (4).

⚠ CAUTION

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

: Grease 99000–25160 (Water resistance grease)



I831G1620032-02

- Apply grease to the spline of steering shaft.

: Grease 99000–25160 (Water resistance grease)

I831G1620033-01

- Install the steering shaft.
- Apply grease to the steering shaft holder dust seal before installing.

: Grease 99000–25160 (Water resistance grease)

I831G1620028-01

- Apply grease to the steering shaft holders before installing the shaft holders.

  : Grease 99000–25160 (Water resistance grease)

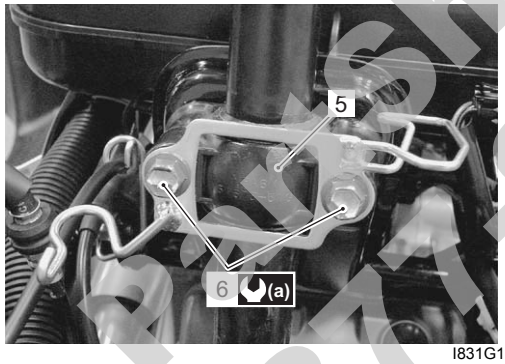
  ⚠ CAUTION

  To prevent the entry of dirt, the dust seal end "A" must face rearward when installing the dust seal to steering shaft.

I831G1620030-02

- Install the steering shaft holder (5) and tighten the mounting bolts (6) to the specified torque.

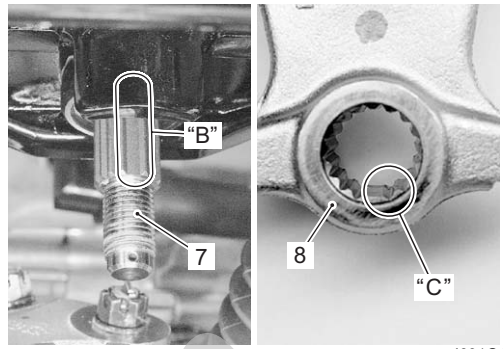
  Tightening torque
  Steering shaft holder bolt (a): 23 N·m (2.3 kgf-m, 16.5 lb-ft)



I831G1620031-02

- After installed steering shaft plate, make sure that the wiring harness, cables and brake hose routing are properly. Refer to "Wiring Harness Routing Diagram in Section 9A (Page 9A-4)".

- When installing the steering arm plate, align the wide spline "B" of steering shaft (7) with slit "C" of steering arm plate (8).



I831G1620034-02

- Apply a small quality thread lock to the thread part of steering shaft.

  1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER 1303 or equivalent)

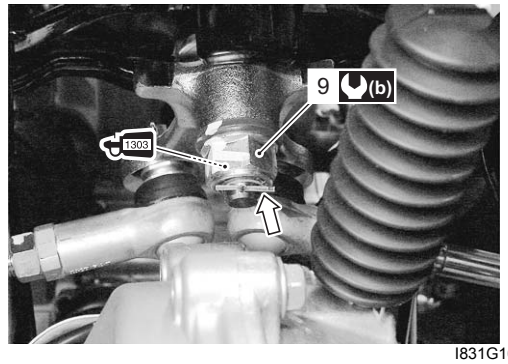
- Tighten the steering shaft lower nut (9) to the specified torque.

  Tightening torque
  Steering shaft lower nut (b): 162 N·m (16.2 kgf-m, 117.0 lb-ft)

- Install the cotter pin.

  ⚠ CAUTION

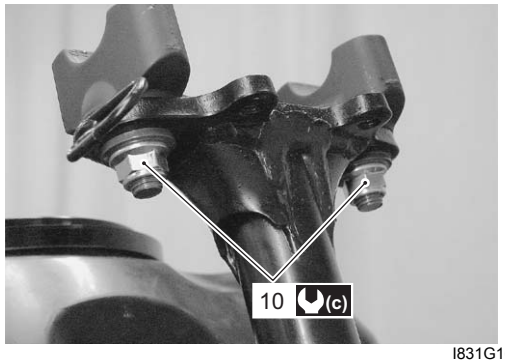
  The removed cotter pin must be replaced with a new one.



I831G1620035-03

- Connect the tie-rod ends. Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation in Section 2B (Page 2B-4)”.
- Tighten the handlebar holder nut (10) to the specified torque.

Tightening torque
Handlebar holder nut (c): 60 N·m (6.0 kgf-m, 43.5 lb-ft)



I831G1620036-02

- Install the handlebars. Refer to “Handlebars Removal and Installation (Page 6B-3)”.
- Install the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
- Install the front wheels. Refer to “Front / Rear Wheel Removal and Installation in Section 2D (Page 2D-2)”.
- After installing these parts, adjust the toe. Refer to “Toe Adjustment in Section 0B (Page 0B-22)”.

Tie-rod / Tie-rod End Removal and Installation

B831G26206006

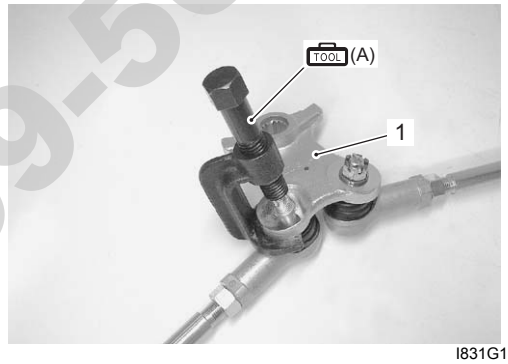
Removal

1) Remove the tie-rod end (steering knuckle side). Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation in Section 2B (Page 2B-4)”.
2) Remove the cotter pins, tie-rod end nut and spring washer.


I831G1620037-01

3) Remove the steering arm plate (1) with a special tool.

Special tool
(A): 09942–72410 (Tie rod end remover)

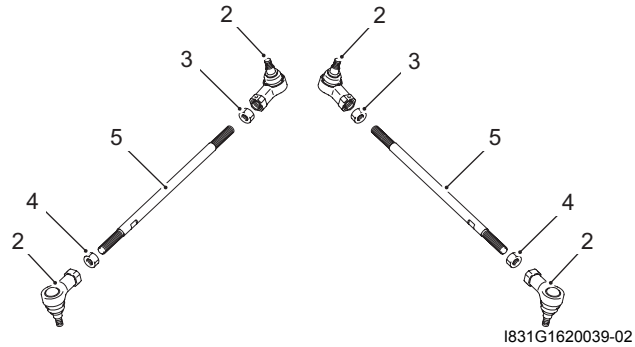


I831G1620038-01

4) Remove the other tie-rod end in the same manner as described previously.
5) Separate the tie-rod ends (2), nuts (3), and (4) and tie-rods (5).

⚠ CAUTION

The lock-nuts (3) have left-hand threads.



I831G1620039-02

Installation
Install the tie-rod in the reverse order of removal. Pay attention to the following points:

- When installing the tie-rods, make sure the short side “a” of tie-rod come outside.
- Push the tie-rod to tie-rod lock-nut tightening direction.
- Tighten the lock-nuts to the specification.

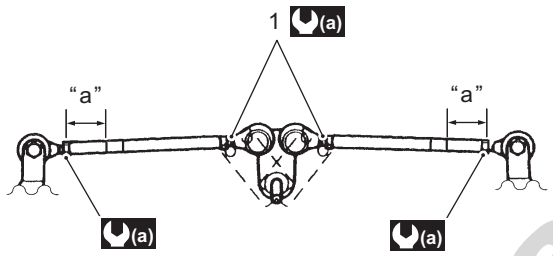
⚠ CAUTION

When tightening the lock-nuts, hold the tie-rod end with a open end wrench.

NOTE

The lock-nuts (1) have left-hand threads.

Tightening torque
Tie-rod lock-nut (a): 45 N·m (4.5 kgf-m, 32.5 lb-ft)



I831G1620040-03

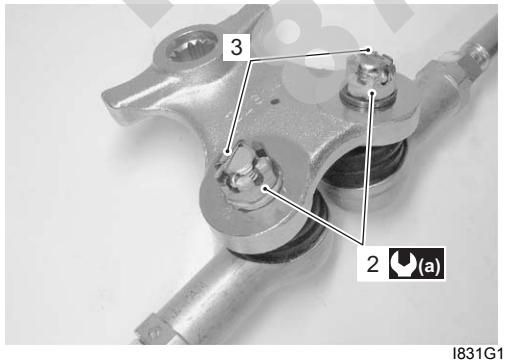
- Install the washers and tighten the rod end nuts (2) (steering arm plate side) to the specified torque.

Tightening torque
Tie-rod end nut (a): 29 N·m (2.9 kgf-m, 21.0 lb-ft)

- Install the cotter pins (3).

⚠ CAUTION

The removed cotter pins must be replaced with new ones.



I831G1620041-01

- Install the tie-rod ends (steering knuckle side). Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation in Section 2B (Page 2B-4)”.
- After installed wheels, inspect the toe-out. If the toe-out is out of specification, bring it into the specified range. Refer to “Steering System Inspection in Section 0B (Page 0B-21)” and “Toe Adjustment in Section 0B (Page 0B-22)”.

Steering Parts Inspection

B831G26206007

Refer to “Steering Shaft Removal and Installation (Page 6B-6)” and “Tie-rod / Tie-rod End Removal and Installation (Page 6B-9)”.

Steering Shaft Holder Dust Seal
Inspect the dust seal for wear or damage. If any defects are found, replace the dust seal with a new one.


I831G1620042-01

Tie-rod
Inspect the tie-rod for distortion or damage. If any defects are found, replace the tie-rod with a new one.


I831G1620043-01

Tie-rod End
Inspect the tie-rod ends for smooth movement. If there are any abnormalities, replace the tie-rod ends with new ones. Inspect the tie-rod end boots for wear or damage. If any defects are found, replace the tie-rod ends with new ones.

I831G1620044-01

Steering Shaft
Inspect the steering shaft for distortion or bend. If any defects are found, replace the steering shaft with a new one.

I831G1620045-01

Steering Shaft Holder
Inspect the steering shaft holders for wear or damage. If any defects are found, replace the steering shaft holders with new ones.

I831G1620046-01

Steering Shaft Bushing and Dust Seal
Inspect the steering shaft bushing (1) and dust seal (2) for wear or damage. If any defects are found, replace them with new ones.

I831G1620047-02

Specifications

Service Data

B831G26207001

Wheel
Unit: mm

Item	Standard	Limit
Steering angle	46° (right & left)	—
Turning radius	3.1 m (10.2 ft)	—
Toe-out (with 75 kg, 165 lbs)	10 ± 4 mm (0.39 ± 0.16)	—
Camber	0.64°	—
Caster	1.6°	—

Tightening Torque Specifications

B831G26207002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Handlebar clamp bolt	26	2.6	19.0	☞(Page 6B-4)
Rear brake lever holder clamp bolt	11	1.1	8.0	☞(Page 6B-4)
Throttle lever case bolt	5	0.5	3.5	☞(Page 6B-5)
Steering shaft holder bolt	23	2.3	16.5	☞(Page 6B-8)
Steering shaft lower nut	162	16.2	117.0	☞(Page 6B-8)
Handlebar holder nut	60	6.0	43.5	☞(Page 6B-9)
Tie-rod lock-nut	45	4.5	32.5	☞(Page 6B-10)
Tie-rod end nut	29	2.9	21.0	☞(Page 6B-10)

NOTE

The specified tightening torque is also described in the following.
"Steering / Handlebars Components (Page 6B-1)"
"Steering / Handlebars Assembly Construction (Page 6B-2)"

Reference:
For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List in Section 0C (Page 0C-7)".

Special Tools and Equipment

Recommended Service Material

B831G26208001

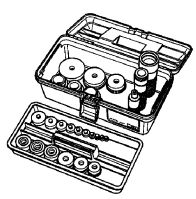
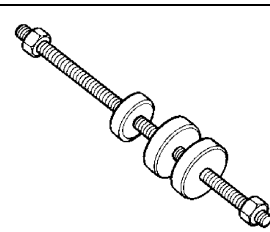
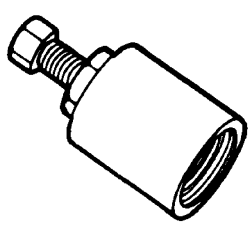
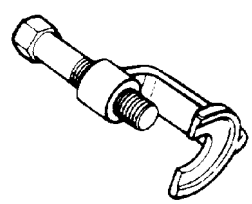
Material	SUZUKI recommended product or Specification		Note
Grease	Water resistance grease	P/No.: 99000–25160	☞(Page 6B-7) / ☞(Page 6B-7) / ☞(Page 6B-7) / ☞(Page 6B-7) / ☞(Page 6B-8)
Handle grip bond	Handle Grip Bond (commercially available)	—	☞(Page 6B-5)
Thread lock cement	THREAD LOCK CEMENT SUPER 1303 or equivalent	P/No.: 99000–32030	☞(Page 6B-8)

NOTE

Required service material is also described in the following.
"Steering / Handlebars Components (Page 6B-1)"
"Steering / Handlebars Assembly Construction (Page 6B-2)"

Special Tool

B831G26208002

09913–70210 Bearing installer set ☞(Page 6B-7)		09924–84521 Bearing installer set ☞(Page 6B-7) / ☞(Page 6B-7)	
09930–30721 Rotor remover ☞(Page 6B-7)		09942–72410 Tie rod end remover ☞(Page 6B-9)	

Section 9

Body and Accessories

CONTENTS

Precautions

Precautions

Precautions for Electrical System

B831G29000001

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

B831G29003001

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

Wiring Systems

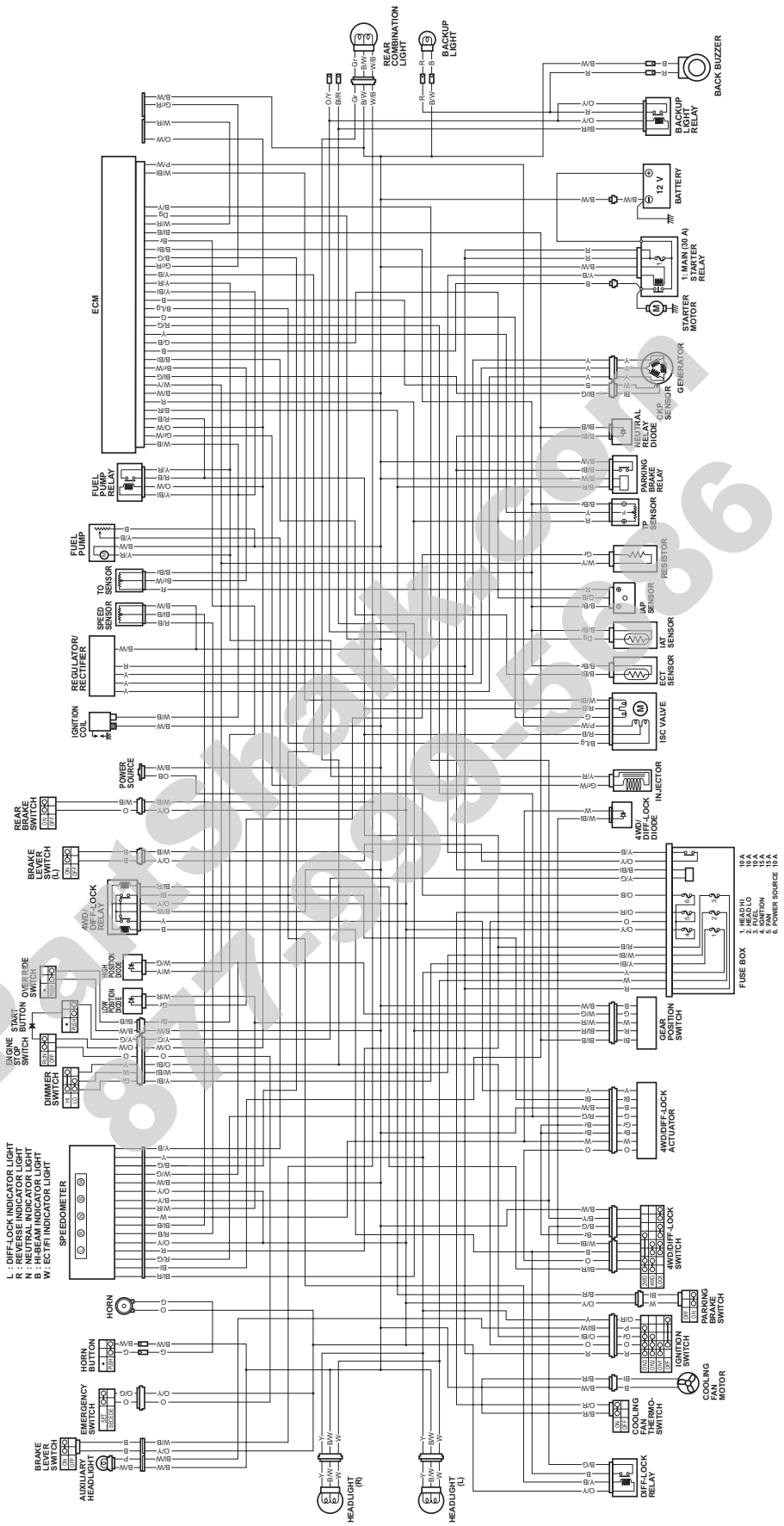
Schematic and Routing Diagram

Wiring Diagram

B831G29102001

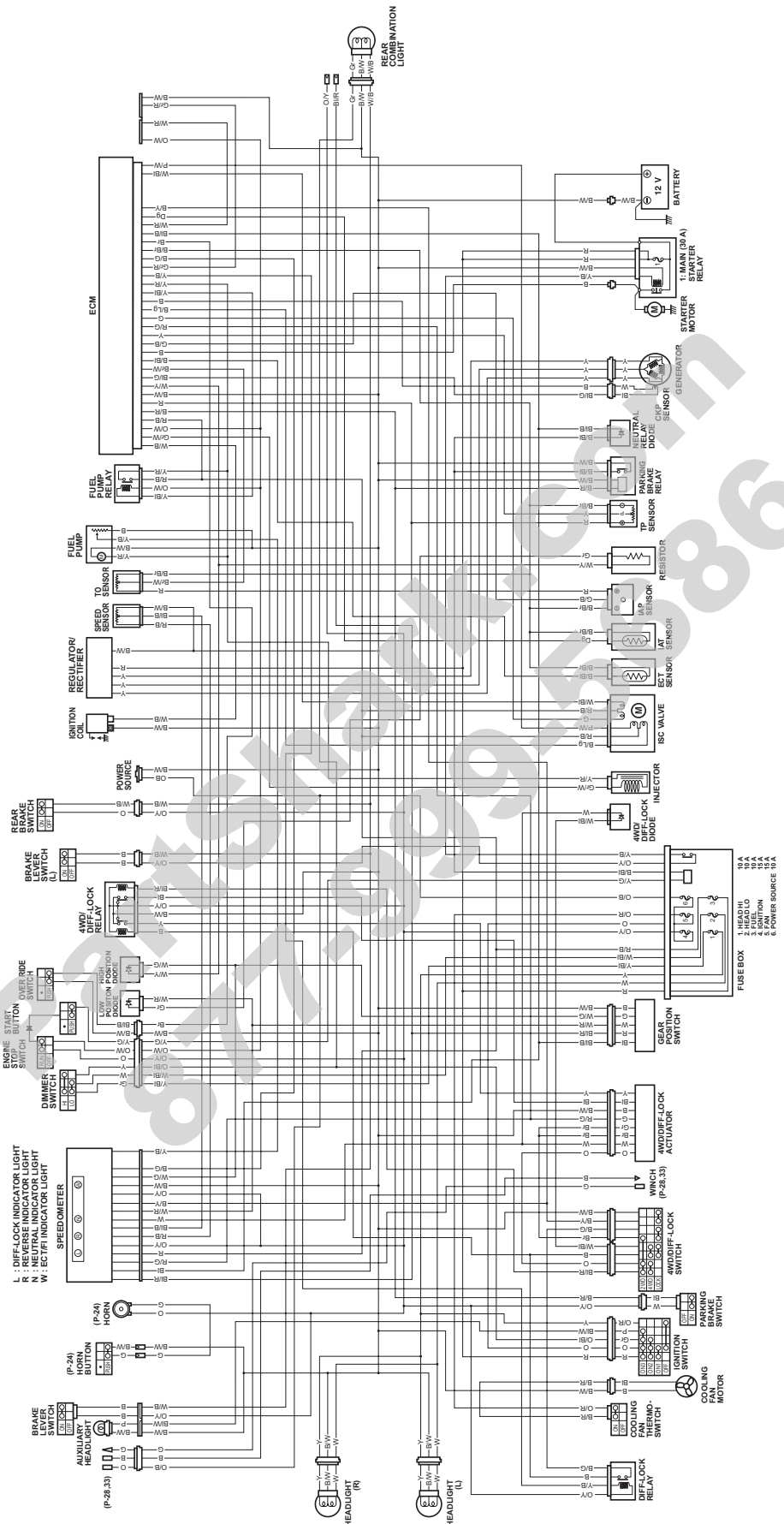
Refer to “Wire Color Symbols in Section 0A (Page 0A-5)”.

For P-17



I831G1910901-10

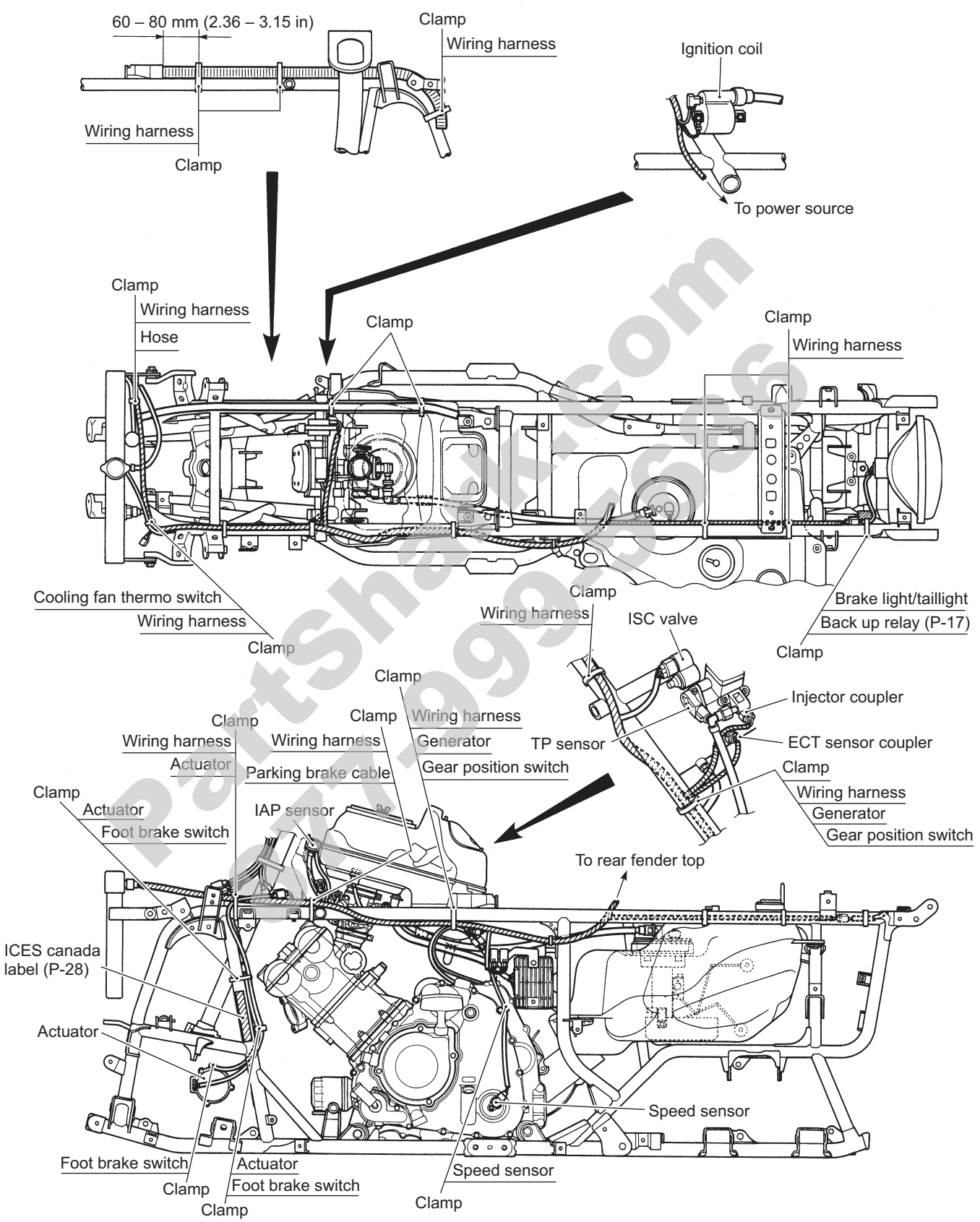
For P-24, 28, 33



I831G1910902-13

Wiring Harness Routing Diagram

B831G29102002



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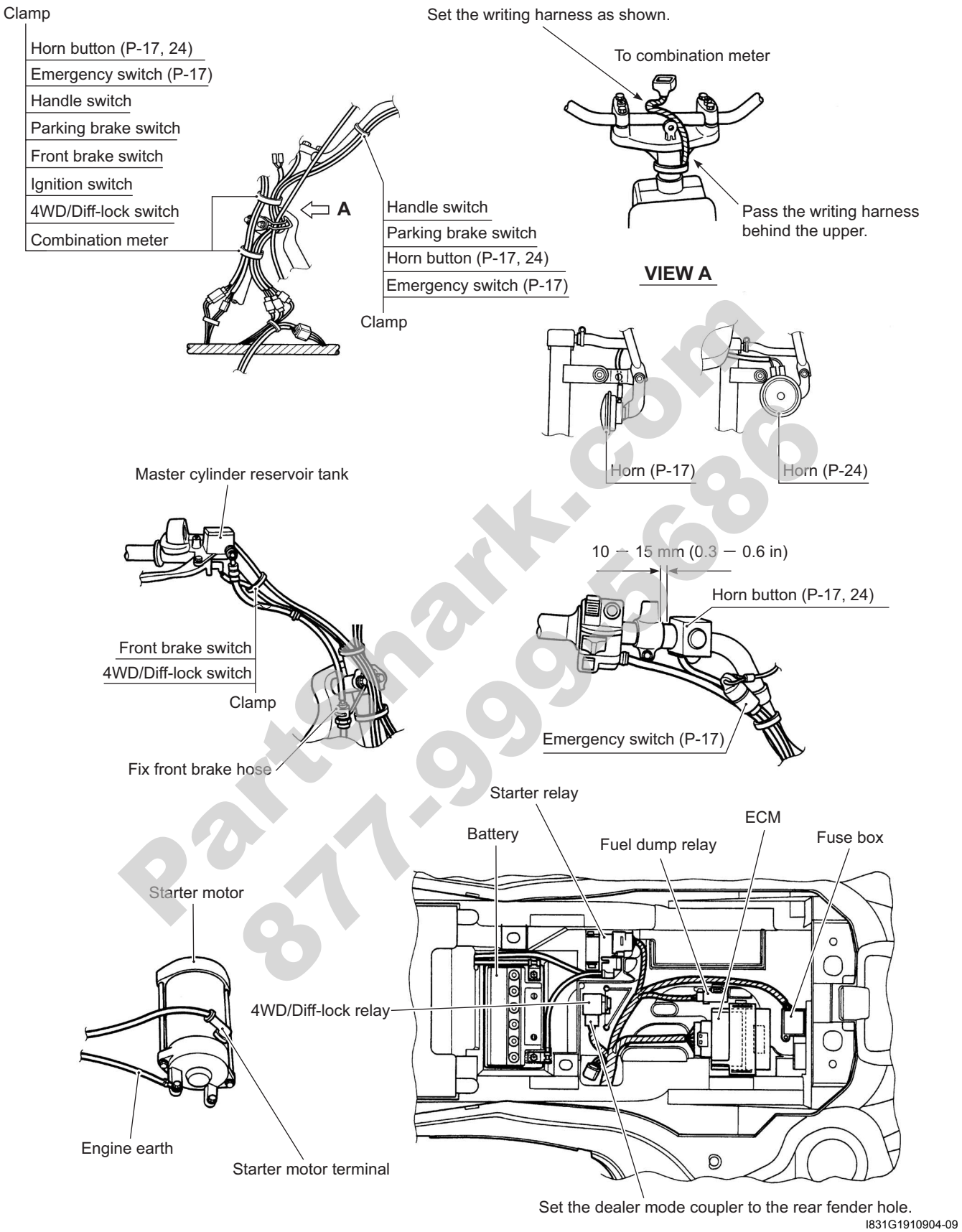
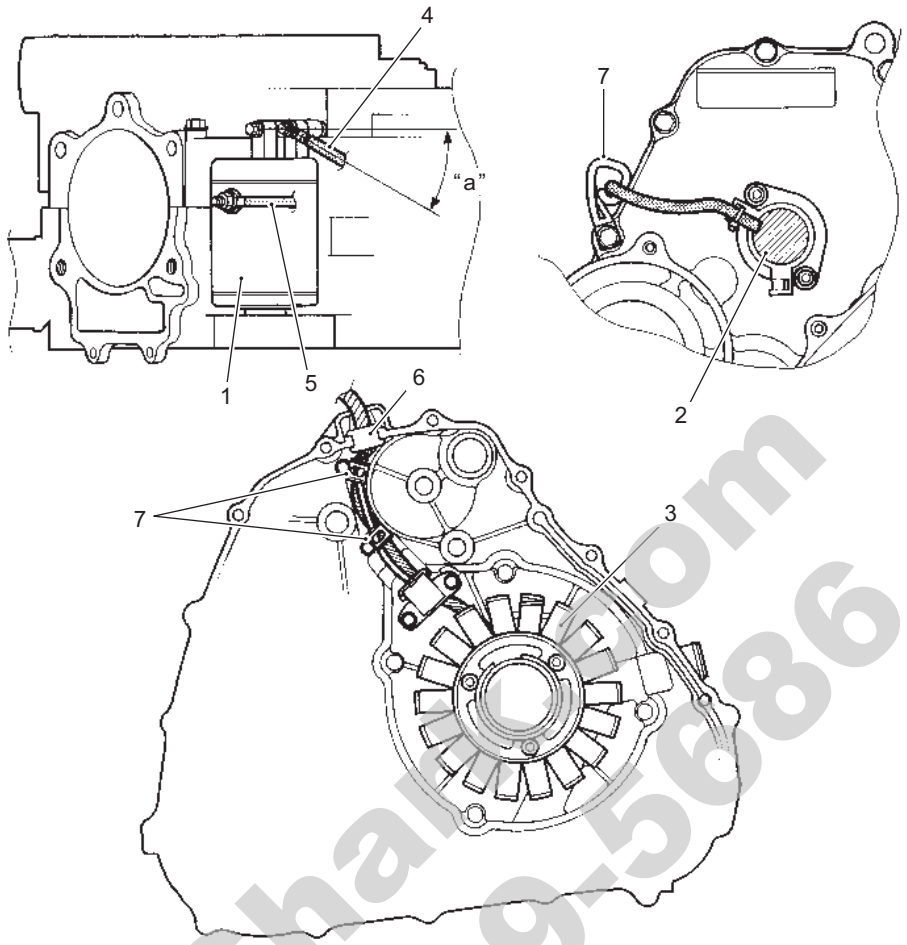


I831G1910904-09



I831G1910905-05

1. Starter motor	3. Generator stator	5. Starter motor lead wire	7. Clamp
2. Gear position switch	4. Ground wire	6. Grommet	"a": 30°

Specifications

Service Data

B831G29107001

Electrical

Unit: mm

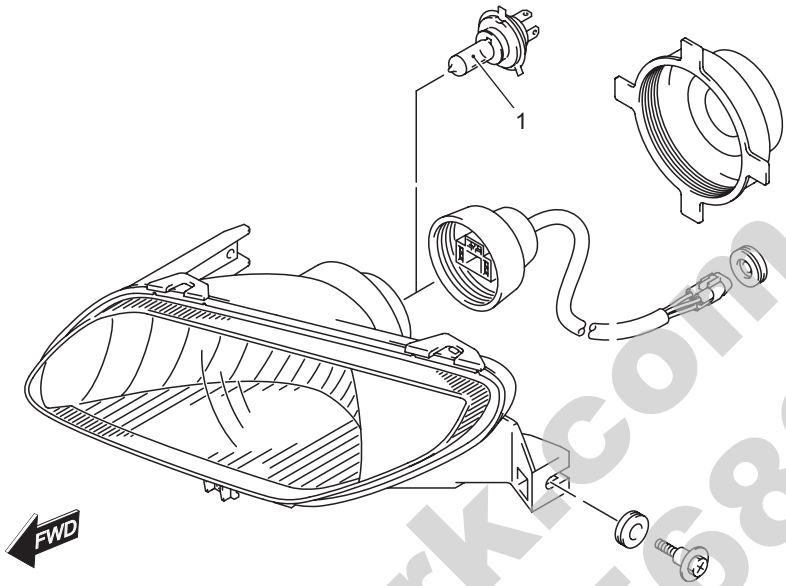
Item			Specification	Note
Fuse size	Headlight	HI	10 A	
		LO	10 A	
	Fuel		10 A	
	Ignition		15 A	
	Power source		10 A	
	Fan		15 A	
	Main		30 A	

Lighting Systems

Repair Instructions

Headlight Components

B831G29206001



I831G1920002-03

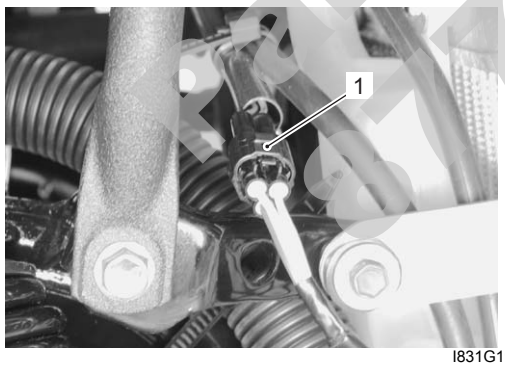
1. Headlight bulb (12 V 35/35 W)

Headlight Removal and Installation

B831G29206002

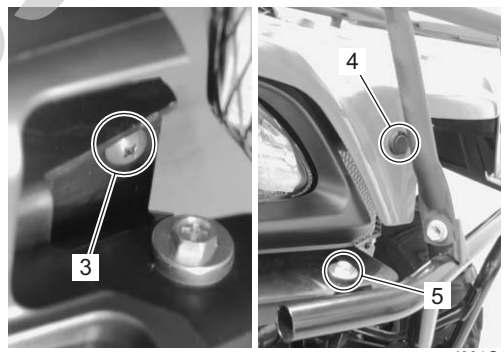
Removal

1) Remove the front grill upper cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the headlight coupler (1).

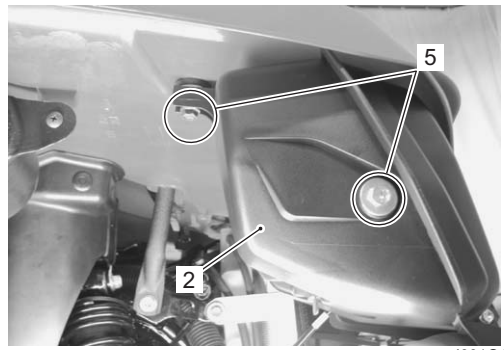


I831G1920003-01

3) Remove the headlight assembly (2) by removing screw (3), fastener (4) and bolts (5).



I831G1920004-02



I831G1920005-03

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

- After installing, be sure to inspect the headlight beam. Refer to “Headlight Beam Adjustment (Page 9B-2)”.

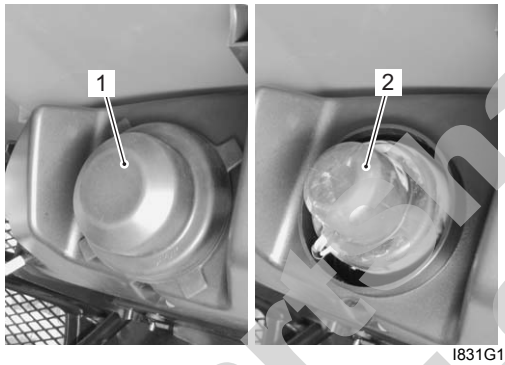
Headlight Bulb Replacement

B831G29206003

⚠ CAUTION

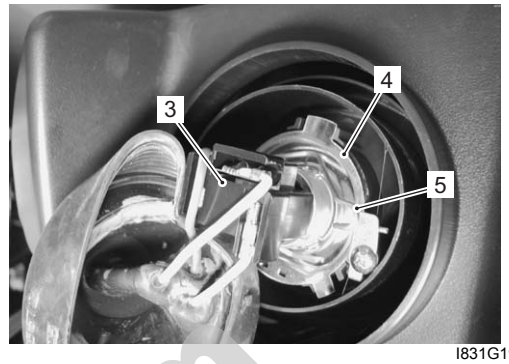
- **If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.**
- **Do not use bulb other than those with predetermined wattage.**
- **Remove the bulb when it gets cool, since it may be heated to an extremely high temperature when the headlight is turned ON.**

1) Remove the headlight housing cover (1) and bulb socket rubber cap (2).



I831G1920006-01

2) Disconnect the headlight coupler (3).
3) Replace the headlight bulb (4) by unhooking the bulb holder spring (5).



I831G1920007-01

4) Reinstall the removed parts.

NOTE

Properly fit the bulb socket rubber cap and headlight housing cover.

Headlight Beam Adjustment

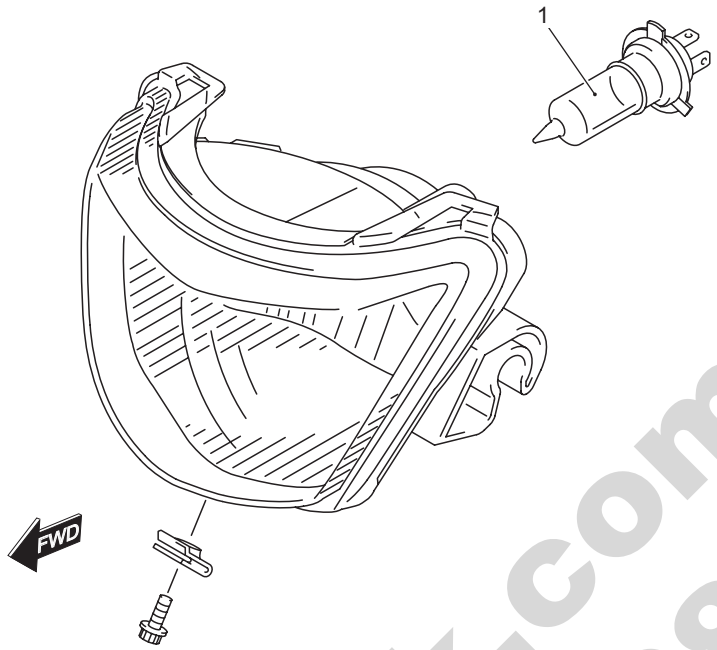
B831G29206004

Adjust the headlight vertical beam.

I831G1920008-01

Auxiliary Headlight Components

B831G29206005



I831G1920009-05

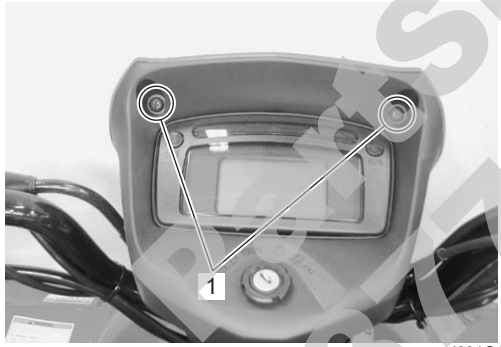
1. Auxiliary headlight bulb (12 V 35/35 W)

Auxiliary Headlight Removal and Installation

B831G29206006

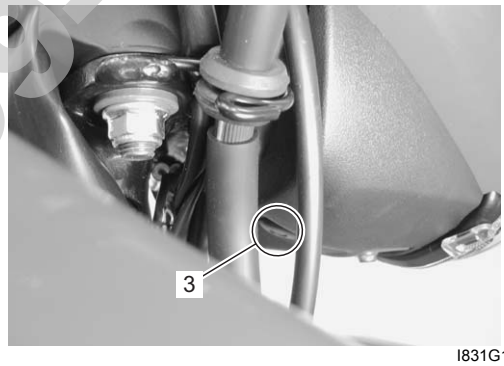
Removal

1) Remove the screws (1).

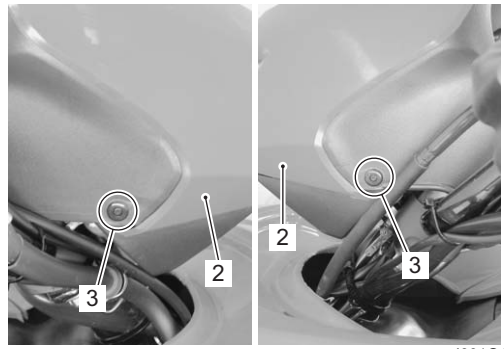


I831G1920010-01

2) Remove the auxiliary headlight cover (2) by removing the fasteners (3).

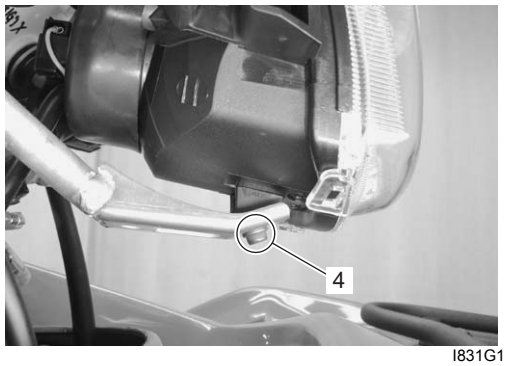


I831G1920011-01



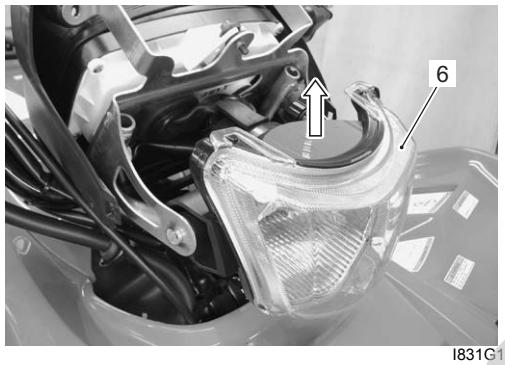
I831G1920012-01

3) Remove the auxiliary headlight mounting bolt (4).

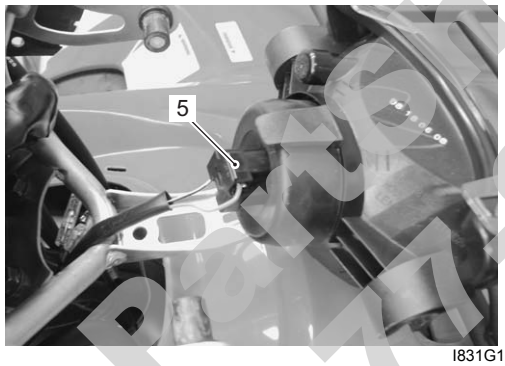


I831G1920013-01

4) Disconnect the auxiliary headlight coupler (5) by removing the auxiliary headlight assembly (6).



I831G1920014-01



I831G1920015-01

Installation

Install the auxiliary headlight in the reverse order of removal.

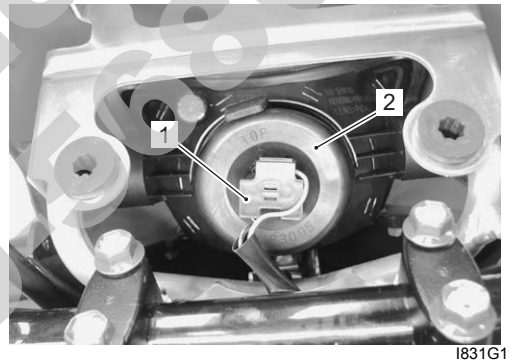
Auxiliary Headlight Bulb Replacement

B831G29206007

⚠ CAUTION

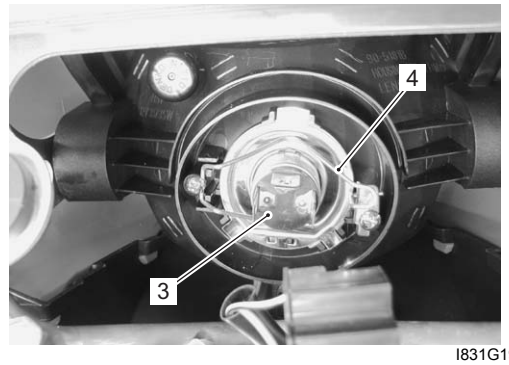
- **If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.**
- **Do not use bulb other than those with predetermined wattage.**
- **Remove the bulb when it gets cool, since it may be heated to an extremely high temperature when the headlight is turned ON.**

1) Remove the combination meter mounting bolt. Refer to “Combination Meter Removal and Installation in Section 9C (Page 9C-3)”.
2) Disconnect the auxiliary headlight coupler (1) and remove the bulb socket cap (2).



I831G1920016-01

3) Replace the auxiliary headlight bulb (3) by unhooking the bulb holder spring (4).

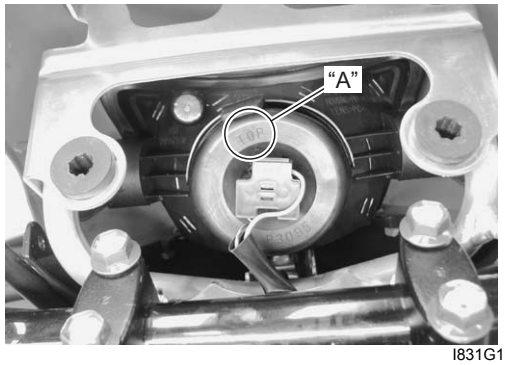


I831G1920017-01

4) Properly fit the bulb socket cap (1).

NOTE

Make sure that the “TOP” mark “A” face to upper side.



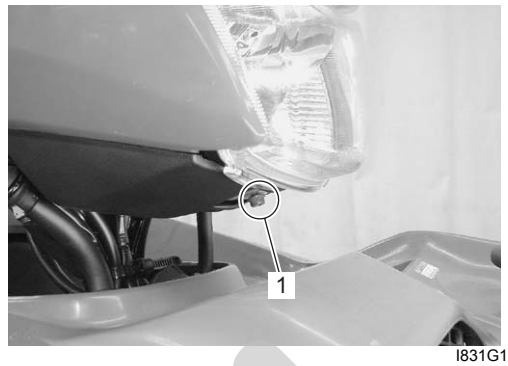
I831G1920018-02

5) Reinstall the removed parts.

Auxiliary Headlight Beam Adjustment

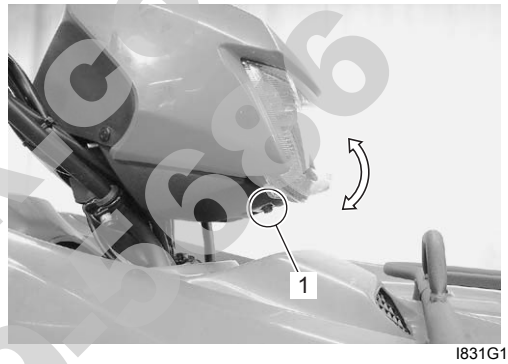
B831G29206008

- Loosen the auxiliary headlight mounting bolt (1).



I831G1920029-01

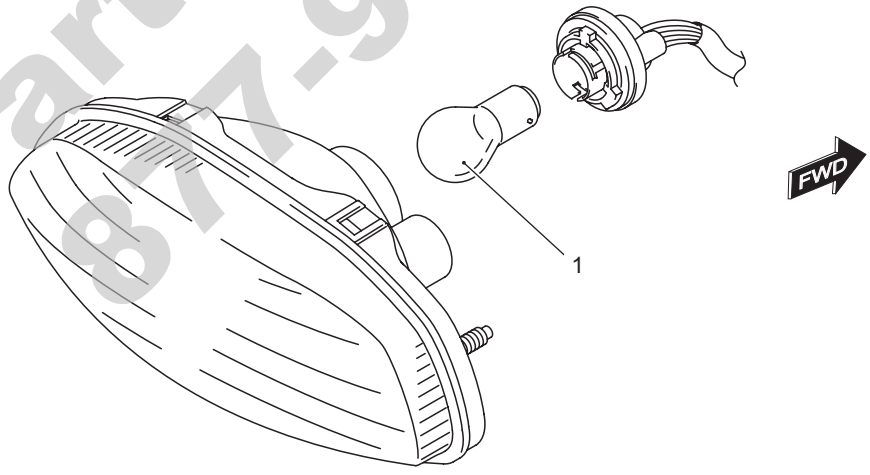
- Adjust the auxiliary headlight beam.
- Tighten the auxiliary headlight mounting bolt (1).



I831G1920030-01

Rear Combination Light components

B831G29206009



I831G1920019-04

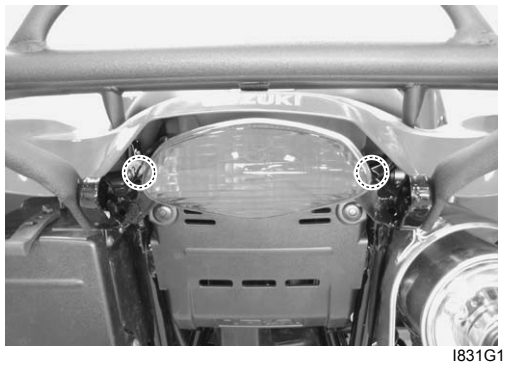
1. Brake light/Taillight bulb (12 V 21/5 W)

Rear Combination Light Removal and Installation

B831G29206010

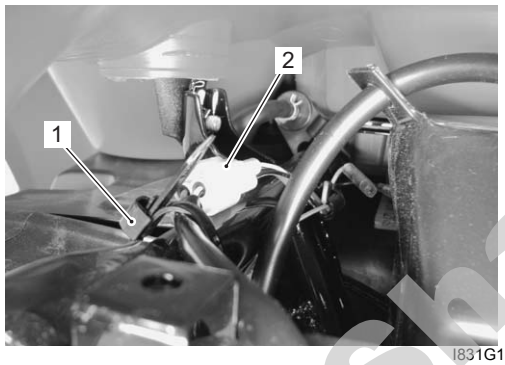
Removal

1) Remove the rear combination light mounting bolts.



I831G1920020-01

2) Remove the rear combination light assembly by disconnecting the clamp (1) and coupler (2).



I831G1920021-01

Installation

Install the rear combination light in the reverse order of removal.

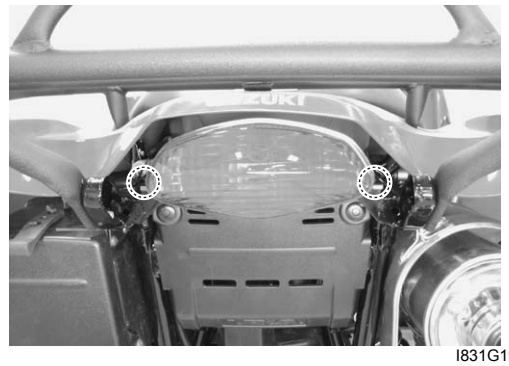
Rear Combination Light Bulb Replacement

B831G29206011

⚠ CAUTION

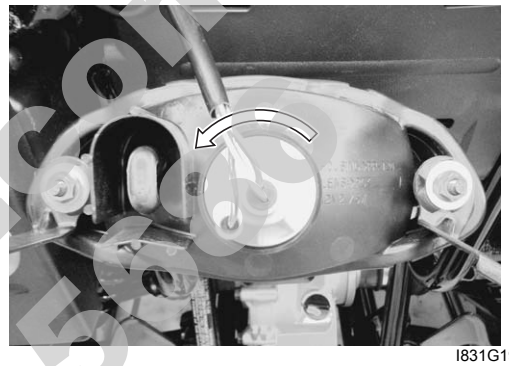
- **If you touch the bulb with your bare hands, clean the bulb with a cloth moistened with alcohol or soapy water to prevent premature bulb failure.**
- **Do not use bulb other than those with predetermined wattage.**

1) Remove the rear combination light.



I831G1920022-02

2) Remove the bulb socket by turning it counterclockwise.



I831G1920023-01

3) Push in on the bulb, turn it counterclockwise, and pull it out.

4) Replace the bulb.

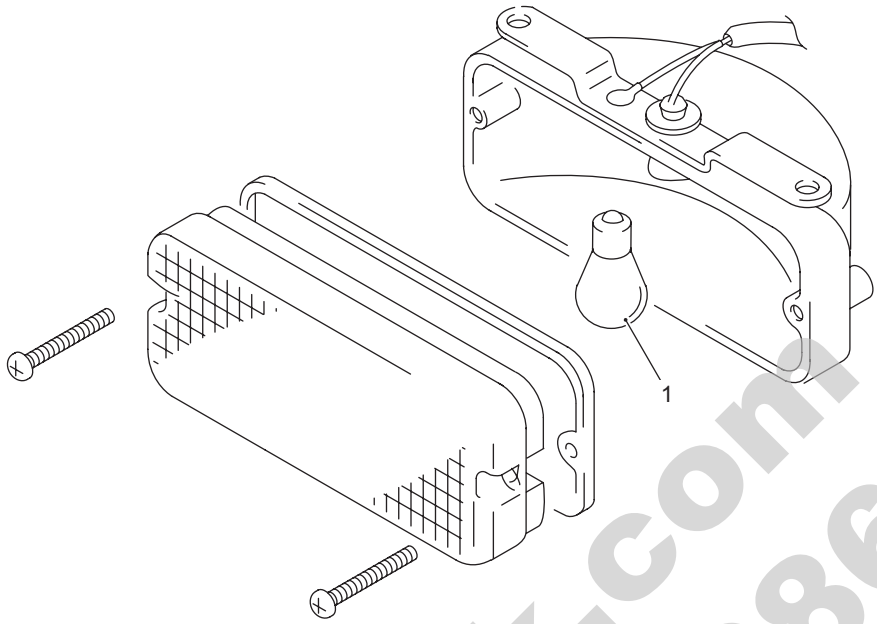
I831G1920024-03

5) Reinstall the removed parts.

Reversing Light Bulb Replacement (For P-17)

B831G29206012

Remove the reversing light bulb (1) as shown in the figure.



I831G1920025-03

1. Reversing light bulb (12 V/21 W)

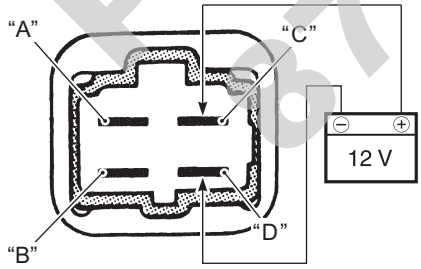
Reversing Light Relay Inspection (For P-17)

B831G29206013

First, check the insulation between “A” and “B” terminals with the multi-circuit tester. Then apply 12 V to terminals “C” and “D” ((+) to “C” and (–) to “D”) and check the continuity between “A” and “B”. If there is no continuity, replace the reversing light relay with a new one.

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

Tester knob indication
Continuity (•))))



I831G1920028-01

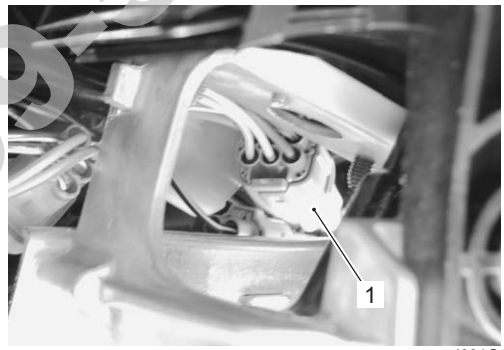
Dimmer Switch Inspection

B831G29206014

Inspect the dimmer switch in the following procedures:

1) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.

2) Disconnect the handlebar switch coupler (1).



I831G1920026-01

3) Inspect the dimmer switch for continuity with a tester. If any abnormality is found, replace the handlebar switch assembly with a new one.
Refer to “Handlebars Removal and Installation in Section 6B (Page 6B-3)”.

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

Tester knob indication
Continuity (•))))

Color / Position	Gr	W	Y
HI	○		○
LO	○	○	

I831G1920027-01

4) After finishing the dimmer switch inspection, reinstall the removed parts.

