Automatic Transaxle (A4CF2)

GENERAL

SPECIFICATION E3E15784

Transaxle model		A4CF2
Engine model		Gasoline 2.0L/ Diesel 1.6L
Torque converter		3 elements 2 phases 1 stage
Torque converter size		Ø236
Oil pump type		Parachoid
Transaxle case type		Separated
Friction elements		Clutch: 3EA
		Brake: 2EA
		OWC : 1EA
Planetary gear		2EA
Gear ratio	1st	2.919
	2nd	1.551
	3rd	1.000
	4th	0.713
	Reverse	2.480
Final gear ratio		3.849(Gasoline)/ 3.532(Diesel)
Fluid pressure balance piston		3EA
Stall speed		2,000~2,700 rpm
Accumulator		4EA
Solenoid valve		6EA (PWM:5EA, VFS:1EA)
Gear shift position		4 range (P,R,N,D)
Oil filter		1EA

- PWM : Pulse Width Modulation
- VFS : Variable Force Solenoid

TIGHTENING TORQUE

Item	Nm	kgf.m	lb-ft
Control cable bracket	15~22	1.5~2.2	11~16
Input shaft speed sensor	10~12	1.0~1.2	7~8
Output shaft speed sensor	10~12	1.0~1.2	7~8
Manual control lever	17~21	1.7~2.1	13~15
Inhibitor switch	10~12	1.0~1.2	7~8
Oil pan	10~12	1.0~1.2	7~8
Valve body mounting bolt	10~12	1.0~1.2	7~8
Oil drain plug	35~45	3.5~4.5	25~32
Pressure check plug	8~10	0.8~1.0	6~7
Front roll support bracket bolt	60~80	6.0~8.0	43~58
Rear roll support bracket bolt	60~80	6.0~8.0	43~58
Transaxle support bracket bolt	60~80	6.0~8.0	43~58

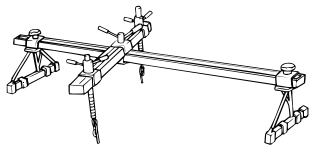
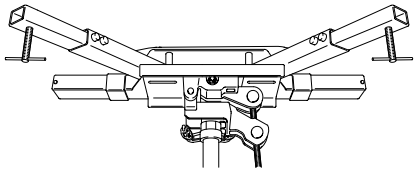
LUBRICANT EC6BEAB5

Item	Specified lubricant	Quantity
Transaxle fluid liter (US qt, lmp.qt)	GENUINE DIAMOND ATF SP-III or SK ATF SP -III	6.6 (6.9, 5.81)

SEALANT

Item	Specified sealant
Rear cover Torque converter housing Oil pan	LOCTITE FMD-546

SPECIAL TOOL E9708F91

Tool (Number and name)	Illustration	Use
09200-38001 Engine support fixture	 AKGF020A	Removal and installation of the transaxle.
09624-38000 Crossmember supporter	 EKBF005A	Supporting of the crossmember.

AUTOMATIC TRANSAXLE SYSTEM

DESCRIPTION E99A07D1

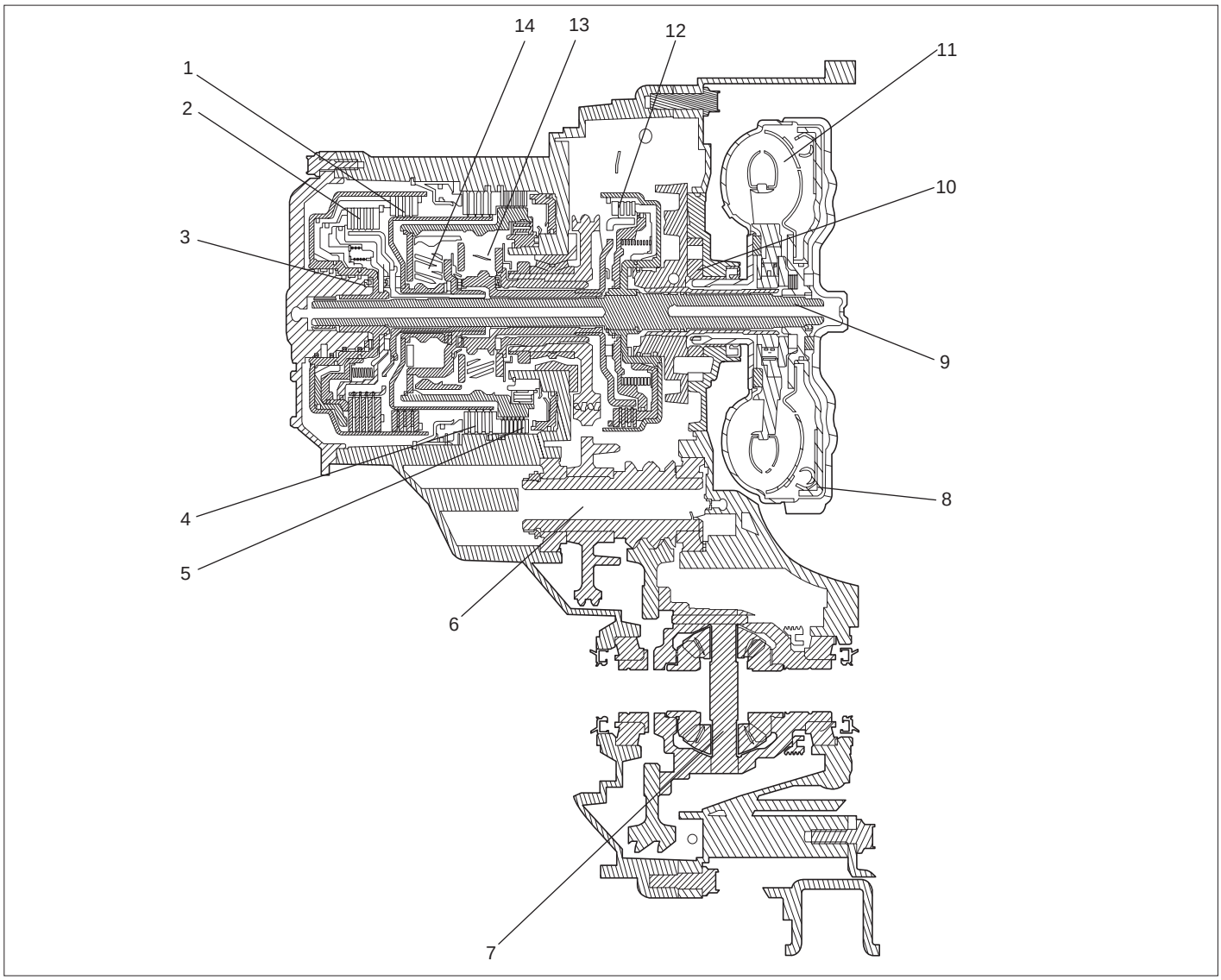
The new small sized automatic transaxle (A4CF2) is for gasoline 2.0 & Diesel 1.6 engine.
The transaxle (A4CF2) is improved on the durability, fuel consumption and efficiency by the new main features as followed.

The new main features
1. The hydraulic centrifugal oil pressure balance piston.
2. The full line pressure variable control system.
3. The long travel damper clutch.
4. The disc type return spring.
5. The ultra flat torque converter.

FUNCTIONS

Item	Contents
Components	The full line pressure variable control operates in the valve body to improve the fuel consumption.
	The long travel damper clutch is applied to the torque converter to improve the engine revolution change reduction capability and the fuel consumption. (17~20°)
	The oil pump of the trochocentric type is changed to parachoid type to improve the processing and the capacity efficiency at the low RPM range.
	The disc type return spring is applied to the low & reverse brake to improve the durability and reduce the length.
	The hydraulic centrifugal oil pressure balance piston is applied to the inside of clutch to improve the durability and the shift control capability.
	The low noise gear and the gear teeth face grinding are applied to the transfer driven gear to improve the noise and the durability.
Electronic control system	The oil pressure value set by TCM is coupled with the engine torque so that the stable shift feeling can be improved.
	The engine torque reduction control operates effectively to improve the shift feeling and the durability.
	It can be the skip shift of 1↔3 and 2↔4 when shifting.
	The reverse clutch, not L/R brake is controlled when controlling the N→R shift so that the N→R shift feeling can be improved.
	The range of the damper clutch direct control expands to improve the fuel consumption.
	The current control chip is installed into the TCM to regulate the solenoid control current and control the oil pressure securely according to the change of the temperature and voltage.
	The FPC(Flexible Printed Circuit) harness is composed of the thin and flat copper in the insulating film like electric wire.
	The tachometer is operated by the change of the frequency forwarded from the TCM to the instrument cluster, not vehicle speed sensor.

TRANSAXLE STRUCTURE



1. Reverse clutch
2. Overdrive clutch
3. Rear cover
4. Second brake
5. Low and reverse brake
6. Output shaft
7. Differential
8. Damper clutch
9. Input shaft
10. Oil pump assembly
11. Torque converter assembly
12. Underdrive clutch
13. Output planetary carrier
14. Overdrive planetary carrier

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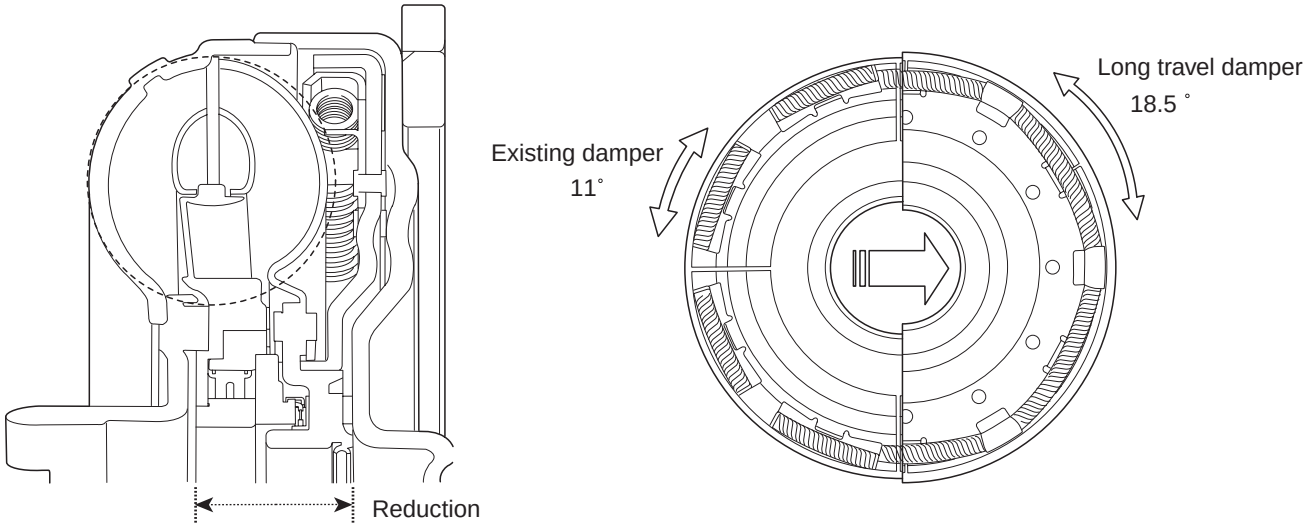
MECHANICAL SYSTEM

FUNCTION

TORQUE CONVERTER

The torque converter, as the power plant which delivers the power of engine to the automatic transaxle, consists of 3 elements, 2 phases and 1 stage type.

- The flowing section form of the torque converter changes the round type to the flat type to reduce the length of the torque converter.
- The maximum operating degree of the damper clutch installed inside the transaxle increases from 11° to 18.5° to improve the engine revolution change reduction capability and the fuel consumption



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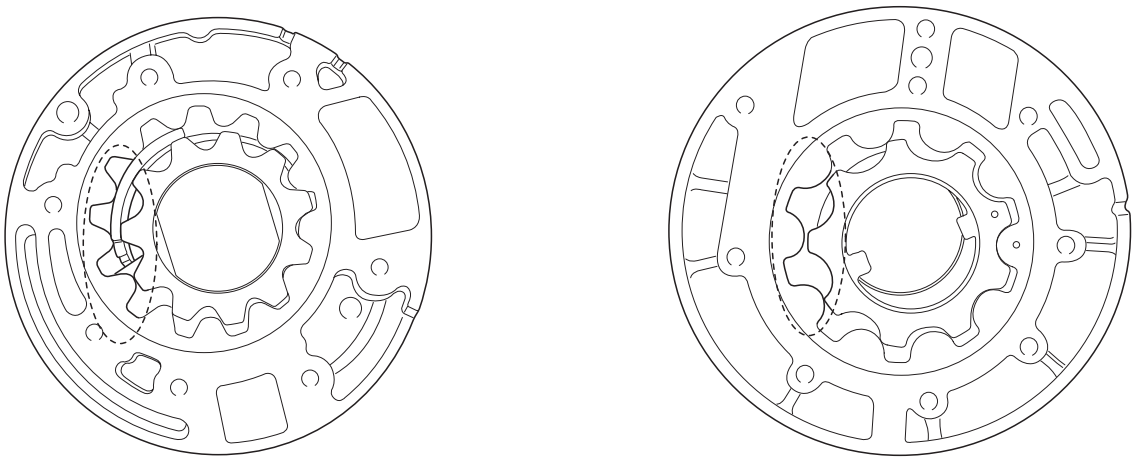
OIL PUMP

The oil pump is made of the aluminum (the reaction shaft support) to loose the weight and selects the parachoid type to improve the processing and the capacity efficiency at the low RPM range.



<Trocoid> <Pharacoid>

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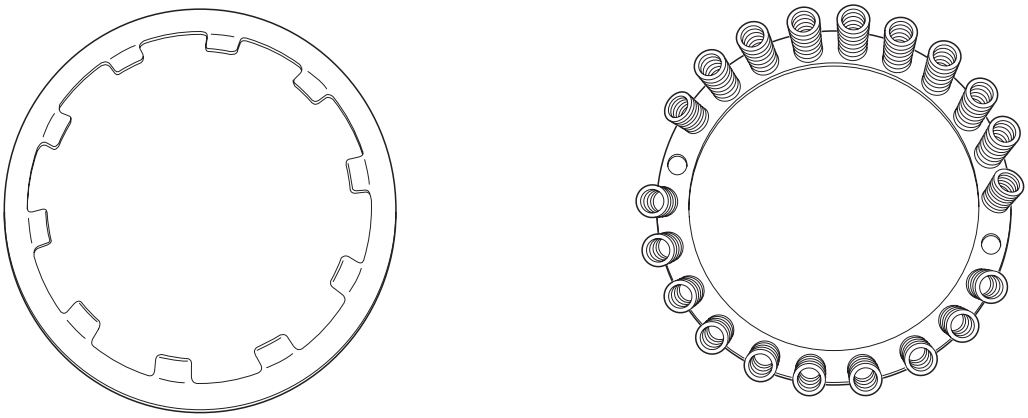
BRAKES

The automatic transaxle (A4CF2) uses the low and reverse brake and the second brake. The low and reverse brake is fixed by the low and reverse annulus gear and overdrive planetary carrier at the 1st speed.

- The disc type return spring is applied to the low and reverse brake and it minimizes the slip of the friction material from the uniform spring operation power to improve the durability and reduce the length.

The overdrive sun gear is held on the transaxle case by the second brake at the 2nd speed.



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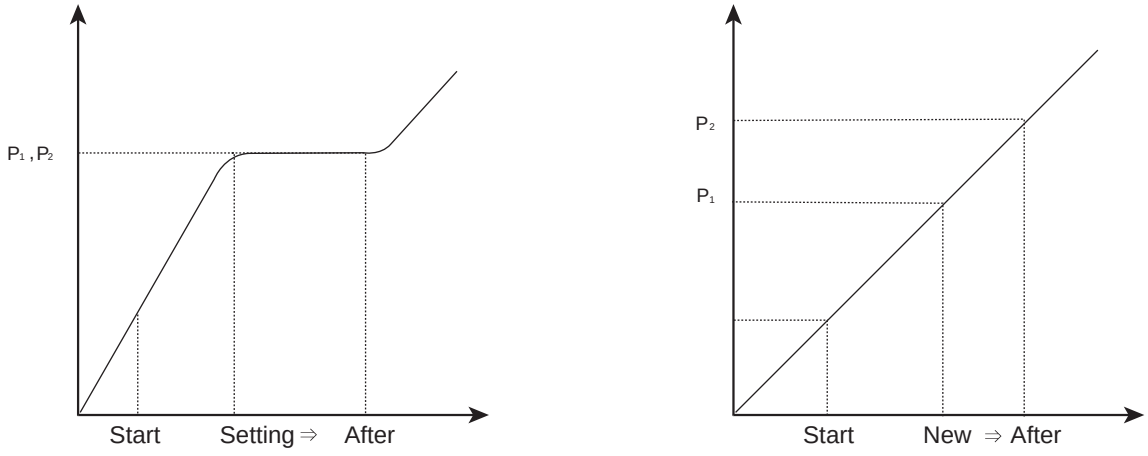

<Disc type return spring> <Coil type return spring>

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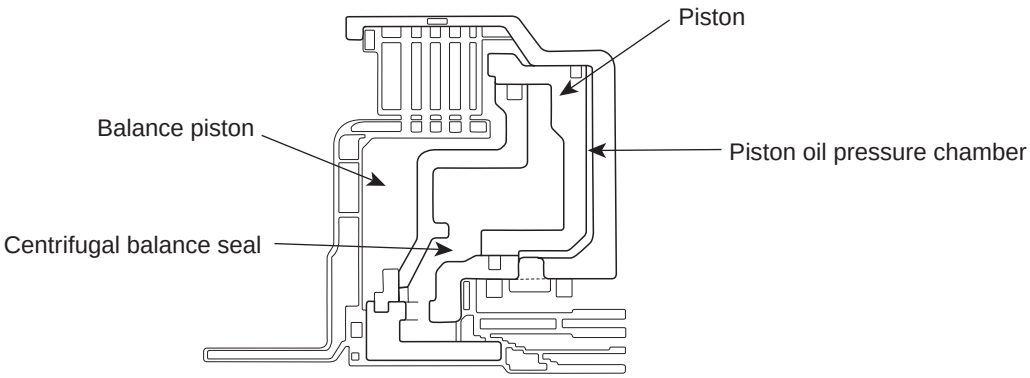
CLUTCH

The multiple clutches and the one way clutch are used as the transaxle device.
The retainer of each clutch is composed of the precision sheet metal parts to realize the productivity and the light weight.
The hydraulic centrifugal oil pressure balance device places inside the clutch assembly.
Generally the oil remained in the piston oil pressure chamber pushes the piston by the centrifugal force. But to prevent the piston from being pushed, the oil filled in between the piston and the return spring retainer occurs the centrifugal force and both of the power is offset so that the piston don't move. In result, it improves the durability and the shift control ability.

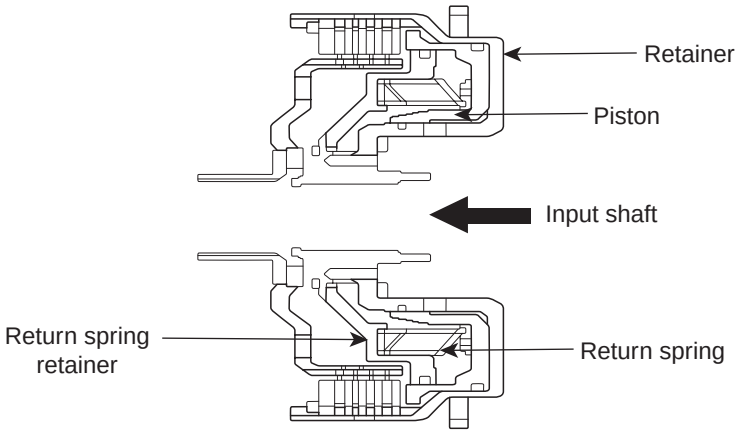


<Centrifugal balance device>

BKGF003A

1. UNDERDRIVE CLUTCH

The underdrive clutch is engaged at 1st, 2nd and 3rd speed.
The driving force of input shaft is delivered to the underdrive sun gear.
The operating oil pressure in the underdrive clutch components operates between the piston and the retainer and pushes the piston to the clutch discs to deliver the driving force from the retainer to the hub.



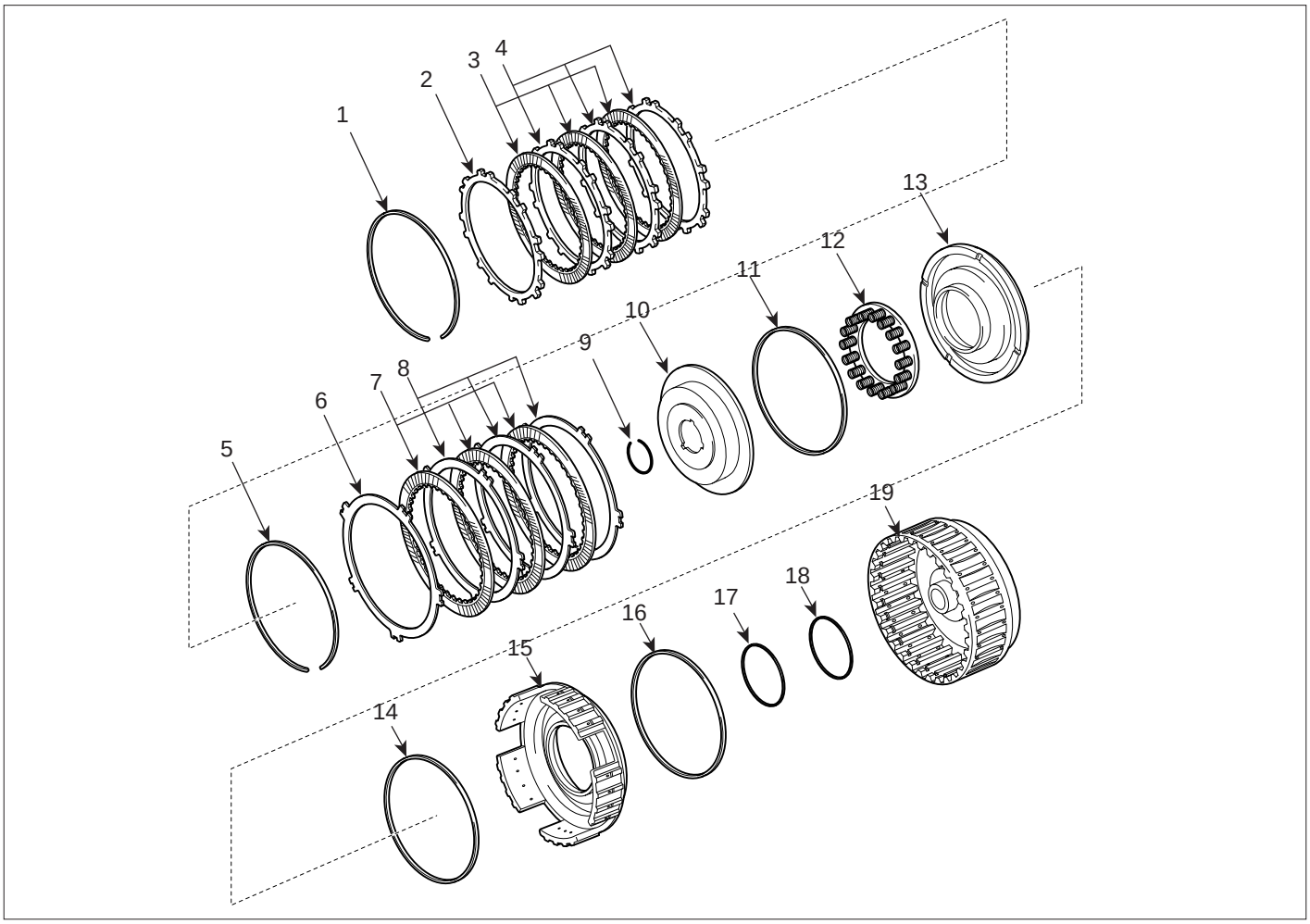
<Underdrive clutch>

BKGF003B

2. REVERSE CLUTCH AND OVERDRIVE CLUTCH

The reverse clutch is engaged at the reverse and delivers the driving force of input shaft to the reverse sun gear.
The overdrive clutch is engaged at the 3rd and 4th speed and delivers the driving force of input shaft to the overdrive planetary carrier and the low and reverse annulus gear.
The operating oil pressure of the reverse clutch operates between the reverse clutch retainer and overdrive clutch retainer and it has the whole overdrive clutch moved to deliver into the hub via retainer.

STRUCTURE OF THE REVERSE AND THE OVERDRIVE CLUTCH

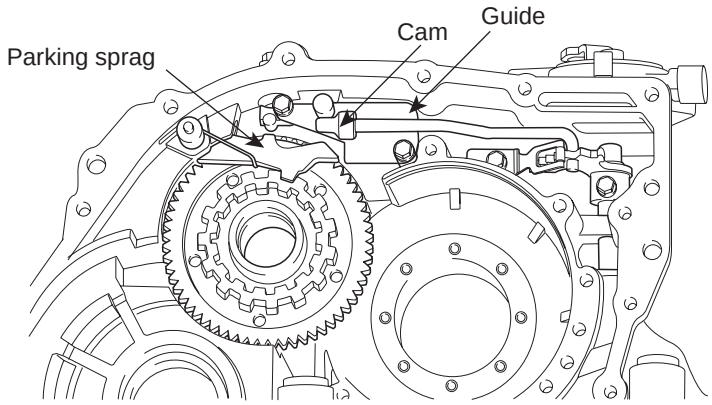


1. Snap ring
2. Clutch reaction plate
3. Clutch disc
4. Clutch plate
5. Snap ring
6. Clutch reaction plate
7. Clutch disc
8. Clutch plate
9. Snap ring
10. Spring retainer
11. D-ring
12. Return spring
13. Overdrive clutch piston
14. D-ring
15. Reverse clutch piston
16. D-ring
17. D-ring
18. D-ring
19. Reverse clutch retainer

BKGF003C

PARKING SYSTEM

The parking system for A4CF2 model is the cam type. The roller type installed to the existing new generation AT needs the support to move the roller when operating the parking system and is so complicated. But the cam type for A4CF2 model doesn't need the support and the structure is simply. It only needs the guide to prevent from moving the cam idly.



<Parking system>

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POWER TRAIN

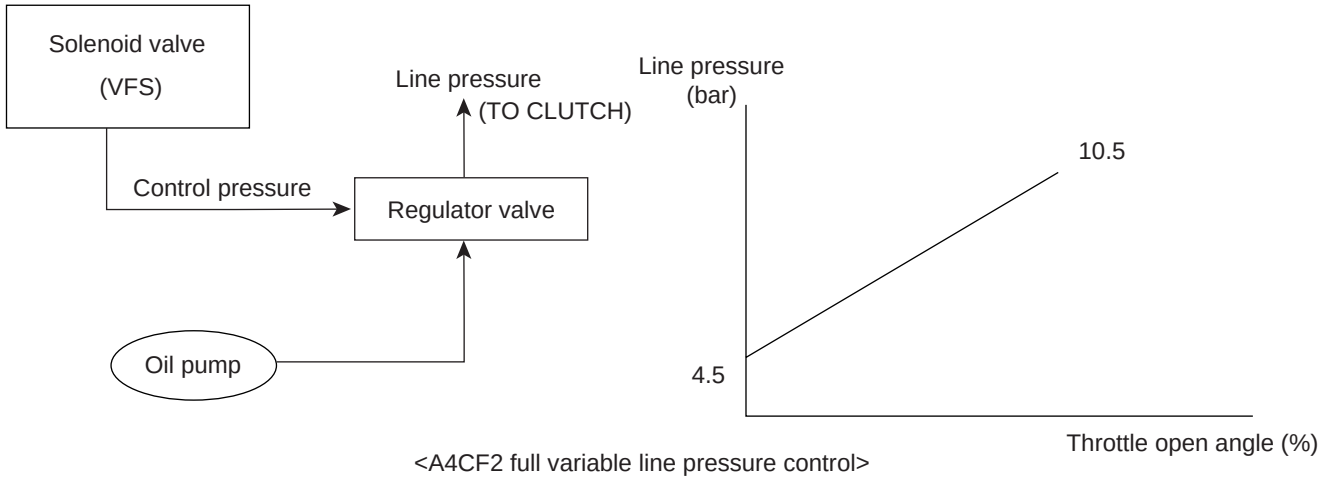
	UD/C	OD/C	REV/C	2-4/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●				●	●
D2	●			●		
D3	●	●				
D4		●		●		
L	●				●	●

OPERATION EBB55498

HYDRAULIC CONTROL SYSTEM

MAIN FEATURES

The VFS (Variable Force Solenoid) installed in the valve body is applied to transaxle(A4CF2). VFS varies the line pressure from 4.5bar to 10.5bar according to throttle open angle and shift range to improve the fuel consumption and shift ability.
And the reducing valve which is installed in the valve body makes the solenoid control pressure using the reducing pressure instead of the line pressure like the HIVEC transaxle.
The material of spool valve in the valve body is changed from the steel to aluminum to reduce the oil leakage by the thermal expansion between the valve body and spool valve at the high temperature.
The switch valve, the solenoid valve and the fail safe valve are operated to drive the vehicle at the 3rd speed and reverse even thought the malfunction of the electronic control parts occur.



<A4CF2 full variable line pressure control>

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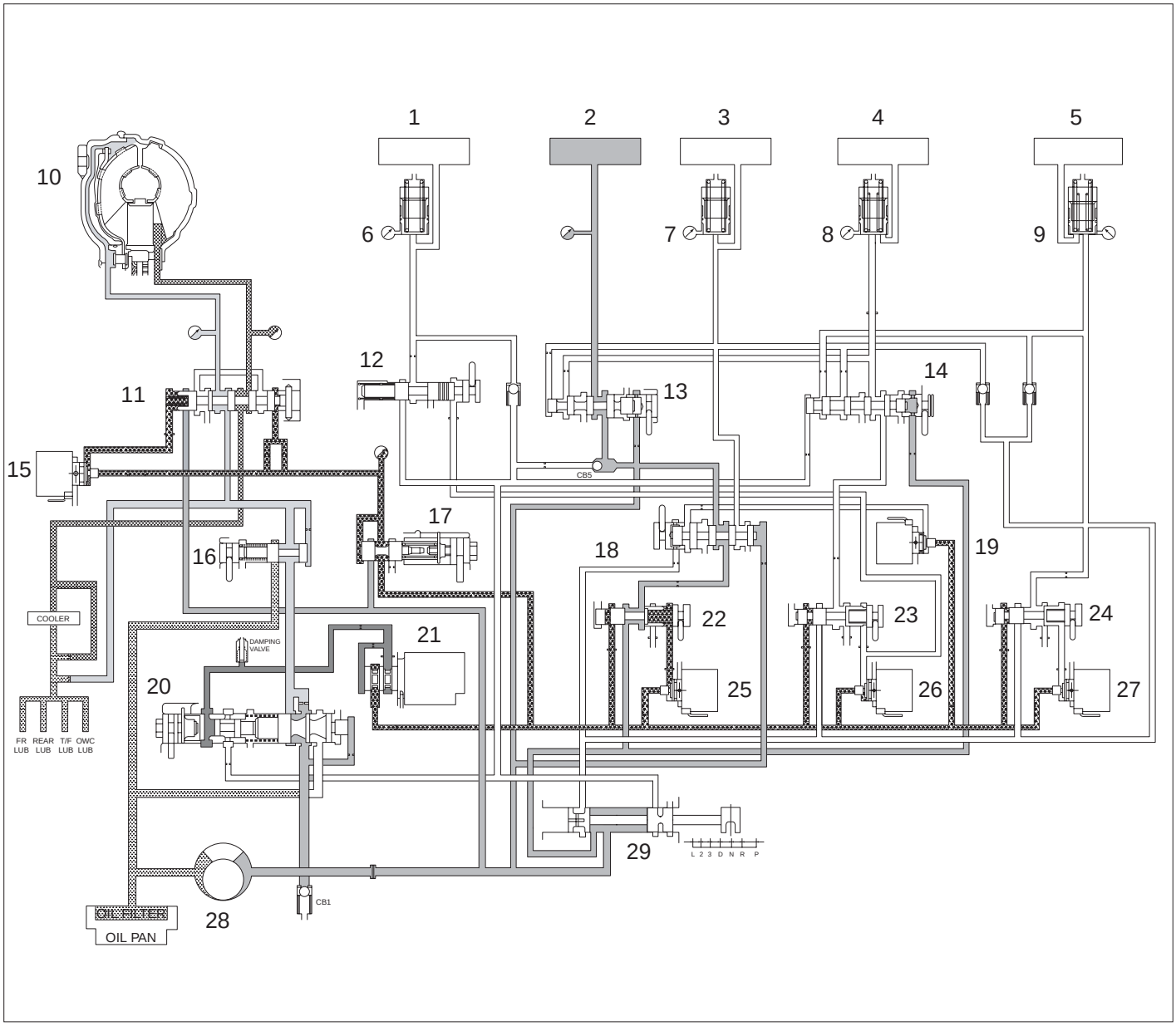
STRUCTURE OF HYDRAULIC CIRCUIT



1. Reverse clutch
2. Low and reverse brake
3. Overdrive clutch
4. 2/4 brake
5. Underdrive clutch
6. Reverse clutch accumulator
7. Overdrive clutch accumulator
8. 2/4 brake accumulator
9. Underdrive clutch accumulator
10. Torque converter assembly
11. Damper clutch control valve
12. N-R control valve
13. Fail safe valve-A
14. Fail safe valve-B
15. PCSV-D
16. Torque converter pressure control valve
17. Reducing valve
18. OD & L/R switch valve
19. ON/OFF solenoid valve
20. Regulating valve
21. VFS valve
22. Pressure control valve-A
23. Pressure control valve-B
24. Pressure control valve-C
25. PCSV-A
26. PCSV-B
27. PCSV-C
28. Oil pump
29. Manual valve

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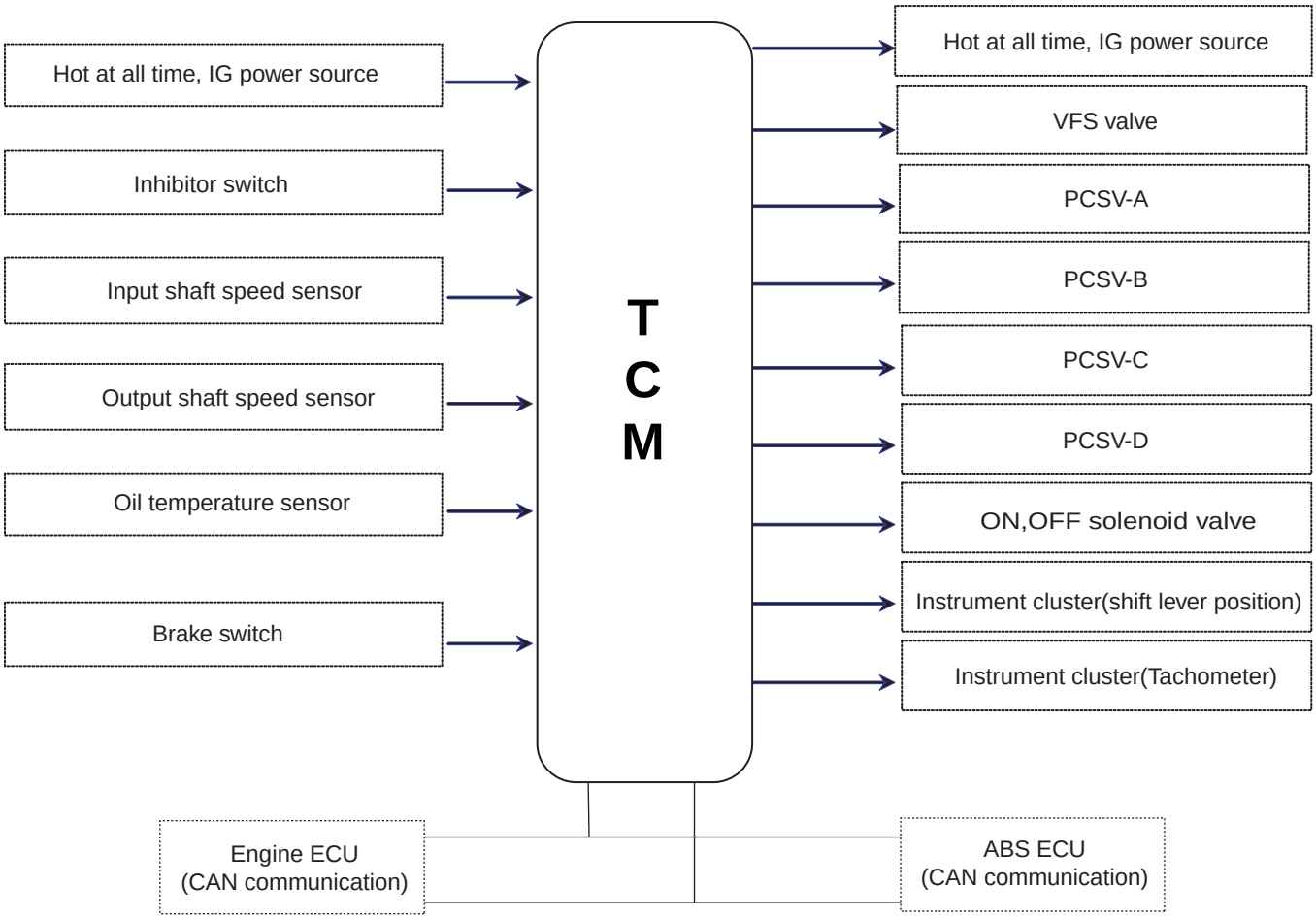
ELECTRONIC CONTROL SYSTEM



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SENSOR AND ACTUATOR FUNCTION

ITEM	FUNCTION
Input shaft speed sensor	Detect the input shaft rpm(TURBINE RPM) at the OD/RVS retainer
Output shaft speed sensor	Detect the output shaft rpm(T/F DRIVE GEAR RPM) at the T/F drive gear
Engine rpm signal	Receive the engine rpm via CAN communication with ECM
Fluid temperature sensor	Detect the temperature of ATF through the thermistor
Brake switch	Detect the brake operation at the contact switch of the brake pedal
Inhibitor switch	Detect the position of select lever through the contact switch
ON/OFF solenoid valve (SCSV-A)	Control the hydraulic passage for the shift control
VFS solenoid valve	Change the line pressure from 4.5 bar to 10.5 bar according to throttle open angle and shift ranges
PCSV-A(SCSV-B)	Control the OD or L/R hydraulic pressure to the pressure control valve for shift control
PCSV-B(SCSV-C)	Control the 2/4 or REV hydraulic pressure to the pressure control valve for shift control
PCSV-C(SCSV-D)	Control the UD hydraulic pressure to the pressure control valve for shift control
PCSV-D(TCC)	Control the hydraulic pressure for the damper clutch control
Torque reduction operation signal	Receive the signal of engine reduction pressure operation from ECM via CAN communication
Cluster	Send the signal of the current position of shift lever and vehicle speed and operate the lamp, distance meter and speed meter

TCM

The TCM which is adapted to the new small sized automatic transaxle (A4CF2) is integrated into the ECM and deliver information via CAN communication.

ITEM	BOSCH TCM
Hardware	Integrated type
Duty driving	Chopping method
Main oil pressure control components	Turbin torque, Vehicle speed
ATF Temp. compensation control	Independently
Direct control range	Wide

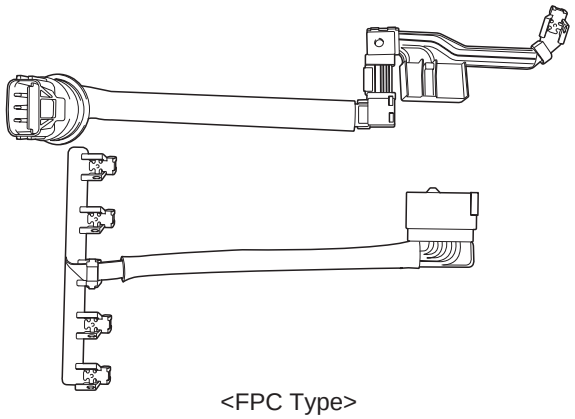
● TLE6288 current control chip

The TLE6288 current control chip is installed into the TCM to regulate the solenoid control current and control the oil pressure securely according to the change of the temperature and voltage. In this case, the control signal of solenoid valve is divided into the Peak signal and the Hold signal.

1. Peak : The 12 voltage signal applied to move the solenoid plunger quickly.
2. Hold : The signal applied to keep holding the pulled solenoid valve.

FPC (FLEXIBLE PRINTED CIRCUIT) HARNESS

The FPC (Flexible Printed Circuit) harness is composed of the thin and flat copper in the insulating film like electric wire.



