Section 5

Transmission / Transaxle

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Precautions

Precautions

Precautions for Transmission / Transaxle

S5JB0A5000001

Air Bag Warning
Refer to “Air Bag Warning: in Section 00”.

Fastener Caution
Refer to “Fastener Caution: in Section 00”.

Precautions in Diagnosing Trouble (for A/T)
Refer to “Precautions in Diagnosing Trouble: in Section 5A”.

Precautions for Disassembly and Reassembly (for A/T)
Refer to “Precautions for Disassembly and Reassembly: in Section 5A”.

Automatic Transmission/Transaxle

Precautions

Precautions in Diagnosing Trouble

S5JB0A5100001

- Do not disconnect couplers from TCM, battery cable from battery, TCM ground wire harness from engine or main fuse before checking the diagnostic information (DTC, freeze frame data, etc.) stored in TCM memory. Such disconnection will clear memorized information in TCM memory.
- For vehicle without engine diagnosis connector, diagnostic information stored in TCM memory can be cleared as well as checked by using SUZUKI scan tool or OBD generic scan tool. Before using scan tool, read its Operator's (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it.
  It is indistinguishable which module turns on MIL because not only ECM but also TCM turns on MIL. Therefore, check both ECM and TCM for DTC when MIL lights on.
  When checking TCM for DTC, keep in mind that DTC is displayed on the scan tool as follows depending on the scan tool used.
  – SUZUKI scan tool displays DTC detected by TCM.
  – OBD generic scan tool displays DTC detected by each of ECM and TCM simultaneously.
- For vehicle with engine diagnosis connector, using SUZUKI scan tool the diagnostic information stored in TCM memory can be checked and cleared as well. Before its use, be sure to read Operator's Manual supplied with it carefully to have good understanding of its functions and usage.
- Not using scan tool (if equipped with AT monitor connector), the DTC stored in TCM memory also can be checked and cleared. DTC stored in the TCM memory is outputted by displaying DTC on digital display odometer with diagnosis terminal of monitor connector grounded. If no DTC is stored in TCM memory, DTC 0000 is outputted. If one or more DTCs are stored in TCM memory, they are outputted starting from smallest code number in increasing order. After all DTCs are outputted, all DTCs are outputted repeatedly.
- Be sure to read "Precautions for Electrical Circuit Service: in Section 00" before inspection and observe what is written there.
- TCM and/or ECM replacement:
  When substituting a known-good TCM and/or ECM, check for the following conditions.
  Neglecting this check may result in damage to a good TCM and/or ECM.
  – All relays and actuators have resistance of specified value.
  – MAF sensor, Manifold absolute pressure (MAP) sensor, TP sensor and fuel tank pressure sensor are in good condition. Also, the power circuit of these sensors is not shorted to the ground.
- Communication of ECUs, ECM, TCM, BCM, combination meter, 4WD control module ABS hydraulic unit / control module assembly, and keyless start control module (if equipped), is established by CAN (controller Area Network). Therefore, handle CAN communication line with care referring to "Precaution for CAN Communication System: in Section 00".

General Service Procedure Information

S5JB0A5100002

When repairing automatic transmission, it is necessary to conduct the on-vehicle test to investigate where the cause of the trouble lies first.
Then whether overhaul should be done or not is determined. If the transmission is disassembled without such preliminary procedure, not only the cause of the trouble would be unknown, but also a secondary trouble may occur and often time would be wasted.

Precautions for Disassembly and Reassembly

S5JB0A5100003

As the automatic transmission consists of high precision components, the following cautions should be strictly observed when handling its parts in disassembly and reassembly.

- Disassembling valve body assembly is prohibited in principle. However, a few parts can be disassembled. When disassembling valve body component parts, confirm whether these parts are allowed to disassemble or not referring to "Valve Body Assembly Components: ".
- Make sure to wash dirt off from the transmission so that no such dirt will enter the transmission during dismounting and remounting.

- Select a clean place free from dust and dirt for overhauling.
- Place a rubber mat on the work bench to protect parts from damage.
- Work gloves or shop cloth should not be used. (Use nylon cloth or paper towel.)
- When separating the case joint, do not pry with a screwdriver or such but tap with a plastic hammer lightly.
- Wash the disassembled parts in ATF (Automatic Transmission Fluid) or kerosene (using care not to allow ATF or kerosene to get on your face, etc.) and confirm that each fluid passage is not clogged by blowing air into it. But use ATF to wash the disc, resin washers and rubber parts.
- Replace each gasket, oil seal and O-ring with a new one.
- Apply ATF to sliding or rotating parts before reassembly.
- A new disc should be soaked in ATF at least 2 hours before use.

Part Inspection and Correction Table

Part	Inspect for	Correction
Casted part, machined part	Small flaw, burr Deep or grooved flaw Clogged fluid passage Flaw on installing surface, residual gasket Crack	Remove with oil stone. Replace part. Clean with air or wire. Remove with oil stone or replace part. Replace part.
Bearing	Unsmooth rotation Streak, pitting, flaw, crack	Replace. Replace.
Bushing, thrust washer	Flaw, burr, wear, burning	Replace.
Oil seal, gasket	Flawed or hardened seal ring Worn seal ring on its periphery or side Piston seal ring, oil seal, gasket, etc.	Replace. Replace. Replace.
Gear	Flaw, burr Worn gear tooth	Replace. Replace.
Splined part	Burr, flaw, torsion	Correct with oil stone or replace.
Snap ring	Wear, flaw, distortion No interference	Replace. Replace.
Thread	Burr Damage	Replace. Replace.
Spring	Settling, sign of burning	Replace.
Clutch disc, brake disc	Wear, burning, distortion, damaged claw	Replace.
Clutch plate, brake plate	Wear, burning, distortion, damaged claw	Replace.
Sealing surface (where lip contacts)	Flaw, rough surface, stepped wear, foreign material	Replace.

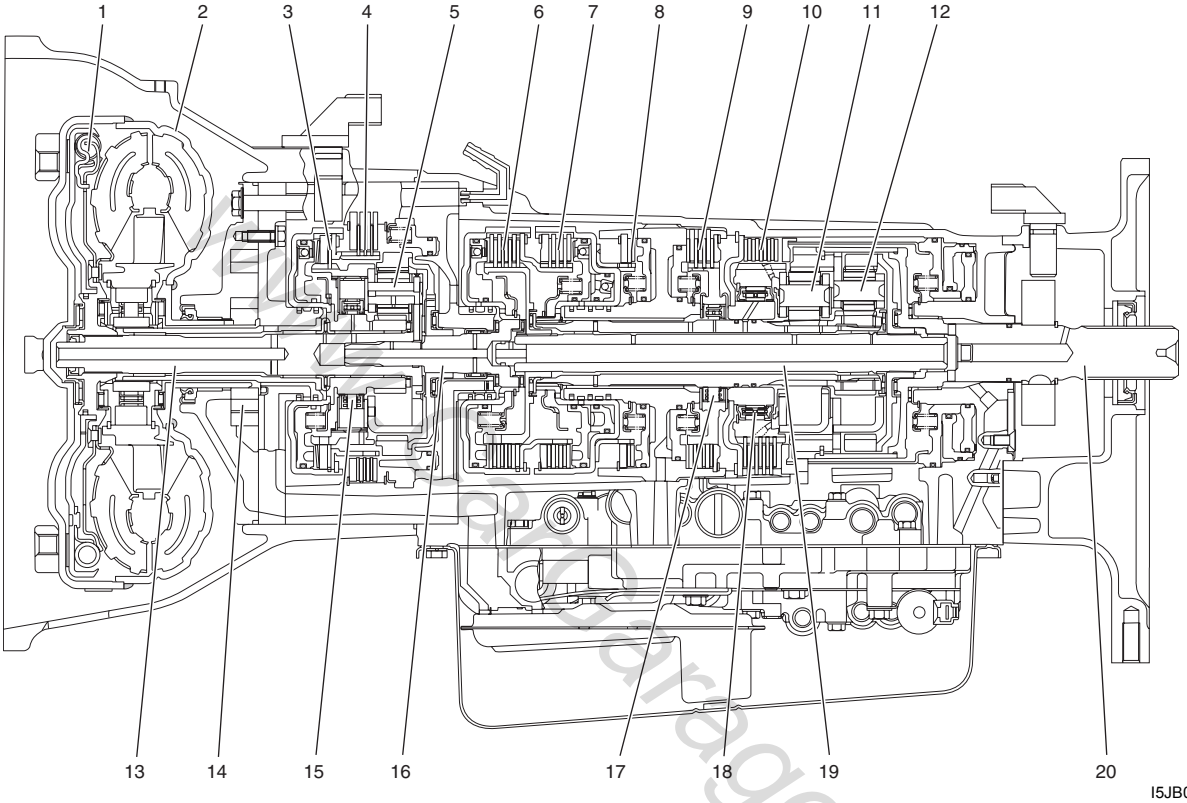
General Description

Automatic Transmission Description

S5JB0A5101001

This automatic transmission is a full automatic type with 3-speed plus overdrive (O/D).
The torque converter is a 3-element, 1-step and 2-phase type and is equipped with an electronically controlled lock-up mechanism. The gear shift device consists of 3 sets of planetary gear units,3 disc type clutches, 4 disc type brakes and 3 one-way clutches. The gear shift is done by selecting one of 7 positions (“P”, “R”, “N”, “D”, “3”, “2” and “L”) by means of the select lever installed on the floor. Also, by using the P/N mode switch located on the console box, it is possible to select the gear change timing of 2 modes, normal and power.

4WD



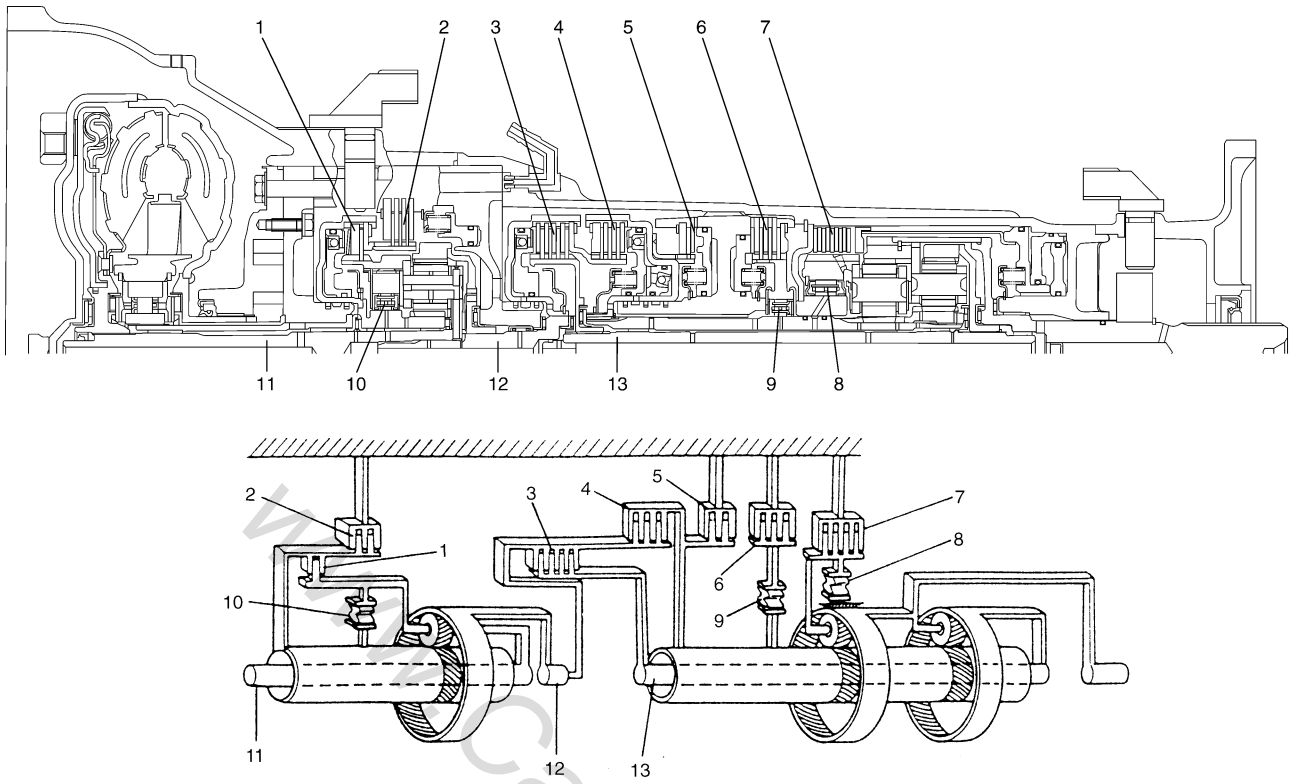
I5JB0A510004-01

1. Torque converter clutch (TCC)	8. Second coast brake	15. O/D one-way clutch
2. Torque converter	9. Second brake	16. Forward clutch input shaft
3. O/D clutch	10. Reverse brake	17. One-way clutch No.1
4. O/D brake	11. Front planetary gear	18. One-way clutch No.2
5. O/D planetary gear	12. Rear planetary gear	19. Intermediate shaft
6. Forward clutch	13. O/D input shaft	20. Output shaft
7. Direct clutch	14. Oil pump	

Item			Specifications	
Torque converter	Type		3-element, 1-step, 2-phase type (with TCC (lock-up) mechanism)	
	Stall torque ratio		2.05	
Oil pump	Type		Trochoid type oil pump	
	Drive system		Engine driven	
Gear change device	Type		Forward 4-step, reverse 1-step planetary gear type	
	Shift position		“P” range	Gear in neutral, output shaft fixed, engine start
			“R” range	Reverse
			“N” range	Gear in neutral, engine start
			“D” range	Forward 1st ↔ 2nd ↔ 3rd ↔ 4th (O/D) automatic gear change
			“D” range (Transfer 4L)	Forward 1st ↔ 2nd ↔ 3rd gear change
			“3” range	Forward 1st ↔ 2nd ↔ 3rd automatic gear change
			“2” range (Normal mode)	Forward 1st ↔ 2nd ← 3rd automatic gear change
			“2” range (Power mode)	Forward 2nd ← 3rd automatic gear change
			“L” range	Forward 1st ← 2nd reduction, and fixed at 1st gear
	Gear ratio	1st	2.826	
		2nd	1.493	
		3rd	1.000	
		4th	0.688	
		Reverse	2.703	
	Control elements		Wet type multi-disc clutch ... 3 sets Wet type multi-disc brake ... 4 sets One-way clutch ... 3 sets	
	Transfer		Hi: 1.000 Lo: 1.970	
	Final gear reduction ratio		5.125	
Lubrication	Lubrication system		Forced feed system by oil pump	
Cooling	Cooling system		Radiator assisted cooling (water-cooled)	
Fluid used			SUZUKI ATF 3317 or Mobil ATF 3309	

Clutch / Brake Functions of Automatic Transmission

S5JB0A5101002



I5JB0A510005-01

1. Overdrive clutch	5. Second coast brake	9. One-way clutch No.1	13. Intermediate shaft
2. Overdrive brake	6. Second brake	10. Overdrive one-way clutch	
3. Forward clutch	7. Reverse brake	11. Overdrive input shaft	
4. Direct clutch	8. One-way clutch No.2	12. Forward clutch input shaft	

Part Name	Function
Overdrive clutch	Meshes overdrive carrier and overdrive sun gear.
Overdrive brake	Fixes overdrive sun gear.
Overdrive one-way clutch	Meshes overdrive carrier and overdrive sun gear only when driven by engine.
Forward clutch	Meshes input shaft and intermediate shaft.
Direct clutch	Meshes input shaft with front sun gear and rear sun gear.
Second coast brake	Fixes front sun gear and rear sun gear.
Second brake	Fixes outer race of one-way clutch No.1, to prevent front sun gear and rear sun gear from turning counterclockwise (reverse direction of engine input rotation direction).
Reverse brake	Fixes front planetary carrier.
One-way clutch No.1	Prevents front sun gear and rear sun gear from turning counterclockwise only when second brake is at work.
One-way clutch No.2	Prevents front planetary — carrier from turning counterclockwise.

Table of A/T System Component Operation

S5JB0A5101003

		Solenoid valve No. 1–A	Solenoid valve No. 1–B	O/D clutch	Forward clutch	Direct clutch		O/D brake
						Inner piston	Outer piston	
P		○	X	○	—	—	—	—
R (V ≤ 7 km/h)		○	X	○	—	○	○	—
R (V> 7 km/h)		X	○	○	—	—	—	—
N		—	—	○	—	—	—	—
D	1st gear	○	X	○	○	—	—	—
	2nd gear	○	○	○	○	—	—	—
	3rd gear	X	○	○	○	—	○	—
	O/D	X	X	—	○	—	○	○
2	1st gear	○	X	○	○	—	—	—
	2nd gear	○	○	○	○	—	—	—
	3rd gear	X	○	○	○	—	○	—
L	1st gear	○	X	○	○	—	—	—
	2nd gear	○	○	○	○	—	—	—

○: ON, X: OFF

		Second coast brake	Second brake	Reverse brake		O/D one-way clutch	One-way clutch No. 1	One-way clutch No. 2
				Inner piston	Outer piston			
P		—	—	—	—	○	—	—
R (V ≤ 7 km/h)		—	—	○	○	○	—	—
R (V> 7 km/h)		—	—	—	—	—	—	○
N		—	—	—	—	○	—	—
D	1st gear	—	—	—	—	○	—	○
	2nd gear	—	○	—	—	○	○	—
	3rd gear	—	○	—	—	○	—	—
	O/D	—	○	—	—	—	—	—
2	1st gear	—	—	—	—	○	—	○
	2nd gear	○	○	—	—	○	—	—
	3rd gear (Fail safe)	—	○	—	—	○	—	—
L	1st gear	—	—	○	○	○	—	—
	2nd gear (Fail safe)	○	○	—	—	○	—	—

○: ON, X: OFF

CAN Communication System Description

S5JB0A5101008

Refer to “CAN Communication System Description: in Section 1A” for CAN communication system description.
TCM communicates control data with each control module as follows.

TCM Transmission Data

				ECM	BCM	Combination Meter	4WD control module
TCM	Transmit	DATA	Torque reduction request	○			
			Slip control signal	○			
			Transmission malfunction indication ON	○*1		○*1	
			Transmission emissions related malfunction active	○*2		○*2	
			Transmission gear selector position	○	○	○	○
			Transmission diagnostic trouble codes			○	

I5JB0A510006-01

NOTE

***1: Vehicle is equipped with engine diagnosis connector only.**
***2: Vehicle is not equipped with engine diagnosis connector only.**

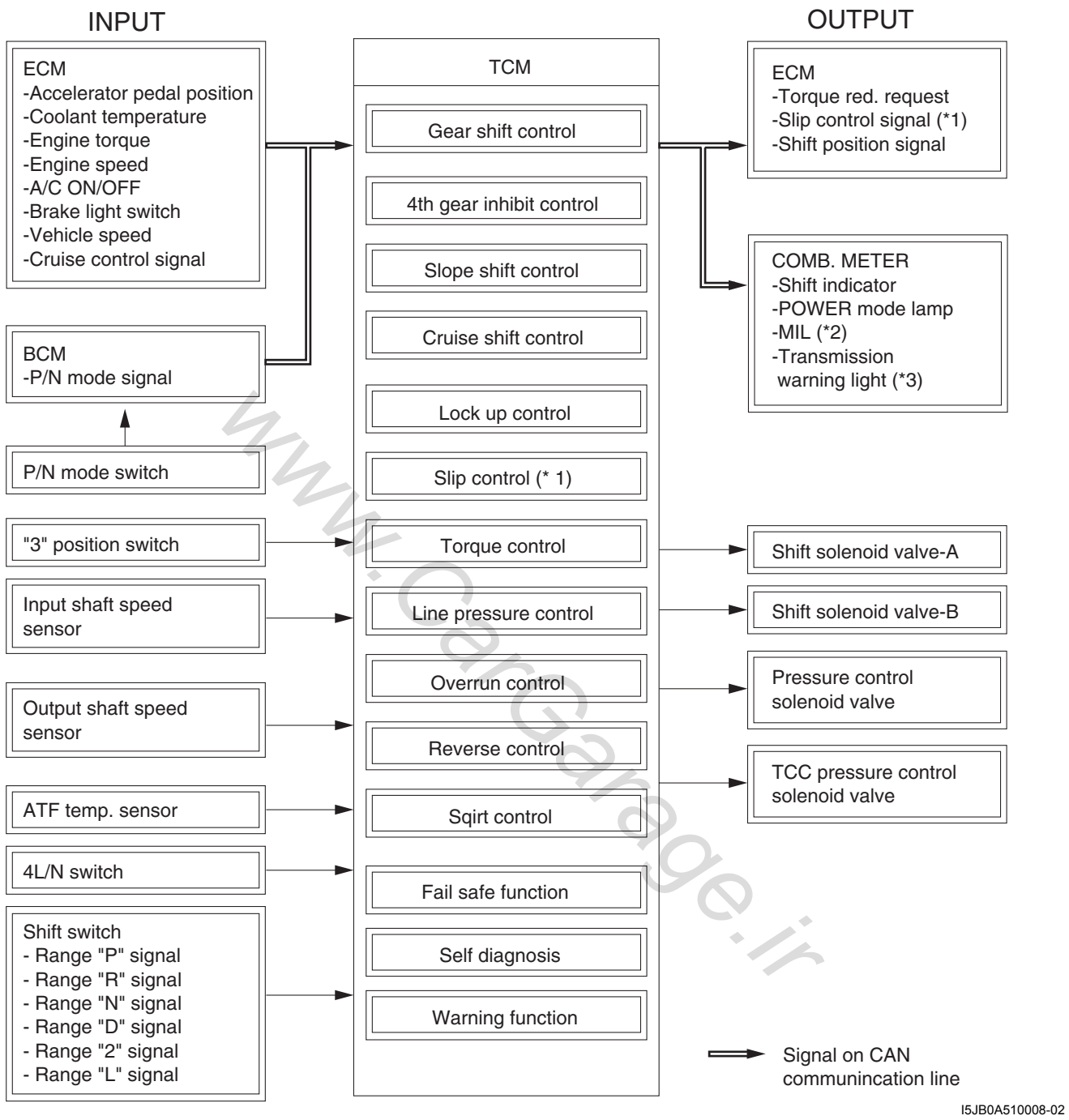
TCM Reception Data

				ECM	BCM
TCM	Receive	DATA	Engine torque signal	○	
			Accelerator pedal position	○	
			Engine speed	○	
			4th gear inhibit	○	
			Torque converter clutch control inhibit	○	
			Lock up/ slip control inhibit signal	○	
			Throttle position	○	
			Stand by to engage air conditioning compressor	○	
			Engine coolant temperature	○	
			Cruise control signal (if equipped with cruise control system)	○	
			Vehicle speed	○	
			Brake pedal switch active	○	
			AT mode status		○
			Air conditioning compressor clutch engaged (if equipped with A/C)	○	

I5JB0A510007-03

Electronic Shift Control Input / Output Table

S5JB0A5101004



I5JB0A510008-02

NOTE

***1: For vehicle not equipped with engine diagnosis connector model (Except RH steering vehicle not equipped with rear fog light model)**
***2: For vehicle not equipped with engine diagnosis connector model**
***3: For vehicle equipped with engine diagnosis connector model**

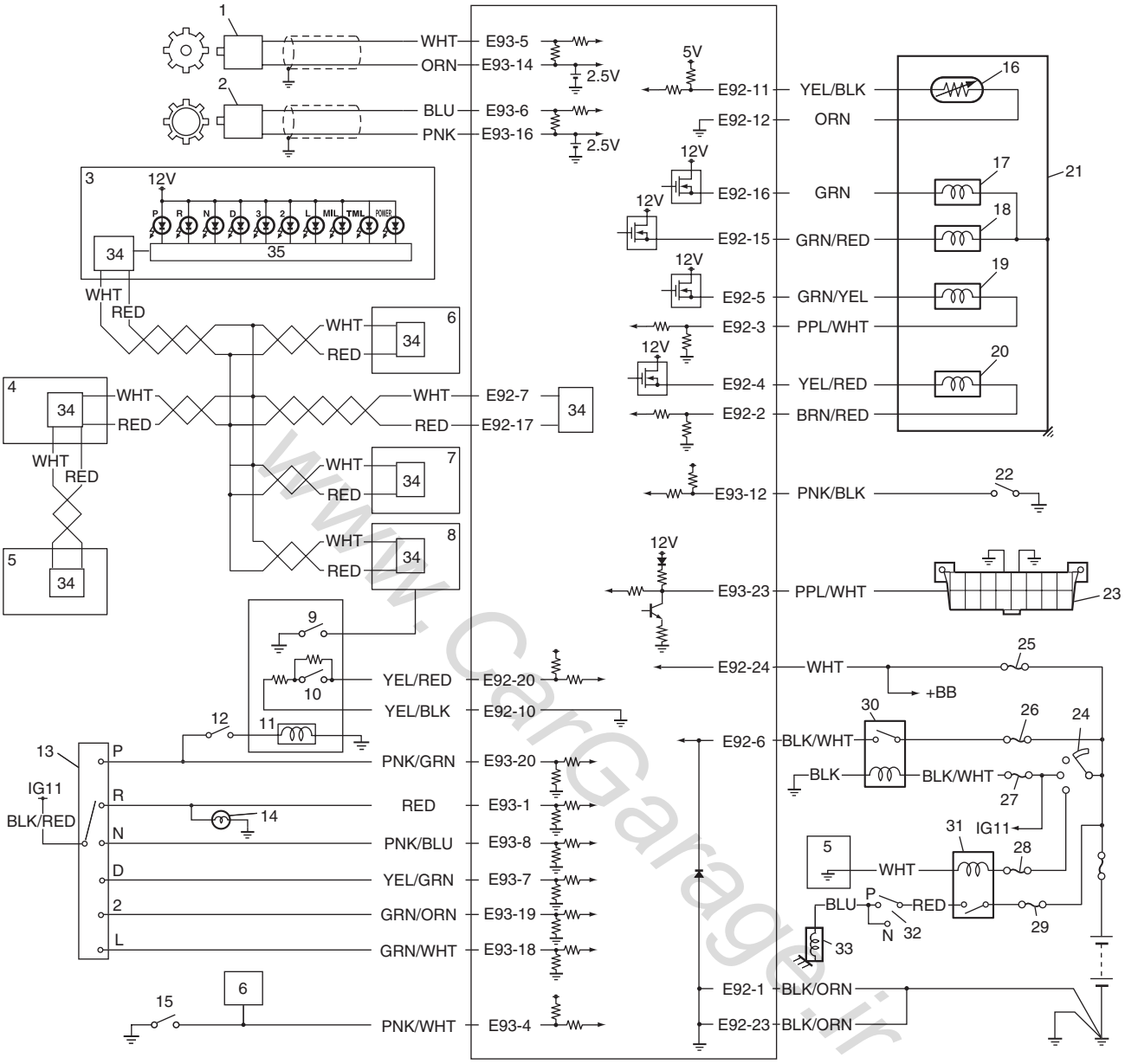
	INPUT / OUTPUT \ CONTROL	Gear Shift control	4th gear inhibit control	Slope shift control	Cruise shift control	Lock-up control	Slip control	Line pressre control	Torque control	Overrun control	Reverse control	Squirt control	Speed meter indicate
Input	Accelerator effective position	○		○	○	○	○	○	○				
	Throttle position				○								
	Coolant temperature		○			○	○						
	Engine torque			○				○	○				
	Engine speed						○	○	○				
	A/C ON/OFF						○						
	Brake light switch	○		○		○							
	Vehicle speed												○
	Cruise control signal				○								
	P/N mode switch	○			○								
	"3" position switch	○								○			
	Input shaft speed sensor					○	○	○	○				
	Output shaft speed sensor	○		○	○	○	○	○	○	○	○	○	
	ATF temperature sensor	○					○	○				○	
	4L/N switch	○		○	○	○							
	Shift switch	○		○	○	○	○	○		○	○	○	
Output	Torque reduction request								○				
	Slip control signal *1						○						
	Shift solenoid valve-A	○	○	○	○					○	○	○	
	Shift solenoid valve-B	○	○	○	○					○	○	○	
	Pressure control solenoid valve							○					
	TCC pressure control solenoid valve				○	○	○						

I5JB0A510157-02

NOTE

***1: For vehicle not equipped with engine diagnosis connector model (Except RH steering vehicle not equipped with rear fog light model)**

Electronic Shift Control System Wiring Diagram



I5JB0A510009-03

[A]: TCM connector (viewed from harness side)	9. P/N mode switch	18. Shift solenoid valve-B	27. "IG COIL" fuse
1. Output shaft speed sensor	10. "3" position switch	19. TCC pressure control solenoid valve	28. "ST SIG" fuse
2. Input shaft speed sensor	11. Shift lock solenoid	20. Pressure control solenoid valve	29. "ST" fuse
3. Combination meter	12. Brake light switch	21. Valve body assembly	30. AT relay included in integration relay No.2 in main fuse box
4. ABS hydraulic unit / control module	13. Transmission range switch	22. Monitor connector (if equipped)	31. Starting motor relay
5. ECM	14. Back-up light	23. DLC	32. Inhibit switch
6. 4WD control module	15. 4L/N switch	24. Ignition switch	33. Starting motor
7. Keyless start control module (if equipped)	16. Transmission fluid temperature sensor	25. "DOME" fuse	34. CAN driver
8. BCM	17. Shift solenoid valve-A	26. "AT" fuse	35. Meter driver

Brake Interlock System Description

S5JB0A5101005

Shift Lock Solenoid Control

This system consists of shift lock solenoid control system and interlock cable control system.
The shift lock solenoid control system is so designed that the select lever can not be shifted from “P” range position unless the ignition switch is turned ON and the brake pedal is depressed. And the interlock cable control system is so designed that the select lever cannot be shifted from “P” range position unless the ignition switch is turned to ACC or ON position. Also, the ignition key cannot be pulled out of the key slot unless the select lever is in “P” range.

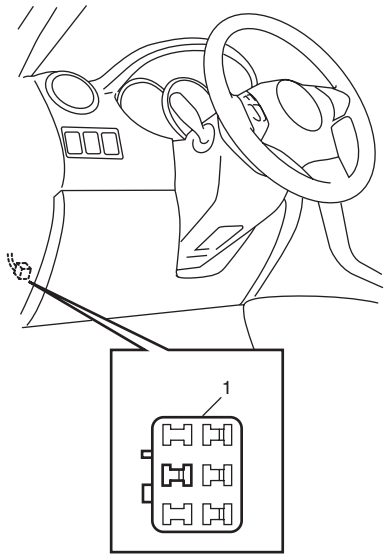
A/T Diagnosis General Description

S5JB0A5101006

This vehicle is equipped with an electronic transmission control system, which control the automatic shift up and shift down timing, TCC operation, etc. suitably to vehicle driving conditions.
TCM has an On-Board Diagnosis system which detects a malfunction in this system and abnormality of those parts that influence the engine exhaust emission.
When diagnosing a trouble in the transmission including this system, be sure to have full understanding of the outline of “On-Board Diagnostic System Description: ” and each item in “Precautions in Diagnosing Trouble: ” and execute diagnosis according to “A/T System Check: ” to obtain correct result smoothly.

NOTE

There are two type of On-Board Diagnostic System, vehicle without engine diagnosis connector (1) and vehicle with engine diagnosis connector, depending on vehicle specifications. Identify the type of system for vehicle being serviced by whether the vehicle equipped with engine diagnosis connector on main harness or not.



I5JB0A510010-01

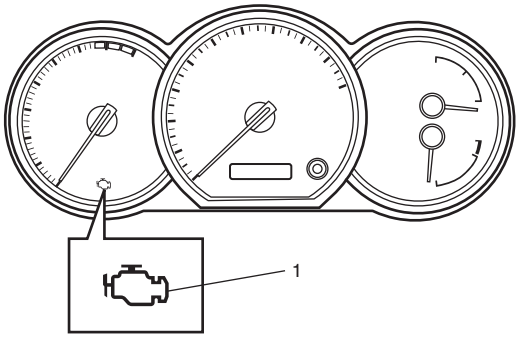
On-Board Diagnostic System Description

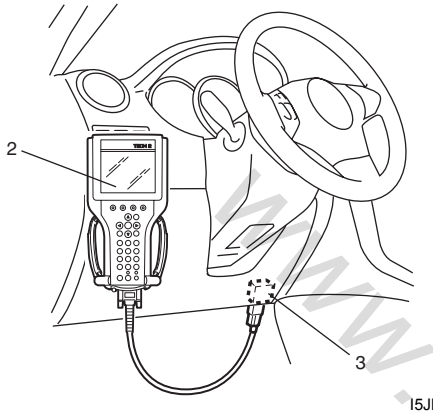
S5JB0A5101007

For Vehicle without Engine Diagnosis Connector

For automatic transmission control system, TCM has the following functions. Refer to “Inspection of TCM and Its Circuits: ”.

- When the ignition switch is turned ON with the engine at a stop, malfunction indicator lamp (MIL) (1) turns ON to check the bulb of the MIL.
- When TCM detects a malfunction in A/T control system TCM desires turning on malfunction indicator lamp (MIL) and stores malfunction DTC in TCM memory.
  (If it detects that continuously 3 driving cycles are normal after detecting a malfunction, however, it makes MIL turn OFF although DTC stored in its memory will remain.)
- It is possible to communicate through DLC (2) by using not only SUZUKI scan tool (3) but also OBD generic scan tool. (Diagnostic information can be checked and erased by using a scan tool.)





I5JB0A510011-01

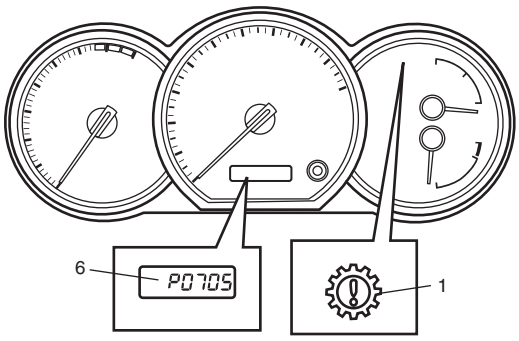
2 Driving cycle detection logic
The malfunction detected in the first driving cycle is stored in TCM memory (in the form of pending DTC and freeze frame data) but the malfunction indicator lamp does not light at this time. It lights up at the second detection of same malfunction also in the next driving cycle.

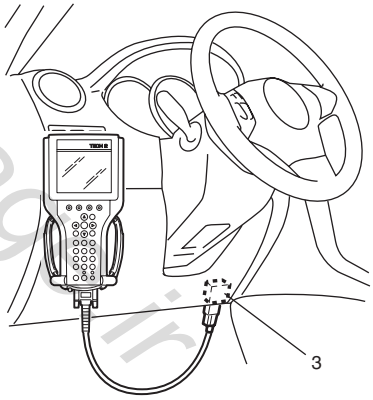
Pending DTC
Pending DTC means a DTC detected and stored temporarily at 1 driving cycle of the DTC which is detected in the 2 driving cycle detection logic.

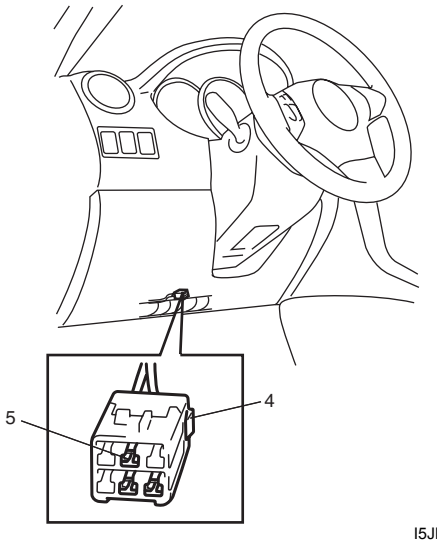
Freeze frame data
TCM stores the engine and driving conditions at the moment of the detection of a malfunction in its memory. This data is called “Freeze frame data”.
Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the vehicle was running or stopped) when a malfunction was detected by checking the freeze frame data.

For Vehicle with Engine Diagnosis Connector
For automatic transmission control system, TCM has the following functions. Refer to “Inspection of TCM and Its Circuits: ”.

- When ignition switch is turned ON with no malfunction in A/T control system is detected, transmission warning light (1) lights for about 2 seconds after ignition switch is turned ON and then goes OFF for bulb check.
- When TCM detects a malfunction in A/T control system, it indicates transmission warning light (1) and stores malfunction DTC in its memory.
- It is possible to communicate with TCM through data link connector (DLC) (3) by using SUZUKI scan tool (2). Diagnostic information can be checked and erased by using SUZUKI scan tool.
- It is also possible to output DTC stored in TCM by displaying DTC on digital display odometer (6) with diagnosis switch terminal (5) of monitor connector (4) grounded. If no DTC is stored in TCM memory, DTC 0000 is outputted repeatedly. If one or more DTCs are stored in TCM memory, they are outputted starting from smallest code number in increasing order. After all DTCs are outputted, they are outputted again in the same manner.







I5JB0A510012-01

2 Driving cycle detection logic
The malfunction detected in the first driving cycle is stored in TCM memory (in the form of pending DTC and freeze frame data) but the malfunction indicator lamp does not light at this time. It lights up at the second detection of same malfunction also in the next driving cycle.

Pending DTC
Pending DTC means a DTC detected and stored temporarily at 1 driving cycle of the DTC which is detected in the 2 driving cycle detection logic.

Schematic and Routing Diagram

Automatic Gear Shift Table

S5JB0A5102001

Automatic gear shift schedule is shown in the following table. Test-drive the vehicle on a flat road in the D position.

Normal Mode

1. Shift Point in D position and normal mode

	Throttle opening (%)	Shift	Vehicle speed km/h (mph)	Remark
UP shift	Over 80%	1st → 2nd	50 – 55 (31 – 34)	
		2nd → 3rd	99 – 104 (62 – 65)	
		3rd → 4th	154 – 159 (96 – 99)	
	50%	1st → 2nd	26 – 31 (16 – 19)	
		2nd → 3rd	56 – 61 (35 – 38)	
		3rd → 4th	91 – 96 (57 – 59)	98-103 (61-64) (with cruise set condition)
	10%	1st → 2nd	10 – 15 (6 – 9)	
		2nd → 3rd	25 – 30 (16 – 19)	
		3rd → 4th	41 – 46 (25 – 29)	
DOWN shift	Over 80%	4th → 3rd	148 – 153 (92 – 95)	
		3rd → 2nd	84 – 89 (52 – 55)	
		2nd → 1st	41 – 46 (25 – 29)	
	50%	4th →3rd	68 – 73 (42 – 45)	75 – 80 (47 – 50) (with cruise set condition)
		3rd 2nd	42 – 47 (26 – 29)	
		2nd → 1st	23 – 28 (14 – 17)	14 – 19 (9 – 12) (with cruise set condition)
	0%	4th → 3rd	22 – 27 (14 – 17)	With applying brake pedal (cost down condition)
		3rd → 2nd	18 – 23 (11 – 14)	
		2nd → 1st	16 – 21 (10 – 13)	

2. Lock-up point in D position and normal mode

	Lock-up clutch status	Throttle opening (%)	Vehicle speed km/h (mph)	Remark
3rd gear lock-up	ON	50%	85 – 90 (53 – 56)	
		20 – 30%	56 – 61 (35 – 38)	
	OFF	50%	76 – 81 (47 – 50)	
		30 – 40%	43 – 48 (27 – 30)	
4th gear lock-up	ON	50%	146 – 151 (91 – 94)	146 – 151 (91 – 94) (with cruise set condition)
		20 – 30%	64 – 69 (40 – 43)	
	OFF	50%	102 – 107 (63 – 66)	85 – 90 (53 – 56) (with cruise set condition)
		20 – 30%	55 – 60 (34 – 37)	

3. Slip lock-up point in D and/or 3 position *1

	Slip lock-up clutch status	Throttle opening (%)	Vehicle speed km/h (mph)	Remark
3rd gear	Slip ON	10 – 15%	29 – 34 (18 – 21)	
	Slip OFF	10 – 15%	25 – 30 (16 – 19)	Without lock-up condition
4th gear	Slip ON	10 – 15%	39 – 44 (24 – 27)	
	Slip OFF	10 – 15%	35 – 40 (22 – 25)	Without lock-up condition

Power Mode

1. Shift Point in D position and power mode

	Throttle opening (%)	Shift	Vehicle speed km/h (mph)	Remark
UP shift	Over 80%	1st → 2nd	50 – 55 (31 – 34)	
		2nd → 3rd	99 – 104 (62 – 65)	
		3rd → 4th	154 – 159 (96 – 99)	
	50%	1st → 2nd	35 – 40 (22 – 25)	
		2nd → 3rd	66 – 71 (41 – 44)	
		3rd → 4th	106 – 111 (66 – 69)	
	10%	1st → 2nd	10 – 15 (6 – 9)	
		2nd → 3rd	25 – 30 (16 – 19)	
		3rd → 4th	41 – 46 (25 – 29)	
DOWN shift	Over 80%	4th → 3rd	148 – 153 (92 – 95)	
		3rd → 2nd	84 – 89 (52 – 55)	
		2nd → 1st	45 – 50 (28 – 31)	
	50%	4th → 3rd	82 – 87 (51 – 54)	
		3rd → 2nd	53 – 58 (33 – 36)	
		2nd → 1st	24 – 29 (15 – 18)	
	0%	4th → 3rd	35 – 40 (14 – 17)	With applying brake pedal (cost down condition)
		3rd → 2nd	18 – 23 (11 – 14)	
		2nd → 1st	16 – 21 (10 – 13)	

2. Lock-up point in D position and power mode

	Lock-up clutch status	Throttle opening (%)	Vehicle speed km/h (mph)	Remark
3rd gear lock-up	ON	50%	106 – 111 (66 – 69)	
		20 – 30%	56 – 61 (35 – 38)	
	OFF	50%	76 – 81 (47 – 50)	
		30 – 40%	43 – 48 (27 – 30)	
4th gear lock-up	ON	50%	156 – 161 (91 – 94)	
		20 – 30%	64 – 69 (40 – 43)	
	OFF	50%	126 – 131 (78 – 81)	
		20 – 30%	55 – 60 (34 – 37)	

3. Slip lock-up point in D and/or 3 position *1

	Slip lock-up clutch status	Throttle opening (%)	Vehicle speed km/h (mph)	Remark
3rd gear	Slip ON	10 – 15%	29 – 34 (18 – 21)	
	Slip OFF	10 – 15%	25 – 30 (16 – 19)	Without lock-up condition
4th gear	Slip ON	10 – 15%	39 – 44 (24 – 27)	
	Slip OFF	10 – 15%	35 – 40 (22 – 25)	Without lock-up condition

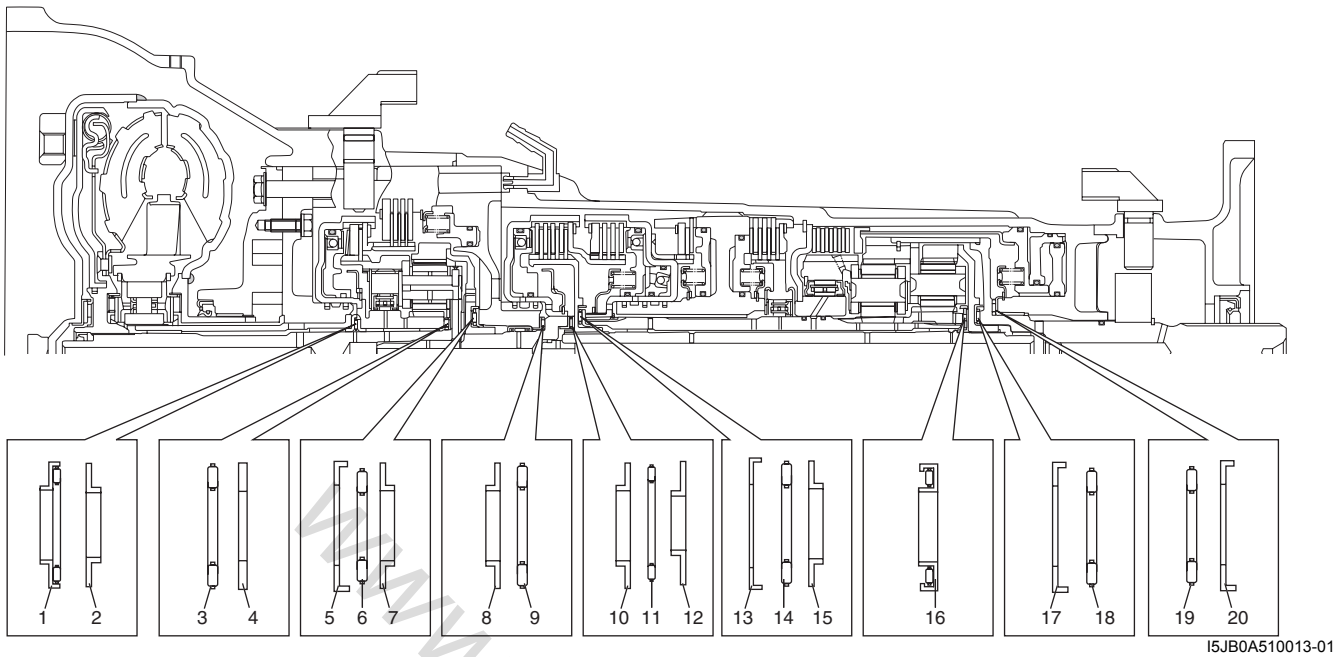
NOTE

***1: For vehicle not equipped with engine diagnosis connector model (Except RH steering vehicle not equipped with rear fog light model)**
The gear change is done at the shift point different from the above while any of the following control functions is working. Bear this in mind when performing inspection.

- **Slope Shift Control**
  When the AT controller makes up-slope judgment, Slope Shift Control (on up-slope) is executed by changing the gear change point to the high-speed side so as to reduce frequent up-shift and down-shift operations. When the AT controller makes down-shift judgment, Slope Shift Control (on down-slope) is executed by changing the gear change point to the low-speed side so as to use engine-brake function effectively while driving on a down-slope.
- **Cruise Shift Control**
  Cruise Shift Control is executed by selecting appropriate gear according to requirement for retaining a constant vehicle speed or acceleration so as to reduce frequent up-shift and down-shift operations while cruising.

Bearing and Race Installation Diagram

S5JB0A5102002



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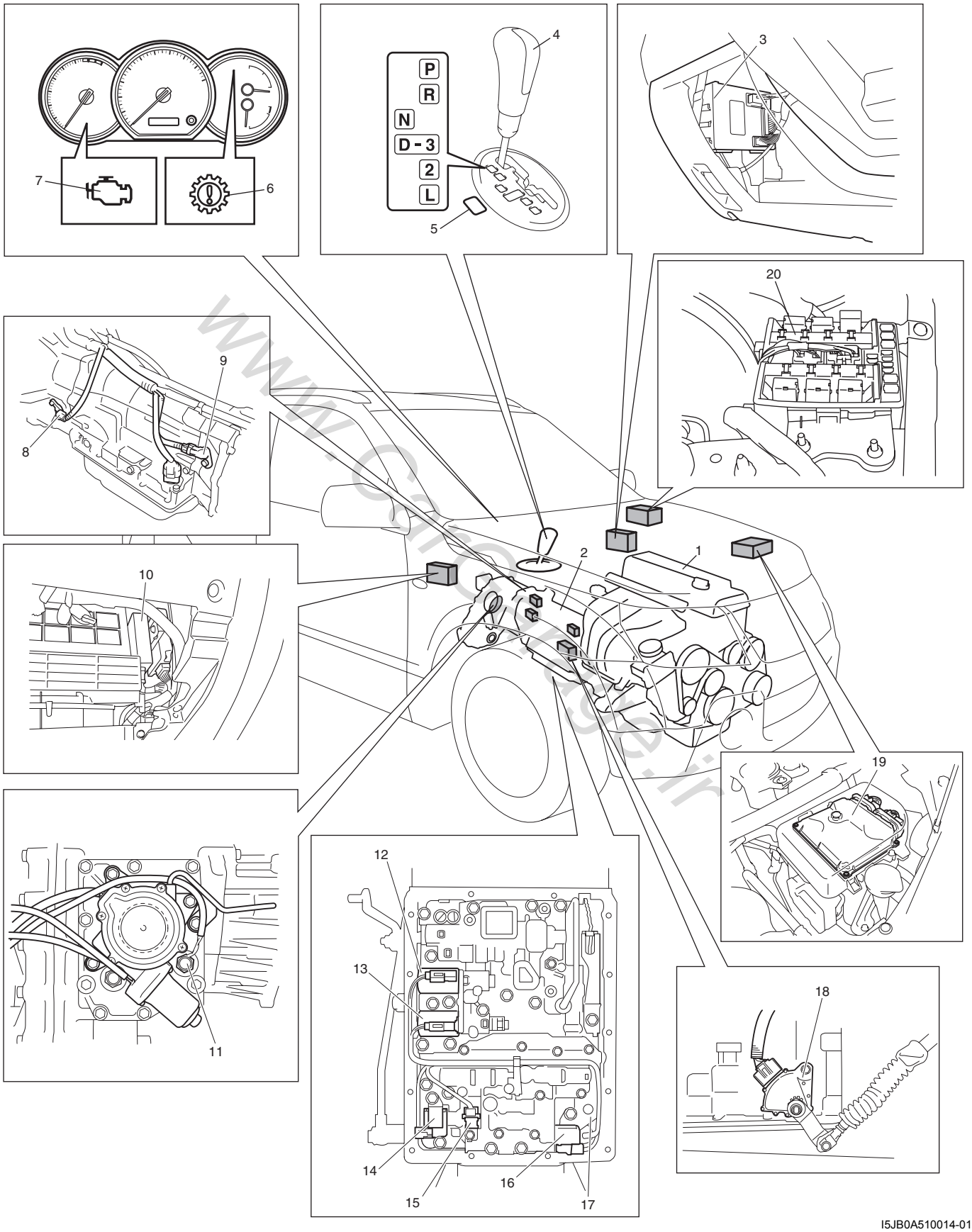
Bearing and Race Dimension

No.	Bearing and race	Inside diameter	Outside diameter
1	Baring assy, O/D FR	24.32 mm (0.957 in.)	43.20 mm (1.701 in.)
2	Race, thrust O/D FR	24.32 mm (0.957 in.)	39.20 mm (1.543 in.)
3	Bearing, assy, thrust O/D case	24.85 mm (0.978 in.)	37.59 mm (1.480 in.)
4	Race, thrust bearing planetary O/D case	25.03 mm (0.985 in.)	37.35 mm (1.470 in.)
5	Race, thrust planetary No.1	30.00 mm (1.181 in.)	48.54 mm (1.911 in.)
6	Bearing, thrust planetary	28.37 mm (1.117 in.)	46.36 mm (1.825 in.)
7	Race, thrust bearing planetary No.2	27.58 mm (1.086 in.)	44.70 mm (1.760 in.)
8	Race, thrust bearing No.1	24.05 mm (0.947 in.)	37.59 mm (1.480 in.)
9	Bearing, thrust forward clutch	23.41 mm (0.922 in.)	37.47 mm (1.475 in.)
10	Race, thrust bearing No.1	24.05 mm (0.947 in.)	37.59 mm (1.480 in.)
11	Bearing, thrust forward clutch	23.41 mm (0.922 in.)	37.47 mm (1.475 in.)
12	Race, thrust bearing No.2	23.29 mm (0.917 in.)	37.59 mm (1.480 in.)
13	Race, thrust bearing FR sun gear	30.00 mm (1.181 in.)	47.90 mm (1.886 in.)
14	Bearing, thrust FR sun gear	28.37 mm (1.117 in.)	46.36 mm (1.825 in.)
15	Race, thrust bearing FR sun gear	27.58 mm (1.086 in.)	44.70 mm (1.760 in.)
16	Race, thrust bearing	21.41 mm (0.843 in.)	47.50 mm (1.870 in.)
17	Race, thrust bearing RR planetary ring	30.00 mm (1.181 in.)	48.54 mm (1.911 in.)
18	Bearing, thrust RR planetary ring	28.37 mm (1.117 in.)	46.36 mm (1.825 in.)
19	Bearing, thrust output shaft	38.10 mm (1.500 in.)	55.55 mm (2.187 in.)
20	Race, thrust bearing output shaft	39.12 mm (1.540 in.)	57.53 mm (2.264 in.)

Component Location

Electronic Shift Control System Components Location

S5JB0A5103001



I5JB0A510014-01

1. Engine	6. Transmission warning light (vehicle is equipped with engine diagnosis connector)	11. 4L/N low switch	16. Shift solenoid valve-B
2. Transmission	7. MIL (vehicle is not equipped with engine diagnosis connector)	12. Pressure control solenoid valve	17. Valve body assembly
3. BCM	8. Input shaft speed sensor	13. TCC pressure control solenoid valve	18. Transmission range sensor
4. Selector lever assembly including “3” position switch	9. Output shaft speed sensor	14. Shift solenoid valve-A	19. ECM
5. P/N mode switch	10. TCM	15. Transmission fluid temperature sensor	20. AT relay included power integration No.2 in main fuse box

Diagnostic Information and Procedures

A/T System Check

S5JB0A5104001

Refer to the following items for the details of each step.

Step	Action	Yes	No
1	☞ **Customer complaint analysis** 1) Perform customer complaint analysis. *Was customer complaint analysis performed according to instruction?*	Go to Step 2.	Perform customer complaint analysis.
2	☞ **DTC / Freeze frame data check, record and clearance** 1) Check for DTC (including pending DTC). *Is there any DTC(s)?*	Print DTC and freeze frame data or write them down and clear them by referring to “DTC Clearance: ”. Go to Step 3.	Go to Step 4.
3	☞ **Visual inspection** 1) Perform visual inspection. *Is there any faulty condition?*	Repair or replace malfunction part. Go to Step 11.	Go to Step 5.
4	☞ **Visual inspection** 1) Perform visual inspection. *Is there any faulty condition?*	Repair or replace malfunction part. Go to Step 11.	Go to Step 8.
5	☞ **Trouble symptom confirmation** 1) Confirm trouble symptom. *Is trouble symptom identified?*	Go to Step 6.	Go to Step 7.
6	☞ **Rechecking and record of DTC / Freeze frame data** 1) Recheck for DTC and freeze frame data referring to “DTC Check: ”. *Is there any DTC(s)?*	Go to Step 9.	Go to Step 8.
7	☞ **Rechecking and record of DTC / Freeze frame data** 1) Recheck for DTC and freeze frame data referring to “DTC Check: ”. *Is there any DTC(s)?*	Go to Step 9.	Go to Step 10.
8	☞ **A/T Basic Check and A/T Trouble Diagnosis** 1) Check and repair according to “A/T Basic Check: ” and “A/T Symptom Diagnosis: ”. *Are check and repair complete?*	Go to Step 11.	Check and repair malfunction part(s). Go to Step 11.
9	☞ **Troubleshooting for DTC** 1) Check and repair according to applicable DTC diag. flow. *Are check and repair complete?*	Go to Step 11.	Check and repair malfunction part(s). Go to Step 11.

Step	Action	Yes	No
10	☞ **Check for intermittent problem** 1) Check for intermittent problem. *Is there any faulty condition?*	Repair or replace malfunction part(s). Go to Step 11.	Go to Step 11.
11	☞ **Final confirmation test** 1) Clear DTC if any. 2) Perform final confirmation test. *Is there any problem symptom, DTC or abnormal condition?*	Go to Step 6.	End.

Step 1. Customer Complaint Analysis

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

Customer problem inspection form (example)

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

PROBLEM SYMPTOMS

☐Engine does not start	☐Engine stops
☐Vehicle does not move (forward, rearward)	☐Transmission does not shift (1st, 2nd, 3rd, 4th, Rev) gear
☐No lock-up (TCC clutch operation)	☐Automatic shift does not occur
☐Shift point too high or too low	☐Transmission slipping in (1st, 2nd, 3rd, 4th, Rev) gear
☐Excessive gear change shock	☐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
Road	☐Urban/☐Suburb/☐Highway/☐Mountainous (uphill/downhill)/☐Paved road/☐Gravel/ ☐Other( )

Vehicle Condition

Transmission range	☐(P,R,N,D,3, 2, L) range/☐(→) range
Transmission temp.	☐Cold/☐Warming up phase/☐Warmed up
Vehicle	☐At stop/☐During driving (constant speed/accelerating/decelerating/ right hand corner/left hand corner)/☐Other ( )/☐Speed (km/h mile/h)
Engine	☐Speed(r/min)/☐Throttle opening(idle/about %/full)
Brake	☐Apply/☐Not apply
O/D OFF switch	☐ON/☐OFF
P/N change switch	☐Power/☐Normal

Malfunction indicator lamp("SERVICE ENGINE SOON" light) condition
☐Always ON ☐Sometimes ON ☐Always OFF ☐Good condition

Diagnostic trouble code	First check : ☐No code	☐Malfunction code( )
	Second check : ☐No code	☐Malfunction code( )

I5JB0A510015-01

NOTE

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

Step 2. DTC / Freeze Frame Data Check, Record and Clearance
First, referring to “DTC Check: ”, check DTC (including pending DTC). If DTC exists, print or write down DTC and freeze frame data and then clear them by referring to “DTC Clearance: ”. DTC indicates malfunction in the system but it is not possible to know from it whether the malfunction is occurring now or it occurred in the past and normal condition has been restored. In order to know that, check symptom in question according to Step 5 and then recheck DTC according to Step 6.
Diagnosing a trouble based on the DTC in this step only or failure to clear the DTC in this step may result in an faulty diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting which is otherwise unnecessary.

Step 3 and Step 4. Visual Inspection
As a preliminary step, be sure to perform visual check of the items that support proper function of the A/T and engine referring to “Visual Inspection: ”.

Step 5. Trouble Symptom Confirmation
Check trouble symptoms based on information obtained in Step 1 ☞ “Customer Complaint Analysis” and Step 2 ☞ “DTC/Freeze Frame Data Check, Record and Clearance”.
Also, recheck DTC according to “DTC Confirmation Procedure” described in each DTC flow.

Step 6 and Step 7. Recheck and Record of DTC / Freeze Frame Data
Refer to “DTC Check: ” for checking procedure.

Step 8. A/T Basic Check and A/T Trouble Diagnosis
Perform A/T basic check according to “A/T Basic Check: ” first. When the end of the flow has been reached, check the parts of the system suspected as a possible cause referring to “A/T Symptom Diagnosis: ” and based on symptoms appearing on the vehicle (symptoms obtained through steps of customer complaint analysis, trouble symptom confirmation and/or A/T basic check) and repair or replace faulty parts, if any.

Step 9. Troubleshooting for DTC
Based on the DTC indicated in Step 6 and 7 and referring to applicable DTC flow, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, TCM or other part and repair or replace faulty parts.

Step 10. Check for Intermittent Problem
Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to “Intermittent and Poor Connection Inspection: in Section 00” and related circuit of DTC recorded in Step 2.

Step 11. Final Confirmation Test
Confirm that the problem symptom has gone and the A/T is free from any abnormal conditions.
If what has been repaired is related to the malfunction DTC, clear the DTC once, set conditions under which DTC was detected and A/T and/or vehicle was repaired and confirm that no DTC is indicated.

Malfunction Indicator Lamp (MIL) Check

S5JB0A5104002

Refer to “Malfunction Indicator Lamp (MIL) Check: in Section 1A”.

Transmission Warning Light Operation Check (Vehicle is Equipped with Engine Diagnosis Connector)

S5JB0A5104003

1) Turn ignition switch ON.
2) Check that transmission warning light lights for about 2 – 4 sec. and then goes OFF. If anything faulty is found, advance “Transmission Warning Light Circuit Check – Light Does Not Come “ON” at Ignition Switch ON (Vehicle is equipped with engine diagnosis connector): ” or “Transmission Warning Light Circuit Check – Light Remains “ON” at Ignition Switch ON (Vehicle is equipped with engine diagnosis connector): ”.

“POWER” Lamp Operation Check

S5JB0A5104004

1) Turn ignition switch ON.
2) Check that “POWER” lamp lights for about 2 – 4 sec. and then goes OFF.
   If anything faulty is found, advance to ““POWER” Light Circuit Check – Light Does Not Come “ON” at Ignition Switch ON: ”.

DTC Table

S5JB0A5104005

NOTE

Confirmation available table of automatic transmission related DTC is shown below.

	Vehicle is not equipped with engine diagnosis connector	Vehicle is equipped with engine diagnosis connector
SUZUKI scan tool	○	○
Generic scan tool	○	X
Not using scan tool (if equipped with A/T monitor connector)	X	○

○: Available-DTC can be confirmed
X: Not available-DTC can not be confirmed

NOTE

A: Driving cycles when MIL lighting and storing DTC in TCM memory for vehicle is not equipped with engine diagnosis connector.
B: Driving cycles when transmission warning light lighting and storing DTC in TCM memory for vehicle is equipped with engine diagnosis connector.

DTC No.	Detecting item	Detecting condition (DTC will set when detecting)	A	B
0000	No malfunction is detected	—	—	—
☞P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	Multiple signals are inputted simultaneously.	1driving cycle	1driving cycle
☞P0707	Transmission Range Sensor Circuit Low	No sensor signal is inputted.	2 driving cycles	2 driving cycles
☞P0712	Transmission Fluid Temperature Sensor “A” Circuit Low	Sensor output voltage is too low.	1driving cycle	1driving cycle
☞P0713	Transmission Fluid Temperature Sensor “A” Circuit High	Sensor output voltage is too high.	1driving cycle	1driving cycle
☞P0717	Input / Turbine Speed Sensor Circuit No Signal	No sensor signal is detected although output speed sensor signal is inputted.	1driving cycle	1driving cycle
☞P0722	Output Speed Sensor Circuit No Signal	No sensor signal is inputted although input speed sensor signal is inputted.	1driving cycle	1driving cycle
☞P0741	Torque Converter Clutch Circuit Performance or Stuck Off	Difference in revolution between engine and input shaft is too large although TCM is commanding TCC pressure control solenoid to turn ON.	2 driving cycles	2 driving cycles *2
☞P0742	Torque Converter Clutch Circuit Stuck On	Difference in revolution between engine and input shaft is too small although TCM is commanding TCC pressure control solenoid to turn OFF.	2 driving cycles	2 driving cycles *2
☞P0751	Shift Solenoid “A” Performance or Stuck Off	The gear commanded by TCM does not match the actual gear when driving.	2 driving cycles	2 driving cycles *2
☞P0752	Shift Solenoid “A” Stuck On	The gear commanded by TCM does not match the actual gear when driving.	2 driving cycles	2 driving cycles *2
☞P0756	Shift Solenoid “B” Performance or Stuck Off	The gear commanded by TCM does not match the actual gear when driving.	2 driving cycles	2 driving cycles *2
☞P0757	Shift Solenoid “B” Stuck On	The gear commanded by TCM does not match the actual gear when driving.	2 driving cycles	2 driving cycles *2
☞P0962	Pressure Control Solenoid “A” Control Circuit Low	No electric flow is detected on pressure control solenoid circuit.	1driving cycle	1driving cycle
☞P0963	Pressure Control Solenoid “A” Control Circuit High	Too much electric flow is detected on pressure control solenoid circuit.	1driving cycle	1driving cycle
☞P0973	Shift Solenoid “A” Control Circuit Low	Voltage of shift solenoid terminal is low although TCM is commanding shift solenoid to turn ON.	1driving cycle	1driving cycle
☞P0974	Shift Solenoid “A” Control Circuit High	Voltage of shift solenoid terminal is high although TCM is commanding shift solenoid to turn OFF.	1driving cycle	1driving cycle

DTC No.	Detecting item	Detecting condition (DTC will set when detecting)	A	B
☞P0976	Shift Solenoid “B” Control Circuit Low	Voltage of shift solenoid terminal is low although TCM is commanding shift solenoid to turn ON.	1driving cycle	1driving cycle
☞P0977	Shift Solenoid “B” Control Circuit High	Voltage of shift solenoid terminal is high although TCM is commanding shift solenoid to turn OFF.	1driving cycle	1driving cycle
☞P1702	Internal Control Module Memory Check Sum Error	Calculation of current data stored in TCM is not correct comparing with pre-stored checking data in TCM.	1driving cycle	1driving cycle
☞P1703	CAN Invalid Data- TCM	TCM receives malfunction signal of throttle position, engine coolant temperature, engine revolution and engine torque from ECM.	1driving cycle *1	1driving cycle *2
☞P1723	Range Select Switch Malfunction	3 position switch signal is inputted out of specified value.	1driving cycle *1	1driving cycle *2
☞P1774	Control Module Communication Bus OFF	Transmitting error detected to TCM for specified time continuously.	1driving cycle	1driving cycle
☞P1777	TCM Lost Communication with ECM (Reception Error)	Receiving error from ECM detected to TCM for specified time continuously.	1driving cycle	1driving cycle
☞P1778	TCM Lost Communication with BCM (Reception Error)	Receiving error from BCM detected to TCM for specified time continuously.	1driving cycle *1	1driving cycle *2
☞P1874	4L switch circuit malfunction (Short)	Actual transfer position is 4H although transfer low signal is inputted.	1driving cycle	1driving cycle *2
☞P1875	4L switch circuit malfunction (Open)	Actual transfer position is 4L or N although transfer low signal is not inputted.	1driving cycle	1driving cycle *2
☞P1878	Torque Converter Clutch Shudder	Variation in the output revolution speed of the specified amplitude and specified cycle is detected under slip lock-up condition.	20driving cycle *1	—
☞P2763	Torque Converter Clutch Circuit High	Too much electric flow is detected on TCC pressure control solenoid circuit.	1driving cycle	1driving cycle
☞P2764	Torque Converter Clutch Circuit Low	No electric flow is detected on TCC pressure control solenoid circuit.	1driving cycle	1driving cycle

NOTE

***1: MIL does not light although DTC is detected and stored.**
***2: Transmission warning light does not light although DTC is detected and stored.**

DTC Check

S5JB0A5104006

NOTE

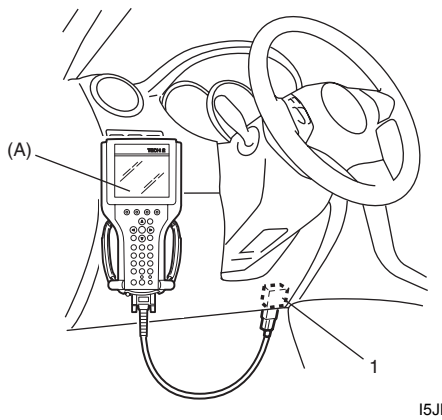
For vehicle without engine diagnosis connector, the MIL is turned on when the ECM and/or TCM detect malfunction(s). Each ECU stores diagnostic information as the diagnostic trouble code (DTC) in its memory and outputs the DTC to the scan tool. Therefore, check both of the ECUs for any DTC with the scan tool because the DTC stored in ECU and TCM is not read and displayed at a time. However, each of the ECUs needs not to be checked with the generic scan tool because the DTC stored in ECM and TCM is read and displayed at a time.

Automatic transmission DTC can be checked using any one of the following 2 methods.

Reading DTC Using SUZUKI Scan Tool

1) Turn ignition switch OFF.
2) Connect SUZUKI scan tool to data link connector (DLC).

Special tool
(A): SUZUKI scan tool

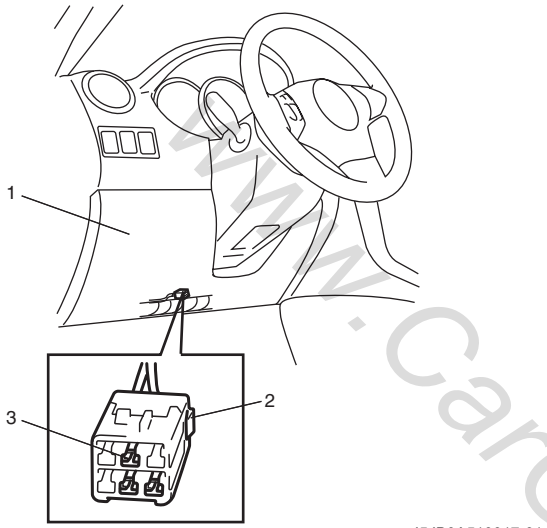


I5JB0A510016-01

3) Read DTC according to instructions displayed on SUZUKI scan tool and write it down. Refer to SUZUKI scan tool operator's manual for further details.
4) After completing the check, turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC).