Specifications

Service Data

B831G29207001

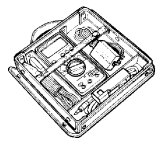
Wattage
Unit: W

Item		Specification	
		P-24, 28, 33	P-17
Headlight	HI	35 x 2	←
	LO	35 x 2	←
Auxiliary headlight		35/35	←
Brake light/Taillight		21/5	←
Revercing light		—	21

Special Tools and Equipment

Special Tool

B831G29208001

09900–25008 Multi-circuit tester set ☞(Page 9B-7) / ☞(Page 9B-7)	

Combination Meter / Fuel Meter / Horn

General Description

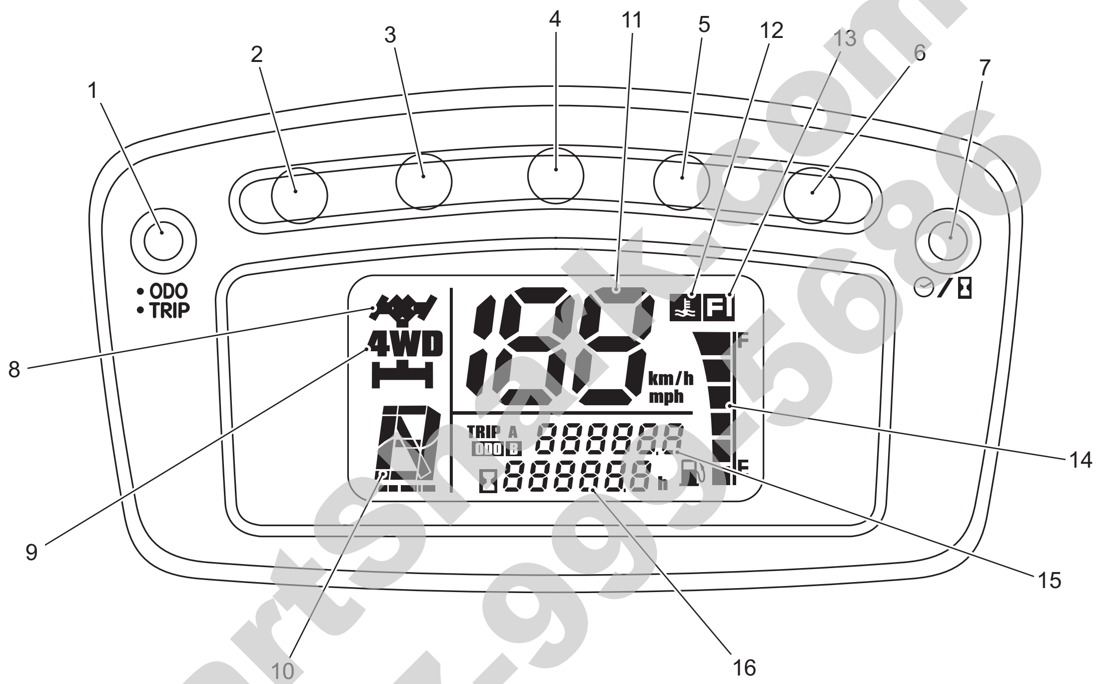
Combination Meter System Description

B831G29301001

This combination meter mainly consists of LCD (Liquid Crystal Display) and LED (Light Emitting Diode).
The LCDs indicate Speed, Odo / Trip A / Trip B, Fuel level, Diff-lock, 4WD, Gear position, Engine coolant temperature, FI and Clock / Hour / 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.



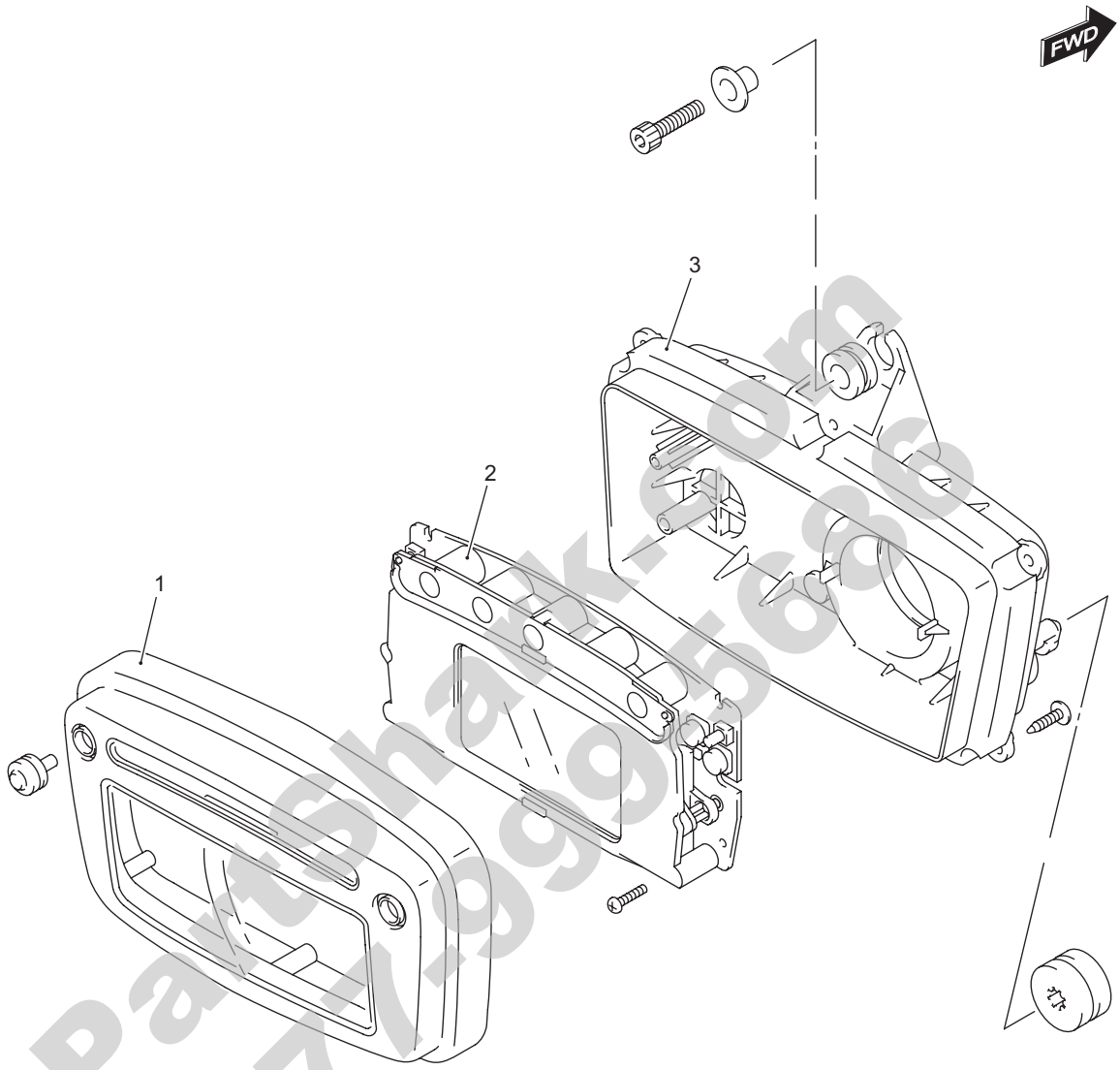
I831G1930001-03

1. Select button (Odo / Trip A / Trip B)	7. Select button (Clock / Hour / FI (DTC))	13. LCD (FI indicator)
2. LED (Diff-lock indicator light)	8. LCD (Diff-lock indicator)	14. LCD (Fuel level indicator)
3. LED (Reverse indicator light)	9. LCD (4WD indicator)	15. LCD (Odo / Trip A / Trip B)
4. LED (Neutral indicator light)	10. LCD (Gear position indicator)	16. LCD (Clock / Hour / FI (DTC))
5. LED (High-beam indicator light) [For P-17]	11. LCD (Speedometer)	
6. LED (Engine coolant temperature / FI indicator light)	12. LCD (Engine coolant temperature indicator)	

Repair Instructions

Combination Meter Components

B831G29306001



I831G1930002-04

1. Upper case	2. Combination meter	3. Lower case

Combination Meter Removal and Installation

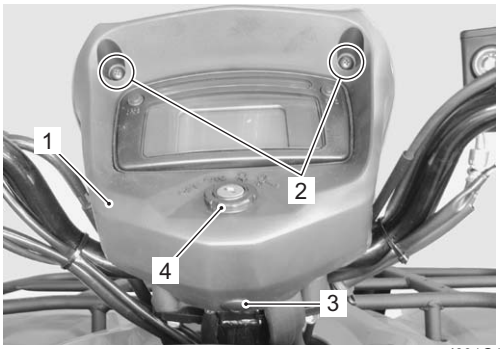
B831G29306002

⚠ CAUTION

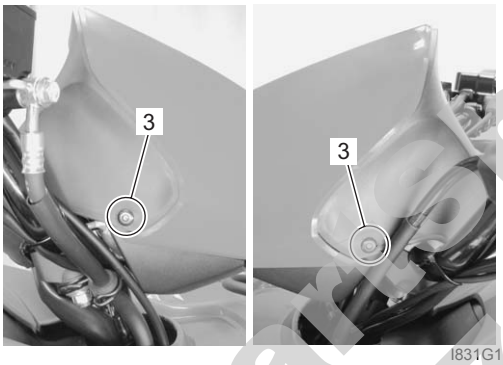
When disconnecting and reconnecting the combination meter coupler, make sure to turn OFF the ignition switch, or electronic parts may get damaged.

Removal

1) Remove the combination meter cover (1) by removing the screws (2), fasteners (3) and ignition switch ring nut (4).



I831G1930004-01

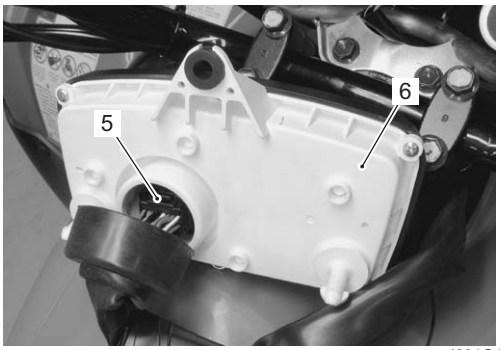


I831G1930003-01

2) Remove the combination meter mounting bolt.

I831G1930005-01

3) Disconnect the combination meter coupler (5) and remove the combination meter assembly (6).

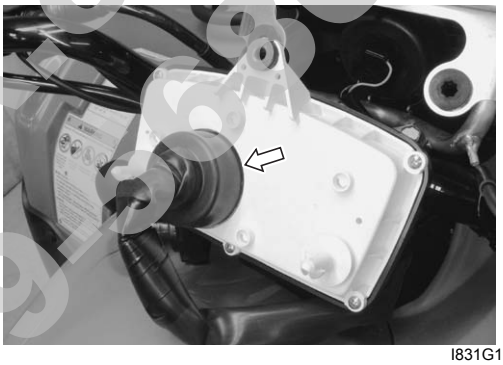


I831G1930006-01

Installation

Install the combination meter in the reverse order of removal. Pay attention to the following points:

- Make sure that speedometer coupler boot is positioned properly.



I831G1930007-01

Combination Meter Disassembly and Assembly

B831G29306003

Refer to “Combination Meter Removal and Installation (Page 9C-3)”.

⚠ CAUTION

Do not attempt to disassemble the combination meter unit.

Disassembly

Disassemble the combination meter as shown in the combination meter components. Refer to “Combination Meter Components (Page 9C-2)”.

Assembly

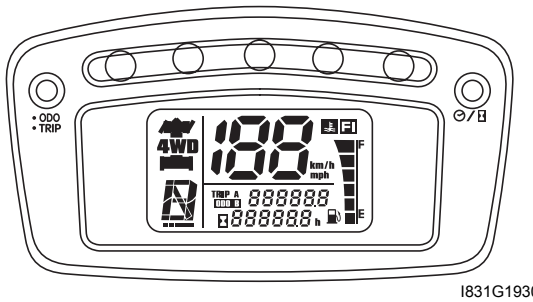
Assemble the combination meter as shown in the combination meter components. Refer to “Combination Meter Components (Page 9C-2)”.

Combination Meter Inspection

B831G29306004

LED Inspection

Check that the LEDs (Diff-lock indicator light, Reverse indicator light and FI indicator light / Engine coolant temperature indicator light) immediately light up for two seconds when the ignition switch is turned to ON.
Check that other LEDs (Neutral indicator light and High-beam indicator light (for P-17)) 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-3)”.



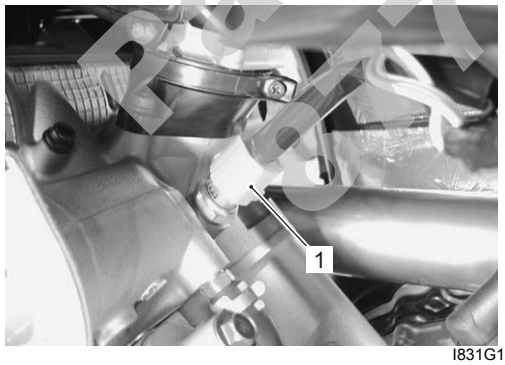
I831G1930008-02

Engine Coolant Temperature Indicator Light Inspection

B831G29306005

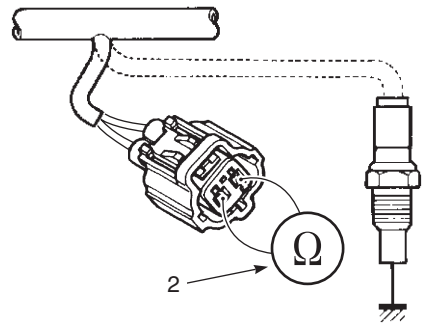
Inspect the engine coolant temperature indicator light in the following procedures:

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D (Page 9D-11)”.
2) Remove the left side cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Disconnect the ECT sensor coupler (1).



I831G1930025-01

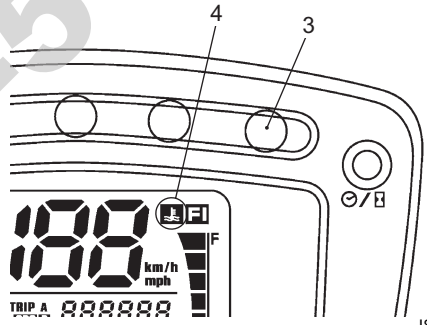
4) Connect the variable resistor (2) between the terminals.



I718H1930009-05

5) Turn the ignition switch ON.
6) Check the LCD and 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-3)”.

Resistance	LED (3)	LCD (4)	Water temperature
Approx. 0.14 kΩ	OFF	OFF	Approx. 110 °C
0 Ω (Jumper wire)	ON	ON	120 °C and over



I831G1930026-03

7) Connect the ECT sensor coupler.
8) Reinstall the removed parts.

Engine Coolant Temperature Removal and Installation

B831G29306006

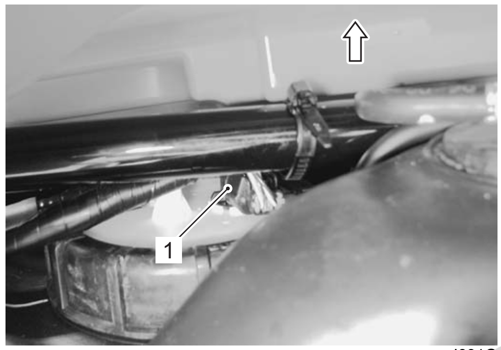
Refer to “ECT Sensor Removal and Installation in Section 1C (Page 1C-4)”.

Fuel Level Indicator Inspection

B831G29306007

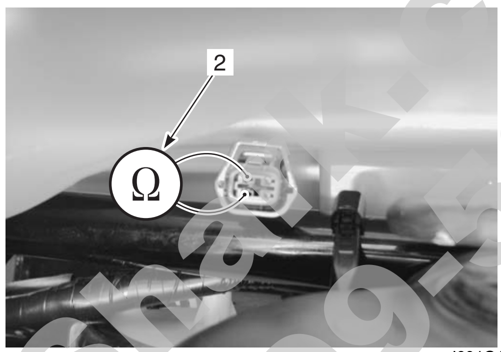
Inspect the fuel level indicator in the following procedures:

1) Move the rear fender upside. Refer to “Fuel Tank Pressure Control (FTPC) Valve Removal and Installation in Section 1G (Page 1G-12)”.
2) Disconnect the fuel level gauge coupler (1).



I831G1930011-01

3) Connect the variable resister (2) between the Y/B and B lead wires from the wire harness.



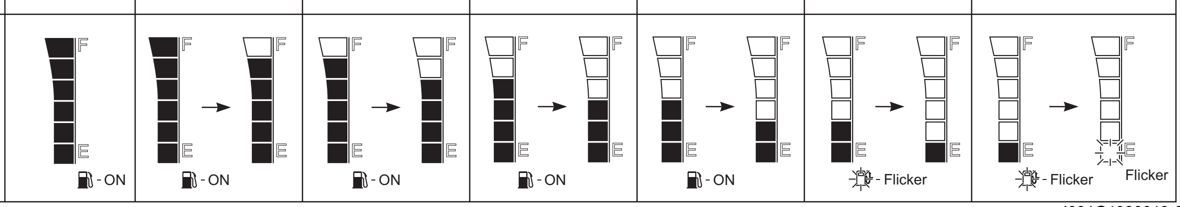
I831G1930012-02

4) Turn the ignition switch ON.
5) 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-3)”.

NOTE

It takes approx. 13 seconds that the fuel level indicator indicates the detected fuel level.

Resistance	Less than 16 Ω	16.5 – 21.5 Ω	23.5 – 30.5 Ω	33 – 41 Ω	53 – 65 Ω	82 – 100 Ω	164 – 208 Ω
Fuel level meter	- ON	- ON	- ON	- ON	- ON	- Flicker	- Flicker; Flicker



I831G1930013-04

6) Connect the fuel level gauge coupler and reinstall the removed parts.

Fuel Level Gauge Inspection

B831G29306008

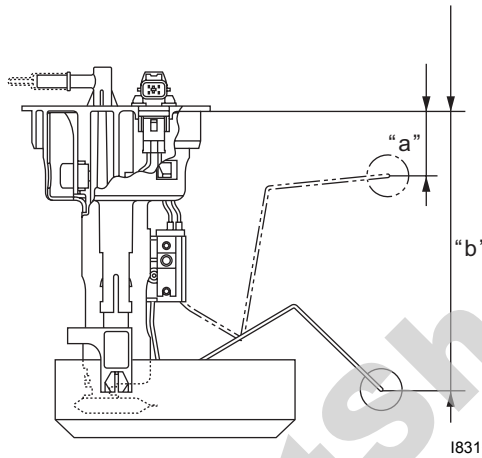
Inspect the fuel level gauge in the following procedures:

1) Remove the fuel pump. Refer to “Fuel Pump Assembly Removal and Installation in Section 1G (Page 1G-9)”.
2) Measure the resistance at each fuel level gauge in float position. If the resistance is incorrect, replace fuel pump with a new one.

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

Tester knob indication
Resistance (Ω)

Float position	Resistance
Full “a”	6.4 – 8.4 Ω
Empty “b”	216 – 222 Ω



I831G1930014-01

“a”: 27.7 mm (1.09 in)	“b”: 166 mm (6.54 in)

3) Install the fuel pump. Refer to “Fuel Pump Assembly Removal and Installation in Section 1G (Page 1G-9)”.

Speedometer Inspection

B831G29306009

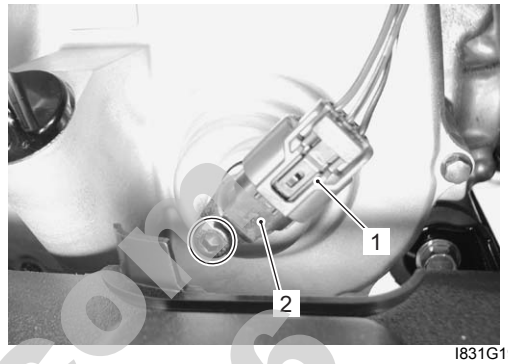
If the speedometer, odometer or trip meter does not function properly, inspect the speed sensor and the coupler connections. If the speed sensor and coupler connections are OK, replace the combination meter unit with a new one. Refer to “Combination Meter Removal and Installation (Page 9C-3)”.

Speed Sensor Removal and Installation

B831G29306010

Removal

1) Remove the engine side cover. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
2) Disconnect the speed sensor coupler (1).
3) Remove the speed sensor (2).



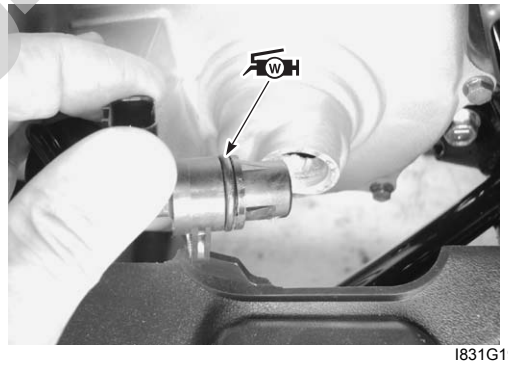
I831G1930015-01

Installation

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

- Apply grease to the speed sensor O-ring.

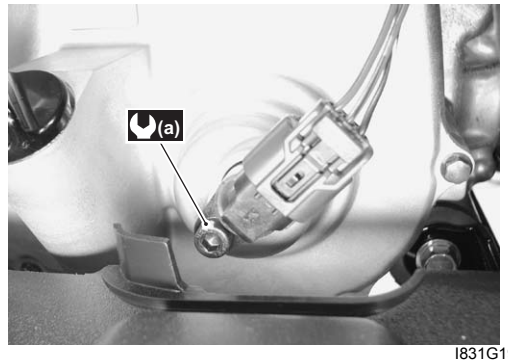
(W) : Grease 99000–25160 (Water resistance grease)



I831G1930016-02

- Tighten the speed sensor mounting bolt to the specified torque.

Tightening torque
Speed sensor mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lb-ft)



I831G1930017-03

Speed Sensor Inspection

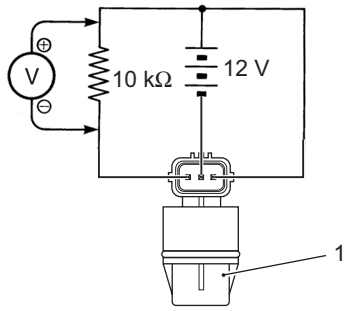
B831G29306011

Inspect the speed sensor in the following procedures:

1) Remove the speed sensor. Refer to “Speed Sensor Removal and Installation (Page 9C-6)”.
2) Connect a 12 V battery, 10 kΩ resistor and multi-circuit tester as shown.

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

Tester knob indication
Voltage (⎓)



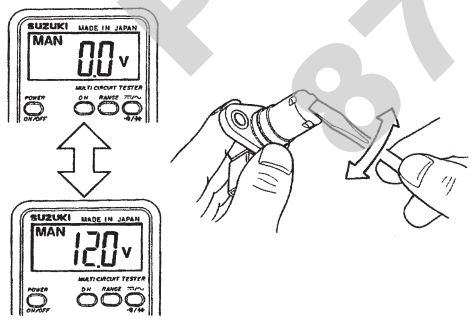
I831G1930018-05

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).



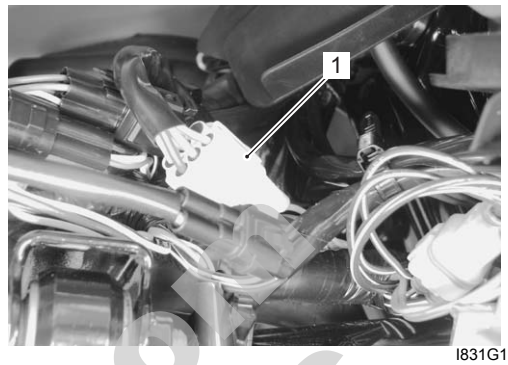
I831G1930022-01

Ignition Switch Inspection

B831G29306012

Inspect the ignition switch in the following procedures:

1) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Disconnect the ignition switch coupler (1).



I831G1930019-02

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	Gr	P	O/R
AUX	○	○	○	○	
	○	○	○		
ON	○	○			
OFF		○			○

I831G1930023-05

4) After finishing the ignition switch inspection, reinstall the removed parts.

Ignition Switch Removal and Installation

B831G29306013

Refer to “Ignition Switch Removal and Installation in Section 1H (Page 1H-7)”.

Horn Inspection (For P-17, 24)

B831G29306014

NOTE

If the horn sound condition is normal, it is not necessary to inspect the horn button continuity.

Horn Button Inspection

1) Disconnect the horn couplers as shown in the wiring harness routing diagram. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-4)”.
2) Inspect the horn button for continuity with a tester. If any abnormality is found, replace the horn button with a new one.
   Refer to “Handlebars Removal and Installation in Section 6B (Page 6B-3)”.

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

Tester knob indication
Continuity (•)))

Position \ Color	G	B/W
•		
PUSH	○	○

I831G1930024-03

3) Connect the horn couplers.

Horn Inspection

1) Disconnect the horn couplers as shown in the wiring harness routing diagram. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-4)”.
2) Connect a 12 V battery to terminal and terminal. If the sound is not heard from the horn, replace the horn with a new one.
3) Connect the horn couplers.

Horn Removal and Installation (For P-17, 24)

B831G29306015

Removal

Disconnect the horn couplers and remove the horn by removing the mounting nut as shown in the wiring harness routing diagram. Refer to “Wiring Harness Routing Diagram in Section 9A (Page 9A-4)”.

Installation

Install the horn in the reverse order of removal.

Specifications

Service Data

B831G29307001

Wattage
Unit: W

Item	Specification	
	P-24, 28, 33	P-17
Speedometer light	LED	←
High beam indicator light	—	LED
Neutral indicator light	LED	←
FI indicator light/Engine coolant temp. indicator light	LED	←
Reverse indicator light	LED	←
Differential lock indicator light	LED	←

Tightening Torque Specifications

B831G29307002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Speed sensor mounting bolt	10	1.0	7.0	☞(Page 9C-6)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

B831G29308001

Material	SUZUKI recommended product or Specification		Note
Grease	Water resistance grease	P/No.: 99000–25160	☞(Page 9C-6)

Special Tool

B831G29308002

09900–25008 Multi-circuit tester set ☞(Page 9C-6) / ☞(Page 9C-7) / ☞(Page 9C-7) / ☞(Page 9C-8)		

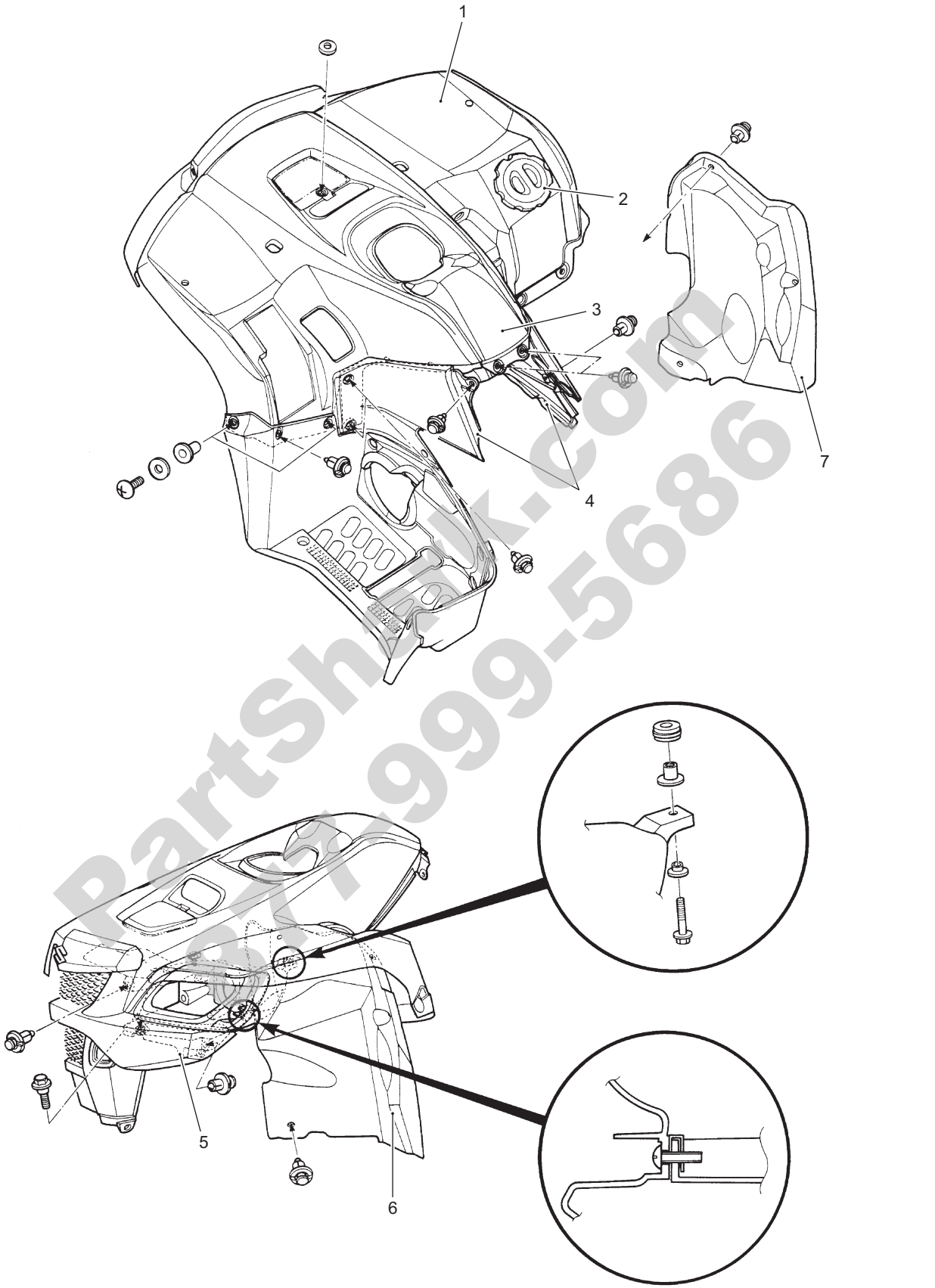
Exterior Parts

Repair Instructions

Exterior Parts Construction

B831G29406001

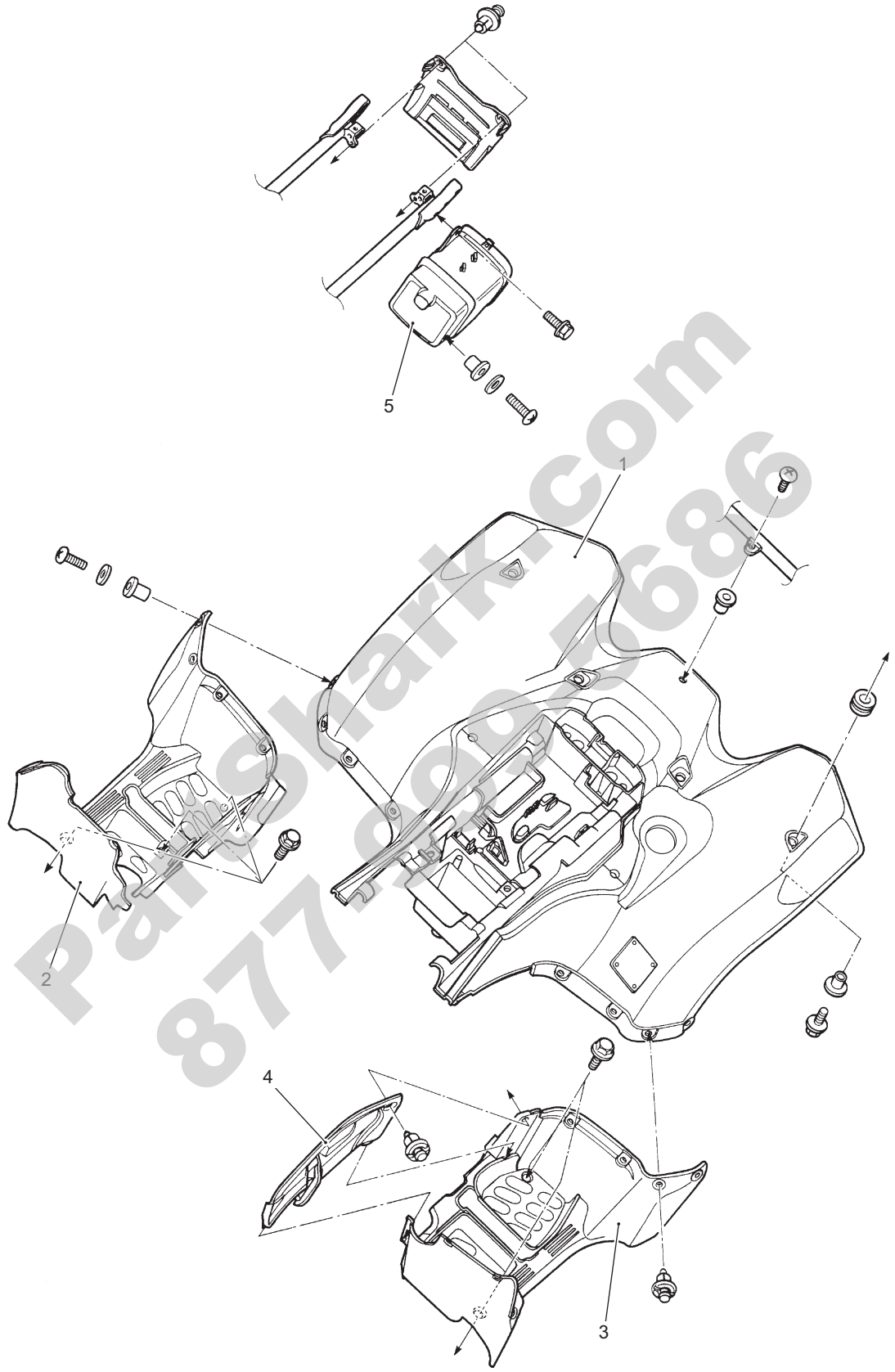
Front Side



I831G1940001-08

1. Front fender	3. Air cleaner box cover	5. Front grill cover	7. Right inner fender
2. Front box	4. Side cover	6. Left inner fender	

Rear Side

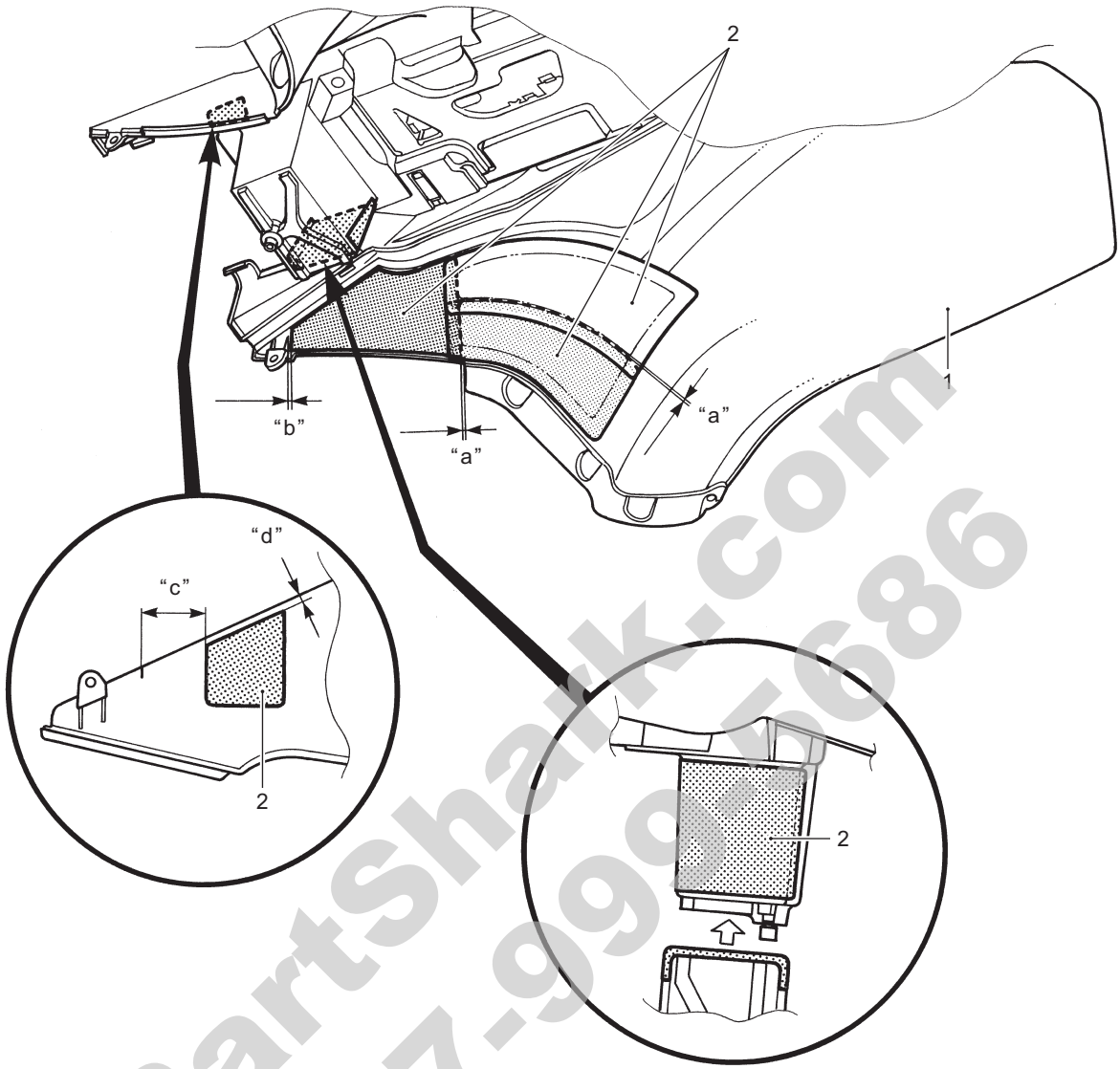


I831G1940002-02

1. Rear fender	2. Right mud guard	3. Left mud guard	4. Engine side cover	5. Rear box

Rear Fender Heat Shield Construction

B831G29406002

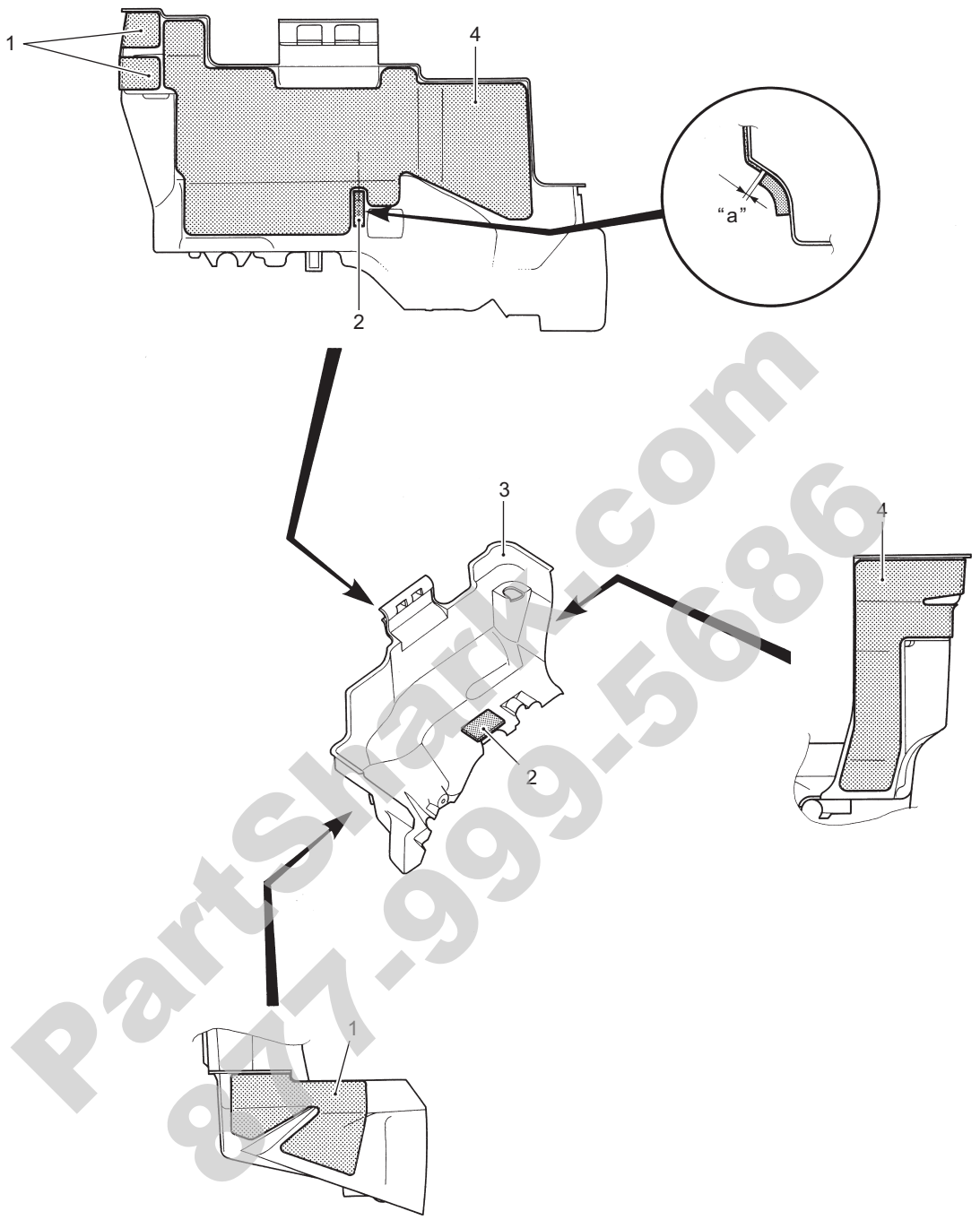


I831G1940003-07

1. Rear fender	"a": 1 – 3 mm (0.04 – 0.12 in)	"c": 67 mm (2.64 in)
2. Heat shield	"b": 5 mm (0.2 in)	"d": 8 mm (0.3 in)

Fuel Tank Lower Cover Heat Shield Installation

B831G29406003



I831G1940045-02

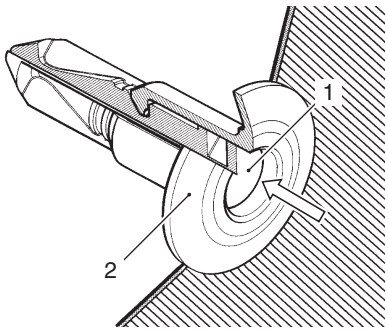
1. Heat shield	2. Cushion	3. Fuel tank lower cover	"a": Max. 5 mm (0.2 in)

Fastener Removal and Installation

B831G29406004

Removal

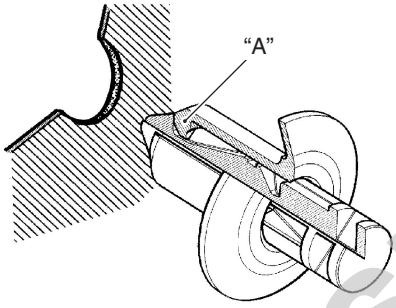
1) Depress the head of fastener center piece (1).
2) Pull out the fastener (2).



I649G1940005-02

Installation

1) Let the center piece stick out toward the head so that the pawls “A” closes.



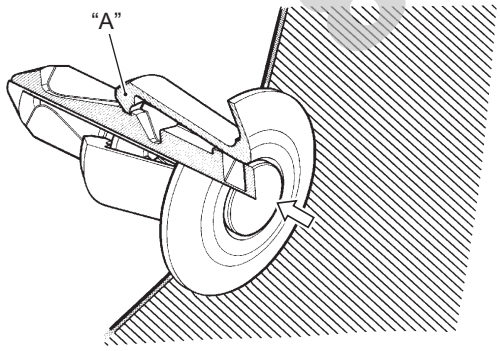
I649G1940006-02

2) Insert the fastener into the installation hole.

NOTE

To prevent the pawl “A” from damage, insert the fastener all the way into the installation hole.

3) Push in the head of center piece until it becomes flush with the fastener outside face.



I831G1940046-01

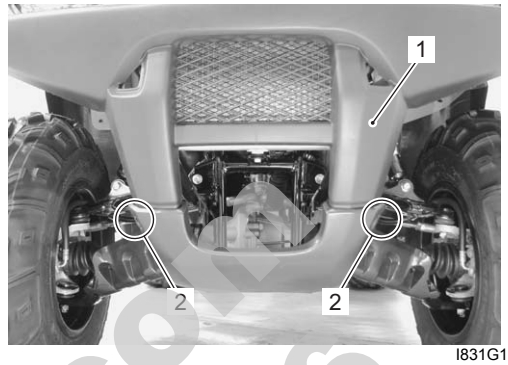
Front Side Exterior Parts Removal and Installation

B831G29406005

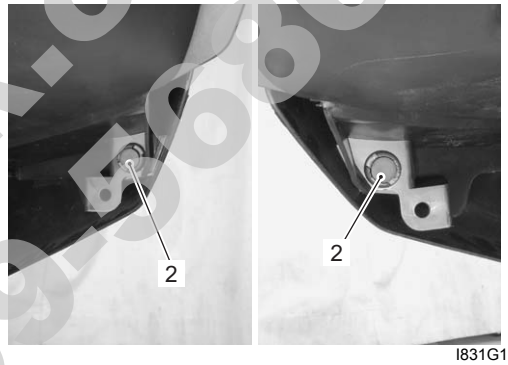
Front Grill Cover

Removal

Remove the front grill cover (1) by removing the fasteners (2).



I831G1940005-01



I831G1940004-01

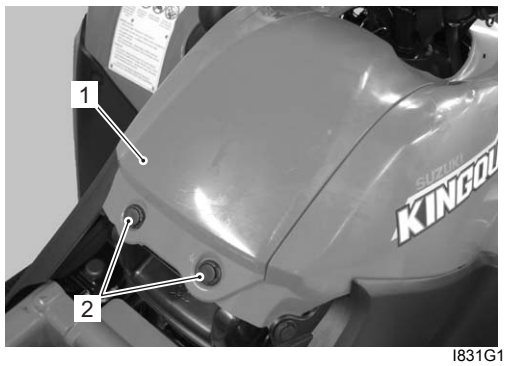
Installation

Install the front grill cover in the reverse order of removal.

Air Cleaner Box Cover

Removal

1) Remove the seat. Refer to “Seat Removal and Installation (Page 9D-11)”.
2) Remove the air cleaner box cover (1) by removing the fasteners (2).



I831G1940006-01

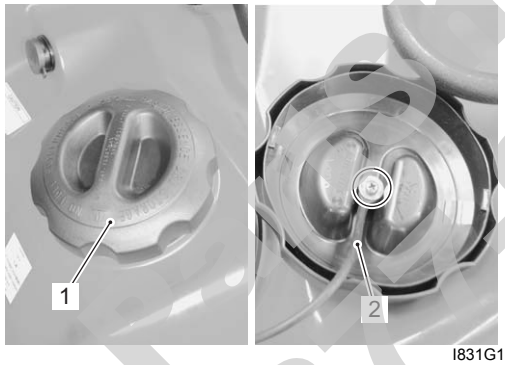
Installation

Install the air cleaner box cover in the reverse order of removal.

Front Box

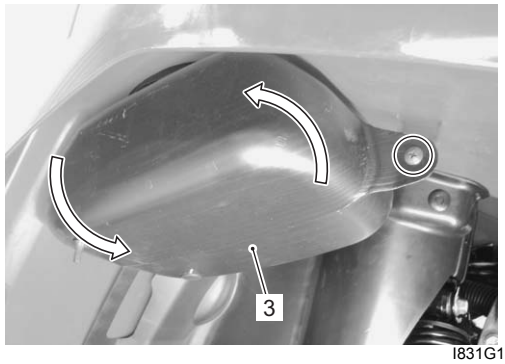
Removal

1) Remove the front box cap (1).
2) Disconnect the front box cap wire (2).



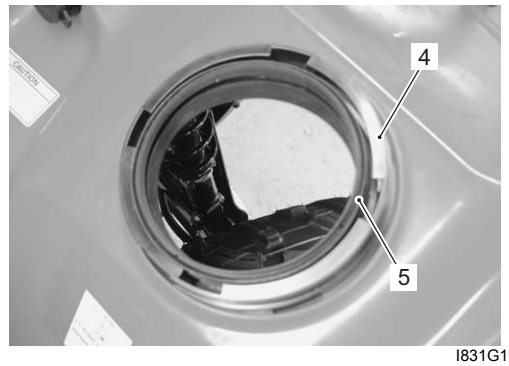
I831G1940007-02

3) Remove the front box mounting screw.
4) Turn the front box (3) counterclockwise and remove it.

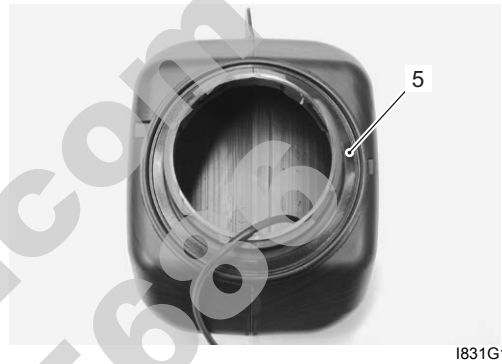


I831G1940008-04

5) Remove the front box holder (4) and cushions (5).



I831G1940009-02

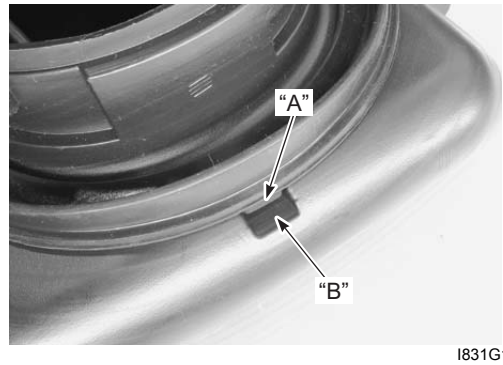


I831G1940010-01

Installation

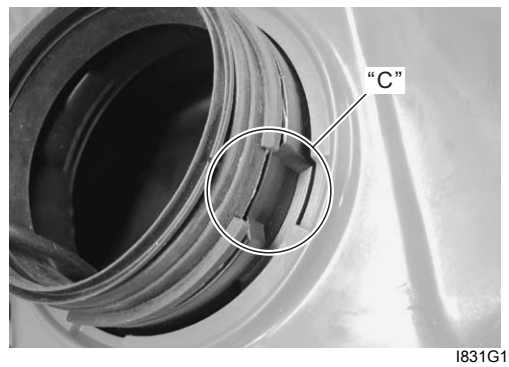
Install the front box in the reverse order of removal. Pay attention to the following points:

- When installing the cushion, fit the convex parts “A” of the cushion onto the concave parts “B” of the front box.



I831G1940011-01

- When installing the cushion to the front box, align the cutout “C” on the front box.

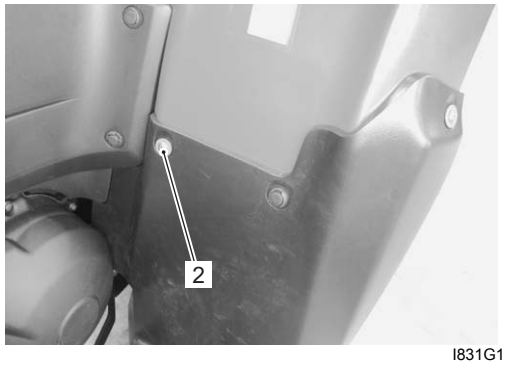


I831G1940012-01

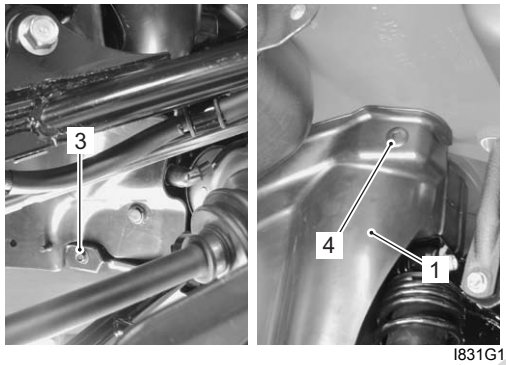
Inner Fender

Removal

Remove the inner fenders (1) by removing the screw (2), bolt (3) and fastener (4), left and right.



I831G1940013-02



I831G1940014-02

Installation

Install the inner fenders in the reverse order of removal.

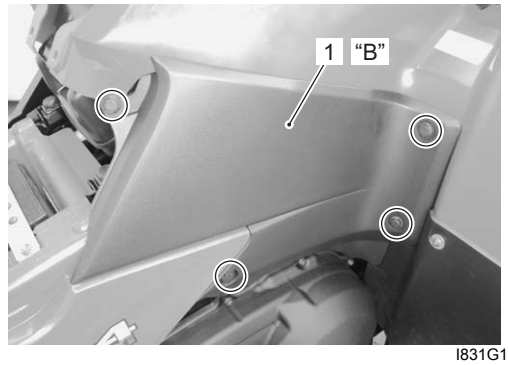
Side Cover

Removal

1) Remove the seat. Refer to “Seat Removal and Installation (Page 9D-11)”.
2) Remove the side cover (1), left and right.

I831G1940015-01

“A”: Left side



I831G1940016-01

“B”: Right side

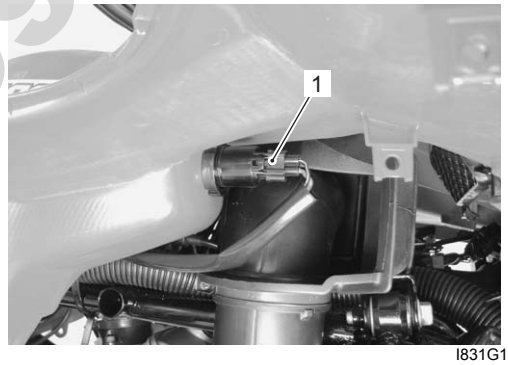
Installation

Install the side cover in the reverse order of removal.

Front Fender

Removal

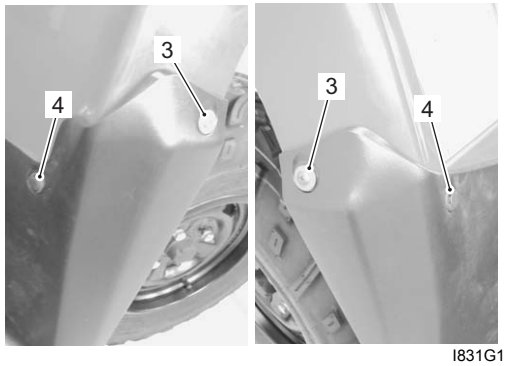
1) Remove the front carrier. Refer to “Front Carrier Removal and Installation in Section 9E (Page 9E-4)”.
2) Remove the seat. Refer to “Seat Removal and Installation (Page 9D-11)”.
3) Remove the air cleaner box cover, front box, inner fenders and side covers. Refer to “Front Side Exterior Parts Removal and Installation (Page 9D-6)”.
4) Disconnect the power source socket coupler (1).



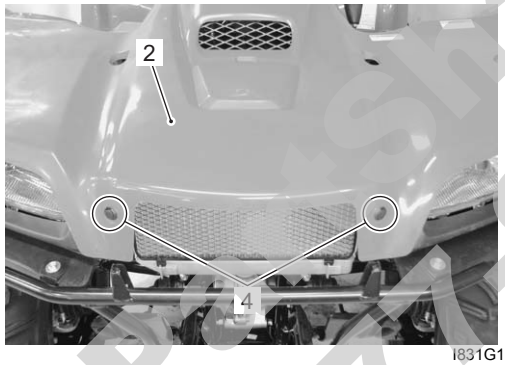
I831G1940017-01

5) Remove the front fender (2) by removing the screws (3) and fasteners (4).

I831G1940018-01



I831G1940019-01



I831G1940020-01

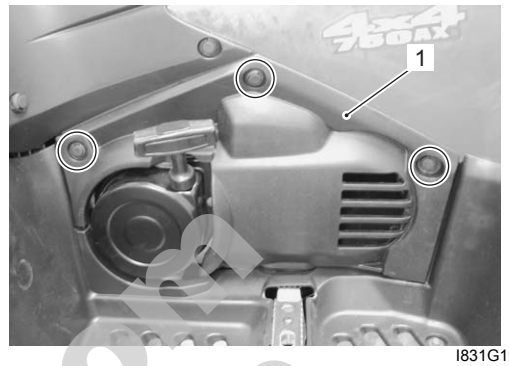
Installation
Install the front fender in the reverse order of removal.

Rear Side Exterior Parts Removal and Installation

B831G29406006

Engine Side Cover

Removal
Remove the engine side cover (1).

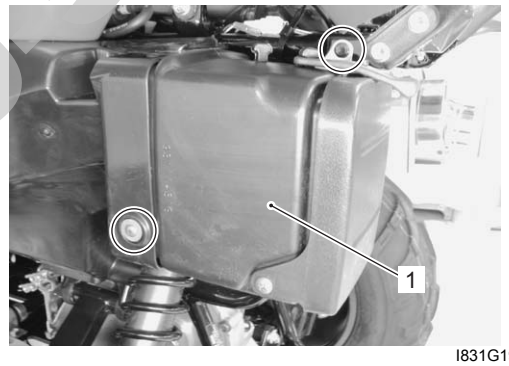


I831G1940021-01

Installation
Install the engine side cover in the reverse order of removal.