<FPC Type>

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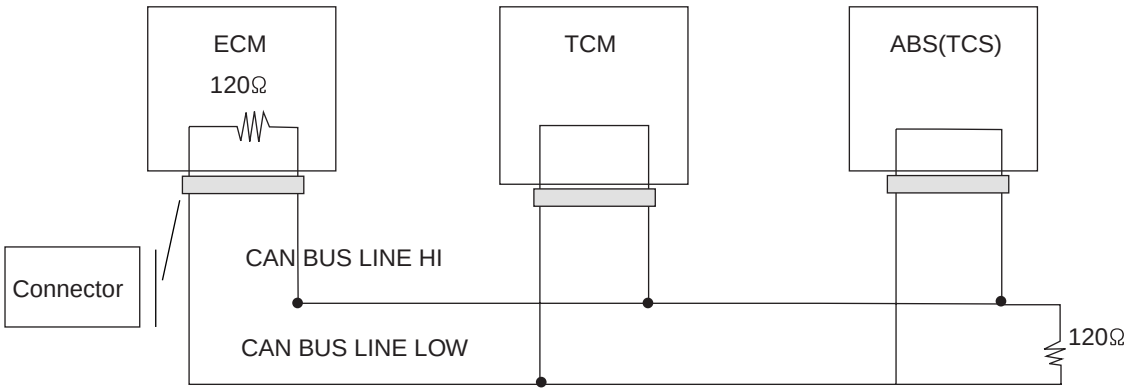
Item	Round Wire Type	FPC Type
Weight (g)	96.6	72
Practical use of space	Low	High
TM installation capability	Bad	Good
Softness	High	Low
Drawing modification	Normal	Low
Quality occurring	High	Low
Tighten in solenoid valve	Bad	Good
Measurement	Unstable	Stable

CAN COMMUNICATION

LAYOUT



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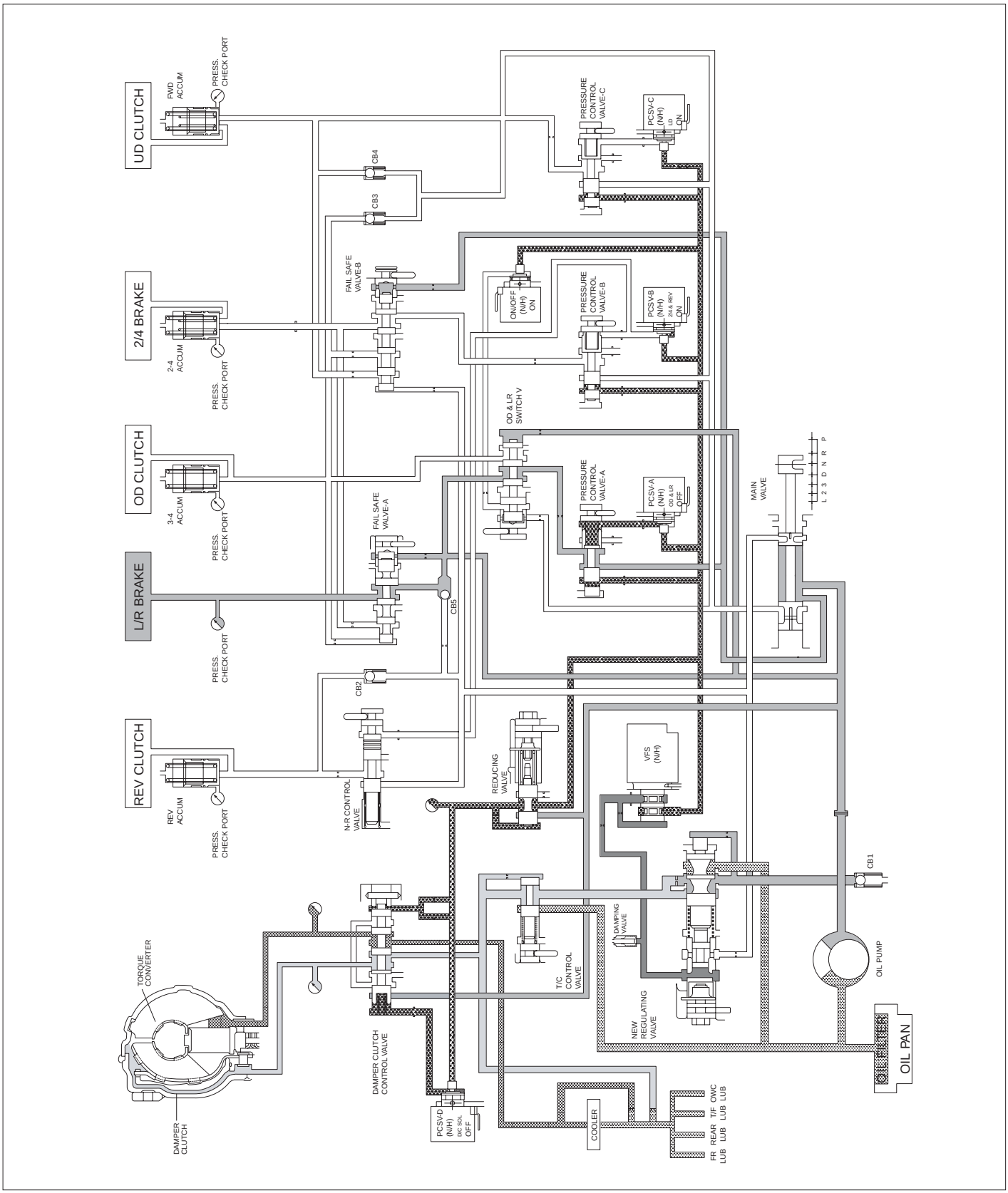
ECM- TCM CAN COMMUNICATION ERROR MANAGEMENT

No.	Item	Error management
1	Engine rpm	3,000 RPM
2	Engine torque	80%
3	Vehicle speed	0 km/h
4	A/C Switch	OFF
5	Engine coolant temperature	70°C
6	TPS	50%
7	Shift range hold signal	OFF

HYDRAULIC CIRCUIT E3672CFB

N RANGE, P RANGE



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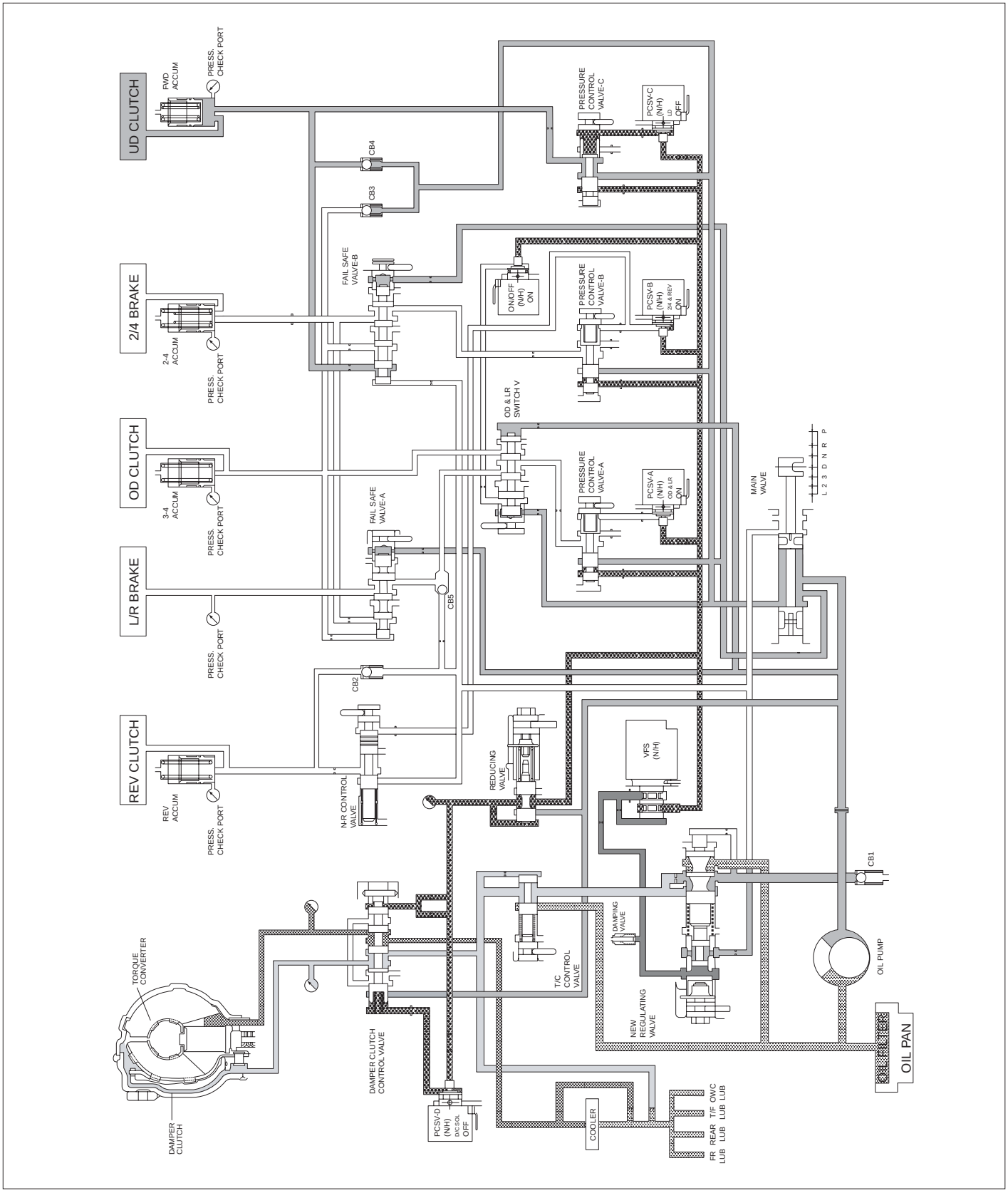
D RANGE(1ST)



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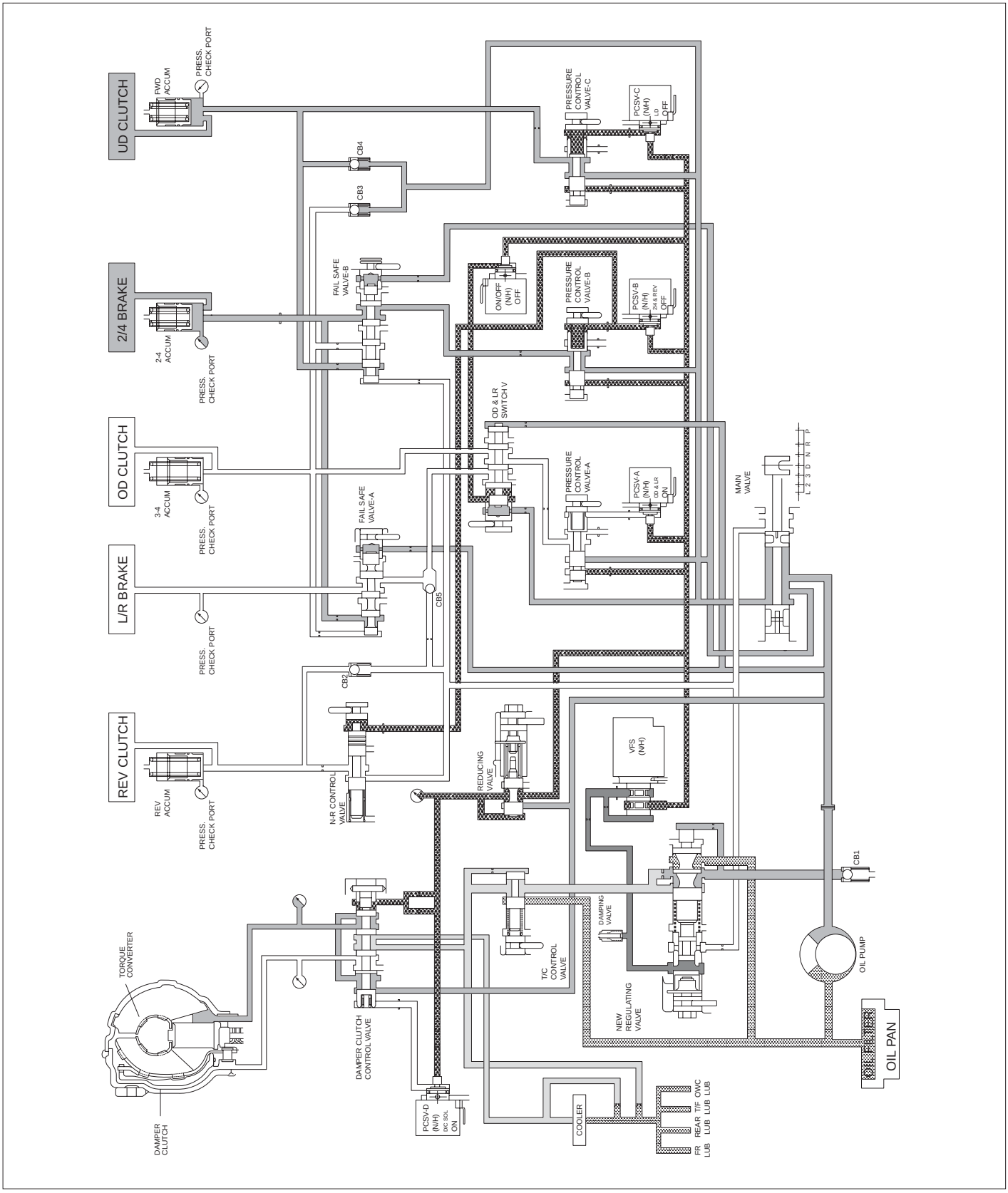
D RANGE(2ND)



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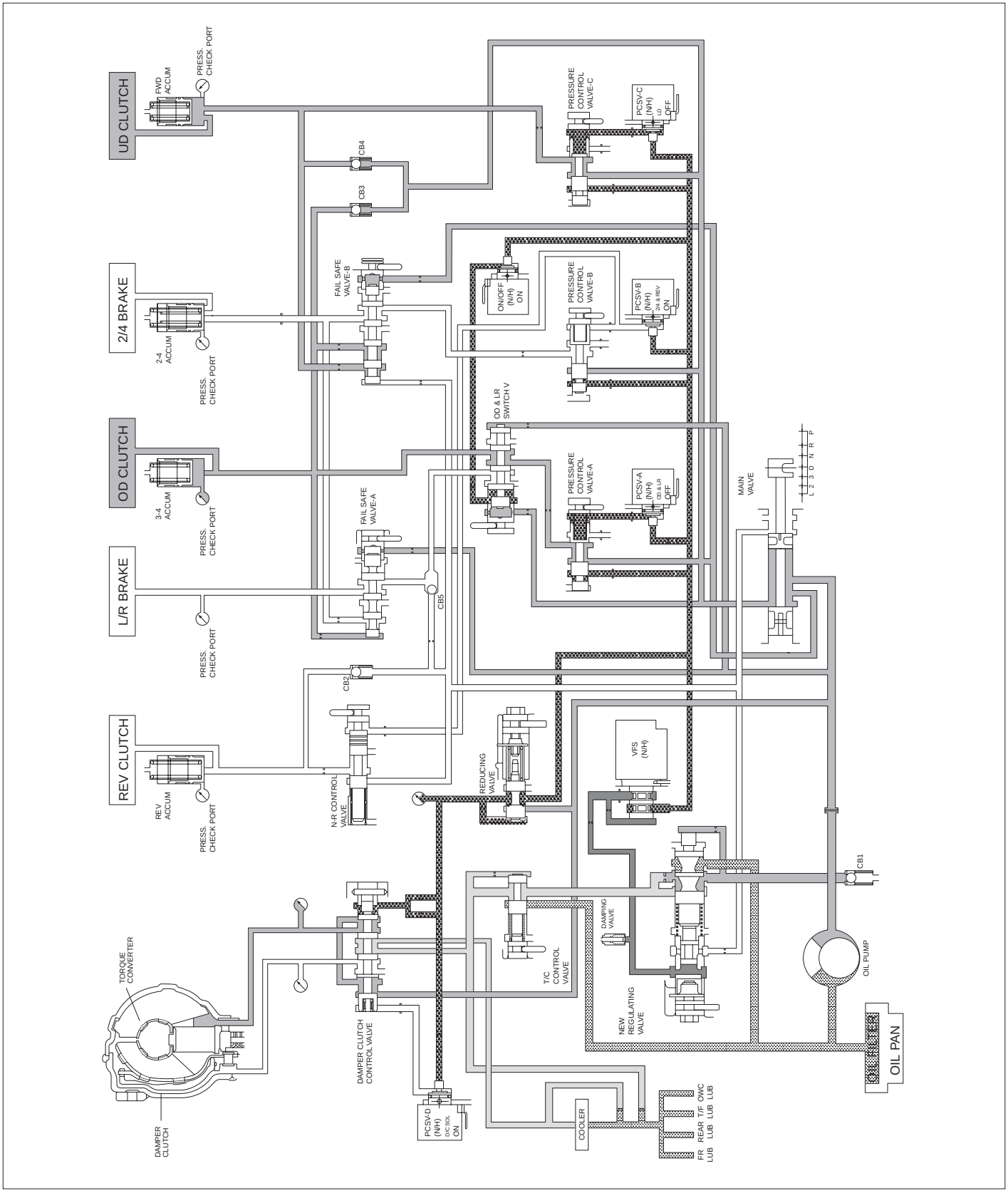
D RANGE(3RD)



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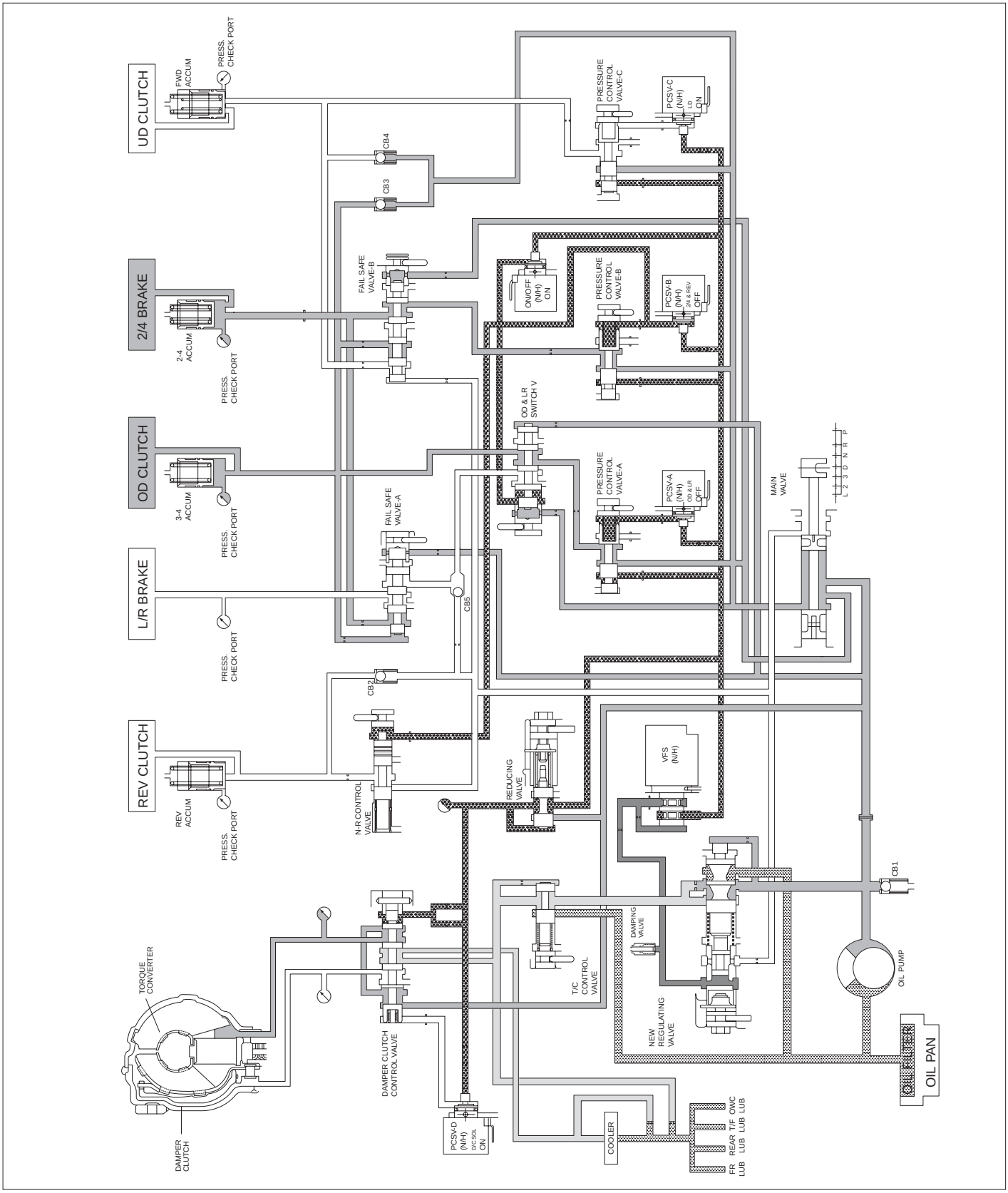
D RANGE(4TH)



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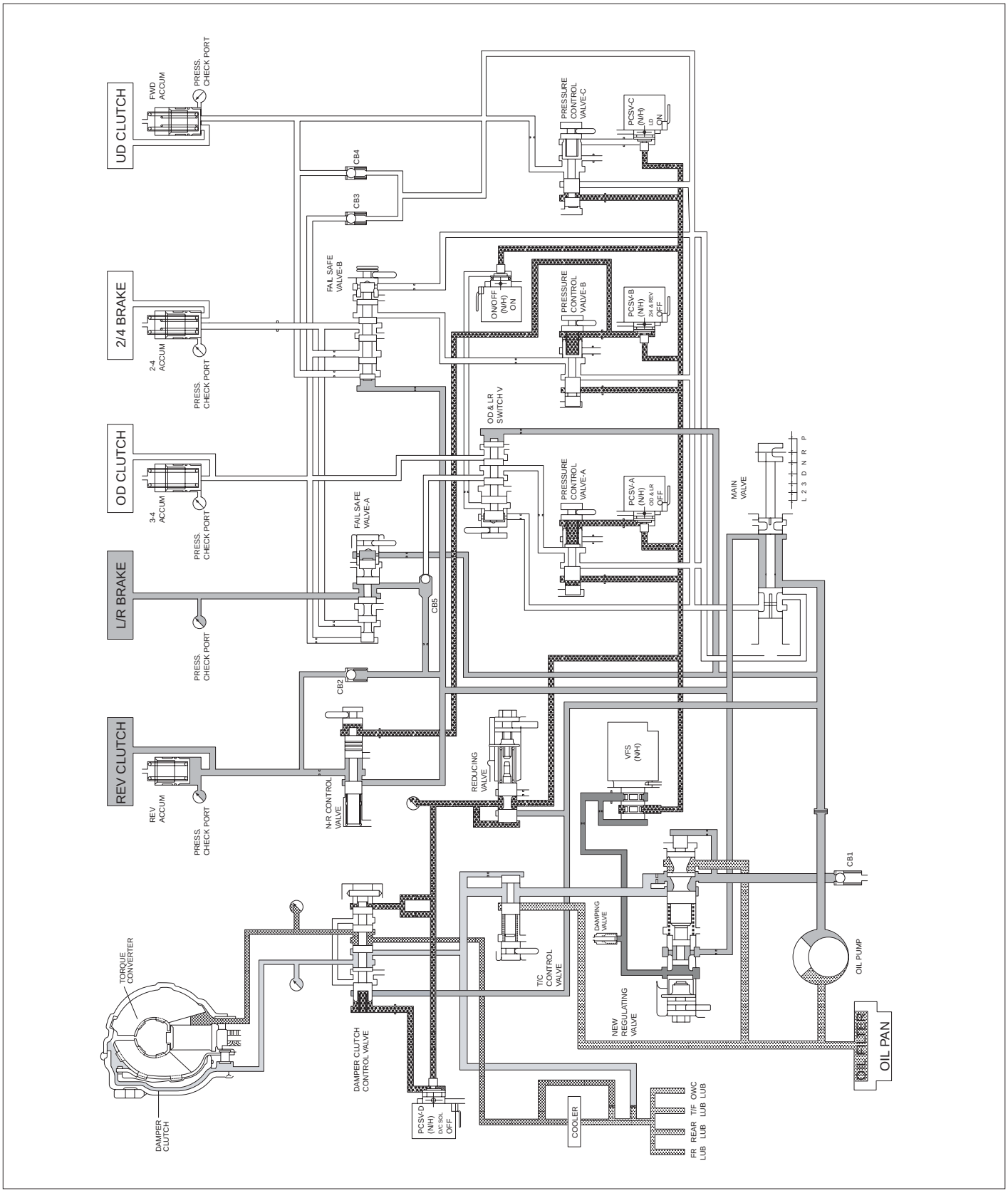
R RANGE



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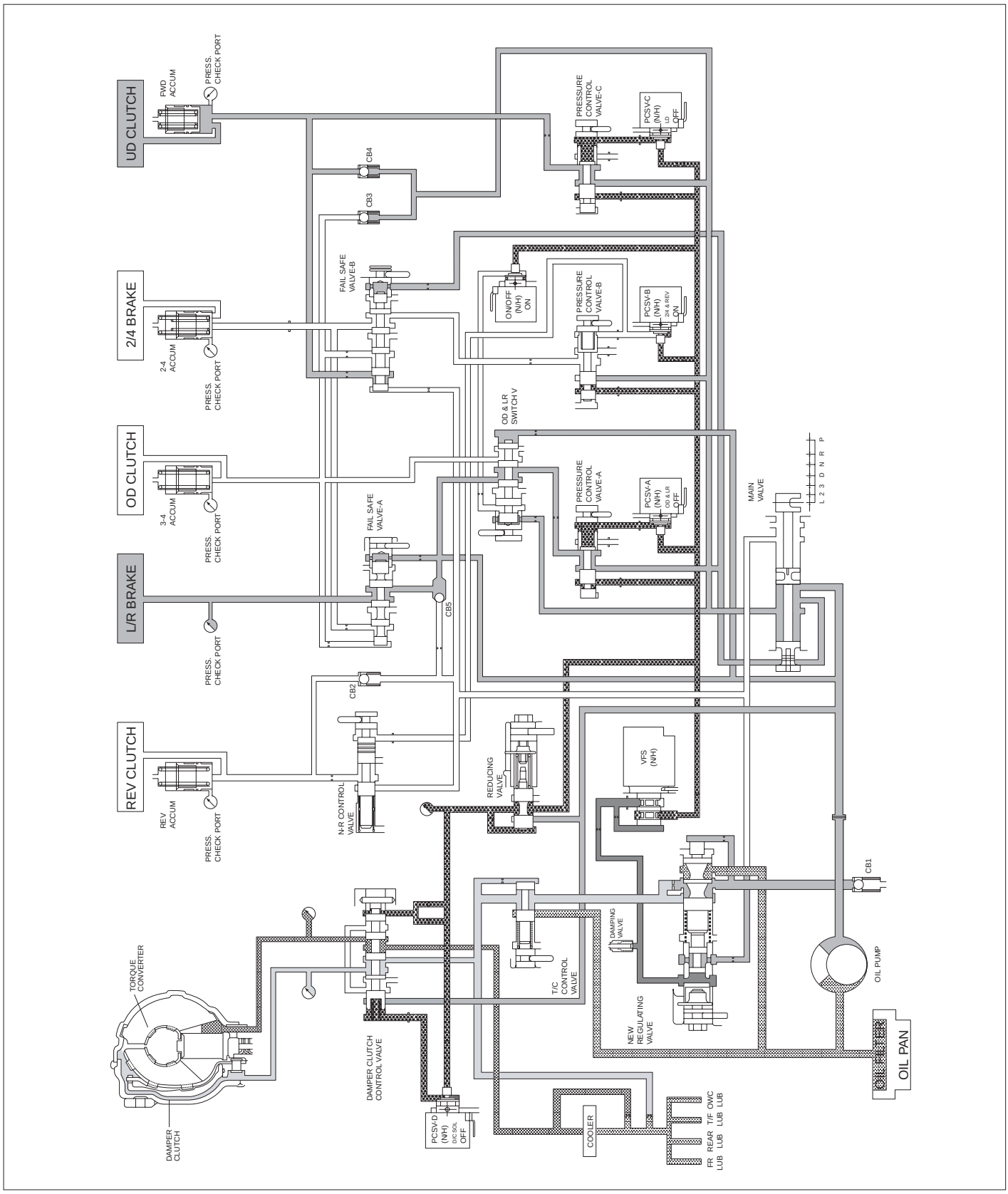
L RANGE



SHDAT6037L

BASIC INSPECTION ADJUSTMENT EB54C4B9

TRANSAXLE FLUID LEVEL

INSPECTION

1. Drive the vehicle until the fluid reaches normal operating temperature [70~80°C(158~176°F)].
2. Place the vehicle on a level surface.
3. Move the gear selector lever through all gear positions. This will fill the torque converter with trans fluid. Set the selector lever to the "N" (Neutral) position.
4. Before removing the oil level gauge, wipe all contaminants from around the oil level gauge. Then take out the oil level gauge and check the condition of the fluid.

NOTE

If the fluid smells as if it is burning, it means that the fluid has been contaminated by fine particles from the bushes and friction materials, a transmission overhaul may be necessary.

5. Check that the fluid level is in the "HOT" mark on the oil level gauge. If fluid level is low, add automatic transaxle fluid until the level reaches the "HOT" mark.

Automatic transaxle fluid : DIAMOND ATF SP-III, SK ATF SP-III Automatic transaxle fluid capacity: 6.6liter(6.9 US qt, 5.81lmp.qt)

NOTE

Low fluid level can cause a variety of abnormal conditions because it allows the pump to take in air along with fluid. Air trapped in the hydraulic system forms bubbles, which are compressible. Therefore, pressures will be erratic, causing delayed shifting, slipping clutches and brakes, etc. Improper filling can also raise fluid level too high. When the transaxle has too much fluid, gears churn up foam and cause the same conditions which occur with low fluid level, resulting in accelerated deterioration of automatic transaxle fluid. In either case, air bubbles can cause overheating, and fluid oxidation, which can interfere with normal valve, clutch, and brake operation. Foaming can also result in fluid escaping from the transaxle vent where it may be mistaken for a leak.

6. Insert the oil level gauge securely.

NOTE

When new, automatic transmission fluid should be red, The red dve is added so the assembly plant can identify it as transmission fluid and distinguish it from engine oil or antifreeze. The red dve, which is not an indicator of fluid quality, is not permanent. As the vehicle is driven the transmission fluid will begin to look darker. The color may eventually appear light brown.

REPLACEMENT

If you have a fluid changer, use this changer to replace the fluid. If you do not have a fluid replace the fluid by the following procedure.

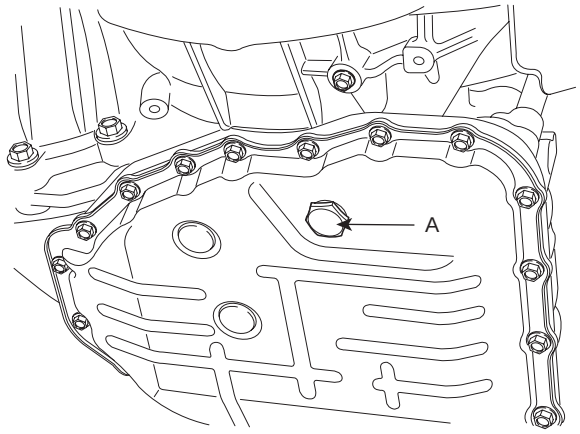
1. Disconnect the hose, which connects the transmission and the oil cooler (inside the radiator).
2. Start the engine and let the fluid drain out.

Running conditions : "N" range with engine idling

CAUTION

The engine should be stopped within one minute after it is started. If the fluid has all drained out before then, the engine should be stopped at that point.

3. Remove the drain plug(A) from the bottom of the transmission case to drain the fluid.



AKGF032W

4. Install the drain plug via the gasket, and tighten it the specified torque.

TORQUE: 35~45 Nm (3.5~4.5kgf.m, 25~32lb-ft)

5. Pour the new fluid in through the oil filler tube.

CAUTION

Stop pouring if the full volume of fluid cannot be poured in.

6. Repeat the procedure in step (2).

NOTE

Check the old fluid for contamination. If it has been contaminated, repeat the steps (5) and (6).

7. Pour the new fluid in through the oil filler tube.

8. Reconnect the hose, which was disconnected in step (1) above, and firmly replace the oil level gauge. (In case of this "replace", this means after wiping off any dirt around the oil level gauge, insert it into the filler tube.)

9. Start the engine and run it at idle for 1~2 minutes.

10. Move the select lever through all positions, and then move it to the "N" or "P" position.

11. Drive the vehicle until the fluid temperature rises to the normal temperature (70~80°C(158~176°F)), and then check the fluid level again. The fluid level must be at the HOT mark.

12. Firmly insert the oil level gauge into the oil filler tube.

TORQUE CONVERTER STALL TEST

This test measures the maximum engine speed when the select lever is at the "D" or "R" position and the torque converter stalls to test the operation of the torque converter, starter motor and one-way clutch operation and the holding performance of the clutches and brakes in the transmission.

CAUTION

Do not let anybody stand in front of or behind the vehicle while this test is being carried out.

1. Check the automatic transmission fluid level and temperature and the engine coolant temperature.
   - Fluid level : At the HOT mark on the oil level gauge
   - Fluid temperature : 80~100°C (176~212°F)
   - Engine coolant temperature : 80~100°C (176~212°F)

2. Check both rear wheels (left and right).

3. Pull the parking brake lever on, with the brake pedal fully depressed.

4. Start the engine.

5. Move the select lever to the "D" position, fully depress the accelerator pedal and take a reading of the maximum engine speed at this time.

CAUTION

- ***The throttle should not be left fully open for any more than eight seconds.***
- ***If carrying out the stall test two or more times, move the select lever to the "N" position and run the engine at 1,000 r/min to let the automatic transaxle fluid cool down before carrying out subsequent tests.***
- ***Move the select lever to the "R" position and carry out the same test again.***

Stall rpm : 2,000~2,700 RPM

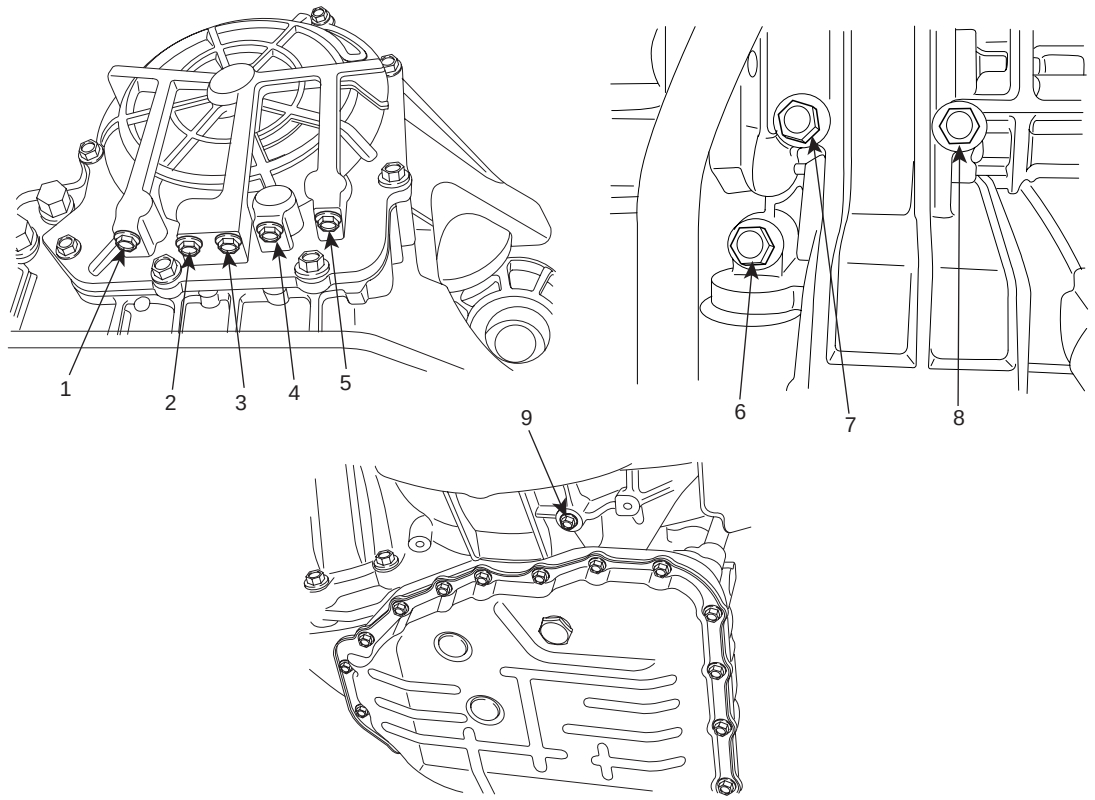
Range	Condition	Passable cause
R range slip	Reverse	REV in D range normal L/R in D range abnormal
D1 rang slip	D range 1st/ Sports mode 1st	L/R in reverse range abnormal UD in reverse range normal
D3 range slip	3rd gear hold	OD in 3rd gear slip (1st and 2nd gear normal)
Forwarding, reverse slip	D range, R range	Torque converter Oil pump, Manual valve in the valve Driving device abnormal

ELEMENTS IN USE IN EACH GEAR

	UD/C	OD/C	REV/C	2-4/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●				●	●
D2	●			●		
D3	●	●				
D4		●		●		
L	●				●	●

HYDRAULIC PRESSURE TEST

1. Warm up the engine until the automatic transaxle fluid temperature is 80~100°C(176~212°F).
2. Jack up the vehicle so that the wheels are free to turn.
3. Connect the special tools(09452-21500, 09452-21000) oil pressure gauge to each pressure discharge port.
4. Measure the hydraulic pressure at each port under the conditions given in the standard hydraulic pressure table, and check that the measured values are within the standard value ranges.
5. If a value is outside the standard range, correct the problem while referring to the hydraulic pressure test diagnosis table.
   a. Bottom side



TORQUE : 8~10Nm(80~100kgf.cm, 6~7lb-ft)

1. LUB pressure port
2. RED pressure port
3. OD pressure port
4. 2/4 pressure port
5. REV pressure port
6. DA pressure port
7. UD pressure port
8. LR pressure port
9. DR pressure port

BKGF008A

STANDARD HYDRAULIC PRESSURE TABLE

No.	Shift range position	Operation					Measuring	Oil pressure (kgf/㎠)				
		PCSV-A	PCSV-B	PCSV-C	PCSV-D	ON/OFF		LR	2-4(2ND)	UD	OD	REV
1	D	0	100	0	0	ON	LR	10.5±0.2	0	10.5±0.2	0	0
2	↑	50	↑	↑	↑	↑	↑	5.7±0.4	↑	↑	↑	↑
3	↑	75	↑	↑	↑	↑	↑	0.9±0.3	↑	↑	↑	↑
4	↑	100	↑	↑	↑	↑	↑	0	↑	↑	↑	↑
5	↑	↑	0	↑	100	OFF	2-4(2ND)	0	10.5±0.2	↑	↑	↑
6	↑	↑	50	↑	↑	↑	↑	↑	5.7±0.4	↑	↑	↑
7	↑	↑	75	↑	↑	↑	↑	↑	0.9±0.3	↑	↑	↑
8	↑	↑	100	↑	↑	↑	↑	↑	0	↑	↑	↑
9	↑	0	↑	↑	↑	↑	OD	↑	↑	↑	10.5±0.2	↑
10	↑	50	↑	↑	↑	↑	↑	↑	↑	↑	5.7±0.4	↑
11	↑	75	↑	↑	↑	↑	↑	↑	↑	↑	0.9±0.3	↑
12	↑	100	↑	↑	↑	↑	↑	↑	↑	↑	0	↑
13	↑	↑	↑	0	0	↑	UD	↑	↑	10.5±0.2	↑	↑
14	↑	↑	↑	50	↑	↑	↑	↑	↑	5.8±0.4	↑	↑
15	↑	↑	↑	75	↑	↑	↑	↑	↑	1.0±0.3	↑	↑
16	↑	0	↑	100	↑	↑	↑	↑	↑	0	↑	↑
17	R	↑	0	↑	↑	ON	REV	17.5±0.2	↑	↑	↑	17.5±0.2
18	↑	↑	50	↑	↑	↑	↑	↑	↑	↑	↑	8.7±0.6
19	↑	↑	75	↑	↑	↑	↑	↑	↑	↑	↑	0.9±0.5
20	↑	↑	100	↑	↑	↑	↑	↑	↑	↑	↑	0

[Measure condition]
- Oil pump revolution : 2500rpm
- LPCSV Duty ratio : 0%

Note) The oil pressure values of "0" marked on the above table must measure less than 0.1kgf/㎠ when testing.

※ The values are subject to change according to vehicle model or condition.

SHDAT6062L

TROUBLESHOOTING EEB93C8D

DIAGNOSTIC TROUBLE CODES (INSPECTION PROCEDURE)

Check the Diagnostic Trouble Codes

1. Turn the ignition switch to OFF.
2. Connect the Hi-scan tool to the DLC connector for diagnosis.
3. Turn the ignition switch to ON.
4. Check the diagnostic trouble codes using the Hi-scan tool.
5. Read the output diagnostic trouble codes. Then follow the remedy procedures according to the "DIAGNOSTIC TROUBLE CODE DESCRIPTION" on the following pages.

NOTE

- *A maximum of 10 diagnostic trouble codes (in the sequence of occurrence) can be stored in the Random Access Memory (RAM) incorporated within the control module.*
- *The same diagnostic trouble code can be stored one time only.*
- *If the number of stored diagnostic trouble codes or diagnostic trouble patterns exceeds 10, already stored diagnostic trouble codes will be erased in sequence, beginning with the oldest.*
- *Do not disconnect the battery until all diagnostic trouble codes or diagnostic trouble patterns have been read out, because all stored diagnostic trouble codes or diagnostic trouble patterns will be cancelled when the battery is disconnected.*
- *All diagnostic trouble codes are deleted from memory the 200th time the ATF temperature reaches 50°C(122°F) after memorization of the most recent diagnostic code.*

6. Delete the diagnostic trouble code.
7. Disconnect the Hi-scan tool.

NOTE

DTC cleaning should only be done with the scan tool.

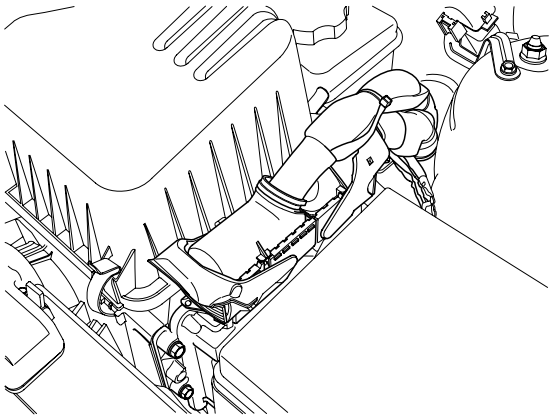
DIAGNOSTIC TROUBLE CODE TABLE

[GASOLINE 2.0]

No.	Code	Item	MIL	Remark
1	P0605	CHECK SUM ERROR	●	ATA-32
2	P0707	TRANSAXLE RANGE SWITCH CIRCUIT LOW INPUT	●	ATA-34
3	P0708	TRANSAXLE RANGE SWITCH CIRCUIT HIGH INPUT	●	ATA-40
4	P0711	TRANSAXLE FLUID TEMPERATURE SENSOR RATIONALITY	●	ATA-43
5	P0712	TRANSAXLE FLUID TEMPERATURE SENSOR CIRCUIT LOW INPUT	●	ATA-49
6	P0713	TRANSAXLE FLUID TEMPERATURE SENSOR CIRCUIT HIGH INPUT	●	ATA-50
7	P0716	A/T INPUT SPEED SENSOR RATIONALITY	●	ATA-53
8	P0717	A/T INPUT SPEED SENSOR CIRCUIT - OPEN or SHORT(GND)	●	ATA-60
9	P0722	A/T OUTPUT SPEED SENSOR CIRCUIT - OPEN or SHORT(GND)	●	ATA-62
10	P0731	GEAR 1 INCORRECT RATIO	●	ATA-69
11	P0732	GEAR 2 INCORRECT RATIO	●	ATA-76
12	P0733	GEAR 3 INCORRECT RATIO	●	ATA-82
13	P0734	GEAR 4 INCORRECT RATIO	●	ATA-88
14	P0741	TORQUE CONVERTER CLUTCH STUCK OFF	●	ATA-92
15	P0742	TORQUE CONVERTER CLUTCH STUCK ON	●	ATA-96
16	P0743	TORQUE CONVERTER CLUTCH CONTROL SOLENOID VALVE - OPEN or SHORT(GND)	●	ATA-100
17	P0748	VFS SOLENOID VALVE CIRCUIT - OPEN or SHORT(GND)		ATA-108
18	P0750	ON/OFF(SCSV-A) SOLENOID VALVE CIRCUIT - OPEN or SHORT(GND)	●	ATA-116
19	P0755	PCSV-A(OD & LR) SOLENOID VALVE CIRCUIT - OPEN or SHORT(GND)	●	ATA-124
20	P0760	PCSV-B(2-4 SOLENOID VALVE) CIRCUIT - OPEN or SHORT(GND)	●	ATA-133
21	P0765	PCSV-C(UD) SOLENOID VALVE CIRCUIT - OPEN or SHORT(GND)	●	ATA-141
22	P0880	TCM POWER SIGNAL ERROR	●	ATA-149
23	U0001	CAN TIME OUT	●	ATA-153
24	U0100	CAN BUS OFF	●	ATA-157

DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY(ROM) ERROR

COMPONENT LOCATION E9BD9FF6



SHDAT6311D

GENERAL DESCRIPTION EB054AAD

The TCU check ROM I.D all the time, in order to maintain for best condition and surrounding.

DTC DESCRIPTION ED831243

The TCU set this code When the ROM I.D is changed by external force or input non-available data.

DTC DETECTING CONDITION E39166A4

Item	Detecting Condition	Possible Cause
DTC Strategy	• Check sum fault	• Faulty TCM
Enable Conditions	• IG "ON"	
Threshold Value	• CAN message transfer error	
Diagnostic Time	• More than 1sec	
Fail safe		

MONITOR SCANTOOL DATA E52CADC8

1. Connect scantool to data link connector(DLC).
2. Ignition "ON".
3. Confirm the "ROM I.D".
4. Perform the "ROM UP-DATE".
5. Perform the Re-diagnosis.
6. Is "DTC" disappeared?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or PCM/TCM's connector or was repaired and PCM/TCM memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

NO

▶ Replace PCM/TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E1E593D2

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode
2. Using a scantool, clear DTC
3. Operate the vehicle within DTC Enable conditions in general information.
4. Are any DTCs present ?

YES

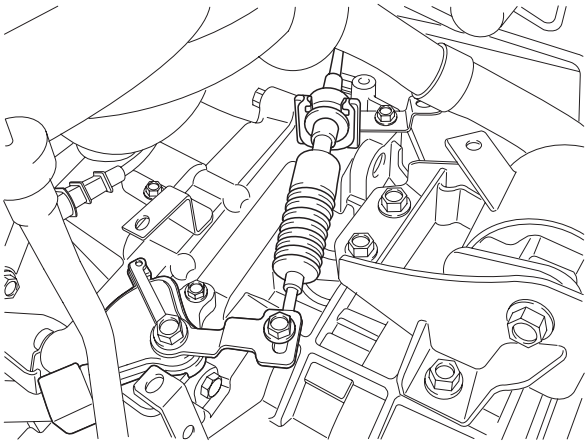
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC P0707 TRANSAXLE RANGE SWITCH - LOW INPUT

COMPONENT LOCATION EA966D07



AKGF101A

GENERAL DESCRIPTION EBFBBBCA

The Transaxle Range Switch sends the shift lever position information to the TCM(PCM) using a 12V (battery voltage) signal. When the shift lever is in the D (Drive) position the output signal of Transaxle Range Switch is 12V and in all other positions the voltage is 0V. The TCM(PCM) judges the shift lever position by reading all signals, for the Transaxle Range Switch, simultaneously.

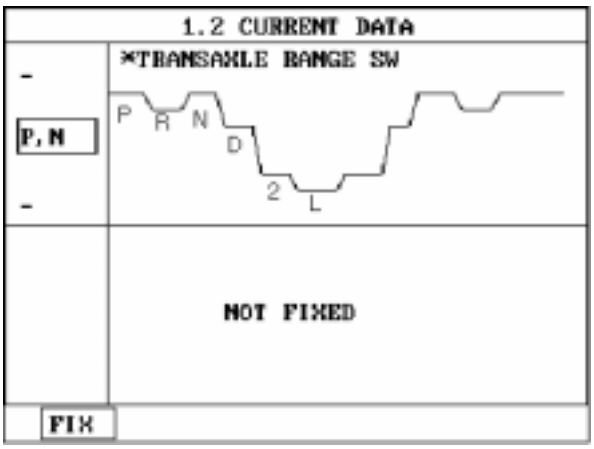
DTC DESCRIPTION ED9D4AA7

The TCM(PCM) sets this code when the Transaxle Range Switch has no output signal for more than 30 seconds.

DTC DETECTING CONDITION E11D1D33

Item	Detecting Condition	Possible cause
DTC Strategy	• Check for no signal	• Open or short in circuit • Faulty Shift cable adjustment • Faulty Inhibitor switch and Manual control lever position adjustment • Faulty TRANSAXLE RANGE SWITCH • Faulty TCM(PCM)
Enable Conditions	• Engine Speed ≥ 1200rpm • Battery Voltage ≥ 10V	
Threshold value	• No signal detected	
Diagnostic Time	• More than 30 secs	
Fail Safe	• Recognition as previous signal. - When P-D or R-D or D-R SHIFT is detected, it is regarded as N-D or N-R though "N" signal is not detected	

SIGNAL WAVEFORM EF200B69



SHDAT6201L

MONITOR SCANTOOL DATA EDC10C3C

1. Connect scantool to data link connector(DLC).
2. Ignition "ON" & Engine "OFF".
3. Monitor the "TRANSAXLE RANGE SWITCH" parameter on the scantool.
4. Move selector lever from "P" range to "L" range.

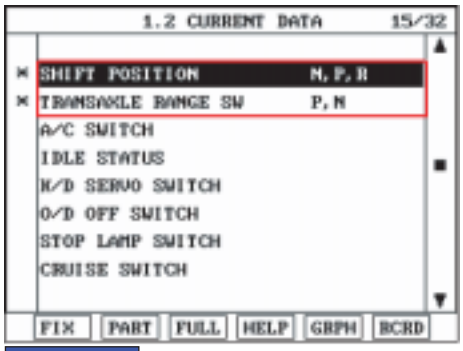


FIG.1)

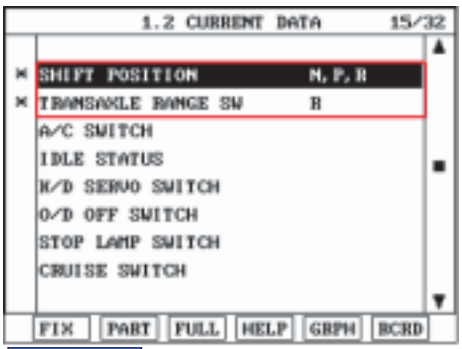


FIG.2)

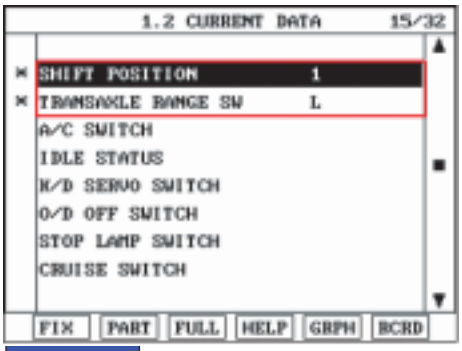


FIG.3)

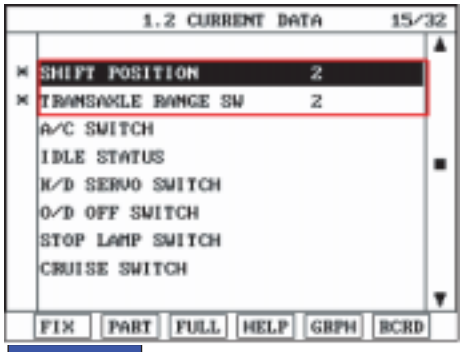


FIG.4)

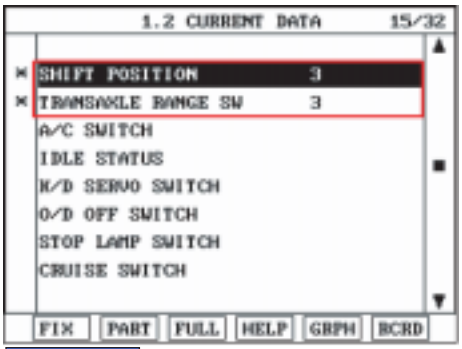


FIG.5)

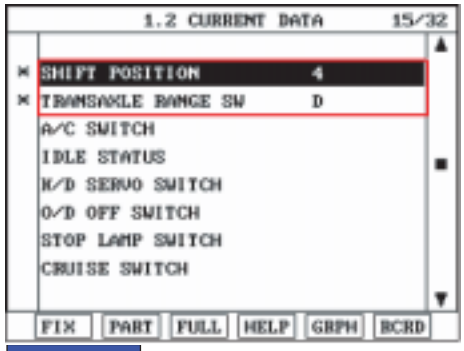


FIG.6)

FIG. 1) P,N
FIG. 2) R
FIG. 3) "L "Range
FIG. 4) "2" Range
FIG. 5) "3" Range
FIG. 6) "D" Range

BKGF101C

5. Does "TRANSAXLE RANGE SWITCH" follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

NO

▶ Go to "Terminal & connector inspection" procedure.

※ Most of fault that happen about inhibitor switch, result from faulty shift cable adjustment or incorrect location of manual control lever and inhibitor switch. So, when DTC which related inhibitor switch or engine start defectiveness at "P" range happen, After check the shift cable adjustment or location of manual control lever and inhibitor switch, repair or replace as necessary.

TERMINAL & CONNECTOR INSPECTION E67C41B2

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

▶ Repair as necessary and go to "Verification of vehicle repair" procedure.