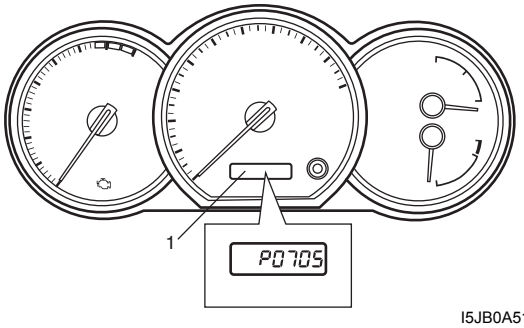
Reading DTC Using Monitor Connector (If Equipped)

1) Turn ignition switch OFF.
2) Remove steering column hole cover (1).
3) Using service wire, connect diagnosis switch terminal (3) of monitor connector (2) to body ground.



I5JB0A510017-01

4) With ignition switch ON position and leaving engine OFF, read DTC displayed on digital display odometer (1) referring to "DTC Table: ".



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5) After completing the check, turn ignition switch OFF and disconnect service wire from monitor connector.

DTC Clearance

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Automatic transmission DTC can be cleared using any one of the following 2 methods.

NOTE

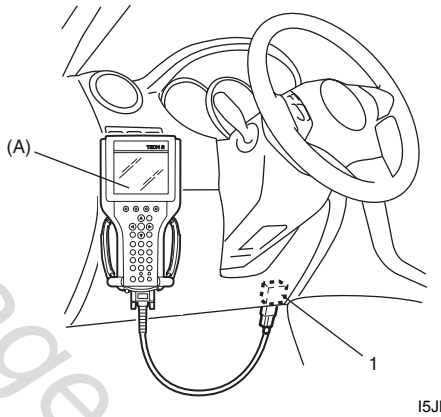
DTC and freeze frame data stored in TCM memory are also cleared in following cases. Be careful not to clear them before keeping their record.

- **When power to TCM is cut off (by disconnecting battery cable, removing fuse or disconnecting TCM connector).**
- **When the same malfunction (DTC) is not detected again during 40 engine warm-up cycles.**

DTC Clearance Using SUZUKI Scan Tool

1) Turn ignition switch OFF.
2) Connect SUZUKI scan tool to data link connector (DLC) (1).

Special tool
(A): SUZUKI scan tool



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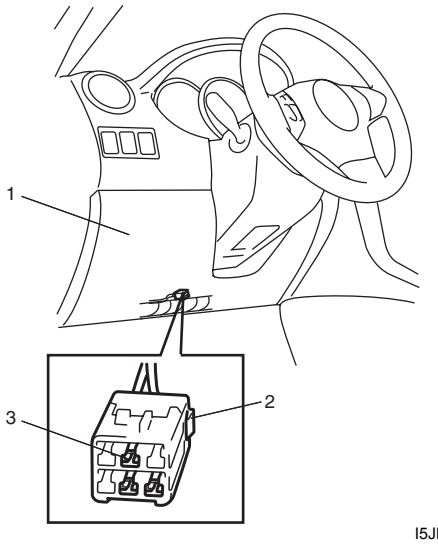
3) Clear DTC according to instructions displayed on SUZUKI scan tool. Refer to SUZUKI scan tool operator's manual for further details.
4) After completing the clearance, turn ignition switch OFF and disconnected SUZUKI scan tool from data link connector (DLC).

DTC Clearance Using Monitor Connector (If Equipped)

1) Remove steering column hole cover (1).
2) Turn ignition switch ON.
3) After 6 seconds or more, repeat connecting and disconnecting diagnosis switch terminal (3) of monitor connector (2) and body ground 5 times at about 1 second interval within 10 seconds, using service wire.
4) Check TCM that no malfunction DTC remains in memory of it.



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Fail Safe Table

S5JB0A5104008

This function is provided by the safe mechanism that assures safe driveability even when the solenoid valve, sensor or its circuit fails. The following table shows the fail safe function for each fail condition of sensor, solenoid, TCM or its circuit.

DTC No.	Trouble Area	Fail Safe Operation
☞P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	• TCM control is performed in priority order below. 3> D> 2> L> R> N> P • Slip controlled lock-up function is inhibited to operate. • Reverse control is inhibited. • Cruise control function is inhibited to operate. • Power mode is inhibited.
☞P0707	Transmission Range Sensor Circuit Low	• Range is assumed to be “D” range. • Slip controlled lock-up function is inhibited to operate. • Reverse control is inhibited. • Cruise control function is inhibited to operate. • Power mode is inhibited.
☞P0712	Transmission Fluid Temperature Sensor “A” Circuit Low	• A/T fluid temperature is assumed to be 80 °C (176 °F). • Lock-up function is inhibited to operate. • Line pressure control at gear shifting is inhibited.
☞P0713	Transmission Fluid Temperature Sensor “A” Circuit High	
☞P0717	Input / Turbine Speed Sensor Circuit No Signal	• Torque reducing request to ECM (torque reduction control) is inhibited. • Lock-up function is inhibited to operate. • Line pressure control at gear shifting is inhibited.
☞P0722	Output Speed Sensor Circuit No Signal	• Vehicle speed which is calculated by input shaft speed sensor signal is used for gear shifting control instead of vehicle speed calculated by output shaft speed sensor (VSS) signal. • Upshifting to 4th gear is inhibited. • Lock-up function is inhibited to operate. • Torque reducing request to ECM (torque reduction control) is inhibited. • Line pressure control at gear shifting is inhibited.
☞P0742	Torque Converter Clutch Circuit Stuck On	When vehicle speed is less than 10 km/h (6 mile/h), gear position is fixed in 1st gear for prevention of engine stall.
☞P0752	Shift Solenoid “A” Stuck On	Upshifting to 4th gear is inhibited.

DTC No.	Trouble Area	Fail Safe Operation
☞P0962	Pressure Control Solenoid “A” Control Circuit Low	• Power supply for all solenoid valves is cut. • Gear position is fixed according to select lever position as shown in the following. R: Reverse D: 4th 3: 4th 2: 3rd L: 1st • Lock-up function is inhibited to operate. • Line pressure control at gear shifting is inhibited.
☞P0963	Pressure Control Solenoid “A” Control Circuit High	
☞P0973	Shift Solenoid “A” Control Circuit Low	
☞P0974	Shift Solenoid “A” Control Circuit High	
☞P0976	Shift Solenoid “B” Control Circuit Low	
☞P0977	Shift Solenoid “B” Control Circuit High	
☞P1702	Internal Control Module Memory Check Sum Error	• Power supply for all solenoid valves is cut. • Gear position is fixed according to select lever position as shown in the following. R: Reverse D: 4th 3: 4th 2: 3rd L: 1st • Lock-up function is inhibited to operate. • Line pressure control at gear shifting is inhibited.
☞P1703	CAN Invalid Data- TCM	In case of throttle position signal malfunction: • Throttle opening used for line pressure control is assumed to be 100%. • Throttle opening used for gear shifting control is assumed to be 0%. • Lock-up function is inhibited to operate. • Line pressure control at gear shifting is inhibited. In case of engine coolant temperature signal malfunction: • Engine coolant temperature is assumed to be 80 °C (176 °F). • Slip controlled lock-up function is inhibited to operate. In case of engine revolution signal malfunction: • Engine revolution is assumed to be maximum revolution. • Lock-up function is inhibited to operate. In case of engine torque signal malfunction: • Slip controlled lock-up function is inhibited to operate. • Engine torque is assumed to be maximum torque. In case of vehicle speed signal: • Cruise control function is inhibited to operate.

DTC No.	Trouble Area	Fail Safe Operation
☞P1774	CAN communication problem-TCM	• Throttle opening used for line pressure control is assumed to be 100%. • Throttle opening used for gear shifting control is assumed to be 0%. • Engine revolution is assumed to be maximum revolution. • Engine torque is assumed to be maximum torque. • Engine coolant temperature is assumed to be 80 °C (176 °F). • Lock-up function is inhibited to operate. • Line pressure control at gear shifting is inhibited. • Torque reducing request to ECM (torque reduction control) is inhibited. • Line pressure is outputted maximum value. • Power mode is inhibited. (P1774 only)
☞P1777	TCM Lost Communication with ECM (Reception Error)	
☞P1778	TCM Lost Communication with BCM (Reception Error)	Power mode is inhibited.
☞P1874	4L switch circuit malfunction (Short)	Slip controlled lock-up function is inhibited to operate.
☞P1875	4L switch circuit malfunction (Open)	
☞P1878	Torque Converter Clutch Shudder	Slip controlled lock-up function is inhibited to operate.
☞P2763	Torque Converter Clutch Circuit High	Power supply for TCC pressure control solenoid is cut.
☞P2764	Torque Converter Clutch Circuit Low	• Lock-up function is inhibited to operate. • When vehicle speed is less than 10 km/h (6 mile/h), gear position is fixed in 1st gear for prevention of engine stall.

Scan Tool Data

S5JB0A5104009

As the data values given in the following table are standard values estimated on the basis of values obtained from the normally operating vehicles by using a scan tool, use them as reference value. Even when the vehicle is in good condition, there may be cases where the checked value does not fall within each specified data range. Therefore, judgment as abnormal should not be made by checking with these data alone.
Also, condition in the following table that can be checked by the scan tool are those detected by TCM and output from TCM as commands and there may be cases where the automatic transmission or actuator is not operating (in the condition) as indicated by the scan tool.

Scan Tool Data	Vehicle Condition		Normal Condition / Reference Values
Gear Position	Ignition switch ON POWER mode OFF	Select lever is in “P” position	P/N
		Select lever is in “R” position	R
		Select lever is in “N” position	P/N
		Select lever is in “D” position	1st
		Select lever is in “3” position	1st
		Select lever is in “2” position	1st
		Select lever is in “L” position	1st
Throttle Position	Ignition switch ON	Accelerator pedal is depressed	0 – 100% (varies depending on depressed value)
		Accelerator pedal is released	0 – 5%
Input Shaft Rev	At engine idle speed and selector lever is in “P”position		(Engine idle speed is displayed in increments of 50 rpm)
	At 40 km/h (25 mile/h) constant speed, 20% or less throttle opening and 3rd gear (“3” range)		2300 RPM (displayed in increments of 50 rpm)
	At 60 km/h (37.5 mile/h) constant speed, 20% or less throttle opening and 4th gear (“D” range)		0 RPM
Output Shaft Rev	At vehicle stop		0 RPM
	At 40 km/h (25 mile/h) constant speed, 20% or less throttle opening and 3rd gear (“3” range)		2300 RPM (displayed in increments of 50 rpm)

Scan Tool Data	Vehicle Condition		Normal Condition / Reference Values
Vehicle Speed 1	At vehicle stop		0 km/h, 0 MPH
Battery Voltage	Ignition switch ON and engine stop		Battery voltage is displayed (8 – 16 V)
ATF Temp	After driving at 60 km/h (37.5 mile/h) for 15 minutes or more, and A/T fluid temperature around sensor reaches 70 – 80 °C (158 – 176 °F)		70 – 80 °C (158 – 176 °F)
TCC Sol Duty	At vehicle stop, closed throttle and 1st gear		0%
	At 80 km/h (50 mile/h) constant speed, 30% or less throttle opening and 3th gear. (“3” range)		100%
Press Cont Sol	At vehicle stop, closed throttle, engine idle speed and 1st gear		9.5%
Slip RPM	Engine running at idle speed and selector lever is in “P” range		0 ±25 RPM
	Engine running, vehicle stop and selector lever is in “D” range		Engine speed is displayed
Vehicle Speed 2	At vehicle stop		0 km/h, 0 MPH
Engine Speed	At engine idle speed		Engine idle speed is displayed
Coolant Temp	Ignition switch ON		Engine coolant temperature is displayed
Target Engine Torque	Ignition switch ON		0 N·m
Engine Torque	Ignition switch ON		0 N·m
MIL request (for E-OBD)	Ignition switch ON		OFF
Malfunction Indication On (for Non E-OBD)	Ignition switch ON		OFF
Fuel Cut Flag	Ignition switch ON		OFF
O/D Off Switch	Ignition switch ON	Shift selector lever to “3” range	ON
		Shift selector lever to other above range	OFF
Trans Range	Ignition switch ON	Select lever is in “P” position	P
		Select lever is in “R” position	R
		Select lever is in “N” position	N
		Select lever is in “D” position	D
		Select lever is in “3” position	D
		Select lever is in “2” position	2
		Select lever is in “L” position	L
Shift Sol A Con	At vehicle stop, closed throttle and 1st gear		ON
	At 60 km/h (37.5 mile/h) constant speed, 20% or less throttle opening and 3rd gear		OFF
Shift Sol A Mon	At vehicle stop, closed throttle and 1st gear		ON
	At 60 km/h (37.5 mile/h) constant speed, 20% or less throttle opening and 3rd gear		OFF
Shift Sol B Con	At vehicle stop, closed throttle and 1st gear		OFF
	At 20 km/h (12.5 mile/h) constant speed, 20% or less throttle opening and 2nd gear		ON
Shift Sol B Mon	At vehicle stop, closed throttle and 1st gear		OFF
	At 20 km/h (12.5 mile/h) constant speed, 20% or less throttle opening and 2nd gear		ON
Mode Select Switch	Ignition switch ON, P/N mode switch is at Normal position		NORMAL
	Ignition switch ON, P/N mode switch is at Power position		POWER
4WD Low Switch	Ignition switch ON, transfer position switch is “4H” position		OFF
	Ignition switch ON, transfer position switch is “4L” position		ON

Scan Tool Data	Vehicle Condition		Normal Condition / Reference Values
D Range Signal	Ignition switch ON	Select lever is in “P” position	P/N range
		Select lever is in “R” position	D range
		Select lever is in “N” position	P/N range
		Select lever is in “D” position	D range
		Select lever is in “3” position	D range
		Select lever is in “2” position	D range
		Select lever is in “L” position	D range
A/C Switch	Ignition switch ON and air conditioner switch OFF		Cancel
Brake Switch	Ignition switch ON	Brake pedal is depressed	ON
		Brake pedal is released	OFF
Accel Actual Pos	Ignition switch ON	Accelerator pedal is depressed	0 – 100% (varies depending on depressed value)
		Accelerator pedal is released	0%

Scan Tool Data Definitions

Gear Position (1ST, 2ND, 3RD, 4TH, N, R): This parameter is indicated actual gear position.

Throttle Position (%): Throttle valve opening ratio sent from ECM on CAN communication line.

Input Shaft Rev (RMP): Input shaft revolution computed by reference pulses coming from input shaft speed sensor on transmission case.

Output Shaft Rev (RMP): Output shaft revolution computed by reference pulses coming from output shaft speed sensor on transmission case.

Vehicle Speed 1 (Km/h): This parameter is competed by output shaft speed sensor and 4WD low switch on TCM. Gear shift schedule relate this parameter.

Battery Voltage (V): Battery voltage read by TCM as analog input signal by TCM.

ATF Temp (°C): ATF temperature detected by signal from transmission fluid temperature sensor installed in valve body.

TCC Sol Duty (%): Electric current value ration between electric current value being outputted from TCM to TCC pressure control solenoid and maximum value can be outputted by TCM.

Press Cont Sol (%): Electric current value ratio between electric current value being outputted from TCM to pressure control solenoid-A and maximum value can be outputted by TCM.

Slip RPM (RMP): This parameter indicates slipping rotation in the torque converter (difference between input shaft rotation and engine rotation).

Vehicle Speed 2 (Km/h): Actual vehicle speed detected by signal on CAN communication line fed from ECM.

Engine Speed (RPM): Engine speed computed by signal on CAN communication line fed from ECM.

Coolant Temp (°C): Engine coolant temperature detected by signal on CAN communication line fed from ECM.

Target Engine Torque (N·m): Target engine torque detected by signal on CAN communication line fed from ECM.

Engine Torque (N·m): Actual engine torque detected by signal on CAN communication line fed from ECM.

MIL Request (ON, OFF) (for E-OBD model): ON: Signal which TCM requires combination meter to turn ON malfunction indicator lamp.
OFF: Signal which TCM does not require combination meter to turn ON malfunction indicator lamp.

Malfunction Indication On (ON, OFF) (for non E-OBD model): ON: Signal which TCM requires combination meter to turn ON transmission warning lamp.
OFF: Signal which TCM does not require combination meter to turn ON transmission warning lamp.

Fuel Cut Flag: ON: Signal which inform that fuel cut is operating.
OFF: Signal which inform that fuel cut is not operating.

O/D Off Switch (ON, OFF): Inputted signal from “3” position switch in selector lever assembly.
ON: Shift selector lever to “3” range
OFF: Shift selector lever to other above range

Trans Range (P, R, N, D, 2, L): It indicates transmission range according to transmission range switch signal.

Shift Sol A Con/ MON (ON, OFF): COM-ON: ON command being outputted to shift solenoid-A.
COM-OFF: OFF command not being outputted to shift solenoid-A.
MON-ON: Electricity being passed to shift solenoid-A.
MON-OFF: Electricity not being passed to shift solenoid-A.

Shift Sol B Con / MON (ON, OFF): COM-ON: ON command being outputted to shift solenoid-B.
COM-OFF: OFF command not being outputted to shift solenoid-B.
MON-ON: Electricity being passed to shift solenoid-B.
MON-OFF: Electricity not being passed to shift solenoid-B.

Mode Select Switch (NORMAL, POWER): Inputted signal from P/N mode switch on center console.
NORMAL: P/N mode switch is at OFF position.
POWER: P/N mode switch is at ON position.

4WD Low Switch (ON, OFF): Inputted signal from 4L/N switch on transfer case.
ON: Transfer gear position is 4L
OFF: Transfer gear position is 4H

D RANGE SIGNAL (P/N range, D range): ON: Signal which TCM require ECM to increase idle speed
OFF: Signal which TCM does not require ECM to increase idle speed

A/C Switch (ON, OFF): ON: Signal which inform that air conditioner compressor is turned ON.
OFF: Signal which inform that air conditioner compressor is turned OFF.

Brake Switch (ON, OFF): Brake light switch position detected by signal on CAN communication line fed from ECM.
ON: Brake pedal depressed
OFF: Brake pedal released

Accel Actual Pos (%): Accelerator pedal opening ratio detected by signal on CAN communication line fed from ECM.

Visual Inspection

S5JB0A5104010

Visually check the following parts and systems.

Inspection Item		Referring
A/T fluid	Level, leakage, color	"A/T Fluid Level Check: "
A/T fluid hoses	Disconnection, looseness, deterioration	"Oil Cooler Hose and Pipe Components: "
A/T select cable	Installation, operation	"Select Cable Adjustment: "
Engine oil	Level, leakage	"Engine Oil and Filter Change: in Section 0B"
Engine coolant	Level, leakage	"Engine Coolant Change: in Section 0B"
Battery	Fluid level, corrosion of terminal	
Connectors of electric wire harness	Disconnection friction	"Intermittent and Poor Connection Inspection: in Section 00"
Fuses	Burning	"Cautions in Body Electrical System Servicing: in Section 9A"
Parts	Installation, damage	
Bolt	Looseness	
Transmission warning light	Operation at engine start	"Transmission Warning Light Operation Check (Vehicle is Equipped with Engine Diagnosis Connector): "
"POWER" lamp	Operation at engine start	""POWER" Lamp Operation Check: "
Malfunction indicator lamp	Operation at engine start	"Malfunction Indicator Lamp (MIL) Check: in Section 1A"
Charge warning lamp	Operation at engine start	"Generator Symptom Diagnosis: in Section 1J"
Engine oil pressure warning lamp	Operation at engine start	"Oil Pressure Switch Inspection: in Section 9C"
Engine coolant temp. meter	Operation at engine start	
Other parts that can be checked visually		

A/T Basic Check

S5JB0A5104011

This check is important for troubleshooting when TCM has detected no DTC and no abnormality has been noted in visual inspection. Follow the flow table carefully.

Step	Action	Yes	No
1	*Was "A/T System Check" preformed?*	Go to Step 2.	Go to "A/T System Check: ".
2	**Perform "Road Test"** *Is it OK?*	Go to Step 3.	Proceed to "Troubleshooting" in "Road Test: ".
3	**Perform "Manual Road Test"** *Is it OK?*	Go to Step 4.	Proceed to "Troubleshooting" in "Manual Road Test: ".
4	**Perform "Engine Brake Test"** *Is it OK?*	Go to Step 5.	Proceed to "Troubleshooting" in "Engine Brake Test: ".
5	**Perform "Stall Test"** *Is it OK?*	Go to Step 6.	Proceed to "Troubleshooting" in "Stall Test: ".

Step	Action	Yes	No
6	**Perform "Time Lag Test"** *Is it OK?*	Go to Step 7.	Proceed to "Troubleshooting" in "Time Lag Test: ".
7	**Perform "Line Pressure Test"** *Is it OK?*	Go to Step 8.	Proceed to "Troubleshooting" in "Line Pressure Test: ".
8	1) Proceed to "Trouble Diagnosis 1" in "A/T Symptom Diagnosis: ". *Is trouble identified?*	Repair or replace faulty parts.	Go to Step 9.
9	1) Proceed to "Trouble Diagnosis 2" in "A/T Symptom Diagnosis: ". *Is trouble identified?*	Repair or replace faulty parts.	Proceed to "Trouble Diagnosis 3" in "A/T Symptom Diagnosis: ".

Road Test

S5JB0A5104012

This test is to check if upshift, downshift and lock-up take place at specified speeds while actually driving vehicle on a level road.

⚠ WARNING

- **Carry out test in very little traffic area to prevent an accident.**
- **Test requires 2 persons, a driver and a tester.**

1) Warm up engine.
2) With engine running at idle, shift select "D".
3) Accelerate vehicle speed by depressing accelerator pedal gradually.
4) While driving in "D" range, check if gear shift and lock-up occur properly as shown in "Automatic Gear Shift Table: ".

Troubleshooting

Condition	Possible cause	Correction / Reference Item
Unable to run in all range	Faulty oil pump	*Inspect. If NG, replace.*
	Seized or broken planetary gear	*Inspect. If NG, replace.*
	Faulty torque converter	*Inspect. If NG, replace.*
	Damaged drive plate	*Inspect. If NG, replace.*
	Faulty valve body component	*Replace valve body assembly.*
Unable to run in reverse position	Faulty direct clutch	*Inspect. If NG, replace.*
	Faulty reverse brake	*Inspect. If NG, replace.*
1 → 2 upshift fails to occur	Malfunction of transmission range sensor	*Inspect. If NG, replace.*
	Maladjust shift control cable	*Adjust.*
	Faulty valve body component	*Replace valve body component.*
	Faulty second brake	*Inspect. If NG, replace.*
	Faulty one-way No.1 clutch	*Inspect. If NG, replace.*
2 → 3 upshift fails to occur	Malfunction of transmission range sensor	*Inspect. If NG, replace.*
	Faulty valve body component	*Replace valve body component.*
	Faulty direct clutch	*Inspect. If NG, replace.*
3 → 4 upshift fails to occur	Malfunction of transmission range sensor	*Inspect. If NG, replace.*
	Faulty valve body component	*Replace valve body component.*
	Faulty O/D brake	*Inspect. If NG, replace.*

Condition	Possible cause	Correction / Reference Item
Incorrect gear shift point	Malfunction of throttle position sensor	*Inspect. If NG, replace.*
	Malfunction of input shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of output shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of power mode switch	*Inspect, If NG, replace.*
	Malfunction of transmission fluid temperature sensor	*Inspect. If NG, replace.*
TCC (lock-up) function does not operate	Malfunction of engine coolant temperature (ECT) sensor	*Inspect. If NG, replace.*
	Malfunction of brake light switch	*Inspect. If NG, replace.*
	Malfunction of throttle position sensor	*Inspect. If NG, replace.*
	Faulty valve body component	*Replace valve body component.*
	Faulty torque converter	*Replace torque converter.*

Manual Road Test

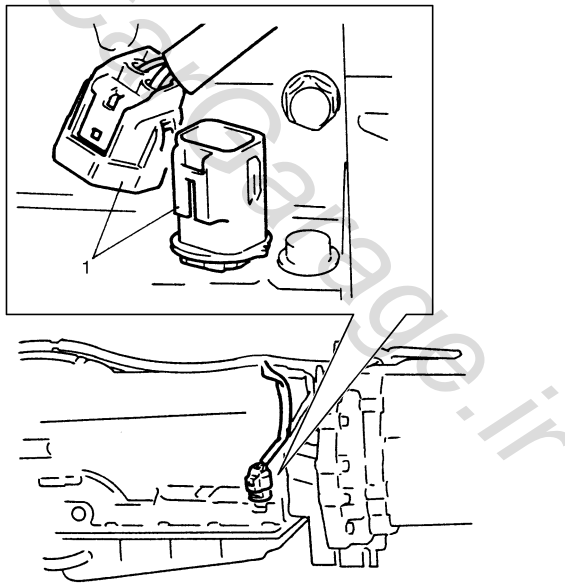
S5JB0A5104013

This test checks the gears being used in “L”, “2”, “3” or “D” range when driven with unoperated gear shift control system. Test drive vehicle on a level road.

NOTE

Before this test, check diagnostic trouble code (DTC).

1) With select lever in “P”, start engine and warm it up.
2) After warming up engine, turn ignition switch OFF and disconnect valve body connector (1).



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3) With select lever in “L” range, start vehicle. Check that 1st gear is being used referring to V1000 table shown below.
4) While vehicle is running, shift select lever to “2” range and check that 1st gear is being used.
5) While vehicle is running, shift select lever to “3” or “D” range and check that 4th gear is being used.
6) After the checks, stop vehicle then turn ignition switch OFF, and connect valve body connector.
7) Clear DTC.

Vehicle speed per 1000 rpm in engine speed

Gear position	Vehicle speed
1st	9.2 km/h (5.7 mile/h)
2nd	17.4 km/h (10.8 mile/h)
3rd	26.0 km/h (16.2 mile/h)
4th	37.7 km/h (23.4 mile/h)

Troubleshooting

Condition	Possible cause	Correction / Reference Item
Selected gear is incorrect	Faulty valve body component	*Replace valve body assembly.*
	Faulty clutch or brake	*Inspect clutch and brake. If any parts are faulty, replace them.*

Stall Test

S5JB0A5104014

This test is to check overall performance of automatic transmission and engine by measuring stall speed at “D” and “R” ranges. Be sure to perform this test only when transmission fluid is at normal operating temperature and its level is between FULL and LOW marks.

⚠ CAUTION

- **Do not run engine at stall more than 5 seconds continuously, for fluid temperature may rise excessively high.**
- **After performing stall test, be sure to leave engine running at idle for longer than 1 minute before another stall test.**

1) Apply parking brake and block wheels.
2) Install tachometer.
3) Start engine with select lever shifted to “P”.
4) Depress brake pedal fully.
5) Shift select lever to “D” and depress accelerator pedal fully while watching tachometer. Read engine rpm quickly when it has become constant (stall speed).
6) Release accelerator pedal immediately after stall speed is checked.
7) In the same way, check stall speed in “R” range.
8) Stall speed should be within following specification.

Engine stall speed
Standard: 2,600 – 3,000 rpm

Troubleshooting

Condition	Possible cause	Correction / Reference Item
Lower than standard level in both “D” and “R” range	Engine output torque failure	*Inspect and repair engine.*
	Faulty one-way clutch of torque converter	*Replace torque converter.*
Higher than standard level in “D” range	Malfunction of pressure control solenoid valve (Low line pressure)	*Inspect. If NG, replace valve body assembly.*
	Malfunction of primary regulator valve (Low line pressure)	*Replace valve body assembly.*
	Slippery O/D clutch	*Inspect. If NG, replace.*
	Slippery forward clutch	*Inspect. If NG, replace.*
	Faulty O/D one-way clutch	*Inspect. If NG, replace.*
	Faulty one-way clutch No.2	*Inspect. If NG, replace.*
	Leakage from “D” range fluid pressure circuit	*Overhaul or replace valve body assembly.*
Higher than standard level in “R” range	Malfunction of pressure control solenoid valve (Low line pressure)	*Inspect. If NG, replace valve body assembly.*
	Malfunction of primary regulator valve (Low line pressure)	*Replace valve body assembly.*
	Slippery direct clutch	*Inspect. If NG, replace.*
	Slippery reverse brake	*Inspect. If NG, replace.*
	Faulty O/D one-way clutch	*Inspect. If NG, replace.*
	Leakage from “R” range fluid pressure circuit	*Overhaul or replace valve body assembly.*

Condition	Possible cause	Correction / Reference Item
Higher than standard level in both "D" and "R" range	Malfunction of pressure control solenoid valve (Low line pressure)	*Inspect. If NG, replace valve body assembly.*
	Malfunction of primary regulator valve (Low line pressure)	*Replace valve body assembly.*
	Clogged oil strainer	*Replace.*
	Faulty oil pump	*Inspect. If NG, replace.*
	Leakage from both "D" and "R" range fluid pressure circuit	*Overhaul or replace valve body assembly.*

Time Lag Test

S5JB0A5104015

This test is to check conditions of clutch, reverse brake and fluid pressure. "Time lag" means time elapsed since select lever is shifted with engine idling till shock is felt.

1) With chocks placed before and behind front and rear wheels respectively, depress brake pedal.
2) Start engine.
3) With stop watch ready, shift select lever from "N" to "D" range and measure time from that moment till shock is felt.
4) Similarly measure time lag by shifting select lever from "N" to "R" range.

Gear shifting time lag
"N" → "D": Less than 1.0 sec.
"N" → "R": Less than 1.4 sec.

NOTE

- **When repeating this test, be sure to wait at least one minute after select lever is shifted back to "N" range.**
- **Engine should be warmed up fully for this test.**
- **Repeat test 3 times and take average of those data for final time lag data.**

Troubleshooting

Condition	Possible cause	Correction / Reference Item
N → "D" time lag exceeds specification	Malfunction of pressure control solenoid valve (Low line pressure)	*Inspect. If NG, replace valve body assembly.*
	Malfunction of primary regulator valve (Low line pressure)	*Replace valve body assembly.*
	Clogged oil strainer	*Replace.*
	Faulty oil pump	*Inspect. If NG, replace.*
	Faulty forward clutch	*Inspect. If NG, replace.*
	Leakage from "D" range fluid pressure circuit	*Overhaul or replace valve body assembly.*
N → "R" time lag exceeds specification	Malfunction of pressure control solenoid valve (Low line pressure)	*Inspect. If NG, replace valve body assembly.*
	Malfunction of primary regulator valve (Low line pressure)	*Replace valve body assembly.*
	Clogged oil strainer	*Replace.*
	Faulty oil pump	*Inspect. If NG, replace.*
	Faulty direct clutch	*Inspect. If NG, replace.*
	Faulty reverse brake	*Inspect. If NG, replace.*
	Leakage from "R" range fluid pressure circuit	*Overhaul or replace valve body assembly.*

Line Pressure Test

S5JB0A5104016

Purpose of this test is to check operating conditions of each part by measuring fluid pressure in fluid pressure line. Line pressure test requires following conditions.

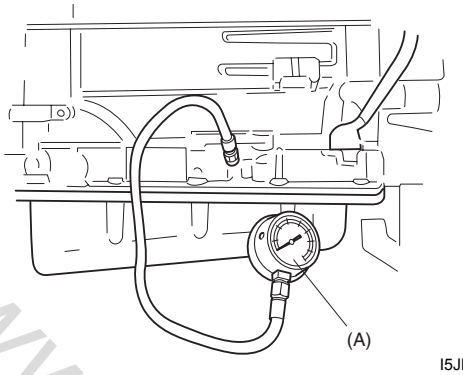
- Automatic fluid is at normal operating temperature (70 – 80 °C / 158 – 176 °F).
- Fluid is filled to proper level (between FULL and LOW on dipstick).
- Air conditioner switch is turned OFF.

1) Apply parking brake securely and place chocks against wheels.
2) Remove fluid pressure check hole plug bolt.
3) Attach oil pressure gauge to fluid pressure check hole in transmission case.

Special tool
(A): 09925–37811–001

⚠ CAUTION

After attaching oil pressure gauge, check that no fluid leakage exists.



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4) Depress foot brake fully, run engine at idle and stall then check fluid pressure in “D” or “R” range.

⚠ CAUTION

- **Do not continue running engine at stall speed longer than 5 seconds.**
- **After performing line pressure test, be sure to leave engine running at idle for longer than one minute before performing another line pressure test.**

Automatic transmission line pressure

	“D” range	“R” range
At idle speed	**304 – 362 kPa (3.1 – 3.7 kg/cm², 44 – 53 psi)**	**440 – 538 kPa (4.5 – 5.5 kg/cm², 64 – 78 psi)**
At stall speed	**1161 – 1321 kPa (11.8 – 13.5 kg/cm², 168 – 192 psi)**	**1485 – 1790 kPa (15.2 – 18.3 kg/cm², 216 – 260 psi)**

5) If check result is OK,disconnect special tool, then tighten fluid pressure check hole bolt to specified torque.

Tightening torque
Fluid pressure check hole bolt: 8 N·m (0.8 kgf-m, 6.0 lb-ft)

Troubleshooting

Condition	Possible cause	Correction / Reference Item
Higher than standard level in each range	Malfunction of pressure control solenoid valve (High line pressure)	*Inspect. If NG, replace valve body assembly.*
	Malfunction of primary regulator valve (High line pressure)	*Replace valve body assembly.*
Lower than standard level in each range	Malfunction of pressure control solenoid valve (Low line pressure)	*Inspect. If NG, replace valve body assembly.*
	Malfunction of primary regulator valve (Low line pressure)	*Replace valve body assembly.*
	Clogged oil strainer	*Replace.*
	Faulty oil pump	*Inspect. If NG, replace.*
	Defective O/D clutch	*Inspect. If NG, replace.*
	Leakage from both “D” and “R” range fluid pressure circuit	*Inspect. If NG, replace valve body assembly.*

Condition	Possible cause	Correction / Reference Item
Lower than standard level in "D" range	Fluid leakage from direct clutch	*Inspect. If NG, replace.*
	Defective O/D clutch	*Inspect. If NG, replace.*
	Leakage from "D" range fluid pressure circuit	*Inspect. If NG, replace valve body assembly.*
Lower than standard level in "R" range	Fluid leakage from direct clutch	*Inspect. If NG, replace.*
	Defective O/D clutch	*Inspect. If NG, replace.*
	Fluid leakage from reverse brake	*Inspect. If NG, replace.*
	Leakage from "R" range fluid pressure circuit	*Inspect. If NG, replace valve body assembly.*

Engine Brake Test

S5JB0A5104017

⚠ WARNING

Before test, make sure that there is no vehicle behind so as to prevent rear-end collision.

1) While driving vehicle in 4th gear of "D" range, shift select lever down to "3" range and check if engine brake operates.
2) In the same way as in Step 1), check engine brake for operation when select lever is shifted down to "L" range.
3) Engine brake should operate in the test.

Troubleshooting

Condition	Possible cause	Correction / Reference Item
Failure to operate when shifted down to "2" range	Faulty second coast brake	*Inspect. If NG, replace.*
Failure to operate when shifted down to "L" range	Faulty reverse brake	*Inspect. If NG, replace.*

"P" Range Test

S5JB0A5104018

1) Stop vehicle on a slope of 5 degrees or more, shift select lever to "P" range and at the same time apply parking brake.
2) After stopping engine, depress brake pedal and release parking brake.
3) Then, release brake pedal gradually and check that vehicle remains stationary.
4) Depress brake pedal and shift select lever to "N" range.
5) Then, release brake pedal gradually and check that vehicle moves.

⚠ WARNING

Before test, make sure no one is around vehicle or down on a slope and keep watchful for safety during test.

Troubleshooting

Condition	Possible cause	Correction / Reference Item
Vehicle moves at "P" range or remains stationary at "N" range	Defective parking lock pawl or spring	*Inspect. If NG, repair.*

A/T Symptom Diagnosis

S5JB0A5104019

Trouble Diagnosis 1

Electrical repair

Condition	Possible cause	Correction / Reference Item
Excessive shift shock	Shift solenoid valve No.1 and/or No.2 circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Pressure control solenoid valve circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Output shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Input shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Transmission fluid temperature sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	CAN communication circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Accelarator pedal position sensor circuit faulty	*Inspect circuit for open, short and intermittent referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	TCM	*Substitute a known-good TCM and recheck.*
	ECM	*Substitute a known-good ECM and recheck.*
No gear shift as 3rd gear	Shift solenoid valve No.1 and/or No.2 circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.it faulty*
	Pressure control solenoid valve circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.it faulty*
	TCM	*Substitute a known-good TCM and recheck.*
Poor 1 → 2 shift	Shift solenoid valve No.2 circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Output shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Transmission range sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	CAN communication circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Accelerator pedal position sensor circuit faulty	*Inspect circuit for open, short and intermittent referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	TCM	*Substitute a known-good TCM and recheck.*
	ECM	*Substitute a known-good ECM and recheck.*

Condition	Possible cause	Correction / Reference Item
Poor 2 → 3 shift	Shift solenoid valve No.1 circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Output shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Transmission range sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	CAN communication circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Accelerator pedal position sensor circuit faulty	*Inspect circuit for open, short and intermittent referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	TCM	*Substitute a known-good TCM and recheck.*
	ECM	*Substitute a known-good ECM and recheck.*
Poor 3 → O/D shift	Shift solenoid valve No.2 circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Pressure control solenoid valve circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Output shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Inputshaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Transmission range sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	CAN communication circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Accelerator pedal position sensor circuit faulty	*Inspect circuit for open, short and intermittent referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	"3" position switch circuit faulty	*Refer to "No Gear Shift to 4th Gear: "*
	TCM	*Substitute a known-good TCM and recheck.*
	ECM	*Substitute a known-good ECM and recheck.*

Condition	Possible cause	Correction / Reference Item
Poor O/D → 3 shift	Shift solenoid valve No.2 circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Pressure control solenoid valve circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Output shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Input shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	CAN communication circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Accelerator pedal position sensor circuit faulty	*Inspect circuit for open, short and intermittent referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	"3" position switch circuit faulty	*Refer to "No Gear Shift to 4th Gear: "*
	TCM	*Substitute a known-good TCM and recheck.*
	ECM	*Substitute a known-good ECM and recheck.*
Poor 3 → 2 shift	Shift solenoid valve No.1 circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Output shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	CAN communication circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Accelerator pedal position sensor circuit faulty	*Inspect circuit for open, short and intermittent referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	TCM	*Substitute a known-good TCM and recheck.*
	ECM	*Substitute a known-good ECM and recheck.*
Poor 2 → 1 shift	Shift solenoid valve No.2 circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Output shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	CAN communication circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Accelerator pedal position sensor circuit faulty	*Inspect circuit for open, short and intermittent referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	TCM	*Substitute a known-good TCM and recheck.*
	ECM	*Substitute a known-good ECM and recheck.*

Condition	Possible cause	Correction / Reference Item
Incorrect gear shift point	Output shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Pressure control solenoid valve circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	CAN communication circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Accelerator pedal position sensor circuit faulty	*Inspect circuit for open, short and intermittent referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	TCM	*Substitute a known-good TCM and recheck.*
	ECM	*Substitute a known-good ECM and recheck.*
Non operate TCC / lock-up system	Lock-up control solenoid valve circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Shift solenoid valve No.1 and/or No.2 circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Pressure control solenoid valve cicuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Output shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Input shaft speed sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Transmission range sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Transmission fluid temperature sensor circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	CAN communication circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	Crankshaft position sensor circuit faulty	*Inspect circuit for opnen, short and intermittent referring to "DTC P0335: Crankshaft Position (CKP) Sensor Circuit (For M16 Engine): in Section 1A".*
	Brake light switch circuit faulty	*Refer to "No Lock-Up Occurs: ".*
	Accelerator pedal position sensor circuit faulty	*Inspect circuit for open, short and intermittent referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	TCM	*Substitute a known-good TCM and recheck.*
	ECM	*Substitute a known-good ECM and recheck.*
Higher or lower stall speed	Pressure control solenoid valve circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	TCM	*Substitute a known-good TCM and recheck.*
Excessive "N" → "D" or "N" → "R" time lag	Pressure control solenoid valve circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	TCM	*Substitute a known-good TCM and recheck.*
Higher or lower line pressure	Pressure control solenoid valve circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	TCM	*Substitute a known-good TCM and recheck.*
Excessive slippage in all range	Pressure control solenoid valve circuit faulty	*Inspect circuit for open, short and intermittent. If NG, repair.*
	TCM	*Substitute a known-good TCM and recheck.*

Trouble Diagnosis 2

On-vehicle repair

Condition	Possible cause	Correction / Reference Item
Unable to run in all range	Faulty valve body component	*Replace valve body assembly.*
Excessive shift shock	Engine abnormal condition	*Inspect and repair engine.*
	Malfunction of shift solenoid valve No.1 and/or No.2	*Inspect. If NG, replace.*
	Malfunction of output shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of input shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of transmission range sensor	*Inspect. If NG, replace.*
	Malfunction of Transmission fluid temperature sensor	*Inspect. If NG, replace.*
	Malfunction of pressure control solenoid valve	*Inspect. If NG, replace valve body assembly.*
	Malfunction of brake light switch except N → D or N → R shifting	*Inspect referring to "Stop (Brake) Lamp Switch Inspection: in Section 9B". If NG, replace.*
	Malfunction of accelerator pedal position sensor	*Inspect referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	Faulty valve body component	*Replace valve body assembly.*
Poor 1 → 2 shift	Malfunction of shift solenoid valve No.2	*Inspect. If NG, replace.*
	Malfunction of output shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of transmission range sensor	*Inspect. If NG, replace.*
	Malfunction of accelerator pedal position sensor	*Inspect referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	Faulty valve body component	*Replace valve body assembly.*
Poor 2 → 3 shift	Malfunction of shift solenoid valve No.1	*Inspect. If NG, replace.*
	Malfunction of output shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of transmission range sensor	*Inspect. If NG, replace.*
	Malfunction of accelerator pedal position sensor	*Inspect referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	Faulty valve body component	*Replace valve body assembly.*

Condition	Possible cause	Correction / Reference Item
Poor 3 → O/D shift	Malfunction of shift solenoid valve No.2	*Inspect. If NG, replace.*
	Malfunction of output shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of transmission range sensor	*Inspect. If NG, replace.*
	Malfunction of "3" position switch	*Inspect. If NG, replace.*
	Malfunction of accelerator pedal position sensor	*Inspect referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	Malfunction of pressure control solenoid valve	*Inspect. If NG, replace valve body assembly.*
	Faulty valve body component	*Replace valve body assembly.*
Poor O/D → 3 shift	Malfunction of shift solenoid valve No.2	*Inspect. If NG, replace.*
	Malfunction of output shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of "3" position switch	*Inspect. If NG, replace.*
	Malfunction of accelerator pedal position sensor	*Inspect referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	Malfunction of pressure control solenoid valve	*Inspect. If NG, replace valve body assembly.*
	Faulty valve body component	*Replace valve body assembly.*
Poor 3 → 2 shift	Malfunction of shift solenoid valve No.1	*Inspect. If NG, replace.*
	Malfunction of output shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of accelerator pedal position sensor	*Inspect referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	Faulty valve body component	*Replace valve body assembly.*
Poor 2 → 1 shift	Malfunction of shift solenoid valve No.2	*Inspect. If NG, replace.*
	Malfunction of output shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of accelerator pedal position sensor	*Inspect referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	Faulty valve body component	*Replace valve body assembly.*

Condition	Possible cause	Correction / Reference Item
Incorrect shift point	Engine abnormal condition	*Inspect and repair engine*
	Malfunction of output shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of accelerator pedal position sensor	*Inspect referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
Non operate TCC / lock-up system	Malfunction of lock-up solenoid valve	*Inspect. If NG, replace.*
	Malfunction of shaft solenoid valve No.1 and/or No.2	*Inspect. If NG, replace.*
	Malfunction of output shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of input shaft speed sensor	*Inspect. If NG, replace.*
	Malfunction of transmission range sensor	*Inspect. If NG, replace.*
	Malfunction of transmission fluid temperature sensor	*Inspect. If NG, replace.*
	Malfunction of pressure control solenoid valve	*Inspect. If NG, replace valve body assembly.*
	Malfunction of brake light switch	*Inspect referring to "Stop (Brake) Lamp Switch Inspection: in Section 9B". If NG, replace.*
	Malfunction of accelerator pedal position sensor	*Inspect referring to "DTC P0122: Throttle Position Sensor (Main) Circuit Low: in Section 1A", "DTC P0123: Throttle Position Sensor (Main) Circuit High: in Section 1A", "DTC P0222: Throttle Position Sensor (Sub) Circuit Low: in Section 1A" and "DTC P0223: Throttle Position Sensor (Sub) Circuit High: in Section 1A".*
	Faulty valve body component	*Replace valve body assembly.*
Excessive "N" → "D" or "N" → "R" time lag	Pressure control solenoid valve circuit faulty	*Inspect. If NG, replace valve body assembly.*
	Clogged oil strainer	*Replace.*
	Faulty valve body component	*Replace valve body assembly.*

Trouble Diagnosis 3

Off-vehicle repair

Condition	Possible cause	Correction / Reference Item
Unable to run in all range	Faulty oil pump	*Inspect. If NG, replace.*
	Seized or broken planetary gear	*Inspect. If NG, replace.*
	Fluid pressure leakage to overdrive clutch due to wear of oil pump bushing	*Inspect. If NG, replace.*
	Damaged drive plate	*Inspect. If NG, replace.*
	Faulty torque converter	*Replace.*
Excessive "N" → "D" shift shock	Faulty forward clutch	*Inspect. If NG, replace.*
Excessive "N" → "R" shift shock	Faulty reverse brake	*Inspect. If NG, replace.*
	Faulty direct clutch	*Inspect. If NG, replace.*
Poor 1 → 2 shift, excessive shock or slippage	Faulty second brake	*Inspect. If NG, replace.*
	Faulty one-way clutch No.1	*Inspect. If NG, replace.*
	Faulty one-way clutch No.2	*Inspect. If NG, replace.*
Poor 2 → 3 shift, excessive shock or slippage	Faulty direct clutch	*Inspect. If NG, replace.*
	Faulty one-way clutch No.1	*Inspect. If NG, replace.*

Condition	Possible cause	Correction / Reference Item
Poor 3 ↔ O/D shift, excessive shock or slippage	Faulty O/D clutch	*Inspect. If NG, replace.*
	Faulty O/D brake	*Inspect. If NG, replace.*
Poor 3 → 2 shift, excessive shock or slippage	Faulty direct clutch	*Inspect. If NG, replace.*
	Faulty one-way clutch No.1	*Inspect. If NG, replace.*
Poor 2 → 1 shift, excessive shock or slippage	Faulty second brake	*Inspect. If NG, replace.*
	Faulty one-way clutch No.1	*Inspect. If NG, replace.*
	Faulty one-way clutch No.2	*Inspect. If NG, replace.*
Non operate TCC / lock-up system	Faulty torque converter	*Replace.*
Excessive "N" → "D" time lag	Faulty oil pump	*Inspect. If NG, replace.*
	Faulty forward clutch	*Inspect. If NG, replace.*
	Leakage from "D" range fluid pressure circuit	*Overhaul or replace valve body assembly.*
Excessive "N" → "R" time lag	Faulty oil pump	*Inspect. If NG, replace.*
	Faulty direct clutch	*Inspect. If NG, replace.*
	Faulty reverse brake	*Inspect. If NG, replace.*
	Leakage from "R" range fluid pressure circuit	*Overhaul or replace valve body assembly.*
Poor engine brake in downshift to "2" range	Faulty 2nd coast brake	*Inspect. If NG, replace.*
Poor engine brake in downshift to "L" range	Faulty reverse brake	*Inspect. If NG, replace.*

No Gear Shift to 4th Gear

S5JB0A5104020

System Description

TCM does not shift to 5th gear under any of the following condition.

- "3" position switch signal is inputted.
- 4L/N switch is turned ON. (4L mode)
- TCM detects the following DTCs.
  DTC, P0722, P0752, P0962, P0963, P0973, P0974, P0976, P0977, P1702

Troubleshooting

⚠ WARNING

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and tester, on a level road.**

Step	Action	Yes	No
1	*Was "A/T System Check" performed?*	Go to Step 2.	Go to "A/T System Check: ".
2	**Check DTC** *Is DTC, P0722, P0752, P0962, P0963, P0973, P0974, P0976, P0977 or P1702 detected?*	Perform DTC Flow to repair and retry.	Go to Step 3.
3	**ECT check** 1) Warm up engine to normal operating temperature. 2) Check ECT monitored by TCM using scan tool. *Is ECT indicated –40 °C (–40 °F)?*	Go to Step 4.	Faulty ECT sensor, its circuit or engine cooling system. If OK, substitute a known-good TCM and recheck.

Step	Action	Yes	No
4	**"3" position switch signal inspection** 1) With ignition switch ON, check voltage between terminal "E92-20" of TCM connector and ground under the following conditions. **"3" position switch specification** **Shift selector lever to "P", "R", "N" or "D" range: 2.9 – 3.8 V** **Shift selector lever to "3", "2" or "L" range: 1.4 – 2.0 V** *Is result as specified?*	Go to Step 5.	Faulty "3" position switch or its circuit. If OK, substitute a known-good TCM and recheck.
5	**4L/N switch signal inspection** 1) With ignition switch ON, check voltage between terminal "E93-4" of TCM connector and ground. **4L/N switch specification** **Transfer gear position "4H": Battery voltage** **Transfer gear position "4L" or "N": 0 – 2 V** *Is result as specified?*	Substitute a known-good TCM and recheck.	Faulty 4L/N switch or its circuit. If OK, substitute a known-good TCM and recheck.

No Lock-Up Occurs

S5JB0A5104021

System Description

TCM turns TCC pressure control solenoid OFF under any of the following conditions.

- Engine coolant temperature is lower than 60 °C (140 °F).
- 4L/N switch is turned ON. (4L mode)
- Brake light switch is turned ON. (Brake pedal is depressed)
- TCM detects the following DTCs.
  P0712, P0713, P0717, P0722, P0962, P0963, P0973, P0974, P0976, P0977, P1702, P1703, P1774, P1777, P2763 and P2764

Troubleshooting

⚠ WARNING

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and tester, on a level road.**

Step	Action	Yes	No
1	*Was "A/T System Check" performed?*	Go to Step 2.	Go to "A/T System Check: ".
2	**Check DTC** *Is DTC P0712, P0713, P0717, P0722, P0962, P0963, P0973, P0974, P0976, P0977, P1702, P1703, P1774, P1777, P2763 or P2764 detected?*	Perform DTC Flow to repair and retry.	Go to Step 3.
3	**ECT check** 1) Warm up engine to normal operating temperature. 2) Check ECT using scan tool. *Is ECT more than 60 °C (140 °F)?*	Go to Step 4.	Faulty ECT sensor, its circuit or engine cooling system. If OK, substitute a known-good TCM and recheck.

Step	Action	Yes	No
4	**4L/N switch signal inspection** 1) With ignition switch ON, check voltage between terminal "E92-4" of TCM connector and ground. **4L/N switch specification** **Transfer gear position or "4H": Battery voltage** **Transfer gear position "4L" or "N": 0 – 2 V** *Is result as specified?*	Go to Step 5.	Faulty "4L" switch or its circuit. If OK, substitute a known-good TCM and recheck.
5	**Brake light switch signal inspection** 1) With ignition switch ON, check voltage between terminal "E61-34" of ECM connector and ground. **Brake light switch specification** **Brake pedal is released: 0 – 1 V** **Brake pedal is depressed: Battery voltage** *Is result as specified?*	Substitute a known-good TCM and recheck.	Mis-adjusted brake light switch, faulty brake light switch or its circuit. If OK, substitute a known-good TCM and recheck.

Transmission Warning Light Circuit Check – Light Does Not Come "ON" at Ignition Switch ON (Vehicle is equipped with engine diagnosis connector)

S5JB0A5104063

Troubleshooting

Step	Action	Yes	No
1	**Combination Meter Power Supply Check** 1) Turn ignition switch ON. *Does other indicator / warning lights in combination meter comes ON?*	Go to Step 2.	Repair combination meter power supply circuit referring to "Combination Meter Circuit Diagram: in Section 9C".
2	1) TCM power and ground circuit check referring to "TCM Power and Ground Circuit Check: ". *Is it in good condition?*	Go to Step 3.	Repair or replace.
3	**DTC check** 1) Check DTC referring to "DTC Check: ". *Is there DTC P1774 or P1775?*	Go to applicable DTC diag. flow.	Go to Step 4.
4	**Combination Meter Function Check** 1) Turn ignition switch ON. *Does A/T selector position indicator show correct select lever position?*	Replace combination meter.	Substitute a known-good TCM and recheck.

Transmission Warning Light Circuit Check – Light Remains "ON" at Ignition Switch ON (Vehicle is equipped with engine diagnosis connector)

S5JB0A5104064

Troubleshooting

Step	Action	Yes	No
1	**Diagnostic Trouble Code (DTC) Check** 1) Check DTC referring to "DTC Check: ". *Is there any DTC(s)?*	Perform DTC Flow to repair and retry.	Substitute a known-good TCM and recheck. If OK, substitute a known-good combination meter and recheck.

"POWER" Light Circuit Check – Light Does Not Come "ON" at Ignition Switch ON

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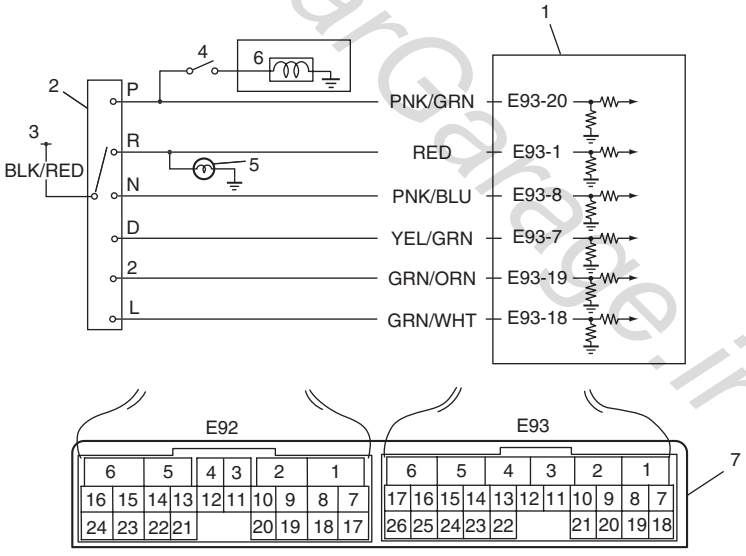
Troubleshooting

Step	Action	Yes	No
1	**Combination Meter Power Supply Check** 1) Turn ignition switch ON. *Does other indicator / warning lights in combination meter comes ON?*	Go to Step 2.	Repair combination meter power supply circuit referring to "Combination Meter Circuit Diagram: in Section 9C".
2	1) TCM power and ground circuit check referring to "TCM Power and Ground Circuit Check: ". *Is it in good condition?*	Go to Step 3.	Repair or replace.
3	**DTC check** 1) Check DTC referring to "DTC Check: ". *Is there DTC P1774 or P1775?*	Go to applicable DTC diag. flow.	Go to Step 4.
4	**Combination Meter Function Check** 1) Turn ignition switch ON. *Does A/T selector position indicator show correct select lever position?*	Replace combination meter.	Substitute a known-good TCM and recheck.

DTC P0705 Transmission Range Sensor Circuit Malfunction

S5JB0A5104026

Wiring Diagram



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1. TCM	4. Brake light switch	7. Terminal arrangement of TCM connector (viewed from harness side)
2. Transmission range sensor (switch)	5. Back-up light	
3. From ignition switch	6. Shift lock solenoid	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Multiple signals are inputted simultaneously for 2 seconds. (1 driving cycle detection logic)	• Select cable maladjusted. • Transmission range sensor (switch) maladjusted. • Transmission range sensor (switch) or its circuit malfunction. • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and shift select lever to "D" range.
4) Keep engine running at idle speed for 25 seconds or more.
5) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was "A/T System Check: " performed?*	Go to Step 2.	Go to "A/T System Check: ".
2	*Do you have SUZUKI scan tool?*	Go to Step 3.	Go to Step 4.
3	**Check transmission range sensor (switch) circuit for operation** Check by using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and check transmission range sensor signal ("P", "R", "N", "D", "2" or "L") on display when shifting select lever to each range. *Is applicable range indicated?*	Intermittent trouble. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00".	Go to Step 5.
4	**Check transmission range sensor (switch) circuit for operation** Check without using SUZUKI scan tool: 1) Turn ignition switch ON. 2) Check voltage at terminals "E93-1", "E93-7", "E93-8", "E93-18", "E93-19" and "E93-20" respectively with select lever shifted to each range. Taking terminal "E93-1" as an example, is battery voltage will be indicated only when shift lever is shifted to "R" range and 0 V for other ranges as shown in table. Check voltage at other terminals likewise, referring to table. *Are check results satisfactory?*	Intermittent trouble. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00".	Go to Step 5.
5	**Check transmission range sensor (switch) for installation position** 1) Check transmission range sensor (switch) for installation position referring to "Transmission Range Sensor Inspection and Adjustment: ". *Is it adjusted correctly?*	Go to Step 6.	Adjust transmission range sensor (switch) and recheck.
6	**Check select cable for adjustment** 1) Check select cable for adjustment referring to "Select Cable Adjustment: ". *Is it adjusted correctly?*	Go to Step 7.	Adjust select cable and recheck.
7	**Check transmission range sensor (switch)** 1) Check transmission range sensor (switch) referring to "Transmission Range Sensor Inspection and Adjustment: ". *Are check results satisfactory?*	Transmission range sensor circuit shorted to power circuit or shorted each other. If wires and connections are OK, substitute a known-good TCM and recheck.	Replace transmission range sensor (switch).

		Terminal					
		E93-20	E93-1	E93-8	E93-7	E93-19	E93-18
Select lever position	P	8 – 14 V	0 V	0 V	0 V	0 V	0 V
	R	0 V	8 – 14 V	0 V	0 V	0 V	0 V
	N	0 V	0 V	8 – 14 V	0 V	0 V	0 V
	D or 3	0 V	0 V	0 V	8 – 14 V	0 V	0 V
	2	0 V	0 V	0 V	0 V	8 – 14 V	0 V
	L	0 V	0 V	0 V	0 V	0 V	8 – 14 V

DTC P0707 Transmission Range Sensor Circuit Low

S5JB0A5104027

Wiring Diagram

Refer to “DTC P0705 Transmission Range Sensor Circuit Malfunction: ”.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Transmission range switch signal (P, R, N, D, 2, L) is not inputted for more than 2 seconds in the following condition. • Vehicle speed is more than 30 km/h (19 mile/h). And • Engine speed is more than 1500 rpm. (2 driving cycle detection logic)	• Select cable maladjusted. • Transmission range sensor (switch) maladjusted. • Transmission range sensor (switch) or its circuit malfunction. • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and shift select lever to “D” range.
4) Start vehicle and increase vehicle speed to 50 km/h (31 mile/h) or more for 2 minutes.
5) Stop vehicle and turn ignition switch OFF.
6) Repeat Step 3) to 5) one time.
7) Stop vehicle.
8) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	*Do you have SUZUKI scan tool?*	Go to Step 3.	Go to Step 4.
3	**Check transmission range sensor (switch) circuit for operation** Check by using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and check transmission range sensor signal (“P”, “R”, “N”, “D”, “2” or “L”) on display when shifting select lever to each range. *Is applicable range indicated?*	Intermittent trouble. Check for intermittent trouble referring to “Intermittent and Poor Connection Inspection: in Section 00”.	Go to Step 5.

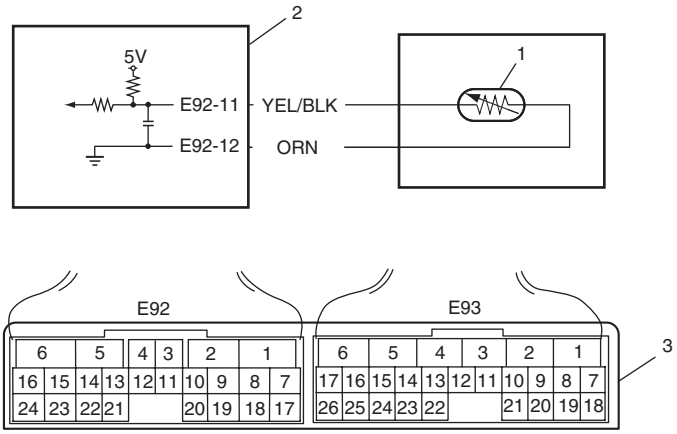
Step	Action	Yes	No
4	**Check transmission range sensor (switch) circuit for operation** Check without using SUZUKI scan tool: 1) Turn ignition switch ON. 2) Check voltage at terminals “E93-1”, “E93-7”, “E93-8”, “E93-18”, “E93-19” and “E93-20” respectively with select lever shifted to each range. Taking terminal “E93-1” as an example, is battery voltage will be indicated only when shift lever is shifted to “R” range and 0 V for other ranges as shown in table. Check voltage at other terminals likewise, referring to table. *Are check results satisfactory?*	Intermittent trouble. Check for intermittent trouble referring to “Intermittent and Poor Connection Inspection: in Section 00”.	Go to Step 5.
5	**Check transmission range sensor (switch) for installation position** 1) Check transmission range sensor (switch) for installation position referring to “Transmission Range Sensor Inspection and Adjustment: ”. *Is it adjusted correctly?*	Go to Step 6.	Adjust transmission range sensor (switch) and recheck.
6	**Check select cable for adjustment** 1) Check select cable for adjustment referring to “Select Cable Adjustment: ”. *Is it adjusted correctly?*	Go to Step 7.	Adjust select cable and recheck.
7	**Check transmission range sensor (switch)** 1) Check transmission range sensor (switch) referring to “Transmission Range Sensor Inspection and Adjustment: ”. *Are check results satisfactory?*	Transmission range sensor circuit open or shorted to ground. If wires and connections are OK, substitute a known-good TCM and recheck.	Replace transmission range sensor (switch).

		Terminal					
		E93-20	**E93-1**	**E93-8**	**E93-7**	**E93-19**	**E93-18**
Select lever position	P	8 – 14 V	0 V	0 V	0 V	0 V	0 V
	R	0 V	8 – 14 V	0 V	0 V	0 V	0 V
	N	0 V	0 V	8 – 14 V	0 V	0 V	0 V
	D or 3	0 V	0 V	0 V	8 – 14 V	0 V	0 V
	2	0 V	0 V	0 V	0 V	8 – 14 V	0 V
	L	0 V	0 V	0 V	0 V	0 V	8 – 14 V

DTC P0712 Transmission Fluid Temperature Sensor "A" Circuit Low

S5JB0A5104029

Wiring Diagram



I5JB0A510021-02

1. Transmission fluid temperature sensor	3. Terminal arrangement of TCM connector (viewed from harness side)
2. TCM	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Transmission temperature sensor terminal voltage is less than 0.05 V for 10 seconds or more after ignition switch ON. (1 driving cycle detection logic)	• Transmission fluid temperature sensor or its circuit. • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine.
4) Keep engine running at idle speed for 1 minute or more.
5) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was "A/T System Check" performed?*	Go to Step 2.	Go to "A/T System Check: ".
2	**Check transmission fluid temperature sensor A circuit for ground short** 1) Turn ignition switch OFF. 2) Disconnect TCM connectors from TCM. 3) Check for proper connection to transmission fluid temperature sensor at terminal "E92-11" and "E92-12". 4) If OK, check continuity between terminal "E92-11" of disconnected harness side TCM connector and ground. *Is continuity indicated?*	Transmission fluid temperature sensor circuit is shorted to ground. If circuit is OK, go to Step 3.	Go to Step 3.
3	**Inspection transmission fluid temperature sensor** 1) Inspection transmission fluid temperature sensor referring to "Transmission Fluid Temperature Sensor Inspection: ". *Is result satisfactory?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00". If OK, substitute a known-good TCM and recheck.	Replace valve body harness including transmission fluid temperature sensor referring to "Transmission Fluid Temperature Sensor Removal and Installation: ".

DTC P0713 Transmission Fluid Temperature Sensor "A" Circuit High

S5JB0A5104030

Wiring Diagram

Refer to "DTC P0712 Transmission Fluid Temperature Sensor "A" Circuit Low: ".

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Transmission temperature sensor terminal voltage is less than 4.89 V under vehicle condition shown in the following. • Ignition switch is turned on for 15 minutes or more • Engine coolant temperature is more than 50 °C (122 °F) (1 driving cycle detection logic)	• Transmission fluid temperature sensor or its circuit. • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine.
4) Start vehicle and increase vehicle speed to about 40 km/h (25 mile/h) for 20 minutes or more.
5) Stop vehicle.
6) Check DTC, pending DTC and freeze-frame data.

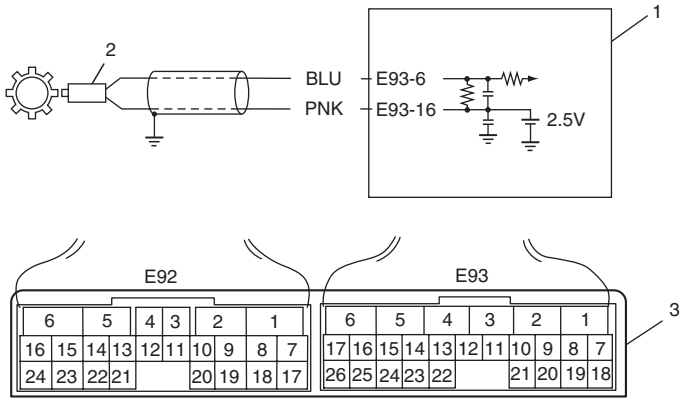
DTC Troubleshooting

Step	Action	Yes	No
1	*Was "A/T System Check" performed?*	Go to Step 2.	Go to "A/T System Check: ".
2	**Check transmission fluid temperature sensor circuit for open** 1) Turn ignition switch OFF. 2) Disconnect TCM connectors from TCM. 3) Check for proper connection to transmission fluid temperature sensor at terminal "E92-11" and "E92-12". 4) If OK, check continuity between terminal "E92-11" and "E92-12" of disconnected harness side TCM connector. *Is continuity indicated?*	Go to Step 3.	Transmission fluid temperature sensor circuit is open circuit.
3	**Check transmission fluid temperature sensor circuit for power supply short** 1) Cool down A/T fluid temperature under ambient temperature. 2) Connect TCM connectors to TCM with ignition switch OFF. 3) Turn ignition switch ON. 4) Measure voltage between terminal "E92-11" of TCM connector and ground. *Is it 4.89 V or more?*	Transmission fluid temperature sensor circuit is shorted to power supply circuit. If circuit is OK, go to Step 4.	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00". If OK, substitute a known-good TCM and recheck.
4	**Inspection transmission fluid temperature sensor** 1) Inspection transmission fluid temperature sensor referring to "Transmission Fluid Temperature Sensor Inspection: ". *Is result satisfactory?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00". If OK, substitute a known-good TCM and recheck.	Replace valve body harness including transmission fluid temperature sensor referring to "Transmission Fluid Temperature Sensor Removal and Installation: ".