Rear Box

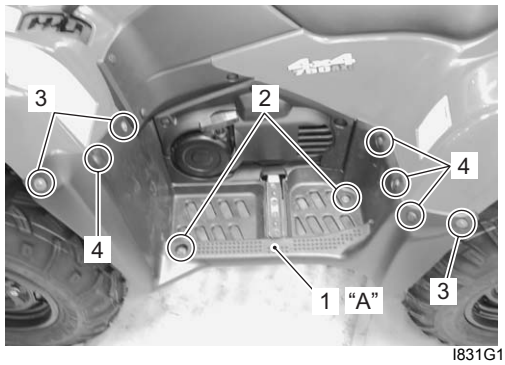
Removal
Remove the rear box (1).



I831G1940022-01

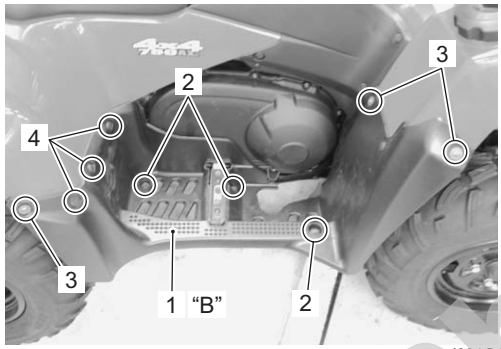
Installation
Install the rear box in the reverse order of removal.

Mud Guard
Removal
Remove the mud guards (1) by removing the bolts (2), screws (3) and fastener (4), left and right.



I831G1940023-05

"A": Left side

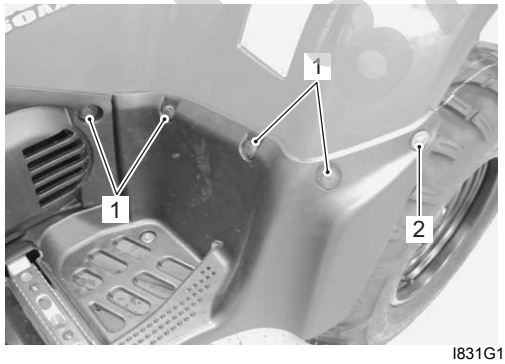


I831G1940024-02

"B": Right side

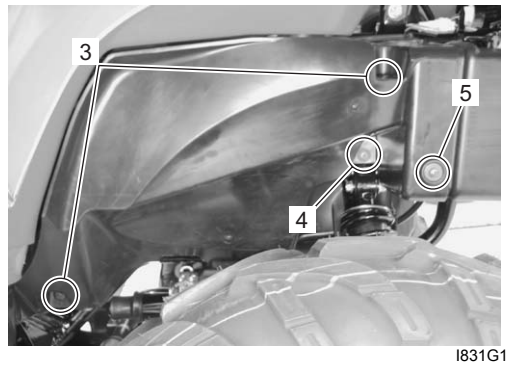
Installation
Install the mud guard in the reverse order of removal.

Fuel Tank Outer Cover
Removal
1) Remove the fasteners (1) and screw (2).



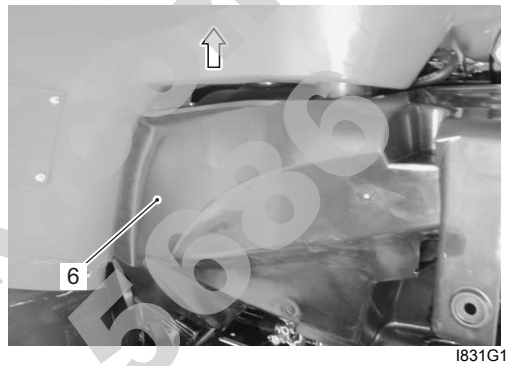
I831G1940025-01

2) Remove the fasteners (3), bolt (4) and screw (5).



I831G1940026-01

3) Move the rear fender upside.
4) Remove the fuel tank outer cover (6).

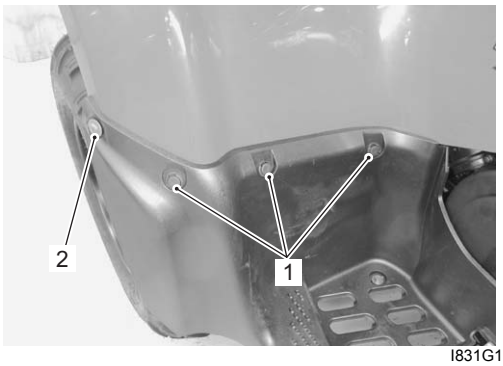


I831G1940027-01

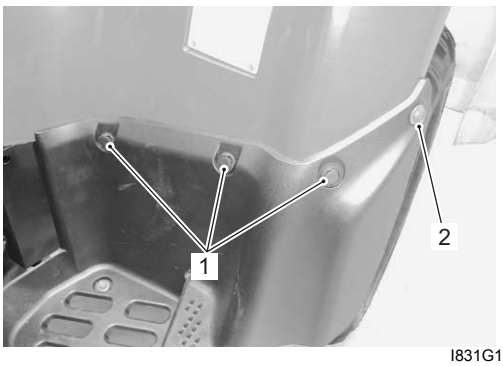
Installation
Install the fuel tank outer cover in the reverse order of removal.

Rear Fender
Removal
1) Remove the rear carrier. Refer to "Rear Carrier Removal and Installation in Section 9E (Page 9E-5)".
2) Remove the seat. Refer to "Seat Removal and Installation (Page 9D-11)".
3) Remove the side covers, left and right. Refer to "Front Side Exterior Parts Removal and Installation (Page 9D-6)".
4) Remove the engine side cover. Refer to "Rear Side Exterior Parts Removal and Installation (Page 9D-9)".

5) Remove the fasteners (1) and screws (2).



I831G1940028-01

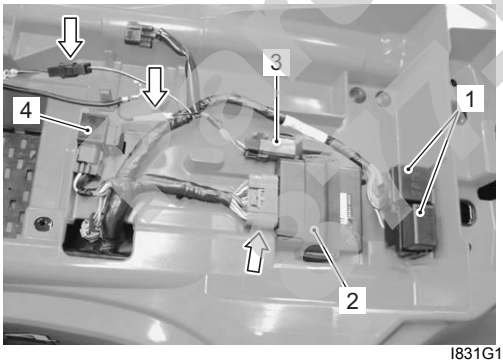


I831G1940029-01

6) Remove the battery. Refer to “Battery Removal and Installation in Section 1J (Page 1J-12)”.

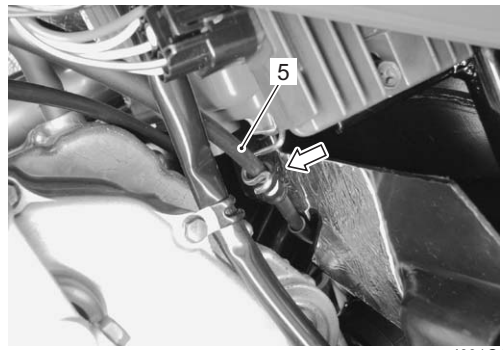
7) Remove the starter relay. Refer to “Starter Relay Removal and Installation in Section 1I (Page 1I-6)”.

8) Disconnect the couplers and remove the neutral relay/fuse box (1), ECM (2), fuel pump relay (3) and 4WD/diff-lock relay (4).



I831G1940030-01

9) Remove the parking brake cable (5) from the cable guide.



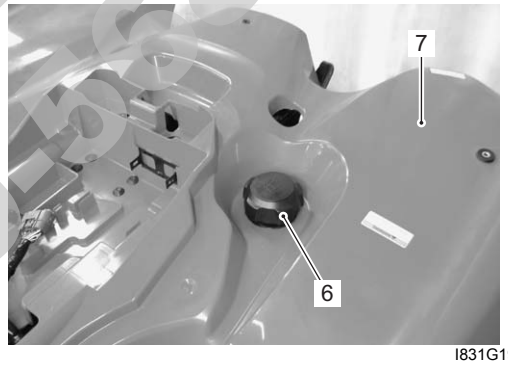
I831G1940031-01

10) Remove the fuel tank cap (6).

⚠ CAUTION

To prevent the fuel tank from contamination with foreign particles, install the fuel tank cap, after removing the rear fender.

11) Remove the rear fender (7).



I831G1940032-01

Installation

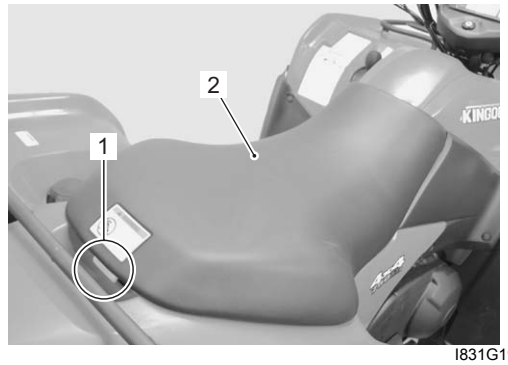
Install the rear fender in the reverse order of removal.

Seat Removal and Installation

B831G29406007

Removal

Pull the seat lock lever (1) upward, and remove the seat (2).



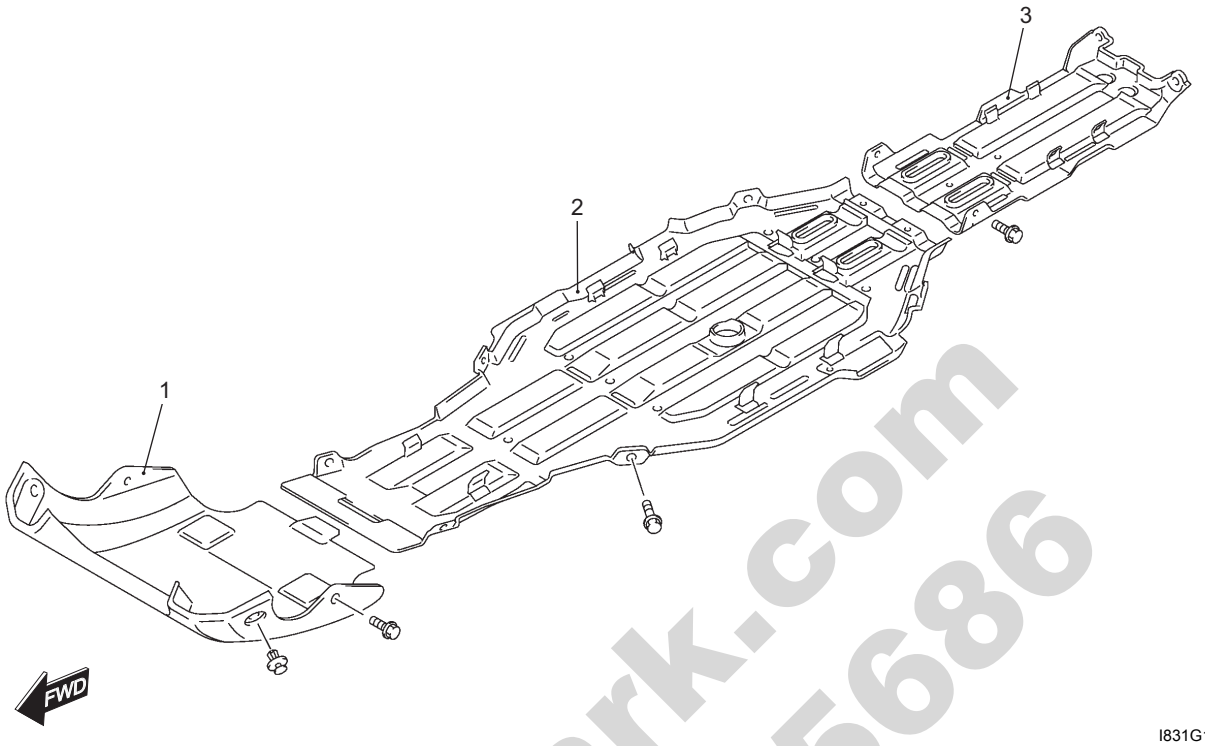
I831G1940033-01

Installation

Install the seat in the reverse order of removal.

Under Cover Components

B831G29406008



I831G1940034-02

1. Front under cover	2. Engine under cover	3. Rear under cover

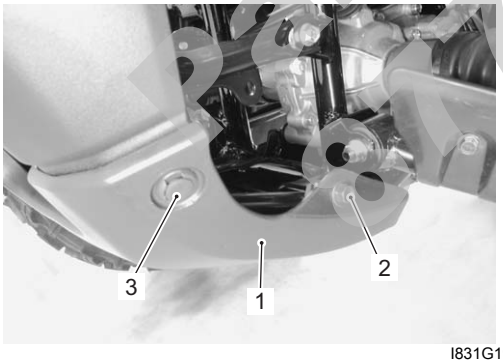
Under Cover Removal and Installation

B831G29406009

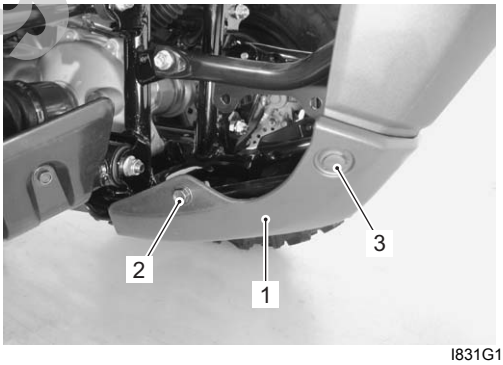
Front Under Cover

Removal

Remove the front under cover (1) by removing the bolts (2) and fasteners (3).



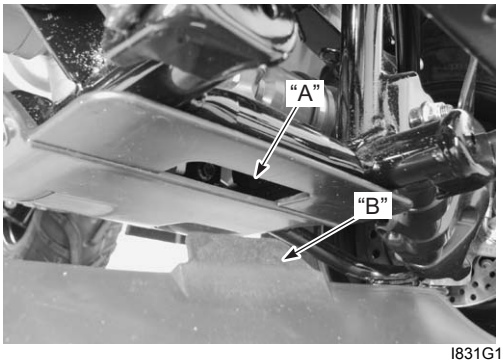
I831G1940035-02



I831G1940036-01

Installation

1) Fix the front under cover “B” to the groove “A” of engine under cover.



I831G1940037-02

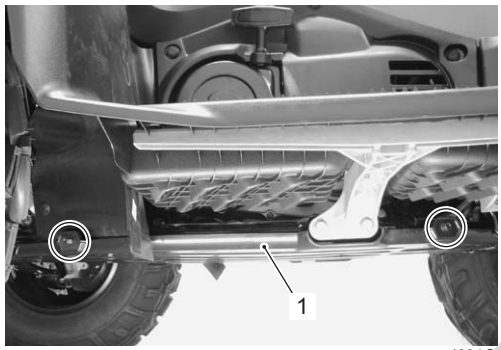
2) Install the front under cover.

Engine Under Cover

Removal

Remove the engine under cover (1).

I831G1940038-01

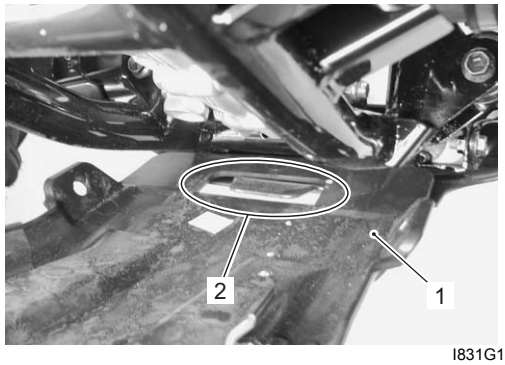


I831G1940039-01

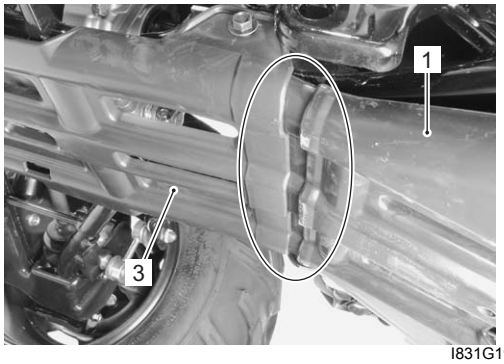
I831G1940040-01

Installation

1) Fix the engine under cover (1) with the front under cover (2) and rear under cover (3).



I831G1940041-01



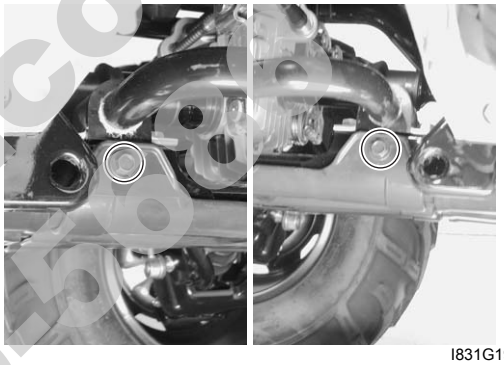
I831G1940042-01

2) Install the engine under cover.

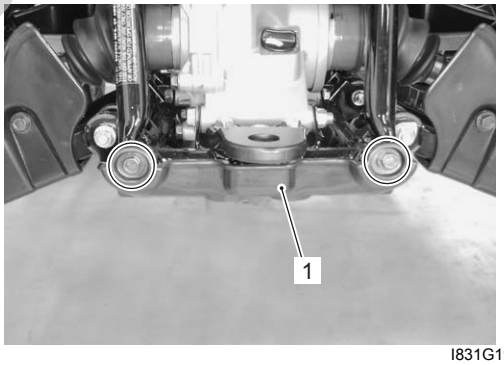
Rear Under Cover

Removal

Remove the rear under cover (1).



I831G1940043-01



I831G1940044-01

Installation

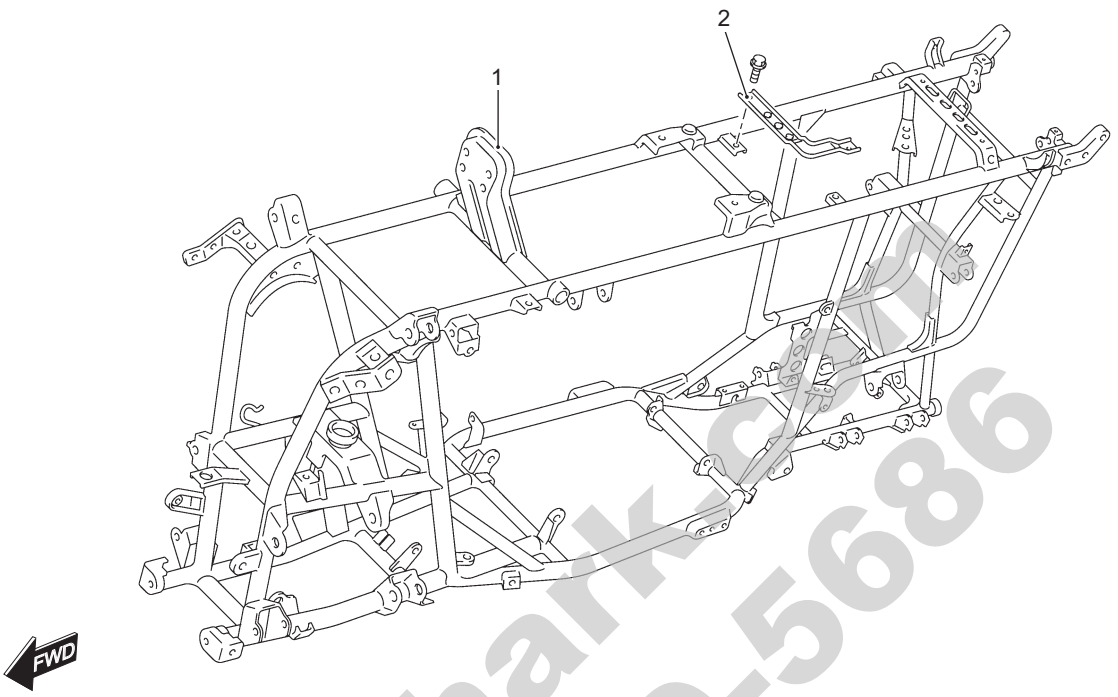
Install the rear under cover in the reverse order of removal.

Body Structure

Repair Instructions

Body Frame Construction

B831G29506001

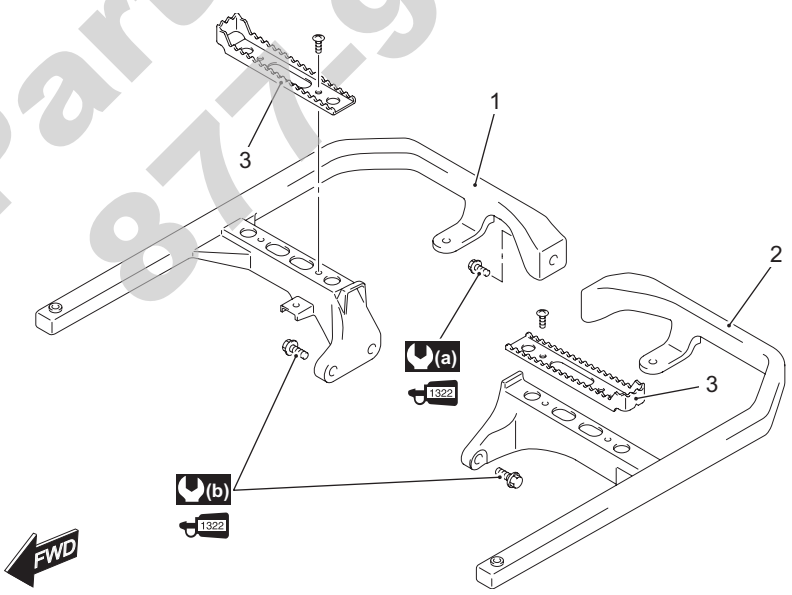


I831G1950005-06

1. Frame	2. Battery plate

Footrest Construction

B831G29506002



I831G1950001-04

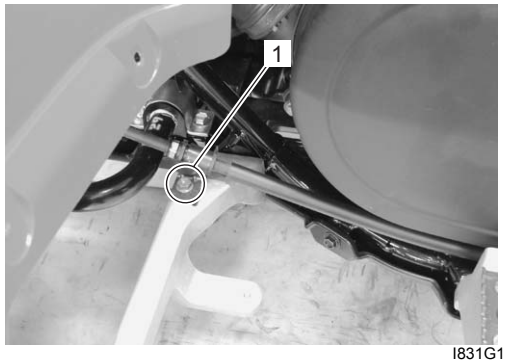
1. Footrest (R)	3. Footrest plate	(b) : 55 N·m (5.5 kgf-m, 40.0 lb-ft)
2. Footrest (L)	(a) : 26 N·m (2.6 kgf-m, 19.0 lb-ft)	1322 : Apply thread lock to the thread part.

Footrest Removal and Installation

B831G29506003

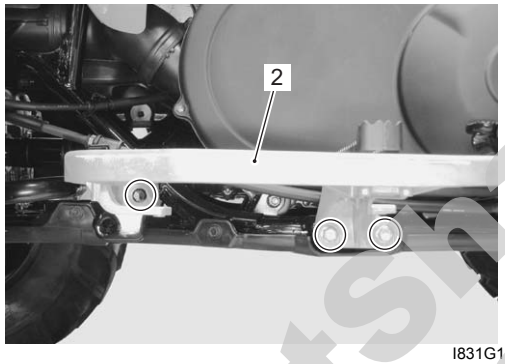
Removal

1) Remove the mud guard. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D (Page 9D-9)”.
2) Remove the rear brake cable clamp (1) (RH).



I831G1950002-01

3) Remove the footrest (2) (RH & LH).



I831G1950004-01

Installation

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

- Apply thread lock to the footrest mounting bolts and tighten them to the special torque.

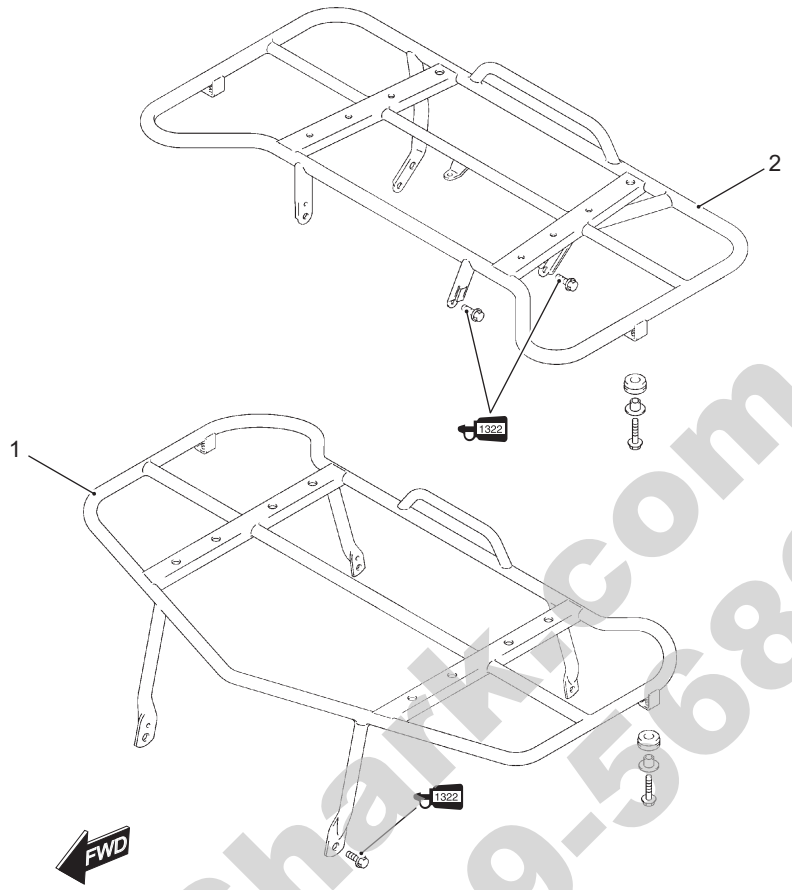
1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)

Tightening torque
Footrest mounting bolt (M8) (a): 26 N·m (2.6 kgf-m, 19.0 lb-ft)
Footrest mounting bolt (M10) (b): 55 N·m (5.5 kgf-m, 40.0 lb-ft)

I831G1950003-01

Carrier Construction

B831G29506004



I831G1950006-06

1. Front carrier	2. Rear carrier	1322 : Apply thread lock to the thread part.

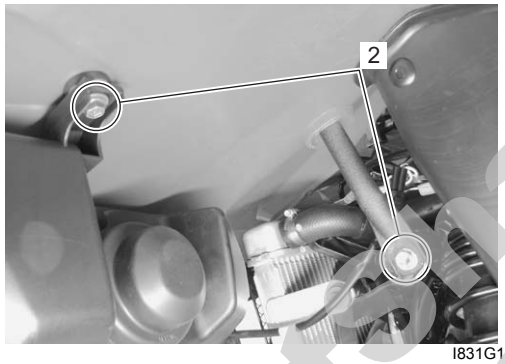
Front Carrier Removal and Installation

B831G29506005

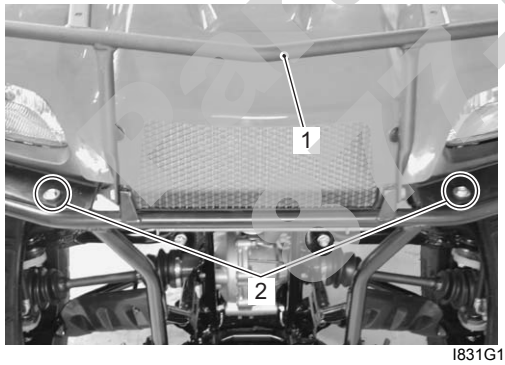
Removal

1) Remove the front grill upper cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
2) Remove the front carrier (1) by removing the bolts (2).

I831G1950007-01



I831G1950008-02



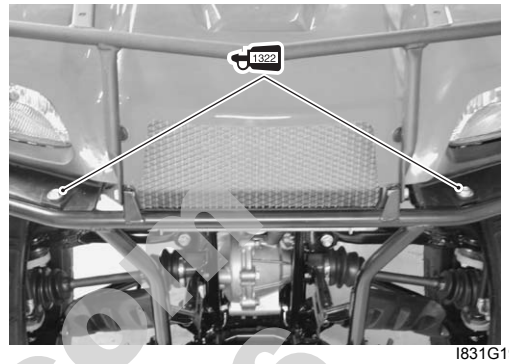
I831G1950009-01

Installation

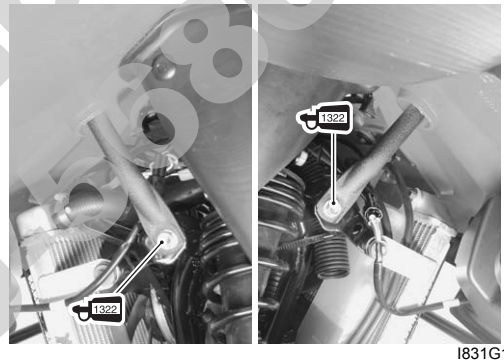
Install the front carrier in the reverse order of removal. Pay attention to the following point:

- Apply thread lock to the front carrier mounting bolts.

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



I831G1950010-01



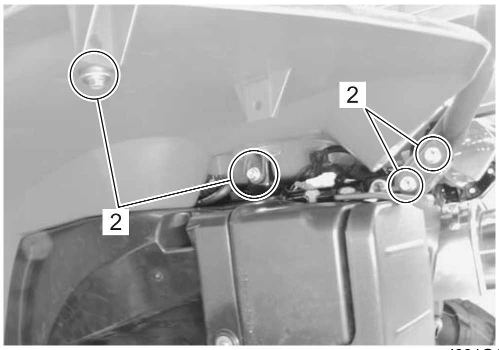
I831G1950011-01

Rear Carrier Removal and Installation

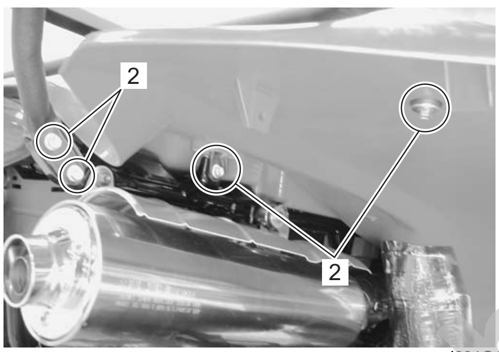
B831G29506006

Removal

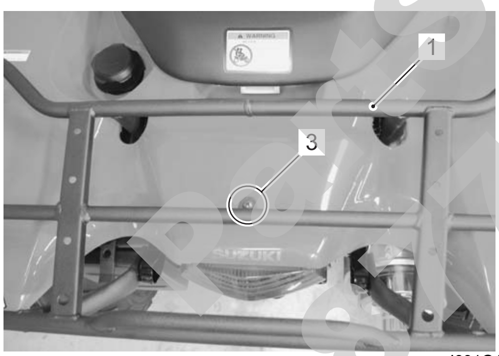
1) Remove the rear carrier (1) by removing the bolts (2) and screw (3).



I831G1950012-01



I831G1950013-01



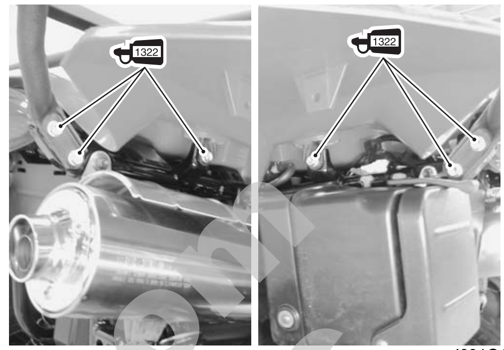
I831G1950014-01

Installation

Install the rear carrier in the reverse order of removal.
Pay attention to the following point:

- Apply thread lock to the rear carrier mounting bolts.

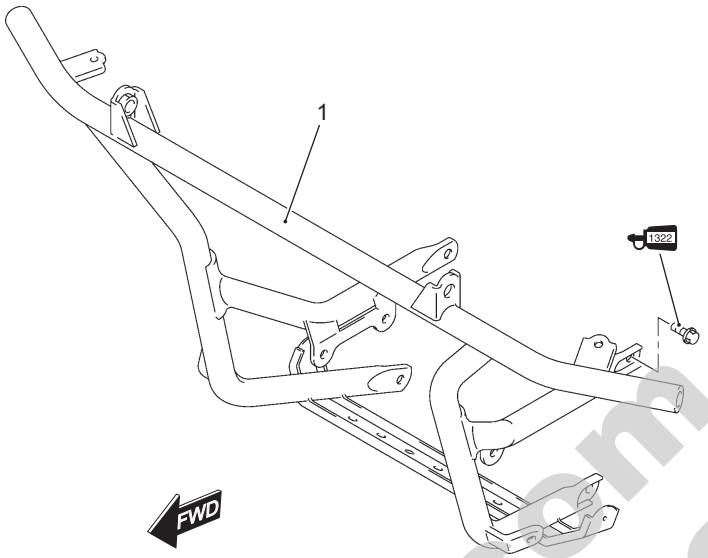
1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)



I831G1950015-01

Front Grip Bar Construction

B831G29506007



I831G1950016-01

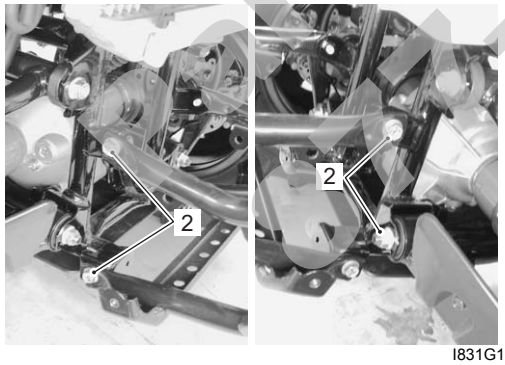
1. Front grip bar	1322 : Apply thread lock to thread part.

Front Grip Bar Removal and Installation

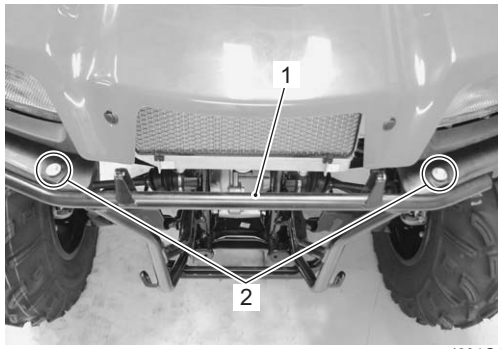
B831G29506008

Removal

1) Remove the front carrier. Refer to “Front Carrier Removal and Installation (Page 9E-4)”.
2) Remove the front cover. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D (Page 9D-6)”.
3) Remove the front grip bar (1) by removing the bolt (2).



I831G1950017-01



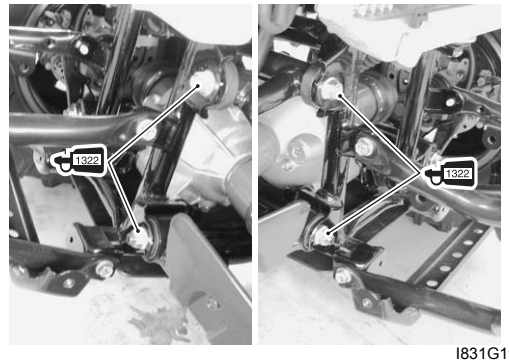
I831G1950018-01

Installation

Install the front grip bar in the reverse order of removal. Pay attention to the following point:

- Apply thread lock to the front grip bar mounting bolts.

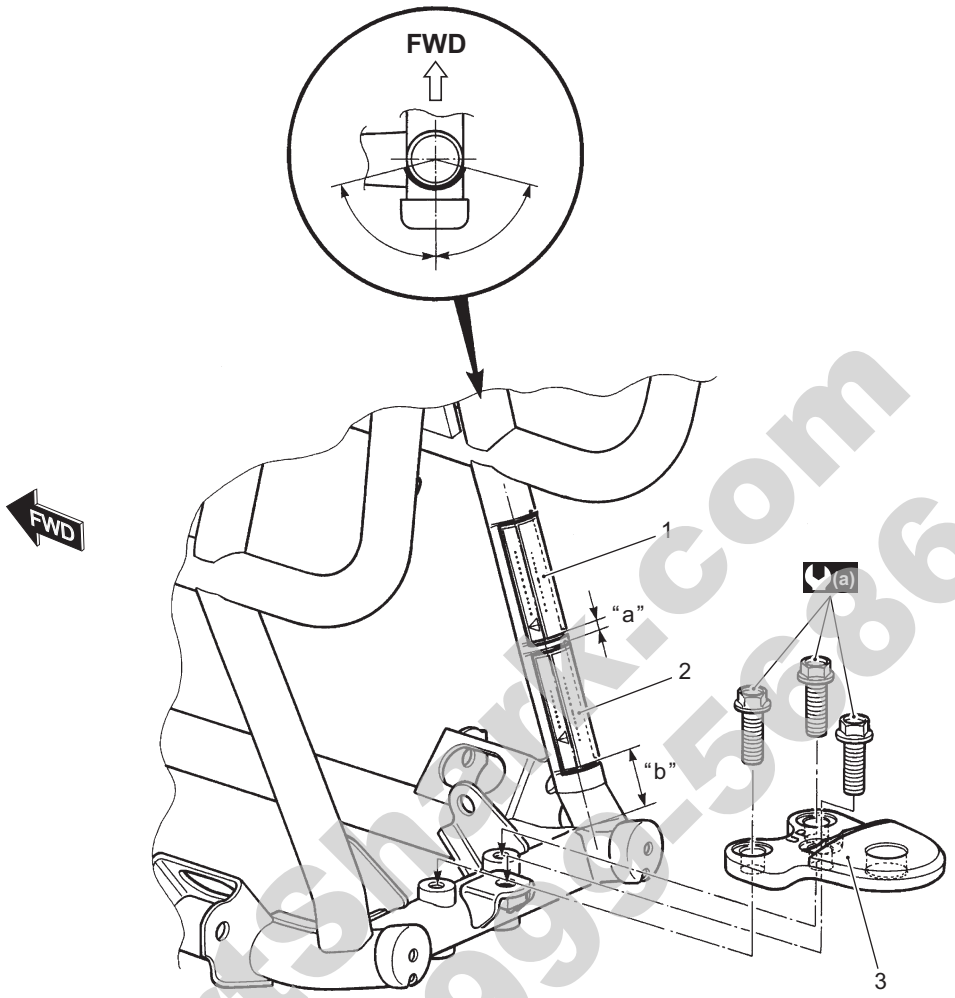
1322 : Thread lock cement 99000–32110 (THREAD LOCK CEMENT SUPER 1322 or equivalent)



I831G1950019-02

Trailer Towing Construction

B831G29506009



I831G1950020-04

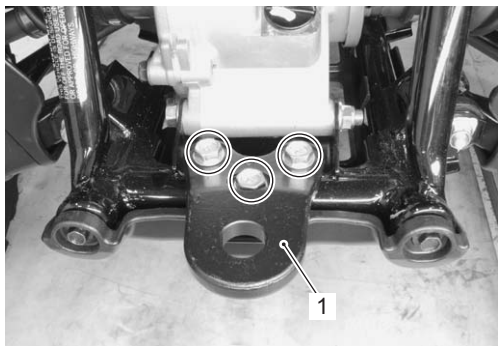
1. Trailer towing warning label (P-17, 28)	(a) : 60 N·m (6.0 kgf-m, 43.5 lb-ft)
2. Trailer towing warning label	"a": 5 mm (0.2 in)
3. Trailer towing	"b": 30 mm (1.2 in)

Trailer Towing Removal and Instruction

B831G29506010

Removal

Remove the trailer towing (1).



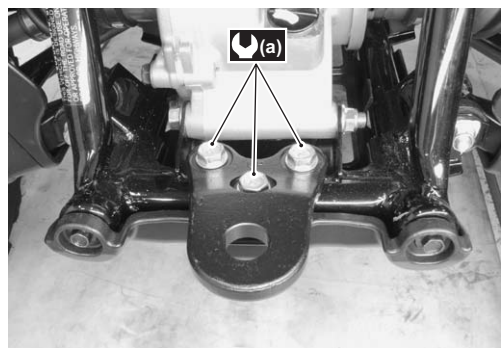
I831G1950021-01

Installation

Install the trailer towing with the trailer towing mounting bolts and then tighten them to the specified torque.

Tightening torque

Trailer towing mounting bolt (a): 60 N·m (6.0 kgf-m, 43.5 lb-ft)



I831G1950022-01

Specifications

Tightening Torque Specifications

B831G29507001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Footrest mounting bolt (M8)	26	2.6	19.0	☞(Page 9E-2)
Footrest mounting bolt (M10)	55	5.5	40.0	☞(Page 9E-2)
Trailer towing mounting bolt	60	6.0	43.5	☞(Page 9E-7)

NOTE

The specified tightening torque is also described in the following.
“Footrest Construction (Page 9E-1)”
“Trailer Towing Construction (Page 9E-7)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

B831G29508001

Material	SUZUKI recommended product or Specification		Note
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 or equivalent	P/No.: 99000–32110	☞(Page 9E-2) / ☞(Page 9E-4) / ☞(Page 9E-5) / ☞(Page 9E-6)

NOTE

Required service material is also described in the following.
“Footrest Construction (Page 9E-1)”
“Carrier Construction (Page 9E-3)”
“Front Grip Bar Construction (Page 9E-6)”

LT-A750XK9 ('09-MODEL)

10

CONTENTS

NOTE:
** Asterisk mark (*) indicates the New K9-model specification.*
** The service data is the same as the K8-model.*

SPECIFICATIONS

DIMENSIONS AND CURB MASS

Overall length	2 115 mm (83.3 in)... P-28, 33 2 135 mm (84.1 in)... P-17, 24
Overall width	1 210 mm (47.6 in)... P-28, 33 1 250 mm (49.2 in)... P-17, 24
Overall height	1 245 mm (49.0 in)
Wheelbase	1 280 mm (50.4 in)
Ground clearance	270 mm (10.6 in)
Seat height	880 mm (34.6 in)
* Curb mass	302 kg (666 lbs) .... P-28, 33 304 kg (670 lbs) P-17, 24
Front track	930 mm (36.6 in)
Rear track	940 mm (37.0 in)

ENGINE

Type	4-stroke, liquid-cooled, DOHC
Number of cylinders	1
Bore	104.0 mm (4.094 in)
Stroke	85.0 mm (3.346 in)
Displacement	722 cm^3 (44.1 cu. in)
Compression ratio	10.0 : 1
Fuel system	Fuel injection
Air cleaner	Non-woven fabric element
Starter system	Electric and recoil starter
Lubrication system	Wet sump
Idle speed	1 300 ± 100 r/min

DRIVE TRAIN

Clutch		Wet shoe, automatic, centrifugal type
Transmission		Automatic variable ratio (V-belt)
Transfer		2-speed forward with reverse
Gearshift pattern,	Transmission	Automatic
	Transfer	L-H-N-R (Hand operated)
Primary reduction ratio (Automatic drive)		2.763 – 0.78 (Variable change)
Secondary reduction ratio		1.904 (40/21)
Final reduction ratio (Front & Rear)		3.600 (36/10)
Transfer gear ratio,	Low	2.562 (41/16)
	High	1.240 (31/25)
	Reverse	1.884 (32/17)
Drive system		Shaft drive

CHASSIS

Front suspension	Independent, double wishbone, coil spring, oil damped
Rear suspension	Independent, double wishbone, coil spring, oil damped
Front wheel travel	180 mm (7.1 in)
Rear wheel travel	200 mm (7.9 in)
Caster	1.6°
Trail	3.4 mm (0.13 in)
Toe-out	10 mm (0.39 in)
Camber	0.64°
Steering angel	46° (right & left)
Turning radius	3.1 m (10.2 ft)
Front brake	Disc brake, twin
Rear brake	Sealed oil-bathed multi-disc
Front tire	AT25 x 8-12☆☆, tubeless
Rear tire	AT25 x 10-12☆☆, tubeless

ELECTRICAL

Ignition type	Electronic ignition (CDI)
Ignition timing	7° B.T.D.C. at 1 300 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 35/35 W × 2
AUX lamp	12 V 35/35 W
Brake light/Taillight	12 V 21/5 W
Reverseing light	12 V 21 W P-17
Speedometer light	LED
Neutral indicator light	LED
High beam indicator light	LED ...P-17
Coolant temperature/FI indicator light	LED
Reverse indicator light	LED
Difflock indicator light	LED

CAPACITIES

Fuel tank		17.5 L (4.6/3.8 US/Imp gal)
Engine oil,	oil change	2 300 ml (2.4/2.0 US/Imp qt)
	With filter change	2 500 ml (2.6/2.2 US/Imp qt)
	Overhaul	3 000 ml (3.2/2.6 US/Imp qt)
Differential gear oil		500 ml (16.9/17.6 US/Imp oz)
Final gear oil		770 ml (26.0/27.1 US/Imp oz)
Coolant		2.5 L (2.6/2.2 US/Imp qt)

LT-A750XPK9 ('09-MODEL)

This chapter describes service data, service specifications and servicing procedures which differ from those of the LT-A750X/ZK9.

11

FOREWORD

This SUPPLEMENTARY SERVICE MANUAL is a supplement to SUZUKI LT-A750X/Z SERVICE MANUAL.
It has been prepared exclusively for the following applicable model.

Applicable model:
LT-A750XP/ZK9

This supplementary service manual describes only service information which differ from that of the main manual. Therefore, whenever servicing the above applicable model, consult this supplement first. And for any section, item or description not found in this supplement, refer to the main manual below.

Main Manual:

Manual Name	Manual No.
LT-A750X/ZK9 SERVICE MANUAL	99500-47021-03E

Other information considered as generally known is not included.
Read the GENERAL INFORMATION section to familiarize yourself with the vehicle 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 vehicle 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 vehicle.*
- ** Illustrations in this manual are used to show the basic principles of operation and work procedures. They may not represent the actual vehicle exactly in detail.*
- ** This manual is written for persons who have enough knowledge, skills and tools, including special tools, for servicing SUZUKI vehicles. 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 vehicle unsafe for the rider.

SUZUKI MOTOR CORPORATION

TABLE OF CONTENTS

NOTE

For the screen toned sections with asterisk (*) in the “TABLE OF CONTENTS” below, refer to the same sections of the service manual mentioned in the “FOREWORD” of this manual.

Section 00

Precautions

CONTENTS

NOTE

For the items with asterisk (*) in the "CONTENTS" below, refer to the same section of the service manual mentioned in the "FOREWORD" of this manual.

Precautions

Precautions

Precautions for EPS (LT-A750XP/ZK9)

B931G40000004

EPS Wiring

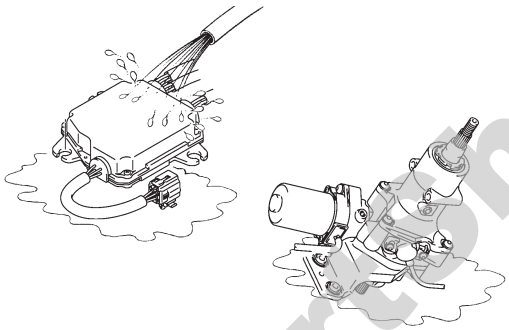
- The EPS parts are connected to various lead wires. The coupler and lead wire connections, as well as the lead wire and wire harness routings must be done correctly. Make sure that the proper clamps are used and positioned correctly.

NOTE

If all of the connections are not properly connected, the EPS may not operate correctly. For connector and coupler precautions. Refer to "Precautions for Electrical Circuit Service in related manual".

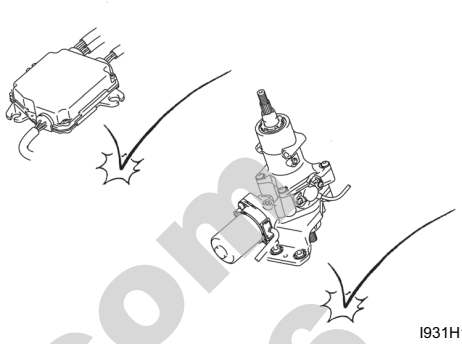
EPS Control Unit / EPS Body Assembly

- Never allow dust or water to contact the EPS control unit and EPS body assembly.



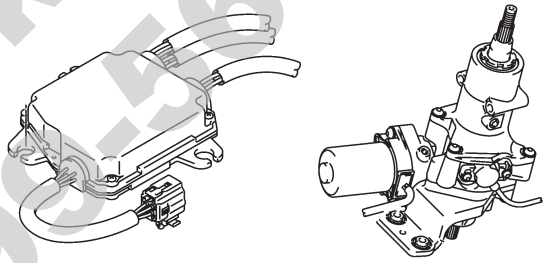
I931H1000004-01

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



I931H1000003-02

- The EPS control unit and EPS body assembly cannot be disassembled. Replace the whole unit with a new one.



I931H1000005-01

Section 0

General Information

0

CONTENTS

NOTE

For the items with asterisk (*) in the "CONTENTS" below, refer to the same section of the service manual mentioned in the "FOREWORD" of this manual.

General Information

General Description

Abbreviations (LT-A750XP/ZK9)

B931G40101012

NOTE

Please refer to the LT-A750XK9 ('09-model) service manual for other abbreviations which are not given in this manual.

E:
EPS: Electronic Power Steering

Vehicle Side View (LT-A750XP/ZK9)

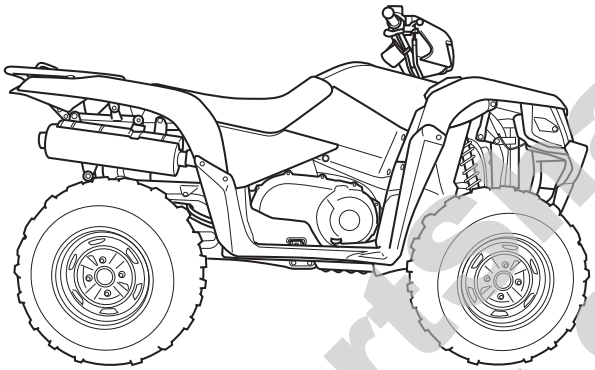
B931G40101013

NOTE

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

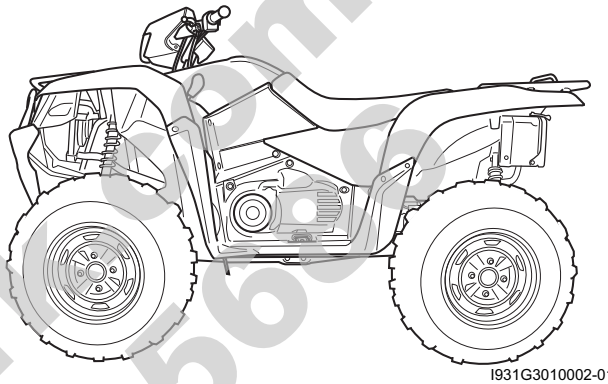
SUZUKI LT-A750XP (2009-model)

Right Side



I931G3010001-01

Left Side



I931G3010002-01

Country and Area Codes (LT-A750XP/ZK9)

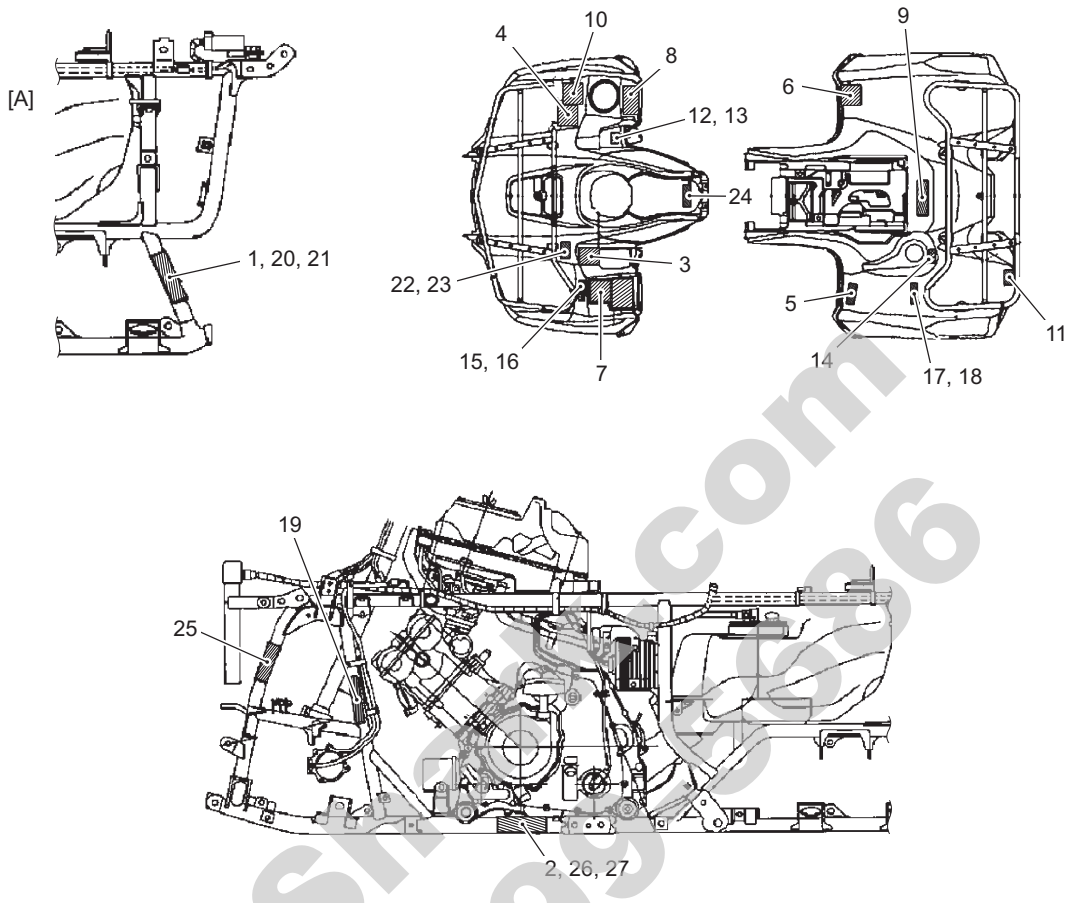
B931G40101014

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

Code	Country or Area	Effective Frame No.
LT-A750XPK9 (P-17)	Sweden	5SAAR41P97100001 –
LT-A750XPK9 (P-24)	Australia	
LT-A750XPK9 (P-28)	Canada	
LT-A750XPK9 (P-33)	U.S.A.	
LT-A750XPZK9 (P-17)	Sweden	
LT-A750XPZK9 (P-24)	Australia	
LT-A750XPZK9 (P-28)	Canada	
LT-A750XPZK9 (P-33)	U.S.A.	

Warning, Caution and Information Labels Location (LT-A750XP/ZK9)

B931G40101015



I931H1010010-03

1. Certification plate (English)	For P-24, 33	15. Front carrier warning label (English)	For P-24, 33
2. Information label (English)	For P-33	16. Front carrier warning label (English/French)	For P-17, 28
3. Gearshift label (English)	For P-17, 24, 28, 33	17. Rear carrier warning label (English)	For P-24, 33
4. Gearshift label (French)	For P-28	18. Rear carrier warning label (English/French)	For P-17, 28
5. Tire air pressure label (English)	For P-17, 24, 28, 33	19. ICES Canada label (English/French)	For P-28
6. Tire air pressure label and warning no-passenger label (French)	For P-28	20. Compliance label (English)	For P-28
7. General warning & AGE, 16 label (English)	For P-17, 24, 28, 33	21. I.D. plate (English)	For P-17
8. General warning label (French)	For P-28	22. Cooling fan label (English)	For P-24, 33
9. Warning no-passenger label (English)	For P-17, 24, 28, 33	23. Cooling fan label (English/French)	For P-17, 28
10. AGE, 16 label (French)	For P-28	24. Compliance label (English/French)	For P-28
11. Manual notice label (English)	For P-33	25. ANSI certification label (Right side of frame)	For P-33
12. Max AMP caution label (English)	For P-24, 33	26. Information label (English)	For P-28
13. Max AMP caution label (English/French)	For P-17, 28	27. Information label (French) (Right side of frame)	For P-28
14. Fuel caution label (English)	For P-24	[A]: Left side of frame	

Specifications

Specifications (LT-A750XP/ZK9)

B931G40107003

NOTE

These specifications are subject to change without notice.