NO

▶ Go to "Power supply circuit inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION EDED8C15

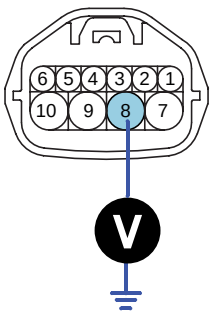
1. CHECK POWER TO RANGE SWITCH

   1) Disconnect "TRANSAXLE RANGE SWITCH" connector.

   2) Ignition "ON" & Engine "OFF".

   3) Measure voltage between terminal "8" of the sensor harness connector and chassis ground.

Specification : approx. B+



CBG01

1. P Range
2. D Range
6. N Range
7. R Range
8. Power supply IG1
9.ST
10.ST

SLDAA7202L

   4) Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

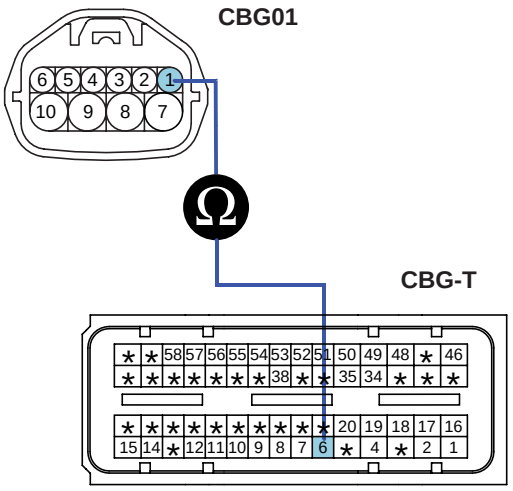
▶ Check that Fuse1-10A is installed or not blown.
▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION EAE255EA

1. Ignition "OFF".
2. Disconnect "TRANSAXLE RANGE SWITCH" and "TCM(PCM)" connector.
3. Measure resistance between each teminal of the sensor harness connector and TCM(PCM)harness connector as below.

Specification :

Pin No of "TRANSAXLE RANGE SWITCH"	CBG01 No.1	CBG01 No.7	CBG01 No.6	CBG01 No.2
Pin No of "TCM(PCM)" harness	CBG-A No.6	CBG-A No.7	CBG-A No.8	CBG-A No.9
Specification	0Ω	0Ω	0Ω	0Ω



SLDAA7206L

4. Is resistance within specifications?

YES

▶ Go to "Component inspection" procedure.

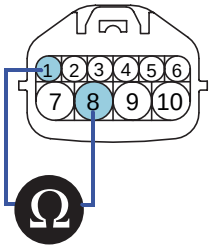
NO

▶ Check for Open in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION ED7021EA

1. Ignition "OFF".
2. Remove "TRANSAXLE RANGE SWITCH".
3. Measure the resistance between each terminal of the sensor.

Specification : approx. 0 Ω



CBG01
Component side

1. P Range
2. D Range
6. N Range
7. R Range
8. Power supply IG1
9.ST
10.ST

Terminal \ Range	P	R	N	D
1	●			
2				●
3				
4				
5				
6			●	
7		●		
8	●	●	●	●
9	●		●	
10	●		●	

[RANGE SWITCH continuity check table (Case of SPORTS MODE vehicle has no 3,2,L range)]

SLDAA7204L

4. Is resistance within specifications?

YES

▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM and then go to "Verification of Vehicle Repair" procedure.

NO

▶ Replace "TRANSAXLE RANGE SWITCH" as necessary and Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E6B0FFCC

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Using a scantool, Clear DTC.
3. Operate the vehicle within DTC Enable conditions in General information.
4. Are any DTCs present?

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC P0708 TRANSAXLE RANGE SWITCH - HIGH INPUT

COMPONENT LOCATION E8B896F2

Refer to DTC P0707.

GENERAL DESCRIPTION EE3B2DFD

Refer to DTC P0707.

DTC DESCRIPTION E7A9DE58

The TCM sets this code when the Transaxle Range Switch outputs multiple signals for more than 30 seconds.

DTC DETECTING CONDITION ECCC2F7E

Item	Detecting Condition	Possible cause
DTC Strategy	• Check for multiple signals	• Open or short in TRANSAXLE RANGE SWITCH • Faulty Shift cable adjustment • Faulty Inhibitor switch and Manual control lever position adjustment • Faulty TRANSAXLE RANGE SWITCH • Faulty PCM
Enable Conditions	• Battery Voltage ≥ 10V	
Threshold value	• Multiple signal	
Diagnostic Time	• More than 10 secs	
Fail Safe	• Recognition as previous signal - When signal is input "D" and "N" at the same time, TCM regards it as "N" RANGE - After PCM/TCM Reset, if the PCM/TCM detects multiple signal or no signal, then it holds the 3rd gear position	

SIGNAL WAVEFORM E2FE50BC

Refer to DTC P0707.

MONITOR SCANTOOL DATA E9EC6BA9

Refer to DTC P0707.

TERMINAL & CONNECTOR INSPECTION EB2B0830

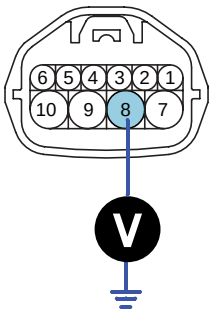
Refer to DTC P0707.

POWER SUPPLY CIRCUIT INSPECTION EC415B7A

1. Disconnect "TRANSAXLE RANGE SWITCH" connector.
2. Ignition "ON" & Engine "OFF".
3. Measure voltage between each terminal of the sensor harness connector and chassis ground.

Specification :

TERMINAL No.	1	2	4	6	7	8	9	10
SPECIFICATION	0V	0V	0V	0V	0V	12V	0V	12V



1. P Range
2. D Range
6. N Range
7. R Range
8. Power supply IG1
9.ST
10.ST

SLDAA7202L

4. Is voltage within specifications?

YES

▶ Go to "Signal circuit inspection" procedure.

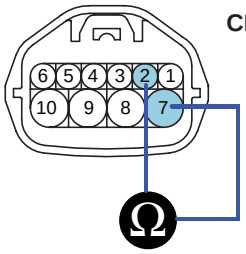
NO

▶ Check for Short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION EA4FAAAC

1. Ignition "OFF".
2. Disconnect "TRANSAXLE RANGE SWITCH" and "TCM(PCM)" connector.
3. Measure resistance between each terminals of the sensor harness to check for Short.

Specification : Infinite



CBG01

1. P Range
2. D Range
6. N Range
7. R Range
8. Power supply IG1
9.ST
10.ST

SLDAA7205L

4. Is resistance within specifications?

YES

▶ Go to "Component inspection" procedure.

NO

▶ Check for Short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E54CEF0E

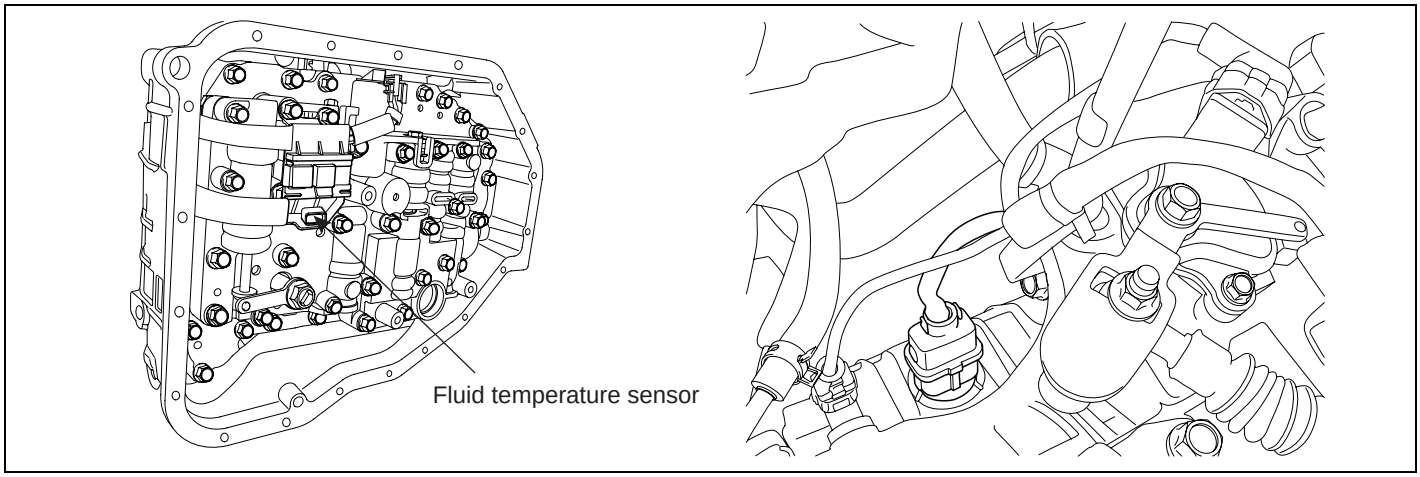
Refer to DTC P0707.

VERIFICATION OF VEHICLE REPAIR EA2AEF1C

Refer to DTC P0707.

DTC P0711 TRANSAXLE FLUID TEMPERATURE SENSOR RATIONALITY

COMPONENT LOCATION E4020C7C



SHDAT6217L

GENERAL DESCRIPTION E30A2C3C

The automatic TRANSAXLE fluid(ATF) temperature sensor is installed in the Valve Body. This sensor uses a thermistor whose resistance changes according to the temperature changes. The TCM supplies a 5V reference voltage to the sensor, and the output voltage of the sensor changes when the ATF temperature varies. The automatic TRANSAXLE fluid(ATF) temperature provides very important data for the TCM's control of the Torque Converter Clutch, and is also used for many other purposes.

DTC DESCRIPTION E37AFF86

This DTC code is set when the ATF temperature output voltage is lower than a value generated by thermistor resistance, in a normal operating range, for approximately 1 second or longer. The TCM regards the ATF temperature as fixed at a value of 80°C(176°F).

DTC DETECTING CONDITION EE58F7D4

Item		Detecting Condition	Possible cause
DTC Strategy		• Check rationality	• Sensor signal circuit is short to ground • Faulty sensor • Faulty PCM
Enable Conditions	Case 1	• Output Speed ≥ 1000rpm • Engine Speed ≥ 1000rpm • ATF temperature ≤ 30°C or ≤ 50°C(Ambient temp. > -7°C) • Accumulated time in condition ≥ 5min	
	Case2	• Output Speed ≥ 1000rpm • Engine Speed ≥ 1000rpm • ATF temperature > 73.5°C • Accumulated time in condition ≥ 5min	
Threshold value	Case1	• Present Oil temp - Oil temp When the time starts ≤ 2°C(35.6°F)	
	Case2	• ATF temperature ≤ -10°C	
Diagnostic Time		• More than 1 sec	
Fail Safe		• Learning control and Intelligent shift are inhibited • Fluid temperature is regarded as 80°C(176°F)	

SPECIFICATION ECC63AD2

TEMP.[°C(°F)]	Resistance(kΩ)	TEMP.[°C(°F)]	Resistance(kΩ)
-40(-40)	139.5	80(176)	1.08
-20(-4)	47.7	100(212)	0.63
0(32)	18.6	120(248)	0.38
20(68)	8.1	140(284)	0.25
40(104)	3.8	160(320)	0.16
60(140)	1.98		

MONITOR SCANTOOL DATA E5E51EEA

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "TRANSAXLE FLUID TEMPERATURE SENSOR" parameter on the scan tool.

Specification : Increasing Gradually

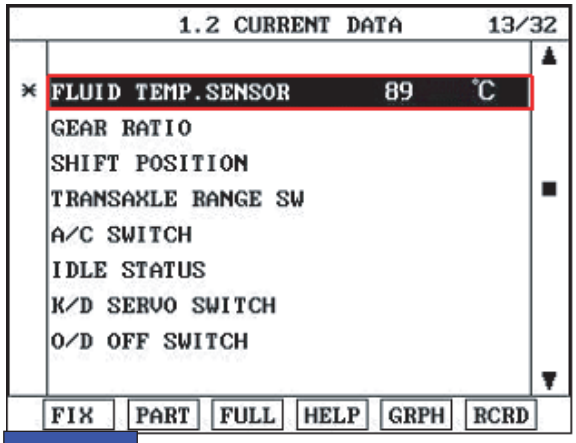


FIG.1)

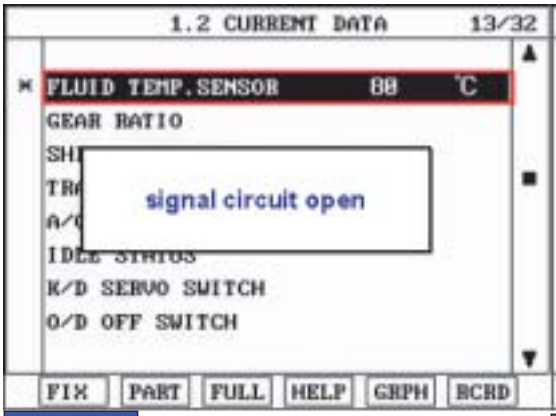


FIG.2)

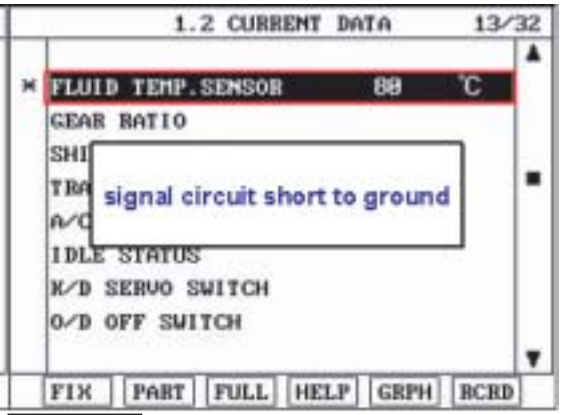


FIG.3)

FIG.1) Normal
FIG.2) Signal harness Open
FIG.3) Signal harness Short

SHDAT6211L

4. Does "TRANSAXLE FLUID TEMPERATURE SENSOR " follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION EFCEDBBA

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

▶ Repair as necessary and go to "Verification of vehicle Repair" procedure.

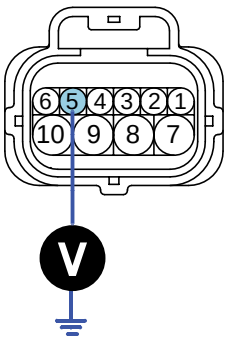
NO

▶ Go to "Component inspection" procedure.

SIGNAL CIRCUIT INSPECTION EB62E4FA

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "TRANSAXLE FLUID TEMPERATURE SENSOR" connector.
3. Measure the voltage between terminal "5" of the "TRANSAXLE FLUID TEMPERATURE SENSOR" harness connector and chassis ground.

Specification : Approx. 5 V



5.TRANSAXLE FLUID TEMPERATURE SENSOR
6.Sensor ground

SHDAT6212N

4. Is voltage within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E16FE0DD

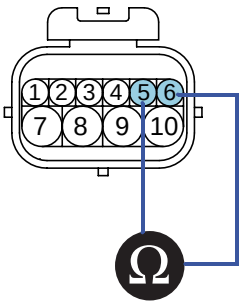
1. CHECK "TRANSAXLE FLUID TEMPERATURE SENSOR"

   1) Ignition "OFF".

   2) Disconnect the "TRANSAXLE FLUID TEMPERATURE SENSOR" connector.

   3) Measure the resistance between terminals "5" and "6" of the "TRANSAXLE FLUID TEMPERATURE SENSOR".

Specification : Refer to "Reference data"



CBG04
Component side

5.TRANSAXLE FLUID TEMPERATURE SENSOR
6.Sensor ground

SHDAT6213N

[REFERENCE DATA]

TEMP.[°C(°F)]	Resistance(kΩ)	TEMP.[°C(°F)]	Resistance(kΩ)
-40(-40)	139.5	80(176)	1.08
-20(-4)	47.7	100(212)	0.63
0(32)	18.6	120(248)	0.38
20(68)	8.1	140(284)	0.25
40(104)	3.8	160(320)	0.16
60(140)	1.98		

   4) Is resistance within specifications?

   YES

   ▶ Go to "CHECK PCM/TCM " as below.

   NO

   ▶ Replace "TRANSAXLE FLUID TEMPERATURE SENSOR" as necessary and Go to "Verification of Vehicle Repair" procedure.

2. CHECK TCM

   1) Ignition "ON" & Engine "OFF".

   2) Connect "TRANSAXLE FLUID TEMPERATURE SENSOR" connector.

   3) Install scan tool and select a SIMU-SCAN.

   4) Simulate voltage (0→5V) to "TRANSAXLE FLUID TEMPERATURE SENSOR" signal circuit.

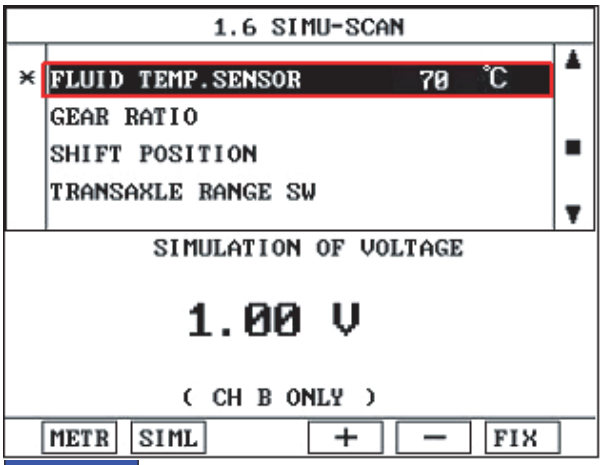


FIG.1)

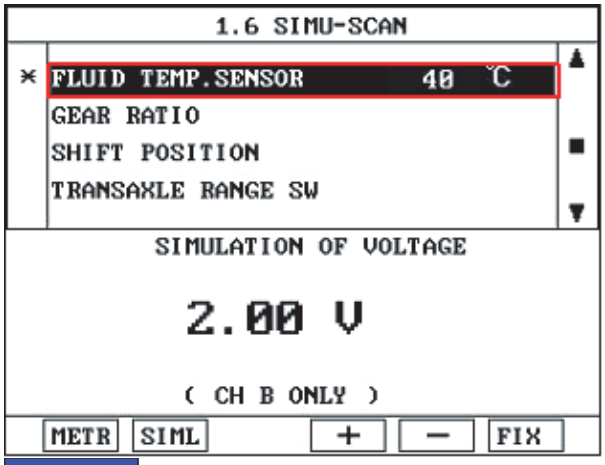


FIG.2)

FIG.1) INPUT 1.00V → 70˚C
FIG.2) INPUT 2.00V → 40˚C

※The values are subject to change according to vehicle model or conditions.

SHDAT6214L

5) Is FLUID TEMP. SENSOR signal value changed according to simulation voltage?

YES

▶ Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EECCAC80

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Using a scantool, Clear DTC.
3. Operate the vehicle within DTC Enable conditions in General information.
4. Are any DTCs present?

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC P0712 FLUID(OIL) TEMPERATURE SENSOR CIRCUIT - LOW

COMPONENT LOCATION EDD1E23A

Refer to DTC P0711.

GENERAL DESCRIPTION EEAD2EF3

Refer to DTC P0711.

DTC DESCRIPTION E7FBDCA7

Refer to DTC P0711.

DTC DETECTING CONDITION EA5B6B9B

Item	Detecting Condition	Possible cause
DTC Strategy	• Check for Voltage range	• Sensor signal circuit is short to ground • Faulty sensor • Faulty PCM
Enable Conditions	• Battery Voltage ≥ 10V	
Threshold Value	• Voltage ＜0.05V	
Diagnostic Time	• More than 1sec	
Fail Safe	• Learning control and Intelligent shift are inhibited • Fluid temperature is regarded as 80°C(176°F)	

SPECIFICATION E306BB1D

Refer to DTC P0711.

MONITOR SCANTOOL DATA E3E21ED8

Refer to DTC P0711.

TERMINAL & CONNECTOR INSPECTION E3FC9002

Refer to DTC P0711.

SIGNAL CIRCUIT INSPECTION E27179DC

Refer to DTC P0711.

COMPONENT INSPECTION E94873E4

Refer to DTC P0711.

VERIFICATION OF VEHICLE REPAIR EB69229F

Refer to DTC P0711.

DTC P0713 FLUID(OIL) TEMPERATURE SENSOR CIRCUIT - HIGH

COMPONENT LOCATION E480BEBD

Refer to DTC P0711.

GENERAL DESCRIPTION E7D1E9E2

Refer to DTC P0711.

DTC DESCRIPTION EDA10621

This DTC code is set when the ATF temperature output voltage is higher than a value generated by thermistor resistance, in a normal operating range, for an extended period of time. The TCM regards the ATF temperature as fixed at a value of 80°C(176°F).

DTC DETECTING CONDITION ECD25E8B

Item	Detecting Condition	Possible cause
DTC Strategy	• Check for Voltage range	• Sensor signal circuit is short to ground • Faulty sensor • Faulty PCM
Enable Conditions	• Battery Voltage ≥ 10V	
Threshold Value	• Voltage ≥ 4.9V	
Diagnostic Time	• More than 1sec	
Fail Safe	• Learning control and Intelligent shift are inhibited • Fluid temperature is regarded as 80°C(176°F)	

SPECIFICATION ECBC1F6F

Refer to DTC P0711.

MONITOR SCANTOOL DATA EDC8ED14

Refer to DTC P0711.

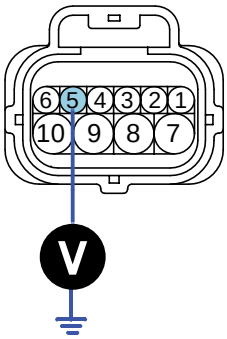
TERMINAL & CONNECTOR INSPECTION EA51A7B5

Refer to DTC P0711.

SIGNAL CIRCUIT INSPECTION E814C399

1. Ignition "OFF".
2. Disconnect the "TRANSAXLE FLUID TEMPERATURE SENSOR" connector.
3. Measure the voltage between terminal "5" of the "TRANSAXLE FLUID TEMPERATURE SENSOR" harness connector and chassis ground.

Specification : Approx. 5 V



5.TRANSAXLE FLUID TEMPERATURE SENSOR
6.Sensor ground

SHDAT6212N

4. Is voltage within specifications ?

YES

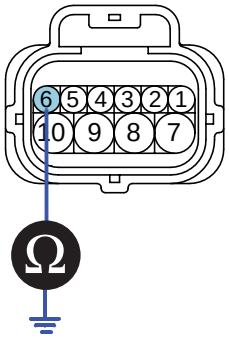
▶ Go to "Ground circuit inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure .

GROUND CIRCUIT INSPECTION EB97AD0F

1. Ignition "OFF".
2. Disconnect the "TRANSAXLE FLUID TEMPERATURE SENSOR" connector.
3. Measure the resistance between terminal "6" of the "TRANSAXLE FLUID TEMPERATURE SENSOR" harness connector and chassis ground.



5.TRANSAXLE FLUID TEMPERATURE SENSOR
6.Sensor ground

SHDAT6216N

4. Is resistance within specifications ?

YES

▶ Go to "Component inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure .

COMPONENT INSPECTION E1501A0A

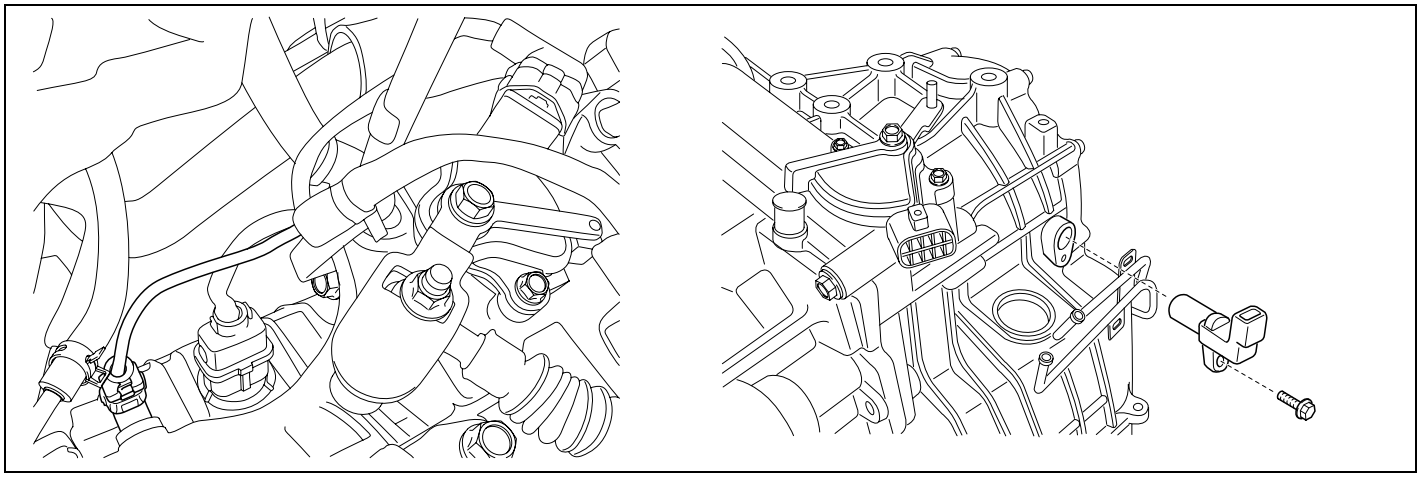
Refer to DTC P0711.

VERIFICATION OF VEHICLE REPAIR E1C9EDFF

Refer to DTC P0711.

DTC P0716 INPUT SPEED SENSOR RANGE/PERFORMANCE

COMPONENT LOCATION ED2D92DA



SHDAT6226D

GENERAL DESCRIPTION E5D09427

The input(turbine) speed sensor outputs pulse-signals according to the revolutions of the input shaft of the transmission. The PCM/TCM determines the input shaft speed by counting the frequency of the pulses. This value is mainly used to control the optimum fluid pressure during shifting.

DTC DESCRIPTION E1906760

The PCM/TCM sets this code if an output pulse-signal is not detected, from the input speed sensor, when the vehicle is running faster than 19 Mile/h(30 Km/h). The Fail-Safe function will be set by the PCM/TCM if this code is detected.

DTC DETECTING CONDITION EB537EA2

Item	Detecting Condition	Possible cause
DTC Strategy	• Speed rationality check	• Signal circuit is open or short. • Sensor power circuit is open • Sensor ground circuit is open • Faulty INPUT SPEED SENSOR • Faulty PCM/TCM
Enable Conditions	• Battery Voltage ≥ 10V	
Threshold value	• Input speed ≥ 8000rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd or 2nd gear • Manual shifting is possible(2nd → 3rd, 3rd → 2nd)	

SPECIFICATION E7A3FD86

Input shaft & Output shaft speed sensor
- Type : Hall sensor
- Current consumption : 22mA(MAX)
- Sensor body and sensor connector have been unified as one.

SIGNAL WAVEFORM E49FB2DB

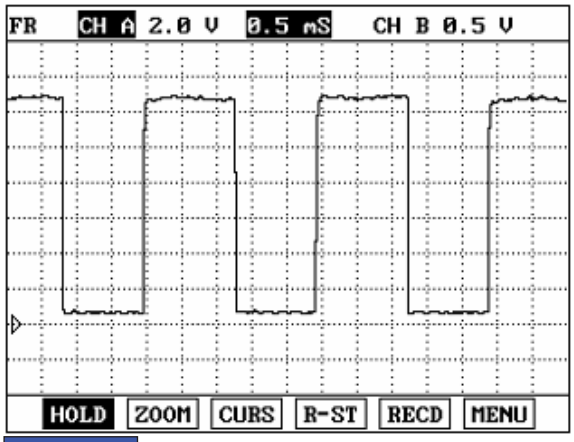


FIG.1)

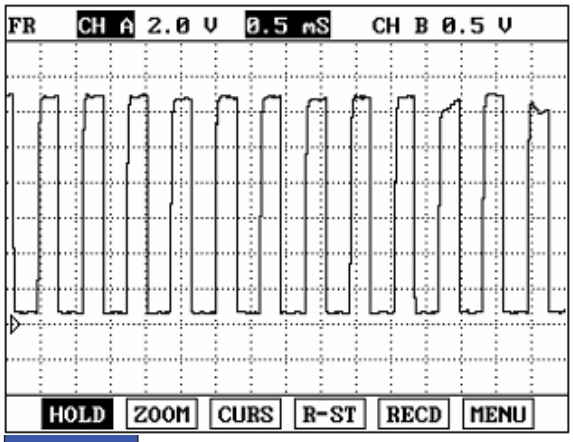


FIG.2)

FIG.1) INPUT SIGNAL → LOW SPEED
FIG.2) INPUT SIGNAL → HIGH SPEED

BKGF105B

MONITOR SCANTOOL DATA E986CCFE

1. Connect scan tool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "INPUT SPEED SENSOR" parameter on the scantool.
4. Driving at speed of over 19 Mile/h(30 Km/h).

Specification : Increasing Gradually

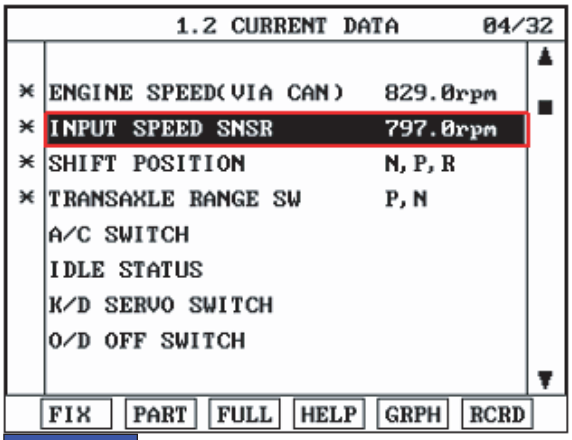


FIG.1)

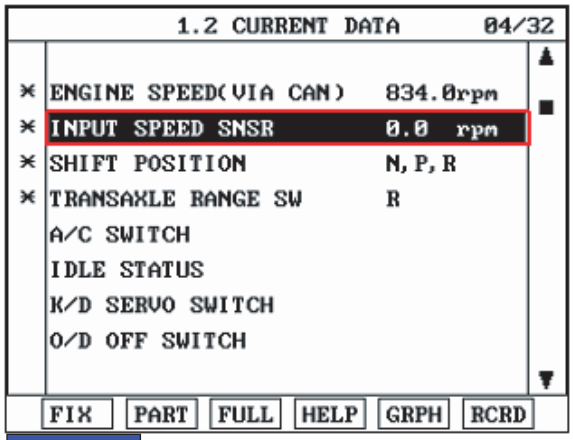


FIG.2)

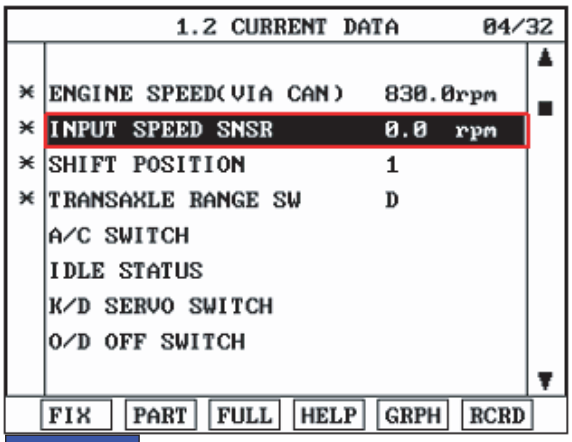


FIG.3)

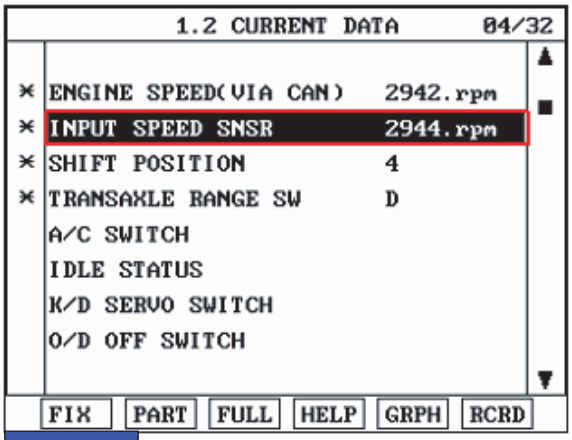


FIG.4)

FIG.1) "P,N" Range
FIG.2) "R" Range,Vehicle Speed = 0
FIG.3) "D" Range,Vehicle Speed = 0
FIG.4) High Speed Driving

BKGF105C

5. Does "Input speed sensor" follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION E08ECDB8

1. Many malfunctions in the electrical system may be caused from poor harness and terminals. These faults can be caused by interference from other electrical systems and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

▶ Repair as necessary and go to "Verification of vehicle repair" procedure.

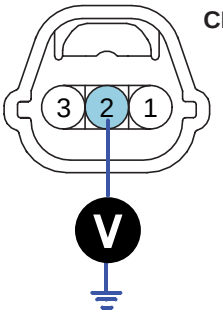
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EAF4E383

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "INPUT SPEED SENSOR" connector.
3. Measure voltage between terminal "2" of the INPUT SPEED SENSOR harness connector and chassis ground.

Specification : approx. 5V



1. Sensor ground
2. **Input speed sensor**
3. Power supply IG1

SHDAT6222N

4. Is voltage within specifications?

YES

▶ Go to "Power supply circuit Inspection" procedure.

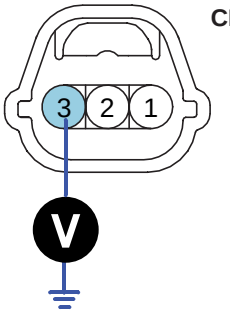
NO

▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
▶ If signal circuit in harness is OK, Go to "Check PCM/TCM" of the "Component Inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION E28C3F56

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "INPUT SPEED SENSOR" connector.
3. Measure voltage between terminal "3" of the INPUT SPEED SENSOR harness connector and chassis ground.

Specification : approx. B+



CBG02-A

1. Sensor ground
2. Input speed sensor
3. Power supply IG1

SHDAT6223N

4. Is voltage within specifications?

YES

▶ Go to "Ground circuit inspection" procedure.

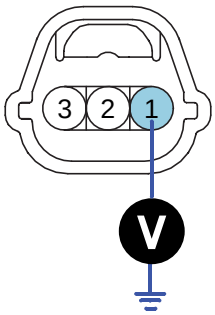
NO

▶ Check for open in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION EC6A8C9D

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "INPUT SPEED SENSOR" connector.
3. Measure resistance between terminal "1" of the INPUT SPEED SENSOR harness connector and chassis ground.

Specification : approx. 0 Ω



CBG02-A

1. Sensor ground
2. Input speed sensor
3. Power supply IG1

SHDAT6224N

4. Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
▶ If ground circuit in harness is OK, Go to "Check PCM/TCM" of the "Component Inspection" procedure.

COMPONENT INSPECTION E4D7E06F

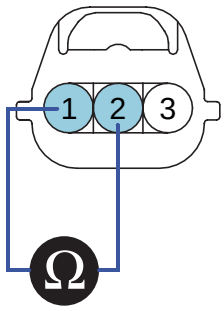
1. Check "INPUT SPEED SENSOR"

   1) Ignition "OFF".

   2) Disconnect the "INPUT SPEED SENSOR" connector.

   3) Measure resistance between terminal "1","2" and "2","3" and "1","3" of the "INPUT SPEED SENSOR" connector.

Specification : Refer to "Reference data"



CBG02-A
Component side

1. Sensor ground
2. Input speed sensor
3. Power supply IG1

SHDAT6225N

   4) Is resistance within specifications?

[REFERENCE DATA]

Data	Reference Data	
Current	22 mA	
Air Gap	Input sensor	1.3mm (0.051in)
	Output sensor	0.85mm (0.033in)
Resistance	Input sensor	Above 4 MΩ
	Output sensor	Above 4 MΩ
Voltage	High	4.8 ~ 5.2V
	Low	Below 0.8V

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

▶ Replace "INPUT SPEED SENSOR" as necessary and Go to "Verification of Vehicle Repair" procedure.

2. CHECK PCM/TCM

   1) Ignition "ON" & Engine "OFF".

   2) Connect "INPUT SPEED SENSOR" connector.

   3) Install scantool and select a SIMU-SCAN.

   4) Simulate frequency to INPUT SPEED SENSOR signal circuit.

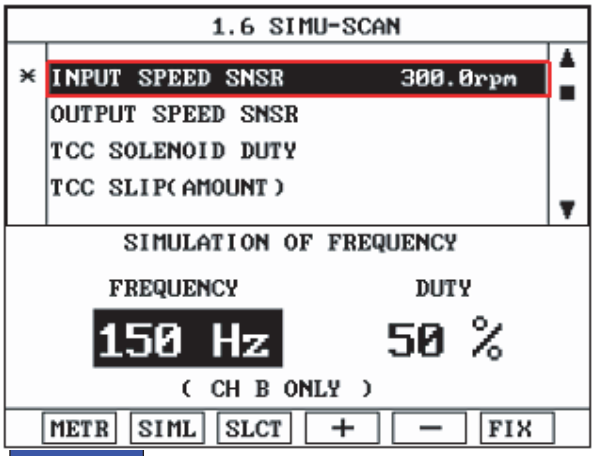


FIG.1)

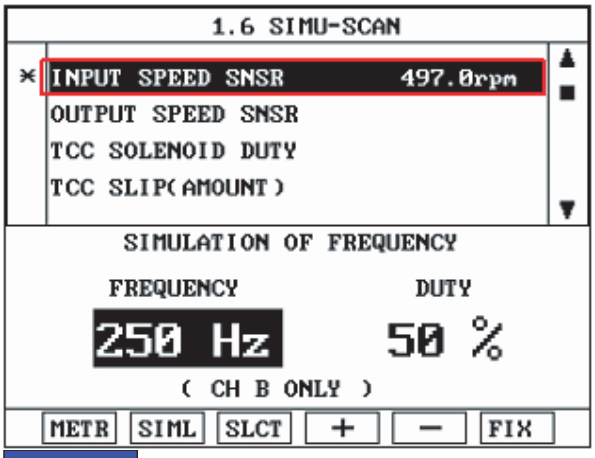


FIG.2)

FIG.1) INPUT 150Hz → 300rpm
FIG.2) INPUT 250Hz → 497rpm

※ The values are subject to change according to vehicle model or conditions.

BKGF105H

5) Is "INPUT SPEED SENSOR" signal value changed according to simulation frequency?

YES

▶ Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E6D5E88D

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scan tool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Using a scan tool, Clear DTC.
3. Operate the vehicle within DTC Enable conditions in General information.
4. Are any DTCs present?

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC P0717 INPUT SPEED SENSOR CIRCUIT - NO SIGNAL

COMPONENT LOCATION E980F277

Refer to DTC P0716.

GENERAL DESCRIPTION EB9FFED9

Refer to DTC P0716.

DTC DESCRIPTION E22817A9

Refer to DTC P0716.

DTC DETECTING CONDITION EA817CC7

Item	Detecting Condition	Possible cause
DTC Strategy	• Speed rationality check	• Signal circuit is open or short. • Sensor power circuit is open • Sensor ground circuit is open • Faulty INPUT SPEED SENSOR • Faulty PCM/TCM
Enable Conditions	• Battery Voltage ≥ 10V • Engine speed ≥ 2600rpm • Lever position : D,3,2,L • Vehicle speed > 16mph(25km/h)	
Threshold value	• Input speed = 0	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd or 2nd gear	

SPECIFICATION E42EC4C3

Refer to DTC P0716.

SIGNAL WAVEFORM EC4002CC

Refer to DTC P0716.

MONITOR SCANTOOL DATA EC45C027

Refer to DTC P0716.

TERMINAL & CONNECTOR INSPECTION E0A7A572

Refer to DTC P0716.

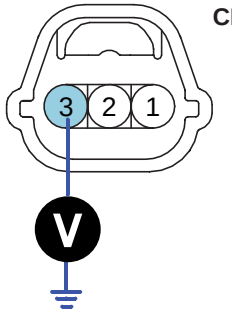
SIGNAL CIRCUIT INSPECTION EDAAE6BF

Refer to DTC P0716.

POWER SUPPLY CIRCUIT INSPECTION E54F0DD8

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "INPUT SPEED SENSOR" connector.
3. Measure voltage between terminal "3" of the INPUT SPEED SENSOR harness connector and chassis ground.

Specification : approx. B+



1. Sensor ground
2. Input speed sensor
3. Power supply IG1

SHDAT6223N

4. Is voltage within specification?

YES

▶ Go to "Ground circuit inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION E084D68D

Refer to DTC P0716.

COMPONENT INSPECTION E6719737

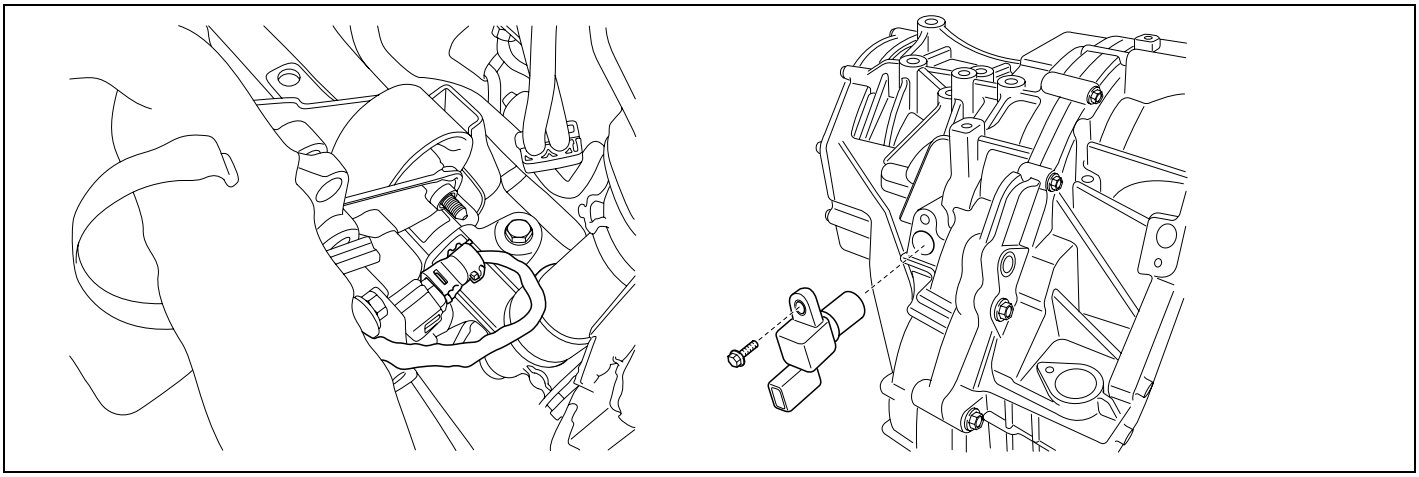
Refer to DTC P0716.

VERIFICATION OF VEHICLE REPAIR EE29FE84

Refer to DTC P0716.

DTC P0722 OUTPUT SPEED SENSOR CIRCUIT - NO SIGNAL

COMPONENT LOCATION E360FE67



SHDAT6236D

GENERAL DESCRIPTION EE288893

The Output Speed Sensor outputs pulse-signals according to the revolutions of the output shaft of the transmission. The Output Speed Sensor is installed in front of the Transfer Drive Gear to determine the Transfer Drive Gear rpms by counting the frequency of the pulses. This value, together with the throttle position data, is mainly used to decide the optimum gear position.

DTC DESCRIPTION E8539F41

The TCM sets this code if the calculated value of the pulse-signal is noticeably different from the value calculated, using the Vehicle Speed Sensor output, when the vehicle is running faster than 12mph(20km/h). The TCM will initiate the fail safe function if this code is detected.

DTC DETECTING CONDITION ECB0953D

Item		Detecting Condition	Possible cause
DTC Strategy		• Speed rationality check	• Signal circuit is open or short • Sensor power circuit is open • Sensor ground circuit is open • Faulty OUTPUT SPEED SENSOR • Faulty PCM
Enable Conditions	Case 1	• Battery Voltage ≥ 10V • TPS ≥ 7% or current gear ≥ 2 • Engine speed ≥ 2600rpm • Lever position : D • State of brake : OFF • Vehicle speed ≥ 20Km/h	
	Case 2	• Battery Voltage ≥ 10V • Lever position : D,3,2 • State of brake : OFF	
Threshold value	Case 1	• Output speed = 0	
	Case 2	• Output speed = 0	
Diagnostic Time	Case 1	• more than 4sec	
	Case 2	• more than 4sec	
Fail Safe		• Locked into 3rd or 2nd gear • Apply an electric current to solenoid valve • Manual shifting is possible (2nd → 3rd, 3rd → 2nd)	

SPECIFICATION EBB270F0

Refer to DTC P0716.

SIGNAL WAVEFORM EB7D5B51

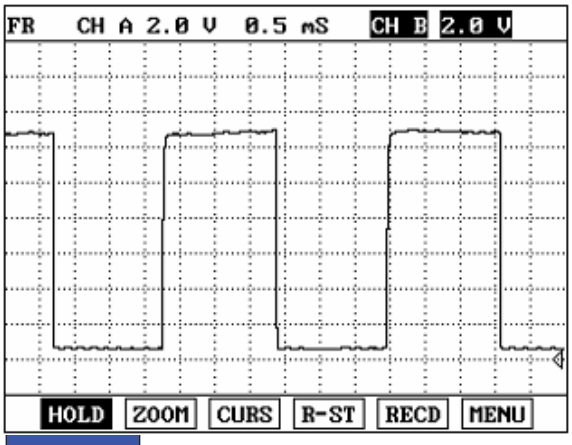


FIG.1)

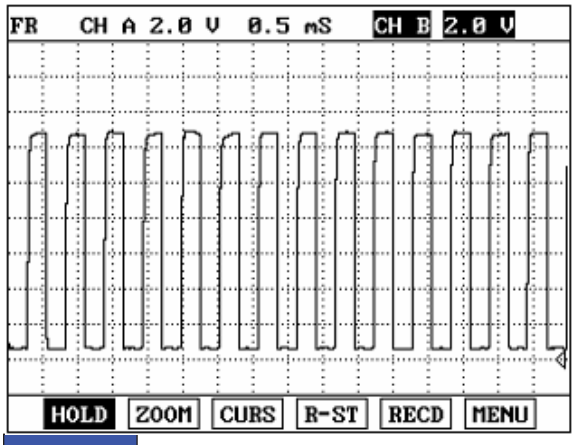


FIG.2)

FIG.1) OUTPUT SIGNAL → LOW SPEED
FIG.2) OUTPUT SIGNAL → HIGH SPEED

BKGF107A

MONITOR SCANTOOL DATA E2E1AE27

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "OUTPUT SPEED SENSOR" parameter on the scantool.
4. Driving at speed of over 30 Km/h(19 mph).