DTC P0717 Input / Turbine Speed Sensor Circuit No Signal

S5JB0A5104031

Wiring Diagram



I5JB0A510022-01

1. TCM	3. Terminal arrangement of TCM connector (viewed from harness side)
2. Input shaft speed sensor	

DTC Detecting Condition and Trouble Area

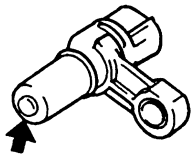
DTC Detecting Condition	Trouble Area
No pulse signal of input shaft speed sensor is inputted for 5 pulses period of output shaft speed sensor through it is detected more than 600 rpm. (1 driving cycle detection logic)	• Input shaft speed sensor or its circuit malfunction. • Improper input shaft speed sensor installation. • Damaged clutch drum. • Foreign material attachment to sensor or drum. • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and shift select lever to “D” range.
4) Start vehicle and increase vehicle speed to about 40 km/h (25 mile/h) for 3 minutes or more.
5) Stop vehicle.
6) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

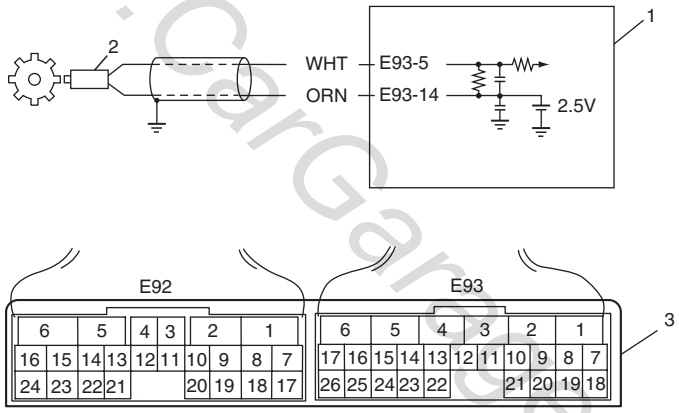
Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	**Check input shaft speed sensor circuit** 1) Disconnect TCM connectors with ignition switch OFF. 2) Check for proper connection to input shaft speed sensor at “E93-6” and “E93-16” terminals. 3) If OK, check resistance of sensor circuit. **Resistance of input shaft speed sensor circuit** **Between terminals “E93-6” and “E93-16” of disconnected harness side TCM connector: 560 – 680 Ω at 20 °C (68 °F)** **Between terminals “E93-16” of disconnected harness side TCM connector and ground: No continuity** *Are check results satisfactory?*	Go to Step 4.	Go to Step 3.

Step	Action	Yes	No
3	**Inspection input shaft speed sensor** Inspect input shaft speed sensor referring to “Input Shaft Speed Sensor Inspection: ”. *Is check result satisfactory?*	Input shaft speed sensor circuit is malfunction.	Go to Step 4.
4	**Check visually input shaft speed sensor and clutch drum using mirror for following** • No damage • No foreign material attached • Correct installation  I2RH01510023-01 *Are they in good condition?*	Intermittent trouble. Check for intermittent trouble referring to “Intermittent and Poor Connection Inspection: in Section 00”.	Clean, repair or replace.

DTC P0722 Output Speed Sensor Circuit No Signal

S5JB0A5104032

Wiring Diagram



I5JB0A510023-01

1. TCM	3. Terminal arrangement of TCM connector (viewed from harness side)
2. Output shaft speed sensor	

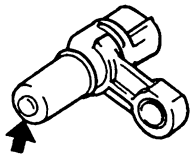
DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
No pulse signal of output shaft speed sensor is inputted for 23 pulses period of input shaft speed sensor. (1 driving cycle detection logic)	• Output shaft speed sensor or its circuit malfunction. • Improper output shaft speed sensor installation. • Damaged sensor rotor. • Foreign material attachment to sensor or rotor. • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and shift select lever to “D” range.
4) Start vehicle and increase vehicle speed to about 40 km/h (25 mile/h) for 3 minutes or more.
5) Stop vehicle.
6) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was "A/T System Check" performed?*	Go to Step 2.	Go to "A/T System Check: ".
2	**Check input shaft speed sensor circuit** 1) Disconnect TCM connectors with ignition switch OFF. 2) Check for proper connection to input shaft speed sensor at "E93-5" and "E93-14" terminals. 3) If OK, check resistance of sensor circuit. **Resistance of input shaft speed sensor circuit** **Between terminals "E93-5" and "E93-14" of disconnected harness side TCM connector: 560 – 680 Ω at 20 °C (68 °F)** **Between terminals "E93-14" of disconnected harness side TCM connector and ground: No continuity** *Are check results satisfactory?*	Go to Step 4.	Go to Step 3.
3	**Inspection output shaft speed sensor** Inspect input shaft speed sensor referring to "Output Shaft Speed Sensor Inspection: ". *Is check result satisfactory?*	Output shaft speed sensor circuit is malfunction.	Go to Step 4.
4	**Check visually Output shaft speed sensor and sensor rotor using mirror for following** • No damage • No foreign material attached • Correct installation  I2RH01510023-01 *Are they in good condition?*	Intermittent trouble. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00".	Clean, repair or replace.

DTC P0741 / P0742 TCC Circuit Performance or Stuck OFF / TCC Circuit Stuck ON

S5JB0A5104033

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
DTC P0741: When driving vehicle in "D" range, difference in revolution between engine and A/T input (input shaft speed) is lager than specification although TCM commanded TCC pressure control solenoid to turn ON. (2 driving cycle detection logic)	• Mechanical malfunction of TCC pressure control solenoid valve. • Malfunction of valve body assembly. • Fluid passage clogged or leaking. • Torque converter clutch malfunction.
DTC P0742: When driving vehicle in "D" range, difference in revolution between engine and A/T input (input shaft speed) is smaller than specification although TCM commanded TCC pressure control solenoid to turn OFF. (2 driving cycle detection logic)	

DTC Confirmation Procedure

⚠ WARNING

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and tester, on a level road.**

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and warm it up to normal operating temperature.
4) Shift select lever to “N” and “D” range for each 10 seconds.
5) Drive vehicle with 4th in “D” range and lock-up ON for 20 seconds or longer referring to “Automatic Gear Shift Table: ”.
6) Drive vehicle with 2nd or 3rd gear in “D” range, 15 – 20% throttle opening and at vehicle speed of 40 km/h (25 mile/h).
7) Stop vehicle and turn ignition switch OFF.
8) Repeat Step 3) to 6) one time.
9) Stop vehicle.
10) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	Check TCC pressure control solenoid valve for operation referring to “Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Inspection: ”. *Are they in good condition?*	Clean fluid passage or replace valve body assembly.	Replace TCC pressure control solenoid valve.

DTC P0751 / P0752 Shift Solenoid-A Performance or Stuck OFF / Shift Solenoid-A Stuck ON

S5JB0A5104034

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
DTC P0751: When one of the following condition was detected while vehicle running at 5 km/h (3.1 mile/h) or more in “D” range after engine being warmed up. • 4th gear ratio is detected although TCM command is for 1st gear (See table below *1) Or • 3rd gear ratio is detected although TCM command is for 2nd gear (See table below *2). (2 driving cycle detection logic)	• Mechanical malfunction of shift solenoid valve–A. • Malfunction of valve body assembly. • Fluid passage clogged or leaking. • Mechanical malfunction of automatic transmission (clutch, brake or gear etc).
DTC P0752: 2nd gear ratio is detected although TCM command is for 3rd gear while vehicle running at 5 km/h (3.1 mile/h) or more in “D” range after engine being warmed up. (2 driving cycle detection logic)	

Table for detecting condition

TCM output gear position		1st	2nd	3rd	4th
Actual gear position	Stuck OFF (DTC P0751)	4th *1	3rd *2	3rd	4th
	Stuck ON (DTC P0752)	1st	2nd	2nd	4th

DTC Confirmation Procedure

⚠ WARNING

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and tester, on a level road.**

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and warm it up to normal operating temperature.
4) Shift select lever to “N” and “D” range for each 10 seconds.
5) Start vehicle and increase vehicle speed to 60 km/h (37 mile/h) with throttle position 40% or more.
6) Stop vehicle and turn ignition switch OFF.
7) Repeat Step 3) to 5) one time.
8) Stop vehicle.
9) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	Check shift solenoid valve–A for operation referring to “Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Inspection: ”. *Are they in good condition?*	Clean fluid passage or replace valve body assembly.	Replace shift solenoid valve–A.

DTC P0756 / P0757 Shift Solenoid-B Performance or Stuck OFF / Shift Solenoid-B Stuck ON

S5JB0A5104035

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
DTC P0756: When one of the following condition was detected while vehicle running at 5 km/h (3.1 mile/h) or more in “D” range after engine being warmed up. • 1st gear ratio is detected although TCM command is for 2nd gear (See table below *1) Or • 4th gear ratio is detected although TCM command is for 3rd gear (See table below *2) (2 driving cycle detection logic)	• Mechanical malfunction of shift solenoid valve–B. • Malfunction of valve body assembly. • Fluid passage clogged or leaking. • Mechanical malfunction of automatic transmission (clutch, brake or gear etc).
DTC P0757: When one of the following condition was detected while vehicle running at 5 km/h (3.1 mile/h) or more in “D” range after engine being warmed up. • 2nd gear ratio is detected although TCM command is for 1st gear (See table below *3). Or • 3rd gear ratio is detected although TCM command is for 4th gear (See table below *4). (2 driving cycle detection logic)	

Table for detecting condition

TCM output gear position		1st	2nd	3rd	4th
Actual gear position	Stuck OFF (DTC P0756)	1st	1st *1	4th *2	4th
	Stuck ON (DTC P0757)	2nd *3	2nd	3rd	3rd *4

DTC Confirmation Procedure

⚠ WARNING

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and tester, on a level road.**

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and warm it up to normal operating temperature.
4) Shift select lever to “N” and “D” range for each 10 seconds.
5) Start vehicle and increase vehicle speed to 65 km/h (40 mile/h) with throttle position 10% or more.
6) Stop vehicle and turn ignition switch OFF.
7) Repeat Step 3) to 5) one time.
8) Stop vehicle.
9) Check DTC, pending DTC and freeze-frame data.

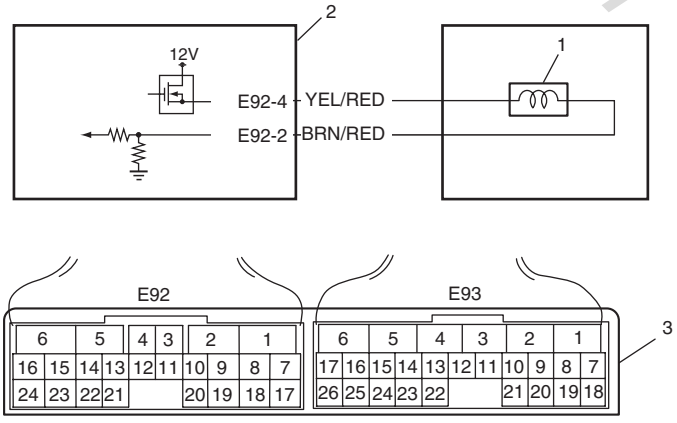
DTC Troubleshooting

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	Check shift solenoid valve–B for operation referring to “Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Inspection: ”. *Are they in good condition?*	Clean fluid passage or replace valve body assembly.	Replace shift solenoid valve–B.

DTC P0962 Pressure Control Solenoid “A” Control Circuit Low

S5JB0A5104039

Wiring Diagram



I5JB0A510024-01

1. Pressure control solenoid valve	2. TCM	3. Terminal arrangement of TCM connector (viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Pressure control solenoid valve output voltage is too low comparing with TCM command value. (1 driving cycle detection logic)	• Pressure control solenoid valve circuit open or shorted to ground. • Malfunction of pressure control solenoid valve. • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine.
4) Keep engine running at idle speed for 30 seconds or more.
5) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was "A/T System Check" performed?*	Go to Step 2.	Go to "A/T System Check: ".
2	**Check pressure control solenoid valve circuit for ground short** 1) Disconnect TCM connectors. 2) Check for proper connection to TCM at terminals "E92-2" and "E92-4". 3) If connection is OK, check continuity between terminal "E92-4" of disconnected harness side TCM connector and ground. *Is continuity indicated?*	Pressure control solenoid valve circuit is shorted to ground. If circuit is OK, go to Step4.	Go to Step 4.
3	**Check pressure control solenoid valve circuit for open** 1) Check resistance between terminals "E92-2" and "E92-4" of disconnected harness side TCM connector. *Is it infinity?*	Pressure control solenoid valve circuit is open circuit. If circuit is OK, go to Step4.	Go to Step 4.
4	**Inspection pressure control solenoid valve** 1) Inspection pressure control solenoid valve referring to "Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Inspection: ". *Is check results satisfactory?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00". If OK, substitute a known-good TCM and recheck.	Replace defective pressure control solenoid valve referring to "Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Removal and Installation: ".

DTC P0963 Pressure Control Solenoid "A" Control Circuit High

S5JB0A5104040

Wiring Diagram

Refer to "DTC P0962 Pressure Control Solenoid "A" Control Circuit Low: ".

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Pressure control solenoid valve output voltage is too high comparing with TCM command value. (1 driving cycle detection logic)	• Pressure control solenoid valve circuit shorted to power circuit. • Pressure control solenoid valve malfunction. • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine.
4) Keep engine running at idle speed for 10 seconds or more.
5) Check DTC, pending DTC and freeze-frame data.

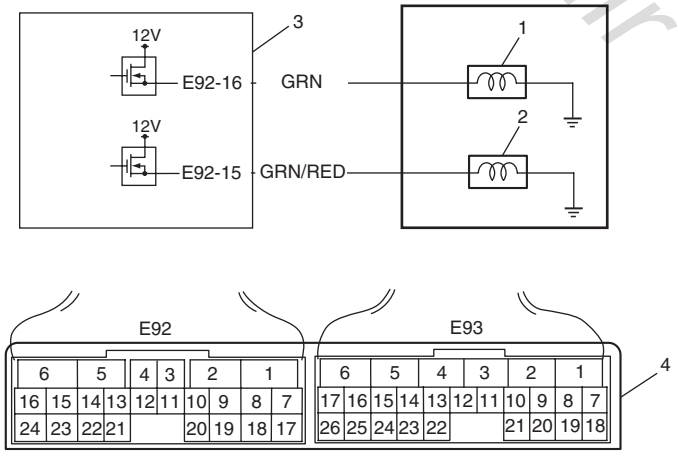
DTC Troubleshooting

Step	Action	Yes	No
1	*Was "A/T System Check" performed?*	Go to Step 2.	Go to "A/T System Check: ".
2	**Check pressure control solenoid valve circuit for power supply short** 1) Disconnect TCM connectors. 2) Check for proper connection to TCM at terminal "E92-2" and "E92-4". 3) If connection is OK, turn ignition switch ON and measure voltage between terminal "E92-2" of disconnected harness side TCM connector and ground. *Is it 0 – 2 V?*	Go to Step 3.	Pressure control solenoid valve circuit is shorted to power circuit.
3	**Inspection pressure control solenoid valve** 1) Inspection pressure control solenoid valve referring to "Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Inspection: ". *Is check results satisfactory?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00". If OK, substitute a known-good TCM and recheck.	Replace defective pressure control solenoid valve referring to "Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Removal and Installation: ".

DTC P0973 / P0976 Shift Solenoid "A" Control Circuit Low / Shift Solenoid "B" Control Circuit Low

S5JB0A5104041

Wiring Diagram



I5JB0A510025-01

1. Shift solenoid valve–A	3. TCM
2. Shift solenoid valve–B	4. Terminal arrangement of TCM connector (viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Voltage of shift solenoid valve TCM terminal is low although TCM is commanding shift solenoid to turn ON. (1 driving cycle detection logic)	• Shift solenoid valve circuit shorted to ground. • Malfunction of shift solenoid valve. • TCM

DTC Confirmation Procedure

DTC P0973:

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine.
4) Shift select lever to “N” and “D” range for each 20 seconds.
5) Check DTC, pending DTC and freeze-frame data.

DTC P0976:

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine.
4) Shift select lever to “N” and “D” range for each 10 seconds.
5) Start vehicle and increase vehicle speed to 20 km/h (12.5 mile/h) with throttle position 10% or less.
6) Stop vehicle.
7) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	**Check shift solenoid valve circuit for ground short** 1) Disconnect TCM connectors. 2) Check for proper connection to TCM at terminals “E92-16” (for shift solenoid valve–A), “E92-15” (for shift solenoid valve–B). 3) If connection is OK, measure resistance between terminal “E92-16” (for shift solenoid valve–A), “E92-15” (for shift solenoid valve–B) of disconnected harness side TCM connector and ground. *Is it less than 11 Ω?*	DTC P0973: Shift solenoid valve-A circuit is shorted to ground. DTC P0976: Shift solenoid valve-B circuit is shorted to ground. If circuit is OK, go to Step 3.	Go to Step 3.
3	**Inspection solenoid valve** 1) Inspection pressure control solenoid valve referring to “Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Inspection: ”. *Is check results satisfactory?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to “Intermittent and Poor Connection Inspection: in Section 00”, If OK, substitute a known-good TCM and recheck.	Replace defective solenoid valve referring to “Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Removal and Installation: ”.

DTC P0974 / P0977 Shift Solenoid “A” Control Circuit High / Shift Solenoid “B” Control Circuit High

S5JB0A5104042

Wiring Diagram

Refer to “DTC P0973 / P0976 Shift Solenoid “A” Control Circuit Low / Shift Solenoid “B” Control Circuit Low: ”.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Voltage of shift solenoid valve TCM terminal is high although TCM is commanding shift solenoid to turn OFF. (1 driving cycle detection logic)	• Shift solenoid valve circuit open or shorted to power circuit. • Malfunction of shift solenoid valve. • TCM

DTC Confirmation Procedure

⚠ WARNING

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and tester, on a level road.**

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and shift select lever to “D” range.
4) Start vehicle and increase vehicle speed to 60 km/h (37 mile/h) in “D” range.
5) Keep on driving in the speed for 20 seconds and decrease vehicle speed gradually.
6) Stop vehicle.
7) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	**Check shift solenoid valve circuit for power supply short** 1) Disconnect TCM connectors. 2) Check for proper connection to TCM at terminal “E92-16” (for shift solenoid valve–A), “E92-15” (for shift solenoid valve–B). 3) If connection is OK, turn ignition switch ON and measure voltage between terminal “E92-16” (for shift solenoid valve–A), “E92-15” (for shift solenoid valve–B) of disconnected harness side TCM connector and ground. *Is it 0 – 2 V?*	Go to Step 3.	DTC P0974: Shift solenoid valve-A circuit is shorted to power supply circuit. DTC P0977: Shift solenoid valve-B circuit is shorted to power supply circuit.
3	**Check solenoid valve circuit for open** 1) Check continuity between terminal “E92-16” (for solenoid valve-A) or “E92-15” (for solenoid valve-B) of disconnected harness side TCM connector and ground. *Is it infinity?*	• DTC P0974: Solenoid valve-A circuit is open circuit. • DTC P0977: Solenoid valve-B circuit is open circuit. • If circuit is OK, go to step 4.	Go to Step 4.

Step	Action	Yes	No
4	**Inspection solenoid valve** 1) Inspection solenoid valve referring to “Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Inspection: ”. *Is check results satisfactory?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to “Intermittent and Poor Connection Inspection: in Section 00”. If OK, substitute a known-good TCM and recheck.	Replace defective solenoid valve referring to “Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Removal and Installation: ”.

DTC P1702 Internal Control Module Memory Check Sum Error

S5JB0A5104044

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
An internal TCM fault is detected by TCM (1 driving cycle detection logic)	TCM

NOTE

DTC P1702 can never be cleared once it has been set.

1) Ignition switch OFF.
2) Replace TCM.
3) Repeat “A/T System Check: ”.

DTC P1703 CAN Invalid Data - TCM

S5JB0A5104045

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
When abnormality on the gear shift control signal from ECM is detected by TCM, TCM sets DTC P1703. (1 driving cycle detection logic)	• Engine control system • TCM • ECM

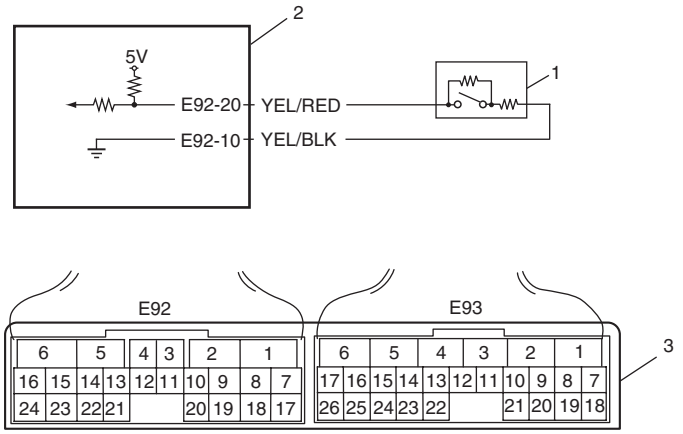
DTC Troubleshooting

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	**DTC Check** Check DTC of ECM referring to “DTC Check: in Section 1A”. *Is there any DTC(s)?*	Go to applicable DTC troubleshooting.	Substitute a known-good TCM and recheck.

DTC P1723 Range Select Switch Malfunction

S5JB0A5104056

Wiring Diagram



I5JB0A510001-01

1. "3" position switch	3. Terminal arrangement of TCM connector (viewed from harness side)
2. TCM	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
"3" position switch signal is inputted out of specified value. (1 driving cycle detection logic)	• "3" position switch or its circuit malfunction • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and run it for 20 sec. or more.
4) Check DTC, pending DTC and freeze-frame data.

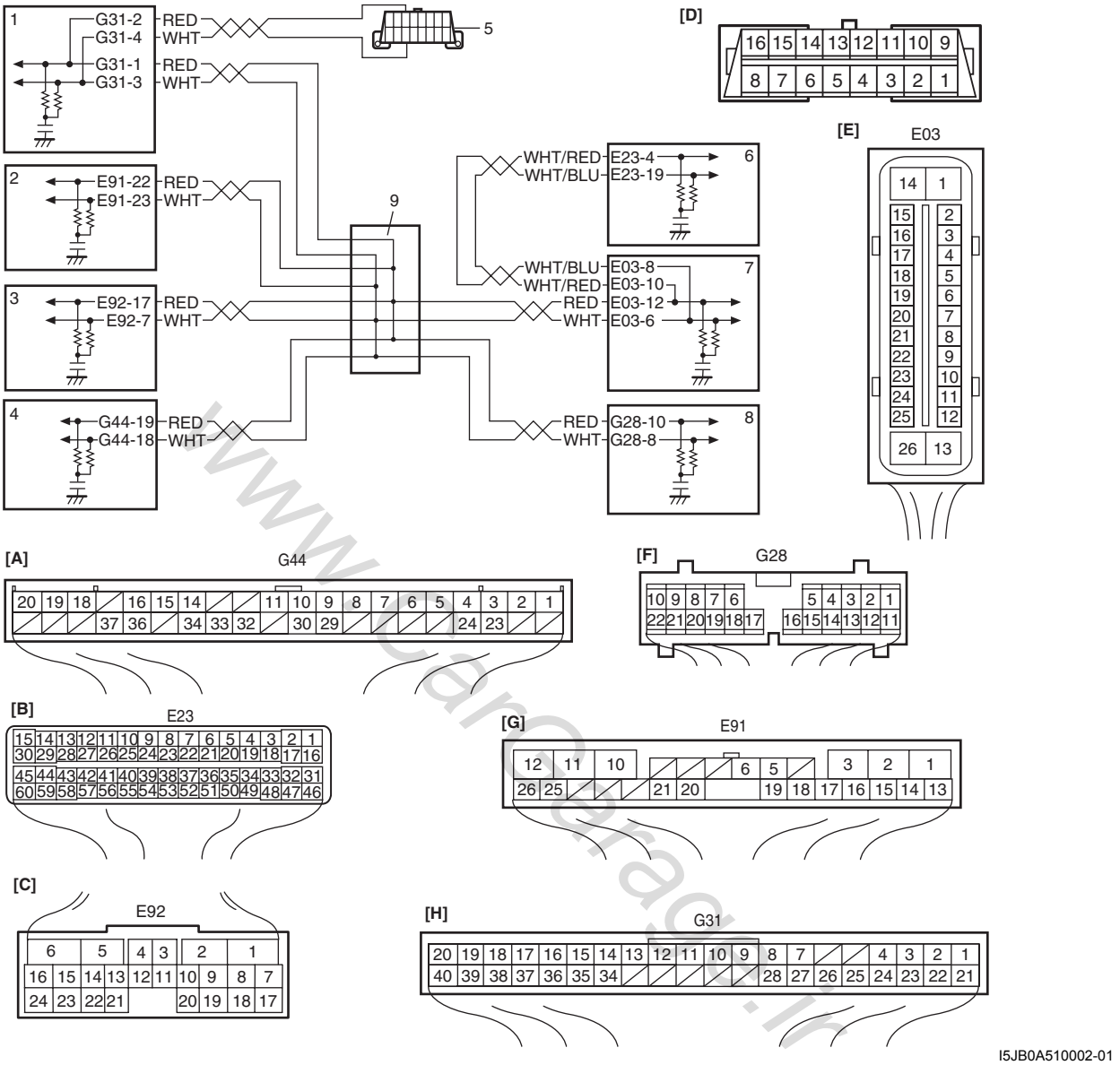
DTC Troubleshooting

Step	Action	Yes	No
1	*Was "A/T System Check" performed?*	Go to Step 2.	Go to "A/T System Check: ".
2	**Check "3" position switch circuit** 1) Disconnect TCM connector with ignition switch OFF. 2) Check for proper connection to "3" position switch at "E92-10" and "E92-20" terminals. 3) If OK, check resistance of switch circuit between terminals "E92-10" and "E92-20" of disconnected harness side TCM connector. **"3" position switch circuit** **Shift selector lever to "P", "N" or "D" range: 3.96 – 4.04 kΩ** **Shift selector lever to "R", "3", "2" or "L" range: 0.99 – 1.01 kΩ** *Is result as specified?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00". If OK, substitute a known-good TCM and recheck.	Go to Step 3.
3	**Check "3" position switch** Check "3" position switch referring to ""3" Position Switch Inspection: ". *Is result as specified?*	Replace "3" position switch.	"3" position switch circuit is malfunction.

DTC P1774: CAN Communication Bus Off

S5JB0A5104057

Wiring Diagram



I5JB0A510002-01

[A]: Keyless start control module connector (if equipped) (viewed from harness side)	[F]: Combination meter connector (viewed from harness side)	3. TCM	8. Combination meter
[B]: ECM connector (viewed from harness side)	[G]: 4WD control module connector (viewed from harness side)	4. Keyless start control module (if equipped)	9. Junction connector
[C]: TCM connector (viewed from harness side)	[H]: BCM connector (viewed from harness side)	5. DLC	
[D]: DLC (viewed from harness side)	1. BCM	6. ECM	
[E]: ABS hydraulic unit / control module connector (viewed from harness side)	2. 4WD control module	7. ABS hydraulic unit / control module	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Transmission error that is inconsistent between transmission data and transmission monitor (CAN bus monitor) data is detected more than 7 times continuously. (1 driving cycle detection logic)	• ECM • TCM • Combination meter • BCM • ABS hydraulic unit / control module • 4WD control module • Keyless start control module (if equipped) • CAN communication line circuit

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch turned OFF.
2) Turn ON ignition switch and clear DTC by using scan tool.
3) Start engine and run it for 1 min. or more.
4) Check DTC and pending DTC.

DTC Troubleshooting

NOTE

Upon completion of inspection and repair work, perform "DTC Confirmation Procedure: " and confirm that the trouble has been corrected.

Step	Action	Yes	No
1	*Was "A/T System Check" performed?*	Go to Step 2.	Go to "A/T System Check: ".
2	**Control module connector check** 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck DTC in TCM referring to "DTC Check: ". *Is there DTC P1774?*	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection Inspection: in Section 00".
3	**CAN communication circuit check** 1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. *Is each CAN communication circuit in good condition?*	Go to Step 4.	Repair circuit.
4	**DTC check** 1) Turn ignition switch to OFF position. 2) Disconnect each connector. ECM ABS hydraulic unit / control module BCM 4WD control module Keyless start control module (if equipped) Combination meter 3) Recheck DTC in TCM referring to "DTC Check: ". *Is there DTC P1774?*	Check TCM power and ground circuit. If circuit is OK, substitute a known-good TCM and recheck.	Check applicable control module power and ground circuit. If circuit is OK, substitute a known-good applicable control module and recheck.

DTC P1777: TCM Lost Communication with ECM (Reception Error)

S5JB0A5104058

Wiring Diagram

Refer to “DTC P1774: CAN Communication Bus Off: ”.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Reception error of communication data for ECM is detected for longer than specified time continuously. (1 driving cycle detection logic)	• ECM • ABS hydraulic unit / control module • TCM • CAN communication line circuit

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch turned OFF.
2) Turn ON ignition switch and clear DTC by using scan tool.
3) Start engine and run it for 1 min. or more.
4) Check DTC and pending DTC.

DTC Troubleshooting

NOTE

Upon completion of inspection and repair work, perform “DTC Confirmation Procedure: ” and confirm that the trouble has been corrected.

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	**Control module connector check** 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck DTC in TCM referring to “DTC Check: ”. *Is there DTC P1777?*	Go to Step 3.	Intermittent trouble. Check for intermittent referring to “Intermittent and Poor Connection Inspection: in Section 00”.
3	**DTC check in ABS hydraulic unit / control module** 1) Check DTC in ABS hydraulic unit / control module. *Is there DTC U1100?*	Go to Step 4.	Go to Step 5.
4	**DTC check** 1) Check DTC in ECM referring to “DTC Check: in Section 1A”. *Is there DTC P1674?*	Go to “DTC P1674: CAN Communication (Bus Off Error): in Section 1A”.	Check ECM power and ground circuit. If circuit is OK, CAN communication circuit between ECM and ABS hydraulic unit / control module is open circuit.
5	**CAN communication circuit check** 1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. *Is each CAN communication circuit in good condition?*	Check TCM power and ground circuit. If circuit is OK, substitute a known-good TCM and recheck.	Repair circuit.

DTC P1778: TCM Lost Communication with BCM (Reception Error)

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Wiring Diagram

Refer to “DTC P1774: CAN Communication Bus Off: ”.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Reception error of communication data for BCM is detected for longer than specified time continuously. (1 driving cycle detection logic)	• BCM • TCM • CAN communication line circuit

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch turned OFF.
2) Turn ON ignition switch and clear DTC by using scan tool.
3) Start engine and run it for 1 min. or more.
4) Check DTC and pending DTC.

DTC Troubleshooting

NOTE

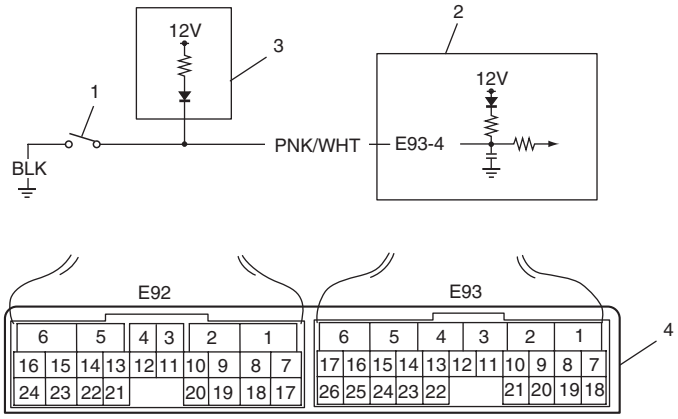
Upon completion of inspection and repair work, perform “DTC Confirmation Procedure: ”“DTC Confirmation Procedure” and confirm that the trouble has been corrected.

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	**Control module connector check** 1) Check connection of connectors of all control modules communicating by means of CAN. 2) Recheck DTC in TCM referring to “DTC Check: ”. *Is there DTC P1778?*	Go to Step 3.	Intermittent trouble. Check for intermittent referring to “Intermittent and Poor Connection Inspection: in Section 00”.
3	**DTC check in BCM (bus off)** 1) Check DTC in BCM referring to “DTC Check: in Section 10B”. *Is there DTC U1073?*	Go to “DTC U1073 (No. 1073): Control Module Communication Bus Off: in Section 10B”.	Go to Step 4.
4	**DTC check** 1) Check DTC in ECM referring to “DTC Check: in Section 1A”. *Is there DTC P1678?*	Check BCM power and ground circuit. If circuit is OK, substitute a known-good BCM and recheck.	Go to Step 5.
5	**CAN communication circuit check** 1) Turn ignition switch to OFF position. 2) Disconnect connectors of all control modules communicating by means of CAN. 3) Check CAN communication circuit between control modules for open, short and high resistance. *Is each CAN communication circuit in good condition?*	Check TCM power and ground circuit. If circuit is OK, substitute a known-good TCM and recheck.	Repair circuit.

DTC P1874 4L Switch Circuit Malfunction (Short)

S5JB0A5104047

Wiring Diagram



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1. 4L/N switch	3. 4WD control module
2. TCM	4. Terminal arrangement of TCM connector (viewed from harness side)

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Actual transfer position is 4H although TCM detected 4L/N switch is turned ON with vehicle speed between 29 km/h (18 mile/h) and 88 km/h (55 mile/h). (1 driving cycle detection logic)	• 4L/N switch or its circuit. • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and transfer position switch to “4H” position.
4) Keep engine running at idle speed for 10 seconds or more with select lever “D” range.
5) Start vehicle and increase vehicle speed to about 60 km/h (37 mile/h) for 2 minutes.
6) Stop vehicle.
7) Check DTC, pending DTC and freeze frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	**Vehicle speed signal check** 1) Check DTC in ECM and ABS hydraulic unit / control module referring to “DTC Check: in Section 1A” or “DTC Check: in Section 4E”. *Is there DTC P P0500: Vehicle speed sensor (VSS) malfunction in ECM and/or DTC C1021, C1022, C1025, C1026, C1031, C1032, C1035 and/or C1036 in ABS hydraulic unit / control module?*	Go to applicable DTC diag. flow.	Go to Step 2.
2	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
3	*Do you have SUZUKI scan tool?*	Go to Step 4.	Go to Step 5.

Step	Action	Yes	No
4	**4L switch and its circuit check** 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Select "DATA LIST" mode on scan tool. 4) Check 4L/N switch signal (ON or OFF) on display when turning transfer position switch to each position. **4L/N switch specifications (scan tool)** **"4H" position: OFF** **"4L" position: ON** *Is OFF / ON displayed as described above?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00". If OK, substitute a known-good TCM and recheck.	Go to Step 6.
5	**4L/N switch and its circuit check** 1) Turn ignition switch ON. 2) Check terminal voltage "E93-4" of TCM connector connected when turning transfer position switch to each position. **4L/N switch specifications** **"4H" position: 10 – 14 V** **"4L" position: 0 – 1 V** *Is voltage as specified?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to "Intermittent and Poor Connection Inspection: in Section 00". If OK, substitute a known-good TCM and recheck.	Go to Step 6.
6	**4L/N switch check** 1) Check 4WD low switch for operation referring to "Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator) in Section 3C". *Is check result satisfactory?*	4L/N circuit is shorted to ground. If wire and connections are OK, substitute a known-good TCM and recheck.	Replace 4L/N switch.

DTC P1875 4L Switch Circuit Malfunction (Open)

S5JB0A5104048

Wiring Diagram

Refer to "DTC P1874 4L Switch Circuit Malfunction (Short): ".

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Actual transfer position is 4L although TCM detected low switch is turned OFF with vehicle speed between 29 km/h (18 mile/h) and 88 km/h (55 mile/h). (1 driving cycle detection logic)	• 4L/N switch or its circuit. • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and transfer position switch to "4L" position.
4) Keep engine running at idle speed for 10 seconds or more with select lever "D" range.
5) Start vehicle and increase vehicle speed to about 50 km/h (31 mile/h) in "4L" position for 2 minutes.
6) Stop vehicle.
7) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	**Vehicle speed signal check** 1) Check DTC in ECM and ABS hydraulic unit / control module referring to “DTC Check: in Section 1A” or “DTC Check: in Section 4E”. *Is there DTC P P0500: Vehicle speed sensor (VSS) malfunction in ECM and/or DTC C1021, C1022, C1025, C1026, C1031, C1032, C1035 and/or C1036 in ABS hydraulic unit / control module?*	Go to applicable DTC diag. flow.	Go to Step 2.
2	*Was “A/T System Check” performed?*	Go to Step 3.	Go to “A/T System Check: ”.
3	*Do you have SUZUKI scan tool?*	Go to Step 4.	Go to Step 5.
4	**4L switch and its circuit check** 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Select “DATA LIST” mode on scan tool. 4) Check 4L/N switch signal (ON or OFF) on display when turning transfer position switch to each position. **4L/N switch specifications** **“4H” position: OFF** **“4L” position: ON** *Is OFF / ON displayed as described above?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to “Intermittent and Poor Connection Inspection: in Section 00”. If OK, substitute a known-good TCM and recheck.	Go to Step 6.
5	**4L/N switch and its circuit check** 1) Turn ignition switch ON. 2) Check terminal voltage “E93-4” of TCM connector connected when turning transfer position switch to each position. **4L/N switch specifications** **“4H” position: 10 – 14 V** **“4L” position: 0 – 1 V** *Is voltage as specified?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to “Intermittent and Poor Connection Inspection: in Section 00”. If OK, substitute a known-good TCM and recheck.	Go to Step 6.
6	**4L/N switch check** 1) Check 4L/N switch for operation referring to “Transfer Assembly Inspection: Motor-Shift Type (Transfer with Shift Actuator) in Section 3C”. *Is check result satisfactory?*	4L/N switch circuit open. If wire and connections are OK, substitute a known-good TCM and recheck.	Replace 4L/N switch.

DTC P1878 Torque Converter Clutch Shudder

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DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
The acceleration slip control function stops when the variation in the output revolution speed of the specified amplitude and specified cycle is detected within a specified period of time. When the specified variation is not detected after the acceleration slip control stops. (20 driving cycle detection logic)	• Mismatching ATF • Torque converter clutch malfunction • TCM

DTC Confirmation Procedure

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine and warm it up to normal operating temperature.
4) Drive vehicle with 3rd or 4th gear in “D” range and slip controlled lock-up ON for 20 seconds or longer referring to “Automatic Gear Shift Table: ”.
5) Stop vehicle.
6) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	1) Change A/T fluid referring to “A/T Fluid Change: ”. 2) Check DTC after performing “DTC Confirmation Procedure: ”. *Is DTC P1878 still indicated?*	Faulty torque converter clutch. Replace torque converter.	System is in good condition.

DTC P2763 Torque Converter Clutch (TCC) Circuit High

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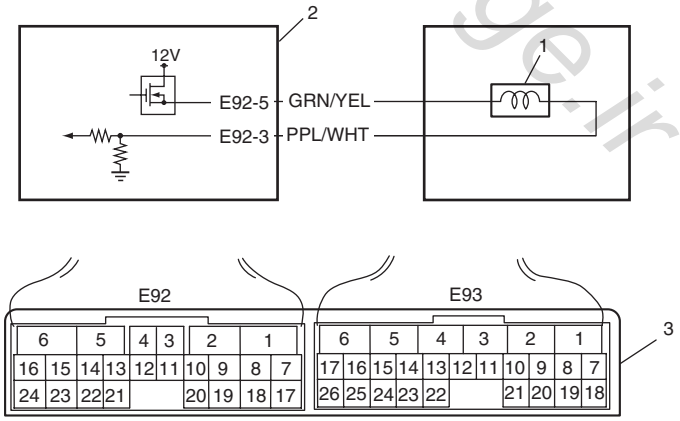
Wiring Diagram



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1. TCC pressure control solenoid valve	3. Terminal arrangement of TCM connector (viewed from harness side)
2. TCM	

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Voltage of TCC pressure control solenoid valve TCM terminal is high although TCM is commanding TCC pressure control solenoid to turn OFF. (1 driving cycle detection logic)	• TCC pressure control solenoid valve circuit shorted to power circuit. • Malfunction of TCC pressure control solenoid valve. • TCM

DTC Confirmation Procedure

⚠ WARNING

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and tester, on a level road.**

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine.
4) Keep engine running at idle speed in “P” range for 10 seconds or more.
5) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	**Check TCC pressure control solenoid valve circuit for power supply short** 1) Disconnect TCM connectors. 2) Check for proper connection to TCM at terminal “E92-3” and “E92-5”. 3) If connection is OK, turn ignition switch ON and measure voltage between terminal “E92-3” of disconnected harness side TCM connector and ground. *Is it 0 – 2 V?*	Go to Step 3.	TCC pressure control solenoid valve circuit is shorted to power supply circuit. If circuit is OK, go to Step 3.
3	**Inspection TCC pressure control solenoid valve** 1) Inspection TCC pressure control solenoid valve referring to “Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Inspection: ”. *Is check results satisfactory?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to “Intermittent and Poor Connection Inspection: in Section 00”. If OK, substitute a known-good TCM and recheck.	Replace TCC pressure control solenoid valve referring to “Transmission Fluid Temperature Sensor Removal and Installation: ”.

DTC P2764 Torque Converter Clutch (TCC) Circuit Low

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Wiring Diagram

Refer to “DTC P2763 Torque Converter Clutch (TCC) Circuit High: ”.

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
Voltage of TCC pressure control solenoid valve TCM terminal is low although TCM is commanding TCC pressurie control solenoid to turn ON. (1 driving cycle detection logic)	• TCC pressure control solenoid valve circuit open or shorted to ground. • Malfunction of TCC pressure control solenoid valve • TCM

DTC Confirmation Procedure

⚠ WARNING

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and tester, on a level road.**

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTCs in TCM and ECM memories by using scan tool.
3) Start engine.
4) Keep engine running at idle speed in “P” range for 20 seconds or more.
5) Check DTC, pending DTC and freeze-frame data.

DTC Troubleshooting

Step	Action	Yes	No
1	*Was “A/T System Check” performed?*	Go to Step 2.	Go to “A/T System Check: ”.
2	**Check TCC pressure control solenoid valve circuit for ground short** 1) Disconnect TCM connectors. 2) Check for proper connection to TCM at terminals “E92-3” and “E92-5”. 3) If connection is OK, check continuity between terminal “E92-5” of disconnected harness side TCM connector and ground. *Is continuity indicated?*	TCC pressure control solenoid valve circuit is shorted to ground. If circuit is OK, go to Step 4.	Go to Step 4.
3	**Check TCC pressure control solenoid valve circuit for open** 1) Check resistance between terminal “E92-3” and “E92-5” of disconnected harness side TCM connector. *Is it infinity?*	TCC pressure control solenoid valve circuit is open. If circuit is OK, go to Step 4.	Go to Step 4.
4	**Inspection TCC pressure control solenoid valve** 1) Inspection TCC pressure control solenoid valve referring to “Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Inspection: ”. *Is check results satisfactory?*	Intermittent trouble or faulty TCM. Check for intermittent trouble referring to “Intermittent and Poor Connection Inspection: in Section 00”. If OK, substitute a known-good TCM and recheck.	Replace TCC pressure control solenoid valve referring to “Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Removal and Installation: ”.

Inspection of TCM and Its Circuits

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TCM and its circuits can be checked at TCM wiring connectors by measuring voltage, pulse signal and resistance.

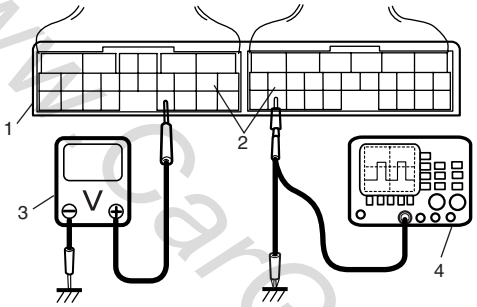
⚠ CAUTION

TCM cannot be checked by itself, it is strictly prohibited to connect voltmeter or ohmmeter to TCM with connector disconnected from it.

1) Remove TCM (1) from vehicle referring to “Transmission Control Module (TCM) Removal and Installation: ”.
2) Connect TCM connectors (2) to TCM.
3) Check voltage and/or pulse signal at each terminal of connectors connected using voltmeter (3) and oscilloscope (4).

NOTE

- **As each terminal voltage is affected by battery voltage, confirm that it is 11 V or more when ignition switch is ON.**
- **Voltage with asterisk (*) cannot be measured by voltmeter because it is pulse signal. Check it with oscilloscope if necessary.**



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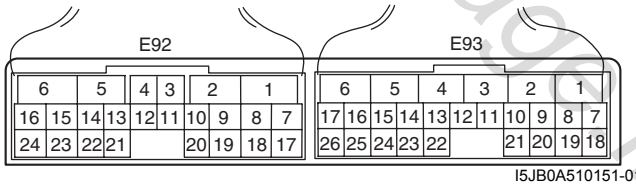
3. Body ground

Terminal arrangement of TCM coupler (Viewed from harness side)



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Connector “E92”

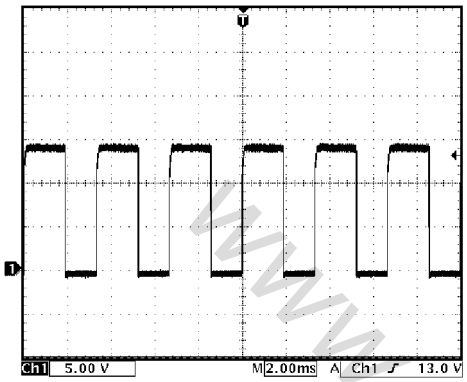
Terminal	Wire color	Circuit	Standard voltage	Condition
1	BLK/ORN	Ground	0 – 1 V	Ignition switch ON
2	BRN/RED	Pressure control solenoid valve (–)	0.6 – 1.0 V	Ignition switch ON
3	PPL/WHT	TCC pressure control solenoid valve (–)	0.6 – 1.0 V	Ignition switch ON
4	YEL/RED	Pressure control solenoid valve (+)	*0 – 0.6 V ↑↓ 10 – 14 V (“Reference Waveform No. 1: ”)	Engine running at idling. (Output signal is duty pulse. Duty ratio varies depending on throttle valve opening.)
5	GRN/YEL	TCC pressure control solenoid valve (+)	*0 – 0.6 V ↑↓ 10 – 14 V (“Reference Waveform No. 2: ”)	Engine running at idling. (Output signal is duty pulse. Duty ratio varies depending on torque converter clutch operating condition.)
6	BLK/WHT	Power source	10 – 14 V	Ignition switch ON
7	WHT	CAN communication line (Low)	*2.5 – 3.6 V ↑↓ 1.6 – 2.5 V (“Reference Waveform No. 3: ”)	Engine running at idling with after warming up. (CAN communication signal is pulse. Pulse signal frequency varies depending on engine condition.))
8	—	—	—	—
9	—	—	—	—
10	YEL/BLK	3 position switch (–)	0 – 1 V	Ignition switch ON
11	YEL/BLK	Transmission fluid temperature sensor (+)	2.9 – 3.1 V	Ignition switch ON, fluid temperature is 20 °C (68 °F)
			0.3 – 0.5 V	Ignition switch ON, fluid temperature is 100 °C (212 °F)
12	ORN	Transmission fluid temperature sensor (–)	0 – 1 V	Ignition switch ON
13	—	—	—	—
14	—	—	—	—
15	GRN/RED	Shift solenoid valve-B (No.2)	9 – 14 V	Ignition switch ON, select lever in “P” range
16	GRN	Shift solenoid valve-A (No.1)	9 – 14 V	Ignition switch ON, select lever in “P” range
17	RED	CAN communication line (High)	*2.5 – 3.6 V ↑↓ 1.6 – 2.5 V (“Reference Waveform No. 3: ”)	Engine running at idling with after warming up. (CAN communication signal is pulse. Pulse signal frequency varies depending on engine condition.)
18	—	—	—	—
19	—	—	—	—
20	YEL/RED	3 position switch (+)	2.4 – 4.3 V	Ignition switch ON, select lever in “P”, “R”, “N” or “D” range
			0.8 – 2.4 V	Ignition switch ON, select lever in “3”, “2” or “L” range
21	—	—	—	—
22	—	—	—	—
23	BLK	Ground	0 – 1 V	Ignition switch ON
24	WHT	Power source for back-up	10 – 14 V	Constantly

Connector “E93”

Terminal	Wire color	Circuit	Standard voltage	Condition
1	RED	Transmission range sensor (“R” range)	8 – 14 V	Ignition switch ON, selector lever at “R” range
			0 – 1 V	Ignition switch ON, selector lever at other than “R” range
2	—	—	—	—
3	—	—	—	—
4	PNK/WHT	4L/N switch	8 – 14 V	Ignition switch ON, transfer position in 4H
			0 – 1 V	Ignition switch OFF, transfer position in 4L and N
5	WHT	Output shaft speed sensor (+)	0 – 1 V	Ignition switch ON, engine stops
			*(“Reference Waveform No. 4: ”)	While engine running. (Output signal is waveform. Waveform frequency varies depending on output shaft speed. (18 pulses are generated par 1 input shaft revolution.))
6	BLU	Input shaft speed sensor (+)	0 – 1 V	Ignition switch ON, engine stops.
			*(“Reference Waveform No. 5: ”)	While engine running. (Output signal is waveform. Waveform frequency varies depending on output shaft speed. (24 pulses are generated par 1 input shaft revolution.))
7	GRN	Transmission range sensor (“D” range)	8 – 14 V	Ignition switch ON, selector lever at “D” range
			0 – 1 V	Ignition switch ON, selector lever at other than “D” range
8	GRN/ORN	Transmission range sensor (“N” range)	8 – 14 V	Ignition switch ON, selector lever at “N” range
			0 – 1 V	Ignition switch ON, selector lever at other than “N” range
9	—	—	—	—
10	—	—	—	—
11	—	—	—	—
12	PNK/BLK	Diagnosis switch	8 – 14 V	Ignition switch ON
13	—	—	—	—
14	ORN	Output shaft speed sensor (–)	2 – 3 V	Ignition switch ON, engine at stop
15	—	—	—	—
16	PNK	Input shaft speed sensor (–)	2 – 3 V	Ignition switch ON, engine at stop
17	—	—	—	—
18	GRN/WHT	Transmission range sensor (“L” range)	8 – 14 V	Ignition switch ON, selector lever at “L” range
			0 – 1 V	Ignition switch ON, selector lever at other than “L” range
19	GRN/ORN	Transmission range sensor (“2” range)	8 – 14 V	Ignition switch ON, selector lever at “2” range
			0 – 1 V	Ignition switch ON, selector lever at other than “2” range
20	PNK	Transmission range sensor (“P” range)	8 – 14 V	Ignition switch ON, selector lever at “P” range
			0 – 1 V	Ignition switch ON, selector lever at other than “P” range
21	—	—	—	—
22	—	—	—	—
23	PPL/WHT	Data link connector	8 – 14 V	Ignition switch ON
24	—	—	—	—
25	—	—	—	—
26	—	—	—	—

Reference Waveform No. 1
Pressure control solenoid valve signal at engine idling.

Measurement terminal	CH1: “E92-4” to “E92-1”
Oscilloscope setting	CH1: 5 V/DIV TIME: 20 ms/DIV
Measurement condition	• After warmed up to normal operating temperature • Engine at specified idle speed with “P” range.



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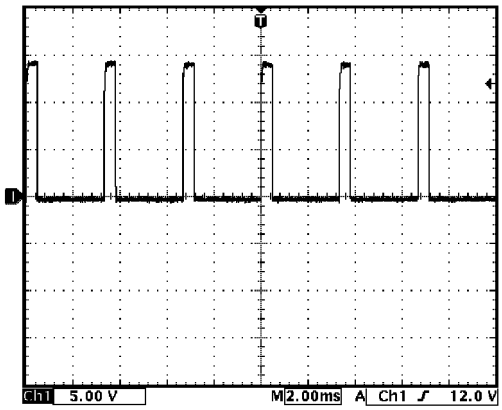
Reference Waveform No. 2
TCC pressure control solenoid valve signal at engine idling.

Measurement terminal	CH1: “E92-5” to “E92-1”
Oscilloscope setting	CH1: 5 V/DIV Time: 2 ms/DIV
Measurement condition	• After warmed up to normal operating temperature • Engine at specified idle speed with “P” range



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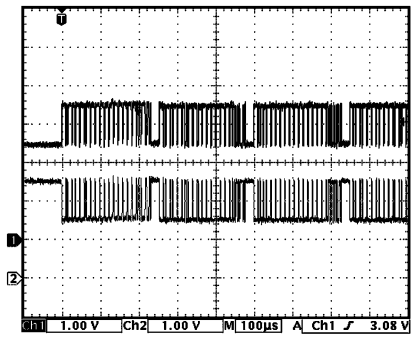
Reference Waveform No. 3
CAN communication line (High & Low) signal at engine idling.

Measurement terminal	CH1: “E92-7” to “E92-1” CH2: “E92-17” to “E92-1”
Oscilloscope setting	CH1: 1 V/DIV TIME: 100 μs/DIV
Measurement condition	• After warmed up to normal operating temperature • Engine at specified idle speed with “P” range.



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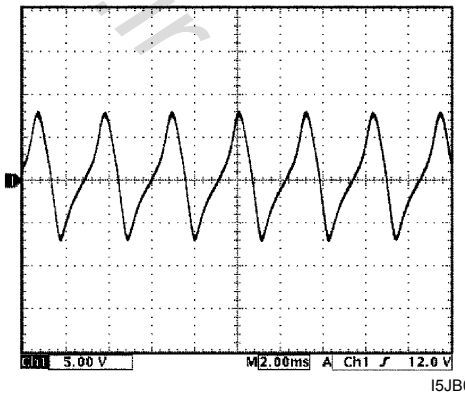
Reference Waveform No. 4
Output shaft speed sensor signal at vehicle speed 40 km/h (25 mile/h).

Measurement terminal	CH1: “E93-5” to “E92-1”
Oscilloscope setting	CH1: 5 V/DIV TIME: 2 ms/DIV
Measurement condition	• After warmed up to normal operating temperature • Drive vehicle at 40 km/h (25 mile/h).



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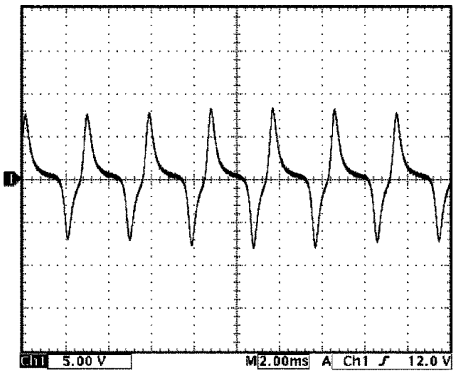
Reference Waveform No. 5

Input shaft speed sensor signal at engine speed 3000 rpm.

Measurement terminal	CH1: “E93-6” to “E92-1”
Oscilloscope setting	CH1: 2 V/DIV TIME: 10 ms/DIV
Measurement condition	• After warmed up to normal operating temperature • Engine at 3,000 rpm with “P” range.



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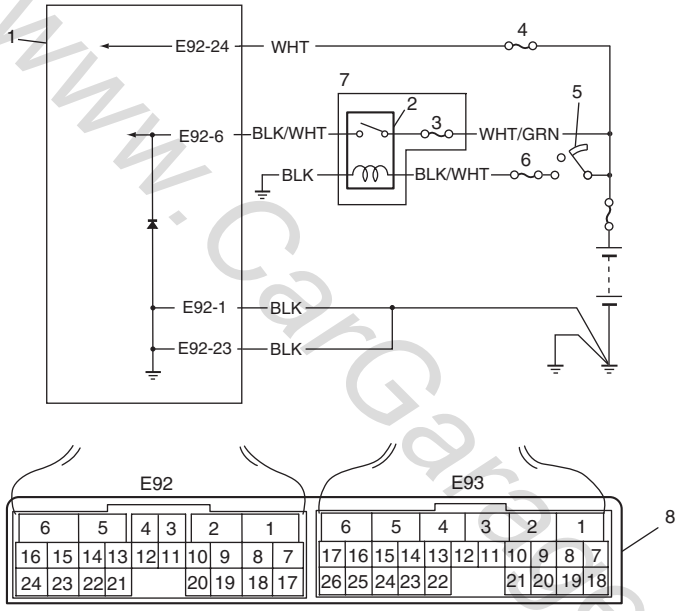
TCM Power and Ground Circuit Check

S5JB0A5104062

Wiring Diagram



I5JB0A510152-01

1. TCM	5. Ignition switch
2. A/T relay	6. “IG COIL” fuse
3. “AT” fuse	7. Power integration No.2 in main fuse box
4. “DOME” fuse	8. Terminal arrangement of TCM connector (viewed from harness side)

Troubleshooting

Step	Action	Yes	No
1	**Check TCM back-up power circuit** 1) Disconnect TCM connector with ignition switch OFF. 2) Check for proper connection to TCM at "E92-24" terminal. 3) If OK, check voltage at terminal "E92-24" of disconnected TCM connector. *Is it 10 – 14 V?*	Go to Step 2.	"WHT" circuit open or shorted to ground.
2	**Check TCM power circuit** 1) Disconnect TCM connector with ignition switch OFF. 2) Check for proper connection to TCM at "E92-6" terminal. 3) If OK, turn ignition switch ON and check voltage at terminal "E92-6" of disconnected TCM connector. *Is it 10 – 14 V?*	Go to Step 4.	Go to Step 3.
3	**Check A/T relay operation** 1) Check A/T relay operation referring to "A/T Relay Inspection: ". *Is check result satisfactory?*	"BLK/WHT", "WHT/GRN", or "BLK" circuit for power supply open.	Replace A/T relay included in power integration No.2 in main fuse box.
4	**Check TCM ground circuit** 1) Turn ignition switch OFF. 2) With TCM connectors disconnected, check for proper connection to TCM at "E92-1" / "E92-23" terminal. 3) If OK, check resistance between "E92-1" / "E92-23" terminal of disconnected TCM connector and body ground. *Is continuity indicated?*	TCM power and ground circuits are in good condition.	"BLK" circuit for TCM ground open.

Repair Instructions

A/T Fluid Level Check

S5JB0A5106041

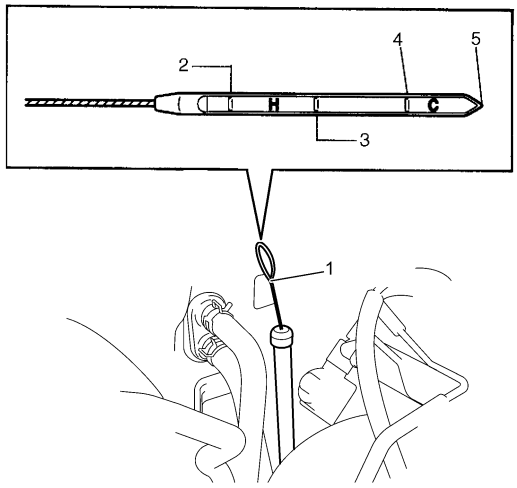
At Normal Operating Temperature

1) Drive vehicle so that A/T fluid temperature reach the normal operating temperature (70 – 80 °C (158 – 176 °F)).
2) Stop vehicle with engine running and place it level.
3) With select lever at “P” range, apply parking brake and place chocks against wheels.
4) Keep engine idling and shift selector slowly to “L” and back to “P” range.
5) With engine idling, pull out dipstick (1), wipe it off with a clean cloth and put it back into place.
6) Pull out dipstick (1) again and check fluid level indicated on it. Fluid level should be between FULL HOT and LOW HOT. If it is below LOW HOT, add specified A/T fluid up to FULL HOT.

A/T fluid specification
SUZUKI ATF 3317 or Mobil ATF 3309

NOTE

- **DO NOT RACE ENGINE while checking fluid level, even after engine is started.**
- **DO NOT OVERFILL. Overfilling can causes foaming and loss of fluid through breather. Then slippage and transmission failure can result.**
- **If vehicle was driven under high load such as pulling a trailer, fluid level should be checked about half an hour after it is stopped.**
- **When checking oil level, oil level gauge must be used in proper direction. Insert oil level gauge so that its front or back face is directed to the front of vehicle. When oil level indicated on front face of oil level gauge differs from that on back face, use lower one.**

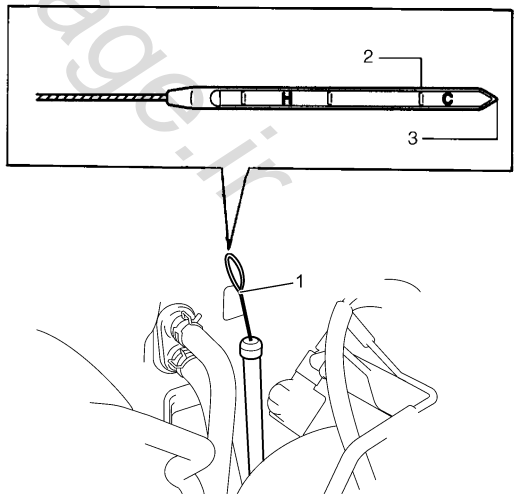


I5JB0A510028-02

2. “FULL HOT”	4. “FULL COLD”
3. “LOW HOT”	5. “LOW COLD”

At Room Temperature

The fluid level check at room temperature performed after repair or fluid change before test driving is just preparation for level check of normal operating temperature. The checking procedure itself is the same as that described in “At Normal Operating Temperature” under “A/T Fluid Level Check: ”. If the fluid level is between FULL COLD and LOW COLD, proceed to test drive. And when the fluid temperature has reached the normal operating temperature, check fluid level again and adjust it as necessary.



I5JB0A510029-02

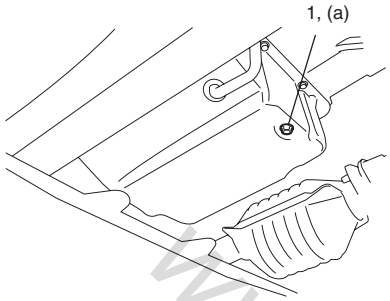
1. Dipstick	3. “LOW COLD”
2. “FULL COLD”	

A/T Fluid Change

S5JB0A5106042

1) Lift up vehicle.
2) When engine is cool, remove drain plug (1) from oil pan and drain A/T fluid.
3) Install drain plug with new gasket.

Tightening torque
A/T fluid drain plug (a): 20 N·m (2.0 kgf-m, 14.5 lb-ft)

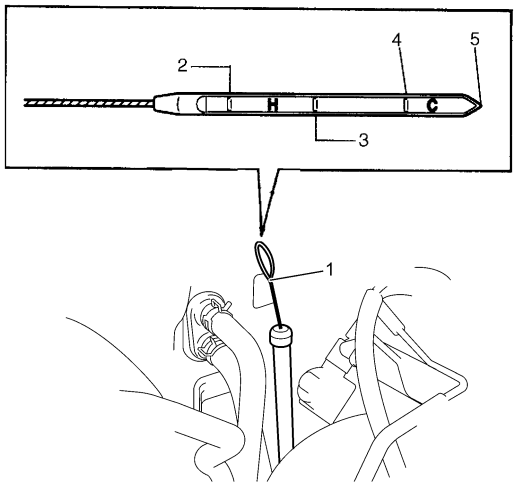


I5JB0A510030-03

4) Lower vehicle and fill proper amount of specified fluid.
5) Check fluid level referring to “At Normal Operating Temperature” under “A/T Fluid Level Check: ”.

A/T fluid specification
SUZUKI ATF 3317 or Mobil ATF 3309

A/T fluid capacity reference value
When draining from drain plug hole: Approx. 2.5 liters (5.33/4.40 US/Imp. pt.)
When overhauling: Approx. 7.2 liters (15.36/12.67 US/Imp. pt.)

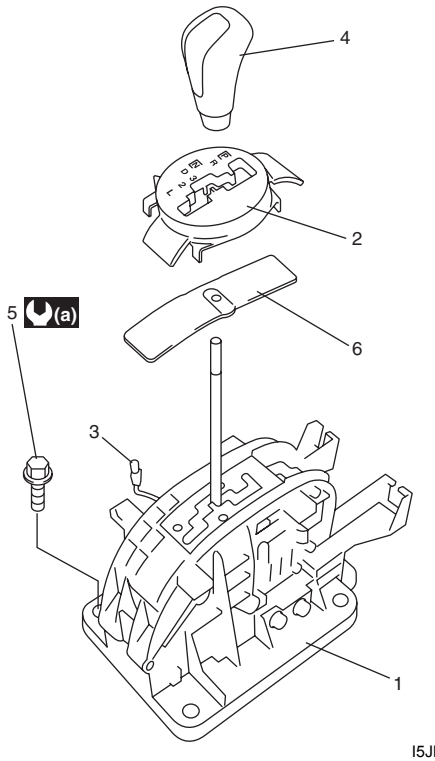


I5JB0A510031-02

1. Dipstick	4. “FULL COLD”
2. “FULL HOT”	5. “LOW COLD”
3. “LOW HOT”	

Manual Selector Assembly Components

S5JB0A5106043



I5JB0A510033-01

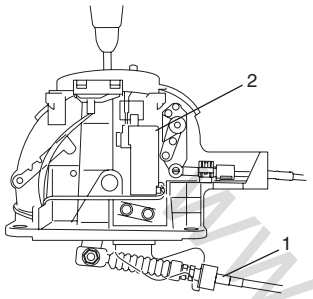
1. Manual lever assembly	
2. Select indicator assembly	
3. Illumination lamp assembly	
4. Knob	
5. Manual selector assembly mounting bolt	
6. Slide cover	
(a) : 17.5 N·m (1.75 kgf-m, 13.0 lb-ft)	

Manual Selector Assembly Removal and Installation

S5JB0A5106044

Removal

1) Disconnect negative cable at battery.
2) Remove front console box.
3) Disconnect shift lever switch connector.
4) Remove manual selector assembly mounting bolts.
5) Disconnect select cable (1) from manual selector assembly (2).



I5JB0A510034-02

Installation

Reverse removal procedure to install manual selector assembly noting the following instructions.

- Tighten manual selector assembly mounting bolts to specified torque.

  Tightening torque
  Manual selector assembly mounting bolt: 18 N·m (1.8 kgf-m, 13.0 lb-ft)

- Adjust select cable referring to “Select Cable Adjustment: ”

Select Lever Knob Installation

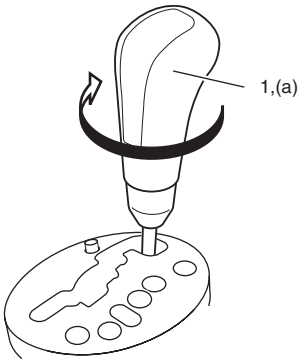
S5JB0A5106045

Screw select lever knob onto select lever by specified numbers of rotation below.

Rotation numbers for select lever knob
Installation (a): 13 – 14 rotations

⚠ CAUTION

When installing select lever knob, do not turn more than specified numbers of rotation. Otherwise select lever knob is damaged.



I4RS0A510058-01

Manual Selector Assembly Inspection

S5JB0A5106046

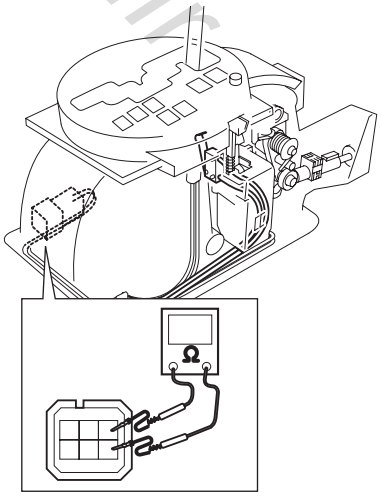
Check select lever for smooth and clear-cut movement individually and position indicator for correct indication. If a malfunction is found, replace select lever assembly.