Dimensions and curb mass

Item	Specification	Remark
Overall length	2 115 mm (83.3 in)	P-28, 33
	2 165 mm (85.2 in)	P-17, 24
Overall width	1 210 mm (47.6 in)	P-28, 33
	1 250 mm (49.2 in)	P-17, 24
Overall height	1 285 mm (50.6 in)	
Wheelbase	1 285 mm (50.6 in)	
Ground clearance	260 mm (10.2 in)	
Seat height	920 mm (36.2 in)	
Curb mass	305 kg (672 lbs)	P-28, 33
	307 kg (677 lbs)	P-17, 24
Front track	940 mm (37.0 in)	
Rear track	920 mm (36.2 in)	

Engine

Item	Specification	Remark
Type	4-stroke, liquid-cooled, DOHC	
Number of cylinders	1	
Bore	104.0 mm (4.094 in)	
Stroke	85.0 mm (3.346 in)	
Displacement	722 cm^3 (44.1 cu. in)	
Compression ratio	10.0 : 1	
Fuel system	Fuel injection	
Air cleaner	Paper element	
Starter system	Electric starter	
Lubrication system	Wet sump	
Idle speed	1 300 ± 100 r/min	

Drive train

Item		Specification	Remark
Clutch		Wet shoe, automatic, centrifugal type	
Transmission		CVT (V-belt)	
Transfer		2-speed forward with reverse	
Gearshift pattern	Transmission	Automatic	
	Transfer	L-H-N-R (Hand operated)	
Automatic transmission ratio		Variable change (2.763 – 0.78)	
Secondary reduction ratio		2.158 (40/21 x 17/15)	
Final reduction ratio (Front & Rear)		3.600 (36/10)	
Transfer gear ratio	Low	2.562 (41/16)	
	High	1.240 (31/25)	
	Reverse	1.882 (32/17)	
Drive system		Shaft drive	

Chassis

Item	Specification	Remark
Front suspension	Independent, double wishbone, coil spring, oil damped	
Rear suspension	Independent, double wishbone, coil spring, oil damped	
Front wheel travel	170.5 mm (6.7 in)	
Rear wheel travel	195 mm (7.7 in)	
Caster	3.3°	
Trail	16.7 mm (0.66 in)	
Toe-out	5 mm (0.20 in)	
Camber	–1.3°	
Steering angle	46° (right & left)	
Turning radius	3.1 m (10.2 ft)	
Front brake	Disc brake, twin	
Rear brake	Sealed oil-bathed multi-disc	
Front tire size	AT25 x 8-12☆☆, tubeless	
Rear tire size	AT25 x 10-12☆☆, tubeless	

Electrical

Item	Specification	Remark
Ignition type	Electronic ignition (CDI)	
Ignition timing	7° B.T.D.C. at 1 300 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	
EPS fuse	40 A	
Headlight	12 V 35/35 W x 2	
Auxiliary light	12 V 35/35 W	
Brake light/Taillight	12 V 21/5 W	
Reversing light	12 V 21 W	P-17
Speedometer light	LED	
Neutral indicator light	LED	
High beam indicator light	LED	P-17
Coolant temperature/FI indicator light	LED	
Reverse indicator light	LED	
Diff-lock indicator light	LED	
EPS indicator light	LED	

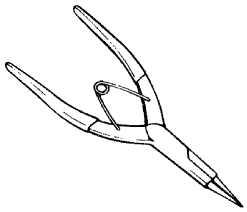
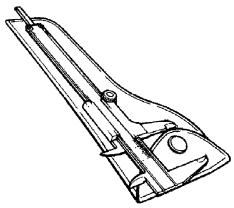
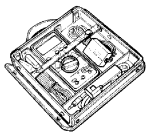
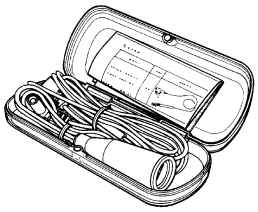
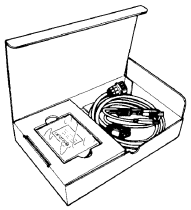
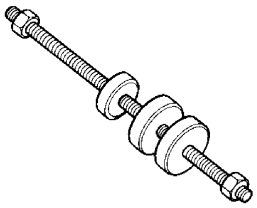
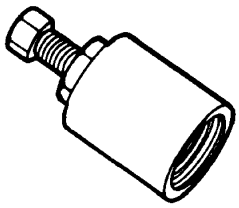
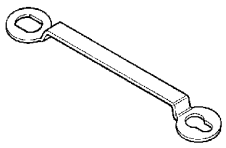
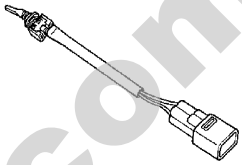
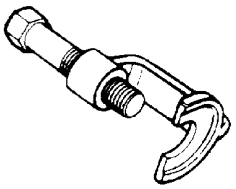
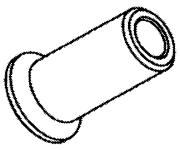
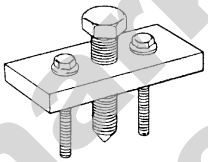
Capacities

Item		Specification	Remark
Fuel tank		17.5 L (4.6/3.8 US/Imp gal)	
Engine oil	Oil change	2 300 ml (2.4/2.0 US/Imp qt)	
	With filter change	2 500 ml (2.6/2.2 US/Imp qt)	
	Overhaul	3 000 ml (3.2/2.6 US/Imp qt)	
Differential gear oil		500 ml (16.9/17.6 US/Imp oz)	
Final gear oil		770 ml (26.0/27.1 US/Imp oz)	
Coolant		2.5 L (2.6/2.2 US/Imp qt)	

Special Tools and Equipment

Special Tool

B931G40108002

 **09900–06107** Snap ring remover (Open type)	 **09900–20102** Vernier calipers (200 mm)	 **09900–25008** Multi circuit tester set	 **09900–25009** Needle-point probe set	 **09904–41010** SUZUKI Diagnostic system set
 **09924–84521** Bearing installer set	 **09930–30721** Rotor remover	 **09930–44530** Rotor holder	 **09930–82710** Mode select switch	 **09930–82720** Mode selection switch
 **09942–72410** Tie-rod end remover	 **09942–83110** Clip remover	 **09944–36011** Steering wheel remover	 **99565–01010–020** CD-ROM Ver.20	

Maintenance and Lubrication

Repair Instructions

Air Cleaner Element Inspection and Cleaning (LT-A750XP/ZK9)

B931G40206030

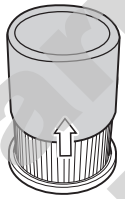
Clean element
Every 1 000 km (600 miles, 3 months)

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

⚠ CAUTION

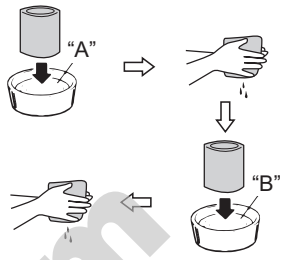
- **If driving under dusty conditions, clean the air cleaner element more frequently. The surest way to accelerate engine wear is to operate the engine without the element or to use a torn element. Make sure that the air cleaner is in good condition at all times. Life of the engine depends largely on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

1) Remove the air cleaner element. Refer to "Air Cleaner Element Removal and Installation in Section 1D in related manual".
2) Separate the polyurethane from element.



I831G1020002-01

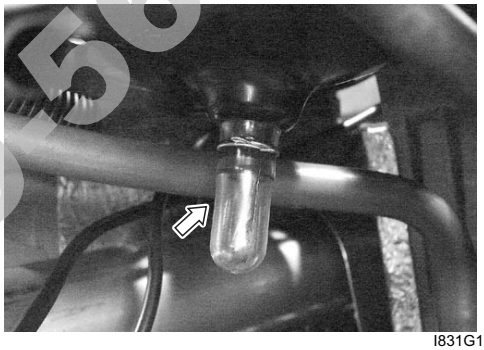
3) Fill a wash pan of a proper size with a non-flammable cleaning solvent. Immerse the air cleaner element in the cleaning solvent and wash it.
4) Press the air cleaner element between the palms of both hands to remove the excess solvent: do not twist or wring the element or it will tear.
5) Immerse the element in motor oil, and then squeeze out the excess oil leaving the element slightly wet.



I931G3020009-01

"A":	Non-flammable cleaning solvent
"B":	Motor oil SAE #30 or SAE 10W-40

6) After cleaning the air cleaner element, reinstall the removed parts.
7) Drain water from the air cleaner box by removing the drain plug.



I831G1020004-01

8) Reinstall the drain plug.

Steering System Inspection (LT-A750XP/ZK9)

B931G40206031

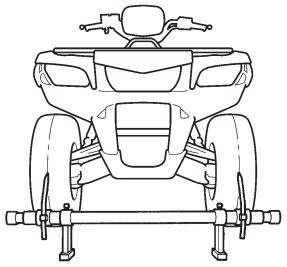
Inspect steering system
Initially at 200 km (100 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter

Steering should be adjusted properly for smooth turning of handlebars and safe running.

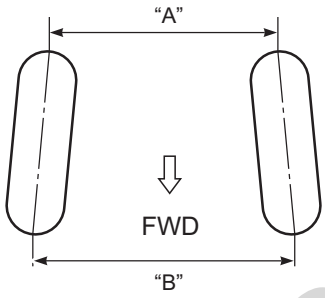
1) Place the vehicle on level ground.
2) Make sure the tire pressure for right and left tires in the same and set to the proper specification.
3) Set the front wheels in the straight position.
4) Place a load of 75 kg (165 lbs) on the seat.

5) Measure the distances (“A” and “B”) between the front wheels. Subtract the measurement of “A” from that of “B” to find the toe-out. If the toe-out is not within specification, adjust the tie-rod to the right or left until the toe-out is within the specified range.

Toe-out (“B” – “A”)
Standard: 5 ± 4 mm (0.20 ± 0.16 in)



I931H1020057-01



I831G1020059-04

If the toe-out is out of specification, bring it into the specified range. Refer to “Toe Adjustment (LT-A750XP/ZK9) (Page 0B-2)”.

Toe Adjustment (LT-A750XP/ZK9)

B931G40206032

Adjust the toe-out as follows:

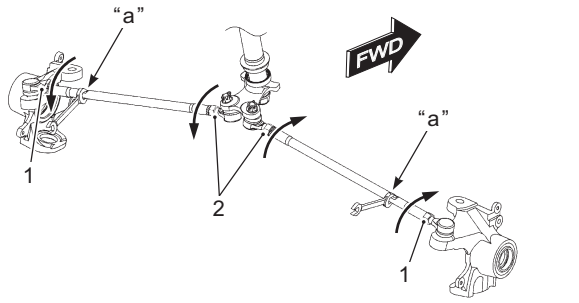
1) Loosen the lock-nuts (1), (2) on each tie-rod.

⚠ CAUTION

- **The lock-nuts (2) have left-hand threads.**
- **When loosening and tightening the lock-nuts, hold the tie-rod end with a open end wrench.**

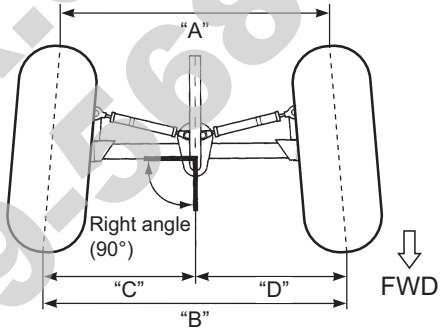
NOTE

Hold the concave part “a” of tie-rod with a wrench.



I931H1020079-02

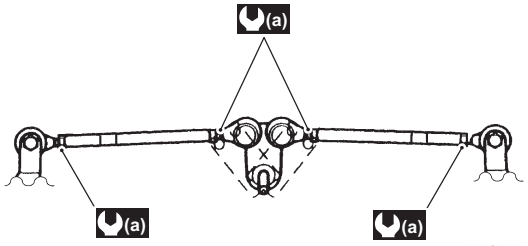
2) Temporarily tighten the four lock-nuts.
3) Check that the distances “C” and “D” are equal, as shown. If the distances are not equal, adjust the tie-rod to the right or left until the toe-out is within specification. Check the toe-out again by measuring distances “A” and “B”.
4) If the toe-out is not within specification, repeat the adjustment as above until the proper toe-out is obtained and distances “C” and “D” become equal.



I831G1020088-04

5) After adjustment has been made, tighten the four lock-nuts to the specified torque.

Tightening torque
Tie-rod lock-nut (a): 29 N·m (2.9 kgf-m, 21.0 lbf-ft)



I831G1020089-01

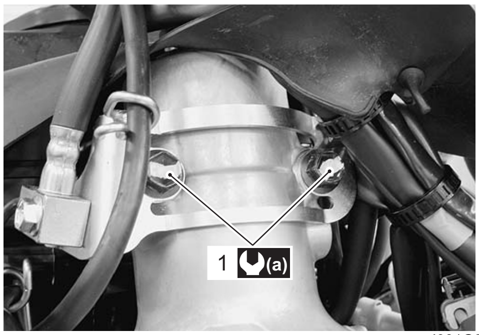
Chassis Bolt and Nut Inspection (LT-A750XP/ ZK9)

B931G40206033

<u>Tighten chassis bolt and nut</u>

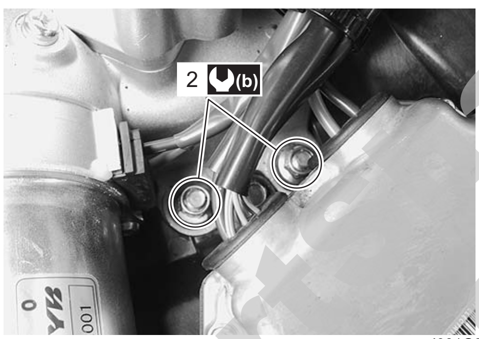
Initially at 200 km (100 miles, 1 month) and every 1 000 km (600 miles, 3 months) thereafter

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



I931G3020001-01

1	(a)	EPS body assembly mounting bolt (Upper) 26 N·m (2.6 kgf-m, 19.0 lbf-ft)

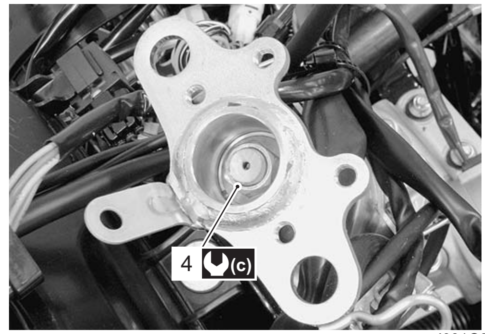


I931G3020002-01

2	(b)	EPS body assembly mounting nut (Lower) 28 N·m (2.8 kgf-m, 20.0 lbf-ft)

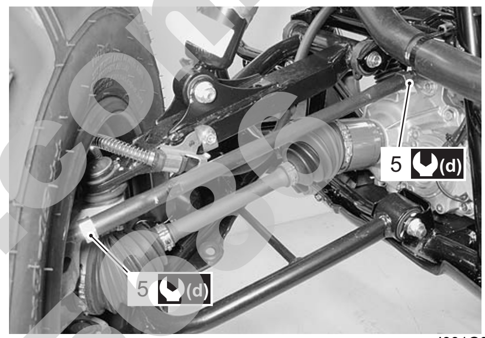
I931G3020003-01

3	(a)	Steering shaft bolt 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



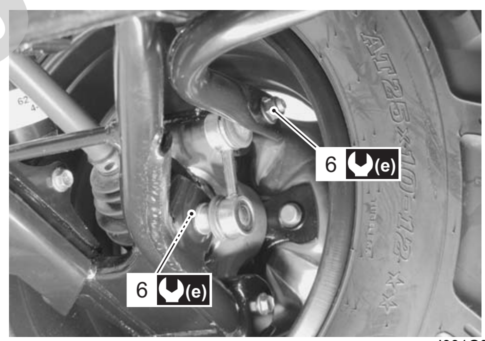
I931G3020004-02

4	(c)	Steering shaft upper nut 120 N·m (12.0 kgf-m, 87.0 lbf-ft)



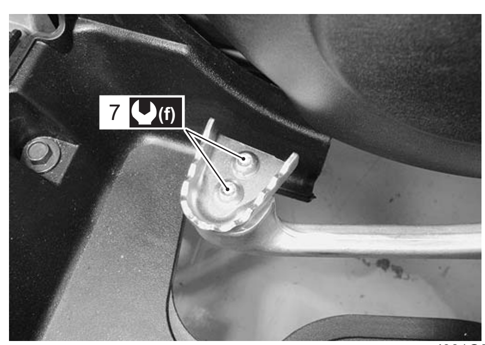
I931G3020005-02

5	(d)	Tie-rod lock-nut 29 N·m (2.9 kgf-m, 21.0 lbf-ft)



I931G3020007-02

6	(e)	Rear stabilizer joint nut 60 N·m (6.0 kgf-m, 43.5 lbf-ft)



I931G3020008-01

7	(f)	Rear brake pedal screw 4.5 N·m (0.45 kgf-m, 3.0 lbf-ft)

Specifications

Tightening Torque Specifications

B931G40207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Tie-rod lock-nut	29	2.9	21.0	☞(Page 0B-2)

NOTE

The specified tightening torque is described in the following.
“Chassis Bolt and Nut Inspection (LT-A750XP/ZK9) (Page 0B-3)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List (LT-A750XP/ZK9) in Section 0C (Page 0C-7)”.

Service Data

Specifications

Service Data (LT-A750XP/ZK9)

B931G40307003

Valve + Valve Guide

Unit: mm (in)

Item	Standard		Limit
Valve diam.	IN.	36.0 (1.42)	—
	EX.	33.0 (1.30)	—
Tappet clearance (When cold)	IN.	0.10 – 0.20 (0.004 – 0.008)	—
	EX.	0.20 – 0.30 (0.008 – 0.012)	—
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 seat width	IN. & EX.	0.9 – 1.1 (0.035 – 0.043)	—
Valve head radial runout	IN. & EX.	—	0.03 (0.001)
Valve spring free length	IN. & EX.	—	46.1 (1.81)
Valve spring tension	IN. & EX.	182 – 210 N (18.6 – 21.4 kgf, 41.0 – 47.2 lbs) at length 36.35 mm (1.43 in)	—

Camshaft + Cylinder Head

Unit: mm (in)

Item	Standard		Limit
Cam height	IN.	36.330 – 36.380 (1.4303 – 1.4323)	36.030 (1.4185)
	EX.	35.300 – 35.350 (1.3898 – 1.3917)	35.000 (1.3780)
Camshaft journal oil clearance	IN. & EX.	0.019 – 0.053 (0.0007 – 0.0021)	0.150 (0.0059)
Camshaft journal holder I.D.	IN. & EX.	22.012 – 22.025 (0.8666 – 0.8671)	—
Camshaft journal O.D.	IN. & EX.	21.972 – 21.993 (0.8650 – 0.8659)	—
Camshaft runout	IN. & EX.	—	0.10 (0.004)
Cylinder head distortion	—		0.05 (0.002)
Cam drive idle gear/sprocket thrust clearance	0.15 – 0.27 (0.006 – 0.011)		—

Cylinder + Piston + Piston Ring

Unit: mm (in)

Item	Standard			Limit
Compression pressure (Automatic-decomp. actuated)	Approx. 1 000 kPa (10.0 kgf/cm^2, 142 psi)			—
Piston-to-cylinder clearance	0.030 – 0.040 (0.0012 – 0.0016)			0.120 (0.0047)
Cylinder bore	104.000 – 104.015 (4.0945 – 4.0951)			Nicks or Scratches
Piston diam.	103.965 – 103.980 (4.0931 – 4.0937) Measure at 15 mm (0.6 in) from the skirt end.			103.880 (4.0898)
Cylinder distortion	—			0.05 (0.002)
Piston ring free end gap	1st	R	Approx. 13.1 (0.52)	10.5 (0.41)
	2nd	RN	Approx. 14.6 (0.57)	11.7 (0.46)
Piston ring end gap	1st	R	0.10 – 0.25 (0.004 – 0.010)	0.50 (0.020)
	2nd	RN	0.10 – 0.25 (0.004 – 0.010)	0.50 (0.020)
Piston ring-to-groove clearance	1st		—	0.180 (0.0071)
	2nd		—	0.150 (0.0059)
Piston ring groove width	1st		0.83 – 0.85 (0.0327 – 0.0335) 1.30 – 1.32 (0.0512 – 0.0520)	—
	2nd		1.01 – 1.03 (0.0398 – 0.0406)	—
	Oil		2.01 – 2.03 (0.0791 – 0.0799)	—
Piston ring thickness	1st		0.76 – 0.81 (0.0299 – 0.0319)	—
			1.08 – 1.10 (0.0425 – 0.0433)	—
	2nd		0.97 – 0.99 (0.0382 – 0.0390)	—
Piston pin bore I.D.	23.002 – 23.008 (0.9056 – 0.9058)			23.030 (0.9067)
Piston pin O.D.	22.992 – 23.000 (0.9052 – 0.9055)			22.980 (0.9047)

Conrod + Crankshaft

Unit: mm (in)

Item	Standard	Limit
Conrod small end I.D.	23.006 – 23.014 (0.9057 – 0.9061)	23.040 (0.9071)
Conrod deflection	—	3.0 (0.12)
Conrod big end side clearance	0.10 – 0.75 (0.004 – 0.030)	1.0 (0.04)
Conrod big end width	24.95 – 25.00 (0.982 – 0.984)	—
Crank web to web width	72.9 – 73.1 (2.87 – 2.88)	—
Crankshaft runout	—	0.08 (0.003)

Oil Pump

Item	Standard	Limit
Oil pressure (at 60 °C, 140 °F)	140 – 180 kPa (1.4 – 1.8 kgf/cm^2, 20 – 26 psi) at 3 000 r/min	—

Clutch

Unit: mm (in)

Item	Standard	Limit
Clutch wheel I.D.	140.0 – 140.2 (5.512 – 5.520)	140.5 (5.53)
Clutch shoe	—	No groove at any part
Clutch engagement r/min	1 500 – 2 000 r/min	—
Clutch lock-up r/min	3 500 – 4 000 r/min	—

Drive Train

Unit: mm (in) Except ratio

Item		Standard	Limit
Automatic transmission ratio		Variable change (2.763 – 0.780)	—
Secondary reduction ratio		2.158 (40/21 x 17/15)	—
Final reduction ratio	Front	3.600 (36/10)	—
	Rear	3.600 (36/10)	—
Transfer gear ratio	Low	2.562 (41/16)	—
	High	1.240 (31/25)	—
	Reverse	1.882 (32/17)	—
Drive V-belt width		34.3 (1.35)	33.3 (1.31)
Movable driven face spring free length		160.0 (6.30)	152.0 (6.00)
Shift fork to groove clearance	Low	0.10 – 0.30 (0.0040 – 0.0120)	0.50 (0.020)
	High	0.10 – 0.30 (0.0040 – 0.0120)	0.50 (0.020)
	Reverse	0.10 – 0.30 (0.0040 – 0.0120)	0.50 (0.020)
Shift fork groove width	Low	5.50 – 5.60 (0.217 – 0.220)	—
	High	5.50 – 5.60 (0.217 – 0.220)	—
	Reverse	5.50 – 5.60 (0.217 – 0.220)	—
Shift fork thickness	Low	5.30 – 5.40 (0.209 – 0.213)	—
	High	5.30 – 5.40 (0.209 – 0.213)	—
	Reverse	5.30 – 5.40 (0.209 – 0.213)	—
Front/Rear output shaft bevel gear backlash		0.03 – 0.15 (0.001 – 0.006)	—
Front drive (differential) gear backlash		0.05 – 0.10 (0.002 – 0.004)	—
Rear drive (final) gear backlash	Without gear cover specification	0.02 – 0.06 (0.0008 – 0.0024)	—
	Gear cover assembled specification	0.08 – 0.15 (0.0031 – 0.0059)	—
Front differential gear oil type		Hypoid gear oil SAE #90, API grade GL-5	—
Rear drive gear oil type		Mobil 424 or equivalent gear oil	—
Front differential gear oil capacity		500 ml (16.9/17.6 US/Imp oz)	—
Final gear oil capacity		770 ml (26.0/27.1 US/Imp oz)	—

Thermostat + Radiator + Fan + Coolant

Item		Standard	Note
Thermostat valve opening temperature		Approx. 82 °C (180 °F)	
Thermostat valve lift		8 mm (0.31 in) and over at 95 °C (203 °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		110 – 140 kPa (1.1 – 1.4 kgf/cm^2, 15.6 – 19.9 psi)	
Cooling fan thermo-switch operating temperature	OFF → ON	Approx. 93 °C (199 °F)	
	ON → OFF	Approx. 87 °C (189 °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	Approx. 250 ml (0.26/0.22 US/Imp qt)	
	Engine	Approx. 2 200 ml (2.32/1.94 US/Imp qt)	

Injector + Fuel Pump + Fuel Pressure Regulator

Item	Specification	Note
Injector resistance	11 – 13 Ω at 20 °C (68 °F)	
Fuel pump discharge amount	55.5 ml (1.88/1.95 US/Imp qt) and more/10 sec.	
Fuel pressure regulator operating set pressure	Approx. 294 kPa (2.9 kgf/cm^2, 41 psi)	

FI Sensors + Secondary Throttle Valve Actuator

Item		Specification	Note
CKP sensor resistance		150 – 250 Ω	
CKP sensor peak voltage		5.0 V and more	When cranking
IAP sensor input voltage		4.5 – 5.5 V	
IAP sensor output voltage		Approx. 2.63 V at idle speed	
TP sensor input voltage		4.5 – 5.5 V	
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		0.15 – 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		0.15 – 4.85 V	
IAT sensor resistance		Approx. 1.60 kΩ at 20 °C (68 °F)	
TO sensor resistance		19 – 20 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		80 V and more	When cranking
ISC valve resistance		Approx. 31 kΩ at 20 °C (68 °F)	

Throttle Body

Item	Specification
Bore size	42 mm
I.D. No.	31G0
Idle r/min	1 300 ± 100 r/min
Fast idle r/min	1 500 – 2 000 r/min (When cold engine)
Throttle cable play	3 – 5 mm (0.12 – 0.20 in)

Electrical
Unit: mm (in)

Item			Specification		Note
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			150 – 250 Ω		
CKP sensor peak voltage			5.0 V and more		
Ignition coil resistance			Primary	0.1 – 0.6 Ω	Terminal – Ground
			Secondary	12 – 19 kΩ	Plug cap – Terminal
Ignition coil primary peak voltage			80 V and more		When cranking
Generator coil resistance			0.4 – 1.0 Ω		
Generator maximum output			Approx. 400 W at 5 000 r/min		
Generator no-load voltage (When engine is cold)			75 V (AC) and more at 5 000 r/min		
Regulated voltage			13.5 – 15.5 V at 5 000 r/min		
Starter motor brush length			Standard	12.0 (0.47)	
			Limit	6.5 (0.26)	
Starter torque limiter slip torque			Standard	41.2 – 62.8 N·m (4.2 – 6.4 kgf-m, 14.5 – 32.5 lbf-ft)	
Starter relay resistance			3 – 5 Ω		
Battery	Type designation		YTX20CH-BS		
	Capacity		12 V 64.8 kC (18 Ah)/10 HR		
Fuse size	Headlight	HI	10 A		
		LO	10 A		
	Power source		10 A		
	Ignition		15 A		
	Fuel		10 A		
	Fan		15 A		
	Main		30 A		
	EPS		40 A		

Wattage
Unit: W

Item		Specification	
		P-24, 28, 33	P-17
Headlight	HI	35 x 2	←
	LO	35 x 2	←
Auxiliary headlight		35/35	←
Brake light/Taillight		21/5	←
Reversing light		—	21
Speedometer light		LED	←
High beam indicator light		—	LED
Neutral indicator light		LED	←
FI indicator light/Engine coolant temp. indicator light		LED	←
Reverse indicator light		LED	←
Differential lock indicator light		LED	←
EPS indicator light		LED	←

Brake + Wheel

Unit: mm (in)

Item	Standard/Specification	Limit
Rear brake pedal height	12.5 – 22.5 (0.5 – 0.9)	—
Rear brake pedal free travel	20 – 30 (0.8 – 1.2)	—
Front brake disc thickness	—	3.0 (0.20)
Front brake disc runout	—	0.30 (0.012)
Front master cylinder bore	12.700 – 12.743 (0.5000 – 0.5017)	—
Front master cylinder piston diam.	12.657 – 12.684 (0.4983 – 0.4994)	—
Front brake caliper cylinder bore	33.960 – 34.010 (1.3370 – 1.3390)	—
Front brake caliper piston diam.	33.878 – 33.928 (1.3338 – 1.3357)	—
Rear brake lever play	6 – 8 (0.2 – 0.3)	—
Brake fluid type	DOT 4	—
Steering angle	46° (right & left)	—
Turning radius	3.1 m (10.2 ft)	—
Toe-out (With 75 kg, 165 lbs)	5 ± 4 mm (0.20 ± 0.16)	—
Camber	–1.3°	—
Caster	3.3°	—

Tire

Unit: mm (in)

Item	Standard		Limit
Cold inflation tire pressure (Solo riding)	Front	35 kPa (0.35 kgf/cm^2, 5.1 psi)	—
	Rear	30 kPa (0.30 kgf/cm^2, 4.4 psi)	—
Tire size	Front	AT25 x 8-12 ☆☆, tubeless	—
	Rear	AT25 x 10-12 ☆☆, tubeless	—
Tire tread depth	Front	—	4.0 (0.16)
	Rear	—	4.0 (0.16)

Suspension

Unit: mm (in)

Item	Standard	Limit
Front shock absorber spring adjustor	2/5 position	—
Rear shock absorber spring adjustor	2/5 position	—

Fuel + Oil

Item	Specification		Note
Fuel type	Use only unleaded gasoline of at least 87 pump octane (R/2 + M/2) or 91 octane or higher rated by the Research Method. Gasoline containing MTBE (Methyl Tertiary Butyl Ether), less than 10% ethanol, or less than 5% methanol with appropriate cosolvents and corrosion inhibitor is permissible.		P-28, 33
	Gasoline used should be graded 91 octane or higher. An unleaded gasoline type is recommended.		Others
Fuel tank capacity	17.5 L (4.6/3.8 US/Imp gal)		
Engine oil type	SAE 10 W-40, API SF/SG or SH/SJ with JASO MA		
Engine oil capacity	Change	2 300 ml (2.4/2.0 US/Imp qt)	
	Filter change	2 500 ml (2.6/2.2 US/Imp qt)	
	Overhaul	3 000 ml (3.2/2.6 US/Imp qt)	

Tightening Torque List (LT-A750XP/ZK9)

B931G40307004

Engine

Item		N·m	kgf-m	lbf-ft
Spark plug		11	1.1	8.0
Cylinder head cover bolt	Initial	10	1.0	7.0
	Final	14	1.4	10.5
Cam drive idle gear/sprocket shaft		41	4.1	29.5
Intake pipe bolt		9	0.9	6.5
Cylinder head bolt (M6)		10	1.0	7.0
Cylinder head bolt (L200)	Initial	25	2.5	18.0
	Final	37	3.7	27.0
Cylinder head bolt (L: 70)		10	1.0	7.0
Cylinder head bolt (L: 100)		10	1.0	7.0
Camshaft journal holder bolt		10	1.0	7.0
Cam chain tension adjuster bolt		10	1.0	7.0
Cam chain tension adjuster cap bolt		7	0.7	5.0
Crankcase bolt (M6)		10	1.0	7.0
Crankcase bolt (M8)		26	2.6	19.0
Valve timing inspection plug		23	2.3	16.5
Clutch shoe nut		150	15.0	108.5
Movable drive face bolt		110	11.0	79.5
Movable driven face bolt		110	11.0	79.5
Movable driven face ring nut		110	11.0	79.5
V-belt outer cover bolt		8	0.8	6.0
V-belt inner cover bolt		9	0.9	6.5
Generator rotor nut		160	16.0	115.5
Generator stator set bolt		11	1.1	8.0
Speed sensor bolt		10	1.0	7.0
Starter clutch bolt		26	2.6	19.0
Exhaust pipe nut		23	2.3	16.5
Muffler connecting bolt		23	2.3	16.5
Muffler mounting bolt		23	2.3	16.5
Engine oil drain plug		21	2.1	15.0
Engine coolant drain plug		13	1.3	9.5
Drive bevel gear nut		100	10.0	72.5
Front output shaft nut		100	10.0	72.5
Engine mounting nut		60	6.0	43.5
Engine mounting damper stopper bolt		23	2.3	16.5
Rear output shaft nut		100	10.0	72.5
Crank balancer drive gear nut		150	15.0	108.5
Crank balancer driven gear bolt		50	5.0	36.0
Starter motor mounting bolt		10	1.0	7.0
Starter motor lead wire connecting nut		6	0.6	4.5
Starter motor housing bolt		5	0.5	3.5
Main oil gallery plug		18	1.8	13.0
Air cleaner box mounting bolt		4.5	0.45	3.0
Left crankshaft spacer nut		38	3.8	27.5
Oil gallery plug (Cylinder head)		10	1.0	7.0

Drive Train

Item	N·m	kgf-m	lbf-ft
4WD/Diff-lock actuator mounting bolt	22	2.2	16.0
Front drive (Differential) gear case bolt	22	2.2	16.0
Front drive (Differential) gear case mounting nut	50	5.0	36.0
Front drive (Differential) gear oil level plug	8.5	0.85	6.0
Front drive (Differential) gear oil filler plug	35	3.5	25.5
Front drive (Differential) gear oil drain plug	32	3.2	23.0
Final drive gear nut	100	10.0	72.5
Final drive gear bearing stopper	100	10.0	72.5
Final gear case bolt (M8)	26	2.6	19.0
Final gear case bolt (M10)	55	5.5	40.0
Final gear mounting nut	65	6.5	47.0
Final gear mounting bolt	65	6.5	47.0
Rear propeller shaft boot clamp screw	2	0.2	1.5
Final gear oil drain plug	23	2.3	16.5
Rear propeller shaft coupling nut	100	10.0	72.5
Front output shaft bolt	10	1.0	7.0
Rear output shaft nut	100	10.0	72.5
Rear output shaft drive bevel gear nut	100	10.0	72.5
Rear output shaft driven gear nut	100	10.0	72.5
Front propeller shaft boot clamp screw	1.3	0.13	1.0
Rear propeller shaft boot clamp screw	2	0.2	1.5

FI System, Intake Air System and Fuel System

Item	N·m	kgf-m	lbf-ft
CKP sensor mounting bolt	6	0.6	4.5
CKP sensor bracket bolt	6	0.6	4.5
Fuel delivery pipe mounting screw	5	0.5	3.5
Fuel pump retainer	35	3.5	25.5
ECT sensor	18	1.8	13.0
ISC valve mounting screw	2	0.2	1.5
TP sensor mounting screw	2	0.2	1.5

Cooling System

Item	N·m	kgf-m	lbf-ft
Water pump cover screw	6	0.6	4.5
Water pump mounting bolt	10	1.0	7.0
Cooling fan thermo-switch	17	1.7	12.5
Thermostat cover bolt	23	2.3	16.5
Cooling fan assembly mounting bolt	8.5	0.85	6.0
Water bypass union	12	1.2	8.5

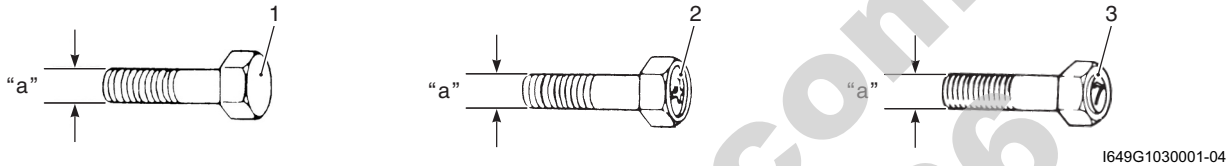
Chassis

Item	N·m	kgf-m	lbf-ft
Handlebar clamp bolt	26	2.6	19.0
Handlebar holder nut	60	6.0	43.5
Rear brake lever holder clamp bolt	10	1.0	7.0
Throttle lever case bolt	2	0.2	1.5
Steering shaft upper nut	120	12.0	87.0
Steering shaft bolt	26	2.6	19.0
EPS control unit mounting nut	12	1.2	8.5
EPS body assembly mounting bolt	26	2.6	19.0
EPS body assembly mounting nut	28	2.8	20.0
Steering shaft lower nut	162	16.2	117.0
Front suspension arm pivot nut (Upper)	60	6.0	43.5
Front suspension arm pivot nut (Lower)	65	6.5	47.0
Steering knuckle end nut (Upper and Lower)	29	2.9	21.0
Tie-rod end nut	29	2.9	21.0
Tie-rod lock-nut	29	2.9	21.0
Front shock absorber mounting bolt (Upper)	55	5.5	40.0
Front shock absorber mounting nut (Lower)	60	6.0	43.5
Front wheel hub nut	110	11.0	79.5
Rear wheel hub nut	121	12.1	87.5
Wheel set nut (Front and Rear)	60	6.0	43.5
Front brake hose union bolt	23	2.3	16.5
Front brake air bleeder valve	6	0.6	4.5
Front brake pad mounting pin	17	1.7	12.5
Front brake caliper mounting bolt	26	2.6	19.0
Caliper holder pin	18	1.8	13.0
Caliper holder slide pin	23	2.3	16.5
Brake pipe flare nut	16	1.6	11.5
Front brake disc mounting bolt	23	2.3	16.5
Brake master cylinder mounting bolt	10	1.0	7.0
Footrest mounting bolt (M8)	26	2.6	19.0
Footrest mounting bolt (M10)	55	5.5	40.0
Rear stabilizer joint nut	60	6.0	43.5
Rear shock absorber mounting nut (Upper and Lower)	60	6.0	43.5
Rear suspension arm pivot nut (Upper and Lower)	60	6.0	43.5
Rear knuckle end nut (Upper and Lower)	60	6.0	43.5
Rear brake cam lever nut	11	1.1	8.0
Rear brake case bolt	26	2.6	19.0
Rear brake pedal shaft nut	60	6.0	43.5
Rear brake pedal screw	4.5	0.45	3.0
Trailer towing bolt	60	6.0	43.5
Brake lever pivot bolt and nut	6	0.6	4.5
Brake lever pivot bolt lock-nut	6	0.6	4.5
Front propeller shaft boot clamp screw	1.3	0.13	1.0
Rear propeller shaft boot clamp screw	2	0.2	1.5

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

CONTENTS

NOTE

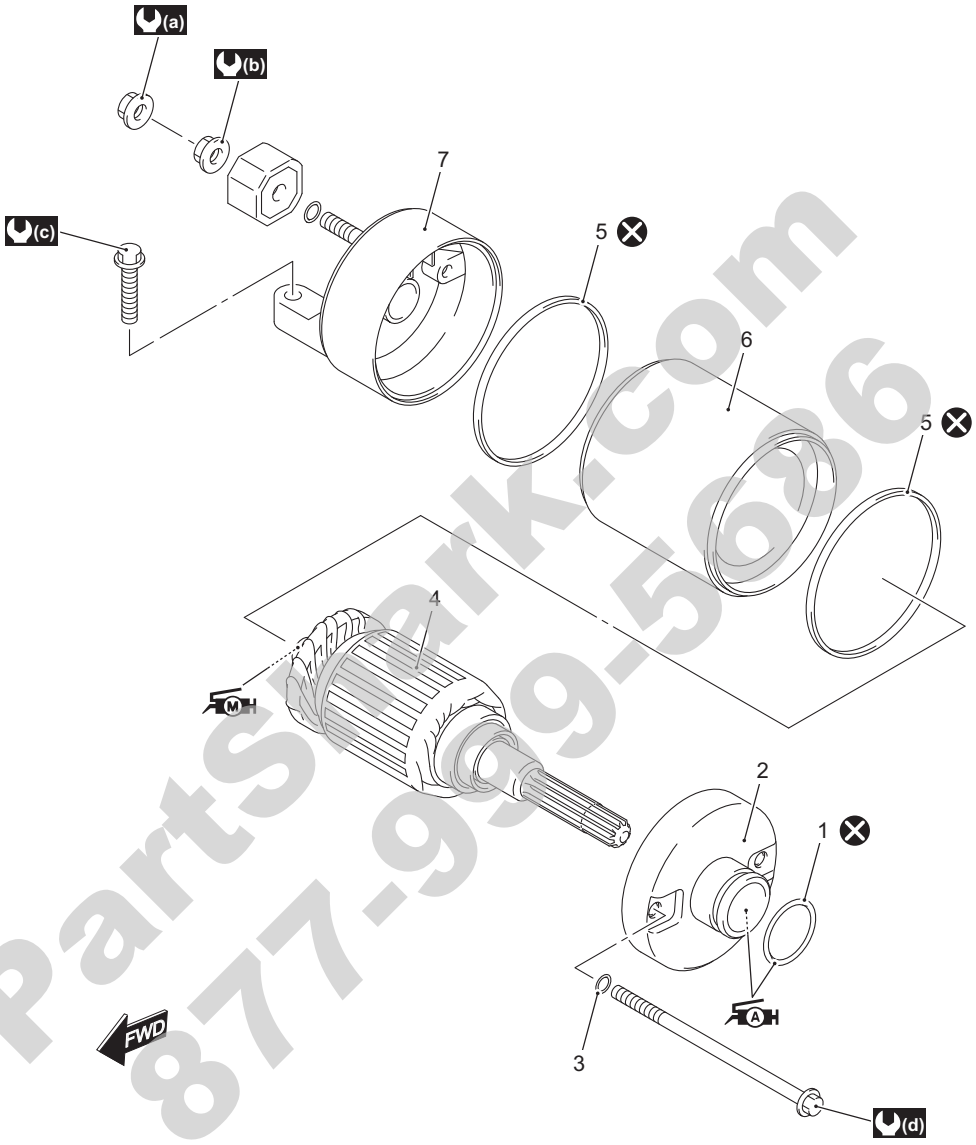
For the items with asterisk (*) in the "CONTENTS" below, refer to the same section of the service manual mentioned in the "FOREWORD" of this manual.

Starting System

Repair Instructions

Starter Motor Components (LT-A750XP/ZK9)

B931G41906022



I931G3190012-03

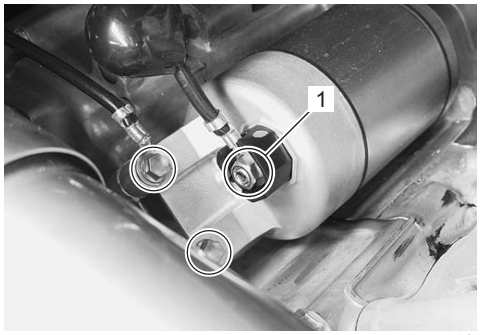
1. O-ring	6. Starter motor case	(d) : 5 N·m (0.5 kgf-m, 3.5 lbf-ft)
2. Housing end (Inside)	7. Housing end (Outside)	A : Apply grease to sliding surface.
3. O-ring	(a) : 6 N·m (0.6 kgf-m, 4.5 lbf-ft)	M : Apply moly paste to sliding surface.
4. Armature	(b) : 11 N·m (1.1 kgf-m, 8.0 lbf-ft)	⊗ : Do not reuse.
5. Square-ring	(c) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)	

Starter Motor Removal and Installation (LT-A750XP/ZK9)

B931G41906023

Removal

1) Turn the ignition switch OFF and disconnect the battery (–) lead wire. Refer to “Battery Removal and Installation (LT-A750XP/ZK9) in Section 1J (Page 1J-2)”.
2) Remove the right side cover. Refer to“Front Side Exterior Parts Removal and Installation in Section 9D in related manual”.
3) Remove the starter motor lead wire (1).



I931G3190001-02

4) Remove the starter motor.

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)

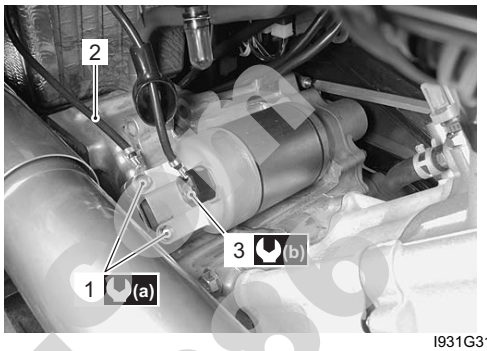
⚠ CAUTION

Replace the O-ring with a new one.

I931G3190002-02

- Tighten the starter motor mounting bolts (1) with the battery (–) lead wire (2) and starter motor lead wire mounting nut (3) to the specified torque. Refer to “Wiring Harness Routing Diagram (LT-A750XP/ZK9) in Section 9A (Page 9A-4)”.

Tightening torque
Starter motor mounting bolt (a): 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
Starter motor lead wire mounting nut (b): 6 N·m (0.6 kgf-m, 4.5 lbf-ft)



I931G3190003-02

Starter Motor Disassembly and Assembly (LT-A750XP/ZK9)

B931G41906024

Refer to “Starter Motor Removal and Installation in related manual”.

Disassembly

Disassemble the starter motor as shown in the starter motor components diagram. Refer to “Starter Motor Components in related manual”.

Assembly

Reassemble the starter motor in the reverse order of removal. Pay attention to the following points:

⚠ CAUTION

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

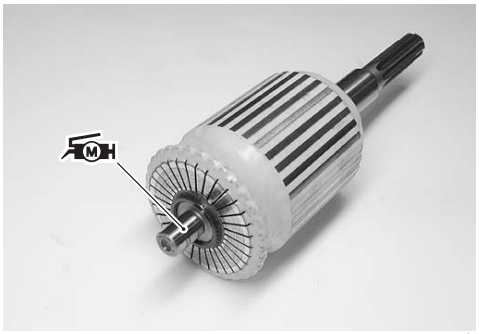
- Apply grease to the lip of the oil seal.

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

I931G3190004-02

- Apply a small quantity of moly paste to the armature shaft.

  : Moly paste 99000–25140 (SUZUKI Moly paste or equivalent)

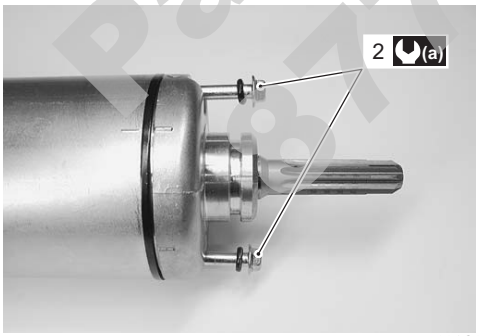


I931G3190005-02

- Align the match mark on the starter motor case with the match mark on the housing end.
- Tighten the starter motor housing bolts (2) to the specified torque.

  Tightening torque
  Starter motor housing bolt (a): 5 N·m (0.5 kgf-m, 3.5 lbf-ft)

I931G3190006-02



I931G3190007-03

Starter Motor Related Parts Inspection (LT-A750XP/ZK9)

B931G41906025

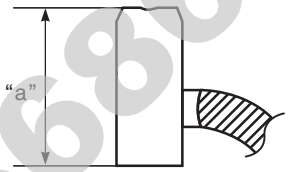
Refer to “Starter Motor Disassembly and Assembly in related manual”.

Carbon Brush

Inspect the carbon brushes for abnormal wear, cracks or smoothness in the brush holder.
If either carbon brush is defective, replace the brush holder set with a new one.
Measure the length “a” of the carbon brushes using a vernier calipers. If the measurement is less than the service limit, replace the housing end assembly with a new one.

Brush length “a”
Service limit: 6.5 mm (0.26 in)

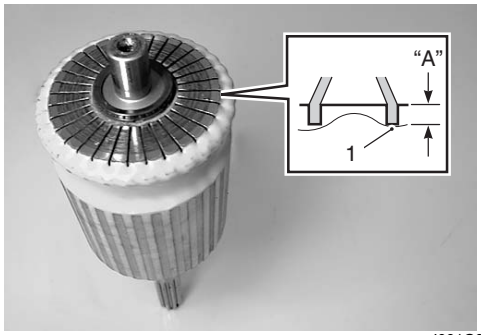
Special tool
: 09900–20102 (Vernier calipers (200 mm))



I718H1190013-01

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.

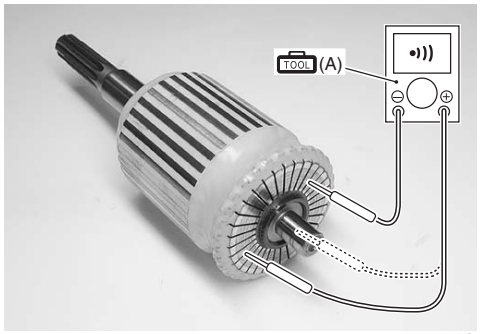


I931G3190008-02

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

Tester knob indication
Continuity set (•)))



I931G3190009-02

Bearing
Check the bearing of housing end for damage.
If any damage is found, replace the housing end.

I931G3190010-02

Oil Seal
Check the seal lip for damage. If any damage is found, replace the housing end (Inside).

I931G3190011-02

Specifications

Service Data (LT-A750XP/ZK9)

B931G41907002

Unit: mm (in)

Item	Specification		Note
Starter motor brush length	Standard	12.0 (0.47)	
	Limit	6.5 (0.26)	
Starter torque limiter slip torque	Standard	41.2 – 62.8 N·m (4.2 – 6.4 kgf-m, 14.5 – 32.5 lbf-ft)	
Starter relay resistance	3 – 5 Ω		

Tightening Torque Specifications

B931G41907003

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Starter motor mounting bolt	10	1.0	7.0	☞(Page 1I-2)
Starter motor lead wire mounting nut	6	0.6	4.5	☞(Page 1I-2)
Starter motor housing bolt	5	0.5	3.5	☞(Page 1I-3)

NOTE

The specified tightening torque is described in the following.
"Starter Motor Components (LT-A750XP/ZK9) (Page 1I-1)"

Reference:
For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List (LT-A750XP/ZK9) in Section 0C (Page 0C-7)".

Special Tools and Equipment

Recommended Service Material

B931G41908001

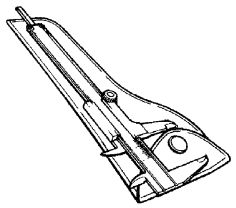
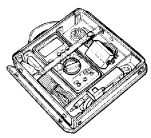
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE "A" or equivalent	P/No.: 99000–25010	☞(Page 1I-2) / ☞(Page 1I-2)
Moly paste	SUZUKI Moly paste or equivalent	P/No.: 99000–25140	☞(Page 1I-3)

NOTE

Required service material is also described in the following.
"Starter Motor Components (LT-A750XP/ZK9) (Page 1I-1)"

Special Tool

B931G41908002

09900–20102 Vernier calipers (200 mm) ☞(Page 1I-3)		09900–25008 Multi circuit tester set ☞(Page 1I-4)	

Charging System

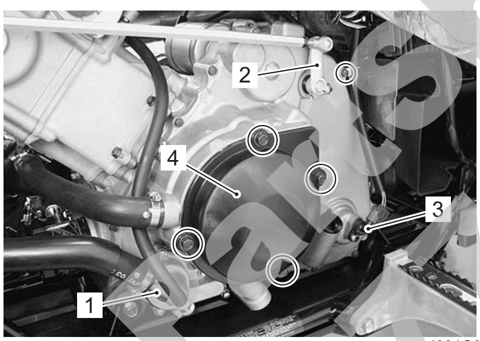
Repair Instructions

Generator Removal and Installation (LT-A750XP/ZK9)

B931G41A06010

Removal

1) Disconnect the (–) battery lead wire. Refer to “Battery Removal and Installation (LT-A750XP/ZK9) (Page 1J-2)”.
2) Drain engine oil. Refer to “Engine Oil and Filter Replacement in Section 0B in related manual”.
3) Remove the left inner fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D in related manual”.
4) Remove the left mud guard. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D in related manual”.
5) Drain engine coolant. Refer to “Cooling System Inspection in Section 0B in related manual”.
6) Remove the water pump assembly (1). Refer to “Water Pump Removal and Installation in Section 1F in related manual”.
7) Disconnect the gearshift lever arm (2) and speed sensor coupler (3).
8) Remove the recoil cover (4).



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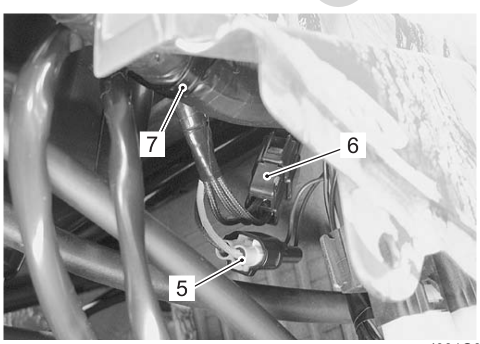
9) Disconnect the CKP sensor coupler (5) and generator coupler (6) and remove the clamp (7).

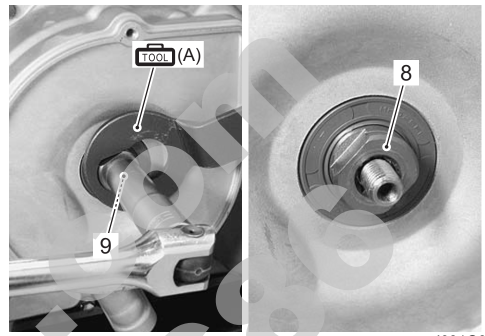


I931G31A0008-01

10) Hold the left crankshaft spacer (8) with the special tool.

Special tool
TOOL (A): 09930–44530 (Rotor holder)

11) Remove the left crankshaft spacer nut (9) and spacer (8).



I931G31A0002-01

12) Remove the generator cover. Refer to “Generator Removal and Installation in related manual”.

Installation

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

- Install the generator cover. Refer to “Generator Removal and Installation in related manual”.

⚠ WARNING

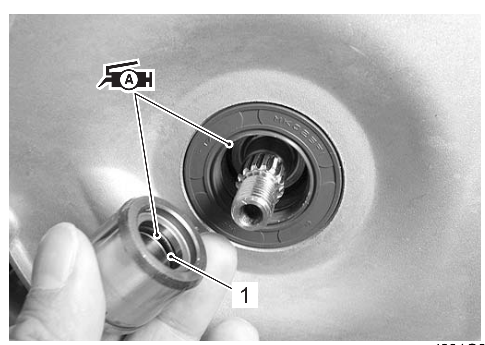
Be careful not to pinch the finger between the generator cover and the crankcase.

- Apply grease to the O-ring (1) and oil seal lip.

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

⚠ CAUTION

Replace the O-ring (1) with a new one.

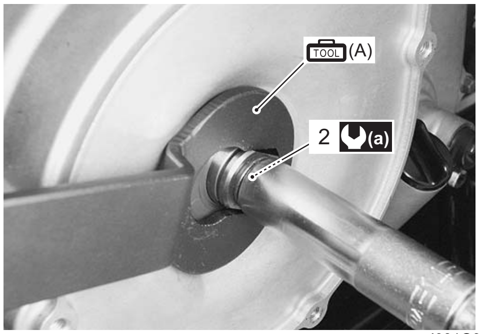


I931G31A0003-01

- Tighten the crankshaft spacer nut (2) to the specified torque with the special tool.

  Special tool
  TOOL (A): 09930–44530 (Rotor holder)

  Tightening torque
  Left crankshaft spacer nut (a): 38 N·m (3.8 kgf-m, 27.5 lbf-ft)



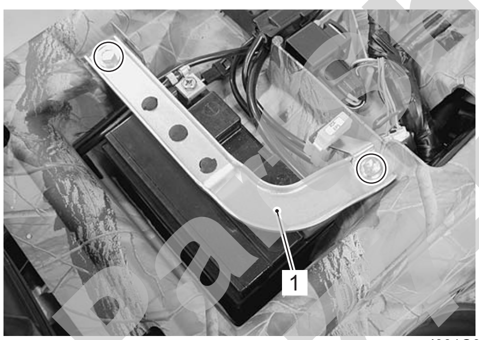
I931G31A0004-01

Battery Removal and Installation (LT-A750XP/ ZK9)

B931G41A06011

Removal

1) Remove the seat. Refer to "Seat Removal and Installation in Section 9D in related manual".
2) Remove the battery stay (1).



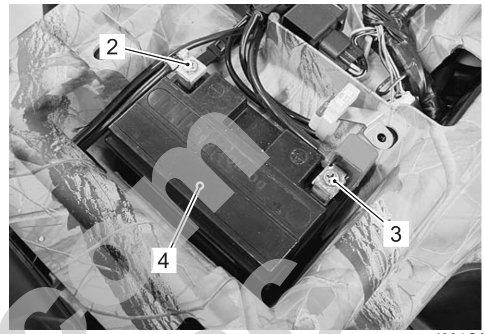
I931G31A0005-01

3) Disconnect the battery (–) lead wire (2).
4) Disconnect the battery (+) lead wire (3).

NOTE

Be sure to disconnect the battery (–) lead wire (2) first, then disconnect the battery (+) lead wire (3).

5) Remove the battery (4).



I931G31A0006-01

Installation

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

⚠ CAUTION

Never use anything except the specified battery.