Specification : Increasing Gradually

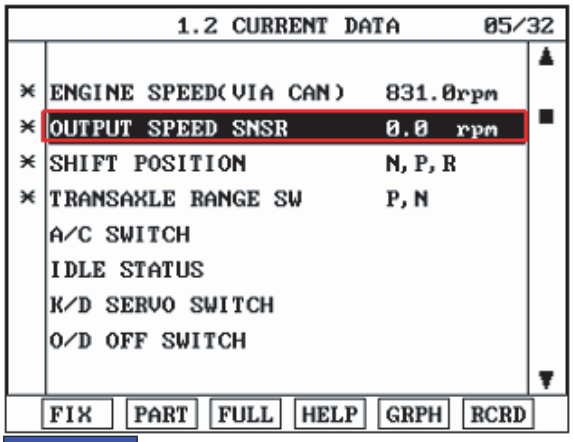


FIG.1)

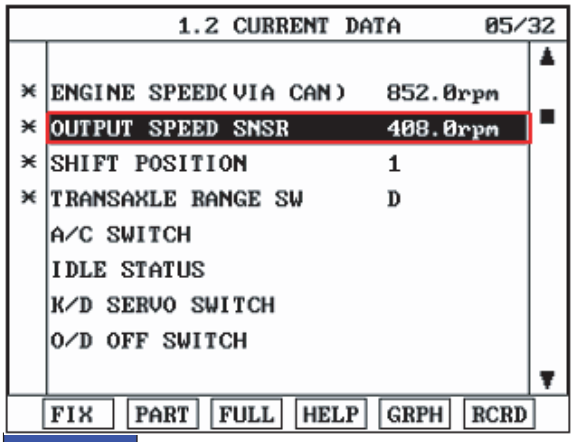


FIG.2)

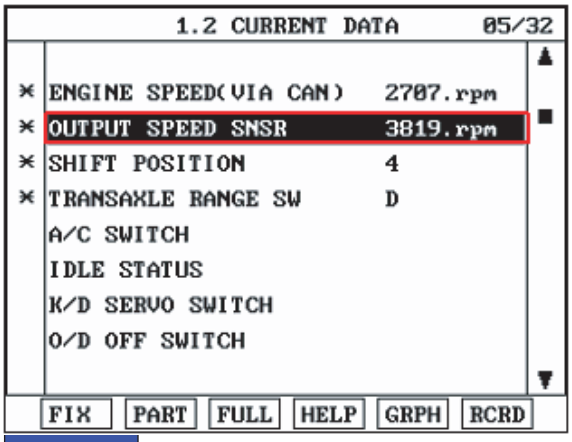


FIG.3)

FIG.1) "P,N" Range
FIG.2) "D" Range, Low Speed

FIG.3) "D" Range, High Speed

BKGF107B

5. Does "Output speed sensor" follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

NO

▶ Go to "Terminal & connector inspection" procedure.

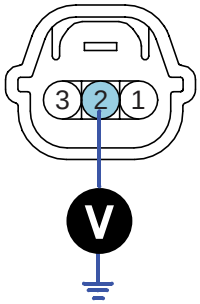
TERMINAL & CONNECTOR INSPECTION ECE65D01

Refer to DTC P0716.

SIGNAL CIRCUIT INSPECTION E16169D6

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "OUTPUT SPEED SENSOR" connector.
3. Measure voltage between terminal "2" of the OUTPUT SPEED SENSOR harness connector and chassis ground.

Specification : approx. 5V



CBG02-B

1. Sensor ground
2. **Output speed sensor**
3. Power supply IG1

SHDAT6232N

4. Is voltage within specification?

YES

▶ Go to "Power supply circuit Inspection" procedure.

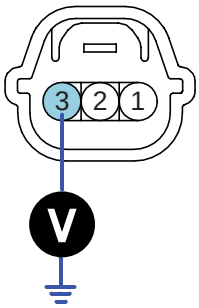
NO

▶ Check for open or short in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
▶ If signal circuit in harness is OK, Go to "Check PCM/TCM" of the "Component Inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION ECD6287D

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "OUTPUT SPEED SENSOR" connector.
3. Measure voltage between terminal "3" of the "OUTPUT SPEED SENSOR" harness connector and chassis ground.

Specification : approx. B+



1. Sensor ground
2. Output speed sensor
3. **Power supply IG1**

SHDAT6233N

4. Is voltage within specification?

YES

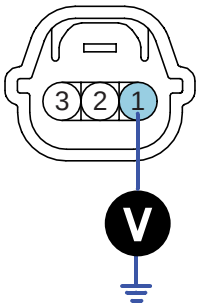
▶ Go to "Ground circuit inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

GROUND CIRCUIT INSPECTION E3DF0C64

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "OUTPUT SPEED SENSOR" connector.
3. Measure resistance between terminal "1" of the OUTPUT SPEED SENSOR harness connector and chassis ground.



1. Sensor ground
2. Output speed sensor
3. Power supply IG1

SHDAT6234N

4. Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.
▶ If ground circuit is OK, Go to "Check PCM/TCM" of the "Component Inspection" procedure.

COMPONENT INSPECTION E3CE452C

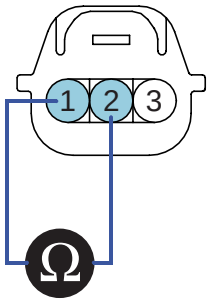
1. Check "OUTPUT SPEED SENSOR"

   1) Ignition "OFF".

   2) Disconnect the "OUTPUT SPEED SENSOR" connector.

   3) Measure resistance between terminal "1","2" and "2","3" and "1","3" of the "OUTPUT SPEED SENSOR" connector.

Specification : Refer to "Reference data"



CBG02-B
Component side

1. Sensor ground
2. Output speed sensor
3. Power supply IG1

SHDAT6235N

   4) Is resistance within specifications?

[REFERENCE DATA]

Data	Reference Data	
Current	22 mA	
Air gap	Input sensor	1.3mm (0.051in)
	Output sensor	0.85mm (0.033in)
Resistance	1(red) - 2(black)	Infinite
	1(black) - 2(red)	Approx. 3.89 MΩ
	1(red) - 3(black)	Approx. 6.55 MΩ
	1(black) - 3(red)	Approx. 5.27 MΩ
	2(red) - 3(black)	Approx. 17.5 MΩ
	2(black) - 3(red)	Infinite

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

▶ Replace "OUTPUT SPEED SENSOR" as necessary and Go to "Verification of Vehicle Repair" procedure.

2. CHECK PCM/TCM

1) Ignition "ON" & Engine "OFF".

2) Connect "OUTPUT SPEED SENSOR" connector.

3) Install scantool and select a SIMU-SCAN.

4) Simulate frequency to OUTPUT SPEED SENSOR signal circuit.

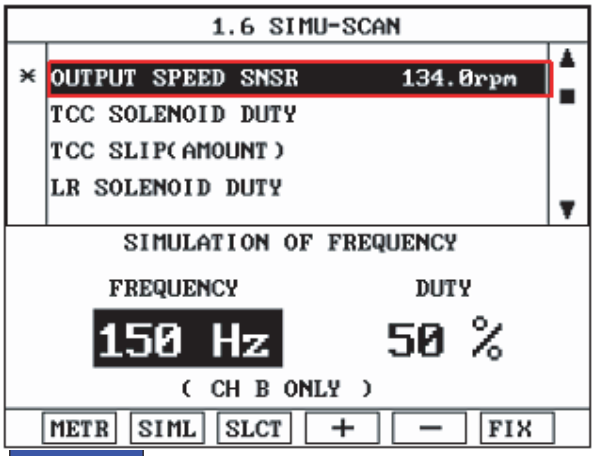


FIG.1)

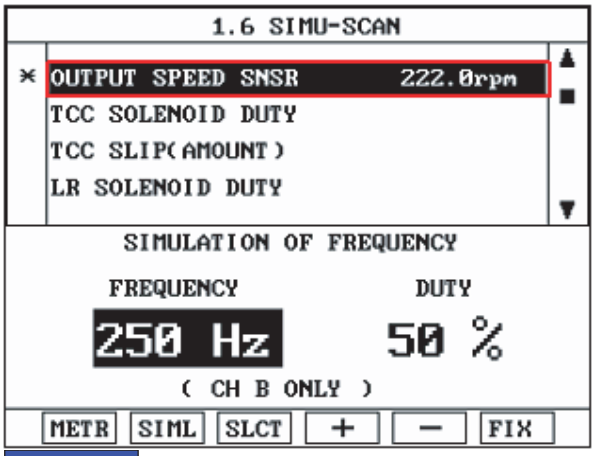


FIG.2)

FIG.1) OUTPUT 150Hz → 134rpm
FIG.2) OUTPUT 250Hz → 222rpm

※ The values are subject to change according to vehicle model or conditions.

BKGF107G

5) Is "OUTPUT SPEED SENSOR" signal value changed according to simulation frequency?

YES

▶ Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage. Repair or replace as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

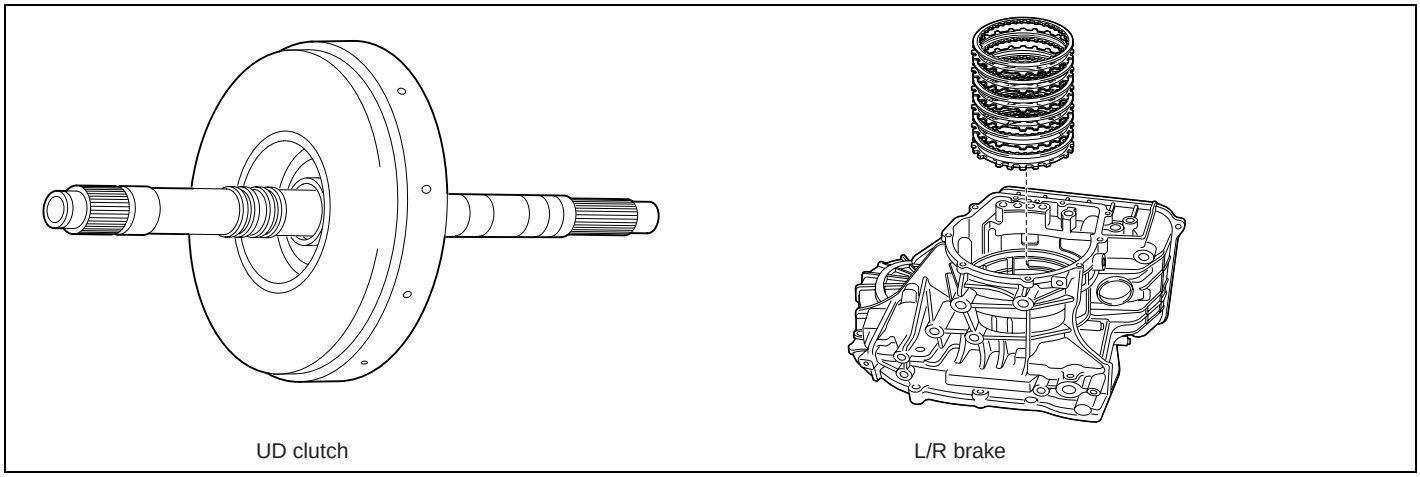
▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EDDDC268

Refer to DTC P0716.

DTC P0731 GEAR 1 INCORRECT RATIO

COMPONENT LOCATION E57BB90B



BKGF108A

GENERAL DESCRIPTION EB5C7DA7

The value of the input shaft speed should be equal to the value of the output shaft speed, when multiplied by the 1st gear ratio, while the transaxle is engaged in the 1st gear. For example, if the output speed is 1000 rpm and the 1st gear ratio is 2.842, then the input speed is 2,842 rpm.

DTC DESCRIPTION E26CC334

This code is set if the value of input shaft speed is not equal to the value of the output shaft, when multiplied by the 1st gear ratio, while the transaxle is engaged in 1st gear. This malfunction is mainly caused by mechanical troubles such as control valve sticking or solenoid valve malfunctioning rather than an electrical issue.

DTC DETECTING CONDITION E0797C65

Item	Detecting Condition	Possible cause
DTC Strategy	• 1st gear incorrect ratio	• Faulty input speed sensor • Faulty output speed sensor • Faulty UD clutch or LR brake or One way clutch
Enable Conditions	• Engine speed ＞450rpm • Output speed ＞200rpm • Lever position : D,3,2,L • Input speed ＞ 0rpm • A/T oil temp output ≥ -10°C(14°F) • TRANSAXLE RANGE SWITCH is normal and after 2sec is passed from IG ON	
Threshold value	• ｜Input speed/1st gear ratio - output speed｜≥200rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd gear.(If diagnosis code P0731 is output four times, the transaxle is locked into 3rd gear)	

SIGNAL WAVEFORM EBE8243D

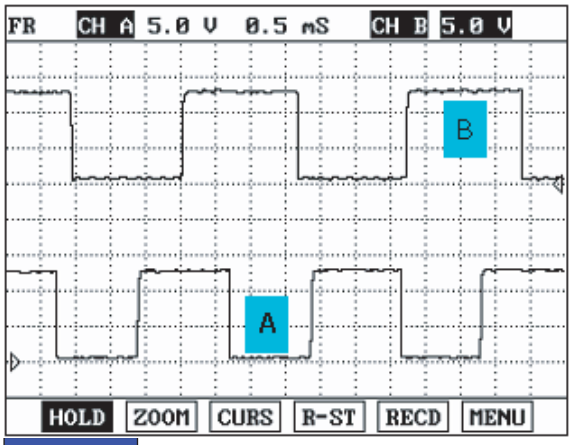


FIG.1)

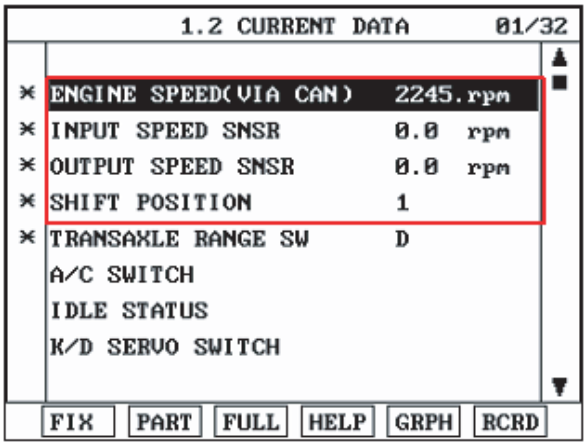
A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

BKGF108B

MONITOR SCANTOOL DATA E77C96BB

1. Connect scan tool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "ENGINE SPEED, INPUT SPEED SENSOR, OUTPUT SPEED SENSOR, GEAR POSITION" parameter on the scan tool.
4. Perform the "STALL TEST" with gear position "1"

Specification : 2000~2700 engine rpm



BKGF108C

OPERATING ELEMENT OF EACH SHIFTING RANGE

	UD/C	OD/C	REV/C	2-4/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●					●
D2	●			●		
D3	●	●				
D4		●		●		
L	●				●	●

Stall test procedure in D1 and reason

Procedure

1. Warm up the engine.
2. After positioning the select lever in "D", depress the foot brake pedal fully after that, depress the accelerator pedal to the maximum.
   * The slippage of 1st gear operating parts can be detected by stall test in D

Reason for stall test

1. If there is no mechanical defaults in A/T, every slippage occur in torque converter.
2. Therefore, engine revolution is output, but input and output speed revolution must be "zero" due to wheel's lock.
3. If 1st gear operating part has faults, input speed revolution will be out.
4. If output speed revolution is output. It means that the foot brake force is not applied fully. Remeasuring is required.

5. Is "STALL TEST " within specification?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Go to "Component inspection" procedure.

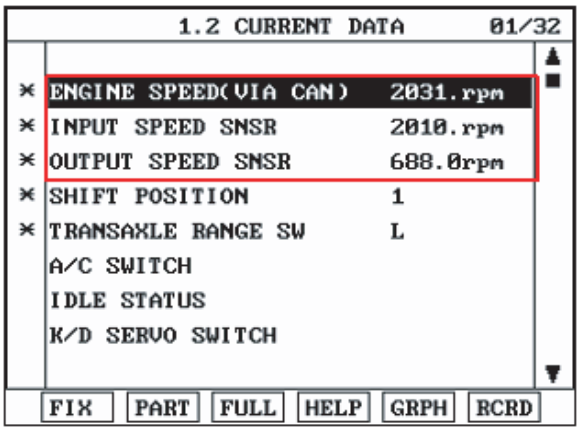
CAUTION

1. ***Do not let anybody stand in front of or behind the vehicle while this test is being carried out.***
2. ***Check the A/T fluid level and temperature and the engine coolant temperature.***
   - ***Fluid level : At the hot mark on the oil level gauge.***
   - ***Fluid temperature : 176 °F~ 212 °F (80~100 °C).***
   - ***Engine coolant temperature : 176 °F~ 212 °F (80~100 °C).***
3. ***Chock both rear wheel(left and right).***
4. ***Pull the parking brake lever on with the brake pedal fully depressed.***
5. ***The throttle should not be left fully open for more than eight second.***
6. ***If carrying out the stall test two or more time, move the select lever to the "N" position and run the engine at 1,000 rpm to let the A/T fluid cool down before carrying out subsequent.***

SIGNAL CIRCUIT INSPECTION E9A1041E

1. Connect Scan tool.
2. Engine "ON".
3. Monitor the "INPUT & OUTPUT SPEED SENSOR" parameter on the scan tool.
4. Accelerate the Engine speed until about 2000 rpm in the 1st gear.

Specification : INPUT SPEED - (OUTPUT SPEED × 1st GEAR RATIO) ≤ 200 RPM



BKGF108D

5. Are "INPUT & OUTPUT SPEED SENSOR" within specifications?

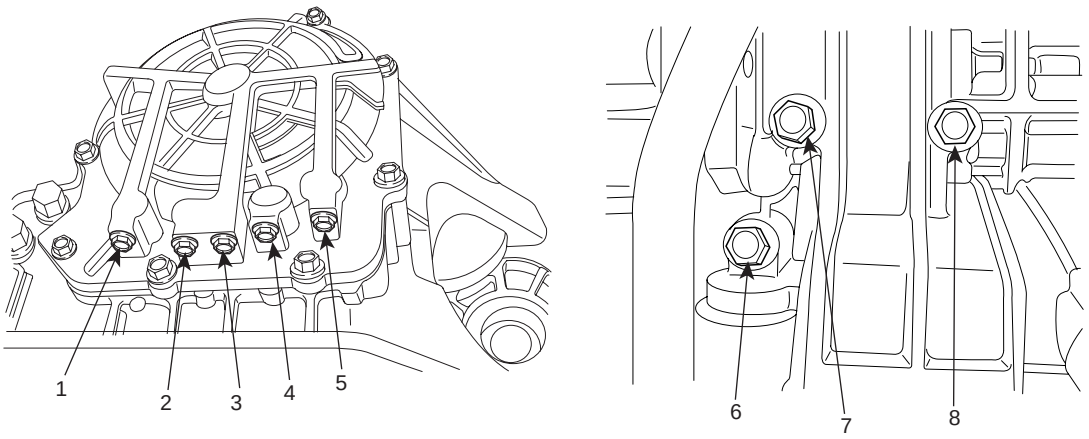
YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for electrical noise of circuit in INPUT &OUTPUT SPEED SENSOR or Replace INPUT & OUTPUT SPEED SENSOR. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E00EF5BF



1. LUB Pressure port
2. RED Pressure port
3. OD Pressure port
4. 2-4 Pressure port
5. REV Pressure port
6. DA Pressure port
7. UD Pressure port
8. LR Pressure port

BKGF108E

1. Connect oil pressure gauge to "UD" and "L/R" port.
2. Engine "ON".
3. Drive a car with gear position 1 in "SPORTS MODE".
4. Compare it with reference data as below.

Specification :

STANDARD HYDRAULIC PRESSURE TABLE

No.	Shift range position	Operation					Measuring	Oil pressure (kgf/㎠)				
		PCSV-A	PCSV-B	PCSV-C	PCSV-D	ON/OFF		LR	2/4(2ND)	UD	OD	REV
1	D	0	100	0	0	ON	LR	10.5±0.2	0	10.5±0.2	0	0
2	↑	50	↑	↑	↑	↑	↑	5.3±0.4	↑	↑	↑	↑
3	↑	75	↑	↑	↑	↑	↑	1.0±0.3	↑	↑	↑	↑
4	↑	100	↑	↑	↑	↑	↑	0	↑	↑	↑	↑
5	↑	↑	0	↑	100	OFF	2/4(2ND)	0	10.5±0.2	↑	↑	↑
6	↑	↑	50	↑	↑	↑	↑	↑	5.3±0.4	↑	↑	↑
7	↑	↑	75	↑	↑	↑	↑	↑	0.9±0.3	↑	↑	↑
8	↑	↑	100	↑	↑	↑	↑	↑	0	↑	↑	↑
9	↑	0	↑	↑	↑	↑	OD	↑	↑	↑	10.5±0.2	↑
10	↑	50	↑	↑	↑	↑	↑	↑	↑	↑	5.6±0.4	↑
11	↑	75	↑	↑	↑	↑	↑	↑	↑	↑	1.0±0.3	↑
12	↑	100	↑	↑	↑	↑	↑	↑	↑	↑	0	↑
13	↑	↑	↑	0	0	↑	UD	↑	↑	10.5±0.2	↑	↑
14	↑	↑	↑	50	↑	↑	↑	↑	↑	5.6±0.4	↑	↑
15	↑	↑	↑	75	↑	↑	↑	↑	↑	1.0±0.3	↑	↑
16	↑	0	↑	100	↑	↑	↑	↑	↑	0	↑	↑
17	R	↑	0	↑	↑	ON	REV	17.7±0.8	↑	↑	↑	17.7±0.8
18	↑	↑	50	↑	↑	↑	↑	↑	↑	↑	↑	8.7±0.8
19	↑	↑	75	↑	↑	↑	↑	↑	↑	↑	↑	0.9±0.5
20	↑	↑	100	↑	↑	↑	↑	↑	↑	↑	↑	0

※ The values are subject to change according to vehicle model or condition.

SHDAT6240L

5. Is oil pressure value within specifications?

YES

▶ Repair AUTO TRANSAXLE(Clutch or Brake) as necessary and Go to "Verification of Vehicle Repair" procedure.

NO

▶ Replace AUTO TRANSAXLE (BODY CONTROL VALVE faulty) as necessary and Go to "Verification of Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR EBBCFA90

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Using a scantool, Clear DTC.
3. Operate the vehicle within DTC Enable conditions in General information.
4. Are any DTCs present ?

YES

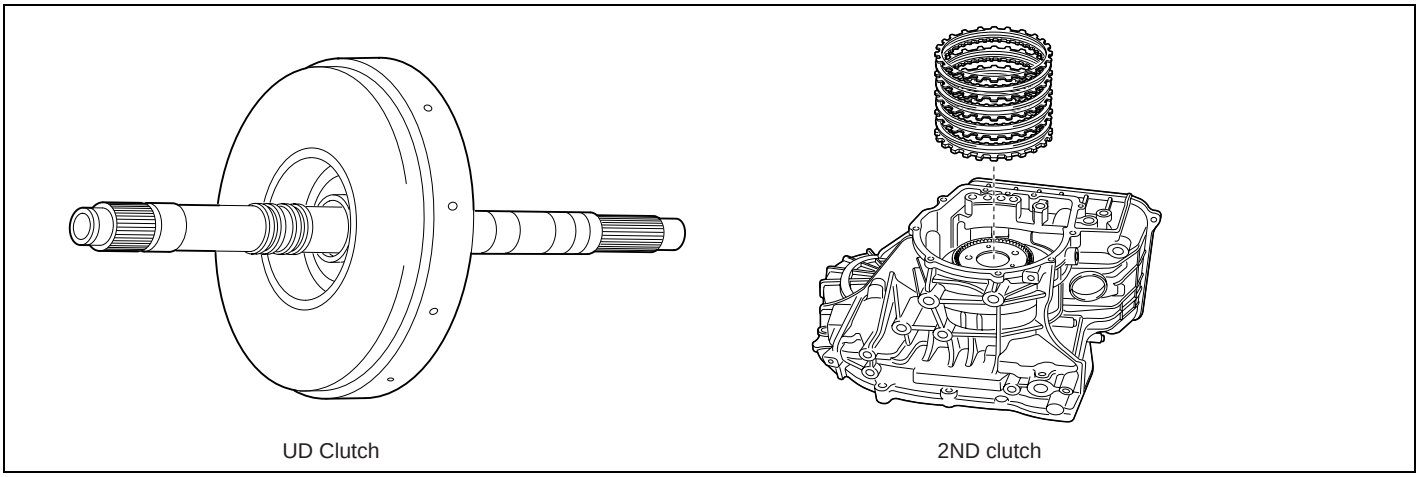
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC P0732 GEAR 2 INCORRECT RATIO

COMPONENT LOCATION EBC1A552



BKGF109A

GENERAL DESCRIPTION E946C139

The value of the input shaft speed should be equal to the value of the output shaft speed, when multiplied by the 2nd gear ratio, while the transaxle is engaged in the 2nd gear. For example, if the output speed is 1000 rpm and the 2nd gear ratio is 1.529, then the input speed is 1,592 rpm.

DTC DESCRIPTION E087320D

This code is set if the value of input shaft speed is not equal to the value of the output shaft, when multiplied by the 2nd gear ratio, while the transaxle is engaged in 2nd gear. This malfunction is mainly caused by mechanical troubles such as control valve sticking or solenoid valve malfunctioning rather than an electrical issue.

DTC DETECTING CONDITION EDB92EE1

Item	Detecting Condition	Possible cause
DTC Strategy	• 2nd gear incorrect ratio	• Faulty input speed sensor • Faulty output speed sensor • Faulty UD clutch or 2-4 brake
Enable Conditions	• Engine speed ＞450rpm • Output speed ＞500rpm • Lever position : D,3,2 • Input speed ＞0rpm • A/T oil temp output ≥ -10°C(14°F) • 11V ≤ Battery Voltage ≤16V • TRANSAXLE RANGE SWITCH is normal and after 2sec is passed from IG ON	
Threshold value	• ｜Input speed/2nd gear ratio - output speed｜≥200rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd gear.(If diagnosis code P0732 is output four times, the transaxle is locked into 3rd gear)	

SIGNAL WAVEFORM EEC82405

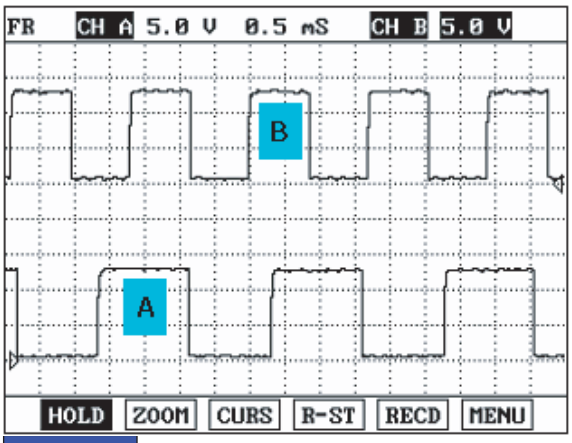


FIG.1)

A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

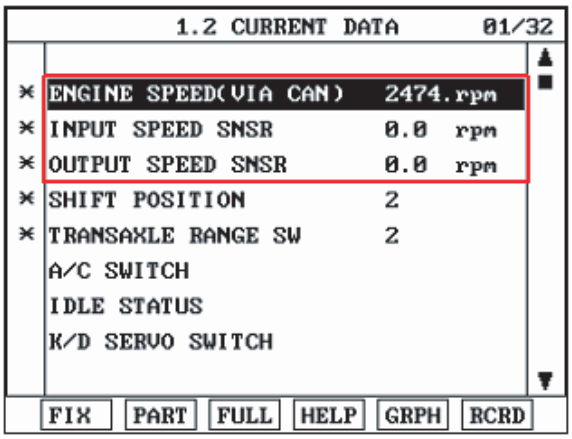
BKGF109B

MONITOR SCANTOOL DATA E45A4641

1. Connect scan tool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "ENGINE SPEED, INPUT SPEED SENSOR, OUTPUT SPEED SENSOR, GEAR POSITION" parameter on the scan tool.
4. Perform the "STALL TEST" with gear position "2".

Specification : 2000~2700 engine rpm

※ This test is possible only for "HOLD S/W" or "SPORTS MODE" applied vehicles.



BKGF109C

OPERATING ELEMENT OF EACH SHIFTING RANGE

	UD/C	OD/C	REV/C	2-4/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●					●
D2	●			●		
D3	●	●				
D4		●		●		
L	●				●	●

Stall test procedure in D2 and reason

Procedure

1. Warm up the engine.
2. After positioning the select lever in "D" or "ON" of the HOLD SW (Operate UP SHIFT in case of "SPORTS MODE"),depress the foot brake pedal fully after that, depress the accelerator pedal to the maximum.
   * The slippage of 2ND BRAKE can be detected by stall test in D2.

Reason for stall test

1. If there is no mechanical defaults in A/T, every slippage occur in torque converter.
2. Therefore, engine revolution is output, but input and output speed revolution must be "zero" due to wheel's lock.
3. If 2nd brake system(2nd gear operating part) has faults, input speed revolution will be out.
4. If output speed revolution is output. It means that the foot brake force is not applied fully. Remeasuring is required.

5. Is "STALL TEST " within specification?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Go to "Component inspection" procedure.

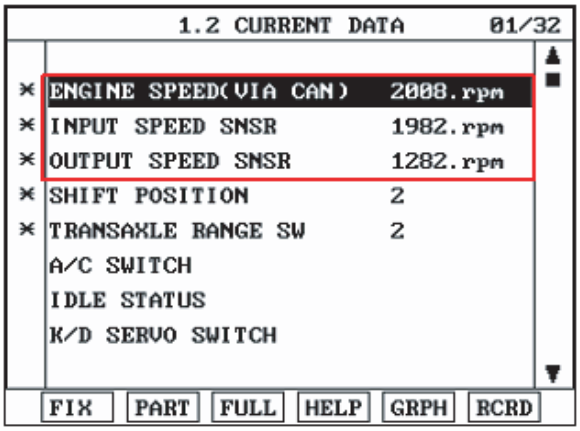
CAUTION

1. ***Do not let anybody stand in front of or behind the vehicle while this test is being carried out.***
2. ***Check the A/T fluid level and temperature and the engine coolant temperature.***
   - ***Fluid level : At the hot mark on the oil level gauge.***
   - ***Fluid temperature : 176 °F~ 212 °F (80~100 °C).***
   - ***Engine coolant temperature : 176 °F~ 212 °F (80~100 °C).***
3. ***Chock both rear wheel(left and right).***
4. ***Pull the parking brake lever on with the brake pedal fully depressed.***
5. ***The throttle should not be left fully open for more than eight second.***
6. ***If carrying out the stall test two or more time, move the select lever to the "N" position and run the engine at 1,000 rpm to let the A/T fluid cool down before carrying out subsequent.***

SIGNAL CIRCUIT INSPECTION E3998F8D

1. Connect Scantool.
2. Engine "ON".
3. Monitor the "INPUT & OUTPUT SPEED SENSOR" parameter on the scantool.
4. Accelerate the Engine speed until about 2000 rpm in the 2nd gear.

Specification : INPUT SPEED - (OUTPUT SPEED × 2nd GEAR RATIO) ≤ 200 RPM



BKGF109D

5. Does "INPUT & OUTPUT SPEED SENSOR" within specifications?

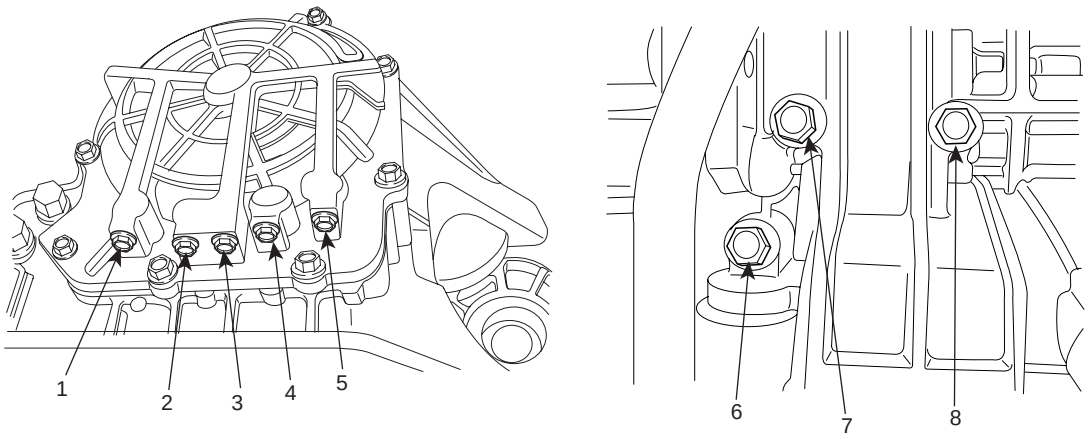
YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for electrical noise of circuit in INPUT & OUTPUT SPEED SENSOR or Replace INPUT & OUTPUT SPEED SENSOR. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E80FF8DD



1. LUB Pressure port
2. RED Pressure port
3. OD Pressure port
4. 2-4 Pressure port
5. REV Pressure port
6. DA Pressure port
7. UD Pressure port
8. LR Pressure port

BKGF108E

1. Connect oil pressure gauge to "UD" and "2-4/B" port.
2. Engine "ON".
3. Drive a car with gear position 2 in "SPORTS MODE".
4. Compare it with reference data as below.

Specification :

STANDARD HYDRAULIC PRESSURE TABLE

No.	Shift range position	Operation					Measuring	Oil pressure (kgf/㎠)				
		PCSV-A	PCSV-B	PCSV-C	PCSV-D	ON/OFF		LR	2/4(2ND)	UD	OD	REV
1	D	0	100	0	0	ON	LR	10.5±0.2	0	10.5±0.2	0	0
2	↑	50	↑	↑	↑	↑	↑	5.3±0.4	↑	↑	↑	↑
3	↑	75	↑	↑	↑	↑	↑	1.0±0.3	↑	↑	↑	↑
4	↑	100	↑	↑	↑	↑	↑	0	↑	↑	↑	↑
5	↑	↑	0	↑	100	OFF	2/4(2ND)	0	10.5±0.2	↑	↑	↑
6	↑	↑	50	↑	↑	↑	↑	↑	5.3±0.4	↑	↑	↑
7	↑	↑	75	↑	↑	↑	↑	↑	0.9±0.3	↑	↑	↑
8	↑	↑	100	↑	↑	↑	↑	↑	0	↑	↑	↑
9	↑	0	↑	↑	↑	↑	OD	↑	↑	↑	10.5±0.2	↑
10	↑	50	↑	↑	↑	↑	↑	↑	↑	↑	5.6±0.4	↑
11	↑	75	↑	↑	↑	↑	↑	↑	↑	↑	1.0±0.3	↑
12	↑	100	↑	↑	↑	↑	↑	↑	↑	↑	0	↑
13	↑	↑	↑	0	0	↑	UD	↑	↑	10.5±0.2	↑	↑
14	↑	↑	↑	50	↑	↑	↑	↑	↑	5.6±0.4	↑	↑
15	↑	↑	↑	75	↑	↑	↑	↑	↑	1.0±0.3	↑	↑
16	↑	0	↑	100	↑	↑	↑	↑	↑	0	↑	↑
17	R	↑	0	↑	↑	ON	REV	17.7±0.8	↑	↑	↑	17.7±0.8
18	↑	↑	50	↑	↑	↑	↑	↑	↑	↑	↑	8.7±0.8
19	↑	↑	75	↑	↑	↑	↑	↑	↑	↑	↑	0.9±0.5
20	↑	↑	100	↑	↑	↑	↑	↑	↑	↑	↑	0

※ The values are subject to change according to vehicle model or condition.

SHDAT6240L

5. Is oil pressure value within specifications?

YES

▶ Repair AUTO TRANSAXLE(Clutch or Brake) as necessary and Go to "Verification of Vehicle Repair" procedure.

NO

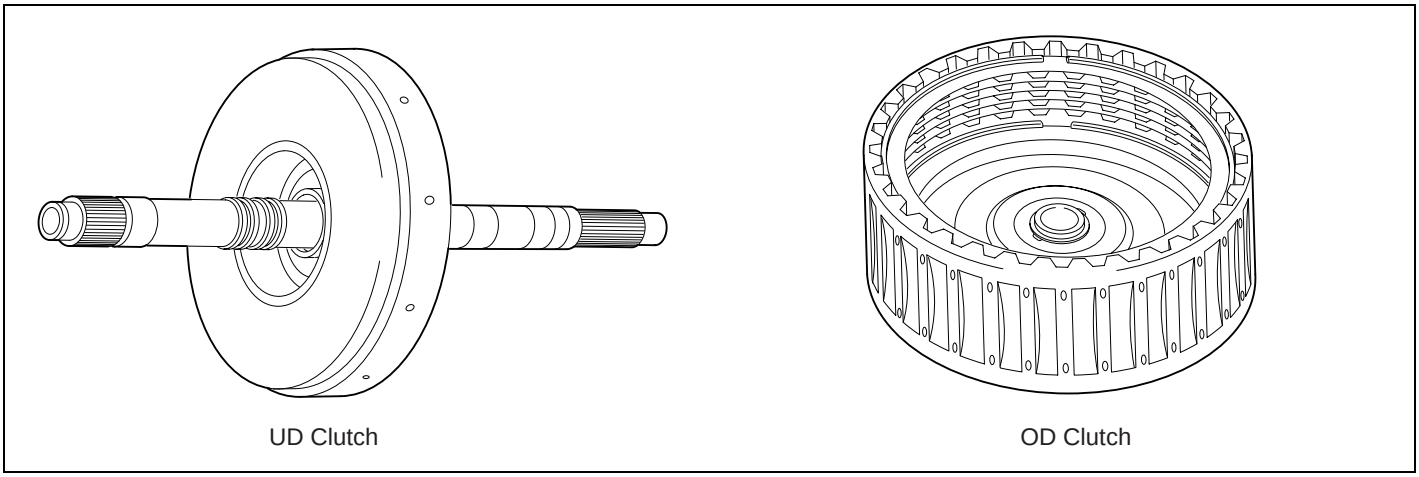
▶ Replace AUTO TRANSAXLE (BODY CONTROL VALVE faulty) as necessary and Go to "Verification of Vehicle Repair " procedure.

VERIFICATION OF VEHICLE REPAIR E18107E4

Refer to DTC P0731.

DTC P0733 GEAR 3 INCORRECT RATIO

COMPONENT LOCATION E50DA047



BKGF110A

GENERAL DESCRIPTION EDCA6BE5

The value of the input shaft speed should be equal to the value of the output shaft speed, when multiplied by the 3rd gear ratio, while the transaxle is engaged in the 3rd gear. For example, if the output speed is 1,000 rpm and the 3rd gear ratio is 1.000, then the input speed is 1,000 rpm.

DTC DESCRIPTION E802A634

This code is set if the value of input shaft speed is not equal to the value of the output shaft, when multiplied by the 3rd gear ratio, while the transaxle is engaged in 3rd gear. This malfunction is mainly caused by mechanical troubles such as control valve sticking or solenoid valve malfunctioning rather than an electrical issue.

DTC DETECTING CONDITION E48AFCDF

Item	Detecting Condition	Possible cause
DTC Strategy	• 3rd gear incorrect ratio	• Faulty input speed sensor • Faulty output speed sensor • Faulty UD clutch or OD clutch
Enable Conditions	• Engine speed ＞450rpm • Output speed ＞900rpm • Lever position : D,3 • A/T oil temp output ≥ -10°C(14°F) • 11V ≤ Battery Voltage ≤16V • TRANSAXLE RANGE SWITCH is normal and after 2sec is passed from IG ON	
Threshold value	• ｜Input speed/3rd gear ratio - output speed｜≥200rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd gear.(If diagnosis code P0733 is output four times, the transaxle is locked into 3rd gear)	

SIGNAL WAVEFORM E68EEA2D

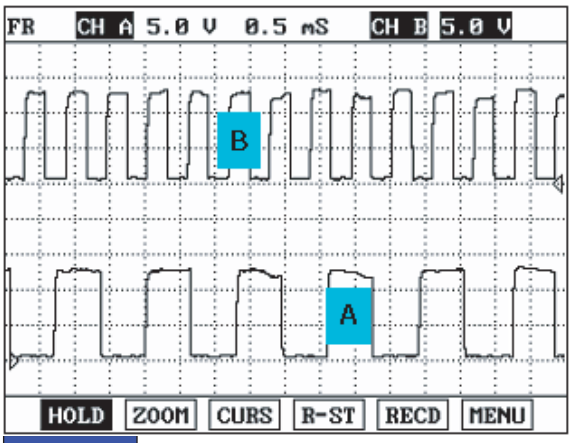


FIG.1)

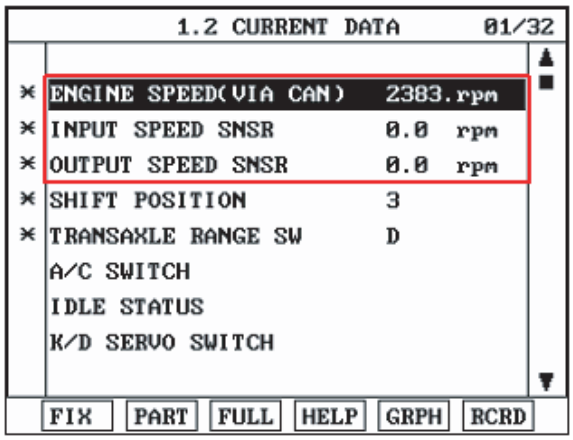
A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

BKGF110B

MONITOR SCANTOOL DATA E22C2E12

1. Connect scan tool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "ENGINE SPEED, INPUT SPEED SENSOR, OUTPUT SPEED SENSOR, GEAR POSITION" parameter on the scan tool.
4. Disconnect the solenoid valve connector and perform the "STALL TEST".

Specification : 2000~2700 engine rpm



BKGF110C

OPERATING ELEMENT OF EACH SHIFTING RANGE

	UD/C	OD/C	REV/C	2-4/B	LR/B	OWC
P					●	
R			●		●	
N					●	
D1	●					●
D2	●			●		
D3	●	●				
D4		●		●		
L	●				●	●

Stall test procedure in D3 and reason

Procedure

1. Warm up the engine.
2. After making 3rd gear hold by disconnecting the solenoid connector, and Then depress the foot brake pedal fully After that, step on the accelerator pedal to the maximum.
   * The slippage of OD clutch can be detected by stall test in D3.

Reason for stall test

1. If there is no mechanical defaults in A/T, every slippage occur in torque converter.
2. Therefore, engine revolution is output, but input and output speed revolution must be "zero" due to wheel's lock.
3. If OD clutch system(3rd gear operating part) has faults, input speed revolution will be output.
4. If output speed revolution is output. It means that the foot brake force is not applied fully. Remeasuring is required.

5. Is "STALL TEST " within specification?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Go to "Component inspection" procedure.

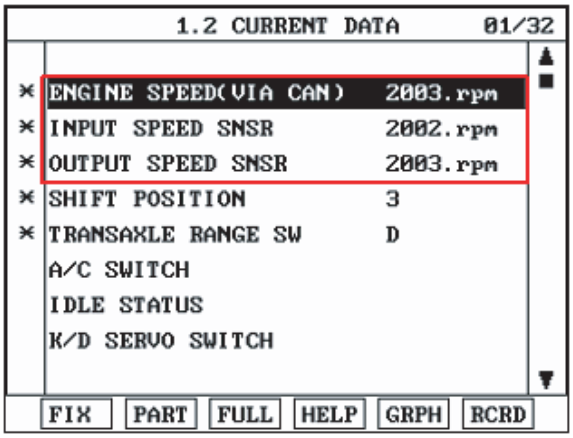
CAUTION

1. ***Do not let anybody stand in front of or behind the vehicle while this test is being carried out.***
2. ***Check the A/T fluid level and temperature and the engine coolant temperature.***
   - ***Fluid level : At the hot mark on the oil level gauge.***
   - ***Fluid temperature : 176 °F~ 212 °F (80~100 °C).***
   - ***Engine coolant temperature : 176 °F~ 212 °F (80~100 °C).***
3. ***Chock both rear wheel(left and right).***
4. ***Pull the parking brake lever on with the brake pedal fully depressed.***
5. ***The throttle should not be left fully open for more than eight second.***
6. ***If carrying out the stall test two or more time, move the select lever to the "N" position and run the engine at 1,000 rpm to let the A/T fluid cool down before carrying out subsequent.***

SIGNAL CIRCUIT INSPECTION EC30AED7

1. Connect Scantool.
2. Engine "ON".
3. Monitor the "INPUT & OUTPUT SPEED SENSOR" parameter on the scantool.
4. Accelerate the Engine speed until about 2000 rpm in the 3rd gear.

Specification : INPUT SPEED - (OUTPUT SPEED × 3rd GEAR RATIO) ≤ 200 RPM



BKGF110D

5. Is "INPUT & OUTPUT SPEED SENSOR" within specifications?

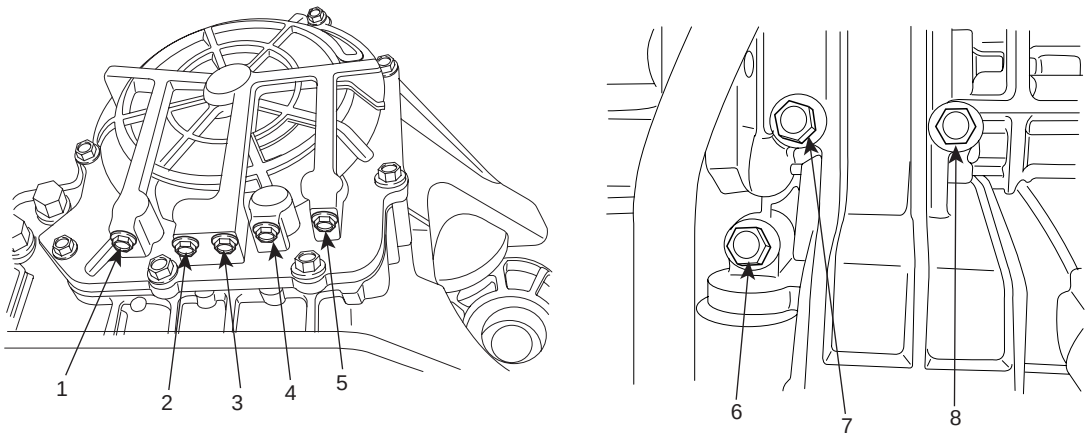
YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for electrical noise of circuit in INPUT & OUTPUT SPEED SENSOR or Replace INPUT & OUTPUT SPEED SENSOR. Repair as necessary and Go to "Verification of Vehicle Repair" procedure .

COMPONENT INSPECTION E1C5F56A



1. LUB Pressure port
2. RED Pressure port
3. OD Pressure port
4. 2-4 Pressure port
5. REV Pressure port
6. DA Pressure port
7. UD Pressure port
8. LR Pressure port

BKGF108E

1. Connect oil pressure gauge to "UD" and "OD" port.
2. Engine "ON".
3. Disconnect the solenoid valve connector.
4. Drive a car with gear position 3 in fail mode.
5. Compare it with reference data as below.