“3” Position Switch Inspection

S5JB0A5106091

1) Disconnect negative cable at battery.
2) Remove front console box.
3) Disconnect manual selector connector (1).
4) Measure resistance between “3” position switch terminals.

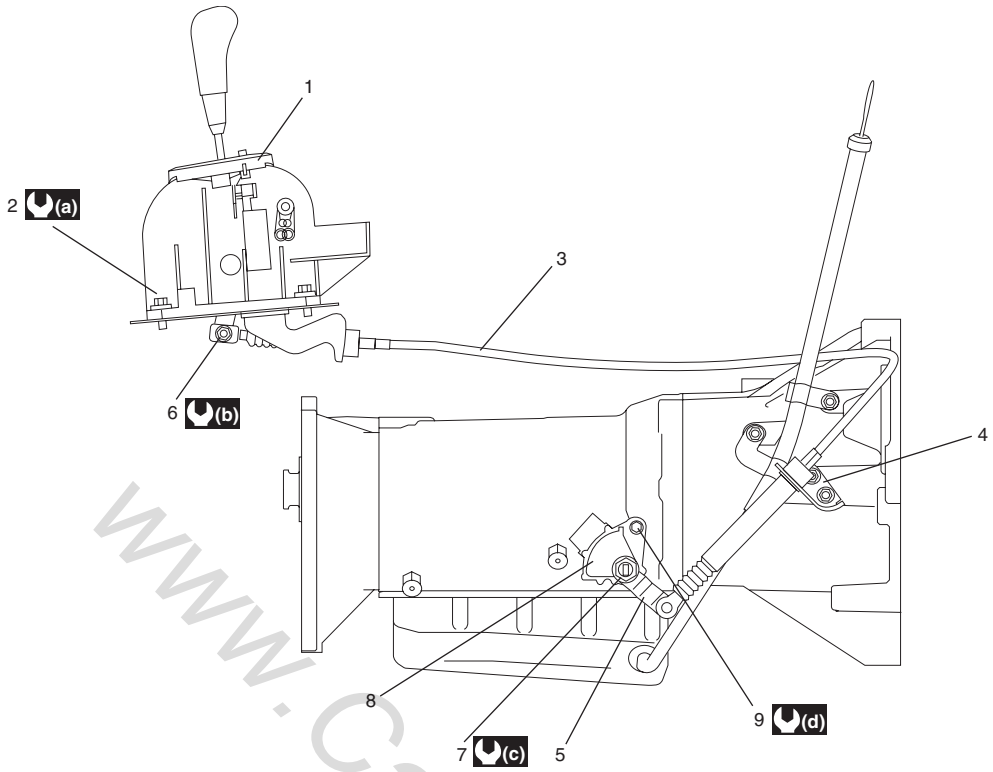
“3” position switch specification
Shift selector lever to “P”, “N” or “D” range: 3.96 – 4.04 kΩ
Shift selector lever to “R”, “3”, “2” or “L” range: 0.99 – 1.01 kΩ



I5JB0A510164-01

Select Cable Component

S5JB0A5106047



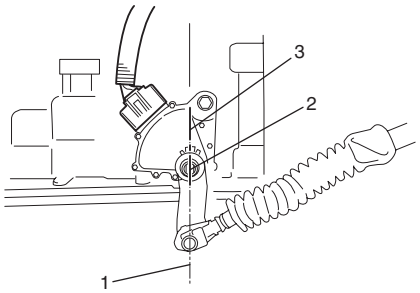
I5JB0A510035-01

1. Manual selector assembly	6. Manual select cable nut	(b) : 13 N·m (1.3 kgf-m, 9.5lb-ft)
2. Manual selector assembly mounting bolt	7. Manual select lever nut	(c) : 12.5 N·m (1.25 kgf-m, 9.0 lb-ft)
3. Select cable	8. Transmission range sensor	(d) : 5.3 N·m (0.53 kgf-m, 4.0 lb-ft)
4. Select cable bracket	9. Transmission range sensor bolt	
5. Manual select lever	(a) : 17.5 N·m (1.75 kgf-m, 13.0 lb-ft)	

Select Cable Adjustment

S5JB0A5106048

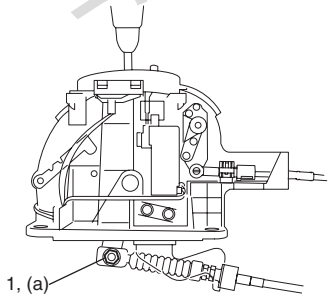
1) Loosen manual select cable nut.
2) Shift select lever to “N”.
3) Align center line (1) on manual shift shaft (2) to “N” reference line (3) as shown in figure.



I5JB0A510038-02

4) Tighten manual select cable nut (1) to specified torque.

Tightening torque
Manual select cable nut (a): 13 N·m (1.3 kgf-m, 9.5 lb-ft)



I5JB0A510036-02

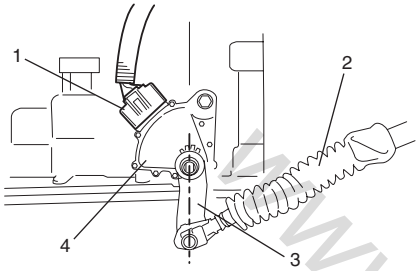
5) After select cable was adjusted, check for the following.
   - Push vehicle with selector lever shifted to “P”. Vehicle should not move.
   - Vehicle can not be driven in “N”.
   - Vehicle can be driven in “D”, “3”, “2” and “L”.
   - Vehicle can be backed in “R”.

Transmission Range Sensor Removal and Installation

S5JB0A5106049

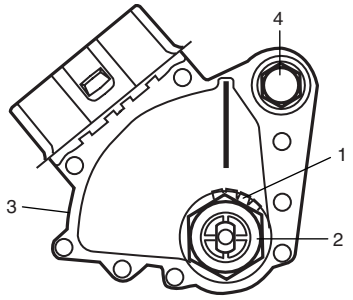
Removal

1) Disconnect negative cable at battery.
2) Hoist vehicle.
3) Disconnect transmission range sensor connector (1).
4) Disconnect select cable (2) from manual select lever (3).
5) Remove manual select lever (3) from transmission range sensor (4).



I5JB0A510037-01

6) Unbend bend parts of lock washer (1), then remove manual shift shaft nut (2), lock washer (1) and grommet.
7) Remove transmission range sensor (3) by removing sensor bolt (4).



I4JA01512011-01

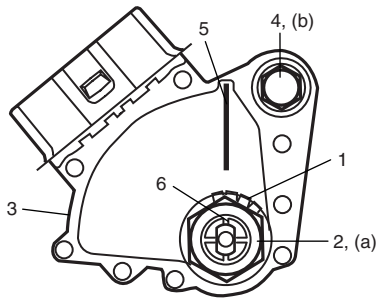
Installation

1) Install transmission range sensor (3) and tighten sensor bolt (4) temporarily.
2) Install grommet, lock washer (1) and manual shift shaft nut (2).
   Tighten nut to specified torque. After tightening it, bend claws of lock washer (1).

   Tightening torque
   Manual shift shaft nut (a): 12.5 N·m (1.25 kgf-m, 9.0 lb-ft)

3) After turning manual shift shaft fully counterclockwise, turn it clockwise by 2 notches and set it to “N” range.
4) With “N” reference line (5) on range sensor and shaft center (6) aligned, tighten transmission range sensor bolt (4) to specified torque.

   Tightening torque
   Transmission range sensor bolt (b): 5.3 N·m (0.53 kgf-m, 4.0 lb-ft)

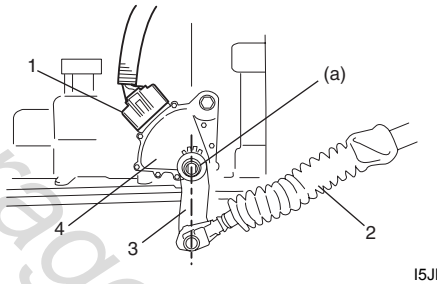


I4JA01512012-01

5) Install manual select lever (3) to transmission range sensor (4).
   Tighten nut to specified torque.

   Tightening torque
   Manual select lever nut (a): 12.5 N·m (1.25 kgf-m, 9.0 lb-ft)

6) Connect select cable (2) to manual select lever (3).
7) Connect transmission range sensor connector (1).
8) Connect negative cable at battery.
9) Adjust select cable referring to “Select Cable Adjustment: ”

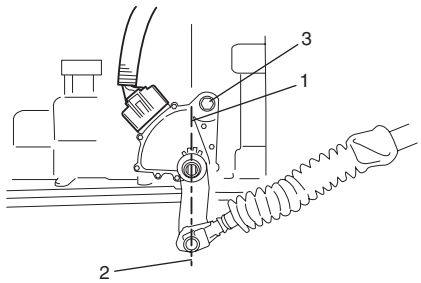


I5JB0A510039-02

Transmission Range Sensor Inspection and Adjustment

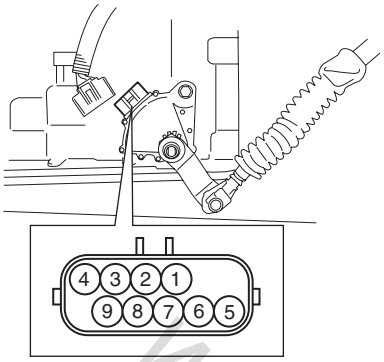
S5JB0A5106050

1) Manual select lever to “N” range.
2) Check that center line (2) on manual shift and “N” reference line (1) on sensor are aligned. If not, loosen sensor bolt (3) and align them.



I5JB0A510040-01

3) Check that engine starts in “N” and “P” ranges but it doesn’t start in “D”, “3”, “2”, “L” or “R” range. Also, check that back-up lamp lights in “R” range.
If faulty condition cannot be corrected by adjustment, disconnect transmission range sensor connector and check that continuity exists as shown by moving select lever.



[A] \ [B]	1	2	3	4	5	6	7	8	9
P				○	○				
		○				○			
R	○	○							
N				○	○				
		○							○
D and 3		○					○		
2		○	○						
L		○						○	

I5JB0A510041-02

[A]: Sensor position
[B]: Terminal No.

Key Interlock Cable Removal and Installation

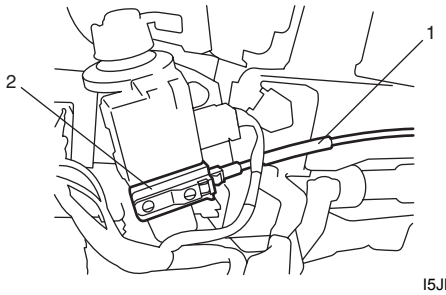
S5JB0A5106051

NOTE

Do not bend interlock cable excessively when removing and installing it, or system will not operate correctly.

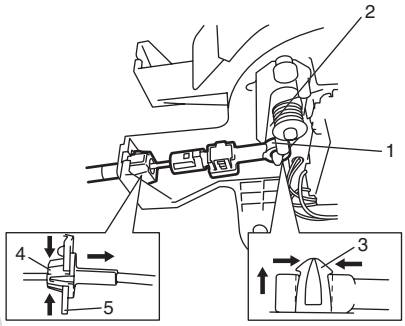
Removal

1) Disconnect negative (–) cable from battery.
2) If equipped with air bag system, disable air bag system. Refer to “Disabling Air Bag System: in Section 8B”.
3) Remove steering column hole cover.
4) Tilt steering column if steering column is adjustable. If no adjustable, loosen steering column bolts.
5) Remove steering column cover.
6) Turn ignition switch to ACC position.
7) Pull out key interlock cable (1) from key cylinder cover (2) while pressing checkhook with slotted screwdriver or the like.



I5JB0A510062-01

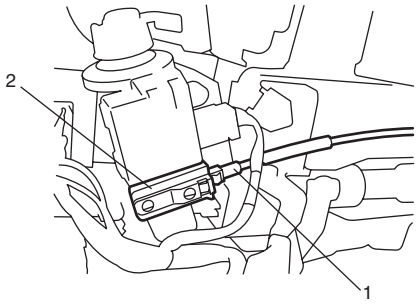
8) Turn ignition switch to LOCK position.
9) Remove front console box.
10) Detach cable end (1) from interlock cam (2) while pressing claws (3) of interlock cam boss.
At this time, be careful not to cause damage to its claws.
Detach cable casing cap (4) from selector bracket (5) while pressing checkhook.
11) Remove interlock cable.



I5JB0A510063-01

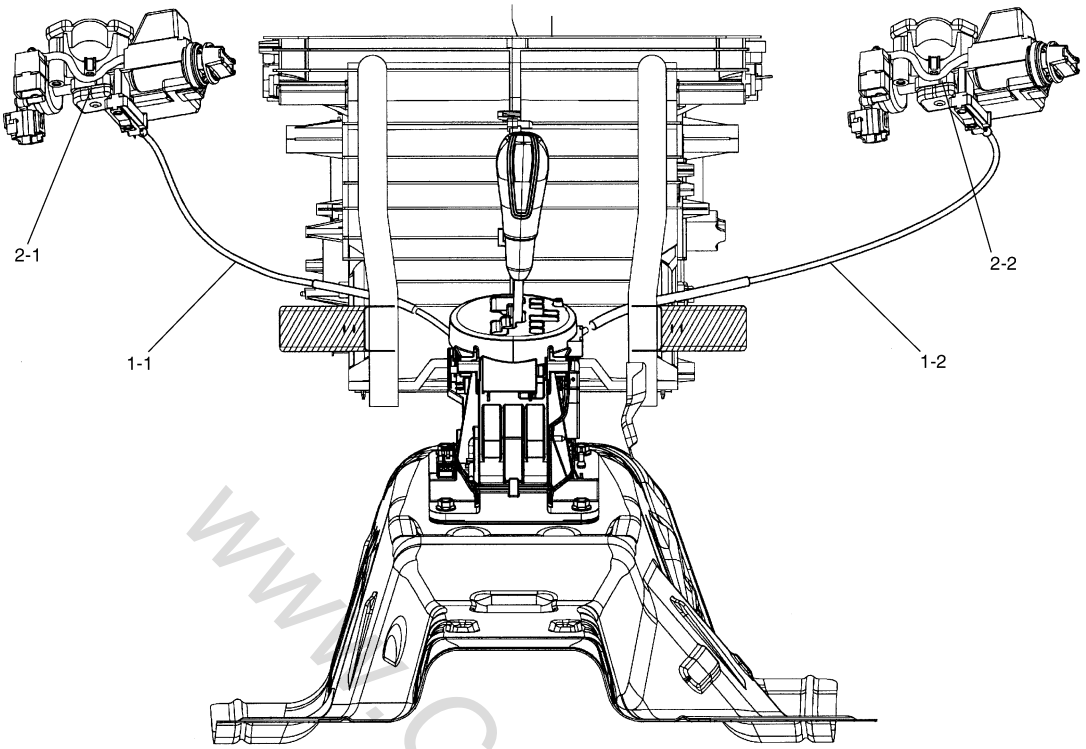
Installation

1) Lay interlock cable to its original cabling route.
2) Turn ignition switch to “ACC” position.
3) Insert cable casing cap (1) into key cylinder cover (2) securely.



I5JB0A510064-01

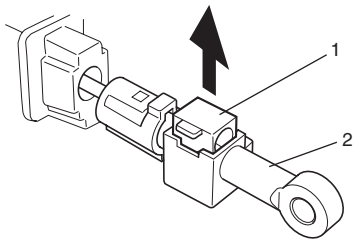
4) Pass and connect interlock cable as shown in the figure.



I5JB0A510065-02

1-1. Interlock cable for LH steering vehicle	2-1. Key cylinder for LH steering vehicle
1-2. Interlock cable for RH steering vehicle	2-2. Key cylinder for RH steering vehicle

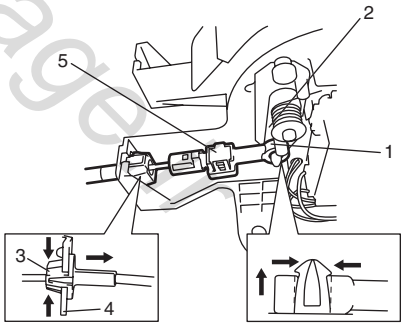
5) Pull out lock button (1) of selector side cable end (2).



I5JB0A510066-01

6) Shift selector lever to “N” position.
7) Install cable casing cap (3) to selector bracket (4).
8) Connect cable end (1) to interlock cam (2) with ignition switch turned to “ACC” position.

9) Drive lock button (5) in cable end until it locks cable expansion and contraction.



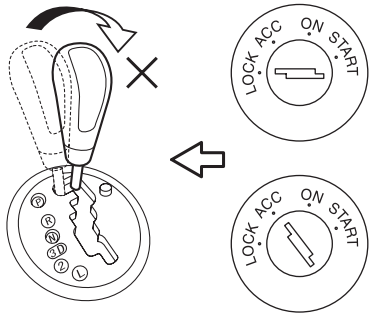
I5JB0A510067-01

10) Install steering column cover.
11) If the vehicle is equipped with air bag system, connect negative cable at battery and enable air bag system, referring to “Enabling Air Bag System: in Section 8B”.

Brake and key Interlock System Inspection

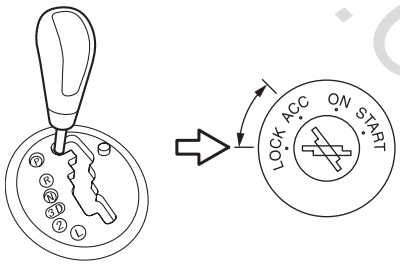
S5JB0A5106052

1) Check that selector lever cannot be moved to any other range from “P” range position when ignition switch key is at ACC position, at LOCK position or it is removed from keyhole of ignition switch, or brake pedal is not depressed.



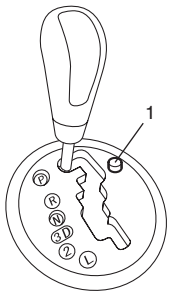
I5JB0A510165-01

2) Shift select lever to “P” range position, release knob button and check for the following.
   - Ignition key can be turned between LOCK and ACC positions back and forth and also it can be removed from ignition switch.



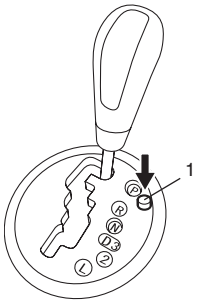
I5JB0A510166-01

   - With shift lock solenoid release button (1) pushed and ignition key turned to ACC position, selector lever can be shifted from “P” range position to any other range.
   - For LH steering vehicle, remove manual release button hole cover (1). With shift lock solenoid release button pushed by key or flat end rod and ignition key turned to LOCK position, selector lever can not be shifted from “P” range position to any other range.



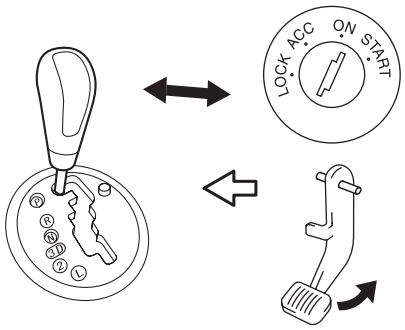
I5JB0A510167-01

   - For RH steering vehicle, with shift lock solenoid release button (1) pushed and ingition key turned to LOCK position, selector lever can not be shifted from “P” range position to any other range.



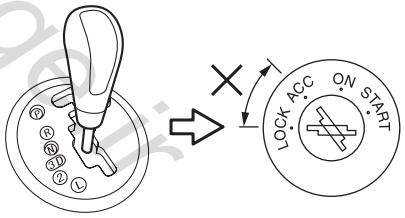
I5JB0A510168-01

   - When ignition switch is turned ON and brake pedal is depressed, selector lever can be shifted from “P” range position to any other range.



I5JB0A510169-01

3) With ignition lever shifted to any position other than “P” range, check that ignition key cannot be turned LOCK position and it cannot be removed from ignition switch unless it is at LOCK position.



I5JB0A510170-01

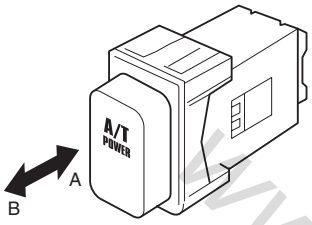
Mode Select Switch Inspection

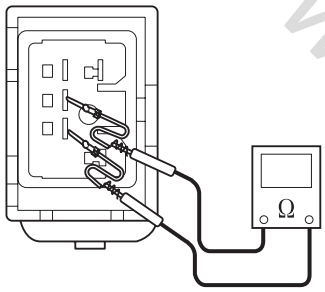
S5JB0A5106053

1) Pull out mode select switch from front center console box.
2) Disconnect mode select switch connector.
3) Check continuity between mode select switch terminals.

Mode select switch specification

Mode select switch	Normal position	Power position
Continuity	No continuity	Continuity





I5JB0A510042-01

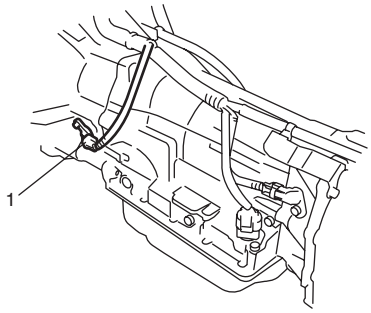
A: Push	B: Push again to release

Input Shaft Speed Sensor Removal and Installation

S5JB0A5106054

Removal

1) Disconnect negative cable at battery.
2) Hoist vehicle.
3) Disconnect input shaft speed sensor connector.
4) Remove input shaft speed sensor (1) from transmission.

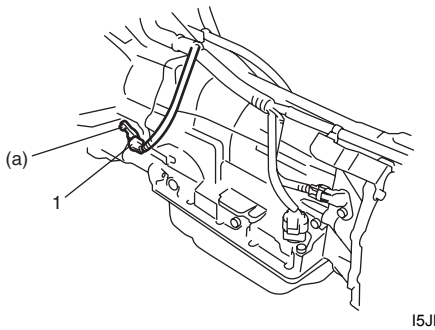


I5JB0A510043-01

Installation

1) Check that sensor is free from any metal particles and damage.
2) Apply A/T fluid to new O-ring and then install input shaft speed sensor (1) to transmission.
   Tighten sensor bolt to specified torque.

Tightening torque
Input shaft speed sensor bolt (a): 7 N·m (0.7 kgf-m, 5.0 lb-ft)



I5JB0A510044-01

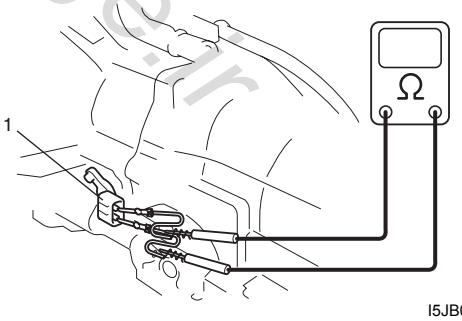
3) Connect input shaft speed sensor connector.
4) Lower hoist.
5) Connect negative cable at battery.

Input Shaft Speed Sensor Inspection

S5JB0A5106055

1) Disconnect negative cable at battery.
2) Hoist vehicle.
3) Disconnect input shaft speed sensor connector.
4) Check input shaft speed sensor (1) for resistance between terminals of sensor.

Input shaft speed sensor resistance
Standard: 560 – 680 Ω (at 20 °C (68 °F))



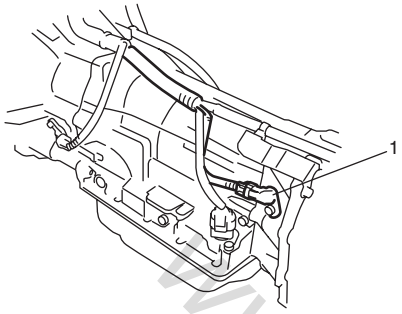
I5JB0A510045-01

Output Shaft Speed Sensor Removal and Installation

S5JB0A5106056

Removal

1) Disconnect negative cable at battery.
2) Hoist vehicle.
3) Disconnect output shaft speed sensor connector.
4) Remove output shaft speed sensor (1) from transmission.

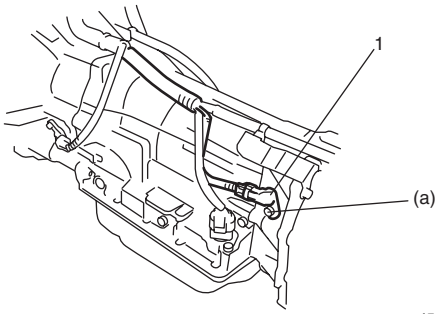


I5JB0A510048-01

Installation

1) Check that sensor is free from any metal particles and damage.
2) Apply A/T fluid to new O-ring and then install output shaft speed sensor (1) to transmission. Tighten sensor bolt to specified torque.

Tightening torque
Output shaft speed sensor bolt (a): 7 N·m (0.7 kgf-m, 5.0 lb-ft)



I5JB0A510049-01

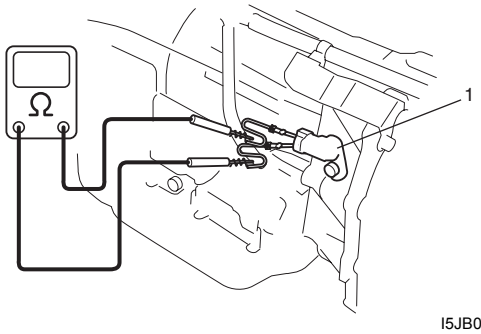
3) Connect output shaft speed sensor connector.
4) Lower hoist.
5) Connect negative cable at battery.

Output Shaft Speed Sensor Inspection

S5JB0A5106057

1) Disconnect negative cable at battery.
2) Hoist vehicle.
3) Disconnect output shaft speed sensor connector.
4) Check output shaft speed sensor (1) for resistance between terminals of sensor.

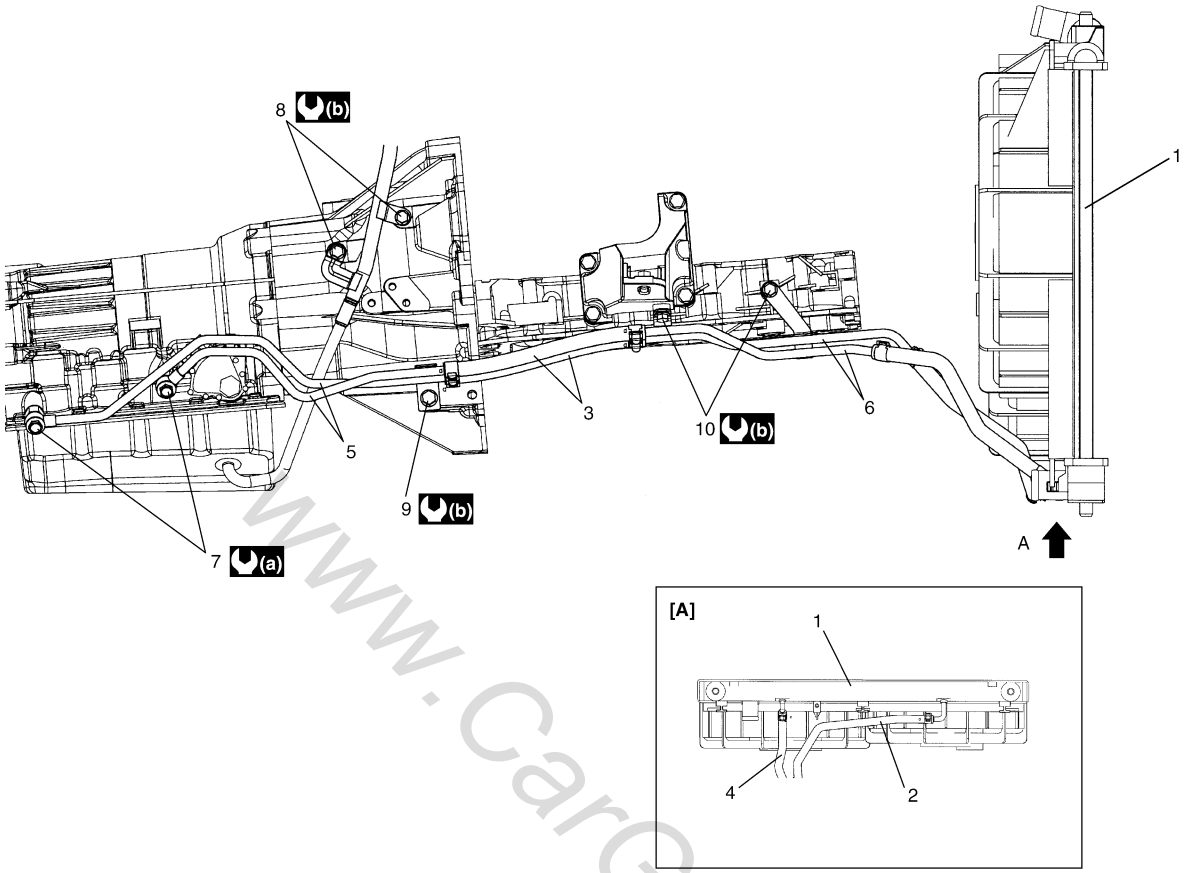
Output shaft speed sensor resistance
Standard: 560 – 680 Ω (at 20 °C (68 °F))



I5JB0A510050-01

Oil Cooler Hose and Pipe Components

S5JB0A5106058



I5JB0A510032-03

[A]: View from A side	3. Oil hose No.1	6. Oil pipe No.2	9. Oil pipe No.1 bolt	(b) : 10 N·m (1.0 kgf-m, 7.5 lb-ft)
1. Radiator	4. Oil hose No.4	7. Oil pipe union bolt	10. Oil pipe No.2 bolt	
2. Oil hose No.3	5. Oil pipe No.1	8. Oil pipe tube bolt	(a) : 25 N·m (2.5 kgf-m, 18.0lb-ft)	

Oil Cooler Hose and Pipes Removal and Installation

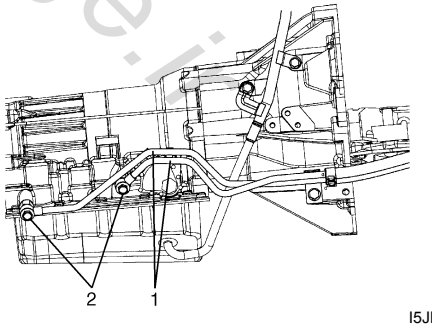
S5JB0A5106059

Removal

1) Lift up vehicle.
2) Make sure to wash dirt off from around pipe joints.
3) With engine is cool, loosen oil cooler pipe union bolts (2) with oil outlet union locked and remove oil cooler pipes (1) from oil outlet unions and hoses.

NOTE

To avoid fluid leakage, plug open ends of oil outlet unions and hoses right after they are disconnected.



I5JB0A510153-01

3. Pipe bolt

Installation

When replacing them, be sure to note the followings.

- To replace clamps at the same time
- To insert hose as far as its limit mark
- To clamp hose securely

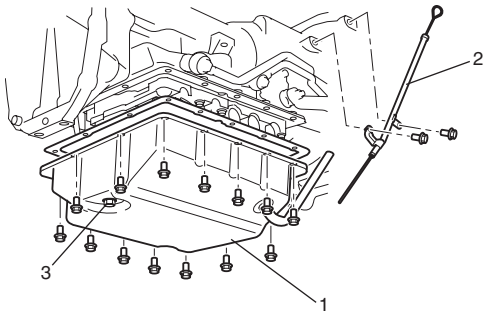
1) Use new union gaskets and connect oil cooler pipes to oil outlet unions.
2) Connect hoses to pipes and clamp them securely.
3) Tighten union bolts to specified torque with oil outlet union locked referring to “Oil Cooler Hose and Pipe Components: ”.
4) Tighten pipe bolt to specified torque referring to “Oil Cooler Hose and Pipe Components: ”.
5) Check A/T fluid level according to procedure described in “A/T Fluid Level Check: ”. Add if necessary.
6) Check for fluid leakage after warming up A/T.

Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Removal and Installation

S5JB0A5106060

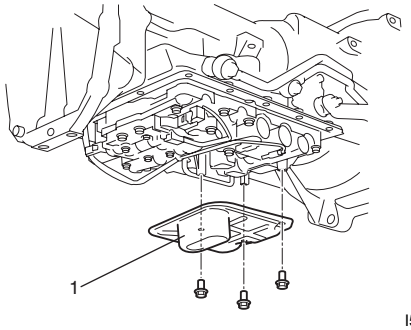
Removal

1) Disconnect negative cable at battery.
2) Pull out fluid level gauge and lift up vehicle.
3) Remove drain plug (3) and drain A/T fluid.
4) Install drain plug (3) with new gasket.
5) Remove oil filler tube (2) and A/T oil pan (1).



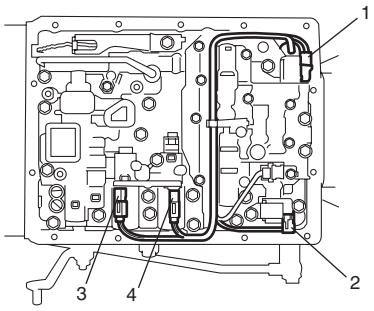
I5JB0A510051-02

6) Remove A/T oil strainer (1).



I5JB0A510052-01

7) Disconnect shift solenoid–A connector (1), shift solenoid–B connector (2), TCC pressure control solenoid connector (4) and Pressure control solenoid connector (3).
8) Remove solenoid valves.



I5JB0A510053-01

Installation

Remove removal procedure to install solenoid valves, noting the following points.

- For details of solenoid valves and their connectors installation, refer to “Automatic Transmission Unit Assembly: ”. Use new O-ring.
- For details of A/T oil pan installation, refer to “Automatic Transmission Unit Assembly: ”.
- Tighten exhaust No.1 pipe bolts & nuts and exhaust bracket bolts & nuts.
- Fill A/T fluid and check fluid level according to procedure described in “A/T Fluid Change: ”.
- Check for fluid leakage after warming up A/T.

Solenoid Valves (Shift Solenoid-A, Shift Solenoid-B, TCC Pressure Control Solenoid and Pressure Control Solenoid Inspection

S5JB0A5106061

Solenoid Valves (Shift Solenoid–A and Shift Solenoid–B)

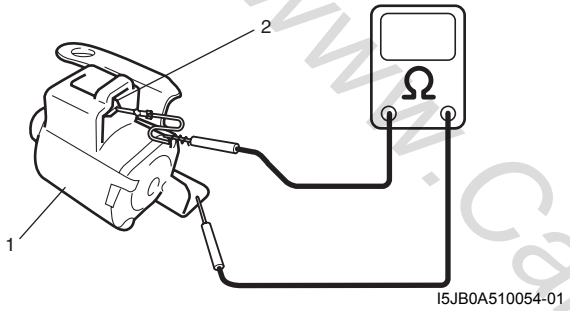
Resistance check

⚠ CAUTION

Be very careful as dust etc. does not enter when solenoid valves are inspected.

Measure resistance between terminal (2) and solenoid valve body. If resistance is out of specification, replace solenoid valve.

Shift solenoid–A and Shift solenoid–B resistance
Standard: 11 – 15 Ω (at 20 °C (68 °F))

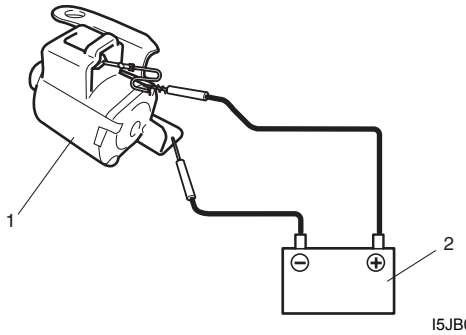


I5JB0A510054-01

1. Shift solenoids

Operation Check

- With solenoid connected to battery (2) as shown in the figure, check that solenoid valve is actuated with click sound.



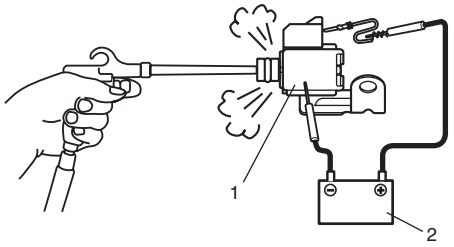
I5JB0A510055-01

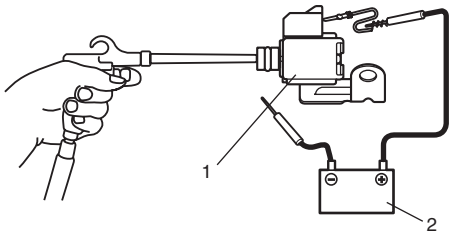
1. Shift solenoids

- With shift solenoid valve (1) connected to battery (2), confirm that shift solenoid valve is open by blowing air (50 – 200 kPa, 0.5 – 2.0 kg/cm^2, 7 – 28.5 psi) into solenoid valve as shown in the figure.
- With shift solenoid valve (1) not connected to battery (2), confirm that shift solenoid valve is closed by blowing air (50 – 200 kPa, 0.5 – 2.0 kg/cm^2, 7 – 28.5 psi) into solenoid valve as shown in the figure.

⚠ CAUTION

Do not insert air gun against strainer installed on inlet of solenoid valve too deeply, when blowing air into solenoid valve. If not, the strainer will be damaged.





I5JB0A510056-01

Pressure Control Solenoid Valve and TCC Pressure Control Solenoid Valve

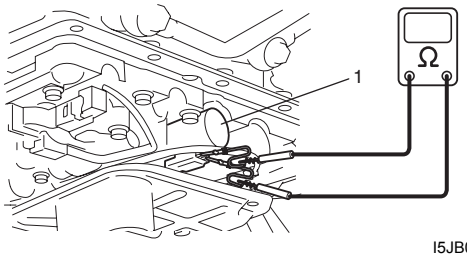
Resistance check

⚠ CAUTION

Be very careful as dust etc. does not enter when pressure control solenoid valves are inspected.

Measure resistance between pressure control solenoid valves (Pressure control solenoid and TCC pressure control solenoid) (1) terminals. If resistance is out of specification, replace valve body assembly.

Pressure control solenoid and TCC pressure control solenoid resistance
Standard: 5.0 – 5.6 Ω (at 20 °C (68 °F))



I5JB0A510057-01

Operation check

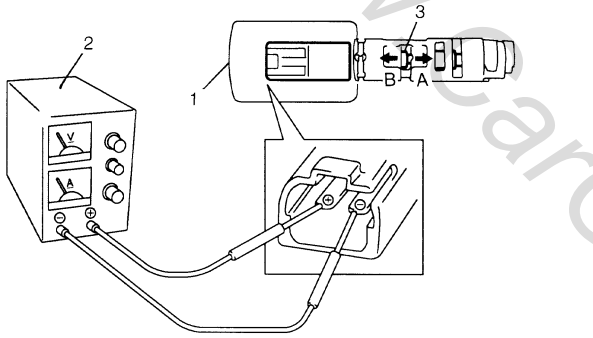
Check pressure control solenoid valves (Pressure control solenoid and TCC pressure control solenoid) (1) operation in either of the following methods.

[Using regulated DC power supply]

1) Connect pressure control solenoid valve (1) with regulated DC power supply (2) as shown in the figure.
2) Turn regulated DC power supply switch ON, increase voltage of power supply keeping current within 1.0 A.
3) Check that valve (3) moves gradually in arrow “A” direction as voltage increases.
4) Check that valve (3) moves in arrow “B” direction as voltage decreases.
5) Turn power supply switch OFF.

⚠ CAUTION

Do not feed current 1.0 A or more, or pressure control solenoid will be burned out.



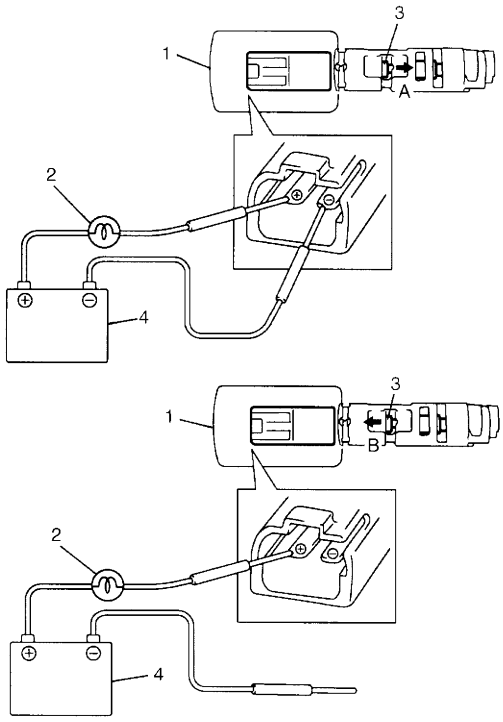
I4JA01512033-01

[Not using regulated DC power supply]

1) Connect pressure control solenoid valve (1) to battery (4) setting 21 W bulb (2) in between as shown in the figure.
2) Check that valve (3) moves in arrow “A” direction.
3) Disconnect pressure control solenoid valve (1) from battery (4) and check that valve (3) moves in arrow “B” direction as shown in the figure.

⚠ CAUTION

Set 21 W bulb in between, or pressure control solenoid valve will be burned out.



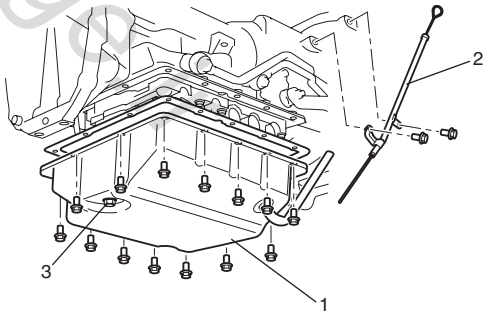
I4JA01512034-01

Transmission Fluid Temperature Sensor Removal and Installation

S5JB0A5106062

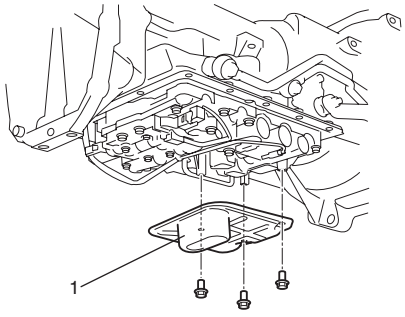
Removal

1) Disconnect negative cable at battery.
2) Pull out fluid level gauge and lift up vehicle.
3) Remove drain plug and drain A/T fluid.
4) Install drain plug with new gasket.
5) Remove oil filler tube (2) and A/T oil pan (1).



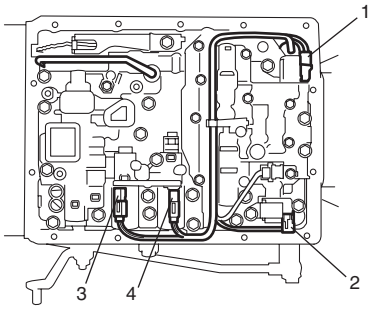
I5JB0A510051-02

6) Remove A/T oil strainer (1).



I5JB0A510052-01

7) Disconnect shift solenoid–A connector (1), shift solenoid–B connector (2), TCC pressure control solenoid connector (4) and Pressure control solenoid connector (3).
8) Remove solenoid valves.

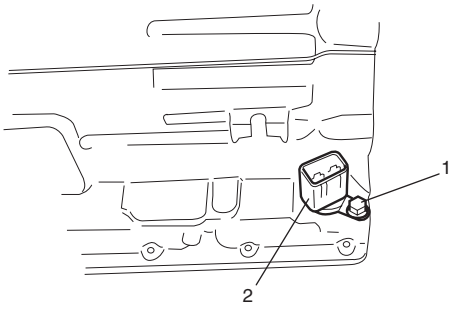


I5JB0A510058-01

9) After removing bolt (1) pull out transmission wire connector (2) from transmission case.

⚠ CAUTION

When pulling transmission wire harness out of transmission case, take care not to damage connectors and transmission fluid temperature sensor at narrow exist of case. Careless sensor treatment might cause sensor malfunction.



I5JB0A510059-01

Installation

Remove removal procedure to install transmission fluid temperature sensor, noting the following points.

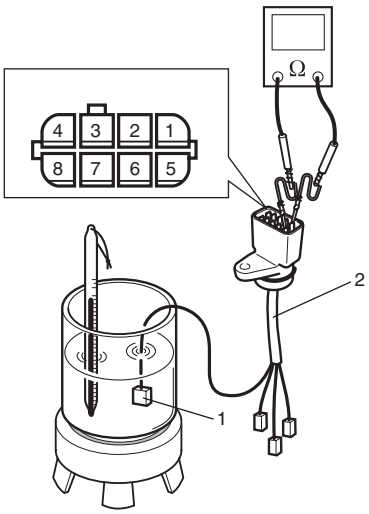
- For details of solenoid valves and their connectors installation, refer to “Automatic Transmission Unit Assembly: ”. Use new O-ring.
- For details of A/T oil pan installation, refer to “Automatic Transmission Unit Assembly: ”.
- Fill A/T fluid and check fluid level according to procedure described in “A/T Fluid Change: ”.
- Check for fluid leakage after warming up A/T.
- Tighten transmission wire connector bolt to specified torque referring to “Automatic Transmission Unit Assembly: ”.

Transmission Fluid Temperature Sensor Inspection

S5JB0A5106063

Immerse transmission fluid temperature sensor (1) in water or oil. Check transmission fluid temperature sensor resistance between terminals of connector. Thus make sure its resistance decreases as temperature rises.
If sensor resistance is out of specification, replace solenoid wire harness (2).

Transmission fluid temperature sensor resistance
10 °C (50 °F): 6.445 kΩ
25 °C (77 °F): 3.5 kΩ
110 °C (230 °F): 0.247 kΩ



I5JB0A510060-01

Transmission Control Module (TCM) Removal and Installation

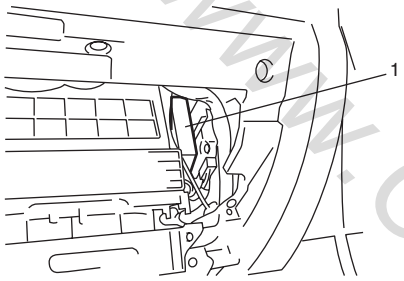
S5JB0A5106064

⚠ CAUTION

TCM consists of highly precise parts, so when handling it, be careful not to expose it to excessive shock.

Removal

1) Disconnect negative cable at battery.
2) Disable air bag system.
   Refer to “Disabling Air Bag System: in Section 8B”.
3) Remove glove box.
4) Disconnect connectors from TCM (1).
5) Remove TCM with 4WD control module by removing its nuts, and then separate TCM and 4WD control module.



I5JB0A510061-01

Installation

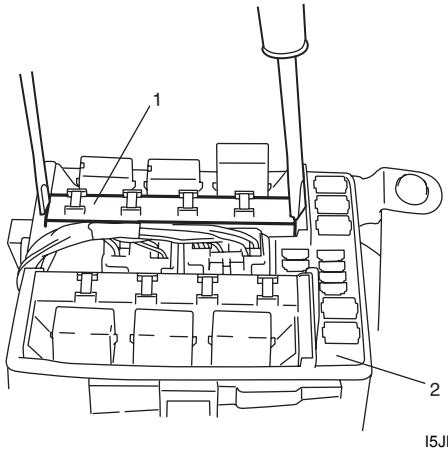
Reverse removal procedure noting the following points.

- Connect TCM connectors securely.
- Be sure to enable air bag system after TCM is back in place. Refer to “Enabling Air Bag System: in Section 8B”.

A/T Relay Inspection

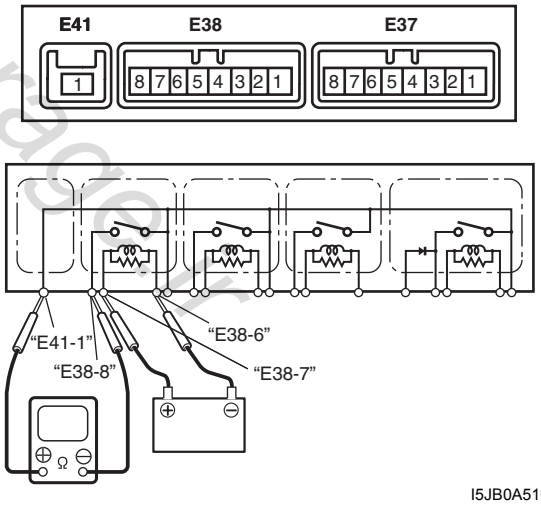
S5JB0A5106092

1) Disconnect negative cable at battery.
2) Remove integration relay No.2 (1) from fuse box No.2 (2).



I5JB0A130031-02

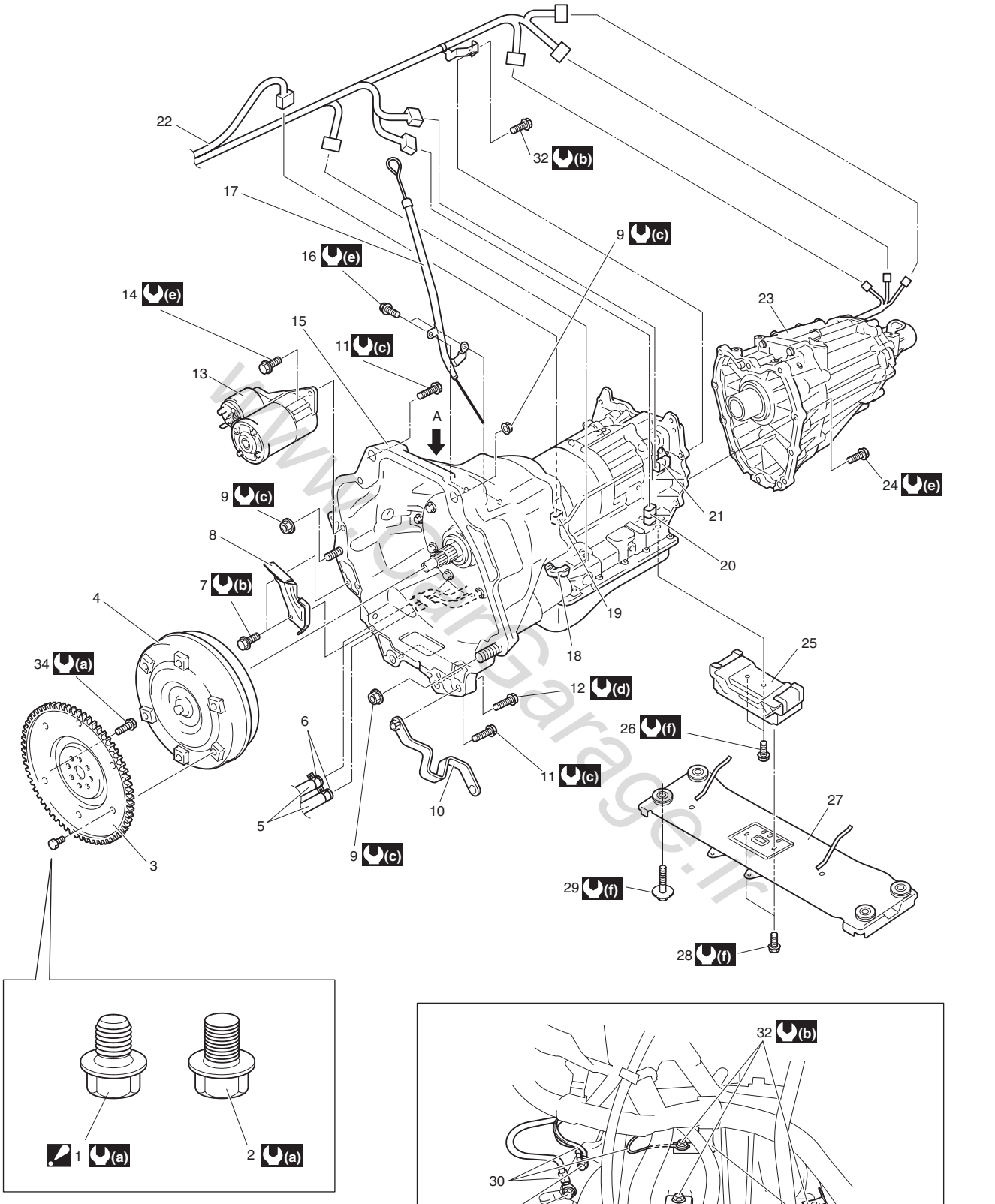
3) Check that there is no continuity between terminals “E41-1” and “E38-8”.
   If there is continuity, replace relay.
4) Connect battery positive (+) terminal to terminal “E38-6” of relay. Connect battery negative (–) terminal to terminal “E38-7” of relay. Check for continuity between terminal “E41-1” and “E38-8”. If there is no continuity when relay is connected to the battery, replace integration relay No.2.



I5JB0A510159-01

Automatic Transmission Unit Components

S5JB0A5106065



I5JB0A510003-01

1. Torque converter mounting bolt No.1 : After tightening torque converter mounting bolt No.1, tighten torque converter mounting bolt No.2.	11. Transmission to engine bolt	21. Output shaft speed sensor	31. Engine earth cable bolt
2. Torque converter mounting bolt No.2	12. Exhaust pipe No.2 bracket bolt	22. Engine harness	32. Harness bracket bolt
3. Drive plate	13. Starting motor	23. Transfer	33. Harness bracket
4. Torque converter	14. Starting motor bolt	24. Transfer to transmission bolt	34. Drive plate bolt
5. Oil cooler hose	15. Transmission	25. Engine rear mounting	(a) : 65 N·m (6.5 kgf-m, 47.0 lb-ft)
6. Clamp	16. Oil filler tube bolt	26. Engine rear mounting bolt	(b) : 10 N·m (1.0 kgf-m, 7.5 lb-ft)
7. Drive plate cover bolt	17. Oil filler tube	27. Engine rear mounting bracket	(c) : 80 N·m (8.0 kgf-m, 58.0 lb-ft)
8. Drive plate cover	18. Input shaft speed sensor	28. Engine rear mounting bracket bolt	(d) : 50 N·m (5.0 kgf-m, 36.5 lb-ft)
9. Engine to transmission bolt	19. Output shaft speed sensor	29. Mounting member bolt	(e) : 23 N·m (2.3 kgf-m, 17.0 lb-ft)
10. Exhaust pipe No.2 bracket	20. Transmission wire connector	30. Engine earth cable	(f) : 55 N·m (5.5 kgf-m, 40.0 lb-ft)

Automatic Transmission Assembly Dismounting and Remounting

S5JB0A5106066

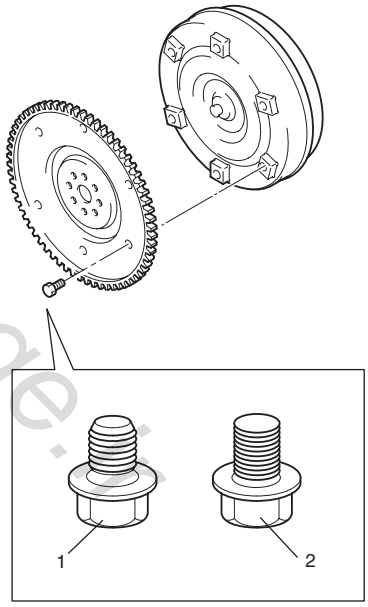
Dismounting

1) Dismount engine with transmission and transfer referring to “Engine Assembly Removal and Installation: For J20 Engine in Section 1D”.
2) Disconnect connectors from output shaft speed sensor, input shaft speed sensor, transmission range sensor, transmission wire, transfer actuator, differential lock switch and 4L/N switch release their wire harnesses from clamps.
3) Remove transfer from transmission.
4) Remove engine earth cable.
5) Remove engine rear mounting member and rear mounting.
6) Remove oil filler tube.
7) Remove cooler hose.
8) Remove drive plate cover, and then remove drive plate bolts by holding crankshaft pulley bolt stationary.
9) Remove Starting Motor referring to “Starting Motor Dismounting and Remounting: in Section 1I”.
10) Remove transmission assembly from engine assembly.

Installation

For remounting, reverse dismounting procedure noting the following points.

- Tighten each bolts and nuts referring to “Automatic Transmission Unit Components: ”
- Tighten drive plate bolt No.1 (1) first and then tighten drive plate bolts No.2 (2).



I5JB0A510068-01

- Set each clamp for wiring securely.
- Fill A/T fluid referring to “A/T Fluid Change: ”.
- Connect battery and check function of engine and transmission.

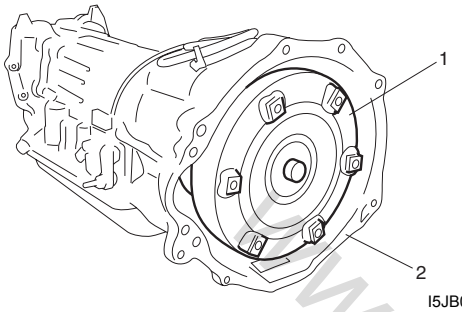
Automatic Transmission Unit Disassembly

S5JB0A5106067

1) Extract torque converter. And remove oil filler tube and dipstick.

⚠ CAUTION

Remove torque converter as much straight as possible. Leaning it may cause damage to oil seal lip.



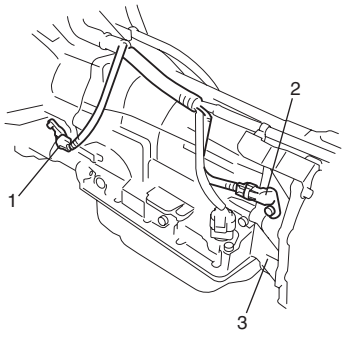
I5JB0A510069-01

1.	Torque converter
2.	Converter housing

2) Remove input shaft speed sensor (1) and output shaft speed sensor (2).
3) Remove 6 adapter case fixing bolts and then remove adaptor case (3) and gasket.

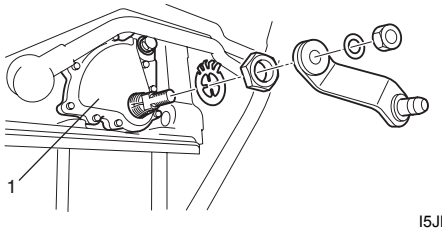
NOTE

Use care not to cause damage to oil seal.



I5JB0A510070-02

4) Remove shift switch (1).

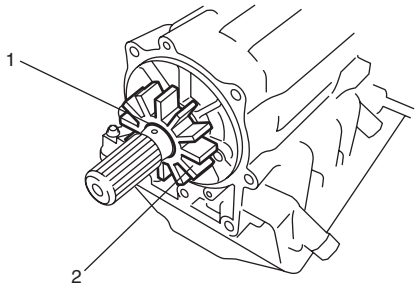


I5JB0A510071-01

5) Remove C-ring (1) and then remove speed sensor rotor (2).

NOTE

Use care not to loose rotor stop key.



I5JB0A510072-01

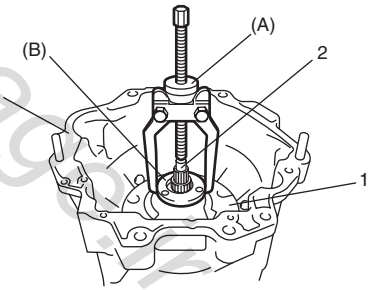
6) Remove oil pump (1) by using special tools.

Special tool
(A): 09913–65135
(B): 09927–66520

NOTE

Use care not to cause damage to shaft bushing surface.

7) Remove bearing at the rear of oil pump (1).
8) Remove O-ring from oil pump (1).
9) Holding input shaft (2) by hand, remove converter housing (3).

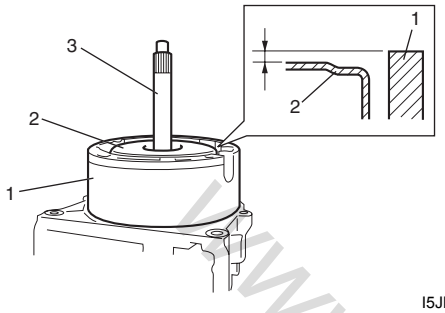


I5JB0A510073-01

10) Check dimensions of overdrive (O/D) case (1) surface and clutch cylinder (2) surface for reassembly.
11) Remove overdrive (O/D) clutch assembly by holding input shaft (3).
12) Remove O/D case, bearing and bearing race.

NOTE

Confirm direction of bearing and bearing race for reassembly.

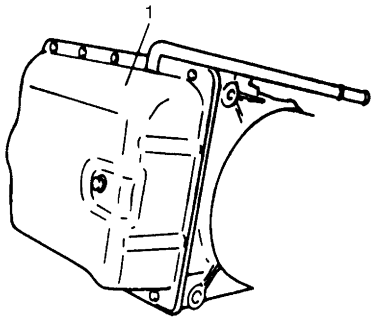


I5JB0A510074-01

13) Remove oil pan (1).

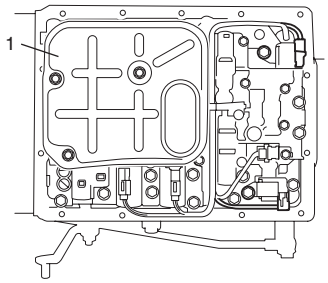
NOTE

- **Hold oil pan with oil pan side down to prevent foreign material in oil pan from entering valve body.**
- **If iron powder is found, it is possible that bearing, gear or clutch plate is worn.**



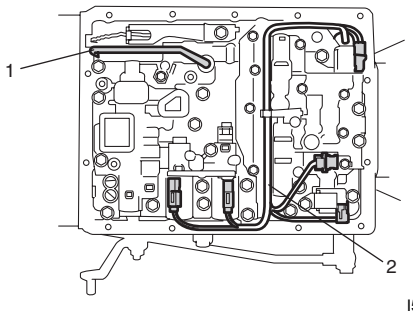
IYSQ01510094-01

14) Remove oil strainer (1).



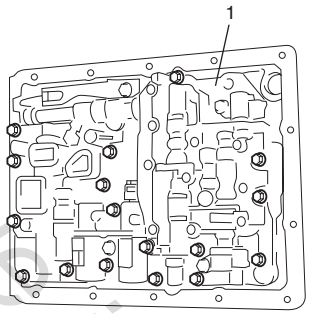
I5JB0A510075-01

15) Remove overdrive (O/D) brake apply tube (1).
16) Disconnect couplers, and then remove transmission wire connector (2).



I5JB0A510077-02

17) Remove valve body (1) mounting bolts as shown in the figure.

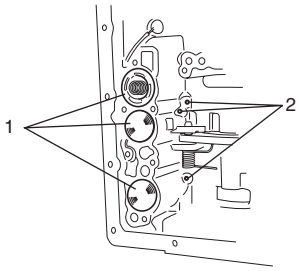


I5JB0A510076-01

18) Remove accumulator pistons (1) by blowing air into holes (2) as shown in the figure.

NOTE

Hold accumulator piston (1) with shop cloth while blowing.

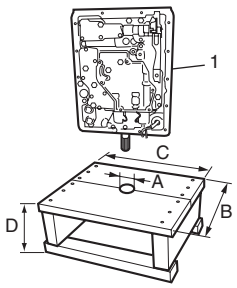


I5JB0A510078-02

19) Place transmission (1) upright as shown in the figure.

NOTE

- **To prevent transmission case from getting damaged, protect its contacting surface with stand by using shop cloth or the like.**
- **A stand of such size as shown in the figure will facilitate work.**



I5JB0A510079-01

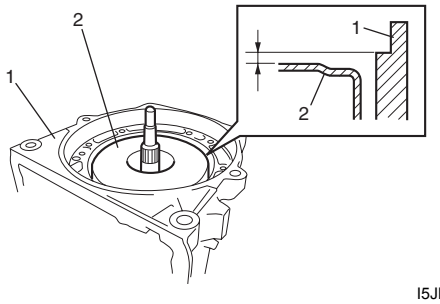
A:	50 mm (1.9 in.)
B:	350 mm (13.8 in.)
C:	400 mm (15.7 in.)
D:	200 mm (7.9 in.)

20) Check top surface level of forward clutch (2) against case (1) for reassembly.

21) Remove forward clutch.

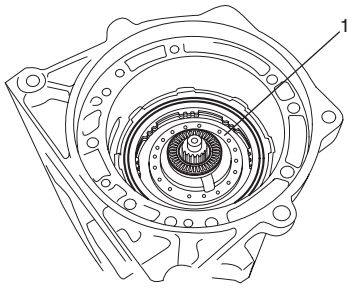
NOTE

Confirm direction of bearing and bearing race for reassembly.



I5JB0A510080-01

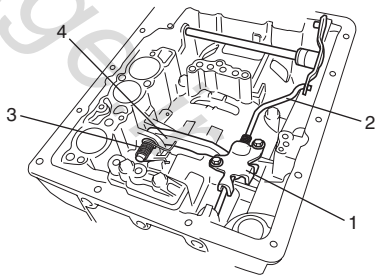
22) Remove direct clutch (1).



I5JB0A510081-01

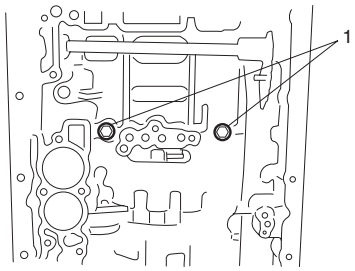
23) Remove pawl bracket (1), and then parking lock rod (2) from manual shift lever.

24) Remove pawl spring (3), pawl pin and parking rock pawl (4).



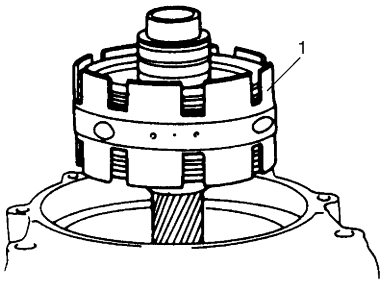
I5JB0A510082-01

25) Remove 2 bolts (1) from valve body side.



I5JB0A510083-01

26) Remove center support assembly (1).

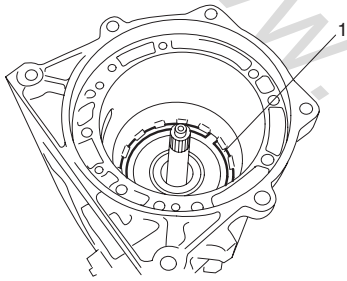


IYSQ01510104-01

27) Remove retaining ring (1), planetary gear assembly leaf spring, bearing and bearing race.

NOTE

- **Use care not to cause damage to case when removing retaining ring.**
- **Confirm direction of bearing and bearing race for reassembly.**

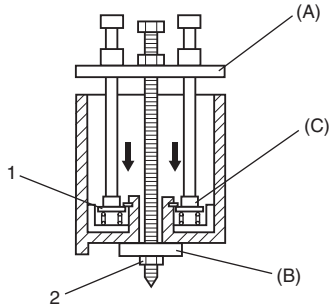


I5JB0A510084-01

28) Remove apply tube.

29) Remove reverse brake return spring (1) using special tools.

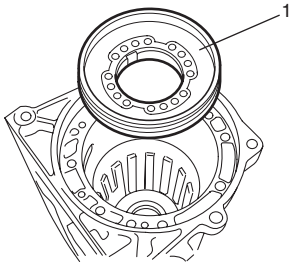
Special tool
(A): 09926–98390
(B): 09944–88210
(C): 09926–98320

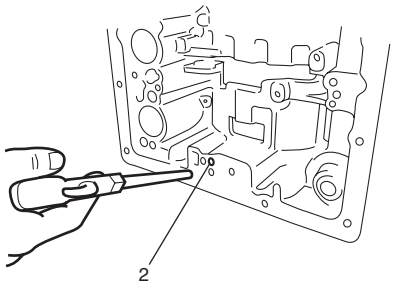


I5JB0A510085-01

2. Nut M12 x 1.75

30) Remove reverse brake piston (1) by applying compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) to oil hole (2).