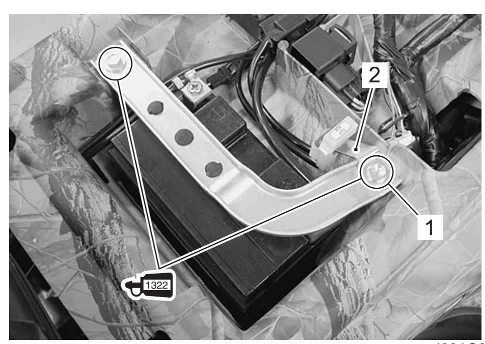
- Tighten the battery mounting bolts securely.

NOTE

Fit the EPS fuse bracket (2) to the mounting bolt (1).

- Apply thread lock to the battery stay mounting bolts and tighten them securely.

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



I931G31A0007-02

Specifications

Tightening Torque Specifications

B931G41A07002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Left crankshaft spacer nut	38	3.8	27.5	☞(Page 1J-2)

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List (LT-A750XP/ZK9) in Section 0C (Page 0C-7)”.

Special Tools and Equipment

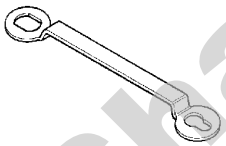
Recommended Service Material

B931G41A08001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI SUPER GREASE “A” or equivalent	P/No.: 99000–25010	☞(Page 1J-1)
Thread lock cement	THREAD LOCK CEMENT SUPER “1322” or equivalent	P/No.: 99000–32110	☞(Page 1J-2)

Special Tool

B931G41A08002

09930–44530 Rotor holder ☞(Page 1J-1) / ☞(Page 1J-2)		

Section 3

Driveline / Axle

CONTENTS

NOTE

For the items with asterisk (*) in the “CONTENTS” below, refer to the same section of the service manual mentioned in the “FOREWORD” of this manual.

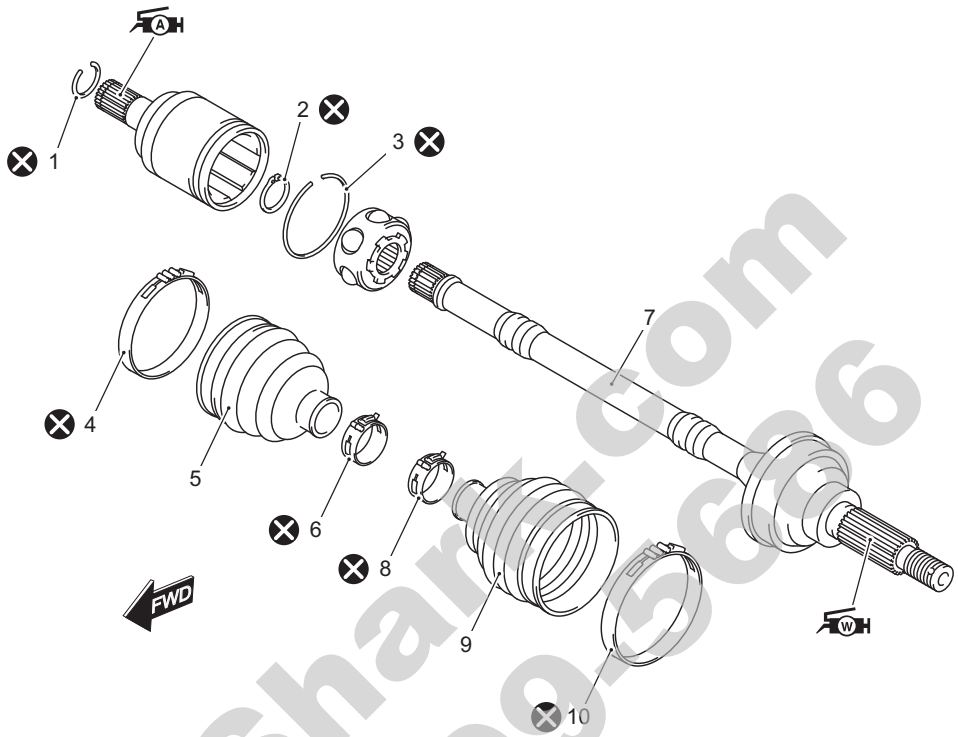
3

Drive Chain / Drive Train / Drive Shaft

Repair Instructions

Front Drive Shaft Components (LT-A750XP/ZK9)

B931G43106009



I931H1310012-03

1. Circlip	6. Inner boot band (Small)	: Apply grease.
2. Snap ring	7. Drive shaft	: Apply water resistance grease.
3. Stopper ring	8. Outer boot band (Small)	: Do not reuse.
4. Inner boot band (Large)	9. Outer boot	
5. Inner boot	10. Outer boot band (Large)	

Front Drive Shaft Disassembly and Assembly (LT-A750XP/ZK9)

B931G43106010

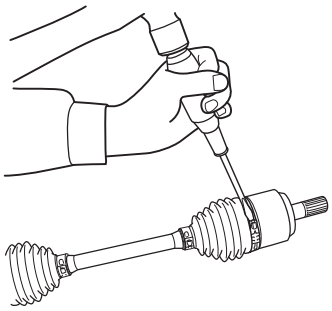
Refer to “Front Drive Shaft Assembly Removal and Installation in related manual”.

Disassembly

⚠ CAUTION

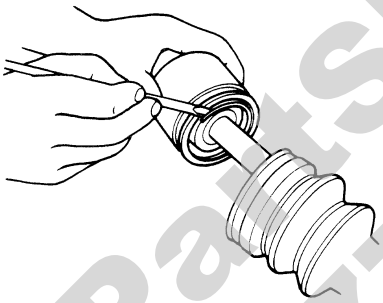
Do not disassemble the wheel side joint. If any damages are found, replace it with a new one.

1) Remove the boot band of the differential side joint.



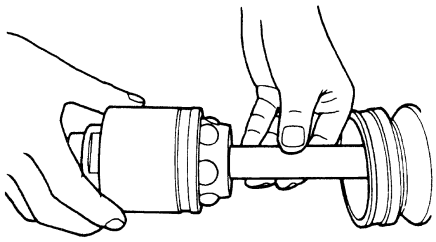
I931H1310003-03

2) Slide the boot toward the center of the front drive shaft and remove the stopper ring from the outer race.



I831G1310006-01

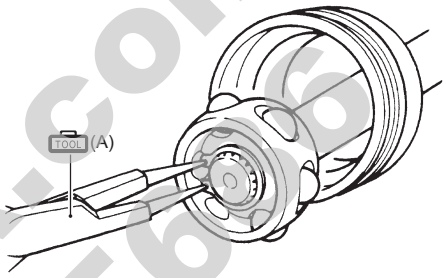
3) Remove the outer race from the front drive shaft.



I831G1310007-01

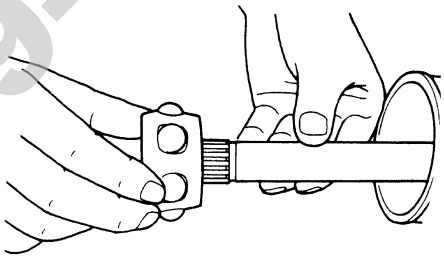
4) Wipe off any grease and remove the snap ring.

Special tool
TOOL (A): 09900–06107 (Snap ring remover (Open type))



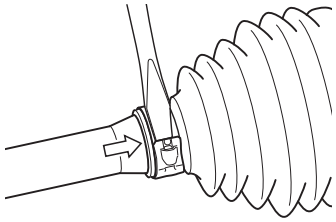
I831G1310022-01

5) Remove the cage from the front drive shaft.



I831G1310009-01

6) Remove the boot band of the small diameter side.



I931H1310004-02

Assembly

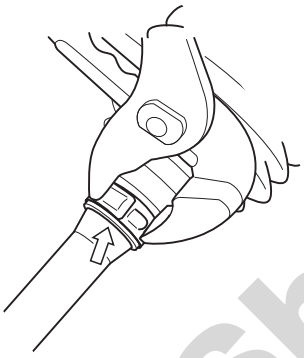
⚠ CAUTION

- **Wash all parts before installation, clean the inside and outside of the boots with a cloth.**
- **Do not wash the boots in any commercially available degreaser, such as gasoline or kerosene. Washing in a degreaser causes deterioration of the boots.**

1) Fit a boot on the drive shaft end, fitting the small diameter side of the boot to the shaft groove, fix its end with a new boot band.

⚠ CAUTION

Replace the boot band with a new one.

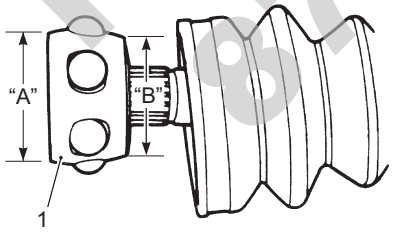


I931H1310005-02

2) Install the cage (1) on the shaft.

⚠ CAUTION

Install the cage with the large diameter side "A" facing the shaft end.



I831G1310012-02

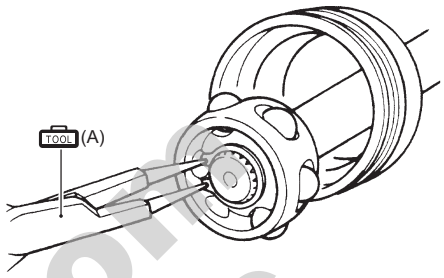
"A": Large diameter	"B": Small diameter

3) Install the new snap ring to the cage.

⚠ CAUTION

Replace the snap ring with a new one.

Special tool
TOOL (A): 09900–06107 (Snap ring remover (Open type))



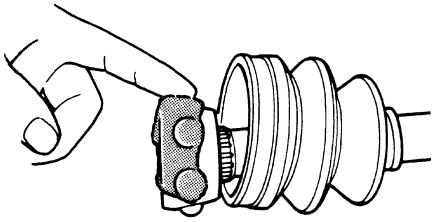
I831G1310023-01

4) Apply grease to the entire surface of the cage and the inside of the outer race.

	Position	
	Wheel side	Differential side
Grease: Quantity	60 g (2.1 oz)	60 g (2.1 oz)

NOTE

The tube of joint grease is included in the wheel side boot set or wheel side joint assembly of spare parts.



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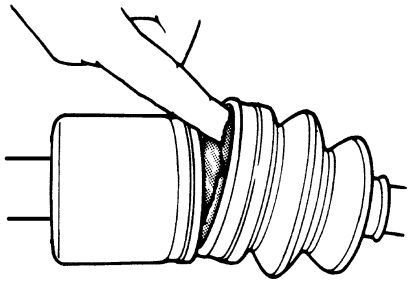
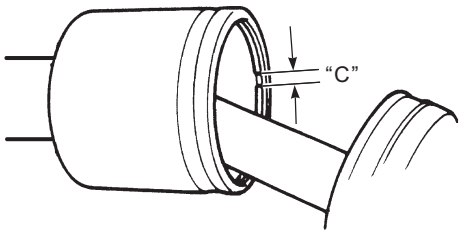


I831G1310014-01

5) Insert the cage into the outer race and install the new stopper ring to the groove of the outer race.

⚠ CAUTION

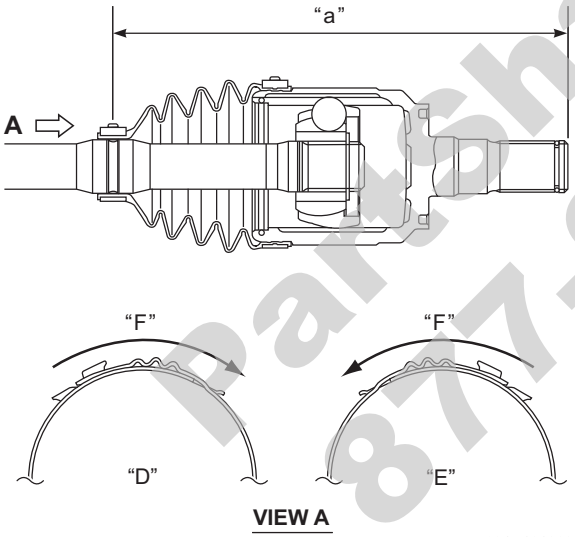
- **Replace the stopper ring with a new one.**
- **Position the opening of stopper ring "C" so that it will not be lined up with a ball.**



I831G1310015-01

6) After installing the boot on the outer race, insert a screw driver into the boot on the outer race side and allow air to enter the boot so that the air pressure in the boot becomes the same as the atmospheric pressure at the positions indicated in the figure.

7) Fix the boot on the outer race with a new boot band, taking care not to distort the boot.



VIEW A

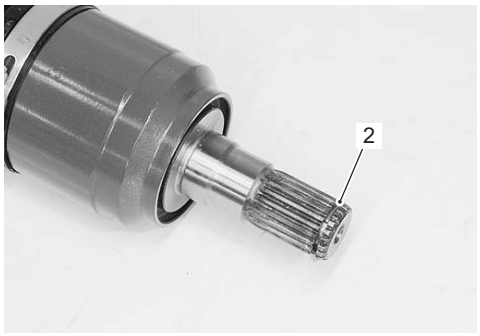
I931H1310006-03

"D": Right side	"F": Rotation direction
"E": Left side	"a": 182.1 mm (7.2 in)

8) Install the circlip (2) into the groove of front drive shaft spline.

⚠ CAUTION

The removed circlip must be replaced with a new one.



I931H1310007-01

9) Inspect the axle play by using a push-and-pull motion given to the axle shaft and wheel spindle.

I931H1310008-01

Front Drive Shaft Inspection (LT-A750XP/ZK9)

B931G43106011

Inspect the front drive shaft in the following procedures:

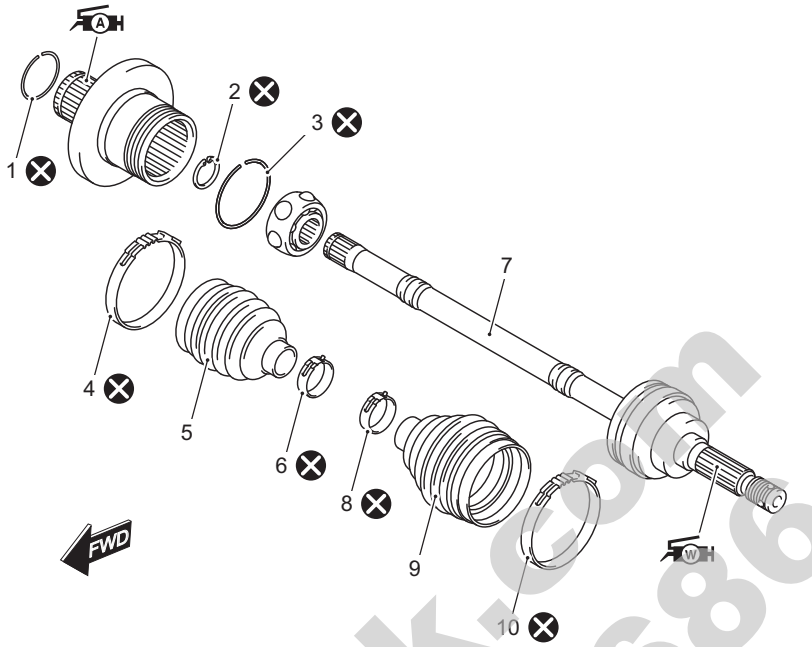
1) Remove the front drive shaft assembly. Refer to "Front Drive Shaft Assembly Removal and Installation in related manual".
2) Check the drive shaft boots for twist and grease leak. If any defects are found, replace the defective parts with new ones.
3) Inspect the boots, circlip and boot bands for wear or damage. If any damages are found, replace them with new ones.

I931H1310009-01

4) Install the front drive shaft assembly. Refer to "Front Drive Shaft Assembly Removal and Installation in related manual".

Rear Drive Shaft Components (LT-A750XP/ZK9)

B931G43106012



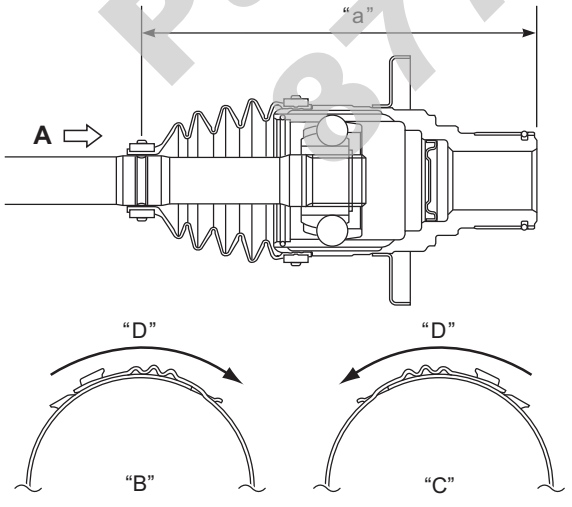
I931H1310013-04

1. Circlip	6. Inner boot band (Small)	A : Apply grease.
2. Snap ring	7. Drive shaft	W : Apply water resistance grease.
3. Stopper ring	8. Outer boot band (Small)	: Do not reuse.
4. Inner boot band (Large)	9. Outer boot	
5. Inner boot	10. Outer boot band (Large)	

Rear Drive Shaft Disassembly and Assembly (LT-A750XP/ZK9)

B931G43106013

Refer to “Rear Drive Shaft Assembly Removal and Installation in related manual”.
Rear drive shaft disassembly and assembly are the same manner of front drive shaft disassembly and assembly except for the position of inner boot bond.



VIEW A

I931G3310001-01

“B”: Right side	“D”: Rotation direction
“C”: Left side	“a”: 166 mm (6.5 in)

Rear Drive Shaft Inspection (LT-A750XP/ZK9)

B931G43106014

Refer to “Rear Drive Shaft Assembly Removal and Installation in related manual”.
Rear drive shaft inspection as the same manner of front drive shaft.

Special Tools and Equipment

Recommended Service Material

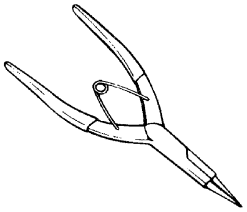
B931G43108001

NOTE

Required service material is also described in the following.
“Front Drive Shaft Components (LT-A750XP/ZK9) (Page 3A-1)”
“Rear Drive Shaft Components (LT-A750XP/ZK9) (Page 3A-5)”

Special Tool

B931G43108002

09900–06107 Snap ring remover (Open type) ☞(Page 3A-2) / ☞(Page 3A-3)		

Section 4

Brake

CONTENTS

NOTE

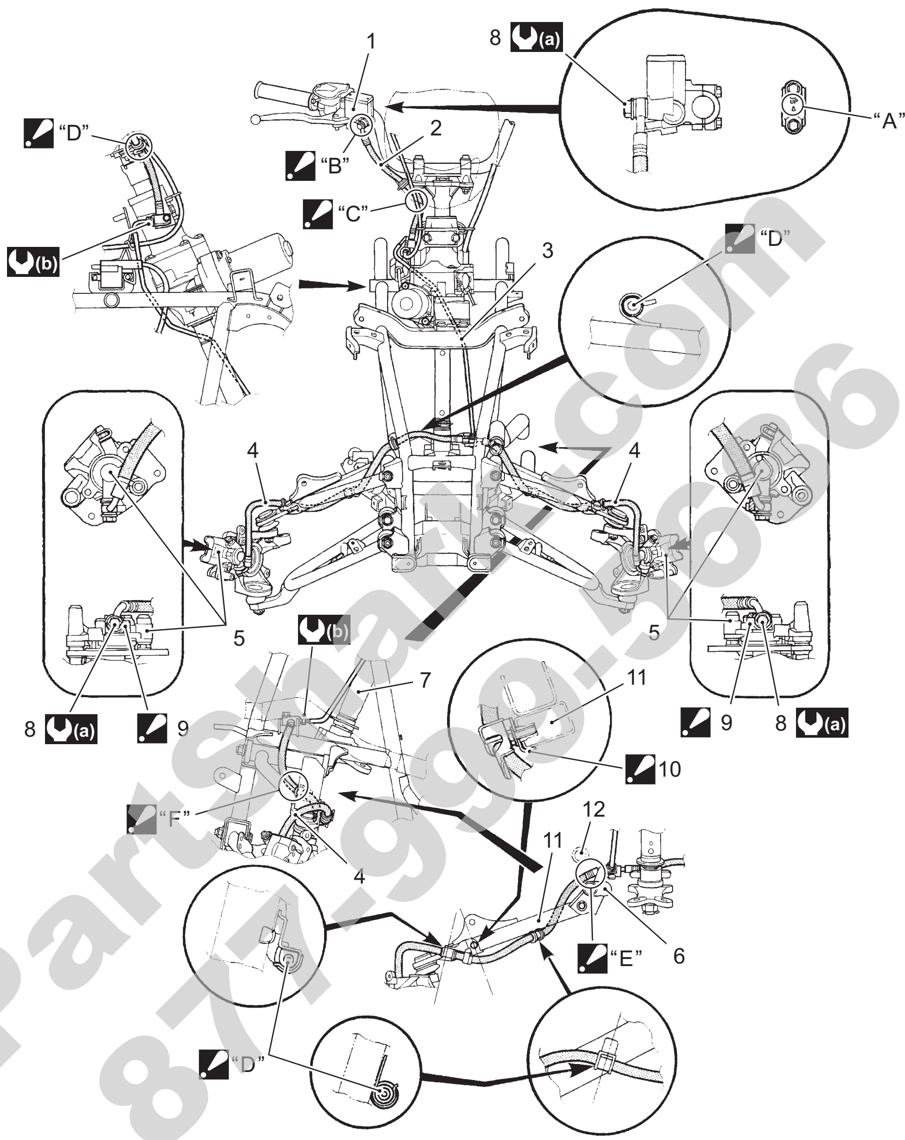
For the items with asterisk (*) in the "CONTENTS" below, refer to the same section of the service manual mentioned in the "FOREWORD" of this manual.

Brake Control System and Diagnosis

Schematic and Routing Diagram

Front Brake Hose Routing Diagram (LT-A750XP/ZK9)

B931G44102003



I931H1410043-05

1. Master cylinder	11. Suspension upper arm
2. Front brake hose No. 1	12. Radiator hose
3. Front brake pipe	"A": UP mark
4. Front brake hose No. 2	"B": After the brake hose union has contacted the reservoir bottom.
5. Front brake caliper	"C": Pass the brake hose behind the throttle cable.
6. Frame	"D": Fix the brake hose to the it guide firmly.
7. Steering shaft	"E": Pass the brake hose No. 2 between the radiator lower hose and frame.
8. Union bolt	"F": Pass the brake hose inside of the suspension arm.
9. Stopper : After the brake hose union has contacted the stopper, tighten the union bolt.	(a) : 23 N·m (2.3 kgf-m, 16.5 lbf-ft)
10. Stopper : After the brake hose clamp has contacted the suspension upper arm, tighten the stopper bolt.	(b) : 16 N·m (1.6 kgf-m, 11.5 lbf-ft)

Repair Instructions

Front Brake Hose Removal and Installation (LT-A750XP/ZK9)

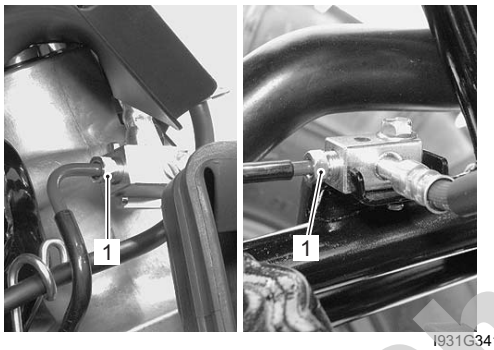
B931G44106019

Removal

⚠ CAUTION

Make sure that the vehicle is supported securely.

1) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D in related manual”.
2) Drain brake fluid. Refer to “Brake Fluid Replacement in related manual”.
3) Loosen the flare nuts (1) and disconnect the brake pipe.



I931G3410001-02

4) Remove the front brake hoses as shown in the front brake hose routing diagram. Refer to “Front Brake Hose Routing Diagram (LT-A750XP/ZK9) (Page 4A-1)”.

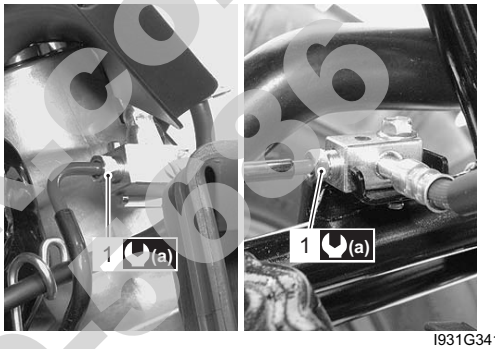
Installation

⚠ 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 in related manual”.
2) Tighten the brake flare nut (1) to the specified torque.

Tightening torque
Brake pipe flare nut (a): 16 N·m (1.6 kgf-m, 11.5 lbf-ft)

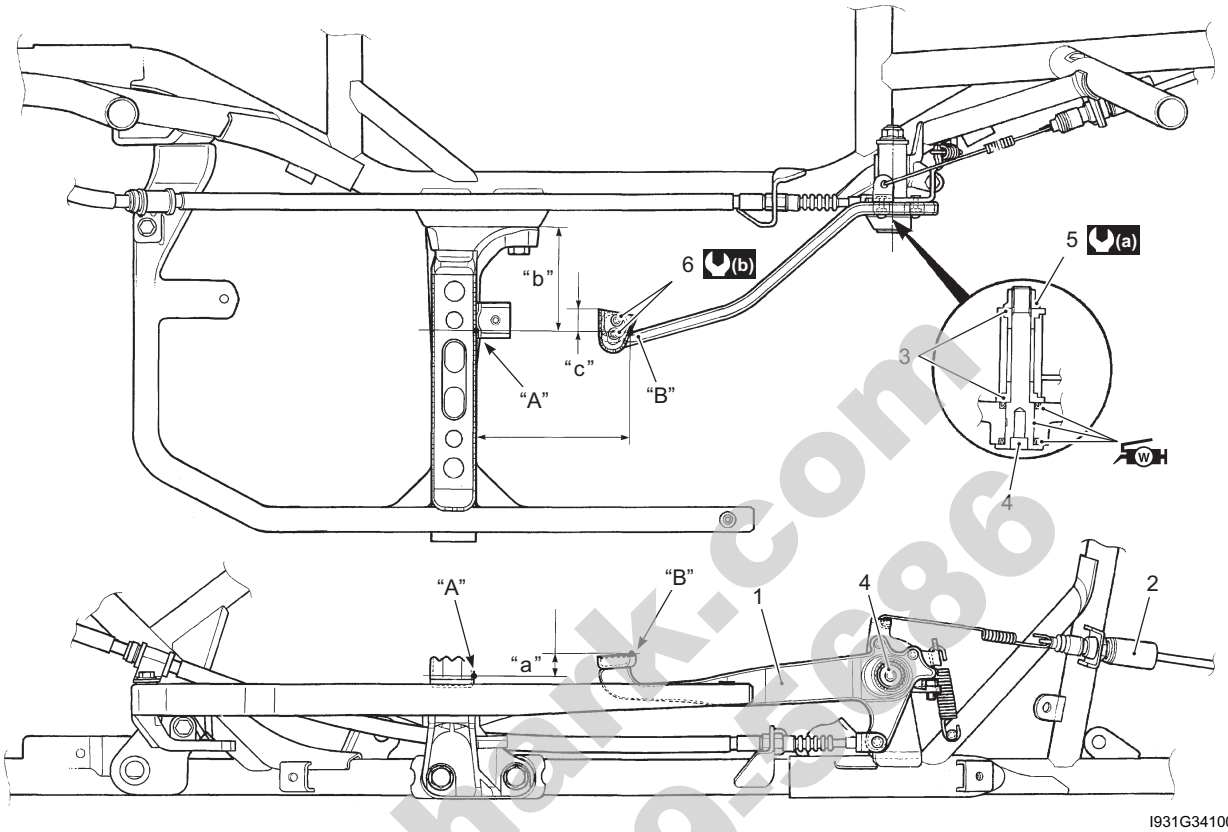


I931G3410009-01

3) Bleed air from the front brake system. Refer to “Air Bleeding from Front Brake Fluid Circuit in related manual”.
4) Install the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D in related manual”.

Rear Brake Pedal Construction (LT-A750XP/ZK9)

B931G44106020



I931G3410002-01

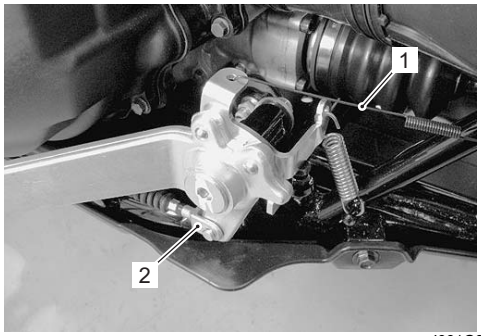
1. Rear brake pedal	6. Rear brake pedal screw	"B": Anchoring point (Pedal side)
2. Rear brake light switch	"a": 12.5 – 22.5 mm (0.49 – 0.89 in)	(a): 60 N·m (6.0 kgf-m, 43.5 lbf-ft)
3. Washer	"b": 83.2 mm (3.28 in)	(b): 4.5 N·m (0.45 kgf-m, 3.0 lbf-ft)
4. Rear brake pedal shaft	"c": 17.5 mm (0.69 in)	W: Apply water resistance grease.
5. Rear brake pedal shaft nut	"A": Anchoring point (Footrest side)	

Rear Brake Pedal Removal and Installation (LT-A750XP/ZK9)

B931G44106021

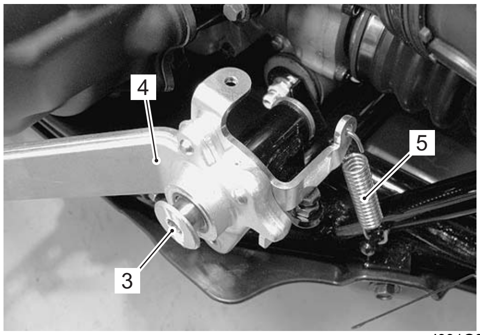
Removal

1) Remove the right inner fender. Refer to "Front Side Exterior Parts Removal and Installation in Section 9D in related manual".
2) Remove the right mud guard. Refer to "Rear Side Exterior Parts Removal and Installation in Section 9D in related manual".
3) Remove the rear brake light switch spring (1).
4) Disconnect the rear brake cable (2). Refer to "Rear Brake Cable Removal and Installation in related manual".



I931G3410003-02

5) Remove the rear brake pedal shaft (3).
6) Remove the rear brake pedal (4) and rear brake pedal spring (5).

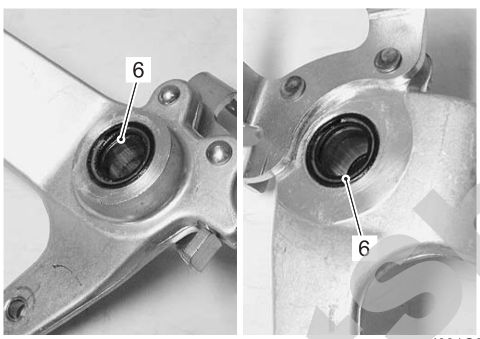


I931G3410010-01

7) Remove the dust seals (6) if necessary.

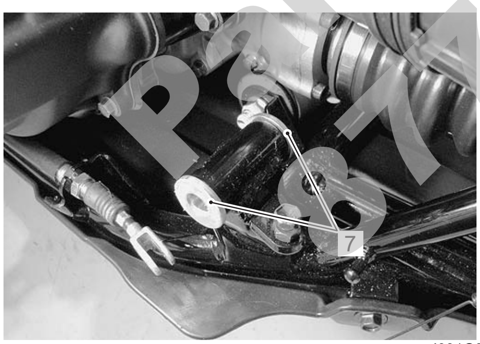
⚠ **CAUTION**

If there are wear or damage, replace the dust seals (6) with new ones.



I931G3410004-01

8) Remove the washers (7).



I931G3410005-01

Installation

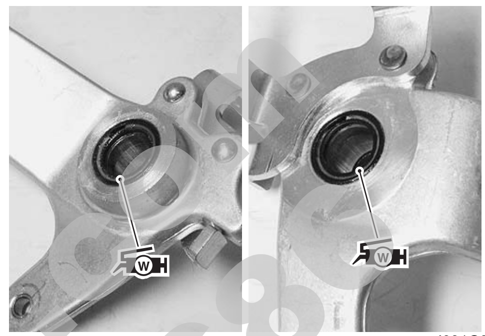
Install the rear brake pedal in the reverse order of removal. Pay attention to the following points:

- Apply grease to the lip of dust seals and washers.

⚠ **CAUTION**

Never reuse the removed dust seals with new ones.

: Grease 99000–25160 (Water resistance grease or equivalent)



I931G3410006-02

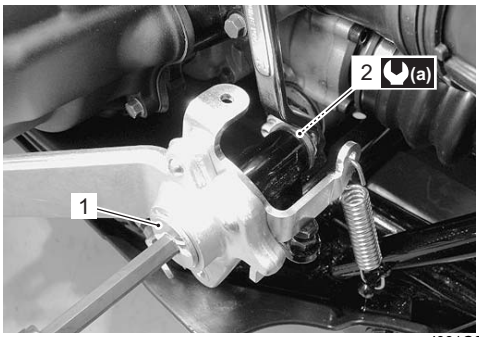
- Apply grease to the rear brake pedal shaft (1).

: Grease 99000–25160 (Water resistance grease or equivalent)

I931H1410035-01

- Install the rear brake pedal shaft (1) and tighten the brake pedal shaft nut (2) to the specified torque.

  Tightening torque
  Rear brake pedal shaft nut (a): 60 N·m (6.0 kgf-m, 43.5 lbf-ft)



I931G3410007-01

- After installed rear brake cable, adjust the adjuster nut. Refer to “Rear Brake Pedal / Rear Brake (Parking Brake) Lever Inspection and Adjustment in Section 0B in related manual”.
- Install the removed parts.

Specifications

Tightening Torque Specifications

B931G44107002

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Brake pipe flare nut	16	1.6	11.5	☞(Page 4A-2)
Rear brake pedal shaft nut	60	6.0	43.5	☞(Page 4A-5)

NOTE

The specified tightening torque is described in the following.
“Front Brake Hose Routing Diagram (LT-A750XP/ZK9) (Page 4A-1)”
“Rear Brake Pedal Construction (LT-A750XP/ZK9) (Page 4A-3)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List (LT-A750XP/ZK9) in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

B931G44108003

Material	SUZUKI recommended product or Specification		Note
Grease	Water resistance grease or equivalent	P/No.: 99000–25160	☞(Page 4A-4) / ☞(Page 4A-4)

NOTE

Required service material is also described in the following.
“Rear Brake Pedal Construction (LT-A750XP/ZK9) (Page 4A-3)”

Section 6

Steering

CONTENTS

NOTE

For the items with asterisk (*) in the "CONTENTS" below, refer to the same section of the service manual mentioned in the "FOREWORD" of this manual.

Precautions

Precautions

Precautions for Steering (LT-A750XP/ZK9)

B931G46000002

Refer to “General Precautions in Section 00 in related manual” and “Precautions for EPS (LT-A750XP/ZK9) in Section 00 (Page 00-1)”.

Steering General Diagnosis

Diagnostic Information and Procedures

Steering Symptom Diagnosis (LT-A750XP/ZK9)

B931G46104002

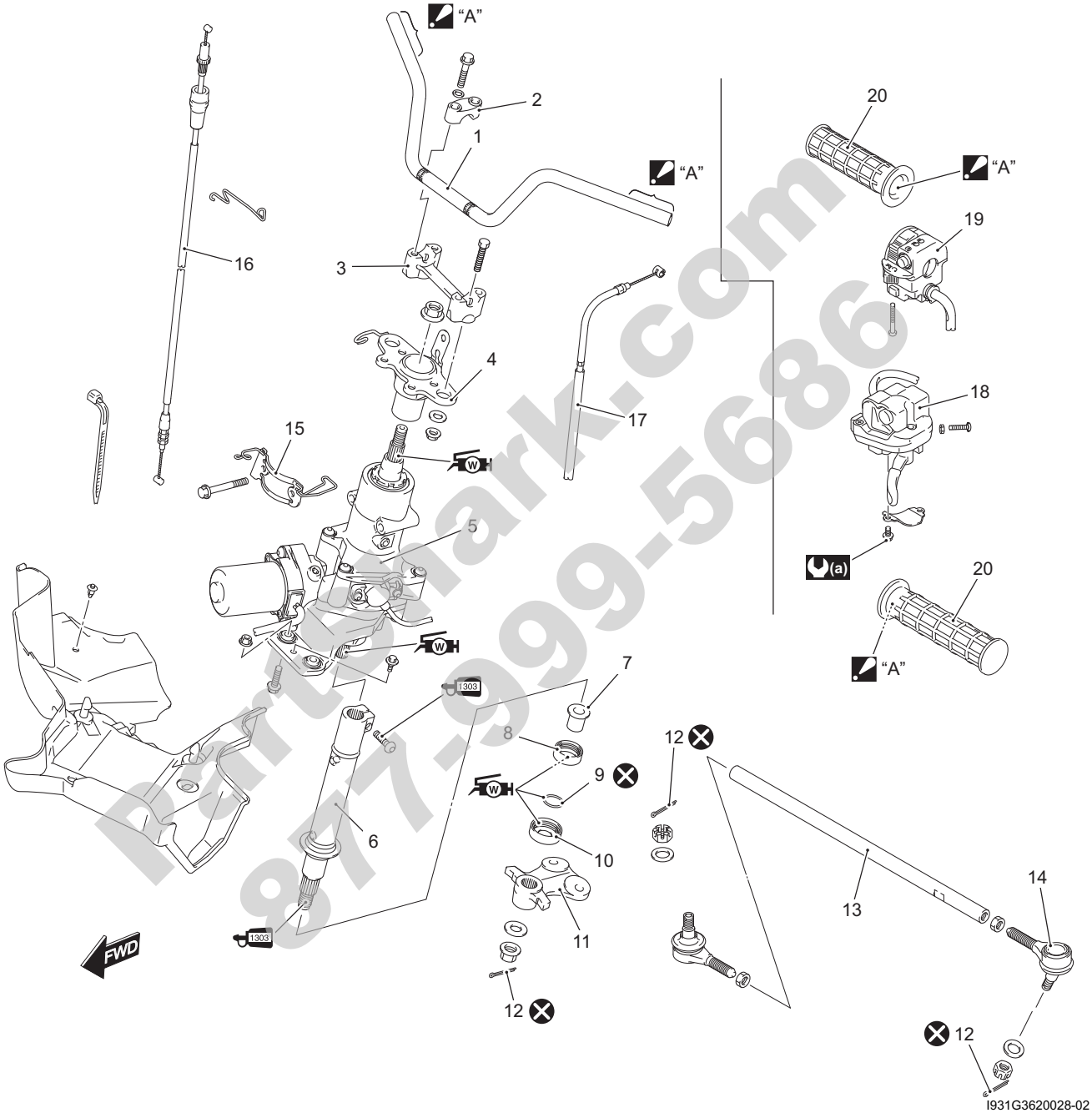
Condition	Possible cause	Correction / Reference Item
Heavy Steering	Distorted steering shaft.	*Replace.*
	Improper front wheel alignment.	*Adjust.*
	Insufficiently lubricated.	*Lubricate.*
	Not enough pressure in tires.	*Adjust.*
	Worn or incorrect tire or wrong tire pressure.	*Adjust or replace.*
	Malfunctioning EPS, if equipped.	Inspect EPS system.
Wobbly Handlebars	Distorted front steering shaft.	*Replace.*
	Crooked tire.	*Replace.*
	Worn or incorrect tire or wrong tire pressure.	*Adjust or replace.*
	Worn bearing/race in steering stem.	*Replace.*
	Worn steering shaft holder bushing.	*Replace.*
	Worn steering knuckle ends or ball stud.	*Replace.*
	Worn front wheel hub bearings.	*Replace.*

Steering / Handlebar

Repair Instructions

Steering / Handlebars Components (LT-A750XP/ZK9)

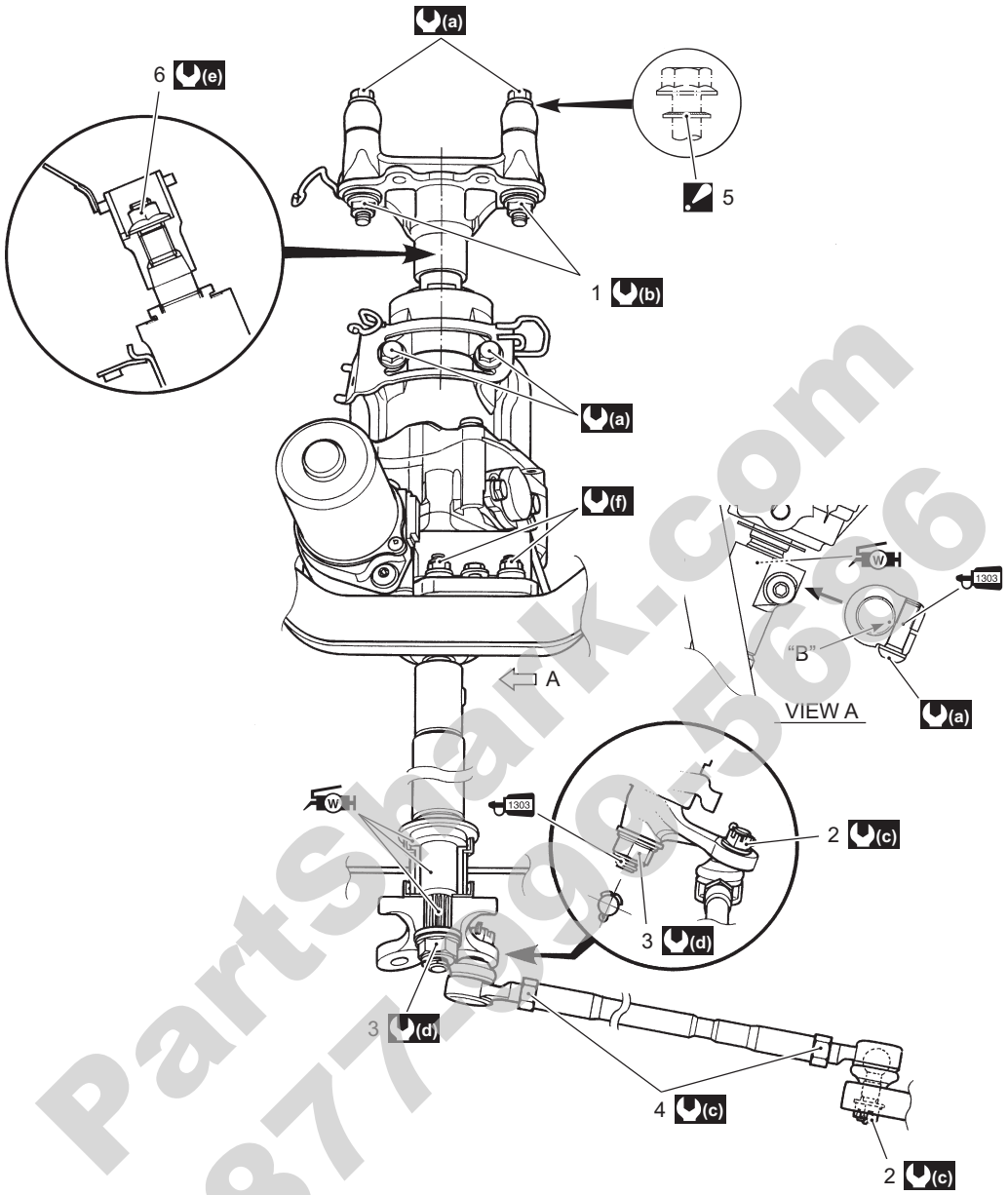
B931G46206008



1. Handlebars	10. Lower dust seal	19. Handlebar left switch assembly
2. Handlebar upper clamp	11. Steering arm plate	20. Handle grip
3. Handlebar holder	12. Cotter pin	"A": Apply grip bond.
4. Steering shaft plate	13. Tie-rod	(a): 4 N·m (0.4 kgf-m, 3.0 lbf-ft)
5. EPS body assembly	14. Tie-rod end	1303: Apply thread lock to the thread part.
6. Steering shaft	15. Cable guide	W: Apply water resistance grease.
7. Steering shaft bushing	16. Throttle cable	: Do not reuse.
8. Dust seal	17. Parking brake cable	
9. O-ring	18. Throttle case assembly	

Steering / Handlebars Assembly Construction (LT-A750XP/ZK9)

B931G46206009



I931H1620037-06

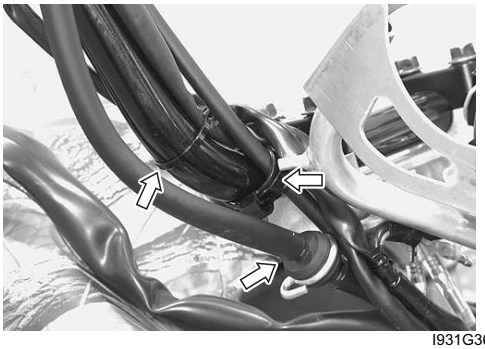
1. Handlebar holder nut	(b) : 60 N·m (6.0 kgf-m, 43.5 lbf-ft)
2. Tie-rod end nut	(c) : 29 N·m (2.9 kgf-m, 21.0 lbf-ft)
3. Steering shaft lower nut	(d) : 162 N·m (16.2 kgf-m, 117.0 lbf-ft)
4. Tie-rod nut	(e) : 120 N·m (12.0 kgf-m, 87.0 lbf-ft)
5. Washer : The conical side of washer faces outside.	(f) : 28 N·m (2.8 kgf-m, 20.0 lbf-ft)
6. Steering shaft upper nut	1303 : Apply thread lock to the thread part.
"B": Red mark	(W)H : Apply water resistance grease.
(a) : 26 N·m (2.6 kgf-m, 19.0 lbf-ft)	

Handlebars Removal and Installation (LT-A750XP/ZK9)

B931G46206010

Removal

1) Remove the auxiliary headlight cover. Refer to “Auxiliary Headlight Removal and Installation in Section 9B in related manual”
2) Remove the combination meter. Refer to “Combination Meter Removal and Installation in Section 9C in related manual”.
3) Remove the clamps.
4) Disconnect the brake hose from the hose guide.



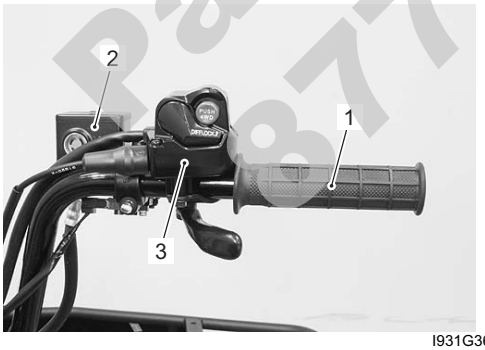
I931G3620001-01

5) Remove the following parts from the handlebars (right side).
   a) Right grip (1)
   b) Front brake master cylinder/Front brake lever (2)

⚠ CAUTION

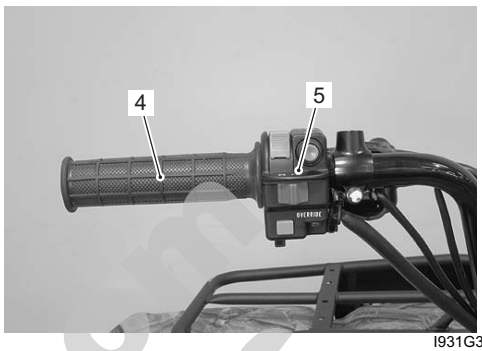
Do not turn the front brake master cylinder upside down.

   c) Throttle lever case (3)



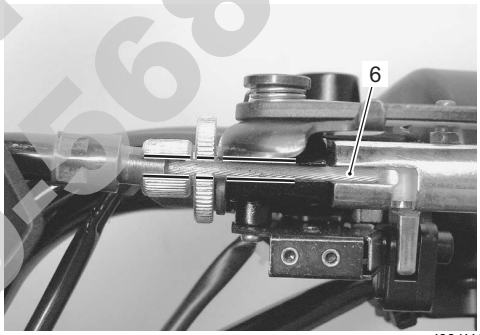
I931G3620002-01

6) Remove the following parts from left handlebars (left side).
   a) Left grip (4)
   b) Left switch box (5)
   c) Horn button (For P-17, 24)
   d) Emergency switch (For P-17)



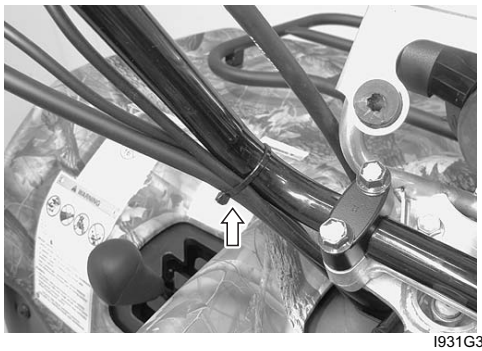
I931G3620003-01

7) Disconnect the parking brake cable (6) from left brake lever.



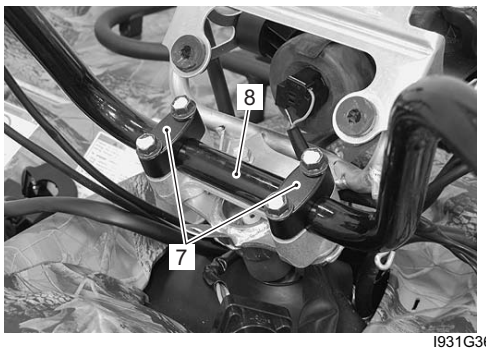
I931H1620004-01

8) Remove the clamp.



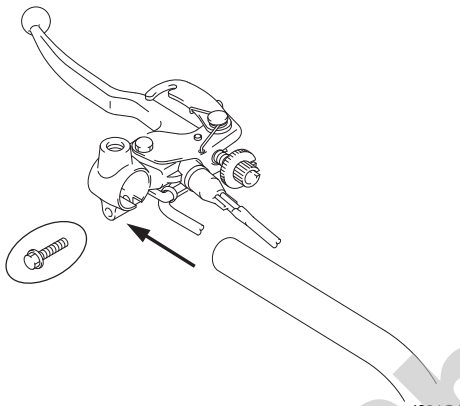
I931G3620004-01

9) Remove the handlebar upper clamps (7) and handlebars (8).



I931G3620027-01

10) Remove the left brake lever from the handlebars (left side).



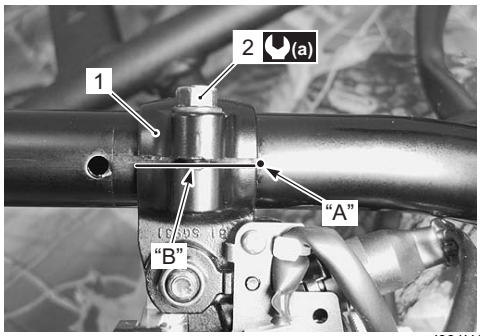
I831G1620006-05

Installation

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

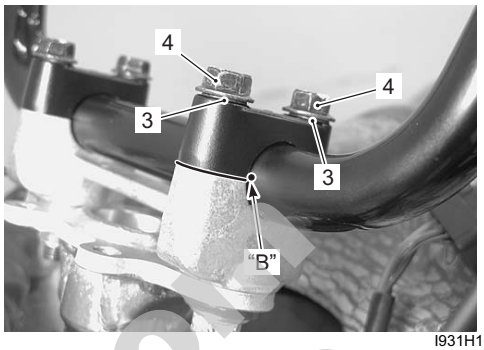
- Install the left brake lever (1) to the handlebars.
- Align the punch mark “A” on the handlebars with the mating surface “B” of rear brake lever (1).
- Tighten the rear brake lever holder clamp bolt (2) to the specified torque.

Tightening torque
Rear brake lever holder clamp bolt (a): 11 N·m (1.1 kgf-m, 8.0 lbf-ft)



I931H1620008-01

- Install the washers (3) and bolts (4) as shown in the steering/handlebars construction. Refer to “Steering / Handlebars Assembly Construction (LT-A750XP/ZK9) (Page 6B-2)”.
- Set the handlebars so that its punch mark “B” aligns with the mating surface of the left handlebar holder.



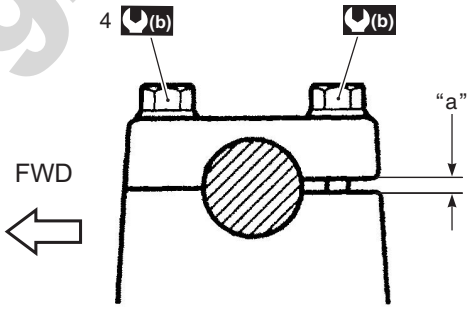
I931H1620009-02

- Tighten the handlebar clamp bolts (4) to the specified torque.

NOTE

First tighten the handlebar clamp bolts (4) (front ones) to the specified torque.

Tightening torque
Handlebar clamp bolt (b): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)

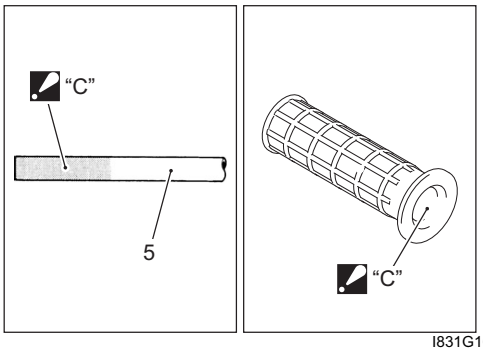


I931H1620010-01

“a”: Clearance

- Apply adhesive agent to the handlebar right and left end and right and left grip inner wall.

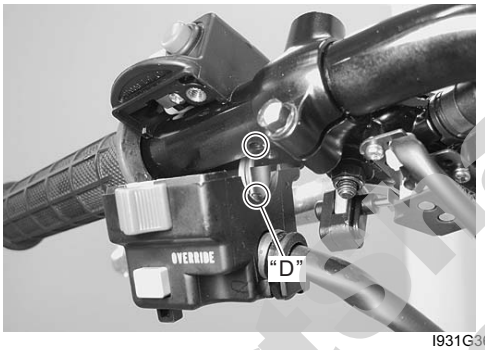
  BOND : Handle grip bond (Handle Grip Bond (commercially available))



I831G1620014-02

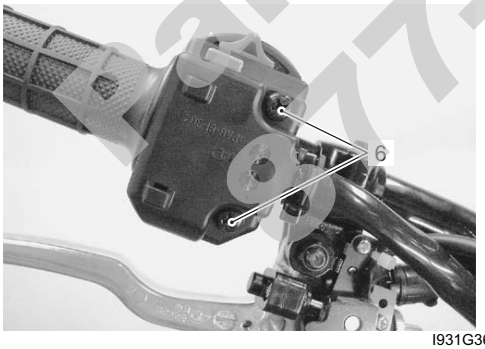
5.	Handlebar
"C":	Apply handle grip bond.

- Insert the projection "D" of the left handlebar switch assembly into the hole of the handlebars.



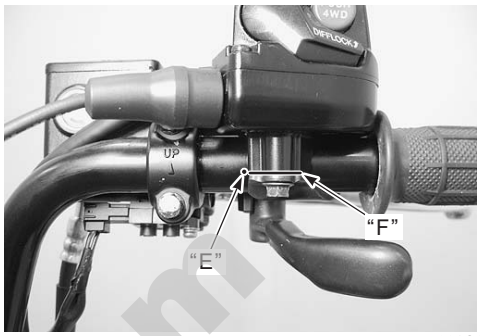
I931G3620005-01

- Tighten the left handlebar switch screws (6).



I931G3620006-01

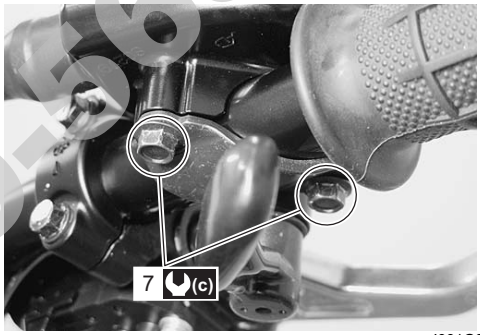
- Install the master cylinder. Refer to "Front Brake Master Cylinder Assembly Removal and Installation in Section 4A in related manual".
- Align the punch mark "E" on the handlebars with the mating surface "F" of the throttle lever case.



I931G3620007-01

- Tighten the throttle lever case bolts (7) to the specified torque.

  Tightening torque
  Throttle lever case bolt (c): 4 N·m (0.4 kgf-m, 3.0 lbf-ft)



I931G3620008-01

Handlebars Inspection (LT-A750XP/ZK9)

B931G46206011

Refer to "Handlebars Inspection in related manual".

Steering Shaft Removal and Installation (LT-A750XP/ZK9)

B931G46206012

Removal

1) Remove the EPS control unit. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) in Section 6C (Page 6C-48)”.
2) Remove the EPS body assembly. Refer to “EPS Body Assembly Removal and Installation (LT-A750XP/ZK9) in Section 6C (Page 6C-50)”.
3) Disconnect the tie-rod ends with the special tool. Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation in Section 2B in related manual”.