Specification : Refer to the "Standard hydraulic pressure table"

STANDARD HYDRAULIC PRESSURE TABLE

No.	Shift range position	Operation					Measuring	Oil pressure (kgf/㎠)				
		PCSV-A	PCSV-B	PCSV-C	PCSV-D	ON/OFF		LR	2/4(2ND)	UD	OD	REV
1	D	0	100	0	0	ON	LR	10.5±0.2	0	10.5±0.2	0	0
2	↑	50	↑	↑	↑	↑	↑	5.3±0.4	↑	↑	↑	↑
3	↑	75	↑	↑	↑	↑	↑	1.0±0.3	↑	↑	↑	↑
4	↑	100	↑	↑	↑	↑	↑	0	↑	↑	↑	↑
5	↑	↑	0	↑	100	OFF	2/4(2ND)	0	10.5±0.2	↑	↑	↑
6	↑	↑	50	↑	↑	↑	↑	↑	5.3±0.4	↑	↑	↑
7	↑	↑	75	↑	↑	↑	↑	↑	0.9±0.3	↑	↑	↑
8	↑	↑	100	↑	↑	↑	↑	↑	0	↑	↑	↑
9	↑	0	↑	↑	↑	↑	OD	↑	↑	↑	10.5±0.2	↑
10	↑	50	↑	↑	↑	↑	↑	↑	↑	↑	5.6±0.4	↑
11	↑	75	↑	↑	↑	↑	↑	↑	↑	↑	1.0±0.3	↑
12	↑	100	↑	↑	↑	↑	↑	↑	↑	↑	0	↑
13	↑	↑	↑	0	0	↑	UD	↑	↑	10.5±0.2	↑	↑
14	↑	↑	↑	50	↑	↑	↑	↑	↑	5.6±0.4	↑	↑
15	↑	↑	↑	75	↑	↑	↑	↑	↑	1.0±0.3	↑	↑
16	↑	0	↑	100	↑	↑	↑	↑	↑	0	↑	↑
17	R	↑	0	↑	↑	ON	REV	17.7±0.8	↑	↑	↑	17.7±0.8
18	↑	↑	50	↑	↑	↑	↑	↑	↑	↑	↑	8.7±0.8
19	↑	↑	75	↑	↑	↑	↑	↑	↑	↑	↑	0.9±0.5
20	↑	↑	100	↑	↑	↑	↑	↑	↑	↑	↑	0

※ The values are subject to change according to vehicle model or condition.

SHDAT6240L

6. Is oil pressure value within specifications?

YES

▶ Repair AUTO TRANSAXLE(Clutch or Brake) as necessary and Go to "Verification of Vehicle Repair" procedure.

NO

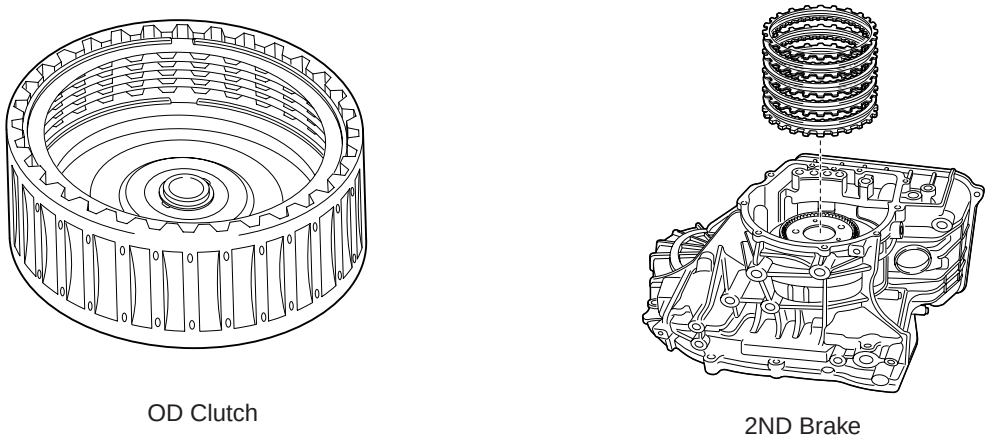
▶ Replace AUTO TRANSAXLE (BODY CONTROL VALVE faulty) as necessary and Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E83B89A0

Refer to DTC P0731.

DTC P0734 GEAR 4 INCORRECT RATIO

COMPONENT LOCATION EC1218FA



BKGF111A

GENERAL DESCRIPTION EC524601

The value of the input shaft speed should be equal to the value of the output shaft speed, when multiplied by the 4th gear ratio, while the transaxle is engaged in the 4th gear. For example, if the output speed is 1,000 rpm and the 4th gear ratio is 0.712, then the input speed is 712 rpm.

DTC DESCRIPTION E646124A

This code is set if the value of input shaft speed is not equal to the value of the output shaft, when multiplied by the 4th gear ratio, while the transaxle is engaged in 4th gear. This malfunction is mainly caused by mechanical troubles such as control valve sticking or solenoid valve malfunctioning rather than an electrical issue.

DTC DETECTING CONDITION EC9CB6DE

Item	Detecting Condition	Possible cause
DTC Strategy	• 4th gear incorrect ratio	• Faulty input speed sensor • Faulty output speed sensor • Faulty OD clutch or 2nd brake
Enable Conditions	• Engine speed ＞450rpm • Output speed ＞900rpm • Lever position : D • Input speed ＞300rpm • A/T oil temp output ≥ -10°C(14°F) • TRANSAXLE RANGE SWITCH is normal and above 2sec is passed from IG ON	
Threshold value	• | Input speed/4th gear ratio - output speed | ≥200rpm	
Diagnostic Time	• More than 1sec	
Fail Safe	• Locked into 3rd gear.(If diagnosis code P0734 is output four times, the transaxle is locked into 3rd gear)	

SIGNAL WAVEFORM E9679261

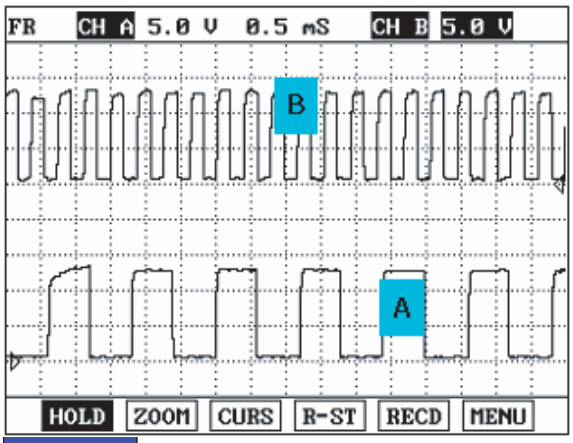


FIG.1)

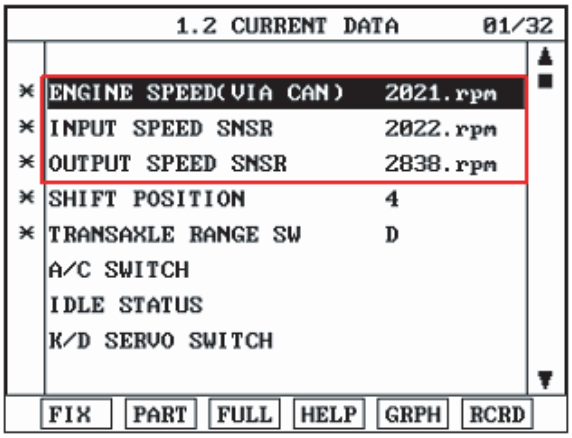
A : INPUT SPEED SENSOR
B : OUTPUT SPEED SENSOR

BKGF111B

SIGNAL CIRCUIT INSPECTION E1D61AD0

1. Connect Scantool.
2. Engine "ON".
3. Monitor the "INPUT & OUTPUT SPEED SENSOR" parameter on the scantool.
4. Accelerate the Engine speed until about 2000 rpm in the 4th gear.

Specification : INPUT SPEED - (OUTPUT SPEED × 4th GEAR RATIO) ≤ 200 RPM



BKGF111C

5. Is "INPUT & OUTPUT SPEED SENSOR" within specifications?

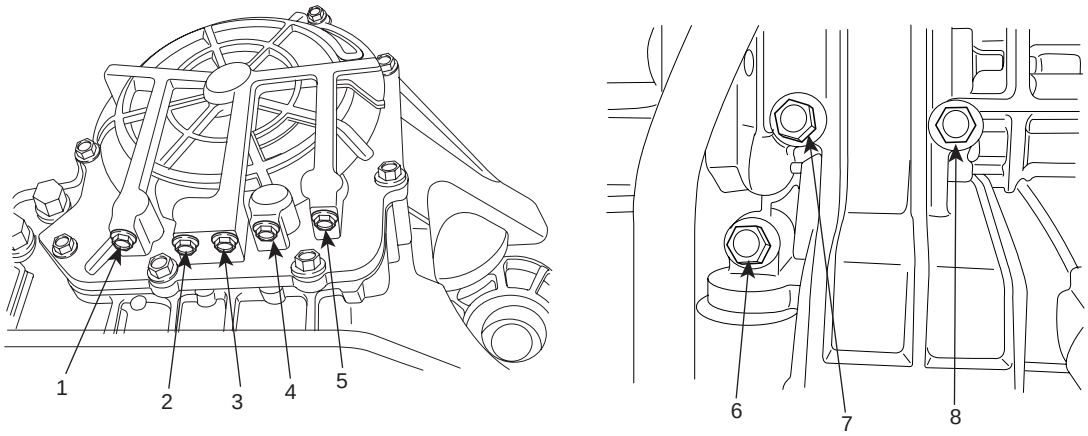
YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for electrical noise of circuit in INPUT & OUTPUT SPEED SENSOR or Replace INPUT & OUTPUT SPEED SENSOR. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

COMPONENT INSPECTION E080B2A7



1. LUB Pressure port
2. RED Pressure port
3. OD Pressure port
4. 2-4 Pressure port
5. REV Pressure port
6. DA Pressure port
7. UD Pressure port
8. LR Pressure port

BKGF108E

1. Connect oil pressure gauge to "OD" and "2nd" port.
2. Engine "ON".
3. Drive a car with gear position "4".
4. Compare it with reference data as below.

Specification : Refer to the "Standard hydraulic pressure table"

STANDARD HYDRAULIC PRESSURE TABLE

No.	Shift range position	Operation					Measuring	Oil pressure (kgf/㎠)				
		PCSV-A	PCSV-B	PCSV-C	PCSV-D	ON/OFF		LR	2/4(2ND)	UD	OD	REV
1	D	0	100	0	0	ON	LR	10.5±0.2	0	10.5±0.2	0	0
2	↑	50	↑	↑	↑	↑	↑	5.3±0.4	↑	↑	↑	↑
3	↑	75	↑	↑	↑	↑	↑	1.0±0.3	↑	↑	↑	↑
4	↑	100	↑	↑	↑	↑	↑	0	↑	↑	↑	↑
5	↑	↑	0	↑	100	OFF	2/4(2ND)	0	10.5±0.2	↑	↑	↑
6	↑	↑	50	↑	↑	↑	↑	↑	5.3±0.4	↑	↑	↑
7	↑	↑	75	↑	↑	↑	↑	↑	0.9±0.3	↑	↑	↑
8	↑	↑	100	↑	↑	↑	↑	↑	0	↑	↑	↑
9	↑	0	↑	↑	↑	↑	OD	↑	↑	↑	10.5±0.2	↑
10	↑	50	↑	↑	↑	↑	↑	↑	↑	↑	5.6±0.4	↑
11	↑	75	↑	↑	↑	↑	↑	↑	↑	↑	1.0±0.3	↑
12	↑	100	↑	↑	↑	↑	↑	↑	↑	↑	0	↑
13	↑	↑	↑	0	0	↑	UD	↑	↑	10.5±0.2	↑	↑
14	↑	↑	↑	50	↑	↑	↑	↑	↑	5.6±0.4	↑	↑
15	↑	↑	↑	75	↑	↑	↑	↑	↑	1.0±0.3	↑	↑
16	↑	0	↑	100	↑	↑	↑	↑	↑	0	↑	↑
17	R	↑	0	↑	↑	ON	REV	17.7±0.8	↑	↑	↑	17.7±0.8
18	↑	↑	50	↑	↑	↑	↑	↑	↑	↑	↑	8.7±0.8
19	↑	↑	75	↑	↑	↑	↑	↑	↑	↑	↑	0.9±0.5
20	↑	↑	100	↑	↑	↑	↑	↑	↑	↑	↑	0

※ The values are subject to change according to vehicle model or condition.

SHDAT6240L

5. Is oil pressure value within specifications?

YES

▶ Repair AUTO TRANSAXLE(Clutch or Brake) as necessary and Go to "Verification of Vehicle Repair" procedure.

NO

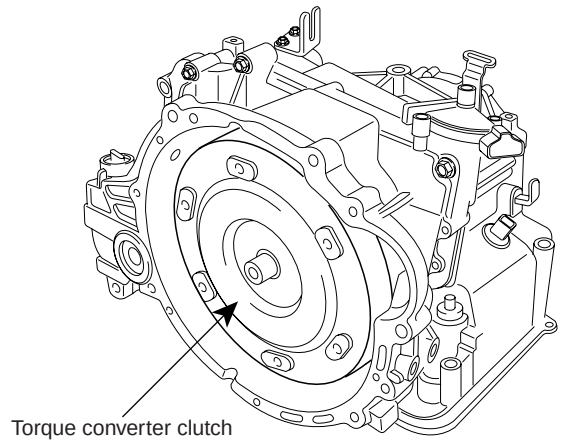
▶ Replace AUTO TRANSAXLE (BODY CONTROL VALVE faulty) as necessary and Go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E808F7CE

Refer to DTC P0731.

DTC P0741 TORQUE CONVERTER CLUTCH CIRCUIT - STUCK OFF

COMPONENT LOCATION E1D988F9



BKGF115A

GENERAL DESCRIPTION E0435161

The PCM/TCM controls the locking and unlocking of the Torque Converter Clutch (or Damper Clutch), to the input shaft of the transmission, by appling hydraulic pressure. The main purpose of T/C clutch control is to save fuel by decreasing the hydraulic load inside the T/C. The PCM/TCM outputs duty pulses to control the Damper Clutch Control Solenoid Valve(DCCSV) and hydraulic pressure is applied to the DC according to the DCC duty ratio value. When the duty ratio is high, high pressure is applied and the Damper Clutch is locked. The normal operating range of the Damper Clutch Control duty ratio value is from 30%(unlocked) to 85%(locked).

DTC DESCRIPTION E647FA2A

The PCM/TCM increases the duty ratio to engage the Damper Clutch by monitoring slip rpms (difference vlaue beteween engine speed and turbine speed). To decrease the slip of the Damper Clutch, the PCM/TCM increases the duty ratio by appling more hyraulic pressure. When slip rpm does not drop under some value with 100% duty ratio, the PCM/TCM determines that the Torque Converter Clutch is stuck OFF and sets this code.

DTC DETECTING CONDITION EFBD1006

Item	Detecting Condition	Possible cause
DTC Strategy	• Stuck "OFF"	※ TORQUE CON-VERTER(DAMPER) CLUTCH : TCC • Faulty TCC or oil pressure system • Faulty TCC solenoid valve • Faulty body control valve • Faulty PCM/TCM
Enable Conditions	• Duty of Damper clutch solenoid valve = 100%	
Threshold value	• Detect the Lock-up clutch control duty = 100% for 2sec	
Diagnostic Time	• More than 2 times	
Fail Safe	• Damper clutch abnormal system (If diagnosis code P0741 is output four times, TORQUE CONVERTER(DAMPER) CLUTCH is not controlled by PCM/TCM)	

MONITOR SCANTOOL DATA E6601018

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Select "D RANGE" and drive vehicle.
4. Monitor the "TORQUE CONVERTER(DAMPER) CLUTCH" parameter on the scantool.

Specification : TCC SOL. DUTY ＞ 30% (In that condition TCC SLIP＜100RPM)

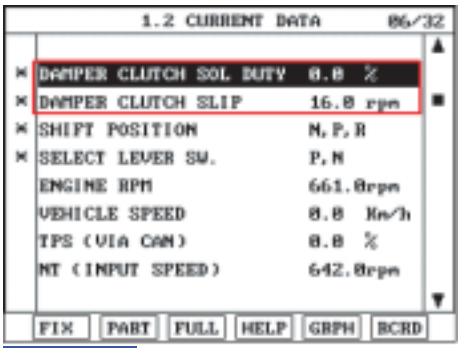


FIG.1)

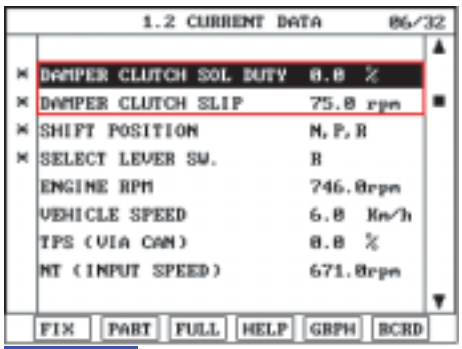


FIG.2)

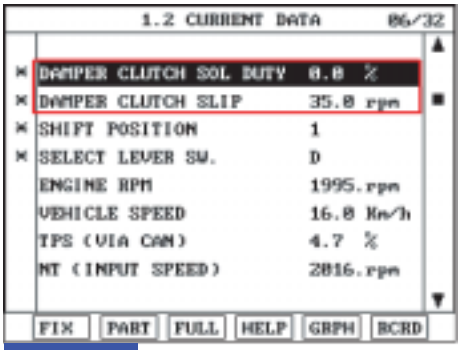


FIG.3)

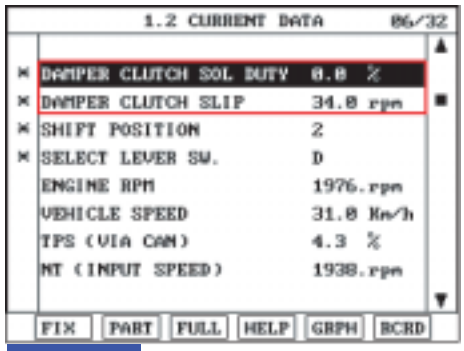


FIG.4)

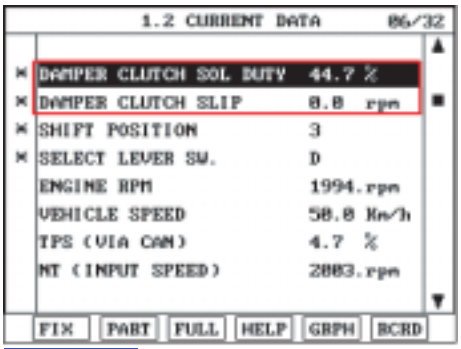


FIG.5)

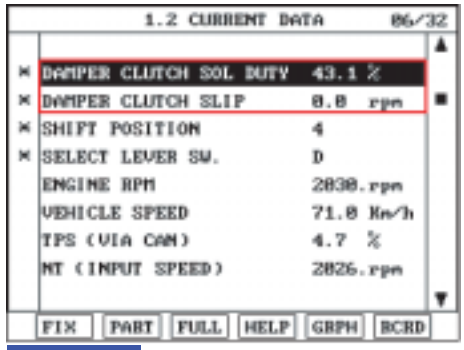


FIG.6)

FIG. 1) "P,N "
FIG. 2) "R"
FIG. 3) "1st" gear
FIG. 4) "2nd" gear
FIG. 5) "3rd" gear
FIG. 6) "4th" gear

SHDAT6250L

5. Are "TCC SOLENOID DUTY and TCC SLIP" within specifications?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of vehicle repair" procedure.

NO

▶ Go to "Component inspection" procedure.

COMPONENT INSPECTION EB9FC80B

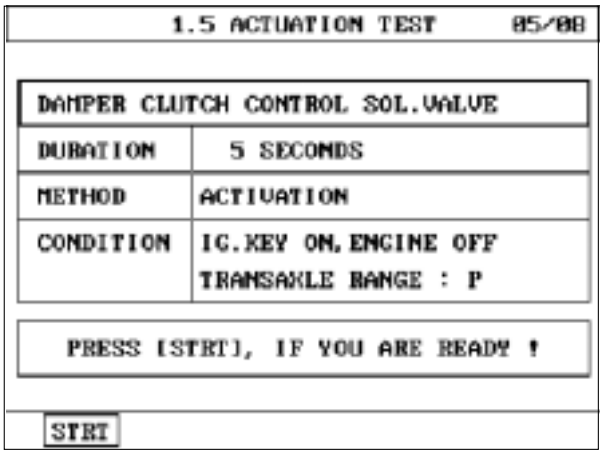
1. CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

   1) Connect scantool to data link connector(DLC).

   2) Ignition "ON" & Engine "OFF".

   3) Select A/T solenoid valve actuator test and operate actuator test.

   4) Is Actuator Testing performed normally?



SHDAT6249L

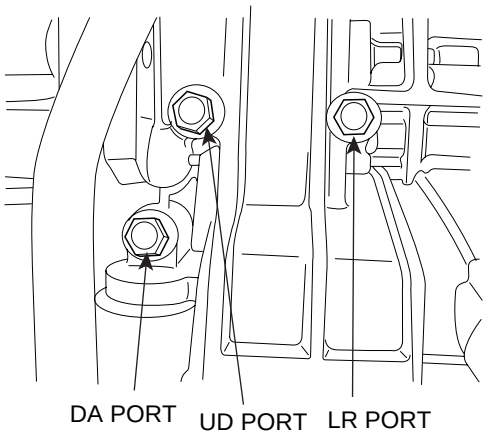
YES

▶ Go to "CHECK OIL PRESSURE" as below.

NO

▶ Replace "TCC SOLENOID VALVE" as necessary and go to "Verification of vehicle repair" procedure.

2. CHECK OIL PRESSURE



BKGF115C

1) Connect oil pressure gauge to "DA" port.

2) Engine "ON".

3) After connecting Scantool and monitor the "TCC SOLENIOD VALVE DUTY" parameter on the scantool data list.

4) Operate vehicle with 3rd or 4tf gear and operate the "TCC SOLENIOD VALVE DUTY" more than 35%.

Specification : Above 2.0~4.6kg/cm² (196~451kpa, 28.4~65.4psi) (Engine Speed : 2500rpm, DCC sol Duty : 50%)

5) Is oil pressure value within specification?

YES

▶ Repair TORQUE CONVERTER CLUTCH(REPLACE Torque Converter) as necessary and go to "Verification of vehicle repair" procedure.

NO

▶ Replace A/T assembly (possible to BODY CONTROL VALVE faulty) as necessary and go to "Verification of vehicle repair" procedure.

VERIFICATION OF VEHICLE REPAIR E6879647

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Using a scantool, Clear DTC.
3. Operate the vehicle within DTC Enable conditions in General information.
4. Are any DTCs present ?

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC P0742 TORQUE CONVERTER CLUTCH CIRCUIT - STUCK ON

GENERAL DESCRIPTION ECBC1BB7

Refer to DTC P0741.

DTC DESCRIPTION E1260C28

The TCM increases the duty ratio to engage the Damper Clutch by monitoring the slip rpms (difference vlaue beteween engine speed and turbine speed). If a very small amount of slip rpm is maintained though the TCM applies 0% duty ratio value, then the TCM determines that the Torque Converter Clutch is stuck ON and sets this code.

DTC DETECTING CONDITION E0C2BDB3

Item	Detecting Condition	Possible cause
DTC Strategy	• Stuck "ON"	※ TORQUE CONVERTER(DAMPER) CLUTCH : TCC • Faulty TCC or oil pressure system • Faulty TCC solenoid valve • Faulty body control valve • Faulty TCM(PCM)
Enable Conditions	• Throttle position > 20% • Output speed > 1000 rpm • Engine speed >0rpm • A/T range switch D,3 • The time after the last shift was finished >3secs • Duty of Damper clutch solenoid valve = 0% • ATF temperature > -10°C(14°F)	
Threshold value	• | Engine rpm - Input speed sensor rpm | ≤ 5 rpm	
Diagnostic Time	• More than 3 seconds	
Fail Safe	• Damper clutch abnormal system (If diagnosis code P0741 is output four times, TORQUE CONVERTER(DAMPER) CLUTCH is not controlled by PCM/TCM)	

MONITOR SCANTOOL DATA E37677D8

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Select "D RANGE" and drive vehicle.
4. Monitor the "TORQUE CONVERTER(DAMPER) CLUTCH" parameter on the scantool.

Specification : TCC SLIP > 5RPM

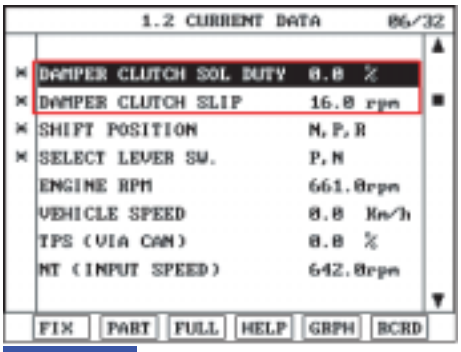


FIG.1)

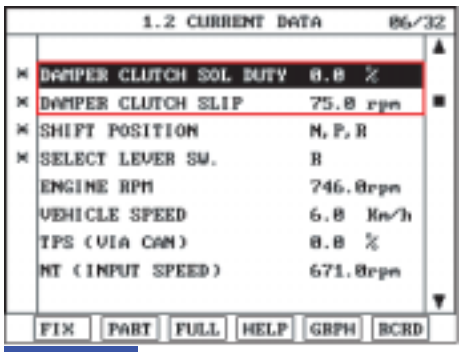


FIG.2)

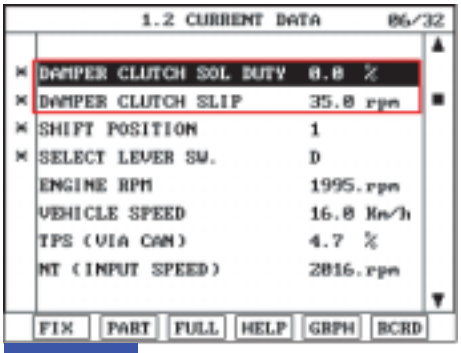


FIG.3)

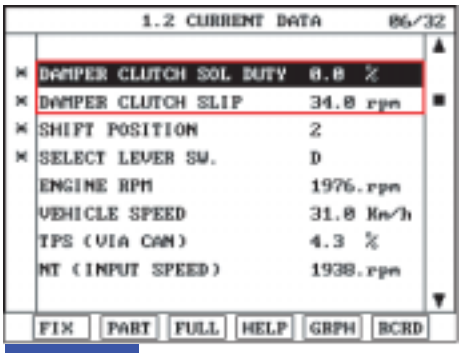


FIG.4)

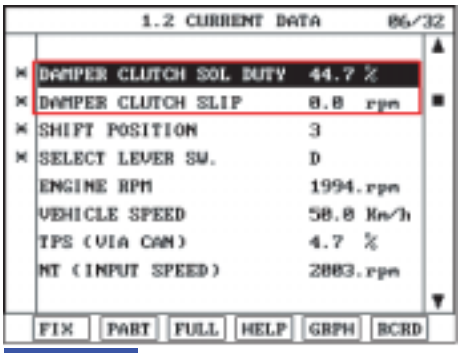


FIG.5)

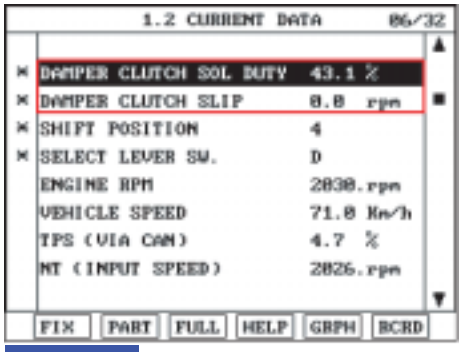


FIG.6)

FIG. 1) "P,N "
FIG. 2) "R"
FIG. 3) "1st" gear
FIG. 4) "2nd" gear
FIG. 5) "3rd" gear
FIG. 6) "4th" gear

SHDAT6250L

5. Is TCC SLIP" within specifications?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of vehicle repair" procedure.

NO

▶ Go to "Component inspection" procedure.

COMPONENT INSPECTION E1EDFEB0

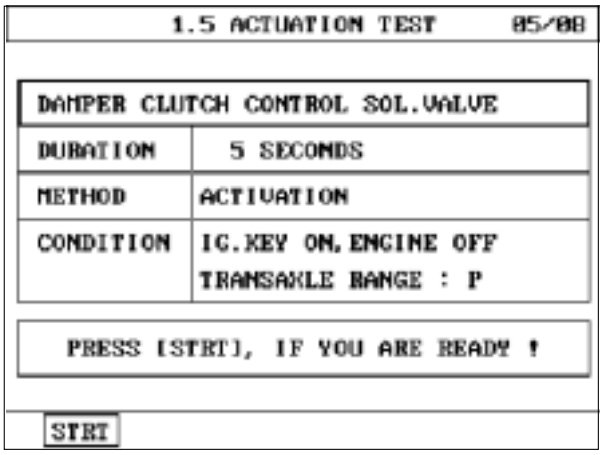
1. CHECK TORQUE CONVERTER CLUTCH SOLENOID VALVE

   1) Connect scantool to data link connector(DLC).

   2) Ignition "ON" & Engine "OFF".

   3) Select A/T solenoid valve actuator test and operate actuator test.

   4) Is Actuator Testing performed normally?



SHDAT6249L

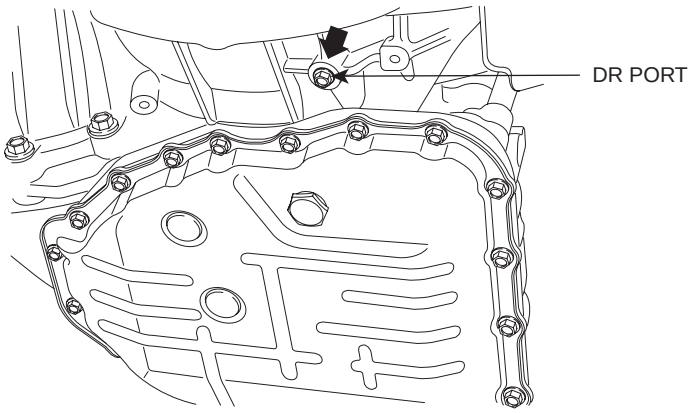
YES

▶ Go to "CHECK OIL PRESSURE" as below.

NO

▶ Repair or replace as necessary and then go to "Verification of vehicle repair" procedure.

2. CHECK OIL PRESSURE



BKGF116B

1) Connect oil pressure gauge to "DR" port.

2) Ignition "ON" & Engine "OFF".

3) After connecting scantool and monitor the "TCC SOLENIOD VALVE DUTY" parameter on the scantool data list.

4) Select 1st gear and accelerate Engine speed to 2500 rpm.

5) Measure oil pressure.

Specification : approx. Above 5.1~7.1kg/cm² (500~696kpa, 72.5~100.99psi)

6) Is oil pressure value within specification?

YES

▶ Repair TORQUE CONVERTER CLUTCH(REPLACE Torque Converter) as necessary and go to "Verification of vehicle repair" procedure.

NO

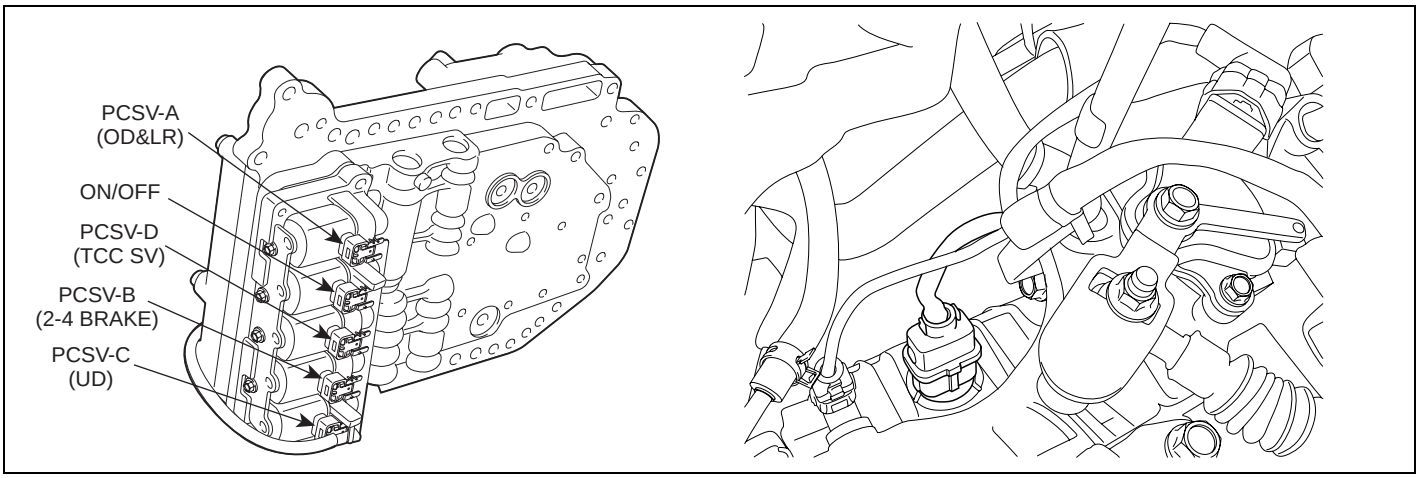
▶ Replace A/T assembly (possible to BODY CONTROL VALVE faulty) as necessary and Go to "Verification of vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E45C2364

Refer to DTC P0741.

DTC P0743 TORQUE CONVERTER CLUTCH CIRCUIT - ELECTRICAL

COMPONENT LOCATION EB1F0645



SHDAT6251D

GENERAL DESCRIPTION E30F232B

Refer to DTC P0741.

DTC DESCRIPTION E66CE837

The PCM/TCM checks the Damper Clutch Control Signal by monitoring the feedback signal from the solenoid valve drive circuit. If an unexpected signal is monitored (for example, high voltage is detected when low voltage is expected, or low voltage is detected when high voltage is expected) the PCM/TCM judges that DCCSV circuit is malfunctioning and sets this code.

DTC DETECTING CONDITION E7FF7047

Item		Detecting Condition	Possible cause
DTC Strategy		• Check voltage range	※ TORQUE CONVERTER(DAMPER) CLUTCH : TCC • Open or short in circuit • Faulty TCC SOLENOID VALVE • Faulty PCM/TCM
Enable Conditions	**Case 1**	• Solenoid status = open	
	Case 2	• Solenoid status = open • time after TCM turns "ON" = 0.5sec	
Threshold value	**Case 1**	• Feed back voltage < 5.5V	
	Case 2	• Feed back voltage > Battery voltage-1	
Diagnostic Time		• more than 1sec	
Fail Safe		• Locked in 3 rd gear	

SPECIFICATION EBB7AB6E

Solenoid Valve for Pressure Control

- Sensor type : Normal open 3-way
- Operating temperature : -30°C~130°C(-22~266°F)
- Frequency :
  - PCSV-A,B,C,D : 50Hz (at the ATF temp. -20°C above)
  - VFS : 400~1000
    ※ KM series : 35Hz

- Internal resistance :
  - Internal resistance : 3.5 ± 0.2Ω (20°C or 68°F)

- Surge voltage : 56 V

SIGNAL WAVEFORM ED099C19

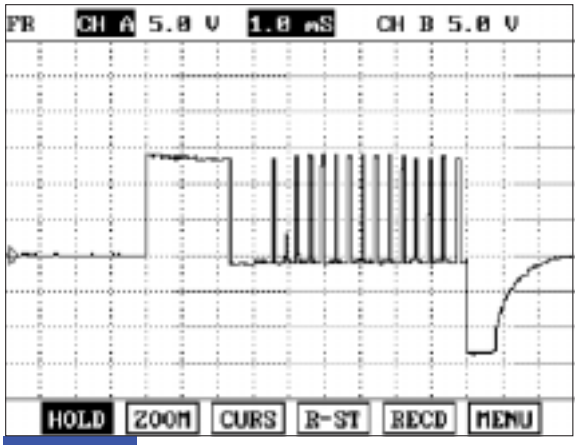


FIG.1)

FIG. 1) Wave form of "TCCSV"

SHDAT6258L

MONITOR SCANTOOL DATA EFA1B33C

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "TCC SOL. VALVE" parameter on the scantool
4. Select "D RANGE" and Operate "TCC SOLENOID DUTY" more than 35%.

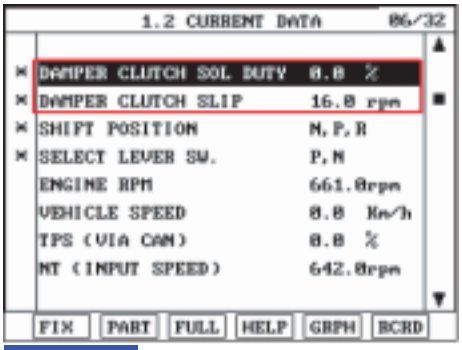


FIG.1)

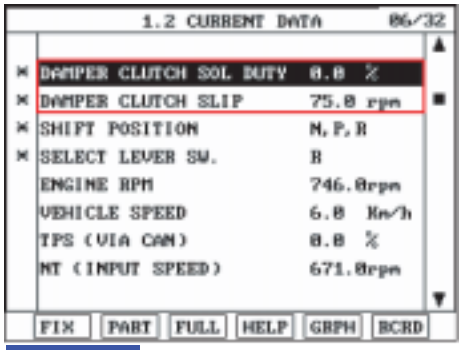


FIG.2)

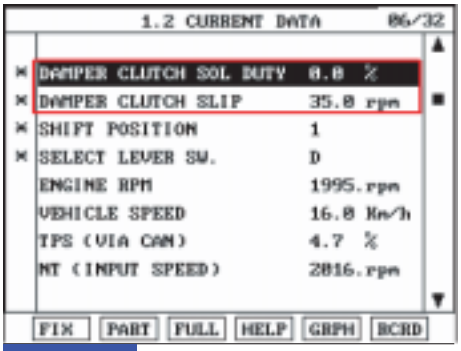


FIG.3)

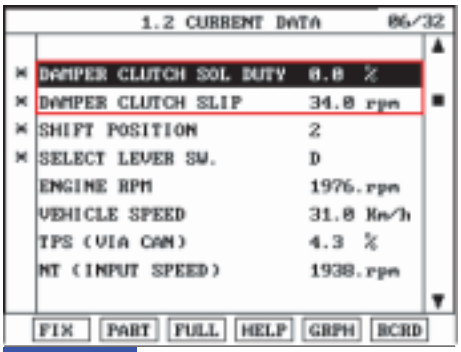


FIG.4)

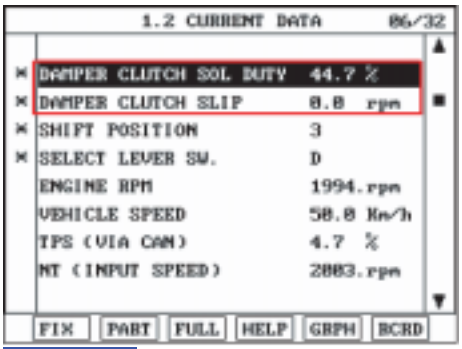


FIG.5)

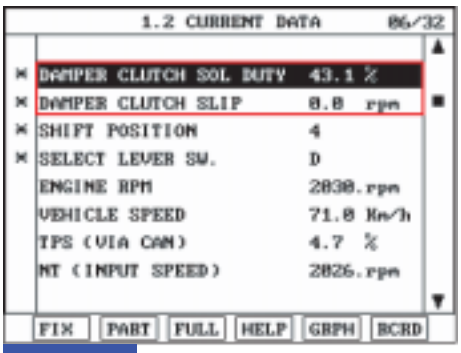


FIG.6)

FIG. 1) "P,N "
FIG. 2) "R"
FIG. 3) "1st" gear
FIG. 4) "2nd" gear
FIG. 5) "3rd" gear
FIG. 6) "4th" gear

SHDAT6259L

5. Does "TCC SOLENOID DUTY " follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of vehicle repair" procedure.

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION E9D2E970

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

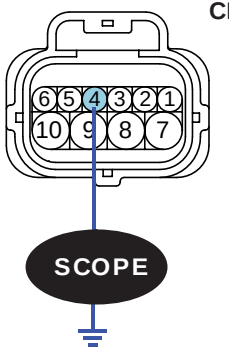
▶ Repair as necessary and then go to "Verification of vehicle repair" procedure.

NO

▶ Go to "Power supply circuit inspection" procedure.

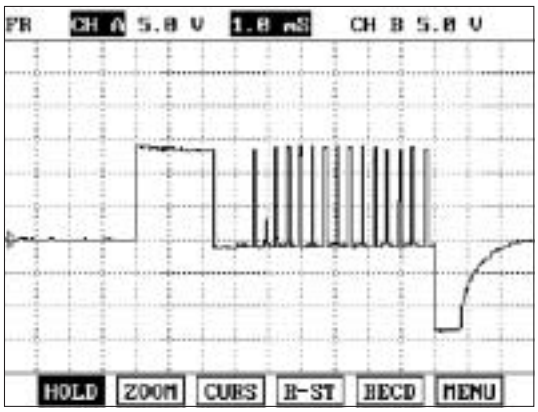
POWER SUPPLY CIRCUIT INSPECTION E1F2A5C3

1. Connect "A/T SOLENOID VALVE" connector and install device for measuring wave form.
2. Turn on the engine and operate damper clutch.
3. Measure wave form between terminal "4" of the sensor harness connector and chassis ground.



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

■ Normal wave form of DCCSV



SHDAT6252N

4. Is measured normally operating wave form?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and Go to "Verification of vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION EAB65FA1

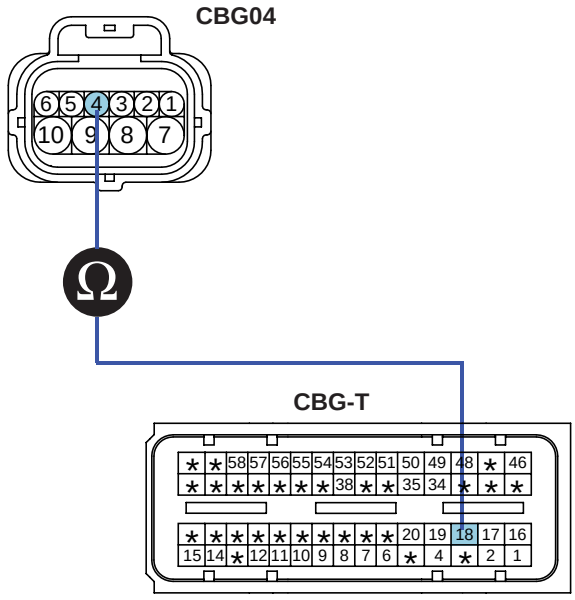
1. Check signal circuit open inspection

   1) Ignition "OFF".

   2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

   3) Measure resistance between terminal "4" of the ATM SOLENOID VALVE harness connector and terminal "18" of the PCM/TCM harness connector.

Specification: approx. 0 Ω



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

46.PCSV-A(OD&LR)
17.PCSV-B(2-4BRAKE)
48.PCSV-C(UD)
18.PCSV-D(DCCSV)
16.ON/OFF SOLENOID V/V
19.VFS
4.GROUND FOR VFS

SLDAA7260L

   4) Is resistance within specifications?

YES

▶ Go to "Check signal circuit short inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

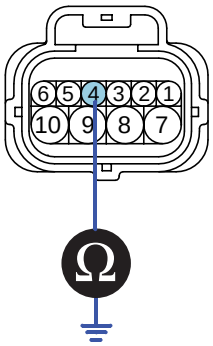
2. Check signal circuit short inspection

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "4" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: Infinite



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6254N

4) Is resistance within specifications?

YES

▶ Go to "signal circuit ground inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

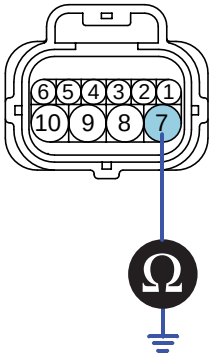
3. Check signal circuit ground inspection

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "7" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: approx. 0Ω



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6255N

4) Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and Go to "Verification of vehicle repair" procedure.

COMPONENT INSPECTION EEA64882

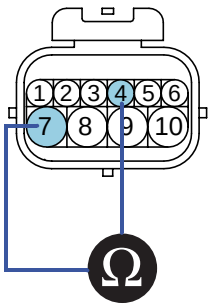
1. CHECK SOLENOID VALVE

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector.

3) Measure resistance between terminal "4" and terminal "7" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 3.5±0.2Ω [(25°C(77°F)]



CBG04
Component side

1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6256N

4) Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

▶ Replace DCC SOLENOID VALVE as necessary and go to "Verification of vehicle repair" procedure.

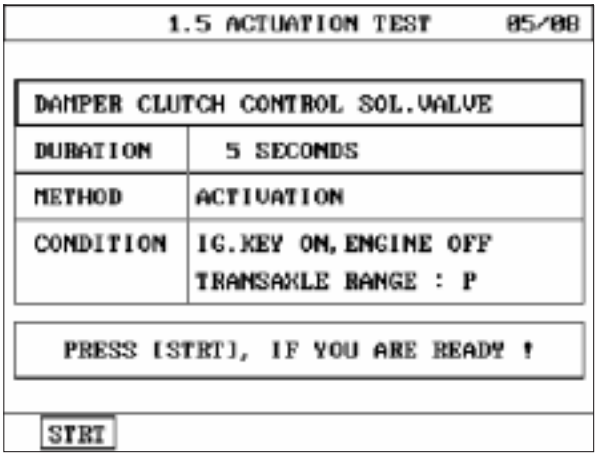
2. CHECK PCM/TCM

1) Connect scantool to data link connector(DLC).

2) Ignition "ON" & Engine "OFF".

3) Select A/T solenoid valve actuator test and operate actuator test.

4) Is Actuator Testing performed normally?



SHDAT6257L

YES

▶ Go to "Verification of vehicle repair" procedure.

NO

▶ Replace PCM/TCM as necessary and go to "Verification of vehicle repair" procedure.

ACTUATOR TEST CONDITION

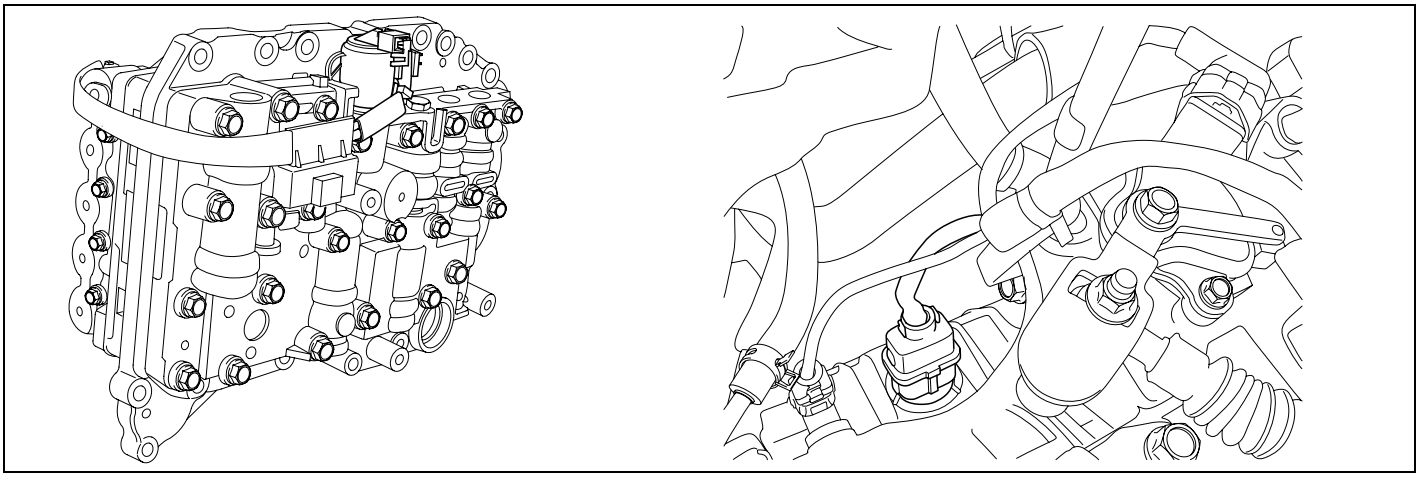
1. IG SWITCH ON
2. TRANSAXLE RANGE SWITCH is normal
3. P RANGE
4. Vehicle Speed 0mph(0km/h)
5. Throttle position sensor＜ 1V
6. IDLE SWITCH ON
7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR EFEE0B09

Refer to DTC P0741.