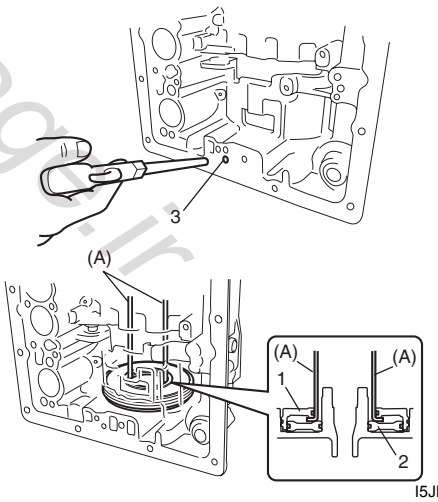


I5JB0A510086-02

31) Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) to oil hole (3) to remove brake reaction sleeve (1) and secondary reverse piston (2).

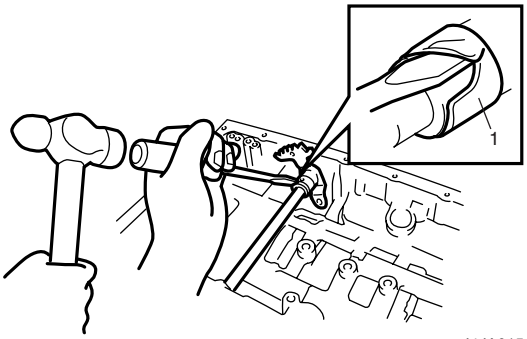
32) Remove brake reaction sleeve (1) and secondary reverse piston (2) by using special tools.

Special tool
(A): 09920–20310



I5JB0A510087-02

33) Remove manual shift shaft and lever as follows.
a) Undo caulking of sleeve cover (1) by using flat end rod or the like and hammer.

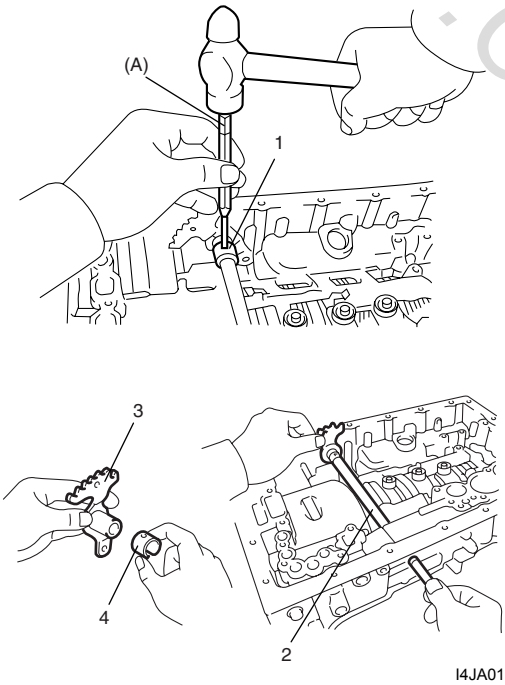


I4JA01512082-01

b) Drive out manual shift lever pin (1) by using special tool and hammer.

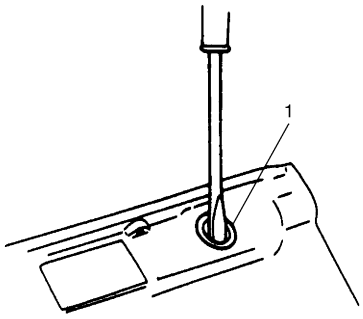
Special tool
(A): 09922–89810

c) Pull out manual shift shaft (2) from transmission case, and then remove manual shift lever (3) and sleeve cover (4).



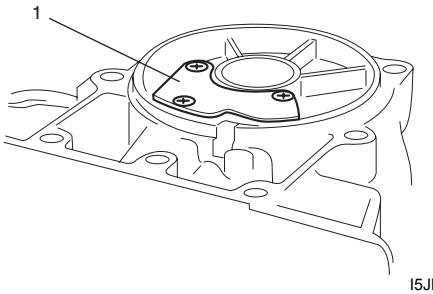
I4JA01512083-01

34) Remove oil seal (1) from both sides of transmission case.



IYSQ01510111-01

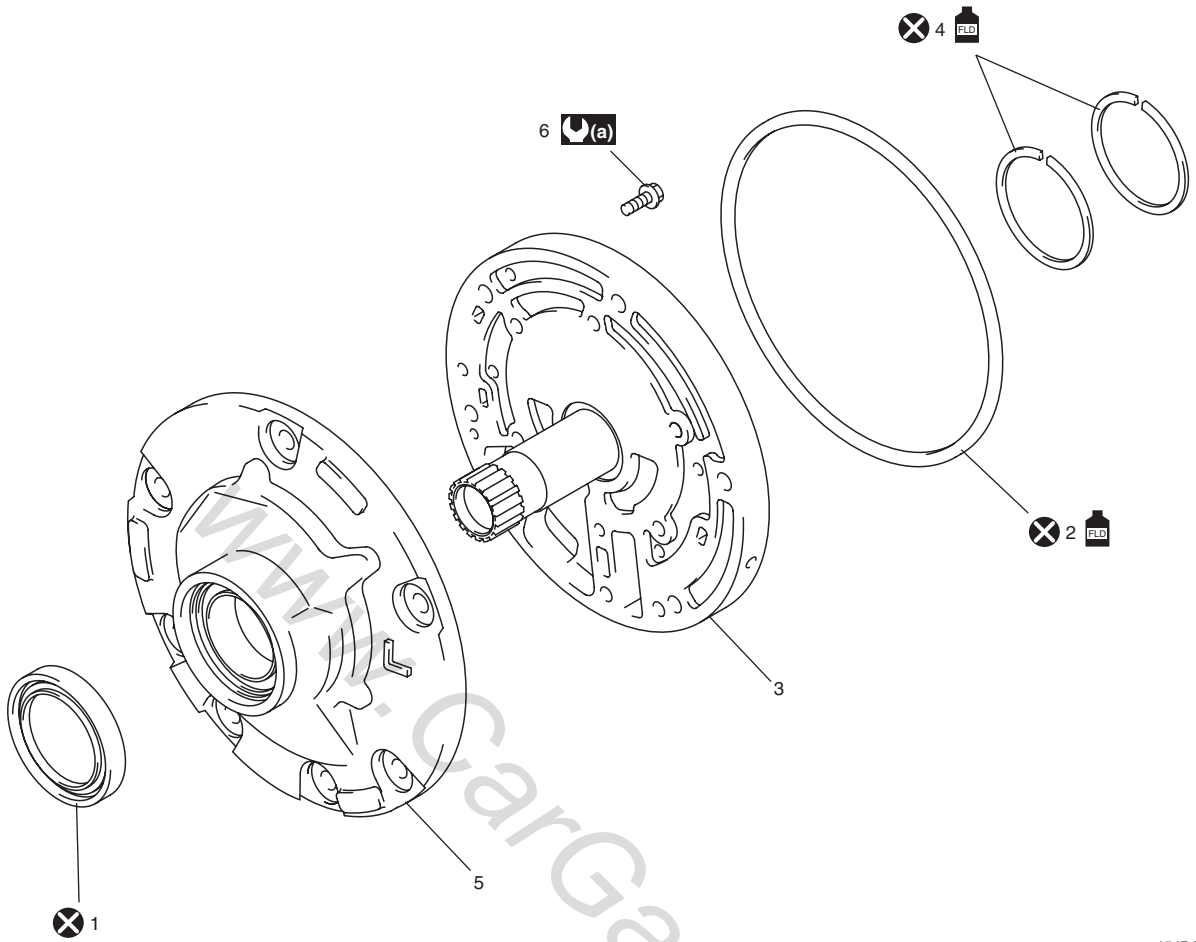
35) Remove cover plate (1).



I5JB0A510089-01

Oil Pump Components

S5JB0A5106068



I5JB0A510090-01

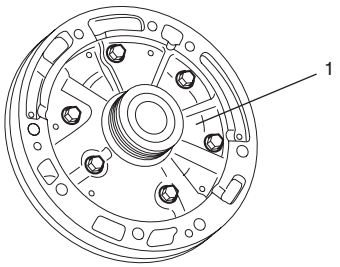
1. Oil pump body oil seal	4. Seal ring	(a) : 7.5 N·m (0.75 kgf-m, 5.5 lb-ft)
2. Oil pump cover O-ring	5. Oil pump body	: Do not reuse.
3. Oil pump cover	6. Oil pump bolt	FLD : Apply A/T fluid.

Oil Pump Disassembly and Assembly

S5JB0A5106069

Disassembly

1) Remove 6 bolts, oil pump cover (1), drive gear and driven gear in that order.

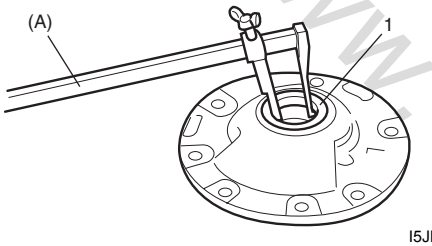


I5JB0A510091-01

2) Remove oil pump cover O-ring.

3) Remove oil pump body oil seal (1) using special tool.

Special tool
(A): 09913–50121



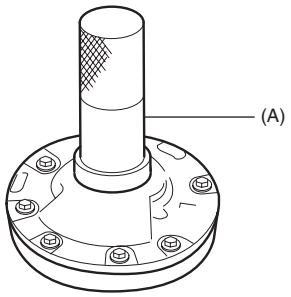
I5JB0A510093-01

Assembly

Assemble each component by reversing removal procedure and noting the following points.

- Before installing inner gear and outer gear to pump body, apply A/T fluid to them.
- Install oil pump seal using special tool.

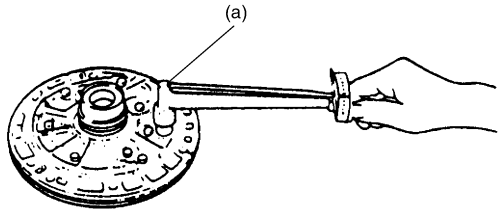
Special tool
(A): 09913–85210



I5JB0A510092-01

- When installing pump cover, use care so that its splined part will not cause damage to oil seal and use specified torque to tighten it to pump body.

Tightening torque
Oil pump bolt (a): 7.5 N·m (0.75 kgf-m, 5.5 lb-ft)



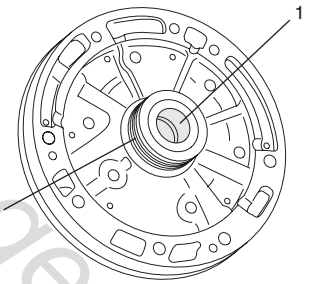
IYSQ01510114-01

- When installing O-ring and oil seal, apply enough A/T fluid to them and fit them securely in groove.
- After installation, check that inner gear turns smoothly by making use of torque converter.
- When installing seal ring, it should not be opened more than necessary.
- Fit claws of seal ring securely.

Oil Pump Inspection

S5JB0A5106070

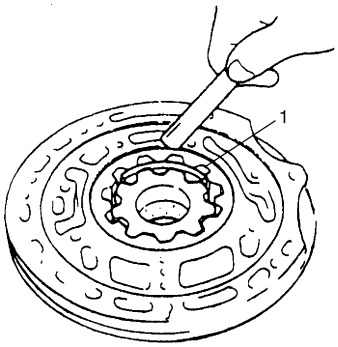
- Check seal ring (2) and bushing (1) for wear and damage.



I5JB0A510094-01

- Check clearance between outer gear (1) and body.

Clearance between outer gear and body
Standard: 0.07 – 0.15 mm (0.0028 – 0.0059 in.)
Service limit: 0.30 mm (0.0118 in.)



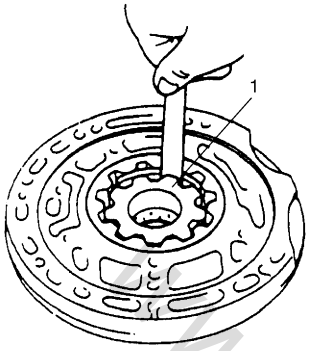
IYSQ01510116-01

- Check tip clearance between inner gear (1) and outer gear.

  Tip clearance between inner gear and outer gear
  Standard: 0.11 – 0.14 mm (0.0043 – 0.0055 in.)
  Service limit: 0.30 mm (0.0118 in.)

  NOTE

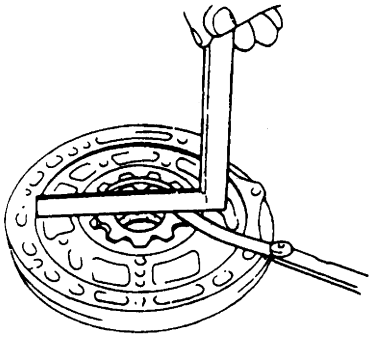
  Measure with torque converter installed.



IYSQ01510117-01

- Check side clearance between inner gear/outer gear and pump body.

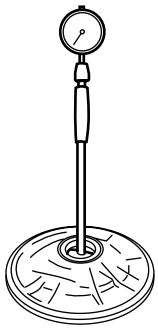
  Side clearance between inner gear / outer gear and pump body
  Standard: 0.02 – 0.05 mm (0.0008 – 0.0020 in.)
  Service limit: 0.1 mm (0.0039 in.)



IYSQ01510118-01

- Measure inside diameter of oil pump body bushing. If inside diameter exceeds limit, replace oil pump body.

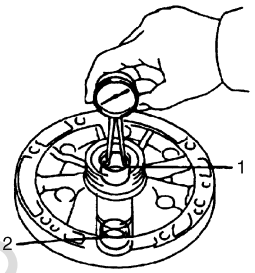
  Oil pump body bushing inside diameter standard
  38.113 – 38.138 mm (1.5005 – 1.5014 in.)



I4JA01512140-01

- Measure inside diameter of stator shaft assembly bushing.
  If inside diameter exceeds limit, replace stator shaft assembly.

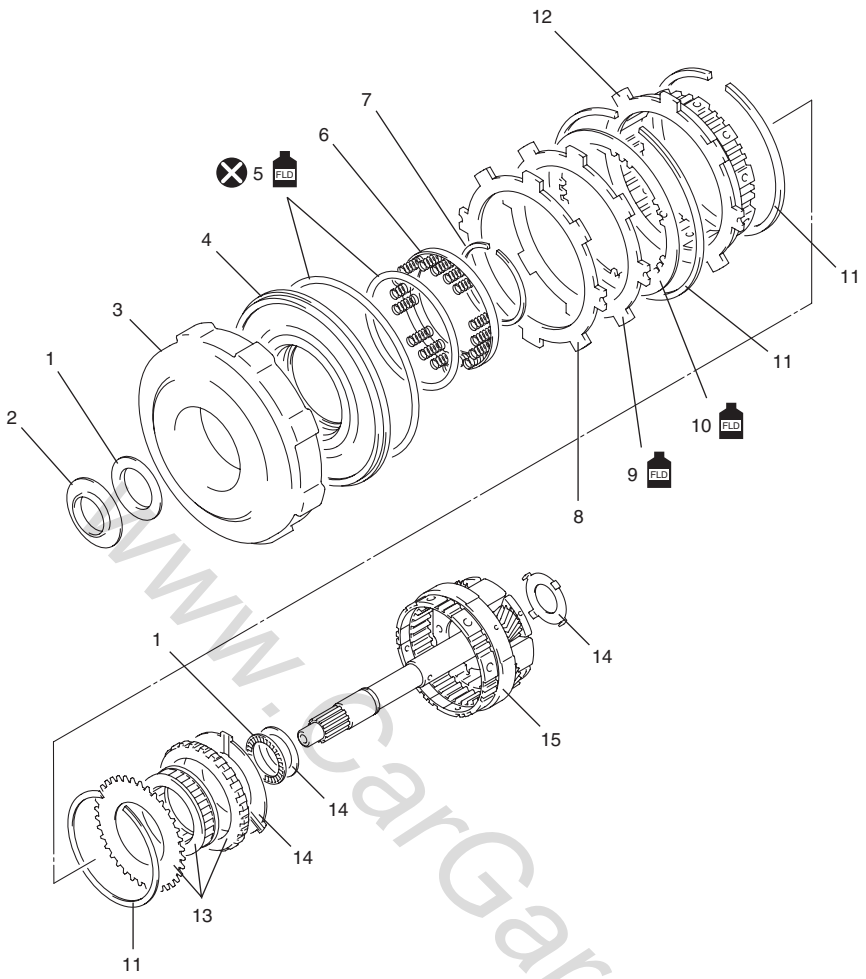
  Stator shaft assembly bushing inside diameter standard
  Front side (2): 21.501 – 21.527 mm (0.8465 – 0.8475 in.)
  Rear side (1): 23.025 – 23.051 mm (0.9065 – 0.9075 in.)



I5JB0A510148-01

Overdrive (Planetary Gear Side) Components

S5JB0A5106071



I5JB0A510096-01

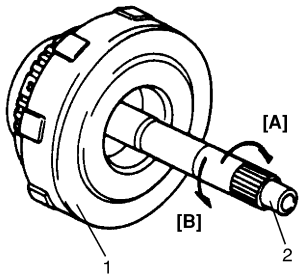
1. Bearing	5. O-ring	9. Clutch plate	13. One-way clutch	FLD : Apply A/T fluid.
2. Race	6. Return spring	10. Clutch disc	14. Thrust washer	
3. Clutch cylinder	7. Snap ring	11. Retaining ring	15. O/D planetary gear	
4. Clutch piston	8. Cushion clutch plate	12. Brake hub	⊗ : Do not reuse.	

Overdrive (Planetary Gear Side) Disassembly and Assembly

S5JB0A5106072

Disassembly

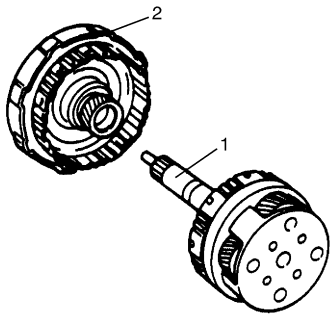
1) With overdrive (O/D) clutch cylinder (1) held stationary, turn O/D input shaft (2) clockwise to check that it turns smoothly and then counterclockwise to check that it locks.



IYSQ01510120-01

[A]:	Rotates
[B]:	Locks

2) Remove O/D planetary gear assembly (1).

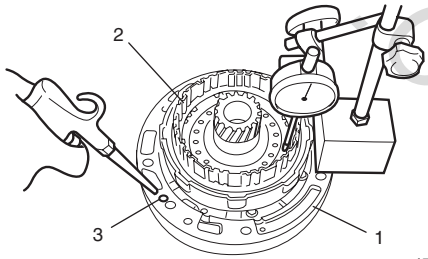


IYSQ01510121-01

2. O/D clutch cylinder

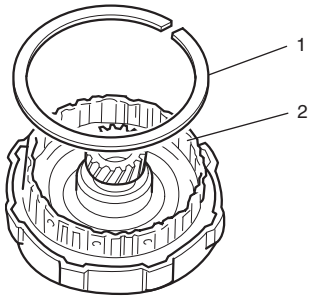
3) With O/D clutch assembly (2) installed to oil pump, apply compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) to oil hole (3) in oil pump (1) and measure stroke of clutch piston. If it is not within standard range, replace cushion clutch plate or clutch disc.

Standard stroke of clutch piston
1.74 – 2.44 mm (0.069 – 0.096 in.)



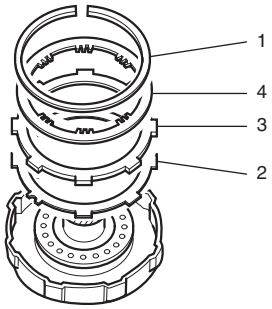
I5JB0A510097-01

4) Remove retaining ring (1) and then remove brake hub (2).



I5JB0A510098-01

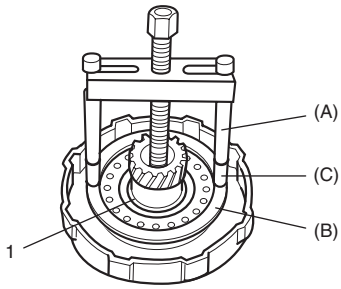
5) Remove retaining ring (1) cushion plate (2), clutch plate (3) and clutch disc (4) in that order.



I5JB0A510099-01

6) With clutch piston return spring compressed with special tools, remove clutch piston return spring.

Special tool
(A): 09918–48211
(B): 09926–98320
(C): 09918–48220

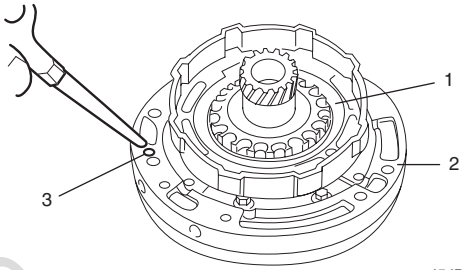


I5JB0A510100-01

1. Snap ring

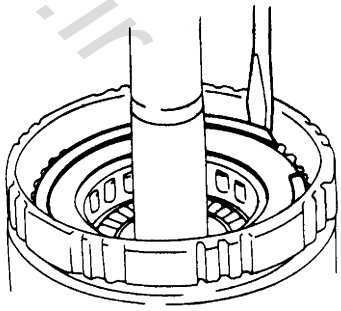
7) Install O/D clutch cylinder to oil pump (2). Apply compression air into fluid hole (3) in oil pump (2) and remove clutch piston (1).

8) Remove piston inner O-ring and piston outer O-ring from clutch piston (1).



I5JB0A510101-01

9) Remove retaining ring from O/D planetary gear and then remove one-way clutch, thrust washer and thrust bearing.

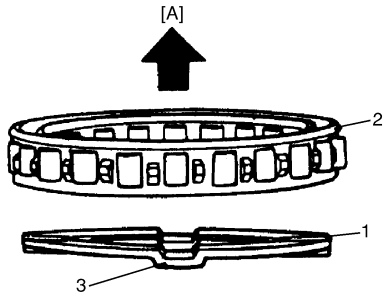


IYSQ01510127-01

Assembly

Assemble each component by reversing removal procedure and noting the following points.

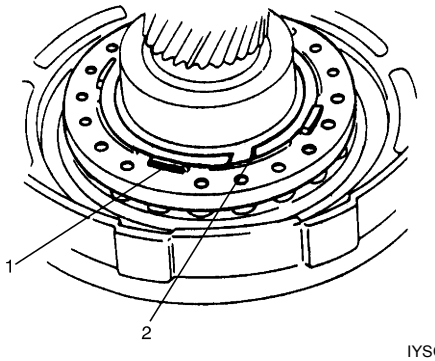
- When installing thrust washer (1), bring its oil groove (3) to the front.
- When installing one-way clutch to one-way clutch outer race, bring its flange (2) to the front.



I5JB0A510154-02

[A]: Front

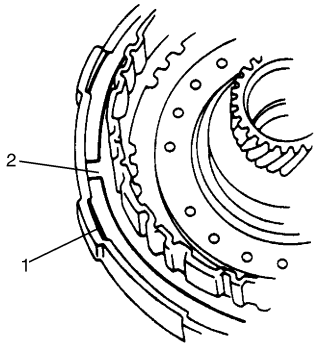
- Before installing piston inner O-ring and piston outer O-ring, apply A/T fluid to them.
- Install so that snap opening and projection (1) of clutch piston return spring will not match.



IYSQ01510129-01

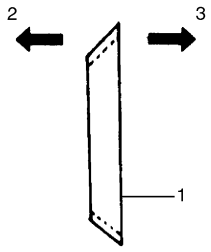
2. Slot

- Install retaining clutch ring and retaining brake hub so that their slots (2) will not match with dent (1) in O/D clutch cylinder.



IYSQ01510130-01

- For installing cushion clutch plate (1), refer to the figure.



IYSQ01510131-01

2. Clutch cylinder side
3. Brake hub side

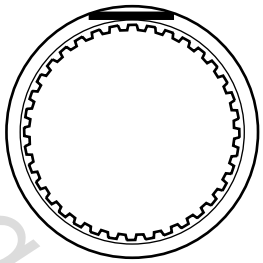
Overdrive (Planetary Gear Side) Inspection

S5JB0A5106073

- Check that sliding surface of discs and plate are not worn or burnt. if necessary, replace them.

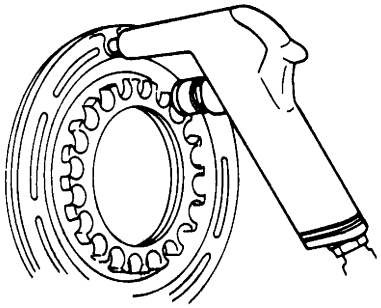
NOTE

- **If disc lining is exfoliated, discolored or worn hardly, replace all discs.**
- **If only a part of printed numbers is corroded, replace all discs.**
- **Before assembling new discs, soak them in A/T fluid for at least 15 minutes.**



I4JA01512210-01

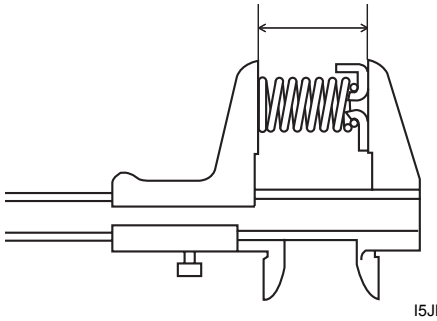
- Check that ball valve of clutch piston is not stuck.
- Check valve for leakage by applying low pressure air into ball valve hale.



IYSQ01510132-01

- Measure free length of piston return spring.

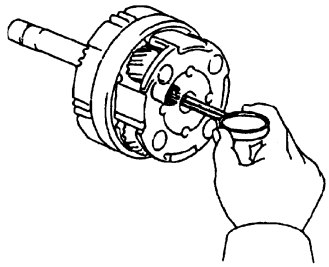
  Standard free length of O/D clutch piston return spring
  16.9 mm (0.665 in.)



I5JB0A510171-01

- Measure inside diameter of planetary gear bushing. If inside diameter exceeds limit, replace planetary gear.

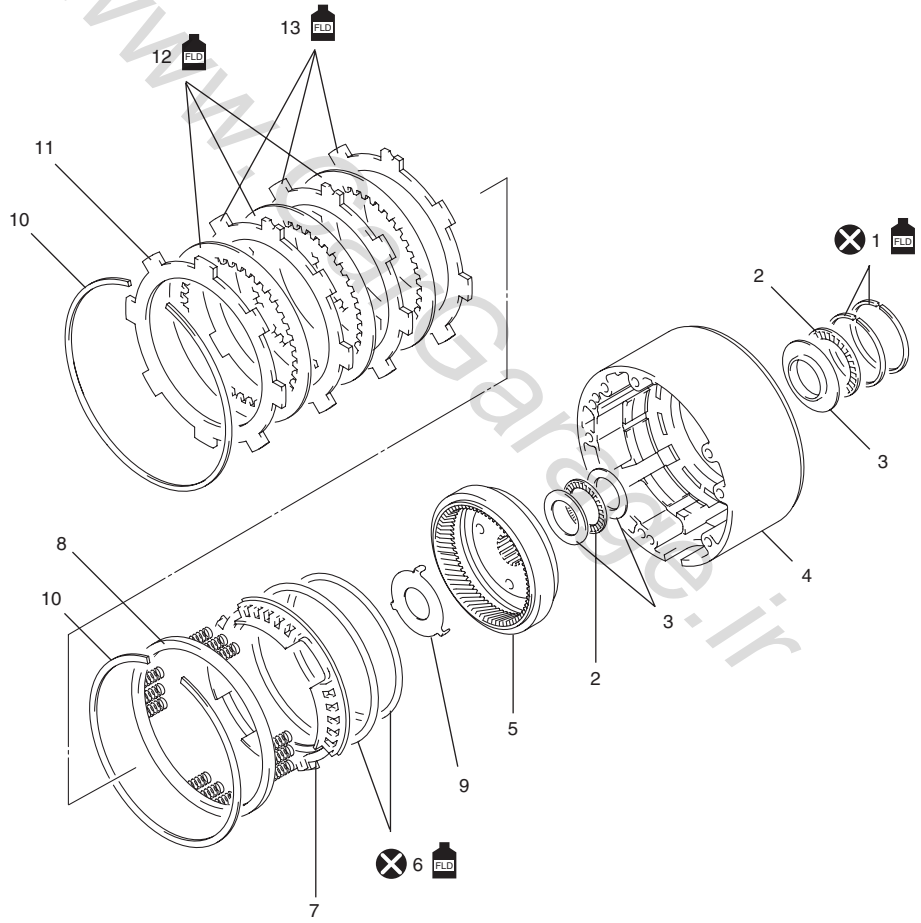
  Planetary gear bushing inside diameter standard
  11.200 – 11.221 mm (0.4409 – 0.4418 in.)



I5JB0A510149-01

Overdrive (Case Side) Components

S5JB0A5106074



I5JB0A510103-01

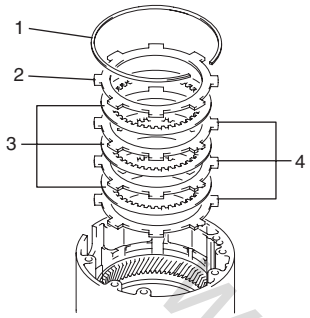
1. Sealing	4. O/D case	7. Brake piston	10. Retaining ring	13. Brake plate
2. Bearing	5. Planetary ring gear	8. Return spring	11. Brake backing plate	⊗ : Do not reuse.
3. Bearing race	6. O-ring	9. Thrust washer	12. Brake disc	FLD : Apply A/T fluid.

Overdrive (Case Side) Disassembly and Assembly

S5JB0A5106075

Disassembly

1) Remove retaining ring (1), brake backing plate (2), brake disc (3) and brake plate (4) in that order. Then remove planetary ring gear, thrust bearing race and thrust bearing.



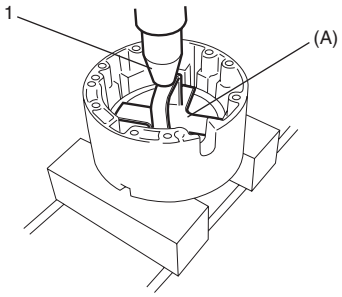
I5JB0A510104-01

2) Remove retaining ring and piston return spring using special tool and press (1).

Special tool
(A): 09926–96510

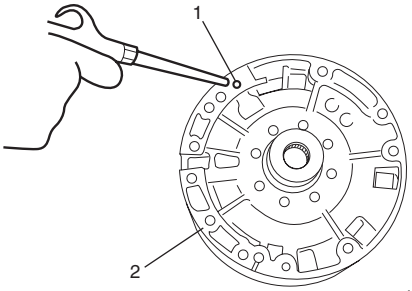
⚠ CAUTION

Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.



I5JB0A510105-01

3) Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) to oil hole (1) in O/D case (2) and remove brake piston.

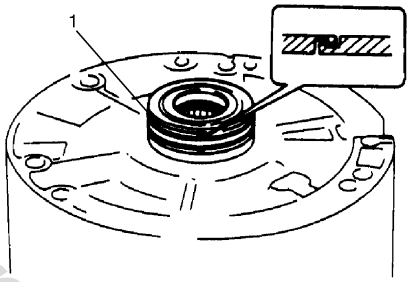


I5JB0A510106-01

4) Remove brake piston inner ring and brake piston outer ring from brake piston.
5) Unsnap seal ring (1).
6) Remove 2 seal rings (1).

NOTE

Be careful not to open seal ring more than necessary.

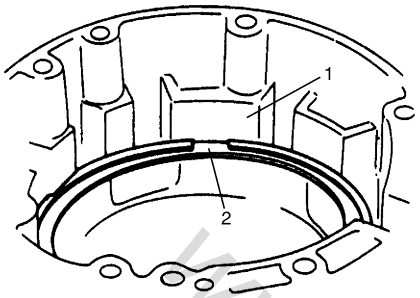


IYSQ01510138-01

Assembly

Install each component by reversing removal procedure and noting the following points.

- When installing rear seal ring, use care not to open it too wide.
- Apply A/T fluid to O-ring, disc, etc. before installing them.
- Opening of retaining brake front ring (2) and projection (1) of O/D case should be matched.

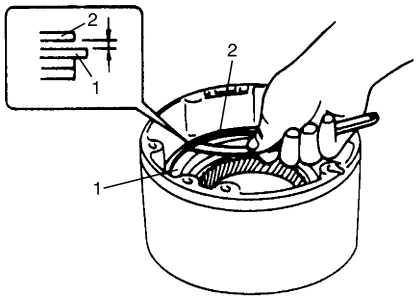


IYSQ01510139-01

- When installing each component, refer to “Overdrive (Case Side) Components: ”.
- Measure clearance between retaining ring (1) and brake backing plate (2) with thickness gauge.
  If the clearance is out of specification, select another plate with suitable thickness from the list below and replace it.

Standard clearance between retaining ring and brake backing plate
0.40 – 1.38 mm (0.016 – 0.054 in.)

Thickness
1.95 – 2.05 mm (0.077 – 0.081 in.)
2.25 – 2.35 mm (0.089 – 0.093 in.)



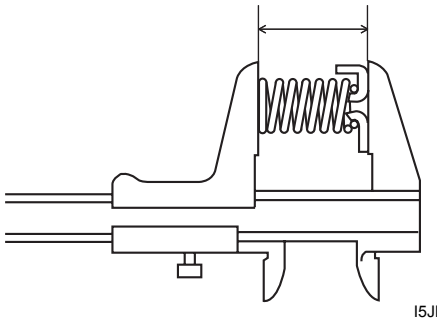
IYSQ01510134-01

Overdrive (Case Side) Inspection

S5JB0A5106076

- Measure free length of piston return spring.

Standard free length of O/D brake piston return spring
15.10 mm (0.594 in.)

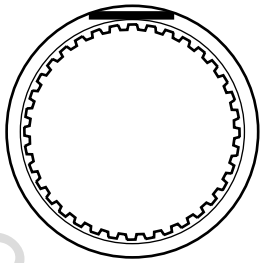


I5JB0A510171-01

- Check that sliding surface of discs and plate are not worn or burnt. If necessary, replace them.

NOTE

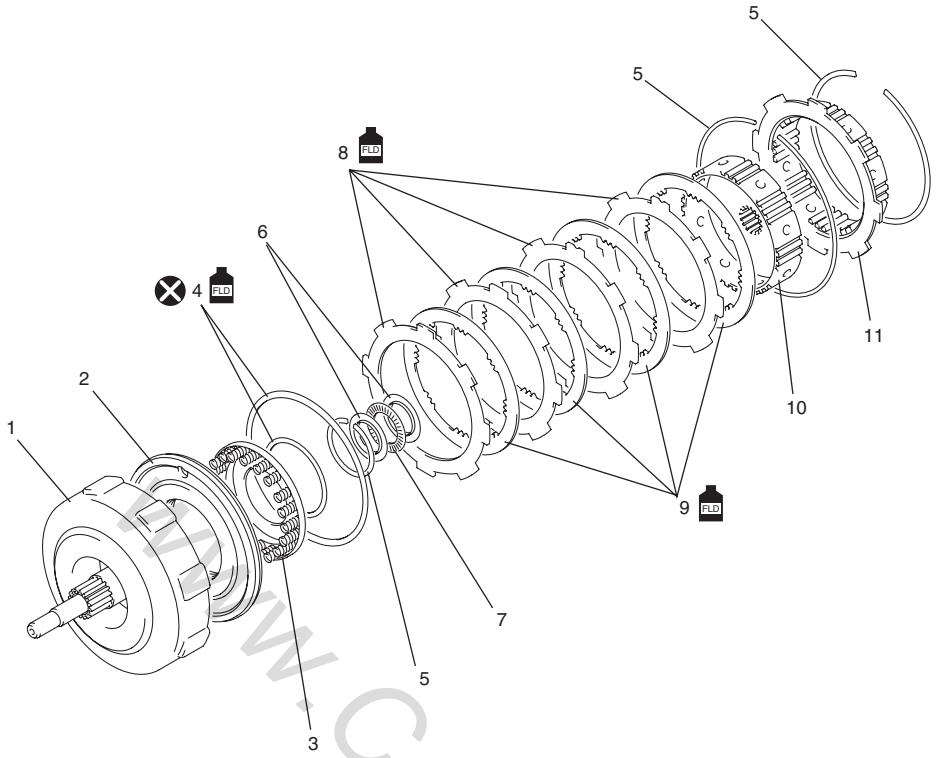
- **If disc lining is exfoliated, discolored or worn hardly, replace all discs.**
- **If only a part of printed numbers is corroded, replace all discs.**
- **Before assembling new discs, soak them in A/T fluid for at least 15 minutes.**



I4JA01512210-01

Forward Clutch Components

S5JB0A5106077



I5JB0A510108-01

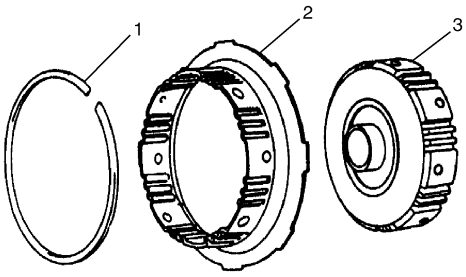
1. Input shaft	5. Retaining ring	9. Clutch disc	FLD : Apply A/T fluid.
2. Piston	6. Bearing race	10. Froward clutch hub	
3. Return spring	7. Bearing	11. Direct clutch hub	
4. O-ring	8. Clutch plate	: Do not reuse.	

Forward Clutch Disassembly and Assembly

S5JB0A5106078

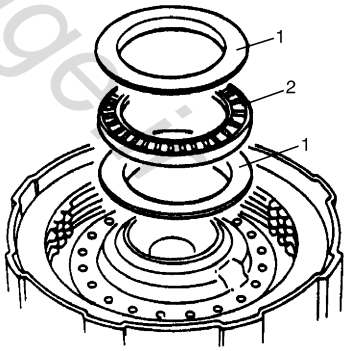
Disassembly

1) After removing retaining ring (1), remove direct clutch hub (2) and forward clutch hub (3).



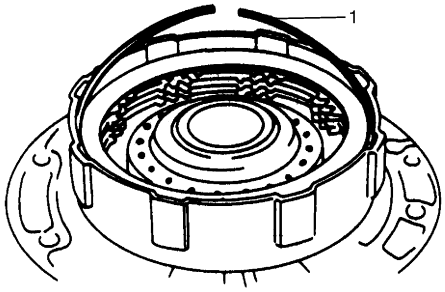
IYSQ01510143-01

2) Remove bearing race (1) and thrust bearing (2).



I5JB0A510109-01

3) Remove retaining ring (1) and then remove all clutch discs.



IYSQ01510147-01

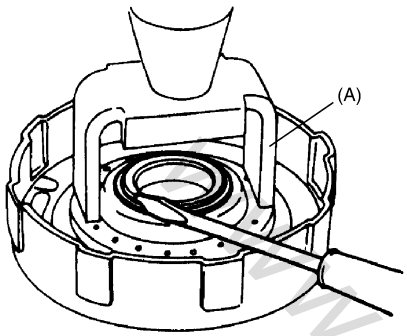
4) Using special tool and hydraulic press, compress forward clutch piston return spring and remove retaining return spring.

Special tool
(A): 09926–98310

⚠ CAUTION

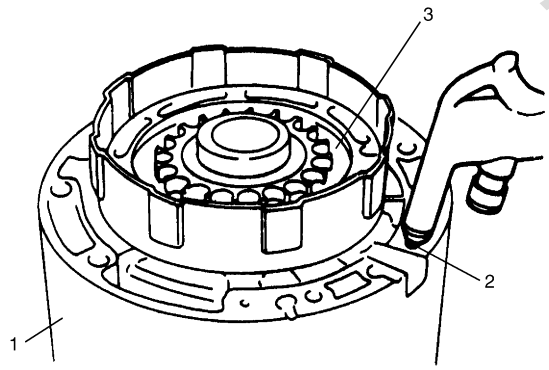
Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

5) Remove forward clutch piston return spring.



IYSQ01510148-01

6) Install forward clutch to O/D case (1). Blow low pressure air into fluid hole (2) at the right of cut in O/D case to remove forward clutch piston (3).



I5JB0A510110-01

Assembly

1) Apply A/T fluid to forward input shaft O-rings, install forward clutch piston and piston return spring (2) to forward input shaft and then install return spring ring with special tool and hydraulic press.

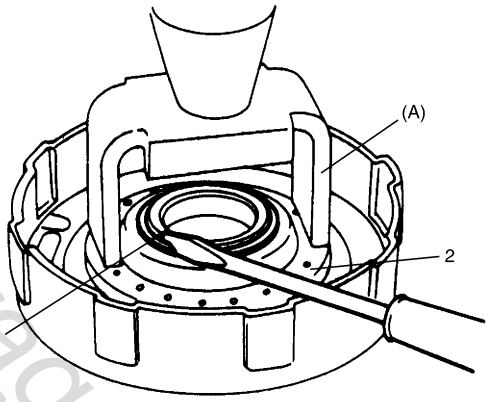
Special tool
(A): 09926–98310

NOTE

- **When installing return spring (2), be careful so that return spring will not fall or tilt.**
- **Do not align opening in retaining ring (1) with lug of forward clutch piston return spring at its retainer section.**

⚠ CAUTION

Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.



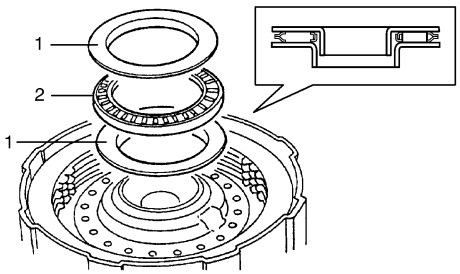
IYSQ01510150-01

2) Install clutch discs and plates and then install retaining clutch ring.

NOTE

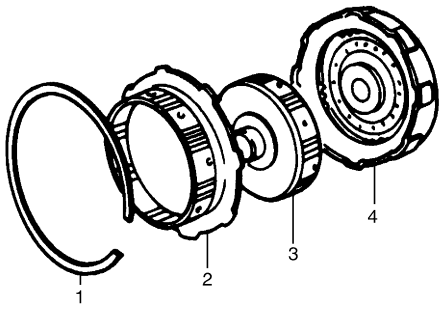
- **Refer to "Forward Clutch Components: " when installing each component.**
- **Do not match opening in retaining clutch ring and dent in forward clutch input shaft.**

3) Install bearing races (1) and thrust bearing (2).



I5JB0A510111-01

4) Install forward clutch hub (3), direct clutch hub (2) and retaining ring (1) in that order.



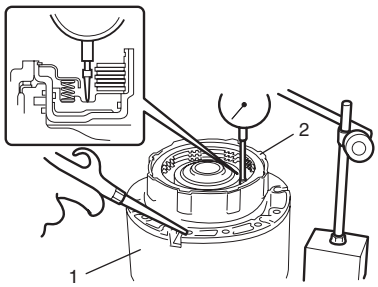
IYSQ01510151-01

4. Input shaft

5) Install forward clutch (2) to O/D case (1). Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) to oil hole at the right of cut in O/D case and measure movement of forward clutch piston.
If measured value is not within standard range, select another plate with suitable thickness from the list below and replace it.

Thickness
1.75 – 1.85 mm (0.069 – 0.073 in.)
1.95 – 2.05 mm (0.077 – 0.081 in.)

Standard forward clutch piston movement
1.40 – 1.70 mm (0.055 – 0.067 in.)



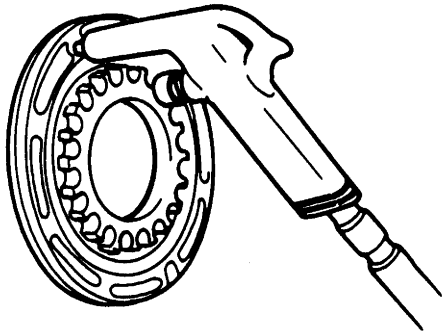
I5JB0A510150-01

Forward Clutch Inspection

S5JB0A5106079

Forward Clutch Piston

- Shake piston to check that ball is not stuck.
- Blow low pressure air to check ball section for leakage.

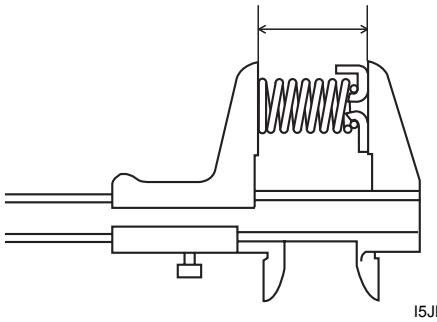


IYSQ01510152-01

Forward Clutch Piston Return Spring

- Measure free length.

Standard free length of forward clutch piston return spring
24.81 mm (0.977 in.)



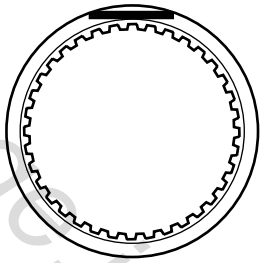
I5JB0A510171-01

Clutch Plate and Disc

- Check that sliding surface of discs and plate are not worn or burnt. If necessary, replace them.

NOTE

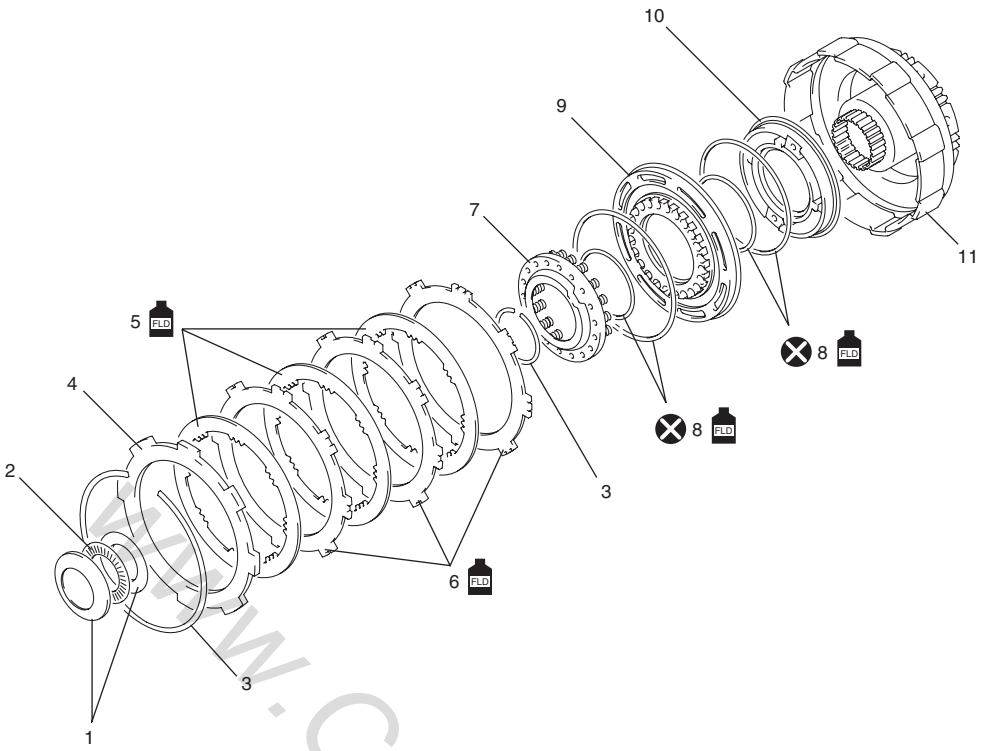
- **If disc lining is exfoliated, discolored or worn hardly, replace all discs.**
- **If only a part of printed numbers is corroded, replace all discs.**
- **Before assembling new discs, soak them in A/T fluid for at least 15 minutes.**



I4JA01512210-01

Direct Clutch Components

S5JB0A5106080



I5JB0A510112-01

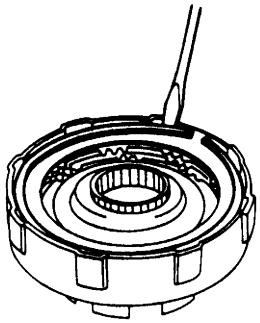
1. Bearing race	5. Clutch disc	9. Direct clutch piston	FLD : Apply A/T fluid.
2. Bearing	6. Clutch plate	10. Direct clutch inner piston	
3. Retaining ring	7. Return spring	11. Direct clutch cylinder	
4. Clutch backing plate	8. O-ring	⊗ : Do not reuse.	

Direct Clutch Disassembly and Assembly

S5JB0A5106081

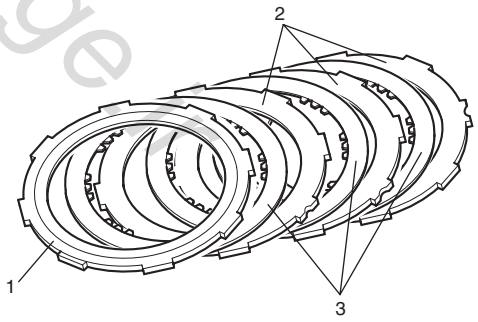
Disassembly

1) Remove direct clutch assembly from center support and then remove retaining ring.



IYSQ01510156-01

2) Remove clutch backing plate (1) and then remove clutch disc (3) and clutch plate (2).



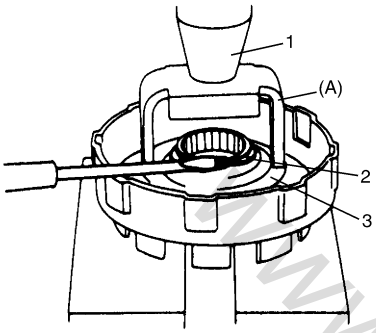
I5JB0A510114-01

3) Using special tool and hydraulic press (1), compress direct clutch piston return spring (3) and remove retaining return spring ring (2).

Special tool
(A): 09926–98310

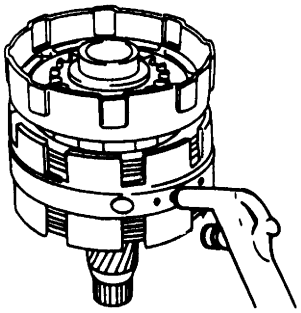
⚠ CAUTION

Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.



IYSQ01510158-01

4) Remove direct clutch piston return spring.
5) Install direct clutch cylinder to center support. Remove direct clutch piston by blowing air into the second hole from the left as shown in the figure. Also, remove direct clutch inner piston by blowing air into hole at the extreme right. And then remove O-rings from pistons.

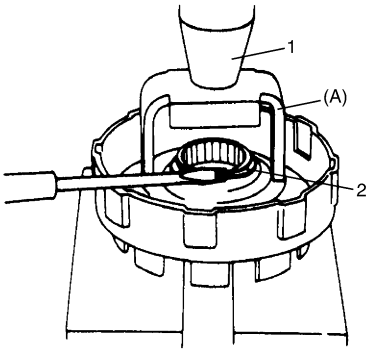


IYSQ01510159-01

Assembly
Assemble each component by reversing disassembly procedure and noting the following points.

- Always use new O-ring and apply A/T fluid before installation.
- Do not align opening in retaining ring (2) with lug of direct clutch piston return spring at retainer.

Special tool
(A): 09926–98310



IYSQ01510160-01

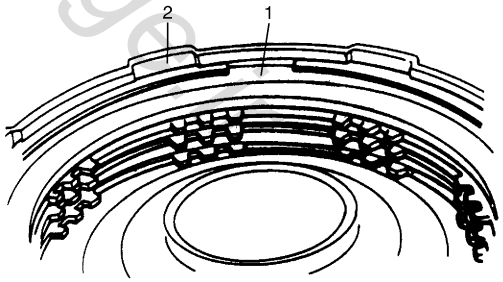
1. Hydraulic press

- Use care so that direct clutch piston return spring will not fall or tilt.

⚠ CAUTION

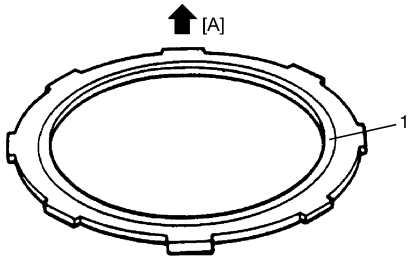
Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

- Do not match opening (1) in retaining back plate ring with cutout (2) in direct clutch cylinder.



IYSQ01510161-01

- Install clutch backing plate with its grooved side (1) facing the front.



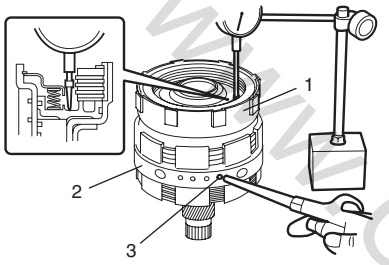
I5JB0A510115-01

[A]: Front

- Install direct clutch assembly (1) to center support (2) and with compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) applied to oil hole (3), measure stroke of direct clutch piston as shown in the figure. If it is not within standard range, select another plate with suitable thickness from the list below and replace it.

Direct clutch piston standard stroke
0.90 – 1.30 mm (0.035 – 0.051 in.)

Identification No.	Thickness
No identification	3.925 – 4.050 mm (0.155 – 0.159 in.)
"B"	3.675 – 3.800 mm (0.145 – 0.150 in.)
"A"	3.475 – 3.600 mm (0.137 – 0.142 in.)



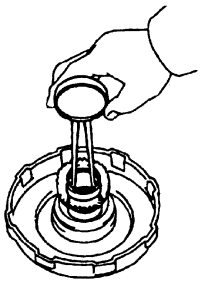
I5JB0A510113-01

Direct Clutch Inspection

S5JB0A5106082

- Measure inside diameter of direct clutch cylinder bushing. If inside diameter exceeds limit, replace direct clutch cylinder.

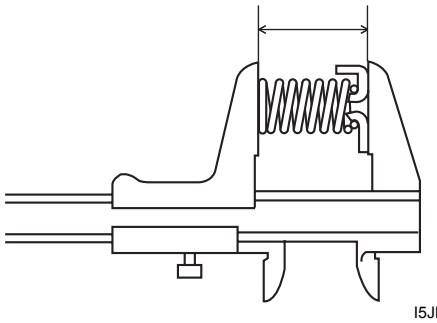
Direct clutch cylinder bushing inside diameter standard
23.062 – 23.088 mm (0.9080 – 0.9090 in.)


I5JB0A510156-01

Direct Clutch Piston Return Spring

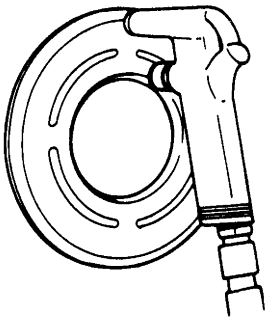
- Measure free length.

Standard free length of direct clutch piston return spring
24.25 mm (0.955 in.)


I5JB0A510171-01

Direct Clutch Piston

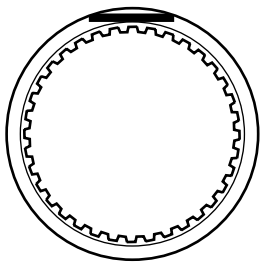
- Shake piston to check that ball is not stuck.
- Apply air pressure and check that there is no leakage.


IYSQ01510163-01

Clutch Disc and Plate
Check that sliding surface of discs and plate are not worn or burnt. if necessary, replace them.

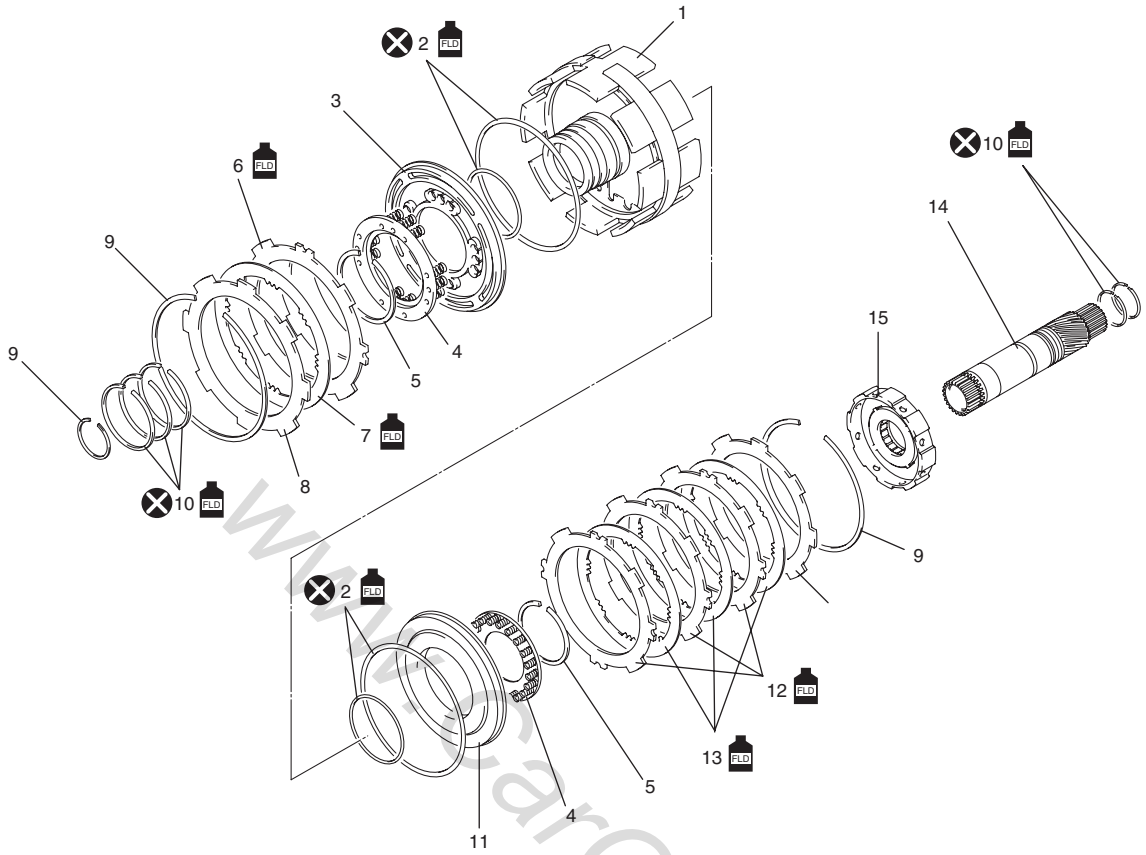
NOTE

- **If disc lining is exfoliated, discolored or worn hardly, replace all discs.**
- **If only a part of printed numbers is corroded, replace all discs.**
- **Before assembling new discs, soak them in A/T fluid for at least 15 minutes.**


I4JA01512210-01

Center Support Components

S5JB0A5106083



I5JB0A510116-01

1. Center support	6. Second coast brake plate	11. Second brake piston	⊗ : Do not reuse.
2. O-ring	7. Second coast brake disc	12. Second brake plate	FLD : Apply A/T fluid.
3. Second coast brake piston	8. Clutch backing plate	13. Second brake disc	
4. Piston return spring	9. Retaining ring	14. Planetary sun gear	
5. Snap ring	10. Seal ring	15. Second brake hub assembly	

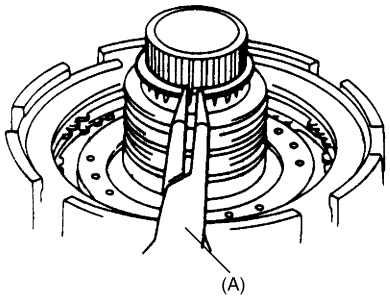
Center Support Disassembly and Assembly

S5JB0A5106084

Disassembly

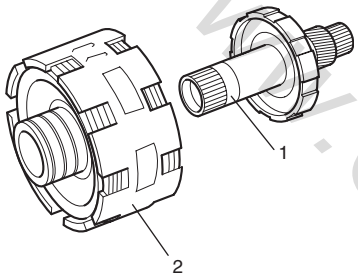
1) Remove retaining ring.

Special tool
(A): 09920–76010



IYSQ01510165-01

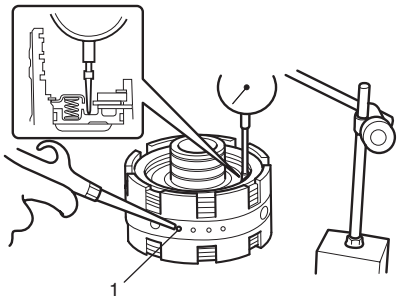
2) Pull out center support assembly (2) from planetary sun gear (1).



I5JB0A510117-01

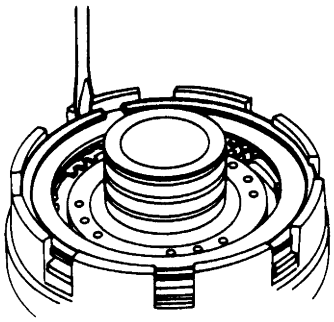
3) Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm², 57 – 113 psi) to oil hole (1) at the extreme left and measure movement of second coast brake (Second coast brake) piston.
If measured value is not within standard range, replace second coast brake plate or second coast brake disc.

Standard second coast brake piston movement
0.75 – 1.35 mm (0.030 – 0.053 in.)



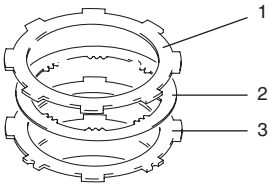
I5JB0A510118-01

4) Remove retaining ring.



IYSQ01510168-01

5) After removing clutch backing plate (1), remove second coast brake plate (3) and second coast brake disc (2).



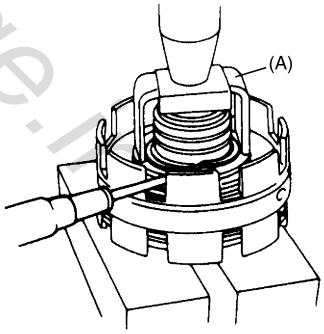
I5JB0A510119-02

6) Using special tool and hydraulic press, compress piston return spring and remove snap ring.

⚠ CAUTION

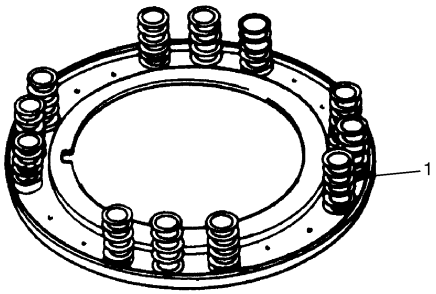
Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

Special tool
(A): 09926–98310



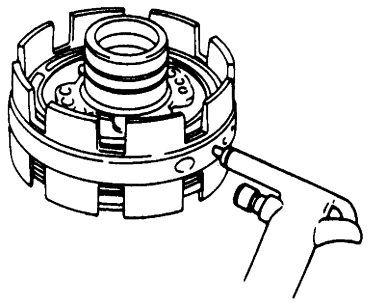
IYSQ01510170-01

7) Remove brake piston return spring (1).



IYSQ01510171-01

8) Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) to oil hole at the extreme left and remove second coast brake piston as shown in the figure. Then remove piston inner O-ring and piston outer O-ring from second coast brake piston.

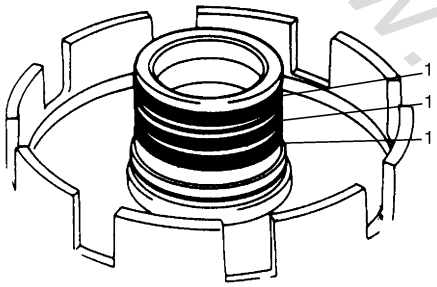


IYSQ01510172-01

9) Remove 3 seal rear rings (1).

NOTE

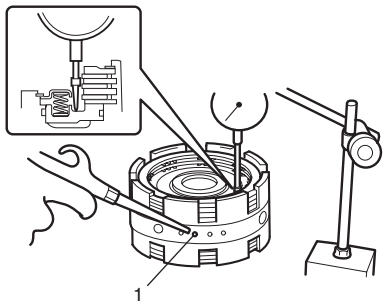
Use care not to open ring more than necessary.



IYSQ01510173-01

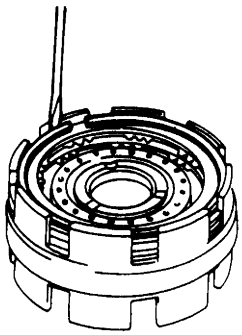
10) Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm^2, 57 – 113 psi) to second hole (1) from the left and measure stroke of second brake (Second brake) piston as shown in the figure.
If measured value is not within standard range, replace second brake plate or second brake disc.

Standard second brake piston stroke
0.97 – 1.70 mm (0.038 – 0.067 in.)



I5JB0A510120-01

11) After removing retaining back plate ring, remove clutch backing plate, second brake plates and second brake discs.



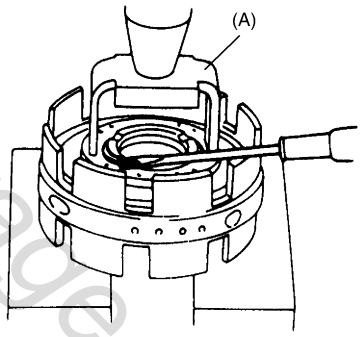
IYSQ01510175-01

12) Using special tool and hydraulic press, compress brake piston return spring and remove snap second coast brake ring.

⚠ CAUTION

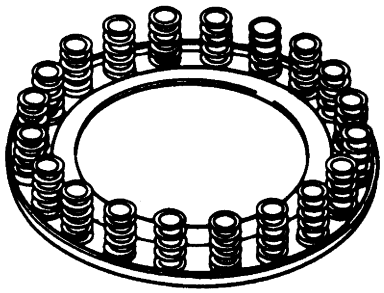
Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

Special tool
(A): 09926–98310



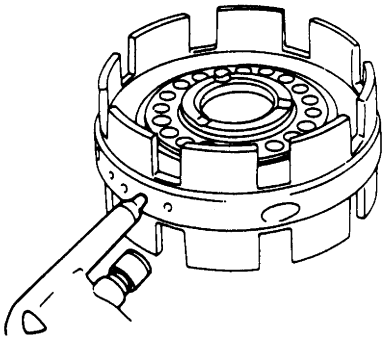
IYSQ01510176-01

13) Remove brake piston return spring.



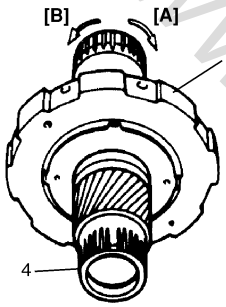
IYSQ01510177-01

14) Blow air into the second air hole from the left and remove second brake piston. Then remove piston inner O-ring and piston outer O-ring from second brake piston.



IYSQ01510178-01

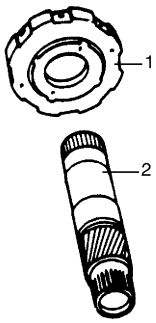
15) With second brake hub assembly (3) held stationary, turn planetary sun gear (4) clockwise to check that it locks and then counterclockwise to check that it turns smoothly.



IYSQ01510179-01

[A]:	Locks
[B]:	Turns

16) Remove second brake hub assembly (1) from planetary sun gear (2).

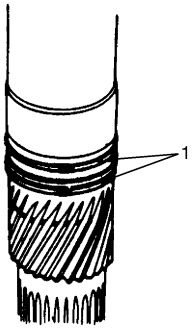


IYSQ01510180-01

17) Remove 2 sun gear seal rings (1) from planetary sun gear.

NOTE

Use care not to open sun gear seal ring more than necessary.

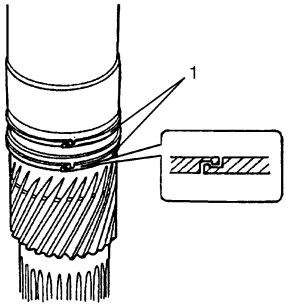


IYSQ01510181-01

Assembly

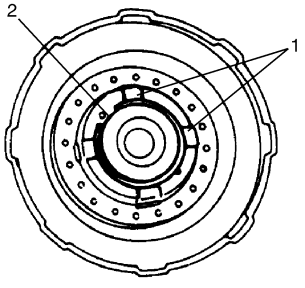
Assemble components by reversing disassembly procedure and noting the following points.

- Snap both ends of sun gear seal ring (1) securely.