⚠ WARNING

When using the tie-rod end remover, keep clear of the tie-rod end because it may come loose with some force and could strike you.

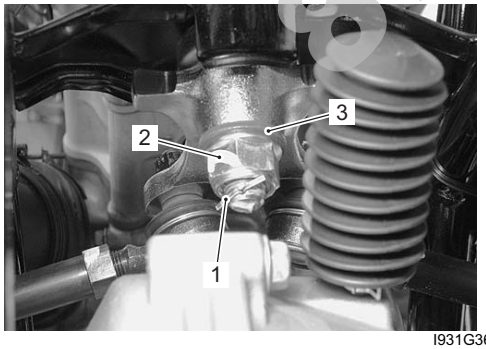
⚠ CAUTION

Make sure that the vehicle is supported securely.

Special tool
TOOL (A): 09942–72410 (Tie-rod end remover)

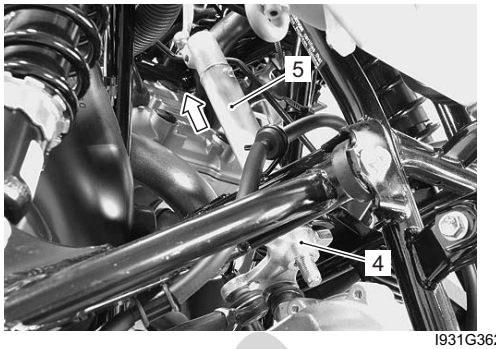
I931G3620009-01

4) Remove the cotter pin (1), nut (2) and washer (3).



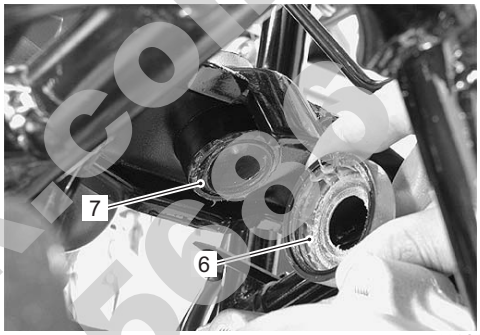
I931G3620010-01

5) Remove the steering arm plate (4) and steering shaft (5).



I931G3620011-01

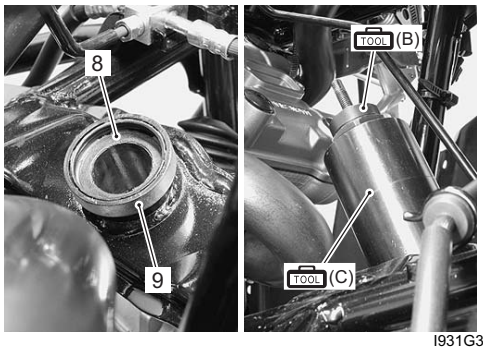
6) Remove the lower dust seal (6) and O-ring (7).



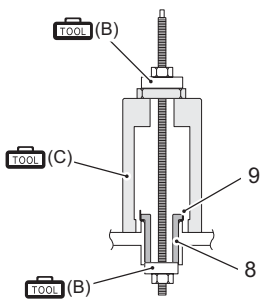
I931G3620012-01

7) Remove the steering shaft bushing (8) and dust seal (9) with the special tools and suitable socket wrench.

Special tool
TOOL (B): 09924–84521 (Bearing installer set)
TOOL (C): 09930–30721 (Rotor remover)



I931G3620013-02

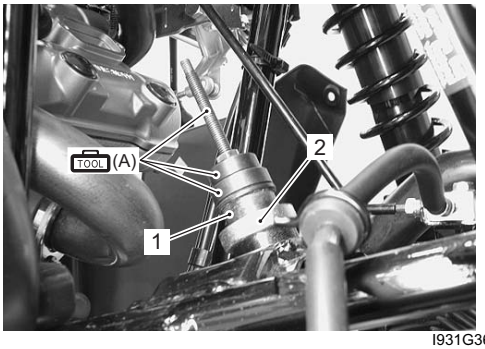


I931H1620020-02

Installation
Install the steering shaft in the reverse order of removal. Pay attention to the following points:

- Install the steering shaft bushing (1) along with dust seal (2) with the special tool.

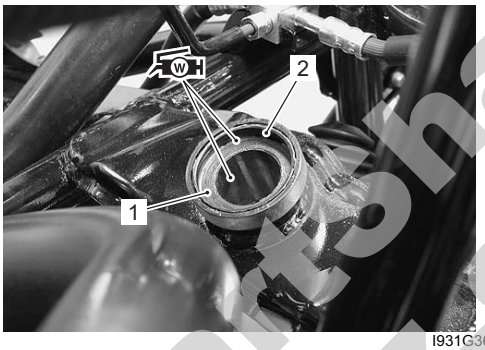
Special tool
TOOL (A): 09924–84521 (Bearing installer set)



I931G3620014-01

- Apply grease to the steering shaft bushing (1) and dust seal (2) and install them.

W/H : Grease 99000–25160 (Water resistance grease or equivalent)



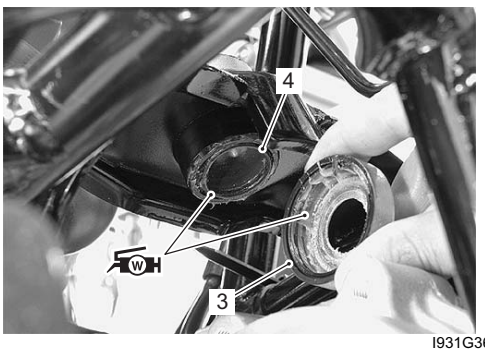
I931G3620015-01

- Apply grease to the lower dust seal (3) and O-ring (4).

⚠ CAUTION

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

W/H : Grease 99000–25160 (Water resistance grease or equivalent)



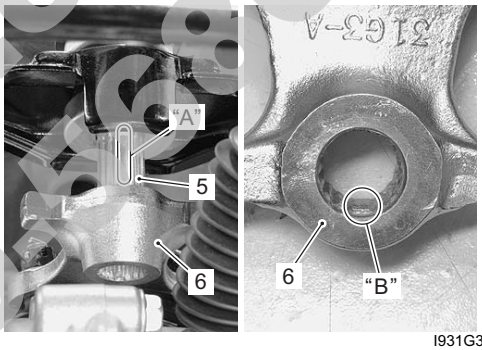
I931G3620016-01

- Apply grease to the steering shaft.

W/H : Grease 99000–25160 (Water resistance grease or equivalent)

I931G3620017-01

- Install the steering shaft.
- When installing the steering arm plate (5), align the wide spline “A” of steering shaft (6) with the wide spline “B” of steering arm plate (5).



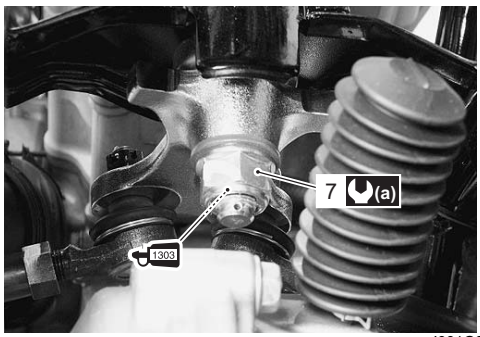
I931G3620018-01

- Apply a small quality thread lock to the thread part of steering shaft.

1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER “1303” or equivalent)

- Tighten the steering shaft lower nut (7) to the specified torque.

Tightening torque
Steering shaft lower nut (a): 162 N·m (16.2 kgf-m, 117.0 lbf-ft)

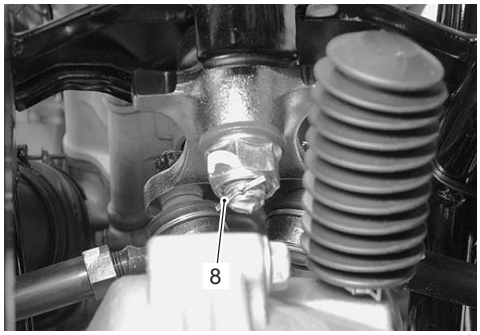


I931G3620019-01

- Install the cotter pin (8).

⚠ CAUTION

The removed cotter pin (8) must be replaced with a new one.



I931G3620020-01

- Install EPS body assembly. Refer to “EPS Body Assembly Removal and Installation (LT-A750XP/ZK9) in Section 6C (Page 6C-50)”.
- Install the EPS control unit. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) in Section 6C (Page 6C-48)”.
- Install the handlebars. Refer to “Handlebars Removal and Installation in related manual”.
- Install the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D in related manual”.
- Install the front wheels. Refer to “Front / Rear Wheel Removal and Installation in Section 2D in related manual”.
- After installing these parts, adjust the toe. Refer to “Toe Adjustment (LT-A750XP/ZK9) in Section 0B (Page 0B-2)”.

Tie-rod / Tie-rod End Removal and Installation (LT-A750XP/ZK9)

B931G46206013

⚠ WARNING

When using the tie-rod end remover, keep clear of the tie-rod end because it may come loose with some force and could strike you.

Removal

1) Remove the tie-rod end with the special tool. Refer to “Front Wheel Hub / Steering Knuckle Removal and Installation in Section 2B in related manual”.

Special tool
TOOL (A): 09942–72410 (Tie-rod end remover)

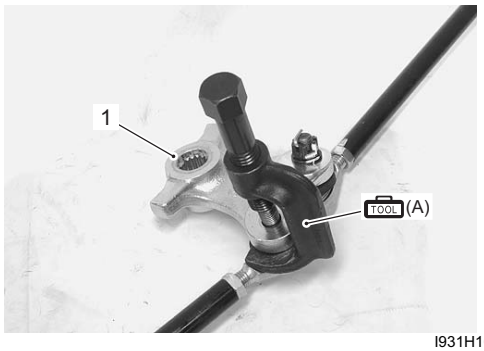
I931G3620021-01

2) Remove the cotter pin, tie-rod end nut and washer.

I931G3620022-01

3) Remove the steering arm plate (1) with a special tool.

Special tool
TOOL (A): 09942–72410 (Tie rod end remover)

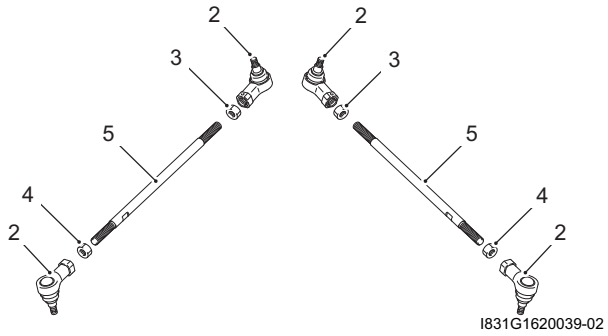


I931H1620030-01

4) Remove the other tie-rod end in the same manner as described previously.
5) Separate the tie-rod ends (2), nuts (3), (4) and tie-rods (5).

⚠ CAUTION

The lock-nuts (3) have left-hand threads.



I831G1620039-02

Installation
Install the tie-rod in the reverse order of removal. Pay attention to the following points:

- When installing the tie-rods, make sure the short side "a" of tie-rod come outside.
- Push the tie-rod to tie-rod lock-nut tightening direction.
- Tighten the lock-nuts to the specification.

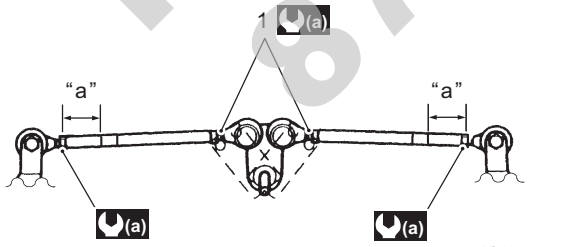
⚠ CAUTION

When tightening the lock-nuts, hold the tie-rod end with a open end wrench.

NOTE

The lock-nuts (1) have left-hand threads.

Tightening torque
Tie-rod lock-nut (a): 29 N·m (2.9 kgf-m, 21.0 lbf-ft)



I831G1620040-03

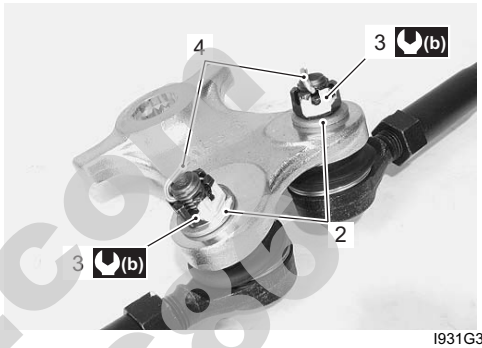
- Install the washers (2) and tighten the rod end nuts (3) (steering arm plate side) to the specified torque.

Tightening torque
Tie-rod end nut (b): 29 N·m (2.9 kgf-m, 21.0 lbf-ft)

- Install the cotter pins (4).

⚠ CAUTION

The removed cotter pins (4) must be replaced with new ones.



I931G3620023-01

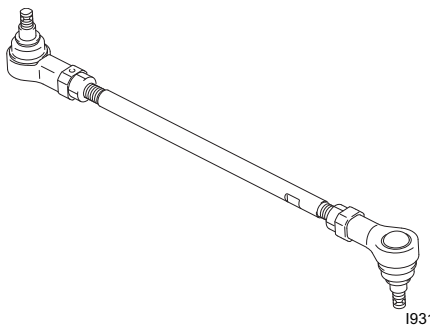
- Install the tie-rod ends (steering knuckle side). Refer to "Front Wheel Hub / Steering Knuckle Removal and Installation in Section 2B in related manual".
- After installed wheels, inspect the toe-out. If the toe-out is out of specification, bring it into the specified range. Refer to "Steering System Inspection in Section 0B in related manual" and "Toe Adjustment (LT-A750XP/ZK9) in Section 0B (Page 0B-2)".

Steering Related Parts Inspection (LT-A750XP/ZK9)

B931G46206014

Refer to "Steering Shaft Removal and Installation (LT-A750XP/ZK9) (Page 6B-6)" and "Tie-rod / Tie-rod End Removal and Installation (LT-A750XP/ZK9) (Page 6B-8)".

Tie-rod
Inspect the tie-rod for distortion or damage. If any defects are found, replace the tie-rod with a new one.


I931G3620024-01

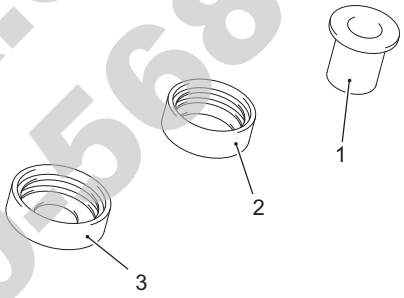
Tie-rod End
Inspect the tie-rod ends for smooth movement. If there are any abnormalities, replace the tie-rod ends with new ones. Inspect the tie-rod end boots for wear or damage. If any defects are found, replace the tie-rod ends with new ones.

I931G3620025-01

Steering Shaft
Inspect the steering shaft for distortion or bend. If any defects are found, replace the steering shaft with a new one.

I931H1620034-01

Steering Shaft Bushing and Dust Seal
Inspect the steering shaft bushing (1), dust seal (2) and lower dust seal (3) for wear or damage. If any defects are found, replace them with new ones.



I931H1620035-01

Specifications

Service Data (LT-A750XP/ZK9)

B931G46207002

Wheel

Item	Standard	Limit
Steering angle	46° (right & left)	—
Turning radius	3.1 m (10.2 ft)	—
Toe-out (with 75 kg, 165 lbs)	5 ± 4 mm (0.20 ± 0.16 in)	—
Camber	–1.3°	—
Caster	3.3°	—

Tightening Torque Specifications

B931G46207003

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
Rear brake lever holder clamp bolt	11	1.1	8.0	☞(Page 6B-4)
Handlebar clamp bolt	26	2.6	19.0	☞(Page 6B-4)
Throttle lever case bolt	4	0.4	3.0	☞(Page 6B-5)
Steering shaft lower nut	162	16.2	117.0	☞(Page 6B-7)
Tie-rod lock-nut	29	2.9	21.0	☞(Page 6B-9)
Tie-rod end nut	29	2.9	21.0	☞(Page 6B-9)

NOTE

The specified tightening torque is described in the following.
“Steering / Handlebars Components (LT-A750XP/ZK9) (Page 6B-1)”
“Steering / Handlebars Assembly Construction (LT-A750XP/ZK9) (Page 6B-2)”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Tightening Torque List (LT-A750XP/ZK9) in Section 0C (Page 0C-7)”.

Special Tools and Equipment

Recommended Service Material

B931G46208001

Material	SUZUKI recommended product or Specification		Note
Grease	Water resistance grease or equivalent	P/No.: 99000–25160	☞(Page 6B-7) / ☞(Page 6B-7) / ☞(Page 6B-7)
Handle grip bond	Handle Grip Bond (commercially available)	—	☞(Page 6B-5)
Thread lock cement	THREAD LOCK CEMENT SUPER “1303” or equivalent	P/No.: 99000–32030	☞(Page 6B-7)

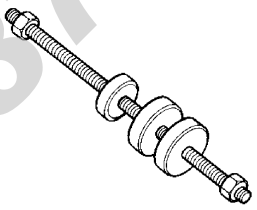
NOTE

Required service material is also described in the following.
“Steering / Handlebars Components (LT-A750XP/ZK9) (Page 6B-1)”
“Steering / Handlebars Assembly Construction (LT-A750XP/ZK9) (Page 6B-2)”

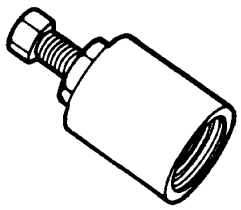
Special Tool

B931G46208002

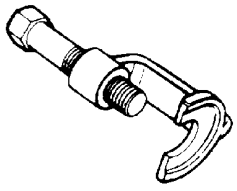
09924–84521
Bearing installer set
☞(Page 6B-6) / ☞(Page 6B-7)



09930–30721
Rotor remover
☞(Page 6B-6)



09942–72410
Tie-rod end remover
☞(Page 6B-6) / ☞(Page 6B-8) / ☞(Page 6B-8)



Power Assisted Steering System

Precautions

Precautions for EPS (LT-A750XP/ZK9)

B931G46300001

Refer to “General Precautions in Section 00 in related manual” and “Precautions for EPS (LT-A750XP/ZK9) in Section 00 (Page 00-1)”.

NOTE

When repairing EPS system, remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D in related manual”.

P/S System Note (LT-A750XP/ZK9)

B931G46300002

⚠ CAUTION

Never remove the torque sensor to prevent accident and damage.

NOTE

EPS body assembly fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

Precautions in Diagnosing Troubles (LT-A750XP/ZK9)

B931G46300003

- Take a note of DTC indicated on the SDS tool or EPS indicator light.
- Before inspection, be sure to read “Precautions for Electrical Circuit Service in Section 00 in related manual” and “Precautions for EPS (LT-A750XP/ZK9) in Section 00 (Page 00-1)” and understand what is written there.
- DTC C1122 (engine speed signal failure) is indicated when ignition switch is at ON position and engine is not running, but it means there is nothing abnormal if indication changes to a normal one when engine is started.
- As DTC is stored in memory of the EPS control unit, be sure to clear memory after repair by performing the procedure described in “DTC (Diagnostic Trouble Code) Deleting (LT-A750XP/ZK9) (Page 6C-21)”.

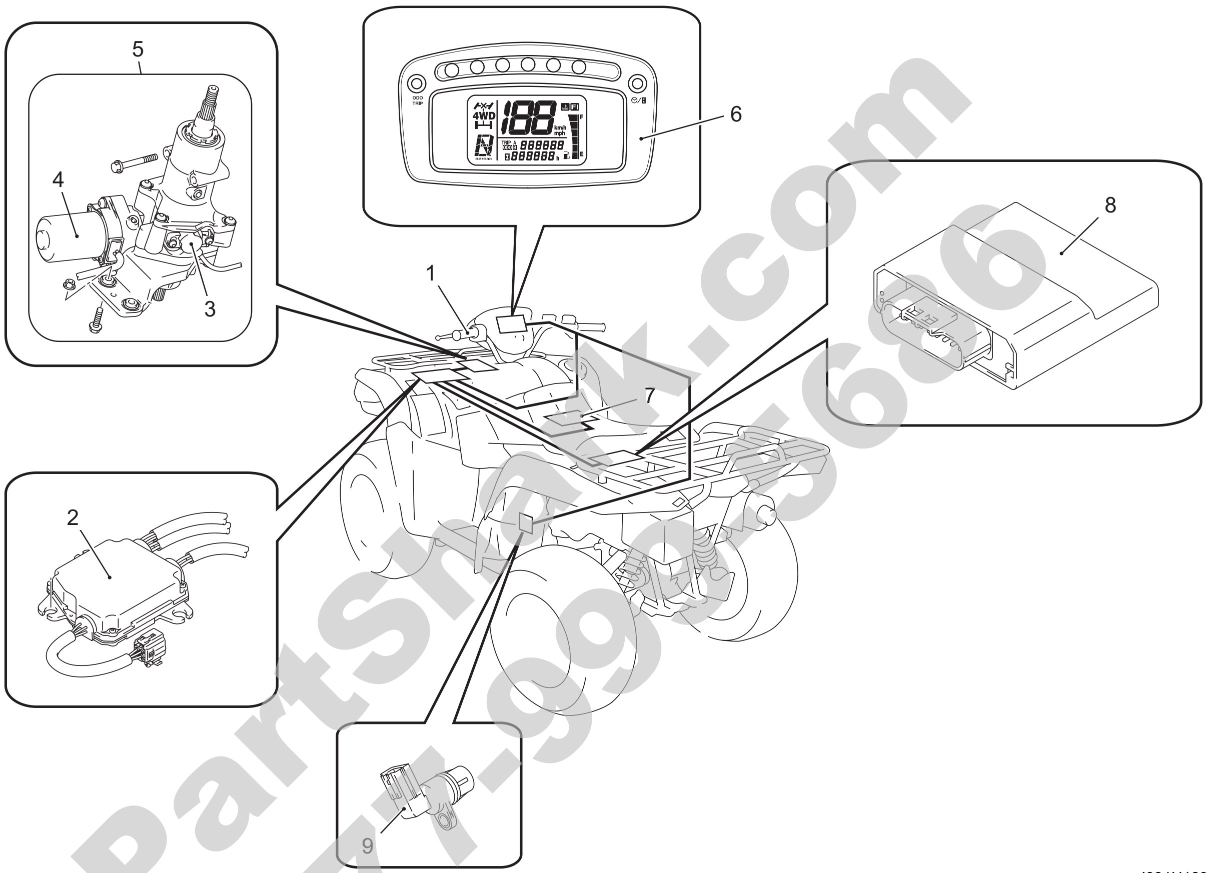
General Description

P/S System Description (LT-A750XP/ZK9)

B931G46301001

This electronic power steering (EPS) system consists of a EPS control unit (2), a torque sensor (3), a EPS motor (4). In this system, the EPS control unit determines the level and direction of the assist force for the handlebars (1) according to the signal from the torque sensor and the vehicle speed signal from speed sensor (9). The EPS control unit runs the motor so as to assist the operation of the handlebars (1). Take a note of DTC indicated on the EPS indicator light.

The EPS diagnoses troubles which may occur in the area including the following components when the ignition switch is ON and the engine is running. When the EPS control unit detects any malfunction, it stops the motor operation.



I931H1630001-04

1. Handlebars	3. Torque sensor	5. EPS body assembly	7. Battery	9. Speed sensor
2. EPS control unit	4. EPS motor	6. Combination meter	8. ECM	

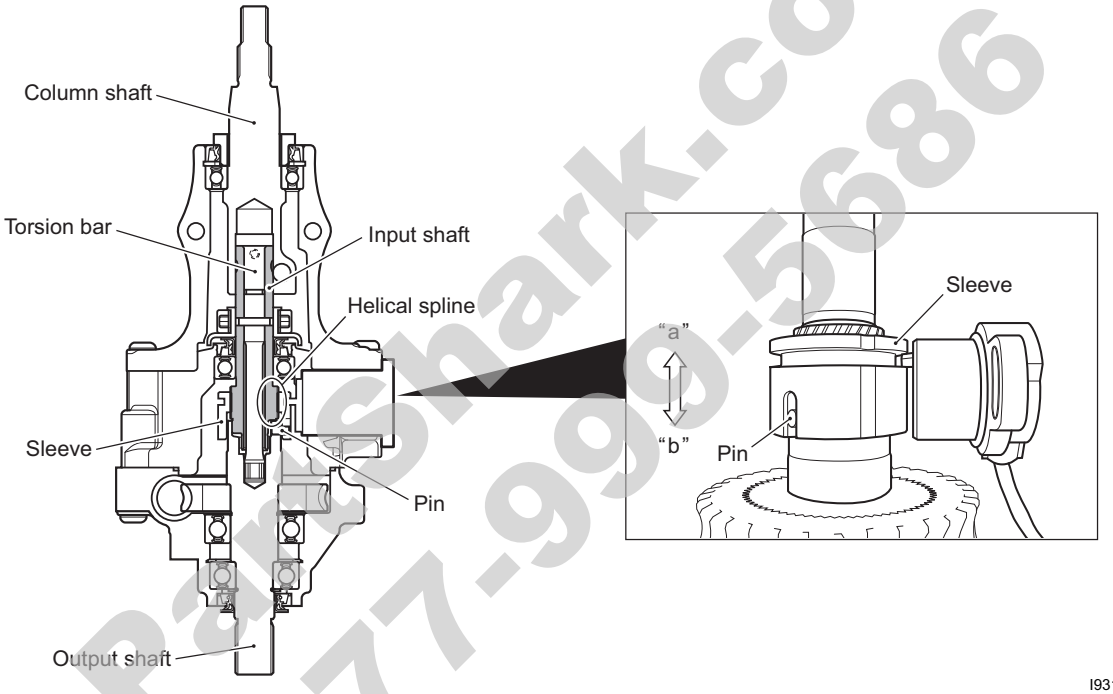
Detecting Principle

The column shaft is connected to the input shaft by means of serration. The output shaft and input shaft are connected via torsion bar. When torque is inputted from the column shaft, a relative angular displacement occurs between the input shaft and the output shaft due to twist of the torsion bar. As the sleeve is engaged with a fixed pin, such an angular displacement of the sleeve is converted to a linear displacement due to helical spline arrangement.

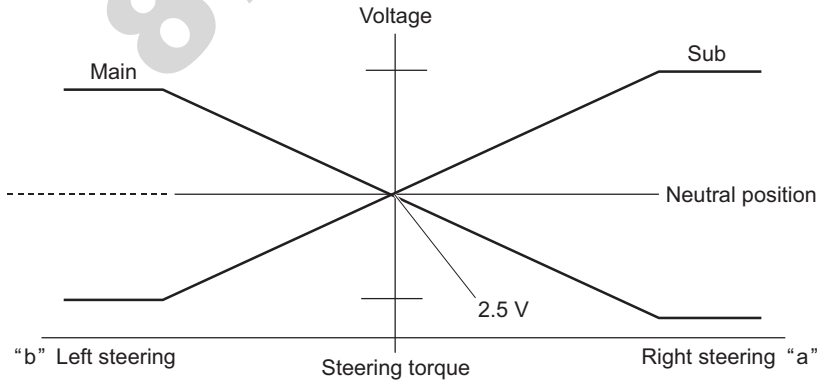
By the return spring of torque sensor lever, the sleeve is always forced to one side within its annular groove. The sleeve's linear displacement causes the torque sensor lever to turn, which is then converted to a voltage signal to supply to EPS control unit.

The torque sensor is a double circuit of main and sub, when the handlebars is in neutral position (no torsional torque applied to the steering wheel), each torque sensor (main and sub) output is 2.5 V and in this state the EPS control unit determines the steering torque as 0. During operating the handlebars, the EPS control unit processes the main torque sensor input signal to determine the steering torque required for the current condition. The relation between the steering direction of the EPS control unit and the output voltage is as follows: The direction is determined to be right turn steering “a” if the main torque sensor output voltage is lower than 2.5 V and to be left turn steering if the voltage is higher than 2.5 V for controlling the steering direction in the case of normal steering operation.

Conversely, the direction is determined to be left turn steering “b” if the sub torque sensor output voltage is lower than 2.5 V and to be right turn steering if the voltage is higher than 2.5 V for controlling the steering direction.



I931H1630002-05

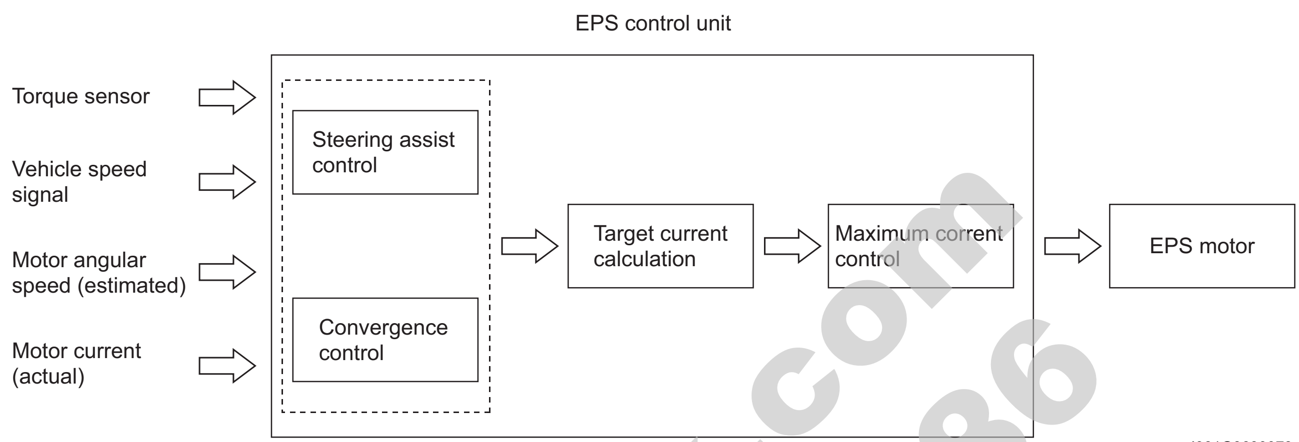


I931H1630003-02

Control System

In the EPS control unit, the steering assist control determines the basic power assist force and the convergence control improves the steering operation feeling. The controller determines the target motor current by the calculation of these controls and the maximum current limiting control and it also regulates the motor current so that the target motor current and the actual current are matched.

Power steering control input / output flow chart



I931G3630073-01

Control	Description
Steering assist control	This control determines the steering assist current on the basis of steering torque as detected by the torque sensor and of speed signal supplied from the speed sensor. This is the fundamental control necessary for the P/S system.
Convergence control	This control prevents convergence from deteriorating at a high speed by making current (compensating current) flow in the direction to keep the steering from turning, thereby improving vehicle maneuvering stability.
Maximum current control	If the steering input is sustained at a standstill, the motor continues to draw the maximum current for full-assist and the motor and EPS control unit may get overheated. To prevent this condition from occurring, this control limits and gradually reduces the maximum current flowing through the motor.
Failsafe control	In the EPS control unit, a failsafe function is integrated in the motor circuit for the purpose of safety. With the failsafe circuit in normal condition, the system is ON for the motor to draw current. If an abnormal condition is detected in the P/S system by the self-diagnostic function, the system turns OFF the circuit to interrupt the current supply to the motor so that the system can stop operation. Refer to "Fail-safe Function Description (LT-A750XP/ZK9) (Page 6C-5)".

EPS Diagnosis General Description (LT-A750XP/ZK9)

B931G46301002

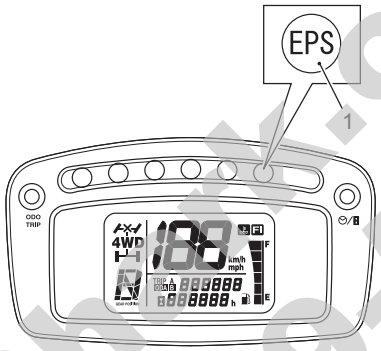
The P/S system in this vehicle is controlled by the EPS control unit. The EPS control unit has an self diagnostic system which detects a malfunction in this system. When diagnosing troubles, be sure to have full understanding of the outline of “Self Diagnostic System Description (LT-A750XP/ZK9) (Page 6C-5)” and each item in “Precautions in Diagnosing Troubles (LT-A750XP/ZK9) (Page 6C-1)”, and then execute diagnosis according to “EPS System Check (LT-A750XP/ZK9) (Page 6C-12)”.

Self Diagnostic System Description (LT-A750XP/ZK9)

B931G46301003

The EPS control unit performs the self diagnosis on the system and operates the “EPS” warning light (1) as follows.

- The “EPS” warning light lights when the ignition switch is turned to ON position (but the engine at stop) regardless of the condition of the P/S control system. This is only to check if the “EPS” warning light is operated properly.
- If the areas monitored by the EPS control unit is free from any trouble after the engine start (while engine is running), the “EPS” warning light turns OFF.
- When the EPS control unit detects a trouble which has occurred in the monitored areas the “EPS” warning light comes ON while the engine is running to warn the driver of such occurrence of the trouble and at the same time it stores the exact trouble area in memory inside of the EPS control unit.



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Fail-safe Function Description (LT-A750XP/ZK9)

B931G46301004

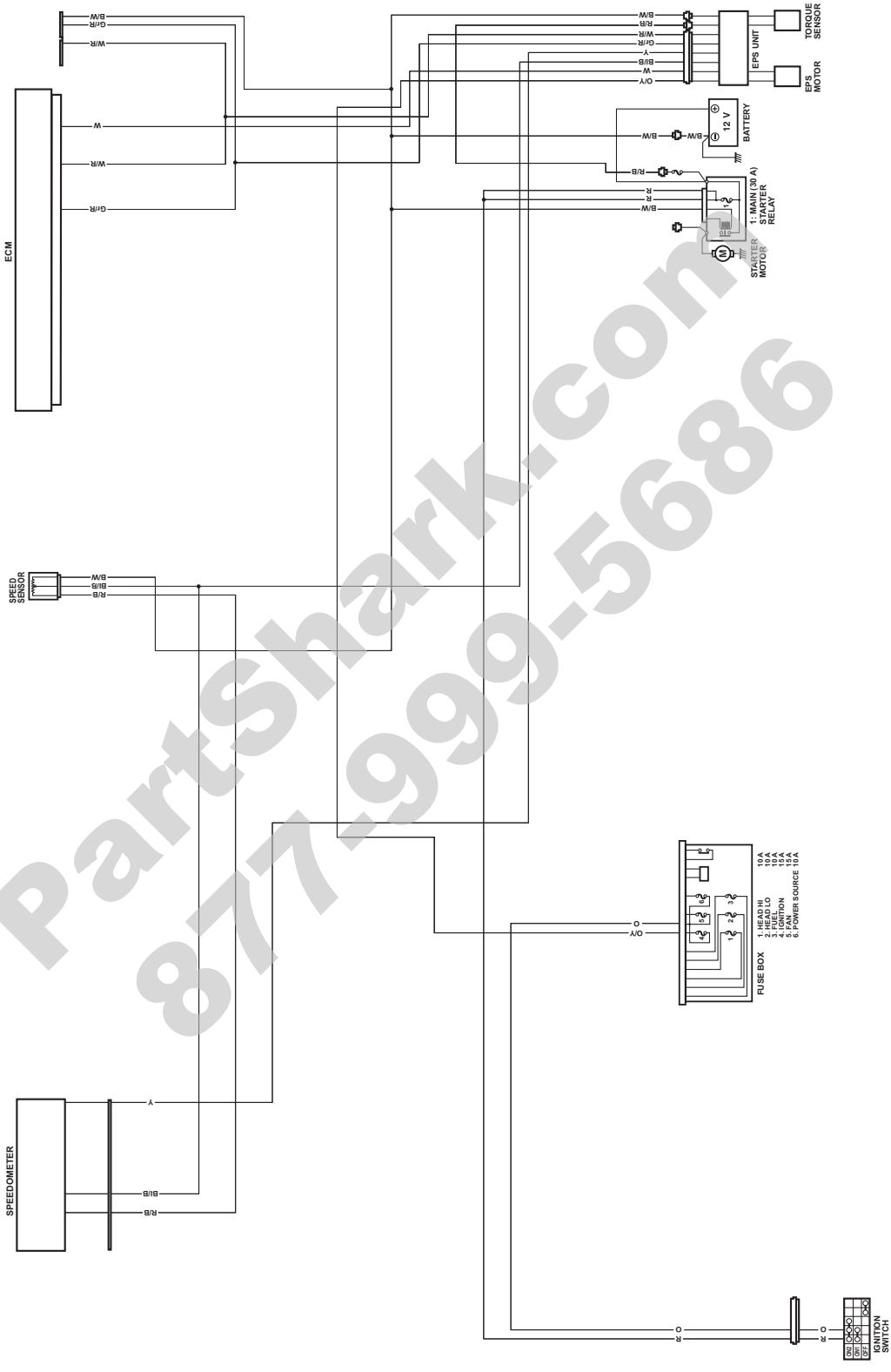
If malfunction occurs in the EPS system, this sets fail-safe relay OFF. Consequently, the indicator light ON, and no current will be applied to motor solenoid valve inactivating EPS and turning EPS indicator light ON. In this case, it functions as the normal steering. If malfunctions occurs while EPS is being activated, the fail-safe relay will be set OFF. Refer to “EPS Control Unit Diagram (LT-A750XP/ZK9) (Page 6C-7)”.

Schematic and Routing Diagram

EPS Wiring Diagram (LT-A750XP/ZK9)

B931G46302001

Refer to “Wire Color Symbols in Section 0A in related manual”.

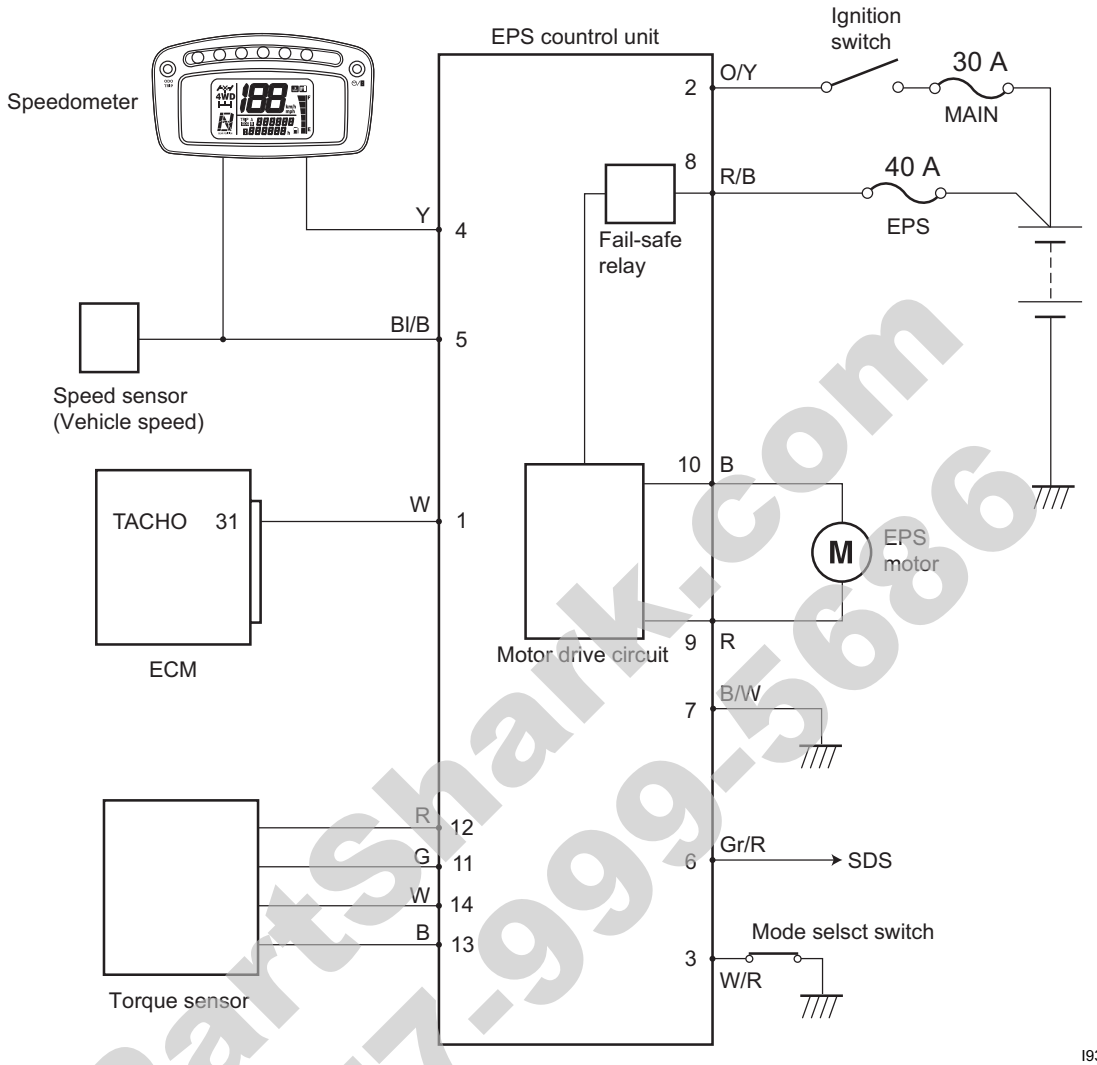


I931G3630070-01

EPS Control Unit Diagram (LT-A750XP/ZK9)

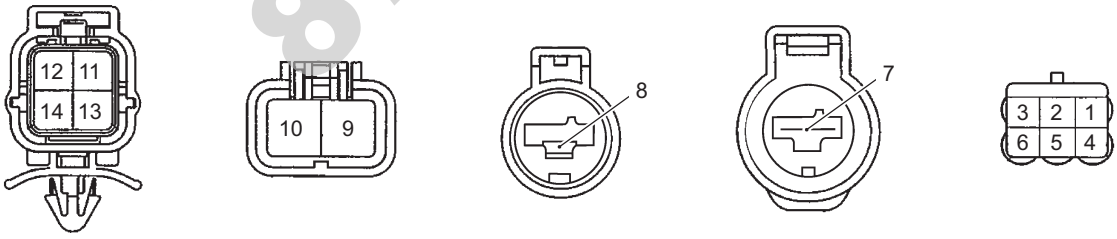
B931G46302002

Refer to “Wire Color Symbols in Section 0A in related manual”.



I931G3630071-01

EPS control unit coupler (EPS control unit harness end)



I931H1630092-01

1. Engine speed signal	8. Power source
2. Ignition signal for EPS control unit	9. Motor output (–)
3. Mode select switch	10. Motor output (+)
4. “EPS” warning light	11. Torque sensor signal (Main)
5. Vehicle speed signal	12. Power supply for torque sensor
6. SDS	13. Ground for torque sensor
7. Ground for EPS control unit	14. Torque sensor signal (Sub)

EPS System Wiring Harness Routing Diagram (LT-A750XP/ZK9)

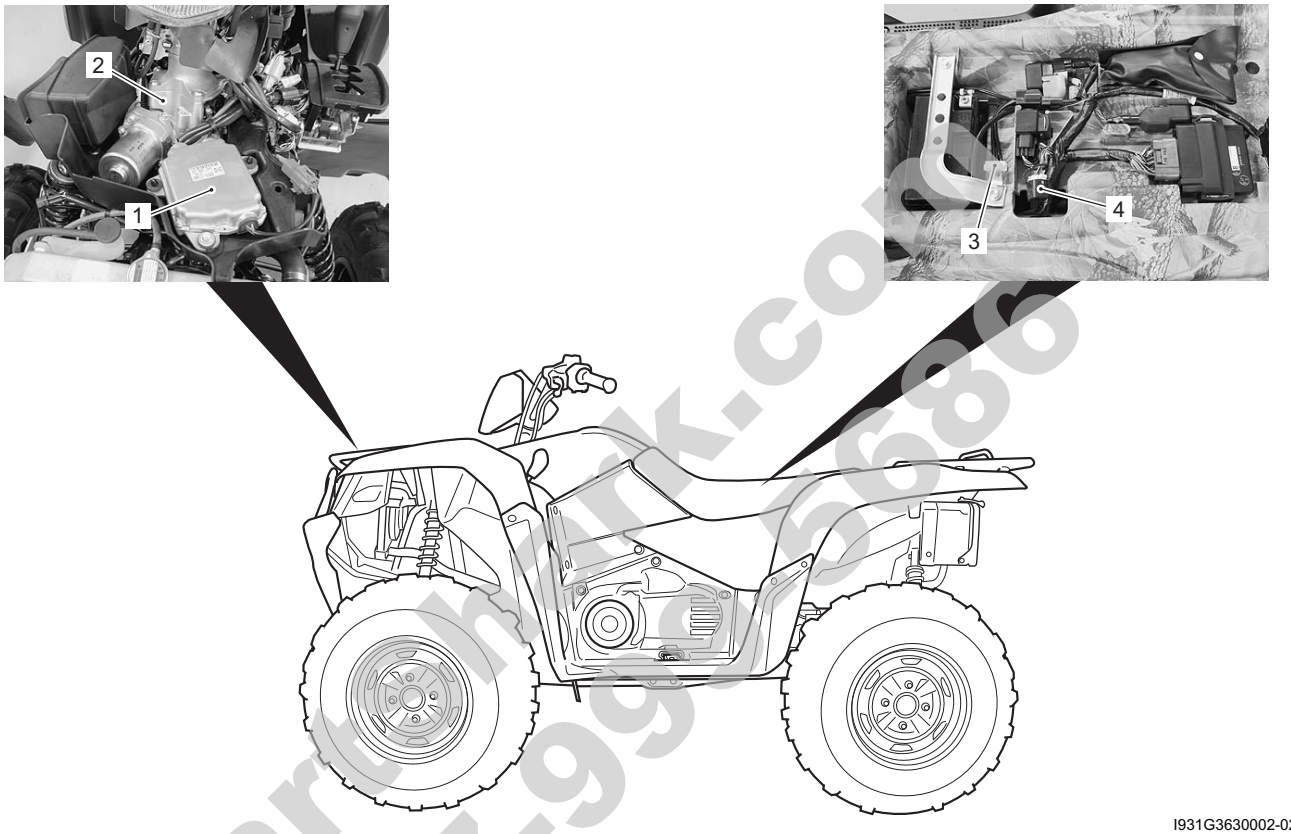
B931G46302003

Refer to “Wiring Harness Routing Diagram (LT-A750XP/ZK9) in Section 9A (Page 9A-4)”.

Component Location

EPS Components Location (LT-A750XP/ZK9)

B931G46303001



I931G3630002-02

1. EPS control unit	3. Fuse (EPS)
2. EPS body assembly	4. Mode select coupler

Diagnostic Information and Procedures

EPS Troubleshooting (LT-A750XP/ZK9)

B931G46304001

The EPS is equipped with a self-diagnosis function. The detected malfunction is stored as a diagnostic trouble code which causes the EPS indicator light to light up or flash in set patterns to indicate the malfunction. Diagnostic trouble codes saved in the memory remain stored even through the ignition switch is turned OFF and they cannot be deleted without performing the DTC erasing procedure. In order to repair the EPS correctly, ask the customer for the exact circumstances under which the malfunction occurred, then check the EPS indicator light and the output diagnostic trouble codes. Explain to the customer that depending on how the vehicle is operated, the EPS indicator light may light up even though the EPS is operating correctly.

Troubleshooting Procedure

Troubleshooting should be proceed as follows. If the order is performed incorrectly or any part is omitted, an error in misdiagnosis may result.

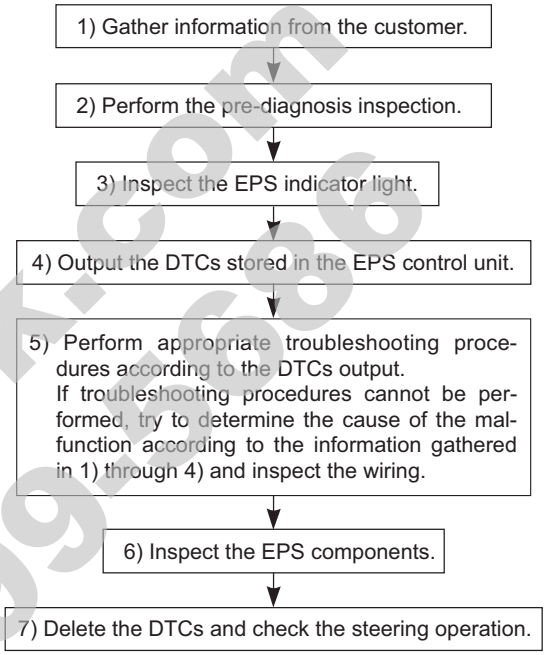
1) Gather information from the customer.
2) Perform the pre-diagnosis inspection. Refer to “Pre-diagnosis Inspection (LT-A750XP/ZK9) (Page 6C-10)”.
3) Inspect the EPS indicator light. Refer to “EPS System Check (LT-A750XP/ZK9) (Page 6C-12)”.
4) Output the DTCs stored in the EPS control unit. Refer to “DTC (Diagnostic Trouble Code) Output (LT-A750XP/ZK9) (Page 6C-19)”.
5) Perform appropriate troubleshooting procedures according to the DTCs output. Refer to “DTC Table (LT-A750XP/ZK9) (Page 6C-25)”.
   If troubleshooting procedures cannot be performed, try to determine the cause of the malfunction according to the information gathered in 1) through 4) and inspect the wiring. Refer to “EPS Wiring Diagram (LT-A750XP/ZK9) (Page 6C-6)” and “EPS Control Unit Diagram (LT-A750XP/ZK9) (Page 6C-7)”.

⚠ CAUTION

Each time a resistance is measured, the ignition switch should be set to OFF.

6) Inspect the EPS components. Refer to “EPS Motor Inspection (LT-A750XP/ZK9) (Page 6C-53)”.
7) Delete the DTCs and check the power steering operation. Refer to “DTC (Diagnostic Trouble Code) Deleting (LT-A750XP/ZK9) (Page 6C-21)”.

Basic Troubleshooting Diagram



I931G3630069-01

Information Gathering
To properly diagnose a malfunction, one must not make guesses or assumptions about the circumstances that caused it. Proper diagnosis and repair require duplicating the situation in which the malfunction occurred. If a diagnosis is made without duplicating the malfunction, even an experienced service technician may make a misdiagnosis and not perform the servicing procedure correctly, resulting in the malfunction not being repaired. Therefore, in order to properly diagnose and repair the vehicle, the customer must be questioned about the conditions at the time that the malfunction occurred making “Information gathering” very important. In order that the information obtained from the customer to be used as a reference during troubleshooting, it is necessary to ask certain important questions concerning the malfunction. Therefore, a questionnaire has been created to improve the information-gathering procedure.

EXAMPLE: CUSTOMER PROBLEM INSPECTION FORM

Customer’s name:	Model:	VIN:	
Date of issue:	Date Reg.	Date of problem:	Mileage:

Problem Symptoms	• Handlebars feels heavy • Vehicle pulls to one side during straight driving • Poor recovery from turns • Too much play in steering • Abnormal noise while vehicle is running: from motor, other _____ • Other _____
Frequency of Occurrence	• Continuous/Intermittent (times a day, a month)/other _____
Conditions for Occurrence of Problem	• Vehicle at stop & ignition switch ON: • When starting: at initial start only/at every start/Other _____ • Vehicle speed while: while accelerating/while decelerating/at stop/ while turning/while running at constant speed/ other _____ • Road surface condition: Paved road/rough road/snow-covered road/other _____ • Chain equipment:
Environmental Condition	• Weather: fair/cloudy/rain/snow/other _____ • Temperature: °F (°C)
DTC	• First check: Normal code/malfunction code ( ) • Second check after driving test: Normal code/malfunction code ( )

I931H1630009-03

NOTE

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

Pre-diagnosis Inspection (LT-A750XP/ZK9)

B931G46304002

The mechanical of the steering system should be inspected prior to performing any electrical checks. These inspections may find problems that the EPS could not detect; thus, shortening repair time.

Tire
Tire type

Tire type
Front: DUNLOP KT411
Rear: DUNLOP KT415

Tire pressure
Refer to “Tire Inspection in Section 0B in related manual”.

⚠ CAUTION

The standard tire fitted on this vehicle is AT25 x 8 – 12 ☆☆ for front and AT25 x 10 – 12 for rear. The use of tires other than those specified may cause instability. It is highly recommended to use a SUZUKI Genuine Tire.

Steering Related Parts
Refer to “Steering Parts Inspection in Section 6B in related manual”.

Battery

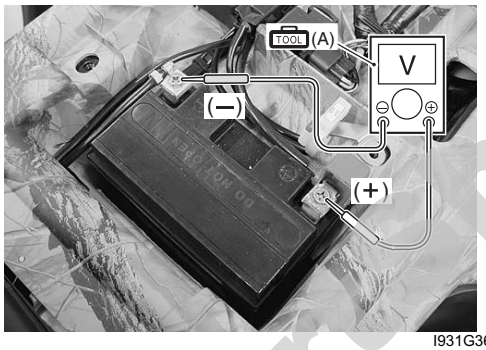
Battery voltage inspection

1) Turn the ignition switch OFF.
2) Remove the seat. Refer to “Seat Removal and Installation in Section 9D in related manual”.
3) Measure the voltage between the (+) and (–) battery terminals using the multi circuit tester.
   If the voltage is less than 12.0 V, charge or replace the battery and inspect the charging system. Refer to “Battery Runs Down Quickly in Section 1J in related manual”.

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

   Tester knob indication
   Voltage (⎓)

   Battery voltage
   12.0 V and more



I931G3630003-01

4) Reinstall the seat.

EPS control unit ground wire inspection

1) Turn the ignition switch OFF.
2) Remove the seat. Refer to “Seat Removal and Installation in Section 9D in related manual”.
3) Disconnect the battery (–) lead wire.


I931G3630004-01

4) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D in related manual”.
5) Disconnect the EPS control unit coupler (1).

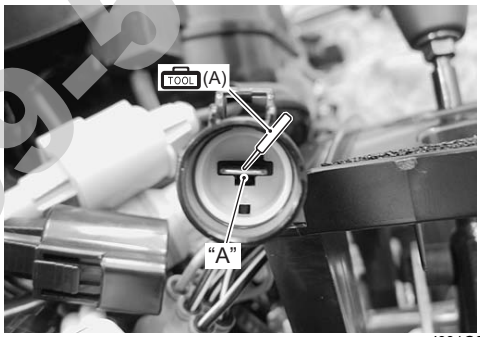
I931G3630005-01

6) Check for continuity between terminal “A” at the coupler and the battery (–) terminal.