DTC P0748 VFS SOLENOID VALVE CIRCUIT - OPEN OR SHORT(GND)

COMPONENT LOCATION E0076A19



SHDAT6268D

GENERAL DESCRIPTION E3BE7364

Variable Faced Solenoid (Linear Solenoid) : With the duty control which uses higher frequency(600Hz), instead of the existing PWM type which adapts low frequency(60Hz) to control, spool valve can be controlled precisely.
In PWM control, the amount of oil flow is determined by the duration of "ON" signal among continuously repeated ON/OFF signals.
In VFS, the amount is decided by how widely spool valve open the passage of going through.

DTC DESCRIPTION E820D6E6

The TCM checks the VFS Control Signal by monitoring the feedback signal from the solenoid valve drive circuit. If an unexpected signal is monitored (for example, high voltage is detected when low voltage is expected, or low voltage is detected when high voltage is expected), the TCM judges that the Low and Reverse control solenoid circuit is malfunctioning and sets this code.

DTC DETECTING CONDITION E712A10E

Item	Detecting Condition	Possible cause
DTC Strategy	• Check feed back period	• Open or short in circuit • Faulty VF SOLENOID VALVE • Faulty PCM/TCM
Enable Conditions	• 10% ≤ Output duty ≤ 90% • Battery voltage ≥ 9V	
Threshold value	• Circuit open or short to ground or short to Battery	
Diagnostic Time	• More than 1sec	
Fail Safe	• Prohibited VFS control	

SPECIFICATION EFBE5F79

Refer to DTC P0743.

SIGNAL WAVEFORM ED0DAEB0

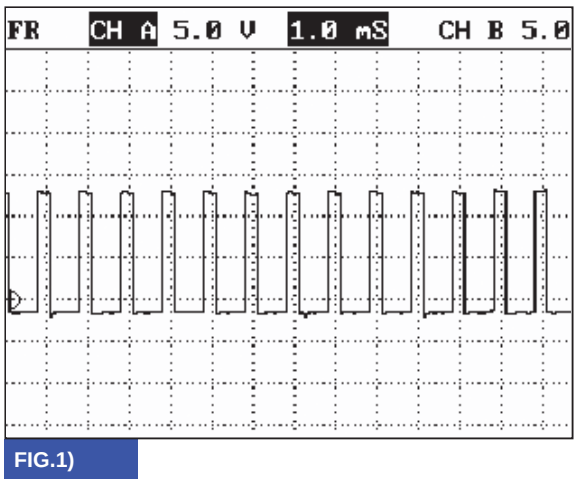


FIG.1)

FIG. 1) Wave form of "VFS"

BKGF118A

MONITOR SCANTOOL DATA EC4867A9

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "VF SOL. VALVE" parameter on the scantool.
4. Shift gear at each position.

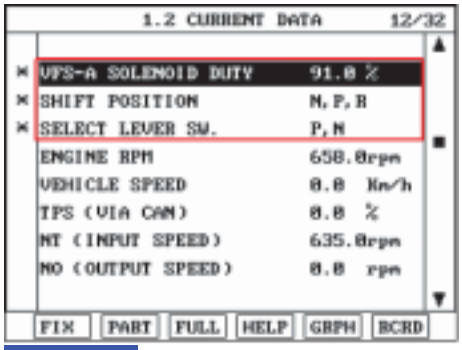


FIG.1)

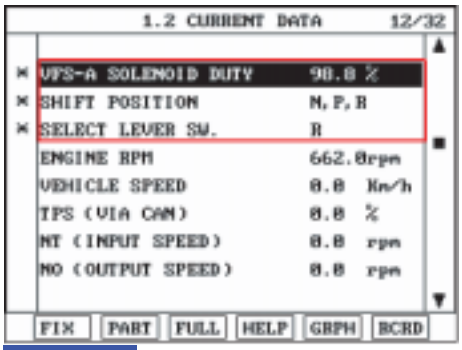


FIG.2)

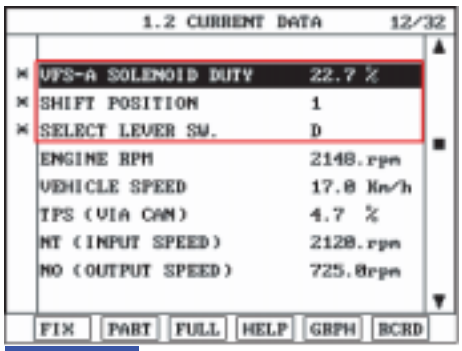


FIG.3)

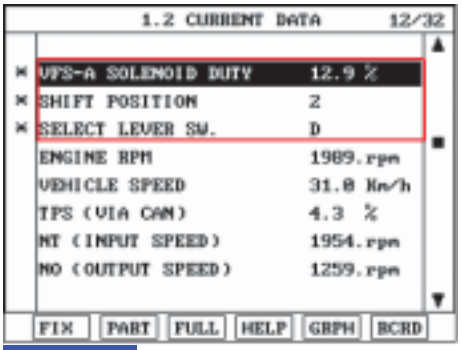


FIG.4)

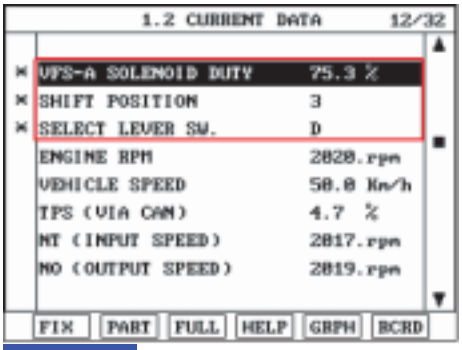


FIG.5)

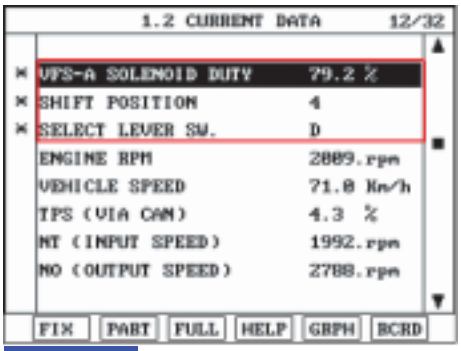


FIG.6)

FIG. 1) "P,N "
FIG. 2) "R"
FIG. 3) "1st" gear
FIG. 4) "2nd" gear
FIG. 5) "3rd" gear
FIG. 6) "4th" gear

SHDAT6261L

5. Does "VF SOL DUTY" follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of vehicle repair" procedure.

NO

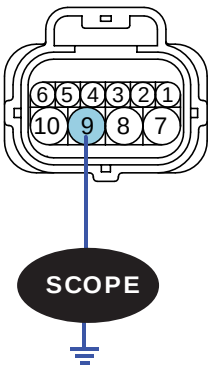
▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION E41A76AA

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION E390EC21

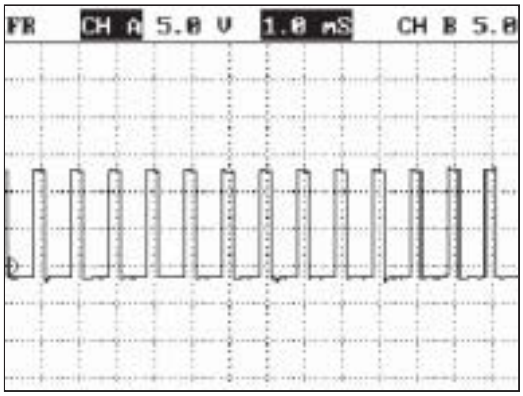
1. Connect "A/T SOLENOID VALVE" connector and install device for measuring wave form.
2. Turn on the Engine and operate VFS SOLENOID VALVE.
3. Measure wave form between terminal "9" of the sensor harness connector and chassis ground.



CBG04

1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

■ Normal wave form of VFSV



SHDAT6262N

4. Is measured normally operating wave form?

YES

▶ Go to "Signal circuit inspection" procedure.

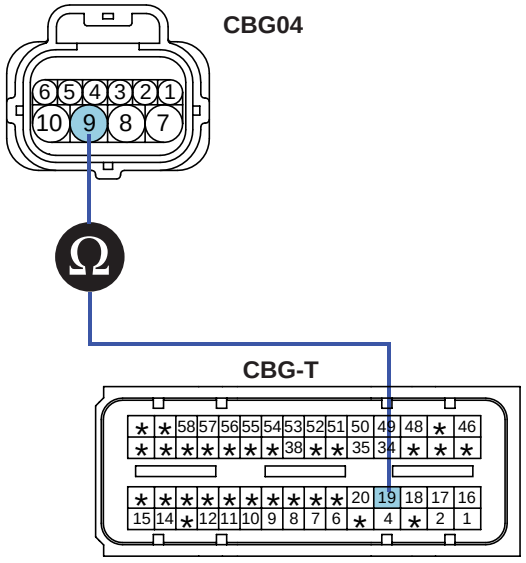
NO

▶ Check for open in harness. Repair as necessary and Go to "Verification of Vehicle Repair" procedure.

SIGNAL CIRCUIT INSPECTION EE546120

1. Check signal circuit open inspection
   1) Ignition "OFF".
   2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.
   3) Measure resistance between terminal "9" of the ATM SOLENOID VALVE harness connector and terminal "19" of the PCM/TCM harness connector

Specification: approx. 0 Ω



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

46.PCSV-A(OD&LR)
17.PCSV-B(2-4BRAKE)
48.PCSV-C(UD)
18.PCSV-D(DCCSV)
16.ON/OFF SOLENOID V/V
19.VFS
4.GROUND FOR VFS

SLDAA7270L

4) Is resistance within specifications?

YES

▶ Go to "Check signal circuit short inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

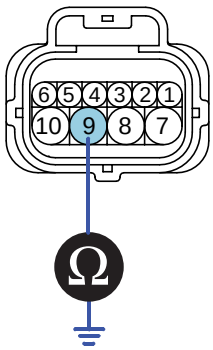
2. Check signal circuit short inspection

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "9" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: Infinite



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6264N

4) Is resistance within specifications?

YES

▶ Go to "signal circuit ground inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

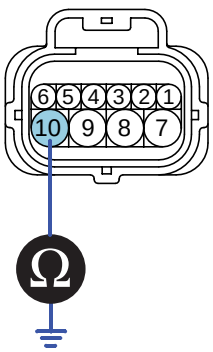
3. Check signal circuit ground inspection

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "10" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: approx. 0Ω



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6265N

4) Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and Go to "Verification of vehicle repair" procedure.

COMPONENT INSPECTION E36B9796

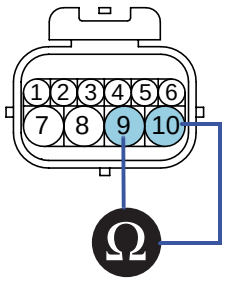
1. CHECK SOLENOID VALVE

   1) Ignition "OFF".

   2) Disconnect "A/T SOLENOID VALVE" connector.

   3) Measure resistance between terminal "9" and terminal "10" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 3.5±0.2Ω [(25°C(77°F)]



CBG04
Component side

1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6266N

   4) Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

▶ Replace "VF SOL VALVE" as necessary and go to "Verification of Vehicle Repair" procedure.

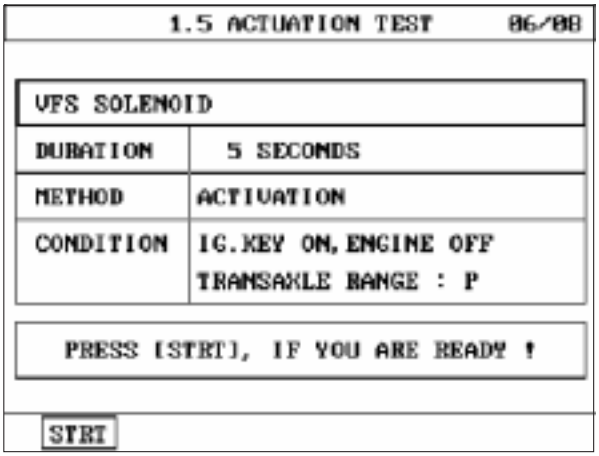
2. CHECK PCM/TCM

1) Connect scantool to data link connector(DLC).

2) Ignition "ON" & Engine "OFF".

3) Select A/T Solenoid valve Actuator test and Operate Actuator test.

4) Can you hear operating sound for "VF SOL VALVE" Actuator Testing Function?



SHDAT6267L

YES

▶ Go to "Verification of vehicle repair" procedure.

NO

▶ Replace PCM/TCM as necessary and go to "Verification of vehicle repair" procedure.

ACTUATOR TEST CONDITION

1. IG SWITCH ON
2. TRANSAXLE RANGE SWITCH is normal
3. P RANGE
4. Vehicle Speed 0mph(0km/h)
5. Throttle position sensor＜ 1V
6. IDLE SWITCH ON
7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR EA867E20

Refer to DTC P0741.

DTC P0750 ON/OFF(SCSV-A) SOLENOID VALVE CIRCUIT - OPEN OR SHORT(GND)

COMPONENT LOCATION E97A1C0C

Refer to DTC P0743.

GENERAL DESCRIPTION EDBC08D7

The Automatic transmission changes the gear position of the transmission by utilizing a combination of clutches and brakes, which are controlled by solenoid valves. This HIVEC automatic transmission consists of a: LR (Low and Reverse Brake), 2ND (2nd Brake), UD (Under Drive Clutch), OD (Over Drive Clutch).

DTC DESCRIPTION EDA4658E

The PCM/TCM checks the Low and Reverse Control Signal by monitoring the feedback signal from the solenoid valve drive circuit. If an unexpected signal is monitored (for example, high voltage is detected when low voltage is expected, or low voltage is detected when high voltage is expected), the PCM/TCM judges that the Low and Reverse control solenoid circuit is malfunctioning and sets this code.

DTC DETECTING CONDITION EF5920A7

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty ON/OFF SOLENOID VALVE • Faulty PCM/TCM
Enable Conditions	• 16V ＞ Actuator(TCU) power supply voltage ＞10V	
Threshold value	• Circuit open or short to ground	
Diagnostic Time	• More than 0.3 sec	
Fail Safe	• Locked in 3rd gear.	

SPECIFICATION EA1B29CE

Refer to DTC P0743.

SIGNAL WAVEFORM EA6E21ED

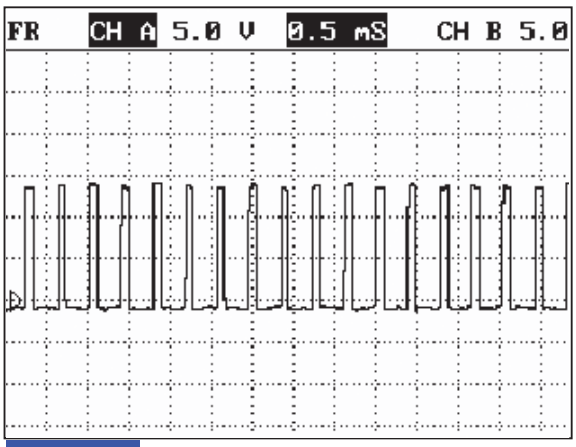


FIG.1)

FIG. 1) Wave form of "ON/OFF(SCSV-A)"

BKGF119A

MONITOR SCANTOOL DATA E05B7503

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "ON/OFF SOL VALVE" parameter on the scantool.
4. Shift gear at each position.

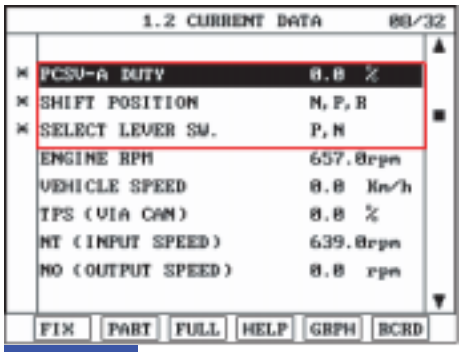


FIG.1)

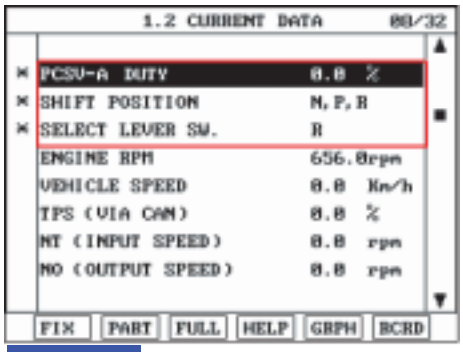


FIG.2)

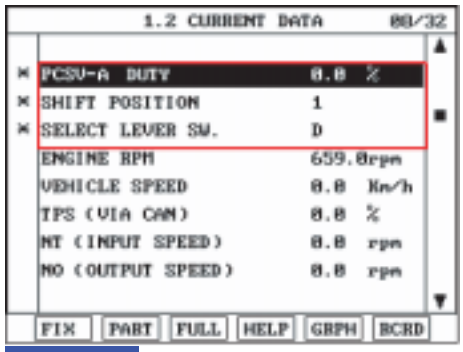


FIG.3)

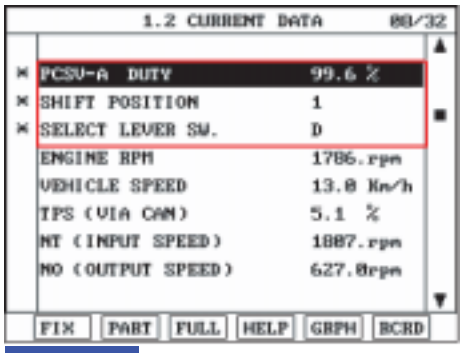


FIG.4)

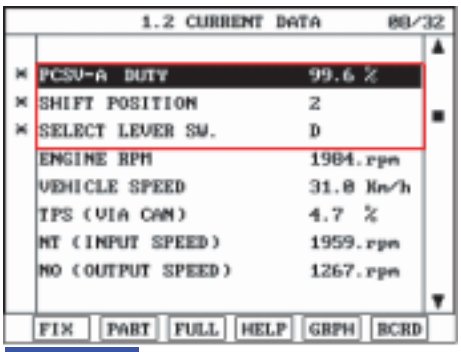


FIG.5)

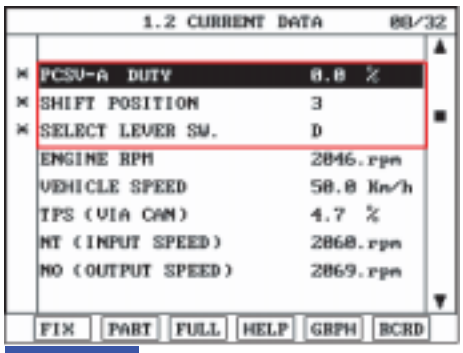


FIG.6)

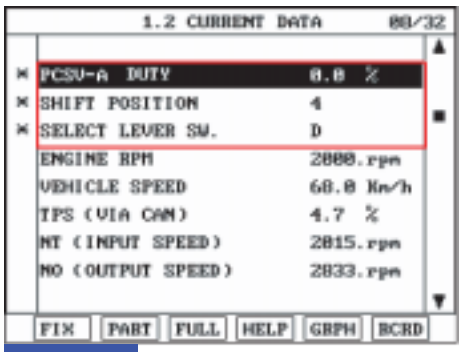


FIG.7)

FIG. 1) "P,N "
FIG. 2) "R"
FIG. 3) "D Range 1st" gear, vehicle speed=0
FIG. 4) "D Range 1st" gear
FIG. 5) "D Range 2nd" gear
FIG. 6) "D Range 3rd" gear
FIG. 7) "D Range 4th" gear

SHDAT6271L

5. Does "ON/OFF SOL VALVE" follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of vehicle repair" procedure.

NO

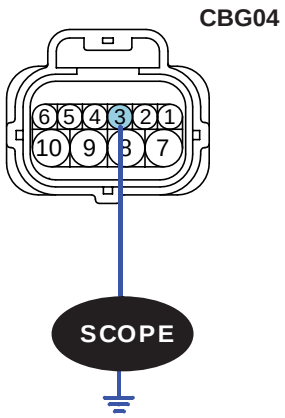
▶ Go to "Terminal & connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION E6276E9A

Refer to DTC P0743.

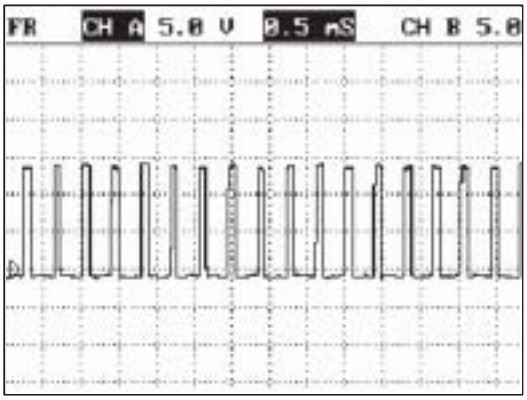
POWER SUPPLY CIRCUIT INSPECTION E73D9A2F

1. Connect "A/T SOLENOID VALVE" connector and install device for measuring wave form.
2. Turn on the Engine and operate ON/OFF(SCSV-A) SOLENOID VALVE.
3. Measure wave form between terminal "3" of the sensor harness connector and chassis ground.



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

■ Normal wave form of ON/OFF SV



SHDAT6272N

4. Is measured normally operating wave form?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION EBDECB11

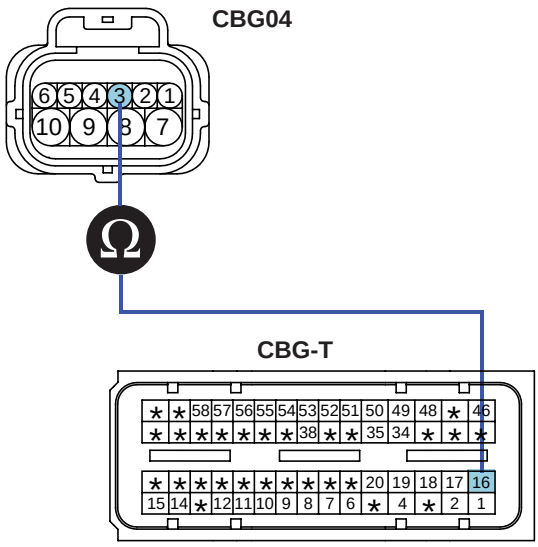
1. Check signal circuit open inspection

   1) Ignition "OFF".

   2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

   3) Measure resistance between terminal "3" of the ATM SOLENOID VALVE harness connector and terminal "16" of the PCM/TCM harness connector.

Specification: approx. 0 Ω



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

46.PCSV-A(OD&LR)
17.PCSV-B(2-4BRAKE)
48.PCSV-C(UD)
18.PCSV-D(DCCSV)
16.ON/OFF SOLENOID V/V
19.VFS
4.GROUND FOR VFS

SLDAA7280L

   4) Is resistance within specifications?

YES

▶ Go to "Check signal circuit short inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

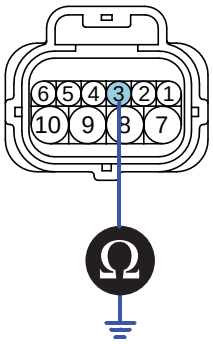
2. Check signal circuit short inspection

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "3" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: Infinite



CBG04

1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6274N

4) Is resistance within specifications?

YES

▶ Go to "signal circuit ground inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

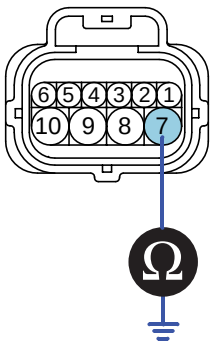
3. Check signal circuit ground inspection

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "7" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: approx. 0Ω



CBG04

1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6275N

4) Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and Go to "Verification of vehicle repair" procedure.

COMPONENT INSPECTION E0B2046E

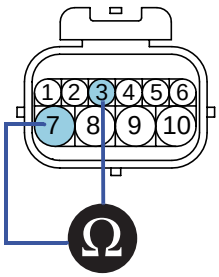
1. CHECK SOLENOID VALVE

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector.

3) Measure resistance between terminal "3" and terminal "7" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 3.5±0.2Ω [(25°C(77°F)]



CBG04
Component side

1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6276N

4) Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

▶ Replace ON/OFF SOLENOID VALVE as necessary and go to "Verification of vehicle repair" procedure.

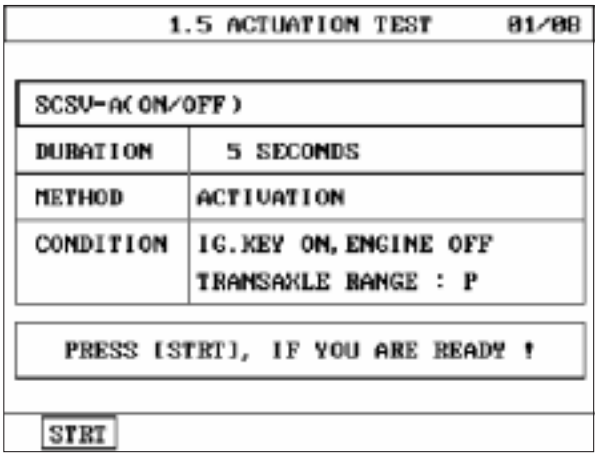
2. CHECK PCM/TCM

1) Connect scantool to data link connector(DLC).

2) Ignition "ON" & Engine "OFF".

3) Select A/T solenoid valve actuator test and operate actuator test.

4) Is Actuator Testing performed normally?



SHDAT6277L

YES

▶ Go to "Verification of vehicle repair" procedure.

NO

▶ Replace PCM/TCM as necessary and go to "Verification of vehicle repair" procedure.

ACTUATOR TEST CONDITION

1. IG SWITCH ON
2. TRANSAXLE RANGE SWITCH is normal
3. P RANGE
4. Vehicle Speed 0mph(0km/h)
5. Throttle position sensor < 1V
6. IDLE SWITCH ON
7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR E55A4EEC

Refer to DTC P0743.

DTC P0755 PCSV-A(OD & LR) SOLENOID VALVE CIRCUIT - OPEN OR SHORT(GND)

COMPONENT LOCATION E9D7EE29

Refer to DTC P0743.

GENERAL DESCRIPTION E9F0ED3C

Refer to DTC P0750.

DTC DESCRIPTION E1EDC76A

The PCM/TCM checks the Under Drive Clutch Control Signal by monitoring the feedback signal from the solenoid valve drive circuit. If an unexpected signal is monitored (for example, high voltage is detected when low voltage is expected, or low voltage is detected when high voltage is expected), the PCM/TCM judges that Under Drive Clutch control solenoid circuit is malfunctioning and sets this code.

DTC DETECTING CONDITION E6D86F68

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty UD SOLENOID VALVE • Faulty PCM/TCM
Enable Conditions	• 16V > Actuator(TCU) power supply voltage > 10V	
Threshold value	• Circuit open or short to ground	
Diagnostic Time	• More than 0.3 sec	
Fail Safe	• Locked in 3rd gear.	

SPECIFICATION E52E4646

Refer to DTC P0743.

SIGNAL WAVEFORM E01F4D1E

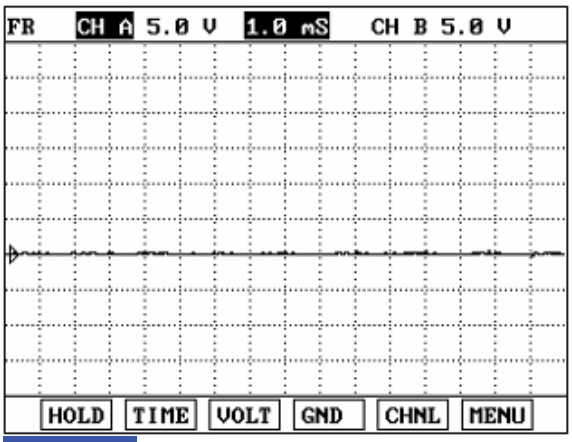


FIG.1)

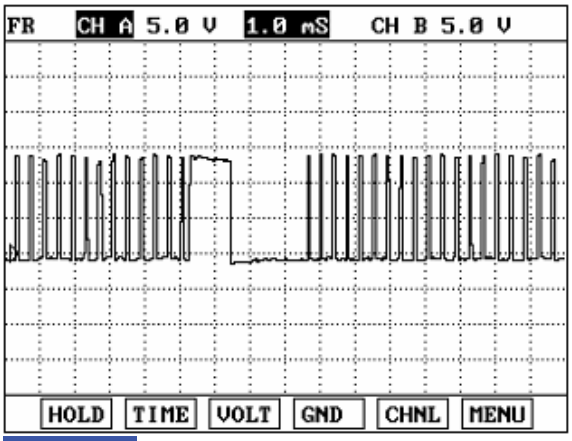


FIG.2)

FIG. 1) Wave form of "ON/OFF(SCSV-A)" in 1st, 3rd, 4th gear
FIG. 2) Wave form of "ON/OFF(SCSV-A)" in 2nd gear

BKGF120A

MONITOR SCANTOOL DATA EB56CCBD

1. Connect scantool to data link connector(DLC)
2. Engine "ON".
3. Monitor the "PCSV-A(OD & LR) SOLENOID VALVE" parameter on the scantool.
4. Shift gear at each position.

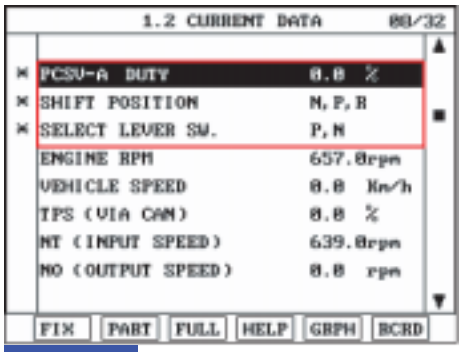


FIG.1)

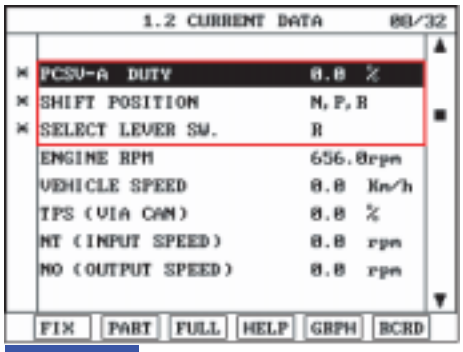


FIG.2)

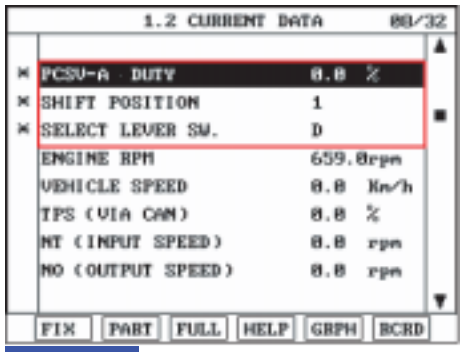


FIG.3)

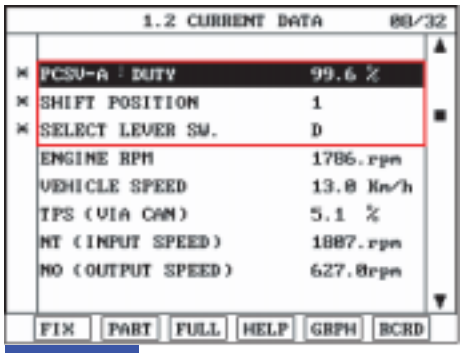


FIG.4)

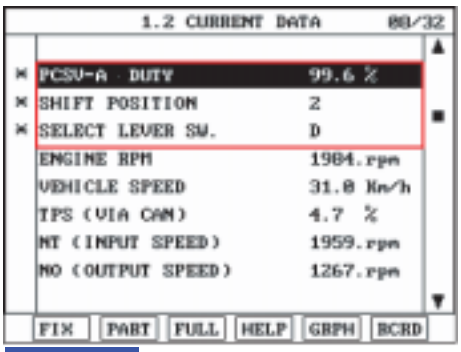


FIG.5)

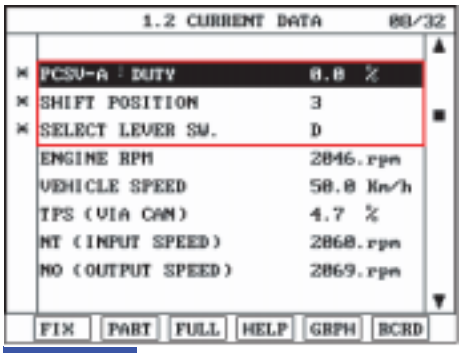


FIG.6)

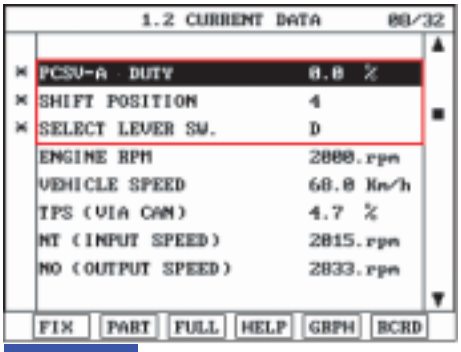


FIG.7)

FIG. 1) "P,N "
FIG. 2) "R"
FIG. 3) "D Range 1st" gear, vehicle speed=0
FIG. 4) "D Range 1st" gear
FIG. 5) "D Range 2nd" gear
FIG. 6) "D Range 3rd" gear
FIG. 7) "D Range 4th" gear

SHDAT6281L

5. Does "PCSV-A(OD & LR) SOLENOID VALVE" follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of vehicle repair" procedure.

NO

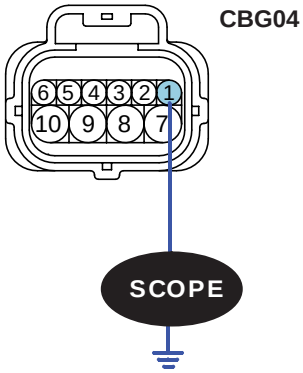
▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION ED935EF0

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION E9038E60

1. Connect "A/T SOLENOID VALVE" connector and install device for measuring wave form.
2. Turn on the Engine and operate PCSV-A(OD & LR) SOLENOID VALVE.
3. Measure wave form between terminal "1" of the sensor harness connector and chassis ground.



1.PCSV-A(OD&LR)
2.PCSV-B(2-4 BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6282N

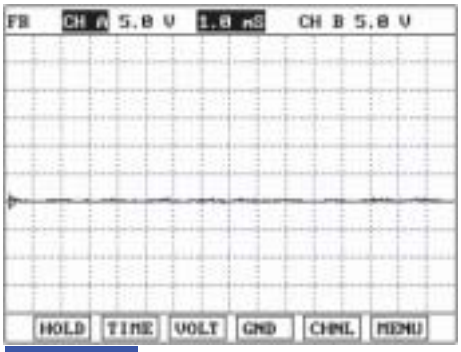


FIG.1)

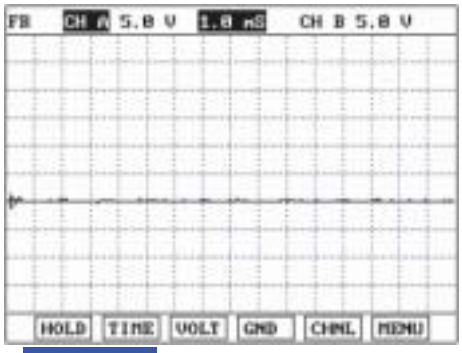


FIG.2)

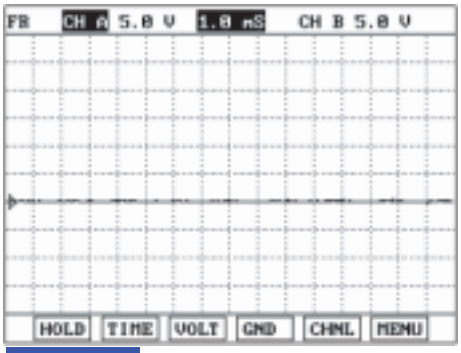


FIG.3)

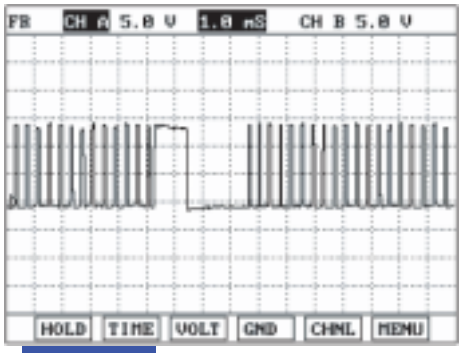


FIG.4)

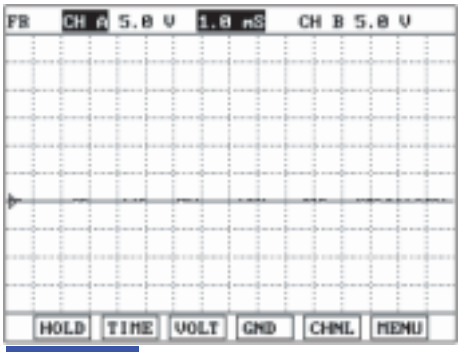


FIG.5)

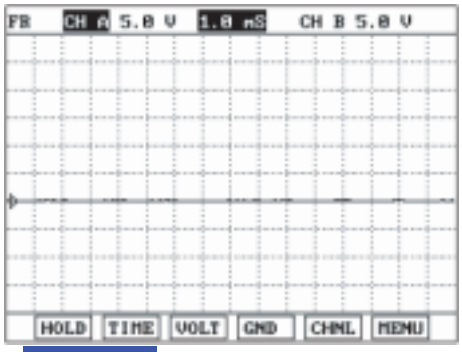


FIG.6)

FIG. 1) "P, N"
FIG. 2) "R"
FIG. 3) "D Range 1st" gear
FIG. 4) "2nd" gear
FIG. 5) "3rd" gear
FIG. 6) "D Range 4th" gear

BKGF120D

4. Is measured normally operating wave form?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION E4880C86

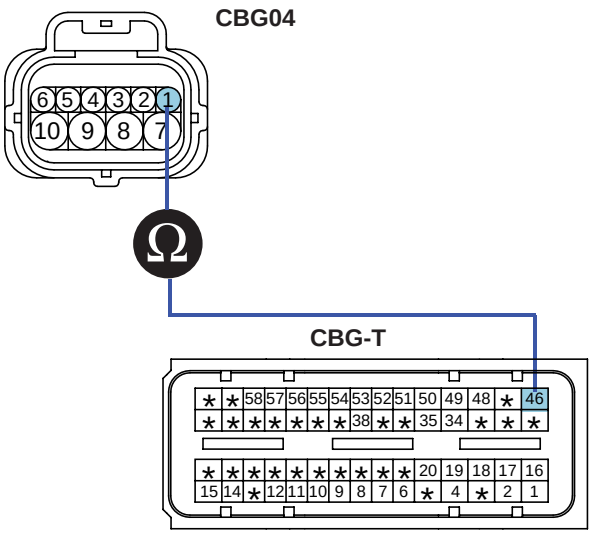
1. Check signal circuit open inspection

   1) Ignition "OFF".

   2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

   3) Measure resistance between terminal "1" of the ATM SOLENOID VALVE harness connector and terminal "46" of the PCM/TCM harness connector.

Specification: approx. 0 Ω



1.PCSV-A(OD&LR)
2.PCSV-B(2-4 BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

46.PCSV-A(OD&LR)
17.PCSV-B(2-4BRAKE)
48.PCSV-C(UD)
18.PCSV-D(DCCSV)
16.ON/OFF SOLENOID V/V
19.VFS
4.GROUND FOR VFS

SLDAA7290L

   4) Is resistance within specifications?

YES

▶ Go to "Check signal circuit short inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

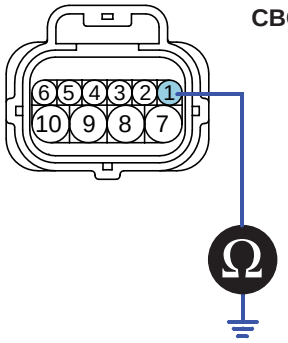
2. Check signal circuit short inspection

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "1" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: Infinite



1.PCSV-A(OD&LR)
2.PCSV-B(2-4 BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6284N

4) Is resistance within specifications?

YES

▶ Go to "signal circuit ground inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

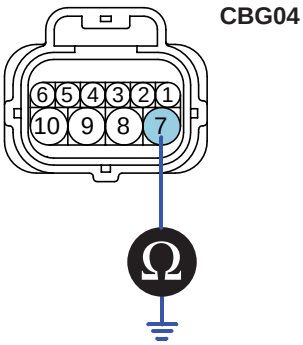
3. Check signal circuit ground inspection

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "7" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: approx. 0Ω



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6275N

4) Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and Go to "Verification of vehicle repair" procedure.

COMPONENT INSPECTION E0EED05A

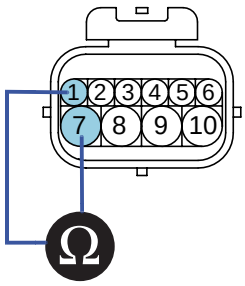
1. CHECK SOLENOID VALVE

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector.

3) Measure resistance between terminal "1" and terminal "7" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 3.5±0.2Ω [(25°C(77°F)]



CBG04
Component side

1.PCSV-A(OD&LR)
2.PCSV-B(2-4 BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6286N

4) Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

▶ Replace PCSV-A(OD & LR) SOLENOID VALVE as necessary and go to "Verification of vehicle repair" procedure.

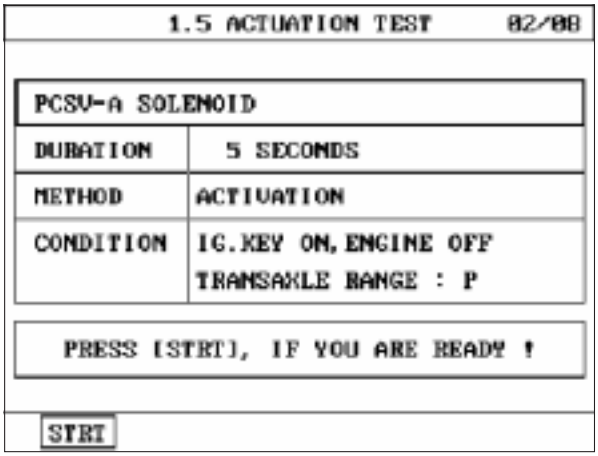
2. CHECK PCM/TCM

1) Connect scantool to data link connector(DLC).

2) Ignition "ON" & Engine "OFF".

3) Select ATM solenoid valve actuator test and operate actuator test.

4) Is Actuator Testing performed normally?



SHDAT6287L

YES

▶ Go to "Verification of vehicle repair" procedure.

NO

▶ Replace PCM/TCM as necessary and go to "Verification of vehicle repair" procedure.

ACTUATOR TEST CONDITION

1. IG SWITCH ON
2. TRANSAXLE RANGE SWITCH is normal
3. P RANGE
4. Vehicle Speed 0mph(0km/h)
5. Throttle position sensor < 1V
6. IDLE SWITCH ON
7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR E2744016

Refer to DTC P0741.

DTC P0760 PCSV-B(2-4 SOLENOID VALVE) CIRCUIT - OPEN OR SHORT(GND)

COMPONENT LOCATION ED73FB53

Refer to DTC P0743.

GENERAL DESCRIPTION E000DFBC

Refer to DTC P0750.

DTC DESCRIPTION E737A454

The PCM/TCM checks the 2nd brake drive control signal by monitoring the feedback signal from the solenoid valve drive circuit. If an unexpected signal is monitored, (For example, high voltage is detected when low voltage is expected or low voltage is detected when high voltage is expected) the PCM/TCM judges that 2nd Brake drive control solenoid circuit is malfunctioning and sets this code.

DTC DETECTING CONDITION EF144174

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty 2-4 SOLENOID VALVE • Faulty PCM/TCM
Enable Conditions	• 16V ＞ Actuator(TCU) power supply voltage ＞10V	
Threshold value	• Circuit open or short to ground	
Diagnostic Time	• More than 0.3 sec	
Fail Safe	• Locked in 3rd gear	

SPECIFICATION EDB3EF83

Refer to DTC P0743.

SIGNAL WAVEFORM E8C9D812

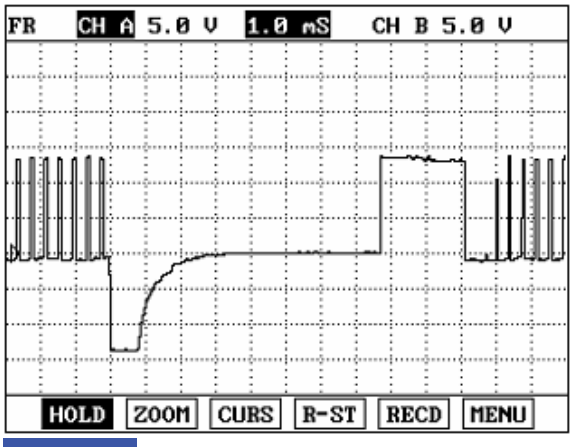


FIG.1)

FIG. 1) Wave form of "PCSV-B (2-4 SOLENOID VALVE)"

BKGF121A

MONITOR SCANTOOL DATA E3DBF9B3

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "PCSV-B(2-4 SOLENOID VALVE)" parameter on the scantool.
4. Shift gear at each position.

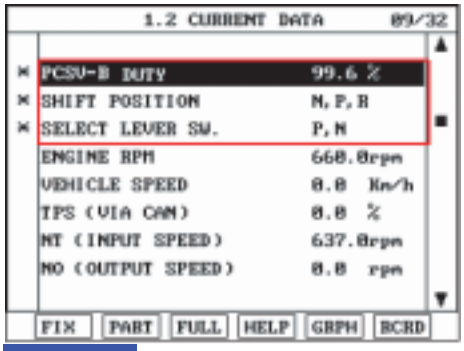


FIG.1)

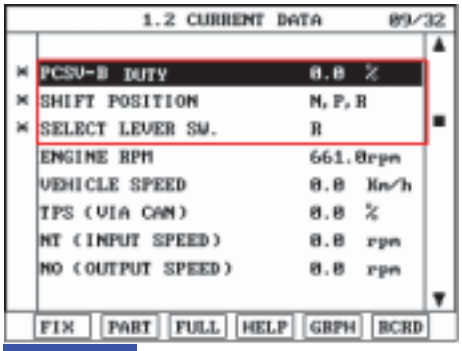


FIG.2)

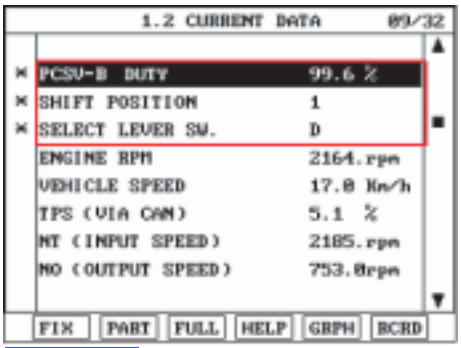


FIG.3)

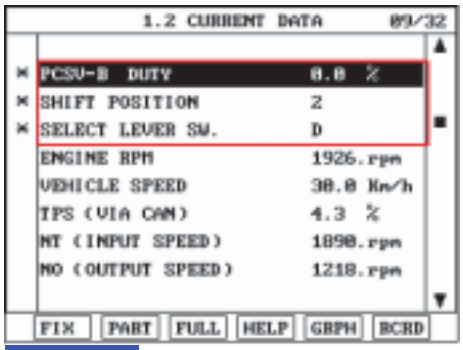


FIG.4)

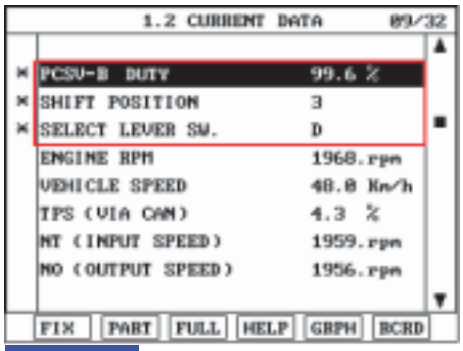


FIG.5)

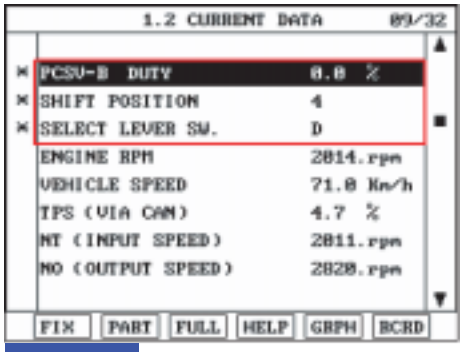


FIG.6)

FIG. 1) "P,N "
FIG. 2) "R"
FIG. 3) "1st" gear
FIG. 4) "2nd" gear
FIG. 5) "3rd" gear
FIG. 6) "D Range 4th" gear

SHDAT6291L

5. Does "PCSV-B(2-4SOLENOID VALVE)" follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of vehicle repair" procedure.