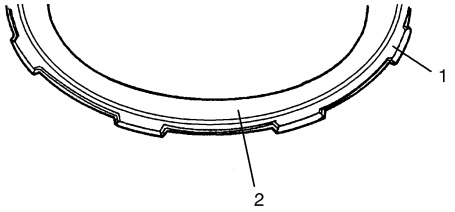
I5JB0A510121-01

- Do not open sun gear seal ring more than necessary.
- Always use new O-ring and apply A/T fluid before installation.
- When installing O-ring, make sure that it is not kinked or caught.
- Push in brake piston horizontally.
- When installing brake piston return spring, be careful so that spring will not fall or tilt.
- When installing snap ring, do not align lug (1) of retainer with opening in snap ring (2).



IYSQ01510182-01

- When installing brake discs, brake plates and clutch backing plate, refer to “Center Support Components: ”.
- Install clutch backing plate (1) with its flat side facing brake disc.



I5JB0A510122-01

2. Step

- After installing each retaining backing plate ring, measure movement of brake piston again.
  If it is not within standard range, it is possible that ring is not installed properly. Then disassemble and reassemble again.

  Standard movement of second coast brake piston and second brake piston
  Second coast brake piston: 1.00 – 1.20 mm (0.039 – 0.047 in.)
  Second brake piston: 1.01 – 2.25 mm (0.040 – 0.089 in.)

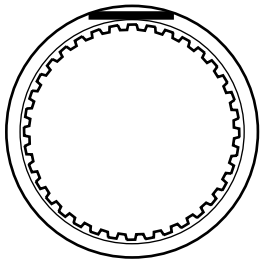
Center Support Inspection

S5JB0A5106089

- Check that sliding surface of discs and plate are not worn or burnt. If necessary, replace them.

  NOTE

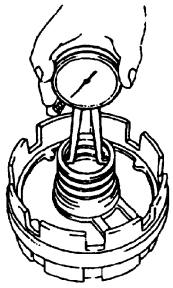
  - **If disc lining is exfoliated, discolored or worn hardly, replace all discs.**
  - **If only a part of printed numbers is corroded, replace all discs.**
  - **Before assembling new discs, soak them in A/T fluid for at least 15 minutes.**



I4JA01512210-01

- Measure inside diameter of center support hub bushing. If inside diameter exceeds limit, replace center support.

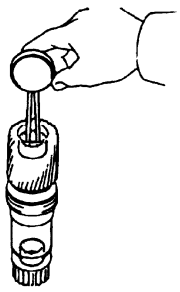
  Center support bushing inside diameter standard
  36.386 – 36.411 mm (1.4325 – 1.4335 in.)



I5JB0A510123-01

- Measure inside diameter of planetary sun gear bushing. If inside diameter exceeds limit, replace planetary sun gear.

  Planetary sun gear bushing inside diameter standard
  21.501 – 21.527 mm (0.8465 – 0.8475 in.)

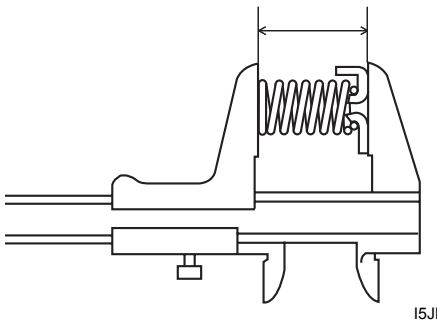


I5JB0A510124-01

- Measure free length of piston return spring.

  Standard free length of second coast brake piston return spring
  16.84 mm (0.663 in.)

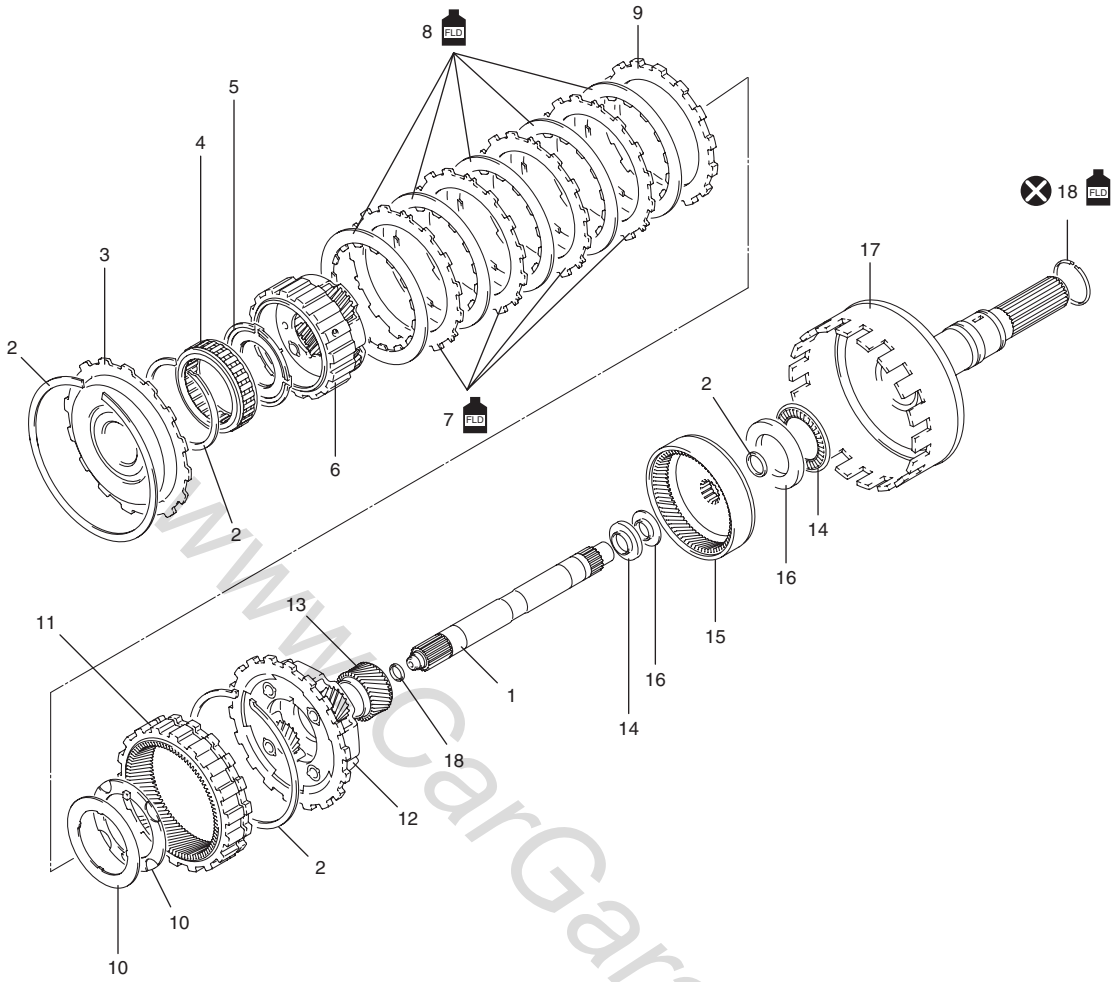
  Standard free length of second brake piston return spring
  15.82 mm (0.623 in.)



I5JB0A510171-01

Planetary Gears and Output Shaft Components

S5JB0A5106085



I5JB0A510125-01

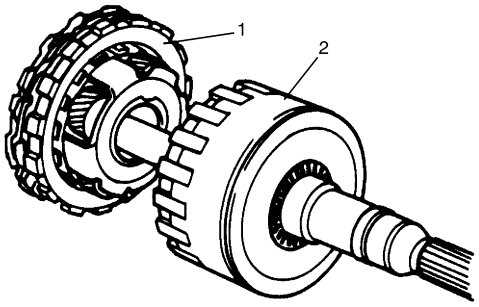
1. Inner shaft	6. Front planetary gear	11. Front planetary ring gear	16. Bearing race
2. Retaining ring	7. Reverse brake plate	12. Rear planetary gear	17. Output shaft assembly
3. Reverse brake reaction plate	8. Reverse brake disc	13. Planetary sun gear	18. Seal ring
4. One-way clutch	9. Reverse brake backing plate	14. Bearing	FLD : Apply A/T fluid.
5. One-way clutch thrust washer	10. Thrust washer	15. Rear planetary ring gear	

Planetary Gears and Output Shaft Disassembly and Assembly

S5JB0A5106086

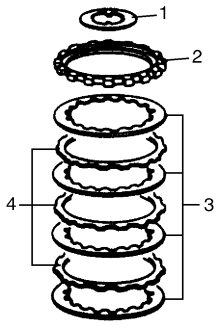
Disassembly

1) Remove front planetary gear assembly (1) from output shaft assembly (2).



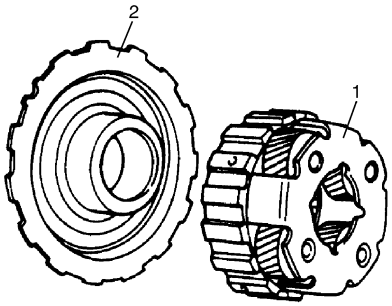
IYSQ01510185-01

2) Remove rear planetary thrust washer (1), reverse brake backing plate (2), reverse brake disc (3) and reverse brake plate (4) from front planetary gear assembly.



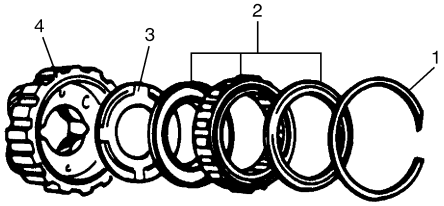
IYSQ01510186-01

3) Remove reverse brake reaction plate (2) from front planetary gear (1).



IYSQ01510187-01

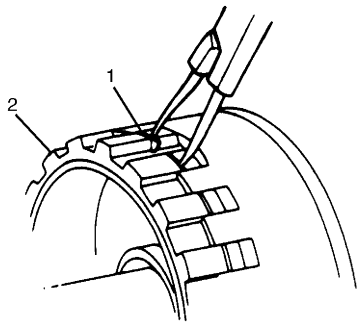
4) After removing retaining ring (1), remove one-way clutch (2) and one-way clutch rear thrust washer (3).



IYSQ01510188-01

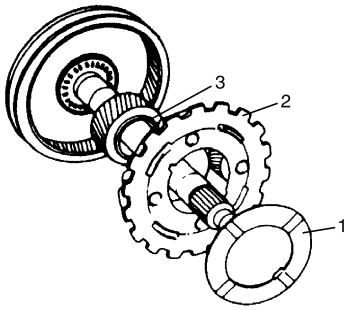
4. Front planetary gear

5) After removing retaining ring (1), remove front planetary ring gear (2), thrust bearing and bearing race.



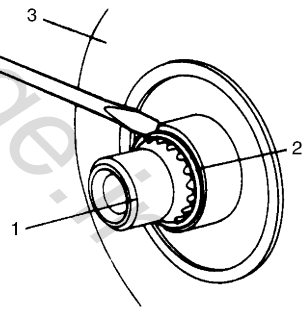
IYSQ01510189-01

6) Remove thrust washer (1), rear planetary gear (2) and rear planetary sun gear (3).



IYSQ01510190-01

7) After removing retaining ring (2) from inner shaft (1), remove rear planetary ring gear (3) and thrust bearing assembly.



IYSQ01510191-01

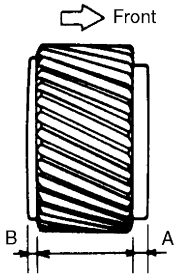
Assembly

Assemble components by reversing disassembly procedure and noting the following points.

- Refer to “Planetary Gears and Output Shaft Components: ” when installing each component.
- Check seal ring for damage before installation and replace if damaged.
- Install planetary sun gear as shown in the figure.

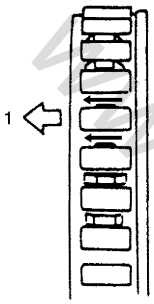
NOTE

A is longer than B.



I5JB0A510155-01

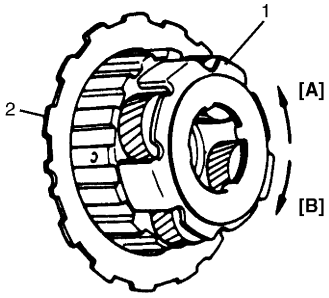
- Fit retaining rings into groove securely.
- Install one-way clutch as shown in the figure.



IYSQ01510193-01

1. Front planetary gear side

- Install reverse brake reaction plate (2) to front planetary gear (1).
  With reverse brake reaction plate (2) fixed stationary, turn front planetary gear (1) clockwise to check that it locks and then counterclockwise to check that it turns smoothly.



IYSQ01510194-01

[A]: Rotates
[B]: Locks

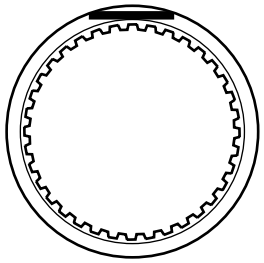
Planetary Gears and Output Shaft Inspection

S5JB0A5106090

- Check that sliding surface of discs and plate are not worn or burnt. if necessary, replace them.

NOTE

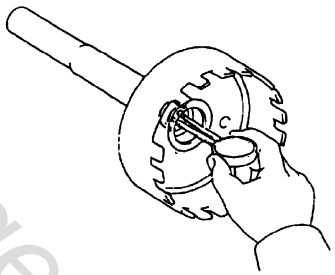
- **If disc lining is exfoliated, discolored or worn hardly, replace all discs.**
- **If only a part of printed numbers is corroded, replace all discs.**
- **Before assembling new discs, soak them in A/T fluid for at least 15 minutes.**



I4JA01512210-01

- Measure inside diameter of output shaft bushing. If inside diameter exceeds limit, replace output shaft.

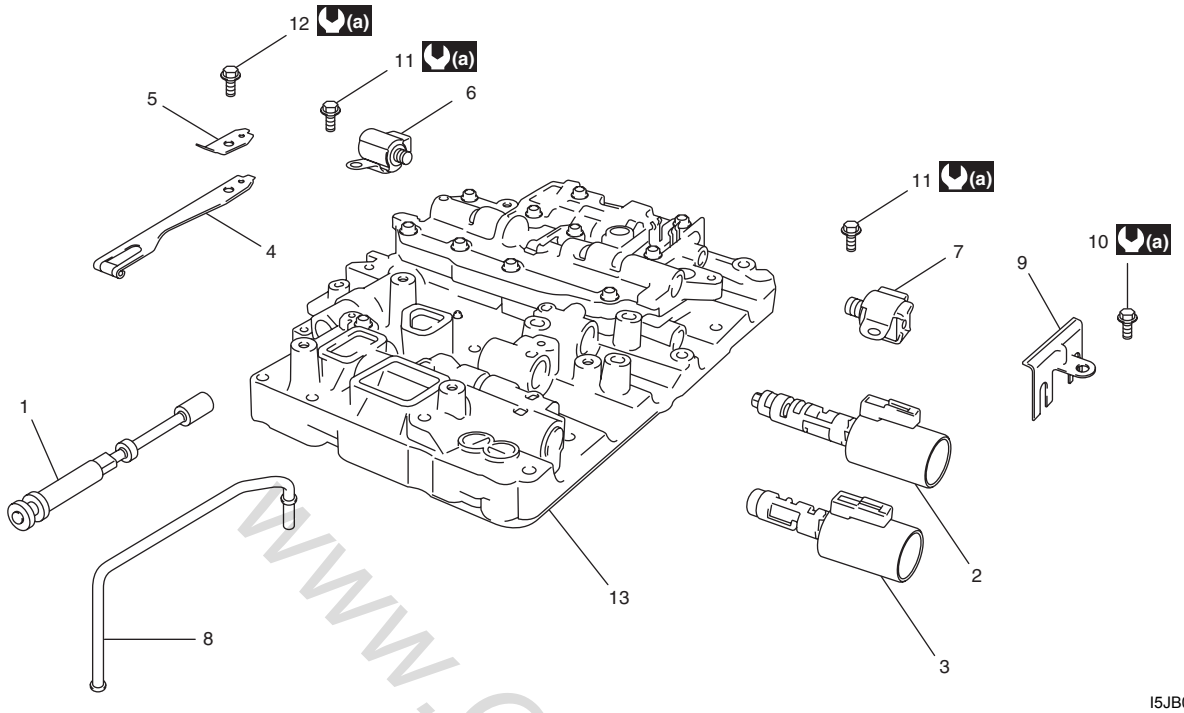
Output shaft bushing inside diameter standard
18.001 – 18.026 mm (0.7087 – 0.7097 in.)



I5JB0A510126-01

Valve Body Assembly Components

S5JB0A5106087



I5JB0A510127-01

1. Manual valve	5. Plate	9. Solenoid clamp	13. Valve body assembly
2. TCC control solenoid valve	6. Shift solenoid valve A	10. Solenoid clamp bolt	(a) : 5.5 N·m (0.55 kgf-m, 4.0 lb-ft)
3. Pressure control solenoid valve	7. Shift solenoid valve B	11. Shift solenoid bolt	
4. Detent spring	8. Over drive (O/D) brake apply tube	12. Detent spring bolt	

Automatic Transmission Unit Assembly

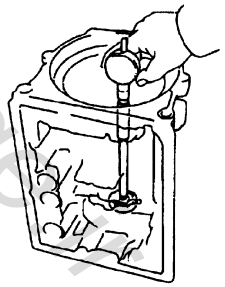
S5JB0A5106088

⚠ CAUTION

When replacing pressure control solenoid valve and/or TCC pressure control solenoid valve, it is strictly required to replace it together with valve body assembly as a set. Replacing pressure control solenoid valve and/or TCC pressure control solenoid valve independently may cause excessive shift shock.

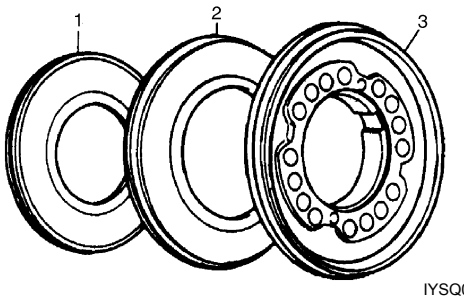
1) Measure inside diameter of transmission case bushing. If inside diameter exceeds limit, replace transmission case.

Transmission case bushing inside diameter standard
38.113 – 38.138 mm (1.5005 – 1.5015 in.)



I5JB0A510129-01

2) After applying A/T fluid to new O-rings, install them to reverse brake piston (3), reaction sleeve (2) and secondary reverse piston (1).



IYSQ01510236-01

3) Measure free length of reverse brake piston return spring.

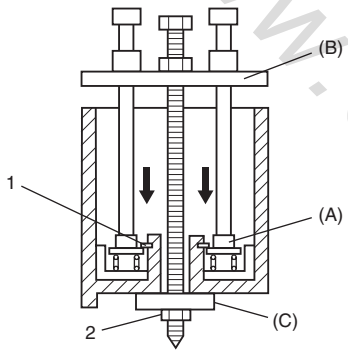
Standard free length of reverse brake piston return spring
16.84 mm (0.663 in.)

4) Install reverse brake piston assembly and brake piston return spring to transmission case, using care not to damage O-ring. Then install snap ring (1) with special tools.

NOTE

- **Install so that opening in snap ring (1) will not align with any of 3 lugs of spring seat.**
- **Do not compress spring more than necessary and do not allow it fall or tilt.**

Special tool
(A): 09926–98320
(B): 09926–98390
(C): 09944–88210



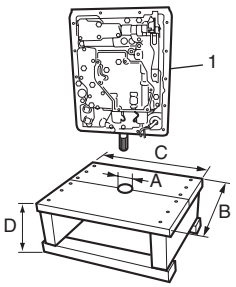
I5JB0A510128-01

2. Nut M12 x 1.75

5) Prepare a stand as shown. It is necessary because work will be done with transmission case (1) set upright from this step on.

NOTE

- **To protect transmission case against damage, spread cloth on stand where case contacts.**
- **A stand of such size as shown in the figure will facilitate work.**



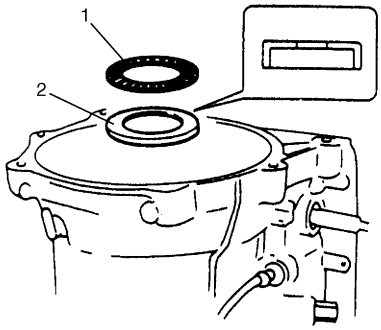
I5JB0A510079-01

A: 50 mm (1.9 in.)	C: 400 mm (15.7 in.)
B: 350 mm (13.8 in.)	D: 200 mm (7.9 in.)

6) Install thrust bearing (1) and thrust bearing race (2) after lubricating them with grease.

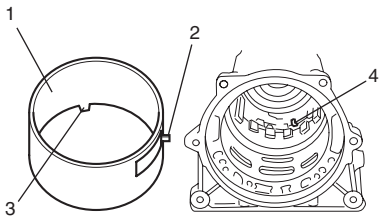
NOTE

Make sure that thrust bearing output shaft race is installed in proper direction.



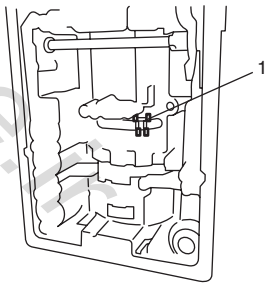
I5JB0A510160-01

7) Install brake applying tube (1) so that its lug (2) fits in a in transmission case (4). After installation, check that 4 lugs (3) along the underside of brake applying tube fit inside of reverse brake piston.



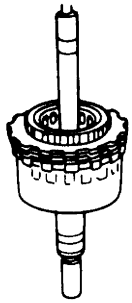
I5JB0A510130-02

8) Install leaf spring (1) as shown in figure.



I5JB0A510131-02

9) Remove reverse brake reaction plate of planetary gear assembly and align lugs of reverse brake plate, reverse brake disc and reverse brake backing plate. Install planetary gear assembly to transmission case so that aligned lugs fit in groove in transmission case.



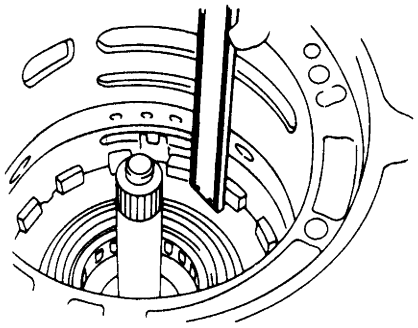
IYSQ01510241-01

10) Measure clearance between reverse brake plate and lugs of transmission case.
If measured value is less than standard range, it is possible that something is installed improperly or dust or fluid is on reverse brake disc, etc. If it exceeds standard range, adjust it to standard clearance with selective reverse brake backing plates as shown after making sure reverse brake disc, reverse brake plate and reverse brake backing plate are in good condition. If the clearance is out of specification, select another plate with suitable thickness from the list below and replace it.

Standard clearance between reverse brake plate and lugs of transmission case
0.52 – 1.27 mm (0.020 – 0.050 in.)

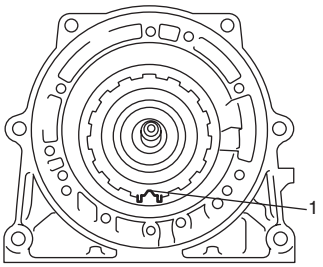
Available plate thickness

Identification No.	Thickness
No identification	2.95 – 3.05 mm (0.116 – 0.120 in.)
"325"	3.20 – 3.30 mm (0.126 – 0.120 in.)
"350"	3.45 – 3.55 mm (0.136 – 0.140 in.)
"375"	3.70 – 3.80 mm (0.146 – 0.150 in.)
"400"	3.95 – 4.05 mm (0.156 – 0.159 in.)
"425"	4.20 – 4.30 mm (0.165 – 0.169 in.)



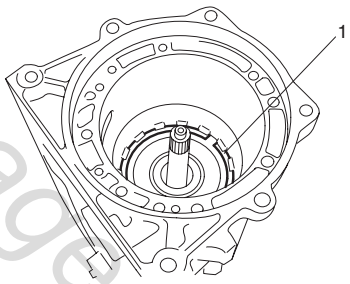
IYSQ01510242-01

11) Install reverse brake reaction plate so that its lug with dent (1) comes to specified position as shown in figure.



I5JB0A510132-01

12) Using screwdriver with vinyl tape or the like wound at its tip, install retaining reaction plate ring (1). After installation, check that ring is in groove securely.

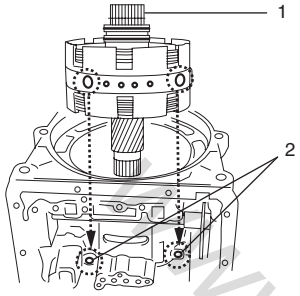


I5JB0A510084-01

13) After confirming that lugs of all brake plates and brake discs are in grooves securely, hold retaining ring (1) of planetary sun gear, install center support assembly by aligning bolt holes (2) in center support and transmission case.

NOTE

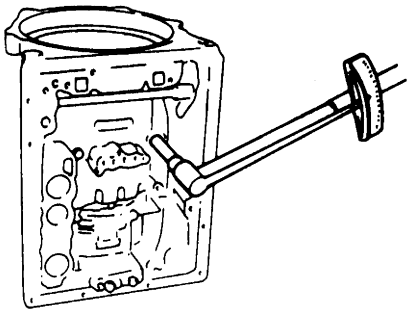
Unless retaining ring of planetary sun gear is held, brake valve gets off center support and that will make it impossible to align fluid holes with bolt holes.



I5JB0A510133-01

14) Tighten center support bolts by certain amount at a time till specified tightening torque is obtained.

Tightening torque
Center support bolt: 26 N·m (2.6 kgf-m, 19.0 lb-ft)

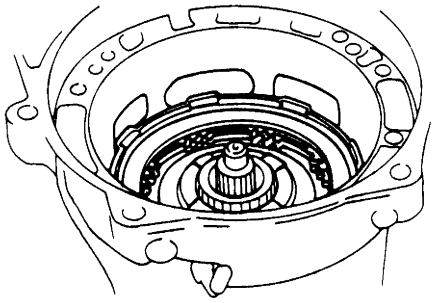


IYSQ01510246-01

15) Install direct clutch assembly by aligning splines in direct clutch cylinder with planetary sun gear.

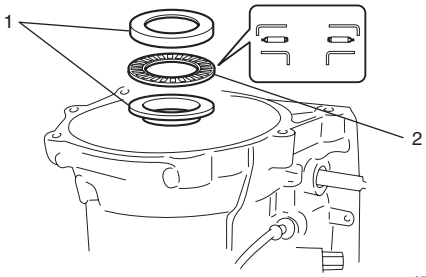
NOTE

Ends of splines in direct clutch cylinder and planetary sun gear should come almost in match.



IYSQ01510247-01

16) Apply grease to thrust bearing (1) and bearing races (2), and then install them to direct clutch.

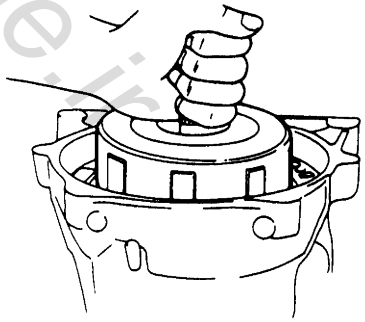


I5JB0A510134-01

17) Install forward clutch assembly by putting all lugs of direct clutch disc hub together and matching them with groove cut in direct clutch input hub, and at the same time aligning splines in forward clutch hub with inner shaft.

NOTE

Use care not to let forward clutch rear No.1 race and thrust bearing installed to forward clutch hub fall off.



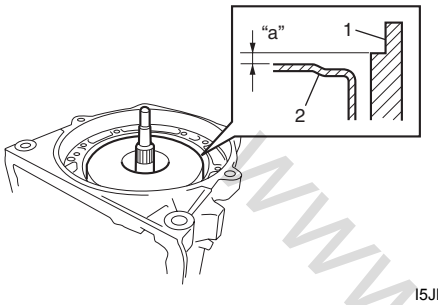
IYSQ01510249-01

18) When clutch disc and plate have been replaced, check height difference between forward clutch input shaft and transmission case (1) by measuring as shown in the figure.

NOTE

If measured value is less than standard value, remove forward clutch assembly and install it again.

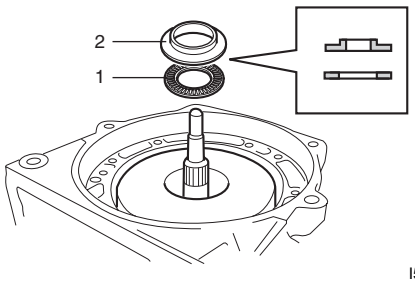
Standard height difference between forward clutch input shaft and transmission case
"a": About 2.0 mm (0.079 in.)



I5JB0A510135-01

2. Forward clutch

19) Apply grease to thrust bearing (1) and bearing race (2), and then install them to forward clutch input shaft.

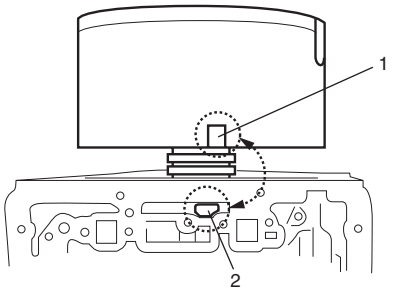


I5JB0A510136-01

20) Install O/D case by aligning cutout in O/D case (1) and that in transmission case.

NOTE

Use care not to drop thrust rear race installed to O/D case.



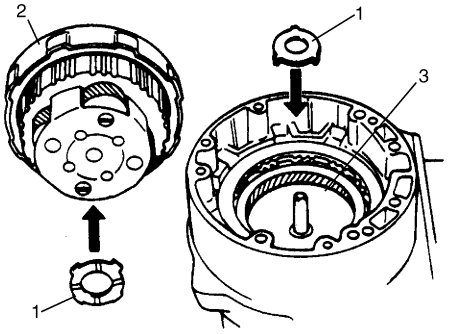
I5JB0A510137-02

2. Cutout in automatic transmission

21) Apply grease to thrust washers (1) and install them to O/D planetary gear (2) and planetary ring gear (3), and then install O/D input shaft assembly to O/D case.

NOTE

- **Fit claws of thrust washer into holes securely.**
- **Use care not to drop thrust washer installed to O/D planetary gear.**



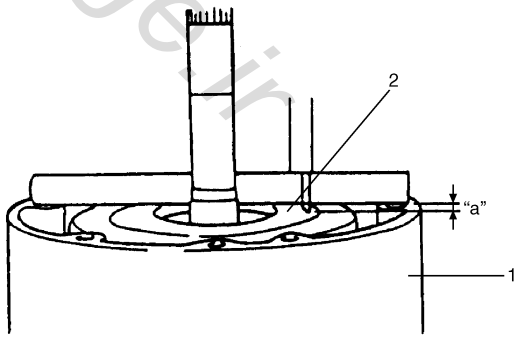
I5JB0A510138-01

22) When clutch disc or plate has been replaced, check height difference between O/D case (1) and O/D clutch cylinder (2) by measuring it as shown in the figure.

NOTE

Measure at the highest point along inner circumference of O/D clutch cylinder.

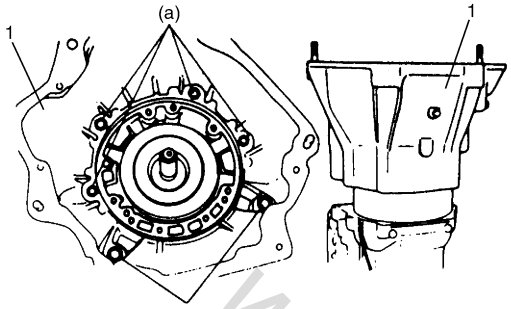
Standard height difference between O/D case and O/D clutch cylinder
"a": About 3.5 mm (0.138 in.)



I5JB0A510161-01

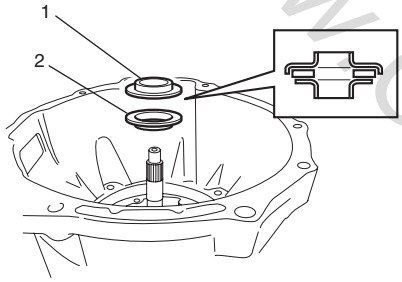
23) Apply A/T fluid to new housing O-ring and install it to O/D case. Then install converter housing (1) and tighten housing bolt to specified torque.

Tightening torque
Torque converter housing bolt (a): 35 N·m (3.5 kgf-m, 25.5 lb-ft)
Torque converter housing bolt (b): 58 N·m (5.8 kgf-m, 42.0 lb-ft)



I5JB0A510162-01

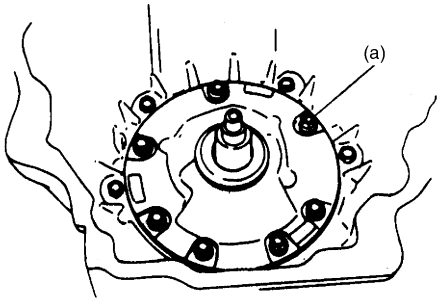
24) Apply grease to bearing race (1) and thrust bearing (2) and install them to O/D clutch cylinder.



I5JB0A510139-01

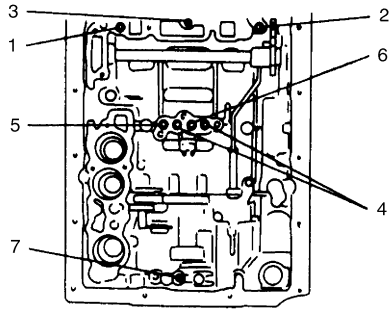
25) Apply A/T fluid to new oil pump cover O-ring and install it to oil pump assembly. Then install oil pump assembly aligning bolt holes in O/D case with those in transmission case oil pump assembly. Apply seal packing to oil pump assembly bolts and tighten them by certain amount of torque at each time one after another till specified torque is attained.

Tightening torque
Oil pump bolt (a): 22 N·m (2.2 kgf-m, 16.0 lb-ft)



IYSQ01510257-01

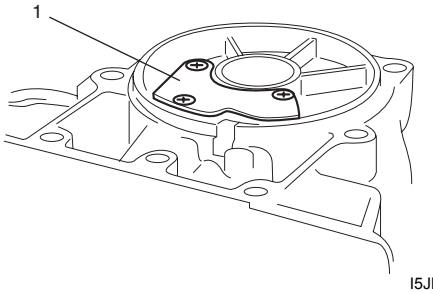
26) Apply 2 – 4 kg/cm^2 air pressure into fluid holes in the figure as numbered and check operation sound of each part.



IYSQ01510258-01

1. O/D clutch	5. Second coast brake
2. O/D brake	6. Second brake
3. Forward clutch	7. Reverse brake
4. Direct clutch	

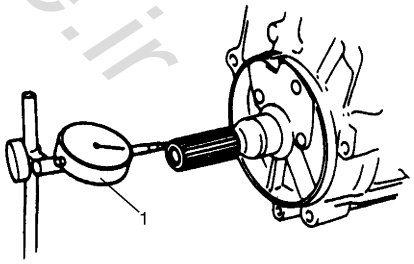
27) Take clown transmission from stand and install new gasket and cover plate (1).



I5JB0A510089-01

28) Measure clearance in shaft direction by applying dial gauge (1) to output shaft as shown in the figure.

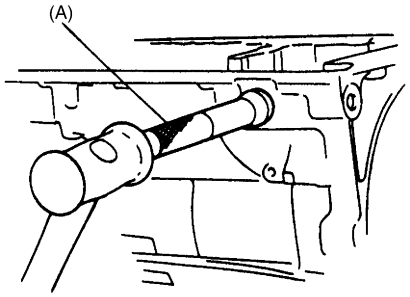
Standard clearance in shaft direction
0.3 – 0.9 mm (0.012 – 0.035 in.)



IYSQ01510259-01

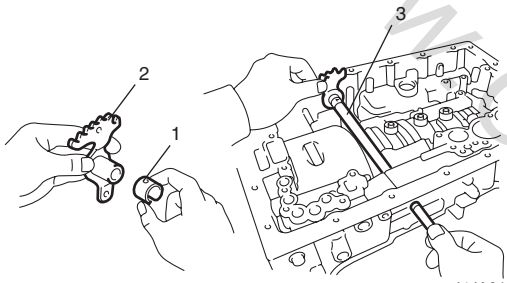
29) Check that inner shaft runs smoothly.
30) Apply grease to lip of new oil lip seal and drive in oil lip seal with special tool till it contacts transmission case.

Special tool
(A): 09923–46020



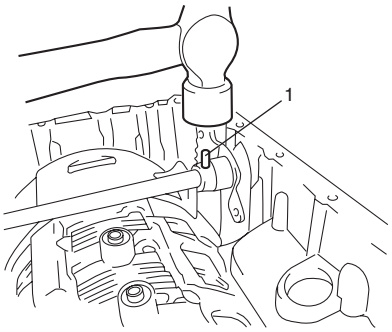
IYSQ01510261-01

31) Install a new spacer (1) to manual shift lever (2).
32) Install manual shift shaft (3) to transmission case through manual shift lever.



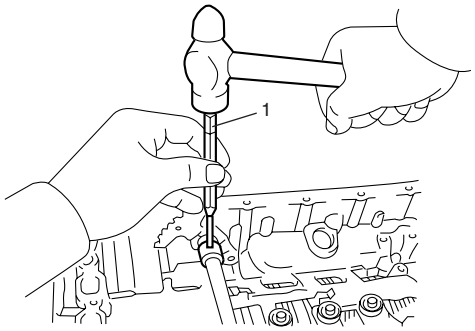
I4JA01512266-01

33) Drive in manual shift lever pin (1) by using hammer.



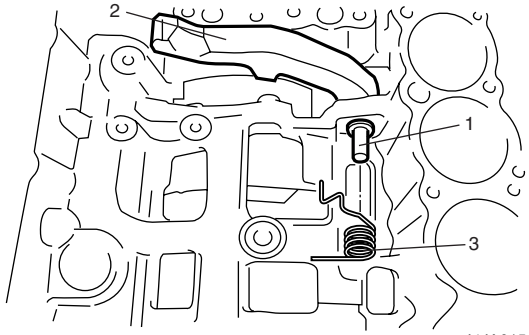
I4JA01512267-01

34) Align hole in sleeve cover with dent in manual shift lever and caulk securely with pin punch (1). Then check that manual shift shaft turns smoothly.



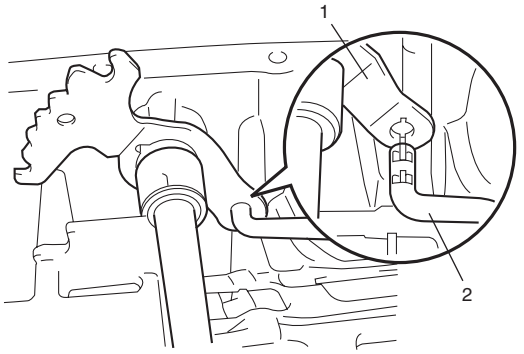
I4JA01512268-01

35) Install parking lock pawl (2), parking pawl pin (1) and parking pawl spring (3).



I4JA01512269-01

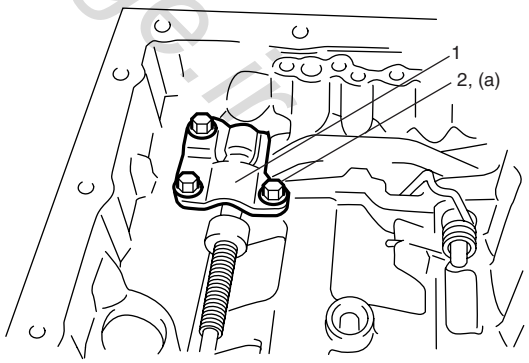
36) Connect parking lock rod (2) to manual shift lever (1) as shown in the figure.



I4JA01512270-01

37) Install parking lock pawl bracket (1).
Tighten parking pawl bracket bolts (2) to specified torque.

Tightening torque
Parking pawl bracket bolt (a): 7.4 N·m (0.74 kgf-m, 5.5 lb-ft)

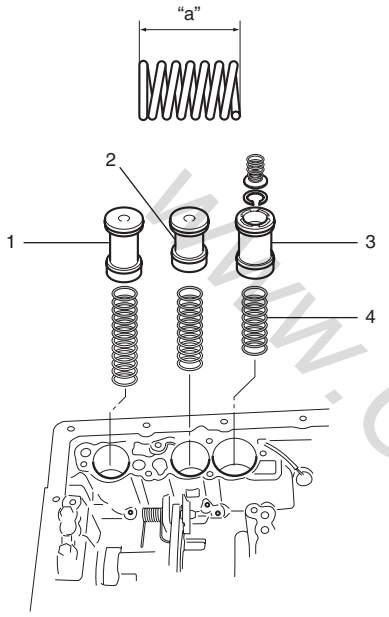


I4JA01512271-01

38) Apply A/T fluid to new O-ring and spring and install them to accumulator piston and install accumulator piston to transmission case.

Accumulator spring specification

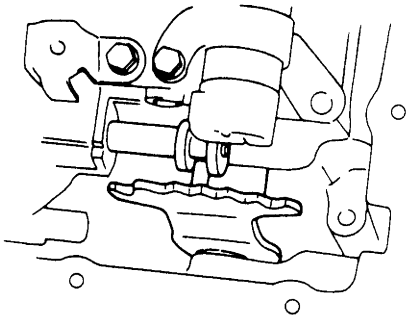
Accumulator piston	Accumulator spring	
	Spring free length "a"	Color
Forward clutch	75.03	White + Blue
Direct clutch	57.74	White + Purple
Second brake	56.16	Purple



I5JB0A510140-01

1.	Forward clutch accumulator piston
2.	Direct clutch accumulator piston
3.	Second brake accumulator piston
4.	Accumulator spring

39) After confirming that accumulator piston is pushed all the way down, match pin of manual shift lever with groove in manual valve.

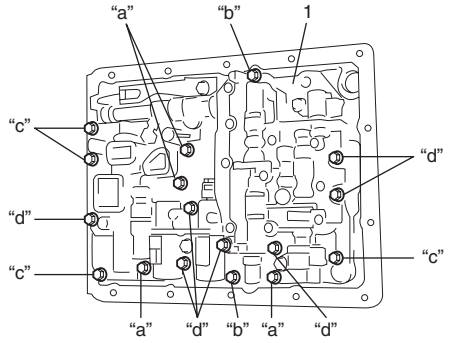


IYSQ01510269-01

40) Fix valve body (1) by using bolts with each nominal length as indicated in the figure and tightening to specified torque.

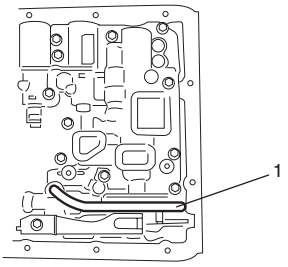
Tightening torque
Valve body bolt: 10 N·m (1.0 kgf-m, 7.5 lb-ft)

Valve body bolt nominal length
"a": 28 mm (1.10 in.)
"b": 30 mm (1.18 in.)
"c": 36 mm (1.42 in.)
"d": 45 mm (1.77 in.)



I5JB0A510141-01

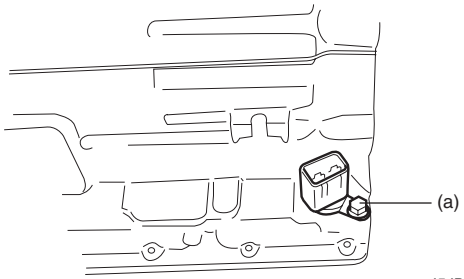
41) Install O/D brake applying tube (1).



I5JB0A510143-02

42) Lubricate new O-ring with A/T fluid and attach it to grommet of solenoid wire harness. Then connect solenoid wire harness to transmission case and fix it with solenoid wire harness clamp. Connect each connector to solenoid. And install new gasket and brake applying cover.

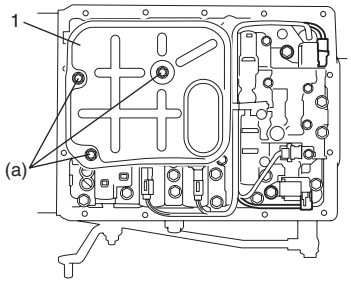
Tightening torque
Transmission wire connector bolt (a): 16 N·m (1.6 kgf-m, 11.5 lb-ft)



I5JB0A510142-01

43) Connect solenoid coupler to each solenoid.
44) Install oil strainer (1) to valve body assembly.

Tightening torque
Oil strainer bolt (a): 5.5 N·m (0.55 kgf-m, 4.0 lb-ft)



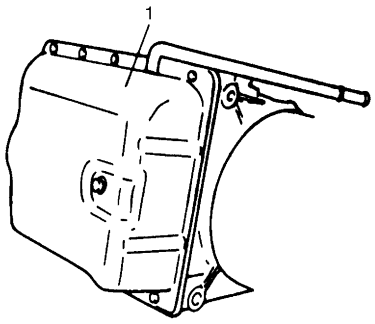
I5JB0A510144-01

45) Install transmission oil pan (1) with new oil pan gasket.

NOTE

Align cutout in oil pan gasket with that in transmission case.

Tightening torque
Transmission oil pan bolt: 4.5 N·m (0.45 kgf-m, 3.5 lb-ft)



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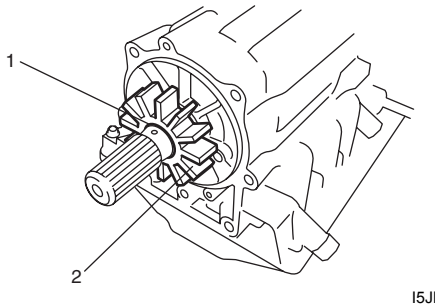
46) With wood rough key attached to output shaft, install sensor rotor (2) by aligning its key groove with wood rough key and install C-ring.

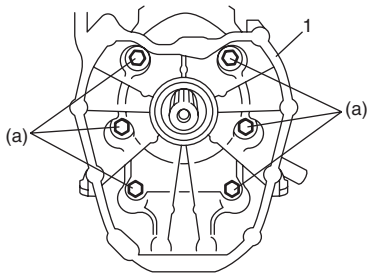


I5JB0A510072-01

1. C-ring

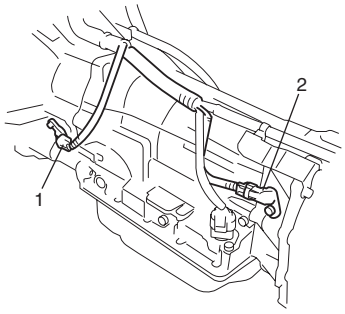
47) Install adapter case (1) with new adapter gasket to transmission case and tighten adapter case bolts to specified torque.

Tightening torque
Adapter case bolt (a): 31 N·m (3.1 kgf-m, 30.0 lb-ft)



I5JB0A510145-01

48) Apply A/T fluid to new O-rings and install them to input shaft speed sensor (1) and output shaft speed sensor (2), and then install input shaft speed sensor (1) and output shaft speed sensor (2).



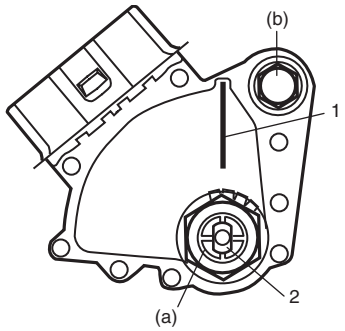
I5JB0A510163-01

49) After turning manual shift shaft fully rearward, turn it back by 2 notches and set it to “N” range. Then install shift switch, lock washer and nut and tighten nut. After tightening it, bend claws of lock washer.

Tightening torque
Manual shift shaft nut (a): 12.5 N·m (1.25 kgf-m, 9.0 lb-ft)

50) With neutral reference line (1) and cut groove (2) in switch aligned, tighten lock bolt.

Tightening torque
Transmission range sensor bolt (b): 5.3 N·m (0.53 kgf-m, 4.0 lb-ft)

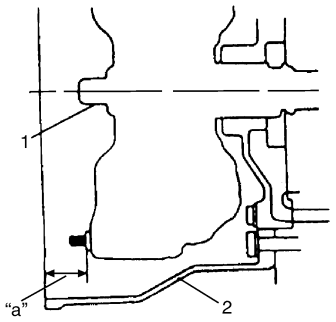


I5JB0A510147-01

51) Confirm that torque converter is fully fitted in transmission. Confirmation can be done by measuring dimension between end surface of housing case (2) and drive plate installation seat.

Standard dimension between end surface of case housing and drive plate installation seat "a"
17.4 mm (0.69 in.)

52) Check that torque converter turns smoothly and apply grease to center piece (1) of torque converter.



IYSQ01510279-01

Specifications

Tightening Torque Specifications

S5JB0A5107001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Fluid pressure check hole bolt	8	0.8	6.0	☞
A/T fluid drain plug	20	2.0	14.5	☞
Manual selector assembly mounting bolt	18	1.8	13.0	☞
Manual select cable nut	13	1.3	9.5	☞
Manual shift shaft nut	12.5	1.25	9.0	☞ / ☞
Transmission range sensor bolt	5.3	0.53	4.0	☞ / ☞
Manual select lever nut	12.5	1.25	9.0	☞
Input shaft speed sensor bolt	7	0.7	5.0	☞
Output shaft speed sensor bolt	7	0.7	5.0	☞
Oil pump bolt	7.5	0.75	5.5	☞
Center support bolt	26	2.6	19.0	☞
Torque converter housing bolt	35	3.5	25.5	☞
Torque converter housing bolt	58	5.8	42.0	☞
Oil pump bolt	22	2.2	16.0	☞
Parking pawl bracket bolt	7.4	0.74	5.5	☞
Valve body bolt	10	1.0	7.5	☞
Transmission wire connector bolt	16	1.6	11.5	☞
Oil strainer bolt	5.5	0.55	4.0	☞
Transmission oil pan bolt	4.5	0.45	3.5	☞
Adapter case bolt	31	3.1	30.0	☞

NOTE

The specified tightening torque is also described in the following.
"Manual Selector Assembly Components: "
"Select Cable Component: "
"Oil Cooler Hose and Pipe Components: "
"Automatic Transmission Unit Components: "
"Oil Pump Components: "
"Valve Body Assembly Components: "

Reference:
For the tightening torque of fastener not specified in this section, refer to "Fastener Information: in Section 0A".

Special Tools and Equipment

Recommended Service Material

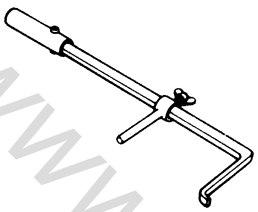
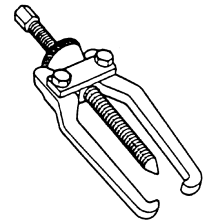
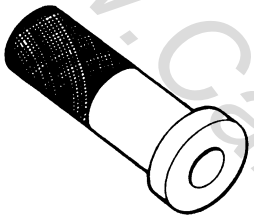
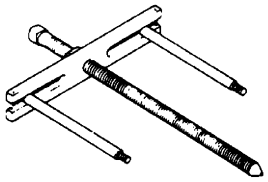
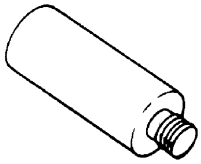
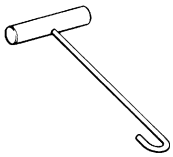
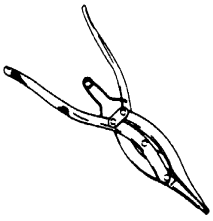
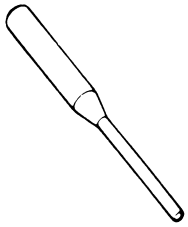
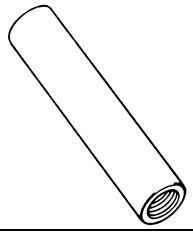
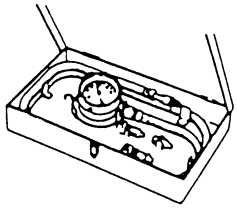
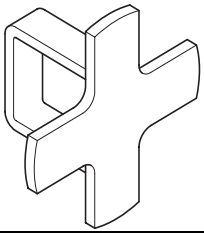
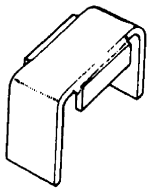
S5JB0A5108001

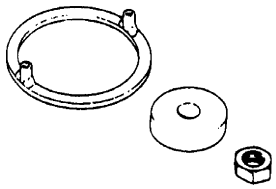
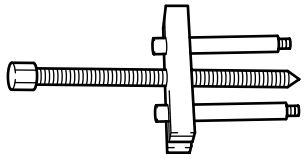
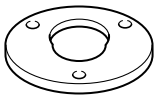
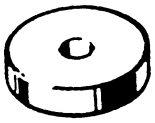
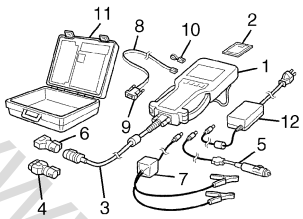
NOTE

Required service material is also described in the following.
“Oil Pump Components: ”
“Overdrive (Planetary Gear Side) Components: ”
“Overdrive (Case Side) Components: ”
“Forward Clutch Components: ”
“Direct Clutch Components: ”
“Center Support Components: ”
“Planetary Gears and Output Shaft Components: ”

Special Tool

S5JB0A5108002

09913–50121 Oil seal remover ☞ 	09913–65135 Bearing puller ☞ 
09913–85210 Bearing installer ☞ 	09918–48211 Oil pump remover ☞ 
09918–48220 Oil pump remover attachment (M8) ☞ 	09920–20310 Clutch spring hook ☞ 
09920–76010 Snap ring opener ☞ 	09922–89810 Shifter lock pin remover (3.5 mm) ☞ 
09923–46020 Joint pipe ☞ 	09925–37811–001 Oil pressure gauge ☞ 
09926–96510 Spring compressor ☞ 	09926–98310 Clutch spring compressor ☞ / ☞ / ☞ / ☞ / ☞ / ☞ 

09926–98320 Spring compressor No. 1 set ☞ / ☞ / ☞ 	09926–98390 Remover ☞ / ☞ 
09927–66520 Oil pump remover ☞ 	09944–88210 Bearing housing installer ☞ / ☞ 
SUZUKI scan tool — This kit includes following items. 1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loop back connector, 11. Storage case, 12. Power supply ☞ / ☞ 	

Manual Transmission/Transaxle

General Description

Manual Transmission Construction

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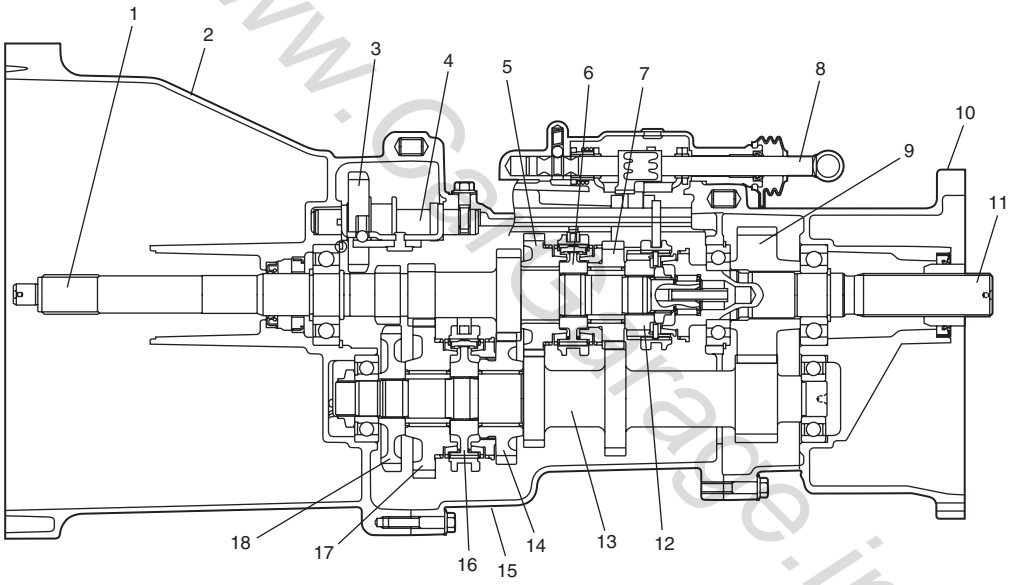
The manual transmission consists of the input shaft, output shaft, countershaft and reverse idle gear shaft which are installed in the die-cast aluminum alloy case. This transmission provides five forward speeds and one reverse speed. The 1st, 2nd, 3rd and 4th speeds are for speed reduction drive, 5th speed is for direct drive. The low speed (1st and 2nd) synchronizer is mounted on the countershaft and engaged with the countershaft 1st or 2nd gear. The high speed (3rd and 4th) synchronizer is mounted on of the input shaft and engaged with the input shaft 3rd and 4th gear. The 5th speed synchronizer is mounted on the input shaft and engaged with the output shaft. The gear shift lever case is located at the upper behind the transmission case and has a cam which prevents direct gear shifting from the 5th speed gear into the reverse gear.

As the die-cast aluminum alloy case are sealed with liquid type gasket, it is necessary to use genuine sealant or its equivalent on its mating surface when reassembling them. Also, the case fastening bolts must be tightened to specified torque by means of the torque wrench and tightening over or below the specified torque should be avoided.

The description under “Repair Instructions” covers the transfer partially which is next to the transmission as well, but their gear boxes are independent and each of them has its own drain and filler plugs for the oil change or the level check.



I5JB0A520017-02

1. Input shaft	7. 3rd gear	13. Countershaft
2. Transmission front case	8. Gear shift shaft	14. 2nd gear
3. Reverse idler gear	9. Output shaft gear	15. Transmission rear case
4. Reverse shaft	10. Adapter case	16. Low speed synchronizer hub
5. 4th gear	11. Output shaft	17. 1st gear
6. High speed synchronizer hub	12. 5th speed synchronizer hub	18. Reverse gear

Diagnostic Information and Procedures

Manual Transmission Symptom Diagnosis

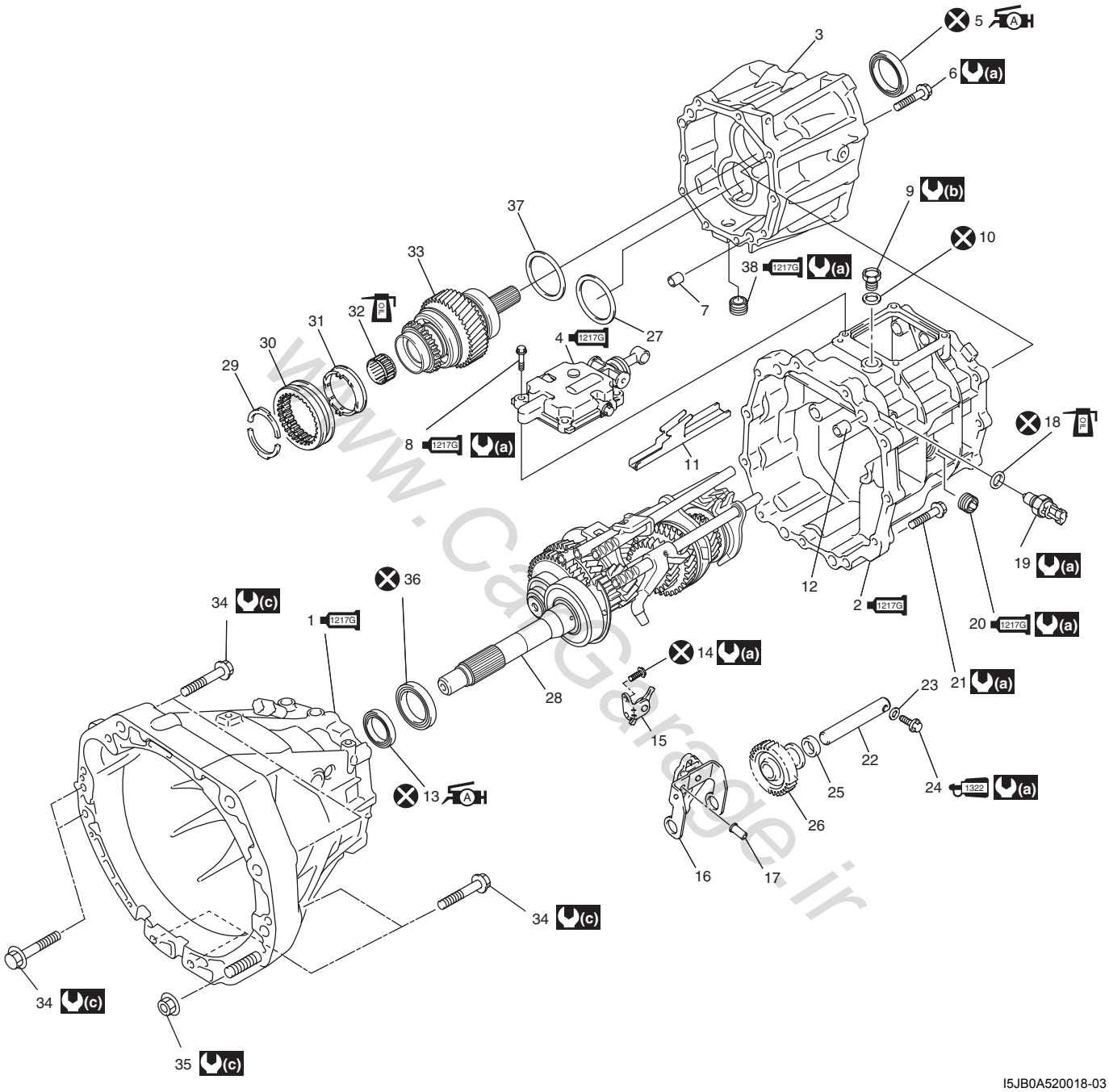
S5JB0A5204001

Condition	Possible cause	Correction / Reference Item
Gear slipping out of mesh	Worn shift fork shaft	*Replace.*
	Worn shift fork or synchronizer sleeve	*Replace.*
	Weak or damaged locating spring	*Replace.*
	Worn bearings on input shaft, countershaft or output shaft	*Replace.*
	Worn chamfered tooth on sleeve or gear	*Replace sleeve and gear.*
	Missing or disengagement of snap ring(s)	*Install or replace.*
Gears refusing to disengage	Weakened or broken synchronizer spring	*Replace.*
	Distorted shift shaft or shift fork	*Replace.*
Hard shifting	Improper clutch pedal free travel	*Replace pedal arm and/or clutch master cylinder.*
	Distorted or broken clutch disc	*Replace.*
	Damaged clutch pressure plate	*Replace clutch cover.*
	Air in clutch hydraulic system	*Bleed air.*
	Fluid leakage from clutch fluid line	*Locate leaking point and repair.*
	Worn synchronizer ring	*Replace.*
	Worn chamfered tooth on sleeve or gear	*Replace sleeve and gear.*
	Distorted shift shaft	*Replace.*
Noise	Inadequate or insufficient lubricant	*Replenish.*
	Damaged or worn bearing(s)	*Replace.*
	Damaged or worn gear(s)	*Replace.*
	Damaged or worn synchronizer ring	*Replace.*
	Damaged or worn chamfered tooth on sleeve or gear	*Replace.*

Repair Instructions

Manual Transmission Assembly Components

S5JB0A5206001

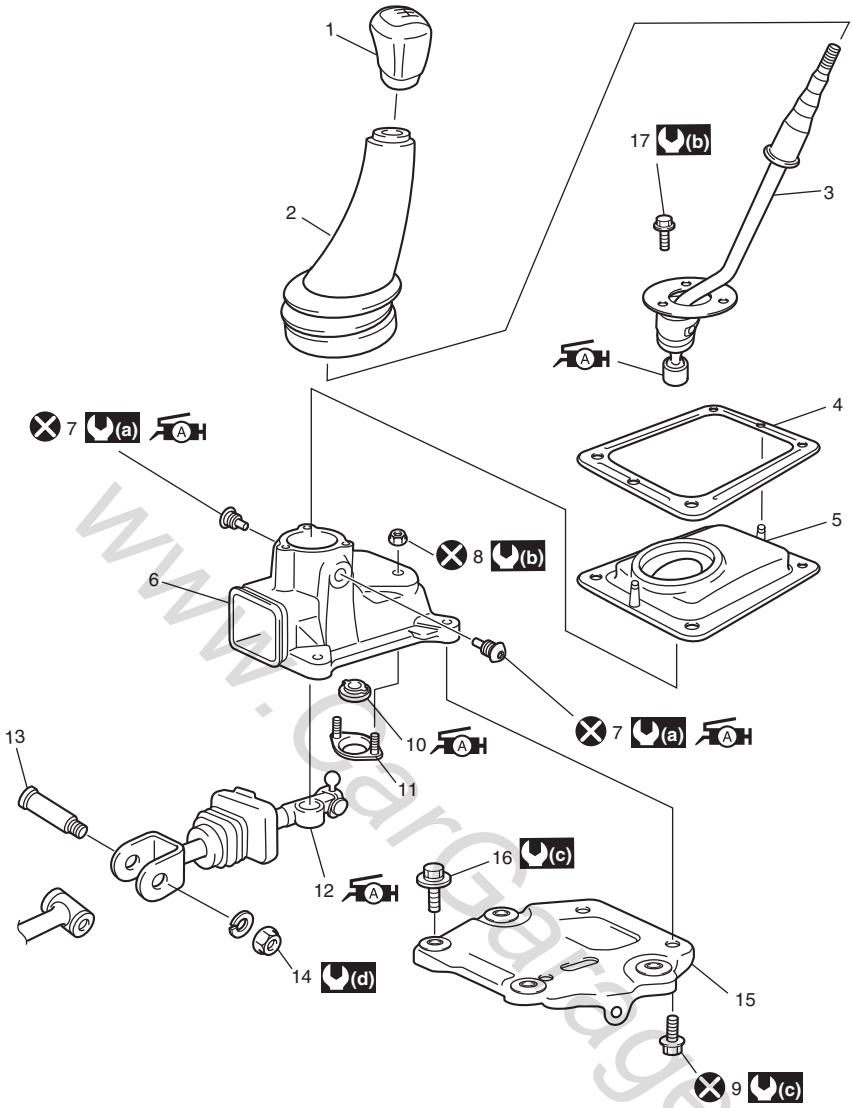


I5JB0A520018-03

1217G 1. Transmission front case : Apply sealant 99000-31260 to mating surface of front case and rear case.	16. Reverse gear shift lever	31. 5th speed synchronizer ring
1217G 2. Transmission rear case : Apply sealant 99000-31260 to mating surface of rear case and adapter case.	17. Reverse shift locating	32. Input shaft needle bearing
3. Adapter case	18. O-ring	33. Output shaft assembly
1217G 4. Gear shift lever front case assembly : Apply sealant 99000-31260 to mating surface of rear case and gear shift lever front case assembly.	19. Back up light switch	34. Transmission to engine bolt
A 5. Adapter case oil seal : Apply grease 99000-25010 to oil seal lip.	1217G 20. Oil filler plug : Apply sealant 99000-31260 to all around thread part of bolt.	35. Transmission to engine nut
6. Adapter case bolt	21. Transmission case bolt	36. Pump seal
7. Knock pin	22. Reverse gear shaft	37. Output shaft shim
1322 8. Gear shift lever case bolt : Apply thread lock 99000-32110 to all around thread part of bolt.	23. Reverse shaft bolt washer	1217G 38. Drain plug : Apply sealant 99000-31260 to all around thread part of bolt.
9. Oil hole plug	1322 24. Reverse shaft bolt : Apply thread lock 99000-32110 to all around thread part of bolt.	(a) : 23 N·m (2.3 kgf-m, 17.0 lb-ft)
10. Oil hole gasket	25. Reverse gear shaft washer	(b) : 10 N·m (1.0 kgf-m, 7.5 lb-ft)
11. Oil gutter	26. Reverse idler gear	(c) : 85 N·m (8.5 kgf-m, 61.5 lb-ft)
12. Knock pin	27. Countershaft shim	: Do not reuse.
A 13. Input shaft oil seal : Apply grease 99000-25010 to oil seal lip.	28. Input shaft & countershaft assembly	MO : Apply transmission oil.
14. Low gear shift inverse lever bolt	29. 5th speed synchronizer lever	
15. Low gear shift inverse lever	30. 5th speed synchronizer sleeve	

Gear Shift Control Lever Rear Case Assembly Components

S5JB0A5206002

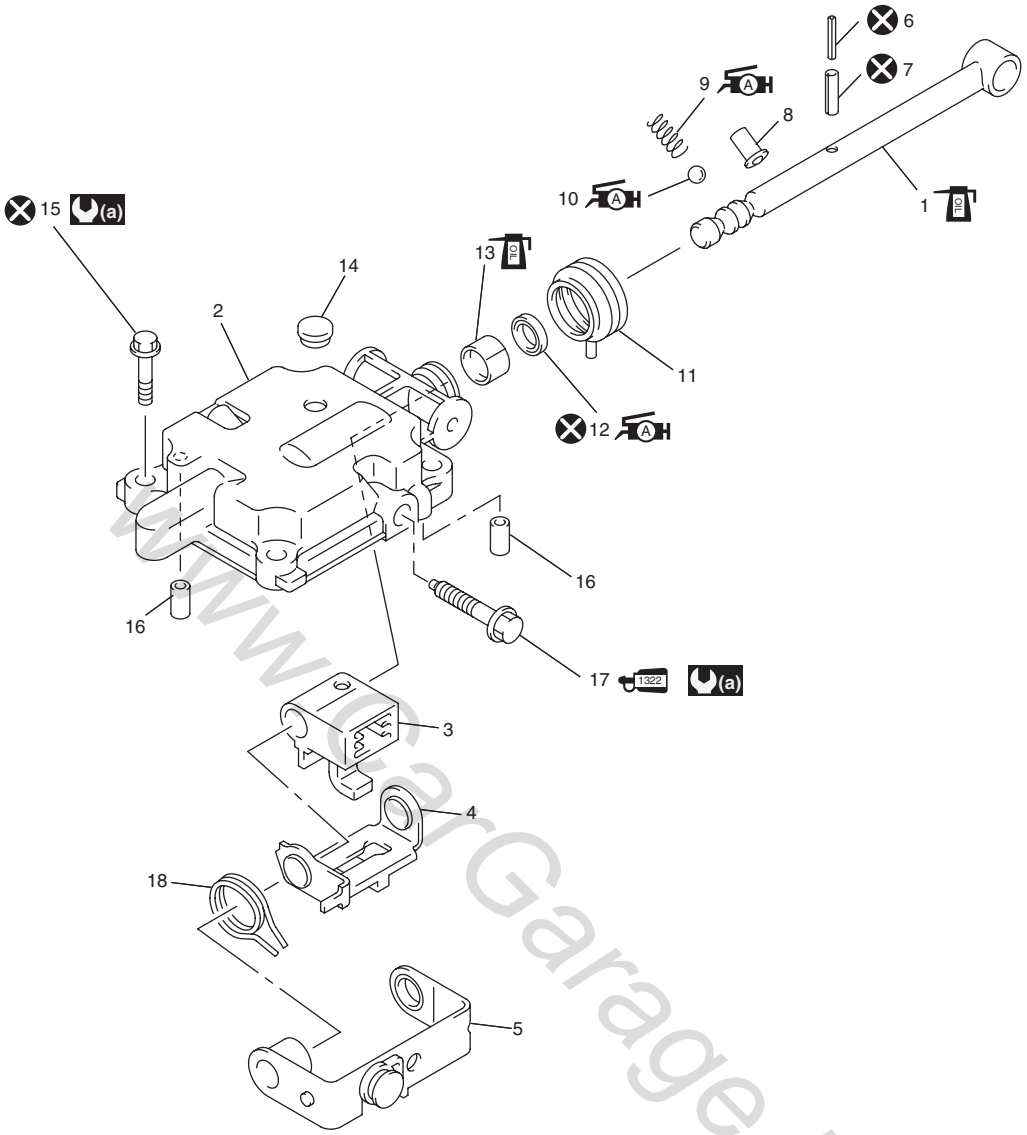


I5JB0A520019-08

1. Gear shift control lever knob	9. Gear shift lever rear case bolt	17. Gear shift lever case cover bolt
2. Gear shift control lever boot	10. Gear shift control joint bush : Apply grease 99000-25010 to bush.	(a) : 9 N·m (0.9 kgf-m, 6.5 lb-ft)
3. Gear shift control lever assembly : Apply grease 99000-25010 to bush of lever.	11. Gear shift stopper plate	(b) : 10 N·m (1.0 kgf-m, 7.5 lb-ft)
4. Gear shift control boot cover	12. Gear shift control shaft : Apply grease 99000-25010 to sliding part of joint.	(c) : 23 N·m (2.3 kgf-m, 17.0 lb-ft)
5. Gear shift control lever No.2 sheet	13. Control shaft joint bolt	(d) : 18 N·m (1.8 kgf-m, 13.0 lb-ft)
6. Gear shift lever rear case	14. Control shaft joint nut	: Do not reuse.
7. Control lever locating bolt : Apply grease 99000-25010 to end of bolt.	15. Gear shift lever case plate	
8. Gear shift stopper plate nut	16. Gear shift lever rear case plate bolt	

Gear Shift Lever Front Case Assembly Components

S5JB0A5206026

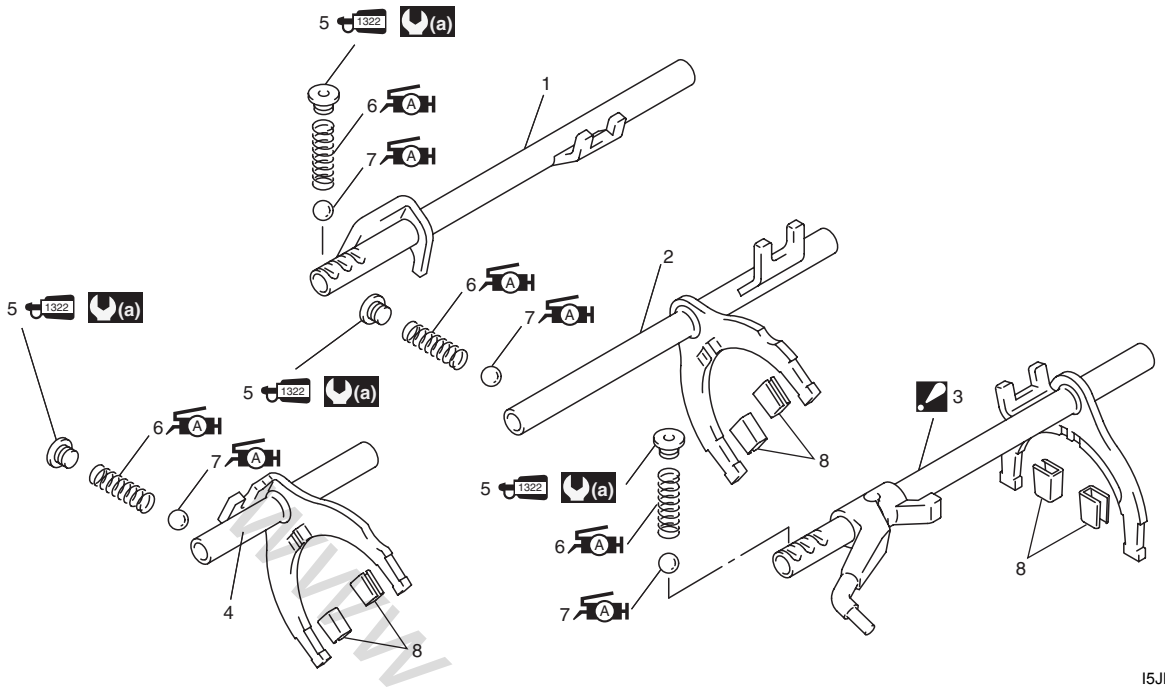


I5JB0A520001-02

1. Gear shift shaft	8. Gear shift locating retainer	15. Gear shift lever front case bolt
2. Gear shift lever front case	9. Gear shift locating spring : Apply grease 99000-25010 to spring.	16. Knock pin
3. Gear shift & select arm	10. Gear shift locating ball : Apply grease 99000-25010 to ball.	1322 17. Gear shift stop bolt : Apply thread lock 99000-32110 to bolt thread.
4. Gear shift interlock plate	11. Gear shift shaft boot	18. Gear select return spring
5. Reverse gear shift limit plate	12. Gear shift shaft oil seal : Apply grease 99000-25010 to seal lip.	(a) : 23 N·m (2.3 kgf-m, 17.0 lb-ft)
6. Gear shift arm inner pin	13. Gear shift case bush	: Do not reuse.
7. Gear shift arm outer pin	14. Gear shift case plug	: Apply transmission oil.