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

   Tester knob indication
   Continuity (•)))

   EPS control unit coupler (Vehicle harness end)



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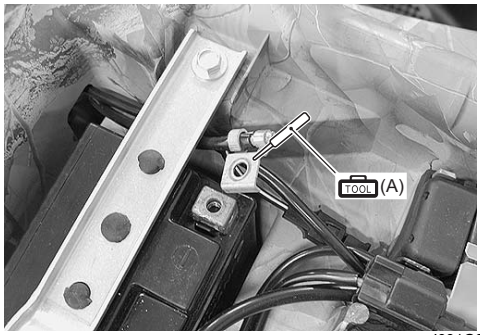


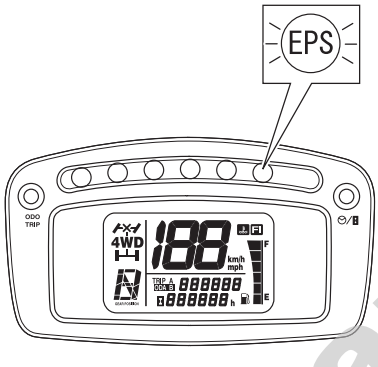
I931G3630007-01

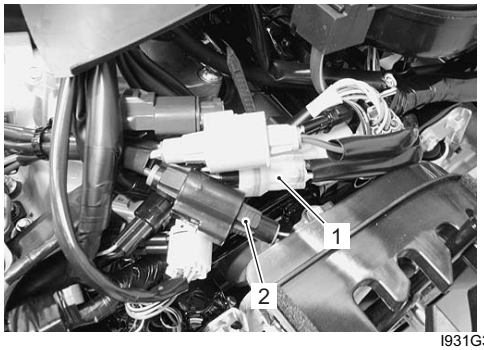
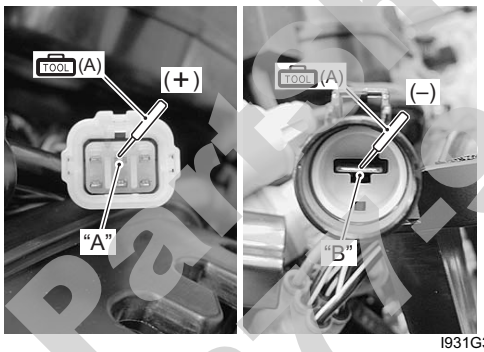
EPS System Check (LT-A750XP/ZK9)

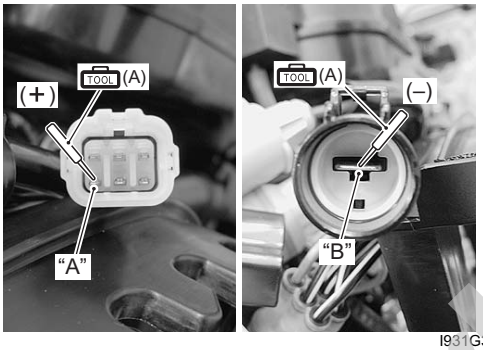
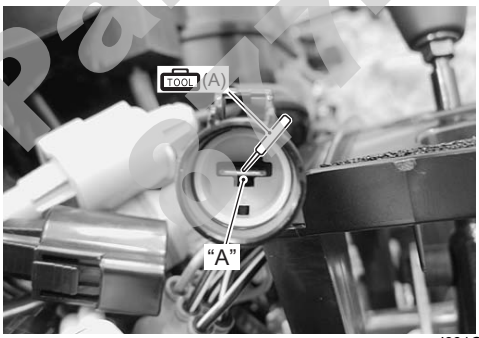
B931G46304003

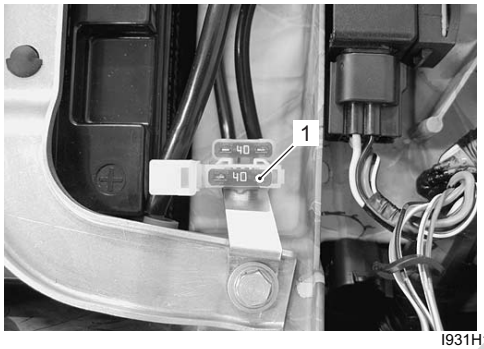
⚠ WARNING

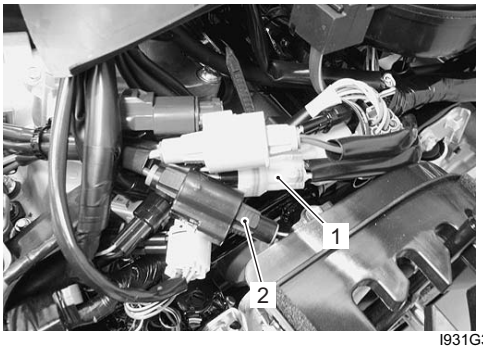
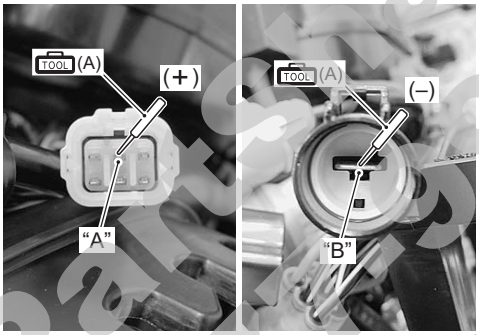
Carry out test drive in light traffic area to prevent an accident.

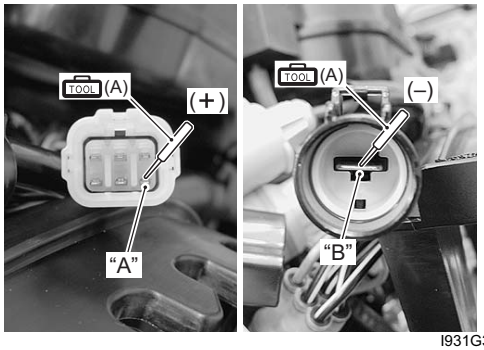
Step	Action	Yes	No
1	1) Perform “Customer Complaint Analysis”. *Was customer complaint analysis performed according to instruction?*	Go to Step 2.	Perform customer complaint analysis.
2	1) Check for operation of the “EPS” warning lamp when turning the ignition switch ON. 2) If OK, start engine, run it idle and check “EPS” warning lamp remains ON continuously.  I931H1630015-02 *Is “EPS” warning lamp remains ON continuously?*	Go to Step 3.	• Go to Step 4. • DTC output (Refer to “DTC (Diagnostic Trouble Code) Output (LT-A750XP/ZK9) (Page 6C-19)”.)
3	**(The EPS indicator light lights up)** 1) Start the engine. *Does the EPS indicator light go off?*	Normal (No DTC exists)	• DTC output (Refer to “DTC (Diagnostic Trouble Code) Output (LT-A750XP/ZK9) (Page 6C-19)”.) • If DTC can not be output (the EPS indicator light does not flash), go to Step 7.

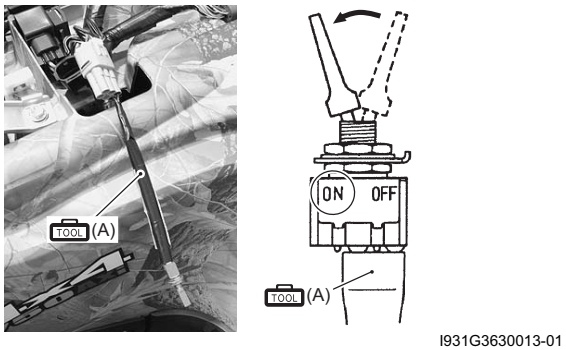
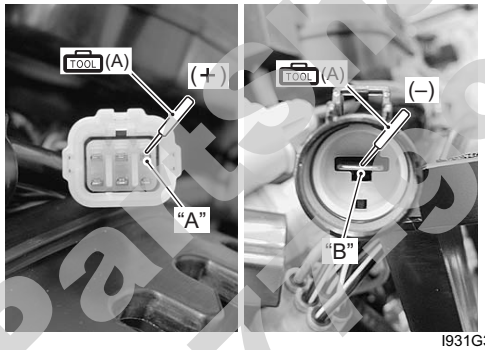
Step	Action	Yes	No
4	**(The EPS indicator light does not light up)** 1) Turn the ignition switch OFF. 2) Disconnect the EPS control unit coupler (1) and (2).  I931G3630008-01 3) Turn the ignition switch ON with the EPS control unit coupler disconnected, measure the voltage between terminal “A” and terminal “B” at the coupler. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Normal value (“A” – “B”)** **Battery voltage (12.0 V and more)** **EPS control unit coupler (Vehicle harness end)**  I931G3630009-01 *Is the voltage between “A” and “B” normal?*	Go to Step 5.	Inspect the wire harness. (Faulty ignition or ground wire)

Step	Action	Yes	No
5	1) Turn the ignition switch ON with the EPS control unit coupler disconnected, measure the voltage between terminal “A” and terminal “B” at the coupler. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Normal value (“A” – “B”)** **1.0 V and more** **EPS control unit coupler (Vehicle harness end)**  I931G3630010-01 *Is the voltage between “A” and “B” normal?*	Go to Step 6.	• Inspect the wire harness. (Faulty indicator light wire) • Indicator light is blown.
6	1) Turn the ignition switch OFF. 2) Check for continuity between terminal “A” at the coupler and body ground. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity (•))))** **EPS control unit coupler (Vehicle harness end)**  I931G3630011-01 *Are there continuity between “A” and body ground?*	Replace the EPS control unit.	Inspect the wire harness. (Faulty ground wire)

Step	Action	Yes	No
7	**(The EPS indicator light does not go off)** 1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D in related manual”. 2) Open the fuse box and inspect the ignition fuse (1). **⚠ CAUTION** **If a fuse is blown, find the cause of the problem and correct it before replacing the fuse.** **EPS fuse** **40 A**  I931H1630016-01 *Is the ignition fuse OK?*	Go to Step 8.	Replace the EPS fuse.

Step	Action	Yes	No
8	1) Turn the ignition switch OFF. 2) Disconnect the EPS control unit coupler (1) and (2).  I931G3630008-01 3) Turn the ignition switch ON with the EPS control unit coupler disconnected, measure the voltage between terminal “A” and terminal “B” at the coupler. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Normal value (“A” – “B”)** **Battery voltage (12.0 V and more)** **EPS control unit coupler (Vehicle harness end)**  I931G3630009-01 *Is the voltage between “A” and “B” normal?*	Go to Step 9.	Inspect the wire harness. (Faulty ignition or ground wire)

Step	Action	Yes	No
9	1) Turn the ignition switch ON with the EPS control unit coupler disconnected, measure the voltage between terminal “A” and terminal “B” at the coupler. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Normal value (“A” – “B”)** **1.0 V and more** **EPS control unit coupler (Vehicle harness end)**  I931G3630012-01 *Is the voltage between “A” and “B” normal?*	Go to Step 10.	Inspect the wire harness. (Faulty indicator light wire)

Step	Action	Yes	No
10	1) Turn the ignition switch OFF. 2) Short the mode select coupler terminals using the special tool. **Special tool** **TOOL (A): 09930–82710 (Mode select switch)**  I931G3630013-01 3) Check for continuity between terminal “A” and terminal “B” at the coupler. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Continuity (•)))** **EPS control unit coupler (Vehicle harness end)**  I931G3630014-01 *Is there continuity between “A” and “B”?*	Replace the EPS control unit.	Inspect the wire harness. (Faulty mode select switch wire)

DTC (Diagnostic Trouble Code) Output (LT-A750XP/ZK9)

B931G46304004

NOTE

- **Even through the EPS is operating correctly, a DTC is memorized in any of the following conditions.**
  - **Previous malfunctions were repaired, but the DTCs were not deleted.**
- **After carrying out DTC deleting and EPS operation check, explain to the customer that the EPS is operating correctly. Refer to "DTC (Diagnostic Trouble Code) Deleting (LT-A750XP/ZK9) (Page 6C-21)".**

Use of Mode Select Switch

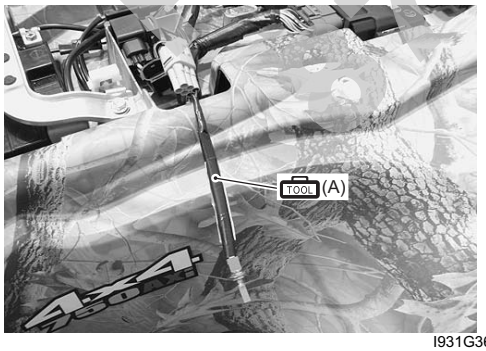
Connect the special tool to the mode select coupler to output the memorized DTCs on the EPS indicator light.

1) Turn the ignition switch OFF.
2) Remove the seat. Refer to "Seat Removal and Installation in Section 9D in related manual".
3) Connect the special tool to the mode select coupler (1).

Special tool

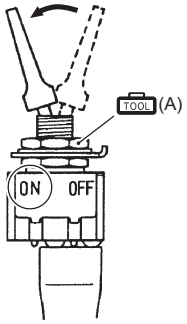
TOOL (A): 09930–82710 (Mode select switch)

I931G3630015-01



I931G3630017-01

4) Switch the special tool to ON.

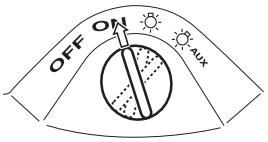


I931H1630028-01

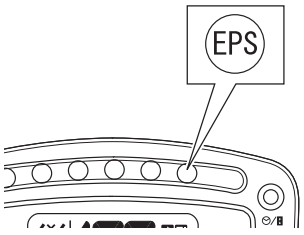
5) Turn the ignition switch ON.
   The EPS indicator light starts flashing to indicate the DTC. Refer to "DTC Table (LT-A750XP/ZK9) (Page 6C-25)".

NOTE

- **If there is a DTC, the EPS indicator light keeps flashing cyclically and repeatedly.**
- **If there is no DTC, the EPS indicator light keeps lighting on.**
- **When outputting DTCs, never turn the ignition switch to headlight ON position or auxiliary headlight ON position in order to prevent the battery from discharging.**



I931G3630018-01



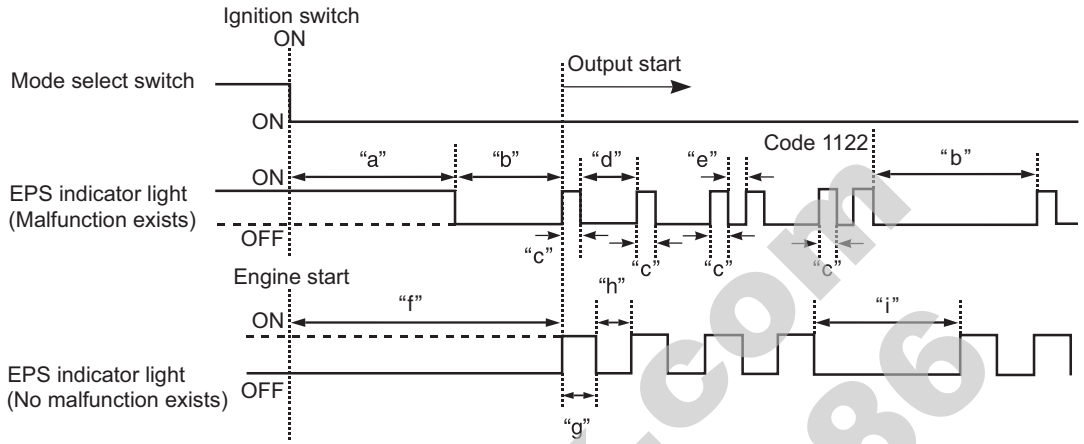
I931H1630029-01

6) Turn the ignition switch OFF and disconnect the special tool.

Understanding the DTC (Diagnostic Trouble Code)

A four-digit DTC is shown through the flashing pattern of the EPS indicator light. A number between 1 and 9 is represented by the number of times that the EPS indicator light lights up in interval of 0.3 seconds and the separation between the each digit are indicated by the light staying off for 1 seconds. In addition, the separation between the start code and the DTC is indicated by the light being off for 3 seconds. After the start code is displayed, DTCs appear from the smallest number code.

If no DTCs are memorized, the EPS indicator light keeps blinking by the four times at same interval.



I931H1630030-04

"a": Initial minimum light ON time (About 3 seconds)	"f": Indicator light OFF time (5 seconds)
"b": Error code interval (About 3 seconds)	"g": Normal code light ON time (1 seconds)
"c": Code light ON time (0.3 seconds)	"h": Normal code light OFF time (1 seconds)
"d": Main-sub code interval (1 seconds)	"i": Interval (3 seconds)
"e": Sub code (0.3 seconds)	

Use of SDS

NOTE

- **Don't disconnect couplers from EPS control unit, the battery cable from the battery, EPS control unit ground wire harness from the engine or main fuse before confirming the malfunction code (self-diagnostic trouble code) stored in memory. Such disconnection may erase the memorized information in EPS control unit memory.**
- **DTC stored in EPS control unit memory can be checked by the SDS.**

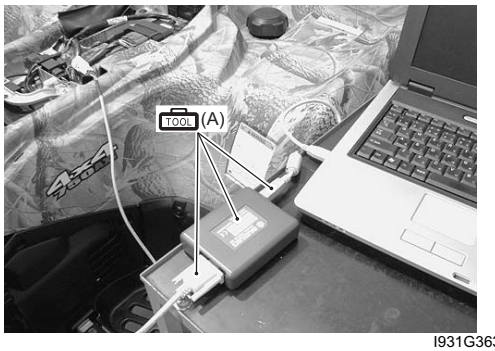
1) Remove the seat. Refer to "Seat Removal and Installation in Section 9D in related manual".

2) Set up the SDS tool. (Refer to the SDS operation manual for further details.)

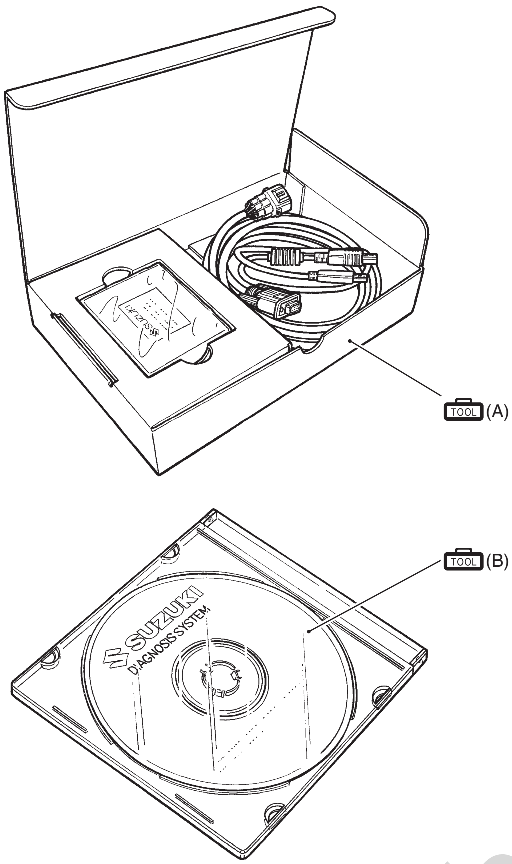
Special tool

TOOL (A): 09904–41010 (SUZUKI Diagnostic system set)

TOOL (B): 99565–01010–020 (CD-ROM Ver.20)



I931G3630019-01

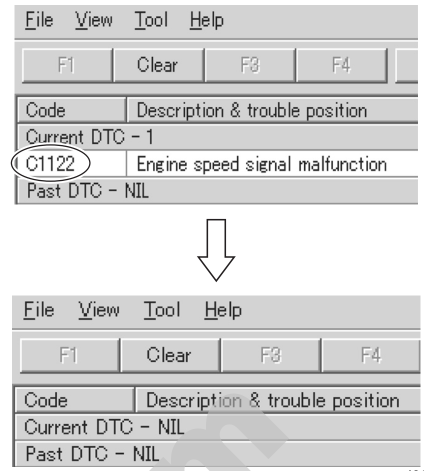


I705H1110116-03

3) Read the DTC (Diagnostic Trouble Code) and show data when trouble (displaying data at the time of DTC) according to instructions displayed on SDS.

NOTE

- **Not only is SDS used for detecting Diagnostic Trouble Codes but also for reproducing and checking on screen the failure condition as described by customers using the trigger.**
- **How to use trigger. (Refer to the SDS operation manual for further details.)**
- **When DTC is checked, DTC "C1122" is displayed with ignition switch turned ON. However, if the engine is started and the display disappears, it is not a trouble.**



I931H1630032-01

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

DTC (Diagnostic Trouble Code) Deleting (LT-A750XP/ZK9)

B931G46304005

Use of Mode Select Switch

1) Remove the seat. Refer to "Seat Removal and Installation in Section 9D in related manual".

I931G3630020-01

2) Connect the special tool to the mode select coupler and output the DTCs.

Special tool
(A): 09930–82720 (Mode selection switch)

I931G3630021-01

3) While the DTCs are being output, set the special tool to OFF.

⚠ CAUTION

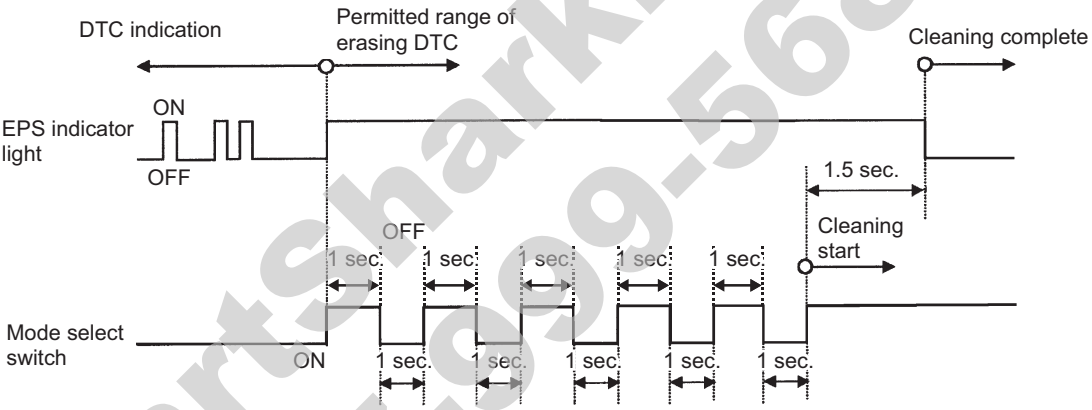
The DTC deletion mode starts 11.5 seconds after the switch is set to OFF.

I718H1450050-01

4) In the DTC deletion mode, switch the mode coupler switch OFF to ON five times or more within 10 seconds, each time leaving it at ON for more than 1 second.

I718H1450051-01

DTC Deleting Diagram



I931H1630035-04

5) After deleting the DTCs, repeat the code output procedure and make sure that no DTCs remain (the EPS indicator light no longer flashes).

NOTE

If any DTCs remain, perform the appropriate procedures, then delete the codes. If DTCs are left stored, confusion may occur and unnecessary repairs may be made.

6) Afterwards, start the engine and turn the handlebars to check that the EPS activates correctly.

7) Disconnect the mode select switch and reinstall the seat.

Use of SDS

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D in related manual”.

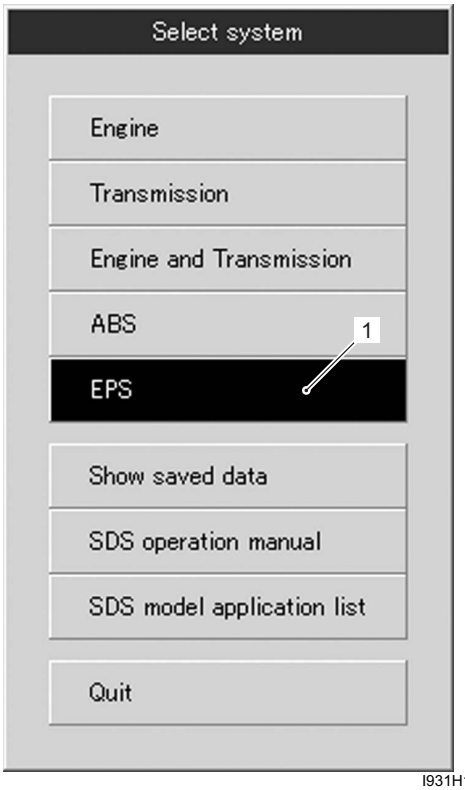
2) After repairing the trouble, turn OFF the ignition switch.

3) Set up the SDS tool. (Refer to the SDS operation manual for further details.)

Special tool
TOOL : 09904–41010 (SUZUKI Diagnostic system set)
TOOL : 99565–01010–020 (CD-ROM Ver.20)

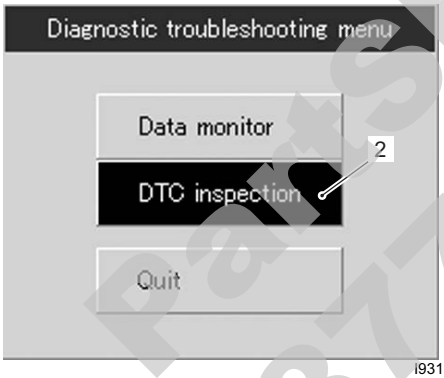
4) Turn the ignition switch ON.

5) Click the “EPS” button (1).



I931H1630101-02

6) Click the “DTC inspection” button (2).



I931H1630103-01

7) Check the DTC.

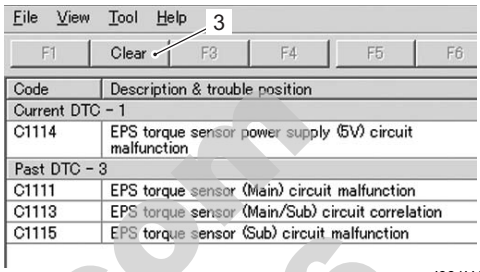
NOTE

The previous malfunction history code (Past DTC) still remains stored in the EPS control unit. Therefore, erase the history code memorized in the EPS control unit using SDS tool.

8) Click “Clear” (3) to delete history code (Past DTC).

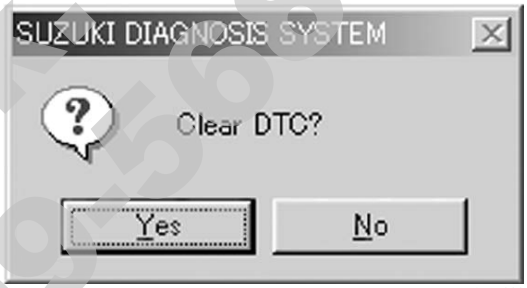
NOTE

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



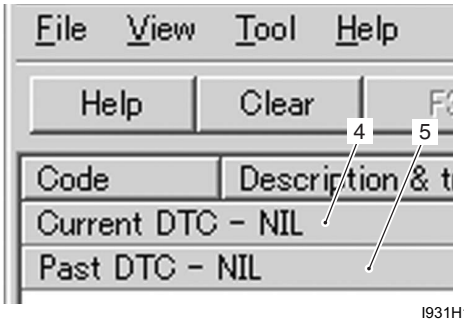
I931H1630036-02

9) Follow the displayed instructions.



I705H1110006-01

10) Check that both “Current DTC” (4) and “Past DTC” (5) are deleted (NIL).



I931H1630102-01

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

12) Disconnect the SDS tool and install the sheet.

13) Start the engine and the handlebars to check that the EPS activates correctly.

SDS Check (LT-A750XP/ZK9)

B931G46304006

Using SDS, take the sample of data from the new vehicle and at the time of periodic maintenance at your dealer. Save the data in the computer or by printing and filing the hard copies. The saved or filed data are useful for troubleshooting as they can be compared periodically with changes over time or failure conditions of the vehicle. For example, when a vehicle is brought in for service but the troubleshooting is difficult, comparison with the normal data that have been saved or filed can allow the specific EPS failure to be determined.

1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D in related manual”.
2) Set up the SDS tool. (Refer to “SDS operation manual for further details.)

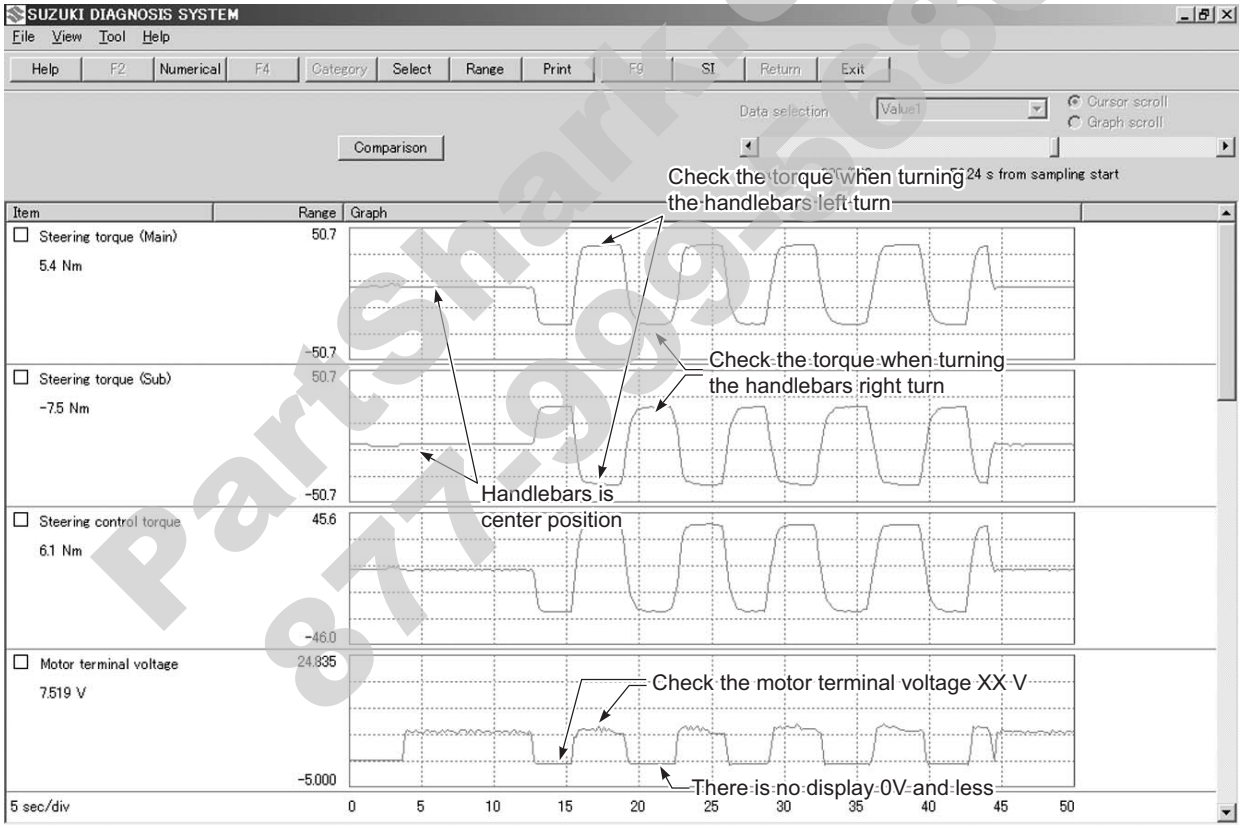
NOTE

- **Before taking the sample of data, check and clear the Past DTC. Refer to “DTC (Diagnostic Trouble Code) Deleting (LT-A750XP/ZK9) (Page 6C-21)”.**
- **A number of different data under a fixed condition as shown should be saved or filed as sample.**

Special tool

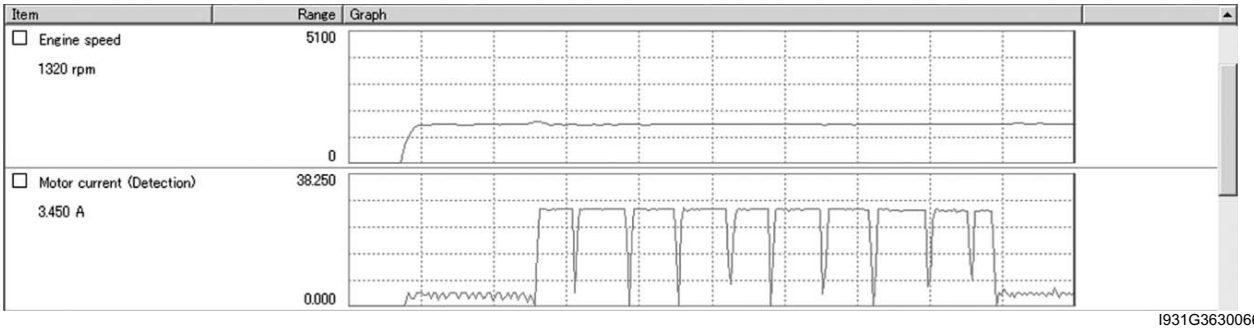
TOOL : 09904–41010 (SUZUKI Diagnostic system set)
TOOL : 99565–01010–020 (CD-ROM Ver.20)

DATA sampled from EPS system



I931H1630104-03

Scroll the screen



I931G3630066-01

DTC Table (LT-A750XP/ZK9)

B931G46304007

DTC	Malfunction cause	Indicator status	Reference
None	Normal	ON *1	—
C1111	Torque sensor (main) circuit voltage failure	ON	Refer to “DTC “C1111”: Torque Sensor (Main) Circuit Malfunction (LT-A750XP/ZK9) (Page 6C-26)”.
C1113	Torque sensor (main) and (sub) circuit voltage difference high	ON	Refer to “DTC “C1113”: Torque Sensor (Main / Sub) Circuit Correlation Malfunction (LT-A750XP/ZK9) (Page 6C-29)”.
C1114	Torque sensor 5 V power supply circuit failure	ON	Refer to “DTC “C1114”: Torque Sensor Power Supply Circuit Malfunction (LT-A750XP/ZK9) (Page 6C-33)”.
C1115	Torque sensor (sub) circuit voltage failure	ON	Refer to “DTC “C1115”: Torque Sensor (Sub) Circuit Malfunction (LT-A750XP/ZK9) (Page 6C-35)”.
C1121	Vehicle speed signal not input	OFF	Refer to “DTC “C1121”: Vehicle Speed Signal Circuit Malfunction (LT-A750XP/ZK9) (Page 6C-38)”.
C1122	Engine speed signal circuit failure *1	ON	Refer to “DTC “C1122”: Engine Speed Signal Circuit Malfunction (LT-A750XP/ZK9) (Page 6C-41)”.
C1141	EPS motor circuit voltage abnormal	ON	Refer to “DTC “C1141”, “C1142”, “C1143”, “C1145” EPS Motor Circuit Malfunction (LT-A750XP/ZK9) (Page 6C-44)”.
C1142	EPS motor circuit actual current and EPS motor circuit target current difference high	ON	
C1143	EPS motor circuit current excessive	ON	
C1145	EPS motor circuit current low command with EPS control unit target current	ON	
C1153	EPS control unit power supply circuit failure	OFF	Refer to “DTC “C1153” EPS Control Unit Supply Voltage Circuit Malfunction (LT-A750XP/ZK9) (Page 6C-46)”.
C1152	Relay welding (EPS control unit internal circuit)	ON	Refer to “DTC “C1152”, “C1154”, “C1155” EPS Control Unit Malfunction (LT-A750XP/ZK9) (Page 6C-47)”.
C1154	Relay failure (EPS control unit internal circuit)	OFF	
C1155	EPS control unit failure	OFF	

*1: It goes off after running the engine.

DTC “C1111”: Torque Sensor (Main) Circuit Malfunction (LT-A750XP/ZK9)

B931G46304008

Possible Cause
• Faulty torque sensor signal circuit. • Faulty torque sensor. • Faulty EPS control unit.

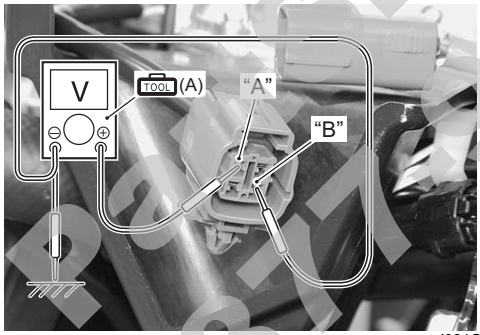
Troubleshooting

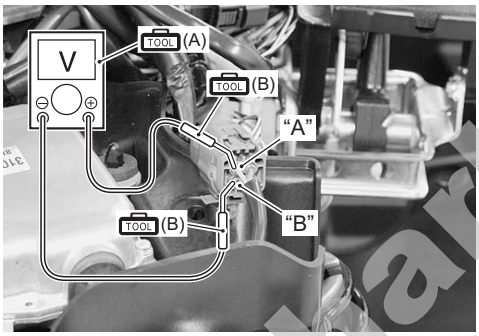
⚠ CAUTION

Never remove the torque sensor to prevent accident and damage.

NOTE

- **After repairing the trouble, clear the DTC using a SDS tool or mode coupler switch. Refer to “DTC (Diagnostic Trouble Code) Deleting (LT-A750XP/ZK9) (Page 6C-21)”.**
- **DTC “C1111” and “C1113” are indicated at the same time due to the malfunction of the same torque sensor circuit.**

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Check the torque sensor coupler for loose or poor contact. If OK, measure the torque sensor input voltage.  I931G3630022-01 3) Disconnect the torque sensor coupler. 4) Turn the ignition switch ON. 5) Measure the input voltage between R wire “A” and ground. If OK, then measure the voltage at the R wire “A” and B wire “B”. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Torque sensor input voltage** **5.0 V**  I931G3630024-01 *Is voltage OK?*	Go to Step 2.	• Loose or poor contacts on the torque sensor. • Power supply circuit (R wire) or ground circuit (B wire) open. • If check result is not satisfactory, replace the EPS control unit with a new one. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.

Step	Action	Yes	No
2	1) Turn the ignition switch OFF. 2) Connect the torque sensor coupler. 3) Insert the needle-point probes to lead wire coupler. 4) Turn the ignition switch ON. 5) Measure the voltage between G wire “A” and B wire “B” by turning the handlebars left and right. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **(B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **Torque sensor (main) voltage** **Handlebars is left turn: Approx. 3.0 V** **Handlebars is right turn: Approx. 2.0 V**  I931G3630025-01  I931H1630042-01 *Is voltage OK?*	• Replace the EPS control unit with a known good one, and inspect it again. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.	• R wire terminal or G wire terminal circuit open (torque sensor side). • If check result is not satisfactory, replace the torque sensor (EPS body assembly) with a new one. Refer to “EPS Body Assembly Removal and Installation (LT-A750XP/ZK9) (Page 6C-50)”.

DTC “C1113”: Torque Sensor (Main / Sub) Circuit Correlation Malfunction (LT-A750XP/ZK9)

B931G46304009

Possible Cause
• Faulty torque sensor signal circuit.
• Faulty torque sensor.
• Faulty EPS control unit.

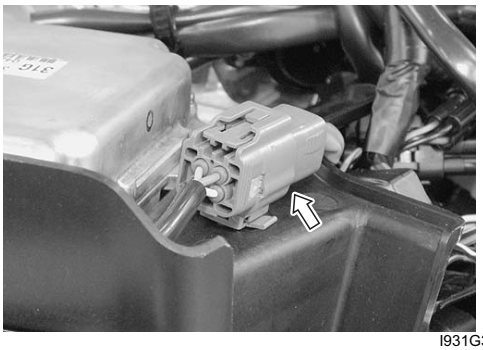
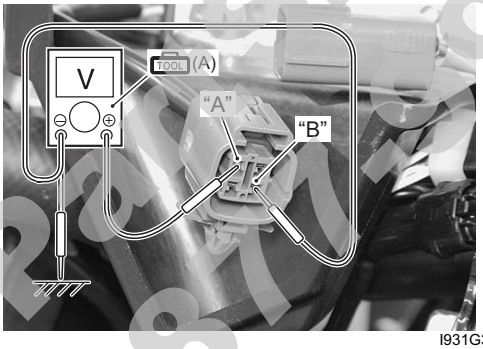
Troubleshooting

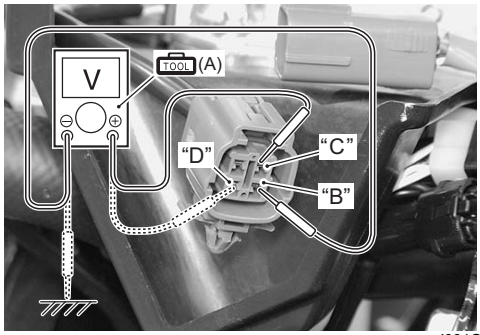
⚠ CAUTION

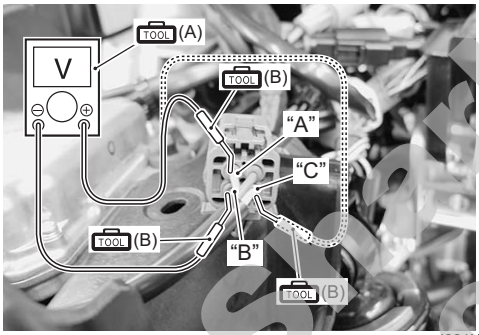
Never remove the torque sensor to prevent accident and damage.

NOTE

- **After repairing the trouble, clear the DTC using a SDS tool or mode coupler switch. Refer to “DTC (Diagnostic Trouble Code) Deleting (LT-A750XP/ZK9) (Page 6C-21)”.**
- **DTC “C1113” and “C1115” are indicated at the same time due to the malfunction of the same torque sensor circuit.**

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Check the torque sensor coupler for loose or poor contact. If OK, measure the torque sensor input voltage.  I931G3630026-01 3) Disconnect the torque sensor coupler. 4) Turn the ignition switch ON. 5) Measure the input voltage between R wire “A” and ground. If OK, then measure the voltage at the R wire “A” and B wire “B”. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Torque sensor input voltage** **5.0 V**  I931G3630027-01	Go to Step 2.	• Loose or poor contacts on the torque sensor. • Power supply circuit (R wire) open. • Power source or power supply circuit shorted to torque sensor (main or sub) circuit. • Torque sensor (main or sub) circuit open. • If check result is not satisfactory, replace the EPS control unit with a new one. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.

Step	Action	Yes	No
1	6) Next, measure the voltage between G wire “C” and ground, G wire “C” and B wire “B”, W wire “D” and ground and W wire “D” and B wire “B”. If the voltage of each measurement is 0 V OK. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Measuring voltage** **0 V**  I931G3630028-01 *Is voltage OK?*	Go to Step 2.	• Loose or poor contacts on the torque sensor. • Power supply circuit (R wire) open. • Power source or power supply circuit shorted to torque sensor (main or sub) circuit. • Torque sensor (main or sub) circuit open. • If check result is not satisfactory, replace the EPS control unit with a new one. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.

Step	Action	Yes	No
2	1) Turn the ignition switch OFF. 2) Connect the torque sensor coupler. 3) Insert the needle-point probes to lead wire coupler. 4) Measure the torque sensor (main) voltage between G wire “A” and B wire “B”. Also, measure the torque sensor (sub) voltage between W wire “C” and B wire “B” by full turning the handlebars left and right. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **(B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **Torque sensor (main/sub) voltage** **Handlebars left turn (Main): Approx. 3.0 V** **Handlebars left turn (Sub): Approx. 2.0 V** **Handlebars right turn (Main): Approx. 2.0 V** **Handlebars right turn (Sub): Approx. 3.0 V**  I931H1630096-06  I931H1630042-01 *Is voltage OK?*	• G, W and B wire open or shorted to ground or poor torque sensor coupler connection. • If wire and connection are OK, intermittent trouble or faulty EPS control unit. • Replace the EPS control unit with a known good one, and inspect it again. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.	If check result is not satisfactory, replace the torque sensor (EPS body assembly) with a new one. Refer to “EPS Body Assembly Removal and Installation (LT-A750XP/ZK9) (Page 6C-50)”.

DTC “C1114”: Torque Sensor Power Supply Circuit Malfunction (LT-A750XP/ZK9)

B931G46304010

Possible Cause
• Faulty torque sensor signal circuit. • Faulty torque sensor. • Faulty EPS control unit.

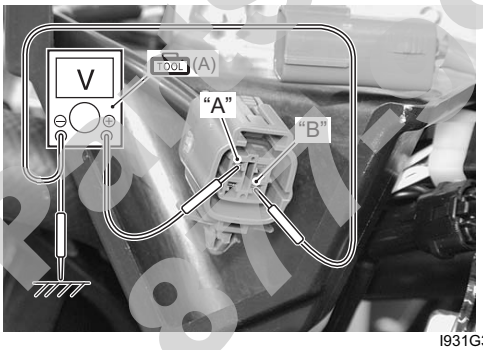
Troubleshooting

⚠ CAUTION

Never remove the torque sensor to prevent accident and damage.

NOTE

After repairing the trouble, clear the DTC using a SDS tool or mode coupler switch. Refer to “DTC (Diagnostic Trouble Code) Deleting (LT-A750XP/ZK9) (Page 6C-21)”.

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Check the EPS control unit power source couplers for loose or poor contact. If OK, measure the torque sensor input voltage.  I931G3630029-01 3) Disconnect the torque sensor coupler. 4) Turn the ignition switch ON. 5) Measure the voltage between R wire “A” and B wire “B”. If OK, then measure the voltage at the R wire “A” and ground. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Torque sensor input voltage** **5.0 V**  I931G3630027-01 *Is voltage OK?*	• If wire and connection are OK, intermittent trouble or faulty EPS body assembly. • Replace the EPS body assembly with a known good one, and inspect it again. Refer to “EPS Body Assembly Removal and Installation (LT-A750XP/ZK9) (Page 6C-50)”.	• Power supply circuit (R wire) shorted to ground. • If check result is not satisfactory, replace the EPS control unit with a new one. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.

DTC “C1115”: Torque Sensor (Sub) Circuit Malfunction (LT-A750XP/ZK9)

B931G46304011

Possible Cause
• Faulty torque sensor signal circuit.
• Faulty torque sensor.
• Faulty EPS control unit.

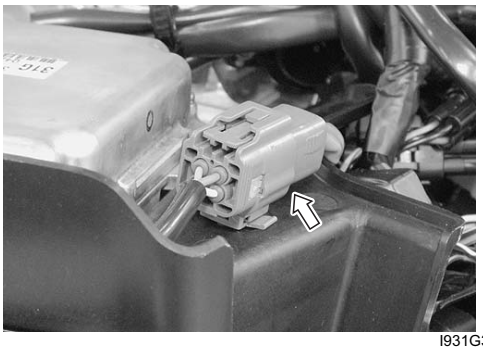
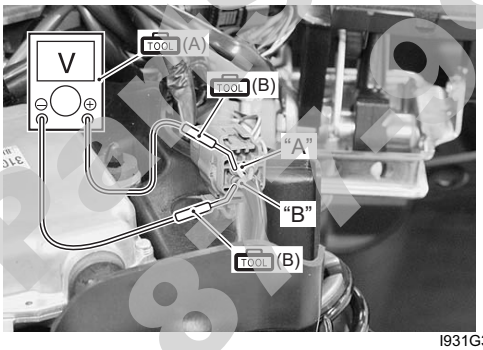
Troubleshooting

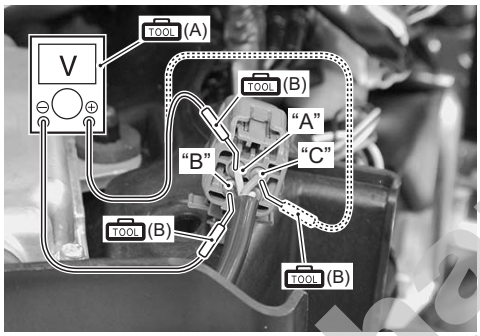
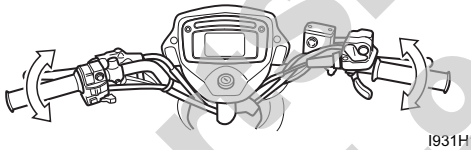
⚠ CAUTION

Never remove the torque sensor to prevent accident and damage.

NOTE

After repairing the trouble, clear the DTC using a SDS tool or mode coupler switch. Refer to “DTC (Diagnostic Trouble Code) Deleting (LT-A750XP/ZK9) (Page 6C-21)”.

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Check the torque sensor coupler for loose or poor contact. If OK, measure the torque sensor input voltage.  I931G3630026-01 3) Disconnect the torque sensor coupler. 4) Turn the ignition switch ON. 5) Measure the input voltage between R wire “A” and ground. If OK, then measure the input voltage between R wire “A” and B wire “B”. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **(B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **Torque sensor input voltage** **5.0 V**  I931G3630032-01 *Is voltage OK?*	Go to step 2.	• Loose or poor contacts on the torque sensor. • Power supply circuit (R wire) or ground circuit (B wire) open. • If check result is not satisfactory, replace the EPS control unit with a new one. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.

Step	Action	Yes	No
2	1) Turn the ignition switch OFF. 2) Connect the torque sensor coupler. 3) Insert the needle-point probes to lead wire coupler. 4) Turn the ignition switch ON. 5) Measure the voltage between W wire “A” and B wire “B” by turning the handlebars left and right. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **(B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **Torque sensor (Sub) voltage** **Handlebars is left turn: Approx. 2.0 V** **Handlebars is right turn: Approx 3.0 V**  I931G3630030-02  I931H1630042-01 *Is voltage OK?*	• Replace the EPS control unit with a known good one, and inspect it again. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.	• R wire terminal or W wire terminal circuit open (torque sensor side). • If check result is not satisfactory, replace the torque sensor (EPS body assembly) with a new one. Refer to “Steering Shaft Removal and Installation in Section 6B in related manual”.

DTC “C1121”: Vehicle Speed Signal Circuit Malfunction (LT-A750XP/ZK9)

B931G46304012

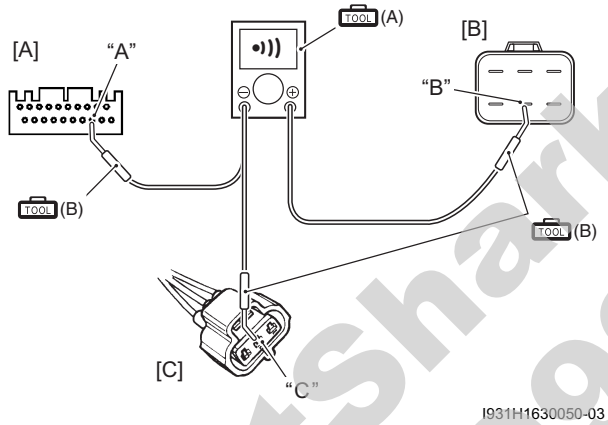
Possible Cause
• Faulty vehicle speed signal circuit.
• Faulty speed sensor.
• Faulty EPS control unit.

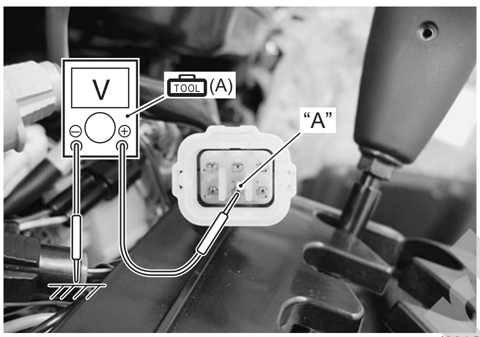
Troubleshooting

NOTE

After repairing the trouble, clear the DTC using a SDS tool or mode coupler switch. Refer to “DTC (Diagnostic Trouble Code) Deleting (LT-A750XP/ZK9) (Page 6C-21)”.

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Check the EPS control unit connector for loose or poor contact. If OK, then check the vehicle speed signal lead wire continuity.  I931G3630031-01	Go to step 2.	Bl/B wire open.

Step	Action	Yes	No
1	3) Disconnect the EPS control unit coupler [B], speed sensor coupler [C] and combination meter coupler [A]. Refer to “Speed Sensor Removal and Installation in Section 9C in related manual” and “Combination Meter Removal and Installation in Section 9C in related manual”. 4) Check the continuity between the Bl/B wire of EPS control unit coupler [B] and Bl/B wire of speed sensor [C]. Also, check the continuity between the Bl/B wire of EPS control unit coupler [B] and Bl/B wire of combination meter [A]. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity (•)))**  *Is continuity OK?*	Go to step 2.	Bl/B wire open.

Step	Action	Yes	No
2	1) Connect the combination meter coupler and speed sensor coupler. 2) Turn the ignition switch ON. 3) Measure the voltage between the BI/B wire “A” and ground. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **<u>Tester knob indication</u>** **Voltage (⎓)** **<u>Vehicle speed signal voltage</u>** **5.0 V**  I931G3630033-01 *Is voltage OK?*	Go to step 3.	BI/B wire shorted to ground.
3	1) Remove the engine side cover. Refer to “Rear Side Exterior Parts Removal and Installation in Section 9D in related manual”. 2) Inspect the speed sensor. Refer to “Speed Sensor Inspection in Section 9C in related manual”.  I931G3630034-01 *Is speed sensor OK?*	Replace the EPS control unit. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.	Replace the speed sensor. Refer to “Speed Sensor Removal and Installation in Section 9C in related manual”.

DTC “C1122”: Engine Speed Signal Circuit Malfunction (LT-A750XP/ZK9)

B931G46304013

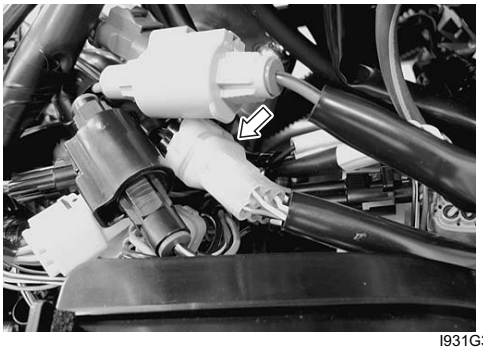
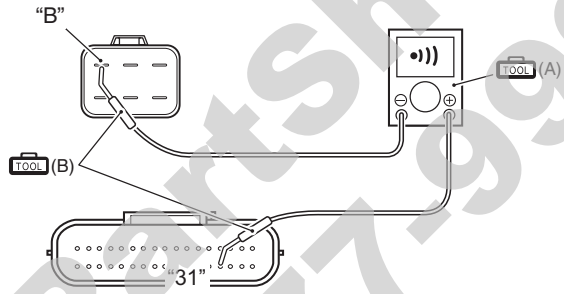
Possible Cause
• Faulty engine speed signal circuit. • Faulty ECM. • Faulty EPS control unit.

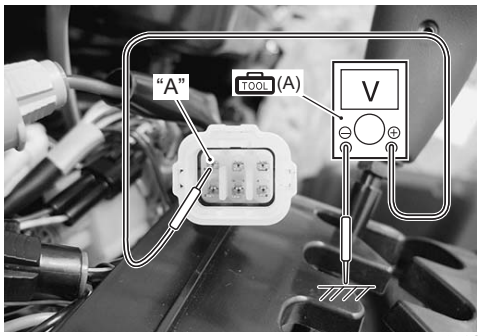
Troubleshooting

NOTE

Start the engine after repairing the DTC and check that the indicator light is turned OFF. Refer to “Precautions in Diagnosing Troubles (LT-A750XP/ZK9) (Page 6C-1)”.

Step	Action	Yes	No
1	1) Setup the SDS tool (Refer to the SDS operation manual for further details.) or connect the mode select switch. 2) Click “Engine” and check the DTC code. *Is not DTC “C12 (P0335)” displayed?*	Go to step 2.	Inspect the CKP sensor. Refer to “DTC “C12” (P0335): CKP Sensor Circuit Malfunction in Section 1A in related manual”.

Step	Action	Yes	No
2	1) Turn the ignition switch OFF. 2) Check the EPS control unit coupler for loose or poor contact. If OK, then measure the engine speed signal lead wire continuity.  I931G3630031-01 3) Disconnect the EPS control unit coupler and ECM coupler. 4) Check the continuity between the W wire “A” and terminal “31”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Continuity (•)))**  I931H1630052-02 *Is continuity OK?*	Go to step 3.	W wire open.

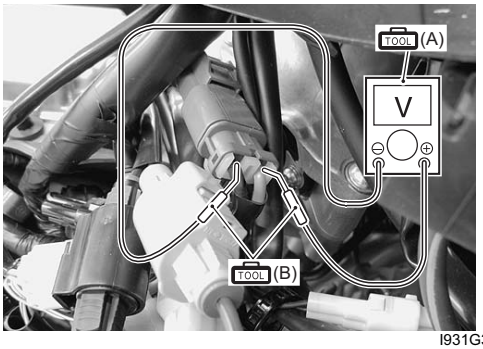
Step	Action	Yes	No
3	1) Connect the ECM coupler. 2) Start the engine. 3) Measure the voltage between W wire “A” and ground. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Engine speed signal voltage** **It changes between 0 – 12 V**  I931G3630035-01 *Is voltage OK?*	Replace the EPS control unit with a new one. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.	Replace the ECM with a new one. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.

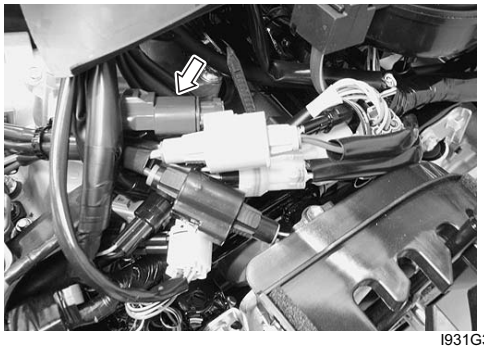
DTC “C1141”, “C1142”, “C1143”, “C1145” EPS Motor Circuit Malfunction (LT-A750XP/ZK9)

B931G46304014

Possible Cause
• Faulty EPS motor circuit.
• Faulty EPS motor.
• EPS control unit malfunction.

Troubleshooting

Step	Action	Yes	No
1	1) Turn the ignition switch OFF. 2) Check the EPS motor coupler for loose or poor contact. If OK, measure the EPS motor voltage.  I931G3630036-01 3) Insert the needle-point probes to lead wire coupler. 4) Start the engine and turn the handlebars left turn. 5) Measure the voltage between R wire “A” and B wire “B”. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **TOOL (B): 09900–25009 (Needle-point probe set)** **Tester knob indication** **Voltage (⎓)** **EPS motor voltage** **Approx. 7.0 V**  I931H1630093-01  I931G3630037-01 *Is voltage OK?*	Go to step 2.	R wire or B wire open or R wire shorted to ground.

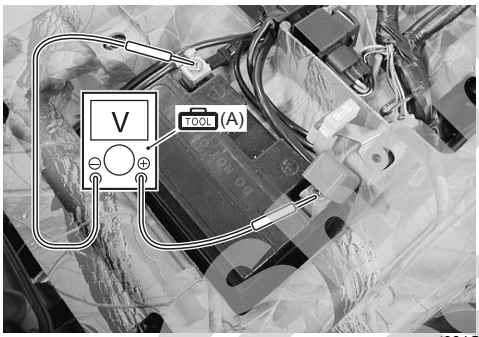
Step	Action	Yes	No
2	1) Turn the ignition switch OFF. 2) Disconnect the EPS motor coupler.  I931G3630038-01 3) Inspect the continuity of the EPS motor. Refer to “EPS Motor Inspection (LT-A750XP/ZK9) (Page 6C-53)”. *Is continuity OK?*	Replace the EPS control unit with a known good one, and inspect it again. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.	Replace the EPS motor (EPS body assembly) with a new one. Refer to “EPS Body Assembly Removal and Installation (LT-A750XP/ZK9) (Page 6C-50)”.