NO

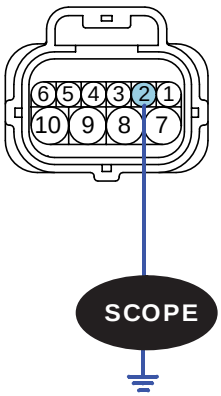
▶ Go to "Terminal & connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION E5FE81F6

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION EFBD518C

1. Connect "A/T SOLENOID VALVE" connector and install device for measuring wave form.
2. Turn on the Engine and operate PCSV-B(2-4 SOLENOID VALVE).
3. Measure wave form between terminal "2" of the sensor harness connector and chassis ground.



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6292N

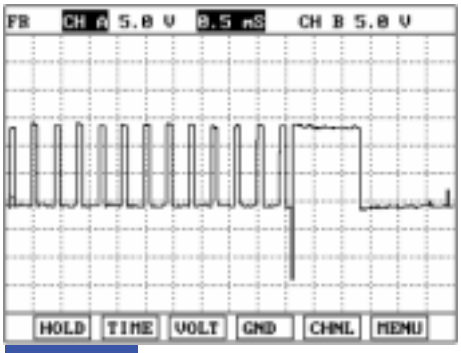


FIG.1)

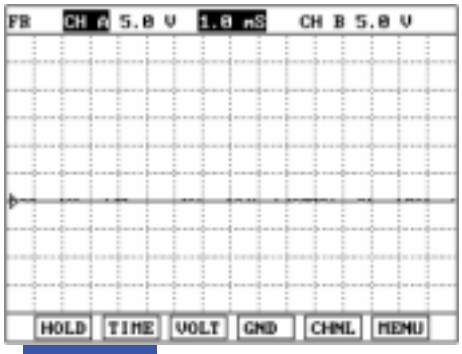


FIG.2)

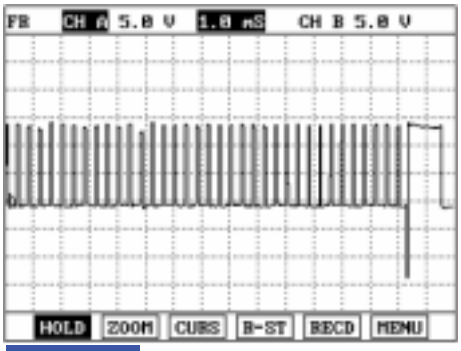


FIG.3)

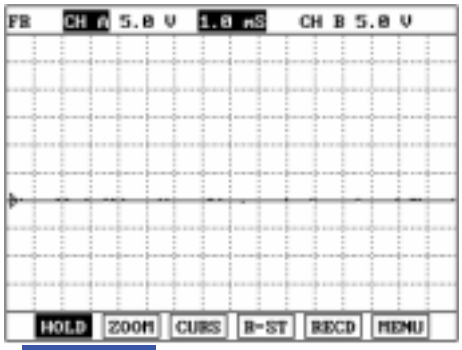


FIG.4)

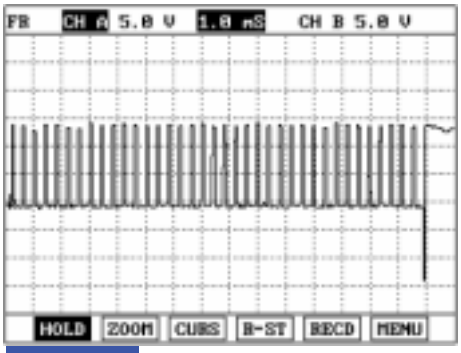


FIG.5)

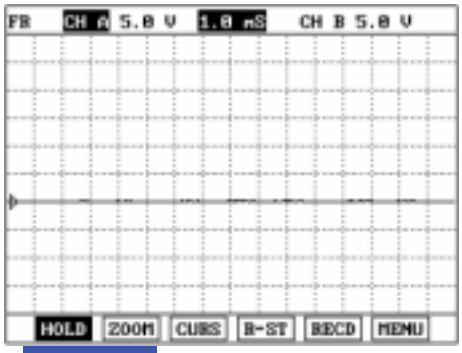


FIG.6)

FIG. 1) "P, N"
FIG. 2) "R"
FIG. 3) "D Range 1st" gear
FIG. 4) "2nd" gear
FIG. 5) "3rd" gear
FIG. 6) "D Range 4th" gear

BKGF121D

4. Is measured normally operating wave form?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION E54FCA09

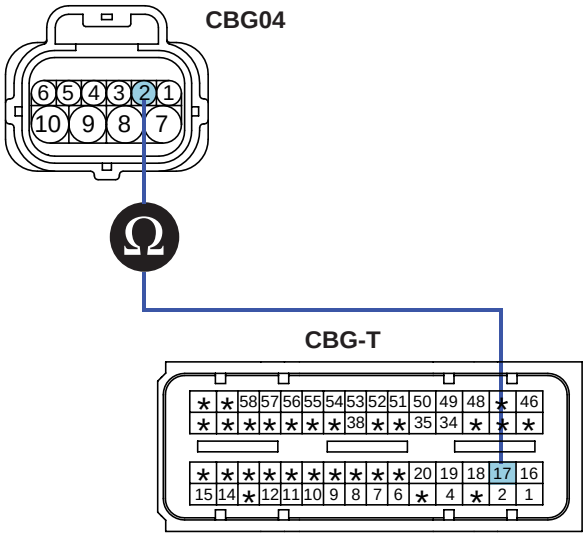
1. Check signal circuit open inspection

   1) Ignition "OFF".

   2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

   3) Measure resistance between terminal "2" of the ATM SOLENOID VALVE harness connector and terminal "17" of the PCM/TCM harness connector.

Specification: approx. 0 Ω



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

46.PCSV-A(OD&LR)
17.PCSV-B(2-4BRAKE)
48.PCSV-C(UD)
18.PCSV-D(DCCSV)
16.ON/OFF SOLENOID V/V
19.VFS
4.GROUND FOR VFS

SLDAA7300L

   4) Is resistance within specifications?

YES

▶ Go to "Check signal circuit short inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

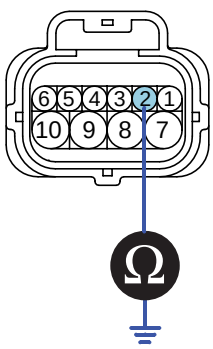
2. Check signal circuit short inspection

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "2" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: Infinite



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6294N

4) Is resistance within specifications?

YES

▶ Go to "signal circuit ground inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

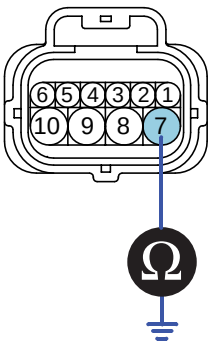
3. Check signal circuit ground inspection

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "7" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: approx. 0Ω



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6275N

4) Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and Go to "Verification of vehicle repair" procedure.

COMPONENT INSPECTION E30E32E8

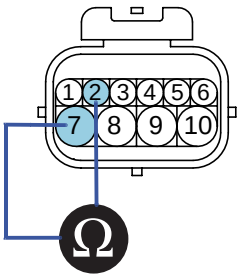
1. CHECK SOLENOID VALVE

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector.

3) Measure resistance between terminal "2" and terminal "7" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 3.5±0.2Ω [(25°C(77°F)]



CBG04
Component side

1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6296N

4) Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

▶ Replace PCSV-B(2-4 SOLENOID VALVE) as necessary and go to "Verification of Vehicle Repair" procedure.

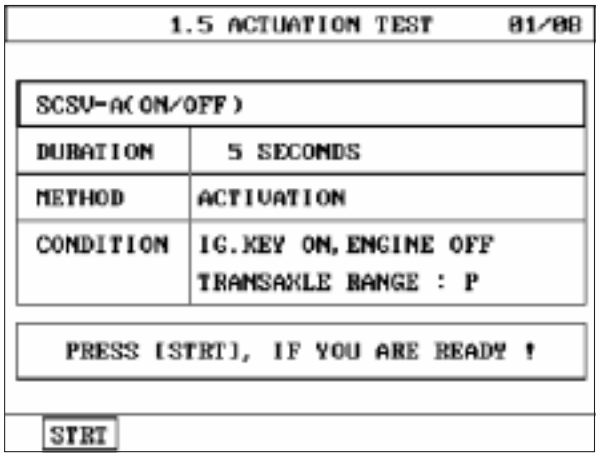
2. CHECK PCM/TCM

1) Connect scantool to data link connector(DLC).

2) Ignition "ON" & Engine "OFF".

3) Select A/T solenoid valve actuator test and operate actuator test.

4) Is Actuator Testing performed normally?



SHDAT6297L

YES

▶ Go to "Verification of vehicle repair" procedure.

NO

▶ Replace PCM/TCM as necessary and go to "Verification of vehicle repair" procedure.

ACTUATOR TEST CONDITION

1. IG SWITCH ON
2. TRANSAXLE RANGE SWITCH is normal
3. P RANGE
4. Vehicle Speed 0mph(0km/h)
5. Throttle position sensor < 1V
6. IDLE SWITCH ON
7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR E78C74C8

Refer to DTC P0743.

DTC P0765 PCSV-C(UD) SOLENOID VALVE CIRCUIT - OPEN OR SHORT(GND)

COMPONENT LOCATION E27195C5

Refer to DTC P0743.

GENERAL DESCRIPTION E786D975

Refer to DTC P0750.

DTC DESCRIPTION E6A320CA

The PCM/TCM checks the Under Drive Clutch Control Signal by monitoring the feedback signal from the solenoid valve drive circuit. If an unexpected signal is monitored (for example, high voltage is detected when low voltage is expected or low voltage is detected when high voltage is expected), the PCM/TCM judges that the OVER DRIVE CLUTCH drive control solenoid circuit is malfunctioning and sets this code.

DTC DETECTING CONDITION E8363A26

Item	Detecting Condition	Possible cause
DTC Strategy	• Check voltage range	• Open or short in circuit • Faulty UD SOLENOID VALVE • Faulty PCM/TCM
Enable Conditions	• 16V ＞ Actuator(TCU) power supply voltage ＞10V	
Threshold value	• Circuit open or short to ground	
Diagnostic Time	• More than 0.3 sec	
Fail Safe	• Locked in 3rd gear.	

SPECIFICATION E1172D4D

Refer to DTC P0743.

SIGNAL WAVEFORM E3CC1305

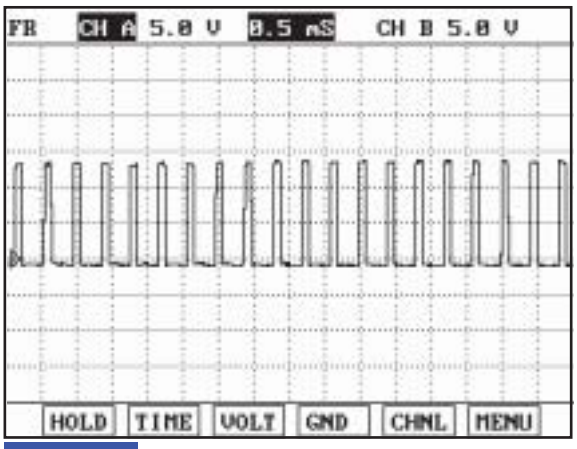


FIG.1)

FIG. 1) Wave form of "PCSV-C(UD) SOLENOID VALVE"

BKGF122A

MONITOR SCANTOOL DATA E9A84F82

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "PCSV-C(UD) SOLENOID VALVE" parameter on the scantool.
4. Shift gear at each position.

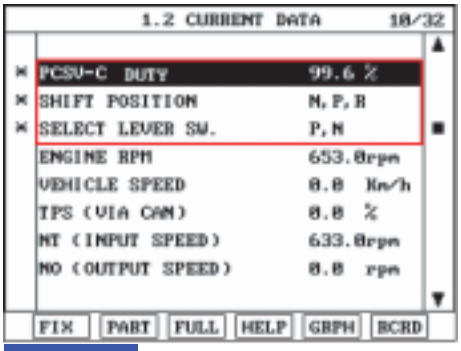


FIG.1)

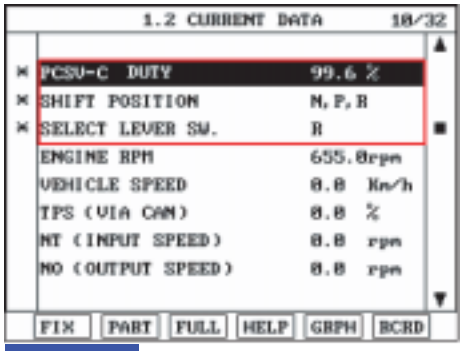


FIG.2)

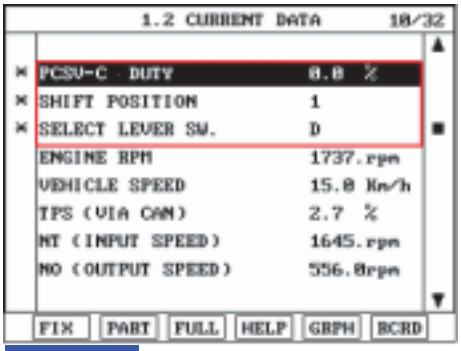


FIG.3)

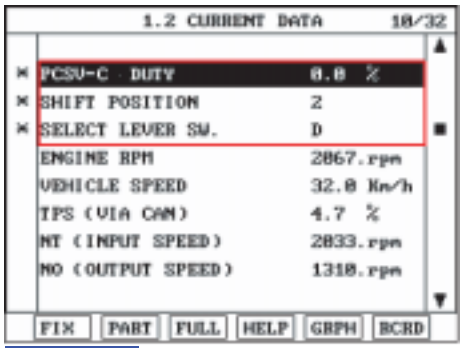


FIG.4)

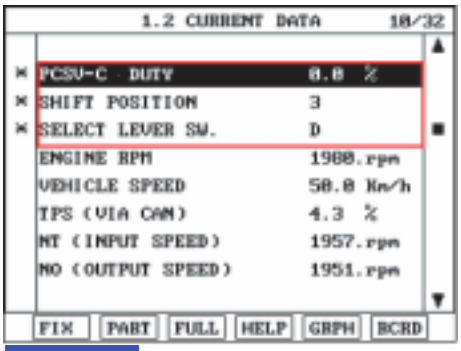


FIG.5)

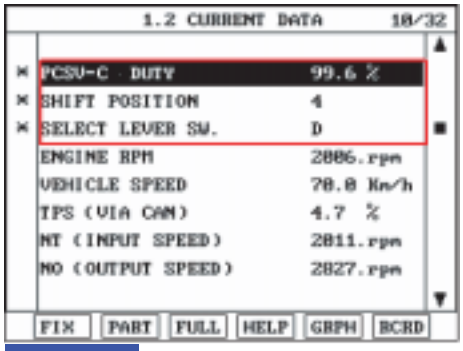


FIG.6)

FIG. 1) "P,N "
FIG. 2) "R"
FIG. 3) "1st" gear
FIG. 4) "2nd" gear
FIG. 5) "3rd" gear
FIG. 6) "D Range 4th" gear

SHDAT6301L

5. Does "PCSV-C(UD) SOLENOID VALVE" follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of vehicle repair" procedure.

NO

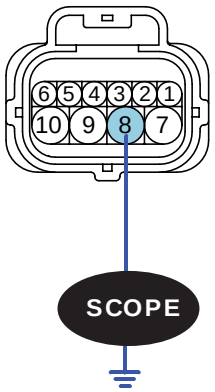
▶ Go to "Terminal & connector inspection " procedure.

TERMINAL & CONNECTOR INSPECTION E9BBACCD

Refer to DTC P0743.

POWER SUPPLY CIRCUIT INSPECTION ED4143CB

1. Connect "A/T SOLENOID VALVE" connector and install device for measuring wave form.
2. Turn on the Engine and operate PCSV-C(UD) SOLENOID VALVE.
3. Measure wave form between terminal "8" of the sensor harness connector and chassis ground.



CBG04

1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6302N

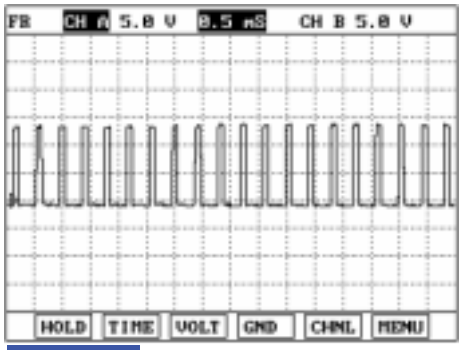


FIG.1)

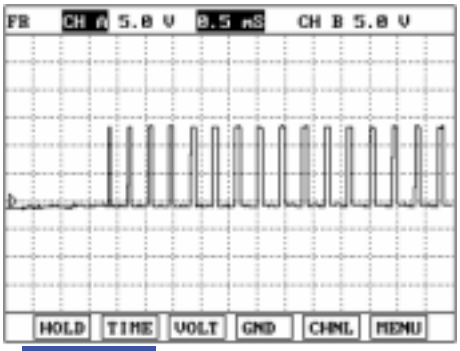


FIG.2)

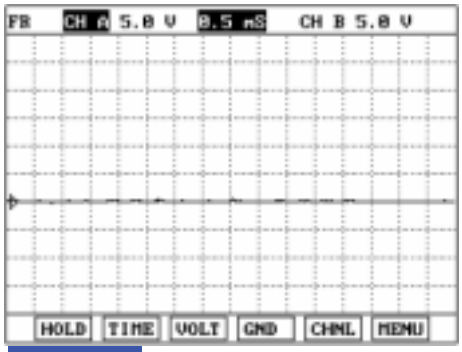


FIG.3)

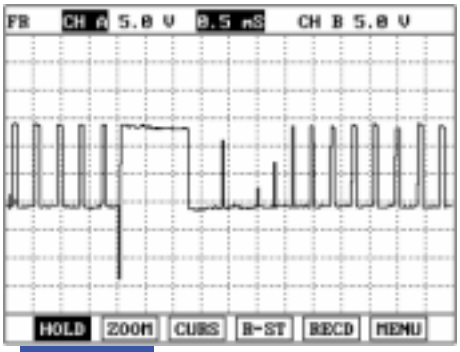


FIG.4)

FIG. 1) "P, N"
FIG. 2) "R"
FIG. 3) "1st ~ 3rd" gear
FIG. 4) "4th" gear

BKGF122D

4. Is measured normally operating wave form?

YES

▶ Go to "Signal circuit inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

SIGNAL CIRCUIT INSPECTION ED0CA1DD

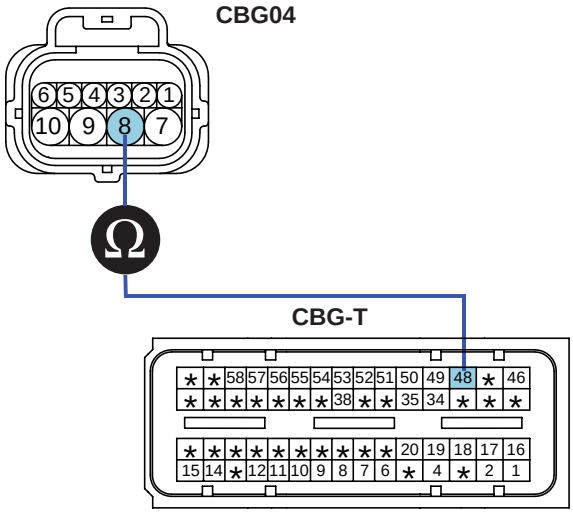
1. Check signal circuit open inspection

   1) Ignition "OFF".

   2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

   3) Measure resistance between terminal "8" of the ATM SOLENOID VALVE harness connector and terminal "48" of the PCM/TCM harness connector.

Specification: approx. 0 Ω



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

46.PCSV-A(OD&LR)
17.PCSV-B(2-4BRAKE)
48.PCSV-C(UD)
18.PCSV-D(DCCSV)
16.ON/OFF SOLENOID V/V
19.VFS
4.GROUND FOR VFS

SLDAA7308L

   4) Is resistance within specifications?

YES

▶ Go to "Check signal circuit short inspection" procedure.

NO

▶ Check for open in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

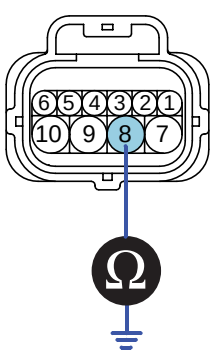
2. Check signal circuit short inspection

1) Ignition "OFF" & Engine "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "8" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: Infinite



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6304N

4) Is resistance within specifications?

YES

▶ Go to "signal circuit ground inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and go to "Verification of vehicle repair" procedure.

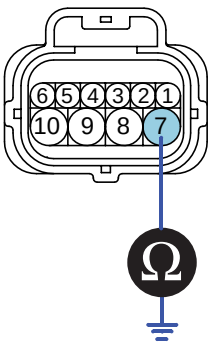
3. Check signal circuit ground inspection

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector and "PCM/TCM" connector.

3) Measure resistance between terminal "7" of the ATM SOLENOID VALVE harness and chassis ground.

Specification: approx. 0Ω



1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6275N

4) Is resistance within specifications?

YES

▶ Go to "Component Inspection" procedure.

NO

▶ Check for short to ground in harness. Repair as necessary and Go to "Verification of vehicle repair" procedure.

COMPONENT INSPECTION E95CF3EF

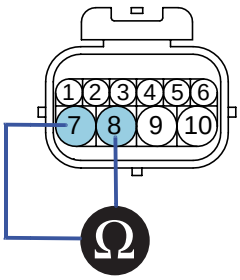
1. CHECK SOLENOID VALVE

1) Ignition "OFF".

2) Disconnect "A/T SOLENOID VALVE" connector.

3) Measure resistance between terminal "7" and terminal "8" of the ATM SOLENOID VALVE harness connector.

Specification: Approximately 3.5±0.2Ω [(25°C(77°F)]



CBG04
Component side

1.PCSV-A(OD&LR)
2.PCSV-B(2-4BRAKE)
3.ON/OFF SOLENOID V/V
4.PCSV-D(DCCSV)
5.ATF SENSOR(+)
6.ATF SENSOR(-)
7.GROUND FOR SOLENOID V/V
8.PCSV-C(UD)
9.VFS
10.GROUND FOR VFS

SHDAT6306N

4) Is resistance within specification?

YES

▶ Go to "CHECK PCM/TCM" as below.

NO

▶ Replace PCSV-C(UD) SOLENOID VALVE as necessary and go to "Verification of Vehicle Repair" procedure.

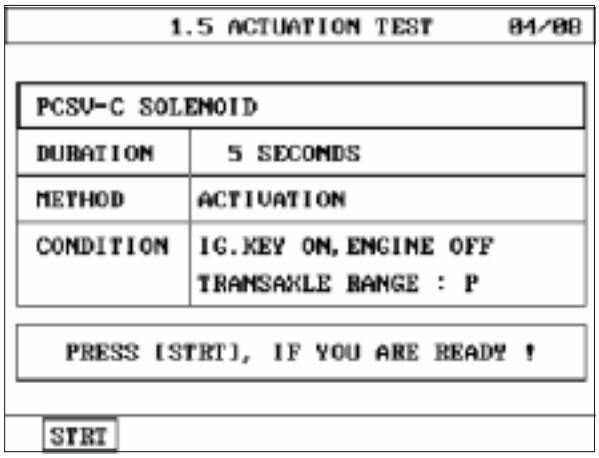
2. CHECK PCM/TCM

1) Connect scantool to data link connector(DLC).

2) Ignition "ON" & Engine "OFF".

3) Select A/T solenoid valve actuator test and operate actuator test.

4) Is Actuator Testing performed normally?



SHDAT6307L

YES

▶ Go to "Verification of vehicle repair" procedure.

NO

▶ Replace PCM/TCM and go to "Verification of vehicle repair" procedure.

ACTUATOR TEST CONDITION

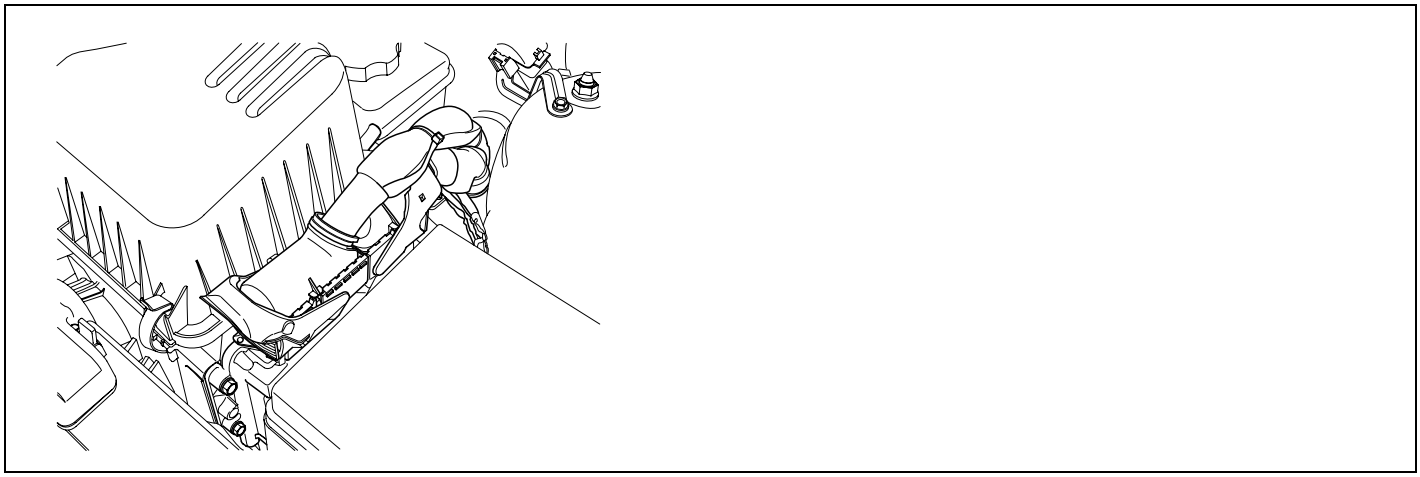
1. IG SWITCH ON
2. TRANSAXLE RANGE SWITCH is normal
3. P RANGE
4. Vehicle Speed 0mph(0km/h)
5. Throttle position sensor < 1V
6. IDLE SWITCH ON
7. ENGINE RPM 0

VERIFICATION OF VEHICLE REPAIR ED7617A5

Refer to DTC P0743.

DTC P0880 TCM POWER SIGNAL ERROR

COMPONENT LOCATION ECB19EF9



SHDAT6311D

GENERAL DESCRIPTION E5832E4D

The TCM monitors suppling voltage to "SOLENOID VALVE".
The gear position is fixed at 3rd gear when input value is higher or lower than specification.

DTC DESCRIPTION E304ACC8

The TCM set this code If an input voltage is higher or lower than specification.

DTC DETECTING CONDITION E7CAA1E8

Item	Detecting Condition	Possible cause
DTC Strategy	• Check communication	• Open or Short in harness • Faulty TCM
Enable Conditions	• 22V ≥ Input voltage to TCM ≥ 9V and after 0.5 sec is passed from IG ON	
Threshold value	• 24.5V＜ Input voltage to TCM＜ 7V	
Diagnostic Time	• More than 0.1sec	
Fail Safe	• Locked in 3 rd gear	

SIGNAL WAVEFORM EA107B37

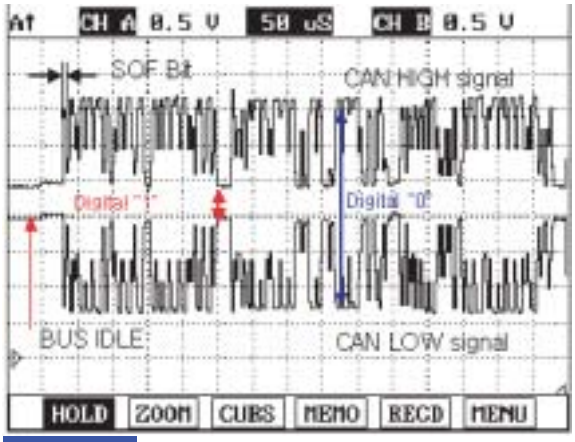


FIG.1)

FIG. 1) Wave form of "CAN COMMUNICATION"

BKGF123A

MONITOR SCANTOOL DATA EEDAE688

1. Connect scantool to data link connector(DLC).
2. Ignition "ON" & Engine "OFF".
3. Monitor the "BATTERY VOLTAGE" parameter on the scantool.

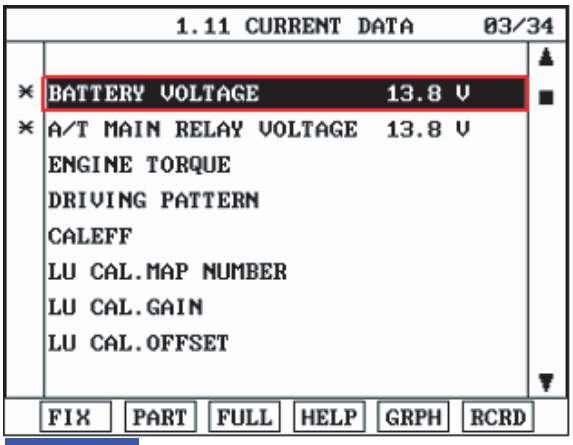


FIG.1)

FIG. 1) BATTERY VOLTAGE

SHDAA6371L

4. Does "BATTERY VOLTAGE" follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION E9E3DF72

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

▶ Repair as necessary and go to "Verification of vehicle repair" procedure.

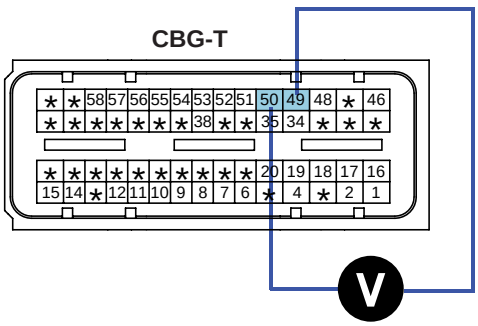
NO

▶ Go to "Power supply circuit inspection" procedure.

POWER SUPPLY CIRCUIT INSPECTION E601BCCD

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "PCM/TCM" connector.
3. Measure voltage between terminal No"49" of TCM harness connector and chassis ground and then terminal No"50" of the TCM harness connector and chassis ground.

Specification : approx. 12V



49. Suppling Voltage
50. Suppling Voltage

SLDAA7372L

4. Is voltage within specifications?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or PCM/TCM's connector or was repaired and PCM/TCM memory was not cleared. And go to Verification of Vehicle Repair procedure.

NO

▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR E9FCAC70

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Using a scantool, Clear DTC.
3. Operate the vehicle within DTC Enable conditions in General information.
4. Are any DTCs present?

YES

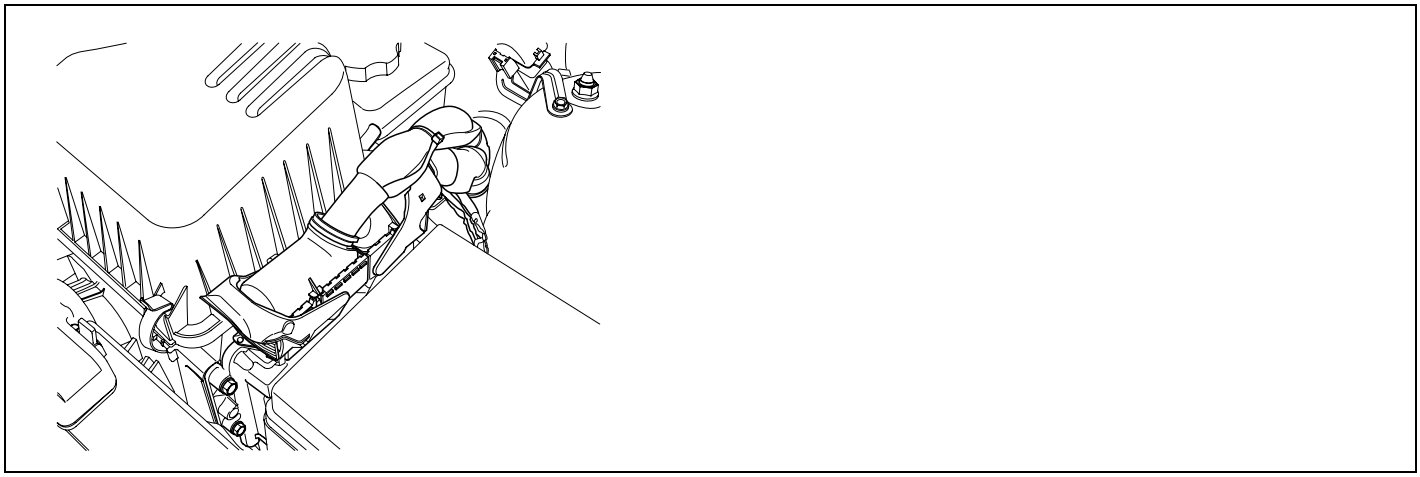
▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC U0001 CAN COMMUNICATION MALFUNCTION

COMPONENT LOCATION E825E402



SHDAT6311D

GENERAL DESCRIPTION EF96C6CA

The TCM can either receive data from the Engine Control Module or ABS control module, or it can send data to the ECM and ABSCM by using CAN communication. The CAN communicaton is one of the vehicle communication methods, which is now widely used to transfer the vehicle data.

DTC DESCRIPTION EC1AE2C3

The TCM reads data on the CAN-BUS line and checks whether the data is equal to the data which the TCM sent before. If the data is not the same the TCM decides that either the CAN-BUS line or TCM are malfuncting and sets this code.

DTC DETECTING CONDITION E97D0387

Item	Detecting Condition	Possible cause
DTC Strategy	• Check communication	• Open or short in CAN communication harness • Faulty ECM • Faulty TCM
Enable Conditions	• Input Speed ＞1000rpm	
Threshold value	• No message from ems	
Diagnostic Time	• More than 0.5sec	
Fail Safe	• INTELLIGENT SHIFT is inhibited • Learning for oil pressure control is inhibited • Torque Retard requirement is inhibited • Direct connection control of DCC is inhibited	

SIGNAL WAVEFORM EFD2A5EB

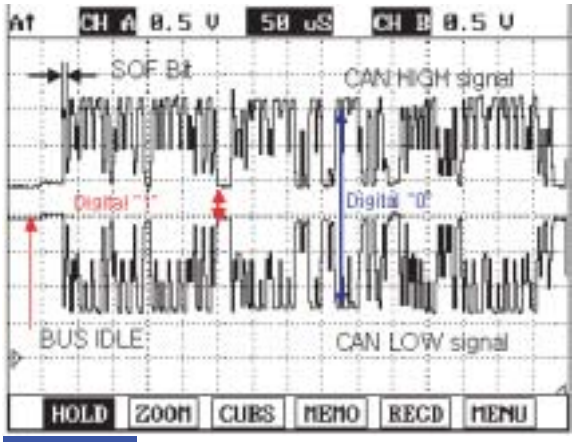


FIG.1)

FIG. 1) Wave form of "CAN COMMUNICATION"

BKGF123A

MONITOR SCANTOOL DATA EE5E7EFC

1. Connect scantool to data link connector(DLC).
2. Engine "ON".
3. Monitor the "CAN COMMUNICATION SERVICE DATA (ENGINE RPM, VEHICLE SPEED SENSOR, THROTTLE P. SENSOR)" parameters on the scantool.

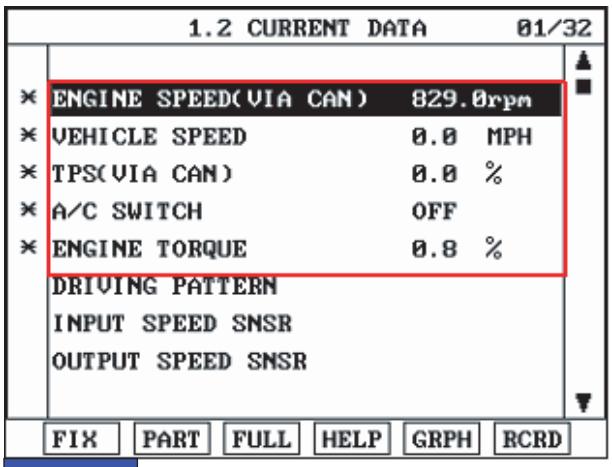


FIG.1)

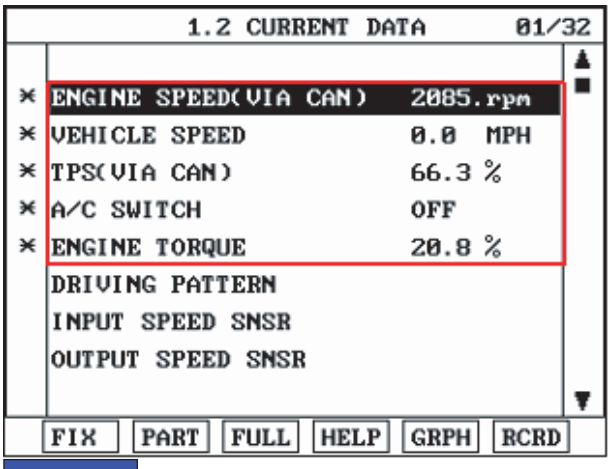


FIG.2)

FIG.1) Low-RPM
FIG.2) High-RPM

BKGF123B

4. Does "CAN BUS LINE DATA" follow the reference data?

YES

▶ Fault is intermittent caused by poor contact in the sensor's and/or TCM(PCM)'s connector or was repaired and TCM(PCM) memory was not cleared. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage. Repair or replace as necessary and go to "Verification of Vehicle Repair" procedure.

NO

▶ Go to "Terminal & connector inspection" procedure.

TERMINAL & CONNECTOR INSPECTION E56D555C

1. Many malfunctions in the electrical system are caused by poor harness and terminals. Faults can also be caused by interference from other electrical systems, and mechanical or chemical damage.
2. Thoroughly check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration, or damage.
3. Has a problem been found?

YES

▶ Repair as necessary and go to "Verification of vehicle repair" procedure.

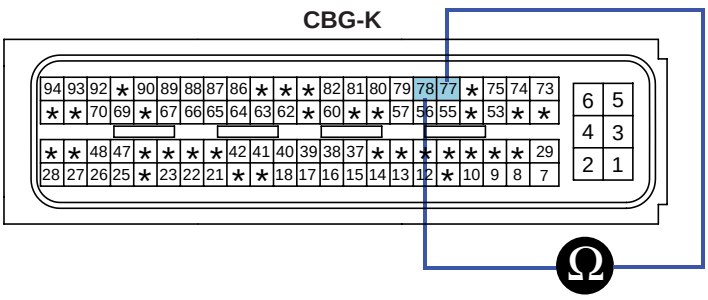
NO

▶ Go to "Signal circuit inspection" procedure.

SIGNAL CIRCUIT INSPECTION EFB1458D

1. Ignition "ON" & Engine "OFF".
2. Disconnect the "PCM/TCM" connector.
3. Measure resistance between terminal "77" and "78" of the "PCM/TCM" harness connector.

Specification : Approx. 120Ω



77. CAN-HIGH
78. CAN-LOW

SLDAA7312L

4. Is measured resistance within specifications?

YES

▶ Substitute with a known-good PCM/TCM and check for proper operation. If the problem is corrected, replace PCM/TCM as necessary and then go to "Verification of Vehicle Repair" procedure.

NO

▶ Check connectors for looseness, poor connection, bending, corrosion, contamination, deterioration or damage of ECM.and then Repair or replace Resistance for CAN communication as necessary and go to "Verification of Vehicle Repair" procedure.

VERIFICATION OF VEHICLE REPAIR EDF8E63F

After a repair, it is essential to verify that the fault has been corrected.

1. Connect scantool and select "Diagnostic Trouble Codes(DTCs)" mode.
2. Using a scantool, Clear DTC.
3. Operate the vehicle within DTC Enable conditions in General information.
4. Are any DTCs present?

YES

▶ Go to the applicable troubleshooting procedure.

NO

▶ System performing to specification at this time.

DTC U0100 CAN MI-COM OR CIRCUIT MAL

COMPONENT LOCATION E57CBC66

Refer to DTC U0001.

GENERAL DESCRIPTION EBCD0E54

Refer to DTC U0001.

DTC DESCRIPTION E22EAAF8

Refer to DTC U0001.

DTC DETECTING CONDITION E671900F

Item	Detecting Condition	Possible cause
DTC Strategy	• Check communication	• Open or short in CAN communication harness • Faulty ECM • Faulty TCM
Enable Conditions	• Input Speed ＞1000rpm	
Threshold value	• No message from ems	
Diagnostic Time	• More than 1.5sec	
Fail Safe	• INTELLIGENT SHIFT is inhibited • Learning for oil pressure control is inhibited • Torque Retard requirement is inhibited • Direct connection control of DCC is inhibited	

SIGNAL WAVEFORM E8DCEB76

Refer to DTC U0001.

MONITOR SCANTOOL DATA E05E1DE0

Refer to DTC U0001.

TERMINAL & CONNECTOR INSPECTION ED41559F

Refer to DTC U0001.

SIGNAL CIRCUIT INSPECTION E98BFE24

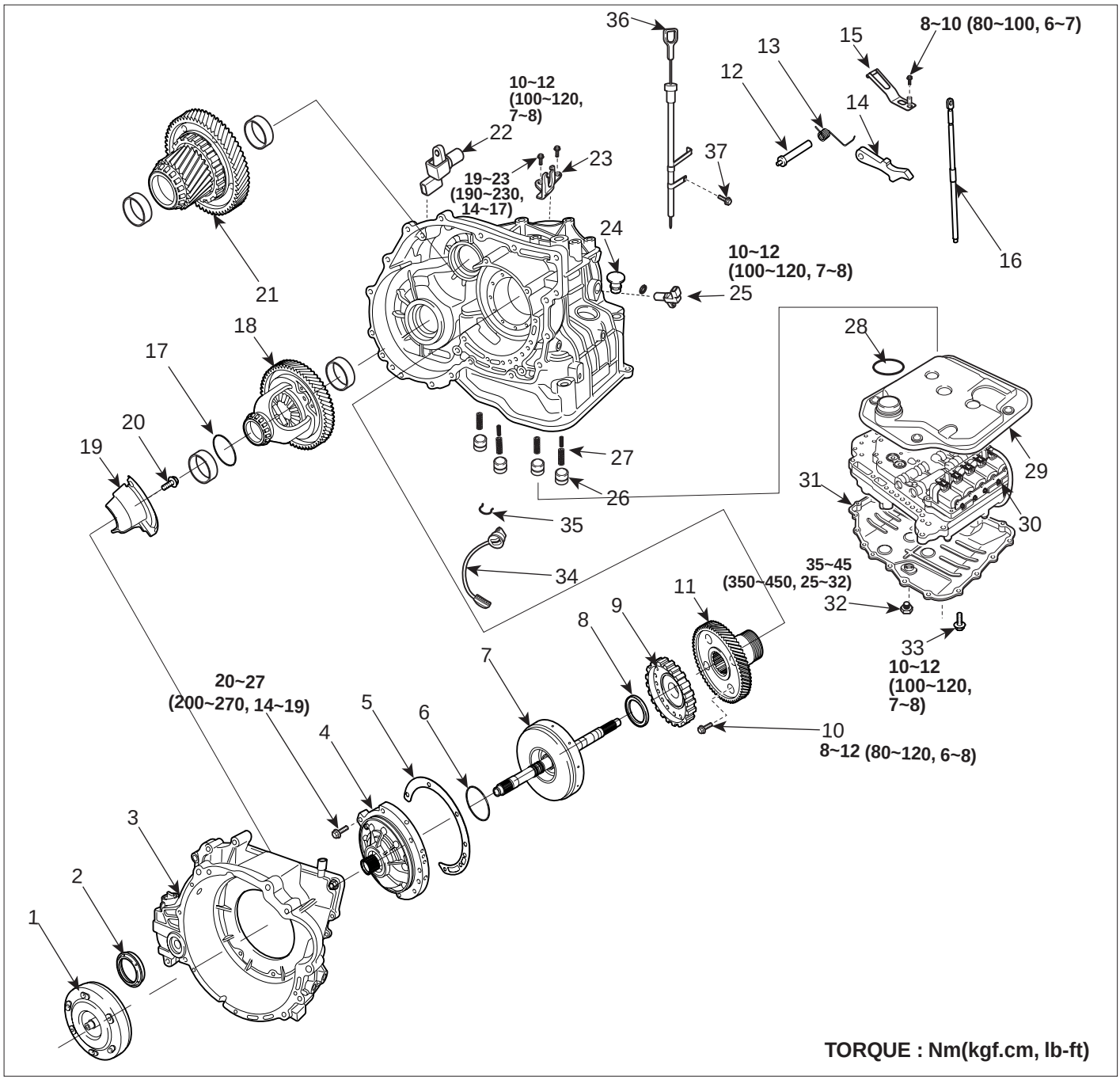
Refer to DTC U0001.

VERIFICATION OF VEHICLE REPAIR ECCF3632

Refer to DTC U0001.