Gear Shift Shaft and Fork Components

S5JB0A5206027

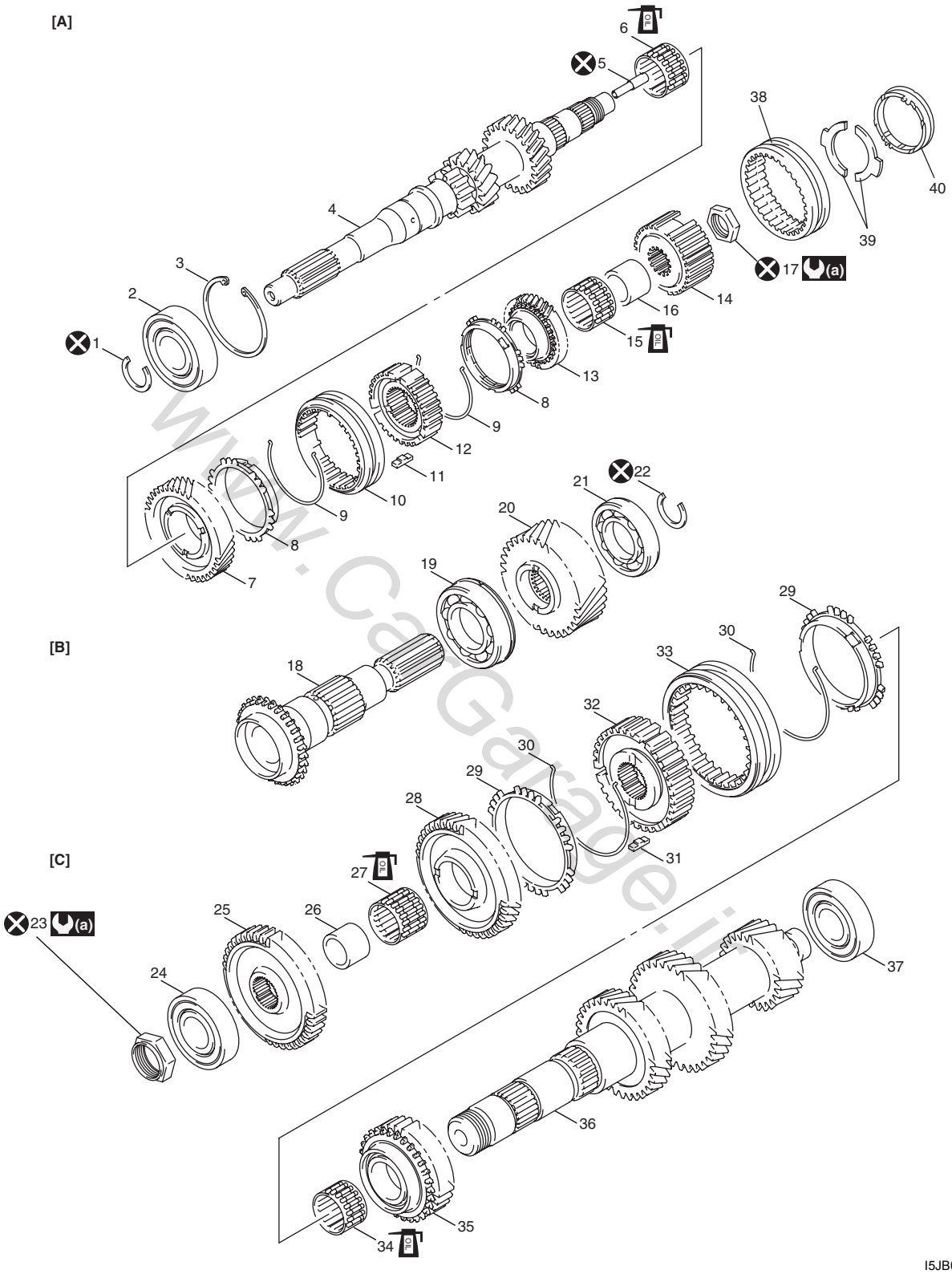


I5JB0A520002-02

1. Low speed gear shift shaft	4. Low speed gear shift fork	A H 7. Gear shift shaft ball : Apply grease 99000-25010 to ball.
2. High speed gear shift fork	1322 5. Gear shift locating bolt : Apply thread lock 99000-32110 to bolt thread.	8. Gear shift fork bush
3. 5th & reverse gear shift fork : Never disassemble.	A H 6. Gear shift locating spring : Apply grease 99000-25010 to spring.	(a) : 23 N·m (2.3 kgf-m, 17.0 lb-ft)

Input Shaft Assembly, Output Shaft Assembly and Countershaft Assembly Components

S5JB0A5206003



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[A]: Input shaft assembly	14. 5th speed synchronizer hub	30. Low speed synchronizer spring
[B]: Output shaft assembly	15. High speed gear needle bearing	31. Low speed synchronizer key
[C]: Countershaft assembly	16. Input shaft 3rd gear bush	32. Low speed synchronizer hub
1. Snap ring	17. Input shaft 5th hub nut	33. Low speed synchronizer sleeve
2. Input shaft front bearing	18. Output shaft	34. Countershaft gear needle bearing
3. Input shaft front bearing circlip	19. Output shaft front bearing	35. 2nd gear
4. Input shaft	20. Output shaft gear	36. Countershaft
5. Input shaft union	21. Output shaft rear bearing	37. Countershaft rear bearing
6. High speed gear needle bearing	22. Output shaft rear snap ring	38. 5th speed synchronizer sleeve
7. 4th gear	23. Countershaft front bearing nut	39. 5th speed synchronizer lever
8. High speed synchronizer ring	24. Countershaft front bearing	40. 5th speed synchronizer ring
9. High speed synchronizer spring	25. Countershaft reverse gear	(a) : 210 N·m (21.0 kgf-m, 152.0 lb-ft)
10. High speed synchronizer sleeve	26. Countershaft low needle bush	: Do not reuse.
11. High speed synchronizer key	27. Countershaft gear needle bearing	: Apply transmission oil.
12. High speed synchronizer hub	28. 1st gear	
13. 3rd gear	29. Low speed synchronizer ring	

Manual Transmission Oil Change

S5JB0A5206004

1) Before changing or inspecting oil, be sure to stop engine and lift vehicle horizontally.
2) With vehicle lifted up, check oil level and leakage. If leakage exists, correct or repair it.

NOTE

Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage.

3) Remove oil filler plug (2).
4) Remove drain plug (1), and drain old oil.
5) Apply sealant to thread of drain plug (1), and tighten it to specified torque.

"A": Sealant 99000–31260 (SUZUKI Bond No.1217G)

Tightening torque
Transmission oil drain plug (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)

NOTE

If water or rust is mixed in drained oil, be sure to check breather hose and boot of transmission.

6) Pour new specified oil until oil level reaches bottom of oil filler plug hole (3) as shown in figure.

NOTE

It is highly recommended to use API 75 W-90 gear oil.

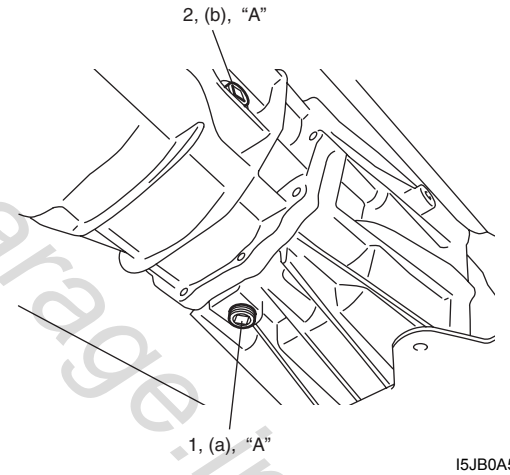
Gear oil specifications
: API GL-4 (For SAE classification, refer to viscosity chart [A] in figure.)

Transmission gear oil capacity (Reference)
1.9 liters (4.0 / 3.3 US / Imp. pt)

7) Apply sealant to thread of filler plug, and then tighten it to specified torque.

"A": Sealant 99000–31260 (SUZUKI Bond No.1217G)

Tightening torque
Oil filler plug (b): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



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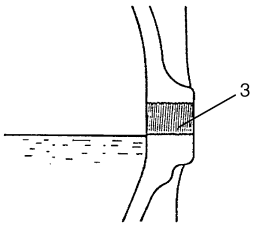

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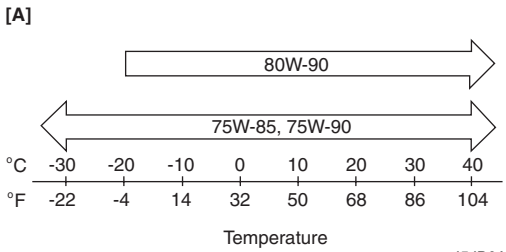


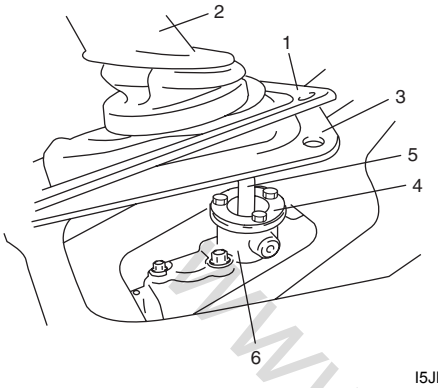
I5JB0A520021-02

Transmission Shift Control Lever Removal and Installation

S5JB0A5206005

Removal

1) Remove front console box referring to “Console Box Components: in Section 9H”.
2) Lift up boot cover (1), boot (2) and sheet (3).
3) Remove case cover (4) and take out shift control lever (5) from gear shift lever rear case (6).



I5JB0A520023-02

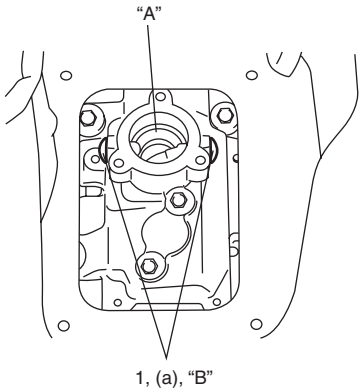
Installation

1) Tighten new control lever locating bolts (1) to specified torque, if removed.

   Tightening torque
   Control lever locating bolt (a): 9 N·m (0.9 kgf-m, 6.5 lb-ft)

2) Apply grease to pivot portions and seat, then install shift control lever.

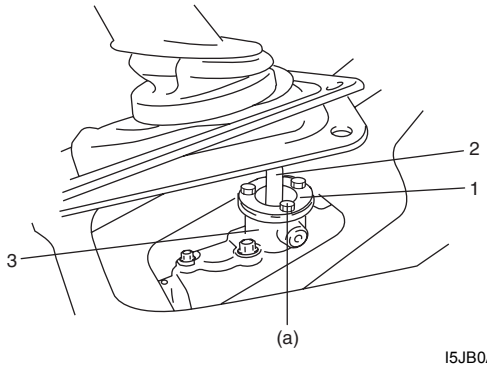
   “A”: Grease 99000–25010 (SUZUKI Super Grease A)



I5JB0A520024-03

3) Set shift control lever (2) to gear shift lever rear case.
4) Install case cover (1) to gear shift lever rear case (3). Tighten case cover bolt to specified torque.

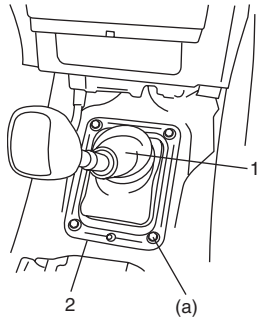
   Tightening torque
   Case cover bolt (a): 10 N·m (1.0 kgf-m, 7.5 lb-ft)



I5JB0A520025-02

5) Install sheet, boot (1) with boot cover (2) to floor panel.

   Tightening torque
   Control lever boot cover bolt (a): 12 N·m (1.2 kgf-m, 9.0 lb-ft)



I5JB0A520027-02

6) Install front console box referring to “Console Box Components: in Section 9H”.

Transmission Shift Control Lever Inspection

S5JB0A5206006

- Check transmission shift control lever lower portion and control lever locating sheet for excessive wear.
- Check boot for damage.

Correct or replace if necessary.

Back Up Light Switch Removal and Installation

S5JB0A5206007

Removal

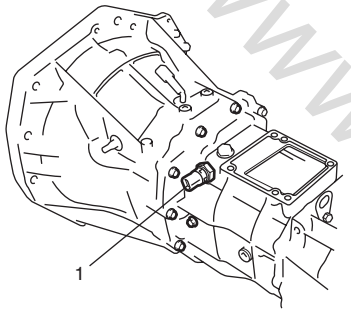
⚠ WARNING

Refrain from work while exhaust No.2 pipe is hot.

NOTE

- **When replacing switch, use care not to let dust enter transmission through switch hole.**

1) Hoist vehicle and disconnect connector from back up light switch.
2) Remove back up light switch (1) from transmission rear case.



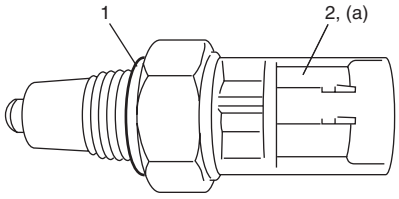
I5JB0A520005-01

Installation

Reverse removal procedure for installation noting the following.

- Apply oil to new O-ring (1) and then install back up light switch to transmission rear case.

Tightening torque
Back up light switch (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



I5JB0A520004-01

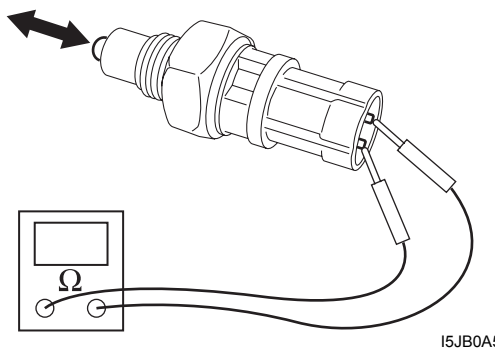
- Check back up light for proper function with ignition switch turned ON and reverse position.

Back Up Light Switch Inspection

S5JB0A5206008

Check back up light switch for function using ohmmeter. If resistance is not as specified below, replace back up light switch.

Back up lamp switch specification
Switch ON (Push): Continuity
Switch OFF (Release): No continuity



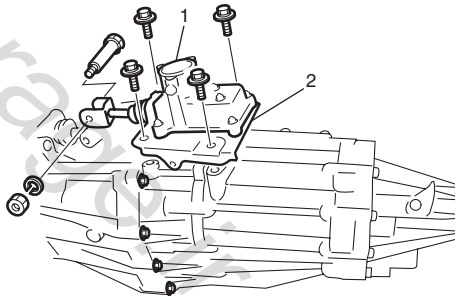
I5JB0A520006-01

Gear Shift Control Lever Rear Case Assembly Removal and Installation

S5JB0A5206028

Removal

1) Dismount transmission assembly from vehicle referring to “Manual Transmission Assembly Dismounting and Remounting: ”
2) Remove gear shift control lever rear case assembly (1) with plate (2) from transfer case.

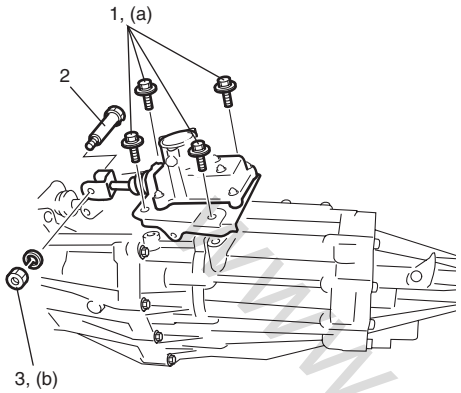


I5JB0A520007-02

Installation

1) Install gear shift control lever rear case assembly with its plate to transfer case referring to figure for proper installing direction of control shaft joint bolt (2). Tighten plate bolts (1) and control shaft joint nut (3) to specified torque.

Tightening torque
Plate bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)
Control shaft joint nut (b): 18 N·m (1.8 kgf-m, 13.0 lb-ft)



I5JB0A520008-02

2) Remount transmission assembly to vehicle referring to “Manual Transmission Assembly Dismounting and Remounting: ”

Gear Shift Control Lever Rear Case Assembly Disassembly and Reassembly

S5JB0A5206029

Disassembly and reassembly component parts referring to “Gear Shift Control Lever Rear Case Assembly Components: ”.

Gear Shift Control Lever Rear Case Assembly Inspection

S5JB0A5206030

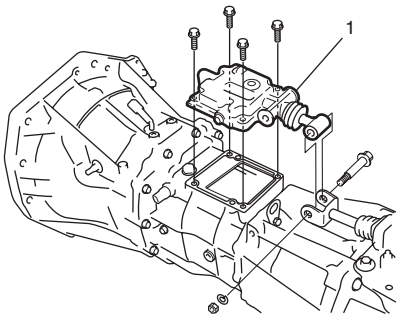
- Check that gear shift control shaft moves smoothly without abnormal noise. If abnormality is found, replace defective part.
- Check bush and boot for damage and deterioration. If abnormality is found, replace defective part.

Gear Shift Lever Front Case Assembly Removal and Installation

S5JB0A5206031

Removal

1) Dismount transmission assembly referring to “Manual Transmission Assembly Dismounting and Remounting: ”
2) Remove gear shift lever front case assembly (1) from transmission rear case.

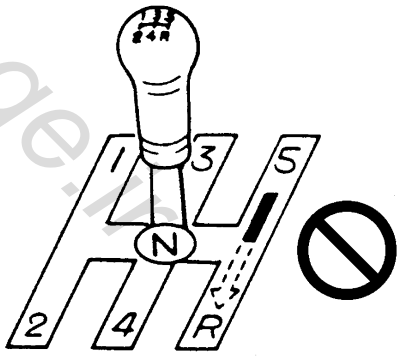


I5JB0A520009-02

Installation

NOTE

- **Install gear shift lever front case to transmission rear case without using sealant for functional check.**
- **Install shift control lever and check to make sure that it shifts smoothly according to shift pattern as shown in the figure.**



I5JB0A520010-01

1) Clean mating surface of both rear case and gear shift lever front case (2), and uniformly apply sealant to lever case as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter, and then mate it with gear shift lever front case.

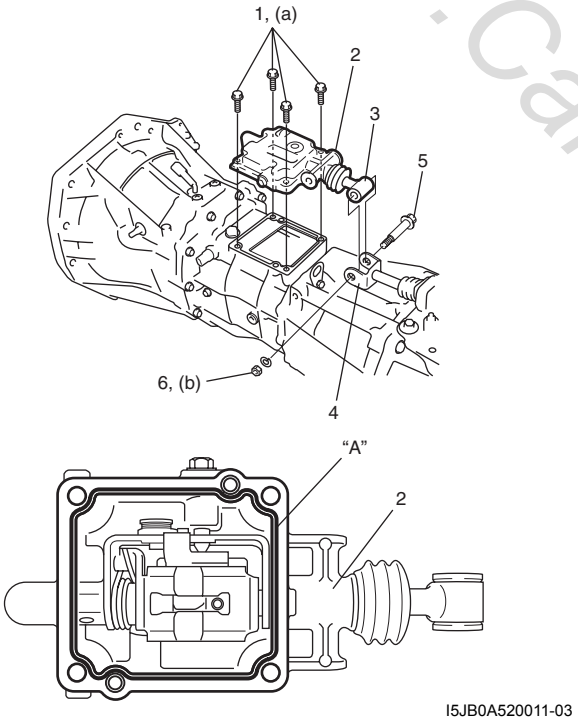
"A": Sealant 99000–31260 (SUZUKI Bond No.1217G)

2) Install lever case to rear case and then tighten new lever case bolts (1) to specified torque.

Tightening torque
Gear shift lever front case bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)

3) Connect gear shift shaft (3) of lever case assembly to gear shift control shaft (4) of gear shift control lever rear case assembly referring to figure for proper installing direction of control shaft joint bolt (5). Tighten control shaft joint nut (6) to specified torque.

Tightening torque
Control shaft joint nut (b): 18 N·m (1.8 kgf-m, 13.0 lb-ft)



I5JB0A520011-03

4) Remount transmission assembly referring to "Manual Transmission Assembly Dismounting and Remounting: "

Gear Shift Lever Front Case Assembly Disassembly and Reassembly

S5JB0A5206032

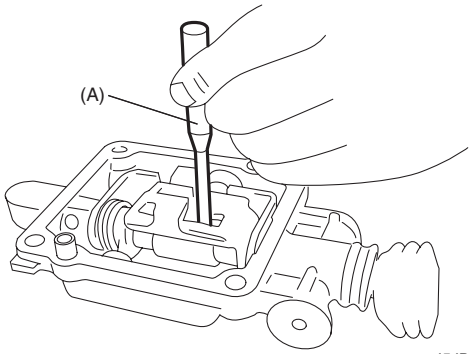
Disassembly

1) Remove gear shift case plug.
2) Drive out gear shift arm pin using special tool, and then disassemble components parts.

⚠ CAUTION

Be careful to disconnect gear shift shaft from gear shift lever front case so that gear shift locating ball and gear shift locating spring may be jumped out.

Special tool
(A): 09925–78210

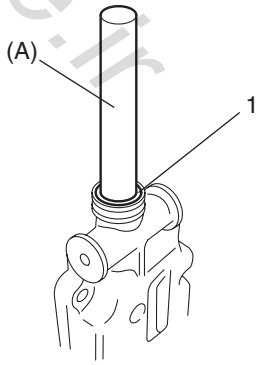


I5JB0A520012-01

Reassembly

1) Install new gear shift shaft oil seal (1) to gear shift lever front case using special tool.

Special tool
(A): 09923–46020

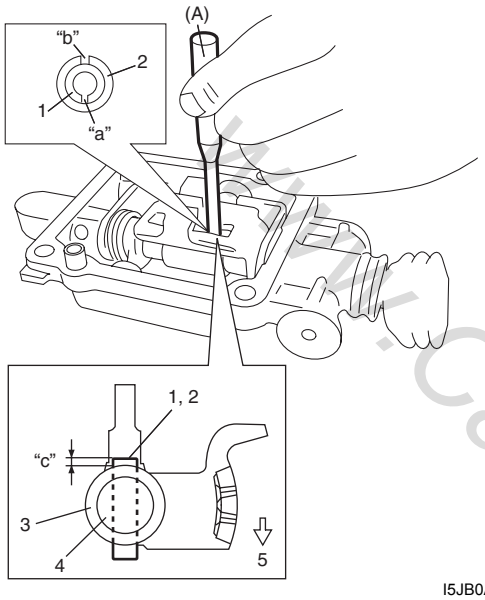


I5JB0A520013-01

2) Assemble components parts referring to “Gear Shift Lever Front Case Assembly Components: ”.
3) Set new gear shift arm inner pin (1) and outer pin (2) facing each gap (“a”, “b”) as shown in figure.
Drive gear shift arm pins by using special tool, till the length “c” becomes the specified. (The length “c” is the length of the pin protrusion from gear shift shaft (4) and select arm (3)).

Special tool
(A): 09925–78210

Gear shift arm pin protrusion “c”: 0.5–1.5 mm (0.020–0.059 in.)



I5JB0A520014-01

5. Case side

Gear Shift Lever Front Case Assembly Inspection

S5JB0A5206033

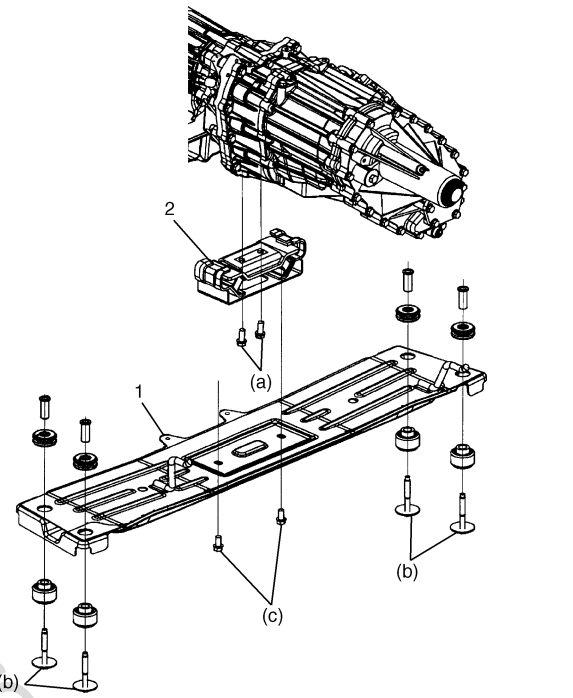
- Check that gear shift shaft moves smoothly without abnormal noise. If abnormality is found, replace defective part.
- Check bushes and boot for damage and deterioration. If abnormality is found, replace defective part.

Engine Rear Mounting Replacement

S5JB0A5206010

When replacement of mounting parts are necessary, torque bolts as specified below.

Tightening torque
Engine rear mounting No.1 bolt (a): 55 N·m (5.5 kgf-m, 40.0 lb-ft)
Engine rear mounting member bolt (b): 55 N·m (5.5 kgf-m, 40.0 lb-ft)
Engine rear mounting No.2 bolt (c): 55 N·m (5.5 kgf-m, 40.0 lb-ft)



I5JB0A520015-01

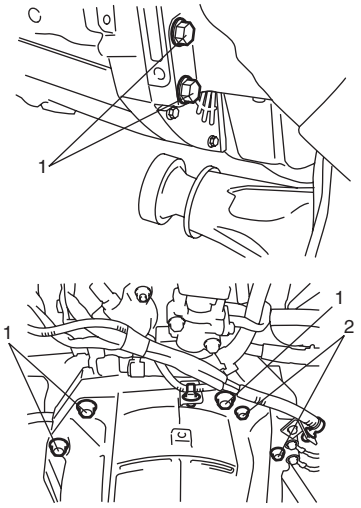
1. Engine rear mounting member
2. Engine rear mounting

Manual Transmission Assembly Dismounting and Remounting

S5JB0A5206011

Dismounting

1) Disconnect negative (–) cable of battery.
2) Remove transmission shift control lever referring to “Transmission Shift Control Lever Removal and Installation: ”.
3) Detach engine harness clamps and ground wire harness from transmission front case.
4) Remove starting motor fastening bolts (2) and transmission fastening bolts (1).

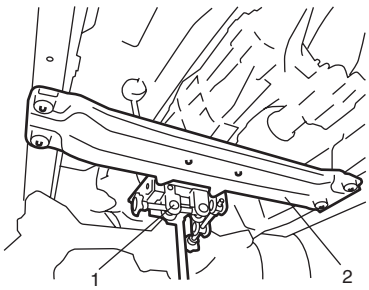


I5JB0A520016-01

5) Disconnect clutch fluid joint from pipe of clutch operating cylinder assembly referring to “Clutch Operating Cylinder Assembly Removal and Installation: in Section 5C”.
6) Hoist vehicle.
7) Drain oil from transmission and transfer.
8) Remove propeller shafts referring to “Propeller Shaft Removal and Installation: in Section 3D”.
9) Remove exhaust No. 2 pipe.
10) Remove engine under cover.
11) Remove clutch housing lower plates (1).
12) Remove transmission fastening nut (2) and bolts (3).

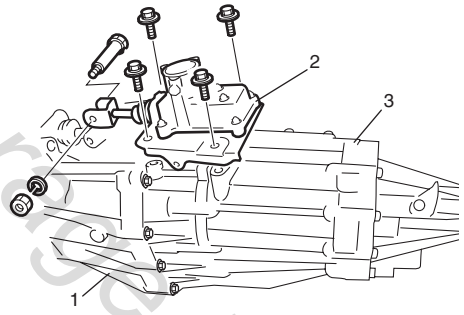
I5JB0A520017-01

13) Disconnect the following couplers and release their harness from clamps.
    - Back up light switch
    - Transfer shift actuator (for J20 engine model)
    - 4L/N switch (for J20 engine model)
    - Center differential lock switch (for J20 engine model)
14) Apply transmission jack (1) and remove engine rear mounting member (2) taking off its bolts.



I5JB0A520029-01

15) After removing mounting member, move rearward transmission and transfer assemblies placed on jack and then lower them.
16) Separate gear shift control lever rear case assembly (2) and transfer assembly (3) from transmission assembly (1).



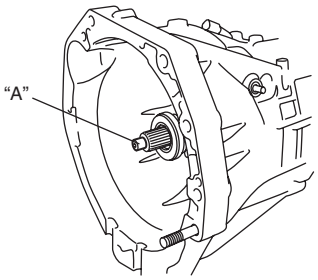
I5JB0A520030-02

Remounting

For remounting, reverse dismounting procedure.

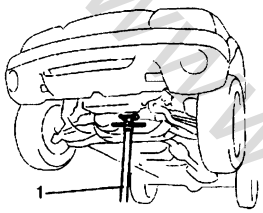
- Apply grease to input shaft.

  "A": Grease 99000–25010 (SUZUKI Super Grease A)



I5JB0A520031-01

- Slant the rear of the engine down, using support device (1) and install transmission to engine.

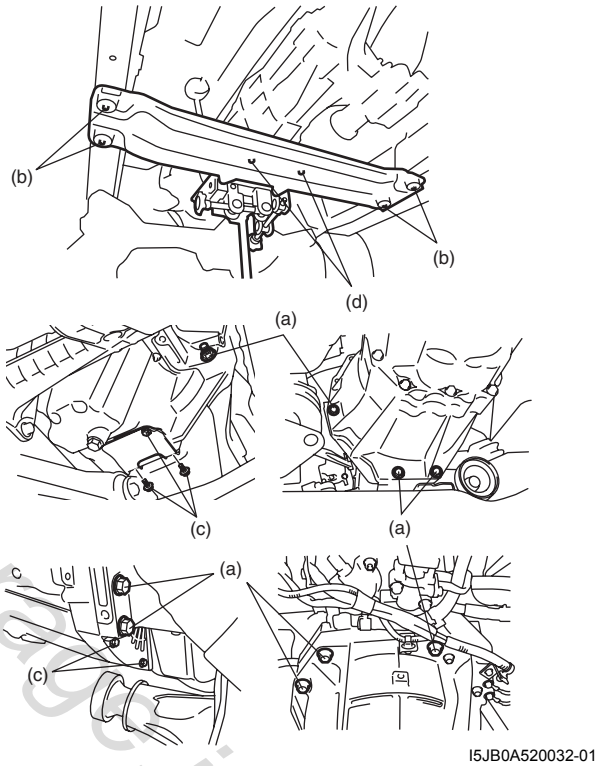


I3JA01520024-01

- Use specified torques as given below.

  Tightening torque
  Transmission to engine bolt and nut (a): 85 N·m (8.5 kgf-m, 61.5 lb-ft)
  Engine rear mounting member bolt (b): 55 N·m (5.5 kgf-m, 40.0 lb-ft)
  Clutch housing lower plate bolt (c): 11 N·m (1.1 kgf-m, 8.0 lb-ft)
  Engine rear mounting No.2 bolt (d): 55 N·m (5.5 kgf-m, 40.0 lb-ft)

- Set each clamp for wiring and hose securely.
- Install shift control lever referring to "Transmission Shift Control Lever Removal and Installation: ".
- Connect clutch fluid joint to pipe of clutch operating cylinder assembly referring to "Clutch Operating Cylinder Assembly Removal and Installation: in Section 5C".
- Install exhaust No.2 pipe referring to "Exhaust System Components: in Section 1K".
- Fill gear oil to transmission referring to "Manual Transmission Oil Change: ".
- Fill gear oil to transfer referring to "Transfer Oil Change: Motor-Shift Type (Transfer with Shift Actuator) in Section 3C" or "Transfer Oil Change: Non-Shift Type (Transfer without Shift Actuator) in Section 3C".
- Connect battery and check function of engine, clutch, transmission and transfer.
- Install propeller shafts referring to "Propeller Shaft Removal and Installation: in Section 3D".

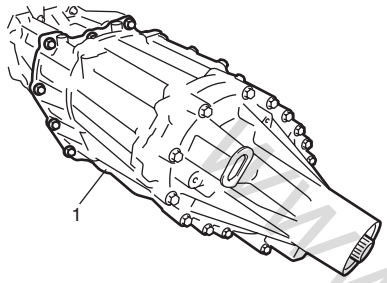


I5JB0A520032-01

Manual Transmission Unit Disassembly

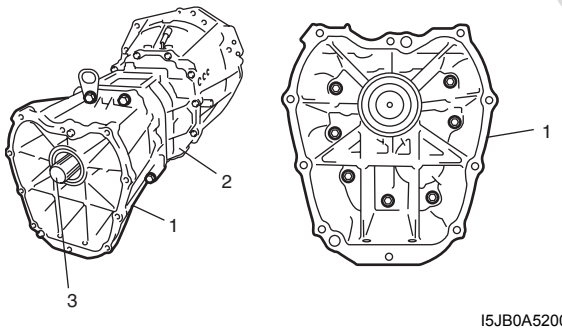
S5JB0A5206012

1) Remove clutch operating cylinder assembly from transmission front case referring to “Clutch Operating Cylinder Assembly Removal and Installation: in Section 5C”
2) Remove gear shift control lever rear cause assembly and gear shift lever front case assembly referring to “Gear Shift Control Lever Rear Case Assembly Removal and Installation: ” and “Gear Shift Lever Front Case Assembly Removal and Installation: ”.
3) Separate transfer assembly (1) from transmission assembly.



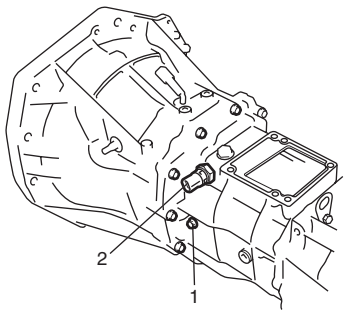
I5JB0A520033-01

4) Remove adapter case (1) from rear case (2).
5) Remove output shaft assembly (3) from adapter case.



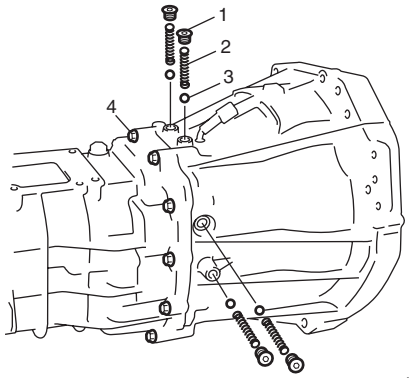
I5JB0A520034-01

6) Remove reverse shaft bolt (1) and back up light switch (2).



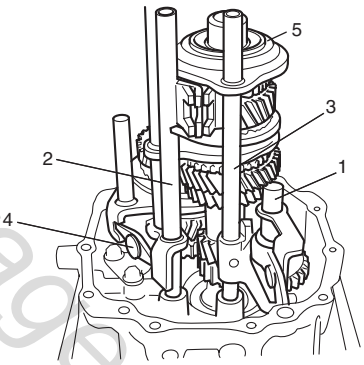
I5JB0A520035-01

7) Remove gear shift locating bolts (1), then take out locating springs (2) and gear shift shaft balls (3).
8) Remove rear to front case bolts (4), then separate rear case from front case tapping front case flange with plastic hammer.



I5JB0A520036-01

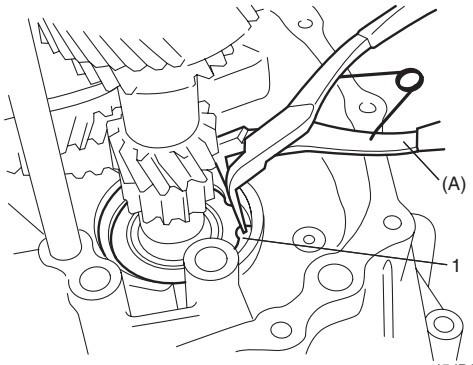
9) Remove oil gutter.
10) Remove reverse shaft assembly (1).
11) Remove low gear shift inverse lever (4).
12) Remove low speed gear shift shaft (2) and 5th & reverse gear shift fork (3) with 5th speed synchronizer sleeve (5).



I5JB0A520037-01

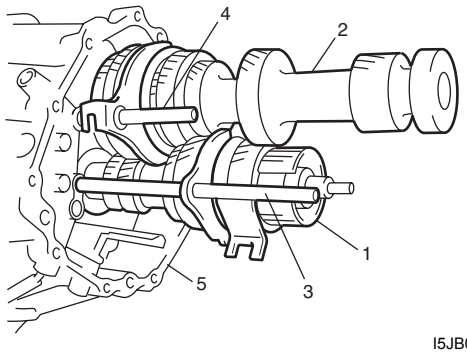
13) Remove input shaft needle bearing, 5th speed synchronizer ring and 5th speed synchronizer levers.
14) Remove input shaft front bearing circlip (1) from case using special tool.

Special tool
(A): 09900–06106



I5JB0A520038-01

15) Remove input shaft assembly (1), countershaft assembly (2), high speed gear shift fork (3) and low speed gear shift fork (4) as assembly from front case (5) tapping input shaft end by plastic hammer lightly.



I5JB0A520039-01

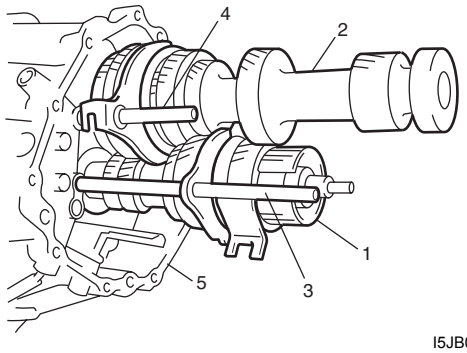
Manual Transmission Unit Reassembly

S5JB0A5206013

1) Assemble input shaft assembly (1), countershaft assembly (2), high speed gear shift fork (3) and low speed gear shift fork (4), then install them all together into front case (5).

⚠ CAUTION

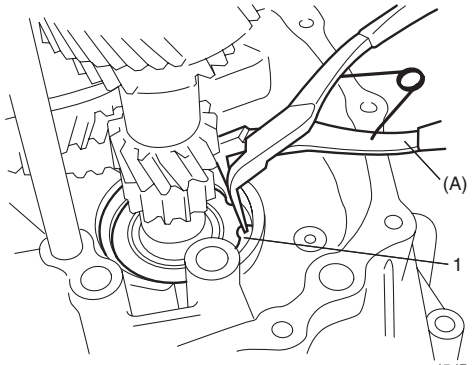
Take care not to damage oil seal lip by input shaft, or oil leakage may take place.



I5JB0A520039-01

2) Install input shaft front bearing snap ring (1) using special tool.

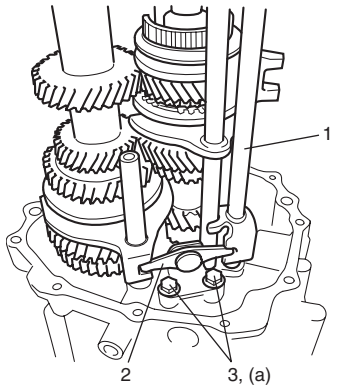
Special tool
(A): 09900–06106



I5JB0A520040-01

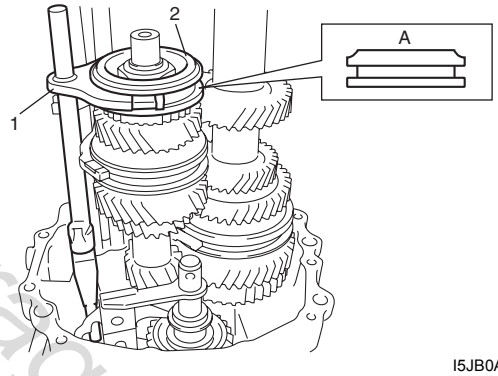
3) Install low speed gear shift shaft (1) and low gear shift inverse lever (2) and tighten with new bolt (3).

Tightening torque
Low gear shift inverse lever bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



I5JB0A520041-02

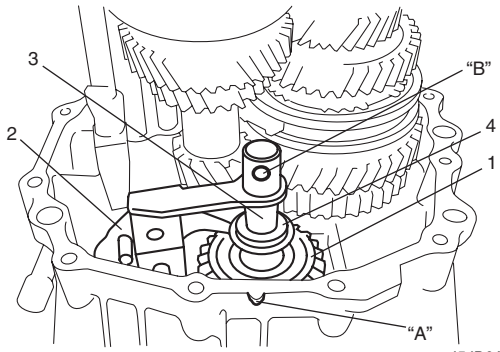
4) Fit 5th & reverse gear shift fork (1) to 5th speed synchronizer sleeve (2), and install them into input shaft and front case in specified direction as shown in figure.



I5JB0A520042-01

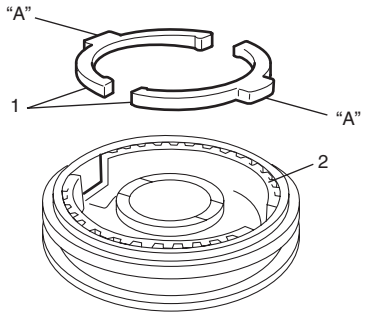
A: Chamfered side

5) Set reverse idler gear (1), reverse gear shift lever (2) and reverse gear shaft washer (4), insert reverse gear shaft (3) into case through idler gear and then align hole “B” in shaft with protrusion “A” in case.



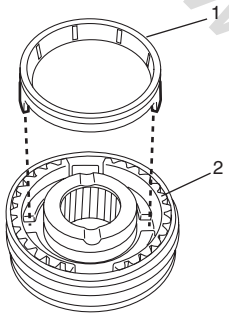
I5JB0A520043-01

6) Install oil gutter.
7) Install 5th speed synchronizer levers and 5th speed synchronizer ring as follows.
   a) Fit 5th speed synchronizer levers (1) to hub (2) aligning protrusion “A” of 5th speed synchronizer levers with groove of hub.



I5JB0A520044-01

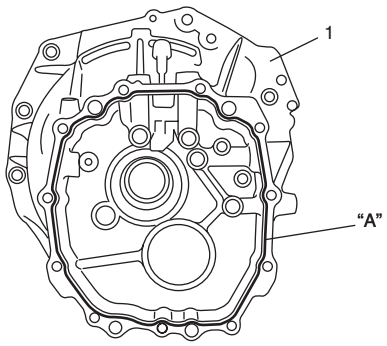
   b) Install synchronizer ring (1) to hub (2) in specified direction as shown in figure.



I5JB0A520045-01

8) Install input shaft needle bearing to end of input shaft.
9) Clean mating surfaces of both front and rear cases, and uniformly apply sealant to front case (1) as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter, and then mate it with rear case.

“A”: Sealant 99000–31260 (SUZUKI Bond No.1217G)



I5JB0A520046-01

10) Install rear case to front case. Tighten case bolts (1) to specified torque.

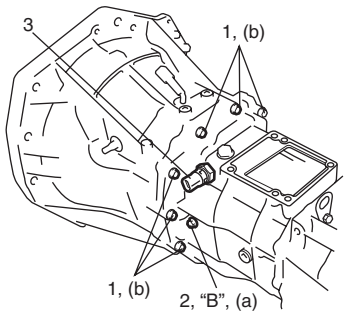
Tightening torque
Transmission case bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)

11) Apply thread lock cement to reverse shaft bolt (2), and tighten it.

“B”: Thread lock cement 99000–32110 (Thread Lock Cement Super 1322)

Tightening torque
Reverse shaft bolt (b): 23 N·m (2.3 kgf-m, 17.0 lb-ft)

12) Install back up light switch (3) referring to “Back Up Light Switch Removal and Installation: ”.

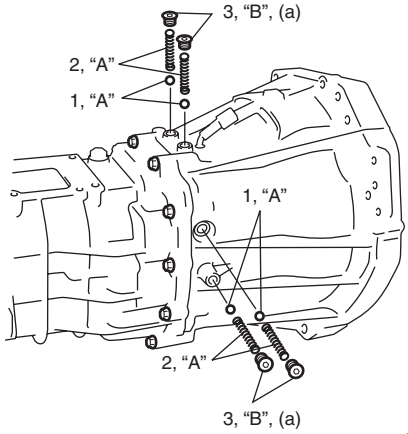


I5JB0A520047-01

13) Apply grease to gear shift shaft balls (1) and locating springs (2), then install them.
Apply thread lock cement to gear shift locating bolts (3), and then tighten them.

“A”: Grease 99000–25010 (SUZUKI Super Grease A)
“B”: Thread lock cement 99000–32110 (Thread Lock Cement Super 1322)

Tightening torque
Gear shift locating bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



I5JB0A520048-01

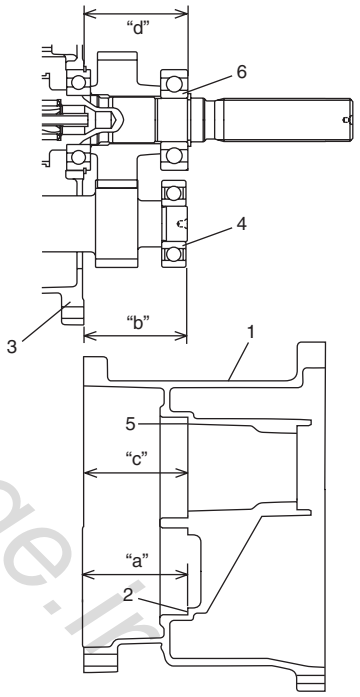
14) Install output shaft assembly into rear case.
15) Select a countershaft shim and output shaft shim as follows.
    a) Measure depth “a” from mating surface of adapter case (1) to face processed for installation of countershaft rear bearing (2) and measure depth “c” from mating surface of adapter case to face processed for installation of output shaft rear bearing (5) using vernier caliper.
    b) Measure height “b” from mating surface of rear case (3) to countershaft rear bearing (2) and “d” from mating surface of rear case (3) to output shaft bearing (6) using vernier caliper.
    c) Calculate “a” – “b” and “c” – “d”, and select a shim according to the following table.

Countershaft shim selection table

Clearance “a” – “b”	Thickness of countershaft shim
1.15 – 1.24 mm (0.046 – 0.048 in.)	0.90 mm (0.035 in.)
1.25 – 1.34 mm (0.050 – 0.052 in.)	1.00 mm (0.039 in.)
1.35 – 1.44 mm (0.054 – 0.056 in.)	1.10 mm (0.043 in.)
1.45 – 1.54 mm (0.057 – 0.060 in.)	1.20 mm (0.047 in.)
1.55 – 1.64 mm (0.061 – 0.064 in.)	1.30 mm (0.051 in.)
1.65 – 1.74 mm (0.065 – 0.068 in.)	1.40 mm (0.055 in.)
1.75 – 1.84 mm (0.069 – 0.072 in.)	1.50 mm (0.059 in.)
1.85 – 1.94 mm (0.073 – 0.076 in.)	1.60 mm (0.063 in.)
1.95 – 2.04 mm (0.077 – 0.080 in.)	1.70 mm (0.067 in.)
2.05 – 2.14 mm (0.081 – 0.084 in.)	1.80 mm (0.071 in.)
2.15 – 2.24 mm (0.085 – 0.088 in.)	1.90 (0.90 + 1.00) mm (0.075 (0.035 + 0.039) in.)

Output shaft shim selection table

Clearance “c” – “d”	Thickness of countershaft shim
0 – 0.09 mm (0 – 0.04 in.)	—
0.1 – 0.19 mm (0.004 – 0.007 in.)	0.1 mm (0.004 in.)
0.2 – 0.29 mm (0.008 – 0.011 in.)	0.2 mm (0.008 in.)
0.3 – 0.39 mm (0.012 – 0.015 in.)	0.3 mm (0.012 in.)
0.4 – 0.49 mm (0.016 – 0.019 in.)	0.4 mm (0.016 in.)
0.5 – 0.59 mm (0.020 – 0.023 in.)	0.5 (0.2 + 0.3) mm (0.020 (0.008 + 0.012) in.)
0.6 – 0.69 mm (0.024 – 0.027 in.)	0.6 (0.2 + 0.4) mm (0.024 (0.008 + 0.016) in.)
0.7 – 0.79 mm (0.028 – 0.031 in.)	0.7 (0.3 + 0.4) mm (0.028 (0.012 + 0.016) in.)



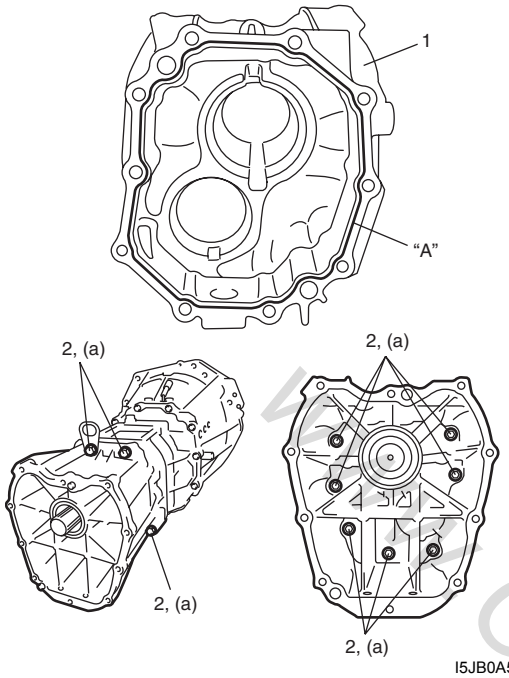
I5JB0A520049-02

16) Install selected countershaft shim and output shaft shim to adapter case.
17) Clean mating surface of both rear case (1) and adapter case, and uniformly apply sealant to rear case as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter, and then mate it with adapter case.

“A”: Sealant 99000–31260 (SUZUKI Bond No.1217G)

18) Install rear case to adapter case. Tighten case bolts (2) to specified torque.

Tightening torque
Adapter case bolt (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



I5JB0A520050-01

19) Install transfer assembly to transmission assembly. Tighten transfer fastening bolts to specified torque referring to "Transfer Assembly Components: Motor-Shift Type (Transfer with Shift Actuator) in Section 3C" or "Transfer Assembly Components: Non-Shift Type (Transfer without Shift Actuator) in Section 3C".

20) Install gear shift control lever rear case assembly and gear shift lever front case assembly referring to "Gear Shift Control Lever Rear Case Assembly Removal and Installation: " and "Gear Shift Lever Front Case Assembly Removal and Installation: ".

21) Install clutch operating cylinder assembly to transmission front case referring to "Clutch Operating Cylinder Assembly Removal and Installation: in Section 5C".

Locating Spring Inspection

S5JB0A5206034

Check locating springs for deterioration and replace with new ones if necessary.

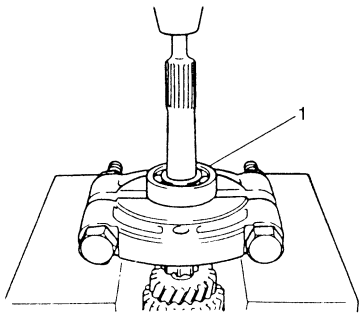
Locating spring free length
Standard: 44.6 mm (1.756 in.)
Service limit: 40.1 mm (1.579 in.)

Input Shaft Disassembly

S5JB0A5206016

1) Remove snap ring.

2) Remove input shaft front bearing (1) using bearing puller and hydraulic press.



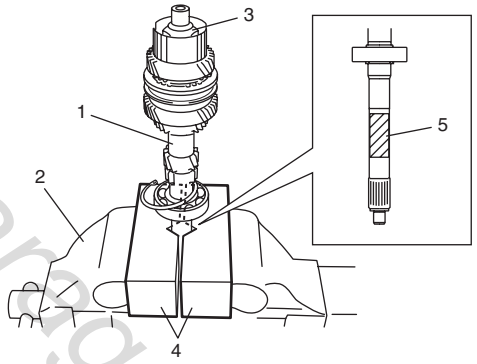
I5JB0A520051-01

3) Remove input shaft union.

4) Hold hatched area (5) of input shaft assembly (1) with "V" blocks (4) on vise (2) or the like to stop rotation of shaft, undo caulking and input shaft 5th hub nut (3).

⚠ CAUTION

Do not hold spline, gear teeth or abrasived surface of shaft with vise through "V" blocks or the like, otherwise shaft components may be damaged.

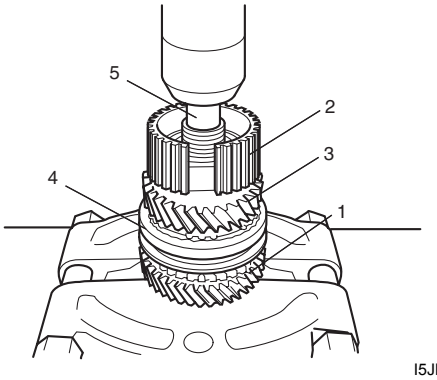


I5JB0A520052-01

5) Apply bearing puller to 4th gear (1), and drive out 5th speed synchronizer hub (2), 3rd gear (3), high speed gear needle bearings, 3rd gear bush, high speed synchronizer assembly (4) and 4th gear all at once from input shaft using metal stick (5) and press.

⚠ CAUTION

To avoid gear teeth from being damaged, support 4th gear at flat side of bearing puller.



I5JB0A520053-01

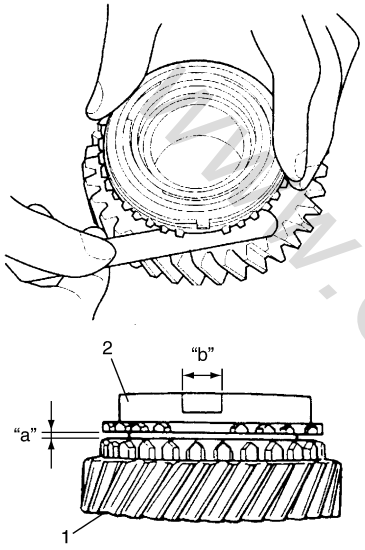
Input Shaft Inspection

S5JB0A5206017

- Check clearance “a” between synchronizer ring (2) and gear (1), key slot width “b” in synchronizer ring and each chamfered tooth of gear and synchronizer ring and replace with new one, if necessary. Also, check gear tooth.

  Clearance “a” between synchronizer ring and gear (Input shaft) (3rd and 4th)
  Standard: 1.0 – 1.4 mm (0.040 – 0.055 in.)
  Service limit: 0.5 mm (0.020 in.)

  Key slot width “b” (3rd and 4th synchronizer ring)
  Standard: 10.0 – 10.2 mm (0.394 – 0.401 in.)
  Limit: 10.45 mm (0.411 in.)



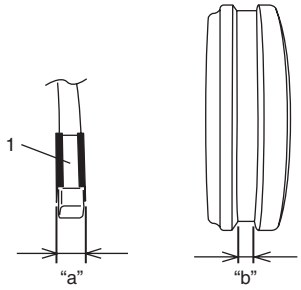
I5JB0A520054-01

- Measure width of high speed gear shift fork end “a” and groove width of high speed synchronizer sleeve “b”, 5th & reverse gear shift fork end “a” and groove width of 5th speed synchronizer sleeve “b” and then calculate clearance “c” as follows:

  Clearance “c” = “b” – “a”

  If clearance exceeds limit, replace fork bush (1) and sleeve.

  Clearance “c” between fork and sleeve for high speed and 5th speed
  Standard: 0.3 – 0.5 mm (0.012 – 0.020 in.)
  Limit: 1.0 mm (0.039 in.)

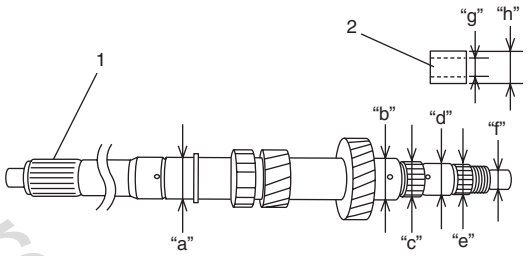


I5JB0A520055-01

- Check diameter of input shaft (1) and needle bush (2) as shown in the figure. If measured value is out of specification, replace input shaft and/or bush.

  Input shaft and needle bush specifications (diameter)

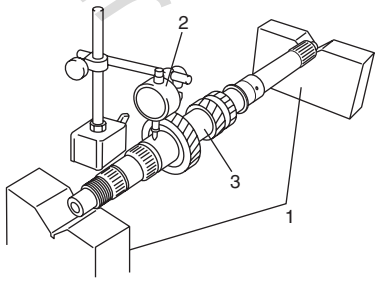
Measuring portion	Standard
“a”	30.002 – 30.015 mm (1.1812 – 1.1816 in.)
“b”	34.950 – 34.991 mm (1.3760 – 1.3775 in.)
“c”	30.959 – 30.975 mm (1.2189 – 1.2194 in.)
“d”	27.987 – 28.000 mm (1.1018 – 1.1023 in.)
“e”	27.967 – 27.980 mm (1.1011 – 1.1015 in.)
“f”	19.975 – 19.991 mm (0.7865 – 0.7870 in.)
“g”	28.000 – 28.013 mm (1.1024 – 1.1028 in.)
“h”	34.975 – 34.991 mm (1.3770 – 1.3775 in.)



I5JB0A520056-01

- Using “V” blocks (1) and dial gauge (2), check runout. If runout exceeds limit below, replace input shaft (3).

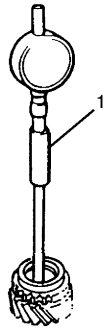
  Input shaft runout
  Limit: 0.02 mm (0.0008 in.)



I5JB0A520057-01

- Using cylinder gauge (1), check inside diameter of each gear. If its inside diameter exceeds specification, replace it.

  Inside diameter (standard) of gear
  3rd and 4th gear: 40.000 – 40.025 mm (1.5748 – 1.5757 in.)



IYSQ01522099-01

- Check chamfered part of each sleeve for damage and excessive wear, and replace as necessary.
- Check each synchronizer key and synchronizer spring and replace as necessary.
- Check spline portions and replace parts if excessive wear is found.

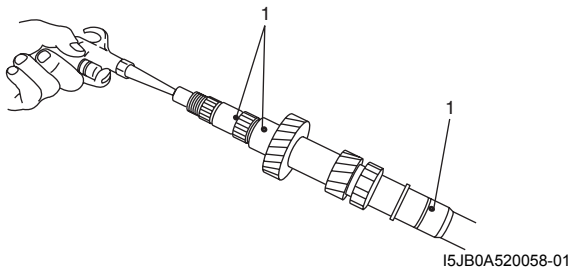
Input Shaft Reassembly

S5JB0A5206018

NOTE

- **Before installation, wash each part and apply specified gear oil to sliding faces of bearing and gear.**
- **Use new snap rings on shaft for installation. Don't reuse snap rings.**

1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
2) To ensure lubrication, air blow oil holes (1) and make sure that they are free from any obstruction.



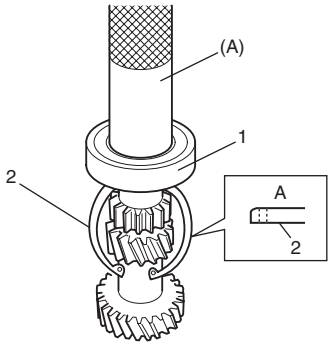
I5JB0A520058-01

3) Drive in input shaft front bearing (1) to input shaft using special tool and hammer and then install snap ring in specified direction as shown in figure.

   Special tool
   (A): 09940–51710

NOTE

Input shaft front bearing circlip (2) must be installed before input shaft front bearing is installed.