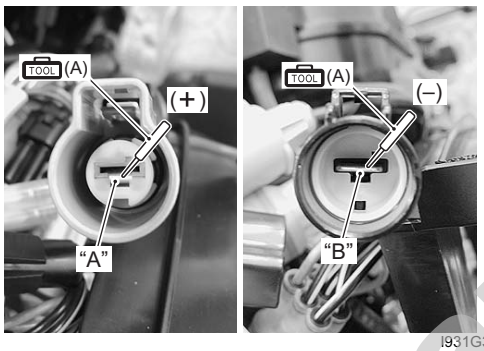
DTC “C1153” EPS Control Unit Supply Voltage Circuit Malfunction (LT-A750XP/ZK9)

B931G46304015

Possible Cause
• Faulty regulator/rectifier.
• Faulty EPS control unit.
• Faulty wire harness, etc.

Troubleshooting

Step	Action	Yes	No
1	1) Remove the seat. Refer to “Seat Removal and Installation in Section 9D in related manual”. 2) Measure the voltage between the (+) and (–) battery terminals using the multi circuit tester. **Special tool** **TOOL (A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Battery voltage** **12.0 V and more**  I931G3630039-01 *Is the voltage over 12 V?*	Go to Step 2.	Charge or replace the battery.
2	1) Start the engine at 5 000 r/min with the dimmer switch set to HI. 2) Measure the voltage between the (+) and (–) battery terminals. **Special tool** **TOOL : 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)** **Regulated voltage** **13.5 – 15.0 V at 5 000 r/min** *Is the voltage 13.5 – 15.0 V?*	Go to Step 3.	Inspect the regulator/ rectifier. Refer to “Regulator / Rectifier Inspection in Section 1J in related manual”.

Step	Action	Yes	No
3	1) Turn the ignition switch OFF. 2) Check the EPS control unit coupler for loose or poor contacts. If OK, then disconnect the EPS control unit coupler. 3) Start the engine at 5 000 r/min with the dimmer switch set to HI. 4) Measure the voltage between terminal “A” and terminal “B” at the coupler. **Special tool** **(A): 09900–25008 (Multi circuit tester set)** **Tester knob indication** **Voltage (⎓)**  I931G3630040-01 *Is the voltage same as Step 2?*	Replace the EPS control unit.	Inspect the wire harness. (Faulty ignition or ground wire)

DTC “C1152”, “C1154”, “C1155” EPS Control Unit Malfunction (LT-A750XP/ZK9)

B931G46304016

	Possible Cause
C1152	• Relay welding (EPS control unit internal circuit)
C1154	• Relay malfunction (EPS control unit internal circuit)
C1155	• EPS control unit malfunction

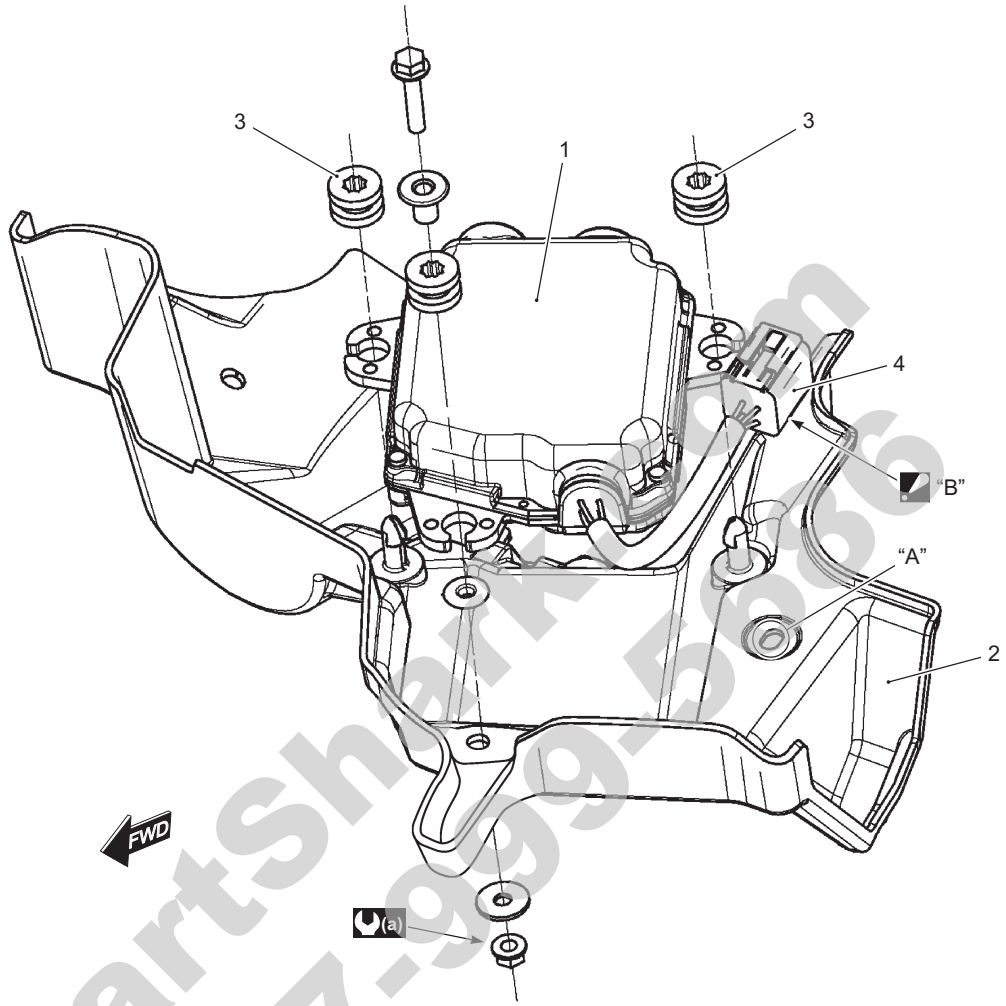
Troubleshooting

- Replace the EPS control unit. Refer to “EPS Control Unit Removal and Installation (LT-A750XP/ZK9) (Page 6C-48)”.

Repair Instructions

EPS Control Unit Construction (LT-A750XP/ZK9)

B931G46306001



I931H1630056-02

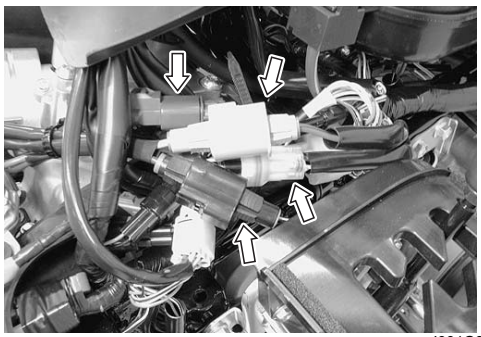
1. EPS control unit	4. Torque sensor coupler
2. EPS control unit plate	(a): 12 N·m (1.2 kgf-m, 8.5 lbf-ft)
3. Cushion	"B": Install the clip of the torque sensor coupler to the hole "A" of the EPS control unit plate.

EPS Control Unit Removal and Installation (LT-A750XP/ZK9)

B931G46306002

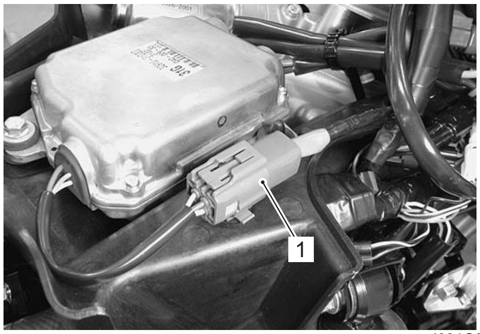
Removal

1) Disconnect the battery (–) lead wire. Refer to "Battery Removal and Installation (LT-A750XP/ZK9) in Section 1J (Page 1J-2)".
2) Remove the front fender. Refer to "Front Side Exterior Parts Removal and Installation in Section 9D in related manual".
3) Disconnect the EPS control unit couplers.



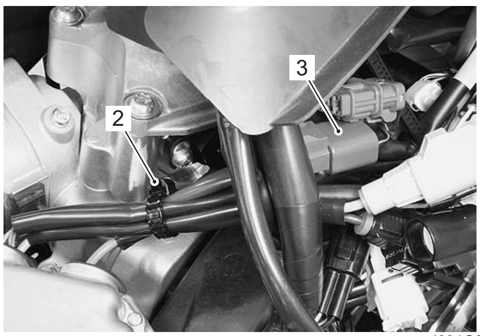
I931G3630041-01

4) Disconnect the torque sensor coupler (1).



I931G3630042-01

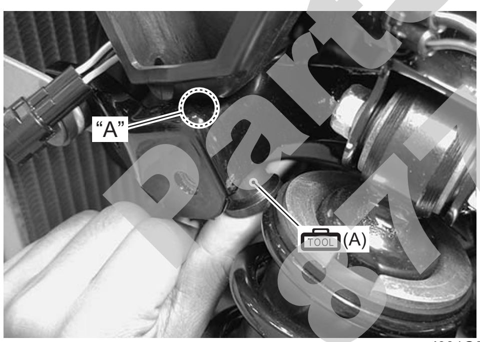
5) Remove the clamp (2) and release the EPS motor lead wire (3).



I931G3630043-01

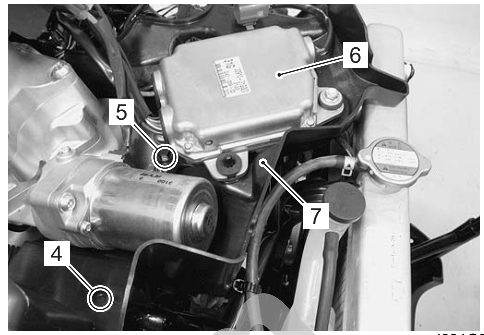
6) Release the clip part “A” of the EPS control unit plate with the special tool.

Special tool
TOOL (A): 09942–83110 (Clip remover)



I931G3630044-01

7) Remove the fastener (4) and bolt (5).
8) Remove the EPS control unit (6) along with the EPS control unit plate (7).



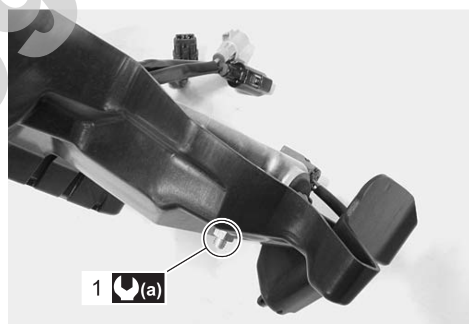
I931G3630045-01

9) Remove the EPS control unit (6) from the EPS control unit plate (7) as shown in the EPS control unit construction. Refer to “EPS Control Unit Construction (LT-A750XP/ZK9) (Page 6C-48)”.

Installation
Install the EPS control unit in the reverse order of removal. Pay attention to the following points:

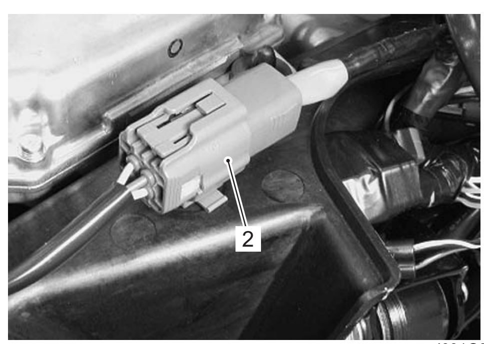
- Tighten the EPS control unit mounting nut (1) to the specified torque.

  Tightening torque
  EPS control unit mounting nut (a): 12 N·m (1.2 kgf-m, 8.5 lbf-ft)



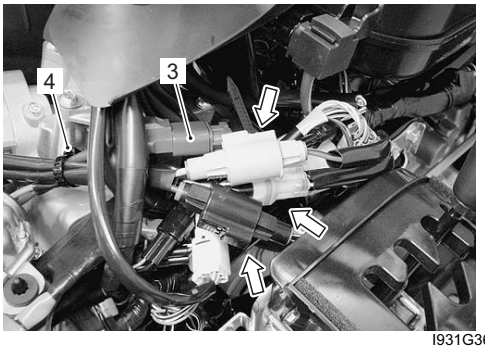
I931G3630046-01

- Connect the torque sensor lead wire (2).



I931G3630047-01

- Connect the EPS motor coupler (3) and clamp (4).
- Connect the other EPS control unit couplers.



I931G3630048-01

- Install the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D in related manual”.

EPS Body Assembly Components (LT-A750XP/ZK9)

B931G46306003

Refer to “Steering / Handlebars Components (LT-A750XP/ZK9) in Section 6B (Page 6B-1)”.

EPS Body Assembly Removal and Installation (LT-A750XP/ZK9)

B931G46306004

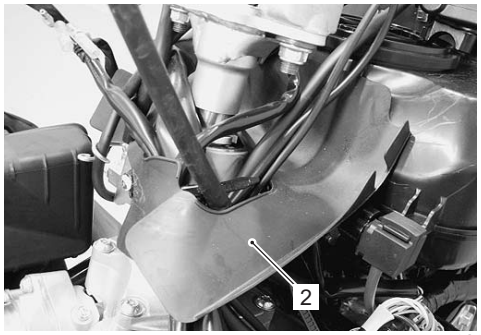
Refer to “Steering / Handlebars Components (LT-A750XP/ZK9) in Section 6B (Page 6B-1)”.
Refer to “Steering / Handlebars Assembly Construction (LT-A750XP/ZK9) in Section 6B (Page 6B-2)”.

Removal

1) Remove the handlebars. Refer to “Handlebars Removal and Installation (LT-A750XP/ZK9) in Section 6B (Page 6B-3)”.
2) Remove the combination meter. Refer to “Combination Meter Removal and Installation in Section 9C in related manual”.
3) Remove the front fender. Refer to “Front Side Exterior Parts Removal and Installation in Section 9D in related manual”.
4) Remove the auxiliary headlight (1). Refer to “Auxiliary Headlight Removal and Installation in Section 9B in related manual”.

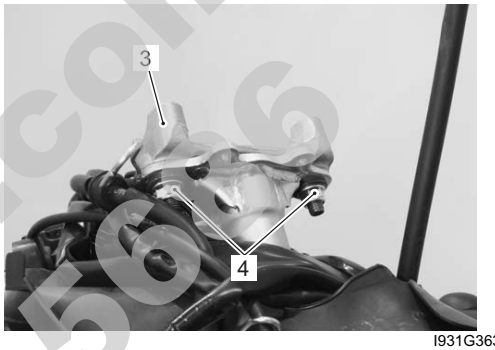
I931G3630049-01

5) Remove the center cover (2).



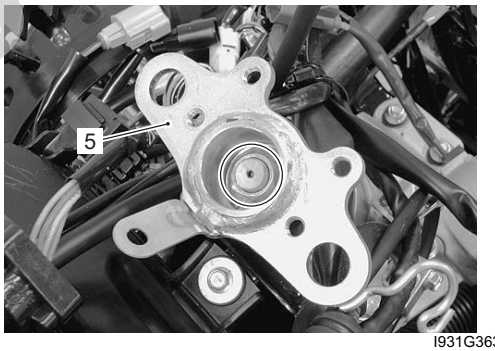
I931G3630050-01

6) Remove the handlebar holder (3) by removing the nuts (4).



I931G3630051-01

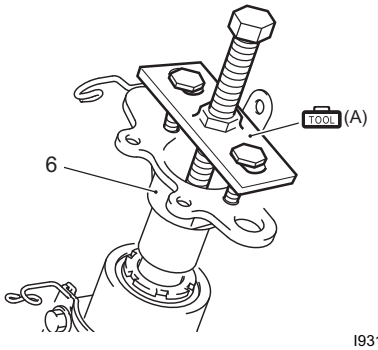
7) Remove the steering shaft upper nut (5).



I931G3630068-01

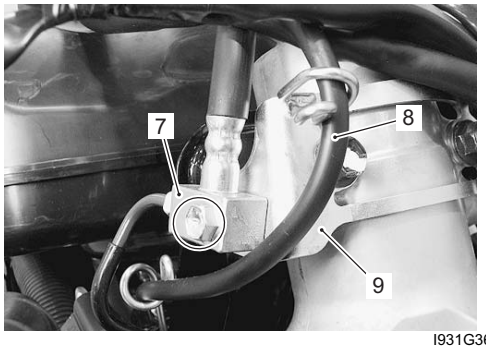
8) Remove the steering shaft plate (6) with the special tool.

Special tool
(A): 09944–36011 (Steering wheel remover)



I931G3630052-01

9) Remove the front brake hose union (7) and throttle cable (8) from the cable guide (9).



I931G3630053-01

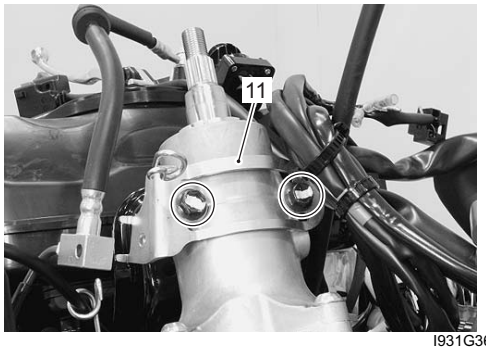
10) Remove the steering shaft bolt (10).

I931G3630054-01

11) Remove the EPS body assembly mounting nuts and bolts.

I931G3630055-01

12) Remove the cable guide (11).



I931G3630056-01

13) Remove the EPS body assembly.

⚠ CAUTION

Never disassemble the EPS body assembly.

I931G3630057-02

Installation

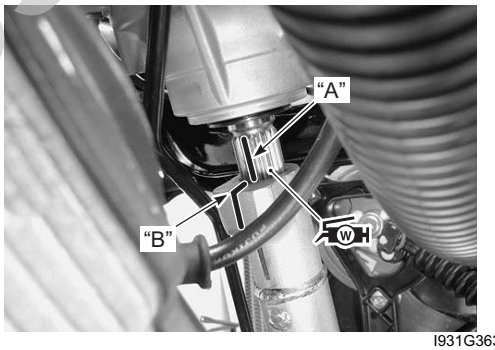
Refer to “Steering / Handlebars Assembly Construction (LT-A750XP/ZK9) in Section 6B (Page 6B-2)”.

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

- Apply grease to the spline of the EPS body assembly.

  : Grease 99000–25160 (Water resistance grease or equivalent)

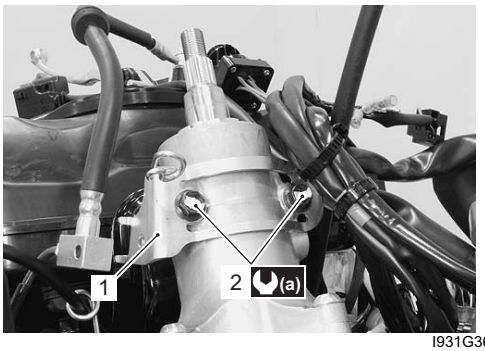
- When installing the EPS body assembly, align the marking “A” of the EPS output shaft and slide “B” of the steering shaft.



I931G3630058-02

- Install the cable guide (1) and tighten the bolts (2) to the specified torque.

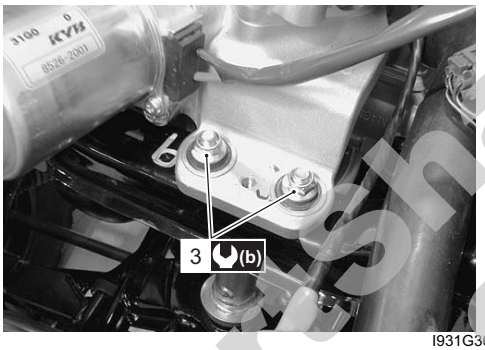
  Tightening torque
  EPS body assembly mounting bolt (a): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



I931G3630059-02

- Tighten the EPS body assembly mounting nuts (3) to the specified torque.

  Tightening torque
  EPS body assembly mounting nut (b): 28 N·m (2.8 kgf-m, 20.0 lbf-ft)

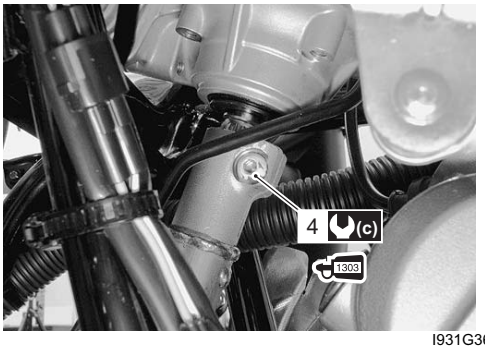


I931G3630060-02

- Apply thread lock to the steering shaft bolt (4) and tighten it to the specified torque.

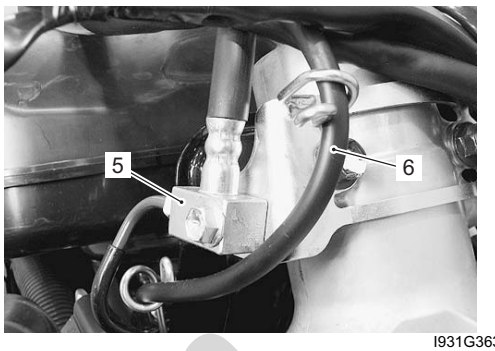
  1303 : Thread lock cement 99000–32030 (THREAD LOCK CEMENT SUPER "1303" or equivalent)

  Tightening torque
  Steering shaft bolt (c): 26 N·m (2.6 kgf-m, 19.0 lbf-ft)



I931G3630061-03

- Install the front brake hose union (5) and throttle cable (6) to the cable guide.



I931G3630062-02

- Apply grease to the spline of the EPS body assembly.

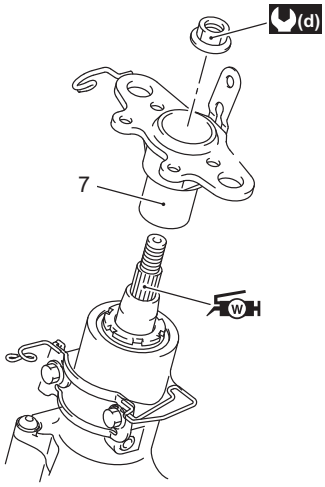
  W/H : Grease 99000–25160 (Water resistance grease or equivalent)

- Install the steering shaft plate (7) and tighten the steering shaft upper nut to the specified torque.

  ⚠ CAUTION

  - **Never use an impact wrench when tightening the steering shaft upper nut.**
  - **Never exceed the specified torque to prevent EPS body assembly damage.**

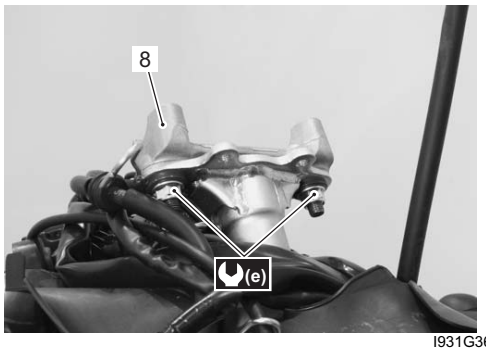
  Tightening torque
  Steering shaft upper nut (d): 120 N·m (12.0 kgf-m, 87.0 lbf-ft)



I931G3630072-01

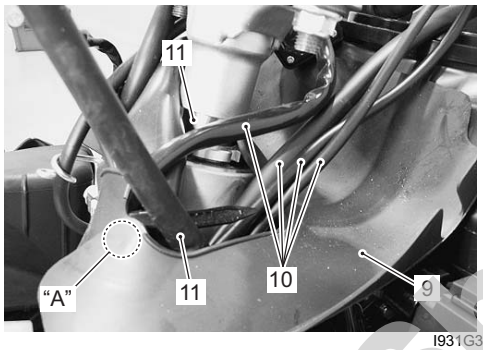
- Install the handlebar holder (8) and tighten the nuts to the specified torque.

  Tightening torque
  Handlebar holder nut (e): 60 N·m (6.0 kgf-m, 43.5 lbf-ft)



I931G3630063-02

- Install the center cover (9).



I931G3630064-02

9.	Center cover
10.	Wiring harness (Left handlebar switch/Parking rear brake switch/ Parking rear brake light switch), (Emergency switch (For P-17) and horn switch (For P-17, 24))
11.	Parking/Rear brake cable
12.	Steering shaft
"A":	Hooked point

- Install the auxiliary headlight. Refer to "Auxiliary Headlight Removal and Installation in Section 9B in related manual".
- Install the front fender. Refer to "Front Side Exterior Parts Removal and Installation in Section 9D in related manual".
- Install the handlebars. Refer to "Handlebars Removal and Installation (LT-A750XP/ZK9) in Section 6B (Page 6B-3)".
- Install the combination meter. Refer to "Combination Meter Removal and Installation in Section 9C in related manual".

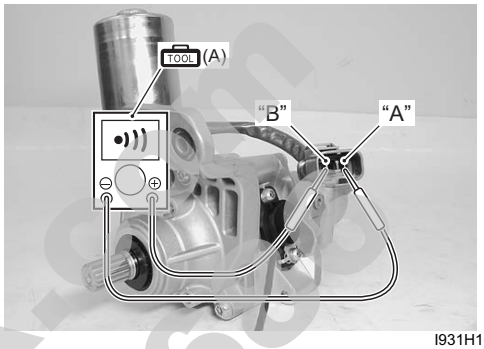
EPS Motor Inspection (LT-A750XP/ZK9)

B931G46306005

1) Disconnect the EPS motor coupler.
2) First, check for insulation with the tester between terminals "A" and "B".
   If continuity does not exist, replace the EPS body assembly with a new one.

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

   Tester knob indication
   Continuity (•))))

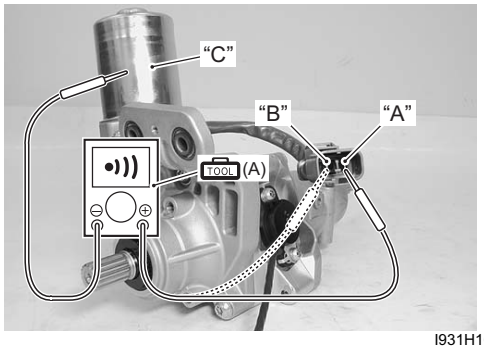


I931H1630107-02

3) Next, check for insulation with the tester between terminal "A" and body ground "C" and terminal "B" and body ground "C".
   If continuity is found, replace the EPS body assembly with a new one.

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

   Tester knob indication
   Continuity (•))))



I931H1630108-02

Specifications

Tightening Torque Specifications

B931G46307001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lbf-ft	
EPS control unit mounting nut	12	1.2	8.5	☞(Page 6C-49)
EPS body assembly mounting bolt	26	2.6	19.0	☞(Page 6C-52)
EPS body assembly mounting nut	28	2.8	20.0	☞(Page 6C-52)
Steering shaft bolt	26	2.6	19.0	☞(Page 6C-52)
Steering shaft upper nut	120	12.0	87.0	☞(Page 6C-52)
Handlebar holder nut	60	6.0	43.5	☞(Page 6C-53)

NOTE

The specified tightening torque is described in the following.
"EPS Control Unit Construction (LT-A750XP/ZK9) (Page 6C-48)"

Reference:
For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List (LT-A750XP/ZK9) in Section 0C (Page 0C-7)".

Special Tools and Equipment

Recommended Service Material

B931G46308001

Material	SUZUKI recommended product or Specification		Note
Grease	Water resistance grease or equivalent	P/No.: 99000–25160	☞(Page 6C-51) / ☞(Page 6C-52)
Thread lock cement	THREAD LOCK CEMENT SUPER "1303" or equivalent	P/No.: 99000–32030	☞(Page 6C-52)

Special Tool

B931G46308002

09900–25008 Multi circuit tester set ☞(Page 6C-11) / ☞(Page 6C-11) / ☞(Page 6C-13) / ☞(Page 6C-14) / ☞(Page 6C-14) / ☞(Page 6C-16) / ☞(Page 6C-17) / ☞(Page 6C-18) / ☞(Page 6C-27) / ☞(Page 6C-28) / ☞(Page 6C-30) / ☞(Page 6C-31) / ☞(Page 6C-32) / ☞(Page 6C-34) / ☞(Page 6C-36) / ☞(Page 6C-37) / ☞(Page 6C-39) / ☞(Page 6C-40) / ☞(Page 6C-42) / ☞(Page 6C-43) / ☞(Page 6C-44) / ☞(Page 6C-46) / ☞(Page 6C-46) / ☞(Page 6C-47) / ☞(Page 6C-53) / ☞(Page 6C-53)	09900–25009 Needle-point probe set ☞(Page 6C-28) / ☞(Page 6C-32) / ☞(Page 6C-36) / ☞(Page 6C-37) / ☞(Page 6C-39) / ☞(Page 6C-42) / ☞(Page 6C-44)
09904–41010 SUZUKI Diagnostic system set ☞(Page 6C-20) / ☞(Page 6C-22) / ☞(Page 6C-24)	09930–82710 Mode select switch ☞(Page 6C-18) / ☞(Page 6C-19)
09930–82720 Mode selection switch ☞(Page 6C-21)	09942–83110 Clip remover ☞(Page 6C-49)
09944–36011 Steering wheel remover ☞(Page 6C-50)	99565–01010–020 CD-ROM Ver.20 ☞(Page 6C-20) / ☞(Page 6C-22) / ☞(Page 6C-24)

Section 9

Body and Accessories

CONTENTS

NOTE

For the items with asterisk (*) in the "CONTENTS" below, refer to the same section of the service manual mentioned in the "FOREWORD" of this manual.

Wiring Systems

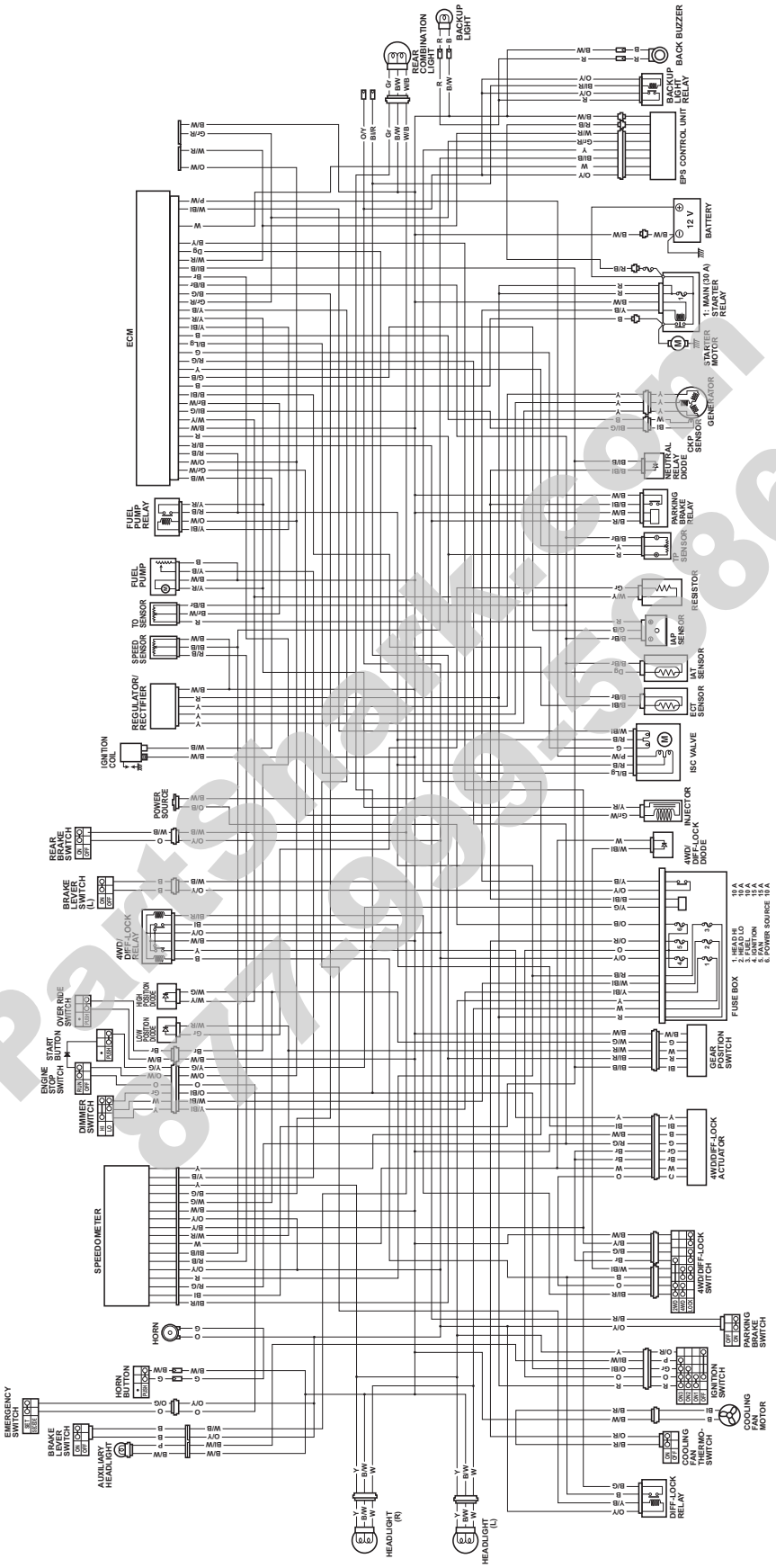
Schematic and Routing Diagram

Wiring Diagram (LT-A750XP/ZK9)

B931G49102003

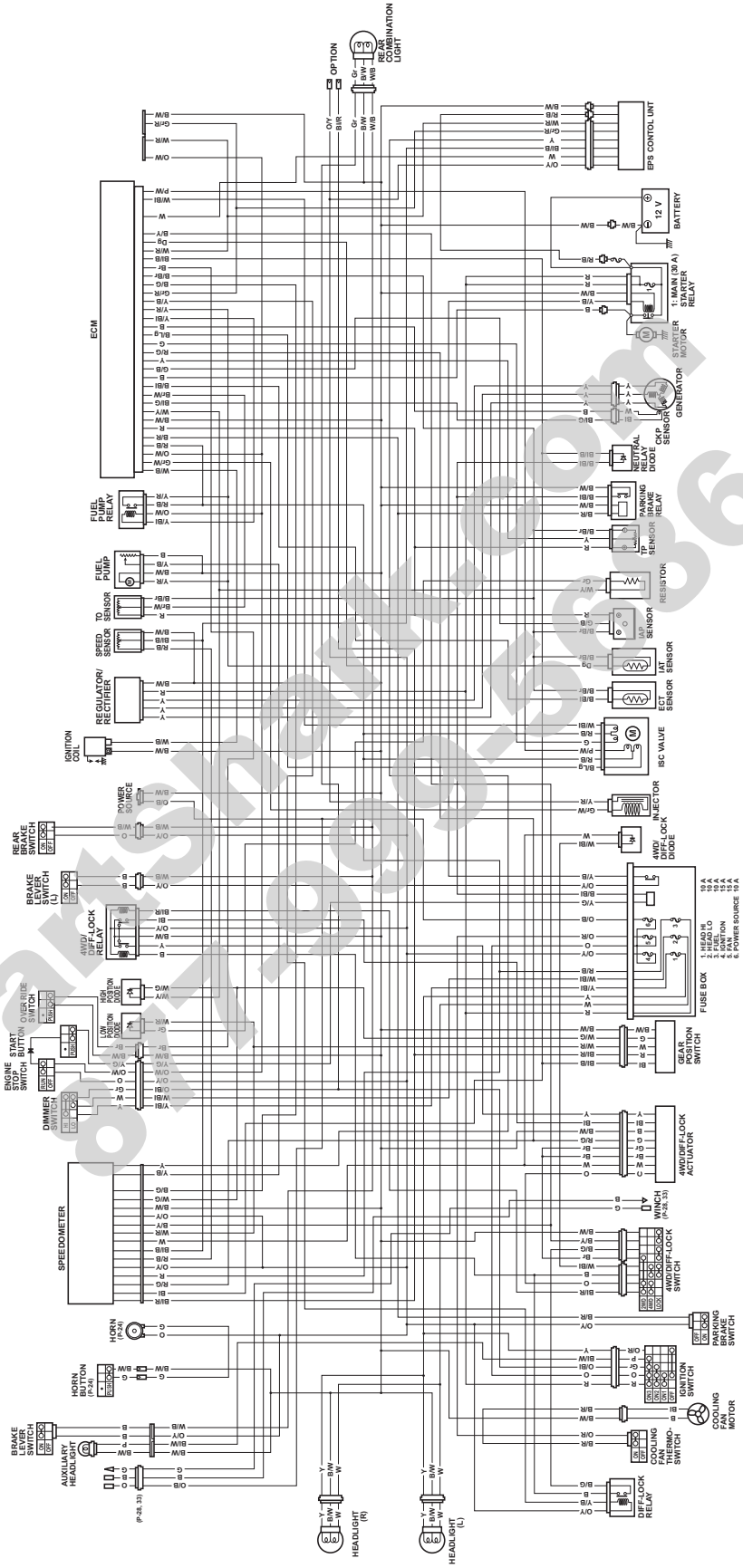
Refer to “Wire Color Symbols in Section 0A in related manual”.

For P-17



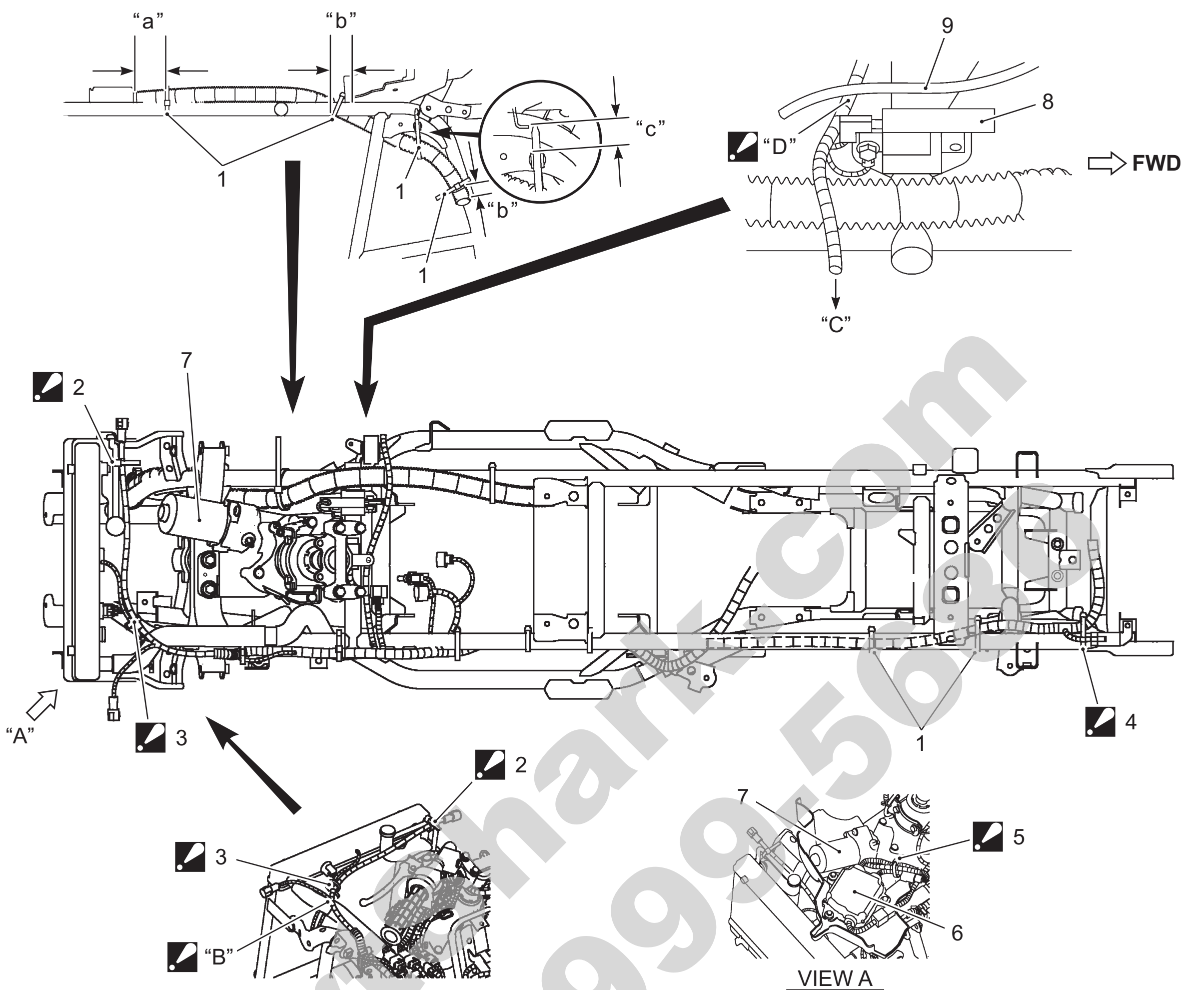
I931G3910901-02

For P-24, 28, 33



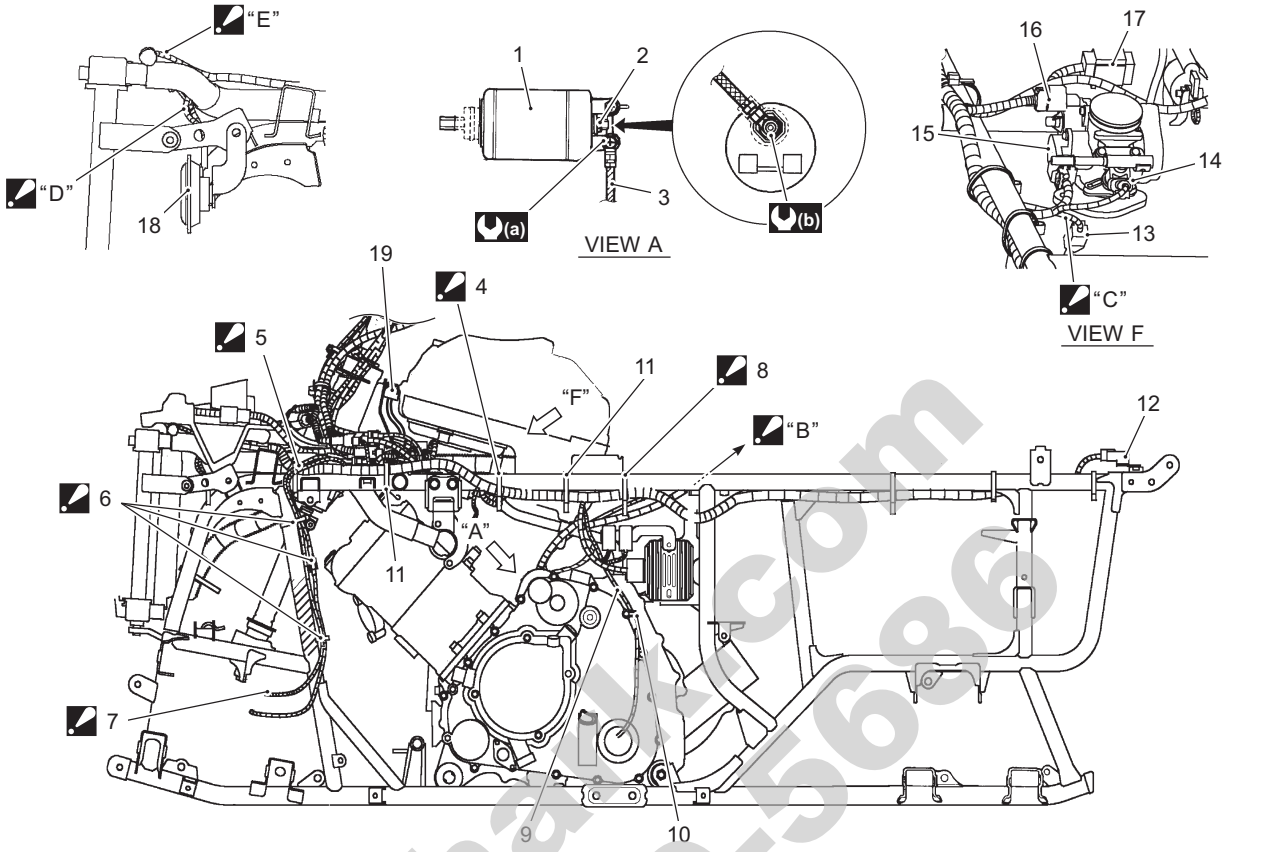
Wiring Harness Routing Diagram (LT-A750XP/ZK9)

B931G49102004



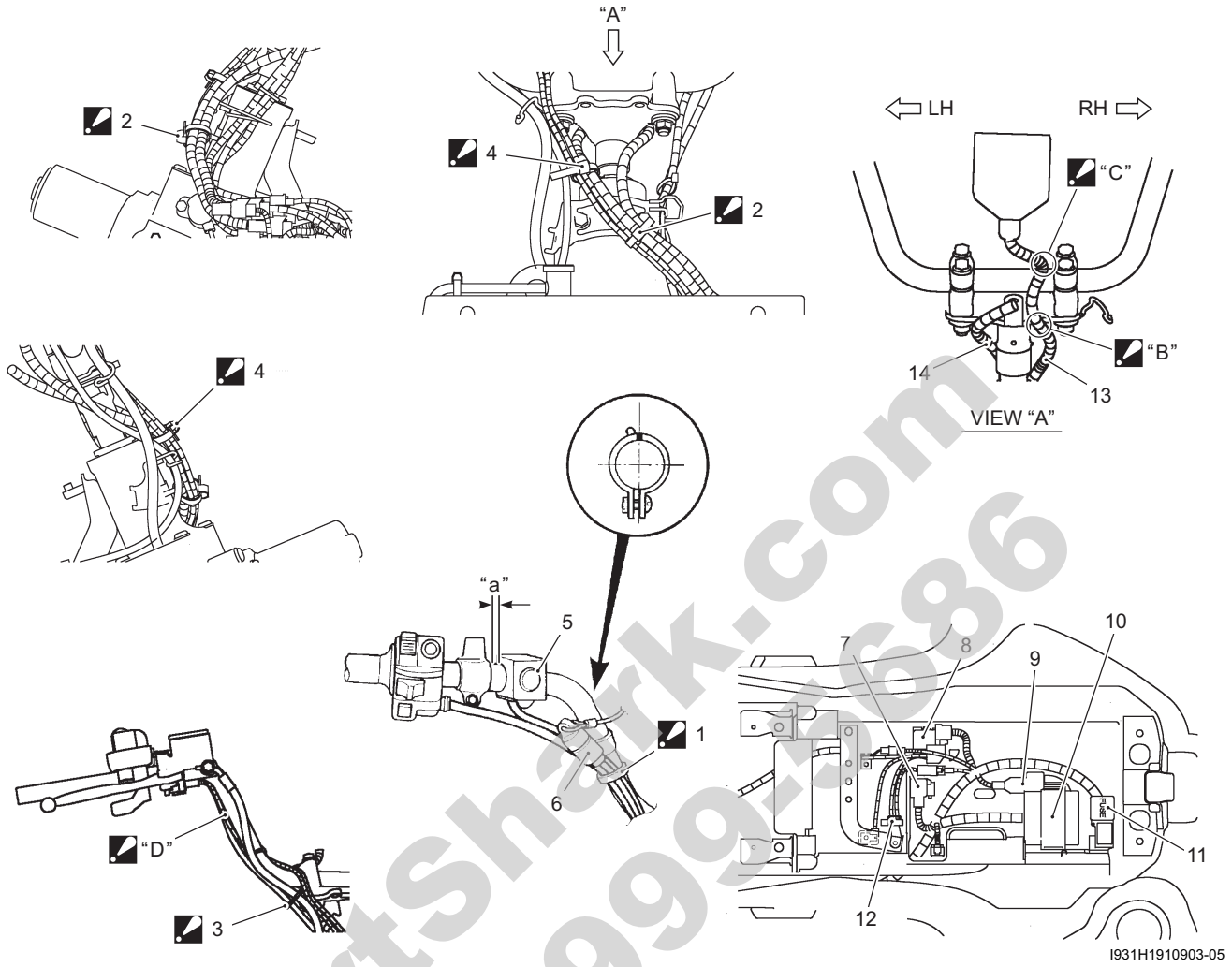
I931G3910905-02

1.	Clamp	9.	Throttle cable
2.	Clamp : Bind the wiring harness and hose with the clamp.	“B”:	Pass the wiring harness and cooling fan lead wire over the radiator hose.
3.	Clamp : Bind the wiring harness and cooling fan thermo switch with the clamp.	“C”:	To power source.
4.	Clamp : Bind the wiring harness and back up relay (For P-17) with the clamp.	“D”:	Pass the wiring harness under of the throttle cable.
5.	Clamp : Bind the EPS motor lead wire and EPS control unit lead wires.	“a”:	60 – 80 mm (2.4 – 3.2 in)
6.	EPS control unit	“b”:	20 – 30 mm (0.8 – 1.2 in)
7.	EPS motor	“c”:	10 – 15 mm (0.4 – 0.6 in)
8.	Ignition coil		

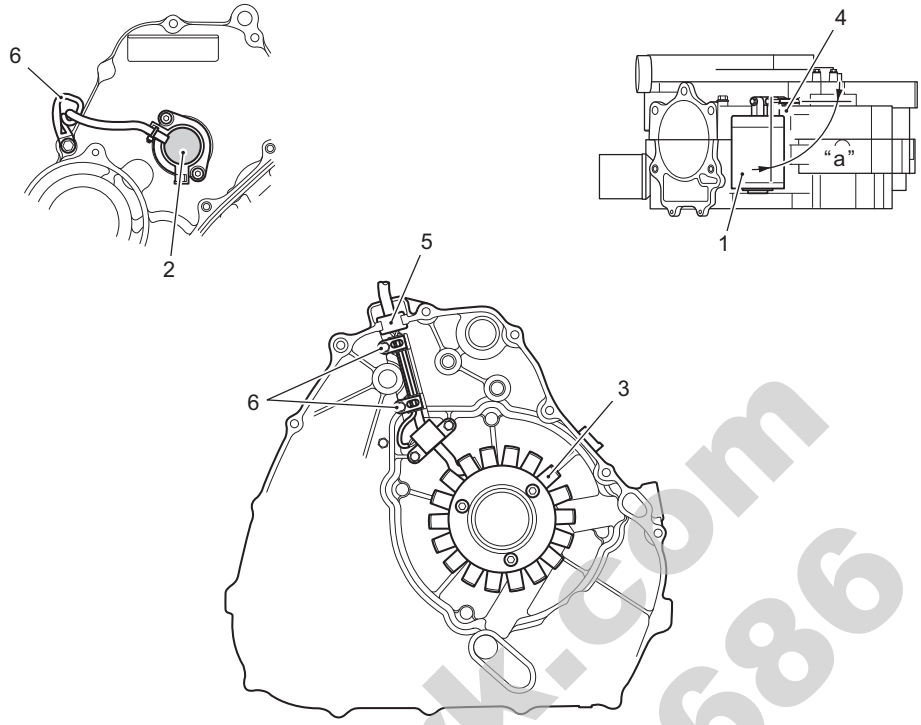


I931G3910903-02

1. Starter motor	14. Injector coupler
2. Starter motor terminal	15. TP sensor coupler
3. Engine earth	16. ISC valve coupler
4. Clamp : Bind the wiring harness and rear brake cable with the clamp.	17. TO sensor
5. Clamp : Bind the wiring harness and diff-lock actuator lead wire with the clamp.	18. Horn (For P-17, 24)
6. Clamp : Bind the diff-lock actuator lead wire and rear brake switch lead wire with the clamp.	19. IAP sensor
7. Clamp : Bind the rear brake switch lead wire with the clamp.	"B": To rear fender top.
8. Clamp : Bind the wiring harness, generator lead wire and gear position switch lead wire.	"C": Slack the read wire.
9. Speed sensor lead wire.	"D": Pass the horn lead wire inside of the stay.
10. Clamp	"E": Pass the branch of left headlight lead wire over the radiator hose.
11. Clamp	(a) : 10 N·m (1.0 kgf-m, 7.0 lbf-ft)
12. Back up relay (For P-17)	(b) : 6 N·m (0.6 kgf-m, 4.5 lbf-ft)
13. ECT sensor coupler	



1. Clamp : Bind the left handlebar switch lead wire, rear brake lever switch lead wire, horn lead wire (For P-17, 24) and emergency switch lead wire (For P-17) with the clamp. Cut the tip of clamp after clamping.	10. ECM
2. Clamp : Bind the combination meter lead wire, 2WD/4WD/diff-lock switch lead wire, ignition switch lead wire, front brake switch lead wire, parking/rear brake lever switch lead wire, left handlebar switch lead wire, horn lead wire (For P-17, 24) and emergency switch lead wire (For P-17) with the clamp. Cut the tip of clamp after clamping.	11. Fuse box
3. Clamp : Bind the front brake switch lead wire and 2WD/4WD/diff-lock switch lead wire with the clamp. Cut the tip of clamp after clamping.	12. Fuse (EPS)
4. Clamp : Bind the combination meter lead wire, 2WD/4WD/diff-lock lead wire and front brake switch lead wire with the clamp.	13. Combination meter lead wire
5. Horn button (For P-17, 24)	14. Ignition switch lead wire
6. Emergency switch (For P-17)	"a": 10 – 15 mm (0.4 – 0.6 in)
7. Drive relay	"B": Pass the combination meter lead wire behind the upper bracket.
8. Starter relay	"C": Slack the combination meter lead wire under the combination meter.
9. Fuel pump relay	"D": Pass the front brake switch lead wire behind the handlebars.



I931G3910904-01

1. Starter motor	3. Generator stator	5. Grommet	"a": 90°
2. Gear position switch	4. Ground wire	6. Clamp	

Specifications

Tightening Torque Specifications

B931G4910S002

NOTE

The specified tightening torque is described in the following.
"Wiring Harness Routing Diagram (LT-A750XP/ZK9) (Page 9A-4)"

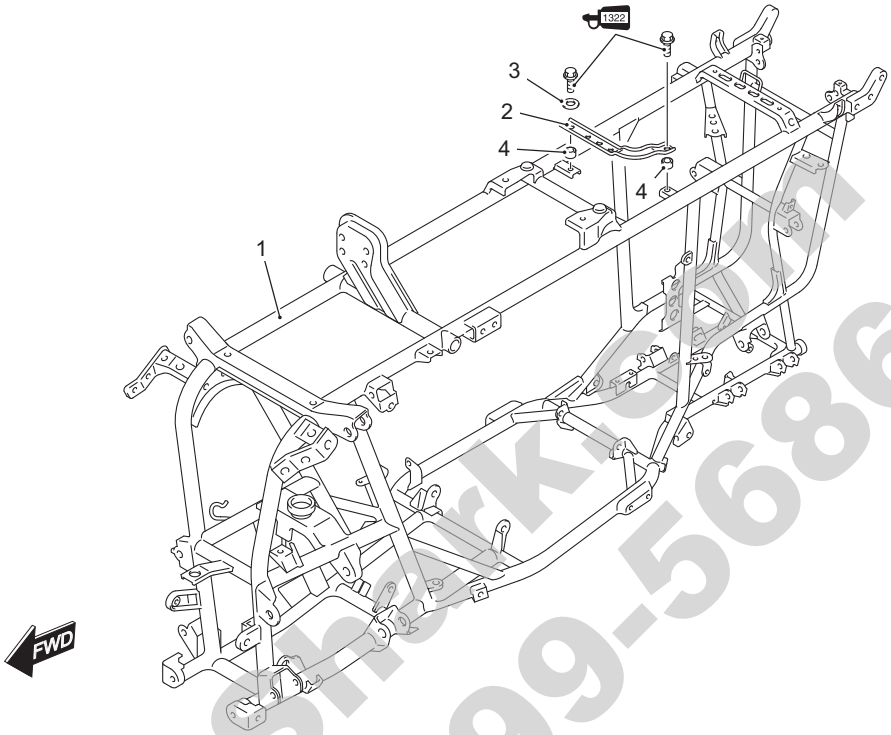
Reference:
For the tightening torque of fastener not specified in this section, refer to "Tightening Torque List (LT-A750XP/ZK9) in Section 0C (Page 0C-7)".

Body Structure

Repair Instructions

Body Frame Construction (LT-A750XP/ZK9)

B931G49506011



I931G3950001-04

1. Frame	3. Washer	1322 : Apply thread lock to the thread part.
2. Battery plate	4. Spacer	

Special Tools and Equipment

Recommended Service Material

B931G49508001

NOTE

Required service material is also described in the following.
"Body Frame Construction (LT-A750XP/ZK9) (Page 9E-1)"