AUTOMATIC TRANSAXLE

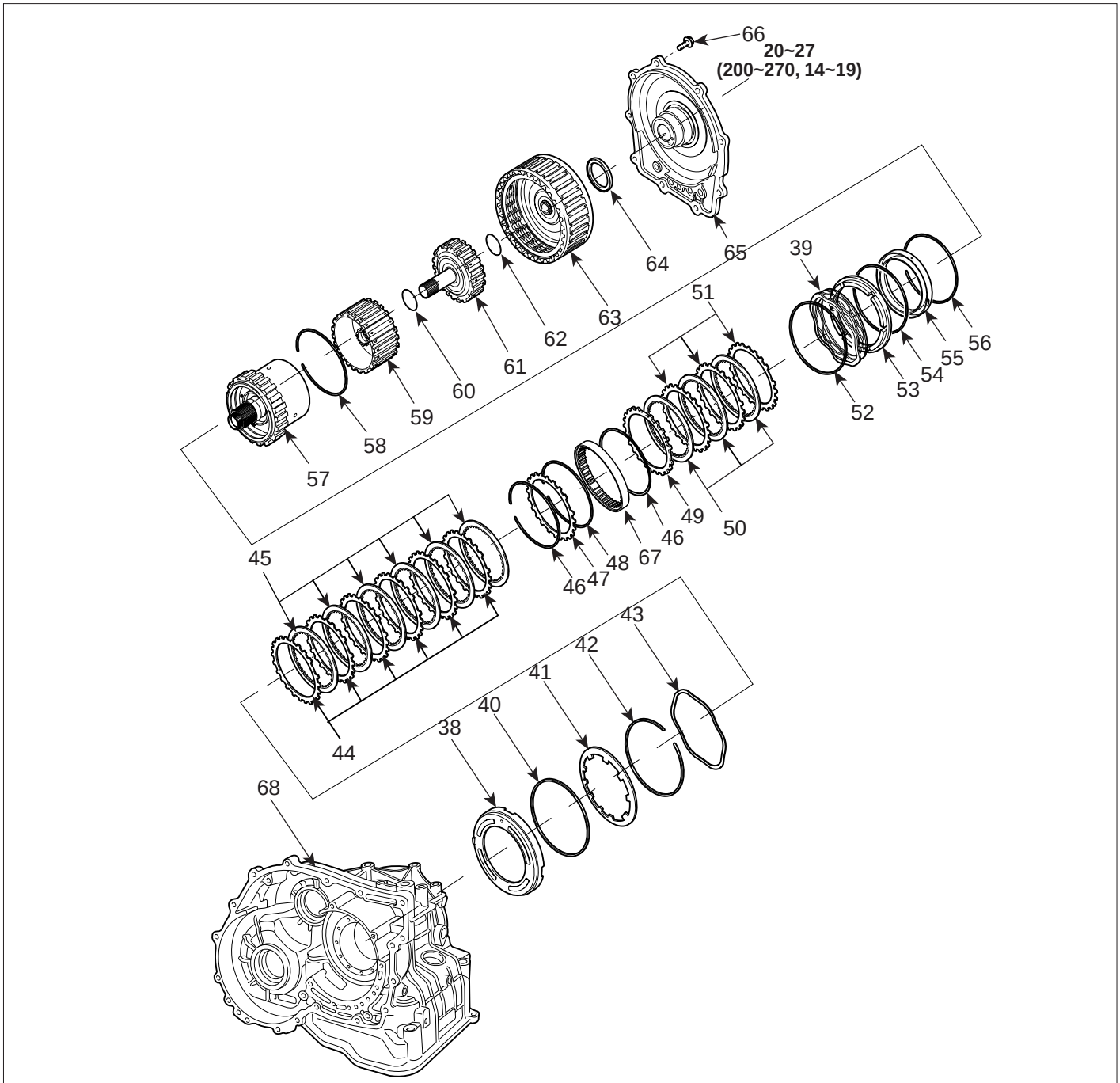
COMPONENTS(1) E0FDA143



1. Torque converter
2. Differential oil seal
3. Converter housing
4. Oil pump
5. Oil pump gasket
6. Thrust washer
7. Underdrive(U/D) clutch
8. Thrust bearing
9. Underdrive(U/D) clutch hub
10. Transfer drive gear mounting bolt
11. Transfer drive gear
12. Parking sprag shaft
13. Sprag spring
14. Parking sprag
15. Detent spring
16. Manual control shaft
17. Spacer
18. Differential
19. Oil separate
20. Oil separate mounting bolt
21. Transfer driven gear
22. Output shaft speed sensor
23. Shift cable bracket
24. Plug
25. Input shaft speed sensor
26. Accumulator piston
27. Coil spring
28. O-ring
29. Oil filter
30. Valve body
31. Oil pan
32. Drain plug
33. Valve body cover bolt
34. Valve body connector
35. Valve body connector mounting clip
36. Oil level gauge
37. Oil level gauge bracket bolt

SHDAT6063L

COMPONENTS(2)



TORQUE : Nm(kgf.cm, lb-ft)

38. Low & reverse brake piston
39. Low & reverse brake return spring
40. Low & reverse brake spring retainer
41. Return spring
42. Snap ring
43. Wave spring
44. Low & reverse pressure plate
45. Low & reverse brake disc
46. Snap ring
47. Reaction plate
48. Snap ring
49. Reaction plate
50. 2ND brake disc
51. 2ND brake pressure plate
52. Snap ring
53. 2ND brake retainer
54. D-ring
55. 2ND brake piston
56. D-ring
57. Low & reverse planetary gear set
58. Snap ring
59. Reverse sun gear
60. Thrust bearing
61. Overdrive(O/D) hub
62. Thrust bearing
63. Reverse & Overdrive(O/D) clutch
64. Thrust bearing
65. Rear cover
66. Rear cover bolt
67. One way clutch inner race
68. Transmission case

SHDAT6064L

REMOVAL E9EF4828

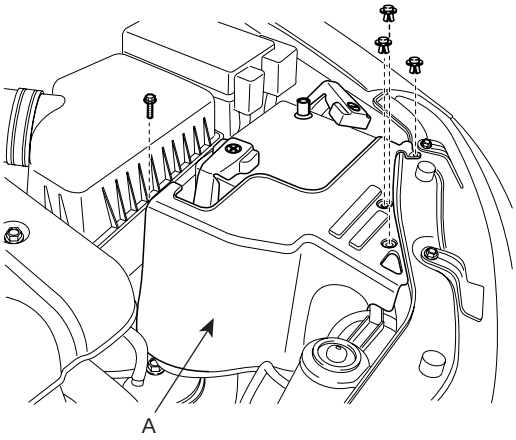
CAUTION

- ***Use fender covers to avoid damaging painted surfaces.***
- ***To avoid damage, unplug the wiring connectors carefully while holding the connector portion.***

NOTE

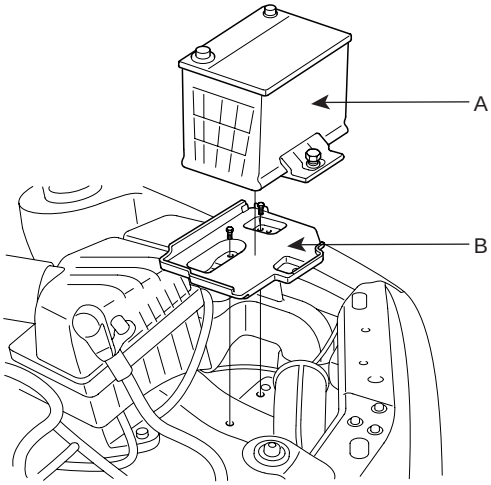
- *Mark all wiring and hoses to avoid misconnection.*

1. Remove the engine cover.
2. Remove the battery heat shield (A).



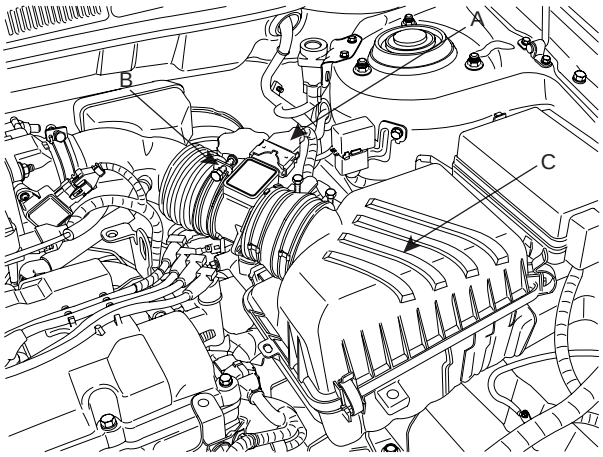
SLDAT7002D

3. Remove the battery (A) and the battery tray (B).



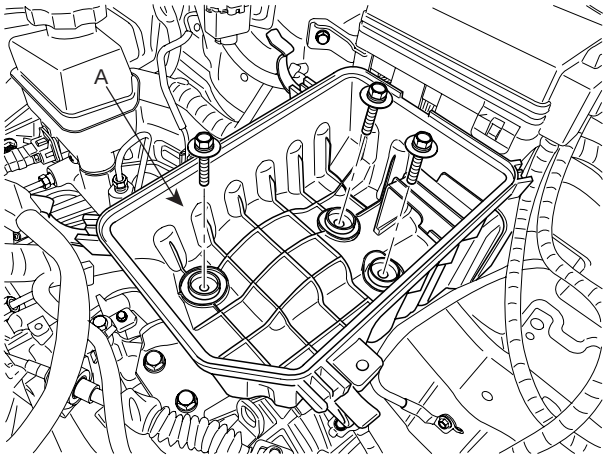
SLDAT7003D

4. Remove the upper cover (C) of the air cleaner assembly after disconnecting the AFS(Air Flow Sensor) connector (A), the clamp (B).



SLDAA7001D

5. Remove the lower cover (A) of the air cleaner assembly.

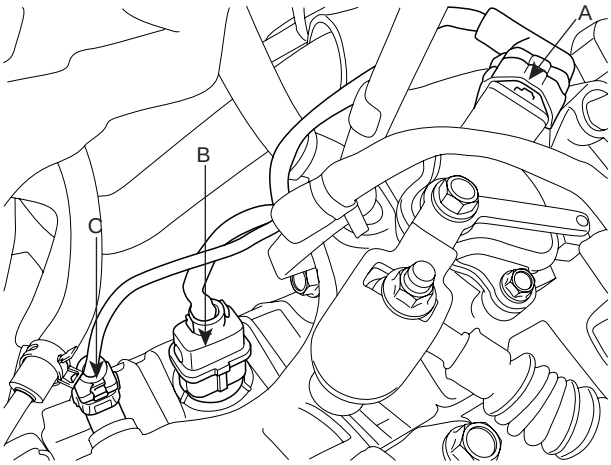


SLDAT7005D

6. Remove the ground cable (A) from transaxle.

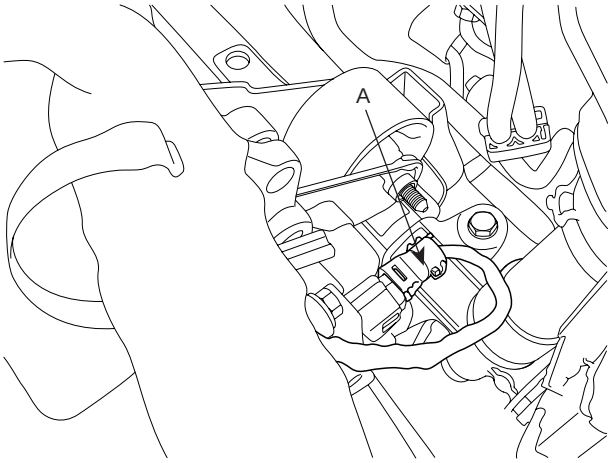
SLDAT7006D

7. Disconnect the inhibiter switch connector (A), the solenoid valve connector (B) and the input shaft speed sensor connector (C).



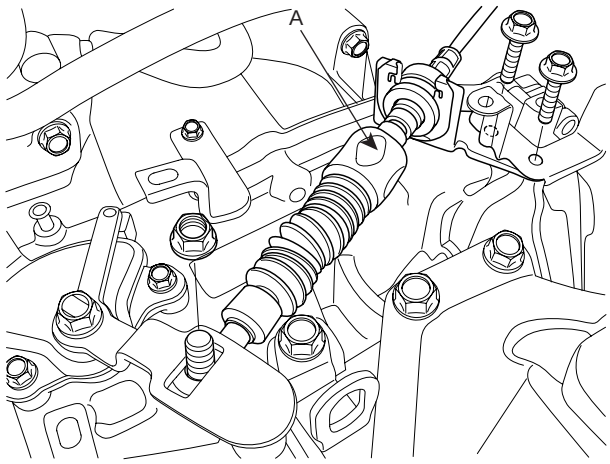
SHDAT6008D

8. Disconnect the output shaft speed sensor connector (A).



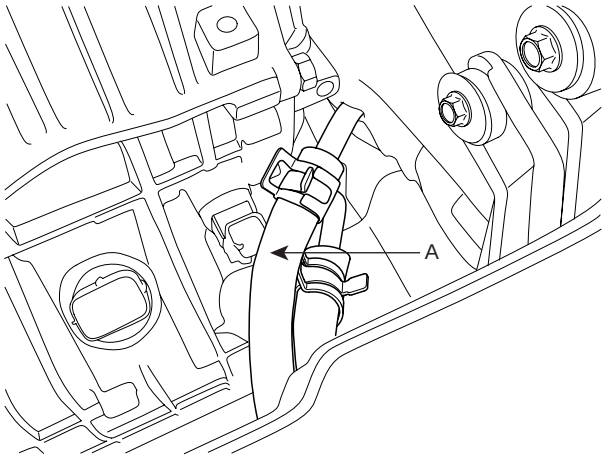
SHDAT6009D

9. Remove the shift cable assembly (A).



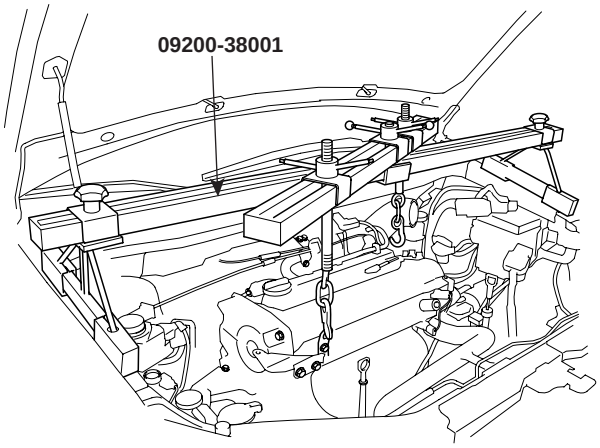
SHDAT6010D

10. Remove the oil cooler hoses (A).



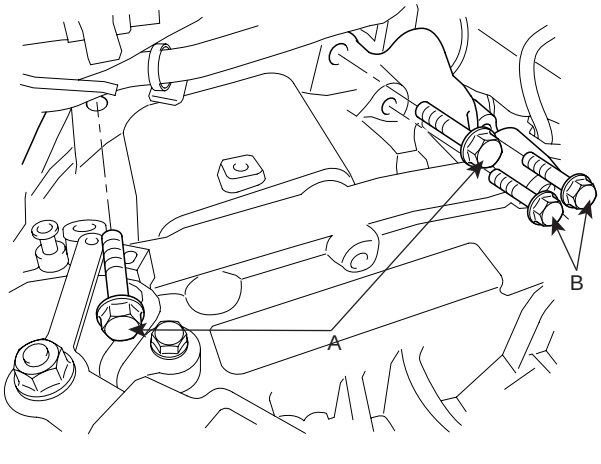
SHDAT6011D

11. Install the special tools (09200-38001), the engine support fixture and the adapter on the engine assembly.



SHDAA6002D

12. Remove the transaxle upper mounting bolts (A-2ea) and the starter motor mounting bolts (B-2ea).



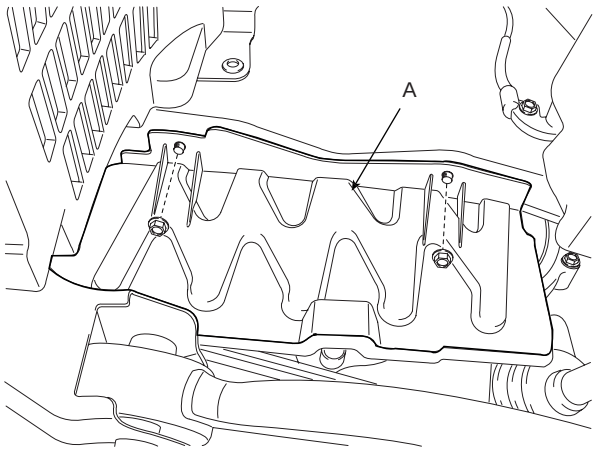
SHDAA6003D

13. After removing the mounting bolts, take the transaxle insulator mounting bracket off.

14. Remove the steering joint assembly bolt. (refer to Steering column/shaft in ST group)

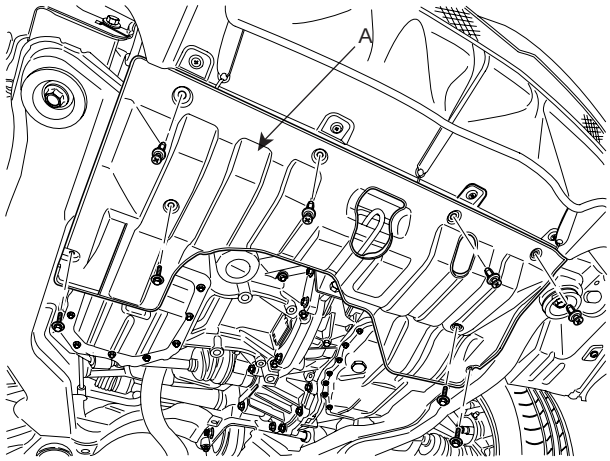
15. Remove the front wheels and tires. (refer to removal in SS group)

16. Remove the side mud cover (A).



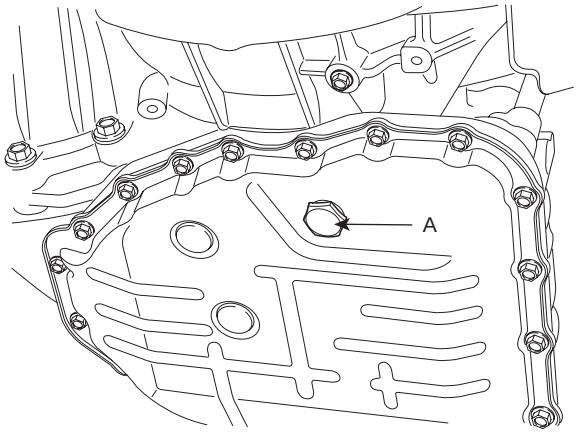
KKNF060A

17. Remove the under shield cover (A).



SLDAT7009D

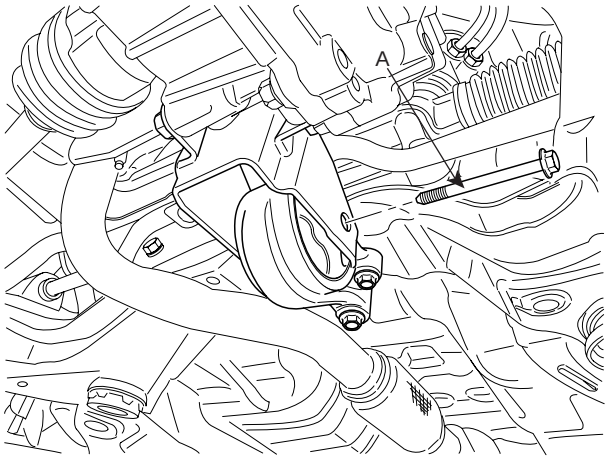
18. Drain the transaxle fluid by removing the oil drain plug (A).



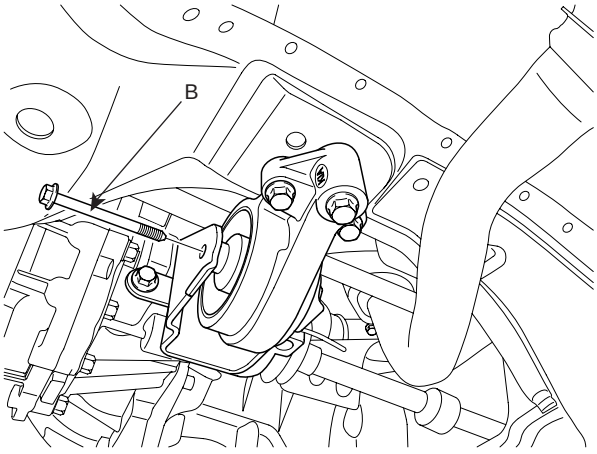
AKGF032W

19. Remove the lower arm ball joint mounting nut, the stabilizer link mounting nut, and the tie rod end mounting nut from the front knuckles. (refer to Front suspension system in SS group)

20. Remove the roll stopper mounting bolts (A, B).

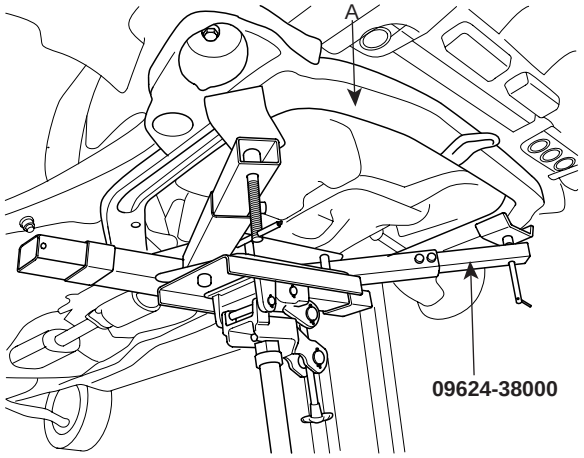


SLDAT7010D



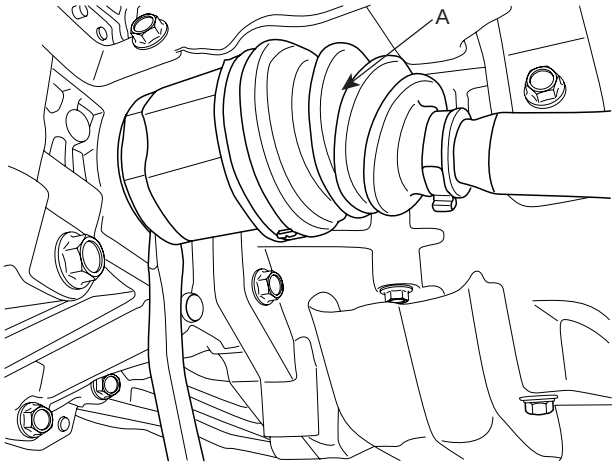
SLDAT7011D

21. Supporting the sub frame (A) with a jack and the Special tool (09624-38000), remove the mounting bolts.(refer to Stabilizer's removal in SS group)

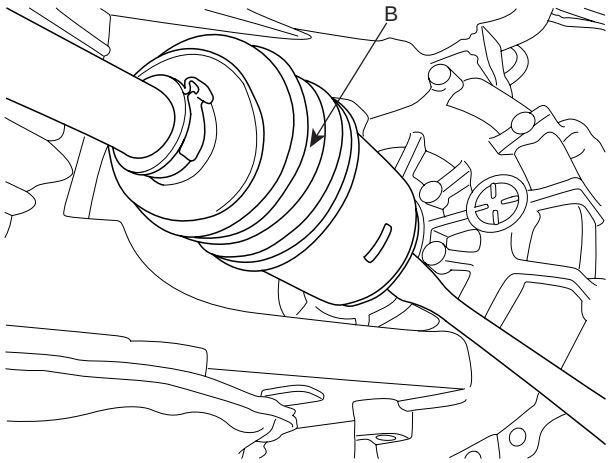


SHDAT6051D

22. Disconnect the drive shafts (A,B) from the transaxle.

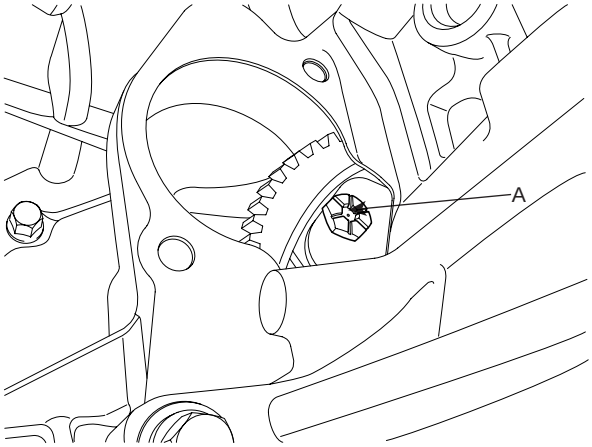


SHDAT6020D



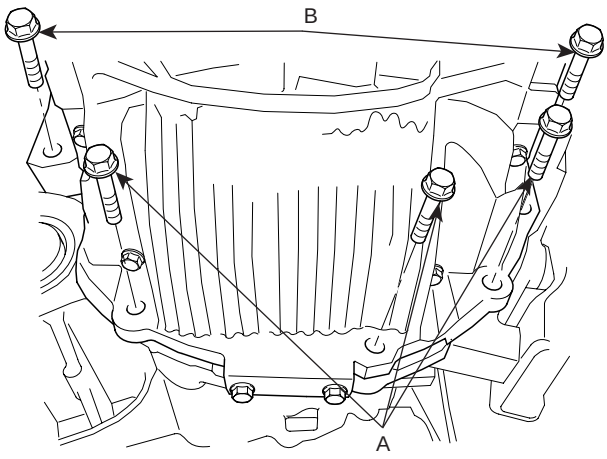
SHDAT6021D

23. Remove the drive plate mounting bolts (A-4ea).



SHDAA6011D

24. Supporting the transaxle with a jack, remove the transaxle lower mounting bolts (A-3ea, B-2ea).



SHDMA6005D

25. Lowering the jack slowly, remove the transaxle.

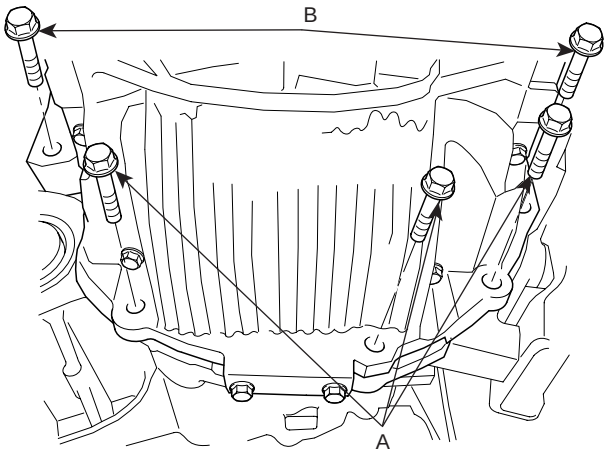
CAUTION

When removing the transaxle assembly, be careful not to damage any surrounding parts or body components.

INSTALLATION EA1DC9AA

1. Install the transaxle lower mounting bolts (A-3ea, B-2ea) after fitting the transaxle assembly into the engine assembly.

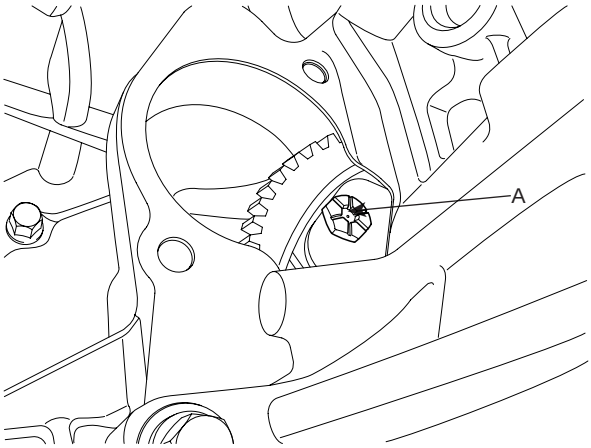
TORQUE : 43-55Nm (4.3-5.5kgf.m, 31.1-39.8lb-ft)



SHDMA6005D

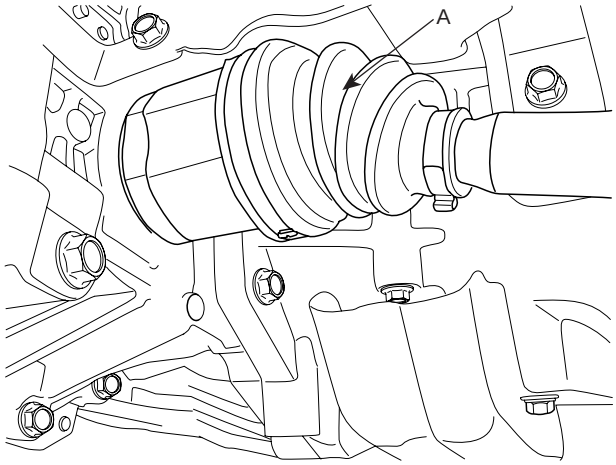
2. Install the drive plate mounting bolts (A-4ea).

TORQUE : 46-53Nm (4.6-5.3kgf.m, 33.3-38.3lb-ft)

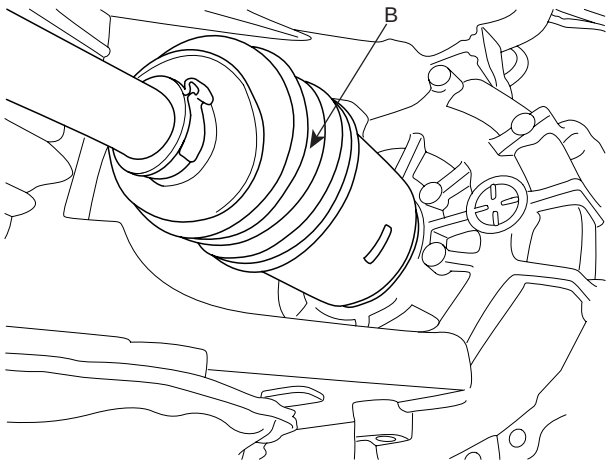


SHDAA6011D

3. Connect the drive shafts (A, B) to the transaxle.



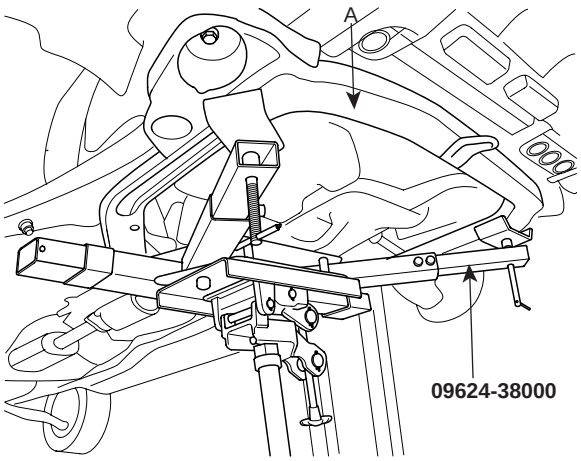
SLDAT7014D



SLDAT7015D

4. Supporting the sub frame (A) with a jack and the Special tool(09624-38000), install the mounting bolts. (refer to Stabilizer's installation in SS group).

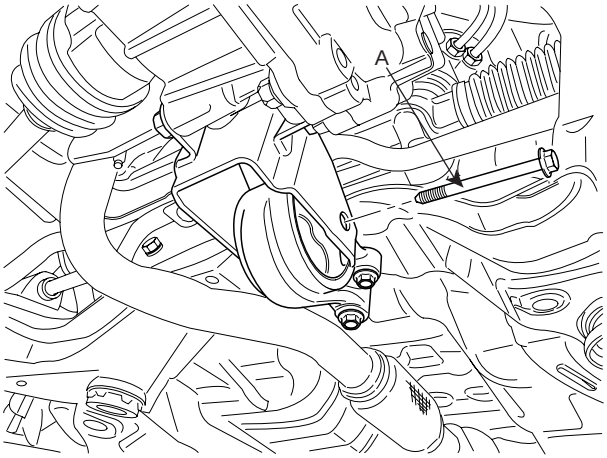
TORQUE : 140-160Nm (14-16kgf.m, 101-118lb-ft)



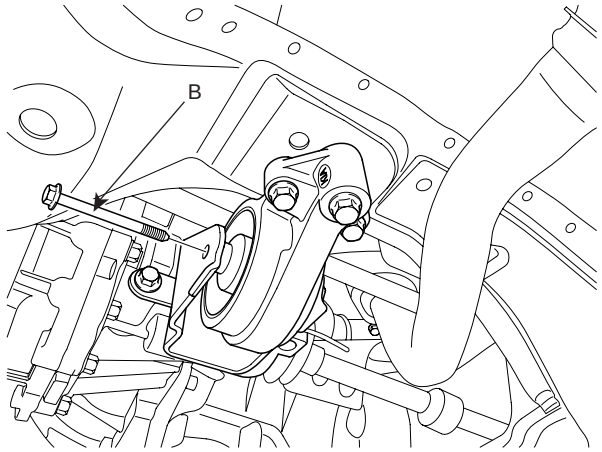
SHDAT6051D

5. Install the roll stopper mounting bolts (A, B).

TORQUE : 50-65Nm (5-6.5kgf.m, 36.2-47.0lb-ft)



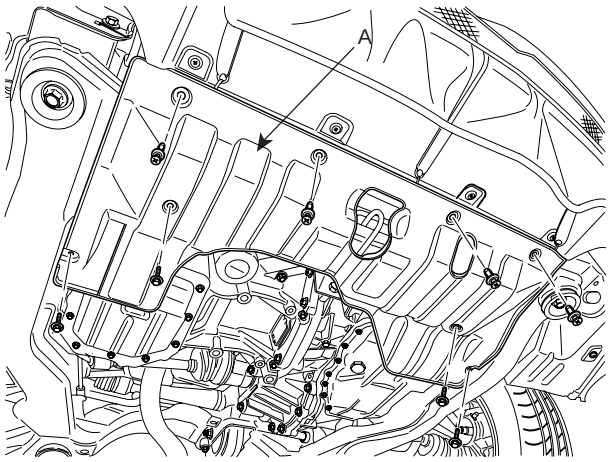
SLDAT7010D



SLDAT7011D

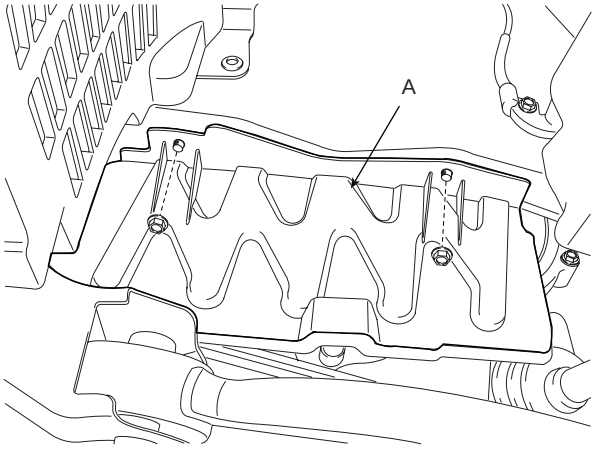
6. Install the lower arm ball joint mounting nut, the stabilizer link mounting nut, and the tie rod end mounting nut to the front knuckles. (refer to Front suspension system in SS group)

7. Install the under shield cover (A).



SLDAT7009D

8. Install the side mud cover (A).



KKNF060A

9. Install the front wheels and tires. (refer to installation in SS group)

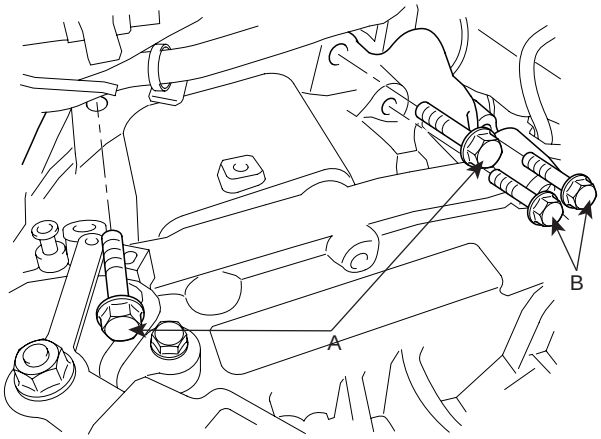
10. Install the steering joint assembly bolt. (refer to Steering column/shaft in ST group)

11. Install the transaxle insulator mounting bracket.

TORQUE : 60-80Nm (6.0-8.0kgf.m, 43.4-57.9lb-ft)

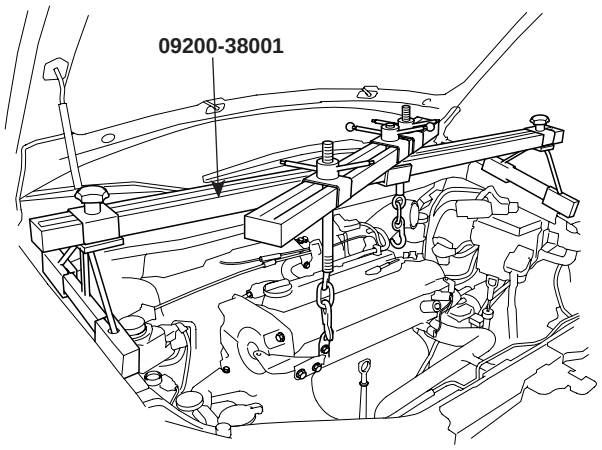
12. Install the transaxle upper mounting bolts (A-2ea) the starter motor mounting bolts (B-2ea).

TORQUE :
[A] 43-55Nm (4.3-5.5kgf.m, 31.1-39.8lb-ft)
[B] 39-60Nm (3.9-6.0kgf.m, 28.2-43.4lb-ft)



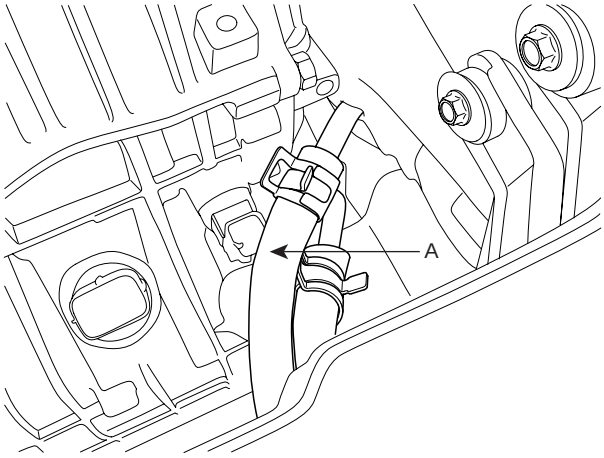
SHDAA6003D

13. Remove the special tool (09200-38001).



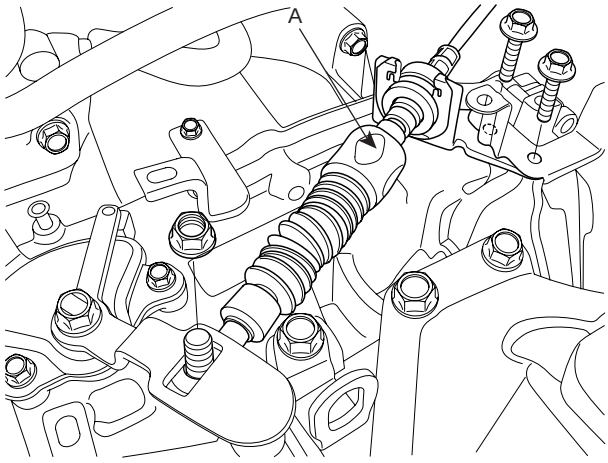
SHDAA6002D

14. Connect the transaxle oil cooler hoses (A) to the tubes by fastening the clamps.



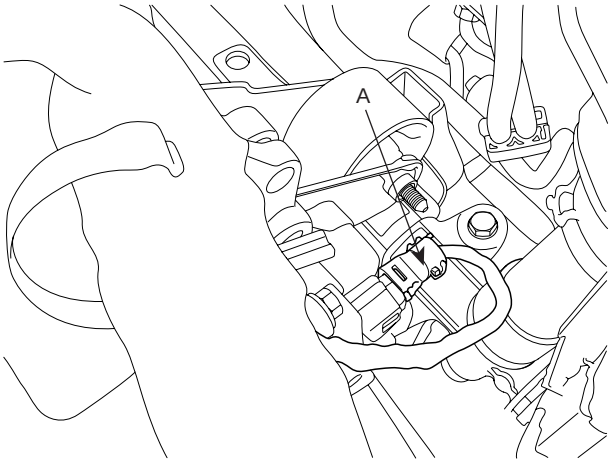
SHDAT6011D

15. Install the control cable assembly (A).



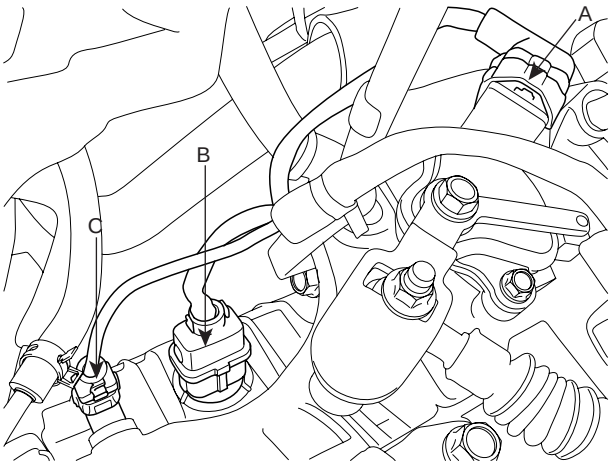
SHDAT6010D

16. Install the output speed sensor connector (A).



SHDAT6009D

17. Connect the inhibiter switch connector (A), solenoid valve connector (B) and the input shaft speed sensor connector (C).

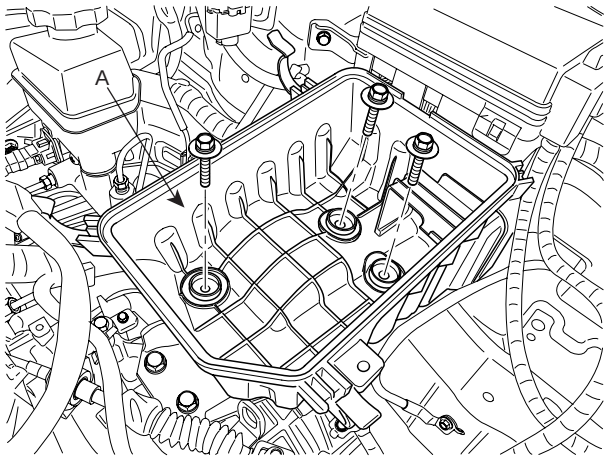


SHDAT6008D

18. Install the ground cable (A) to transaxle.

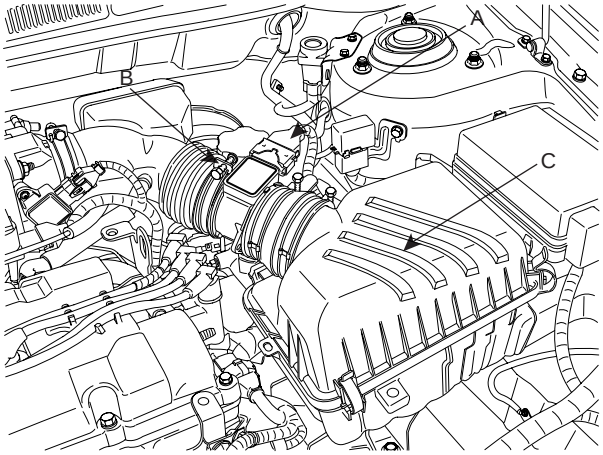
SLDAT7006D

19. Install the lower cover (A) of the air cleaner assembly.



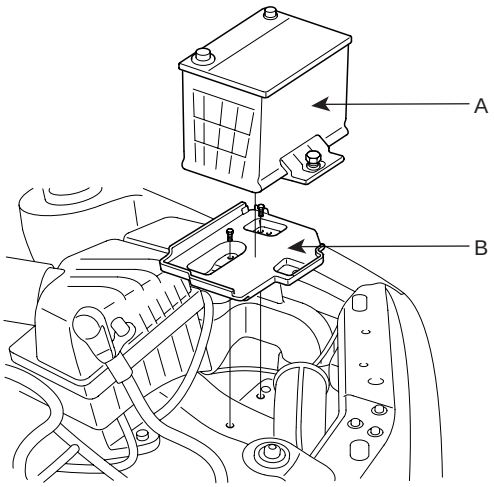
SLDAT7005D

20. Install the upper cover (C) of the air cleaner assembly and connect the AFS(Air Flow Sensor) connector (A), the clamp (B).



SLDAA7001D

21. Install the battery (A) and the battery tray (B).



SLDAT7003D

22. Install the battery heat shield (A).

23. Install the engine cover.

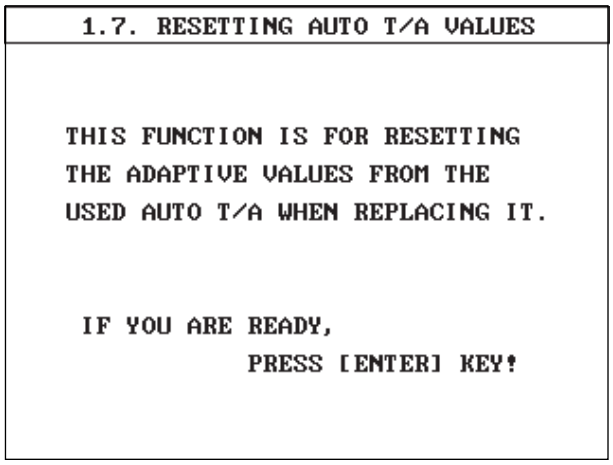
After completing the installation perform the following procedure;

- Adjust the shift cable.
- Refill the transaxle fluid.
- Clean the battery posts and cable terminals with sandpaper and grease them to prevent corrosion before installing.

NOTE

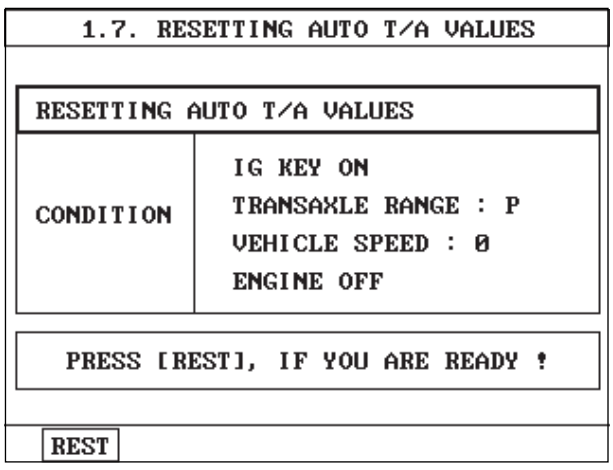
When replacing the automatic transaxle, reset the automatic transaxle's values by using the High- Scan Pro.

a. Connect the Hi-Scan Pro connector to the data link connector under the crash pad and power cable to the cigar jack under the center facia.
b. Turn the ignition switch on and power on the Hi-Scan Pro.
c. Select the vehicle's name.
d. Select 'AUTOMATIC TRANSAXLE'.
e. Select 'RESETTING AUTO T/A VALUES' and perform the procedure



SCMAT6512L

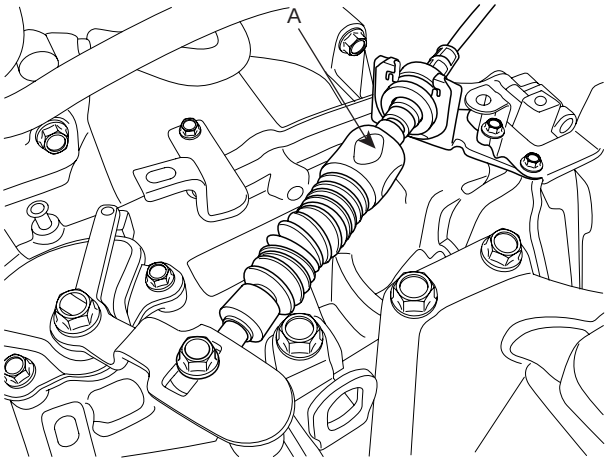
f. Perform the procedure by pressing F1 (REST).



SCMAT6513L

ADJUSTMENT E418DB24

1. Install the transaxle control cable and adjust as follows.
2. Move the shift lever and the transaxle range switch to the "N" Position, and install the control cable.
3. When connecting the control cable to the transaxle mounting bracket, install the clip until it contacts the control cable.
4. Remove any free-play in the control cable by adjusting nut and then check to see that the select lever moves smoothly.
5. Check to see that the control cable (A) has been adjusted correctly.



SLDAA7002D