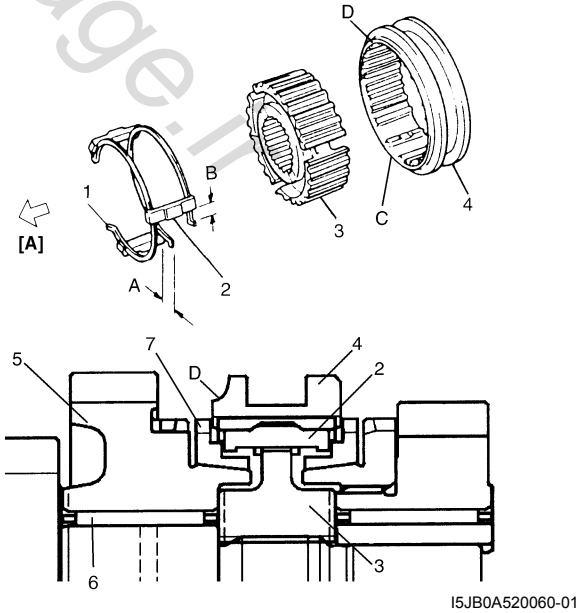


I5JB0A520059-01

A:	Bearing side

4) Apply oil to high speed gear needle bearing (5), and then install needle bearing, 4th gear (5) and high speed synchronizer ring (7) to input shaft.
5) Assemble synchronizer sleeve (4) and hub (3) as follows.
   a) Fit high speed synchronizer sleeve to hub in specified direction as shown in figure.
   b) Insert 3 keys (2) to hub.
   c) Set springs (1) at specified position as shown in figure.

   Synchronizer key installation position
   : A = B



I5JB0A520060-01

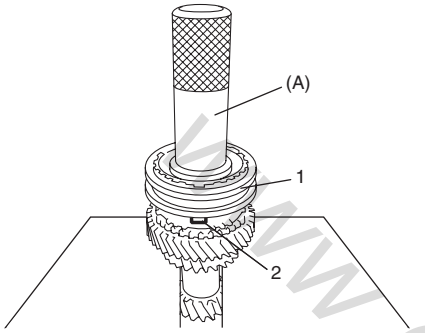
[A]:	4th gear side
C:	Key way
D:	Projecting end

6) Drive in high speed synchronizer assembly (1) using special tool and hammer.

NOTE

- **While press-fitting sleeve & hub, make sure that synchronizer ring key slots (2) are aligned with keys in sleeve & hub assembly.**
- **Check free rotation of 4th gear after press fitting sleeve & hub assembly.**

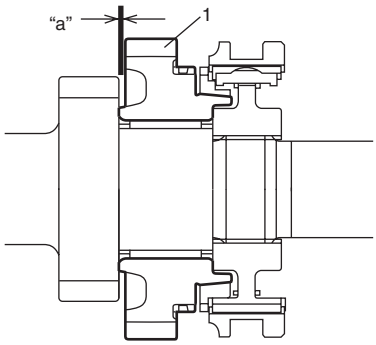
Special tool
(A): 09913–84510



I5JB0A520061-01

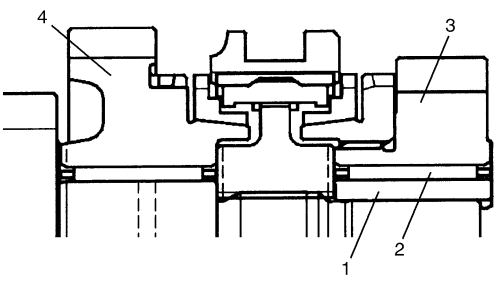
7) Check 4th gear (1) thrust clearance by using thickness gauge. If clearance is out of specification, repress-fit or replace defective part.

4th gear thrust clearance
"a": 0.10 – 0.25 mm (0.004 – 0.010 in.)



I5JB0A520062-01

8) Apply oil to high speed gear needle bearing, and then install 3rd gear bush (1), high speed gear needle bearing (2) and 3rd gear (3).

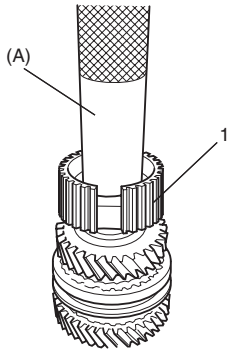


I5JB0A520063-01

4. 4th gear

9) Press-fit 5th speed synchronizer hub (1) using special tool and hammer.

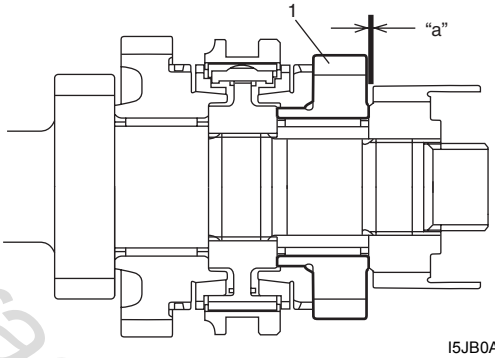
Special tool
(A): 09913–84510



I5JB0A520064-01

10) Check 3rd gear (1) thrust clearance by using thickness gauge. If clearance is out of specification, repress-fit or replace defective part.

3rd gear thrust clearance
"a": 0.10 – 0.25 mm (0.004 – 0.010 in.)



I5JB0A520065-01

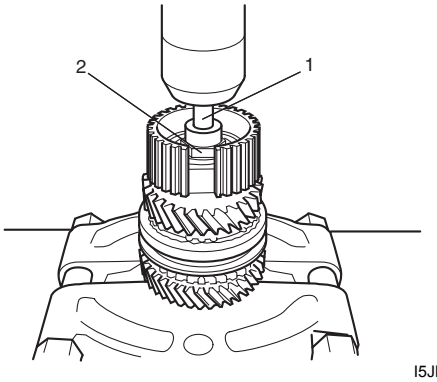
11) Tighten input shaft 5th hub nut to specified torque in the same manner as step 4) of "Input Shaft Disassembly: ".

⚠ CAUTION

Do not hold spline, gear teeth or abrasived surface of shaft with vise through "V" blocks or the like, otherwise shaft components may be damaged.

Tightening torque
Input shaft 5th hub nut: 210 N·m (21.0 kgf-m, 152.0 lb-ft)

12) Caulk input shaft 5th hub nut (2) using caulking tool.
13) Drive in new input shaft union (1) using puller and hydraulic press.



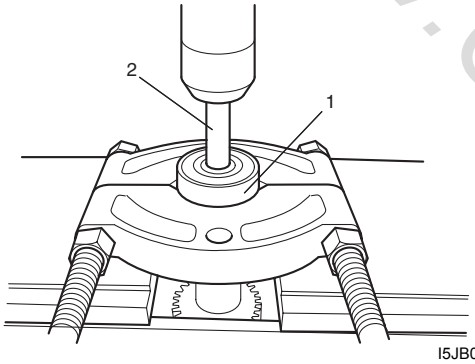
I5JB0A520066-01

Countershaft Disassembly and Assembly

S5JB0A5206019

Disassembly

1) Remove countershaft rear bearing (1) using bearing puller, metal stick (2) and hydraulic press.

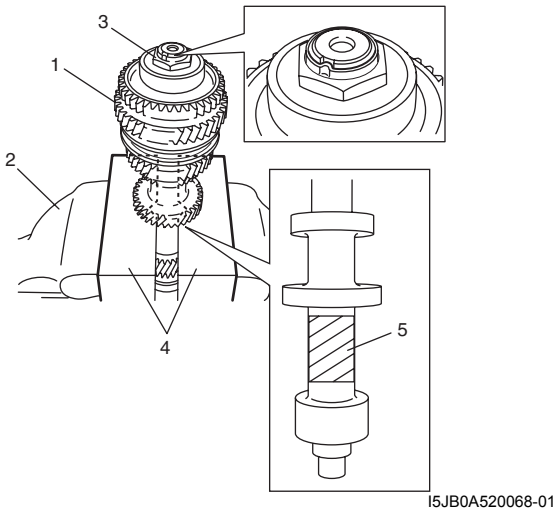


I5JB0A520067-01

2) Hold hatched area (5) of countershaft assembly (1) with “V” blocks (4) on vise (2) or the like to stop rotation of shaft, undo caulking and countershaft front bearing nut (3).

⚠ CAUTION

Do not hold spline, gear teeth or abrasived surface of shaft with “V” blocks on vise or the like, otherwise shaft may be damaged.

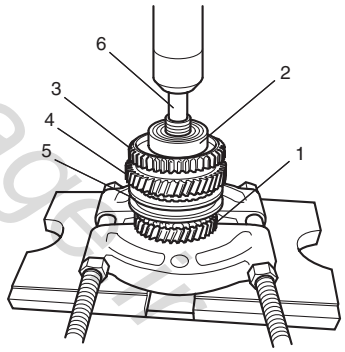


I5JB0A520068-01

3) Apply bearing puller to 2nd gear (1), and drive out countershaft front bearing (2), countershaft reverse gear (3), 1st gear (4), countershaft gear needle bearings, countershaft low needle bearing bush, low speed synchronizer assembly (5) and 2nd gear all at once from countershaft using metal stick (6) and hydraulic press.

⚠ CAUTION

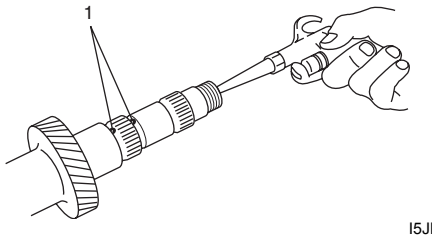
To avoid gear teeth from being damaged, support 2nd gear at flat side of bearing puller.



I5JB0A520069-01

Assembly

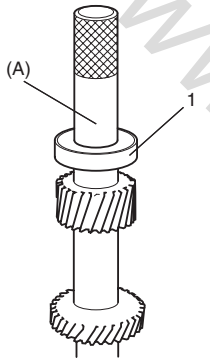
1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
2) To ensure lubrication, air blow oil holes (1) and make sure that they are free from any obstruction.



I5JB0A520070-01

3) Drive in countershaft rear bearing (1) using special tool and hammer.

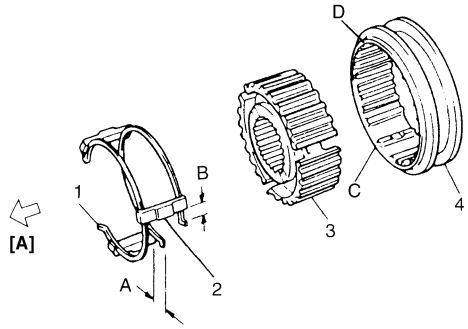
Special tool
(A): 09913–84510

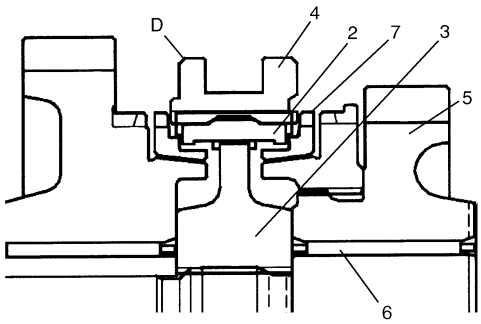


I5JB0A520071-01

4) Apply oil to countershaft gear needle bearing (6), and then install needle bearing, 2nd gear (5) and low speed synchronizer ring (7).
5) Assemble synchronizer sleeve (4) and hub (3) as follows.
   a) Fit low speed synchronizer sleeve to hub in specified direction as shown in figure.
   b) Insert 3 keys (2) to hub.
   c) Set springs (1) at specified position as shown in figure.

Synchronizer key installation position
: A = B





I5JB0A520072-01

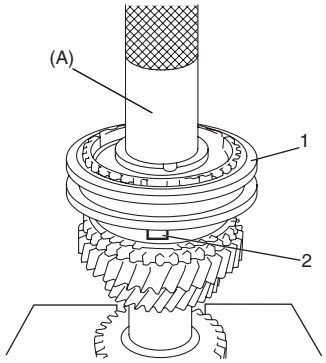
[A]:	1st gear side
C:	Key way
D:	Chamfered side

6) Drive in low speed synchronizer assembly (1) using special tool and hammer.

NOTE

- **While press-fitting sleeve & hub, make sure that synchronizer ring key slots (2) are aligned with keys in sleeve & hub assembly.**
- **Check free rotation of 2nd gear after press-fitting sleeve & hub assembly.**

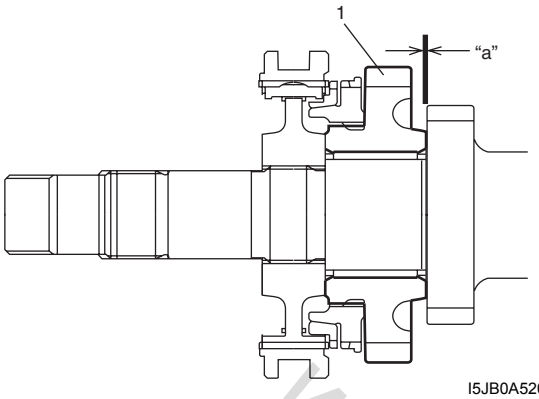
Special tool
(A): 09913–84510



I5JB0A520073-01

7) Check 2nd gear (1) thrust clearance by using thickness gauge. If clearance is out of specification, repress-fit or replace defective part.

2nd gear thrust clearance
"a": 0.10 – 0.25 mm (0.004 – 0.010 in.)

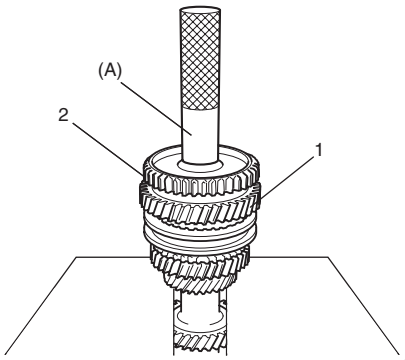


I5JB0A520074-01

8) Apply oil to countershaft gear needle bearing, and then countershaft low needle bush, needle bearing and 1st gear (1) to countershaft.

9) Press-fit countershaft reverse gear (2) using special tool and hammer.

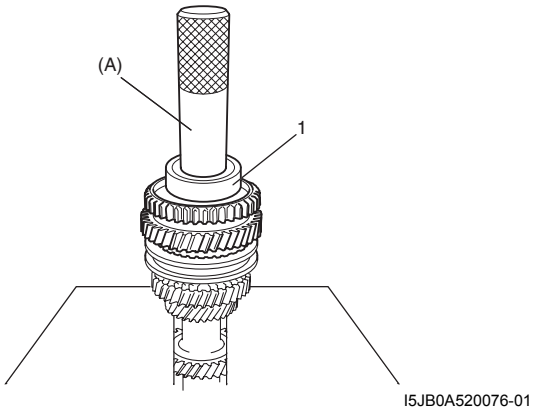
Special tool
(A): 09913–80113



I5JB0A520075-01

10) Press-fit countershaft front bearing (1) using special tool and hammer.

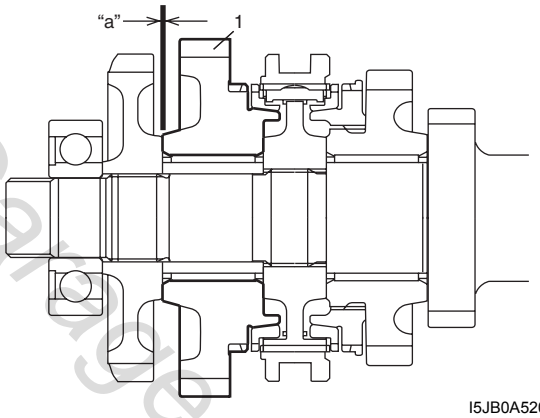
Special tool
(A): 09913–84510



I5JB0A520076-01

11) Check low gear (1) thrust clearance by using thickness gauge. If clearance is out of specification, repress-fit or replace defective part.

Low gear thrust clearance
"a": 0.10 – 0.25 mm (0.004 – 0.010 in.)



I5JB0A520077-01

12) Tighten countershaft front bearing nut to specified torque while locking counter shaft in the same manner as step 2) of "Disassembly" under "Countershaft Disassembly and Assembly: ".

⚠ CAUTION

Do not hold spline, gear teeth or abrasived surface of shaft with vise through "V" blocks or the like, otherwise shaft may be damaged.

Tightening torque
Countershaft front bearing nut: 210 N·m (21.0 kgf-m, 152.0 lb-ft)

13) Caulk countershaft front bearing nut using caulking tool and hammer.

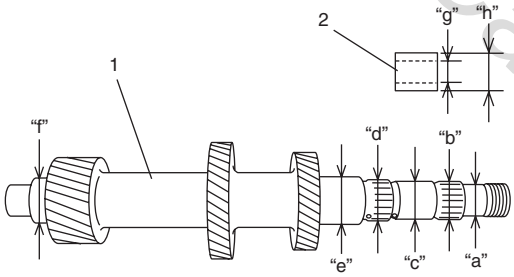
Countershaft and Reverse Idle Gear Inspection

S5JB0A5206020

- Using micrometer, check diameter of countershaft (1) and needle bush (2) as shown. If measured value is out of specification, replace counter and/or bush.

Countershaft diameter (standard)

Measuring portion	Standard
"a"	25.002 – 25.015 mm (0.9843 – 0.9848 in.)
"b"	27.987 – 28.000 mm (1.1019 – 1.1023 in.)
"c"	27.987 – 28.000 mm (1.1019 – 1.1023 in.)
"d"	30.959 – 30.975 mm (1.2189 – 1.2194 in.)
"e"	34.975 – 34.991 mm (1.3770 – 1.3775 in.)
"f"	30.002 – 30.015 mm (1.1812 – 1.1816 in.)
"g"	28.000 – 28.013 mm (1.1023 – 1.1028 in.)
"h"	34.975 – 34.991 mm (1.3770 – 1.3776 in.)



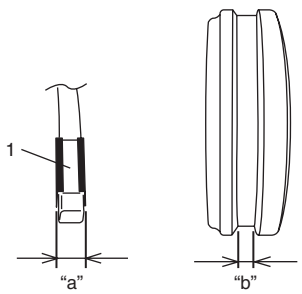
I5JB0A520078-01

- Measure width "a" of low speed gear shift fork and groove width "b" of low speed gear synchronizer sleeve and then calculate clearance "c" as follows:

Clearance "c" = "b" – "a"

If clearance exceeds limit, replace fork bush (1) and sleeve.

Clearance "c" between fork and sleeve
Standard: 0.3 – 0.5 mm (0.012 – 0.020 in.)
Limit: 1.0 mm (0.039 in.)

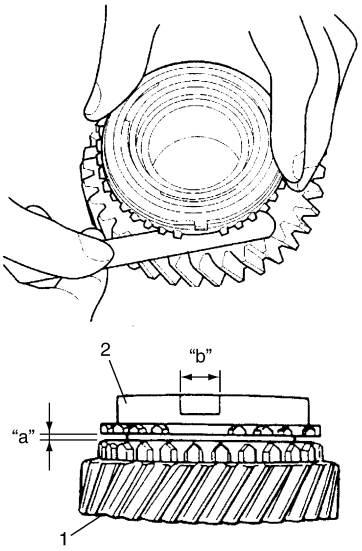


I5JB0A520055-01

- Check clearance "a" between synchronizer ring (2) and gear (1), key slot width "b" in synchronizer ring and each chamfered tooth of gear and synchronizer ring and replace with new one, if necessary. Also, check gear tooth.

Clearance "a" between synchronizer ring and gear (Countershaft) (1st and 2nd)
Standard: 1.0 – 1.4 mm (0.040 – 0.055 in.)
Service limit: 0.5 mm (0.020 in.)

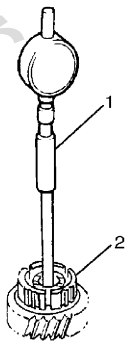
Key slot width "b" (1st and 2nd synchronizer ring)
Standard: 10.0 – 10.2 mm (0.394 – 0.401 in.)
Limit: 10.45 mm (0.411 in.)



I5JB0A520079-01

- Using cylinder gauge (1), check inside diameter of countershaft 1st and 2nd gears (2). If measured value exceeds specification, replace countershaft 5th gear.

Countershaft 1st and 2nd gears diameter
Standard: 40.000 – 40.025 mm (1.5748 – 1.5757 in.)



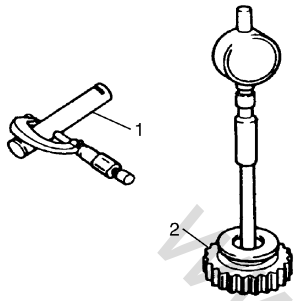
IYSQ01522122-01

- Check oil clearance between reverse idle gear (2) and shaft (1) measuring inside diameter “a” of gear and diameter “b” of shaft and calculate as follows:

  Clearance “c” = “b” – “a”

  If clearance exceeds limit, replace gear and shaft.

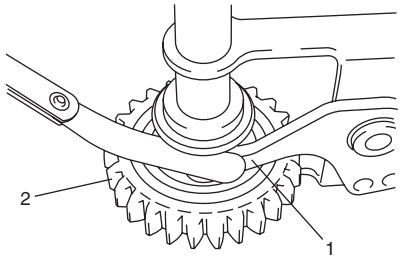
  Oil clearance “c” between reverse idle gear and shaft
  Standard: 0.016 – 0.045 mm (0.0006 – 0.0018 in.)
  Limit: 0.13 mm (0.005 in.)



IYSQ01522123-01

- Check clearance between reverse idle gear (2) and lever (1) of reverse gear shift link.
  If clearance exceeds limit, replace gear and lever.

  Clearance between reverse idle gear and lever
  Standard: 0.05 mm – 0.35 mm (0.002 – 0.014 in.)
  Limit: 0.5 mm (0.020 in.)



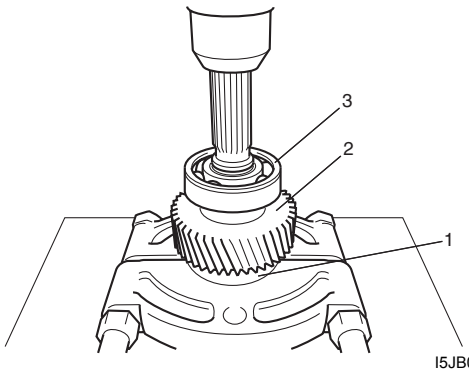
I5JB0A520080-01

Output Shaft Disassembly and Assembly

S5JB0A5206021

Disassembly

1) Remove output shaft rear snap ring.
2) Apply bearing puller to output shaft front bearing (1), and drive out output shaft front bearing, output shaft gear (2) and output shaft rear bearing (3) all at once from output shaft using press.

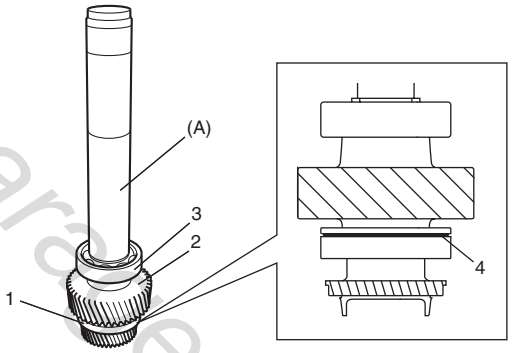


I5JB0A520081-01

Assembly

1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
2) Put front bearing (1) onto output shaft facing groove (4) side to output shaft gear (2) and drive in output shaft front bearing, output shaft gear and output shaft rear bearing (3) all together using special tool and hammer.

   Special tool
   (A): 09940–51710



I5JB0A520082-01

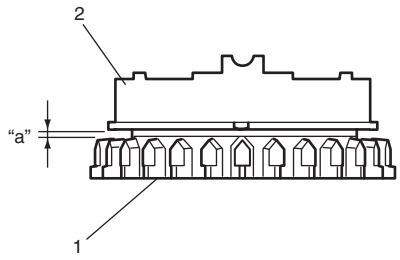
3) Install new output shaft rear snap ring.

Output Shaft Inspection

S5JB0A5206035

Check clearance “a” between ring (2) and output shaft (1), each chamfered teeth of gear, ring and sleeve, then determine parts replacement.

Clearance between synchronizer ring and output shaft
Standard “a”: 1.0 - 1.4 mm (0.040 - 0.055 in.)
Service limit “a”: 0.5 mm (0.020 in.)



I5JB0A520083-01

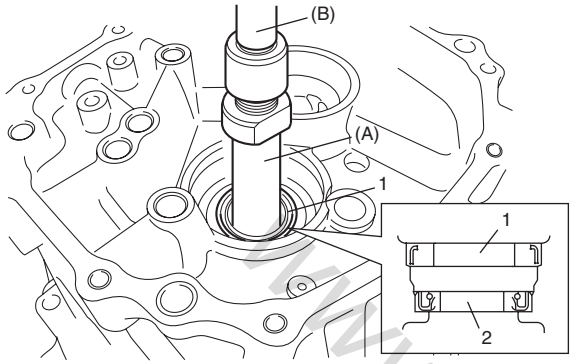
Manual Transmission Front Case Disassembly and Assembly

S5JB0A5206022

Disassembly

Remove pump seal (1) and oil seal (2) from front case using special tools.

Special tool
(A): 09941–64511
(B): 09930–30104



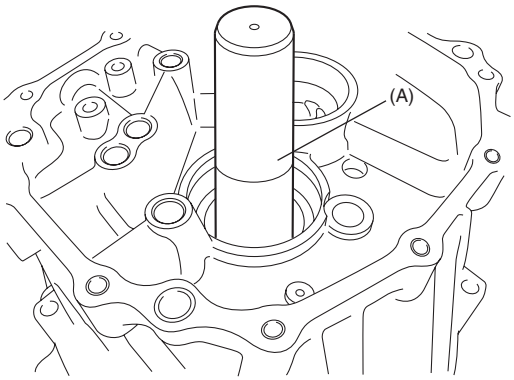
I5JB0A520084-02

Assembly

1) Set new oil seal to front case with its spring side facing rear case side.
2) Install oil seal until it becomes flush with case surface using special tool and hammer and apply grease to oil seal lip.

Special tool
(A): 09940–51710

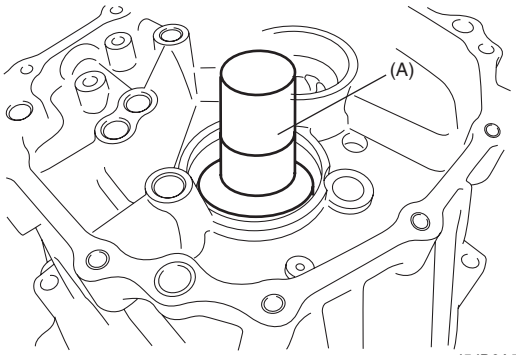
: Grease 99000–25010 (SUZUKI Super Grease A)



I5JB0A520085-02

3) Install pump seal to front case using special tool and hammer.

Special tool
(A): 09913–75810



I5JB0A520088-01

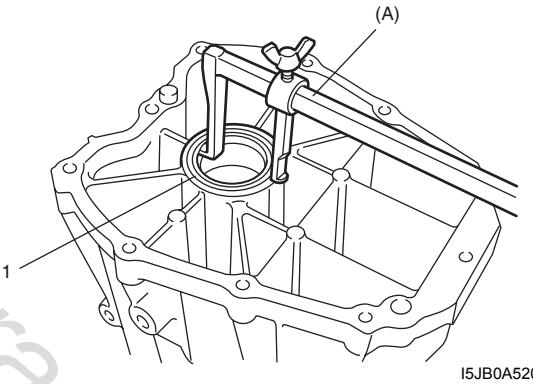
Manual Transmission Adapter Case Disassembly and Assembly

S5JB0A5206023

Disassembly

Remove oil seal (1) from adapter case using special tool.

Special tool
(A): 09913–50121



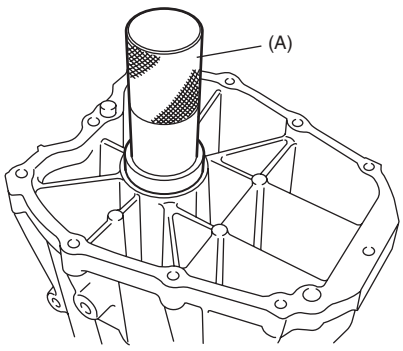
I5JB0A520086-01

Assembly

1) Set new oil seal to adapter case with its spring side facing rear case side.
2) Install oil seal until it becomes flush with case surface using special tool and hammer and apply grease to oil seal lip.

Special tool
(A): 09913–85210

: Grease 99000–25010 (SUZUKI Super Grease A)



I5JB0A520087-01

Specifications

Tightening Torque Specifications

S5JB0A5207001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Transmission oil drain plug	23	2.3	17.0	☞
Oil filler plug	23	2.3	17.0	☞
Control lever locating bolt	9	0.9	6.5	☞
Case cover bolt	10	1.0	7.5	☞
Control lever boot cover bolt	12	1.2	9.0	☞
Back up light switch	23	2.3	17.0	☞
Plate bolt	23	2.3	17.0	☞
Control shaft joint nut	18	1.8	13.0	☞ / ☞
Gear shift lever front case bolt	23	2.3	17.0	☞
Engine rear mounting No.1 bolt	55	5.5	40.0	☞
Engine rear mounting member bolt	55	5.5	40.0	☞ / ☞
Engine rear mounting No.2 bolt	55	5.5	40.0	☞ / ☞
Transmission to engine bolt and nut	85	8.5	61.5	☞
Clutch housing lower plate bolt	11	1.1	8.0	☞
Low gear shift inverse lever bolt	23	2.3	17.0	☞
Transmission case bolt	23	2.3	17.0	☞
Reverse shaft bolt	23	2.3	17.0	☞
Gear shift locating bolt	23	2.3	17.0	☞
Adapter case bolt	23	2.3	17.0	☞
Input shaft 5th hub nut	210	21.0	152.0	☞
Countershaft front bearing nut	210	21.0	152.0	☞

NOTE

The specified tightening torque is also described in the following.
“Manual Transmission Assembly Components: ”
“Gear Shift Control Lever Rear Case Assembly Components: ”
“Gear Shift Lever Front Case Assembly Components: ”
“Gear Shift Shaft and Fork Components: ”
“Input Shaft Assembly, Output Shaft Assembly and Countershaft Assembly Components: ”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Fastener Information: in Section 0A”.

Special Tools and Equipment

Recommended Service Material

S5JB0A5208001

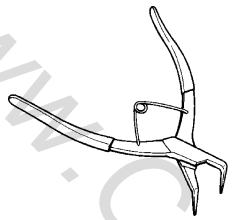
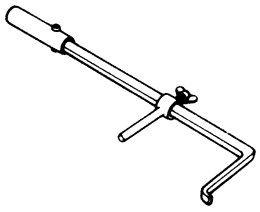
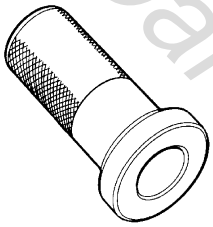
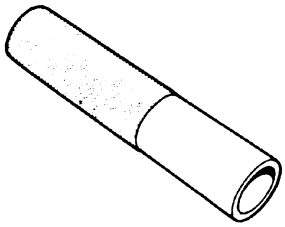
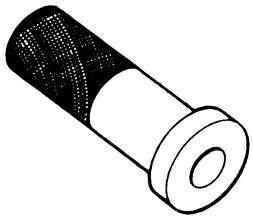
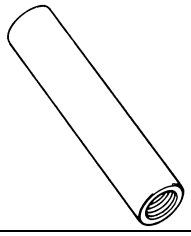
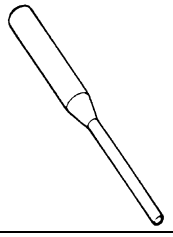
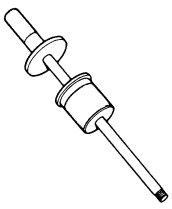
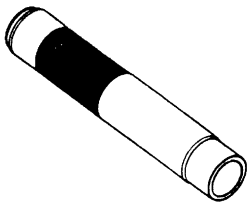
Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI Super Grease A	P/No.: 99000–25010	☞ / ☞ / ☞ / ☞ / ☞
Sealant	SUZUKI Bond No.1217G	P/No.: 99000–31260	☞ / ☞ / ☞ / ☞ / ☞
Thread lock cement	Thread Lock Cement Super 1322	P/No.: 99000–32110	☞ / ☞

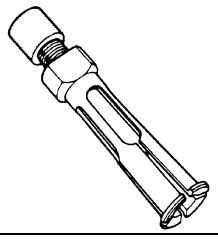
NOTE

Required service material is also described in the following.
“Manual Transmission Assembly Components: ”
“Gear Shift Control Lever Rear Case Assembly Components: ”
“Gear Shift Lever Front Case Assembly Components: ”
“Gear Shift Shaft and Fork Components: ”
“Input Shaft Assembly, Output Shaft Assembly and Countershaft Assembly Components: ”

Special Tool

S5JB0A5208002

09900–06106 Snap ring pliers (closing type) ☞ / ☞ 	09913–50121 Oil seal remover ☞ 
09913–75810 Bearing installer ☞ 	09913–80113 Bearing installer ☞ 
09913–84510 Bearing installer ☞ / ☞ / ☞ / ☞ / ☞ 	09913–85210 Bearing installer ☞ 
09923–46020 Joint pipe ☞ 	09925–78210 Spring pin remover (6 mm) ☞ / ☞ 
09930–30104 Sliding shaft ☞ 	09940–51710 Bearing installer ☞ / ☞ / ☞ 

09941–64511 Bearing and oil seal remover (30 mm Min.) ☞		

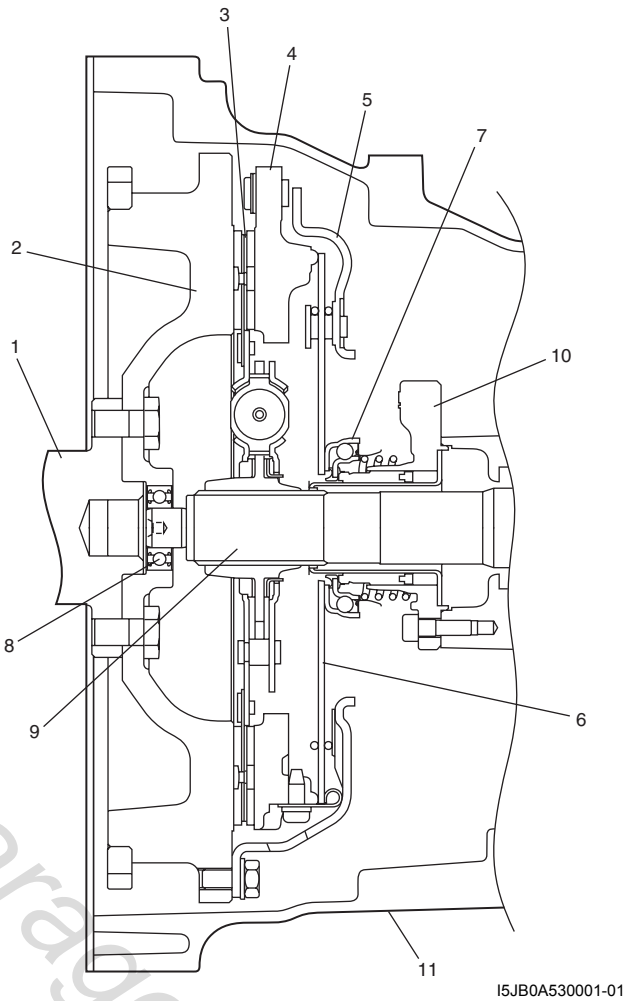
Clutch

General Description

Clutch (Hydraulic Type) Construction

S5JB0A5301001

The clutch is a diaphragm-spring clutch of a dry single disc type. The diaphragm spring is of a tapering-finger type, which is a solid ring in the outer diameter part, with a series of tapered fingers pointing inward.
The disc, carrying torsional coil springs, is positioned on the transmission input shaft with an involute spline fit.
The clutch cover is secured to the flywheel, and carries the diaphragm spring in such a way that the peripheral edge part of the spring pushes on the pressure plate against the flywheel (with the disc in between), when the clutch release bearing (incorporated in clutch operating cylinder) is held back. This is the engaged condition of the clutch.
Depressing the clutch pedal causes the release bearing (incorporated in clutch operating cylinder) to advance and pushes on the tips of the tapered fingers of the diaphragm spring. When this happens, the diaphragm spring pulls the pressure plate away from the flywheel, thereby interrupting the flow of drive from flywheel through clutch disc to transmission input shaft.
Clutch fluid is supplied from brake fluid reservoir.
Clutch fluid level can be checked by brake fluid level of brake fluid reservoir.



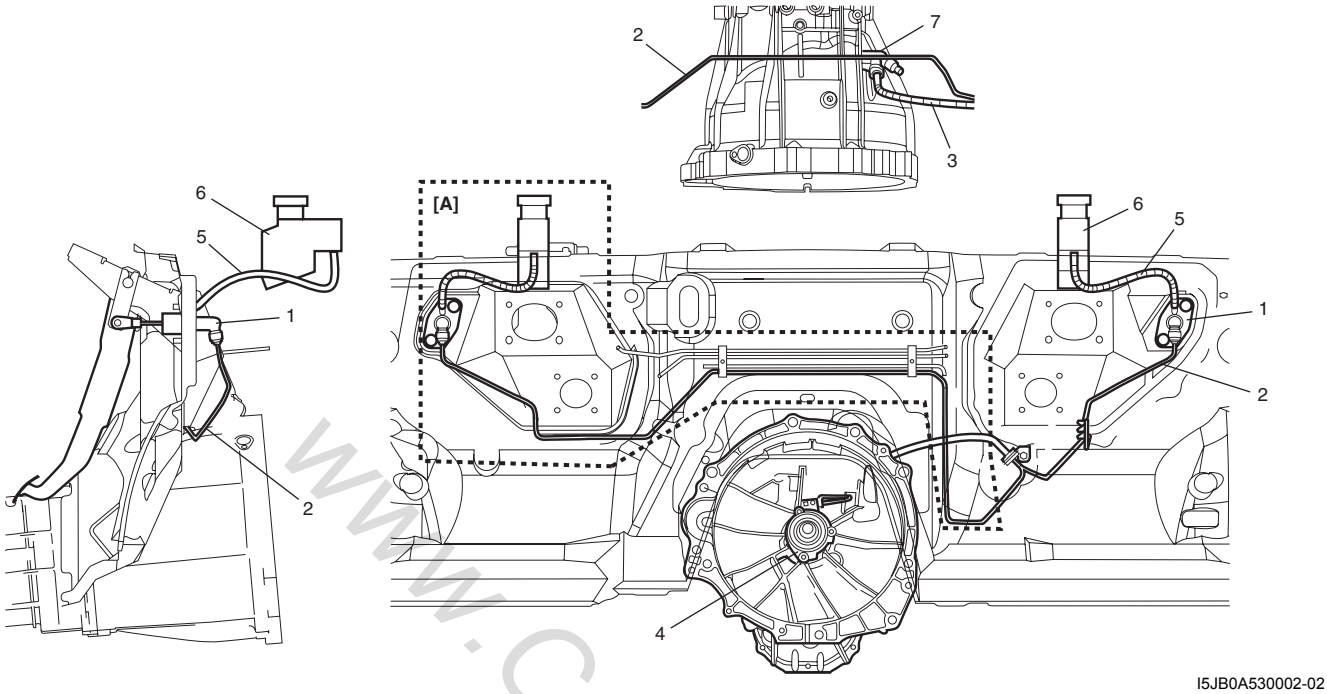
I5JB0A530001-01

1. Crankshaft	7. Release bearing
2. Flywheel	8. Input shaft bearing
3. Clutch disc	9. Input shaft
4. Pressure plate	10. Operating cylinder
5. Clutch cover	11. Clutch housing
6. Diaphragm spring	

Component Location

Clutch Fluid Pipe and Hose Location

S5JB0A5303001



I5JB0A530002-02

[A]: Right-hand steering vehicle	3. Clutch fluid hose	6. Brake master cylinder reservoir
1. Clutch master cylinder	4. Clutch operating cylinder assembly	7. Clutch fluid pipe joint
2. Clutch fluid pipe	5. Clutch reservoir hose	

Diagnostic Information and Procedures

Clutch (Hydraulic Type) Symptom Diagnosis

S5JB0A5304001

Condition	Possible cause	Correction / Reference Item
Slipping	Improper clutch pedal free travel	*Bleed air or replace master cylinder.*
	Worn or oily clutch disc facing	*Replace disc.*
	Warped disc, pressure plate or flywheel surface	*Replace disc, clutch cover or flywheel.*
	Weakened diaphragm spring	*Replace clutch cover.*
	Master cylinder piston or seal cup not returning	*Repair master cylinder.*
Dragging clutch	Improper clutch pedal free travel	*Bleed air or replace master cylinder.*
	Weakened diaphragm spring, or worn spring tip	*Replace clutch cover.*
	Rusted input shaft splines	*Lubricate.*
	Damaged or worn splines of transmission input shaft	*Replace input shaft.*
	Excessively wobbly clutch disc	*Replace disc.*
	Clutch facings broken or dirty with oil	*Replace disc.*
	Fluid leakage	*Repair or replace.*

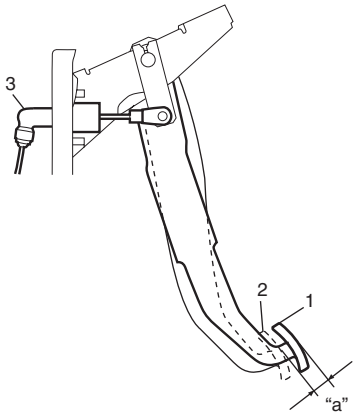
Condition	Possible cause	Correction / Reference Item
Clutch vibration	Glazed (glass-like) clutch facings	*Repair or replace disc.*
	Clutch facings dirty with oil	*Replace disc.*
	Release bearing slides unsmoothly	*Replace clutch operating cylinder assembly.*
	Wobbly clutch disc, or poor facing contact	*Replace disc.*
	Weakened torsion springs in clutch disc	*Replace disc.*
	Clutch disc rivets loose	*Replace disc.*
	Distorted pressure plate or flywheel surface	*Replace clutch cover or flywheel.*
	Weakened or loosened engine mounting bolt or nut	*Retighten or replace mounting.*
Noisy clutch	Worn or broken release bearing	*Replace clutch operating cylinder assembly.*
	Input shaft front bearing worn down	*Replace input shaft bearing.*
	Excessive rattle of clutch disc hub	*Replace disc.*
	Cracked clutch disc	*Replace disc.*
	Pressure plate and diaphragm spring rattling	*Replace clutch cover.*
Grabbing clutch	Clutch disc facings soaked with oil	*Replace disc.*
	Clutch disc facings excessively worn	*Replace disc.*
	Rivet heads showing out of facing	*Replace disc.*
	Weakened torsion springs	*Replace disc.*

Clutch Pedal Height Inspection

S5JB0A5304002

Measure clutch pedal height “a” from brake pedal (2). If pedal height is excessive low or high, check installation position of clutch position switch, clutch fluid leakage, bending of clutch pedal arm and bending of push rod of clutch master cylinder (3). If any abnormality is found, adjust or replace it with a new one.

Clutch pedal height
“a”: Approx. 20 mm (0.79 in.)



I5JB0A530003-01

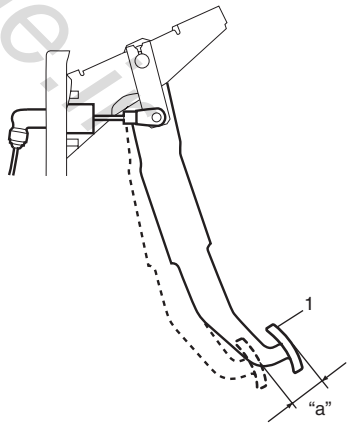
1. Clutch pedal

Clutch Pedal Free Travel Check

S5JB0A5304003

Depress clutch pedal (1), stop the moment clutch resistance is felt and measure distance (clutch pedal free travel). Free travel should be within the following specification. If free travel is out of specification, check installation position of clutch pedal position switch, clutch fluid leakage, bending of clutch pedal arm and bending of push rod of clutch master cylinder. If any abnormality is found, adjust or replace it with a new one.

Clutch pedal free travel
“a”: 0 – 10 mm (0 – 0.4 in.)



I5JB0A530004-01

Clutch Fluid Inspection

S5JB0A5304004

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

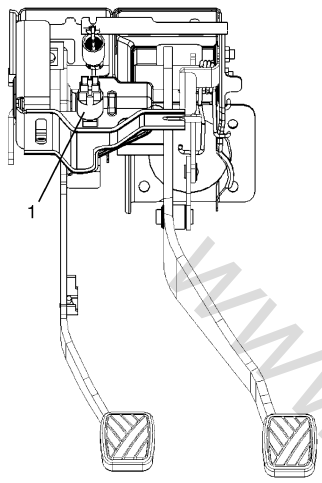
Repair Instructions

Clutch Pedal Position (CPP) Switch Removal and Installation

S5JB0A5306001

Removal

1) Disconnect connector of CPP switch (1) with ignition switch OFF.
2) Remove CPP switch (1) from pedal bracket.



I5JB0A530005-02

Installation

1) Instal CPP switch to pedal bracket.
2) Adjust switch position referring to “Clutch Pedal Position (CPP) Switch Inspection and Adjustment: ”.
3) Connect connector to CPP switch securely.

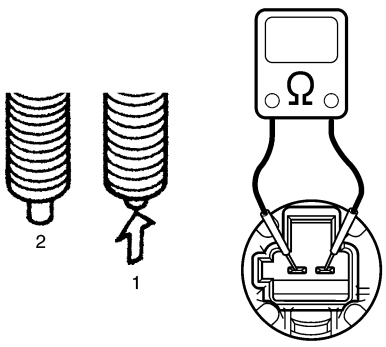
Clutch Pedal Position (CPP) Switch Inspection and Adjustment

S5JB0A5306002

Inspection

Check for resistance between terminals under each condition below. If check result is not satisfactory, replace.

CPP switch resistance
When switch shaft is pushed (1): Continuity
When switch shaft is free (2): No continuity

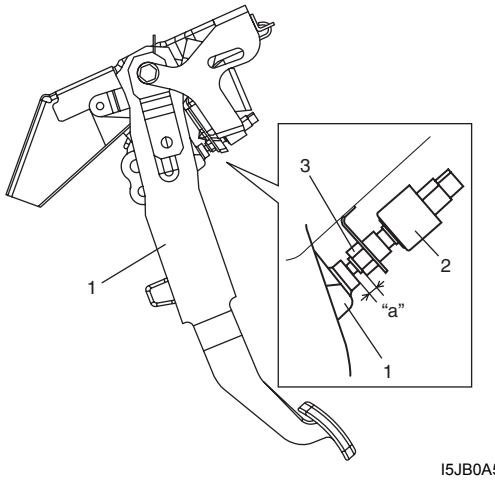


I5JB0A530006-01

Adjustment

With clutch pedal (1) released, adjust switch (2) position so that clearance between end of thread and clutch pedal arm is within specification.

Clearance between end of thread and clutch pedal arm
“a”: 0.5 – 1.5 mm (0.02 – 0.06 in.)



I5JB0A530007-02

Clutch Fluid Pipe and Hose Removal and Installation

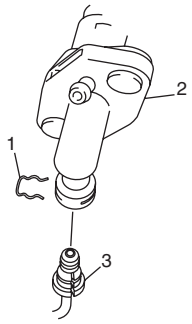
S5JB0A5306003

⚠ CAUTION

Do not allow fluid to get on painted surface. It may cause painted surface damage.

Removal

1) Remove dust and dirt from each joint of hose and pipe to be disconnected and clean around reservoir cap of brake master cylinder.
2) Take out fluid with syringe or such.
3) Remove clamp (1) of clutch master cylinder (2) and disconnect fluid pipe (3).

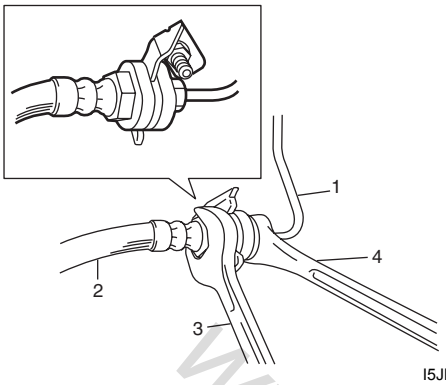


I5JB0A530008-01

4) Disconnect fluid pipe (1) from hose (2).

NOTE

To disconnect pipe (1) from hose (2), separate them by using flare nut wrench (4) and spanner (3) so as not to kink them.



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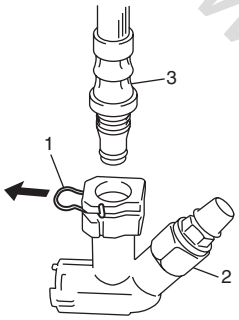
5) Pull clamp (1) of fluid pipe joint (2) and disconnect fluid hose (3).



I5JB0A530010-02

Installation

Reverse removal sequence noting the following points.

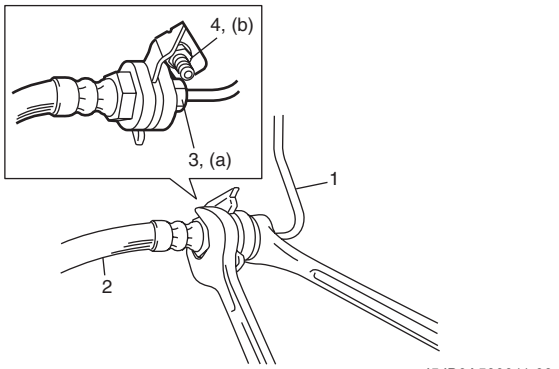
- Tighten flare nut (3) and hose bracket nut (4) to specified torque.

Tightening torque

Clutch fluid pipe flare nut (a): 16 N·m (1.6 kgf-m, 11.5 lb-ft)

Clutch fluid hose bracket nut (b): 10 N·m (1.0 kgf-m, 7.5 lb-ft)

- Do not allow pipe (1) and hose (2) to contact hard against vehicle or other parts.
- Install each clamp securely.
- After installation, check clutch pedal free travel and bleed air from system.
- Check fluid leakage.
- Add fluid close to MAX level of reservoir.



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Clutch Fluid Pipe and Hose Inspection

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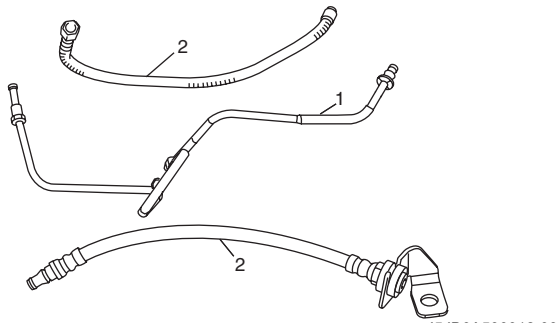
Check pipe (1) and hose (2) for dent, kink, crack, dirt and dust. Replace if check result is not satisfactory.



I5JB0A530012-03

Clutch Master Cylinder Removal and Installation

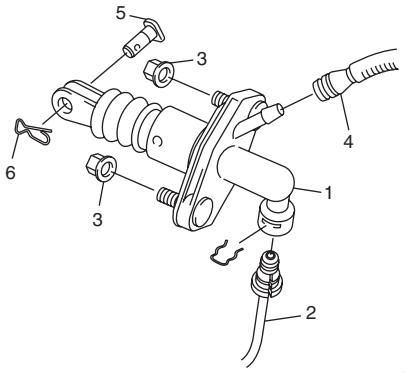
S5JB0A5306005

⚠ CAUTION

- **Do not allow fluid to get on painted surfaces. It may cause painted surface damage.**
- **Do not disassemble clutch master cylinder.**

Removal

1) Clean around reservoir cap of brake master cylinder and take out fluid with syringe or such.
2) Detach main fuse box.
3) Disconnect fluid pipe (2) and reservoir hose (4) from master cylinder assembly (1).
4) Remove clip (6) and push rod clevis pin (5).
5) Remove master cylinder attaching nuts (3).
6) Remove master cylinder assembly (1) and gasket.



I5JB0A530013-01

Installation

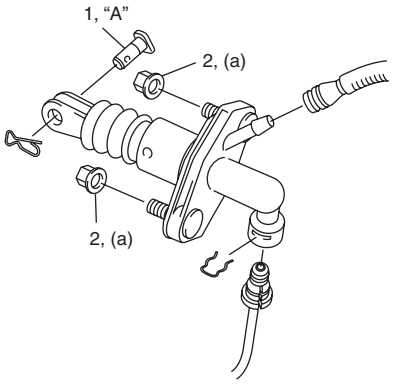
Reverse removal procedure for installation noting the following.

- Apply grease to push rod clevis pin (1).

"A": Grease 99000–25100 (SUZUKI Silicone Grease)

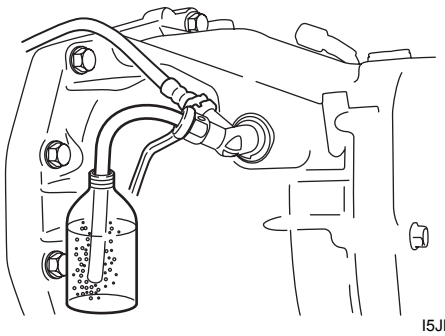
- Tighten master cylinder attaching nuts (2) to specified torque.

Tightening torque
Clutch master cylinder attaching nut (a): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



I5JB0A530014-01

- Fill reservoir with specified brake fluid and check fluid leakage.
- After installation, bleed air from clutch system and check clutch pedal free travel. Refer to "Air Bleeding of Brake System: in Section 4A" for air bleeding procedure.



I5JB0A530015-03

Clutch Master Cylinder Inspection

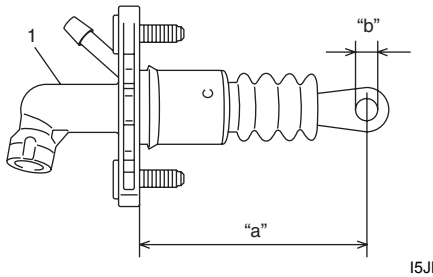
S5JB0A5306008

- Check master cylinder (1) for damage and fluid leakage, boot for damage and deterioration, gasket for damage and deterioration.
- Check for push rod clevis distance "a" and clevis pin hole diameter "b" as shown.

If any malfunction is found, replace master cylinder.

Push rod clevis distance "a":
106.1 – 107.1 mm (4.18 – 4.22 in.)

Clevis pin hole diameter "b":
10.05 – 10.15 mm (0.396 – 0.399 in.)



I5JB0A530016-01

Clutch Operating Cylinder Assembly Removal and Installation

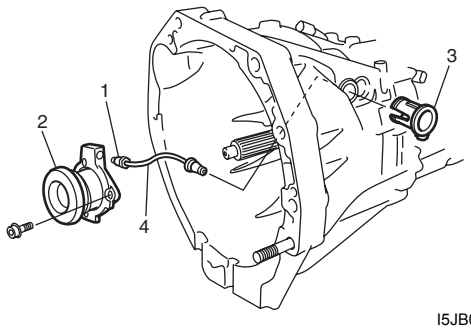
S5JB0A5306009

⚠ CAUTION

- **Do not allow fluid to get on painted surfaces. It may cause painted surface damage.**
- **Do not disassemble clutch operating cylinder assembly.**

Removal

1) Clean around reservoir cap of brake master cylinder and take out fluid with syringe or such.
2) Dismount transmission assembly referring to "Manual Transmission Assembly Dismounting and Remounting: in Section 5B".
3) Loosen clutch fluid pipe flare nut (1) of clutch operating cylinder assembly (2).
4) Remove clutch pipe joint sleeve (3) from transmission front case and then remove clutch fluid pipe (4).
5) Remove clutch operating cylinder assembly from transmission front case.



I5JB0A530017-01

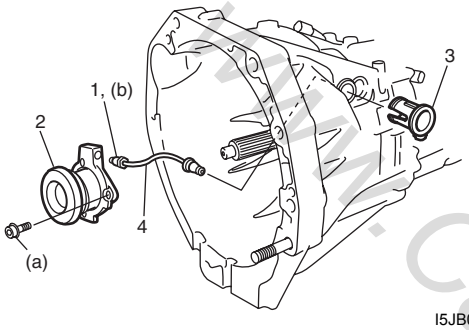
Installation

1) Install clutch operating cylinder assembly (2) to transmission front case. Tighten mounting bolts to specified torque.

Tightening torque
Clutch operating cylinder assembly mounting bolt (a): 10 N·m (1.0 kgf-m, 7.5 lb-ft)

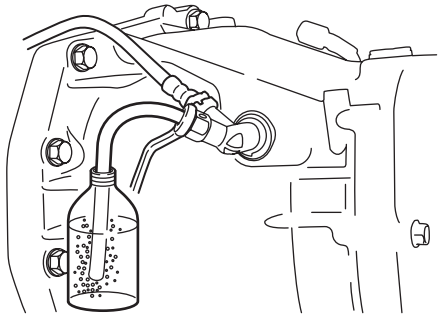
2) Connect clutch fluid pipe (4) to clutch operating cylinder assembly temporarily.
3) Install clutch pipe joint sleeve (3) to transmission front case securely and then tighten clutch fluid pipe flare nut (1) to specified torque.

Tightening torque
Clutch fluid pipe flare nut (b): 16 N·m (1.6 kgf-m, 11.5 lb-ft)



I5JB0A530018-01

4) Remount transmission assembly referring to "Manual Transmission Assembly Dismounting and Remounting: in Section 5B".
5) Fill reservoir with specified brake fluid and check for fluid leakage.
6) Bleed air from system and check clutch pedal free travel. Refer to "Air Bleeding of Brake System: in Section 4A" for air bleeding procedure.

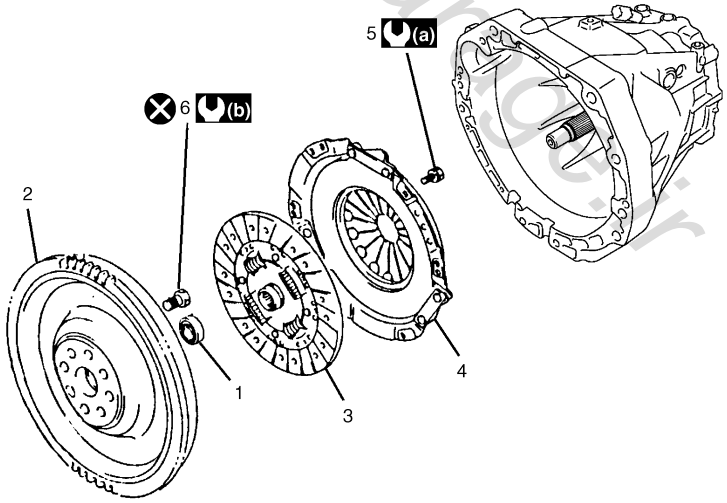


I5JB0A530015-03

Clutch Operating Cylinder Assembly Inspection
Check clutch fluid leakage, spring for damage and bearing for smooth rotation. If malfunction is found, replace clutch operating cylinder assembly.

Clutch Cover, Clutch Disc and Flywheel Components

S5JB0A5306010



I5JB0A530022-01

1. Input shaft bearing	4. Clutch cover	(a) : 23 N·m (2.3 kgf-m, 17.0 lb-ft)
2. Flywheel	5. Clutch cover bolt	(b) : 70 N·m (7.0 kgf-m, 50.5 lb-ft) (for M16 engine model) 68.5 N·m (6.85 kgf-m, 49.5 lb-ft) (for J20 engine model)
3. Clutch disc	6. Flywheel bolt	⊗ : Do not reuse.

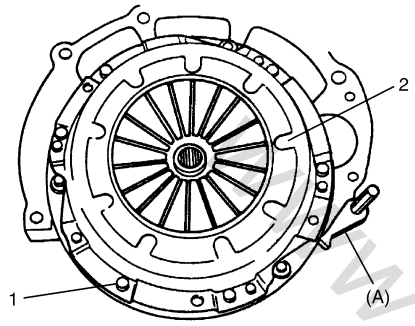
Clutch Cover, Clutch Disc and Flywheel Removal and Installation

S5JB0A5306012

Removal

1) Dismount transmission assembly referring to “Manual Transmission Assembly Dismounting and Remounting: in Section 5B”.
2) Hold flywheel stationary with special tool and remove clutch cover bolts (1), clutch cover (2) and clutch disc.

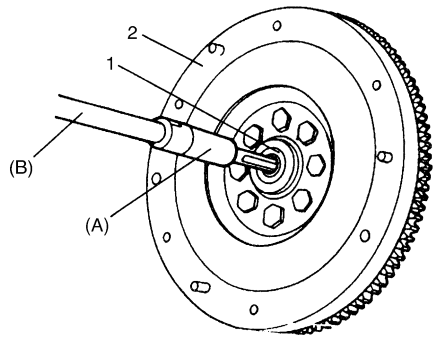
Special tool
(A): 09924–17811



IYSQ01530019-01

3) Pull out input shaft bearing (1) by using special tools.

Special tool
(A): 09921–26020
(B): 09930–30104



I2RH01530023-01

4) Remove flywheel from crankshaft.

Installation

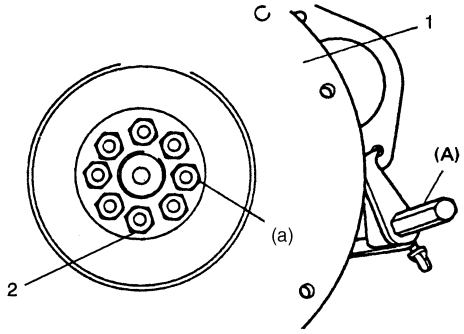
NOTE

Before installation, make sure that flywheel surface and pressure plate surface have been cleaned and dried thoroughly.

1) Install flywheel (1) to crankshaft and tighten new bolts (2) to specification.

Special tool
(A): 09924–17811

Tightening torque
Flywheel bolt (for M16 engine model) (a): 70 N·m (7.0 kgf-m, 50.5 lb-ft)
Flywheel bolt (for J20 engine model) (a): 68.5 N·m (6.9 kgf-m, 49.5 lb-ft)



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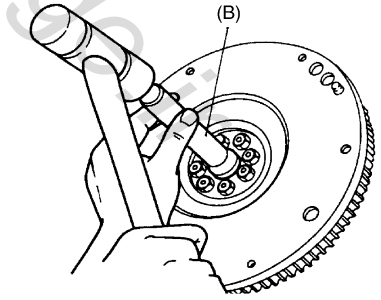
2) Using special tool, install input shaft bearing to flywheel.

Special tool
(B): 09925–98210



IYSQ01530022-01

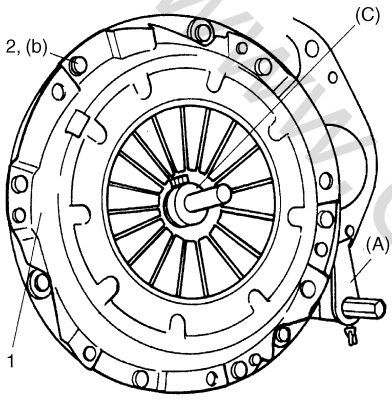
3) Aligning clutch disc to flywheel center by using special tool, install clutch cover (1) and bolts (2). Then tighten bolts to specification.

NOTE

- **While tightening clutch cover bolts, compress clutch disc with special tool by hand so that disc centered.**
- **Tighten cover bolts little by little evenly in diagonal order.**

Special tool
(A): 09924–17811
(C): 09923–36320

Tightening torque
Clutch cover bolt (b): 23 N·m (2.3 kgf-m, 17.0 lb-ft)



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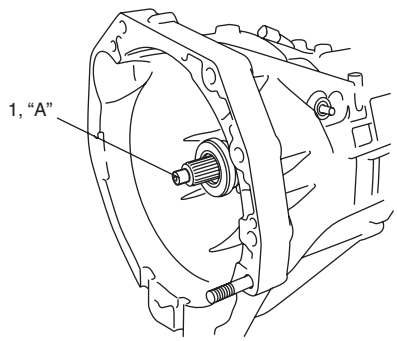
4) Slightly apply grease to input shaft (1).

"A": Grease 99000–25210 (SUZUKI Super Grease I)

5) Join transmission assembly with engine. Refer to "Manual Transmission Assembly Dismounting and Remounting: in Section 5B".

NOTE

Turn crankshaft with wrench from front while inserting transmission input shaft (1) to clutch disc until splines mesh.



I5JB0A530021-01

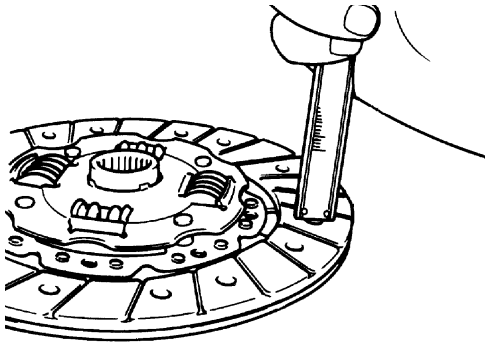
Clutch Cover, Clutch Disc and Flywheel Inspection

S5JB0A5306013

Input Shaft Bearing
Check bearing for smooth rotation and replace it if abnormality is found.

Clutch Disc
Measure depth of rivet head depression, i.e. distance between rivet head and facing surface. If depression is found to have reached service limit at any of holes, replace disc assembly.

Rivet head depth
Standard: 1.5 mm (0.06 in.)
Service limit: 0.5 mm (0.02 in.)



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Clutch Cover
- Check diaphragm spring for abnormal wear or damage.
- Inspect pressure plate for wear or heat spots.

If abnormality is found, replace it as assembly. Do not disassemble it into diaphragm and pressure plate.

Flywheel
Check surface contacting clutch disc for abnormal wear or heat spots. Replace or repair as required.

Specifications

Tightening Torque Specifications

S5JB0A5307001

Fastening part	Tightening torque			Note
	N·m	kgf-m	lb-ft	
Clutch fluid pipe flare nut	16	1.6	11.5	☞ / ☞
Clutch fluid hose bracket nut	10	1.0	7.5	☞
Clutch master cylinder attaching nut	23	2.3	17.0	☞
Clutch operating cylinder assembly mounting bolt	10	1.0	7.5	☞
Flywheel bolt (for M16 engine model)	70	7.0	50.5	☞
Flywheel bolt (for J20 engine model)	68.5	6.9	49.5	☞
Clutch cover bolt	23	2.3	17.0	☞

NOTE

The specified tightening torque is also described in the following.
“Clutch Cover, Clutch Disc and Flywheel Components: ”

Reference:
For the tightening torque of fastener not specified in this section, refer to “Fastener Information: in Section 0A”.

Special Tools and Equipment

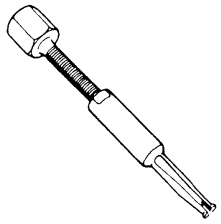
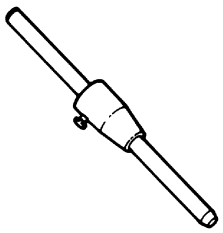
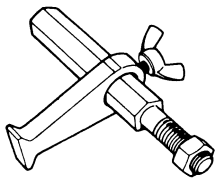
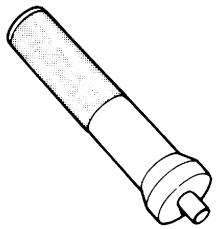
Recommended Service Material

S5JB0A5308001

Material	SUZUKI recommended product or Specification		Note
Grease	SUZUKI Silicone Grease	P/No.: 99000–25100	☞
	SUZUKI Super Grease I	P/No.: 99000–25210	☞

Special Tool

S5JB0A5308002

09921–26020 Bearing remover ☞ 	09923–36320 Clutch center guide (15 mm) ☞ 
09924–17811 Flywheel holder ☞ / ☞ / ☞ 	09925–98210 Input shaft bearing installer ☞ 
09930–30104 Sliding shaft ☞